

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 2 and 9, 1934.*

I.—GENERAL; PLANT; MACHINERY.

Design of town gas-fired furnaces. F. L. ATKIN (Gas J., 1934, 205, 104—107, 152—153).—A graph of flue losses in B.Th.U./cu. ft. of gas burned at various flue-gas temp. for a no. of gas-air mixtures is given and has been used to treat the subject theoretically, especially from the viewpoint of recuperation. The proportionate loss due to use of excess air increases with rise in temp. The effect of increasing the insulation is not directly proportional to the heat conservation, and an optimum thickness which is independent of the working temp. (T) is suggested. The ratio of total heat required to raise the furnace to T to the heat necessary to balance radiation losses per hr. has been calc. It decreases with T but increases with increase in insulation thickness. R. N. B.

Heating tests with iron and copper water pipes. S. ZEISSL (Z. Metallk., 1933, 25, 266—267).—When cold H_2O is kept in Fe pipes in a warm room the rate of rise in temp. is slightly $>$ when kept in Cu pipes. A. R. P.

Internal-combustion engine exhaust valve failures. C. C. HODGSON (J. Iron & Steel Inst., 1933, 127, 189—202).—Examples are given and discussed of the more common types of valve failure. Breakage is attributed to corrosion-fatigue, the corrosive medium being the hot gas. Burning and cracking at the edges of the valves appear to be caused initially by leakage of hot gases. Hence the best life should be obtained from steels having the greatest resistance to scaling, other conditions being equal. Whilst this statement is broadly true, none of the commercial valve steels is entirely immune to burning. A. R. P.

Relative surface ratio as an expression of fineness. E. W. REED-LEWIS (Concrete, 1933, 41, No. 12, 9—10).—In the analysis of sub-sieve particle-size distribution, a standard sample, prepared by a central laboratory, should be available in order to calibrate apparatus. The "surface ratio," *i.e.*, the ratio of surface to abs. vol., expresses fineness better than "sp. surface," *i.e.*, no. of sq. cm. of surface per g. The "relative surface ratio" is obtained from the ordinary granulometric analysis when the latter is expressed in terms of groups of mean particle size. T. W. P.

Construction of nomographs for the solution of formulæ. A. ALISON (Ind. Chem., 1933, 9, 429—430).—The theory of proportional charts and the method of construction and use of a chart for the solution of a formula for, *e.g.*, the flow of effluent in sewers are given. D. K. M.

Gas analysis with modified Orsat apparatus. A. C. EGERTON and F. L. SMITH (J. Sci. Instr., 1934, 11, 28).—The Orsat absorption bulbs are replaced by pipettes which supply the chemical absorbent as a fountain and so hasten the absorption process. The measuring pipette is filled with NH_2Ph , which permits more accurate readings than H_2O and also has less solvent power for CO_2 . D. F. T.

Gloss and smoothness. A. KLUGHARDT (Papier-Fabr., 1933, 31, 697—701).—The regularly reflected light from a surface, and therefore its gloss (A), depends on (I) its colour, (II) its n , and (III) the orientation of the reflecting elements in the surface; smoothness (B) depends only on (III). A method is given whereby the B of papers may be calc. from A by elimination of (I) and (II), A being measured photometrically (cf. B., 1933, 1040). D. A. C.

Measurement of gloss of transparent and translucent material. A. KLUGHARDT (Papier-Fabr., 1933, 31, 703—705).—The sample is placed over a standard BaO surface in a photometer. D. A. C.

De-airing of clay.—See VIII. **Determining dust in gases.** Ferrous [constructional] material. Ta.—See X. **H_2O -immersed air oven.**—See XIV. **Air-permeability of leather etc.**—See XV.

PATENTS.

Open-hearth furnace. I. A. BILLIAR (U.S.P. 1,905,677, 25.4.33. Appl., 2.12.31).—A regenerative, open-hearth furnace (F) is provided with burners projecting downward through the roof, forming short intense flames on the surface of the bath; waste gas is exhausted through both ends of F and led to regenerators below. The air for combustion is blown at low pressure through tubular preheaters and the chequer regenerators, the air which actually delivers the fuel being blown at a higher pressure through tubular preheaters only. B. M. V.

Open-hearth furnace. W. F. BARTHOLOMEW (U.S.P. 1,907,140, 2.5.33. Appl., 23.10.30).—A non-reversing, recuperative furnace is described; the claims relate to the angle of incidence of the flames and the shape of the roof. B. M. V.

Catalytic apparatus. A. O. JAEGER, Assr. to SELDEN RES. & ENG. CORP. (U.S.P. 1,905,719, 25.4.33. Appl., 10.6.29).—The vertical tubes of a bath-cooled catalyser are arranged in annular zones alternately containing catalyst and for downflow of cooling medium, baffles being provided so that the upflow of medium is around the catalyst tubes. B. M. V.

* The remainder of this set of Abstracts will appear in next week's issue.

Heat transfer. F. H. MORRIS, Assr. to STANDARD OIL Co. (U.S.P. 1,905,185, 25.4.33. Appl., 2.9.27).—Two fluids are caused to exchange heat through the medium of a third fluid of widely different *d*, e.g., Hg, which is showered through them in succession and recycled. B. M. V.

Heat exchanger. C. A. CROWL, Assr. to S. P. FOLTZ (U.S.P. 1,904,857, 18.4.33. Appl., 10.6.32).—A heat exchanger of the parallel double-passage type, constructed of interchangeable units, is described. B. M. V.

Utilisation of radiant-heat energy. G. EGLOFF and L. A. MEKLER, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,904,361, 18.4.33. Appl., 21.6.28).—Radiant heat from a combustion chamber is distributed over a no. of heat-absorbing surfaces (e.g., tubes carrying a fluid) by reflecting surfaces which, e.g., may be of bright metal kept cool by the entering fluid. B. M. V.

Drying equipment. W. W. SIBSON and H. H. BELCHER, Assrs. to PHILADELPHIA DRYING MACHINERY Co. (U.S.P. 1,907,220, 2.5.33. Appl., 31.3.30).—A drying tunnel is provided with walls of adjustable slats through which the drying atm. is circulated transversely, returning over heaters etc. Fresh circulating medium is admitted in the cooling zones. B. M. V.

Cooling tower. G. T. MARTIN, Assr. to FLUOR CORP., LTD. (U.S.P. 1,907,330, 2.5.33. Appl., 2.5.30).—Methods of supporting the louvres are described. B. M. V.

Rotary cooler. R. C. NEWHOUSE, Assr. to ALLIS-CHALMERS MANUF. Co. (U.S.P. 1,902,517, 21.3.33. Appl., 11.7.29).—A cooler for, e.g., a rotary cement kiln comprises a rotary cylindrical drum having outer plain and inner fluted walls, air being caused to pass in parallel both over the material and through the flutes into the adjacent kiln. B. M. V.

Anti-freeze composition for radiators and the like. J. B. McCAULEY (U.S.P. 1,902,287, 21.3.33. Appl., 3.9.31).—A jelly is made by boiling together sugar 3 lb., salt 6 lb., copperas 1 oz., HCl 2 oz., heavy oil 1 lb., and H₂O 14 quarts; the product is added to boiling H₂O. B. M. V.

Antifreezing compounds. W. E. KEMMERICH (U.S.P. 1,906,972, 2.5.33. Appl., 6.9.29. Ger., 6.9.28).—To prevent the formation of ice crystals in cooling-brines, 10–45 pts. of urea, or condensation products thereof with polyhydric alcohols, are added per 100 pts. of solution. B. M. V.

Odorant for refrigeration. F. J. DOBROVOLNY, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,905,817, 25.4.33. Appl., 2.1.30. Renewed 10.9.31).—An alkyl mercaptan (e.g., 0.5–2.0% of EtSH) is added to a hydrocarbon or halogenated hydrocarbon refrigerant. B. M. V.

Grinding mill. R. P. JUGEL, Assr. to AMER. BALL MILL Co. (U.S.P. 1,905,411, 25.4.33. Appl., 31.3.30).—Detachable linings for the head and trunnions of a ball mill are described. B. M. V.

Grinding mill. C. E. WUENSCH, Assr. to MINERALS BENEFICIATION, INC. (U.S.P. 1,905,545, 25.4.33. Appl.,

6.3.31).—A mill comprising loose balls in a rotating basin is described. B. M. V.

Rod mill. C. H. MACDONALD (U.S.P. 1,905,417, 25.4.33. Appl., 4.4.30).—A mill, especially suitable for paper pulp (*P*), has a no. of considerable openings in the periphery, is placed in a casing, and co-operates with a stationary curved apron to effect circulation and preliminary breaking of *P*. B. M. V.

Rock crusher and separator. G. A. REYNOLDS (U.S.P. 1,902,721, 21.3.33. Appl., 25.10.30).—In a disintegrator comprising hammers pivoted between discs, the hammer shafts and the discs are provided with fan blades, and intermittent currents of air are permitted to be induced through openings in the housing near the shaft which are opened and closed by reciprocating doors. B. M. V.

Pulverising, crushing, and/or breaking machines. GAS LIGHT & COKE Co., and E. E. CALVERT (B.P. 402,481, 9.6.32).—A toothed roll operating in conjunction with a yieldable breaker plate has uninterrupted longitudinal teeth inclined at 10–25° to the axis, the faces (*F*) being radial and the backs inclined at 25–45° to *F*. B. M. V.

Mill for pulverising and the like. D. Y. BRYANT (U.S.P. 1,903,166, 28.3.33. Appl., 3.8.31).—A cylindro-conical ball mill is provided with trailing openings in the periphery, which form cascades of the material and through which drying air may be exhausted. B. M. V.

Mixing machine. C. F. SCHNUCK and F. H. BANBURY, Assrs. to FARREL-BIRMINGHAM Co., INC. (U.S.P. 1,905,755, 25.4.33. Appl., 23.5.30).—A weight or ram of special form for feeding a Banbury mixer is described. B. M. V.

[Pneumatic] separator. J. B. GAFFNEY, Assr. to FULLER LEHIGH Co. (U.S.P. 1,905,458, 25.4.33. Appl., 1.3.28).—Within the cone of a cyclone separator is another cone of blunter angle and capable of axial adjustment; separate deliveries are provided from the apices of each cone. B. M. V.

Filter. V. C. NORQUIST and E. E. TREANOR, Assrs. to BUTLER MANUF. Co. (U.S.P. 1,905,738, 25.4.33. Appl., 6.6.30).—The apparatus comprises a vertical bundle of tubes, the tubes being formed of filter medium. B. M. V.

Filter. E. E. TRAFTON (U.S.P. 1,906,932, 2.5.33. Appl., 1.8.31).—The filter elements are in the form of discs of decreasing diam., held by springs in a stepped housing so that a backwash is freely passed by the lifting of the elements from the seats. B. M. V.

Filter. L. H. CLARK, Assr. to SHARPLES SPECIALTY Co. (U.S.P. 1,905,806, 25.4.33. Appl., 24.2.28).—Ultra-filter membranes are loosely fitted over porous bodies having a rigid surface. A no. of units may be threaded on a hollow outlet shaft. B. M. V.

Centrifugal apparatus. E. ROBERTS, Assr. to WESTERN STATES MACHINE Co. (U.S.P. 1,905,306, 25.4.33. Appl., 10.4.28).—A centrifuge of the basket type having bottom discharge is provided with means to open the discharge valve and admit steam to loosen the cake at the right time, i.e., when slowed down. B. M. V.

Feeding of liquids to centrifugal separator bowls. A. E. FLOWERS, ASSR. to DE LAVAL SEPARATOR CO. (U.S.P. 1,906,457, 2.5.33. Appl., 1.8.30).—The fixed feed-tube is provided with vanes to give the fluid rotation in the same direction as the bowl and at a speed which is gradually accelerated by decreasing the area of the passages. B. M. V.

Settling apparatus. J. MACD. MITCHELL (U.S.P. 1,906,916, 2.5.33. Appl., 6.6.30).—Baffles are provided in the neighbourhood of the sludge discharge of a settler, which restrict the overflow of clear liquid when sludge accumulates; the level of the feed liquid is thus raised and causes the appropriate sludge valve to open. B. M. V.

Vacuum distillation. R. E. WILSON, ASSR. to STANDARD OIL CO. (U.S.P. 1,905,201, 25.4.33. Appl., 2.1.30).—In an evaporator of the type in which a condensing surface (*C*) is closely adjacent the heated, vertical, film-evaporating surface (*E*), *C* is polished and staggered polished baffles to catch entrainment are placed between *E* and *C*. B. M. V.

Vacuum surface distillation. R. E. WILSON, ASSR. to STANDARD OIL CO. (INDIANA) (U.S.P. 1,906,033, 25.4.33. Appl., 2.1.30).—For the distillation of, *e.g.*, oils of high b.p. without cracking, the oil is passed in thin films over the outside of vertical tubes carrying hot gases. B. M. V.

Crystallisation apparatus. W. E. BURKE, ASSR. to AMER. POTASH & CHEM. CORP. (U.S.P. 1,906,534, 2.5.33. Appl., 24.10.30).—A tall vessel is provided with gentle rotational agitation, the [super-]cooled liquor admitted near the bottom, the crystal sludge drawn off through the conical bottom, and the mother-liquor overflowed at an enlarged chamber at the top which is provided with agitators and/or rakes to give a slight downward agitation and remove any sediment. B. M. V.

Production of dehydrated products. J. A. BURNER, ASSR. to AIR SYSTEMS, INC. (U.S.P. 1,905,263, 25.4.33. Appl., 2.10.30).—The liquid, *e.g.*, milk, is centrifugally sprayed into a whirling annular stream of hot air, the longitudinal motion of the two fluids being the same, but their rotations opposite. B. M. V.

Generation of vapours. H. C. HEATON (U.S.P. 1,905,283, 25.4.33. Appl., 14.1.27. Renewed 12.7.32).—Inert discrete material, *e.g.*, sand or shot, is allowed to fall downwards through chambers *A*, *B*, and *C* countercurrent to gases which are burned in *B* and cooled in *A*. The liquid is preheated in tubes in *C* which are heated by contact with the sand, further heated in tubes on the walls of *B*, and vaporised in tubes across *B*. B. M. V.

Apparatus for contacting solid and gaseous materials. E. O. BARSTOW and S. B. HEATH, ASSRS. to DOW CHEM. CO. (U.S.P. 1,905,883, 25.4.33. Appl., 13.2.30).—A tower suitable for adsorption cycles is provided with longitudinal horizontal tubes for heat-exchange medium and with transverse inverted troughs connected alternately to an inlet manifold for the gas on one side and outlet on the other. The solid reactant is stationary during the whole cycle. B. M. V.

Continuously operating dust collector. M. I. DORFAN, ASSR. to PANGBORN CORP. (U.S.P. 1,907,197,

2.5.33. Appl., 17.9.30).—The apparatus comprises a no. of groups of preliminary settlers and bag filters discharging their dust to a common conveyor. The bags are shaken and valves operated automatically to a time schedule. B. M. V.

Steam dryer or grit and dust extractor from air or gases and the like. F. K. O. MOYNAN (B.P. 402,455, 2.6.32 and 23.5.33. Addn. to B.P. 341,532; B., 1931, 370).—The apparatus described in the prior patent is constructed with the outlet at the bottom instead of at the top. B. M. V.

Heat exchanger and centrifugal dust separator, particularly for heating air by and separating dust from flue gases. LODGE-COTTRELL, LTD. From METALLGES. A.-G. (B.P. 402,693, 27.6.33).—The dirty gas is admitted through the annular spaces and the clean gas exhausted in the reverse direction through the bores of a no. of inclined double tubes. Besides the 180° change of direction the gas is caused to whirl. The air to be heated is passed around the outside of the tubular elements. B. M. V.

Apparatus for separating and grading dust particles. J. L. MUSGRAVE, and R. CRITTALL & Co., LTD. (B.P. 402,476, 7.6.32).—The dust-laden air is passed upwards through a separating chamber the inlets and outlets of which are obstructed by a no. of superposed, diminishing, annular baffles. B. M. V.

Treatment of pneumatic cleaning air. M. I. DORFAN, ASSR. to PANGBORN CORP. (U.S.P. 1,902,061, 21.3.33. Appl., 4.12.29).—Air leaving coal-cleaning plants is divided by skimming into about $\frac{1}{3}$ heavily dust-laden (*D*) and $\frac{2}{3}$ fairly clean (*C*). *C* is returned to the blowing fan and *D* subjected to efficient filtration and exhausted to atm., being replaced by air drawn from elevators etc. to keep them under vac. B. M. V.

Storing, measuring, and proportioning semi-fluent materials. C. B. THORNE (U.S.P. 1,906,664, 2.5.33. Appl., 18.11.29).—The individual bins are circular towers with rotating rakes on the bottom which are brought into action if the material refuses to "run"; the measuring devices are of the adjustable radial-compartment type and discharge on to a common conveyor or series of conveyors. B. M. V.

Treatment of gases. C. T. BUFF, ASSR. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,905,993, 25.4.33. Appl., 26.8.31. Ger., 29.8.30).—The gases are admitted vertically downwards and caused to reverse upon the surface of a liquid bath; they are then electrically cleaned in the annular space surrounding the inlet conduit, the electrodes being washed by sprays, those for the live electrodes being interconnected with a switch so that when the sprays are on the current is off. B. M. V.

Charging of compressed [dissolved] gas cylinders. R. G. WULFF (U.S.P. 1,906,035, 25.4.33. Appl., 22.9.28).—The cylinder is charged with a solution of gas in a liquid which is very cold and under high pressure. Preferably the solvent remaining from the last charge is completely evacuated by heating and the passage of another gas. B. M. V.

Treatment and utilisation of gases and equipment therefor. W. A. DARRAH (U.S.P. 1,906,447,

2.5.33. Appl., 2.1.30).—Combustion gases (containing acid-forming substances) are slowly cooled, preferably in contact with metal surfaces, with the object of forming a large proportion of the lower oxides of impurities, e.g., SO_2 , even though the atm. is an oxidising one; the acids are afterwards absorbed in basic material.

B. M. V.

Protection of polished surfaces. INTERNAT. LATEX PROCESSES, LTD. (B.P. 403,902, 21.7.33. U.S., 30.7.32).—Highly polished surfaces, e.g., of metal, wood, etc., are covered with a temporary protective coating, such as of crinkled paper, secured by a non-tacky deposit of rubber applied as an aq. dispersion.

D. F. T.

Polariscope tube. C. H. NINEGAR (U.S.P. 1,907,363; 2.5.33. Appl., 27.5.31).—A method of holding the transparent disc at the end of the sample tube is described.

B. M. V.

Crystallisation of substances. H_2O softening.—See VII. Pptn. of particles from gases.—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Assessing the value of gas coals. R. A. MOTT (Gas J., 1934, 205, 33—34, 88—90).—Gas coals should give a large yield of volatile matter of high calorific val. and have moderate swelling power. The C and H contents of a no. of coals have been correlated with swelling power (Sheffield method), calorific val., and thermal yield per ton. Coals for use in horizontal retorts should contain C 85—86%, H 5.5% on an ash-, H_2O -, and S-free basis. In steamed vertical retorts a gas of higher calorific val. is required, to counteract dilution by water-gas, and in this case an optimum C content is 87%. Assessment by volatile matter content alone is misleading. The heats necessary to evaporate 1% of moisture in the coal and to "carbonise" 1% of ash have been calc.; these are approx. equal for horizontal retorts, but in the ratio 1:2 for vertical retorts. Extra heat is lost on account of removal of coke in the pan ash, and allowing for this the ratios become 1:2 and 1:5. It is therefore suggested that a premium price should be paid for coals of low ash content.

R. N. B.

Evaluation of coals for gasworks purposes. N. HESSLER (Gas- u. Wasserfach, 1933, 76, 881—887, 899—905).—The use of laboratory measurements, now available, of swelling pressure, agglutinating val., and thermal yield of gas, in assessing the val. of coals for both gas and coke manufacture is discussed. A distillation test of a charge weighing 1 kg. is described. Results are given for Westphalian, Silesian, and English coals, and are correlated with a study of the banded constituents of the coals. This is considered of greater importance in connexion with the manufacture of coke than of gas.

H. J. H.

Proposed simplification of the Parr unit coal formula. G. THIESSEN (Fuel, 1933, 12, 403—411; cf. B., 1910, 616).—Coal calorific vals. on a mineral-free basis, calc. by using a val. for the mineral matter content given by $1.08A + KS$ (A = ash, S = S, and K varies from 0.14 for lignites to 0.23 for semi-bituminous coals), agree with the vals. obtained by the Parr unit coal calorific val. formula. For practical purposes

the use of the val. $K = 0.21$ gives results well within the experimental error. The same method cannot be applied successfully to the Parr formulæ for calculating unit fixed C or unit volatile matter.

A. B. M.

Experimental blending of coals. R. W. PERRY (Gas World, 1934, 100; Coking Sect., 5—10).—The usual methods of testing the quality of coke that would be produced from a given coal in the coke oven, viz., large-scale, bag, and box tests, are not recommended. An experimental oven holding 500 lb. of coal, used by the Midland Coke Research Committee, is preferred and described. The following procedure is used. (1) The crushed coal is carbonised at varying rates of heating, carbonisation being completed in 12—26 hr. in the experimental 18-in. oven. (2) The coal is then mixed with varying amounts of fusain (I) starting with $\frac{1}{2}$ or 1% and increasing by 1% in each successive mixture. Charges are carbonised until an optimum shatter figure is obtained, generally with < 5% of fusain. (3) A third series of tests is then performed by using substitutes for (I), generally coke dust.

G. E. F.

Determination of volatile constituents of coal by Doliński's and by the American method. J. PFANHAUSER and C. FIJALKOWSKI (Przemysł Chem., 1933, 17, 271—273).—The vals. obtained by Muck's method are 1.45% higher for coking coals and 1% higher for non-coking coals than are those given by the method of Doliński and Drozdowski; the latter method is the more reliable.

R. T.

Physico-chemical phenomenon of the wetting resistance of peat towards water. M. V. TSCHAPEK (Kolloid-Z., 1934, 66, 91—95).—The resistance of dry peat to wetting by H_2O is due, not to the content of waxy and resinous substances, but to a film of adsorbed air. Wetting occurs readily when the film is removed.

E. S. H.

Some factors influencing maintenance costs of carbonising plants. T. C. FINLAYSON (Gas J., 1934, 205, 148—151).—The maintenance cost (C) of continuous vertical retorts is approx. 9.25d. per ton of coal carbonised, i.e., 4% per year of the capital cost of the plant. Regular coal travel, level gauge on the offtake, continuous working, and control of the temp. in the combustion flues all lower C . Spalling of SiO_2 has been attributed to scurfing, but is probably due to the high temp. gradient in the top portion of the retort wall. Production of a gas of high calorific val. increases the life of the retort, and the addition of > 25% of steam should be avoided.

R. N. B.

Coke formation. XI. Formation of coke. R. A. MOTT (Fuel, 1933, 12, 412—418; cf. B., 1934, 49).—The evidence in favour of the "wetting theory" of coke formation (cf. B., 1933, 849) is reviewed. The microscopical appearance of pellets which have been formed by briquetting powdered coal under pressure (3 tons/sq. in.), and have been subsequently heated to successively higher temp. within the plastic range, shows that actual surface flow can be produced in coal.

A. B. M.

Manufacture of household coke in coke ovens. H. O. H. CERCKEL (Gas J., 1933, 204, 831—833).—Satisfactory domestic coke can be produced in coke ovens only by medium-temp. (700—750°) carbonisation. This

necessitates the use of narrow ovens (7—9 in.) to lessen the coking time and give an economic throughput. The Bruay plant and the Lecocq coke oven are described.

R. N. B.

Pneumatic cleaning of gas coke. G. W. H. HOLMES (Gas J., 1933, 204, 827—830).—Raw coke is fed on to a triangular, perforated, metal sheet which is reciprocated on inclined toggle plates in the direction of its length. Air is blown through the holes in the plate, and the dirt is trapped by diagonal steel strips and removed at one end. Material of intermediate d is recirculated, giving a sharp separation of coke and dirt. The air after use is passed through a cyclone separator and bag filter to remove dust. The ash content of an unscreened coke was reduced from 12.4% to 8.3% and the H_2O content slightly decreased. The % ash in cleaned coke increases with decrease in particle size. The process working with closely-sized coke can effect a separation into light combustible coke and heavy coke of low porosity.

R. N. B.

Vertical retorts [in gas manufacture] and their maintenance. D. W. REES (Gas World, 1933, 99, 625—627).—Working conditions for the attainment of optimum results, and detailed figures of an 8-day test are given.

R. N. B.

Graphical control of gas producers. WA. OSTWALD (Feuerungstech., 1933, 21, 81—84; Chem. Zentr., 1933, ii, 1456).—Data relating to the reactions (a) $C + O_2 = CO_2$; $C + 2H_2O = CO_2 + 2H_2$ and (b) $2C + O_2 = 2CO$; $C + H_2O = CO + H_2$ are expressed graphically.

A. A. E.

Removal of sulphur from gas. A. THAU (Gas- u. Wasserfach, 1934, 77, 33—35).—Gas is purified from H_2S by passing it through a tower packed with Fe_2O_3 shaped in porous balls of diam. 2.5—3.0 cm. The gas velocity can be increased to 20 times that when using finely-divided oxide in box purifiers, and the amount of Fe_2O_3 per cu. m. of free space is increased from 300 to 700 kg. When saturated, 45% of pure S is obtained by oxidation and solvent extraction. A plant for treating 10^5 cu. m. per day needs a ground space of only 25 sq. m., and after allowing credit for the S produced the purification costs are estimated to be 19 pf. per 10^3 cu. m.

R. N. B.

Nitric oxide in coke-oven gas. F. SCHUSTER (Brennstoff-Chem., 1933, 14, 469—470).—The literature is summarised.

A. B. M.

Prevention of ignition of firedamp by the heat of impact of coal-cutter picks against hard rocks. M. J. BURGESS and R. V. WHEELER (Safety in Mines Res. Bd., 1933, Paper No. 81, 14 pp.).—The ignition of firedamp can be prevented by the continuous discharge into the "holing" (H) of a sufficient quantity of CO_2 . It is suggested that this, obtained in the form of "Drikold" (I), be stored in a liquefier mounted on the frame of the coal-cutter and discharged into H through a pipe attached to the jib. A discharge rate of 1.5 cu. ft./min. was found necessary, representing a consumption of 11 lb. of (I) per hr.

E. S.

A stationary flame and its utilisation. M. KUROKAWA (J. Fuel Soc. Japan, 1933, 12, 125—128).—The conditions to be fulfilled for the maintenance of a steady

stationary flame are discussed and a mathematical relation existing between the variables is deduced. This relation, when tested experimentally, was found to hold within certain limits. With gas supplied at a const. pressure to a given orifice the calorific val. can be determined by measuring the length of flame. Vals. determined in this way are compared with those determined calorimetrically. Fair agreement is obtained with gases rich in hydrocarbons, but not with those containing much H_2 or N_2 .

E. S.

Asphalt emulsions. G. WEISS (Allgem. Oel- u. Fett-Ztg., 1933, 30; Mineralöle, 6, 623—628).—Patents concerning the composition of various types of asphalt emulsions are reviewed, and details of a scheme of analysis are given.

E. L.

Behaviour of motor spirit towards sulphuric acid and the determination of individual hydrocarbon groups. E. WENDEHORST and E. KNOCH (Angew. Chem., 1934, 47, 43—47).—Exact measurements are recorded of the behaviour of various constituents of motor spirits towards H_2SO_4 . C_6H_6 (I) is completely sulphonated by 100% H_2SO_4 in 1 hr. Some benzine (II) is dissolved by the mixture of H_2SO_4 and sulphonated (I), and this can be either corr. for or prevented by the addition of 10% of C_6H_{12} , which does not affect the sulphonation. Amylene (III) is partly sulphonated and partly polymerised; the proportions polymerised under various conditions are tabulated, and the amount of polymerised (III) may be determined by distilling up to the end b.p. of the original mixture. (I) diminishes the loss of (II) during sulphonation.

A. G.

Acid content of aged mineral oils. E. VELLINGER and A. KLINKENBERG (Ann. Office nat. Combust. liq., 1933, 8, 301—312; Chem. Zentr., 1933, ii, 1458—1459).—The acid content of slightly or moderately refined oils, determined with the Sb electrode, increases only slightly during ageing; that of over-refined oils increases considerably. The sludge consists of free acid and saponifiable substances. Acid vals. are affected by the velocity of determination, depending on the saponifiability of constituents of the aged oil.

A. A. E.

Determination of flash point. BAADER (Allgem. Oel- u. Fett-Ztg., 1933, 30; Mineralöle, 6, 613—623).—The author's objections to the (Marcusson) open-crucible test are summarised and a new apparatus (fitted with electrical heating and fixed electrical ignition device etc.), which is used to determine the "true" ignition point under atm. pressure, *i.e.*, the min. temp. at which it is possible to ignite the oil vapour even under the most favourable conditions (suitably regulated current of O_2), is described.

E. L.

Artificial ageing of lubricating oils. S. FACHINI and F. SPORER (Giorn. Chim. Ind. Appl., 1933, 15, 553—554).—The artificial ageing test suggested consists in heating the oil at 150° in the air in a resistant porcelain dish of definite dimensions, and treating the cooled product with normal benzene to determine insol. matter. This test divides oils into four fundamental types: (1) oils which give a deposit after 15 hr. and increasing quantities later; (2) those which form a deposit only after 75 hrs. heating; (3) oils which yield, comparatively quickly, a small ppt., which subsequently increases in

amount very slowly; (4) those which, after 150 hr., give little deposit but thicken owing to evaporation of their lighter constituents and later harden to asphalt consistency. Oils of type (3) are often better than those which yield a deposit only after more prolonged oxidation. In conjunction with the acid, sap., and I vals. etc. of the artificially aged product, the above test is found useful in the evaluation of lubricating oils. T. H. P.

Colloidal graphite lubrication. (A) E. W. STEINITZ, (B) H. KARPLUS (Petroleum, 1933, 29, No. 48; Motorbenz., 6, 4—8).—(A) The assumption of the formation of an adsorbed layer of graphite (I) on polished bearing surfaces lubricated with oils containing colloidal (I) is criticised. (B) Polemical. A. B. M.

Economic working-up of residues containing paraffin wax. R. FÜSSSTEIG (Allgem. Oel- u. Fett-Ztg., 1933, 30; Mineralöle, 6, 628—635).—An economical system of processing, employing the Henderson-Gröling cylindrical sweating chambers, is described. E. L.

Town gas-fired furnaces.—See I. Hydrogenation cracking of naphthols.—See III. Mineral-asphalt mixtures.—See IX. Coke for blast furnaces.—See X. Oil-resisting rubber.—See XIV. Adsorbents from starch etc.—See XVII.

PATENTS.

Manufacture of fuel briquettes. A. ROBERTS (A. A. ROBERTS) (B.P. 402,107 and 402,139, 23.2.32).—(A) Solid carbonaceous material, e.g., coal, coke, sawdust, is pulverised to pass a screen of between 25- and 100-mesh, is mixed with $\geq 5\%$ of hydraulic cement or other inorg. bonding material (B) and with an amount of H_2O which is equal in wt. to the added cement if the pulverised fuel will just pass 30-mesh, but which is increased in direct proportion to the mesh of the screen as the fuel increases in fineness, and the mixture is briquetted. A small amount, e.g., 0.5%, of NaCl and/or H_3BO_3 may be added with advantage to the mixture to be briquetted. The components are mixed at 80—120° if the fuel is free from org. B, but at a higher temp. (< 200°) if it naturally contains such material. (B) An org. B, e.g., pitch, may be added to the mixture, in amount $\geq 7\%$ of the total; in this case the amount of H_2O used is $1\frac{1}{4}$ times the total wt. of B when the fuel will just pass 30-mesh and greater in proportion as the fuel increases in fineness. A. B. M.

(A) Rendering fuel briquettes hard and smokeless. (B) Oven for carbonising coal briquettes. H. F. MAUREL, Assr. to MAUREL INVESTMENT CORP. (U.S.P. 1,908,910—11, 16.5.33. Appl., [A] 31.12.29, [B] 31.3.30).—(A) The briquettes are heated to drive off the H_2O and the more volatile oils, leaving the heavier fractions to serve as a binder; they are then cooled sufficiently to cause the gases contained within them to contract, and are subjected to the action of air or O_2 . (B) The briquettes (I) are loaded into the buckets of an endless conveyor (C) which passes through a H_2O -seal into the carbonising oven (O), wherein it passes horizontally back and forth from one end to the other at successively lower levels until it reaches the bottom. Hot combustion gases are supplied to a system of horizontal pipes lying between the sections of C, the gases

being introduced at the top of O so that (I) are subjected to a high temp. when they first enter, and to a falling temp. as they pass down O. At the lower part of O and separated from the carbonising zone by horizontal partitions and pivoted sealing-plates are cooling and hardening zones, traversed by cooling gases to which air may be added. C leaves the oven through a pivoted outlet door, the provision of a H_2O -seal being unnecessary. A. B. M.

Production of carbonised fuel briquettes. W. C. CARPENTER (U.S.P. 1,908,689, 16.5.33. Appl., 30.1.29).—Finely-divided vegetable material is moulded and the briquettes (I) are forced through an externally-heated tube (T). Pointed projections on the interior surface of T cut grooves in the sides of (I) which permit the ready escape of volatile matter therefrom; a series of such projections is provided in order to maintain the grooves free from accumulations. The volatile products evolved pass through apertures in the walls of T. The carbonised (I) are cooled in a continuation of T, and are then discharged. A. B. M.

Treatment of coal with oil. H. J. ROSE and W. H. HILL, Assrs. to KOPPERS CO. OF DELAWARE (U.S.P. 1,905,060, 25.4.33. Appl., 12.4.29).—Water-gas tar is heated with approx. 10% of S and 25% of coal to approx. 320° with gradual reduction to 200°, under pressure, which is finally reduced to atm. by releasing the H_2S ; the dehydrogenated tar will then have dissolved the coal. B. M. V.

Distillation of solid carbonaceous materials and apparatus therefor. BRIT. COAL DISTILLATION, LTD., and C. MACHEN (B.P. 401,767, 30.5.32. Cf. B.P. 324,212; B., 1930, 310).—Coal, lignite, etc. is carbonised in an inclined rotary retort (R) comprising an outer cylindrical shell containing a no. of tubular compartments (C) through which the material passes in counter-flow to heating gases which pass both externally and internally of C. C are shorter than is the external shell of R, so that a chamber of the full diam. of R is formed at the gas-inlet end thereof. The hot gases from the stationary combustion chamber pass into the chamber at the end of R and are then subdivided into two streams, one passing through and the other around the C containing the fuel. The ratio in which the gases are so subdivided is controlled by the valves and fans at the other (upper) end of R where the two streams are withdrawn separately. Provision is made for utilising part of the exhaust gases from the indirect heating system for drying and preheating the incoming charge of fuel. A. B. M.

Destructive distillation of resinous wood with superheated steam. R. FRYE (U.S.P. 1,909,397, 16.5.33. Appl., 28.7.31).—The wood is charged into a retort (R) which is first heated to about 100°; superheated steam at 260—425° is then passed through R, which is simultaneously heated externally until the temp. of the interior reaches 400—510°. These conditions are then maintained until all the volatile resinous constituents of the wood have been removed. A. B. M.

Coking retort ovens. J. VAN ACKEREN, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,908,464 and

1,908,576, 9.5.33. Appl., [A] 26.4.30, [B] 20.7.28.—(A) The oven chambers and heating walls (*W*) of a horizontal coke-oven battery are supported by a single wall beneath each of the *W*. The space between each pair of supporting walls is occupied by two cross-regenerators, each extending half the width of the battery, and so connected that the regenerators (*R*) on one side operate for inflow while those on the other side operate for outflow. Each *R* communicates with all the flame flues (*F*) of one *W* by means of a horizontal flue. The *F* of adjacent *W* are connected in pairs for operation in series. The connexions of the horizontal flues are so arranged as to prevent counterflow between fuel gas and air in adjacent portions thereof. (B) Each *W* of a vertical coke-oven battery has an upper and a lower series of vertical *F* connected at their respective upper and lower ends by horizontal flues. The horizontal flues of each series in one wall are connected to the corresponding flues of an adjacent *W* in such a manner that each pair of associated *W* has two independent heating systems. *R* connected to the respective heating systems are arranged in two superposed rows along one side of the battery. A. B. M.

(A) **Coking of coal.** (B) **Preparation of coal for carbonisation.** S. W. PARR and T. E. LAYNG, Assrs. to URBANA COKE CORP. (U.S.P. 1,907,568—9, 9.5.33. Appl., [A] 21.1.29, [B] 25.2.29. Cf. U.S.P. 1,754,765; B., 1931, 232).—(A) The coal is dried and preheated, *e.g.*, in rotary drums, to a temp. just < that at which it first softens and at which the carbonisation reactions begin to be exothermic, and is then charged into ovens to which sufficient heat is supplied to raise the temp. of the coal rapidly through the plastic range to a final temp. of about 950°. (B) The coal is preheated by passing superheated steam in direct contact therewith; the exhaust steam and gases from this stage of the process are utilised for drying the coal in the preceding stage by bringing them in indirect contact therewith. Suitable apparatus is described. A. B. M.

Coking of coal. S. W. PARR and T. E. LAYNG, Assrs. to URBANA COKE CORP. (U.S.P. 1,909,421, 16.5.33. Appl., 29.1.25; cf. preceding abstract).—The coal is preheated to just below the crit. temp. in an inclined cylinder provided with a screw for simultaneously tumbling and advancing the material so as to ensure uniform heating thereof. It then falls into a heat-insulated reservoir, whence it is discharged intermittently, as required, into the retorts (*R*). *R*, which are preferably vertical, and cylindrical or slightly coned in shape, are preheated to about 750°, and the fuel is supplied thereto at such a rate that the initial temp. at the centre of the charge is approx. equal to the crit. temp.; sufficient heat is supplied to *R* to complete the coking of the coal. Uniform heating of *R* is effected by using hot gases to heat a refractory wall which in turn radiates heat to *R*; the gases are then led into direct contact with *R* and are finally discharged into the heating chamber surrounding the preheating device. A. B. M.

Production of [low-temperature] coke. F. PUENING (U.S.P. 1,905,055, 25.4.33. Appl., 7.4.28).—In a low-temp. retort comprising a rotating member which

is heated at one part of its revolution and effects distillation of the coal at another part, the boundary between the two zones is sealed by previously made coke. B. M. V.

Apparatus for distillation of carbonaceous liquids. C. R. FABEN, Assr. to H. G. JENNISON (U.S.P. 1,907,767, 9.5.33. Appl., 3.2.30).—Distillation is effected by passing hot combustion gases from a furnace (*F*) through the liquid. The still (*S*) has a heat-insulating wall, in the upper part of which is a manifold to which the hot gases are supplied. They pass thence down vertical passages in *W*, to radial inlets, and into *S*. Means are provided for supplying air under pressure to *F* and for withdrawing the gases from *S* under partial vac., whereby the rate of flow of the gases and therefore their composition can be controlled. The bottom of *S* forms a door which can be opened to allow a solid residue to be discharged. A. B. M.

Treatment of hydrocarbons. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,908,133, 9.5.33. Appl., 16.9.27).—Bituminous coal (*C*) is destructively distilled by external heating under non-burning conditions at a temp. adequate to produce incondensable gas and coal-tar vapours (*V*), which are separated; at least portions of each are forced upwardly through *C*, which is maintained at a temp. sufficiently high to decompose the returned *V* substantially into coke and gas, the latter being collected. H. S. G.

Apparatus for gasification of finely-grained moist fuels. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 401,463, 1.9.32).—The process of B.P. 214,544 (B., 1924, 549), wherein the fuels to be gasified are maintained in movement similar to that of a boiling liquid, is made suitable for use with moist fuels by causing the fuel to slide down into the producer over a sloping surface which is flushed by the hot gasification products. A. B. M.

Manufacture of carbon black. H. D. ELKINGTON. From N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 402,322, 12.4.33).—A hydrocarbon gas or vapour is passed through a sheet of live flame and then through a closely adjacent layer of incandescent chequerwork. The mixture of C and gas so formed is rapidly cooled by admixture with some of the gas, which has been passed through a refrigerator, and is then passed to a separator and collector. A. B. M.

Manufacture of transmitter carbon. H. H. LOWRY, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 1,907,843, 9.5.33. Appl., 11.3.30).—Anthracite is crushed, screened, and washed, and then heated in a reducing atm., *e.g.*, in an electrically-heated, inclined, rotary furnace, whereby the volatile matter is removed and the Fe compounds are reduced to Fe. The particles of higher Fe content are then removed, by means of a magnetic separator, to leave a product of Fe content > 0.14%. A. B. M.

Removal of engine carbon. C. J. LIVINGSTONE and S. P. MARLEY, Assrs. to GULF REFINING CO. (U.S.P. 1,909,200, 16.5.33. Appl., 14.7.30).—The C deposit (I) is treated with a penetrating and film-forming composition, *e.g.*, a solution of pyroxylin (II), the film is allowed

to form, and this is removed together with the loosened C. The (II) is preferably dissolved in a mixture of the usual solvent used therefor, *e.g.*, EtOH and EtOAc or COEt₂, with another solvent capable of penetrating and softening (I), *e.g.*, PhCl or C₂H₄Cl₂. A. B. M.

Apparatus for making [fuel] gas. W. G. LAIRD, Assr. to HEAT TREATING Co. (U.S.P. 1,906,470, 2.5.33. Appl., 30.1.29).—Coke (*A*) is converted into producer gas (*B*) in a central producer (*P*) and the hot *B* is passed first through chequerwork (*W*) surrounding the upper part of *P* and then downwardly through coal (*C*) in adjacent vertical retorts (*R*), whence the mixed gases pass to market. Later, steam is passed upwards through the carbonised coal (*D*) and the partly reduced water-gas through *W* and *P*, the finished water-gas being also marketed. *D* now being cool is replaced by fresh *C*, and *A* is made up with *D*. B. M. V.

Apparatus for dehydrating gas. F. W. SPERR, JUN., Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,905,068, 25.4.33. Appl., 30.12.30).—Fuel gas is compressed, cooled by direct contact with H₂O (*T*₁) from a cooling tower, and passed in direct contact with cooled brine (*B*) in a scrubber which also has coils cooled by *T*₂. Part of *B* is evaporated to maintain its concn. and cooled indirectly by *T*₃. *T*₁, *T*₂, *T*₃ are all returned to the tower. B. M. V.

Treatment of gas. A. R. POWELL, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,905,053, 25.4.33. Appl., 5.8.31).—Fuel gas, freed from tar, NH₃, and other impurities, is compressed and cooled and the oil mist removed by electrical pptn., the mist including the gum-forming constituents. B. M. V.

Separation of acetylene. AIR REDUCTION Co., INC., Asses. of F. J. METZGER (B.P. 401,531, 27.1.33. U.S., 11.2.32).—Gaseous mixtures containing C₂H₂ are scrubbed with an alkyl carbonate, whereby the C₂H₂ is selectively absorbed. It is subsequently recovered by heating the liquid. A. B. M.

Detecting the presence of combustible gases or vapours. J. MALECKI (B.P. 402,011, 23.6.33. Poland, 23.6.32).—The air etc. to be tested is passed through a tube containing a suitable catalyst or oxidising agent (*e.g.*, hopcalite for detecting CO in air) and the change in temp. due to combustion is shown by using a suitable multiphase system, *e.g.*, Et₂O or C₅H₁₂ in equilibrium with its vapour, the change of pressure in which actuates an indicator. Thus the Et₂O and vapour may be enclosed in two bulbs, which may be arranged in the current of air, one before and the other after contact with the catalyst, the bulbs being connected to the arms of a U-tube containing Hg, movement of which makes or breaks an electric circuit. A. B. M.

Distillation of gas liquor. H. KOPPERS, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,905,108, 25.4.33. Appl., 16.3.31. Ger., 15.6.29).—After distillation of the free NH₃ the liquor is freed from PhOH, C₅H₅N, etc. by injected steam, the vapours being cycled through a stripping column and re-injected, the liquor made alkaline with, *e.g.*, CaO, and the fixed NH₃ distilled off. B. M. V.

Treatment of residual tars. J. KUHL and W. H. SHIFFLER, Assrs. to STANDARD OIL Co. OF CALIFORNIA

(U.S.P. 1,909,587, 16.5.33. Appl., 23.5.28).—Residues resulting from the treatment of petroleum oils with AlCl₃ are sprayed into the top of a vertical retort (*R*) down which they fall countercurrent to a stream of hot combustion gases. The powdered carbonised product is withdrawn from the bottom of *R*. The gases and vapours pass to a condensing and scrubbing system. Means are provided for circulating liquid from the upper portion of the settling chamber, in which the condensed products collect, through a cooler and into the scrubbing tower. A. B. M.

Bituminous emulsion. O. R. DOUTHETT, Assr. to BARBER ASPHALT Co. (U.S.P. 1,905,630, 25.4.33. Appl., 31.8.28. Renewed 7.9.32).—The dispersing medium is sulphonic sludge (from petroleum refining) treated to remove sol. alkaline-earth salts and over-neutralised to p_H 12.0–13.0. B. M. V.

Production of pitch. G. E. McCLOSKEY, Assr. to BARRETT Co. (U.S.P. 1,907,078, 2.5.33. Appl., 19.10.28).—Coal-distillation gases are cooled to form a suspension of H₂O and tarry matter which is removed by electrical pptn. and heated at < 150° in the base of the precipitator to return H₂O to the gas stream. B. M. V.

(A, B) **Coking and (A) gasification of hydrocarbons.** A. S. KNOWLES and C. W. ANDREWS, Assrs. to TAR & PETROLEUM PROCESS Co. (U.S.P. 1,906,863—4, 2.5.33. Appl., [A] 20.10.27, [B] 5.3.29).—(A) Hydrocarbon residues, pitch, etc. are distilled in an apparatus wherein the liquefied material, in the form of a thin film, is heated in a current of gas and/or steam. Thus the material may be caused to flow on to a quantity of coke supported in a cylindrical basket (*B*) which rotates in a chamber (*C*) heated from below. Gas or steam is circulated through *C*. After flowing through the coke, the material, while still liquid, falls on to the floor (*F*) of *C* whereon it is coked. (B) *C* may consist of two parts—a smaller, upper part containing the rotating *B*, and a lower part having an extended *F* heated from below. The supply of material and the heat supply to *F* are so adjusted as always to maintain a layer of liquid material above the layer of coke on *F*. The supply of material is periodically stopped until coking of this layer is complete; the coke is then removed and the process recommenced. A. B. M.

Cracking of hydrocarbons by heating under pressure in the liquid phase. C. STILL (B.P. 401,508, 19.12.32. Austr., 17.12.31).—Oils are heated under pressure in a pipe coil (*C*) and are then expanded into a vessel (*V*) above which is mounted a fractionating column. The raw material is also fed into *V* wherein it is distilled. Pitch is withdrawn continuously from *V*, whereas the vaporised oils are fractionated to give benzene and higher-boiling oils. The latter (pitch-free) oils are alone passed into *C* for cracking. A. B. M.

Conversion of hydrocarbon oils. TEXACO DEVELOPMENT CORP. (B.P. 401,694, 17.5.32. U.S., 16.5.31).—A condensate oil is heated to a high cracking temp. under pressure and passed to a reaction chamber where it is cooled by contact with fresh oil at a lower temp. and where separation into liquid and vapour occurs. The vapours are passed to one or more digestion zones

in which they are maintained at a cracking temp. and in the final one of which they are scrubbed with cooled condensate oil. They then pass to a fractionating zone in which a final light distillate is separated out, leaving a reflux condensate which provides the condensate oil used as starting material. H. S. G.

Conversion of hydrocarbon oil into motor and marine fuel. S. SWARTZ, Assr. to JENKINS PETROLEUM PROCESS CO. (U.S.P. 1,913,619, 13.6.33. Appl., 7.11.29).—To a heavy asphaltic hydrocarbon oil is added powdered $\text{Ca}(\text{OH})_2$ (100% passing 100-mesh; 25–50% passing 325-mesh) in the proportion of 0.5–0.75 lb. per barrel of oil, and the mixture is cracked to obtain vaporous products and an unvaporised residual oil (*R*), containing suspended particles of CaO and associated *C* readily separable by settling; *R* is separately withdrawn and distilled in a zone under vac., to remove lighter constituents. The remaining oil is removed to a zone where the suspended particles are allowed to settle out, leaving a clarified product, substantially free from *C* and other objectionable solid materials, for use as fuel oil. H. S. G.

Production of gasoline. C. R. WAGNER, Assr. to PURE OIL CO. (U.S.P. 1,913,691, 13.6.33. Appl., 10.10.29).—Unsaturated hydrocarbon gases from vapour-phase oil conversion are heated at $177\text{--}371^\circ/40\text{--}100$ atm. in presence of a catalyst comprising a metal of group VIII (especially Pd and Pt sponge), the conditions being such that an exothermic reaction of polymerisation takes place without substantial cracking. H. S. G.

Treatment of hydrocarbon liquids, such as gasoline, kerosene, etc. M. P. YOUNGER, Assr. to PHILLIPS PETROLEUM CO. (U.S.P. 1,910,734, 23.5.33. Appl., 26.11.28).—Cracked gasoline vapours at atm. pressure are mixed with O_2 and injected tangentially into a closed chamber, where they are maintained at $149\text{--}179^\circ$ for sufficient time for oxidation of undesirable unsaturated hydrocarbons and S compounds to take place and for them to separate from the purified vapours, which subsequently are removed and condensed. H. S. G.

Refining of hydrocarbons. G. C. CONNOLLY, Assr. to SILICA GEL CORP. (U.S.P. 1,909,811, 16.5.33. Appl., 19.5.30).—A gas or vapour mixture containing light oil, S components, H_2O , and olefine hydrocarbons (I) is treated with a solid porous absorbent, e.g., SiO_2 gel (II), to remove the light oil, washed with an alkali solution to remove H_2S , and brought in contact at $300\text{--}450^\circ$ with a catalyst capable of aiding the conversion of the S compounds into H_2S , e.g., (II) impregnated with Fe_2O_3 . The H_2S is removed and the mixture again treated with (II) to remove H_2O , before being brought in contact with a substance capable of extracting (II), e.g., H_2SO_4 . H. S. G.

Refining of hydrocarbons. E. C. HERTHEL, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,908,606, 9.5.33. Appl., 14.9.28).—In combined vapour-phase cracking and refining operations a partial condensate (*C*) is produced from the vapours escaping from the fractionating operation (*F*) before they contact with the absorptive catalyst, by indirect heat exchange with a cooling medium. *C* is then introduced into direct contact with

the vapours in *F*, which is controlled by independently regulating the amount of *C* so introduced. H. S. G.

Treatment [refining] of hydrocarbons. SHARPLES SPECIALTY CO., Asses. of L. D. JONES and E. M. JAMES (B.P. 401,298, 4.3.32. U.S., 5.3.31).— H_2SO_4 or other refining agent is finely dispersed in the hydrocarbon (*H*) by agitation intense enough to render the acid-sludge particles formed thereby difficult to separate by normal centrifugal means. Rapid agitation is discontinued and the mixture is allowed to age for 4–20 min.; then a small quantity of H_2O is added with mild agitation and the mixture of sludge and *H* promptly and rapidly separated by centrifugal means before hardening of the sludge occurs and prior to the formation of impurities sol. in *H*. H. S. G.

[Petroleum] refining. T. G. GRAY, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,908,599, 9.5.33. Appl., 10.7.28).—Hydrocarbon vapours are passed downwardly through a series of beds of solid, absorptive, polymerising material and alternate free vapour spaces in which polymerides produced by the vapour-catalyst contact are separated from the vapour stream and separately discharged without again coming in contact with further catalytic material. H. S. G.

Removal of impurities from oil. E. PETTY, Assr. to CROSS DEVELOPMENT CORP. (U.S.P. 1,908,616, 9.5.33. Appl., 13.1.30).—Fresh acid is mechanically mixed with the oil (e.g., lubricating oils or light petroleum distillates) to effect rapid and complete contact and the mixture is immediately separated by centrifugal means. The acid-treated oil is brought in contact with an absorptive clay, separated therefrom, and used to preheat the oil to be purified. The recovered spent acid is utilised in preheating the oil prior to its contact with fresh acid, which treatment is carried on in presence of the spent acid. The final treated oil is neutralised with NH_3 . H. S. G.

Decolorisation of hydrocarbon material. S. E. CAMPBELL (U.S.P. 1,907,318, 2.5.33. Appl., 16.7.29).—A hydrocarbon distillate is passed through a series of chambers containing dil. H_2SO_4 (approx. 50%) until the acid is reduced to approx. 10% concn. in successive portions by absorption of the basic compounds. The acidic substances are then removed by passing the distillate through an alkaline solution ($> 10\%$ concn.) until the alkali has been reduced to approx. 5% concn. H. S. G.

Reagent for sweetening petroleum. H. H. CANNON and W. W. GARY, Assrs. to CANNON-PRUTZMAN TREATING PROCESSES, LTD. (U.S.P. 1,907,150, 2.5.33. Appl., 21.10.29. Renewed 6.9.32. Cf. U.S.P. 1,789,167; B., 1931, 1038).—A reagent for treating hydrocarbon oils containing mercaptans comprises a hydroxide of a metal of group II (e.g., Ca), PbO , diatomaceous earth, and free S. H. S. G.

Stabilising petroleum distillates. J. W. ORELUP, Assr. to PATENT FUELS & COLOR CORP. (U.S.P. 1,909,069, 16.5.33. Appl., 10.11.28).—1 pt. of $\text{C}_5\text{H}_5\text{N}$ or a picoline is added to 5000 pts. of a cracked high-compression petroleum distillate. H. S. G.

Separation [fractionation] of mineral oil. M. H. TUTTLE (U.S.P. 1,912,348—9, 30.5.33. Appl., 22.12.32).—(A) A mineral oil is separated into portions respectively

richer in paraffinic and in naphthenic constituents by: (a) extraction with a mixture of wood-tar acids, *e.g.*, beech-wood creosote, and $\frac{1}{2}$ of the group comprising SO_2 , furfuraldehyde, NH_2Ph ; (b) simultaneous or subsequent subjection of the oil to the action of a paraffinic solvent comprising any or all of the compounds C_2H_6 , C_3H_8 , C_4H_{10} , C_5H_{12} , petroleum oil, natural gasoline, or Pennsylvania gasoline; (c) final removal of the solvents from the respective fractions. (B) The hydrocarbon oil is extracted with a mixture of cresylic acid and SO_2 in presence of a solvent having greater solvent properties for paraffinic than for naphthenic constituents of the oil, the respective proportions of the solvents being adjusted to form a 2-layer solvent system. H. S. G.

Breaking of petroleum emulsions. M. DE GROOTE and A. F. WIRTEL, Assrs. to TRETOLITE CO. (U.S.P. 1,913,538, 13.6.33. Appl., 14.7.32).—A petroleum emulsion of the H_2O -in-oil type is treated with a demulsifying agent, selected from the class comprising the H_2O -sol. (*e.g.*, Na) salts, acids, and esters of a "sulpho-abiectane acid body" obtained by sulphonating the hydrogenated product of the thermal decomp. of wood rosin; the mixture is then set aside until separation into its component parts has taken place. H. S. G.

Hydrogenation under pressure of hydrocarbons. H. D. ELKINGTON. From A.-G. F. STEINKOHLEVERFLÜSSIGUNG U. STEINKOHLEVEREDELUNG (B.P. 402,264, 10.1.33).—Petroleum oils or other carbonaceous materials are heated with H_2 under pressure, and if desired in the presence of a catalyst, in a system of vertical tubes of alternately wide and narrow cross-section, connected in series in such a manner that the reaction material flows downwards through the wide tubes and upwards through the narrow. Coke formation is thereby avoided. A. B. M.

Filtration of oils through paper. W. S. BAYLIS, Assr. to FILTROL CO. OF CALIFORNIA (U.S.P. 1,906,356, 2.5.33. Appl., 5.8.29).—The final filtration is effected at 72 – 121° through paper containing 10–25% of an acid-activated clay, *e.g.*, that described in U.S.P. 1,397,113 (B., 1922, 5A). Conc. H_2SO_4 ($\geq 3\%$) is preferably used to acidify the oil, which may be given a preliminary contact filtration with fuller's earth etc. B. M. V.

Reactivation of spent filter materials. M. GOEBEL, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,905,087, 25.4.33. Appl., 19.6.30).—Clays after use in the decolorising of petroleum are extracted with a mixture of MeOH, COMe_2 , benzol, and naphtha, or liquids of the same classes. B. M. V.

Separation of methane from hydrocarbon gas mixtures. E. C. BRITTON and R. F. PRESCOTT, Assrs. to DOW CHEM. CO. (U.S.P. 1,908,312, 9.5.33. Appl., 27.5.29).—The mixed gases, to which sufficient Cl_2 has been added to react with the C_2H_6 and higher hydrocarbons present, are passed over a PbCl_2 or other metallic chloride catalyst at 200 – 400° , whereby a selective chlorination of hydrocarbons other than CH_4 is effected; the chlorinated derivatives (chiefly mono- and di-substitution products of C_2H_6 etc.) are removed by cooling, the HCl is eliminated by washing with H_2O , and the purified CH_4 is dried. A. B. M.

Production of motor fuel and the like. E. E. REID, Assr. to COLUMBIA ENG. & MANAGEMENT CORP. (U.S.P. 1,912,009, 30.5.33. Appl., 27.8.29).—The unsaturated hydrocarbons obtained by subjecting low-boiling hydrocarbons to cracking conditions of high temp. and low pressure are separated from the major quantity of free H_2 concurrently produced and are separately polymerised to form higher-boiling compounds by moderate heating at > 500 lb./sq. in. H. S. G.

Production of motor fuels. M. P. APPLEBEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 403,406, 13.6.32).—A gas containing C_2H_4 and C_3H_6 , with or without higher olefines (oil-cracking gas) and steam, is passed over a hydrating catalyst (B phosphate) at elevated temp. and pressure (200 – $350^\circ/50$ atm.). The product is a blending agent for MeOH and hydrocarbon fuels, and has a high C_8H_{14} no. H. A. P.

[Gum inhibitors for] motor fuel. L. B. CHEBOTAR, Assr. to TEXAS CO. (U.S.P. 1,913,370, 13.6.33. Appl., 27.2.32).—Substances capable of oxidation to give antioxidants are added to the fuel and oxidised *in situ* either by an added oxidising agent or by the peroxides generated by storage in air. The preferred agent is a mixture of a quinone (or quinol) with $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ and its derivatives; on oxidation an indophenol is formed. H. A. P.

Liquid fuel. R. H. VAN SCHAACK, JUN., Assr. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,907,309, 2.5.33. Appl., 7.12.29).—The fuel comprises petroleum distillate and a *tert.* aliphatic alcohol, *e.g.*, a 3 : 1 petrol–BuOH mixture. B. M. V.

[Production of] fuels in paste, jelly, or like form. J. S. B. FLEMING, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 403,401, 19.5.32).—To a solution of nitrocellulose (5–10 wt.-%) in MeOH or EtOH is added a gelling agent, *e.g.*, compounds of Cu, Sn, or Pb [$\text{Pb}(\text{OAc})_2$; or the solution is kept in contact with Pb, Cu, Cu bronze, etc.] (0.001–0.5%), and (after thickening) an anti-gelling agent is added (citric, malic, or tartaric acid; 0.2–0.5%). H. A. P.

Manufacture of lubricating oils. STANDARD OIL DEVELOPMENT Co., Assees. of G. H. B. DAVIS (B.P. 401,341, 7.5.32. U.S., 11.6.31).—An improved lubricant is obtained by adding to a hydrocarbon oil, *e.g.*, a viscous fraction of a naphthenic base oil, a solid waxy hydrocarbon together with $\geq 10\%$ of a substance having pour-point depressing properties, *e.g.*, wax tailings which may be mildly oxidised; a derivative of paraffin wax such as an acid oxidation product or its Zn or Mg salt; or a condensation product of a waxy hydrocarbon and an aromatic hydrocarbon. H. S. G.

Lubricating oils. STANDARD OIL DEVELOPMENT Co., Assees. of P. K. FROLICH (B.P. 402,262, 29.12.32. U.S., 23.3.32).—A lubricant particularly suitable for "breaking-in" new internal-combustion engines comprises a suitably refined, viscous hydrocarbon oil containing 0.25–5.5% of a synthetically produced ester having b.p. $> 150^\circ$ ($> 180^\circ$), other than an ester of a polymeric carbohydrate, *e.g.*, glycol stearate, Pr^nOBz . H. S. G.

Manufacture of pour-point depressants for use with lubricating oils. STANDARD OIL DEVELOPMENT

Co., Assees. of R. G. SLOANE (B.P. 402,253, 8.12.32. U.S., 29.12.31).—A highly active fraction having a mean mol. wt. > 1200 is obtained by subjecting a crude depressant (*D*), such as is obtained by the low-temp. $AlCl_3$ condensation of waxy hydrocarbons with or without an aromatic hydrocarbon, to distillation at a temp. $<$ that of decomp. to separate a relatively light inactive fraction boiling up to about 370° ; or by extracting *D* with a solvent or solvents belonging to the class of wax precipitants; or by distillation and extraction of the residue with solvents. H. S. G.

Manufacture of solid greases. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 401,295, 6.5.32 and 8.5.33. Cf. B.P. 379,717; B., 1932, 971).—Solid lubricating greases, including those described in B.P. 317,630 (B., 1929, 862), are improved by addition of 0.5–25% (3–10%) of the polymerisation product of polymerisable unsaturated hydrocarbons (other than isoolefines), or the products obtainable therefrom by hydrogenation and/or isomerisation, having high mol. wts. (800 to > 2000), e.g., polymerised hexene, styrene, or turpentine oil, hydrogenated rubber. E. L.

Antisolvent dewaxing. J. A. ANDERSON, Assr. to STANDARD OIL Co. (U.S.P. 1,907,703, 9.5.33. Appl., 10.4.31).—Heavy mineral lubricating oils are dewaxed by diluting with benzol (65%), $COMe_2$ (25–32%), and naphtha (3–10%), chilling to solidify the wax, separating the wax, and distilling the diluent from the dewaxed oil. H. S. G.

Core oil. G. F. KENNEDY, Assr. to HERCULES POWDER Co. (U.S.P. 1,910,799, 23.5.33. Appl., 4.12.31).—A core oil comprises linseed oil, a petroleum distillate, and rosin which has been partly oxidised to prevent subsequent crystallisation. H. S. G.

Oxidation of paraffin wax. B. GALLSWORTHY, Assr. to TEXAS Co. (U.S.P. 1,909,945, 23.5.33. Appl., 23.3.27).—Paraffin wax, $d^{25}_4 0.78$ (approx.), is blown with air while heated at 127 – 168° until the product has $d^{25}_4 0.85$, contains relatively little unoxidised wax, and is free from gummy products which yield a ppt. in a 90% gasoline solution and also will dissolve to the extent of $< 2\%$ in lubricating oil at temp. above the cloud point. The oxidised mass may be subjected to a sweating operation. H. S. G.

Wax composition. F. H. MACLAREN, Assr. to STANDARD OIL Co. (U.S.P. 1,905,923, 25.4.33. Appl., 13.3.29).—A composition having high m.p. but surface tackiness at room temp. comprises: high-m.p. petrolatum 78, low-m.p. petrolatum 20, and rosin 2%. B. M. V.

Apparatus for producing combustible gas from volatile liquid fuels. A. CURIONI (B.P. 403,904, 13.10.32. Cf. B.P. 399,655).

Surface distillation [of oils].—See I. Oxidising combustible material. Treating oxidised hydrocarbons. Alcohols etc. from olefines.—See III. Textile oil. Waterproofing paper.—See V. $Al_2(SO_4)_3$ from clay. Shales. $CO-H_2$ mixtures.—See VII. Paving material. Roofing mastic.—See IX. Alloy for use in petroleum cracking.—See X. Electrolysis apparatus.—See XI. Greases.—See

XII. H_2O -repellent coating. Resin from wood. Synthetic resins from tar oil.—See XIII. Petrolatum compositions.—See XX. Sewage [as fuel].—See XXIII.

III.—ORGANIC INTERMEDIATES

Hydrogenation-cracking of naphthalene. C. C. HALL (Fuel, 1933, 12, 419–427; cf. B., 1933, 379).—The experiments were carried out in a 2-litre Ni-steel rotating converter. The initial H_2 pressure was 100 atm. and the time of heating generally 2 hr. In absence of a catalyst $\alpha-C_{10}H_7\cdot OH$ (*A*) yielded 64.1, 64.5, and 76.0%, and $\beta-C_{10}H_7\cdot OH$ (*B*) 23.8, 57.2, and 67.6%, of neutral material, at 400° , 450° , and 500° , respectively; these products contained 0.8, 16.2, 34.8%, and 6.7, 17.9, and 32.2% (calc. on the original material), respectively, of $C_{10}H_8$ (I). In the products from *A* α -dinaphthylene oxide, and in those from *B* $\beta\beta$ - $(C_{10}H_7)_2O$ and β -dinaphthylene oxide were identified; $\beta\beta$ - $(C_{10}H_7)_2$ was found in the products from both *A* and *B* at the higher temp. In presence of NH_4 molybdate-activated charcoal complete deoxygenation of *B* was effected after heating for 2 hr. at 400° , and of *A* after 2 hr. at 450° or 5 hr. at 400° , the yield of neutral material being about 90%. From *A* after heating for 2 hr. at 400° about 5% of phenolic material (*ar*-tetrahydro- α -naphthol) was present in the product. Addition of S to the catalyst accelerated the rate of deoxygenation; in presence of S deoxygenation was practically complete after 2 hr. at 350° . The yields of (I) in the catalyst experiments were 16–30%. The greater part of the neutral oil obtained in these experiments boiled in the range 195 – 210° and consisted of (I) and tetralin (II). At the higher temp., in addition to these compounds, $PhBu^a$ (III), $PhEt$ (IV), $PhMe$ (V), and C_6H_6 (VI) were present. Small amounts of $\alpha\alpha$ - and $\beta\beta$ - $(C_{10}H_7)_2$ were isolated from the higher-boiling residues in the products from the hydrogenation-cracking of *B* and *A*, respectively. The probable course of the reactions involved is discussed; as far as the main reactions are concerned it is concluded that in presence of a catalyst $C_{10}H_8$ is the first stable product and that (II) is formed therefrom by a secondary hydrogenation process and subsequently breaks down into (III), (IV), (V), and (VI). A. B. M.

$CaCN_2$.—See VII. Xanthates as flotation agents.—See X. Abs. EtOH.—See XVIII.

PATENTS.

Oxidation of combustible material. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,913,054, 6.6.33. Appl., 22.6.31).—The material to be oxidised is vaporised by steam or other non-oxidising gases and mixed with air etc. just prior to passage over the catalyst, which is heated by a bath of material with a b.p. $>$ the reaction temp. (Pb, alloys, $NaNO_3$ - $NaNO_2$, amalgams). Apparatus is claimed. H. A. P.

Treatment of mixtures of partly oxidised hydrocarbon. J. H. JAMES, Assr. to C. P. BYRNES (U.S.P. 1,912,484, 6.6.33. Appl., 8.2.27).—The gases from the catalytic air-oxidation (I) of hydrocarbons (e.g., over Mo, V, or similar oxides at $<$ red heat) are scrubbed by $Ca(OH)_2$, the Ca salts of the lower fatty

acids produced are washed with light petroleum, and the acids regenerated. The liquid condensate from (I) is distilled; a residue of resinous and higher fatty acids and esters is obtained which is purified through the Ca salts. The distillate is fractionally redistilled, the fraction of b.p. $< 238^\circ$ being refined to give motor fuel and resinous acids (II), and that of b.p. $238\text{--}330^\circ$ (III) cracked to give a further fuel fraction, b.p. $< 238^\circ$, a fraction, b.p. $238\text{--}330^\circ$, which is reoxidised with a fresh batch of oil, and an asphaltic residue. Alternatively, (III) is saponified to give (II) and unsaponifiable matter which is reoxidised. H. A. P.

(A) Preparation of formaldehyde by catalytic oxidation of methyl alcohol. (B) Formaldehyde synthesis and catalyst. V. E. MEHARG and H. ADKINS, Asss. to BAKELITE CORP. (U.S.P. 1,913,404—5, 13.6.33. Appl., [A] 7.5.27, [B] 31.7.31).—(A) Catalysts consisting of > 40 wt.-% of Mo oxides, or (Mo + V) oxides, and an oxide of Fe, La, Th, Nd, Zn, or Sn (Mo-Fe oxides at $340\text{--}370^\circ$ or Mo-V-Fe oxides) are used. (B) The above catalysts (Mo-Fe oxide) are prepared in a coherent form of high mechanical strength and activity by pptn. of NH_4 molybdate with FeCl_3 in dil. aq. solution. H. A. P.

Production of alcohols from olefines. W. ENGS and R. Z. MORAVEC, Asss. to SHELL DEVELOPMENT CO. (U.S.P. 1,912,695, 6.6.33. Appl., 9.2.31).—*sec.*-Olefines $> \text{C}_3\text{H}_6$ (Δ^a - and Δ^b - C_4H_8) are converted into alcohols by agitation with about 1 equiv. of 90—100% H_2SO_4 at $< 47^\circ$, or by addition of H_2SO_4 to the appropriate (cracked) petroleum fraction, and hydrolysis of the alkyl H sulphate layer by dilution to 25—35% acidity and heating. Olefines containing quaternary C should first be removed, e.g., by fractionation or polymerisation. H. A. P.

Production of aliphatic alcohols and esters [from olefines]. H. DREYFUS (B.P. 402,060, 21.4.32).—Hydrocarbon vapours are cracked in presence of org. acid vapour (AcOH , EtCO_2H), e.g., at $600\text{--}800^\circ$, with or without catalyst. Preferably the reaction products are then passed over a hydration or esterification catalyst (H_3PO_4 on pumice) at about $400^\circ/20\text{--}100$ atm. Petroleum, b.p. $200\text{--}350^\circ$, with 70 vol.-% of AcOH gives EtOAc . C. H.

Purification of higher alcohols. H. E. BUC, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,911,798, 30.5.33. Appl., 17.11.28).— Pr^nOH is freed from Bu^nOH by preferential dehydration of the latter with aq. mineral acids (65% H_2SO_4). H. A. P.

Manufacture of acetic anhydride from crude sodium acetate. J. C. WHITE and H. G. STONE, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,912,747, 6.6.33. Appl., 4.3.30).— NaOAc (I) containing tarry impurities is charred at $200\text{--}300^\circ$ and then chlorinated (SO_2Cl_2 , S_2Cl_2) in Ac_2O and the product is distilled. The distillate is purified by addition of pure (I) and Cl_2 and redistillation. H. A. P.

Manufacture of acetic acid. C. HANER and E. P. FENIMORE, Asss. to PUBLICKER, INC. (U.S.P. 1,911,315, 30.5.33. Appl., 19.8.31).— AcOH and some MeCHO are formed by passage of (95%) aq. EtOH and O_2 or air over CuO at $300\text{--}400^\circ$ ($320\text{--}340^\circ$). The CuO is activ-

ated by EtOH alone at $320\text{--}340^\circ$. H_2O exerts a favourable influence. H. A. P.

Concentration of dilute aqueous solutions [of acetic acid]. F. E. LICHTENTHAELER (U.S.P. 1,912,585, 6.6.33. Appl., 17.9.30).—To the solutions is added a hydrate-forming anhyd. salt (sufficient MgSO_4 to form the hexahydrate) moistened with a "wetting agent" (COMe_2) to prevent coalescence; the cryst. magma is then washed with an org. solvent (COMe_2) and the extract distilled. H. A. P.

Manufacture of acetyl chloride. I. G. FARBENIND. A.-G. (B.P. 402,328 and 402,335, [A] 28.4.33, [B] 1.5.33. Ger., [A] 29.4.32, [B] 30.4.32).—(A) Liquid AcOH at $80\text{--}110^\circ$ is treated with COCl_2 gas, preferably in presence of a metal of group II or III as catalyst, AcCl being distilled off as formed. (B) Vapours of AcOH and COCl_2 are passed over H_3PO_4 -activated C at $\geq 250^\circ$. C. H.

Manufacture of substituted alkyl chlorides. BOOR'S PURE DRUG CO., LTD., F. L. PYMAN, and H. H. L. LEVENE (B.P. 402,159, 4.6.32).—Alcohols, $\text{NR}_2\text{[CH}_2\text{]}_n\text{OH}$, in which n is 7—11 and R is alkyl or NR_2 is piperidyl, are synthesised (a) by condensation of chloroalcohols with NHR_2 or (b) by reduction of carboxylic esters, and are converted into chlorides by SO_2Cl_2 , preferably in CHCl_3 . Examples are alcohols in which: R = Et, $n = 7$ (I) (b.p. $139\text{--}141^\circ/25$ mm.), 8 (II) (b.p. $187\text{--}190^\circ/72$ mm.), 9 (III) (b.p. $171\text{--}173^\circ/23$ mm.), 10 (IV) (b.p. $193\text{--}196^\circ/20$ mm.), 11 (V) (b.p. $219\text{--}220^\circ/72$ mm.); $n = 10$, R = Me (VI) (b.p. $202\text{--}204^\circ/30$ mm.), Bu (VII) (b.p. $233\text{--}235^\circ/50$ mm.), C_5H_{11} (b.p. $227\text{--}229^\circ/17$ mm.) or $\text{NR}_2 = \text{piperidyl}$ (VIII) (m.p. $55\text{--}56^\circ$; b.p. $210\text{--}211^\circ/25$ mm.); $n = 11$, R = Bu (IX) (b.p. $215^\circ/17$ mm.), C_7H_{15} (b.p. $236\text{--}238^\circ/6$ mm.). Hydrochlorides of chlorides from (V) (m.p. $84\text{--}86^\circ$), (I) (m.p. $82\text{--}84^\circ$), (VII), (VIII) (m.p. $127\text{--}128^\circ$), (IX), (II) (m.p. 73°), (III) (m.p. $85\text{--}86^\circ$), (IV) (m.p. $80\text{--}82^\circ$), (VI) (m.p. $133\text{--}138^\circ$) are described. $\text{NEt}_2\text{[CH}_2\text{]}_{10}\text{CO}_2\text{Et}$ has b.p. $210\text{--}212^\circ/50$ mm. C. H.

Purification of aliphatic nitrates. S. G. NORTON and N. C. BOYD, Asss. to HERCULES POWDER CO. (U.S.P. 1,912,399, 6.6.33. Appl., 10.5.28).— $\text{C}_3\text{H}_5(\text{O-NO}_2)_3$ and similar nitrates are neutralised and stabilised by washing with aq. solutions of one or more salts of $p\text{H } 8\text{--}12$, the acids of which do not react with the nitrate (Na_3PO_4 , $\text{Na}_2\text{B}_4\text{O}_7$). H. A. P.

Urea synthesis. F. W. MILLER, JUN., Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,908,715 and 1,908,995, 16.5.33. Appl., 28.5.31).—In the manufacture of urea by condensation of CO_2 with a large excess of NH_3 in presence of MeOH at 150° under pressure, the melt, after completion of the reaction, is forced by its own pressure into a primary still, from which, as the temp. falls from 150° to 100° , the excess of NH_3 is distilled and condensed under pressure and cooling; it then enters a secondary still in which the unconverted $\text{NH}_2\text{CO}_2\text{NH}_4$ together with most of the MeOH is distilled over into (A) a condenser, or (B) a solution of urea in MeOH . In either case the distillate together with more NH_3 and CO_2 is returned to the autoclave for the next cycle of operations. A. R. P.

Manufacture of amines of the benzene series. E. I. DU PONT DE NEMOURS & Co., and A. J. WUERTZ

(B.P. 402,063, 11.5.32).—A halogenated C_6H_6 is heated with aq. NH_3 in a closed vessel, *e.g.*, at 150–225°, in presence of an inorg. oxidant ($KClO_3$) and, if desired, NH_4NO_3 and a catalyst [Cu , Cu_2O , $Cu(NO_3)_2$, $AgCl$]. The prep. of NH_2Ph , $p-C_6H_4(NH_2)_2$, and $p-NO_2-C_6H_4-NH_2$ is described. C. H.

Purification of dihydric phenols. N. ELLIOTT, Assr. to DOW CHEM. CO. (U.S.P. 1,912,628, 6.6.33. Appl., 4.9.31).—*o*-, *m*-, and *p*- $C_6H_4(OH)_2$ are purified by distillation with an org. solvent of b.p. > 130° in which the phenol is sol. when hot but relatively insol. at room temp., *e.g.*, *o*- $C_6H_4Cl_2$, $PhCl$, 1 : 2 : 4- $C_6H_3Cl_3$. H. A. P.

Manufacture of halogenated hydroquinones [quinols]. [Photographic developers.] H. VON BRAMER and J. W. ZABRISKIE, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,912,744, 6.6.33. Appl., 13.7.32).—Quinol is halogenated (Cl, Br) in suspension in CCl_4 , the mono-halogeno-derivative being removed as formed. Apparatus is described. H. A. P.

Phthalates of hydroquinone [quinol] monoethers. C. J. STAUD and T. F. MURRAY, JUN., Assrs. to EASTMAN KODAK CO. (U.S.P. 1,912,734, 6.6.33. Appl., 29.7.32).—Quinol monoethers are heated with *s*- or *as*-phthalyl chloride in presence or absence of a solvent or diluent at about 100°. The *phthalates*, m.p. 93° and 144–145°, respectively, of quinol Me and CH_2Ph ethers are described; they are used as filters for ultra-violet light. H. A. P.

Preparation of dinaphthylamines. A. M. CLIFFORD, Assr. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,913,332, 6.6.33. Appl., 2.5.28).—A naphthol (2 mols.) and (anhyd.) NH_3 (1.5 mols.) are heated together (at 300–310°/650–400 lb. per sq. in. for 8–14 hr.). The yield is almost quant. H. A. P.

Separation of 1 : 5- and 1 : 8-aminonaphthalene-sulphonic acids. E. F. HITCH and C. K. BLACK, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,912,639, 6.6.33. Appl., 11.9.30).—An alkaline solution of the acids is acidified to p_H 4–4.6, the pptd. 1 : 8- $NH_2 \cdot C_{10}H_6 \cdot SO_3H$ filtered off, and the 1 : 5-acid pptd. by further acidification. H. A. P.

Purification of perylenetetracarboxylic acid imide compounds. A. O. JAEGER and L. C. DANIELS, Assrs. to SELDEN CO. (U.S.P. 1,913,052, 6.6.33. Appl., 12.1.29).—The imides are hydrolysed to perylenetetracarboxylic acid, which is purified by oxidation (by passing Cl_2 into its alkaline solution) and reconverted into imide, alkylimide, etc. by NH_3 or an amine. H. A. P.

Manufacture of bornyl oxalates. L. and E. DARRASSE and L. DUPONT (B.P. 402,286, 28.2.33. Ger., 29.2.32).—Turpentine is agitated with anhyd. $H_2C_2O_4$ at 110–125°, H_2O being removed from the vapours before returning to the reacting mixture. If all O_2 be displaced or reaction effected in vac., the elimination of reaction H_2O may be omitted. Antioxidants (quinol) may be added. C. H.

Polymerisation of furylethylene. B. E. SORENSON, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,911,722, 30.5.33. Appl., 23.1.29).—The furylethylene is heated with oxidising agents (BzO_2H) or weak

org. acids to yield (PhMe-sol.) resins which form H_2O -resistant films. H. A. P.

Manufacture of hydroxythionaphthens [thioindoxyls] and indigoid dyes derived therefrom. I. G. FARBENIND. A.-G. (B.P. 402,265, 11.1.33. Ger., 11.1., 11.11., and 12.11.32).—Thioindoxyls are prepared from alkoxyxylylidenes, alkoxyxylenesulphonic acids, alkoxyxylylidenesulphonic acids (SO_3H *ortho* to NH_2), or their halogenated derivatives *via* alkoxyxylylthioglycollic acids having the position *ortho* to the $\cdot S \cdot CH_2 \cdot CO_2H$ either free, or substituted by NH_2 , CN , $CO \cdot NH_2$, or CO_2H . The thioindoxyls, or the thioindigoid dyes derived therefrom, may be halogenated. Examples are 5-methoxy-6 : 7-dimethylthioindoxyl, m.p. 150°, and the corresponding 5 : 4 : 6- and 6 : 4 : 5- (m.p. 152–154°) derivatives; 7 : 4 : 6- and 6 : 4 : 7- (m.p. 94–96°) -ethoxydimethylthioindoxyls; 5-chloro-7-methoxy-4 : 6-dimethylthioindoxyl, m.p. 118° (thioglycollic acid, m.p. 74°), the 5 : 6 : 4 : 7- (m.p. 128–130°), 4 : 5 : 6 : 7- (m.p. 152°), and 6 : 5 : 4 : 7- (m.p. 129–130°) compounds; 5-chloro-6-ethoxy-4 : 7-dimethylthioindoxyl, m.p. 133–134°; 6-bromo-5-methoxy-4 : 7-dimethylthioindoxyl, m.p. 94° (thioglycollic acid, m.p. 78–80°). The corresponding thioindigoid dyes give green-blue, red, scarlet, orange, claret, and red-violet shades. C. H.

Preparation of aminopyridylazoquinolines. G. B. ELLIS. From C. F. BOEHRINGER & SOEHNE, G.M.B.H. (B.P. 402,184, 11.7.32).—Excess of acid prevents side-reactions in the diazotisation of 8-aminoquinolines and coupling with 2 : 6-diaminopyridine. Examples are 8-aminoquinoline and its 6-Cl-, 6-OMe-, and 6-OEt-derivatives; the diaminoazo compounds have m.p. 200°, —, 169°, and 208°, respectively. C. H.

Separating C_2H_2 and CH_4 from mixed gases. [Products from] gas liquor.—See II. $CO \cdot H_2$ mixtures [for MeOH synthesis].—See VII. Wax-like product.—See XII. Aliphatic acids by fermentation.—See XVIII. [Products from] sewage.—See XXIII.

IV.—DYESTUFFS.

PATENTS.

Preparation of anthraquinone vat dyes. R. N. LULEK, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,912,378, 6.6.33. Appl., 16.12.26).—Fast golden-brown vat dyes are obtained by benzoylating aminoanthrimides, or the products obtained from them by action of $AlCl_3$ (at 190–200°). The former are prepared by condensing < 1 mol. of a chloroanthraquinone (1 : 5- $C_{14}H_6O_2Cl_2$) with 1 mol. of an α -diaminoanthraquinone [1 : 5- $C_{14}H_6O_2(NH_2)_2$] in presence of Cu-bronze and NaOAc. H. A. P.

Indigoid dyes.—See III. Sensitising dye.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Influence of light on cotton and wool. E. J. SIMOLA (Suomen Kem., 1933, 6, A, 126–129).—Exposure to sunlight reduces the tensile strength (*T*) of cotton and wool by 17.8% and 7.3%, respectively, and the stretching properties of the yarn by 12% and 37.7%. Mercerised cotton yarn has the smallest loss

of *T*, but the greatest loss of elasticity (27.3%). The effect of light on wool increases with fineness of fibre.

E. S. H.

Layering phenomena in celluloid films containing pigment. E. MIEHLNICKEL (*Kolloid-Z.*, 1933, 66, 84—86).—Celluloid films containing C or C + Si, for use in X-ray technique, are frequently rendered inhomogeneous in consequence of irregularities in drying. Addition of 7% of resin gives better distribution of the pigment. A modified drying technique is also described.

E. S. H.

Solid ligninsulphonic acid and its dissolution. C. KULLGREN (*Papier-Fabr.*, 1934, 32, 2—6).—During the initial stages of a sulphite cook, the solid Ca lignin-sulphonate is formed, which is later rendered sol. by exchanging its Ca⁺⁺ for H⁺. The probable mechanism of this base exchange is discussed. It is suggested that effective dissolution depends on maintaining a correct ratio of [Ca⁺⁺]:[H⁺] of the cooking liquor, the [H⁺] alone being relatively unimportant.

D. A. C.

Value of Lauan wood as pulp material. N. MIGITA (*J. Cellulose Inst.*, Tokyo, 1933, 9, 338—342).—White Lauan (*Pentacure contorta*) wood has a high lignin content and is low in pentosans. After digestion with NaOH a short fibre is given which is easily disintegrated on beating for 12 min. Sheets made from it have a low tensile strength and extremely low folding-endurance.

D. A. C.

Rapid determination of moisture and consistency of insulating-board pulp. L. K. ARNOLD (*Paper Trade J.*, 1934, 98; T.A.P.P.I. Sect., 4).—The Youtz-Lauer method (*ibid.*, 1931, 93; T.A.P.P.I. Sect., 173), in which the pulp is distilled with xylene to remove H₂O, is applied to cornstalk board. The method gives results in close agreement with the slower method of drying to const. wt. Suitable apparatus is described.

H. A. H.

Rate of drying of newsprint. F. W. ADAMS (*Paper Trade J.*, 1934, 98; T.A.P.P.I. Sect., 2—4).—Montgomery's equations (B., 1933, 423) for the drying rates of kraft (I) paper have been applied to newsprint (II). Production and evaporation rates for (II) increase with steam temp., and are considerably > those for (I).

H. A. H.

Amount of coating of mineral-coated paper. ANON. (*Paper Trade J.*, 1934, 98; T.A.P.P.I. Sect., 1).—T.A.P.P.I.'s tentative standard method is described. It depends on the decomp. of the adhesive by an enzyme (preferably "Degoma D.L."), thus loosening the mineral coating. The % found is usually correct to within 0.5—2%.

H. A. H.

Some problems of fading [of paper]. J. GRANT (*Paper-Maker*, 1933, 86, Ann. No., 65—71).—Factors affecting the fading of coloured papers, and methods of causing fading artificially, are reviewed. Changes in fluorescence (when viewed in screened ultra-violet light) brought about by exposure to the unfiltered light are regarded as giving a measure of the degree of instability of the colour, although it is recognised that it is the paper, rather than the dye, that is affected. The use of a min. time val. as a numerical indicator of fastness, therefore, is not possible in cases where a

low dilution of a stable colour is involved, unless an empirical blank is deducted to allow for the fading of the paper. Factors affecting the discoloration of undyed paper, and the influence of exposure and heat tests on bleached and sized (with rosin and with gelatin) papers, are briefly discussed.

H. A. H.

Analysis of paper ash containing titanium pigments. J. M. JARMUS and W. R. WILLETS (*Paper Trade J.*, 1934, 98; T.A.P.P.I. Sect., 5—7).—The determination of Ti, in absence and in presence of other loading materials, is described in detail. It involves reduction with amalgamated Zn and titration with a Fe^{III} salt; 3 schemes are used, depending on the nature of the other materials present.

H. A. H.

Gloss measurement.—See I. **Timber decomp.**—See IX. **[Wrappings for] butter. Feeding-stuffs from wood.**—See XIX. **Stability of nitrocellulose.**—See XXII.

PATENTS.

Textile oil. W. T. REDDISH, Assr. to TWITCHELL PROCESS CO. (U.S.P. 1,909,721, 16.5.33. Appl., 1.7.29).—A self-scouring textile oil consists of 7½—25% of mahogany sulphonates free from emulsion-inhibiting components dissolved in a highly refined, neutral mineral oil free from oxidisable components. (Cf. B.P. 354,297; B., 1931, 1002.)

H. S. G.

Manufacture of coloured soluble cellulose. E. DE STUBNER (U.S.P. 1,914,489, 20.6.33. Appl., 8.1.30).—A sol. cellulose derivative, e.g., nitrocellulose, in the fibrous state and wet with a non-solvent org. liquid (*A*), e.g., EtOH, is mixed with a pigment (*P*) either dry or as a pulp wet with *A*, and the whole is worked until *P* and the fibrous cellulose derivative are uniformly dispersed in the resultant pulp. The coloured product is used for production of lacquers etc. by addition of a solvent (EtOAc) and the usual addenda.

F. R. E.

Ageing of alkali-cellulose. R. ETZKORN, Assr. to AMER. GLANZSTOFF CORP. (U.S.P. 1,911,560, 30.5.33. Appl., 6.10.31. Ger., 20.2.31).—The ageing of pulp for the prep. of viscose after steeping in NaOH is controlled by careful control of the pressure in the ripening room.

D. A. C.

Production of cellulose acetate. A. H. STEVENS. From E. BERL (B.P. 403,554, 12.4.33).—Cellulose triacetate is partly hydrolysed to the COMe₂-sol. ester by "deliberate" addition of HClO₄ or a perchlorate (I) in presence of AcOH, the temp. and time of treatment depending on the proportion of (I) added.

F. R. E.

Apparatus for digestion of nitrocellulose. M. G. MILLIKEN, Assr. to HERCULES POWDER CO. (U.S.P. 1,911,201, 30.5.33. Appl., 29.5.29).—Nitrated cotton is digested with H₂O by pumping through a coil (*C*) steam-jacketed at the intake end and 2500—3000 ft. long, with a velocity of 2 ft. per sec. at 160°/80 lb. per sq. in. Jamming is relieved by passing the mixture through a conical spring-loaded valve, to which more H₂O is added, at the discharge end of *C*, and up a vertical standpipe sufficiently high to balance the pressure in *C*.

D. A. C.

Production of nitrocellulose. M. O. SCHUR, Assr. to BROWN CO. (U.S.P. 1,913,416 and 1,914,302, 13.6.33.

Appl., [A] 13.5.30, [B] 31.5.30.—(A) Thick (450 g./sq. m.) sheets of unbeaten wood pulp can be satisfactorily nitrated in 2–4 hr. at 30–40° without losing their integrity by using two nitrating baths (*A*, *B*), the ratio of H_2SO_4 to HNO_3 being < 2 : 1 (1–1.5 : 1) in *A* and about 3 : 1 in *B*. 0.5–2 hr. is a suitable treating time in *A*, the sheets (after draining) being then transferred to *B* for about 2 hr. The composition of *A* is less crit. if the sheets are pretreated (5 min.) in a bath of the type used in the second nitration. (B) Pulp sheets are nitrated at 25–40° in a bath in which the ratio of HNO_3 to H_2SO_4 is > 1 : 2 and the H_2O content 12–23%. A suitable bath contains 16% of H_2O , and 42% each of HNO_3 and H_2SO_4 . At 25° nitration is complete in 6 hr.

D. J. N.

Manufacture of films from cellulose derivatives. DEUTS. CELLULOID-FABR. (B.P. 403,851, 20.4.33. Ger., 20.4.32).—A solution of a cellulose derivative (*D*) (cellulose acetate or nitrate, ethylcellulose nitrate) and a plasticiser in a solvent mixture (of which the individual constituents are non-solvents for *D*) composed of 1 pt. of H_2O -miscible, e.g., EtOH, and < 2 pts. of H_2O -immiscible solvent, e.g., Et_2O , is extruded through a slit into a coagulating bath consisting of H_2O and a H_2O -miscible aliphatic alcohol, e.g., EtOH. F. R. E.

(A) **Manufacture of cellulosic films, sheets, and threads.** (B) **Production of films and coatings of cellulosic material.** C. W. BONNIKEN, and PROTECTO-GLASS, LTD. (B.P. 402,784 and 402,807, 4.6.32).—(A) A cellulose ester solution (*I*), e.g., acetate in $COMe_2$, rendered gas-free in vac. is drawn from a suitable aperture through a bath of coagulating liquid (castor oil or BuOBz with or without a small proportion of triacetin) previously freed from gas in vac. or by boiling. (B) Apparatus is described, suitable for coating glass etc. (cf. B.P. 388,050; B., 1933, 356). F. R. E.

[Coated] articles made of or containing cellulose derivatives. CELLULOID CORP. (B.P. 402,877, 5.7.32. U.S., 8.7.31).—Sheets, films, or articles, such as containers or closure means therefor, of cellulose esters or ethers are coated with a composition, free from natural or artificial resins, containing a polymerised hydrocarbon having a vinyl group, e.g., polymerised styrene, and a plasticiser, e.g., aryl phosphates, phthalic esters, to render them resistant to H_2O , org. liquids, and chemical reagents. F. R. E.

Manufacture and treatment of artificial textile materials. H. DREYFUS (B.P. 402,776, 7.6.32).—Filaments, yarns, films, etc. containing org. derivatives (acetate) of cellulose are treated with diesters or ether-esters of alkylidene glycols, e.g., methylene or ethylidene diacetate, with or without an inert diluent (H_2O , EtOH) or a plasticiser (Ph_3PO_4 , acetins, etc.) and then stretched. F. R. E.

Processing of viscose rayon. G. A. RICHTER and P. C. SCHERER, JUN., ASSRS. to BROWN CO. (U.S.P. 1,915,072, 20.6.33. Appl., 27.12.28).—The crude yarn is desulphurised and bleached in one step by treatment with hot dil. alkali (*A*) (0.2% NaOH) through which a current of air or O_2 is passed, or with *A* containing a catalytic oxidising agent (salts of Fe, Mn, Co, Ni, Cr, or V), with or without passage of O_2 ; the yarn is then

freed from metallic compounds by treatment with suitable reagents, e.g., Fe by $H_2C_2O_4$, Mn by SO_2 , and is finally washed. F. R. E.

Finishing of viscose rayon. G. A. RICHTER and C. H. GOLDSMITH, ASSRS. to BROWN CO. (U.S.P. 1,915,952, 27.6.33. Appl., 14.11.29).—The crude material is treated with an oxidising bleach (*B*) [Cl_2 , NaOCl, $Ca(OCl)_2$], the excess of (*B*) is subsequently reduced with CH_2O solution, and the bleached material is desulphurised with a sulphide solution and finally super-bleached with acid $KMnO_4$. F. R. E.

Desulphurisation [of viscose filaments]. J. C. FUNCKE, ASSR. to AMER. GLANZSTOFF CORP. (U.S.P. 1,911,563, 30.5.33. Appl., 1.9.31).—An amine (NH_2Ph) is added to the desulphurising agent to facilitate the removal of CS_2 from viscose. D. A. C.

Treatment [purification] of [viscose] artificial silk. H. W. K. JENNINGS. From GLANZSTOFF-COURTAULDS GES.M.B.H. (B.P. 400,760, 13.9.32).—Viscose rayon, freshly spun and freed from acid on bobbins, is dried so that it loses its high wet-swelling properties and may be satisfactorily desulphurised on the same bobbins.

A. J. H.

Chemical pulping process. G. A. RICHTER, ASSR. to BROWN CO. (U.S.P. 1,915,953, 27.6.33. Appl., 29.5.30).—Cellulose material, e.g., wood, is cooked at < 163° with an acid sulphite liquor, preferably $NaHSO_3$, containing combined SO_2 (*A*) < 4% and free SO_2 < half the *A* content. F. R. E.

[Continuous] chemical treatment [of fibrous material]. H. L. WOLLENBERG, ASSR. to LONGVIEW FIBRE CO. (U.S.P. 1,915,812, 27.6.33. Appl., 16.12.30).—Fibrous material (*A*), e.g., wood chips, is introduced into the treatment vessel (*B*) in a continuous moving column sufficiently dry and compressed to prevent overflow of treatment liquid (*C*), which is simultaneously introduced under pressure. The mixture of *A* and *C*, in its upward advance through *B*, is heated while pressure is gradually reduced. Subsequently the spent liquor is separated and the cooked *A* discharged in a compact moving column which acts as a seal to maintain the pressure in *B*. F. R. E.

Preparation of pulp. U. S. McMILLAN, ASSR. to McMILLAN FIREPROOF FIBRE CO. (U.S.P. 1,913,607, 13.6.33. Appl., 30.9.29).—Wood or the like supported on a reciprocating frame (*F*) is subjected to the action of steel-wire brushes projecting through openings in *F* and rotating at high speed in the direction of the length of the fibre. The disintegrated material is conveyed (by air) to a roller mill (*M*) where it is treated (while *M* is running) with hot H_2O or acid or alkaline digestion liquors, e.g., with sulphite liquor at 110–150°/40–70 lb. sq. in. D. J. N.

Digestion of materials containing cellulose. A. BROBECK (U.S.P. 1,914,073, 13.6.33. Appl., 3.2.32. Swed., 6.2.31).—In digestion processes where the liquor is continuously circulated through an external heater (*H*) special straining devices (described) are used which ensure uniform withdrawal of liquor at all points on the circumference of the digester (*D*). The main part of the drawn-off liquor is returned to the top of *D* through *H*;

the remainder by-passes *H* and is fed back into *D* at the bottom.

D. J. N.

Paper manufacture. H. R. RAFTON and A. M. BROOKS, Assrs. to RAFFOLD PROCESS CORP. (U.S.P. 1,914,527, 20.6.33. Appl., 4.5.31).—An aq. dispersion of rubber (I) is used as the sizing agent, optionally in conjunction with softening agents [for (I)], vulcanising agents, and/or resin size. Alternatively, alkaline filler may be temporarily protected by a coating of pptd. (I) before being added to resin-sized stock at the wet end of the machine. The sizing of paper containing (I) is improved by heat.

D. J. N.

Manufacture of waterproof paper and pasteboard. F. B. DEHN, From INTERNAT. BITUMEN EMULSIONS CORP. (B.P. 403,116, 8.6.32).—Such products containing 50—60% of asphalt uniformly distributed therein are obtained by first treating the pulp in the beater with resin soaps, alkali oleates, Na silicate, etc. until the pulp is slightly alkaline and then adding an aq. dispersion of asphalt. The mixture, optionally after the addition of a precipitant [NaCl , Na_2SO_4 , $\text{Al}_2(\text{SO}_4)_3$], is sheeted and dried.

D. J. N.

Waterproofing of [fibrous] materials with aqueous emulsions. C. A. BRAUN, Assr. to INTERNAT. BITUMEN EMULSIONS CORP. (U.S.P. 1,905,212, 25.4.33. Appl., 21.4.30. Ger., 7.4.28).—Paper, *e.g.*, is treated in the state of pulp with an emulsion stabiliser, and then with a quick-breaking aq. emulsion of waterproofing agent (I), *e.g.*, hydrocarbons, free from colloidal powder or clay. Electrolyte may be added at the pulp stage, or the paper made and dried at a sufficient temp. to melt (I).

B. M. V.

Manufacture of fireproof bodies. G. H. ELLIS, Assr. to INSULITE Co. (U.S.P. 1,905,222, 25.4.33. Appl., 19.7.30).—Not readily combustible bodies of the artificial wood type are manufactured from a minor part of protein-containing material such as cattle hair, and a major part of woody pulped material; these are mixed, sheeted, pressed, and finally heated at 150—200°/400—500 lb. per sq. in. for 20—40 min.

B. M. V.

Sizing [of paper pulp]. W. H. RANDALL, Assr. to FIDELITY TRUST Co. (U.S.P. 1,914,163, 13.6.33. Appl., 24.6.29).—The dry, unemulsified sizing agent (I) (resin, wax, etc.), preferably molten, is incorporated with dry pulp [25% of (I) is suitable] until completely absorbed, and the mixture, after dilution with H_2O , is added to unsized pulp.

D. J. N.

[Compositions for] sizing of paper and the like. K. BRUCKMANN, and AMBER SIZE & CHEM. Co., LTD. (B.P. 403,095, 9.3.32).—Stable resin emulsions are prepared by introducing into a colloid mill, simultaneously as separate streams, molten resin and an aq. dispersion of a protective colloid (formalised casein, gum arabic, colloidal clay, etc. dispersed in, *e.g.*, 0.72% aq. NaOH).

D. J. N.

[Sized] paper testing apparatus. A. H. STEVENS, From SORG PAPER Co. (B.P. 403,304, 15.6.33).—Penetration of H_2O through the paper is made to close the grid circuit of a thermionic valve and indirectly to cause a drop in the plate current (indicated by a milliammeter). The paper is laid on a dry metal plate (*P*) and H_2O

applied to the other side by an absorbent pad fitted into an inverted jar containing H_2O . If the dry paper is a conductor it is separated from *P* by a thin perforated film of insulating material.

D. J. N.

[Parchmentising] treatment of fibrous cellulosic materials. MATHIESON ALKALI WORKS, Asses. of R. B. MACMULLIN and W. K. MCCREARY (B.P. 399,725, 27.3.33. U.S., 25.4.32).—Translucent, mouldable, and highly absorbent products are obtained by immersing cellulose (*C*) in solutions of various salts, *e.g.*, NaNO_3 , NaI, KI, and NH_4NO_3 , in liquid NH_3 at -34° to -30° for 5—30 min. under such conditions that the *C* is not dissolved; the presence of small amounts of H_2O in the liquid NH_3 accelerates the swelling of the *C*.

A. J. H.

[Manufacture of glassine or imitation parchment] paper. G. L. BIDWELL, Assr. to RIEGEL PAPER CORP. (U.S.P. 1,914,798, 20.6.33. Appl., 10.5.32).—The wet paper web is dried to a H_2O content of 60—65% and then passed through a bath containing cerelose, Na metasilicate (I), a plasticiser (glycerin etc.), and H_2O and the drying is completed. A flexible sheet of enhanced transparency and sheen is obtained. When glassine paper is required the paper is moistened with aq. (I), supercalendered, and waxed.

D. J. N.

Manufacture of paper. G. L. BIDWELL, Assr. to RIEGEL PAPER CORP. (U.S.P. 1,914,799, 20.6.33. Appl., 10.5.32).—An additional wire part is added to the wet end of the Fourdrinier machine in the manufacture of glassine or imitation parchment papers, thus eliminating all wire and felt marks. The dryers are divided into two batches, between which is placed a size press (*P*) containing Na metasilicate (*A*), cerelose, glycerin, MgCl_2 , and H_2O . After drying, and prior to calendering, the web is sprayed with aq. *A*. By carefully controlling the composition of the mixture in *P* the desired degree of transparency and gloss may be obtained.

D. A. C.

Production of artificial leather and imitation parchment. R. MÜLLER (B.P. 403,858, 1.5.33).—Preformed fleecy webs of cellulose or wood pulp, while on an endless metallic band (*B*), are impregnated with an aq. dispersion of rubber containing colouring, filling, and vulcanising agents if desired, and, after expressing the surplus liquid, are dried, stripped from *B*, grained, and/or vulcanised.

F. R. E.

Manufacture of artificial leather. G. A. RICHTER, W. B. VAN ARSDEL, and R. B. HILL, Assrs. to BROWN Co. (U.S.P. 1,905,749, 25.4.33. Appl., 17.9.29).—A fibrous material is impregnated with a major part of rubber and minor part of a non-brittle synthetic resin in the form of dispersions and/or solutions.

B. M. V.

Production of a material [containing rubber] for use as a substitute for leather. H. JACKSON (B.P. 402,982, 27.3.33).—A latex-vulcanising agent is added to vegetable paper-forming material in a hollander (*H*), both constituents of the mixture being free from latex coagulants. Rubber latex is introduced into the pulp before, while, or after it leaves *H* for the paper-making machine.

D. F. T.

Packing or jointing material. A. W. CHILLCOTT, From VELLUMOID Co. (B.P. 403,712, 23.6.32).—Two outer layers of proofed fibrous sheet material ("Vellum-

oid") (*A*) are fixed (adhesive) to an inner layer of cork, the exposed edges and/or apertures or boltholes being coated with *A* or with a metallic layer. F. R. E.

Manufacture of artificial [cellulosic] products. H. DREYFUS (B.P. 403,645, 17.6.32).—Filaments, yarns, ribbons, films, plastic masses, etc. are made from mixed esters or ether-esters of cellulose containing $> 10\%$ of an aromatic acid radical, e.g., Bz, and a substantial proportion of the ether and/or aliphatic acid radicals, e.g., Ac. The products have higher m.p. than has commercial cellulose acetate. F. R. E.

Manufacture of fibrous composition. U. S. McMILLAN, Assr. to McMILLAN FIREPROOF FIBRE Co. (U.S.P. 1,907,080, 2.5.33. Appl., 30.9.29).—A fireproof composition which is plastic when wet is formed by kneading defiberised vegetable matter with powdered inorg. substances in a rod mill having a single, heavy, loose roll instead of a no. of rods. B. M. V.

Deodorisation of paper. M. O. SCHUR, Assr. to BROWN Co. (U.S.P. 1,905,757, 25.4.33. Appl., 5.5.31).—Paper containing viscose is treated in an oxidising bath or, when partly dried, in an oxidising atm. while in the form of a rapidly moving sheet. B. M. V.

Stencil sheet. H. SIMON, Assr. to G. WAGNER (U.S.P. 1,915,904, 27.6.33. Appl., 30.8.32).—Fibrous sheets, e.g., Yoshino paper, are coated with a mixture of sulphonated oil 40, $(C_6H_4Me)_3PO_4$ 20, oleyl alcohol 10, myricyl alcohol 5, gelatin 8, glycerin 3, pigment (ultramarine) 10, wood flour (beechwood) 6, H_2O 130 pts., and preservative $[C_6H_2Me(NO_2)_3] 0.5$ pt.; before drying, the coating may be treated with a hardening agent (CH_2O) . F. R. E.

[Manufacture of] carbon papers and like transfer materials. SOC. ANON. DES ANC. ETABL. BRAUNSTEIN FRÈRES (B.P. 403,002, 2.5.33. Fr., 26.5.32).—Stearic acid or a sol., e.g., Na, stearate and $H_2C_2O_4$ (I) is added to pulp in the hollander to yield a paper containing 0.2–5 wt.-% of stearic acid, and the beating is prolonged to an extent such that a transparent parchment-like paper would be produced if (I) were not added; the paper is impregnated with ink in the usual manner. F. R. E.

Safety paper. B. W. SMITH, Assr. to TODD Co., Inc. (U.S.P. 1,911,774, 30.5.33. Appl., 29.1.31).—Cheques etc. are protected against chemical erasure by impregnation or varnishing with 4:4'-dihydroxy-diphenyl-diphenyl sulphide, etc., in conjunction with diphenylguanidine, its salts (with soap-forming acids), or sulphonated derivatives. H. A. P.

Cigarette [paper]. A. H. Low (U.S.P. 1,905,416, 25.4.33. Appl., 19.1.31).—The paper is treated with a fixed-alkali (Na) silicate. B. M. V.

Producing board-like material with the aid of mineral wool. I. KITSÉE, Assr. to MINERALITE CORP. (U.S.P. 1,890,184, 6.12.32. Appl., 21.11.29).—Slag wool or asbestos and a fibrous material are moistened with an aq. alkali silicate and the mixture is formed into boards under heat and pressure. A. R. P.

Manufacture of surface-filled paper. CHAMPION COATED PAPER Co., Assees. of D. B. BRADNER (B.P.

403,852, 21.4.33. U.S., 14.5.32).—See U.S.P. 1,913,329; B., 1934, 140.

Imitation leather.—See VI. Composite glass.—See VIII. Building materials.—See IX. Rubberised fibrous plastic.—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Use of rubber with textiles. E. WURM (Chem.-Ztg., 1934, 58, 53–55).—An account is given of rubber-proofing by the spreading and calendering processes. D. F. T.

PATENTS.

Boiling-out or kier-boiling of cotton fibres. I. G. FARBENIND. A.-G. (B.P. 403,009, 12.5.33. Ger., 12.5.32).—Treatment is effected with a liquor free from org. solvent but containing an alkali, a wetting agent (e.g., an alkylated naphthalenesulphonic acid), and an inorg. absorbent (*A*) (metal hydroxides are excluded) such as fuller's earth and H_2SiO_3 gel, so that the yellow colouring matters of the cotton become transferred to *A*. A. J. H.

Bleaching of vegetable fibres. H. T. BÖHME A.-G. (B.P. 401,199, 2.5.33. Ger., 29.6.32).—The textile material after wetting with an aq. solution of a highly sulphonated oil or the like is impregnated with a Cl-containing bleaching lye (e.g., NaOCl) and soon after is directly treated for 3–4 hr. with dil. aq. H_2O_2 at 90–95°; after rinsing and souring with dil. aq. HCO_2H the material has a soft handle and full white colour. A. J. H.

Bleaching of [vegetable] fibres. H. KAUFFMANN, Assr. to BUFFALO ELECTRO-CHEM. Co., Inc. (U.S.P. 1,908,481, 9.5.33. Appl., 10.12.31. Ger., 4.10.30).—Cotton materials are lightly chemicked, then washed, and treated with a solution containing H_2O_2 and Na_2SiO_3 ; the usual wastage of active O is thereby avoided. A. J. H.

Bleaching of tanner's wool. P. H. D. PLAINE, Assr. to RÖHM & HAAS Co. (U.S.P. 1,912,345, 30.5.33. Appl., 24.12.30).—Tannin substances are extracted by treatment with cold dil. aq. NaOH (about 0.2% solution) preferably buffered with $Na_2B_4O_7$ or Na_2HPO_4 , and bleaching is then completed by the use of $Na_2S_2O_4$. A. J. H.

Removal of pitch and other colouring matter from wool. W. SAARE (B.P. 401,525, 14.1.33).—Apparatus is described by means of which wool is exposed in a closed chamber to $CHCl \cdot CCl_2$, hexalin, or tetralin vapour, then cooled to condense adhering vapour, the resulting liquor is expressed, and the wool finally washed in an alkaline solution to remove the colouring matter. A. J. H.

Mordanting and assistant therefor. A. A. CLAFLIN, Assr. to NIACET CHEMICALS CORP. (U.S.P. 1,911,307, 30.5.33. Appl., 18.2.31).—Aldol is claimed as an assistant (in the chroming bath) in the chrome-mordanting of wool, and in mordanting with Fe^{III} , Al, and Sn^{IV} salts. H. A. P.

Dyeing of textiles. W. G. ABBOTT, JUN., Assr. to ABBOTT MACHINE Co. (U.S.P. 1,899,004, 28.2.33. Appl., 7.4.28).—Mordanting with Cr (for wool) and subsequent

dyeing are effected within a machine the metal surfaces of which are Cr-plated and inert to metal-sensitive dyes.

A. J. H.

Dyeing of [delustred] rayon. B. L. HATHORNE, Assr. to TUBIZE CHATILLON CORP. (U.S.P. 1,913,987, 13.6.33. Appl., 3.6.29).—Viscose rayon the matt appearance of which is due to the presence of occluded wax, fat, or oil globules is dyed with oil-sol. dyes. A. J. H.

Dyeing. [Coloured discharge-printing.] D. H. POWERS, Assr. to UNITED STATES FINISHING CO. (U.S.P. 1,912,008, 30.5.33. Appl., 23.11.29).—Coloured discharges on cellulose acetate and similar fibres are produced by use of printing pastes containing a vat dye and the reaction product of Na (or K) formaldehyde-sulphoxylate and an amine (NH_2Ph). H. A. P.

Ageing of printed fabric. R. E. RUPP (U.S.P. 1,913,615, 13.6.33. Appl., 6.4.31).—Excessive rise of temp. within vat-dye printed fabric during steaming (due to the exothermic reactions accompanying fixation of the dye) is prevented by causing a large steam flow across the fabric at suitable points within the usual ageing chamber (C), caused by withdrawing part of the steam at those points by means of injectors (I); the steam withdrawn and the steam working I is afterwards recirculated through C. The withdrawn steam may be cooled before re-use, if desired. A. J. H.

Production of pattern effects on [crêpe] textile fabrics. BLEACHERS' ASSOC., LTD., and G. D. SUTTON (B.P. 401,504, 13.12.32).—Crêpe fabric is embossed under suitable conditions of temp.; H_2O content, and pressure before or after the usual crêping treatment (immersion in a hot liquor); the compressed parts of the fabric fail to gain or lose their usual pebble appearance.

A. J. H.

Delustring of artificial silk. IMPERIAL CHEM. INDUSTRIES, LTD., L. G. LAWRIE, and H. D. MUDFORD (B.P. 400,244, 18.4.32).—Cellulose and cellulose acetate silk materials are treated with a hot liquor containing an Al salt (preferably 1 pt. of Al sulphate-acetate or formate) and a sulphonated alkylated petroleum fraction [e.g., 2 pts. of any one of the products claimed in B.P. 274,611 or 311,885 (B., 1927, 841; 1929, 639)], then rinsed, and dried.

A. J. H.

Delustring [of acetate rayon, varnishes, etc.]. H. A. GARDNER (U.S.P. 1,906,148—9, 25.4.33. Appl., [A] 1.7.29, [B] 1.2.32).—Alkoxides of Ti and Zr, e.g., $\text{Ti}(\text{OEt})_4$, are prepared (B) by treating TiCl_4 or ZrCl_4 with EtOH and Na metal, and are then incorporated (A) with a cellulose acetate rayon spinning solution or a varnish or lacquer under conditions such that a small amount of H_2O is present to hydrolyse them and ppt. TiO_2 or ZrO_2 in a finely-divided form. A. J. H.

Weighting of silk. V. FROELICHER, Assr. to TEXTILE DYEING & PRINTING CO. OF AMERICA, INC. (U.S.P. 1,902,226, 21.3.33. Appl., 27.7.32).—Silk is weighted in the usual manner with SnCl_4 and Na_2HPO_4 , and then further weighted and partly delustred by successive treatment with solutions containing a Pb salt, e.g., $\text{Pb}(\text{OAc})_2$, and $\text{Na}_2\text{B}_4\text{O}_7$, followed by the usual treatment with dil. aq. Na_2SiO_3 . A. J. H.

(A) Treatment [weighting] of natural and artificial silk. (B) Weighting of textile fibres. (A, B)

F. W. WEBER and (A) E. SCHAEFER, Assrs. to MAYWOOD CHEM. WORKS (U.S.P. 1,896,381 and 1,896,858, 7.2.33. Appl., [A] 11.2.31, [B] 3.2.30).—Weighting liquors are prepared by adding the carbonate of (A) a metal (particularly Ca and Mg) the chloride and phosphate of which are H_2O -sol. and -insol., respectively, or (B) a rare-earth metal (e.g., Th and La), to the usual SnCl_4 weighting solution so that its acidity is substantially reduced. A. J. H.

Weighting of (A) regenerated cellulose [rayon], (B) artificial silk consisting of cellulose esters. F. W. WEBER and E. SCHAEFER, Assrs. to MAYWOOD CHEM. WORKS (U.S.P. 1,898,105 and 1,906,206, [A] 21.2.33, [B] 25.4.33. Appl., [A, B] 3.7.31).—The weighting liquor used contains SnCl_4 made basic by addition of (A) $\text{Zr}(\text{CO}_3)_2$, (B) ZnCO_3 ; such liquors can be used repeatedly without substantial change in composition occurring. A. J. H.

Loading of natural or artificial silk or mixed materials containing them. W. ZÄNKER (B.P. 398,323, 25.7.32. Ger., 23.5.32).—Following a preliminary loading in the usual SnCl_4 bath, the material is further loaded by successive immersion in baths containing salts of Pb, Al, Fe, Cr, and Mn, etc., one of which baths must contain a Mg salt. A. J. H.

Treatment of silk stockings and like silk fabrics [with rubber dispersions]. NAUGATUCK CHEM. CO., Assees. of M. C. TEAGUE and N. H. BREWSTER (B.P. 403,394, 11.6.32. U.S., 16.10.31).—Silk fabrics are immersed in a hot aq. bath to which are subsequently added coloring agents and an aq. dispersion of rubber (R). Further heating effects fixation of the dye. A coagulant is then added to ppt. the R, which is thereby intimately distributed throughout the fabric. D. F. T.

Production of upholstering material made of rubberised fibres and process for its production. ANODE RUBBER CO., LTD., Assees. of MAGYAR RUGGYANTÁRUGYÁR RÉSZVÉNYTÁRSASÁG (B.P. 403,375, 16.6.32. Hung., 24.7.31).—In the production of shaped upholstering material consisting of rubberised fibres, the fibres are treated with a coagulant liquid, dried, and placed in the shaping mould before treating them with rubber latex. D. F. T.

Leather imitations [containing rubber]. MAGYAR RUGGYANTÁRUGYÁR RÉSZVÉNYTÁRSASÁG (B.P. 403,556, 18.4.33. Hung., 15.4.32).—Fabric is coated with rubber on both sides and the side with the thinner rubber layer is provided with vegetable or animal fibres to simulate the inner side of tanned leather; any desired leather pattern may be applied to the other side by press-vulcanisation. D. F. T.

Peroxide bleaching.—See VII. **Washing compositions.**—See XII. **H_2O -repellent coating.**—See XIII. **Fungicides.**—See XVI. **Printing on fabrics.**—See XXI.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Rapid analysis of Khibin [phosphate] minerals according to the method of insoluble residues. II. M. L. CHEPELEVETZKI, O. S. VOZNESENSKAYA, and

R. D. FAIN (Zavodskaya Lab., 1933, No. 5, 6—11).—If the residue from dissolution in boiling 40% HNO_3 is R^I and that from 4% HCl is R^{II} , then $\% \text{Al}_2\text{O}_3 = 0.775(R^I - R^{II}) + 1.65$, and $\% \text{P}_2\text{O}_5 = 40.05 - 0.987R^I + 0.566R^{II}$.
CH. ABS.

Waste gases produced in preparing kieselguhr.

W. LIESEGANG (Angew. Chem., 1934, 47, 48—49).—The gas evolved when kieselguhr is calcined is chiefly SO_2 ; H_2S , NH_3 , aldehydes, $\text{C}_5\text{H}_5\text{N}$, and thio-acids are also present. Kieselguhr contains 1.1—4.4% S.
A. G.

Determination of lead dioxide in red lead. E.

SCHÜRSMANN and K. CHARISIUS (Chem.-Ztg., 1934, 58, 55—56).—In order to avoid complications from metallic Pb which may be present, the method adopted is to treat the red lead with HCO_2H and weigh the CO_2 formed.
D. F. T.

Formation of "white" calcium cyanamide.

M. G. GABRIELOVA (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 49—58).—Interaction of NH_3 and CaCO_3 at 800° is accelerated by CaF_2 , CaSO_4 , or 3% $\text{C} + \text{Al}(\text{OH})_3$; $\text{Ca}_3(\text{PO}_4)_2$ is less effective. The product ($\text{N} > 18\%$) is uniform, non-hygroscopic, stable in storage, and easily ground.
CH. ABS.

Arsine as a military gas. A. LABAT and E.

DUFILHO (Bull. Trav. Soc. Pharm. Bordeaux, 1933, 71, 113—119; Chem. Zentr., 1933, ii, 1821).—For determination in air, AsH_3 is absorbed in anhyd. Na_2SO_4 or Baudou's paper, which is treated with dil. H_2SO_4 , Zn, and CuSO_4 solution, and the liberated AsH_3 detected colorimetrically with paper treated with Denigès' reagent (Bull. Soc. Pharm. Bordeaux, 1931, 3, 157).
A. A. E.

S from gas.—See II. CaO .—See IX. Xanthates as flotation agents. Ta.—See X.

PATENTS.

Distilling hydrochloric acid. S. B. HEATH, Assr. to DOW CHEM. CO. (U.S.P. 1,906,467, 2.5.33. Appl., 9.7.31).—For the prep. of conc. HCl vapours the feed gases are scrubbed with cold CaCl_2 brine and the solution is fractionated, the exit gases being richer than the const.-boiling composition and the exit brine above 110° . There is no surface heat transmission in the fractionator, hence it may be made of refractory material, and the brine is steamed out and neutralised before reconcn.
B. M. V.

Stabilised peroxide solutions, and application thereof to bleaching. H. T. BÖHME A.-G. (B.P. 403,035, 3.7.33. Ger., 28.7.32).—Aq. Na_2O_2 or H_2O_2 is stabilised by addition of a Mg, Al, or alkaline-earth salt of a sulphonated saturated and/or unsaturated higher aliphatic alcohol, e.g., oleyl alcohol, or hydrogenated coconut oil acids.
A. R. P.

Manufacture of soda ash briquettes. H. W. GLEICHERT, Assr. to PITTSBURGH PLATE GLASS CO. (U.S.P. 1,906,574, 2.5.33. Appl., 26.4.30).—A briquette suitable for the desulphurisation of Fe is bound with 10—15% of molasses and pressed.
B. M. V.

Production of [sodium] cyanide. E. J. PRANKE (U.S.P. 1,905,304, 25.4.33. Appl., 29.11.29).—Crude

CaCN_2 (I) is heated in a crucible with comminuted alkali metal (Na) at $> 900^\circ$. The reaction is claimed to be: $\text{CaCN}_2 + \text{C} + 2\text{Na} = 2\text{NaCN} + \text{Ca}$, the free C being that normally present in the crude (I). The Na may be in liquid or vapour form if agitation is provided. The product may be used as such, or the NaCN extracted with anhyd. NH_3 .
B. M. V.

Conversion of salt mixtures containing ammonium chloride into a granular form. J. Y. JOHNSON.

From I. G. FARBENIND. A.-G. (B.P. 403,781, 29.9.32).—A mixture of NH_4Cl (with or without other NH_4 salts), ground CaCO_3 or MgCO_3 , preferably containing some clay substance, and 4—15% of H_2O is converted into small granules by shaking, and these are dried to hard lumps by passing the granules through a rotary dryer.
A. R. P.

Crystallisation of substances [e.g., ammonium nitrate] that crystallise exothermically. APPAREILS ET ÉVAPORATEURS KESTNER (B.P. 403,240, 6.2.33. Fr., 5.2. and 23.3.32).

—A hot (130°) solution of NH_4NO_3 containing 88% of salt is subjected to reduced pressure, e.g., 60 mm., whereby the H_2O evaporates until crystallisation commences; the heat produced in this action serves to evaporate more H_2O and eventually to produce a dry salt. The process is applicable to mixtures of NH_4Cl and KNO_3 , with or without KCl in suspension.
A. R. P.

Apparatus for continuous calcination of gypsum. F. J. GOUGH, Assr. to UNITED STATES GYPSUM CO. (U.S.P. 1,905,089, 25.4.33. Appl., 18.11.29).

—The gypsum is forced downwards through a smaller rotating vertical conduit by means of a stationary worm and rises through a larger co-axial cylinder which is provided with cross-flues and external heating surface. From the large kettle it may pass to a no. of smaller ones heated by steam coils.
B. M. V.

Preparation of hygroscopic salts. O. V. MARTIN, Assr. to TEXACO SALT PRODUCTS CO. (U.S.P. 1,907,076, 2.5.33. Appl., 28.8.30).—Partly hydrated CaCl_2 in the form of granules is surface-coated with CaO or MgO , which withdraws the combined H_2O at the surface layer; the powder is preferably applied while the granules are in contact with the drying gases.
B. M. V.

Preparation of calcium nitrate from phosphate rock. A. L. MCCALLUM, B. P. SUTHERLAND, and J. B. THOMPSON, Assrs. to CONSOLIDATED MINING & SMELTING CO. OF CANADA, LTD. (U.S.P. 1,905,930, 25.4.33. Appl., 30.7.31).—Low-grade phosphate rock is treated with HNO_3 in two countercurrent stages with filtration at each stage.
B. M. V.

Production of zinc salt solutions. A. T. MERTES, Assr. to KREBS PIGMENT & COLOUR CORP. (U.S.P. 1,906,074, 25.4.33. Appl., 18.2.31).—Zn is dissolved from oxidised ore containing acid-sol. SiO_2 by H_2SO_4 added in successive quantities so that the concn. is never $> 2\%$ and the finishing point is at $p_{\text{H}} 3-5$.
B. M. V.

Concentrating beryllium oxide occurring in minerals containing beryllium silicate(s). L. BURGESS (U.S.P. 1,905,340, 25.4.33. Appl., 16.1.32).

—Beryl is calcined at $1700-1900^\circ$ with sufficient C substantially to reduce SiO_2 , but insufficient to affect

the BeO. Preferably, Fe is added to form a Fe-Si with $\leq 50\%$ Fe, which is separated magnetically, or the whole may be melted and stratified. B. M. V.

Manufacture, from dolomite, of magnesia deficient in lime and calcium nitrate. KLÖCKNER-WERKE A.-G. (B.P. 403,054, 17.8.33. Ger., 2.9.32).—The dolomite (I) is dissolved in HNO_3 , NH_4NO_3 added, and the solution agitated with calcined and finely-ground (I), whereby almost pure MgO is pptd. and a conc. solution of $\text{Ca}(\text{NO}_3)_2$ obtained. A. R. P.

Making magnesium hydroxide. AMER. ZINC, LEAD, & SMELTING Co. (B.P. 403,860, 3.5.33. U.S., 24.5.32).—An 8% MgSO_4 solution is treated with gaseous NH_3 in an amount equal to 3 times that required to combine with the SO_4 . Alternatively, a 16% solution of MgSO_4 is treated gradually with an equal vol. of H_2O while NH_3 is passed into the liquid. A. R. P.

Production of aluminium sulphate from clay. W. W. GROVES, FROM MERRIMAC CHEM. Co., INC. (B.P. 403,657, 23.6.32).—Sludge acid obtained as a waste product in refining petroleum oils is diluted to 30–35% H_2SO_4 and decanted from the pptd. org. compounds. Small clay cylinders made by calcining the shaped clay at 650–850° are heated with this acid until the Al_2O_3 is dissolved and the impurities in the acid are adsorbed by the SiO_2 residue (I) of the clay. (I) is then washed free from acid and calcined (to remove org. matter) for use in filtering or decolorising, and the Al solution is evaporated to recover $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$. A. R. P.

Non-hygroscopic composition comprising aluminium sulphate and an acid salt. C. C. FEAGLEY, ASSR. to GRASELLI CHEM. Co. (U.S.P. 1,905,833, 25.4.33. Appl., 25.6.26).—Particles of NaHSO_4 are dusted with Na_2CO_3 to form a skin of normal sulphate and are afterwards mixed with $\text{Al}_2(\text{SO}_4)_3$. B. M. V.

Treatment of aluminous materials [shales from coal measures]. W. B. LEWELLYN, and P. SPENCE & SONS, Ltd. (B.P. 402,410, 29.2.32).—Shales which have a high $\text{Al}_2\text{O}_3 : \text{Fe}_2\text{O}_3$ ratio and do not disintegrate in hot H_2SO_4 are leached, without weathering or calcining and without grinding finer than 1 in., with hot H_2SO_4 to obtain a solution having d 1.45–1.56. The nearly neutral solution is diluted and cooled to obtain $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ and the mother-liquor evaporated for $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$. A. R. P.

Treatment of silicates [e.g., leucite] with acids to obtain their soluble salts. F. JOURDAN (B.P. 402,977, 20.3.33. It., 18.3.32).—Leucite (I) granules are placed in a perforated container (C) in the upper part of an autoclave (A) the lower part of which contains dil. HNO_3 . The pressure in A is maintained at such a val. that the HNO_3 is kept at 125–140° and C is kept at $< 125^\circ$ so that the vapours condense on the (I) and extract the K_2O and Al_2O_3 . Any Fe extracted is hydrolysed at the temp. of the liquid, and since the temp. of C is $> 100^\circ$ the SiO_2 residue is porous but not gelatinous. A. R. P.

Manufacture of sodium aluminate. ALUMINIUM, LTD., ASSEES. of H. W. HEISER (B.P. 403,719, 30.6.32. U.S., 28.3.32).—A mixture of hydrated Al_2O_3 (100), Na_2CO_3 (80), and NaAlO_2 (35 pts.) with 10–15% of

H_2O is briquetted and the briquettes are heated at 900–1100°. A. R. P.

Manufacture of base-exchange materials for water softening. P. LASSELLE, ASSR. to PERMUTIT Co. (U.S.P. 1,906,163, 25.4.33. Appl., 10.3.27).—The three following solutions are mixed to form a jelly, preferably additional sol. salts (e.g., Na_2SO_4) being added to form crystals which will leave the gel porous: (a) Na or other alkaline silicate, (b) $\text{Al}_2(\text{SO}_4)_3$ or other non-alkaline amphoteric salt, (c) Na aluminate or other alkaline amphoterate. B. M. V.

Recovering base-exchange material. O. LIEBKNECHT, ASSR. to PERMUTIT Co. (U.S.P. 1,906,166, 25.4.33. Appl., 12.1.31. Ger., 25.1.30).—Waste fines from grinding of the gel are gelatinised with alkali and returned to the gel-forming solutions, or are superficially gelatinised and kneaded with new wet gel. B. M. V.

Manufacture of compound silicate gels. R. RILEY, ASSR. to AMER. ZEOLITE CORP. (U.S.P. 1,906,181, 25.4.33. Appl., 2.12.30).—For the prep. of base-exchange gels, aq. solutions of (a) alkaline silicate, (b) alkaline aluminate, and (c) non-alkaline Al salts are formed, a and b are mixed to form a jelly, a and c to form another jelly; the latter is adjusted with more c to $pH < 7$, and the two jellies are blended by kneading, dried, and granulated. B. M. V.

Production of mixtures of carbon monoxide and hydrogen. W. D. WILCOX (U.S.P. 1,905,326, 25.4.33. Appl., 28.6.30).—Hydrocarbon vapours (e.g., CH_4) are treated with excess of steam and further heated by external heat at $> 980^\circ$ until 80% dissociation has taken place; the exact amount of O_2 is then added to oxidise the remaining CH_4 to CO and convert into H_2O vapour all H_2 in excess of twice the vol. of CO. The mixture produced is suitable for the synthesis of MeOH. B. M. V.

Simultaneous production of condensed carbon dioxide and slow-setting cement. C. C. LOOMIS and A. D. MACDONALD, ASSRS. to NEW ENGLAND LIME Co. (U.S.P. 1,905,598, 25.4.33. Appl., 5.6.29).—Limestone is acted on by H_2SO_4 of $\leq 40\%$ concn. but not in excess, at 110–300°, with agitation until the acid is substantially neutralised; the residue is suitable for direct use as plaster, and the CO_2 is obtainable under any reasonable pressure. Two stages may be used. B. M. V.

Selective recovery of iodine from brines. F. K. RANDOLPH (U.S.P. 1,907,333, 2.5.33. Appl., 7.1.30).—I is pptd. by means of Cu_2Cl_2 and the slurry separated, the Cu_2I_2 is decomposed by NaOH, and the solution separated. The slurry of CuOH is chloridised for re-use, and additional Cu_2Cl_2 is prepared from CuO, Cu, and HCl, all processes being at room temp. except the prep of CuO. B. M. V.

[NH_3 from] gas liquor.—See II. Catalyst for CH_2O synthesis.—See III. Chrome-yellow.—See XIII. Manures.—See XVI.

VIII.—GLASS; CERAMICS.

Dependence on time of the action of water on glass. G. KEPPELER and M. THOMAS-WELZOW (Glas- tech. Ber., 1933, 11, 205–208; Chem. Zentr., 1933, ii,

1569).—If instantaneous dissolution of alkali is followed by diffusion of H_2O or solution into the SiO_2 framework, then $x^2 = ct$, where x is extractability, t is extraction time, and c is a const. Experimental curves were approx. parabolic. c depends on the composition of the glass and the surface condition. A. A. E.

Physico-chemical fundamentals of the modern silicate industry. W. EITEL (Angew. Chem., 1933, 46, 803—810).—A review, dealing especially with the systems $CaO-SiO_2$, $Al_2O_3-SiO_2$, and $CaO-Al_2O_3-SiO_2$, the structure of silicate minerals, the absorption spectra of silicate glasses containing Ni, F, etc., the effect of additions such as WO_3 to glass, and the influence of fluorides on the crystallisation of cristobalite in opaque glasses. H. F. G.

Coloration of glazes by light. C. W. PARMELEE and A. E. BADGER (J. Amer. Ceram. Soc., 1934, 17, 1—2).—The actinic darkening of glazes and bodies is probably due to a change in state of oxidation of the light-sensitive oxides of Fe, Mn, U, Ti, Pb, etc. A glaze of flint, felspar, and whitening appears to contain sufficient Fe_2O_3 to cause appreciable darkening in ultra-violet light. A glaze containing flint, felspar, whitening, B_2O_3 , clay, Pb_3O_4 , Zn, SnO_2 , and TiO_2 darkened when exposed for < 1 min. to daylight. The original colour is usually restored by refiring. J. A. S.

Effect of glaze composition on the colours produced by sodium uranate. K. KAUTZ (J. Amer. Ceram. Soc., 1934, 17, 8—10).—Compositions are given for the production of green, yellow, ivory, orange, and red glazes maturing at cones 6—7, by the addition of up to 0.6% of $Na_2O, 2UO_3, 6H_2O$. J. A. S.

Factors involved in the production of glazed brick by the dry-press process. W. C. RUECKEL (J. Amer. Ceram. Soc., 1934, 17, 10—13).—Brick dry-pressed from 2 clays with varying grain size, H_2O content, and forming pressure were equal to stiff-mud brick in appearance and in their ability to withstand the autoclave crazing test. Fine-grinding (through 14—20-mesh) and high pressures (1500—3500 lb./sq. in. and 7—4% H_2O) eliminated "pinholing" and "crawling." In some cases of higher H_2O content it was necessary to evacuate the mould box to avoid "pressure-cracking." No cupping of the face was noted in dry-pressing. J. A. S.

De-airing of clay as applied to the stiff-mud process. W. W. KRIEDEL (Bull. Amer. Ceram. Soc., 1933, 12, 338—340).—Various American installations, and the essential requirements, of vac. plant for removing entrapped air from pugged clay, and the advantageous effects of the vac. process on the properties of clays and of the fired products, are discussed. A. L. R.

Cone-10 saggar bodies with talc as a component. H. THIEMECKE (J. Amer. Ceram. Soc., 1934, 17, 2—6).—Bodies containing 15% of a pure talc (SiO_2 63.5, MgO 31.7, H_2O 4.8%) showed better working properties in the plastic state, increased mullite development and dry, fired, and hot strengths, and decreased shrinkage, absorption, coeff. of expansion, and tendency to sag. The fired surfaces were smoother

and of a golden-brown colour. Increase of talc content beyond 15% does not appreciably improve the body.

J. A. S.

Acid lining for melting non-ferrous metals in the high-frequency furnace. J. A. KLJUTSCHAREV and S. A. LÖWENSTEIN (Feuerfest, 1933, 9, 157—159).—Satisfactory crucibles for melting 80:20 Cu-Ni and similar alloys in the high-frequency induction furnace may be made from a mixture of natural sand 33, ground sand 30, coarsely-ground quartz 10, powdered glass 15, and clay 12%. The materials are pressed into shape after thorough mixing with 6.7—6.8% H_2O and tempering, and allowed to dry for 30 hr. before use. The first melting operation serves to sinter the crucible sufficiently to prevent fracture during subsequent melting and casting operations. A. R. P.

Effect of grain sizing on shrinkage and porosity of Georgia kaolin refractories. F. H. NORTON (Bull. Amer. Ceram. Soc., 1933, 12, 336—337).—Measurements made on crushed Georgia kaolin grog mixtures (I) in a dry, packed condition showed that (I) of low porosity (25%, and 22% by careful screening) could be produced by plant methods; from such (I), by adding just sufficient raw clay to fill the voids, products having low porosity and shrinkage on firing were obtained.

A. L. R.

PATENTS.

Glass-melting furnace. G. LUFKIN, Assr. to OWENS-ILLINOIS GLASS Co. (U.S.P. 1,906,695, 2.5.33. Appl., 26.11.30).—Even distribution of the batch is effected at the inlet end by a no. of feeding devices, and at the transfer "bridge" (weir), between the melting and refining compartments, by a no. of baffles.

B. M. V.

Melting of glass by electricity. H. F. HITNER, Assr. to PITTSBURGH PLATE GLASS Co. (U.S.P. 1,906,594, 2.5.33. Appl., 26.8.31).—Glass is melted and refined in a U-shaped furnace, the feed limb being circular in cross-section and surrounded by high-frequency coils; the outlet limb may be rectangular if desired, and electrodes are inserted through the walls at various points to maintain the temp. by bath resistance.

B. M. V.

(A) **Forehearth of glass-melting furnaces.** (B) **Manufacture of glass.** H. A. WADMAN, Assr. to HARTFORD-EMPIRE Co. (U.S.P. 1,905,533—4, 25.4.33. Appl., [A] 1.3.30, [B] 25.7.31. Renewed [B] 9.9.32).—Devices heated as a result of the electrical resistance of glass are described. (A) A forehearth is formed as a trough heated externally by separate bodies (B) of glass contained in a larger trough which is subdivided so that the different B may be heated to different temp. by means of their individual electrodes. (B) In a glass-melting furnace having multiphase electrodes (E), the current naturally tends to flow near the walls (W) and, owing to the position of max. heat, to cause contamination of the glass; the currents are therefore diverted from W by feeding in the non-conducting solid materials of the glass through W and between E.

B. M. V.

Manufacture of laminated, non-splintering glass. A. RENFREW, J. S. B. FLEMING, and IMPERIAL CHEM.

INDUSTRIES, LTD. (B.P. 403,723, 30.6.32).—The interlayer consists of a polymerised vinyl acetate (containing preferably $< 4\%$ of unpolymerised material) and 5–25 wt.-% of camphor, with or without Bu_2 phthalate or other plasticiser, and/or solvents up to 35% of the total wt. of the composition. S. M.

Composite glass. M. L. MACHT, Assr. to DUPLATE CORP. (U.S.P. 1,906,474, 2.5.33. Appl., 25.9.30).—An interposed sheet of cellulose ester is glued to sheets of glass by a mixture of: soft synthetic (glyptal) resin and a glycerol ester of fatty acid polymerised together, pyroxylin, and a pyroxylin plasticiser which is a common solvent of the adhesive and the sheet. B. M. V.

Finishing of fused silica articles. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 403,898, 4.7.33. Fr., 9.7.32).—The article (*A*) is rotated while traversing an apparatus in which it is progressively subjected to the shaping action of suitable scraping devices (*S*) (grindstones etc.) and to the glazing action of a source of heat (*H*) (electric arc etc.). *A* is then uniformly reheated at 1000° in order to remove condensed SiO_2 vapour. *S* and *H* are so disposed that the portion of *A* being scraped is above the $\alpha \rightarrow \beta$ cristobalite transformation point (200–275°). J. A. S.

Primary clouding of enamel glazes. P. EYER (B.P. 403,314, 26.6.33).—To the glaze batch is added $> 10\%$ of ZrO_2 and $> 15\%$ of high- Na_2O glass, either raw or as a precalined mixture. Up to 25% of purified $\text{Ca}_3(\text{BO}_3)_2$ or boracite may be employed in place of or in addition to the borax already in the batch. J. A. S.

Production of cloud effects in [fused] enamels. E. S. SMITH, Assr. to TOLEDO PORCELAIN ENAMEL PRODUCTS Co. (U.S.P. 1,907,094, 2.5.33. Appl., 23.11.32).—A solid, wet coat of vitreous enamel is applied and this is speckled with frit of another colour which is then streaked with a brush and jarred to produce a cirrus effect, the whole being then fired to the fusion point of the first coat. B. M. V.

Heat-treatment of ceramic materials. J. HARRINGTON, Assr. to J. HARRINGTON Co. (U.S.P. 1,906,465, 2.5.33. Appl., 22.4.29).—A beehive kiln (*K*) is provided with an entirely separate combustion furnace in which the fuel is burned at max. efficiency, the gases, if too hot, being diluted in a transfer passage and admitted to *K* at the top. B. M. V.

Treatment of ceramic materials. M. LASLEY (U.S.P. 1,906,384, 2.5.33. Appl., 10.4.31).—Impurities are oxidised in inherently plastic clays or shales by roasting a $\frac{1}{4}$ -in. layer of 8-mesh material or finer for 1–4 min. at 426–759°. B. M. V.

Manufacture of abrasive bodies. E. E. NOVOTNY, Assr. to J. S. STOKES (U.S.P. 1,907,088, 2.5.33. Appl., 26.11.32).—A composition containing the following is hardened by heat: abrasive grains, natural vegetable resin containing free phenolic OH groups, another phenolic substance, a hardening agent, aldehydes, a synthetic resin produced *in situ*, from, e.g., a polybasic acid-polyhydric alcohol product. (Cf. U.S.P. 1,902,461; B., 1933, 1021.) B. M. V.

[Manufacture of] bonding compositions and abrasive articles made therewith. CARBORUNDUM Co., LTD. (B.P. 403,698, 29.6.32. U.S., 1.7.31).—A binder for abrasives is made by slowly adding a liquid, hardenable resin (*I*), e.g., a phenol resin in the “*A*” stage (2 pts.), to disintegrated, coagulated rubber (1 pt.) and kneading the mixture at approx. 85°, with or without addition of H_2O , until it flows. On keeping, a cream rich in rubber separates, with which more (*I*) may be incorporated. S. M.

Protecting glass.—See IX. Glass substitute.—See XIII.

IX.—BUILDING MATERIALS.

Suitability of limes for sand-lime brick manufacture. G. E. BESSEY and H. J. ELDRIDGE (J.S.C.I., 1933, 52, 443–447 r).—Samples of CaO have been examined for their suitability for sand- CaO brick manufacture, as adjudged by the compressive strengths obtained on small test specimens. The property of the CaO which is of paramount importance is soundness, and CaO of any type or composition may be satisfactorily used if it is sound. A simple method of testing for soundness for this purpose is described and permissible limits of expansion are suggested. Chemical composition is of secondary importance. Moderately hydraulic CaO appears to be as satisfactory as high- Ca CaO , but magnesian CaO requires very careful treatment in order that bricks may be sound, and except under exceptional circumstances should be avoided.

New-process high-strength and masonry cements. A. J. BLANK (Concrete, 1933, 41, No. 12, 26–29).—Details are given of the manufacturing processes and test results of the new CaO -clay-cement clinker cements. T. W. P.

Wet sieving [of cement]. M. FERET (Rev. Mat. Constr., 1933, 288, 296–300).—For sieve analyses, sieving in H_2O has certain advantages over the ordinary methods. H_2O does not attack cement during the short time of sieving, but the mesh may become partly obstructed by formation of CaCO_3 . Details of suggested apparatus are given. T. W. P.

Surface colouring of artificial stone and cement products. W. SERKIN (Tonind. Ztg., 1933, 57, 1168–1171).—Materials used in the surface painting of concrete products are described. T. W. P.

Determining silt content in concrete aggregates. D. T. M. DAVIS (Eng. News-Rec., 1934, 112, 53).—In the field determination of silt content (*I*), the aggregate (*II*) is washed in a pycnometer and the wash- H_2O decanted through a 200-mesh sieve to retain sand lost in the operation. The *d* and H_2O content of (*II*) having been determined in the same apparatus, (*I*) can be calc. The necessary formulæ are given. T. W. P.

Mineral-asphalt mixtures for road construction. I. J. Z. ZALESKI (Przemysł Chem., 1933, 17, 242–247, 255–259, 273–278).—The hardness (*I*) of briquettes prepared from powdered limestone (*II*) and asphalt (*III*) is estimated by determining the rate of penetration by a standard needle under const. load, their plasticity (*IV*) from the depth of penetration at the splitting point,

and their brittleness (V) from the no. and dimensions of the cracks forming around the point of entry of the needle. (I), (IV), and (V) vary considerably and irregularly with different (III) contents and qualities, with the fineness of milling of (II), with the duration and temp. of heating the (II)–(III) mixture, and with the briquetting pressure. R. T.

Decomposition of timber. II. Decay of greenheart. III. Pitchpine. IV. Extensive wet rot. V. Dry rot. E. A. RUDGE (J.S.C.I., 1933, 52, 447–449 T; 1934, 53, 22–24 T, 37–38 T, 38–40 T).—II. Analyses of decayed greenheart for cellulose, lignin, etc. indicate that the mechanism of decay is probably dependent on a type of Cross and Bevan equilibrium, on secondary equilibria between the hemicelluloses and degradation products, and on the existence of conditions conducive to the diffusion of Ca salts to the affected tissue.

III. From a study of specimens of pitchpine recovered from service under various conditions it is concluded that the incipient decay of the wood follows the infiltration of a certain type of inorg. compound, and that the reactions involved occur only when the humidity of the timber is sufficiently high for free ionic movement. It is shown that when the infiltrated Ca is in the form of the bicarbonate, the cation becomes associated with the Cross and Bevan cellulose. Alkali and alkaline-earth salts of strong acids have no influence on the decay of wood.

IV. Four cases of extreme wet rot have been examined, and the existence of purely chemical processes associated with the infiltration of inorg. matter has been indicated. The mechanism of rot in advanced stages is confused by the complexity of reactions involved by the presence of micro-organisms, and it is concluded that the primary steps in the general decay of wood are due to the action of inorg. ions.

V. Examples of dry rot present many features in common with other cases of decay, and indicate the function of inorg. matter. The presence of moisture, generally assumed to be necessary to the growth of fungus, is shown to be necessary for free ionic movement through the wood. The presence of fungus growth is not the criterion of dry rot, but the latter is identical with wet rot in its early stages, fungus attack being subsequent to inorg. intrusion of the woody tissue.

Blue stain in *Pinus radiata* (*insignis*) timber. Preliminary experiments with case stock. J. E. CUMMINS (J. Counc. Sci. Ind. Res., Australia, 1933, 6, 244–252).—Treatment of timber (I) with "Lignasan" prevented staining. A solution containing 14 lb. of Na_2CO_3 , $10\text{H}_2\text{O}$ and 6 lb. of NaHCO_3 per 20 gals. was rather less effective. In both cases considerable surface mould developed, but this may be largely reduced by stacking to accelerate the drying of the (I). A. G. P.

Effect of steam-sterilisation on susceptibility of wood to blue-staining and wood-destroying fungi. A. D. CHAPMAN (J. Agric. Res., 1933, 47, 369–374).—Steam-sterilisation of pine wood, especially under pressure, facilitates the growth of wood-destroying fungi and increases susceptibility to deterioration by stain fungi. A. G. P.

Asphalt emulsions.—See II. **Pigments for artificial stone.** Casein [on plaster].—See XIII.

PATENTS.

Hydraulic cement. E. W. RICE, ASSR. to SANTA CRUZ PORTLAND CEMENT CO. (U.S.P. 1,907,003, 2.5.33. Appl., 16.1.32).—Portland cement clinker (I) is mixed with additional CaO and SiO_2 and ground ($>94\%$ passing 200-mesh), a slow combination taking place without reburning. A suitable mixture consists of shale 24, CaO 6, and (I) 70%. B. M. V.

Manufacture of water-repellent [cementitious] compositions. H. S. LUKENS, ASSR. to W. ADAMSON (U.S.P. 1,906,276, 2.5.33. Appl., 30.6.26).—A cement is made with H_2O in which is emulsified an insol., non-volatile, and stable solid dissolved in a volatile solvent, e.g., paraffin wax in benzol and an equal vol. of emulsifiable oil, the emulsion being flocculated after mixing by the Ca salts in Portland cement, or MgCl_2 in Sorel cement. B. M. V.

Plasters, cements, and the like. GYPSUM MINES, LTD., and R. COLLINS (B.P. 402,810, 7.6.32).—A mixture of shredded vulcanised rubber (10–33%) and gypsum plaster or Portland cement (90–67%) is used as a sound-insulating plaster. C. A. K.

Production of material for making waterproof mortar. K. C. RANKIN, ASSR. to ROCKLAND & ROCKPORT LIME CORP. (U.S.P. 1,905,187, 25.4.33. Appl., 9.2.32).—Crushed CaO is mixed with tallow or other oil or fat containing glycerides which will be dispersed by the heat of slaking. B. M. V.

Production of [low-density] aggregates from earth substances. F. A. GLASS (U.S.P. 1,906,748, 2.5.33. Appl., 8.4.32).—Earth minerals are melted (slags may be used), cooled, granulated, mixed with finely-divided fuel and, if desired, a little raw earth, and sintered. B. M. V.

Building and like materials. W. and E. M. ADAMS (B.P. 402,845, 14.6.32).—Building units of brick, concrete, wood, etc. are treated with a protective compound, e.g., asphalt (I) of m.p. 38–41° to seal the pores and then with (I) of m.p. 104–121°, with or without fillers. C. A. K.

Building materials, more particularly acoustic and thermic insulating materials. B. NEUHOF (B.P. 403,094, 14.6.33. Ger., 17.6.32).—A mixture of cement, CaO , clay, etc. and waste lyes from cellulose manufacture is used as a basis. Alkali carbonate is added if the lyes are sulphites, or an acid if sulphates, in order to generate gas bubbles in the mass. C. A. K.

Treatment of surfaces of bricks, building blocks, and the like. J. A. JOHNSON, and NORBITON POTTERIES & BRICKWORKS, LTD. (B.P. 402,918, 10.10. and 13.12.32).—"Semi-dry" bricks are treated on one face at least by a jet of steam and air carrying sand or a mixture of sand and colouring agent, before being burned. C. A. K.

Protective coverings for walls, buildings, etc., articles of a stony character, and also for articles of metal, wood, glass, board, asbestos, cement, etc. J. F. BARR and D. DE LANGE (B.P. 402,993,

25.4.33).—A protective material consists of a mixture of sand (50–70%), a laminated metal, *e.g.*, 20% of steel, Cu, Zn, Al, or graphite, a synthetic resin (*e.g.*, 3%), and a solvent of low b.p., *e.g.*, tetralin, CCl_4 , PhMe. C. A. K.

Parting compound for treating sand moulds. H. E. BECKMAN, Assr. to SPRINGFIELD FACING CO. (U.S.P. 1,906,357, 2.5.33. Appl. 6.10.31).—A major part of calcareous material is mixed with sufficient metal stearate to form a H_2O -resistant, dry, impalpable powder. B. M. V.

Preparation of paving material. G. H. ALVEY, Assr. to UVALDE ROCK ASPHALT CO. (U.S.P. 1,906,301, 2.5.33. Appl., 13.10.30).—Bituminous matter is extracted by a solvent from the finer portions of crushed rock asphalt which is too brittle to use, is replaced by a softer bitumen (aq. emulsion if desired), and the fines are put back with the coarse. B. M. V.

Roofing mastic. A. C. FISCHER, Assr. to PHILIP CAREY MANUFG. CO. (U.S.P. 1,905,376, 25.4.33. Appl., 4.6.20).—The composition comprises a bituminous base, and an adhesive ingredient (rosin etc.) combined with a jelly substance (glycerin) to retard setting. B. M. V.

Preservation of wood. J. H. ZUMWALT (U.S.P. 1,905,327, 25.4.33. Appl., 8.1.30).—The wood is impregnated with a solution containing 15% of Na silicate and 1% of Na arsenate and then treated with acid (*e.g.*, 2% H_2SO_4). B. M. V.

Protecting polished surfaces.—See I. **Slow-setting cement.**—See VII. **Coating wood etc.**—See XIII.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

Coke consumption in blast-furnace practice: effect of removal of breeze. D. F. MARSHALL and R. V. WHEELER (J. Iron & Steel Inst., 1933, 127, 87–113).—Removal of breeze on a $1\frac{1}{4}$ - or $1\frac{1}{2}$ -in. screen from the coke used in the blast-furnace smelting of Fe causes the furnace to drive more easily and reduces the coke consumption per ton of Fe by 10–12%. The results of extended trials confirm German and American experience, that the best size of coke for Fe smelting should not exceed 3 in. or be $< 1\frac{1}{4}$ or 1 in. and should contain a min. of breeze. A. R. P.

Recent developments in American blast-furnace design and practice. W. A. HAVEN (J. Iron & Steel Inst., 1933, 127, 51–80).—A review of modern American methods of dressing and smelting Fe ores and treating the by-products. A. R. P.

External heat loss of a blast furnace. D. F. MARSHALL (J. Iron & Steel Inst., 1933, 127, 127–144).—Determinations on a furnace, 53 ft. high and 25 ft. diam. at the bottom, lined with 3 ft. of firebrick insulated by 3 in. of slag wool from the outer plates which were painted with bitumen showed that, of a total heat loss of 480 B.Th.U. per lb. of Fe produced, only 16 were due to conduction to the ground and 64 to radiation and convection, the remaining 400 being lost in the cooling- H_2O . These figures differ considerably from those of

other investigators, especially as regards the low losses by radiation, convection, and conduction from the furnace walls. A. R. P.

Viscosity of molten slag from acid and basic open-hearth furnaces. T. MATSUKAWA (Suiyokai-shi, 1933, 8, 245–256).—Addition of CaF_2 to a basic open-hearth furnace slag increases the fluidity and lowers the m.p. by about 100° for 1% F. The viscosity of slag containing about 60% of $\text{CaO} + \text{MgO} + \text{MnO}$ (MnO 0.32–13.64%) decreases, and the m.p. is lowered, with rise in MnO content. Increase in MgO raises the m.p. of slag containing $\text{CaO} + \text{MgO}$ about 36%. CH. ABS.

Determination of carbon in carbonaceous pyrites. V. P. ZEMLYANITZUIN (Zavodsk. Lab., 1933, No. 1, 33–34).—Results obtained by ignition and by use of Na_2O_2 agree well. CH. ABS.

Determination of the dust content of purified and flue gases in steelworks. F. LÜTH and K. GUTHMANN (Arch. Eisenhüttenw., 1933–4, 7, 343–351).—A crit. review of the efficiency of the various methods now in use in steelworks for determining the dust content of gases. A. R. P.

Technical spectrographic analysis in steelworks' laboratories. W. GERLACH (Arch. Eisenhüttenw., 1933–4, 7, 353–354). **Spectrographic determination of silicon in iron.** G. SCHEIBE, H. HAMMERSCHMID, and G. LIMMER (*Ibid.*, 354).—A criticism of Scheibe's method (*ibid.*, 1930–1, 4, 579) and a reply. A. R. P.

Determination of oxygen in iron and steel. V. P. SHISHKOV (Zavodsk. Lab., 1933, No. 4, 14–17).—(a) H_2 is passed over the metal at 800° and H_2O determined. (b) The sample is heated in vac. at 1150° and the CO_2 and CO evolved are determined with KOH and Cu_2Cl_2 respectively. CH. ABS.

Formation of graphite nuclei in cast iron. E. SCHEIL, W. RUFF, and E. H. SCHULZ (Arch. Eisenhüttenw., 1933–4, 7, 333–335).—Micrographic examination of cast Fe cast from various temp. shows that the no. of graphite nuclei (I) present is a function of the cooling conditions and increases with the degree of undercooling (II). The size of (I) decreases with (II) since, under these conditions, the rate of crystallisation of the cementite eutectic increases more rapidly than that of the graphite eutectic, hence the outer layers of castings, in spite of the greater no. of (I) present, tend to solidify whiter than the core. Access of O_2 to the casting stream produces an oxide film the diffusion of which into the metal causes an increase in the no. of (I) formed. A. R. P.

Influence of phosphorus on the properties of hardened and tempered cast iron. J. E. HURST (J. Iron & Steel Inst., 1933, 127, 229–251).—The mechanical properties of cast Fe containing C 3.4–3.8 (graphite 2.8–3.2), Si 2.2–2.5, Mn about 1, Cr 0.5–0.7, and P 0.035–1.56% have been determined in the as-cast (I), stabilised (II), annealed (III), hardened (IV), and tempered (V) states. In (I) increase in P increases the Brinell hardness (*H*) and modulus of elasticity (*E*), but decreases the tensile strength (S_T), area of stress-deflexion curves (*A*), and permanent-set val. (V_P). After quenching in oil from $> 875^\circ$ all the specimens had *H*

> 500, the max. val. being obtained with high P and the min. with intermediate P content. In (IV) S_T is seriously reduced except in the high-P specimens; E and V_P are lowered appreciably to a degree which is greater the higher is P. In (V) H decreases with rising tempering temp., but the high-P specimens retain their H val. to just > 600°, when all specimens show the same H irrespective of the % P. Tempering is accompanied by an immediate recovery in S_T , E , and V_P , the T_S reaching a max. > that in (I); the maxima occur at a crit. tempering temp. (t), above which the vals. revert to those in (I), and are lower with increasing P as also is t . The internal stress vals. are substantially changed by tempering, and reach zero at between 500° and 575°, irrespective of the P content. In (II) S_T , H , and E are < in the other states, and the reduction is greatest with low P; hardening and tempering cast Fe from this state produces similar results to those described above. In (III) at > 900° the reduction in H increases with increase in P and is generally accompanied by an increase in S_T and A . Hardening after annealing produces irregular results, especially in metal containing > 1% P.

A. R. P.

Heat- and corrosion-resisting cast iron. J. YAMAMOTO and R. YAGI (Suiyokai-shi, 1933, 8, 257—262).—Cast Fe containing C 2.2, Si 6, Ni 13, Cr 1.5, Cu 5—6% gave the best results.

CH. ABS.

Influence of the composition of cast iron on rate of wear. E. SÖHNCHEN and E. PIVOVARSKY (Arch. Eisenhüttenw., 1933—4, 7, 371—372).—The rate of wear (W) of cast Fe depends on the type of friction to which it is subjected; thus an alloy which shows little W under sliding friction (F_S) may show considerable W under rolling friction (F_R). Deviations from the rule that W decreases as the hardness increases are due to structural differences; thus a pearlitic structure has a lower W than a ferritic. W in F_R depends on the treatment of the surface; any treatment which increases the hardness, e.g., nitrogenisation, or reduces the rate of oxidation, e.g., Cr-plating, reduces W . Increase in Si reduces W in F_R , but increases it in F_S ; Ni reduces W , and Cr and P up to 0.25% reduce W in both cases. Cu has little effect in F_R , but reduces W considerably in F_S , probably owing to its lubricating action.

A. R. P.

Effect of sulphur and phosphorus on corrosion of iron. L. TRONSTAD and J. SEJERSTED (J. Iron & Steel Inst., 1933, 127, 425—436).—The corrosion of various mild steels in 2*N*-NaCl, through which O₂ was bubbled or to which Na₂CrO₄ was added, has been examined by measuring the loss in wt. and absorption of O₂ as well as by microscopical and micro-analytical methods. Increase in P from 0.01 to 0.03% produced no appreciable effect since it remains almost entirely in solid solution; increase in S, however, seems to promote corrosion. A certain proportion of the sulphide inclusions (I) initiate the anodic attack of the surrounding metal, producing areas of local corrosion, but a larger proportion of (I) are nearly or completely inactive. It is suggested that the activity is due to the presence of crevices which cause the particles to act as cathodes for corrosion of the H₂-evolution type.

A. R. P.

Comparative corrosion-fatigue tests employing two types of stressing action. H. J. GOUGH and D. G. SOPWITH (J. Iron & Steel Inst., 1933, 127, 301—332).—Tests have been made on a cold-drawn mild steel (A), 18:8 Cr-Ni (B), 17:1 Cr-Ni (C), and 15% Cr (D) steels, duralumin (E), and 2.5% Al-Mg alloy (F) to determine the endurance in a fine spray of 3% aq. NaCl under reversed direct (S_D) and flexural (S_F) stresses at a frequency of 2200 cycles per min. The results are shown as S/N curves on the basis of 2.5×10^7 reversals. In no case do these curves show a tendency to become parallel to the N axis, i.e., none of these materials shows a corrosion-fatigue limit under these conditions. The curves after a certain endurance become simple exponentials and are of three types: (a) uniform slope for A and B under S_D , (b) decreasing curvature merging into uniform slope for C , D , E , and B under S_F , and (c) increasing curvature merging into uniform slope for F . The fracture of A and E is of the serrated type, showing that fatigue cracks penetrate very deeply into the metal before failure occurs, whereas the fracture of B , C , and D is similar to that produced by fatigue in air and is probably caused by local rupture of the protective film.

A. R. P.

Corrosion-resistant ferrous material in chemical engineering. S. WERNICK (Ind. Chem., 1933, 9, 378—380, 445—447).—The different methods of protection of ferrous material by external coating, and the physical and chemical compositions, the mechanical and corrosion-resisting properties (including corrosion-brittleness and weld decay) of Ni-Cr and similar steels, and their industrial applications are discussed.

D. K. M.

Function of lime in the desulphurisation of iron and steel. I. TRIFONOV and D. MIREV (Arch. Eisenhüttenw., 1933—4, 7, 337—341).—On heating an intimate mol. mixture of CaO and FeS reaction commences at just < 500°, and at 775° the mixture contains just < 40% CaS; the quantity of free CaS in the mixture then falls with further rise in temp. until it reaches 3.8% at 910° and the mixture melts. From this point up to 1100° the free CaS increases rapidly up to 48.4% and then slowly to 50% at 1300° and above. This behaviour is attributed to the formation of the compound CaO,FeS at 910° since mixtures of CaS and FeO show no min. CaS content at this temp. At > 1100° the reaction is $2\text{CaO} + 2\text{FeS} = \text{CaS} + \text{FeS} + \text{CaO,FeO}$ and the reaction products are the same when 2CaS and 2FeS are used. With a 2:1 mol. mixture of CaO and FeS reaction proceeds completely thus: $2\text{CaO} + \text{FeS} = \text{CaO,FeO} + \text{CaS}$ and with a 2:1 mol. mixture of FeO and CaS thus: $2\text{FeO} + \text{CaS} = \text{CaO,FeO} + \text{FeS}$. These results explain the phenomena observed in the desulphurising of Fe with CaO and the inhibiting effect thereon of FeO in the slag.

A. R. P.

Structural changes in hypoeutectoid steels on heating. (SIR) H. C. H. CARPENTER and J. M. ROBERTSON (J. Iron & Steel Inst., 1933, 127, 259—284).—During the heating of steel with 0.2—0.6% C ferrite (F) is absorbed by the spread of austenite (A) from points originally occupied by pearlite (P), and, on quenching, this A area is converted into fine-grained martensite (M); on slow cooling, however, F begins to form at the

boundaries of the M grains and thus a small-grained F - P structure develops from comparatively large A areas. At just $>$ the upper limit of the crit. range (R_C) steel consists of a system of small A crystals which with further rise in temp. grow and absorb their neighbours until finally all the small crystals are absorbed and grain growth ceases. With a given rate of cooling (C_R) more F is formed from small- than from large-grained A since the F always forms at the grain boundaries. In steel with 0.1% C small A grains are formed at just $> R_C$, but small F crystals are not obtained on cooling since in this steel the size of the F crystals is affected only by C_R and not by the initial temp. (T), owing to the coalescence of F on cooling. The size of the P grains is affected, however, by T ; when T is within R_C P occurs as groups of small particles, when T is just $> R_C$ the particles of P are widely distributed, and when T is much $> R_C$ the size of the P grains increases with the size of the A grains. The behaviour of steels near the eutectoid composition when heated at or just above R_C is complicated by the fact that dissolution of F and cementite (C) is completed at the same temp., and hence these constituents act as nuclei for the changes which occur on cooling, so that a very intimate F - P mixture is obtained; the typical structure of definite P grains surrounded by F envelopes is obtained only when T is high enough to dissolve all F and C to give homogeneous A . Both T and C_R affect the development of the banded structure; the greater are T and the time of heating the smaller must C_R be to obtain bands. Repeated heating above R_C does not progressively decrease grain size, only the first heating being effective.

A. R. P.

Properties of austenitic steels. L. B. PFEL and D. G. JONES (J. Iron & Steel Inst., 1933, 127, 337—378).—The rate of work-hardening (W) of 18% Cr austenitic steels decreases rapidly with increase in Ni from 8 to 12%, then more slowly up to 29%; for alloys with 0.1% C the Brinell hardness (H) after 50% reduction by rolling (R) is 467 for the 18/8 (I), 364 for the 18/12 (II), and 335 for the 18/15 alloy (III). Increase in C from 0.04 to 0.1% increases W appreciably, whereas a slight decrease in W occurs when the % C is raised to 0.2 for (I). Variations in the % C in (III) have a much less marked effect, the H of annealed alloys being raised only slightly and W remaining almost const. Mo increases the H of annealed (I) but reduces W , whereas it has very little effect on (III); Ti has a similar action to that of Mo. Addition of Si to 22/9 Cr-Ni steel raises the initial H but decreases W , whereas it has no effect on 22/15 Cr-Ni steel. The effects of Mo, Ti, and Cr additions to (I) are attributed to the inhibiting action of these elements on the breakdown of austenite; this has been confirmed by magnetic measurements. The softening temp. (T) of cold-rolled strip is unaffected by the degree of cold-work, softening occurring gradually with rise in annealing temp. without any sudden drop in H , except in the case of (III), which softens rapidly at 725—750°. Increase in C raises T rapidly, whereas increase in Ni reduces it; additions of Si, Mo, and Ti raise T and increase H of the fully annealed alloys. In all the steels, except (I), tested an increase in H occurs on annealing at 550°. By suitable heat-treatment,

comprising a low-temp. anneal to ensure that no C is dissolved or left in solution and that the boundaries of the fine crystals produced by recrystallisation do not coincide with the deposited carbide films, almost any type of cold-worked austenitic steel may be heated at about 650° without becoming subject to intercryst. corrosion (cf. following abstract).

A. R. P.

Intergranular corrosion of 18/8 austenitic stainless steels. E. C. ROLLASON (J. Iron & Steel Inst., 1933, 127, 391—413).—From short-time heating tests at various temp. on 7 different modifications of 18:8 Cr-Ni steel a relation has been established between the temp. (t) and time (T) of heating required to produce intergranular corrosion [weld decay (D)] in the CuSO_4 - H_2SO_4 test. According to the C content, T is a min. between 750° and 650°; at higher or lower temp. T increases, giving rise to two curves suggestive of asymptotic vals., the slope of the lower curve being expressed by $t = KT^{-0.065}$, where K is a const. Comparison of these curves for the different steels shows that increase in C or addition of Cu increases, whereas addition of W decreases, the susceptibility to D . Alloys with high Cr (21%) and $> 1\%$ Si, with $> 4\%$ Mo, or with 0.6% W and 0.5% Ti are resistant to D provided that the prior heat-treatment is conducted at $> 1050^\circ$; this indicates that addition of elements which form a contracted γ -field with Fe in sufficient amount to produce δ -Fe when the alloy is quenched from $> 1000^\circ$ greatly enhances resistance to D . The development of D appears to be due to the initial separation of Cr-rich carbides with the consequent reduction in the Cr content of certain areas, the coagulation of fine carbide particles, and the diffusion of Cr and Ni into the Cr-impoverished areas. A. R. P.

Formation of columnar crystals in steel sheets after normalisation. F. KINSKÝ (J. Iron & Steel Inst., 1933, 127, 209—221).—Their formation is attributed to small thermal intercryst. strains set up by a rapid passage through the region of max. segregation of α ; the crystals appear after box-annealing in the A1—A3 range (950—850°) in an oxidising medium, and their formation can be prevented by annealing in a neutral or slightly reducing medium which prevents decarburisation, although subsequent annealing in an oxidising medium will induce their formation.

A. R. P.

Inclusions in steels. A. M. PORTEVIN and R. PERRIN (J. Iron & Steel Inst., 1933, 127, 153—172).—A theoretical discussion, based on the phase rule, of the causes and nature of the inclusions (I) in steel leads to the conclusion that (I) should be considered as an elementary slag in space and time, in space because their very small dimensions permit their assimilation to an element of val., and in time because they develop in conjunction with the metal containing them or from which they are derived. Methods of studying the nature of (I) are described, some characteristic (I) (MnS, SiO_2 crystals, garnet, chromite, oxysulphide eutectics, etc.) are illustrated, and the equilibria in the systems Fe-Mn-O, Fe-Si-O, Fe-Mn-Si-O, and Fe-Mn-Al-O are discussed theoretically on the basis of recent work.

A. R. P.

Notched-bar impact strength and the width of the lines in X-ray interference diagrams of steel.

E. SIEBEL, R. BERTHOLD, and P. KÖTZSCHKE (Arch. Eisenhüttenw., 1933—4, 7, 355—358).—No relation between these properties was found in a Cr-Ni steel the impact strength of which could be altered by heat-treatment, or in a hardened plain steel aged at 100—300° or heated for a short time in this temp. range. A. R. P.

Influence of various alloying elements on the hardening of steel by quenching. H. ESSER, W. EILENDER, and H. MAJERT (Arch. Eisenhüttenw., 1933—4, 7, 367—370).—The crit. quenching rates, R_1 , at which martensite first appears in the troostitic structure, and R_2 , at which the austenite is completely converted into martensite, have been determined for various alloyed steels with 0.3—1.5% C. R_1 and R_2 are progressively reduced by increasing Ni or Mn content and by Cr and W up to a certain amount; with high Cr and W, both R_1 and R_2 increase again. Si first reduces both rates, then rapidly increases them with > 3% Si; Co increases them linearly, and V with quenching temp. of 950—1000° increases them linearly at first and afterwards more rapidly. In steels quenched at 1100° V behaves like Si. The different behaviour of the various alloying elements is attributed to their effect on the range of stability and the rate of transformation of the γ -phase. A. R. P.

Iron-nickel alloys. O. DAHL and J. PFAFFENBERGER (Z. Metallk., 1933, 25, 241—244).—Measurements of the hardness and electrical resistance of Fe-Ni alloys with 50—90% Ni show that max. changes in these properties on annealing at 400—600° occur with the alloy corresponding to FeNi₃. This permalloy effect (I) is attributed to a change from random to regular orientation of the atoms in the lattice after this treatment, and not to pptn.-hardening effects, since it is entirely unaffected by the presence of C, O, or N in the alloy and occurs even in vac.-melted alloys of high purity. Addition of Be, Ti, V, Cu, or Al produces age-hardening effects without affecting (I). With 2% Si, however, (I) apparently disappears, and with 5% Si it appears in the inverse direction; this behaviour is shown to be due to superimposed pptn.-hardening effects of Si, (I) actually remaining unchanged. A. R. P.

Influence of the quenching conditions on the internal stress in [nickel] steels. H. BÜHLER and E. SCHEL (Arch. Eisenhüttenw., 1933—4, 7, 359—363).—The magnitude and distribution of the stress (S) are determined by (a) the thermal contraction above the transformation point (T), (b) the expansion during transformation, and (c) the thermal contraction below T . As the quenching temp. (t) is lowered the effect of these factors disappears successively; when t is at the beginning (B) of martensite formation (M) the effect of (b) on S increases, and if thermal stresses are already present these are reduced but transformation stresses are increased. When t is between B and the ending (E) of M the converse effect is observed, and when t is at E only thermal stresses are present and these are the smaller the lower is t . By progressively raising the temp. of the quenching medium (Q) while keeping t const. the effects of (c), (b), and (a) disappear or are reduced in succession. These results show that in hardening low-C steels the temp. of Q should be kept at

about E to obtain min. S , and in hardening steels which develop S due to (b) Q should be > E . It should be remembered, however, that in stage-hardening, the rate of cooling in the region in which rapid pearlite formation occurs may not be fast enough to ensure thorough hardening throughout the metal. A. R. P.

New nickel-manganese steel. J. H. HALL (Japan Nickel Rev., 1934, 2, 67—82).—The material consists of 10—14% Mn steel which contains 3—5% Ni and has the C content reduced to about the eutectoid ratio. An austenitic structure is obtained after heating at 900—1010° and cooling in air. The resulting steel is not affected by subsequent heating, if the temp. does not exceed 425° for a prolonged period or 610° for a short time. Wear-resistance, resistance to heat embrittlement, behaviour on rolling, drawing, and welding, and its applications are discussed. Mechanical properties of cast, rolled, and drawn Ni-Mn steel are given. E. S. H.

Nickel-chromium-molybdenum steels for heavy-duty forgings. M. R. CHASE (Japan Nickel Rev., 1934, 2, 83—92).—The physical properties and applications of steels of the following types are given: (a) C 0.30—0.35, Mn 0.55, Cr 0.75, Ni 1.50, Mo 0.25, Si 0.25%; (b) C 0.35—0.45, Mn 0.55, Cr 0.75, Ni 1.50, Mo 0.25, Si 0.25%; (c) C 0.50—0.60, Mn 0.55, Cr 0.75, Ni 1.50, Mo 0.30, Si 0.25%; and (d) C 0.50—0.60, Mn 0.55, Cr 0.80, Ni 1.50, Mo 0.75, Si 0.25%. E. S. H.

Influence of the chief alloying elements on mechanical properties of the largest steel forgings. H. KORSCHAN (Japan Nickel Rev., 1934, 2, 27—52).—Curves are given which show the change in chemical composition and mechanical properties of 100-ton castings of C, Mn, Ni, and Mo-Cr-Ni steels after various stages of hot-working and heat-treatment. E. S. H.

Physical chemistry of flotation. VI. Influence of surface-active substances on selective wetting of minerals as a foundation of the theory of flotation. M. E. LIPETZ and M. M. RIMSKAYA (Tzvet. Met., 1932, No. 7—8, 12—27; cf. B., 1933, 920).—Selective-wetting (I) isotherms have been studied, variations in (I) with concn. of surface-active substances (II) in one of the liquids being given. For hydrophilic minerals the adsorption layers of the collectors cause a decrease in (I) with transition into non-(I). For hydrophobic minerals the reverse holds. The inversion points of (I), characterising the concns. of reagents favouring or "poisoning" flotation (F), determine the behaviour of minerals in selective F . In the (I) of mineral particles by the aq. medium at the air boundary the non-wetting caused by F agents is a result of hysteresis; adsorption layers simply hinder the attainment of the equilibrium in the (I) process. The action of (II) on the (I) at the boundaries of two liquids always proceeds in parallel with their hysteretic influence on the inhibition of (I) by the aq. medium at the air boundary. CH. ABS.

Chemical basis of flotation. I. W. WARK (Proc. Austral. Inst. Min. Met., 1933, No. 90, 83—107).—A summary of recent work of Wark and Cox (B., 1932, 347; 1933, 631). A. R. P.

Nature of the flotation process. D. L. TALMUD (J. Tech. Phys., U.S.S.R., 1931, 1, 67—76).—Curves show the stability of films of palmitic, stearic, and oleic acids, Et oleate, and cetyl alcohol, and their effect in holding in suspension CaCO_3 , MoS_2 , and PbS .

CH. ABS.

Xanthates, their properties and importance for flotation. I. Preparation. II. Flotation. E. A. SCHTSCHERBAKOVA (Tzvet. Met., 1932, No. 1, 6—22, No. 7—8, 43—65).—I. The prep. of xanthates from various alcohols is described.

II. Purified xanthates give the best results. The quality of xanthates may considerably influence the separation of minerals from polymetallic ores. Higher xanthates are better than Na ethylxanthate. K isomethylxanthate may be replaced by K butylxanthate. Of the higher xanthates examined K benzylxanthate was the least active.

CH. ABS.

Oxygen-free [ore] flotation. I. Flotation of galena in absence of oxygen. S. F. RAVITZ and R. R. PORTER (Amer. Inst. Min. Met. Eng., Tech. Publ., 1933, No. 513, 17 pp.).—From experiments made in N_2 with H_2O and reagents completely freed from O (< 0.8 pt. in 10^8 pts.) and with galena (I) freed from oxidation products (II) by prolonged washing with H_2O , it is shown that pure (I) floats without any reagents and is rapidly and completely floated by traces of terpeneol alone or Na ethylxanthate alone; the presence of (II) on the surface of (I) retards flotation appreciably. These results are in opposition to the chemical theory of flotation and to the suggestion that air does not displace H_2O from the surface of (I). It is suggested tentatively that the function of xanthates in flotation is to remove (II) from mineral surfaces, leaving the non-polar sulphide free for displacement of H_2O by gas.

A. R. P.

Flotation of Bahr-Usyak sulphidic copper ore (South Ural). A. S. SLADKOV (Tzvet. Met., 1932, No. 7—8, 93—107).—The ores contain 5.85% Cu; 0.5 g. Au and 21.6 g. Ag per ton. The Cu is present as chalcocite and chalcopyrite. Flotation gave a recovery of Cu 97—98, Au 81, Ag 70%.

CH. ABS.

Action of salt solutions on the Mansfeld copper shales and sulphide copper ores. F. KRÜLL (Chem. Erde, 1933, 8, 496—503).—Cu ores were digested with solutions of KCl, NaCl, MgCl_2 , MgSO_4 , and CaCl_2 of various concns. and at various temp. and pressures, but on an average only 0.05% Cu passed into solution.

L. J. S.

Flash-roasting [of copper sulphide ores]. F. S. WARTMAN (Amer. Inst. Min. Met. Eng., Tech. Publ., 1933, No. 514, 1933, 12 pp.).—In the flash-roasting of sulphide ores of Fe and Cu in a vertical shaft furnace, variations in particle size below 100-mesh, in temp. between 1000° and 1250° , and in the height of the shaft have little effect on the S content of the calcine (C), but an updraught of air effects more efficient removal of S than does a downdraught; excess of O_2 or air over that required to complete the roast is inert, and in no case is SO_3 found in the flue gas or $\text{SO}_4^{''}$ in C. The temp. of the roasting particles is much $>$ that of the furnace, so that fusion or partial fusion into spherical pellets or shells occurs and hence dust losses are low.

Flash-roasting of chalcocite yields a mixture of Cu_2O and CuO , and of chalcopyrite and bornite $\text{CuO}, \text{Fe}_2\text{O}_3$ and, with a deficiency of air, Cu. At high temp. when an excess of Cu_2O is present the compound $\text{Cu}_2\text{O}, \text{Fe}_2\text{O}_3$ is formed as black hexagonal crystals, d 5.47, whereas at lower temp. $\text{CuO}, \text{Fe}_2\text{O}_3$ results in one of two forms: (a) strongly magnetic, steel-grey crystals, d 5.3, at 800 — 900° with rapid cooling, (b) feebly magnetic, brown tetragonal crystals, d 5.29, at 350° with slow cooling. All three compounds are practically insol. in commercial leaching liquors, even conc. aq. NH_3 and hot 8% aq. KCN; flash-roasted Cu ores can, however, be smelted with unroasted ore to yield metallic Cu by any of the usual processes.

A. R. P.

Spectroscopic determination of secondary constituents in copper. R. BRECKPOT (Ann. Soc. Sci. Bruxelles, 1933, 53, 219—247).—Using the most suitable comparison rays, the min. quantities of impurities which can be determined spectroscopically in Cu are: Pb 0.001, Bi and Ag 0.0001, Sb and As 0.01%.

J. W. S.

Influence of iron and aluminium on the accuracy of determination of tin in copper-zinc alloys. M. I. SHUBIN (Zavodskaya Lab., 1933, No. 1, 25—33).—At 1% Sn, adsorption of Fe raises the result by 0.05% for 0.2% Fe, 0.10—0.15% for 1—3% Fe, and 0.03—0.06% for 1—4% Al.

CH. ABS.

Heavy-metal alloys containing beryllium. W. HESSENBRUCH (Z. Metallk., 1933, 25, 245—249).—A review of recent work on the pptn.-hardening of Cu, Ni, and Co alloys containing Be, with special reference to the acid-resisting Contracid alloys (cf. B., 1933, 1013).

A. R. P.

Causes of the variability of some electrical properties of manganin. N. A. SHALBEROV (J. Tech. Phys., U.S.S.R., 1931, 1, 509—545).—Heating for a long period at 550 — 600° reduces the tendency to vary with time. Change in sp. resistance is due to the formation of an oxide film low in Mn.

CH. ABS.

Milling methods and costs at the concentrator of the Mount Isa Mines, Ltd., Mt. Isa, Queensland. L. K. JACOBSEN (Proc. Austral. Inst. Min. Met., 1933, No. 90, 191—207).—A description of the gravity and flotation plant and procedure for concentrating PbCO_3 and PbS ores is given together with flow sheets.

A. R. P.

Sintering and smelting mixed lead carbonate-lead sulphide concentrates at Mt. Isa, Queensland. F. A. FORWARD (Proc. Austral. Inst. Min. Met., 1933, No. 90, 125—189).—The concentrates from the flotation plant contain 48% Pb, much of which is present as PbCO_3 ; they are mixed with limestone, hæmatite, and, if necessary, pyrites and returned sinter fines to give a feed to the sintering machines containing about 5.5—7% S. With a 7.5-in. bed the S in the finished sinter is 1.7%. Details are given of the blast-furnace operation and fume-collecting plant and of the difficulties met with in installing suitable plant.

A. R. P.

Extraction of ferruginous lead concentrates from oxidised lead ores of the Kara-Ken-Sai deposit (Kasakstan, Turian District, U.S.S.R.). S. I. POLKIN (Tzvet. Met., 1932, No. 12, 10—49).—The ores (Pb 16—18, Zn 2.3, Fe 36%) are oxidised Pb-Fe ores

consisting mainly of limonite and cerussite, with large amounts of colloidal slimes, so that table concn. is inapplicable. Flotation with coal tar gave an 85–87% extraction of Pb. The Zn remained uniformly distributed among the products of flotation. CH. ABS.

Refining of lead by chlorination. F. M. LOSKUTOV (Tzvet. Met., 1932, No. 9, 87–98).—Under the conditions employed, the chlorination process showed little superiority over the heating process. CH. ABS.

Pyrometallurgical treatment of lean antimony ores. Y. Y. SLOBODSKA (Tzvet. Met., 1932, No. 7–8, 108–113).—Ores containing 3.3% Sb, sulphidic or oxidised, can be smelted without previous concn., yielding Sb_2O_3 , which is then reduced with anthracite (I) (97% recovery). With oxidised ores addition of (I) to the charge reduces non-volatile Sb_2O_5 to Sb_2O_3 . Oxidation heating of the ore without (I) at 900° gave 80% recovery of Sb, only that present as sulphide being extracted. CH. ABS.

Applications of tantalum. S. GANSWINDT and K. MATTHIES (Chem. Fabr., 1933, 6, 521–523).—The principal physical and chemical properties of Ta, including its resistance to corrosion, are summarised, and a brief account is given of the uses of the metal, e.g., at high temp., in rectifiers, as a “getter” in thermionic valve construction, for handling hot conc. HCl, for laboratory apparatus, and as a protective lining for autoclaves etc. H. F. G.

Behaviour of metals under static and dynamic deformation. P. LUDWIK (Z. Metallk., 1933, 25, 221–228).—Recent work on the phenomena of plasticity, work-hardening, age-hardening, crystal recovery, recrystallisation, internal stress, damping capacity, and sensitivity to notch-brittleness is reviewed. Tests on numerous steels and light-metal alloys under the corrosive action of sea- H_2O show that the fatigue limit never exceeds 15 or 7 kg. per sq. mm., respectively, and cannot be improved by heat-treatment. Polished specimens usually show a greater endurance limit than specimens with a rough or notched surface. A. R. P.

Crystal structure and practical metal working with electron as an example. W. SCHMIDT [with H. ALTWICKER, A. BECK, H. BOTHMANN, W. SCHMIDT, E. SCHMID, W. SCHULTZE, G. SIEBEL, and P. SPITALER] (Z. Metallk., 1933, 25, 229–236).—The crystal orientation (I) in a metal has a considerable effect on the working properties, especially in the case of hexagonal metals like Mg where the ease of deformation varies considerably with the direction of application of the load. Thus Mg alloys draw readily when the direction of drawing is at 45° to the hexagonal base of the crystals, and are relatively brittle when it is parallel or at right angles to the base. The best working temp. is $> 225^\circ$; below 210° cracking invariably occurs. The effect of (I) on drawing, rolling, forging, and extrusion of electron is discussed at length, and practical hints for the correct working of the alloy are given. A. R. P.

Corrosion tests on hydronalium. P. BRENNER (Z. Metallk., 1933, 25, 252–253).—Tests in sea- H_2O and in agitated 3% aq. NaCl over a period of 12 months have shown that hydronalium (Mg 10, Al 90%) is practi-

cally inert to attack either in the hard or soft state, whereas duralumin is severely and 99.5% aluminium considerably corroded under the same conditions. Alloys with $< 8\%$ Mg show a tendency to scale and sometimes the sheet splits into two or more thinner sheets when kept for long periods in stirred 3% aq. NaCl. A. R. P.

Preparation of magnesium from magnesium oxide by the fluoride process. I. Composition of the bath. G. FUSEYA, K. MORI, and H. INAMURA (J. Electrochem. Assoc., Japan, 1933, 1, 109–115).—The systems MgF_2 – BaF_2 and MgF_2 – CaF_2 form eutectics at 912° (30–35 wt.-% MgF_2) and 970° (52% MgF_2) respectively. The system BaF_2 – CaF_2 forms a solid solution in all proportions with min. f.p. 1277° (50% BaF_2); that of the system MgF_2 – BaF_2 – CaF_2 is at 817° (40, 42, 18%). CH. ABS.

Electrolytic manufacture of magnesium. Y. KATO, R. TAKASE, and K. TACHIKI (J. Electrochem. Assoc., Japan, 1933, 1, 103–108).—On addition of C and MgO to the chloride bath electrolysis proceeds smoothly without evolution of Cl_2 at the same applied voltage (5.5) and c.d. as for chloride alone; the current efficiency is 75–80%. Fe_2O_3 , SiO_2 , and P_2O_5 escape as volatile $FeCl_3$, $SiCl_4$, and $POCl_3$. Mg (98% purity) is obtained at 22 kw.-hr. per kg. CH. ABS.

Electrolytic parting of the noble metals. F. VOGEL (Russ.-German. Vestn. Nauk Tech., 1932, No. 11–12, 21–28).—The Ag content of a Au–Ag alloy is preferably increased by fusion with a Ag-rich alloy. For electrolytic refining of Ag, the Siemens & Halske process is preferred to that of Dietzel. CH. ABS.

Heating of Fe and Cu water pipes.—See I. **Melting non-ferrous metals.**—See VIII. **Electrolytic etching.**—See XI. **Distilled H_2O .**—See XXIII.

PATENTS.

Operation of blast furnaces. L. B. WEIDLEIN (U.S.P. 1,906,680, 2.5.33. Appl., 3.2.32).—All the gas-outlet pipes at the top of a blast furnace (F) are taken to a junction chamber on the axis of and above F , thus producing uniform draught-resistance all around the circumference. B. M. V.

Roasting of ores. A. L. J. QUENEAU (U.S.P. 1,905,604, 25.4.33. Appl., 25.6.31).—In a roasting process at some stage of which excessive heat may be developed, the temp. is controlled by addition of endothermically decomposable material to that zone. In the roasting of Zn ores that material may be $ZnSO_4$ collected from the oxidising gases leaving the top or feed-hearth of the roaster. B. M. V.

Production of sheet metal. J. C. WILLIAMS, J. S. WILLIAMSON, J. ECHOLS, C. H. HUNT, and G. W. VREELAND, Assys. to WEIRTON STEEL Co. (U.S.P. 1,906,297, 2.5.33. Appl., 14.10.30).—Fe or steel sheets suitable for shaping are hot-rolled to an intermediate gauge, descaled, cold-rolled to near the finished thickness, normalised, sand-blasted, and finally given a light cold-rolling to produce a “temper finish.” B. M. V.

Production of sheet metal. J. B. TYTUS, Assr. to AMER. ROLLING MILL Co. (U.S.P. 1,907,019–20, 2.5.33.

Appl., 18.1.29).—The billets are reduced hot, then cold-rolled to gauge, normalised at 898°, quickly cooled, and annealed. Continuous processes are intended.

B. M. V.

Heat-treating [metal sheets]. H. A. DREFFEIN (U.S.P. 1,905,272, 25.4.33. Appl., 13.7.31).—The sheets etc. are normalised at $\leq 954^\circ$ while moving countercurrent to non-oxidising burning gases, and quickly cooled to $\geq 648^\circ$ in a countercurrent of the same gases after cooling.

B. M. V.

(A) **Prevention of oxidation of metals during heat-treatment.** (B) **Low-temperature bright-annealing.** [A, B] R. J. COWAN and (B) O. E. CULLEN, Assrs. to SURFACE COMBUSTION CORP. (U.S.P. 1,905,809—10, 25.4.33. Appl., [A] 2.5.31, [B] 29.12.30).—(A) A reducing gas for temp. $< 676^\circ$ (at which temp. H_2 is ineffective) comprises dehydrated flue gas and any alcohol flowed countercurrent to the metal during heating and concurrent during cooling. (B) Annealing is effected at $< 650^\circ$ in a much hotter furnace by moving the metal countercurrent to a hydrocarbon gas, e.g., C_3H_8 , fast enough to prevent excessive rise of temp., and continuing in the cooling zone concurrent to some of the gas from the heating zone.

B. M. V.

Production of stainless iron. W. H. KEEN, Assr. to C. W. GUTTZEIT (U.S.P. 1,905,721, 25.4.33. Appl., 14.8.30).—Stainless "iron" of usual composition (Cr 10—15, C 0.06—0.15%) is heat-treated to render it easily machinable by working at a temp. (980—1036°) low enough to prevent the formation of austenite, annealed to the required hardness at 816—871°, cooled to 480—590°, reheated to 828—870°, and cooled in still air.

B. M. V.

Steel alloys. H. J. SCHIFFLER (B.P. 403,806, 14.12.32. Ger., 18.12.31).—Claim is made for steel containing Cr 2—4 (3), Al 0.2—0.6 (0.25), Mo 0.3—0.8 (0.5), C < 0.5 (0.08), Si 0.2—0.35 (0.35), and ≤ 1 of the metals Co, Cu, Mn, W, U, Zr ($\geq 1\%$). V and/or Ti may replace part of the Mo, but $\leq 0.2\%$ Mo must be present. The steels are said to resist heat and pressure well and to be non-scaling at high temp.

A. R. P.

Cast ferrous nitrided article. A. W. MORRIS, Assr. to MOORE DROP FORGING CO. (U.S.P. 1,906,995, 2.5.33. Appl., 21.11.31).—Cast Fe (defined as Fe containing 1.7—3.75% C) is alloyed also with 1—2% Zr and then nitrided.

B. M. V.

Nitridation of metals. A. B. KINZEL, Assr. to ELECTRO METALLURG. CO. (U.S.P. 1,907,183, 2.5.33. Appl., 26.5.31).—During the nitriding process the articles are heated by high-frequency (order of $10^4 \sim$) electric currents induced in them.

B. M. V.

Apparatus for hardening metals. F. A. MILLIFF (U.S.P. 1,907,331, 2.5.33. Appl., 6.4.31).—Nitriding etc. is carried out under vac., which reduces the b.p. of the steel.

B. M. V.

Welding electrode. H. SCOTT, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,905,247, 25.4.33. Appl., 8.4.31).—A low-C ($< 0.3\%$) steel has the Ar3 point lowered to between 550 and 200° by addition of $> 2\%$ each of any two of the metals Ni, Mn, Cr.

B. M. V.

Covered welding rod. H. B. WOODS, Assr. to HUGHES TOOL CO. (U.S.P. 1,905,081, 25.4.33. Appl., 23.12.29).—Coverings composed of $CaCO_3$, SiO_2 , Fe—Mn, and (optionally) Fe—Si or Fe—Cr in wide proportions are claimed.

B. M. V.

Coated welding wire. R. NOTVEST, Assr. to J. D. ADAMS MANUFACTURING CO. (U.S.P. 1,905,648, 25.4.33. Appl., 12.2.32).—The coating comprises Fe_2O_3 55 pts. and SiO_2 45 pts. with aq. Na silicate as a binder and sufficient $CaCO_3$ to neutralise. Finely-divided Si or other metal to reduce exothermically the Fe_2O_3 at the arc temp. may be added.

B. M. V.

Alloy for use in the cracking of petroleum. V. B. BROWNE (U.S.P. 1,905,436, 25.4.33. Appl., 7.2.30).—A metal resistant to corrosion at high temp. comprises: Cr 4.0—8.0, Cu 0.25—5.0, Al 0.50—1.00%, the balance being chiefly Fe.

B. M. V.

Ore separation. A. J. WEINIG and R. E. CUTHBERTSON, Assrs. to AMER. METAL CO., LTD. (U.S.P. 1,906,029, 25.4.33. Appl., 8.12.27).—Selective flotation of micaceous gangue from Cu and Pb minerals is effected by the use of glue to depress Cu and gangue, or if alum is also added the gangue will be further depressed but Cu floated.

B. M. V.

Copper alloy. J. K. SMITH, Assr. to BERYLLIUM DEVELOPMENT CORP. (U.S.P. 1,905,314, 25.4.33. Appl., 22.12.31).—A strong, tough, non-corrodible alloy comprises: Cu 70—90 (79.5), Ni 10—30 (19.5), Be 0.1—2.0 (0.5), Mn 0.1—2.0 (0.25)%, and usual impurities the remainder (0.25%).

B. M. V.

High-strength, hot-working, copper-nickel-zinc alloy. W. W. SIEG (U.S.P. 1,907,219, 2.5.33. Appl., 11.11.31).—An alloy of Cu 49.5—55.5, Ni 1.0—6.0, Al 0.01—1.00, Pb 0.5—2.5, Si 0.01—1.50, Mn 0.01—2.50, and Zn remainder (approx. 47%) is claimed.

B. M. V.

Manufacture of metal articles [from a hardenable copper alloy]. H. W. BROWNSDON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 402,796, 3.5.32 and 13.1.33).—Bolts, screws, etc. are formed from a Cu alloy containing 0.5—5 (1—3)% Al and 3—4 times as much Ni which has been softened by quenching from 800—900° and are then hardened by reheating at 300—600°. The alloy may contain also $\geq 37\%$ Zn in α -solid solution and/or 0.5—15% Mn.

A. R. P.

Metal alloy. A. FRITSCHLE, Assr. to OWENS-ILLINOIS GLASS CO. (U.S.P. 1,906,567, 2.5.33. Appl., 17.10.31).—A machinable alloy of high resistance to corrosion and high tensile strength comprises: Cu 58.5—63.5 (60.25), Ni 17.5—21.5 (19.25), Zn 8.0—11.0 (10.0), Al 7.0—9.50 (8.65), Pb 0.50—1.00 (0.75), Mn 0.15—0.25 (0.25), and, if desired, Fe 0.50—0.75 (0.75), Si 0.05—0.10 (0.1%).

B. M. V.

Production of alloys of the alkaline earths with lead or other metals. G. N. KIRSEBOM, and CALLOY, LTD. (B.P. 403,120, 11.6.32).—Alloys of Ca, Ba, Sr, Mg, or Be with Al are produced by introducing granules of the corresponding oxide into Al at 1200° and keeping the mixture at this temp. for some hr. After cooling to $< 1000^\circ$, molten Pb or Cd is poured through the Al, whereby the latter gives up the alloying element to the

Pb or Cd. Alloys of Cd and Be produced in this way yield pure Be when the Cd is removed by distillation.

A. R. P.

Metallic lead-alkali, lead-alkaline earth, and like alloys. M. SCHLÖTTER (B.P. 402,769, 1.6.32. It., 1.7.31).—A molten compound of the metal to be alloyed with the Pb is electrolysed over a bath of molten Pb which acts as the cathode, *e.g.*, for Na-Pb alloys NaOH is electrolysed using a C, Fe, or Ni anode. [Stat. ref.]

A. R. P.

Manufacture of a metallic composition. A. P. ROUX, Assr. to GEN. CABLE CORP. (U.S.P. 1,905,505, 25.4.33. Appl., 3.12.29).—For the manufacture of, *e.g.*, wire-drawing dies 4 different W carbides containing, respectively, 0.5–1.0, 3.5–4.0, 5.5–6.0, and 7.5–8.0% C, the average being 5–6%, are mixed at 693–1100°, sintered at 1371°, and compressed hot.

B. M. V.

Inorganic metal insulation. E. RUPP, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,905,753, 25.4.33. Appl., 23.3.31. Ger., 7.4.30).—The metal, *e.g.*, Cu, is coated with fused NaF or KF, a double fluoride of the metal and alkali metal being formed. Cooling is effected in a non-oxidising atm.

B. M. V.

Coating of metal objects. B. HEMANN (U.S.P. 1,906,154, 25.4.33. Appl., 1.11.30).—The article is heated to loosen foreign matter and open the pores, dipped in a hot bath composed of linseed oil, turpentine, micaceous hæmatite, asphaltum, and fish oil, and baked in an oven.

B. M. V.

Coating of articles with molybdenum. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 402,916, 7.10.32. Ger., 1.2.32).—Fe or Ni articles are coated with a colloidal paste of MoO₃, obtained by heating (NH₄)₂MoO₄ at 300° in vac., and then heated at > 900° (1050°) in H₂ or other reducing gas until the MoO₃ is reduced to Mo, which alloys with the metal surface.

A. R. P.

(A) Metal-cleaning compositions. (B) Materials for cleaning metal surfaces, particularly for removing soldering fluxes therefrom. J. H. GRAVELL (B.P. 403,373–4, 15.6.32. U.S., [A] 5.4.32, [B] 26.3.32).—The metal is sprayed or scrubbed with (A) 37.5% H₃PO₄, or (B) 10% Na₃PO₄ containing a small amount of "Neomerpin" or "Nekal." A. R. P.

Decoration of metals. F. MALEVAL (U.S.P. 1,906,168, 25.4.33. Appl., 24.8.29. Fr., 24.7.29).—A paste for sticking metal leaf to a thicker metal base comprises mastic resin and petroleum jelly dissolved in a hydrocarbon compound, *e.g.*, C₂HCl₃.

B. M. V.

Manufacture of columbium [niobium]. C. W. BALKE, Assr. to FANSTEEL PRODUCTS CO., INC. (U.S.P. 1,905,882, 25.4.33. Appl., 20.1.28).—K Nb double fluoride is fused and reduced by a d.-c. arc of 20 volts and 50–70 amp./sq. in. A method of purifying a Nb ore is described.

B. M. V.

Production of yttrium and metals of the yttrium group. J. A. HEANY, Assr. to SIRIAN LAMP CO. (U.S.P. 1,905,866, 25.4.33. Appl., 8.2.30).—A pure Y compound and an alkaline fluoride are subjected to fused electrolysis with a cathode c.d. of 1–3 amp./sq. in.,

this being sufficient to deposit Y but not the alkali metal. The deposit may be washed with H₂O and hot conc. HNO₃ and then heated to incandescence in vac.

B. M. V.

Nib for gold pen-points. K. K. LEDIG, Assr. to AMER. PLATINUM WORKS (U.S.P. 1,906,689, 2.5.33. Appl., 30.3.29).—The nib is plated with Au and Ag and then heated at about 750° in reducing material so that diffusion of the metals takes place.

B. M. V.

Obtaining pure metallic cobalt in powder. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of SOC. GÉN. DE CONSTRUCTIONS ELECTRIQUES ET MÉCANIQUES (ALSTHOM) (B.P. 403,281, 27.4.33. Fr., 29.4.32).—Aq. CoSO₄ containing a little free H₂SO₄ and 5–15% of tartaric acid is electrolysed at 40–60°, using a Pt or Co anode and an Al cathode with a c.d. of 500–5000 amp. per sq. dm. The cathode is scraped continuously or periodically with an insulated scraper, or it may be vibrated by repeated shocks at intervals to cause the fine crystals to fall off. The Co powder thus obtained is heated in H₂ at 600° and then in vac.; it is useful in preparing sintered carbide alloys.

A. R. P.

(A) Chloridisation of tin ores. (B) Extraction of tin from ores and the like. L. A. WOOD, H. L. SULLMAN, H. F. K. PICARD, and BRIT. AMER. MINES, LTD. (B.P. 403,122–3, 15.6.32).—The ore is mixed with C and conc. aq. CaCl₂ to the consistency of wet sand and the mixture passed first through a rotary dryer heated with waste gases and afterwards through a furnace (*F*) heated at 700–900° to expel the Sn as chloride. In (A) an excess of C is added to ores containing free SiO₂ and other metallic bases sufficient to reduce these as well as the SnO₂ to metal, and the CO evolved in *F* is used for heating *F* or for drying the charge. The Sn (in both processes) is recovered by collecting the volatilised SnCl₂ in H₂O and electrolysing the solution.

A. R. P.

Beryllium-aluminium alloys. J. K. SMITH, Assr. to BERYLLIUM DEVELOPMENT CORP. (U.S.P. 1,905,312–3, 25.4.33. Appl., 22.12.31).—The alloys comprise: Be 55–70, Al 25–40, and 0.5–2.5% each, but > a total of 5%, of Mn, Mo, and (A) V or (B) Zr.

B. M. V.

Production of powder from ductile metals, especially magnesium. I. G. FARBENIND. A.-G. (B.P. 403,888, 7.6.33. Ger., 22.7.32).—Blocks of the metal are pressed against rotating rollers covered with strips of cotton, leather, rubber, or the like which are provided with steel pins; *e.g.*, card clothing as employed in the textile industry for separating raw materials into fibres may be used.

A. R. P.

Production of finely-divided metals by precipitation of their salts by means of metals in powdered form. TRÉFILIERIES ET LAMINOIRS DU HAVRE (B.P. 403,469, 12.8.32. Fr., 14.8.31).—The chloride solution of the metal to be pptd. is treated first with 50–100 g. of NaCl, NH₄Cl, or KCl per litre, and a small amount of HCl, and then with Al powder at 40–90°. The Al may be rendered more active by alloying a small proportion of Ca with it.

A. R. P.

Melting and purifying magnesium and magnesium alloys. DOW CHEM. CO. (B.P. 403,891, 8.6.33. U.S., 3.8.32).—The metal is melted under a flux of

CaCl₂ (85—50 pts.) and NaCl (15—50 pts.) with a small proportion of BaCl₂ and an alkali or alkaline-earth fluoride in an atm. of N₂ and CS₂ or a volatile F compound, *e.g.*, NH₄F, NH₄HF₂, or NH₄BF₄. A. R. P.

[Magnesium] alloy. E. DE RIDDER and H. A. ALTWICKER, Assrs. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 1,905,445, 25.4.33. Appl., 23.6.31).—A light alloy suitable for deeply-drawn sheet comprises: Mn 0.2—1.5, Zn 0.5—3.0, and Al 0.5—6.5%, the balance being Mg. B. M. V.

Production of aluminium alloys. J. STONE & Co., LTD., A. J. MURPHY, and S. A. E. WELLS (B.P. 403,700, 29.6.32).—Alloys of Al with Cu 0.5—5, Ni 0.5—3, Mg 0.1—2.5, Fe 0.2—2.0, and Si 0.2—2.5 are melted with $\geq 1\%$ Ce, which removes adsorbed gases, refines the grain structure, improves the casting qualities, and prevents segregation of the Fe. The alloys are amenable to heat-hardening. A. R. P.

Anodic coating of aluminium. ALUMINUM COLORS, INC., Asses. of B. R. HAUSEIN (B.P. 403,560, 24.4.33, U.S., 26.7.32).—The Al is treated anodically in 35—60% H₂SO₄ at 20—30°, a current of air being blown through the solution near the anode to prevent rise in temp. Addition of a small amount of glycerin to the bath prevents chemical corrosion of the anode. A. R. P.

Electrodeposition of (A) tin-gold, (B) zinc-gold, alloys. H. J. KERSTEN, Assr. to UNIVERSITY OF CINCINNATI (U.S.P. 1,905,105—6, 25.4.33. Appl., 20.2.30).—(A) White gold is plated from a bath containing a Au-alkali cyanide and alkali stannate, the Au content being $<$ the Sn; *e.g.*, KAuC(N)₂ 3 g., K₂SnO₃.H₂O 10 g., H₂O 1 litre. (B) A lilac-coloured deposit is produced from KAuC(N)₂ 2.5 g., K₂Zn(CN)₄ 10.0 g., H₂O 1 litre, or other cyanide bath in which the Au is not in excess of the Zn, though the actual deposit consists of Zn 30%, Au 70%. Such alloys are not attacked by HNO₃. B. M. V.

Treatment of waste metal products. D. R. TULLIS and P. OAKLEY (B.P. 403,179, 24.8.32).—Waste metal turnings, drillings, etc. are heated in a closed furnace (*F*) at 300—800° to expel H₂O, oil, and other volatile matter and to anneal the metal without causing the particles to coalesce. CO, with or without Cl₂ or a volatile chloride, may be passed through *F* to reduce the oxides of certain metals. After removing dust by screening, the treated metal is passed through a magnetic separator to remove Fe and is briquetted for remelting. A. R. P.

Protecting polished surfaces.—See I. Soda ash briquettes.—See VII. Protecting metal.—See IX. [Alloys for] batteries. Metal-coated C brushes.—See XI. Ammunition case.—See XXII.

XI.—ELECTROTECHNICS.

Electrolytic etching process. I. Choice of solutions. II. [Comparison of chemical and electrolytic processes.] M. NAGANO (J. Electrochem. Assoc. Japan, 1933, 1, 55—60).—I. For Cu, nearly saturated aq. alkali nitrate + HNO₃, HCO₂H, AcOH, etc. to 0.5*N*, used at 0.1—0.3 amp. per sq. cm. (anodic), is preferred; for Zn 20—25% aq. NH₄Cl is recommended.

II. The electrolytic process is usually much the more

rapid, but a deeper etch is obtained at the edge of the article than at the centre. CH. Abs.

Cellulose films.—See V. Melting non-ferrous metals.—See VIII. Mg. Manganin. Ta. Noble metals.—See X.

PATENTS.

Electric induction [muffle] furnaces. ELECTRIC FURNACE Co., LTD., Asses. of E. F. NORTHRUP (B.P. 402,988, 8.4.33. U.S., 30.4.32).—In a furnace constructed as in B.P. 382,708 (B., 1933, 25) the secondary winding, which normally follows the course of the primary winding, is lengthened by the provision of non-inductive return loops the sides of which are substantially parallel. J. S. G. T.

Means for operating electric high-frequency furnaces. ALLMÄNNA SVENSKA ELEKTR. AKTIEB. (B.P. 402,791, 17.10.32. Swed., 9.6.32).—Means for converting d.c. into a.c., comprising an ion valve containing metal vapour arranged so that de-ionisation precedes voltage reversal, are claimed. J. S. G. T.

Electrical condenser. J. E. LILIENFELD (U.S.P. 1,906,691, 2.5.33. Appl., 28.3.28).—An insulating coating of metal oxide, *e.g.*, Al₂O₃, may be made commercially reliable, the capacity of the apparatus increased (owing to the reduced thickness of insulation), and its unidirectional property destroyed by a superposed coating of a more conducting solid, *e.g.*, Cu, applied in such a manner that mol. contact is obtained, the thickness being of the order of 10⁻⁴ mm. A final protection of Ag is recommended. B. M. V.

Electrolytic cells, *e.g.*, condensers. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 402,967, 3.3.33. Holl., 5.3.32).—Escape of liquid from the exhaust aperture (*A*) provided for the escape of gases under pressure is prevented by coating the wall and surroundings of *A* with a wax, *e.g.*, earth wax. J. S. G. T.

Apparatus for electrolysis. W. HOLLAND (U.S.P. 1,905,627, 25.4.33. Appl., 24.9.30).—An electrolytic cell producing gases at both electrodes is claimed, in which both gases are mixed immediately. Their use in an internal-combustion engine is suggested. B. M. V.

[Electric] liquid-treating apparatus. C. R. MASON, Assr. to J. J. SCHAEFFER (U.S.P. 1,906,914, 2.5.33. Appl., 11.5.32).—The liquid, *e.g.*, potable H₂O, is passed between a no. of pairs of electrodes while flowing in a spiral channel, or over a table divided into narrow channels, for the purpose of killing bacteria. B. M. V.

Alkaline electric storage batteries. DRUMM BATTERY Co., LTD., and R. H. D. BARKLIE (B.P. 402,752, 28.5.32).—Cell parts are made of Mg, or of Mg-rich alloys containing ≥ 8 wt.-% Cd or $\geq 4\%$ Ni and $\geq 4\%$ Cd. The preferred alloy consists of Mg 99, Ni 0.5, and Cd 0.5%. J. S. G. T.

Ultra-violet ray lamp. W. F. HENDRY, Assr. to MANHATTAN ELECTRICAL SUPPLY Co., INC. (U.S.P. 1,907,294, 2.5.33. Appl., 17.8.27).—A Hg-vapour lamp having a bulb of Pyrex or other borosilicate glass is described. A twin glass seal for a Cu lead-in wire is provided, the actual sealing medium being fir balsam on the outside of the seal. B. M. V.

Solution for [lead] storage battery. J. C. ADEN, Assr. to W. E. PHILLIPS, A. G. FITZGERALD, and A. C. FORT (U.S.P. 1,906,784, 2.5.33. Appl., 27.8.29).—To the ordinary H_2SO_4 is added 4% of a solution of AcOH 1.6% and uric acid 0.4%. B. M. V.

Accumulator electrodes. BLEI-IND. A.-G. VORM. JUNG & LINDIG, and E. M. SCHNEIDER (B.P. 403,701, 17.3.32).—A small quantity of paste is arranged in grooves at the bottom of both sides of a Pb plate. J. S. G. T.

Photoelectric tube. J. H. DE BOER and M. C. TEVES, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,906,448, 2.5.33. Appl., 11.1.30. Holl., 12.1.29).—A glass vac. vessel (*V*) has a layer of alkaline-earth halide deposited on the inner wall by vaporisation, and afterwards a unimol. layer of photoelectric material (*Cs*) by adsorption while *V* is heated to remove unadsorbed particles. B. M. V.

Photoelectric cells. INTERNAT. GEN. ELECTRIC Co., INC., Asses. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 403,763, 8.8.32. Ger., 8.8.31).—A W sheet is coated with a compound of W with one of the elements of the O sub-group of group VI, e.g., O, S, Se, Te, by heating in the vapour of that element, e.g., in air or O_2 . J. S. G. T.

Gaseous electric-discharge device. F. SKAUPY, H. EWEST, and H. PULFRICH, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,905,759, 25.4.33. Appl., 4.6.31. Ger., 18.7.30).—In a vac. tube containing a common gas, e.g., CO_2 , and in which provision is made for its renewal by heating a solid substance (*A*) in the tube, another substance is also provided, either mixed with *A* or in a separate heated compartment, which will evolve a gas to oxidise or otherwise convert the solid products (*C* suboxide) formed by decomp. of the original gas. B. M. V.

Electric current valve. J. G. H. LIEBEL and R. C. JACQUELET, Assrs. to UNION SWITCH & SIGNAL Co. (U.S.P. 1,905,724, 25.4.33. Appl., 8.8.27. Renewed 4.2.33).—A rectifier of the Cu-Cu oxide-surface-reduced Cu type is oxidised at 1037° , reduced by a liquid at an elevated temp., and the surface burnished. Suitable reducers are transformer oil, glycerin, etc. B. M. V.

Manufacture of resistors. J. A. FLANZER, Assr. to TECHNIDYNE CORP. (U.S.P. 1,906,848, 2.5.33. Appl., 15.4.30).—Resistance units of the painted-film type are dried rapidly and under closely controlled conditions in order to obtain uniform results. B. M. V.

Manufacture of silicon carbide resistor. E. HEDIGER, Assr. to GLOBAR CORP. (U.S.P. 1,906,853, 2.5.33. Appl., 17.11.31. Can., 19.7.30).—A self-bonded resistor is formed from grains cemented together by recrystallisation or local sublimation on heating strongly. A temporary binder or a little C may be incorporated to afford passage of electric current. The product is claimed to have a sp. resistance of < 0.1 ohm/cm. cube and a positive temp. coeff. over the range 750 – 1500° . B. M. V.

Electrical precipitation of suspended (A) particles from gaseous fluids, (B) material from gases. LODGE-COTTRELL, LTD. From (A) METALLGES. A.-G.,

(B) INTERNAT. PRECIPITATION Co., INC. (B.P. [A] 403,665 and [B] 403,829, [A] 27.6.32, [B] 14.2.33).—(A) An extended collecting electrode (*C*) is arranged substantially parallel to the path of the spark discharge between two other electrodes (*E*), and a unidirectional p.d. is maintained between *C* and one *E*, whereby a unidirectional corona discharge is produced. (B) Sharp, unidirectional, high-potential impulses (*I*) of short duration are applied to opposing discharge and collecting electrodes continually maintained at a unidirectional p.d. (*P*), the direction of *I* being the same as that of *P*, whilst the magnitude of *I* is much $>$ that of *P*. J. S. G. T.

Insulating compositions for submarine electric-signalling cables. ELECTRICAL RES. PRODUCTS, INC., Asses. of A. R. KEMP (B.P. 404,027, 8.7.32. U.S., 30.9.31).—An insulating material, suitable for high-frequency signalling cables, comprises a hydrocarbon (C_5H_8)_{*n*}, e.g., a mixture of gutta-percha and deproteinised rubber, with 5–30% of a plasticiser, viz., synthetic Bu stearate and/or Et abietate. D. F. T.

Insulating material [for coils]. G. F. HADLEY, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,915,311, 27.6.33. Appl., 11.8.27).—Mica sheets are bound with light Japanese or Dexter paper impregnated with a composition which is made by heating together tung oil (*I*), esterified rosin (*II*), and gilsonite (*III*). (*I*) may be substituted by other drying oils, (*II*) by a natural or glyptal resin, and (*III*) by manjak, stearine, etc. S. M.

Electrically coating the bore of carbon brushes for attaching the lead[-in] wire with metal. Y. UEKI (U.S.P. 1,907,224, 2.5.33. Appl., 25.4.31. Jap., 8.5.30).—The brushes (*B*) are piled alternately with anodes contained in rubber bags, the bags and the plates being perforated with holes in line with those through *B* for the binding screws. The channel thus formed is used as a plating vat. B. M. V.

Treating gases.—See I. Transmitter C. Treating gas. Pitch.—See II. Paper tester.—See V. Glass-melting furnaces.—See VIII. Nitriding metals. Welding electrode. Pb alloys. Metal insulation. Nb. Y. Au pen-points. Powdered Co. Treating Sn ores. Coating of Al. Electrodeposited Sn- and Zn-Au alloys.—See X. Photochemical printing.—See XXI.

XII.—FATS; OILS; WAXES.

Tung oil: chemical studies and specification. L. A. JORDAN (J.S.C.I., 1934, 53, 1–11 r).—The methods commonly employed for determining I val. give for tung oil (*T*) results particularly liable to variation according to experimental conditions. A procedure and apparatus have been devised for hydrogenating *T* whereby readily reproducible results in close accordance with theory are obtained. The effects of varying temp. of heat-treatment and acid val. of *T* on the time of gelation are discussed, and the relationship between the probable course of the polymerisation process and the properties of *T* gel and of *T* heat-thickened at different temp. is outlined. The chief methods hitherto employed for carrying out the "heat test" for *T* are described, and

it is shown how the properties of the resultant gel are affected by the experimental conditions. Extraction of the gel for the determination of "polymerisable" material provides a method for the evaluation of *T*, but the extent of the variability due to the temp. of gelation and particularly the time of after-heating of the gel has not previously been recognised. Details of a new procedure for carrying out the "heat test" and subsequent examination of the gel are given, with specifications for the oil-bath and thermometer employed. The method is recommended for inclusion in the British Standard Specification for *T*.

Tung oil from *Aleurites montana* and specification tests. L. A. JORDAN (J.S.C.I., 1934, 53, 21—22 *tr*).—Particulars are given of the characteristics of several different specimens of tung oil from *A. montana*, and attention is called to the importance of providing for two types of oil, namely, of *A. montana* and *A. fordii*, in specifications. Whilst both oils are suitable for varnish making and commercial purposes generally, there is a considerable difference in behaviour under present specification methods of testing. Suggestions are made as to suitable lower limits for specification of *A. montana* oil, viz., I val. (Wijs) 155, n_D 1.5130, d_{15}^{15} 0.934. The heat test should be \geq 12 min. and 30% extractive by the Paint Research Station method.

Vitamin-D in the fats of "Ivassy" (small heron from the Ochotsk Sea) and barbel. S. MATZKO (Questions of Nutr., U.S.S.R., 1933, 2, No. 4, 23—24).—The fat of the barbel contains (per g.) 50—60, that of "Ivassy" 10, Steenbock units of vitamin-D.

NUTR. ABS. (m).

Spoilage [rancidification] of fats and oils. II. R. NEU (Allgem. Oel- u. Fett-Ztg., 1933, 30, 583—588; cf. B., 1934, 69).—Powick's explanation (B., 1924, 302) of the production of epihydrinaldehyde (I) during rancidification is regarded as forced. It is suggested, alternatively, that the peroxidised oleic ester passes into an unsaturated linolenic ester diperoxide (peroxidised at the outer double linkings); this is converted into the dimonoxide (di-epoxide), which absorbs H_2O to yield an unsaturated (OH)₂-ester, which splits on further oxidation into heptaldehyde, pimelsemialdehyde, and (CH-CHO)₂, which in turn oxidises to acraldehyde (II) and (I). In the case of oleic acid itself, which gives a weaker Kreis reaction than do its esters, it is suggested that the OH-acids form estolides, so that the production of (I) and (II) is checked or inhibited. The oxidation of linoleic and linolenic acids is explained on similar lines, the suggested reactions being compatible with the observations of Salway (B., 1916, 366), Barnicoat (A., 1931, 1072), and Pritzker and Jungkunz (B., 1926, 1020). E. L.

Determination of the washing power of detergents. A. VAN DER WERTH (Allgem. Oel- u. Fett-Ztg., 1933, 30, 588—594; cf. Götte, B., 1933, 797, 973).—Actual washing tests are considered complicated and unsatisfactory for general purposes, and the suggestion is made that it should be possible (and might be better) to get a useful comparison of the washing val. of varied washing agents by measuring the three properties which are regarded as the essential factors conditioning their

detergent action, viz., the adsorptive and dispersive properties and the wetting power of the solutions. Accordingly, it is proposed to determine (1) lathering no. after 1 and 3 min., (2) lowering of interfacial tension (drop no.) towards a H_2O -insol. liquid, and (3) the sinking time of a fabric (cotton, wool, silk, etc.) using in each case an aq. solution of the detergent to which oil and C black have been added, in order to match practical conditions. The tests are to be made at, e.g., 20° and 80°, and the results grouped synoptically for comparison. E. L.

PATENTS.

Sulphonated oils. IMPERIAL CHEM. INDUSTRIES, LTD., and R. GREENHALGH (B.P. 404,364, 18.7.32).—Acetylated castor oil or ricinoleic acid is sulphonated with SO_3 or oleum in solution in liquid SO_2 ; the product is exceedingly resistant to hydrolysis by hot dil. mineral acids. E. L.

Production of soap. A. W. KEEBLE and C. H. MILLER (B.P. 403,590, 25.7.33).—Rosin is dissolved in a portion of the oils by heating to about 121°, and the solution, after cooling to 45—100°, is rapidly crutched into a mixture of the rest of the fat stock and the total amount of alkali equiv. to the whole of the fats. E. L.

Soap. J. WEARHAM (B.P. 403,650, 20.6.32).—Ergosterol is added to soap mixtures, and the whole irradiated by ultra-violet light during or after saponification, cooling, etc. E. L.

Soap. A. J. LORENZ and M. H. WODLINGER (B.P. 403,083, 10.6.32).—An antirachitic irradiated sterol (ergosterol etc.), which has beneficial dermatological properties, is incorporated in the (toilet) soap, e.g., during crutching or milling. E. L.

Compositions suitable for use in the washing of textile materials or for other washing purposes [shampoos etc.]. R. H. MARRIOTT (B.P. 401,413, 29.6. and 13.7.32).—Detergents comprise a mixture of the Na salt of a sulphonated alcohol, e.g., lauryl, oleyl, or octadecyl alcohol, and a colloidal clay (bentonite, "Wilkinite"); alkaline salts can be added as required. E. L.

Hydrogenation [process for fatty oils and] catalyst [therefor]. O. G. BENNETT and C. B. JACKSON, ASSRS. to CATALYST RES. CORP. (U.S.P. 1,905,433, 25.4.33. Appl., 27.9.32).—A catalyst prepared as in U.S.P. 1,893,155 (B., 1933, 798) is improved if sulphates are added to the mixture to be calcined. B. M. V.

Manufacture of grease. C. E. LAUER, ASSR. to TEXAS CO. (U.S.P. 1,912,001, 30.5.33. Appl., 1.7.30).—A mixture of mineral and fatty oils, e.g., petroleum and castor oil, is heated at about 340°/400 lb. per sq. in. in a coil at mid-points of which aq. alkali, e.g., NaOH, is introduced, and thence is passed into a heated kettle provided with agitators and an outlet for vapours and steam and operating under 100 lb. per sq. in. pressure, from which grease is withdrawn. The process is continuous. D. K. M.

Extraction of oil from oil-containing [palm] fruits. F. KRUPP GRUSONWERK A.-G. (B.P. 401,550, 27.2.33. Ger., 6.8.32).—Special nut-washing is eliminated, in the plant illustrated, whereby after removing

(shelling) the pulp (*P*) from the nuts (*N*) in the heater, the mixture of *P* and *N* is led through a hot- H_2O bath to remove the bulk of the oil, and finally *P* and *N* are separated and processed further as required.

E. L.

Manufacture of technically valuable compounds from oxidation products of drying oils. I. G. FARBENIND. A.-G. (B.P. 402,759, 6.6.32. Ger., 4.6.31).— H_2O -sol. derivatives (I) are obtained by treating the oxidation products of drying oils (*e.g.*, linoxyn or blown oils, conveniently in aq. suspension, or dissolved in a solvent) with H_2SO_3 or its salts ($NaHSO_3$) at temp. up to 100° and under pressure if desired. The films obtained by evaporating solutions of (I) may be rendered insol. by heating up to 100° , or treating with an oxidising agent (H_2O_2).

E. L.

Solid gelled non-drying vegetable oils and compositions containing them. M. G. THOMSON, A. C. HETHERINGTON, S. A. SIM, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 403,648, 18.6.32).—Non-drying oils, *e.g.*, castor oil, are blown with gases containing O_2 at 150 – 160° (140 – 200°) until a stiff jelly is obtained on cooling; by working on rolls dispersions in solvents, *e.g.*, $PbMe$, can be prepared which are compatible with, *e.g.*, nitrocellulose and are useful for leather finishes etc., since the coatings formed dry quickly without penetrating porous surfaces.

E. L.

Treating [polymerising] oil. W. F. HARRISON and A. H. BATCHELDER, Assrs. to CALIFORNIA INK CO., INC. (U.S.P. 1,915,260, 20.6.33. Appl., 22.1.30).—Polymerised oil of low acid val. is prepared by circulating the oil through a closed vac. system, so that it is successively heated (to cause polymerisation) and sprayed through a nozzle, to produce vaporisation of fatty acids etc. (I). A current of inert gas may be applied in order to assist (I).

E. L.

Production of sterols [from yeast]. C. N. FREY and R. F. LIGHT, Assrs. to STANDARD BRANDS, INC. (U.S.P. 1,912,440, 6.6.33. Appl., 22.3.28).—Yeast is saponified by aq. $EtOH$ (or $MeOH$)– KOH (or $NaOH$) of such concn. that the final solution contains approx. 40% of alcohol, and the solution decanted from insol. matter (I) and allowed to crystallise. The cryst. sterol is collected and washed with hot H_2O to remove soaps, the mother-liquors being used to re-extract (I).

H. A. P.

[Wax-like] emulsifiable product and emulsion obtained therefrom. H. BENNETT (U.S.P. 1,914,100, 13.6.33. Appl., 8.5.31).—Stable aq. emulsions, suitable for edible, cosmetic, or industrial purposes, can be prepared directly from the product obtained by esterifying a dihydric alcohol (glycol, triethylene glycol, etc.) with excess of a higher fatty acid ($> C_5$, *e.g.*, stearic or lauric acid) in presence of a catalyst (Na glycerophosphate).

E. L.

Medicinals from fatty acids.—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Drying of white- [and red-]lead paint films. C. P. VAN HOEK (Verfkroniek, 1934, 7, 16).—The rapid drying of these paints is due, not to saponification of the

drying oil, but to one or more of the following causes: (1) catalysis of the oxidation and polymerisation processes; (2) neutralisation of lower fatty acids split off during the oxidation of the oil; (3) the low oil content of the paint; (4) the low degree of adsorption of driers by these pigments.

D. R. D.

Sun exposure of test panels: influence of direction and inclination. O. J. STEPLEIN (Nat. Paint, Varnish, & Lacquer Assoc., Inc., Sci. Sect., Jan., 1934, Circ. No. 447, 1–10).—The duration, intensity, and fluctuational characteristics of ultra-violet radiation effective in exposure tests are plotted from astronomical and meteorological data for Miami and a point representative of the east industrial region of the northern United States.

G. H. C.

Mildew prevention on painted surfaces. II. H. A. GARDNER, L. P. HART, and G. G. SWARD (Nat. Paint, Varnish, & Lacquer Assoc., Inc., Sci. Sect., Jan., 1934, Circ. No. 448, 11–32).—The tests reported previously (B., 1933, 1067) have been extended to 5 months and substantiate the results given. Hg compounds or Paris-green (in green paints) give the best protection, but where human poisons are undesirable, thymol (I) and many other compounds (17 listed) are effective. Some of these retard drying and must be compensated for by extra drier in formulating the paint; acting as antioxidants, they may prolong the life of the film. Rapid drying to prevent attachment of spores is important when toxicity is low. Application of aq. $HgCl_2$ or (I) in aq. $EtOH$ is valuable before painting over mildewed surfaces, but thorough washing with H_2O and soap or alkali is effective.

G. H. C.

Weather-resistance of pigments. H. WAGNER (Paint Manuf., 1934, 4, 5–9, 12).—Initial destruction of a paint film is due to the action of ultra-violet light on the oil; hence films which are more transparent are less durable. "Chalking" appears subsequently and, when H_2O penetrates the disrupted surface, swelling and rapid destruction ensue. Both these effects are dependent on the oil absorption (*O*) of the pigment present; *O* should therefore be reduced where possible by avoiding fine grinding. 1 – 10μ is suggested as the most favourable particle diam. The pore spaces of pigments having low swelling power (*S*) should be occupied by addition of finely-dispersed fillers. Max. durability is attained when neither the pigment nor any soap formed from it by reaction with the oil undergoes hydrolysis. The relative *S* vals. of linseed oil paints made from 16 pigments and fillers are tabulated together with their *O* vals.

S. M.

Analysis of chromate-green. C. P. A. KAPPELMEIER (Verfkroniek, 1934, 7, 12–14).—Warnier's method for the determination of $PbCrO_4$ in pigments by dissolving in aq. $NaOH$, adding KI and HCl , and titrating with $Na_2S_2O_3$ (*ibid.*, 1933, 6, 212) is not applicable to Cr -greens, since CrO_4^{2-} is reduced by $Fe(CN)_6^{4-}$ in alkaline solution. In order to avoid this difficulty, the Prussian-blue should be decomposed by heat, the product dissolved in HCl and $KClO_3$, the Fe pptd. as $Fe(OH)_3$ by $NaOH$ and H_2O_2 and determined volumetrically, the Pb in an aliquot portion of the filtrate

determined as PbCrO_4 , and the CrO_4^{2-} in another portion determined iodometrically. D. R. D.

Pigments for [Sorel's] artificial stone. A. KLEMM (Farbe u. Lack, 1933, 607).—Pigments used for cement and CaO are generally satisfactory, e.g., finely-divided Fe and Mn earth colours, C and earth blacks, lithopones of high ZnS content, Cr_2O_3 greens. Artificial Fe oxides, Ultramarine-blue, Hansa-yellow and -red dyes can be used only in absence of excess of MgOCl_2 . Quartz, chalk, china clay, light and heavy barytes when added as fillers produce a white surface-bloom. S. M.

Viscosity of oil varnishes. J. SCHEIBER (Farbe u. Lack, 1933, 580).—The η of linseed stand oil dispersed in equal vols. of several polar and non-polar solvents as determined in a capillary viscosimeter do not bear out Boller's conclusions (B., 1934, 156). The results (tabulated) are also variously affected by the temp. The Engler apparatus is not sufficiently accurate for comparisons, particularly with efflux periods $<$ that of H_2O . S. M.

Requirements of "silver" lacquers. H. NOLTE (Farbe u. Lack, 1933, 559–560, 569–570, 583, 605–606).—The manufacture of lacquers for Sn printing, posters, etc. is discussed. To withstand storage under tropical conditions, varnishes for food containers should be made from only the hardest resins, e.g., copal and synthetic products, which are usually modified with thickened tung oil. Linseed oil modifications are less resistant to alkalis and heat. Stoving at a high temp. also increases the alkali-resistance (results tabulated) and hardness. Glyptal resins give extremely durable, non-yellowing films. Sierra Leone copal resins are unsuitable because of the odours evolved after drying. In the case of "silver" poster lacquers resoftening, which is marked in the region of dark pigments, on exposure is reduced by adding tung oil (1 pt.) to the linseed oil (4 pts.) medium. Loss of gloss is due to the use of either excessively polymerised oil or excess of thinners. A matt effect is achieved by addition of starch or MgO ; for outside exposure an albertol resin is recommended. An intermediate layer of a high- η nitrocellulose lacquer is often an advantage. S. M.

Casein in practice. E. KUNZE (Farbe u. Lack, 1933, 581–582; cf. B., 1933, 1066).—The powdered, commercial variety consists of casein (I), slaked CaO (II), and chalk; when freshly prepared it gives satisfactory films on plaster \approx 3–4 months old which has been cleaned and well moistened. It is safer to use the paste form produced by kneading insol. (I) into milk-of-lime. A more stable, adhesive paste product for coating plaster is made directly from the washed and pressed curd by grinding with (II). The stability and transparency are further improved by grinding the curd mash with gradual additions of powdered quicklime, keeping the temp. below 70° ; H_2O is added when the reaction is complete. The painting should not be done in dry, hot weather or in direct sunlight. S. M.

Determining Ti pigments in paper ash.—See V. **Surface colouring of stone etc.**—See IX. **Tung oil.**—See XII. **Rubber pigments.**—See XIV.

PATENTS.

Manufacture of chrome-yellow colours which are stable to light. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 403,762, 8.8. and 26.10.32).—The ppt. of PbCrO_4 , in admixture with isodimorphous PbSO_4 and chromates and sulphates of Ba, Sr, and Ca, is heated and stirred in aq. suspension until all the rhombic crystals become monoclinic. The transition temp. varies with the proportion of PbSO_4 present. The light-resistance and staining power of the pigment increase with its final sedimentation vol., which is controlled by adjusting the pH of the reacting solutions. S. M.

Manufacture of writing and marking leads. J. S. STAEDTLER (B.P. 402,959, 10.2.33. Ger., 11. and 21.4.32. Addn. to B.P. 383,330; B., 1933, 78).—Leads described in the prior patent are pretreated (e.g., by soaking in Sudan dye solutions) with a dye sol. in the agent used for fixing marks made by the lead (e.g., EtOH solutions of shellac). The pretreated leads are then prepared by means of a fat mass similarly coloured. S. S. W.

Cellulose acetate compositions containing dibenzylaniline. T. F. MURRAY, JUN., and C. J. STAUD (U.S.P. 1,912,718, 6.6.33. Appl., 9.6.32).—To produce a cryst. effect $\text{NPh}(\text{CH}_2\text{Ph})_2$ (I) (5 pts.) is incorporated with the cellulose acetate (10 pts.) solution in COMe_2 . 3–4 pts. of (I) give a translucent film. S. M.

Cellulose nitrate composition and solvent mixture therefor. M. H. MORRISON and E. H. NOLLAU, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,915,163, 20.6.33. Appl., 6.4.31).—The cellulose nitrate, plasticiser, etc. are dispersed in a mixture (by wt.) of either EtOAc (20–40 pts.), EtOH (32–70), and $\text{C}_2\text{H}_4\text{Cl}_2$ (10–28), or COMe_2 (15–25), EtOH (30–75), and $\text{C}_2\text{H}_4\text{Cl}_2$ (10–45). S. M.

[Plasticisers for] cellulose ester or ether compositions. E. I. DU PONT DE NEMOURS & Co. (B.P. 403,667, 27.6.32. U.S., 25.6.31).—The use of bis- β -aryloxyethyl ethers is claimed. S. M.

Non-chalking coating composition. J. W. GILBERT, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,914,563, 20.6.33. Appl., 3.1.29).— Sb_2O_3 is incorporated in a nitrocellulose or other cellulose ester lacquer containing common plasticisers and solvents. S. M.

Water-repellent coating composition. G. R. ENSMINGER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,915,301, 27.6.33. Appl., 6.11.31).—Paper, silk, and other fabrics are impregnated with a high- η nitrocellulose solution containing a H_2O -repellent wax, e.g., high m.-p. paraffin, and a non-volatile naphthene-base oil, e.g., petroleum jelly, in stated proportions. S. M.

Preparation of compound for coating wood, metal, etc. A. M. DUNSTONE (B.P. 402,865, 20.6.32. Austral., 6.7.31).—Casein (4 vols.) is saturated with H_2O (6 vols.) and 24 vols. of normal rubber latex (or the equiv. amounts of conc. latex and H_2O) and $\frac{1}{3}$ vol. of aq. NH_3 , d 0.88, are added. Vulcanising agents, accelerators, and cellulose lacquer ($1\frac{1}{2}$ vols.) may be incorporated if desired. [Stat. ref.] S. S. W.

[Latent or solid] solvents for cellulose materials. C. S. MINER, ASSR. to QUAKER OATS CO. (U.S.P. 1,914,522; 20.6.33. Appl., 15.3.28).—Solid furan derivatives, *e.g.*, pyromucic acid or its Et ester, furfurylideneacetone, and furylacrylic acid, are used instead of camphor in the production of cellulose ester or ether plastics.

F. R. E.

Preparation of resin from wood-distillation products. J. C. CARLIN and C. A. HOCHWALT, ASSRS. to TENNESSEE PRODUCTS CORP. (U.S.P. 1,911,489, 30.5.33. Appl., 10.1.31).—The unrefined, dehydrated tar from a hard wood distilling at 195–250° is condensed with excess of CH₂O, (CH₂)₆N₄, etc. in presence of NH₃, but without addition of phenols. The product is a hard, mouldable resin, insol. in EtOH, and partly sol. in C₆H₆ etc.

S. M.

Cleaning and changing the colour of rosin. E. HEY (U.S.P. 1,912,037, 30.5.33. Appl., 4.5.27).—Rosin is bleached by subjecting its solution in an org. solvent to the action of Zn and HCl in described manner.

S. M.

Manufacture of synthetic resins [from tar oils]. S. P. BURKE and M. R. BHAGWAT, ASSRS. to COMBUSTION UTILITIES CORP. (U.S.P. 1,911,745, 30.5.33. Appl., 13.12.28).—The tar oil distillate is washed with cold H₂O or dil. H₂SO₄ to remove NH₃, C₅H₅N, etc. before being condensed with CH₂O.

S. M.

Plastic phenolic resin composition. L. SONTAG, ASSR. to GEN. PLASTICS, INC. (U.S.P. 1,911,477, 30.5.33. Appl., 21.1.31).—An alkyl (Et₃) citrate is used to plasticise thermo-hardening phenol-CH₂O resins.

S. M.

Manufacture of synthetic [glyptal] resin. C. G. MOORE and M. ZUCKER, ASSRS. to GLIDDEN CO. (U.S.P. 1,915,544, 27.6.33. Appl., 1.7.29).—A polybasic acid, *e.g.*, phthalic anhydride, is heated with a polyhydric alcohol, *e.g.*, glycerol, linseed or other drying oil acids, and a coumarone resin.

S. M.

Manufacture of [mottled] thermoplastic materials. CELLULOID CORP. (B.P. 402,974, 13.3.33. U.S. 12.3.32).—Two or more layers of, *e.g.*, cellulose acetate are worked into a coherent mass by multi-stage rolling, a colouring agent (*P*) being contained in the surface of at least one of the layers in the first stage; the layers treated in each successive stage are formed from material produced in the previous stage. The process is continued until *P* is distributed throughout the mass. Plasticisers and swelling agents (containing opaque pigments if desired) may be incorporated.

S. S. W.

Manufacture of artificial materials [from vinyl compounds]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 403,750, 13.7.32).—The acid condensation of a vinyl alcohol or ester with an aldehyde (I) is effected in presence of a H₂O-insol. diluent, *e.g.*, C₆H₆, which is distilled off together with H₂O formed. Neutral H₂O-absorbents may also be added, *e.g.*, CaCl₂. The reaction proceeds quantitatively and excess of (I) need not be used.

S. M.

Manufacture of a plastic material capable of being hardened. H. FRITZ and E. GLASER (B.P. 403,230, 9.1.33. Austr., 6.2.32).—A powdered, hydraulic binder (I), *e.g.*, Portland cement, calcined gypsum, is worked up

to the desired consistency with a hygroscopic substance (II), *e.g.*, AlCl₃, and a H₂O-sol. anhyd. liquid (III), *e.g.*, EtOH, triacetin. ZnCl₂ may serve for both (I) and (II), and glycerin for both (II) and (III).

S. M.

Manufacture of floor covering [linoleum]. H. H. HOPKINS, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,912,200, 30.5.33. Appl., 15.11.28).—The resinous condensation product of glycerol, or other polyhydric alcohol, with monobasic acids, *e.g.*, linseed or tung oil acids, and a polybasic acid, *e.g.*, phthalic anhydride, is used as binder in place of linoxyn for coating burlap etc.

S. M.

Plastic glass substitute. J. F. WALSH, ASSR. to CELLULOID CORP. (U.S.P. 1,912,554, 6.6.33. Appl., 10.3.30).—Mixtures of toluenesulphonamide-CH₂O resins having m.p. <100° but >room temp. are used with suitable pigments, plasticisers, etc. for making imitation food articles.

S. M.

Rubberised and fibrous plastic material unattackable by oil. C. ANGOT (U.S.P. 1,907,231, 2.5.33. Appl., 6.6.31. Ger., 14.6.30).—A mixture is made of rubber 40–50, fillers 20–40, fibres 10–20, animal glue 2–5, glycerin 1–2, and a vulcanisation accelerator 0.5–1.0%, with S 5–12% of the rubber.

B. M. V.

Sealing composition. R. R. GRANT, ASSR. to BLUE ROCK CHEM. CORP. OF VIRGINIA (U.S.P. 1,906,749, 2.5.33. Appl., 19.2.31).—A composition that remains flexible comprises: oxidised and polymerised castor oil 60, Al₂O₃ 5, mica 15, and asbestos 15 pts. The temp. of mixing should be >150° during at least the incorporation of Al₂O₃.

B. M. V.

Distilling resinous wood. Core oil.—See II. **Polymerised furelyethylene.**—See III. **Coloured sol. cellulose. Coated cellulosic articles. Sizing of paper. Parchmentised cellulose. Artificial products. Fibrous composition.**—See V. **Delustring varnishes etc.**—See VI. **Laminated glass. Abrasive articles.**—See VIII. **Coating metal etc.**—See X. **Insulating composition.**—See XI. **Gelled oils.**—See XII. **Rubber-plastic compositions. Surface-finishing golf balls.**—See XIV. **Light-sensitive flayers.**—See XXI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Industrial microscopy. III. Rubber pigments. C. H. BUTCHER (Ind. Chem., 1933, 9, 431; cf. B., 1933, 976).—Fine particles are more difficult to mix with rubber (I) than coarse ones; they develop less resilient stocks and are more likely to cause scorching. Fine particles are studied by dispersing them in (I) and then diluting the mix with a solvent and counting the no. in unit vol. by known colloid methods. Irregular-shaped particles show a Brownian movement. Needle-shaped ZnO imparts stiffness. The optimum whitening of (I) is obtained with ZnO particles of about 0.15 μ diam. The *n* may be determined by embedding the material in solidified melts of known *n*; when the objective is moved upwards from the position of focus on a microscope the bright bands around the pigment move inward if the pigment (*P*) has the higher *n*, and *vice versa*. C black is best mounted as a dispersion of 2 g. of a mixture of 2 g.

of *P* and 100 g. of clear pale crêpe rubber in 25 c.c. of xylene; a 500-g. wt. is allowed to remain for 3 hr. on the cover-glass before examination. D. K. M.

Oil-resisting rubber. W. J. S. NAUNTON, M. JONES, and W. F. SMITH (Trans. Inst. Rubber Ind., 1933, 9, 169—189).—Immersion of a small disc in Diesel oil at 55° for 6 days is a useful test as to the relative oil-resistance of rubbers. Reduced milling is favourable to increased resistance, as also is the use of rubber obtained from latex to which a special protective agent, *e.g.*, methylcellulose, has been added. Prolonged vulcanisation with a surplus of S progressively reduces the susceptibility to oils, but accelerators have little influence. Fillers, especially MgCO₃, have a slight protective action. Most softeners reduce the oil-resistance; some, however, *e.g.*, glue, are neutral in this respect and so are suitable softeners for oil-resisting rubber. Surface protection by varnishes is difficult because these soon flake from soft rubber. Of synthetic resins, the glyptals are beneficial when incorporated in large proportion in rubber; introduction of chlorinated rubber is inefficacious; a high proportion, *e.g.*, >75%, of ethylene polysulphide (I) is effective. Duprene (II) (polymerised chloroprene) is 5 times as oil-resistant as rubber although inferior to (I) or glyptal resins in this feature. As (II) cannot be vulcanised to an ebonite stage it is possible by vulcanising a mixture of (II) and raw ebonite mix to obtain a flexible ebonite of excellent oil-resisting, physical, and ageing qualities. D. F. T.

Reclaimed rubber. M. KATH (India-Rubber J., 1934, 87, 103—104).—Reclaimed rubber as an ingredient in rubber compounds reduces irregularities in the mixing and vulcanisation processes; it acts as a softener, decreases the tendency to premature vulcanisation, and improves ageing behaviour. "Alkali reclaim" absorbs H₂O 8 times as rapidly as does "acid reclaim." D. F. T.

Water-immersed air oven for accelerated ageing tests on rubber. A. G. MILLIGAN and J. E. SHAW (J. Sci. Instr., 1934, 11, 10—14).—A cylindrical, brass ageing oven to which a slow stream of air is supplied by an automatic siphoning device is immersed to within 1 in. of its top in a thermostatically controlled H₂O-bath. The temp. of all parts of the oven space is uniform and const. within ±0.1°. D. F. T.

Ageing of rubber. B. L. JOHNSON (J. Elisha Mitchell Sci. Soc., 1933, 49, 39—40).—X-Ray interferences in crude rubber appear only at elongations of 80—100%. The same amount of depolymerisation takes place with or without antioxidant; hence other factors, perhaps oxidation at the isoprene double linking, cause the ageing. Decrease in the intensity of diffraction lines with ageing is due to a smaller no. of micelles, and not to their variation in size. CH. ABS.

Hygroscopicity of materials used in the rubber industry. I, II. B. FABRITZEV and R. SASTENKER (J. Rubber Ind., U.S.S.R., 1931, 5, No. 2—3, 28—36; 6, No. 7, 13—17).—Vals. for various materials are recorded. MgCO₃ (4.29% H₂O) over H₂O absorbed 11.4% H₂O, but on drying evolved only 13.87% H₂O. Milling produces pronounced drying. Except when very hydro-

scopic materials are used, the H₂O content of the mixture is reduced to <0.36% by very brief milling. CH. ABS.

Oxidation of rubber. III. Russell effect of rubber. A. VAN ROSSEM and J. H. E. HESSELS (Kautschuk, 1933, 9, 181—184; 1934, 10, 4—7).—First-latex sheet rubber after exposure for a few hr. to sunlight or to an electric arc produces an image on a photographic plate. An ultra-violet lamp is not suitable, because O₃ also affects the behaviour of the rubber towards the plate; the active O₃-products, however, are more stable to heat than the compounds responsible for the Russell effect (I). (I) is much less pronounced with first-latex crêpe and the smoke constituents of the sheet rubber appear to be mainly responsible. Hard fine Para rubber also does not show (I) appreciably, presumably on account of the different character of the smoke used. Its COME₂ extract, however, and that of crêpe and sheet rubber and of dried latex show (I). Mastication has little influence, but the incorporation of diphenylguanidine with S or of mercaptobenzthiazole markedly depresses (I). With vulcanised rubber (I) is always feeble and so is of little use as an index to the relative tendency to oxidation. D. F. T.

Effect of temperature on plasticity of rubber. R. D. PRESTWICK (Trans. Inst. Rubber Ind., 1933, 9, 196—204).—Using the formula $k = yx^n$, where *k* is the plasticity, *y* the thickness (mm.) of the sample after *x* min. compression, and *n* is a const., results with a parallel-plate plastometer (using uncompounded or compounded rubber at 50—80°) are related by the equation $\log k + b \log t = a$, where *a* and *b* are consts. and *t* is the temp. For soft mixtures, *b* = 0.78, but is smaller for harder stocks, *e.g.*, those containing C black. The val. of *n* in the first equation varies with the rubber and the temp., the extremes obtained being 0.215 for a soft rubber and 0.042 for a hard mixture. D. F. T.

Solution properties of dried rubber. T. H. MESSENGER (Trans. Inst. Rubber Ind., 1933, 9, 190—195).—Intensive drying of pale crêpe rubber under reduced pressure over P₂O₅ induces some kind of association or polymerisation, the proportion insol. in C₆H₆ gradually increasing. The η of the solutions also shows a marked increase, followed by a decrease; previous milling causes a retardation in these changes of η . Drying of solutions of rubber in C₆H₆ or CCl₄ induces no rise in η . D. F. T.

Rubber with textiles.—See VI.

PATENTS.

Manufacture of hydro-rubber. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 402,925, 22.10.32).—Rubber and similar highly polymerised unsaturated hydrocarbons are hydrogenated under pressure in presence of solvents and of catalysts containing heavy metals of group VI, *e.g.*, W, Mo, Cr, or their oxides and/or sulphides; if desired, oxides or sulphides of other metals, especially those of group VIII, or these metals themselves, may also be present. D. F. T.

Vulcanisation of caoutchouc. A. SKIPSEY (B.P. 403,480, 8.9.32).—The vulcanising agent consists of a

mixture of a P sulphide (preferably P_4S_3), an inorg. base, e.g., MgO, and S, preferably made into a paste with a mineral oil. Vulcanisation is so rapid that the use of polyhydroxy-compounds, e.g., glycerol or starch, aldehyde-amine condensation products, ester gum, etc. as retarding agents may be necessary. D. F. T.

Accelerator for vulcanisation of rubber. A. CAMBRON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,915,979, 27.6.33. Appl., 4.6.29).—Vulcanisation is accelerated by the reaction product of NH_2Ph and $PrCHO$ prepared under essentially anhyd. conditions and in presence of $< 5\%$ of an acidic material, e.g., $ZnCl_2$. D. F. T.

[Surface] treatment of vulcanised rubber. GOOD-YEAR TIRE & RUBBER Co. (B.P. 404,120, 10.11.32. U.S., 31.3.32).—The appearance and dirt-resisting qualities of vulcanised rubber are improved by exposure to ultra-violet radiation. D. F. T.

Manufacture of rubber threads. R. F. MCKAY. From INTERNAT. LATEX PROCESSES, LTD. (B.P. 404,194, 20.5.33).—Jets of an aq. dispersion of rubber are directed on to backing surfaces; the strips so produced are coagulated and superposed to form a compact homogeneous thread. D. F. T.

Manufacture of rubber thread. INTERNAT. LATEX PROCESSES, LTD., Assees. J. R. GAMMETER (B.P. 404,219, 5.7.33. U.S., 6.8.32).—Rubber is deposited from a fluid, e.g., from an aq. dispersion of rubber, on a moving surface with grooves in the direction of travel, the grooves being separated by sharp edges. A band is thus obtained of parallel rubber threads with intervening thin rubber films which can easily be separated to give individual threads. D. F. T.

Production of compositions and goods containing (A) rubber and similar material, (B) two or more substantially mutually-insoluble plastics. DUNLOP RUBBER Co., LTD., D. F. TWISS, and J. A. WILSON (B.P. 403,141—2, 30.6.32).—(A) The effect produced by compounding rubber with a plastic, or mixture of plastics, is modified by previously dispersing a quantity of rubber in the plastic ingredient. (B) Of 3 mutually insol. plastics (A, B, C), A is dispersed in B, and (A + B) in C; A and C may be the same; one may be rubber. D. F. T.

Providing [unpainted] golf balls with a hardened surface finish. DUNLOP RUBBER Co., LTD., D. F. TWISS, and F. A. JONES (B.P. 403,726, 1.7.32).—The unpainted surface is treated with a halogen or halogens, e.g., Cl_2 , which may be applied in vapour form or in solution, the additional medium being desirably one which will retard the action on the gutta and/or rubber. D. F. T.

Protecting polished surfaces.—See I. Paper manufacture. Leather substitute.—See V. Silk stockings. Rubberised fibres. Imitation leather.—See VI. Abrasive articles.—See VIII. Insulation of cables.—See XI. Coating wood etc. Rubberised fibrous plastic.—See XIII.

XV.—LEATHER; GLUE.

Astringent properties of tannins used in vats and of home origin. G. A. ARBUZOV (Ovlad. Tekh. Kozh.

Proiz., 1932, No. 3, 35).—The astringencies of tanning substances in the head vats are: willow (I) 72.8, (I) (25%) + pine (II) 64.3, (I) (10%) + (II) 41.5, (II) 41.0, oak (III) (66%) + (II) 58.5, (III) 54.6, (III) (33%) + (II) 43.0. The cause of the low astringency of pine tannins is discussed. CH. ABS.

Influence of drying and the introduction of non-tanning substances on results of analysis [of hide powder] by the Wilson-Kern method. S. B. SHIMENOVICH (Ovlad. Tekh. Kozh. Proiz., 1931, No. 1, 32—33).—Drying tanned hide powder increases the amount of tannins as determined by the Wilson-Kern method (I). The simplified (I) (increase in wt.) gives slightly lower results. Addition of gallic acid increases the % of tannins as determined by the official method, but not by (I). In (I) tanned hide powder should be dried before rinsing. CH. ABS.

Separation of diketopiperazines of leather. N. I. GAVRILOV and E. D. KAVERZNEV (Ovlad. Tekh. Kozh. Proiz., 1931, No. 2, 24).—Hydrolysis (autoclave) or digestion with trypsin of collagen shows that anhydride rings are present and are not formed in gelatinisation. The amount of cyclic anhydrides is $>$ in gelatin. Anhydrides containing (a) proline and phenylalanine (I) and (b) glycine and (I) were separated. Hydrolysis of collagen affords 18% of NH_3 , and of gelatin 4.8%. CH. ABS.

Grease stains on leather. I. Cause of grease stains on vegetable-tanned heavy leather. J. H. HIGHBERGER and E. K. MOORE (J. Amer. Leather Chem. Assoc., 1934, 29, 16—37).—The so-called "kidney grease stains" are due to an abnormally high fat content deposited in the corium during the lifetime of the animal. Greasy cured hides can be detected by determination of the d of a sample, using a Westphal balance and BuOH saturated with H_2O as the liquid. Hides of $d < 1.24$ produce grease-stained leather. The grease does not spread on leaving the cured greasy hides in pile for a period. Some grease stains are due to excessive oil absorption by hides of medium or low fat content, the cause of which is not known. D. W.

Combating salt stains [on leather]. N. I. BULGAKOV and K. P. POPOV (Ovlad. Tekh. Kozh. Proiz., 1932, No. 2, 38—39).—The pickle should contain Na_2CO_3 , and the salt for the drained leather 5% of Na_2CO_3 . CH. ABS.

Physico-mechanical and chemical properties of vegetable-tanned sole leather from pigskin. A. I. GOLENKIN (Ovlad. Tekh. Kozh. Proiz., 1932, No. 4, 41—43).—Constituents and tanning characteristics have been determined. CH. ABS.

Apparatus for determining the permeability to air of leather and other materials. N. S. FEDOROV (Ovlad. Tekh. Kozh. Proiz., 1932, No. 4, 49—51).—An apparatus which permits the maintenance of a const. H_2O pressure is described. CH. ABS.

Apparatus for measuring the permeability of leather to water. N. S. FEDOROV (Ovlad. Tekh. Kozh. Proiz., 1932, No. 4, 48—49).—Calibrated vertical tubes 1 m. long, filled with H_2O , lead to cylindrical vessels with H_2O -soaked membranes of leather. The rate of movement of the H_2O meniscus is measured. CH. ABS.

Utilisation of chrome-leather cuttings for preparing glue. A. A. PCHELIN (Ovlad. Tekh. Kozh. Proiz., 1931, No. 2, 19—20).—The material is treated with dil. aq. NaOH and detanned with $MgCO_3$. The glue (48—50%) has low adhesive power. CH. ABS.

Analysis of by-products [glue, gelatin] and leather substitutes. G. A. BRAVO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1934, 12, 17—26).—A summary of published methods.

Hardening of gelatin.—See XXI.

PATENTS.

Quick tanning. C. KANNEL (B.P. 402,524, 25.7.32).—Limed hides are washed, treated with aq. $NaHSO_3$, H_3BO_3 , and glucose to which may be added $PhSO_3H$, quinones, quinols, or CH_2O , and then tanned in ordinary vegetable tanning liquors in a drum fitted with pegs and provided with a hollow axle shaft for removal of gases. D. W.

Artificial leather.—See V, VI. **Bleaching tanners' wool.**—See VI.

XVI.—AGRICULTURE.

Influence of replaceable bases on physico-mechanical properties of soils. I. Influence of adsorbed sodium. A. M. PANKOV (Trans. Dokuchaiev Soil Inst., 1933, 8, No. 2, 1—27).—There exists no regular relationship between the properties studied and the amount of adsorbed Na. A. M.

Continuous automatic extraction of soils. J. C. RUSSELL (Soil Sci., 1933, 36, 447—450).—Suitable leaching apparatus is described for determining H_2O -sol. matter and exchangeable bases in soils. For the latter purpose, all exchangeable Ca may be removed from high-Ca soils by use of 250 c.c. of $N-NH_4Cl$. A. G. P.

Occurrence of *Azotobacter* in the peat soils of New York. J. K. WILSON and B. D. WILSON (Cornell Univ. Agric. Exp. Sta. Mem., 1933, No. 148, 15 pp.).—*Azotobacter* (I) were present in a large no. of soils having a p_H range of 3.6—7.6. No relationship was apparent between the occurrence of (I) and the p_H or the proportion of any one of the common mineral constituents of the soils. In certain carbonate-containing soils which proved unsuitable for the macroscopic colony growth of (I), conditions were improved in this respect by adjustment of the $CaCO_3 : PO_4'''$ ratio, e.g., by additions of sol. PO_4''' , acids, or S. A. G. P.

Salt-water-flooded soils on the eastern shore of Virginia. J. B. HESTER (Soil Sci., 1933, 36, 427—434).—Cultivation prior to flooding increased the absorption of NaCl by the soils. Flooding markedly lowered the replaceable Ca and increased the replaceable Mg content. In light sandy soils germination and the growth of young plants were adversely affected by 0.2% of NaCl in the soil. Injury was partly counteracted by applications of $Ca(NO_3)_2$ or CaO. Tolerance of NaCl was much higher in soils having high proportions of org. matter. A. G. P.

Migration of salts in soils. H. ERLNMEYER (Chem. Erde, 1933, 8, 317—320).—Sand mixed with $NaNO_3$ contained in a filter-cloth and covered with a

porous plate was placed over a beaker of H_2O and the whole placed in a closed box with $CaCl_2$. After 61 days there was a loss of 26.9 g. of H_2O as vapour and 1.3924 g. of $NaNO_3$ had migrated into the porous plate, forming an efflorescence on the top. With KCl (a less hygroscopic salt) there was no action. L. J. S.

Effects of additions of certain Colorado soils on the outgo of bases, chlorides, and sulphates from a Tennessee soil. W. H. MACINTYRE, W. M. SHAW, B. ROBINSON, and K. B. SANDERS (Soil Sci., 1933, 36, 435—446).—Lysimeter tests show that the characteristic bacterial activity and high salt accumulation of "brown spot" Colorado soils (B., 1934, 112) was not imparted to Tennessee soils (I) by admixture with them. The change in composition of the leachate from such mixtures was < that induced by incorporation of $CaCO_3$ or clover hay with (I). A. G. P.

Use of indicators for the qualitative determination of soil reaction. H. J. HARPER (Soil Sci., 1933, 36, 451—463).—Addition of customary indicators (I) to soil results in decreased p_H , the effect being most marked in neutral or approx. neutral soils, and inversely related to the concn. of the (I) used. Except in very acid soils, filtrates from soil-(I) mixtures were more acid than corresponding suspensions. Bromothymol-blue and bromocresol-green were absorbed by soils to a greater extent than bromocresol-purple (II), chlorophenol-red, or cresol-red. A 0.04% solution of (II) in 10% MeOH or EtOH, neutralised to p_H 6.1 (or titrated to a light red colour) with $Ca(OH)_2$, serves to classify soils according to the following p_H ranges: < 7.5, 6.8—7.4, 6.1—6.7, 5.5—6.0, > 5.4. A. G. P.

Distillation method for determining combined water and organic matter in soils. G. J. BOUYOUKOS (Soil Sci., 1933, 36, 471—484).—Modifications of the previous method (B., 1933, 34) are described. The H_2O given up by org. matter of soils during destructive distillation may be regarded as combined H_2O . A. G. P.

Microbiological determination of the manurial requirements of soils. V. S. BUTKEVICH (Chem. Social. Agric., 1932, 1, No. 1, 64—73).—The use of *Aspergillus oryzae* is proposed. It develops less acidity, and reflects more fully the amounts of nutrients present. A. M.

Relation of the nitrifying capacity of soils to the availability of ammonia and nitrates. G. S. FRAPS and A. J. STERGES (Soil Sci., 1933, 36, 465—470).—No relationship was apparent between the availability of NH_4^+ , NO_3^- , or the N of cottonseed meal and the nitrifying capacity of soils. Nitrates were, in general, slightly more available than was NH_4 . A. G. P.

Ammonium sulphate compared with nitro-chalk as a nitrogenous fertiliser on an open hill *Molinia* pasture. T. E. JONES (Welsh J. Agric., 1933, 9, 191—195).—On pastures cut monthly from June to Nov., $(NH_4)_2SO_4$ (I) gave greater yields than nitro-chalk (II) in the first season. In the second season (II) had changed the *Molinia* into a bent pasture and yields were higher than those obtained with (I), which latter had produced very little change in the botanical composition of the herbage. A. G. P.

Mixed fertilisers; science and practice. A. BECKER (Chem.-Ztg., 1934, 58, 25—26).—The relative merits of the use of mixed and of individual fertilisers are discussed. It is frequently an advantage to apply N later than P and K and in quantities dependent on the particular crop requirements and weather conditions. A. G. P.

Test of floats as fertiliser and the influence of farm manure on their effectiveness. T. L. LYON (Cornell Univ. Agric. Exp. Sta. Bull., 1933, No. 574, 18 pp.).—On a gross-wt. basis, rock phosphate in the form of "floats" (I) was approx. 50% as effective as superphosphate, in the season of application, and produced an equal residual effect on the succeeding crop. The action of (I) was improved by simultaneous applications of farmyard manure to extents which varied with the soil type. Additions of CaSO_4 did not improve the effect of (I). A. G. P.

Influence of manures on drought-resistance of wheat. S. P. MOLCHANOV and A. A. SHIRSHOV (Chem. Social. Agric., 1932, 1, No. 1, 82—86).—The amount of H_2O evaporated per g. of dry matter (*M*) decreases with increase in moisture content to a certain limit and then increases. Mineral manures do not affect the course of the curve. An excess of K manures does not give the soil any sp. protective power. N and P reduce the H_2O consumption per g. of *M* formed. A. M.

Control of "yarovisation" [of wheat]. A. A. RICHTER, V. A. RANTSAN, and M. Z. PEKKER (Compt. rend. Acad. Sci. U.R.S.S., 1933, 72—77).—During the process of "yarovisation" (cold treatment of winter wheat to permit spring sowing) the amylolytic and proteolytic activities of the seeds rise continuously during the entire process, the peroxidase-time curve has 2 maxima (on the 15th and 39th days), and the catalase (I) activity is greatest on the 20—25th day; the final (I) activity is \times the initial. The metabolism of the seeds and their p_{H} are at a max. on the 15th day. The intensity of staining by toluidine-blue of the embryo of yarovised seeds is $>$ that of untreated ones at p_{H} 3.8—8.3, and $<$ at p_{H} 9.2. R. T.

Inhibition of selenium injury to wheat plants by sulphur. A. M. HURD-KARRER (Science, 1933, 78, 560).—Wheat plants grown in soil to which 15 p.p.m. of Se as Na_2SeO_4 are added show characteristic chlorosis. In sand and solution cultures the toxicity varies according to the ratio $\text{Na}_2\text{SeO}_4:\text{Na}_2\text{SO}_4$. With no SO_4^{--} present the plants die in the early seedling stage; with high SO_4^{--} , compared with SeO_4^{--} , there is no visible injury. In H_2O cultures with Se concns. up to 28 p.p.m., plants are uninjured with a ratio Se:S \times 1:12. Growth is largely inhibited at a ratio 1:2. S or $(\text{NH}_4)_2\text{SO}_4$ prevented injury to plants in soils containing Na_2SeO_4 . L. S. T.

Influence of soil moisture on yield of cotton. S. A. KUDRIN and S. V. NEMILOVSKY (Chem. Social. Agric., 1932, 1, No. 2, 72—80).—Soil-moisture conditions are only of importance when the nutrient content is low. The moisture content should be about 22 wt.-% just before florescence, and 22—30% during flowering. Pot-culture methods are satisfactory for determining the manurial requirement of cotton. A. M.

Deficiency of the clover nodule organism on some Welsh soils. A. A. POULTER (Welsh J. Agric., 1933, 9, 145—159).—Inoculation of the soils with wild white clover soil improved the establishment (*E*), vigour, and nodulation (*N*) of clover seedlings. Liming assisted *E* to a lesser degree without inoculation. In the absence of basic slag CaO was essential for *N* even when a soil inoculant was used. A. G. P.

Distribution of wild white clover (*Trifolium repens*) in relation to the activity of earthworms (*Lumbricidae*). G. H. BATES (Welsh J. Agric., 1933, 9, 195—208).—No relationship was apparent between the proliferation of *T. repens* and the occurrence of worm casts. The latter create a surface layer of soil having a higher CaCO_3 content (or lower CaO requirement) and higher N and org. matter contents than the underlying soil. A. G. P.

Manuring red clover for seed. G. EVANS (Welsh J. Agric., 1933, 9, 135—141).—Heavy applications of K fertilisers increased the yield of seed, the no. of flowering stems (I), the no. of heads (II), the no. of florets per head, the no. of seed per head (III), and the wt. per 1000 seed (IV). Generous dressings of superphosphate applied simultaneously intensified the effects in every particular. Use of CaO in conjunction with P and K reduced the effects of these fertilisers on (I), (II), and (IV), but increased the size of the heads and (III). Nitrogenous manures did not affect the quality or quantity of seed produced, but increased (I) and (II). A. G. P.

Manuring red clover for seed production. J. L. JOHN (Welsh J. Agric., 1933, 9, 132—135).—Nitrogenous manures (used in conjunction with P and K) increased the total wt. of seed produced, the no. of florets per head, and the no. of seed per 100 florets. A. G. P.

Symbiotic nitrogen fixation in the genus *Casuarina*. H. MOWRY (Soil Sci., 1933, 36, 409—421).—A no. of species of *Casuarina* produce root nodules in which N fixation by symbiotic organisms takes place. Artificial inoculation experiments are recorded. A. G. P.

Carbon dioxide storage. V. Breaking the dormancy of potato tubers. N. C. THORNTON (Contr. Boyce Thompson Inst., 1933, 5, 471—481; cf. B., 1933, 1032).—Treatment of dormant tubers (whole or cut) with $>$ 30% of CO_2 and varying proportions of O_2 for 3—7 days accelerated sprouting. With 50—70% of CO_2 the p_{H} of the juice changed 0.6—0.7 p_{H} unit towards alkalinity, and the rate of O_2 uptake increased. The reducing properties of the juice were markedly increased. During treatment the glutathione content of the tubers was $<$ that of controls, but became much $>$ that of controls after planting. A. G. P.

Effect of spray materials on carbon dioxide assimilation by McIntosh apple leaves. M. B. HOFFMAN (Proc. Amer. Soc. Hort. Sci., 1932, 29, 389—393).— CaO-S spray reduces assimilation of CO_2 ; Bordeaux mixture has no effect. CH. ABS.

Determination of the distribution of particle sizes in lead arsenate sprays. P. J. CLARK (New Zealand J. Sci. Tech., 1933, 15, 183—187).—The

Calbeck-Harner sedimentation method (B., 1927, 127) is adapted for this purpose. The use of a cylindrical pan and the maintenance of const. temp. during the experiment are necessary.
A. G. P.

Downy mildew (blue mould) of tobacco. I. Influence of over-wintered plants. II. Wild hosts. III. Spraying. A. V. HILL and H. R. ANGELL (J. Counc. Sci. Ind. Res., Australia, 1933, 6, 260—268).—Infection was restricted more effectively by using or maintaining relatively dry soil conditions than by spraying with Bordeaux mixture.
A. G. P.

Use of chlorates as weed eradicators. D. CLOUSTON and A. HILL (Scot. J. Agric., 1933, 16, 196—208).—The successful use of NaClO_3 and KClO_3 on a no. of weed species is described. Applications in H_2O are more effective than is dusting. The amount of H_2O used is unimportant provided there is a sufficiency to ensure good distribution. Annual weeds may be treated at any time. Autumn treatment is most successful with perennials having strong underground organs, and is preferably preceded by ploughing. Chlorates are decomposed in soil during the winter months and do not injure subsequent crops.
A. G. P.

Greenhouse fumigations with naphthalene solutions. F. WILCOXON, A. HARTZELL, and W. J. YOUSEN (Contr. Boyce Thompson Inst., 1933, 5, 461—469).—The air of the greenhouse is circulated continuously through a saturating vessel containing solid (*e.g.*, in S) or liquid (*e.g.*, in oil) solutions of C_{10}H_8 (I). The concn. maintained in the greenhouse is controlled by the proportion of (I) in the solution used. (Cf. B., 1930, 962.)
A. G. P.

Yield and iodine level of milk from cows on iodine-manured pasture. K. SCHARRER, W. SCHROPP, and J. SCHWABOLD (Bied. Zentr. [Tierernähr.], 1933, B, 5, 676—700).—Manuring with I resulted in a considerably increased the I content of pasture, which reached a max. soon after treatment and subsequently declined to normal (10—12 weeks). The increased I of milk from cows on "iodised" pasture (I) was proportionally < that of the pasture itself. The feeding of (I) is associated with higher milk yields (*d* and fat content are not appreciably altered), a favourable effect on the oestrous cycle, and a prolonged lactation period.
A. G. P.

PATENTS.

[Apparatus for] manufacture of artificial manures. STURTEVANT ENG. CO., LTD., F. W. R. WILLIAMS, and A. OGILVIE (B.P. 402,832, 10.6.32).—Claim is made for an automatic plant which delivers the correct quantities of H_2SO_4 and phosphate rock to a mixing chamber from which the paste is fed on to an endless conveyor passing through fume-removing and drying chambers, and delivering the dried product through a rotary slicer to the final dryer, and thence to a packing station.
A. R. P.

Manufacture of fungicides. IMPERIAL CHEM. INDUSTRIES, LTD., and T. CALLAN (B.P. 403,411, 15.4.32).—The Hg, Pb, Cu, and Zn "salts" of salicylanilide are claimed, and are prepared from the Na salt by double decomp. in H_2O .
H. A. P.

XVII.—SUGARS; STARCHES; GUMS.

Viscosity of sucrose-salt mixtures. E. LANDT (Z. Ver. deut. Zucker-Ind., 1933, 83, 1086—1094).—Determinations of η of aq. sucrose (I) solutions (0.5—2.5*M*) containing NaCl , NH_4Cl , KCl , LiCl , or CaCl_2 (0.5—5*M*, or 10*M*) have been determined at 20° and compared with the data for aq. (I) or salt alone at the same concns. The relative increase in the η of (I) solutions by adding equiv. concns. of salt diminishes in the order $\text{CaCl}_2 > \text{LiCl} > \text{NaCl} > \text{KCl} > \text{NH}_4\text{Cl}$. The difference is the greater, the more conc. is the (I) solution. The phenomena are discussed in relation to ion hydration.
E. S. H.

Adsorbents obtained by the action of sulphuric acid on starches, sugars, etc. G. SOLLAZZO (L'Ind. Chimica, 1933, 8, 1554—1561).—The starch or sugar is treated with cold conc. H_2SO_4 and the resulting C is heated with NaOH solution, washed repeatedly, and dried. The % yields of dry C are: from sucrose 66, mannitol 14—16, glucose 38, lactose and rice starch 44. The powers of adsorption from 0.01% methylene-blue solution, taking Merck's medicinal C at 100 (when Norit = 30), are: C from gum arabic 210, from glucose 134, lactose 163, sucrose 95, mannitol 85, rice starch 153, almond husks 100. When the C is prepared in vac. the results are frequently higher, but in some cases lower.
H. F. G.

Phosphoric acid in potato starch. (A) M. SAMEC. (B) J. JANICKI (Rocz. Chem., 1933, 13, 607—617, 618—621).—(A) Polemical, against Janicki (B., 1932, 814). (B) Polemical, in reply to Samec.
R. T.

Diastase in honey.—See XIX.

XVIII.—FERMENTATION INDUSTRIES.

Acidimetry of wines. G. HOSSACK (Analyst, 1934, 59, 12—13).—To avoid the necessity of using an external indicator in determining the total acids (I) and fixed acids (II) of coloured wines the following procedure is recommended. To 50 ml. of wine are added 10 ml. of saturated aq. BaCl_2 and 50 ml. of 0.1*N*- NaOH , whereby all the colouring matter is pptd.: after dilution to 250 ml. 100 ml. of the filtered solution are acidified with 25 ml. of 0.1*N*- HCl and titrated back with 0.1*N*- NaOH (phenolphthalein) to obtain (I). A further 50 ml. of wine are evaporated to dryness, the residue is heated at 105° and dissolved in H_2O , and the solution treated as above to obtain (II). (I) — (II) represents the volatile acids present. CO_2 must be excluded throughout the operations.
A. R. P.

Composition and calorific value of English cider. D. W. STEUART (Analyst, 1934, 59, 27—28).—The compositions, *d*, and calorific vals. of 6 types of sharp cider and 2 types of West-Country cider are tabulated. The EtOH content varies from 2.3 to 10%, the sugar from 3 to 6%, the acidity from 0.38 to 0.83%, and the calorific val. from 218 to 465 g.-cal. per pint.
A. R. P.

Absolute ethyl alcohol of high purity. W. SWIEN-TOSLAWSKI and J. USAKIEWICZ (Rocz. Chem., 1933, 13, 546—551).—99.6% EtOH, prepared from 96% EtOH by distillation from CaO , is converted into abs. EtOH by

heteroazeotropic distillation with CS_2 or C_6H_6 -benzene. The b.p. of the product is $78.320^\circ \pm 0.002/760$ mm.

R. T.

Diastase in honey. Calf chymase.—See XIX.

PATENTS.

Denaturing of alcohol. W. C. MARTIN, Assr. to GOVT. OF UNITED STATES (U.S.P. 1,914,519, 20.6.33. Appl., 1.8.31).— α -, β -, or γ -Terpineol, or combinations of these, combined with crude Pr^sOH , hydrocarbons, or other denaturing agents, impart a disagreeable taste to EtOH. When used with Aldehol (I) (grade A, a product of oxidation of kerosene) or Alcotate (II) (a petroleum product free from H_2O) the odour is masked, and the separation of pure EtOH from the mixture made very difficult. The characteristics of (I) and (II) are given.

I. A. P.

Production of aliphatic acids [by fermentation]. H. R. STILES, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,913,346, 6.6.33. Appl., 25.11.29).—Carbohydrate or OH-fatty acid media are fermented by (87—98% of) bacteria producing EtCO_2H (*B. acidipropionici*) and small amounts of PrCO_2H (*Clostridium acetobutylicum*) and $\text{OH}\cdot\text{CHMe}\cdot\text{CO}_2\text{H}$ (*Lactobacillus casei*)-producing bacilli at p_{H} 4.6—7.0 (CaCO_3 , Na_2CO_3 , NaHCO_3 , or NH_3) and 20—38°. Volatile acids (AcOH — PrCO_2H) are thus produced at the expense of OH-acids.

H. A. P.

Sterols [from yeast].—See XII.

XIX.—FOODS.

Vitamin-B content of Indian rice. II. H. W. ACTON, S. GHOSH, and A. DUTT (Indian J. Med. Res., 1933, 21, 103—107).—Various kinds of rice examined by the Spruyt colorimetric method show a fall in the colour index (I) with increasing degrees of hulling, polishing, and washing. Feeding experiments on "Munia" rice birds show somewhat similar decreases in the vitamin- B_1 content, suggesting a definite relation between this and (I).

NUTR. ABS. (m).

Vitamin content of South Indian mangoes (Sci. Rep. Govt. Agric. Chem., Coimbatore, 1932—33, 26).—Two varieties of mangoes contain appreciable amounts of vitamin-A, but little or no vitamin-B. The variety of higher nutritive val. contains considerably less reducing sugar.

NUTR. ABS. (m).

Variation in the composition of milk in certain Midland districts of England during the years 1923—31. A. G. BAKER and H. T. CRANFIELD (J. Dairy Res., 1933, 4, 246—254).—Variations in the % of fat and solids-not-fat of milks from 12 centres are recorded. A relationship is indicated between rainfall and milk composition for each year.

A. G. P.

Factors influencing the coagulation of milk by calf chymase. P. PARISI (Giorn. Chim. Ind. Appl., 1933, 15, 545—552).—The enzymic coagulation of milk is accelerated by increase in $[\text{H}^+]$ and $[\text{Ca}^{++}]$, and retarded by addition of KOH, NaOH, or aq. NH_3 , irrespective of alteration of the p_{H} . Cooling, heating, and presence of acids influence the velocity only by modifying the reaction or the content of Ca^{++} . Between 30° and 36° (but not outside these limits) the temp. coeff. of the

coagulation is approx. const. for a single milk under varying conditions, but varies from 1.35 to 2.09 for different milks. The coeff. increases with increase in acidity and with decrease in $[\text{Ca}^{++}]$.

T. H. P.

Mode of combination and distribution of traces of heavy metals in dairy products. W. L. DAVIES (J. Dairy Res., 1933, 4, 255—264).—The distribution of small amounts of Cu and Fe between cream and separated milk follows that of curd-N. Absorption of complex proteinates at the surface of the fat globules is indicated. The heavy metal passing into butter from cream is also related to the curd-N, but not to the acidity of the cream. The Cu associated with the curd in butter is approx. twice that associated with the protein-N of the buttermilk. In absence of proteins the entry of Cu into the fat phase of mixtures of olive oil and Cu lactate solution is greatest at neutrality and declines with increasing acidity. The addition of milk-protein slightly increases the amount of Cu passing into the fat. Diffusion of heavy metals in milk through colloidion membranes increases with acidity and is parallel with the diffusion of H^+ . The ionic concn. of heavy metals in milk is low, but rises with increasing acidity.

A. G. P.

Bacterial milk taint. A. CUNNINGHAM (J. Dairy Res., 1933, 4, 197—205).—An odour resembling that of amyl alcohol is traced to the growth in milk of micrococci similar to *M. caseolyticus*, and probably derived from the litter of the cowshed floor. The aroma was produced by cultures on media containing leucine as the only org. compound.

A. G. P.

Factors affecting solubility of milk powders. II. **Influence of temperature of reconstitution on protein solubility.** G. R. HOWAT and N. C. WRIGHT (J. Dairy Res., 1933, 4, 265—272).—The solubility of spray-dried separated milk was not appreciably affected by the temp. at which reconstitution was carried out. Similar samples, preheated for 6 hr. at 105—110°, showed increasing solubility with rising temp. of reconstitution (I). In commercial roller-dried milks the solubility increased with (I) up to approx. 50°, and declined somewhat at higher temp. The initial increase was due to the presence of proteins rendered insol. by overheating in the dry state. The protein remaining insol. at 50° was that portion denatured and irreversibly coagulated by moist heating. The decreased solubility between 50° and 100° resulted from heat-treatment accompanying (I). The fat content of the whole-milk powders had little effect on (I). In the routine examination of dried milks, (I) at 20° and at 50° yields the most valuable information as to the condition of the proteins (cf. B., 1933, 363).

A. G. P.

F.p. of milk : Hortvet method. E. V. JONES (Analyst, 1934, 59, 29).—Attention is directed to the necessity of removing the freezing starter from the apparatus before tapping the thermometer; unless this is done a high zero val. is obtained.

A. R. P.

Aid to the reading of Gerber milk-fat tubes. E. B. GRAYSON (Analyst, 1934, 59, 29).—The tube is held about 1 in. away from a light-tight box containing an electric lamp and a glass window covered inside with

a sheet of grease-proof paper, against which the zero line and upper meniscus of the fat stand out clearly.

A. R. P.

Amyl alcohol as a source of error in the Gerber test [for milk]. B. L. HERRINGTON (J. Dairy Sci., 1933, 16, 557—558).—The importance of using amyl alcohol having b.p. 128—132° (i.e., containing *iso*- and *sec*-butylcarbinols only) is emphasized. Testing the alcohol by means of "blank" Gerber tests, using H₂O instead of milk, is not always satisfactory. A. G. P.

Factors contributing to an off-flavour in ice cream. C. D. DAHLE and E. C. FOLKERS (J. Dairy Sci., 1933, 16, 529—547).—The off-flavour is due to presence of Cu (> 1.3 p.p.m. in the finished product) together with the acid of fruit. Cu was derived from Cu vac. pans. A. G. P.

Manufacture of casein from skimmed milk. ANON. (Food, 1934, 3, 167—170).—An illustrated description.

Two surface defects of butter—"primrose colour" and "toppiness." C. R. BARNICOAT (New Zealand J. Sci. Tech., 1933, 15, 199—203).—"Toppiness" (the tallow-like flavour of slightly oxidised fats) may be minimised by use of wrapping papers containing min. amounts of sol. metal contaminants and avoiding exposure of the surface, especially to direct sunlight. "Primrose" colour is the result of surface desiccation and is curable by use of non-absorbent wrappings impermeable to H₂O. A. G. P.

Discoloration in New Zealand cheddar cheese. Muddy, pink, and bleached defects. I. Bacteriological investigation. G. F. V. MORGAN. **II. Biochemical investigations.** G. M. MOIR (J. Dairy Res., 1933, 4, 226—237, 238—245).—II. The discoloration is associated with mould growth. Pink discoloration results from the action of acids on the annatto colouring matter. Bleaching is a reduction process in which the fat is concerned. Muddy or dark discoloration is due to the activity of enzymes (possibly including tyrosinase) which diffuse into the body of the cheese from areas of mould growth. A. G. P.

Chemistry of Cheddar cheese-making. F. H. McDOWALL and R. M. DOLBY (Nature, 1934, 133, 101).—At various stages in the above process the wheys show a steady rise in the lactic acid (I) content even through the salting stage (II) and despite the fall or absence of increment in the titratable acidity at (II). The rise in (I) is accompanied by a marked increase in Ca, and (I) is removed in the whey as Ca lactate. The lactose content of whey falls at (II). L. S. T.

Effect of feeding dried beet slices as compared with fresh beet on the qualitative and quantitative supply of cows' milk. C. KRONACHER, J. KLIESCH, and H. SCHUBERT (Bied. Zentr. [Tierernähr.], 1933, B, 5, 648—652).—The total yield and % fat of milk was as high when dried slices as when fresh roots were given. A. G. P.

Digestibility for poultry and cows of feeding-stuffs prepared from wood. E. MANGOLD and H. BRUGGEMANN [with E. THEEL] (Landw. Jahrb., 1933, 78, 649—658).—Wood fibre treated by the Schwalbe

process showed digestibility coeffs. ranging from 55 to 77%. A. G. P.

Use and value of milk and milk products in the fattening of poultry. R. FANGAUF and R. DEDITIUS (Bied. Zentr. [Tierernähr.], 1933, B, 5, 469—506).—For fattening old hens, milk gave better results than meat meal and oil cake. Condensed skim milk, curd, and casein also gave good results. A. G. P.

Fattening trials with ducklings. H. BÜNGER and A. WERNER [with J. SCHULTZ, H. KRUEGER, and J. KESELING] (Bied. Zentr. [Tierernähr.], 1933, B, 5, 507—531).—In a comparison of casein (I) with fish meal and meat meal as protein supplements, (I) produced rather smaller live-wt. increases in the early part of the experimental period and tended to induce lameness (probably lack of vitamins-A and -D). At later stages there was little difference between the effect of the two rations. In certain cases sour skim milk gave inferior results to those of a soya bean-fish meal ration, probably as a result of its high lactic acid content. A. G. P.

Use of carbon dioxide in the storage of chilled beef. W. A. EMPEY and J. R. VICKERY (J. Counc. Sci. Ind. Res., Australia, 1933, 6, 233—243).—Although it is impossible, by use of CO₂, to ensure complete absence of wastage during transport-storage periods of approx. 45 days, an atm. containing 10—12% CO₂ and temp. of -1° markedly restrain microbial growth, notably that of *Achromobacter*. A. G. P.

Cleaning of fruit carrying lead. H. C. MCLEAN and A. L. WEBER (Science, 1933, 78, 579).—Wetting and degumming agents in hot alkali or alkaline silicate solutions are more effective than the same agents in acid solution for reducing As and Pb residues on fruits and vegetables. L. S. T.

Determination of diastase in Danish honey. C. HARTMANN (Dansk Tidsskr. Farm., 1934, 8, 1—12).—A crit. review of known methods. Experiments with 32 samples of Danish honey showed that different methods gave only approx. parallel results, probably owing to variations in their H₂O and acid contents. R. P. B.

Casein in practice.—See XIII. **Yield of milk from cows.**—See XVI.

PATENTS.

Treatment of [cereal] grains. L. W. LARSEN, Assr. to ANSUL CHEM. CO. (U.S.P. 1,914,341, 13.6.33. Appl., 18.6.30).—Grain is bleached with H₂SO₃ (I) by being allowed to fall past sprays of H₂O and of liquid SO₂. The surface of the grain is moistened by the H₂O and the SO₂ dissolves in the surface film with formation of (I). Alternatively, the H₂O and SO₂ may be sprayed at the same time so that a mist of (I) is formed. E. B. H.

Preparation of cereals. E. BERLINER (B.P. 402,899, 26.8.32. Ger., 4.11.31).—Wheat and rye grains, after cleaning, are saturated with an emulsion of fat solvents and dil. alkaline lye, and are then maintained at 60°. The husks (H) are softened, but the emulsion does not penetrate further into the grains than the aleurone cells. After removing H, the grains are washed and dried. E. B. H.

Bleaching of flour. J. STRAUB (U.S.P. 1,913,776, 13.6.33. Appl., 21.3.29. Holl., 5.4.28).—Mixtures of org. peroxides (I) which are liquid below 45° are sprayed, either alone or emulsified with H₂O, into the flour (II), which is afterwards mixed. (I) may also be adsorbed on dry starch and then mixed with (II). E. B. H.

Bread-dough improving and bleaching process and composition. A. R. SASSE, Assr. to C. M. HARDENBERGH (U.S.P. 1,913,044, 6.6.33. Appl., 9.12.29).—An improving and bleaching agent (I) for flour consists of a mixture of Mn succinate, Fe^{II} lactate, gum arabic, Na citrate, and Na₂CO₃, with starch as filler. When H₂O is added in small quantities to the flour Mn(OH)₂ is formed, which is oxidised by atm. O₂ to MnO₂; this in turn loses O to oxidise the carotene in the flour, with the re-formation of Mn(OH)₂. The action of (I) is catalytic. E. B. H.

Bread-leavening composition. M. BONOTTO, Assr. to AMER. SOYA PRODUCTS CORP. (U.S.P. 1,914,478, 20.6.33. Appl., 15.12.30).—A yeast food and bread improver consists of a vegetable Na proteinate mixed with vegetable proteinates of Ca and NH₄ and Na (or K) phosphoproteinates, which are obtained by the addition of salts to a moist soya-bean curd. It is claimed that improved loaf characteristics and yield are obtained. E. B. H.

Preparation of bread. B. C. NIEDZWIEDZ (B.P. 404,144, 18.1.33).—Bread having an alkaline reaction is produced by aerating coarsely-ground meal with fruit juices and bicarbonates, and baking. E. B. H.

Production of pasteurised cheese. E. GALBANI (B.P. 404,141, 9.1.33. It., 9.1.32).—A white cheese and a green cheese are pasteurised separately and then mixed together in a pasty condition, producing a green-streaked cheese of attractive appearance. E. B. H.

Manufacture of soy[a-bean] milk and its derivatives. M. ADLER (B.P. 402,948, 12.1.33. Austr., 16.1.32).—Objectionable flavours are removed from soya-bean products by partial pre-roasting, extraction with EtOH, and heating an aq. suspension while passing a stream of superheated steam or air. E. B. H.

Manufacture of tea free from theine or caffeine. A. J. FRITZ (B.P. 403,868, 15.5.33).—Tea is decaffeinated either (a) by solvent extraction of its alkaline suspension (S), removal of caffeine (I) from this, and returning the other extractives to tea, or (b) by auto-claving S to above the sublimation point of (I) and collecting the escaping gases, which are treated as above. E. B. H.

Treatment of nuts. J. A. ZALOOM, Assr. to ZENOBIA Co., Inc. (U.S.P. 1,911,869, 30.5.33. Appl., 4.2.33).—Nuts having a hard cleft shell, e.g., pistachio, are prepared for sale by heating and spraying with edible colour, rolling in NaCl during roasting, and finally coating with a H₂O-resisting glaze. E. B. H.

Production of cattle food. H. H. MORETON, Assr. to BILTMORE CONSERVATION CORP. (U.S.P. 1,911,282, 30.5.33. Appl., 11.2.30. Renewed 27.9.32).—Garbage is heated in jacketed pans under an internal pressure of 40 lb. per sq. in. and then subjected to vac. This treatment is claimed to assist the separation of oils and fats.

It is repeated after the addition of aq. Na₂CO₃, followed by a solution of alum and "chloride of lime," and the residue is dried. E. B. H.

Protective coating [for foodstuffs]. L. A. HALL and E. L. GRIFFITH, Assrs. to GRIFFITH LABORATORIES, Inc. (U.S.P. 1,914,351, 13.6.33. Appl., 16.7.30).—A protective, adherent, flexible coat is formed on meat by dipping in a solution prepared by dissolving pure food-gelatin in H₂O and adding K₂Al₂(SO₄)₄ as hardener and glycerin as emollient. Further coats of technical gelatin may be applied and allowed to dry. E. B. H.

Dehydrated products [milk].—See I. Wax-like product.—See XII. Glass substitute.—See XIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Evaluation of saffron. C. ZÄCH (Mitt. Lebensm. Hyg., 1933, 24, 156—164; Chem. Zentr., 1933, ii, 1445).—Vals. were: aq. extract 58—62 (whole), 61—65 (powder); reducing substances before inversion 22—25, after inversion 24—27%. Higher vals. indicate addition of sugar. A. A. E.

Viscosity measurements for the evaluation of fluid extracts. H. SCHRADER (Pharm. Ztg., 1934, 79, 88—89).—The usefulness of these determinations (with a Höppler viscosimeter) is exemplified by the examination of Ex. *Secale cornuti fluidum* and Ex. *Thymi comp. fluidum Synd.* E. H. S.

Analytical constants of Bulgarian rose oil. R. GARNIER and S. SABETAY (Compt. rend., 1933, 197, 1748—1750).—EtOH is a normal constituent of rose oil (1.4—12.0%). The rhodinol (I) content is 44.7—60.9%; this, together with the α val., is characteristic of a good sample of the oil, but shows no proportionality. The variability of other constituents is considerable. The fraction responsible for the characteristic odour is small and of unknown constitution, but has a higher $[\alpha]$ than (I). P. G. M.

Essential oils in fungi. AYE (Apoth.-Ztg., 1932, 47, 1027—1028; Chem. Zentr., 1933, ii, 1534).—*Sclerotinia vulgare* (80 kg.) affords an oil (2 g.), d 0.87, containing S; *Tricholoma sulfuris*, contains S; *Lactaria piperata* (20 kg., 0.5 g.), acid val. 29, ester val. 223; *Trametes pini*, acid val. 88, ester val. 131, affording crystals, m.p. 60°; *Polyporus squamarius*, d 0.926, acid val. 86, ester val. 70, $[\alpha]_D$ 5—6°, contains S, and affords crystals, m.p. 35°; *Lentinus tigrinus*, acid val. 93, ester val. 75; *Clitocybe odora*, aniseed odour, but aniseed acid or anethole not found; *Phallus impudicus*, contains S. In some cases the oils appear to be formed by enzyme action on treatment with H₂O. A. A. E.

Blue mould of tobacco.—See XVI.

PATENTS.

Preparation of agar-petrolatum compositions. F. W. NITARDY, F. F. BERG, and P. GEORGI, Assrs. to E. R. SQUIBB & SONS (U.S.P. 1,913,561, 13.6.33. Appl., 10.11.31).—To a hot, aq. solution of agar-agar (or other jelly-forming material) is added a hot mixture or oil-in-H₂O emulsion containing an emulsifying agent, e.g., acacia, and the mixture is allowed to cool without stirring. E. H. S.

[Preparation of] sulphuric esters of halogenated fatty acids [medicinals]. W. T. WINCKLER, Assr. to VON WINKLER LABORATORIES, INC. (U.S.P. 1,912,814, 6.6.33. Appl., 30.8.28).—(Unsaturated) OH-acids (ricinoleic acid) are halogenated (iodinated) and the product is treated with H_2SO_4 , neutralised with alkali, and purified by dissolution in EtOH. H. A. P.

Preparation of aminoalcohols [pharmaceuticals]. F. STOLZ, K. BÖTTCHER, J. HALLENSLEBEN, and W. KROHS, Assrs. to WINTHROP CHEM. CO., INC. (U.S.P. 1,913,520, 13.6.33. Appl., 23.10.28. Ger., 29.10.27).—Aralkyl (benzyl) alkylaminoketones are reduced catalytically (Pd or Ni- H_2) to the alkylaminoalcohol and alkylbenzene etc.: $R\cdot CO\cdot CH_2\cdot NR'\cdot CH_2Ph + 2H_2 \rightarrow PhMe + R\cdot CH(OH)\cdot CH_2\cdot NHR'$. The following are prepared by interaction of $CH_2Ph\cdot NHMe$ with the appropriate α -halogenoketone: 3:4-dihydroxyphenyl, m.p. 120°, phenyl, and p-hydroxyphenyl benzylmethylaminomethyl ketone (hydrochloride, m.p. 222–224°), and phenyl α -benzylmethylaminoethyl ketone, b.p. 197–198°/14 mm. H. A. P.

Manufacture of aminoketoalcohols [pharmaceuticals]. K. WARNAT, Assr. to HOFFMANN-LA ROCHE, INC. (U.S.P. 1,911,332, 30.5.33. Appl., 30.12.30. Ger., 18.1.30).—Condensation products of α -halogenoketones ($CHMeBr\cdot CPh$) with physiologically active α -aminoalcohols (ephedrine) are claimed. Condensation products of $CHMeBr\cdot CPh$ with *l*-, m.p. 92–93° (inactive) (hydrochloride, m.p. 194°), and *d*- ψ -, m.p. 156° (hydrochloride, m.p. 206°, $[\alpha]_D^{20} -12.6^\circ$), -ephedrine, of *dl*-ephedrine with $CH_2Br\cdot CPh$, m.p. 76° (hydrochloride, m.p. 146°), of *l*-ephedrine with $CH_2EtBr\cdot CPh$, and of (?) $CH_2Ph\cdot CH(OH)\cdot NHMe$ with $CH_2Br\cdot CPh$, m.p. 80° (hydrochloride, m.p. 167–168°, sinters 100°), and $CHMeBr\cdot CPh$, m.p. 110° (hydrochloride, m.p. 177°), are described. H. A. P.

Manufacture of derivatives [dialkylamides] of di- or tri-methoxy- and -ethoxy-benzoic acids [pharmaceuticals]. H. J. W. FRANCE. From F. HOFFMANN-LA ROCHE & Co. A.-G. (B.P. 403,892, 16.6.33).—The acid chloride is added to excess $NHMe_2$ or $NHEt_2$ in an inert solvent. Veratrodide-ethylamide, b.p. 205°/12 mm., and -methylamide, m.p. 102–103°, b.p. 203°/12 mm.; 3:4:5-trimethoxybenzdi-methylamide, m.p. 74°, b.p. 218°/13 mm., and -ethylamide, m.p. 54°, b.p. 220–226°/13 mm.; 2:3-dimethoxybenzdimethylamide, b.p. 172°/12 mm.; 3-methoxy-4:5-diethoxybenzdiethylamide, b.p. 211–212°/12 mm.; and 3:5-dimethoxy-4-ethoxybenzdiethylamide, b.p. 213°/13 mm., are described. H. A. P.

Production of soluble salts of barbituric acids. W. W. TRIGGS. From ABBOTT LABORATORIES (B.P. 404,038, 11.7.32).—The barbituric acid derivative is treated with an alkali alkoxide ($NaOEt$ or $LiOEt$) in an aliphatic alcohol (EtOH) or ketone ($COMe_2$); in the former case the Na or Li derivative is pptd. by C_6H_6 or light petroleum. H. A. P.

Liver extract. E. D. CAMPBELL, Assr. to E. LILLY & Co. (U.S.P. 1,914,338, 13.6.33. Appl., 20.10.28).—An aq.-alcoholic (50–70% EtOH) extract of liver is freed from EtOH and then either conc. or treated with EtOH to a concn. of 90–92% EtOH, and the resulting ppt. is separated for administration. E. H. S.

Preparation of cortin. F. A. HARTMAN (U.S.P. 1,914,125, 13.6.33. Appl., 26.8.30).—The Et_2O -sol. portion of the ground adrenal cortex (either alone, acidified, or mixed with NaCl) is extracted with EtOH and the EtOH-free extract extracted with Et_2O to remove the cortin. The operations are preferably performed at low temp. and in a non-oxidising atm. E. H. S.

[Manufacture of crystallised derivatives of] germinal gland hormones. SCHERING-KAHLBAUM A.-G. (B.P. 403,344, 8.9.33. Ger., 27.9.32).—The hormones are purified by crystallisation of their quinoline derivatives. E. H. S.

Manufacture of a substance for treatment of malignant tumours, in particular cancer. E. J. GEORGIU (B.P. 403,269, 12.4.33. Ger., 16.4.32).—The blood-serum from pregnant animals (preferably taken during the final period) is treated with EtOH, and the sterilised ppt. is dissolved in NaCl solution, which is then freed from EtOH by heating *in vacuo*. E. H. S.

Cigarette paper.—See V. Soap. Wax-like product.—See XII. Alkaloids from tea.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Hardening of gelatin by means of copper dichromate solutions. H. D. MURRAY and D. A. SPENCER (Phot. J., 1933, 73, 497–501).—A study of the mechanism of the reactions involved shows that the action of $CuCl_2$ on the Ag image is to produce a mixed deposit of $AgCl$ and Cu_2Cl_2 (I). The (I) can be removed by prolonged washing in H_2O ; it is more quickly sol. in dil. HCl, or in aq. KCl (more sparingly in KBr). $K_2Cr_2O_7$ (II) oxidises the (I), and is simultaneously reduced to a Cr^{III} compound which can harden the gelatin in the immediate neighbourhood. Thus the relative proportions of KCl and (II) used determine the type of bleaching, inasmuch as the diffusion of the hardened image from the centres of hardening is dependent on the diffusion of dissolved (I) before oxidation by (II). The mechanism of the hardening of gelatin is discussed. Experiments in support of the results are detailed. J. L.

[Photographic] papers sensitised by iron salts and giving selenium images. T. PAVOLINI (Corriere Foto., 1932, 29, 245–246, 303–304).—Paper is sensitised with aq. $FeCl_3$, tartaric acid (I), and H_2SeO_3 . After exposure it is treated with aq. HCl + NaCl. Alternatively, the H_2SeO_3 may be added to the HCl-NaCl bath. $FeCl_3$ is reduced in light by the (I) to $FeCl_2$, which then liberates Se. Paper sensitised with $Fe_2(C_2O_4)_3$, exposed, and developed in aq. KCNSe gives a red positive image of Se. CH. ABS.

Ammoniacal [photographic] developers. J. VIDAL (Cinémat. franç., Suppl. tech., 1931, 14, 4).—In an NH_3 -glycin developer an exposed plate is slowly fixed out and simultaneously gives a greyish image which is apparently formed by physical development resulting from the formation of a sol. NH_3 -AgBr complex. Similar results have been obtained with other weak reducers. Developers of higher reduction potential

than that of glycine simultaneously give a black image by chemical development. With NH_3 -glycine the amount of Ag deposited as a uniform greyish-white ppt. on the surface of the emulsion layer increases with the NH_3 content, but is decreased by addition of a Ag salt such as a $\text{Ag-Na}_2\text{S}_2\text{O}_3$ complex. CH. ABS.

Celluloid films.—See V.

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Sensitisation of silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 403,840, 10.3.33. Ger., 10.3.32. Addn. to B.P. 386,791; B., 1933, 285).—Seleno- ψ cyanines containing an acylamino-group derived from C_3 - C_5 acids (EtCO_2H , PrCO_2H) are claimed. Examples are 5-propionamido- (sensitivity λ 500–630 $\text{m}\mu$) and 5-butyramido-1 : 6'-dimethyl-1-ethylseleno- ψ -cyanine iodide (λ 500–635 $\text{m}\mu$). H. A. P.

Manufacture and use of sensitising dye for photographic silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 403,974, 27.6.32. Ger., 27.6.31).—A quaternary salt from 1-methylbenzselenzazole (1-methylbenzselenzazole ethiodide) is condensed with $\text{C}(\text{OEt})_4$ in EtOH in presence of $\text{C}_5\text{H}_{11}\text{N}$. The product sensitises at λ 500–690 $\text{m}\mu$ (max. 615 $\text{m}\mu$). H. A. P.

Manufacture of light-sensitive layers. I. KREIDL, C. ROSEN, and K. RUTTER (VEREIN. CHEM. FABR. KREIDL, HELLER & Co.) (B.P. 403,664, 24.6.32. Austr., 24.6.31).—Condensation products of aldehydes with compounds of the urea or $\text{CS}(\text{NH}_2)_2$ type which are swellable or sol. in H_2O are rendered sensitive to light by treatment with chromates, diazo compounds, Fe salts, etc. Formation of streaks during drying is avoided by addition to the coating mixture of small proportions of albumin. The treated resin may also be used as a carrier for Ag halides. S. M.

Positive photographic film. V. B. SEASE, ASSR. to DU PONT FILM MANUFG. CORP. (U.S.P. 1,905,188, 25.4.33. Appl., 2.8.30).—Colour is obtained by complementary images in two (or more) sensitive films separated by a light-restraining layer containing a suspension of a photographically inert salt removed in a first development and fixing; a suitable salt is unsensitised Ag halide. B. M. V.

Colour photography. W. FINNIGAN and R. A. RODGERS (B.P. 403,257, 23.3.33).—The rear emulsion of a bipack is made from an ordinary plate which is specially panchromatised with a mixture of dicyanine, homocol, pinaverdol, pinacyanol, and conc. aq. NH_3 . The formula and procedure are detailed. The film must be developed with pyrocatechol developer. This emulsion is claimed to be especially sensitive in the region λ 4750–8000 Å. J. L.

Production of colour pictures from silver pictures. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 401,340, 5.5.32).—Certain azo dyes are used which are reducible by $\text{Na}_2\text{S}_2\text{O}_4$, and the reduction products of which form H_2O -sol. Ag compounds and are not easily re-oxidised. A dyed Ag halide emulsion is exposed (under a positive), developed, and fixed in usual manner. The reduction is effected with HBr (or HI), which does not reduce the dye without the presence of Ag; $\text{CS}(\text{NH}_2)_2$ is used to form a complex Ag com-

pound, which acts as a catalyst. A solution of equal pts. of (1) 6250 c.c. of H_2O , 17 g. of I, 33 g. of KI, 525 c.c. of conc. H_2SO_4 , and (2) 6250 c.c. of H_2O , 33 g. of Na_2SO_3 , 33 g. of $\text{CS}(\text{NH}_2)_2$, is prescribed. After treatment the picture is fixed with an acidified solution of CuCl_2 . In view of the high concn. of acid used, the emulsion layer is preferably intensively hardened. J. L.

Development of photographic silver salt layers. H. GOSSLER (B.P. 403,789, 26.10.32. Ger., 27.10.31).—Fog-free compensatory development in blue-black tones of under- or over-exposed negatives is obtained by addition of a glyoxaline (nitrobenzimidazole) to the developer (0.05–0.35 g./litre) or to a protective layer on the negative. H. A. P.

Photographic toning. E. MAYER and N. BENEDIK (DR. E. MAYER & BENEDIK), and F. NEUBER (B.P. 401,548, 24.2.33).—The toning bath consists of mixtures of phospho- (or arseno-)molybdates with HSCN (or KSCN); to the heated solution HCl is added, and the solution cooled and stored for use. Red tones passing through violet to pure blue are obtained according to the increasing dilution of the solutions used. Brown or green tones are obtained by treating the previously toned images with 0.1% aq. NH_3 or 0.1% aq. Na_2S solutions, respectively. The toning process also somewhat intensifies the image. J. L.

Preparation of photographic tanned-colloid images. KALLE & Co. A.-G. (B.P. 401,898, 8.12.32. Ger., 9.12.31).—Diazo compounds (I) are used which give on insolation products which are tanning agents; such are, e.g., high-mol. diarylamines and diarylmethanes containing 1 or 2 diazo groups. Examples are gelatin emulsions made up with stabilised (I) from: 6-(*p*-aminoanilinomethyl)-1 : 2 : 3 : 4-tetrahydronaphthalene; 3 : 3'-diamino-4 : 4'-dihydroxy-5 : 5'-dicarboxydiphenylmethane (from dinitrated methylenedisalicylic acid); 4-(*p*-amino-*o*-carboxyanilino)-4'-hydroxydiphenylmethane (by warming the tetrazotised diamine obtained by condensing 4 : 4'-diaminodiphenylmethane with 5-nitroanthranilic acid and reducing the NO_2); product from *p*-diazodiphenylamine and CH_2O . C. H.

Production of photographic prints. W. P. LEUCH, and S. C. & P. HARDING, LTD. (B.P. 403,203, 7.10.32. Cf. B.P. 308,653; B., 1930, 641).— H_3BO_3 with excess alkali carbonate is used as stabiliser in diazo-type developers containing, e.g., phloroglucinol. $\text{Na}_2\text{B}_4\text{O}_7$ is not nearly as effective. J. L.

Photochemical printing of designs on fabrics. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 403,001, 1.5.33. Holl., 7.2.33).—The illuminant used is a metal-vapour discharge tube (e.g., high-pressure Hg-vapour tube) with an incandescent cathode, such that the energy of the wave-lengths < 2700 Å. is $< 10\%$ of that of λ 2700–5000 Å. In particular, radiation of λ 2537 Å. should not reach the material under exposure. J. L.

Developers.—See III.

XXII.—EXPLOSIVES; MATCHES.

Titrimetric determination of the stability of nitrocellulose. T. TOMONARI (Angew. Chem., 1934, 47, 47–48).—1 g. of cellulose nitrate (I) is boiled for

15 min. with 50 c.c. of MeOH, and the extract titrated (Me-red) with 0.01*N*-NaOH. The titre in c.c. is termed the "acid no." (*A*), and 100/*A* is termed the "stability no." The explosion temp. falls with rising *A*; when *A* is < 5 the (I) is stable. Stabilising by boiling with H₂O removes the acidic substance sol. in MeOH, but new acidic substances are formed. A. G.

Combustion of colloidal propellants. A. D. CROW and W. E. GRIMSHAW (Phil. Mag., 1934, [vii], 17, 161—172; cf. B., 1932, 289).—The use of crushers in measuring the pressure variation with time in explosions introduces errors. These vitiate Muraour and Aunis' criticism of the temp.-density rate-of-burning law (A., 1933, 357; B., 1933, 365). H. J. E.

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Manufacture of double-base propellant powder. W. E. WAGNER, Assr. to WESTERN CARTRIDGE CO. (U.S.P. 1,906,675, 2.5.33. Appl., 7.4.33).—In grains composed of nitrocellulose and nitroglycerin, the latter is extracted from the surface of the grains and, if desired, replaced by a slower-burning constituent. B. M. V.

Ammunition case. A. G. SCHURICHT, Assr. to WESTERN CARTRIDGE CO. (U.S.P. 1,907,218, 2.5.33. Appl., 28.1.31).—An alloy for cartridges etc. comprises Cu 90—94.5, Si 0.5—1.5, and Zn 1—9%. B. M. V.

Purifying aliphatic nitrates.—See III. Nitrocellulose.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Chemical treatment of sewage as adjunct to sprinkling-filter operation. J. R. DOWNES (Water Works and Sewerage, 1933, 80, 166—167).—FeSO₄ (252 lb. per 10⁶ gals.) is applied at the plant influent and the sludge returned to the incoming sewage. The 48-hr. biochemical O₂ demand is reduced by 50%. CH. ABS.

Immersion turbidimeter and sludge blanket detector. D. E. BLOODGOOD (Water Works and Sewerage, 1933, 80, 144—145).—A calibrated Al tube carries at its lower end a light and flashlight cells operated by a Hg switch. A float with mirrors fixed at 45° permits the reading of the scale at the point of disappearance of the light source. CH. ABS.

Generation of hydrogen sulphide in sanitary sewers. F. D. BOWLUS and A. P. BANTA (Water Works and Sewerage, 1933, 80, 141—143).—The effects of temp., velocity, SO₄" content, and sewage concn. have been studied. The SO₄-splitting organisms are more active at the higher temp. The ratio biochemical O₂ demand to Cl demand is of val. in tracing industrial wastes, since it is increased by the introduction of wastes high in org. matter. CH. ABS.

Oligodynamic action and its use with slow sand filtration. S. TOHMA (Arb. Med. Fak. Okayama, 1933, 3, 582—596).—The bactericidal activity of Cu, Ag, and Au, particularly in the powder form, is influenced by light. When a bactericidal metal powder is placed on the filter membrane before slow sand filtration the bacterial count of the filtrate is decreased. CH. ABS.

Use of tear gas in fumigation with hydrogen cyanide. E. LANDAUER (Chinese Med. J., 1938, 47, 896—906).—The efficiency of CNCl, CH₂PhBr, and CCl₃·NO₂ (I) as indicators for the presence of HCN when used as a fumigant increases in this order. (I) is considered the most advantageous. A. L.

Preparation of "distilled water" by electro-osmosis. II. R. DIETZEL (Pharm. Ztg., 1934, 79, 71—72; cf. A., 1931, 1144).—H₂O of a high degree of chemical and bacteriological purity can be obtained by means of the Siemens-Halske osmosis apparatus (type III). D. R. D.

Factors involved in the use of chloramines for disinfection of swimming pools. A. H. FLETCHER and E. C. LINK (Amer. J. Publ. Health, 1933, 23, 1255—1259).—Observations made on 13 swimming pools at Memphis, Tenn., show that decided advantages accrue from the use of NH₃-Cl₂ treatment over Cl₂ alone, especially in pools operated on the fill-and-draw system or those in which the circulation of the whole of the contents was inadequately performed. The use of NH₃-Cl₂ enables higher residuals of Cl₂ to be maintained without discomfort and thus to counterbalance its lag in killing power on *B. coli*, but careful control of the NH₃-Cl₂ ratio and the *p*_H of the H₂O is required. Treatment with CuSO₄ at the rate of 50 lb. per 10⁶ gals. on alternate days prevented the formation of all algal or slimy growths in the open-air pools. C. J.

Concentration method for the bacteriological examination of water. J. W. EDINGTON (Nature, 1934, 125, 132—133).—An adaptation of the method of using Seitz filters for filtering bulk samples of H₂O is described. Definite amounts of the sample can be quickly measured and filtered under aseptic conditions. L. S. T.

Nomographs [for flow of sewage effluent].—See I. Greenhouse fumigation.—See XVI.

PATENTS.

Sewage purification. A. R. PUTNAM (U.S.P. 1,915,240, 20.6.33. Appl., 28.11.32).—The screened sewage is coagulated with Ca(OH)₂ and FeCl₃ and after clarifying is further purified by treatment with Cl₂, KMnO₄, or Na₂O₂. The sludge is then dewatered by centrifuging and heated (retort) sufficiently to char the residue. The aq. portion of the distillate contains small amounts of EtOH, COMe₂, etc., and the gaseous products form a useful source of heat. A portion of the charred residue is finely ground and returned to the sewage inlet as the C present has high adsorptive powers and the Fe₂O₃ etc. weight the floc and assist it to settle. The excess sludge is dried, finely ground, and used as fuel for the dryer. Some of the wet sludge may be returned to the coagulation basin where it assists in the separation of the floc. C. J.

Treatment of sewage. A. BROWN (B.P. 403,703, 22.4.32).—Sewage solids are maintained in suspension by the agitation produced by a series of breast wheels placed transversely across the sewage carrier and caused to revolve by the flow in the channel. C. J.

H₂O-softening.—See VII. Liquid-treating apparatus.—See XI. Cattle food.—See XIX.