BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 11 and 18, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Thermo-physical properties of refrigerants. E. Griffiths and J. H. Awbery (Engineering, 1932, 133, 84).—The latent heats of evaporation of C_5H_{12} and SO_2 between —20° and +30°, and the densities of the saturated vapours of di- and tri-chloroethylene, Et_2O, C_5H_{12}, and SO_2, over the range —10° to +40° have been determined. H. F. Gillbe.

Control methods in fractionators. S. S. Smith (J. Inst. Petroleum Tech., 1931, 17, 686—693).—In four different cases it is shown how the control methods in fractionators at various points in the system can be improved. E. Doctor.

Apparatus for exact gas analysis using samples of about 5 c.c. E. Ott and A. Schmidt (Gas- u. Wasserfach, 1931, 74, 1107—1109).—Schmidt's "manometric" burette, in which pressure changes with const. vol. are measured, is combined with Ott's combustion and absorption apparatus. The latter consists of 2 or 3 absorption pipettes and a combustion tube with Pt spiral. For town's gas, where the eventual vol. reduction is very great, N_2 is added in order to make manometer readings possible. The gas sample is saturated with H_2O vapour throughout and the apparatus is independent of temp. changes in the laboratory. C. Irwin.

Portable apparatus for gas analysis especially in mines. A. Schmidt (Gas- u. Wasserfach, 1931, 74, 1181—1182).—The apparatus described previously (B., 1931, 186) is simplified by omission of the oleum pipette and by the use of a shorter manometer tube, the proportion of combustible gases being low; the apparatus for micro-analysis is also omitted. The accuracy (to 0·02%) is not impaired by these alterations. Apart from its use for mine gases it can easily be adapted to determination of the purity of cylinder O_2 and similar high-percentage gases, using N_2 as a diluent. C. Irwin.

Patents.

Furnaces. Stein & Atkinson, Ltd. From Chapman-Stein Co. (B.P. 362,910, 9.9.30).—A primary air supply under considerable pressure blows across a secondary air chamber, through an ejector device, across a gas-supply chamber, into the furnace. It is adaptable to burn either rich or poor fuel; in the former case the fuel is diluted with products of combustion withdrawn from the furnace. B. M. Venables.

Rotary drum furnace. Fellner & Ziegler A.-G., and B. Young (B.P. 363,900, 21.2.31).—The upper end of a kiln for calcining cement, ores, etc. is provided with metallic lifter blades, the next zone below is subdivided into a number of parallel passages within the shell of the kiln, the next zone is for calcination proper and is preferably enlarged, and the lowest end is of normal diam. and provides for preliminary combustion. B. M. Venables.

Lifter bars, blades, or the like for rotary kilns or drum furnaces. H. von Ferber (B.P. 359,845, 24.2.31).—The bars (etc.) consist entirely of SiC or are composed of SiC and ordinary firebrick, the firebrick portion being fitted within the lining of the kiln or furnace. H. Royal-Dawson.

Reversing regenerative furnaces. Wellman Smith Owen Eng. Corp., Ltd., and H. W. Soward (B.P. 364,303, 12.12.30).—The gas port is surrounded at the sides and top by three air ports all of which converge towards the gas. B. M. Venables.

Furnaces fired alternatively with oil or exhaust gases. J. Howden & Co., Ltd., and W. H. Howden (B.P. 363,174, 15.1.31).—An interlock between valves for the control of gas and oil, respectively, is provided so that they cannot both be open at the same time. B. M. Venables.

[Abutments for arches of] furnaces. Gas Light & Coke Co., W. G. Adam, and P. Gray (B.P. 364,123, 1.10.30).—The skew-backs or springer blocks are of metal and together with the furnace casing form hollow spaces through which air is supplied under the arch. The method of construction is especially suitable for furnaces with superposed arches. B. M. Venables.

Heat-exchanging apparatus. Aktieb. Ljungströms Ångturbin (B.P. 363,357, 10.9.30. Swed., 21.5.30).—A heat exchanger of the rotating regenerative type is constructed of two alternate series of corrugated plates; one series has shallow corrugations at an angle to the flow, and the other deeper and more widely spaced corrugations parallel to the flow. B. M. Venables.

Economisers and other tubular heat exchangers. G. F. Holler (B.P. 363,083, 10.11.30).—The tubes of a heat exchanger are formed into slab-like masses by means of solid metal; the slabs are vertically arranged and may have a wavy surface, but not to such an extent as to allow lodgment of dust. B. M. Venables.

Heat insulation. K. Ruckstuhl (B.P. 363,487, 27.11.30).—A flexible tube is formed from a helically wound, thin, polished metal strip and is wound round the article to be insulated. B. M. Venables.

Drying, heating, cooling, etc. granular, powdery, and like materials. Stettiner Chamotte-Fabr. A.-G. vorm. Didier (B.P. 363,701, 15.9.30. Ger., 23.9.29).—The material is caused to pass through a

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

sinuous passage in concurrent contact with gases which immediately previously have passed countercurrent through an annular passage surrounding that for the material. B. M. Venables.

Apparatus for cleaning heating surfaces of dryers or other apparatus heated by oil-containing steam. O. Eberhardt (B.P. 363,080, 10.11.30. Ger., 11.11.29).—After shutting off the steam and permitting it to cool sufficiently to act as a condenser, the apparatus is supplied with vapour of a volatile oil solvent derived from a separate still, the solvent being circulated until the apparatus is clean; thereafter the distillation etc. is continued, but the return flow of clean volatile condensate is caught in a separating vessel and oil alone is finally left in the still. B. M. Venables.

Cooling towers. L. G. Mouchel & Partners, Ltd., and G. Prud'Homme (B.P. 363,902, 24.2.31).—A mist catcher at the top of a cooling tower is in the form of a double co-basal cone of thin wires electrically charged. The angles of the cones should be about 90°. B. M. Venables.

Cooling towers for water or other liquids. O. N. Arup, R. Christiani, and A. Nielsen (Christiani & Nielsen) (B.P. 363,016, 23.9.30).—A form of construction embodying a framework of metal or ferro-concrete and a light walling of timber is described. B. M. Venables.

Refrigerants. Brit. Thomsom-Houston Co., Ltd., Assees. of C. Dantsizen (B.P. 363,613, 17.9.31. U.S., 19.9.30).—The medium comprises HCO_2Me and about 5% of MeOH or EtOH. L. A. Coles.

Machines for crushing coke, coal, etc. I. H. Pilot (B.P. 363,269, 22.4.31).—A form of crusher plate is described. B. M. Venables.

Ball crushing mills. S. A. Ward (B.P. 363,065, 3.11.30).—A form of driving spider for a mill of the ball-race type is described. B. M. Venables.

Pulverisers. A. W. Bennis (B.P. 364,193, 8.10.30).—The diaphragms between the beaters of a pulveriser are provided with ribs extending radially and axially, forming eddying chambers in which pulverisation is promoted. The central spaces through the diaphragms are smaller in the final one leading to the fan than in the others. B. M. Venables.

Pulverisers. Erie City Iron Works, Assees. of G. H. Kaemmerling (B.P. 363,010, 20.9.30. U.S., 27.9.29).—A form of hammer head or paddle is described. B. M. Venables.

Apparatus for washing granular and like materials. F. Parker, Ltd., and F. W. Parker (B.P. 363,654, 16.9.30).—In a countercurrent washer of the rotating-cylinder type, the outlet for dirty water is through a screen forming part of or attached to that end of the cylinder, the other end of the cylinder being provided with slightly conical, co-axial screens for grading the washed material. B. M. Venables.

Extraction of tannin or other organic substances from vegetable or animal matter. R. Hodgson & Sons, Ltd., and N. L. Holmes (B.P. 364,174, 4.10.30).—The material is caused to progress upwardly through an inclined rotating cylinder by means of an internal helix, while the solvent runs downwards and out through a screen at the lower end and thence to a stand-pipe which maintains the level of the liquid at a point a considerable distance up the cylinder. The material also enters the cylinder from the upper end, but through an axial pipe extending to near the bottom. B. M. Venables.

Filtering apparatus. Bartlett Hayward Co., Assees. of A. L. Genter (B.P. 362,933, 5.9.30. U.S., 2.10.29).—A filter unit partly submerged in a bath of prefilt is given an oscillatory rotation in order to keep the bath agitated while a comparatively slow net rotation takes place. The filter unit comprises preferably a cage of horizontal tubular filters which are discharged while above the bath by oscillation against scrapers with the simultaneous application of compressed air. B. M. Venables.

Rotary pressure filters. W. W. Groves. From G. E. Macwhirter (B.P. 363,609, 29.6.31).—Discharge doors are described for extraction filters of the type in which the undissolved solids are left inside the rotating cylinder. B. M. Venables.

Air-pressure filter. J. Flanigan (B.P. 363,429, 26.9.30).—The outlet from a vessel which can be put under pressure by pumping air into it is in the form of a pipe extending internally up from the bottom, the lower end being provided with a cup packed with filter pulp. B. M. Venables.

Thickening filters. J. B. Vernay (B.P. 363,301, 8.8.31. Fr., 9.8.30).—The filter comprises a number of vertical cylindrical elements suspended in a tank of prefilt which is provided with rakes to deliver the thickened sludge to a central bottom outlet. The filter elements are continuously rotated slowly about the common axis and, while compressed air is applied to loosen the cakes, also about their own axes. B. M. Venables.

Liquid filters. Electrolux, Ltd. From Platen-Munters Refrigerating System Aktieb. (B.P. 363,228, 21.2.31).—The filter comprises a spiral of wire surrounded by a fabric sleeve. It is cleaned by allowing the spiral to expand. B. M. Venables.

Centrifugal separators. H. W. Fawcett (B.P. 362,843, 6.6. and 11.11.30).—An automatic valve for the discharge of solid matter is described. It is operated by a separate liquid which acquires a centrifugal hydraulic head and the flow of which is diverted by the accumulation of mud round the normal outlet. B. M. Venables.

Centrifugal bowls. Aktieb. Separator (B.P. 363,584, 10.4.31. Swed., 11.4.30).—A method of supplying additional liquid for the discharge of solid matter is described. B. M. Venables.

Devices for intimately mixing, churning, or agitating liquid substances. J. Robinson and J. H. Thompson (B.P. 363,543, 6.2.31).—A perforated plate is reciprocated by hand inside a cylindrical vessel which has a detachable bottom and top for ease in cleaning. B. M. Venables.

Concentration of liquids. Metallges. A.-G. (B.P. 363,116, 4.12.30. Ger., 23.12.29).—A liquid which contains scale-forming constituents the solubility of which decreases with rising temp. is circulated through an unheated evaporator and a separate heater under such conditions in the latter that (*a*) the flow is turbulent, the speed being greater than 1 m./sec.; (*b*) the pressure is maintained sufficiently high to prevent ebullition, by throttling in two stages (by the action of a valve and the spraying jets in the evaporator); and (*c*) the temp. rise is so small that the liquid remains in the metastable zone of solubility. The pump for circulating will therefore need considerable power and may be driven by a steam turbine the exhaust from which passes to the heater. The treatment of sulphite waste liquor is given by way of example. B. M. Venables.

Liquid seals [for electrostatic precipitators]. Lodge-Cottrell, Ltd. From Metallges. A.-G. (B.P. 363,771, 29.10.30).—The oil seal is surrounded by a hood through which the live lead, embraced by a solid insulator, passes. The hood encloses a space for clean gas which is put into communication with the clean end of the precipitator by a pipe of small bore. The space is maintained at a temp. high enough to prevent deposition of dew, or low enough to prevent volatilisation of the oil, by circulating the latter through a heater-cooler and/or by the use of a jacket to the hood. B. M. Venables.

Apparatus for cooling and preliminarily washing gases, particularly blast-furnace gases, which are to be purified by electrical precipitation. Lodge-Cottrell, Ltd., Assees. of Siemens-Schuckertwerke A.-G. (B.P. 363,978, 29.8.31. Ger., 29.8.30).—The gases are passed downwards together with jets of liquid through an axial conduit which terminates in a converging taper above a pool of liquid; on the return upwards through a casing surrounding the conduit the gases pass between electrically charged electrodes preferably in the form of co-axial cylinders, which may also be irrigated. The final outlet conduit surrounds the inlet pipe. B. M. Venables.

Apparatus for pneumatic separation of materials. R. H. Kirkup (B.P. 363,147, 24.12.30).—The apparatus comprises an inclined bed through which air currents are caused to flow from a const. source, but are pulsated by the rotation of shutters. The bed is preferably divided into sections and the shutters under adjoining sections are rotated out of phase. B. M. Venables.

Apparatus for eliminating substances from gases by washing. Carrier Eng. Co., Ltd., and K. J. R. Robertson (B.P. 364,239, 5.11.30).—The gas is impelled forward by a fan and to a minor extent by liquid sprays; the mixture then passes through perforated plates the apertures of which are shaped to produce violent eddies. The liquid is preferably hygroscopic or a solvent, and is regenerated for re-use. B. M. Venables.

Separation of solid particles from flue gases. M. Frey (B.P. 364,256, 17.11.30. Holl., 31.7.30).—The gas is caused to whirl in a downwardly directed circular conduit which is provided with radial jets of washing fluid which do not become atomised until they impinge on the wall; in no case is excessive spraying particularly desirable, but only the formation of an irrigated surface upon which the solid matter conc. in the outer layer by centrifugal force will be caught. The lower end of the conduit is surrounded by a separating vessel. B. M. Venables.

Continuous determination of the quantities of gas absorbed in liquids. G. Szikla and P. von Vago (B.P. 363,369, 16.9.30. Ger., 16.9.29).—The liquid is passed through a boiler at a const. rate, the outflow being at the b.p.; the evolved gas and vapour are separated by condensation, the latter being returned to the boiler to remove any gas redissolved during the condensation. The gas is reheated to the b.p. of the liquid or some other const. temp. and allowed to exhaust through a capillary tube the pressure drop in which is measured. The gas may be analysed by the use of several capillary tubes with intermediate absorption or reaction vessels. B. M. Venables.

Apparatus for gas analysis. R. Kölliker (B.P. 363,252, 28.3.31. Ger., 29.3.30).—An ejector operated by a bottle of compressed gas is used as an aspirator. B. M. Venables.

Carrying out catalytic gas reactions. E. H. Sale, and Imperial Chem. Industries, Ltd. (B.P. 364,215, 18.10.30).—The ingoing constituents are separately heated by the outgoing products, the temp. of the constituents being regulated by the proportion of products with which they exchange heat and controlled by valves at the cool end of the exchanger; *e.g.*, in the production of petrol, the middle oil may be heated at $\ngtr 400°$ to avoid decomp., and the H_2 at $> 500°$, so that the mixture attains the reaction temp. of 470°. B. M. Venables.

Application of tensile and elongation tests to materials [*e.g.*, rubber]. India-Rubber, Gutta Percha, & Telegraph Works Co., Ltd., and H. Leared (B.P. 364,229, 30.10.30).—A strip of elastic material is pulled along two lines at 120° to the vertical, the centre of the strip passing over a pin which is lifted by a beam and counterweight so that all three forces are equal. The counterweight is composed of a vessel adapted to receive water which is automatically turned off when the sample breaks. The clamps for the ends of the strips are in the form of grooved pulleys which wind the strip further on as it stretches, thus compensating for decreased grip as the sample shrinks in diam. B. M. Venables.

[Detection of leaks during] manufacture of vacuum vessels and apparatus. W. Dällenbach (B.P. 360,279, 20.1.31. Ger., 20.1.30. Addn. to B.P. 303,512; B., 1930, 539).—One side of the wall of apparatus to be tested, or a part of such wall, is subjected to the action of gaseous NH_3 under pressure, while the other side has a cloth or paper cover containing $HgNO_3$ as indicator. H. Royal-Dawson.

Gyratory cone crushers. Nordberg Manufg. Co., Assees. of E. B. Symons (B.P. 364,651, 6.9.30. U.S., 9.12.29).—See U.S.P. 1,791,584; B., 1931, 910.

[Spray] cooling systems for [the grates of] furnaces. Amer. Eng. Co. (B.P. 363,725, 31.7.30. U.S., 7.6.30).

[Lubrication of pendulum rollers of] pulverising mills. Internat. Combustion, Ltd., Assees. of F. H. Rosencrants (B.P. 364,213, 13.10.30. U.S., 11.10.29).

Crushing machines [for waste tins etc.]. Greenwood & Batley, Ltd., J. C. M. Maclagan, and A. Pendlebury (B.P. 364,169, 3.10.30).

Vaporiser. Heating oils.—See II. **Steel apparatus.**—See X. **Temp. control.**—See XI. **Treatment of liquids.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Yorkshire, Nottinghamshire, and Derbyshire coalfield. South Yorkshire area. Analysis of commercial grades of coal. I. Anon. (Dept. Sci. Ind. Res., Fuel Res., Survey Paper No. 20, 1931, 73 pp.).—Proximate analyses, determinations of calorific val., S, water-sol. chlorides, P in coals suitable for coke manufacture, and, in some cases, ultimate analyses and laboratory assays at 600°, are recorded for coals from a number of South Yorkshire collieries. A. B. Manning.

Use of calcium oxide in the determination of sulphur in coals by the Eschka method. N. J. Ivison (Fuel, 1932, **11**, 23—24).—CaO may be substituted for MgO in making determinations of S in coal, but the accuracy obtainable does not appear to be as good when the former is used, particularly with coals rich in S. More consistent results are obtained when the mixture is heated in a crucible than when a dish is used. A. B. Manning.

Light spirits from low-temperature carbonisation of coal. D. Hicks and J. G. King (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 34, 1931, 26 pp.).—The spirits studied were obtained by the carbonisation of coal in vertical Fe retorts heated externally to 625° (cf. B., 1927, 288). Part of the spirit was recovered from the gas by oil scrubbing and the remainder by fractionating the tar and subsequently washing the fraction to 170° with aq. NaOH to remove tar acids. The approx. yields were 2·5 gals. of gas spirit and 1·2 gals. of tar spirit, but the relative yields varied with the condensing conditions. The crude spirits contained a high proportion of unsaturated hydrocarbons (20—40%) and could not be satisfactorily refined by the use of conc. H_2SO_4. Refining was therefore carried out with 80% H_2SO_4, preceded and followed by a wash with 5% aq. NaOH, the washed spirit being finally distilled with "open" steam. Spirits which tended to overheat with 80% acid were given a preliminary wash with 60% or 70% acid. Washing losses were high (13·5—16%). The refined spirits were water-white, free from offensive odour, and neither discoloured nor formed undue amounts of "gum" on storage for a reasonable length of time. The blended gas and tar spirits formed an excellent motor spirit with good anti-knock properties; such refined blends contained approx. 20—30% of unsaturated hydrocarbons, 30—40% of aromatic hydrocarbons, and about 40% of naphthenes and paraffins. The solubilities of the spirits in 90% and 95% alcohol have been determined (cf. King and Manning, B., 1929, 1040). A complete study has also been made of the variation in composition, in "gum" and peroxide formation, and in engine performance, of representative spirits during storage for periods up to 170 days. A. B. Manning.

Path of travel of the gases in the coke oven. G. E. Foxwell (Fuel, 1932, **11**, 4—19; cf. B., 1924, 737).—In view of recent proposals to withdraw the volatile products of carbonisation through pipes embedded in the centre of the charge in a coke oven, further experiments with improved apparatus have been made to determine the resistance to flow of gas of the plastic layer formed in the coal. The results of laboratory experiments and calculations based thereon show that the proposed process would necessitate suction of the greater part of the gases through the plastic layer; this is possible for coals of low plastic resistance, but would, even then, give rise to practical difficulties in regulating the necessary suction, and is quite impracticable technically for coals of high plastic resistance. These results have been confirmed by experiments in which coals were carbonised in a small rectangular retort and the distillation products were withdrawn (*a*) from the free space above the charge, and/or (*b*) from an offtake pipe embedded in the charge. In addition to the practical difficulties withdrawal of the products by the latter method has the disadvantage of giving a benzol and tar high in paraffins. A. B. Manning.

Action of hydrogen on coal. I. A. Crawford, F. A. Williams, J. G. King, and F. S. Sinnatt (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 29, 1931, 37 pp.).—By the limited action of H_2 at 370—380°, and under a max. pressure of 230—270 kg./sq. cm., weakly or non-caking bituminous coals could be converted into products solid at room temp. and possessing strongly caking properties, and under somewhat more drastic conditions some caking properties could be conferred even on peat and anthracite. The amount of H_2 reacting in the case of the bituminous coals was $<$ 1·0% of the ash-free dry coal. Extraction of these partly hydrogenated products with C_6H_6 under atm. pressure yielded considerably more sol. material than the original coals (3—8% as compared with 0·1—1·5%). The majority of the extracted residues still yielded coherent cokes on carbonisation in the Gray–King assay apparatus. The mechanism of partial hydrogenation is briefly discussed. A. B. Manning.

Products liquefied from town's gas by cooling [to —20°]. K. Bunte and F. Steinbrunn (Gas- u. Wasserfach, 1931, **74**, 1193—1195).—This research was carried out in order to throw light on the problem of deposits on gas-meter diaphragms. No result in this direction was obtained as the only unsaturated compounds identified were pyrrole and coumarone in very small proportions. Org. S, which is associated with resinification, was present, but no other resinifying compounds were found. The oil had initial b.p. 88° and the general characteristics of crude benzol. It was fractionated and also distilled with shavings from a meter diaphragm, with brass filings, etc., without apparent alteration. C. Irwin.

Removal of carbon dioxide and hydrogen sulphide from [town's] gas. A. Thau (Gas- u. Wasserfach, 1931, **74**, 1150—1155).—The removal of CO_2 from town's gas is necessary when the gas is made by carbonisation of lignite. The newer processes for

H_2S removal are reviewed. CO_2 removal, where practised, is effected by cooling or water-washing under pressure. This is expensive unless the gas is required to be compressed at any time, and it involves complete pre-removal of H_2S. In smaller gas works, using lignite, reduction to CO or washing with Na_2CO_3 is more usual. The Girdler process is a washing process for the removal of H_2S and CO_2, using an aq. solution of di- and tri-ethanolamines. These compounds are sol. in water in all proportions, have b.p. 271° and 227°, and their 50% aq. solutions absorb from 50 to 120 vols. of the gases at room temp. In consequence of the low b.p. of the solution the H_2O content of the gas is not increased. The heat of reaction with CO_2 and H_2S must be fully utilised by means of heat exchangers for the subsequent regeneration. The best absorption of H_2S is obtained at 15—32°, but of CO_2 at 50°. The solution from the washer does not corrode Fe, but Cu, Zn, and Al are inadmissible. Losses of washing solution are chiefly mechanical and are said to amount to 50% of the stock in a year. SO_2 if present in the gas should be previously removed. Benzol is unaffected. Apparently it will be necessary to absorb the stripped H_2S in Fe oxide. The process is not likely to compete with the usual one for H_2S removal alone, but may be valuable when CO_2 removal is also necessary.

C. Irwin.

Sulphur compounds in water-gas and their removal. W. E. Bakes, J. G. King, and F. S. Sinnatt (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 31, 1931, 35 pp.).—Water-gas made from a low-S coke contained 20·07 grains of S per 100 cu. ft. of gas, present in the following forms: H_2S 14·2 grains; CS_2 1·2 grains; COS 2·4 grains; other forms, including probably mercaptans, 2·27 grains. SO_2, thiophen, and colloidal S were probably absent. The proportion of S present as H_2S increased with the total S content of the gas, in some cases reaching 90—95% of the total. Attempts were made to remove these S compounds by adsorption on SiO_2 gel and active C, respectively. The former proved unsuitable; its adsorptive capacity for these compounds was low and was, moreover, further decreased when the H_2O content of the gas exceeded 10—15 grains per 100 cu. ft. Active C proved to be a suitable adsorbent for the purpose, removing about 95% of the S in the gas, but revivification of the material at first offered some difficulties. These were overcome and revivification was successfully effected by treatment of the spent material with steam containing a little air and NH_3 at 250° for 1 hr. (cf. B.P. 337,348; B., 1931, 189). The estimated cost of the materials for purifying 10^6 cu. ft. of gas per day, and reducing the S content from 30 to 0·5 grain per 100 cu. ft. is 0·32d. per 1000 cu. ft. The capital and operating costs should be small. A. B. Manning.

Washing of benzol from coal gas. O. Krebs (Gas- u. Wasserfach, 1931, 74, 1159—1165).—Working results with several types of benzol washer are discussed and the importance of extraction efficiency, rather than benzol content of the rich oil, is stressed. Losses of wash oil are partly due to entrainment and may be reduced by the use of catching devices. Bad yields of benzol are caused generally by too small washers. The fitting of new packing in a hurdle washer involves a considerable loss of wash oil owing to absorption by the wood. Some of the practical difficulties of adjusting benzol washing to irregularities in coke-oven operation might be removed by using parallel in place of countercurrent washing, which would reduce the pressure loss in the washer to almost nil. There is reason to believe that the washing efficiency would not be less.

C. Irwin.

Theory of gas drying. F. O. Hawes and H. Wadsworth (Gas J., 1931, **196**, 619—620).—The working cost of a $CaCl_2$ drying plant was quoted as 0·17d. per 1000 cu. ft., and from v.-p. curves it is shown that a plant using aq. $CaCl_2$ (*d* 1·39) should have the same efficiency as one using 82% glycerin; the $CaCl_2$ process is preferred owing to difficulties of concn. and pumping of the viscous glycerin. The dew point of the exit gas must be kept above the earth temp. The disadvantages of the process are: loss of $CaCl_2$ solution due to absorption of NH_3, formation of solid hydrates in cold weather necessitating use of dil. solutions, formation of $C_{10}H_8$ balls by pptn. around a grease nucleus, and corrosion of the evaporator tubes by HCl formed by dissociation of traces of NH_4Cl. R. N. B. D. Bruce.

Oxidation of hydrogen, carbon monoxide, and the paraffin hydrocarbons by copper oxide. J. G. King and L. J. Edgcombe (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 33, 1931, 28 pp.).—The rates of oxidation of H_2 and of CO by CuO at 280° have been determined by passing the gas at a const. rate (corresponding to contact times of 3, 1·5, and 1 sec. respectively) over CuO contained in an electrically-heated SiO_2 tube, and determining at suitable intervals the H_2O and CO_2 formed. The vol. of oxide used was 2 c.c., of which about 50% was free space. The rate of oxidation at first increased, passed through a max., and then decreased. The initial increase was more rapid with CO than with H_2, but the max. attained was higher for the latter gas and the high rate was maintained for a longer period. Addition of H_2O vapour (1·3%) to the CO brought about a more rapid increase to a higher max., which was maintained until almost all the CuO had been reduced. When using mixtures of the gases it was found that if the CO : H_2 ratio exceeded 0·22 some CO remained after complete oxidation of the H_2. The CO_2 formed was absorbed appreciably by the CuO, but could be recovered quantitatively by evacuating the tube. The rates of oxidation of CH_4, C_2H_6, C_3H_8, and C_4H_{10} by CuO at 280°, expressed as vol.-% after 10 min. contact, were nil, 0·8, 1·0, and 1·4, respectively. These rates increased with rise of temp., but were not affected by the presence of CO or H_2. Such oxidation of the saturated hydrocarbons would not appreciably affect the accuracy of the analysis of town's gas by methods in which the CO and H_2 are oxidised over CuO, but would cause appreciable errors in the analysis of gases rich in hydrocarbons, *e.g.*, low-temp. carbonisation gases; for such gases the CO should be removed by absorption and the H_2 oxidised at 230—250°. Difficulties which occur in the complete oxidation of hydrocarbons over CuO at higher temp. may be overcome by the addition of a suitable catalyst, *e.g.*, CoO, to the CuO (cf. Campbell and Gray, J.S.C.I., 1930, **49**, 450 T). A. B. Manning.

Tars and oils produced from coal. Anon. (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 32, 1931, 123 pp.).—Statistics relating to the national coal-tar production and the importation of oils are discussed. The tar obtained by the low-temp. carbonisation of coal from the Shafton seam in a vertical cast-Fe retort (cf. B., 1927, 288) has been examined. Laboratory experiments on the production from this tar of oils which are miscible with petroleum fuel oils, by pptn. of the pitch with light petroleum or other solvents, showed this process to be less efficient than straight distillation; the pptn. process proved more suitable for a high-temp. vertical-retort tar. A complete examination, involving the separation of the various fractions by means of solvents as well as by means of distillation, has also been made of a low-temp. tar obtained by carbonising a blend of a non-caking (Pooley Hall) and a caking (Wearmouth) coal. The results confirm those of similar investigations previously published (cf. B., 1927, 37; Morgan and co-workers, J.S.C.I., 1928, **47**, 131 T; B., 1929, 156; J.S.C.I., 1929, **48**, 89 T). A strongly-caking (Mitchell Main), a medium-caking (Dalton Main), and a non-caking (Warwick Slate) coal have been carbonised in horizontal Fe retorts (cf. J.S.C.I., 1922, 270 R) at temp. ranging from 400° to 900° The following are some of the general effects which were produced by raising the temp. of carbonisation: (*a*) the yields of tar from each coal passed through a max. (8—9% of the air-dried coal) at about 550°; (*b*) the sp. gr. of the tars increased, those of the 900° tars being higher than the corresponding vals. for high-temp. tars from horizontal retorts, indicating the occurrence of considerable cracking in the type of retort used; (*c*) the proportion of tar acids in the tar oils increased to a max. at 600—700° (30·9%, 36·0%, and 42·7%, respectively) and then fell considerably at 800° and 900°; (*d*) the proportion of tar acids boiling below 200° (in the total tar acids) at first decreased, but above 500—600° increased rapidly; (*e*) the wax content of the tars decreased (from 1·2%, 1·6%, and 2·5%, respectively, to nil); (*f*) the aromatic hydrocarbons in the spirit scrubbed from the gas increased from 7·2% to 70% (for the Mitchell Main coal). These and other data are recorded fully in tabular form.

A. B. Manning.

Removal of phenols from water of distillation of brown coal. R. von Walther and K. Lachmann (Braunkohlenarch., 1930, No. 31, 29—43; Chem. Zentr., 1931, ii, 165).—The solubilities of NH_2Ph, quinoline, C_6H_6, and $C_6H_4Me_2$ in H_2O, the distribution of PhOH and *m*-$C_6H_4(OH)_2$, the amount of quinoline passing into H_2O from a C_6H_6–quinoline mixture, the distribution of PhOH between C_6H_6–quinoline and H_2O, and similar data for C_6H_6–NH_2Ph, C_6H_6, and "yellow oil" have been determined. The last three liquids are unsuitable for the removal of the phenols.

A. A. Eldridge.

Hydrogenation at high pressure. G. Roberti (Mem. R. Accad. Ital., 1930, 1, Chim., No. 2; Chem. Zentr., 1931, i, 2558).—The phenols in a fraction (b.p. 180—200°) from crude tar are reduced when passed with H_2 over CoS at 100 atm. The colourless product (*d* 0·78) washed out of the residual phenols is essentially naphthenic. No separation of coke was observed. From the decrease in reduction in approaching 400° it appears that the reaction proceeds PhOH $\rightarrow$ *cyclo*hexanol $\rightarrow$ C_6H_6, with the second stage quicker than the first. Catalysis is due to CoS or Co_4S_3 (formed by reduction), but not to CoO or Co. L. S. Theobald.

Evaluation of kukkersite by means of its specific gravity. D. von Engelhardt (Brennstoff-Chem., 1932, **13**, 10—11).—The % of org. material in "kukkersite," an Esthonian oil shale, is given approx. by the formula $(165 \cdot 8/d) - 61 \cdot 6$. The sp. gr. is calc. from the vol. occupied by 10 g., which is found by introducing 10 g. of the finely-divided material into a measuring vessel containing petroleum and determining the rise in height of the liquid. A. B. Manning.

Purification of crude benzol with concentrated and 80% sulphuric acid. E. Moehrle (Brennstoff-Chem., 1932, **13**, 6—9).—Benzol containing small proportions of indene, styrene, *cyclo*hexene, or *n*-hexylene was completely freed from these constituents by washing with conc. H_2SO_4. When mixtures of C_6H_6 or $C_6H_4Me_2$ with *cyclo*hexene were treated with conc. H_2SO_4 among the reaction products were condensation products of two *cyclo*hexene rings with one aromatic ring. Washing the C_6H_6 mixtures with 80% H_2SO_4 removed some of the indene, styrene, or *cyclo*hexene, but left the *n*-hexylene untouched. Experiments are in hand to determine whether the unsaturated hydrocarbons left in the C_6H_6 after washing with 80% H_2SO_4 are in sufficient amount to cause objectionable gum formation on storage.

A. B. Manning.

Absorption and retention of hydrocarbons by solid fuels. IV. B. Moore (Fuel, 1932, **11**, 20—23; cf. B., 1931, 1080).—The "absorptive capacity" of a bituminous coal for C_6H_6 increased with the degree of fineness of the sample. The increase from grades of 30—60-mesh to those of 90—200-mesh (I.M.M.) was not marked, but the rate of absorption and the amount absorbed by the grades through 200-mesh were very much greater than the corresponding quantities for the larger grades. The results are discussed in relation to those previously described. There appears to be a simple relation, approx. linear, between the "absorptive capacity" of fuels for C_6H_6 or C_6H_{14} and their ignition temp., the latter falling as the former increase.

A. B. Manning.

Refining mineral oils by cold fractionation. H. Steinbrecher (Braunkohlenarch., 1930, No. 31, 1—10; Chem. Zentr., 1931, i, 3743).—The separation of brown-coal tar into its constituent fractions by means of org. solvents, particularly α-dichlorohydrin, ethylene chlorohydrin, and $CH_2Ph \cdot OH$, is described. $CH_2Ph \cdot OH$ is suitable for the differentiation of brown-coal and petroleum benzines. A. A. Eldridge.

Apparatus for sweating of paraffin wax. H. L. Allan (J. Inst. Petroleum Tech., 1931, **17**, 657—668).—A new type of Alanmor stove is described which is claimed to effect sweating from scale to white wax in a quicker and more economical way than the Henderson stove. E. Doctor.

Gasification of Argentine coals for the production of energy by means of gas engines. E. Latzima (Bol. Acad. Nac. Cienc., Cordoba, 1931, **31**, 241—389).

Control of fractionators. Gas-analysis apparatus.—See I. **Identifying wood charcoal.**—See IX. **Castor oil as lubricant.**—See XII.

Patents.

Washing and/or separating apparatus for treating coal or other mineral substances. A. A. Hirst (B.P. 362,935, 6.9.30).—The operation of jig-washers is improved by the provision of mechanical means to effect gentle agitation and stirring. A. B. Manning.

Conversion of distillates obtained from coal, oil shale, and the like into products of lower b.p. A. G. L. Try and M. Stuart (B.P. 363,360, 11.9.30).—The volatile products from the destructive distillation of coal, lignite, etc. are subjected as they leave the retort and are still in the vapour phase to a high-tension silent electrical discharge. If desired, the vapours may be mixed with a hydrogenating gas before treatment. Cracking takes place accompanied by the hydrogenation of the unsaturated hydrocarbons and the conversion of phenolic substances into hydrocarbons. A. B. Manning.

Destructive hydrogenation of coal. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 363,040 and 363,105, [A] 16.10.30, [B] 26.11.30).—(A) Finely-divided caking coal (0·3—1 mm. in diam.) is heated rapidly under conditions which cause the particles to form distended hollow globules, *e.g.*, by permitting the coal to fall freely through heated combustion gases at about 500°. The coal is then treated with H_2 under high pressure (250 atm.) at raised temp. (about 500°) without the use of a liquid vehicle. Non-caking coals may be similarly treated if they are first admixed with a bituminous caking material, *e.g.*, pitch or bitumen. (B) In the hydrogenation of finely-divided coals without the addition of a liquid vehicle, 10—30% of a solid carbonaceous residue, *e.g.*, that obtained in the process itself, low- or high-temp. coke etc. is incorporated with the coal in order to prevent agglomeration thereof during the process and to facilitate removal of the residue from the apparatus. A. B. Manning.

Destructive hydrogenation of carbonaceous materials in the liquid phase. P. J. Askey, R. Holroyd, C. Cockram, and Imperial Chem. Industries, Ltd. (B.P. 363,445, 11.10.30).—The hydrogenation is carried out in the presence of 1% or less of a catalyst comprising an org. salt of Sn, *e.g.*, oxalate, acetate, etc., or an organo-tin compound, *e.g.*, $SnPh_4$, which is not volatilised, but which is decomposed at or below the reaction temp. A. B. Manning.

Manufacture of coal products. Koppers Co., Assees. of H. J. Rose and W. H. Hill (B.P. 362,934, 5.9.30. U.S., 16.9.29).—Products for coating purposes etc. are prepared by heating coal and oil together so as to form a solution of the coal without substantial decomp. (cf. B.P. 268,372; B., 1928, 882), and thickening the mass while fluid by adding to it C_6H_6, PhMe, solvent naphtha, turpentine, paraffin oil or wax, asphalt, etc. A. B. Manning.

Apparatus for treating petroleum. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,806,282, 19.5.31. Appl., 6.9.21. Renewed 28.5.28).—A series of vertical tubes extending through a furnace are arranged in cylindrical formation between a number of lower drums and an upper one to which is connected a dephlegmator having a perforated plate for supporting broken material. Means are provided for taking off vapours from the upper part of the dephlegmator, and condensing and collecting them, and for supplying raw oil thereto. Reflux condensate and new oil are passed from the dephlegmator to one of the lower drums and residue is withdrawn from another, the whole system being maintained under superatm. pressure. H. S. Garlick.

Heating of oils. L. de Florez, Assr. to Texas Co. (U.S.P. 1,808,343, 2.6.31. Appl., 17.4.29).—Oil is passed through vertical tubes disposed around a vertical flue, at either the top or bottom of which a burner is placed. The tubes are heated by radiation from the flame and protect the walls, which may be of light construction. The hot gases from the burner are conducted to a settling chamber containing transverse tubes for the recovery of the heat from the gases. The construction allows of ready removal of tubes for cleaning purposes and the correct proportioning of the radiant and convective heating effects. T. A. Smith.

Production of low-boiling-point hydrocarbons. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,806,616, 26.5.31. Appl., 6.9.21. Renewed 16.7.28).—Oil is pumped through a heating coil to a separating chamber from which vapours are removed, and then to a vapour chamber. The unvaporised oil is passed through a second heating coil to the vapour chamber. The vapours are removed and condensed, and the unvaporised oil is returned to the first coil, the oil being maintained under the pressure of the generated vapours during treatment. H. S. Garlick.

Treatment of heavy hydrocarbon material. C. W. Andrews and R. D. Rogers, Assrs. to C.P.T. Development Corp. (U.S.P. 1,805,711, 19.5.31. Appl., 6.6.29).—Hydrocarbon oils are raised to a high temp. while flowing in a stream under sufficient pressure to prevent undue evaporation, and sprayed into a chamber containing downwardly inclined baffles. Substantial vaporisation occurs. The vapours are removed and the unvaporised portion drips from the baffles direct on to the floor of the chamber, which is heated sufficiently to produce cracking and reduce the residue to a layer of hard metallurgical coke. H. S. Garlick.

Condensation of gasoline vapours. F. W. Isles, Assr. to Standard Oil Development Co. (U.S.P. 1,809,167, 9.6.31. Appl., 25.1.27).—Benzol is sprayed into the vapours from a gasoline still to assist in the condensation of the light gases. The recovery of the gasoline is considerably increased and the product is suitable for blending with heavy naphtha. The benzol may be replaced by a naphtha fraction of the same average b.p. as benzol. T. A. Smith.

Cracking of hydrocarbons. E. C. Herthel, Assr. to Sinclair Refining Co. (U.S.P. 1,809,297, 9.6.31. Appl., 8.2.30).—In a cracking furnace an adjustable baffle divides the stream of heating gases so that part passes over one of two banks of tubes in series, and the remainder over the other. D. K. Moore.

Operation of pressure stills [for cracking of hydrocarbon oils]. E. C. Herthel, Assr. to Sinclair Refining Co. (U.S.P. 1,809,273, 9.6.31. Appl., 21.11.24). —An oil heavier than, and containing constituents similar to those of, the distillate is introduced into a reflux tower into which the vapours from a pressure still containing cracked oil pass. D. K. Moore.

Conversion [cracking] of hydrocarbon. N. E. Loomis, Assr. to Standard Oil Development Co. U.S.P. 1,809,174, 9.6.31. Appl., 5.5.24).—The heavy condensate from the lower part of a condenser attached to a cracking still operating under pressure is returned to it, while the light condensate from the upper part of the condenser is withdrawn to a cracking coil working under a higher pressure than that in the still. D. K. Moore.

Cracking of hydrocarbons. U. A. R. Dudley (B.P. 363,051, 23.10.30 and 12.6.31).—Hydrocarbon oils are cracked at low pressures by passing through heated tubes containing finely-divided siliceous material, *e.g.*, sand. The C deposited in the siliceous material is periodically removed as CO_2 by forcing air through the tubes. D. K. Moore.

Treatment [cracking] of hydrocarbons. L. de Florez, Assr. to Texas Co. (U.S.P. 1,806,597, 26.5.31. Appl., 4.8.22).—Hydrocarbon oils are passed through a pipe-still at a substantially uniform rate of flow, and at predetermined recurrent intervals a correction to the quantity of fuel added to maintain a predetermined temp. at a selected point is automatically made. H. S. Garlick.

Cracking of hydrocarbon oils. Standard Oil Development Co., Assrs. of H. Sydnor (B.P. 362,666, 6.12.30. U.S., 6.12.29).—The oil to be treated is heated to cracking temp. in a zone of restricted cross-section and passed downwardly through two or more heat-insulated, vertical cracking zones of large cross-section, arranged in series and/or in parallel. The cracked oil is passed under reduced pressure into a rectifying zone. H. S. Garlick.

Cracking of [hydrocarbon] oil. L. Kirschbraun, Assr. to Universal Oil Products Co. (U.S.P. 1,805,628, 19.5.31. Appl., 21.8.22).—Oil is subjected to cracking conditions of temp. and pressure in a heating zone and passed to an expansion chamber divided into a number of separate compartments maintained at successively lower pressures. The hot oil is admitted to the compartment under highest pressure and passes from one to another through overflow pipes. The vapours evolved in each compartment except the last (which are led to a dephlegmator) are allowed to percolate through the oil in the next succeeding one. H. S. Garlick.

Apparatus for distilling and coking heavy hydrocarbon liquids. A. S. Knowles and C. W. Andrews, Assrs. to Tar & Petroleum Process Co. (U.S.P. 1,805,720, 19.5.31. Appl., 25.6.28).—The hot, heavy residue from a cracking operation is distributed over crushed material contained in a stationary basket situated in the upper chamber of an oven, and drops down on to a rotating basket containing further crushed material, preferably coke. Additional distillation takes place and the volatile matter is carried off through an upper passage. The residue finally drops to the floor of the oven where it is coked. H. S. Garlick.

Cracking of hydrocarbon products. G. Egloff and H. P. Benner, Assrs. to Universal Oil Products Co. (U.S.P. 1,805,615, 19.5.31. Appl., 25.4.21. Renewed 2.7.28).—A wax oil, *e.g.*, that resulting from the atm. distillation of a Mexican crude, is subjected to distillation under a gradually decreasing, self-imposed v.p. (from 350 down to 80 lb. per sq. in.) while the temp. is being substantially raised. H. S. Garlick.

Hydrocarbon oil conversion. L. C. Huff. Assr. to Universal Oil Products Co. (U.S.P. 1,806,063, 19.5.31. Appl., 21.1.26).—In a cracking process the oil is raised to cracking temp. by passing it under superatm. pressure through an elongated conduit into which is introduced at spaced intervals an extraneous combustible fluid in order to effect submerged combustion in the oil undergoing treatment. H. S. Garlick.

Conversion of heavy into lighter hydrocarbons. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,806,284, 19.5.31. Appl., 2.5.23. Renewed 28.5.28).—Oil is continuously passed under superatm. pressure in a confined stream through a heating zone where it is subjected to a conversion temp., and discharged into an elongated vaporising zone from which the vapours are progressively discharged as the oil passes therethrough. These vapours are combined and passed to a dephlegmator from which reflux condensate is returned under mechanical pressure to the heating zone for re-treatment. Unvaporised residual oil is continuously withdrawn from the system. H. S. Garlick.

Treating petroleum hydrocarbons in the vapour phase. R. Cross, Assr. to Cross Development Co. (U.S.P. 1,805,686, 19.5.31. Appl., 16.10.26).—Oil is subjected to cracking conditions of temp. and pressure and the dephlegmated vapours are brought into intimate contact with a liquid alkali or alkaline-earth metal, *e.g.*, Na or Ca, which is continuously circulated in counter-flow relation with the oil vapours. Polymerides and reaction products are separated and diverted from the system, selected portions being recycled, and unused treating material is continuously supplied. H. S. Garlick.

Cracking of oils. J. C. Black (U.S.P. 1,806,037, 19.5.31. Appl., 14.11.28).—An anhyd. metallic halide mixed with petroleum oil is continuously mixed with a higher-boiling petroleum distillate at approx. 65—150° to produce metallic halide–unsaturated hydrocarbon reaction products (which are removed) and substantially saturated hydrocarbon oils. These are subjected to cracking conditions under superatm. pressure at approx. 400—450° and the products fractionated to produce gasoline-b.p. hydrocarbons, the high-b.p. distillate used in the process, and a residual oil. The separated metallic halide reaction products are continuously subjected to destructive distillation, the products being passed together with the gasoline stock produced in the cracking operation to a fractionating tower. H. S. Garlick.

Distillation of petroleum. E. G. Rogatz, Assr. to Union Oil Co. of California (U.S.P. 1,806,023, 19.5.31.

Appl., 6.11.26).—Preheated oil is introduced into a distilling column above an exhausting section (*A*) thereof, through which it descends in intimate countercurrent contact with an ascending stream of relatively hotter vapours. The liquid bottoms are removed from the base of the column and heated without cracking by passage through a heating coil, the vapours evolved being returned to the base of section *A* of the column. The residual liquid is removed from the system. The vapours from *A* are introduced into a fractionating section where they are washed and fractionated in countercurrent contact with a relatively colder reflux liquid introduced into the top of the section. The bottoms from the fractionating section are fed into the upper portion of *A*. The vapours from the top of the fractionating section are withdrawn and condensed.
H. S. Garlick.

Vaporiser and process of vaporising [oil]. E. H. Leslie and E. M. Baker (U.S.P. 1,808,419, 2.6.31. Appl., 20.3.23).—Oil is passed through a pipe-still and delivered to an evaporating vessel containing ring packing on which the oil is distributed to form a large surface. Equilibrium between the vapours and oil is thus obtained. The upper portion of the vaporiser is also filled with ring packing and unvaporised oil is retained in the lower portion of the apparatus. The residue from a vaporiser is passed through a cracking coil and delivered to a second vaporiser, the residue from which is used to preheat indirectly the incoming oil.
T. A. Smith.

Distilling and cracking of petroleum oils. J. C. Black (U.S.P. 1,806,036, 19.5.31. Appl., 8.10.28).—A residual oil from which the gasoline stock and light gas oil have been separated by distillation is heated and passed along with hot cracked oil into a fractionating tower from which a synthetic gas oil and light and heavy cracked gas-oil stocks are separately removed. The residuum is cracked and separated by fractionation into synthetic gasoline b.p. stock and heavy gas-oil stock, and a residue the Saybolt viscosity at 50° of which is reduced to 300 sec. max. by commingling with the light, cracked, gas-oil stock derived from the distillation stage. H. S. Garlick.

Pyrogenetic decomposition of [petroleum] oils. H. Sydnor, Assr. to Standard Oil Development Co. (U.S.P. 1,809,185, 9.6.31. Appl., 6.7.27).—Heating electrically or otherwise the pipes conveying cracked oil from the furnace to the point of condensation is used as a means to minimise the deposition of carbonaceous matter in them. D. K. Moore.

Treatment of petroleum oils. G. Egloff and J. C. Morrell, Assrs. to Universal Oil Products Co. (U.S.P. 1,805,616, 19.5.31. Appl., 4.3.22. Renewed 17.5.27).—The oil is raised to conversion temp. under pressure and passed to an enlarged zone into which SO_2 and steam are introduced, the vapours evolved being condensed. H. S. Garlick.

Conversion of petroleum oil. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,806,283, 19.5.31. Appl., 8.2.22).—A stream of charging oil is passed through that portion of a furnace maintained at the lowest temp., in order to volatilise the lighter constituents and H_2O, and is delivered to a zone from which the vaporisable constituents are removed to be isolated from the process; simultaneously a second stream of oil is passed under pressure through another portion of the furnace, where it is raised to cracking temp. and delivered to an independent enlarged zone for conversion. The vapours are passed to a dephlegmator to which liquid oil from the first zone is supplied to act as dephlegmating medium, the unvaporised liquid oil and condensate being withdrawn and supplied as the charging oil for the second stream. H. S. Garlick.

Apparatus for conversion of petroleum oil. W. R. Howard, Assr. to Universal Oil Products Co. (U.S.P. 1,806,060, 19.5.31. Appl., 27.12.21. Renewed 3.3.27).—In a main still hydrocarbon oil is continuously subjected to cracking conditions of temp. and pressure, and the vapours evolved are passed through the oil prior to entering the vapour line connected with dephlegmating and condensing means. Condensate from the vapour line is returned to a reflux still disposed within the main still and connected to an independent still for re-treating the returned reflux condensate from the reflux still. H. S. Garlick.

Distillation of materials containing hydrocarbons. C. J. Greenstreet (B.P. 362,424, 30.5.30 and 2.7.30).—Finely-divided coal or other carbonaceous material is intimately mixed with up to twice its wt. of a commercial mineral oil having a low initial b.p. (about 200°) and wide distilling range substantially coincident with that of the volatiles in the carbonaceous material under the prevailing conditions and with an end-point of about 400°, *e.g.*, Persian fuel oil (*d* approx. 0·895). About 50—60% of distillates are removed by slow distillation, with or without stirring, and with or without oxidation during distillation, leaving a fluid residue of finely-divided material in heavy oil. This is preferably accomplished in the presence of a petroleum or other soap, or of an alkali or an alkaline salt. Steam may be passed through the mixture during distillation and an animal or vegetable oil may replace part of the mineral oil. Production may be made continuous by withdrawing part of the exhausted material and replacing it by fresh mixture. H. S. Garlick.

Subjecting one or more components of mixtures of hydrocarbons to exothermic chemical reactions. N. V. de Bataafsche Petroleum Maats., Assees. of R. M. Deanesly (B.P. 363,028, 9.10.30. U.S., 4.11.29).—The mixture of hydrocarbons, *e.g.*, propylene and C_3H_8, is introduced into a tower about halfway down and the reacting liquid, *e.g.*, H_2SO_4, partly at the top and partly halfway down. The temp. is controlled by condensing the vapour produced by the heat of reaction and reintroducing it into the tower at two points.
D. K. Moore.

Dehydrogenation of hydrocarbons. M. B. Hopkins, Assr. to Standard Oil Development Co. (U.S.P. 1,808,168, 2.6.31. Appl., 31.7.23).—Hydrocarbons such as C_3H_8 are heated at 250—470° with O_2, the quantity of the latter being limited so that only unsaturated compounds are formed. One atom of O is added for every 2 atoms of H it is desired to remove.
T. A. Smith.

Rectification and purification of hydrocarbon vapours. P. La F. Magill, Assr. to Roessler & Hasslacher Chem. Co. (U.S.P. 1,807,924, 2.6.31. Appl., 25.11.27).—Hydrocarbon vapours from a rectifying column are partly condensed and introduced without separation into a liquid hydrocarbon containing an alkali metal. The vapour is carried away to a condenser while the liquid containing the by-products is floated off from the liquid containing the alkali, and is returned to the rectifying column, forming part of the reflux. D. K. Moore.

Composition for purifying petroleum oils. J. H. Hirt (H. M. Hirt extrix.), Assr. to L. J. Hirt (U.S.P. 1,809,554, 9.6.31. Appl., 23.3.29).—The product obtained by stirring 200 pts. of small lump CaO into a hot mixture of 260 pts. of 38% aq. NaOH and 35 pts. of PbO removes S from petroleum by cold contact with it. If the oil has a tendency to darken MgO is substituted for CaO in the above mixture, but the removal of S is slower. D. K. Moore.

Manufacture of hydrocarbons. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 363,344, 6.6.30).—High-temp. coke, which may be freed from inorg. substances by boiling with acids, is used as a catalyst for the conversion at high temp. and ordinary or high pressure of paraffins into olefines or of either into aromatic hydrocarbons. D. K. Moore.

Production of asphaltic products from aromatic extracts of mineral oils. Burmah Oil Co., Ltd. From H. L. Allan (B.P. 362,580, 6.10.30).—The more volatile constituents are removed from the aromatic extract of a mineral oil obtained by refining crude oil with liquid SO_2, NH_2Ph, PhOH, or other selective solvent of the aromatic and unsaturated hydrocarbons, which is then converted into an asphaltic product by air-blowing at 200°/50 lb. per sq. in. H. S. Garlick.

Fuels for internal-combustion engines. J. F. P. de la Riboisière (B.P. 362,673, 11.12.30).—The fuel consists of hydrocarbon material containing a proportion of an arylamine, *e.g.*, NH_2Ph or toluidine, or an azocyclic compound (pyridine etc.), in association with a relatively small proportion of substantially anhyd. EtOH or MeOH. $Fe(CO)_5$ or similar antiknock compounds are absent. H. S. Garlick.

Manufacture of lubricating oils. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 362,465, 30.6.30).—Unsaturated hydrocarbons obtained by dehydrogenation or cracking of hydrocarbons of high mol. wt. rich in H are subjected to condensation, with or without the addition of cyclic hydrocarbons, in stages carried out at successively higher temp., the condensed products (resinous matters) formed at the end of the first stage being separated before carrying out the second stage. $AlCl_3$, $ZnCl_2$, BF_3, $FeCl_3$, $POCl_3$, activated Al, Na, or Zn powder may be employed as condensing agents, and different ones may be employed at different stages. H. S. Garlick.

Production of lubricating oil. C. J. Livingstone and W. A. Gruse, Assrs. to Gulf Refining Co. (U.S.P. 1,808,853, 9.6.31. Appl., 18.5.28).—The decrease of viscosity with rise of temp. of lubricating petroleum oil is reduced by the addition of up to 0·5% of a soap and a miscible thinning agent, *e.g.*, naphtha, C_6H_6, CCl_4. D. K. Moore.

Lubricating oil. H. T. Bennett, Le R. G. Story (Assr. to J. Chatfield), and H. B. Beckley (U.S.P. 1,806,734, 26.5.31. Appl., 29.3.26).—The lubricant comprises about 95·9% of a mineral lubricating oil having viscosity (Saybolt) 280/100° F., about 4% of neatsfoot oil, and about 0·1% of Al stearate. The product has a pour point of $<$20° F. H. Royal-Dawson.

Lubricants and brake-impregnating materials. J. W. Addyman and C. E. Holt (B.P. 359,602, 1.8.30).—A composition consisting of graphite, CS_2, naphtha, and a lubricating oil, with or without paraffin oil, is claimed. H. Royal-Dawson.

Purification of lubricating oils. Standard Oil Development Co., Assees. of R. K. Stratford (B.P. 362,600, 21.10.30. U.S., 29.10.29).—The oil and approx. 100—150% by wt. thereof of undiluted liquid PhOH is passed at a temp. below that at which the PhOH becomes completely miscible with the oil, and preferably $\not>$ 60°, countercurrently through a series of agitators, the mixture from one agitator being allowed to settle, and the oil and PhOH layers separated before they are passed to the succeeding agitators. A separated, purified oil layer, which is subjected to distillation to remove absorbed PhOH, and a PhOH layer are removed from the end agitators of the series. H. S. Garlick.

[High-tension] cable oil. W. Claypoole, Assr. to Texas Co. (U.S.P. 1,807,060, 26.5.31. Appl., 18.4.29).—A mixture of 85—90% of a mineral hydrocarbon oil, 10—15% of rosin, and 0·5% or less of rubber is claimed. It has a resistivity of 250×10^{10} to 300×10^{10} ohms per c.c. at 100°. H. Royal-Dawson.

Cutting oil. O. E. Cushman and T. W. Doell, Assrs. to Standard Oil Co. of California (U.S.P. 1,806,933, 26.5.31. Appl., 21.1.29).—The composition (proportions stated) consists of a mineral oil (sol. in liquid SO_2), lard oil, dégras, S, $C_{10}H_8$, and pine oil. H. Royal-Dawson.

Hydrocarbon oil of good non-smoke rating. C. I. Robinson, Assr. to Standard Oil Development Co. (U.S.P. 1,809,183, 9.6.31. Appl., 10.11.22).—An oil of low S content, high non-smoke rating, and good burning properties is obtained by cracking paraffin wax at 357—400° under pressure below 60 lb. per sq. in. D. K. Moore.

Apparatus for treating paraffin. L. H. Macomber (U.S.P. 1,809,130, 9.6.31. Appl., 13.5.29).—Wax-containing oil, diluted with naphtha, is cooled in a long cylindrical vessel which is fitted with perforated, canvas-covered tubes. One end of the vessel is fitted with a movable piston which forces oil and amorphous wax through the canvas filters, the paraffin being retained in the cylinder and removed by subsequent melting. T. A. Smith.

Production from hydrocarbon oil of black pigment consisting of carbon. A. L. Miller, Assr. to Ault & Wiborg Co. (U.S.P. 1,807,321, 26.5.31. Appl., 4.2.28).—High-grade lampblack which can be used instead of C black in the manufacture of printing ink is prepared from creosote or hydrocarbon oil in good yield (4 lb. per gal.) by burning the oil in a limited supply of preheated air. The oil jet is surrounded by an annulus delivering preheated air at 65 lb. pressure, the whole burner being surrounded by another annulus delivering preheated low-pressure air. The flame delivers into a chamber the upper portion of which is water-cooled, the lower portion being protected by refractory brickwork. A $\frac{1}{8}$-in. oil jet supplies oil at the rate of 500 lb. per hr., for which 45—50 cu. ft. of high-pressure air and 500 cu. ft. of low-pressure air are consumed per min. For this burner a chamber 4·5 ft. in diam. is employed, the temp. in the furnace being maintained at 1300—1430°. T. A. Smith.

Burners for furnaces. Babcock & Wilcox, Ltd. From Fuller Lehigh Co. (B.P. 364,783, 6.12.30).

Closure means for coke ovens. P. van Ackeren, Assee. of H. Koppers A.-G. (B.P. 365,015, 5.12.30. Ger., 9.12.29).

Coke-pushing machines. C. Still (B.P. 364,830, 1.1.31. Luxemb., 23.7.30).

Crushing coke etc. Catalytic gas reactions.—See I. C_2H_2. **Wetting etc. agents.**—See III. **Crêped paper.**—See V. **H_2SO_4 from petroleum distillates.**—See VII. **Ferrous alloys.**—See X. **Tanning materials.**—See XV. **Preserving fresh fruit.**—See XIX.

III.—ORGANIC INTERMEDIATES.

Phenols from brown-coal distillates.—See II.

Patents.

Manufacture of acetylene. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 363,375, 5.8.30).—Hot gases for conversion into C_2H_2 by passage through an electric arc are obtained by (i) thermal decomp. of CH_4, yielding C, which is removed, and a 1 : 1 mixture by vol. of H_2 and CH_4 at 500—700°; (ii) mixing CH_4 with CO and H_2 obtained by the partial combustion of an equal. vol. of CH_4, the temp. of the mixture being 500°; (iii) passing a mixture of 60% CH_4, 20% C_2H_6, and 20% C_3H_8 through an electric arc, removing C, scrubbing the gases from unsaturated hydrocarbons, and preheating to 600° by the gases leaving this arc. After conversion into C_2H_2 the gases are cooled as rapidly as possible to prevent the formation of by-products. D. K. Moore.

Production of formic acid. H. Weitz (B.P. 360,299, 13.2.31).—A mixture of Na boroformate and a hydroxycarboxylic acid free from H_2O of crystallisation (*e.g.*, salicylic acid) liberates HCO_2H gradually when moistened. C. Hollins.

Synthetic manufacture of acetic acid [from acetaldehyde]. Nippon Chissohiryo Kabushiki Kaisha (B.P. 359,878, 29.5.31. Jap., 10.9.30).—O_2, with or without diluent gas, is introduced through a valve in the bottom of a cylindrical vessel, containing MeCHO and catalyst (Mn acetate), in which a gas pressure (*e.g.*, 5—6 atm.) sufficient to prevent boiling of the MeCHO is maintained. C. Hollins.

Manufacture of acetic anhydride. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 359,964, 24.6. and 4.7.30).—In the catalytic prep. of Ac_2O in presence of boryl or other phosphate, increased yields are obtained by adding to the AcOH a small amount of an amide, nitrile, NH_3, NH_4 salt, or an amine or amine salt, *e.g.*, 1% of urea, 1·5% of acetamide, 1% of PhCN, 1% of NH_3, 0·4% of NH_4NO_3, or 0·2% of pyridine. C. Hollins.

Separation of acetic anhydride and acetic acid. C. F. Boehringer & Söhne G.m.b.H. (B.P. 360,330, 27.3.31. Ger., 27.11.30. Addn. to B.P. 358,831; B., 1932, 172).—AcOH is frozen out from its mixture with Ac_2O in absence of H_2O. A non-aq. solvent of low f.p., *e.g.*, PhMe, may be present and is separated from the Ac_2O by distillation. C. Hollins.

Absorption of *iso*butylene in strong acids. N. V. de Bataafsche Petroleum Maats. (B.P. 360,331, 27.3.31. Holl., 28.4.30).—H_2SO_4, H_3PO_4, etc. is caused to absorb more than 2, 3, etc. equivs. of *iso*butylene. The mixture may be distilled in steam or vac. without neutralisation, preferably after dilution to 40% acid in the case of H_2SO_4. *tert.*-BuOH and polymerised *iso*butylenes are obtained. C. Hollins.

[Manufacture of] wetting, penetrating, foaming, and dispersing agents. H. T. Böhme A.-G. (B.P. 359,449, 9.7.30. Ger., 20.9.29).—Unsaturated or polyhydric aliphatic alcohols above C_8 are sulphonated in the form of their lower alkyl (C_1—C_8) ethers, *e.g.*, Pr^{β} or Bu^{α} octodecenyl ether, or octodecylene glycol Me ether. [Stat. ref.] C. Hollins.

Manufacture of wetting, washing, emulsifying, and dispersing agents. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,002, 21.7.30).—Products of the destructive oxidation of non-aromatic hydrocarbons above C_7, or further products obtained from these by catalytic reduction, dehydration, or decarboxylation, are treated with $>$ 1 mol. of SO_3, *e.g.*, at 20—40°. C. Hollins.

Manufacture of sulphonic acids [wetting and emulsifying agents]. I. G. Farbenind. A.-G. (B.P. 360,297, 11.2.31. Ger., 11.2.30).—The alkylated carbazoles, obtained from carbazole and olefines above C_2 (B.P. 327,746; B., 1930, 625), *e.g.*, di- and tetra-*iso*propyl- and dibutyl-carbazoles, are sulphonated. C. Hollins.

Manufacture of *o*-amino-*p*-cresolcarboxylic acid. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 359,727, 29.10.30).—The Na or K salt of 2-amino-*p*-cresol is converted by CO_2 at 130—150°/10—15 atm. into the 5-carboxylic acid, m.p. 164°. C. Hollins.

Manufacture of derivatives of *o*-anisidine and like *o*-alkoxyanilines. Boot's Pure Drug Co., Ltd., and R. Child (B.P. 359,772, 29.11.30).—Acet-*o*-anisidide is converted by $ClSO_3H$ at 50° into the 4-sulphonyl chloride, m.p. 152—153° (amide, m.p. 226°), which is reduced by Na_2SO_3 to the sulphinic acid, m.p. 117—119° (+ H_2O). C. Hollins.

Manufacture of organic [polycyclic] compounds containing nitrogen. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 359,490, 18.7.30).—A polynuclear compound having a pair of free *peri*-positions is condensed with cyanoacetic acid or ester in presence of

$AlCl_3$ etc. Acenaphthene gives the ketimide of *peri*-acenaphthindandione, m.p. 285—287° (hydrochloride, m.p. 300°); 1-methylnaphthalene and anthracene react similarly. C. Hollins.

Manufacture of aminoanthraquinonenitriles. I. G. Farbenind. A.-G. (B.P. 359,850, 28.2.31. Ger., 1.3.30).—A 1 : 4-diaminoanthraquinone-2-sulphonic acid is heated with aq. KCN, NaCN, or NH_4CN, whereby the SO_3H group is removed and CN enters the 2- and/or 3-positions. The following are described: 1-amino-4-*cyclo*hexylamino-2-cyanoanthraquinone, m.p. 211—212°; the 3-cyano-compound, m.p. 239—240° (formed at 105°, converted by aq. NaCN at 110—115° into the 2-isomeride); 1-amino-4-*p*-toluidino-2- and -3-cyanoanthraquinones; 1-amino-4-*n*-butylamino-2 : 3-dicyanoanthraquinone, and the 2- or 3-cyano-compound; 1-amino-4-methylamino-2 : 3-dicyano- and -2-cyano-anthraquinone; 1 : 4-diamino-2 : 3-dicyanoanthraquinone. C. Hollins.

Manufacture of anthraquinone derivatives. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 359,397, 14.6.30).—A 1-amino-4-arylsulphonamidoanthraquinone-2-sulphonic acid is converted into the corresponding 2-alkoxy-compound without hydrolysis of the sulphonamide group by heating, *e.g.*, at 80—100°, with a solution of Na, NaOH, etc. in a mono- or poly-hydric alcohol. The prep. of 1-amino-4-*p*-toluenesulphonamido-2-methoxy- and -2-β-hydroxyethoxy-anthraquinone is described; the latter has m.p. 197—199°. C. Hollins.

Catalytic gas reactions.—See I. **Hydrocarbons.**—See II. **Deacidification of nitrated products.**—See XXII.

IV.—DYESTUFFS.

Patents.

Manufacture of arylated safranines. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 359,298, 16.6.30).—Safranines are reduced to leuco-compounds and arylated by condensation with an arylamine and its hydrochloride at 180—260°; or phenosafranine is treated at 140° with Zn dust in presence of *p*-toluidine and its hydrochloride and the mixture is heated at the b.p. The prep. of diphenyl-, di-*o*- or -*p*-tolyl-, di-α-naphthyl, di-(*m*- or *p*-aminophenyl)-, and di-(2-amino-4-tolyl)-phenosafranines, and of phenyldimethylsafranine, is described. C. Hollins.

Manufacture of dyes [from indolines]. I. G. Farbenind. A.-G. (B.P. 359,753, 14.11.30. Ger., 16.11.29).—A nitrosyl halide is condensed with 2 mols. or 2 successive mols. of a 2-methylene-1 : 3 : 3-trialkylindoline in presence of Ac_2O or other acid anhydride as condensing agent. The intermediate 2-nitrosomethylene-1 : 3 : 3-trimethylindoleninium chloride, m.p. 195°, from 2-methylene-1 : 3 : 3-trimethylindoline and NOCl in CCl_4 gives with a further mol. of the indoline in Ac_2O a yellow dye identical with the product of B.P. 291,888 (B., 1928, 599). C. Hollins.

Manufacture of [thioindigoid] vat dyes. I. G. Farbenind. A.-G. (B.P. 359,426, 8.7.30. Ger., 8.7.29).—A 6-halogeno-4-alkyl- or 4 : 6-dialkyl-thioindoxyl is condensed with a 5 : 7-dihalogeno-4-alkylthioisatin α-anil (etc.), or a 6-halogeno-4-alkyl- or 4 : 6-dialkylthioisatin α-anil (etc.) with a 5 : 7-dihalogeno-4-alkylthioindoxyl. Where the alkyl is Me and the halogen is Cl or Br bluish-pink vat dyes are obtained. C. Hollins.

Preparation of violet [wool] dyes of the anthraquinone series. Chem. Fabr. vorm. Sandoz (B.P. 360,053, 5.7.30. Ger., 12.7.29).—A 1-amino-2-methylanthraquinone carrying a reactive group (halogen, OH, OR, or NO_2) in 4-position is condensed with a *m*-halogenoarylamine and sulphonated. 4-Bromo-1-amino-2-methylanthraquinone and *m*-chloroaniline give a base, m.p. 276°, which is sulphonated to a pure violet wool dye. C. Hollins.

Manufacture of acid wool dyes of the anthraquinone series. I. G. Farbenind. A.-G. (B.P. 360,293, 6.2.31. Ger., 8.2.30).—A 4-halogeno-1-aminoanthraquinone-2-sulphonic acid is condensed below 100° with an *o*-aminophenol in presence of a Cu salt and aq. Na_2SO_3 or $NaHCO_3$, preferably with exclusion of air. The 4-Br-compound with *o*-aminophenol, *o*-aminophenol-4-sulphonic acid, 3-amino-*p*-cresol, or 4-chloro-*o*-aminophenol gives blue wool dyes, becoming grey to black on chroming. C. Hollins.

Manufacture of colour lakes. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 359,643, 9.9.30).—Acid dyes are converted into lakes in presence of aq. solutions of urea–aldehyde condensation products or polymerised acrylic derivatives, acrylic acid–styrene, acrylic acid–vinyl alkyl ethers or esters, or maleic acid–styrene, if necessary with the addition of org. dispersing agents, *e.g.*, resin soap, and/or H_2O-sol. org. solvents. The products show smaller covering power, but are glazed, non-bronzing, and bluer. Examples are: *m*-toluidine-6-sulphonic acid → β-naphthol, with resin soap, Na salt of polymerised acrylic acid, and $BaCl_2$; *p*-toluidine-3-sulphonic acid → 2 : 3-hydroxynaphthoic acid or Lithol-red R with resin soap, urea–CH_2O, and $CaCl_2$. C. Hollins.

Manufacture of monoazo dyes insoluble in water on the fibre [ice colours]. I. G. Farbenind. A.-G. (B.P. 359,968, 28.7.30. Ger., 3.8.29).—The 2 : 3-hydroxynaphthoyl derivatives of halogenoaminocresol Me ethers are coupled on the fibre with suitable diazo components, *e.g.*, 4- or 5-chloro- or 4 : 5-dichloro-*o*-toluidine. Examples are hydroxynaphthoyl derivatives of 6-chloro-4-amino-*m*-cresol Me ether, 5-chloro-2-amino- and 2-chloro-5-amino-*p*-cresol Me ethers. The Turkey-red dyeings produced are fast to kier-boiling, light, and Cl_2. C. Hollins.

Anthraquinone derivatives.—See III. **[Dye from] cellulose derivative.**—See V.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Preparation of cellulose from maize stalks using nitric acid. E. Horváth and G. Éber (Mezög. Kutat., 1931, 4, 123—133; Chem. Zentr., 1931, ii, 514—515).—The material is treated with 2—3% HNO_3 at 70—98° and extracted with 1—6·6% NaOH at 21—100° or under 3 atm. A. A. Eldridge.

Determination of degradation of sulphite-cellulose. C. Kullgren (Svensk Kem. Tidskr., 1931, 43, 161—174).—The acid no. of a sulphite pulp, determined as follows, is a measure of its lignin content and degradation, and bears a const. relationship to its OMe val. 3—4 g. (dry wt.) of sulphite pulp are shaken with 300 c.c. of 0·1—0·5*N*-HCl (preferably 0·2*N*-HCl) and washed first with 0·5—1 litre of 0·2*N*-HCl and then with 1—2 litres of distilled H_2O free from Cu. 1—1·7 g. (dry wt.) are dried between filter-papers, shaken with 100 c.c. of *N*-NaCl, and set aside for 10 min. The filtrate is titrated with 0·01*N*-NaOH and the residue washed, dried, and weighed. The acid no. is expressed as the no. of c.c. of 0·01*N*-acid evolved per 1 g. of sulphite cellulose. A. Renfrew.

Report of the joint meeting of the Fibre-analysis Committee, the Technical Committee of the Association of Cellulose and Paper Chemists and Engineers, and of the Association of German Chemists, Dec., 1931 (Papier-Fabr., 1931, 29, 801—807, and Zellstoff u. Papier, 1932, **12**, 9—14).).—**I. Determinations of the degree of decomposition [of pulp] by the usual methods.** C. G. Schwalbe. Results of a large number of determinations made on 9 different pulps by four hypochlorite and three $KMnO_4$ methods show that very divergent vals. are obtained. For the former methods this divergence is least for the Sieber–Kleinstück procedure, whilst of the latter, the Johnsen–Björkman method gives the best agreement. Factors affecting the results are discussed, and it is suggested that improvement may be obtained by more careful opening out of the sample, increasing its wettability by means of a wetting agent, etc.

II. Distribution of rosin, ash, and reducing substances in pasteboards. C. G. Schwalbe. Variations in the results of determinations of rosin, fat, mineral matter, etc. are due to the original wood and to certain factors in the cooking process. Improvement is effected by washing the pulp after cooking, but careful sampling of the pasteboard sheets by the strip or wedge method is essential before analysis, and better results are obtained if the test samples are first disintegrated, pulped in an experimental hollander, and then made into thin sheets.

III. Determination of rosin and fat in pasteboards by emulsification. C. G. Schwalbe. NaOH is unsuitable as a solvent for the rosin–fat mixture because it also dissolves wood gum; this is not the case with NH_3, which has the further advantage that it is easily removed by evaporation. Extraction with 5% aq. NH_3 removes 70—86% of the total rosin in the material, but the sticky rosin is less sol. in this liquid than is the oxidised substance and the method does not give satisfactorily const. vals.

IV. Strength testing. B. Possanner von Ehrenthal. Factors such as fibre strength, degree of beating, method of preparing the sheets, etc., which affect the strength of the sheets, are discussed.

V. Precipitation and colloid titration of ligninsulphonic acids with fuchsin. T. Hennig. Fuchsin forms a sparingly sol. condensation product with ligninsulphonic acids, and titration of the latter with this and with other basic dyes is possible. The titration is useful in the control of the sulphite cooking process. Gravimetric determination of the fuchsin-ligninsulphonic acid ppt. is of limited val. B. P. Ridge.

Fractionation of commercial acetylcellulose. I. R. O. Herzog and A. Deripasko (Cellulosechem., 1931, **13**, 25—31).—Fractionation of acetylcellulose by pptn. gives fractions differing in elastic properties and degree of dispersion (measured by the rate of flow or osmotic pressure). R. S. Cahn.

Determination of the ripeness of viscose. E. Berl and H. Dillenius (Cellulosechem., 1932, **13**, 1—25).—The methods of determination of ripeness of viscose by pptn. with NaCl or, better, NH_4Cl, and by decomp. with I are modified; they give parallel results. Electrolytes which hasten or retard ripening affect the NaCl and NH_4Cl figures, but do not alter the amount of free NaOH. Viscosity measurements confirm results recorded in the literature, except that no max. was observed shortly before coagulation. R. S. Cahn.

Identification of woods.—See IX. **Determining H_2O in nitrocellulose.**—See XXII.

Patents.

Production of fibrous material. S. D. Wells, Assr. to Mine & Smelter Supply Co. (U.S.P. 1,807,111, 26.5.31. Appl., 27.9.27).—The material, *e.g.*, straw, is subjected to a mild chemical digestion, partly disintegrated with H_2O in, *e.g.*, a swing-hammer mill, washed, and finally beaten to the required degree preferably in a rod mill. Washing is conveniently effected on the countercurrent principle using two cylinder mould machines in series with an intermediate disintegrating and mixing tank. By thus separating the two operations of washing and beating, less H_2O is required and the quality of the product is improved. D. J. Norman.

Manufacture of synthetic [fibrous] amphibolic products. G. E. Seil (U.S.P. 1,807,178, 26.5.31. Appl., 11.4.30).—Molten siliceous material, *e.g.*, Ca or Mg silicate, is fed, preferably by gravity, into an annular stream of air flowing co-axially with and in the same direction as the molten material, but at such higher velocity as to cause a partial vac. within the air stream; fine fibres resembling cotton staple are produced. Transfer of heat from the molten material to the rest of the apparatus is prevented by supplying the air through an annular slot concentric with, of greater diam. than, and separate from the conduit through which the molten material flows. The size and form of the filaments may be varied by altering the air pressure (normally 40 lb. per sq. in.). D. J. Norman.

Preparing textile fibres from rags containing artificial silk. E. E. T. Diederix and S. Vlessing (Vlessing & Co.) (B.P. 359,012, 11.7.30. Holl., 11.7.29).—The disinfected (with dil. aq. H_2O_2) and sorted rags are treated with 0·4% aq. Na_2CO_3 for 10 min. at 45°, washed, and immersed for 10 min. in a liquor containing 1% each of NaOH and AcOH. After further washing, the rags are dried to a H_2O content of 25% and mechanically disintegrated into spinnable fibres. D. J. Norman.

Cleaning of animal and vegetable textile fibres or textile materials. C. Lüdecke and W. Wilcken (B.P. 362,352, 1.8.30).—The cleansing medium consists of a H_2O-miscible emulsion comprising a dispersing agent, which is an acid or acid salt (H_2SO_3, $NaHSO_3$, $ClSO_3H$, H_3BO_3, H_3PO_4) together with an oxidising agent (H_2O_2,

$NaMnO_4$) or a reducing agent (SO_2, $Na_2S_2O_4$), a fat solvent (benzine, $C_2H_3Cl_3$), and a stabiliser such as a vegetable mucous substance (tragacanth, agar-agar), with addition of an alcoholic formalin solution of sour or skimmed milk. F. R. Ennos.

Manufacture of gas-cell fabric. W. C. Calvert (B.P. 359,823, 20.1.31).—Aircraft fabric is coated several times with a composition containing gelatin, casein, or regenerated cellulose, and polyglycerol or polyglycol in the approx. ratio 1 : 2—2·5. D. J. Norman.

Manufacture of gun-wad felt. W. W. Triggs. From Amer. Hair & Felt Co. (B.P. 358,318, 29.10.30).—Felt is impregnated with a size containing tapioca gum and Na resinate, and is then passed over drying cylinders. D. J. Norman.

Directly-heated pulp digester. E. Morterud (U.S.P. 1,807,544, 26.5.31. Appl., 26.2.29).—Steam is injected at a number of points at or near the middle of the digester, preferably while maintaining undirectional circulation of the liquor by a pump. D. J. Norman.

Digesting and cooking liquor preparation system [for paper pulp]. A. D. Merrill (U.S.P. 1,807,320, 26.5.31. Appl., 24.6.30).—The cooking acid is prepared in the pressure accumulators of the digester system. Thus, milk of lime, SO_2 gas, and low-pressure relief liquor are fed together into an accumulator and the resulting warm acid is subsequently further heated by introducing high-pressure relief liquor. Apparatus is described. D. J. Norman.

Manufacture of cellulose by the sulphite process. T. E. Waenerlund, Assr. to M. O. Ock Domsjö Aktieb. (U.S.P. 1,809,499, 9.6.31. Appl., 3.9.30. Swed., 20.2.29).—Cooking acid containing 8% or more of free SO_2 is obtained by passing the raw acid through an absorption tower where it is enriched at atm. pressure with SO_2 from relief liquor and gases. The enriched acid then passes through a heat exchanger (to recover heat from the relief liquor and gases before they enter the absorption towers) to a storage vessel. D. J. Norman.

Cellulose derivative manufacture. M. O. Schur and R. A. Webber, Assrs. to Brown Co. (U.S.P. 1,806,421, 19.5.31. Appl., 20.7.27).—Cellulose derivatives of improved quality and colour are obtained from high-α-cellulose pulp if the pulp is first freed from short, broken fibres and colloidal cellulose (" fines ") with which the colour-forming impurities of the pulp are chiefly associated. This separation may be effected by, *e.g.*, repeatedly washing the pulp against a 50-mesh Fourdrinier wire, and is preferably carried out at an early stage in the refining of the original pulp. The separated " fines " (4—25% of the original pulp) may be used for cheap papers or low-grade cellulose derivatives. D. J. Norman.

Manufacture and application of cellulose solutions and cellulose derivatives produced therefrom. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 359,249, 14.11.30).—Cellulose or a conversion product thereof is dissolved in the additive products of alkylating or aralkylating agents with heterocyclic *tert.* bases, optionally in the presence of diluents and preferably in the absence of air. *E.g.*, 100 pts. of finely-divided, preferably regenerated, cellulose is stirred at $\not> 110^\circ$ with benzylpyridinium chloride (prep. given) until a viscous homogeneous solution of cellulose is obtained, which may either be spun, *e.g.*, into water, or used as a starting material for the prep. of cellulose esters or ethers. In examples, the prep. of acetyl-, butyryl-, benzoyl-, and acetylbenzoyl-cellulose, of the phthalic and anthranilic esters, and of the CPh_3 ether is described. The prep. of an azo dye derived from the anthranilate is given. D. J. Norman.

Manufacture of stable organic acid esters of cellulose. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 362,489, 1.9.30).—The crude esterification solution is treated with NaOAc to neutralise the acid catalyst (H_2SO_4 or acid sulphate), and heated at 60—100° until a stable product is obtained, sufficient H_2O being added before heating so that the solubility properties of the cellulose ester remain unaltered. F. R. Ennos.

Manufacture of ethers of cellulose, starch, or the like. I. G. Farbenind. A.-G. (B.P. 359,618, 19.8.30. Ger., 19.8.29).—Moist alkali-cellulose, or cellulose regenerated therefrom, or starch is treated with a gaseous alkylene oxide, under reduced pressure or in admixture with an inert gas. Loose, fibrous, colourless products are obtained which are insol. in EtOH, $CHCl_3$, AcOH, etc., but sol. in *N*-HCl, H_2O, or *N*-NaOH (depending on the conditions of etherification) to clear ropy solutions suitable for films, threads, etc. or for use in the textile or paper-coating industries. D. J. Norman.

Manufacture of derivatives of cellulose and other carbohydrates. I. G. Farbenind. A.-G. (B.P. 358,510, 8.5.30. Ger., 8.5.29).—Cellulose is made to react with alkylene oxides under mild conditions so that $\frac{1}{3}$—1 hydroxyalkyl group is introduced per mol. of $C_6H_{10}O_5$, and the resulting products are esterified. Thus, 100 pts. of linters, 60 pts. of $(CH_2)_2O$, and 5 pts. of $NPhEt_2$ are stirred together for 3—4 hr. in an autoclave at 40—50°. The excess of reagents is removed, *e.g.*, by washing with very dil. acid or an org. solvent, and the resulting product (containing one OEt group per $3C_6H_{10}O_5$) is acetylated. The products thus obtained are directly sol. in $COMe_2$ and are more resistant to water than $COMe_2$-sol. acetates as ordinarily prepared. D. J. Norman.

Manufacture of mixed cellulose esters derived from both nitric acid and a fatty acid. Deuts. Celluloid-Fabr. (B.P. 360,311, 24.2.31. Ger., 24.2.30).—Nitrocellulose containing NO_2 groups equiv. to at least cellulose dinitrate (10·5—12·5% N) is treated with a fatty acid (preferably containing 2—5% of H_2O, or optionally in the presence of its anhydride and/or inert diluents) and a reagent capable of converting fatty acids into acid chlorides, *e.g.*, $SOCl_2$. *E.g.*, 100 pts. of nitrocellulose (11·1% N) are dissolved in 400 pts. of AcOH (containing 2—5% of H_2O) and treated with 200 pts. of $SOCl_2$. When the evolution of gas slackens, the temp. is raised to and maintained at 50—60° until the evolution of gas ceases. On pouring the clear reaction mixture into H_2O, cellulose mononitroacetate (5·2% N, 41% combined AcOH) is pptd. as white flocks. The reaction is usually complete in 20 min. and the cellulose complex suffers very little degradation, owing to low solubility of HCl in glacial AcOH. D. J. Norman.

Working-up of crude cellulose ester solutions. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 358,979—80, 16.7.30).—(A) After neutralising the catalyst, H_2O is stirred in and the volatile solvents are distilled off in azeotropic mixture with H_2O. The quantity of H_2O added should be such that the residue after distillation consists of a solution of the cellulose ester in 40—70% aq. AcOH, from which the ester is then recovered by pptn. with H_2O. (B) The catalyst is neutralised and the reaction mixture stirred for 0·5 hr. at 50° with two successive quantities of H_2O. After removal of the resulting dil. aq. AcOH, the residue, now containing 30—50% of the AcOH originally present, is forced (preferably while hot) through a sieve into water at a temp. above the b.p. of the azeotropic mixture of solvent, AcOH, and H_2O. D. J. Norman.

Treatment of cellulose solutions. [Manufacture of viscose films.] C. E. Hetzel, Assr. to Zeloid Products Corp. (U.S.P. 1,807,036, 26.5.31. Appl., 24.9.26. Renewed 8.4.30).—Viscose solution is filmed on a travelling belt and coagulated by treatment with a saturated solution of $NaHSO_4$ containing 5% of animal glue. The film is then stripped from the base and passed successively through the following baths: aq. $NaHSO_4$ containing Na lactate and a small quantity of an Fe salt, hot aq. Na_2SO_4, very dil. AcOH, aq. NaCl, cold H_2O, aq. Na_3PO_4, aq. NaCl, a solution of soap or sulphonated oil, hot H_2O, cold H_2O. If desired, the film may then be bleached by two treatments with $H_2C_2O_4$ with intermediate washing, after which it is finally washed, impregnated with glycerin, and dried. D. J. Norman.

Purification of solutions used in the artificial silk industry. Verein. Glanzstoff-Fabr. A.-G. (B.P. 363,213, 9.2.31. Ger., 10.2.30).—Viscous solutions such as cuprammonium cellulose solution or viscose are filtered through cellulose plates, which are made of linters and/or wood pulp reinforced on one or both sides by permeable protective fabrics or metal-wire sieves securely fastened thereto, after insertion in filter-presses, flat filters, candle filters, etc. F. R. Ennos.

Manufacture of (A) **artificial threads, bands, films, etc.,** (B) **viscose and viscose bodies.** I. G. Farbenind. A.-G. (B.P. 362,785—6, 2.3.31. Ger., 1.3.30).—The cellulosic material employed consists of (A) sulphite-cellulose made from wood of deciduous trees, particularly beech wood, and subsequently refined by alkali; (B) soda- or sulphate-cellulose which has been subjected to an alkaline improving process before bleaching. F. R. Ennos.

Manufacture of artificial threads etc. from cellulose. L. Lilienfeld (B.P. 362,460, 28.5.30).—Filaments of high strength ($>$2 g. per denier) are prepared from ripened or unripened viscose made from matured or unmatured alkali-cellulose with ordinary spinning baths by using viscose solution of considerably higher viscosity than is normally used. Such solutions may be prepared by using a parent cellulose of high viscosity and conducting the subsequent operations at a low temp. D. J. Norman.

Manufacture of artificial films, foils, etc. [from organic derivatives of cellulose]. Brit. Celanese, Ltd. (B.P. 359,390, 20.12.30. U.S., 28.1.30).—The base on which the film is made is composed of or coated with a synthetic resin rendered insol. and infusible by heat. D. J. Norman.

Spinning caps for manufacturing artificial silk. S. G. S. Dicker. From N. V. Philips' Gloeilampenfabr. (B.P. 361,842, 18.8.30).—The caps consist wholly or partly of Zr. H. Royal-Dawson.

Manufacture and treatment of artificial thread and the like, and apparatus therefor. Courtaulds, Ltd., and E. A. Morton (B.P. 363,064, 1.11.30).—Cakes or coils of artificial silk arranged in tiers are conveyed between two synchronously moving endless belts, where they are subjected to treatment by liquids or gases passing intermittently to the interior of the cakes through holes in one or both of the belts, which converge towards, move parallel to, and diverge from one another during the stages of introduction, treatment, and removal, respectively, of the cakes. F. R. Ennos.

Dehydrating and shaping of artificial silk spinning cakes deformed in washing or other wet-treatment process. Verein. Glanzstoff-Fabr. A.-G. (B.P. 362,727, 13.1.31. Ger., 15.1.30).—The cakes, wrapped in fabric or net-like coverings, are placed co-axially in perforated rotation vessels of diam. approximating to that of the original periphery of the cakes, centrifuged, and dried by warm air. F. R. Ennos.

Treatment of yarns or threads [with liquids]. Brit. Celanese, Ltd. (B.P. 359,477, 16.6.30. U.S., 14.6.29).—The application of treating liquids to filaments which are being produced at high speed, *e.g.*, dry-spun, is effected by passing the filament in contact with the edge of a disc dipping into the treating liquor and rotating in a plane substantially at right angles to the direction of travel of the filament. D. J. Norman.

Improving paper machine operation. H. R. Rafton, Assr. to Raffold Process Corp. (U.S.P. 1,808,073, 2.6.31. Appl., 11.12.28. Renewed 5.3.31).—The formation of soft lumps in the paper when using an alkaline filler, *e.g.*, $CaCO_3$ or $Mg(OH)_2$, in conjunction with a furnish which includes casein-coated "broke" is prevented by adding the alkaline filler, together with alum if desired, to the diluted stock just before it reaches the paper machine. D. J. Norman.

[Translucent or transparent] papers. Morland & Impey, Ltd., and A. G. Rendall (B.P. 359,744, 7.11.30).—Copying paper is treated on the side to which the ink is applied with a spirit or water ink, *e.g.*, flake-white or other ink-permeable pigment in admixture with aq. gum or glycerin. D. J. Norman.

Manufacture of transparent paper. S. D. Warren Co., Assees. of S. Boyer (B.P. 362,322, 14.5.31. U.S., 27.5.30).—Well-beaten sulphite paper is damped to a H_2O content of about 30% with H_2O containing up to 8% of, *e.g.*, glycerin, and passed through a calendar stack comprising two sets of 5 or 6 hard-steel rolls separated by a set of 2 or 3 soft, *e.g.*, cloth-jacketed, rolls. The temp. of the steel rolls should be such that the H_2O content of the paper on reaching the soft rolls is 10—12% and on leaving the second set of steel rolls is 6—7%. D. J. Norman.

Crêping of paper. W. W. Rowe (B.P. 359,154, 22.9.30).—Kraft paper is coated with a water-repellant thermoplastic material, *e.g.*, bitumen at 205°, cooled to room temp., and fed on to a crêping roll, the temp. of which is so adjusted that the bitumen becomes plastic and adheres to the roll. After crêping (by stripping with a doctor blade), the paper is stretched and passed between hot rollers in contact with a suitable backing material. D. J. Norman.

Safety paper. J. Genoese (U.S.P. 1,804,978, 12.5.31. Appl., 1.3.26).—Paper is immersed in an aq. alcoholic solution of I, $Co(NO_3)_2$, and $Na_2S_2O_3$ and then dried. H. Royal-Dawson.

Conditioning of textile materials. Brit. Celanese, Ltd. (B.P. 359,867, 31.3.31. U.S., 31.3.30).

[Paper-pulp] sheet material [perforated] for packing. Holed-Tite Packing Corp. (B.P. 364,872, 28.1.31. U.S., 18.2.30).

Composite [paper] material for containers. L. G. Lange (B.P. 361,280, 10.5.30).

Concn. of liquids.—See I. **Insulation for conductors.**—See XI. **Wool-washing water.**—See XII. **Ink for cellulose esters.**—See XIII. **Impregnating substances with rubber latex.**—See XIV. **Paste for paper bottles.**—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Heat effects of the chlorine decomposition and bleaching processes. H. Rauchberg (Zellstoff u. Papier, 1932, **12**, 10).—Experiments in the bleaching and decomp. of spruce-wood meal, unbleached pulp, etc. show that the heat of reaction in kg.-cal. per g. of Cl_2 is more than twice as great for the bleaching-powder process as for that in which Cl_2 is used as gas in bleaching or in the Cl_2-decomp. process. In the latter it might have been expected that in addition to the heat of formation of HCl, further heat of oxidation would be liberated; the small heat of reaction actually found is explained by the assumption that chlorination occurs which yields less heat than does the oxidising reaction of the bleaching-powder process. The heat of dissolution of Cl_2 in H_2O plays no important part. B. P. Ridge.

Bleach liquors.—See VII. **Dyed leathers. Wetting leather.**—See XV.

Patents.

[Bleaching] treatment of fibres [particularly furs]. H. G. Reichard (U.S.P. 1,805,316, 12.5.31. Appl., 10.8.29).—The fibrous material is impregnated with a 1% solution of $FeCl_3$ [or other non-reducing salt, *e.g.*, $Fe_2(SO_4)_3$] and then bleached in an alkaline 5% solution of H_2O_2; the $FeCl_3$ prevents swelling of the skin with consequent deterioration. A. J. Hall.

Dyeing [with vat dyes]. R. G. Knowland and N. Kosak, Assrs. to Nashua Manufg. Co. (U.S.P. 1,805,098, 12.5.31. Appl., 12.3.28).—Dyeing is effected in the usual hyposulphite dye-bath except that NaOH is replaced by NMe_4OH or NEt_4OH, and the dyed fabric is not washed, but is directly dried above 60° so that the $NMe(or\ Et)_4OH$ is decomposed into its volatile constituents, which are driven out of the fabric. A. J. Hall.

Dyeing and printing by means of vat dyes. Durand & Huguenin A.-G., Assees. of I. G. Farbenind. A.-G. (B.P. 361,165, 24.12.30. Ger., 28.12.29).—In developing the ester salts of leuco-vat dyes on wool in a bath containing an oxidising agent other than a Cu salt (cf. B.P. 313,407; B., 1931, 17), a thiocyanate (*e.g.*, NH_4CNS) is added since it acts as an oxidisable buffer substance and thereby prevents excessive oxidation of the dye or wool. A. J. Hall.

Treatment of artificial silk. Lyons Piece Dye Works (B.P. 361,418, 22.8.30. U.S., 10.9.29).—Viscose, cuprammonium, and cellulose nitrate silk materials (cellulose acetate silk is less responsive) are steeped, before or after dyeing, at 20° for 5—45 min. in an aq. solution of $Ca(CNS)_2$ or other thiocyanate (d 1·115—1·210) and then washed, whereby they are partly delustred and acquire 50—80% increased affinity for dyes, 5—10% increased tensile strength, and 20—30% increased extensibility. A. J. Hall.

Obtaining coloured discharge effects. Durand & Huguenin A.-G. (B.P. 361,678, 29.12.30. Ger., 27.12.29).—More intense coloured discharge effects are obtained with dyes sensitive to excessive reduction in the usual hyposulphite discharge paste by the addition to this of about 1% of $NaClO_3$. A. J. Hall.

Sizing [of threads etc.]. I. G. Farbenind. A.-G. (B.P. 361,691, 12.1.31. Ger., 11.1.30).—Threads are treated with a product obtained by the reaction between an alkylene oxide and a high-viscosity polyvinyl alcohol. H. Royal-Dawson.

[Softening] treatment of textiles. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 360,982, 16.8.30).—Textile fibres, especially artificial silk, are softened by impregnation with H_2O-sol. products (*e.g.*, oleyl- and stearyl-sarcosines) obtained from aliphatic primary or secondary aminocarboxylic acids by substituting a H atom attached to N by a saturated or unsaturated fatty acid (C_8 or above). Impregnation may be effected during dyeing or finishing. A. J. Hall.

Manufacture of cellulose acetate threads and textile fabrics of acetate silk. K. Beck (B.P. 361,200, 3.2.31. Ger., 5.2.30).—Cellulose acetate materials are steeped in cold or warm (40—50°) aq. solutions containing 15—35% of CH_2O and 10—30% of Me, Et, Bu, or similar alcohol capable of forming an acetal-like compound with the CH_2O, and are then washed and dried, whereby they become softer, less lustrous, and more voluminous, and shrinkage occurs. A. J. Hall.

Treatment of materials made of or containing organic derivatives of cellulose. Brit. Celanese, Ltd., W. A. Dickie, and E. L. Greenwood (B.P. 360,896, 8.8.30. Addn. to B.P. 274,841 and 314,396; B., 1928, 782; 1930, 1106).—The coating composition applied to cellulose acetate (etc.) materials contains a solvent for cellulose derivative in addition to a solvent for the H_2O-insol. thickening agent. A. J. Hall.

Coating of felt with a layer of varnish. P. and C. Habig (B.P. 362,376, 25.8.30. Austr., 20.5.30).—The felt, smoothed and compressed by removing the loose fibres by singeing or corroding with $CaCl_2$, brushing with a leather varnish, and pressing between hot surfaces, is then brushed or sprayed with mastic, smoothed, sprayed with varnish, and dried. F. R. Ennos.

[Manufacture of crêped] threads or fabrics made of or containing cellulose esters. Brit. Celanese, Ltd., W. A. Dickie, and R. W. Moncrieff (B.P. 362,523, 10.9.30).—Improved crêpe effects are obtained by the process of B.P. 357,169 (B., 1931, 1090) if the thread is superficially hydrolysed at intervals along its length instead of continuously. D. J. Norman.

[Aluminium] rollers for use in dyeing and similar treatment of textile fabrics. Phœnix Iron Works Co., Ltd., and H. Hey (B.P. 364,865, 26.1.31).

Wetting etc. agents.—See III. **Cleaning textiles.**—See V. **Coating for fabrics.**—See XIII.

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

Catalytic decomposition of chlorine [bleach] liquors [by metals]. W. Kind (Rev. Gén. Mat. Col., 1931, **35**, 450—453).—A review of previous investigations including those of Higgins (B., 1911, 1296), Weyrich (B., 1915, 1139), Kind and Baud (Textilber., 1931, **12**, 184), with particular reference to the effect of metals and metallic oxides (with and without the presence of protective agents) in accelerating decomp. of hypochlorite bleach liquors and the cellulose material being bleached. (Cf. Kauffmann, B., 1932, 60.) A. J. Hall.

Gas-analysis apparatus.—See I. **Oxidation of H_2 and CO by CuO. CO_2 and H_2S from gas. S compounds in water-gas.**—See II. **Pptd. white lead.**—See XIII.

Patents.

Purification of sulphuric acid [from treatment of petroleum distillates]. F. E. Kimball (U.S.P. 1,805,247, 12.5.31. Appl., 14.8.30).—H_2SO_4 containing org. matter and C is mixed with 1% of $Sb_2(SO_4)_3$ and fed to a suitable vessel in which it is agitated with air heated to 260°. The outgoing air is cooled to condense any evaporated H_2SO_4. The whole process is a continuous one. The use of $Sb_2(SO_4)_3$ facilitates the oxidation of the org. matter with less reduction of H_2SO_4 than would otherwise occur. F. Yeates.

Manufacture of concentrated nitric acid. Imperial Chem. Industries, Ltd. From E. I. Du Pont de Nemours & Co. (B.P. 361,161, 22.12.30).—A mixture of dil. HNO_3 and H_2SO_4 flows down a fractionating tower and becomes heated by ascending dil. HNO_3 vapour distilled from the effluent collected at the bottom. Conc. HNO_3 vapour is driven off at the top. During distillation the dil. HNO_3 vapour passes countercurrent to the effluent, which is substantially denitrated. The process is continuous. F. Yeates.

Production of concentrated caustic soda. C. Sundstrom and C. S. Lykes, Assrs. to Solvay Process Co. (U.S.P. 1,806,096, 19.5.31. Appl., 9.4.25).—Conc. crude NaOH solution containing suspended alkali salts as impurities is cooled, subjected to vigorous mass agitation, and clarified in a settling system. Cooling takes place approx. to the min. temp. appropriate for the settling stage (having regard to the concn. of the particular solution), thus ensuring, during agitation, substantial further pptn. of impurities and conversion of the suspended solids into a form which readily settles. F. Yeates.

Treatment of marine algæ. Comp. Franç. de l'Iode et de l'Algine (B.P. 363,353, 6.9.30. Fr., 6.9.29).—The algæ are successively treated with aq. $CaCl_2$, washed with H_2O to extract sol. salts, macerated with dil. H_2SO_4, treated with aq. NaOH or Na_2CO_3 to form Na alginate, and filtered to remove cellulose. L. A. Coles.

Manufacture of sulphates [from potassium aluminous minerals]. R. H. McKee, Assr. to Tennessee Corp. (U.S.P. 1,804,631, 12.5.31. Appl., 1.11.24).—K- and Al-bearing sericitic minerals are ground to 20—30-mesh and treated with dil. H_2SO_4 (30—60% concn.) for the production of K_2SO_4 and $Al_2(SO_4)_3$. The reaction is strongly exothermic. Details for separating the K and Al sulphates from each other and from $Fe_2(SO_4)_3$ are given. F. Yeates.

Production of alumina from alkaline-earth [calcium] aluminates. Lonza Elektrizitätswerke u. Chem. Fabr. A.-G. (B.P. 363,612, 18.8.31. Switz., 21.8.30).—The ore is treated with sufficient HNO_3 or H_2SO_4 to interact only with the Ca combined as $Ca(AlO_2)_2$ and the residue is treated with sufficient NaOH to dissolve the Al_2O_3 present; after filtration of the solution, $Al(OH)_3$ is pptd. by one of the usual methods. L. A. Coles.

Production of aluminium fluoride–alkali fluoride double compounds. H. A. Gill. From Saline Ludwigshalle (B.P. 361,031, 8.9.30).—Al residues (*e.g.*, ashes, scrap, ball-mill dust) are treated with HCl or H_2SO_4 and the resulting $AlCl_3$ or $Al_2(SO_4)_3$ solutions are further treated with an alkali chloride or sulphate in the presence of HF, or with an alkali fluoride (such as fluorspar) alone, to ppt. cryolite and similar compounds. Mixtures of the reactants may be used. F. Yeates.

Manufacture of magnesium chloride and other magnesium salts of high purity [from dolomite]. R. C. Lord, Assr. to Dow Chem. Co. (U.S.P. 1,808,362, 2.6.31. Appl., 23.2.24).—Dolomite is calcined under such conditions of temp. and pressure as to decompose the $MgCO_3$ and leave the $CaCO_3$ unattacked. The calcined product is then agitated with aq. NH_4Cl (*e.g.*, mother-liquor from the Solvay process) at approx. boiling temp., the resulting NH_3 is distilled off, and the undecomposed $CaCO_3$ is separated from the $MgCl_2$ solution formed by the reaction. Mg salts other than the chloride may be produced by treating the calcined dolomite with a solution of a salt containing the desired acid radical. Continuous operation by means of 5 stills in series is described. F. Yeates.

Conversion of ferrophosphorus into ferric phosphate [$FePO_4$] by roasting in air or other gases containing oxygen. C. (Baron) von Girsewald and H. Weidmann, Assrs. to Amer. Lurgi Corp. (U.S.P.

1,807,767, 2.6.31. Appl., 5.5.30. Ger., 29.5.29).—Alkali-metal compounds or alkaline earths are used singly or in conjunction, in relatively small quantities, as catalysts when converting ferrophosphorus into $FePO_4$ at raised temp. with gases containing O_2. F. Yeates.

Production of carbon dioxide ice. J. R. Donald (U.S.P. 1,806,240, 19.5.31. Appl., 1.11.28).—CO_2 gas is compressed, liquefied by cooling, and fed to certain of a series of heat-insulated chambers. The liquefied gas in a previously filled chamber is simultaneously evaporated (with formation of CO_2 ice), the resulting gas being used for the cooling mentioned. At the same time a block of solidified CO_2 is removed from another chamber. By this process a substantially dense ice is formed without the use of excessively high pressures. F. Yeates.

Amphibolic products.—See V. **Steel apparatus. Reduction of Mg compounds. [Corrosion-resistant] Pb alloys.**—See X. **Ag salt from castor oil.**—See XII. **Chrome-yellow colours.**—See XIII. **Fertilisers.**—See XVI. **Sanitary composition.**—See XXIII.

VIII.—GLASS; CERAMICS.

Solubility of R_2O–PbO–SiO_2 glass in water. K. Tabata, K. Yegami, and S. Moriyasu (Proc. World Eng. Congr., 1929, **31**, 409—416).—The formula $xK_2O,(1-x)Na_2O,zPbO,ySiO_2$, based on the results of previous work on the surface devitrification of glass, is used to express the composition of glasses, the H_2O solubilities of which were measured by the H-electrode method. The conditions of the experiments were so chosen that the activity coeff. of OH ion in the solution was 1, or nearly 1. From the results it is possible to calculate the solubility of any glass of the above composition (in which $z = 0·25$) if it is unsaturated with respect to SiO_2 solvation. F. Salt.

Coloration and origin of gold, ruby, and sapphire glass. B. Lange (Veröff. Kaiser Wilh.-Inst. Silikatforsch., 1930, **3**, 5—12; Chem. Zentr., 1931, i, 2444).—The determination of Au in glass is described. In a ruby glass containing $4·27 \times 10^{-5}$ g. Au per g. the colloid particles were of equal size; in one containing $2·22 \times 10^{-5}$ g. they were larger. For a sapphire glass containing $2·71 \times 10^{-5}$ g. the absorption curve indicated partial mol. dissolution, probably as complex Au silicates. In the production of ruby glass the Au dissolves at high temp. with mol. union. On rapid cooling, this condition is maintained and colourless glasses result; on annealing, liberation of free Au mols. occurs. Metals are shown to dissolve in glasses and in fused salts, the dissolution being neither colloidal nor truly mol., but due to the formation of unstable compounds. A. A. Eldridge.

Micro-analysis of glasses. IV. W. Geilmann [with H. Wegener and F. W. Wrigge] (Glastech. Ber., 1931, **9**, 274—279; Chem. Zentr., 1931, ii, 455).—In the absence of SO_3, F is converted into $BaSiF_6$; $0·5$—1×10^{-6} g. of F can be detected, or 1—3×10^{-6} g. as Na_2SiF_6, in which case SO_3 does not interfere. Solutions of Zr salts form with Na alizarinsulphonate a reddish-violet lake stable towards HCl; this is decomposed by F compounds, yielding free alizarin, the colour changing to yellow. P_2O_5, SO_3, and $H_2C_2O_4$ interfere. SiF_6'' can also be determined (10^{-6} g.) by means of the blue coloration produced in a molybdate solution containing benzidine and NaOAc. P, As, and Ca compounds interfere. A test involving the formation of SiF_4 is described; glasses which release their F only to fused alkali are first fused with NaOH. Alternatively, the glass may be fused with B_2O_3 and the BF_3 detected by the coloration produced on Zr paper. A. A. Eldridge.

Progress report on determination of crystalline compounds causing opacity in enamels by X-ray methods. A. I. Andrews, G. L. Clark, and H. W. Alexander (J. Amer. Ceram. Soc., 1931, **14**, 634—639).—The investigation was carried out on white sheet-steel covercoats and on white dry-process cast-Fe enamels. SnO_2 is the chief opacifying compound when commercial tin oxide is used as the opacifying agent, Sb_2O_5 when antimony oxide or Na antimonate is used. Na_2SiF_6, fluorspar, and cryolite produce an opaque glass, but do not cause opacity in glazes unless used with SnO_2, Sb_2O_5, or Na antimonate. F. Salt.

Metal marking of whiteware glazes as influenced by sulphur and carbon in kiln atmospheres. R. F. Geller and A. S. Creamer (J. Amer. Ceram. Soc., 1931, **14**, 624—630).—A study was made of the effect of CO_2 and SO_2 gas in the kiln atm. at 860° on the susceptibility of tableware glazes to "marking" with metal objects such as knives. CO_2 did not produce glazes which metal-mark. Concns. of 0·1—1·2% SO_2 increased the tendency to marking; concns. of 3% and more destroyed the gloss of the glaze, and on one vitreous low-fired ware from 3% to 12·5% of SO_2 caused a tendency to marking. F. Salt.

Japanese acid clay. K. Kobayashi (Proc. World Eng. Congr., 1929, **31**, 417—434).—Japanese acid clay belongs to a group of clay-like substances, of which the average mol. formula is $Al_2O_3,6SiO_2,nH_2O$, n being about 6. An account is given of its production, mining and prep., geological origin, physical and chemical properties, and of its various applications. The average chemical composition of five of the chief clays is given. F. Salt.

The batting machine—jollying and jiggering. Study of the behaviour of plastic clays under pressure. J. W. Mellor (Trans. Ceram. Soc., 1931, **30**, 235—243).—Mathematical. H. H. Macey.

Thermal expansion of fired clay ware. T. Yoshioka (Proc. World Eng. Congr., 1929, **31**, 435—451).—The results are reported of an investigation to determine the thermal-expansion behaviour of typical Japanese clays in the form of pure clay bodies, clay–quartz bodies, clay–felspar bodies, and clay–quartz–felspar bodies. Measurements were made by Cobb's method, and the result is a repetition and confirmation of Cobb's work using Japanese clays. F. Salt.

Crazing of English earthenware. II. A. Heath (Trans. Ceram. Soc., 1931, **30**, 199—216; cf. B., 1923, 1022).—The tendency towards crazing of a large number of earthenware bodies covering the range of normal compositions is shown in a series of diagrams. It is considered that a safe body should contain $> 70\%$ of

SiO_2 and $> 3\%$ of bases; a suggested composition for a body most free from the danger of crazing is given. H. H. Macey.

Durability of bone-china hotel ware. A. S. W. Odelberg (Trans. Ceram. Soc., 1931, **30**, 225—234).—Impact tests show that bone-china ware is much more resistant to chipping and breakage than either earthenware or hard porcelain. Further advantages are the durability of decoration, shape, and appearance. H. H. Macey.

Further investigation of the magnesia-zircon series based on *X*-ray and microscopical examination. A. L. Roussin and J. H. Chesters (Trans. Ceram. Soc., 1931, **30**, 217—224; cf. B., 1930, 990).—A series of briquettes made from mixtures of magnesite and zircon were found to contain at least two minerals; these occur in max. proportions in the 20—80 and 50—50 mixtures (by wt.). Comparison by *X*-ray and microscopical examination of the same materials shows the importance of using both methods. Thus the mineral found microscopically in the 20—80 mixture was at first believed to be identical with the original zircon, except for grain size, but *X*-ray examination shows it to be an entirely different mineral. H. H. Macey.

Application of tensile tests to the study of the bonding of refractory materials. J. H. Chesters and W. J. Rees (Trans. Ceram. Soc., 1931, **30**, 258—267).—An apparatus capable of heating a refractory rod up to 1000° under const. tension, and of recording its extension, is described. The results of tests on various materials are given. H. H. Macey.

Modulus of elasticity as an indication of the uniformity of electrical porcelain. A. J. Monack (J. Amer. Ceram. Soc., 1931, **14**, 608—616).—The mean val. of 164 measurements of the modulus of elasticity on a body containing 30% of china clay, 20% of Dorset ball clay, 20% of flint, and 30% of felspar was $9 \cdot 54 \pm 0 \cdot 02 \times 10^6$ lb. per sq. in.; on a similar body with Kentucky ball clay instead of Dorset ball clay it was $10 \cdot 01 \pm 0 \cdot 02 \times 10^6$ lb., the max. error for these results being 1·5%. The use of the modulus of elasticity as a measure of uniformity is satisfactory, but for practical applications it should be coupled with some measurement such as the tensile strength or transverse strength. F. Salt.

Effect of firing temperature on the dielectric strength of porcelain. A. J. Monack and L. R. Shardlow (J. Amer. Ceram. Soc., 1931, **14**, 603—607).—An electrical porcelain body containing 30% of china clay, 20% of ball clay, 30% of felspar, and 20% of flint was prepared in the usual way, and specimens were formed by pressing and fired to temp. between cones 7 and 12. The puncture voltages were determined on the specimens in an oil bath at 36°. The puncture voltage increased rapidly in the firing range between cones 7 and 9 and was const. between cones 9 and 12. The standard deviation, coeff. of variability, and probable error of the mean showed min. vals. at cone 9, and the most uniform body was obtained at this temp. F. Salt.

Mechanical and thermal shock tests on ceramic insulating materials. H. M. Kraner and R. A. Snyder (J. Amer. Ceram. Soc., 1931, **14**, 617—623).—Two simple tests, modulus of rupture and resistance to thermal shock, are chosen as a daily check on the quality of porcelain. The tests are described and the dimensions and method of preparing the test pieces are given. Results on a number of German and American porcelains are reported. The extent to which the results are influenced by the glaze is noted. F. Salt.

***X*-Ray examination of magnesite bricks.** O. Krause and W. Ksinsik (Feuerfest, 1931, **7**, 177—179).—*X*-Ray examination has shown that in well-burnt MgO bricks the Fe_2O_3 is present as MgO,Fe_2O_3. Extraction of the bricks with aq. NH_4Cl removes the periclase and leaves a residue having a high content of this ferrite in the form of transparent reddish-brown grains. A. R. Powell.

Refractories in metallurgical operations. C. E. Williams (Metals & Alloys, 1932, **3**, 3—11).

Silicon carbide and its applications in metallurgy. H. R. Houchins and C. McMullen (Metals & Alloys, 1932, **3**, 12—14).

Aluminosilicate refractories. G. A. Bole (Metals & Alloys, 1932, **3**, 15—21).

Plastic distortion of glass.—See X.

Patents.

Heat treatment of ceramic and other ware in tunnel kilns or furnaces. Harrop Ceramic Service Co. (B.P. 363,305, 14.7.30. U.S., 10.4.30).—The articles are carried on plates sliding along the floor of a kiln heated by hot gases introduced separately into the kiln and into a tunnel below it. L. A. Coles.

Lifter bars etc. for kilns.—See I.

IX.—BUILDING MATERIALS.

Change in setting time of Portland cement. K. Koyanagi (Zement, 1931, **20**, 540—541; Chem. Zentr., 1931, ii, 757).—Asano's results (1927) are not in accord with those of Weithase owing to the higher milling temp. used in Japan. Double setting does not depend on the alkali content; it does not appear if the cement is stored in dry air or in moist air free from CO_2. A. A. Eldridge.

Effect on the strength of the product of addition of small quantities of cement to lime mortar. K. Mandl (Mitt. Staatl. tech. Versuchsamts, 1930, **19**, 80—86; Chem. Zentr., 1931, ii, 758).—1% of cement had an unfavourable effect; improvement commenced at 3%, but a marked favourable influence was observed only with large additions. A. A. Eldridge.

Preservation of wood by water-soluble salts. E. G. Abel (Angew. Chem., 1932, **45**, 108—109).—The use of preps. containing $ZnSiF_6$ for wood preservation is recommended despite the adverse criticism of Wolmann and Pflug (B., 1931, 926). Fixation of the preservative exceeds 30% and is not 10% as claimed by the latter authors. The application of Cr salts for increasing fixation is discussed. F. O. Howitt.

Identification of wood and wood-charcoal fragments. J. C. Maby (Analyst, 1932, **57**, 2—8).—For superficial examination the wood or charcoal should be broken, not cut, since pitting and other structure can be better observed. For microscopical purposes radial longitudinal, tangential longitudinal, and transverse sections should be cut, staining, if necessary, with Fe and hæmatoxylin followed by safranine. Soft woods may be cut directly, medium and hard woods require treatment with HF to remove SiO_2, whilst charcoal, rotting woods, and similar materials are first mounted in cellulose nitrate. Transverse sections are most useful for general diagnostic purposes, and points to be observed are the relative size, distribution, and frequency of the conducting vessels, medullary rays, wood fibres, storage parenchyma, and resin ducts. Photomicrographs are given of several woods. T. McLachlan.

Patents.

Manufacture of [watertight] cement roof slabs. M. V. Jensen (B.P. 360,226, 29.11.30).—A 1 : 3 : 9 mixture (by vol.) of powdered asbestos, cement, and gravel is used. H. Royal-Dawson.

Rotary drum furnace.—See I. **Antifouling composition.**—See X. **Japanning on concrete. Cellulose paint etc. for timber.**—See XIII.

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

Improvement of cast iron by alloying and overheating. E. Schüz (Mitt. Forschung. Konzerns Gutehoffnungshütte, 1930, 1, 34—40; Chem. Zentr., 1931, i, 2529—2530).—Cr and Al, in particular, increase the stability of cast Fe to heat by forming a protective layer of oxide. The necessary contents of Cr, C, and Cr + Si for conditioning heat-resistant cast Fe are reported. Si increases vol. stability, thus diminishing the cracking of the protective oxide layer. L. S. Theobald.

Slag studies with special reference to manganese-containing slags. C. W. Carstens and K. Kristoffersen (Neues Jahrb. Min., 1931, 62, 163—196; Chem. Zentr., 1931, i, 2529).—Rhodonite, 70—80% $MnSiO_3$, 20—25% $FeSiO_3$, with a small CaO content, appeared in an acid Bessemer slag; in a basic slag a manganese-knebelite, $64Mn_2SiO_4,36Fe_2SiO_4$, was found embedded in a glass. The following minerals with varying Mn contents were detected in the slags examined: Mn-spinel, $MnAl_2O_4$ (face-centred cubic; a 8·184 ± 0·005 Å.) with an excess of 2·70% Al_2O_3; Mn-olivine containing a small amount of CaO; Mn-Ca-olivine; manganosite-lime MnO,CaO; alabandin-oldhamite, MnS,CaS; hausmannite; gehlenite, $Ca_2Al_2SiO_7$; cubic CSi; CSi, zinc-blende type, with a 4·348 ± 0·005 Å.; perowskite with $CaSiO_3$ and Al_2O_3. Mn-containing akermanite, $Ca_2(Mg,Mn)Si_2O_7$ or $Ca_2(Ca,Mn)Si_2O_7$, was occasionally detected. L. S. Theobald.

Zinc as a galvanic element. E. Schrader (Z. Metallk., 1931, 23, 301—305).—When Zn sheets are immersed in dil. H_2SO_4 one side dissolves much more rapidly than the other. Large Pb segregations do not accelerate dissolution as much as evenly-distributed fine particles of Pb. With $< 1\%$ Pb and $< 0{\cdot}02\%$ Fe the rate of dissolution of Zn in acid falls off rapidly; amalgamation of the Zn serves to check the rate of dissolution only when all the impurities in the surface are sol. in Hg. The structure of Zn sheet has been followed throughout the rolling from the ingot stage; it is shown that fissures form in the upper part of the ingot during the early stages of rolling and that these are subsequently elongated and folded over, leaving minute cavities and hair cracks through which the acid can penetrate to the middle of the sheet. If the sheet is amalgamated the Hg follows the cracks and renders parts of the sheet more reactive than others, thus causing premature perforation in these parts. Some tentative directions are given for improving the quality of Zn sheets during rolling. A. R. Powell.

Dezincing of lead slags. Thews (Metallbörse, 1931, 21, 339—340, 436; Chem. Zentr., 1931, ii, 619).—Processes are described. A. A. Eldridge.

Corrosion phenomena in tin containers. O. Carrasco and E. Sartori (Giorn. Chim. Ind. Appl., 1931, 13, 557—564).—When an Fe–Sn couple is immersed in dil. solutions of citric, tartaric, and acetic acids buffered with the corresponding Na salts, the relative positions of the two metals in the potential series are often inverted. When the metals, in distinctly acid solution, are joined by a closed circuit, the Sn exerts a protective influence on the Fe, but does not entirely prevent it from dissolving. Oxidising substances act protectively on both metals, but to different extents, and render the Sn more electronegative to the Fe; S and H_2S behave similarly towards the Sn, but the Fe becomes more electropositive. With citric acid as electrolyte, the prevailing e.m.f. is lowered appreciably by addition of chlorides (especially KCl), particularly if conc. near the electrode showing cathodic behaviour, the flow of current often being inverted. Agitation of the electrolyte near the electrodes always tends to diminish the anodic behaviour of each electrode, especially the Fe, and inverts the polarity whenever the conditions are such that the Fe acts as a less noble element than the Sn. Lacquering of the Sn with fat–resin lacquer greatly lowers its basic character, so that it behaves as a cathode towards either unlacquered Sn or Fe, or lacquered Fe. With the couple naked Fe–lacquered Fe, the latter exhibits anodic behaviour after a certain time. With electrolytes containing dissolved Cu salts, Fe is always electropositive to Sn. These results are considered from the theoretical and practical viewpoints. T. H. Pope.

Plastic distortion of metals [and of glass]. G. I. Taylor and H. Quinney (Phil. Trans., 1931, A, 230, 323—362).—Experiments on tubes of Cu, Al, Pb, Cl, mild steel, and heated glass are described. The theory of plastic distortion is discussed. N. H. Hartshorne.

Opacity in enamels.—See VIII. **Annealing metals.**—See XI.

Patents.

Production of steel and iron and steel alloys. C. E. Every-Clayton. From F. Krupp A.-G. (B.P. 362,823, 27.4.31).—Fe or an Fe or steel alloy is heated with an oxide of a metal or metalloid under reduced pressure in the presence of free or combined C and one or more of the elements Ni, Si, P, Al, or Ti which reduce the solid solubility of C in the resulting alloy. *E.g.*, a mixture of soft Fe (6·4 lb.), Ni (0·92 lb.), graphite (1 lb.), chromite (5·8 lb.) containing 16% Fe and 31% Cr, CaO (0·7 lb.), and fluorspar (0·03 lb.) is heated in vac. in a high-frequency induction furnace to produce an acid-resisting Fe containing 0·016% C, 0·61% Si, 8·9% Ni, and 18% Cr. A. R. Powell.

Manufacture of [copper-chromium structural] steel. Verein. Stahlwerke A.-G. (B.P. 362,700, 23.12.30. Ger., 23.1.30. Addn. to B.P. 307,492; B., 1930, 719).—In steels of the type previously claimed the Cu content is maintained at 0·5—0·6%, whereas when the Mn content is $<$ 0·8% the Si content is adjusted to 0·3—0·7% and when the Mn content is 0·8—1·5% the Si is kept below 0·3%, the Si + Mn in all cases being 1·1—1·8%. A. R. Powell.

[Nickel-chromium steel] apparatus or articles for use in chemical and like processes and alloys therefor. W. H. Hatfield and H. Green (B.P. 362,902, 4.9.30).—Welded vessels or plant made from steel containing 10—20 (18)% Cr, 6—14 (8)% Ni, 0·07—0·25% C, 0·3—0·9 (0·6)% Ti, and 0·3—1·5 (0·6)% W are claimed. The presence of Ti prevents loss of Cr in welding and together with the W increases the resistance of the steel to corrosion by 1% lactic acid solutions at the b.p. and by 5% H_2SO_4 containing $(NH_4)_2SO_4$. [Stat. ref.] A. R. Powell.

Increasing the creep limit or strength of metals and alloys [of iron, nickel, and chromium]. Heraeus-Vacuumschmelze A.-G. (B.P. 363,306, 15.7.30. Ger., 16.12.29).—Fe-Cr-Ni alloys with $>$ 50% Ni and 12—30% Cr, or Fe-Cr alloys with 20—40% Cr, with or without small quantities of Mo, Al, W, or Mn, are annealed at temp. above 1100°, whereby the creep limit is increased at temp. above the recrystallising point. A. R. Powell.

[Corrosion-resistant] ferrous alloys. H. E. Potts. From Electro Metallurg. Co. (B.P. 362,975, 11.9.30).—Tubes for use in the cracking of hydrocarbon oils are made of an alloy of Fe with 6—16 (8)% Mn, 16—22 (18)% Cr, 1—10 (3—5)% Mo, and $<$0·3 (0·1)% C. A. R. Powell.

Welding of manganese steel and electrodes therefor. Manufacture of articles of steel subject to wear and abrasion. Quasi-Arc Co., Ltd., and E. F. Newell (B.P. 363,018 and 363,068, [A] 25.9.30, [B] 3.11.30).—Welding rods comprising an alloy of Fe with 6—10% Ni, 15—30% Cr, and 0·5—2% W or Mo coated with blue asbestos, or made of mild steel coated with a paste containing 20% Ni, 55% Cr, 4% W or Mo, 10% $CaCO_3$, 5% CaF_2, and 6% Na_2SiO_3, are claimed for use in (A) producing a hard austenitic weld in Mn steel, or (B) for building up by fusion deposition a hard wear-resisting surface on a mild steel base. A. R. Powell.

Coating of iron, steel, zinc, or the like with an organic salt of the metal. W. W. Triggs. From Metal Finishing Research Corp. (B.P. 362,956, 8.8.30).—The metal is immersed in a warm solution of an aliphatic dicarboxylic or hydroxydicarboxylic acid or of an aromatic monocarboxylic or sulphonic acid, preferably containing an active oxidising agent, *e.g.*, H_2O_2 or finely-divided MnO_2, and a catalyst, *e.g.*, Na_2SO_3, or $NaNO_3$. Oxalic, succinic, and gallic acids are specifically claimed. To obtain differently coloured coatings salts of Mn, Cu, Cr, or Ag may be added, with or without a small quantity of H_3PO_4. A. R. Powell.

Coating objects of iron or steel with aluminium or aluminium alloy. E. H. E. Johansson (B.P. 363,158, 5.1.31).—The articles are first immersed in a fused mixture of $CaCl_2$ 2—50 pts., KCl 1—30 pts., NaCl 0·5—20 pts., Na_3AlF_6 0·1—5 pts., and $ZnCl_2$ 0·5—30 pts., and then plunged, while still hot, directly into a bath of molten Al or Al alloy. A. R. Powell.

Rust-proofing iron or steel surfaces. Pyrene Co., Ltd. From Parker Rust Proof Co. (B.P. 362,746, 23.1.31).—Fe or steel articles which have been coated with a phosphate film containing metallic Cu are boiled in a solution containing 1—5 (2—3) g. of $K_2Cr_2O_7$ per litre. A. R. Powell.

Ore concentration [by froth flotation]. Minerals Separation, Ltd., Assees. of C. H. Keller (B.P. 362,927, 1.9.30. U.S. 10.9.29).—The use of a xanthate produced by the reaction of KOH, a furan derivative (*e.g.*, furfuryl alcohol), and CS_2 is claimed as a collector in the oil flotation of Cu, Pb, and Zn ores. A. R. Powell.

Froth-flotation concentration of [oxidised copper and tin] minerals. Minerals Separation, Ltd., and S. Tucker (B.P. 363,122, 6.12.30).—Ores containing cassiterite or oxidised Cu minerals are ground with Na_2SiO_3 and oleic acid (or other higher fatty acid or alkali salt thereof) and then subjected to flotation in the presence of an alkali xanthate. A. R. Powell.

Manufacture of bearing metals. Hirsch, Kupfer- u. Messingwerke A.-G. (B.P. 359,570, 19.5.31. Ger., 13.2.30. Cf. B.P. 352,639; B., 1931, 890).—Suitable alloys consist of 65—80% Cu and 2—6% Si, together with 0·1—3% Sn, if desired. In an example, the alloy contains 76% Cu, 20% Zn, 3% Si, and 1% Sn. [Stat. ref.] H. Royal-Dawson.

[Zinc] alloy particularly for bearing surfaces. H. C. Hall (B.P. 362,507, 6.9.30).—An alloy of Zn (88%) with 3—12·5 (9)% Al, 0·1—2 (1·6)% Cu, and 0·5—2·3 (1·4)% Mg is claimed. A. R. Powell.

Pickling of oxidised metal. Hirsch, Kupfer- u. Messingwerke A.-G. (B.P. 360,126, 18.9.30. Ger., 19.10.29).—The metal is treated first with a persulphate and then with H_2SO_4, or a combined bath may be used. H. Royal-Dawson.

Lead alloys [with a high resistance to corrosion]. H. C. Lancaster, W. T. Butcher, and Goodlass Wall & Lead Industries, Ltd. (B.P. 362,683, 16.12.30).—Pb containing 0·001—0·003% Ni is claimed, especially for the lining of H_2SO_4 tanks. A. R. Powell.

Lead-antimony alloy for pressed tubes, more particularly for cable sheaths. Siemens-Schuckertwerke A.-G. (B.P. 362,973, 10.9.30. Ger., 27.9.29).—Alloys of Pb with $<$ 1% Sb and $<$ 1% of a compound of Sb with Cu, Ni, Mn, or Mg, or, preferably, Cd are claimed. For cable sheathing the alloy comprises 99·25% Pb, 0·25% Sb, and 0·5% CdSb. A. R. Powell.

Obtaining pure copper by electrolysis. Hirsch, Kupfer- u. Messingwerke A.-G. (B.P. 363,404, 18.9.30. Ger., 6.3.30).—The solder and Fe are removed mechanically from scrap brass and the clean scrap is melted into anodes, these being then electrolysed in a solution containing 12—16% $CuSO_4,5H_2O$ and up to 15% H_2SO_4, using a c.d. of 500 amp. per sq. m. at 55°. When sufficient Zn has accumulated in the electrolyte the Cu therein is pptd. with Zn scrap or ZnO, and, after further purification in the usual way, the Zn is recovered from the resulting $ZnSO_4$ solution by electrolysis. [Stat. ref.] A. R. Powell.

Production of metallic magnesium by electrothermal reduction of magnesium compounds. Oesterr. Amerikan. Magnesit A.-G. (B.P. 362,835, 6.7.31. Austr., 4.8.30).—An intimate mixture of MgO and C is blown through an electric arc and the resulting vapours are chilled to obtain Mg dust, which is then purified by sublimation in vac. or by heating in a current of H_2. A. R. Powell.

Production of metallic barium in closed vessels. Egyesült Izzolámpa és Villamossági Részvénytársaság (B.P. 363,189, 26.1.31. Hung., 24.1.30).—BaO is reduced by Na vapour at 300—500° under diminished pressure. For the production of Ba on a Ni cathode in a photoelectric cell, the Ni is coated with BaO and the completed cell is immersed in molten $NaNO_2$ and $NaNO_3$. A current is then passed between the incandescent W spiral in the glass bulb and an external electrode in the fused salt bath, whereby Na is reduced from the inner walls of the bulb and immediately reduces the BaO on the Ni cathode. A. R. Powell.

Obtaining good contact between conductors of aluminium and its alloys. Verein. Aluminium-Werke A.-G. (B.P. 363,075, 6.11.30. Ger., 17.2.30).—The ends of the bars are coated with a paste of graphite, a grease, and hard metal chips and the two ends are then pressed firmly together and held by rivets or screws in such a way that the hard metal penetrates through the oxide films on the Al bars and thus reduces the resistance of the contacts. A. R. Powell.

Electroplating metal alloys [stainless steel] containing chromium. Württembergische Metallwarenfabr. (B.P. 362,608, 28.10.30. Ger., 27.11.29).—The steel is first coated with a thin film of Sn, Zn, Cd, Pb, or their alloys by the hot-dipping process, and the excess of the coating metal is brushed off while still fluid. A. R. Powell.

[Tool for] treatment of bearing metals. A. E. Ricard (B.P. 364,220, 21.10.30. Fr., 18.9.30).

Presses for extruding metal. E. H. Harberd. From Blei-Industrie A.-G. vorm. Jung & Lindig (B.P. 365,469, 30.5.31).

Rotary drum furnace. Washing blast-furnace gases.—See I. **Antifouling composition.**—See XIII.

XI.—ELECTROTECHNICS.

Economy and thermal efficiency of modern electric furnaces for annealing metals. H. Masukowitz (Z. Metallk., 1931, 23, 306—309, 335—337).—The advantages of using electric furnaces in preference to gas-fired furnaces for annealing brass wire, strip, and rod are discussed and some modern types of electric furnace are described. For the continuous annealing of wire at 600° the furnace has a slightly arched longitudinal section and an elliptical cross-section with spirals of nichrome wire wound spirally round the heating tube and packed in a specially prepared heat-insulating material; the furnace consumes 81 kw.-hr. per ton of brass at 600°. Furnaces made on a similar principle have been developed for annealing copper and brass rods and tubes in a current of inert gas to prevent oxidation; these are described in detail with reference to diagrams and their performance on various types of work is shown graphically. A. R. Powell.

Electrical porcelain. Ceramic insulating materials.—See VIII. **Zn as galvanic element.**—See X.

Patents.

[Electrical] indication and control of temperature. K. S. Mills (B.P. 363,452, 18.10.30).—An anode–cathode emission system is contained in a tube of quartz or other refractory material, and the cathode in contact with the wall of the tube is coated with BaO. The anode is in the form of a cylinder of nearly equal surface to that of the cathode and is kept cooler than the cathode by the provision of a thick lead, which conducts well both thermally and electrically. The resulting current may be initiated and measured by known means. B. M. Venables.

[Positive-column] luminescence gas-discharge tubes. Claude Neon Lights, Inc., Assees. of L. L. Beck (B.P. 363,343, 5.6.30. U.S., 28.2.30).—A thermionic cathode transmits to the gas filling, consisting of Ne mixed with $\ngtr$ 0·5% of A, Kr, or Xe, currents of density 0·1—1·0 amp. per sq. cm. of cross-section of the positive column, to offset the tendency of the latter gases to impair the characteristic colour of the neon discharge. [Stat. ref.] J. S. G. Thomas.

Magnetic cores. Brit. Thomson-Houston Co., Ltd., Assees. of A. Boyajian (B.P. 363,606, 19.5.31. U.S., 21.5.30).—Joints in laminated magnetic circuits are filled with a mixture of Fe powder and Portland cement. J. S. G. Thomas.

Insulation of electrical conductors. Chem. Fabr. vorm. Sandoz (B.P. 363,435, 30.9.30. Ger., 8.7.30).—Conductors are covered with layers of mono- or diacetylated cellulose fibre prepared by any acetylation process which causes no apparent structural alteration of the fibre. J. S. G. Thomas.

[High-tension] cored carbons. E. and O. Conradty (C. Conradty) (B.P. 364,881, 3.2.31).

Electric-discharge tubes. Siemens-Reiniger-Veifa Ges. f. medizin. Technik m.b.H. (B.P. 364,568, 2.10.30. Ger., 24.10.29).

Röntgen-ray apparatus. Koch & Sterzel A.-G. (B.P. 365,150, 9.10.30. Ger., 10.10.29).

Cooling towers. Electrostatic precipitators. Washing furnace gases.—See I. **Conversion of distillates. Lubricating oil. Cable oil.**—See II. **C_2H_2.**—See III. **Plating stainless steel. Cu. Mg. Welding**

Mn steel. Ba in closed vessels. Contact between conductors. Cable sheaths.—See X. **Mouldable material. Insulating compounds.**—See XIII. **Rubber poor in albumin. [Polymerised rubber] insulation. Protection of insulating materials.**—See XIV.

XII.—FATS; OILS; WAXES.

Pressure treatment of arachis seeds. G. Loew (Giorn. Chim. Ind. Appl., 1931, **13**, 565—568).—As regards the colour of the oil and the ease of treatment of the residual cake (containing 14—15% of oil), the best results are achieved if seeds containing 2·5—3% H_2O are subjected to 200 atm. pressure at 60—65°.
T. H. Pope.

Utilisation of castor oil as a lubricant. E. André (Bull. Mat. Grasses, 1931, **15**, 297—301).—A lecture. It is noted that the free fatty acid content as calc. from the acid val. may differ from the figure obtained by extraction with Na_2CO_3. E. Lewkowitsch.

Deterioration of castor oil. E. André (Ann. Office Nat. Combust. liq., 1931, **5**, 845—850; Chem. Zentr., 1931, ii, 512).—Complete removal of lipase by filtration diminishes development of acidity. Rancidity is delayed by negative oxidation catalysts. A. A. Eldridge.

Determination of unsaponifiable matter with special reference to fish and marine-animal oils. E. R. Bolton and K. A. Williams (Analyst, 1932, **57**, 25—27).—Modifications of the usual method are recommended. The Et_2O extract is washed with 0·5*N*-NaOH to remove any dissolved fatty acids. The unsaponifiable matter is dissolved in warm neutral EtOH and titrated with 0·1*N*-NaOH to correct for fatty acids.
T. McLachlan.

Fat hydrogenation. E. F. Armstrong (Chem. & Ind., 1932, 92—94).

Erratum. On p. 30, col. 2, lines 6 to 8 should read: "freshly distilled light petroleum, the less volatile fractions (which may inhibit the positive reaction) being eliminated on the water-bath."

Vanillin in cacao butter.—See XIX. **Cod-liver oil emulsions.**—See XX.

Patents.

Recovery of fatty products [cacao butter]. H. L. Borg, Assr. to Gen. Foods Corp. (U.S.P. 1,808,831, 9.6.31. Appl., 21.1.28).—Rejected cacao beans, dust from fanners, etc., containing 30% of fat, are finely ground and the liquid mass is slowly stirred with 12 wt.-% of H_2O at 100° for about 3 hr. An equal wt. of boiling H_2O is added to the mass and the fat is allowed to settle out. Less than 1% of the fat escapes recovery.
E. Lewkowitsch.

Expressing oils [and fats] from materials [oleaginous seeds etc.]. Hanseatische Muehlenwerke A.-G. (B.P. 360,332, 31.3.31. Ger., 29.7.30).—0·2—1·5% of (vegetable) lecithin is added to the ground cacao bean to facilitate removal of the fat by expression.
E. Lewkowitsch.

Recovery of neutral grease from wool-washing water. E. Mertens (B.P. 360,209, 19.11.30. Belg., 23.11.29).—Frothy pptd or colloidal concentrates from such water are treated in a digester while the pressure is independently maintained and is higher than that corresponding to the steam temp., *e.g.*, by introducing compressed air. E. Lewkowitsch.

Manufacture of soap powder. R. L. Holliday, Assr. to Colgate-Palmolive-Peet Co. and Proctor & Gamble Co. (U.S.P. 1,804,932, 12.5.31. Appl., 19.4.26).—A solution of soap and soda ash containing ample excess (60%) of H_2O is sprayed into a tower and the drops are entrained and dried by a stream of heated air in concurrent flow; cooling air currents may be provided. The apparently dry powder produced contains about 40% of H_2O. E. Lewkowitsch.

Purification [desulphurisation] of vegetable or animal oils or fats. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 362,964, 8.9.30).—S compounds are removed with the sludge by heating the oils at 150—250° with small amounts (*e.g.*, 10%) of salts or soaps of Pb, Cu, or Ni, which are sol. in H_2O or in the oil; it is advantageous to ppt. the metal salts as hydroxides within the oil by the addition of solutions of, *e.g.*, Na_2CO_3, or reducing agents such as $NaHSO_3$, at below 100—150°. E. Lewkowitsch.

Manufacture of oxidation products of siccative oils. F. Fraunberger and G. Knöffler (U.S.P. 1,806,247, 19.5.31. Appl., 24.7.25. Ger., 11.8.24).—Linseed oil in emulsion in H_2O (*e.g.*, with gum arabic) is oxidised by agitation etc. with air at 40—80°; the linoxyn settles out as flakes. E. Lewkowitsch.

Production of derivatives of oxidised oils or fatty acids, and sulphonated products therefrom. Imperial Chem. Industries, Ltd., A. J. Hailwood, and R. P. McGlynn (B.P. 362,971, 10.9.30).—Polyunsaturated oils or fatty acids (*e.g.*, linseed oil, fish oil) are treated with H_2O_2 in the presence of glacial AcOH so as to saturate some of the double linkings with OH groups (which are partly acetylated); the products are then sulphonated with H_2SO_4 etc., with or without the use of an auxiliary agent, *e.g.*, pyridine, Ac_2O.
E. Lewkowitsch.

Manufacture of polymerisation products from oils and fats. I. G. Farbenind. A.-G. (B.P. 362,845, 6.8.30. Ger., 10.8.29).—Aq. emulsions of polymerisable oils etc. (*e.g.*, tung oil, stabilised with emulsifying agents as desired) are polymerised, together with a polymerisable hydrocarbon, *e.g.*, butadiene, isoprene, in the presence of O_2 or of suitable oxidising compounds such as H_2O_2, Bz_2O_2, and, if desired, with vulcanisation accelerators, metal soaps, etc.; on coagulation rubber-like products are obtained. E. Lewkowitsch.

[Fatty] oil composition and process of inhibiting oxidation [rancidity] thereof. T. H. Rogers, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,805,458, 12.5.31. Appl., 21.8.22. Renewed 5.3.27).—0·1—2% of an aliphatic polybasic hydroxy-carboxylic acid (or its Na, K, or NH_4 salt), *e.g.*, tartaric or citric acid, is added to prevent rancidity, especially of lacquer compositions containing castor oil; preferably compounds sol. in the oil or solvents are selected.
E. Lewkowitsch.

Emulsification of water-insoluble substances. H. Bennett (U.S.P. 1,807,563, 26.5.31. Appl., 30.3.29).—Monoethanolamine (1 pt.) is heated with linoleic acid

(2 pts.) at 100° (with or without beeswax, 12 pts.); xylidine (22 pts.) and water (10 pts.) are stirred in, yielding a thin emulsion stable at 60°. Di- and tri-ethanolamines, alkaline-earth hydroxides, other fatty acids, fats, etc., eugenol, hexane, etc., and waxes may be used. The products are suitable as polishing and cleaning agents.
E. Lewkowitsch.

Treatment [bleaching] of beeswax. W. S. Baylis, Assr. to Filtrol Co. of California (U.S.P. 1,808,755, 9.6.31. Appl., 11.5.26).—Melted beeswax is washed with dil. H_2SO_4 and then bleached by treatment with decolorising earths (in one or more stages) at 150° under vac. A suitable apparatus is described.
E. Lewkowitsch.

Wetting etc. agents.—See III. **Coating for fabrics.**—See XIII. **Artificial cream.**—See XIX. **Ag salt from castor oil.**—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Particle size and colour character of precipitated white lead. E. Sauer and M. Zipfel (Kolloid-Z., 1932, **58**, 97—110).—White lead, pptd. by leading CO_2 through aq. $Pb(OAc)_2$, has the composition $(PbCO_3)_2,Pb(OH)_2$. The best product is obtained when an excess of CO_2 is avoided; this can be ensured by p_H control, which gives a satisfactory indication of the end-point. A high temp. is favourable. The degree of dispersion of the product prepared under different conditions has been determined by sedimentation analysis and microscopical examination and has been compared with the colour val. The addition of gum arabic leads to a highly disperse product, which, however, forms secondary aggregates, but the product has good painting properties. E. S. Hedges.

Analysis of cadmium red pigments. C. G. Daubney (Analyst, 1932, **57**, 22—25).—The pigment is digested with 50% HNO_3 till S and Se are dissolved. Se is reduced with N_2H_4,HCl in aq. NH_3 and S is pptd. as $BaSO_4$. Cd is pptd. from a separate portion of the first filtrate as an 8-hydroxyquinoline complex.
T. McLachlan.

Cellulose lacquers. K. Nord (Tids. Kjemi, 1931, **11**, 141—143).—A lecture. H. F. Harwood.

Bakelite ointment jars. C. A. Rojahn and E. Filss (Pharm. Ztg., 1932, **77**, 111).—Treatment of bakelite with various substances in the cold (4 weeks) and the hot (100°, 1—3 hr.), respectively, gave the following results: dil. aq. NaOH (4—8%), gradually attacked, completely destroyed; 5% HCl, slightly roughened, attacked on long boiling; H_2O, EtOH, Et_2O, I, fatty and essential oils, soap, no action, no action.
E. H. Sharples.

Patents.

Paint composition. J. R. Durbon (U.S.P. 1,808,841, 9.6.31. Appl., 14.6.26).—The composition for automobile tops consists of linseed oil, Japan drier, and a paint in equal amounts. The paint is composed of 12·5% of pigment (C 16%, Ca phosphate 77%, $CaCO_3$ 3%, $CaSiO_3$ 2%, H_2O 2%) and 87·5% of vehicle (rosin 14·8%, fixed fatty oils 31·9%, ash 2%, mineral spirits 51·3%). H. Royal-Dawson.

Manufacture of painting or coating material. T. Maeda (B.P. 361,805, 22.4.31).—A mixture of glycerin, formalin, gelatin, AcOH, and salicylic acid is added to a hot aq. solution of carragheen. Pigments and fillers may also be present. H. Royal-Dawson.

Antifouling composition. A. J. N. Graafland and F. J. Nellensteyn (B.P. 362,526, 10.9.30. Holl., 12.9.29).—The material consists of a mixture of Portland cement (rich in SiO_2) and a poisonous vegetable substance, *e.g.*, powdered desiccated juice of *Euphorbia tirucalla*, extract of *Derris elliptica*, or powdered blossoms of *Chrysanthemum cinerariæfolium*. No oils or greases are added, so that, on drying, the material forms a porous film of a hydrophilic character which prevents growth of marine organisms. A. R. Powell.

Obtaining the adhesion of cellulose paint or varnish to timber. A. H. Huddart (B.P. 361,634, 3.12.30).—The surface of the timber is heated to 200—240° and allowed to cool, and the wood pores are then filled with either a paste of $CaSO_4$ in resin–oil varnish, or with a mixture of $CaSO_4$ or Na_2SiO_3 in water; after drying, the surface is smoothed down by rubbing.
H. Royal-Dawson.

Removal or stripping of coatings of varnish, paints, lacquers, and the like. J. Lewy (B.P. 361,217, 27.2.31. Ger., 2.7.30).—Solutions in CH_2Cl_2 of small amounts of rubber or similar material, of viscosity sufficient to prevent excessive flow, are claimed.
S. S. Woolf.

Emulsified ink and paints. H. Heckel (B.P. 360,948, 8.8.30).—Pigmented emulsions of the water-in-oil type, in which "mahogany sulphonates" are used as emulsifying and pigment-dispersing agents, are claimed. The outer phase is an org. vehicle comprising gums, resins, etc. dissolved in naphtha; inks and paints thus made have satisfactory "shortness," *e.g.*, for silk screen work. S. S. Woolf.

Ink for [marking on] cellulose esters. J. H. Clewell, Assr. to Du Pont Viscoloid Co. (U.S.P. 1,806,965, 26.5.31. Appl., 12.4.28).—Compositions of a cellulose ester solvent of b.p. 140—225° (*e.g.*, Et lactate, diacetone alcohol, diethylene glycol), a dye sol. therein, *e.g.*, a nigrosine base, and a thickener, *e.g.*, shellac, are claimed. S. S. Woolf.

Purification of [white] pigment materials. W. H. Test (U.S.P. 1,806,988, 26.5.31. Appl., 8.11.27).—Pigments such as Ti compounds, $BaSO_4$, or $CaSO_4$ which contain Fe compounds as impurities are heated to 1000° with CO to reduce the Fe to metal. On cooling to 120° in the continued presence of CO, the Fe is converted into $Fe(CO)_5$ which is distilled off.
S. S. Woolf.

Manufacture of chrome yellow colouring matters. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 363,362, 15.9.30).—The products are obtained by the simultaneous pptn. of $PbCrO_4$ and $BaCrO_4$ (or $SrCrO_4$), together with the sulphates of the metals, if desired; *e.g.*, Na_2CrO_4 and Na_2SO_4 are added to a solution containing $Pb(NO_3)_2$ and $Sr(NO_3)_2$ or, after or during neutralisation, to a suspension of PbO in conc. $BaCl_2$ solution. [Stat. ref.] L. A. Coles.

[Coating] compositions comprising derivatives of cellulose. Brit. Celanese, Ltd., and W. H. Moss (B.P. 362,480, 28.8.30).—Compositions which give flexible, non-sticky coatings are obtained from org. derivatives of cellulose by using therewith relatively large quantities (>150%, preferably 170—220%) of a plasticiser consisting of an aromatic sulphonamide or a derivative thereof, *e.g.*, xylenesulphonmethylamide, or an org. ester of tartaric acid, *e.g.*, Bu tartrate, optionally in association with other plasticisers.
D. J. Norman.

Preparations suitable for coating or sticking. Consort. f. Electrochem. Ind. G.m.b.H. (B.P. 361,768, 16.3.31. Ger., 14.3.30).—Mixtures of two or more polyvinyl ester modifications of different degrees of polymerisation, *e.g.*, acetate of high viscosity and butyrate of low viscosity, dissolved in suitable solvent(s), with or without a diluent, are claimed. S. S. Woolf.

Coating of fabrics and material therefor. P. Stamberger (B.P. 361,025, 5.9.30. Hung., 11.9.29).—Oils, fatty acids, etc. are brought to a plastic or thermoplastic condition by moderated treatment with S, and applied to the fabric; the coating is fixed and rendered non-sticky by treatment with $COMe_2$ etc., or by ageing by heat, or by exposure to air or ultra-violet light etc.
E. Lewkowitsch.

[Printing pastes for] manufacture of floor coverings and the like. Imperial Chem. Industries, Ltd., F. T. Walker, and A. C. Hetherington (B.P. 360,815, 1.5.30).—A paste for block-printing linoleum etc. comprises a cellulose ester or ether (*e.g.*, nitrocellulose, benzylcellulose), a pigment, and a drying oil (linseed oil) with a plasticiser (tritolyl phosphate, glyceryl ditolyl ether, etc.), and both medium- and high-boiling solvents (*e.g.*, Et and Bu lactates) in the absence of low-boiling solvents and diluents.
E. Lewkowitsch.

Japanning on concrete grounds. S. Asobe (B.P. 361,040, 15.9.30. Jap., 2.4.30).—A concreted surface is treated with successive coats of mixtures of raw Japan lacquer ("Kiurushi"), asphalt, powdered "burnt earth" (white bole containing a small amount of Fe), and/or slate powder, and a finishing layer of refined Japan lacquer ("Urushi"). S. S. Woolf.

Purification of rosin. Newport Co., Assees. of R. C. Palmer, J. L. Burda, and A. F. Oliver (U.S.P. 1,807,599, 2.6.31. Appl., 26.12.29).—After evaporation of most of the solvent from the impure wood-rosin solution obtained by extraction of resinous wood, the terpenes and pine oil are removed by treatment with dry steam. The residue is dissolved in a petroleum solvent (b.p. 100—160°) and cooled to ppt. pitchy matter and the supernatant liquor is washed with H_2O and filtered through fuller's earth. S. S. Woolf.

Treatment of rosin. W. B. Logan, Assr. to Newport Co. (U.S.P. 1,807,483, 26.5.31. Appl., 3.1.29).—Impure rosin is bleached by known methods and then heated for 8 hr.—10 min. at 260—325°, effecting no material decomp., but removing "potential colour bodies" (which normally develop a brown colour on dissolution in alkali and pptn. with Al salts in the preparation of paper size). The tendency of the rosin to crystallise is reduced, and its optical rotation is raised to +20° or even +35°. S. S. Woolf.

Production of high-grade rosin. I. W. Humphrey, Assr. to Hercules Powder Co. (U.S.P. 1,806,973, 26.5.31. Appl., 24.10.27).—Impure wood- or gum-rosin, in conc. solution if desired in petrol or other similar solvent, is treated at normal or raised temp. and/or pressure with one or more petroleum hydrocarbons boiling below 15°, *e.g.*, *n*- or *iso*-C_4H_{10}, C_3H_8, etc., in which the dark impurities in the rosin are insol. The pure rosin solution is drawn off and the solvent recovered. S. S. Woolf.

Preparation of [rosin–rosin oil insulating] compounds. C. A. Purdy, Assr. to Western Electric Co., Inc. (U.S.P. 1,807,931, 2.6.31. Appl., 29.2.28).—Solid and liquid ingredients, *e.g.*, rosin and rosin oil, are introduced into a large heated tank filled with previously prepared compound, displacing an equiv. amount of the latter into a second heated tank, and a continuous circulation of the compound is maintained between the two tanks by means of a smaller third tank and an electrical device, thus ensuring thorough mixing. A vac. is then applied to the whole system to remove H_2O. S. S. Woolf.

Production of [synthetic resin] coatings. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 360,944, 7.8.30).—Coatings comprising an artificial resin capable of being hardened, *e.g.*, PhOH–CH_2O, "glyptal," etc., an inorg. softening agent, *e.g.*, graphite, asbestos powder, talc, together with a filler capable of rendering the coating resistant and acid-proof, *e.g.*, Pb_3O_4, PbO, quartz powder, are claimed. In coatings comprising two or more layers, the hardening agent may be incorporated in the final layer, whilst the softeners are confined to the lower layer or layers. S. S. Woolf.

Manufacture of synthetic ["alkyd"] resin. L. V. Adams, Assr. to Gen. Electric Co. (U.S.P. 1,805,473, 19.5.31. Appl., 1.5.28).—A polyhydric alcohol is condensed with a polybasic acid in the presence of a metal soap, *e.g.*, Co linoleate, Al stearate, Fe or Bi lactate, Pb or Ca glyceroxide; *e.g.*, glycerol is treated with Ca, uncombined Ca is removed, and the treated glycerol is condensed with phthalic anhydride.
S. S. Woolf.

Artificial resinous substances. Imperial Chem. Industries, Ltd., and W. Baird (B.P. 360,173, 21.10.30).—A polyhydric alcohol (not glycol), a polybasic acid (or anhydride), and a non-hydroxylated fatty oil, *e.g.*, linseed oil, are heated in an autoclave under pressure until homogeneous, and finally in an open vessel until the reaction has been completed. E. Lewkowitsch.

Manufacture of resinous products. Armstrong Cork Co., Assees. of E. J. Pieper (B.P. 360,930, 12.6.30. U.S., 17.6.29).—In a fatty acid-modified "glyptal" type of synthetic resin, the alcohol component comprises ethylene glycol and, if desired, a polyethylene glycol as well as glycerol, excess of the first-named being employed. Rapid air-drying to soap-resistant films is claimed for lacquers made from such resins. [Stat. ref.]
S. S. Woolf.

Mouldable [filled] compositions. H. Wade. From Bakelite Corp. (B.P. 359,986, 1.5.30).—The filler (*e.g.*, grit for grinding wheels) is coated with a solution of a (reactive) phenolic resinoid that has been brought so far towards the insol. condition that a non-tacky coating is obtained on evaporation of the solvent.

E. Lewkowitsch.

Mouldable material and process. R. E. Coleman and F. J. Groten, Assrs. to Monowatt Electric Corp. (U.S.P. 1,808,529, 2.6.31. Appl., 28.6.28).—An inert filler such as asbestos fibre or talc is coated or impregnated with a slow-hardening binder, *e.g.*, compositions of drying or semi-drying oils together with metallic driers or vulcanising agents, and oil-sol. materials, *e.g.*, resins, bitumens. The plastic so formed is partly "cured" and intimately mixed with a heat-convertible synthetic resin, *e.g.*, of the PhOH–CH_2O type, containing filler if desired. The mixture of slow- and rapid-hardening plastics (the proportions of which are adjusted according to properties desired) is subsequently moulded under heat and pressure.

S. S. Woolf.

Manufacture of [olefine–polysulphide] plastic substances. J. C. Patrick (B.P. 360,890, 2.5.30. U.S., 10.6.29).—A suitable polysulphide solution (cf. B.P. 302,270; B., 1929, 826) is stabilised, *e.g.*, by refluxing for 15—20 hr., and an olefine–halogen additive product, *e.g.*, $C_2H_4Cl_2$, is caused to react with it in the presence of a solvent promoting miscibility, *e.g.*, 10—80 vol.-% of EtOH in the reaction mixture.

S. S. Woolf.

Coal products. C black.—See II. **Ice colours. Colour lakes.**—See IV. **Artificial films etc. Material for containers.**—See V. **Oxidation of siccative oils. Non-rancid fatty oils.**—See XII. **Treated rubber [for paint etc.]. Polymerised rubber [for varnish etc.].**—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Concentrated [rubber] latex and its industrial uses. F. W. Warren (Trans. Inst. Rubber Ind., 1931, **6**, 431—437).—The application of latex, in a conc. and compounded condition, to the manufacture of dipped goods and to spreading processes is described and the advantages are indicated. The manufacture of rubber-coated metal goods by electrodeposition of rubber from compounded latex is also described. D. F. Twiss.

Uses of concentrated [rubber] latex. J. H. Carrington (Trans. Inst. Rubber Ind., 1931, **6**, 438—457).—The production, properties, and compounding of conc. latex are described together with its application to the various methods of manufacture, the main processes for the latter being impregnation, spreading and doubling, spraying, dipping, electrodeposition, gelling, extrusion, moulding and drying, agglomeration, and vulcanisation. D. F. Twiss.

Unburstable [sponge-]rubber balls. R. Defries (Trans. Inst. Rubber Ind., 1931, **6**, 475—486).—Their manufacture is reviewed and details are given concerning methods for inflation of the cells, compounding, etc.

D. F. Twiss.

Some problems in sponge-rubber manufacture. S. A. Brazier (Trans. Inst. Rubber Ind., 1931, **6**, 526—558).—A review is given covering the history, raw materials, inflating agents, typical formulæ, processing, and vulcanisation of sponge rubber. The difference between sponge rubber and cellular rubber is indicated and illustrated by photographs. The physical characteristics of sponge rubber, *e.g.*, compression under load, hysteresis, permanent set, vol./mass ratio, heat and sound insulation, shock absorption, and ageing, with methods for their evaluation, are described. D. F. Twiss.

Impurities of importance to the rubber industry. D. F. Twiss (Trans. Inst. Rubber Ind., 1931, **7**, 56—66). —A general review of the important rôle of natural and extraneous non-caoutchouc substances. D. F. Twiss.

Preservation of rubber by surface treatment. T. R. Dawson (Trans. Inst. Rubber Ind., 1931, **7**, 95—111).—Surface treatment may be applied to rubber in various ways, *e.g.*, by means of dusting powders, aq. solutions, org. bases and antioxidants, light-absorbing agents, antiseptics, preservative paints, and suitable gas. Numerous examples of preservative materials are cited representative of technical practice and of commercial proprietary articles. D. F. Twiss.

Theory and application of the parallel-plate plastimeter [for rubber]. J. R. Scott (Trans. Inst. Rubber Ind., 1931, **7**, 169—186).—By mathematical treatment a formula is evolved which permits the determination of the plastic consts. of a rubber stock, whereas previously this plastimeter has yielded only empirical results. It is also shown that unvulcanised rubber containing reinforcing powders possesses a definite yield val. or friction. D. F. Twiss.

Influence of rate of stretching in tensile testing [of rubber]. R. Dorey (Trans. Inst. Rubber Ind., 1931, **7**, 158—168).—Within reasonable limits accidental variation in speed of stretching has only a small and almost negligible effect on tensile tests. More strongly reinforced mixings, however, exhibit a greater susceptibility to such influence, and high speeds give the effect of a stiffer rubber. Stretching at the rate of approx. 700% per min. gives results which are least affected by slight variations. D. F. Twiss.

Tensile testing of rubber. M. Jones (Trans. Inst. Rubber Ind., 1931, **7**, 48—55).—Except with extreme variations, speed of extension has little influence on tensile vals. Wherever possible the vulcanised test pieces should be cut from a single calendered sheet and, if of dumb-bell pattern, along the direction of calendering. The rupture of a ring test piece generally occurs at a point on one of the pulleys, and, almost invariably, along the direction of calendering; these features favour the use of the average and not of the min. cross-section for calculation of the tensile strength. Dumb-bell and ring test pieces may not place a series of vulcanised rubbers in the same order unless care be taken to eliminate any undue grain or lamination in the material. D. F. Twiss.

Patents.

Production of rubber poor in albumin. Revertex, Ltd., Assees. of Metallges. A.-G. (B.P. 363,193, 28.1.31. Ger., 11.2.30).—Rubber suitable for submarine cables is produced by heating rubber latex with dil. alkali for 3—10 hr. at a temp. below the b.p. (*e.g.*, at 90—100°) under ordinary pressure so that on adding a coagulant such as $ZnCl_2$ the amount of albumin pptd. is so small that the washed and dried rubber contains $<0{\cdot}05\%$ N. D. F. Twiss.

Impregnation of permeable substances with rubber latex or the like. P. H. Head (B.P. 361,398, 23.7.30 and 9.4.31; cf. B.P. 316,335).—In the manufacture of textile driving bands, the permeable material is impregnated with rubber latex which is vulcanised previously or subsequently. Impregnation may be rendered more complete by application of pressure and the latex may contain dyes to protect against the action of light and a substituted phenol to prevent mildew. The latex may be coagulated while still wet by spraying with, or dipping in, an acid solution followed by successive immersion in aq. NH_3 and H_2O. D. F. Twiss.

Application of variegated or "jazz" colourings to the surfaces of articles [*e.g.*, rubber play balls]. India Rubber, Gutta Percha, & Telegraph Works Co., Ltd., and J. Hubbard (B.P. 362,947, 11.9.30).—By applying one or more liquid colouring materials, comprising pigment dispersed in a medium such as rubber solution or varnish, to the surface of a liquid, *e.g.*, very dil. NaOH, with which it will not mix and which prevents the general spreading of the colours, a bath is produced by immersion in which articles may be given irregular colouring. D. F. Twiss.

Treatment of rubber. A. Davies (B.P. 360,852, 8.8.30).—Rubber is heated, *e.g.*, by forcing it through a tube a about 285°, in the presence of a catalyst (Mg or a Mg alloy) in an atm. of inert gas, *e.g.*, N_2, without distillation. The resulting viscous liquid is miscible with oils and can be used in the manufacture of paints or linoleum. D. F. Twiss.

Polymerisation of rubber distillates. A. Davies (B.P. 360,934, 10.7.30).—Rubber distillates, obtained by the pyrogenic decomp. of unvulcanised rubber, are subjected to heat (approx. 285°) and pressure in the presence of Mg or a Mg alloy as polymerisation catalyst. Liquid products and resins suitable for use in varnish, for printing inks, and in insulating compounds, respectively, are obtained. D. F. Twiss.

Manufacture of rubber-like masses. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 360,821—2, 30.5.30. Cf. B.P. 358,534; B., 1932, 172).—Butadiene or an analogue is polymerised (A) in the presence of an unsaturated nitrile of the formula $CRR'{:}CR''{\cdot}CN$ (*e.g.*, acrylonitrile), where R, R′, and R″ signify H or alkyl, avoiding the application of a metallic polymerising agent, an alkali hydride, or an organo-metallic compound, and using preferably an emulsion process, (B) in the presence of a substance of the formula $CRR'{:}CR''{\cdot}CO_2R'''$ (*e.g.*, acrylic acid or an ester), where R, R′ and R″ signify H or alkyl and R‴ represents H or a hydrocarbon residue, the proportion of this substance being at least about 10% of the butadiene hydrocarbon with which it is emulsified in an aq. medium. The products in both cases are plastic, absorb fillers well, and yield vulcanisates of superior soft-rubber qualities. D. F. Twiss.

Vulcanisation of natural rubber and rubber-like masses. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 360,949, 9.8.30).—The product obtained by the reaction of a μ-mercaptobenzthiazole, or a salt thereof, with a compound containing a halogen atom attached to a C atom which is linked by a double or triple linking to O or N (other than in an acyl group), *e.g.*, with a chloroformic ester, phosgene, or cyanuric chloride, is applied to accelerate vulcanisation. D. F. Twiss.

Vulcanisation of rubber. R. T. Vanderbilt Co., Inc., Assees. of L. A. Edland (B.P. 362,740, 20.1.31. U.S., 29.3.30).—Te and S in cryst. form together with an org. vulcanisation accelerator, *e.g.*, mercaptobenzthiazole, tetramethylthiuram disulphide, or Te diethyldithiocarbamate, are employed in the vulcanisation of rubber. Good results are obtained in 15—45 min. at 148°. D. F. Twiss.

Vulcanisation of rubber. Rubber Service Laboratories Co., Assees. of W. Scott (B.P. 362,862, 8.9.30. U.S., 14.9.29).—Vulcanisation is accelerated by a nitrophenylarylthiazyl disulphide together with a basic, org., nitrogenous compound or a salt thereof. 2-Nitrophenylbenzthiazyl disulphide, obtained by treating mercaptobenzthiazole with a nitrophenylsulphur halide, and diphenylguanidine are typical of the 2 classes. D. F. Twiss.

Manufacture of rubber. Imperial Chem. Industries, Ltd. (B.P. 361,466, 12.9.30. U.S., 27.9.29).—Diaminodiarylalkanes of the general formula $AR{\cdot}CXY{\cdot}R'A'$, where A and A′ are alkylated or aralkylated NH_2 groups, R and R′ aryl residues, and X and Y are H or alkyl, *e.g.*, 4:4′-tetramethyldiaminodiphenylmethane, are applied to increase the resistance of rubber to deterioration. D. F. Twiss.

Manufacture of age-resisting rubber compounds. Rubber Service Laboratories Co., Assees. of W. Scott (B.P. 362,907, 8.9.30. U.S., 10.9.29).—A substance capable of imparting age-resisting qualities to rubber is produced by heating with S the reaction product of an aminodiphenylmethane and a naphthol, *e.g.*, of *pp′*-diaminodiphenylmethane and β-naphthol. D. F. Twiss.

Protection of rubber and other insulating materials. Brit. Celanese, Ltd., and W. H. Moss (B.P. 362,481, 28.8.30).—Insulation, especially rubber insulation, on electrical apparatus is protected against air, O_3, and ultra-violet light by a coating containing an org. derivative of cellulose, *e.g.*, cellulose acetate, together with $>100\%$ (preferably 170—220%) of a plasticiser consisting of an aromatic sulphonamide, *e.g.*, xylenesulphonmethylamide and/or a tartaric ester, *e.g.*, Bu_2 tartrate. D. F. Twiss.

Moulding and curing [vulcanising] of rubber goods [*e.g.*, sleeves for rubber-soled footwear]. C. H. R. Collins (B.P. 360,912, 6.8.30).

Tensile tests on rubber.—See I. **Cable oil.**—See II. **Material for containers.**—See V. **Polymerised products from oil etc.**—See XII. **Varnish etc. remover.**—See XIII.

XV.—LEATHER; GLUE.

Use of sulphide lime liquors in the sterilisation of dried hides infected with anthrax. V. Influence of temperature and movement of the liquors on rate of disinfection. M. E. Robertson (J. Soc. Leather Trades' Chem., 1931, **15**, 586—593; cf. B., 1931, 129).—Disinfection with 1% $Na_2S,9H_2O$ in 1·2% CaO at below 20° was slow and uncertain. The hide structure was adversely affected at above 20°. The amount of infection was reduced by stirring the liquors each day. Anthrax spores were killed more rapidly in moving Na_2S–CaO liquors than in stationary liquors.
D. Woodroffe.

Tanning of snake skins. V. Keigueloukis (Boll. Uff. R. Staz. sperim. Ind. Pelli, 1931, **9**, 434—436).—Details of the procedure are given. T. H. Pope.

De-tanning of chromed leather. E. Simoncini (Boll. Uff. R. Staz. sperim. Ind. Pelli, 1931, **9**, 417—420). Acids forming sol. Cr salts remove Cr from its combination with hide substance. In dil. equiv. solutions, mineral acids, which act more intensely than org. acids, extract equal percentages of Cr, but the actions of different org. acids, like those of more conc. mineral acids, vary with the nature of the acid. Excess of acid, either inorg. or org., gives irregular results, owing to hydrolysis of the leather. The de-chroming action increases in the following order: tartaric, oxalic, lactic, and citric acids, Rochelle salt, H_2SO_4, HNO_3, HCl.
T. H. Pope.

Wetting of glove leather. I. Cantarella (Boll. Uff. R. Staz. sperim. Ind. Pelli, 1931, **9**, 421—430).—The treatment of tanned glove leather prior to dyeing is improved and hastened if Rochelle salt or Na lactate is added to the bath used. T. H. Pope.

Fading tests on [dyed] leather. D. Woodroffe (J. Soc. Leather Trades' Chem., 1931, **15**, 593—596). —Considerable fading was obtained after 3 months' exposure to light of chrome-tanned leathers dyed with malachite-green, chrysoidine, Bismarck-brown, methylene-blue, brilliant-safranine G conc., and basic-green R, but not on leathers dyed with direct dyes or acid dyes, except violets and blues. D. Woodroffe.

Patents.

Production of synthetic dressing or tanning materials. A. M. Nastukov (U.S.P. 1,806,910, 26.5.31. Appl., 1.11.28. U.S.S.R., 28.6.27).—Crude oil (or its distillates) or solvent naphtha is condensed with H_2SO_4 and CH_2O and the product, after being neutralised and washed, is oxidised with, *e.g.*, dil. HNO_3 at atm. pressure or above and dissolved in dil. alkali. D. Woodroffe.

Tanning skins for making transmission belts, belting, etc. R. Chavand (B.P. 362,185, 23.12.30. Belg., 6.1.30).—Narrow strips of the skin are cut to the desired shape and fixed in a stretching frame suitably arranged so that stretching may begin when the skin is immersed in a tanning bath. The stretching is continuous and progressive during the whole of the tanning process. D. Woodroffe.

Manufacture of [agglomerated] horn products. G. Bonnard (B.P. 362,188, 24.12.30. Fr., 9.1.30).—Small pieces of horn are completely hydrated with hot or cold H_2O, dried superficially *in vacuo* at 15° or in a current of air at 40—45°, mixed with synthetic resin, and heated to 130—150° while under high pressure in a mould. D. Woodroffe.

Manufacture of paste or glue [for sealing paper bottles]. R. Leibfarth (B.P. 362,011, 10.9.30).—Acid-free casein is kneaded with cryst. $Na_2B_4O_7$ in the cold with H_2O, a larger quantity of water at 70° is then added, followed by addition of NH_4Cl with const. stirring. Finally albumin and sugar are mixed in.
H. Royal-Dawson.

Extraction of tannin.—See I. **Bleaching furs.**—See VI.

XVI.—AGRICULTURE.

Fertiliser experiments on mineral soils. H. R. Christensen [with S. Tovberg-Jensen] (Pflanzenbau, 1930, **5**, 1—86; Chem. Zentr., 1931, ii, 487).—Field and laboratory tests with P_2O_5 and K were compared. The best measure of lack of P appears to be the "relative solubility," *i.e.*, the ratio of citric acid-sol. to HCl-sol. P_2O_5. The citric acid method of determining the P requirement gives poor results; better results are obtained with H_2CO_3 extracts. Stable manure increases the humus content of soil more than do "complete artificial fertilisers" with the same content of plant nutrients; both promote bacterial life and metabolic processes in the soil. Fixation of N by *Azotobacter* proceeds very slowly in soils treated with mannitol; P fertilisers accelerate this process. In nitrification experiments addition of $CaCO_3$ markedly increased the formation of nitrate. The ability of the soil to produce CO_2 is no indication of its fertility. A. A. Eldridge.

Patents.

Manufacture of phosphatic fertilisers. Soc. Anon. pour le Traitement des Minerais Alumino Potassiques (B.P. 363,550, 13.2.31. Switz., 17.2.30).—$Ca_3(PO_4)_2$ fused by heating, *e.g.*, in an electric furnace is run into aq. H_3PO_4 (which may contain, *e.g.*, KH_2PO_4) in proportions such as to yield $CaHPO_4,CaH_4(PO_4)_2$, or mixtures of these with citrate-sol. complex phosphates.
L. A. Coles.

Production of [non-caking mixed] fertilisers. Patentverwertungs A.-G. "Alpina" (B.P. 359,512, 17.6.30. Ger., 20.6.29).—Permanently strewable fertilisers are produced by incorporating one or more hygroscopic agents, *e.g.*, $Ca(NO_3)_2$, $CaCl_2$, with the material. [Stat. ref.] H. Royal-Dawson.

Excavating apparatus for removal of fertilisers and other materials from heaps. G. M. Tyler (B.P. 364,689, 4.6.31).

XVII.—SUGARS; STARCHES; GUMS.

Non-sugars in the beet. O. Spengler (Züchter, 1929, **1**, 193—196; Chem. Zentr., 1931, ii, 506).—The beet contains about 0·0002% Zn. P_2O_5 is of great importance in beet culture; a high K content produces pulpiness. Raffinose is present (0·02%) and passes unchanged through the process of manufacture. The raffinose content is greatest in wet years. Young beets contain little protein; in mature beets 50% of the N is protein-N.
A. A. Eldridge.

Potato dextrin. Present-day manufacturing methods. A. E. Williams (Chem. Trade J., 1932, **90**, 99—100).

Patents.

Starch ethers. Carbohydrate derivatives.—See V.

XVIII.—FERMENTATION INDUSTRIES.

Recent advances in the fermentation industries. J. V. Eyre (Inst. Chem., 1932, 20 pp.).—Streatfeild memorial lecture.

Patents.

Apparatus for brewing beverages and the like. S. A. Haines (B.P. 363,393, 15.8.30. U.S., 19.8.29).—The apparatus is divided into a lower compartment or boiler (*A*) and an upper or infusion-receiving compartment (*B*) furnished with a filtering receptacle. The boiling liquid from *A* is carried by a tube and sprayed into *B*. The tube, which can be submerged to varying depths in the liquid in *A*, has a vent opening into the upper portion of *A* to prevent premature thermosiphonic action. At the orifice of the tube in *B* is an audible alarm which indicates the end of the infusion operation. C. Ranken.

Separation of proteinases and carboxypolypeptidases. Kalle & Co. A.-G. (B.P. 361,603, 18.11.30. Ger., 9.12.29).—The less sol. peptidases are fractionally pptd. and separated from the proteinases by the addition of 50 vol.-% $COMe_2$ or EtOH to the aq. solution of the enzymes. C. Ranken.

Purifying air.—See XXIII.

XIX.—FOODS.

Detection of rye in wheat flour, and of barley in rye and wheat flours. P. Rudolph and H. Barsch (Chem.-Ztg., 1931, **55**, 995—996).—HCl (*d* 1·124) gives no colour when shaken with wheat, but turns red in the presence of 10% or more of rye flour. Barley is detected microscopically from its characteristic epidermis cells, or chemically by addition of 2 c.c. of HCl (*d* 1·124) to 10 c.c. of a filtered 10% cold aq. extract. Rye, wheat, or a mixture of the two gives a flocculent ppt. (accelerated by warming), whilst barley flour gives none; the reverse obtains on filtration and addition of 10 c.c. of 96% EtOH to 5 c.c. of filtrate. Addition of 25% aq. NH_3 to the aq. extract gives colours (yellow with barley, greenish with rye) increasing in depth on exposure to air. These tests are sensitive to 20% of barley flour in mixtures. J. Grant.

Hydrogen-ion concentration of acid flour pastes. O. Eckardt (Z. ges. Getreide-Mühlenw., 1931, **18**, 57—62, 79—83; Chem. Zentr., 1931, ii, 509).—The $[H^{\cdot}]$ falls, but the acidity increases, with increase in the ash content of flour, but the former increases after 4 months. Mixtures of flour and H_2O in the proportion 1 : 10 have $[H^{\cdot}]$ 0·15—0·30 higher than those in the ratio 1 : 2. Lactic and acetic acids are buffered by flour, the more markedly the greater is the ash content. The behaviour of mixtures of the acids is described. A. A. Eldridge.

Analysis of sour milk. P. Guarnieri (Atti III Cong. Naz. Chim. pura appl., 1929, 482—483; Chem. Zentr., 1931, ii, 511).—Sour milk is heated at 40° with 0·1 vol. of 2*N*-NaOH until a homogeneous mixture is obtained; the fat is determined by Gerber's or Höyberg's method. A. A. Eldridge.

Rapid nephelometric examination of milk. G. Denigès (Bull. Soc. Pharm. Bordeaux, 1931, **69**, 1—17; Chem. Zentr., 1931, ii, 788).—Nephelometric tests for detecting whether the % of fat is $>$ or $<$ 30 g. per litre and whether that of casein is at least 30 g. per litre are described. The test can be modified to provide a determination sufficiently accurate for practical use. A. A. Eldridge.

Degradation of protein and the fusibility of Emmenthal cheese. K. Vas (Milchwirt. Forsch., 1931, **12**, 183—198; Chem. Zentr., 1931, ii, 649—650).—A discussion of the effect of the sol. N content. A. A. Eldridge.

Extraction and determination of vanillin in chocolate and cocoa butter. D. M. Freeland (Analyst, 1932, **57**, 9—15).—The fat is dissolved in a min. quantity of light petroleum (40—60°) and extracted with a 2% solution of NH_3 in 95% EtOH. The aq. EtOH extract is acidified with 0·5*N*-HCl and evaporated to low bulk at 70°. The residue is extracted with Et_2O, and this is re-extracted with 2% aq. NH_3. Brine is added, followed by HCl to render just acid, and the vanillin is extracted with Et_2O. The crude vanillin is dissolved in 40% EtOH, this is evaporated off, and 0·02*N*-NaOH is added till neutral to methyl-red. *p*-Toluidine, equal in wt. to that of the crude vanillin, is added and the whole titrated with 0·05*N*-H_2SO_4 to the turbid end-point. The mean recovery is 88% and results must be adjusted accordingly. T. McLachlan.

The chemist and food. L. H. Lampitt (Chem. & Ind., 1932, 83—84).

Science and the meat industry. T. Moran (Chem. & Ind., 1932, 84—86).

The milk industry. J. Golding (Chem. & Ind., 1932, 86—87).

Milk pasteurisation. H. Raistrick (Chem. & Ind., 1932, 88—92).

Quality in potatoes. W. H. Parker (Chem. & Ind., 1932, 94—95).

Lacquer and the canning industry. A. Samson (Chem. & Ind., 1932, 95—97).

Patents.

(a, b) **Pasteurisation of milk.** (c) **Treatment, pasteurisation, and cooling of milk or other liquids.** A. G. Enock, and R. Morton & Co., Ltd. (B.P. 363,037, 363,048, and 363,071, [a] 16.10.30, [b] 21.10.30, [c] 4.11.30).—(a) Milk is heated to 60·5—65·5°, held at that temp. for 30 min., and filled while hot into bottles which are capped and then cooled in a suitable chamber. (b) Milk bottles are made to pass through chambers maintained respectively at 62·5—65·5°, 10—15·5°, and —1° to 4·5°, in a method of pasteurising milk. (c) Milk bottles, or other lightly capped containers, are passed through heating or cooling media with an air-bell fitted to the top of the vesselr Access of foreign material to the inside of the containe.

is prevented and an air reservoir is provided. Apparatus is claimed in all three cases. E. B. Hughes.

Production of artificial cream or artificial sweet milk. A. Benzon and K. K. Jensen (B.P. 362,744, 22.1.31).—Liquefied butter, without additional oil or fat, is injected into heated skimmed milk or sweet milk by means of a high-pressure atomiser, until the final product has the required % of fat.

H. Royal-Dawson.

Manufacture of coffee free from caffeine. W. H. Levelt (B.P. 362,313, 22.4.31. Holl., 26.4.30).—Coffee beans are treated with steam at 100—120° in a perforated vessel provided with an outer jacket on which the steam condenses instead of on the coffee. The last traces of solvent used to extract the caffeine are also removed by steam, the whole process being carried out in the same vessel. E. B. Hughes.

Industrial product based upon Paraguayan tea. M. G. Veiga (U.S.P. 1,802,292, 21.4.31. Appl., 29.8.28).—The leaves and non-ligneous parts of the plant *Ilex paraguariensis* (Paraguayan tea or "maté") are slowly hydrated by sprinkling with water until fermentation sets in, the fermented product is heated for 5—10 min. at 24—75°, and, after fanning, the cleansed product is further fermented by subjection to the action of vapours from beet sugar and chicory essence in a closed chamber for $\frac{3}{4}$ hr., the product being finally "toasted" in an oven. H. Royal-Dawson.

Working up natural materials containing lecithin. L. Berczeller (B.P. 361,956, 25.8.30. Austr., 24.8.29).—The disagreeable flavour of soya-lecithin obtained by usual methods of prep. is removed by steam-distillation. This process may be carried out on the beans before extraction by EtOH.

E. B. Hughes.

Production of citrus fruit products. H. G. Loesch, Assr. to Gen. Foods Corp. (U.S.P. 1,808,737, 2.6.31. Appl., 29.12.25).—Pectin and citric acid are produced from whole lemons. The white rind, yellow rind, and juice contain 45%, 15%, and 40% of lecithin, respectively. The lemons are finely pulped, heated with 2 pts. of H_2O for $\frac{1}{2}$ hr., and the liquid is pressed out and cleared by settling with starch. The solution is conc. in vac. and the pectin pptd. by the addition of at least an equal vol. of denatured 95% EtOH. The pectin is separated by hydraulic pressure, washed twice in more EtOH, and dried. The EtOH is treated to obtain Ca citrate, which is filtered off and converted into citric acid by the addition of H_2O and an equiv. of H_2SO_4. The clear citric acid solution is conc. in vac. and allowed to crystallise. The EtOH is recovered. Both products are of good quality. E. B. Hughes.

Composition for preservative treatment of fresh fruit. E. M. Brogden and M. L. Trowbridge, Assrs. to Brogdex Co. (U.S.P. 1,809,016, 9.6.31. Appl., 2.3.25).—Wax-like compositions, or emulsions, are prepared from paraffin wax, a phenolic mould retarder (xylenol with xylene), and a solvent such as light mineral oil of the kerosene type, with or without an emulsifying agent. The mould retarder recommended is "high coefficiency acid" derived from coal-tar distillation. The emulsion or wax is sprayed on to the fruit surface and then spread all over in a continuous film. E. B. Hughes.

Producing effervescent refreshing drinks from milk. R. Mack (B.P. 364,657, 11.9.30).

Manufacture of sweetmeats [containing uncooked vegetable juices]. (Mrs.) I. H. V. Gheynst (B.P. 364,547, 30.9.30).

Mixing etc. of liquids.—See I. **Steel apparatus.**—See X. **Cacao butter.**—See XII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of alcohol in tinctures. E. Meyer (Apoth.-Ztg., 1931, **45**, 405—406; Chem. Zentr., 1931, ii, 475).—Hering's method gives the same results as the [German] official method, but is simpler and more rapid. The Swiss official method gives divergent results. A. A. Eldridge.

Determination of ether in Tinct. Valerianæ ætherea. W. Zimmermann (Apoth.-Ztg., 1931, **46**, 374—377; Chem. Zentr., 1931, ii, 475).—Certain varieties of valerian contain a substance, extractable with spirit. æther., which interferes with the determination of Et_2O by means of KOAc solution. Hence 1 c.c. of Et_2O is added to 5 c.c. of tincture, when 3·6—4·4 c.c. of Et_2O separate. A. A. Eldridge.

Determination of camphor in spirit of camphor. M. Ruszkowski (Spraw. Prac. Dzialu Chem. Państ. Zakl. Hig., 1929, No. 2, 6 pp.; Chem. Zentr., 1931, ii, 475—476).—The NH_2OH,HCl method is the best, but Bougault and Leroy's method gives poor results owing to volatility of the camphor. A reflux condenser is necessary. The spirit (10 g.) with NH_2OH,HCl (1 g.), NaOH (2 g.), and H_2O (20 g.) is heated on the water-bath for 3 hr., neutralised with H_2SO_4, and shaken 3 times with Et_2O, the residue from which is weighed.

A. A. Eldridge.

Determination of oil in cod-liver oil emulsions. Scheunemann (Pharm. Ztg., 1932, **77**, 66).—The method recommended is that of tenfold dilution with H_2O followed by centrifuging with H_2SO_4 and amyl alcohol in a butyrometer, a process occupying $\frac{1}{2}$ hr.

F. O. Howitt.

***Lobelia* alkaloids.** W. Peyer and F. Gstirner (Arch. Pharm., 1932, **270**, 44—48; cf. David, B., 1929, 416).—The alkaloids in Herba lobelia may be determined by the following methods. (i) The drug is shaken with Et_2O and aq. NH_3 and the Et_2O solution extracted with dil. HCl. Aq. NH_3 is added to alkalinity, followed by extraction with Et_2O. The residue after removal of Et_2O is taken up in aq. EtOH and titrated with HCl. (ii) After removing the Et_2O, the residue is taken up with HCl and the alkaloids are pptd. with silicotungstic acid. The ppt. is dried at 100°, ashed, and weighed. (iii) The aq. NH_3–Et_2O extract of the drug is extracted with dil. HCl and treated with silicotungstic acid as in (ii). To determine the alkaloids in Tinctura lobelia, the latter is evaporated in vac. to a few c.c. at 30—40°, taken up with HCl, made alkaline with aq. NH_3, extracted with Et_2O, and the residue, after removing the Et_2O, is taken up with aq. EtOH and titrated as above.

H. Davson.

Comparison of the physiological activity of fluid extracts of ergot as determined by the cock's-comb and colorimetric methods. T. D. Gerlough (Amer. J. Pharm., 1931, **103**, 644—647).—An examination of 24 samples of the extract by the U.S.P. X colorimetric and cock's-comb methods showed that fair agreement existed between the two; the average deviation of the chemical from the biological method was 16·2% and the former gives a good estimate of the potency. Used in conjunction with the biological assay the colorimetric method eliminates considerable preliminary testing. E. H. Sharples.

Bakelite ointment jars.—See XIII. **Vanillin in chocolate etc.**—See XIX.

Patents.

Manufacture of disubstituted carbamic acid esters. F. Hoffmann-La Roche & Co. A.-G. (B.P. 359,865, 30.3.31. Ger., 2.1.31).—Compounds, having a physostigmine-like action, but stable in hot water, are obtained by the action of disubstituted carbamyl halides on alkali salts of phenols containing aliphatic or heterocyclic *tert.* N or of a *sec.* amine on carbonates of such phenols. Examples are: *m*-dimethylaminophenyl phenylmethylcarbamate, m.p. 84°, b.p. 245°/18 mm., diphenylcarbamate, m.p. 110°, and dimethylcarbamate, b.p. 190°/14 mm. from K *m*-dimethylaminophenoxide and phenylmethyl-, diphenyl-, and dimethyl-carbamyl chlorides, respectively; ω-diethylamino-*o*-tolyl dimethylcarbamate (methiodide, m.p. 157°), from *o*-hydroxybenzyldiethylamine, b.p. 120—125° (sulphate, m.p. 173—174°); 8-quinolyl dimethylcarbamate, m.p. 80° (hydrochloride, m.p. 195°) from 8-hydroxyquinoline; *m*-dimethylaminophenyl piperidinocarbamate, m.p. 56°, from the carbonate and piperidine. C. Hollins.

Manufacture of trialkoxy-derivatives of phenylethylamine. Soc. Chem. Ind. in Basle (B.P. 360,266, 7.1.31. Switz., 8.1.30).—ω-Nitro-3 : 4 : 5-alkoxystyrenes, in which at least one alkyl is above C_1, are reduced. 3 : 4 : 5-Triethoxybenzoyl chloride, b.p. 153°/1 mm., is hydrogenated and the resulting 3 : 4 : 5-triethoxybenzaldehyde, m.p. 69—70°, is condensed with nitromethane to give the nitrostyrene, m.p. 108—109°, from which 3 : 4 : 5-triethoxyphenylethylamine, b.p. 140°/1 mm. (hydrochloride, m.p. 178—179°), is obtained. Other compounds described are: 3 : 5-dimethoxy-4-butoxybenzoyl chloride, b.p. 160°/4 mm. (aldehyde, m.p. 54—55°; nitrostyrene, m.p. 94—96°; amine, m.p. 153—154°), and 3 : 5-dimethoxy-4-benzyloxybenzoic acid, m.p. 159—160° (chloride, m.p. 95°; aldehyde, m.p. 65—66°; nitrostyrene, m.p. 134—135°; amine, m.p. 163°). C. Hollins.

Manufacture of *l*-1-phenyl-2-methylaminopropan-1-ol [*l*-β-methylamino-α-phenyl-*n*-propyl alcohol (*l*-ephedrine)]. Knoll A.-G. Chem. Fabr., G. Hildebrandt, and W. Klavehn (B.P. 360,334, 8.3.31. Ger., 8.4.30).—*l*-Phenylpropanolone, obtained, *e.g.*, by fermentation of sucrose in presence of PhCHO, is reduced in presence of NH_2Me to *l*-ephedrine, m.p. 40° (B,HCl, m.p. 214—216°). Suitable reducing agents are Al–Hg in wet Et_2O, and H_2 and colloidal Pt. C. Hollins.

Making silver salt of amino-sulphonated castor oil. W. T. Winckler, Assr. to Von Winkler Laboratories, Inc. (U.S.P. 1,809,770, 9.6.31. Appl., 11.6.30).—The dried Ag salt of sulphonated castor oil is treated under pressure with ethylenediamine; the clear, red-brown, liquid product is miscible with H_2O in all proportions, and is suitable for pharmaceutical use. (Cf. U.S.P. 1,751,964; B., 1930, 1091.) E. Lewkowitsch.

Denicotining raw tobaccos, intermediary products, and tobacco products ready for use. Gen.-Direktion der österr. Tabak Régie (B.P. 363,614, 24.12.30. Austr., 27.12.29. Cf. B.P. 315,715; B., 1931, 319).—The tobacco is heated to about 100° by a current of a non-condensing medium (air) and then to a suitable temp. by superheated steam. L. A. Coles.

Extraction of caffeine.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Patents.

Supports for carrying photographic plates or films for *X*-ray exposures. N. V. Philips' Gloeilampenfabr. (B.P. 365,387, 3.3.31. Holl., 8.3.30).

[Copying photographs on lenticular films in] colour photography. C. Nordmann (B.P. 364,627, 1.10.30. Fr., 1.10.29).

Viscose films.—See V.

XXII.—EXPLOSIVES; MATCHES.

Determination of water in nitrocellulose by means of alcohol, xylene, etc. W. Fermazin (Chem.-Ztg., 1931, **55**, 995).—A 10% mixture of sample and EtOH or xylene is heated in a salt-bath in a current of N_2, and the resulting vapours are passed through a sintered-glass crucible containing CaC_2, the solvent then being condensed and returned to the distillation flask, while the C_2H_2 passes over to an absorption vessel containing ammoniacal Cu_2Cl_2. The resulting Cu_2C_2 is subsequently removed by filtration, dissolved in HCl, and a solution of the residue after evaporation reduced with H_2SO_3 and pptd. with NH_4CNS; 1 g. $Cu_2(CNS)_2 \equiv 0{\cdot}1481$ g. H_2O. The reagent must be freshly prepared by decolorisation of 20% $CuSO_4$ with NH_2OH,HCl and addition of aq. NH_3 in slight excess. The error is about 1 mg. for 1 g. H_2O. J. Grant.

Solvent recovery by the Bayer active-carbon process in the manufacture of cordite and similar products. J. C. Liddle (Chem. & Ind., 1932, 3—4).—A plant, comprising two adsorbers, a condenser, and blowers, is described. The solvent concn. may be as low as 1/500 of full saturation. This gives a wide safety margin and enables strong suction to be employed, thus avoiding the formation of pockets of gas. Active C lowers the vapour tension of solvent vapours and so reduces the inflammability of the gas in the adsorbers. During adsorption the max. rise in temp. is 10°, and as the highest temp. reached by the C is 110°, which occurs during steaming, no oxidation takes place. The C is dried by passing air at 100° through it. The capacity of a plant at a Chinese factory is 1 ton per day, and the average concn. 10—20 g. per cu. m. About 87% of available solvent is recovered, and loss during adsorption is $< 1\%$. British Carbo-Union (Bayer) plants usually show 98% efficiency. W. J. Wright.

Patents.

Deacidification of nitroglycerin and similar nitrated products. K. H. Schmid (B.P. 362,175, 16.12.30. Ger., 28.12.29).—Purification is effected by means of anhyd. NH_3, introduced directly in the form of a spray or, alternatively, as a solution in nitroglycerin, the process being made continuous by allowing the mixture of nitroglycerin and salt to overflow. During the reaction the mixture may be circulated by mechanical stirrers or by utilising the NH_3 gas blast, and suitable means of cooling may be employed, if desired. Excess of dissolved NH_3 can be removed by an air current. The process is also applicable to nitrated aromatic hydrocarbons and liquid nitrated Cl-substitution products of polyhydric alcohols. W. J. Wright.

Priming compositions for percussion caps. Imperial Chem. Industries, Ltd., and A. Weale (B.P. 362,048, 19.9.30).—The sensitiveness of compositions containing Pb azide, either cryst. or colloidal, is increased by addition of guanylnitrosoaminoguanyltetrazen (" tetrazen "), the amount of the latter being increased when the azide content is low and the proportion of the other inert components consequently high. Two suitable compositions contain Pb azide 25, 14; $Ba(NO_3)_2$ 54·5, 46; $CaSi_2$ 20, 20; " tetrazen " 0·5, 10; PbO_2 0, 10. The tendency of the azide to separate during the loading of the caps may be avoided by introducing the composition in two layers, one consisting of the azide-tetrazen mixture, and the other of the combustible and the oxidising agent. W. J. Wright.

Gun wad felt.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Theory and practice of aëration. W. F. Langelier (J. Amer. Water Works' Assoc., 1932, **24**, 62—72).—Many of the uses of mechanically produced aëration at atm. pressure are described, with particular reference to water and sewage. The factors which determine the effectiveness of an aërator installation, whether used for absorption of O_2 or removal of CO_2 or other volatile substances, are: temp. of the water, saturation deficit (or surplus) of the gas in the water, area of contact surface per unit vol. of the water, time of contact, and turbulence of water at contact surface. Theoretically bubble-type aërators are more efficient than waterfalls, cascades, or sprays. In the activated-sludge process of sewage purification a combination of bubble aërator and mechanical stirrer is considered likely to be advantageous. C. Jepson.

Fluorescence in relation to sewage. J. A. Radley (Analyst, 1932, **57**, 28—29).—A substance with a strong blue fluorescence in ultra-violet light may be extracted from sewage by Et_2O, and is, apparently, a mixture of a fat with a very intense reddish-yellow fluorescence and creatinine. The use of ultra-violet light offers no advantages over the usual methods of analysis.
T. McLachlan.

Removal of [free carbonic] acid from water. J. Tillmans, P. Hirsch, and H. Lürmann (Gas- u. Wasserfach, 1931, **74**, 1097—1101, 1128—1133, 1147—1149, 1172—1175, 1195—1198).—The use of $CaCO_3$ for the purpose is ineffective if the content of $CaHCO_3$ is considerable. Theory suggests that the difficulty would not arise if $MgCO_3$ were used in place of $CaCO_3$. As natural magnesite or dolomite reacts only very slowly with CO_2 in solution, ignited magnesite must be used. The granulated product reacts with water without losing its structure, and is therefore preferred to dolomite. After the initial vigorous action due to the presence of free MgO a uniform reduction of free CO_2 in a corrosive water occurs over a long period. Neutrality, *i.e.*, equivalence of CaO and CO_2 content, was obtained if the feed was not too great, but was not secured by a similar filter packed with marble with one eighth of the water feed. An excessive feed of water was found gradually to reduce the efficiency of the magnesite, owing to surface absorption of CO_2. Similarly, a water containing excess CaO, as would happen with reduced flow, causes a surface deposit of CaO to form which also reduces reaction. The filter therefore is in a sense self-regulating and cannot bring the water to greater alkilinity than equivalence of CaO and CO_2. The material hardens somewhat with use, but without producing back-pressure, and a filter treating 8 litres per hr. was worked for 9 months without any loss of efficiency. The above results were obtained with a moderately hard corrosive water. A soft corrosive water was treated successfully at 20 litres per hr. In this case a prefilter containing $CaCO_3$ is an advantage. With a hard water a flow of 12 litres per hr. gave a non-corrosive water and with a 50% excess the free CO_2 was negligibly slight. Such a water could not be treated with $CaCO_3$ at all. In all cases the Fe content of the magnesite-treated water was nil after the first few days. The magnesite after use invariably contained about 25% CO_2, irrespective of the water treated. A product of similar composition is obtained by heating magnesite to 570°. It is equally efficient and the bringing-in period is reduced. The magnesite process is far superior to aëration, treatment with Na_2CO_3, or with $CaCO_3$, being complete in its action and yet unable to give excess alkalinity. C. Irwin.

Water analysis, its interpretation and relationship to water purification. N. J. Howard (J. Amer. Water Works' Assoc., 1932, **24**, 132—138).—A lecture.
C. Jepson.

Patents.

Purification of air. E. H. Tetley (B.P. 363,124, 9.12.30).—Purified air, suitable for power purposes in breweries etc., is obtained by passing it through aq. $KMnO_4$ by means of a comparatively large, double-convex nozzle. Any $KMnO_4$ carried forward is collected on inclined baffles with staggered openings and is returned. C. Jepson.

Manufacture of a sanitary composition. Harpic Manufg. Co., Ltd., and H. Pickup (B.P. 362,363, 1.9.30).—A mixture of nitre cake with 8—12% of $Al(SO_4)_3$ is heated for 2½—3 hr. above its fusion point (220—230°), allowed to cool, and pulverised. A " synthetic " nitre cake may be used.
H. Royal-Dawson.

Manufacture of respiratory masks. O. H. Dräger, Assee. of Drägerwerk Heinr. & Bernh. Dräger (B.P. 365,347, 5.2.31. Ger., 5.3.30).