

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUG. 28 and SEPT. 4, 1931.*

I.—GENERAL; PLANT; MACHINERY.

Heating value of superheated and saturated steam. C. KIRSCHBAUM (Chem. Fabr., 1931, 287—288).—Experiments with two heat exchangers containing, respectively, straight and spiral steam coils showed that the difference between heat transfer with and without superheat is inappreciable. In the calculation of heating surfaces it is sufficient to take the heat-exchange number and temp. fall, referring to saturated steam at the appropriate pressure. C. IRWIN.

Effect of scrapers on heating, cooling, and mixing. F. E. HUGGINS, JUN. (Ind. Eng. Chem., 1931, 23, 749—753).—Curves are produced indicating the increased rate of heating or cooling of liquid or semi-liquid masses when efficient scrapers remove the insulating layer formed on the container. The use of scrapers was not justified for thin liquids, *e.g.*, water, but much time was saved with the more viscous liquids as represented by heavy oils. C. A. KING.

Huillard drying furnaces. J. HAMON (Bull. Soc. Ind. Mulhouse, 1930, 96, 484—490).—The usual type of Huillard dryer comprises a tower with several superposed perforated hearths with larger central apertures; on a vertical shaft are rabbles rotating on each hearth, working the material inwards, and rotating distributors over each central aperture, upon which the material is worked outwards by fixed rabbles, gases from the furnace passing upwards, and salt or other material to be dried, downwards. On account of its great economy of fuel (1.3% of standard coal against 3.4% for a rotating cylinder) it was formerly adopted for drying KCl; a further economy is possible if waste gases are available. The formation of crusts in the furnace and corrosion in the exhaust fan and cyclone collector (through which some damp salt will pass) were both very serious. The trouble was due to the formation of a NaCl-KCl mother-liquor provided by the first moisture evaporated, and was known to disappear when 3—4% out of the total 8—10% of moisture had been removed; therefore the top hearth was heated more intensely. One method of doing this is to admit about one third of the fresh gases to the top hearth direct, and to exhaust them from above the second while the remaining two thirds pass from the bottom to the same exhaust. A more complicated flow is also described in which all the gases pass countercurrent to the material through at least one hearth before being exhausted. The rotating distributors are also made conical and the fixed rabbles abolished, and provision has been made for controlled admission of cold air to various points. B. M. VENABLES.

Tank insulation. ANON. (Ind. Eng. Chem., 1931, 23, 776).—The insulation of the working tanks in a creosoting installation from which the creosote at a temp. of 93° is circulated through the treating cylinders effected a fuel saving of 12.3%. C. IRWIN.

Multiple-bush hot air and gas pyrometer. W. GILBERT (Engineering, 1931, 132, 63).—The thermocouple, in this case used for measuring the temp. of the exit gases from a rotary kiln, is surrounded by a number of concentric tubes between which the hot gases pass. This minimises loss of heat from the couple by radiation if the walls of the pipe are at a lower temp. than that of the gases. C. W. GIBBY.

Weight-%.-mol.-% nomograph. H. WATERMAN (Ind. Eng. Chem., 1931, 23, 803).—In a binary system of which *A* and *B* are the mol. wts. of the components, a pivot point is obtained on the nomograph where the straight line joining *A* and *B* cuts the centre line. Then any line drawn through this point will join equiv. mol.-% and wt.-% of *A*. Three-component systems may be dealt with by taking them in pairs. The component scales are logarithmic, whilst the mol.- and wt.-% scales are plotted as $\log(100 - x)/x$. C. IRWIN.

Anhyd. liquid SO₂.—See VII. **Corrosion prevention.**—See X. **Purification of gases.** **Flue gas purification.**—See XI.

PATENTS.

Chemical furnace. F. L. PRESTON (U.S.P. 1,784,109, 9.12.30. Appl., 7.7.28).—The apparatus comprises two heated pans in line and a single hood which is placed over the pan in action and removed from that being discharged and charged. One side of the sloping roof of the hood is double and is continued over the edge of the pan into a trough, forming an outlet passage and liquid seal for gases, in the latter of which noxious or desired constituents may be absorbed. B. M. VENABLES.

Processes for heating material to medium and high temperatures with utilisation of heat of condensation. E. DAUB (B.P. 349,923, 27.11.29).—Oils are distilled or cracked by utilising the latent heat of condensation of stable cyclic org. compounds of of b.p. above 100°, *e.g.*, C₁₀H₈, C₁₄H₁₀, PhOH, diphenol, quinoline, etc. The temp. in different parts of the apparatus may be regulated as required by suitably controlling the pressure. A. B. MANNING.

Treatment of liquid furnace material. C. H. SCHOL (B.P. 350,035, 11.3.30. Ger., 28.1.30).—Liquid slag is poured on to the top of a wheel which is provided

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

with shallow cavities in which H_2O or other vapour-producing material has been previously charged. The resulting porous mass is allowed to form a continuous band overflowing the cavities and is removed by a rotating scraper at the lower part of the wheel. The H_2O or other fluid may be supplied through radial pipes attached to the wheel and provided with valves which are automatically open through about $\frac{1}{4}$ of a revolution and closed for $\frac{3}{4}$.

B. M. VENABLES.

Recuperative furnace construction. A. E. WHITE. From MORGAN CONSTRUCTION Co. (B.P. 350,278, 4.7.30).—Vertical recuperator tubes supported on an apertured plate are provided with means for locking the tubes to the plate so that they cannot creep upwards owing to repeated expansion and contraction.

B. M. VENABLES.

Heat-exchanging apparatus. C. COOPER, D. M. HENSHAW, and W. C. HOLMES & Co., LTD. (B.P. 350,190, 12.5.30).—In a heater or cooler having a thermostat in the outgoing stream of fluid that is to be discharged at const. temp., if the flow is irregular (*e.g.*, water-gas) a single thermostat will be insufficient owing to lag. In this invention claim is made for the use of an additional thermostat in the inlet stream or at some intermediate point in the path of the desired fluid, to effect a preliminary regulation of the heating or cooling agent.

B. M. VENABLES.

Grinding mills. HARDINGE Co., INC., ASSEES. OF H. HARDINGE (B.P. 350,785, 21.7.30. U.S., 22.7.29).—A screening device situated inside the outlet of a cylindrical mill is described. Scoop-like members formed of a grid backed by screening material are attached to the shell near the outlet; these permit undersize to pass out through the trunnion and deliver oversize and balls to shoots which, when they are in an upper position, are inclined back into the interior of the mill. At the same time a central passage is left for the discharge of any abnormal overload of material.

B. M. VENABLES.

Grinding of materials. J. F. GODDARD, and SUPER CEMENT, LTD. From J. LUNDTEIGEN (B.P. 350,538, 12.3.30).—Material, *e.g.*, cement clinker or gypsum, being ground in the dry state has mixed with it a segregating agent which when rubbed against the particles being ground generates static electricity and causes repulsion of the particles.

B. M. VENABLES.

Pulveriser. G. H. KAEMMERLING, ASSR. to ERIE CITY IRON WORKS (U.S.P. 1,783,717, 2.12.30. Appl., 16.7.29).—A pulveriser of the type having a beater and fan on the same shaft is rendered usable on damp or clogging material by the provision of extra air inlets on the side of the fan casing remote from the beater; the inlets are normally closed by plugs, but in the event of clogging they are opened and an additional rush of air is permitted through the fan.

B. M. VENABLES.

Apparatus for crushing, granulating, or grinding minerals, rock, slags, etc. J. F. WAKE (B.P. 349,995, 6.2.30).—The apparatus comprises a number of nested rings, of progressively different diameters, which are caused to approach and recede from each other by the action of a central driving cylinder or roll which is either (*a*) eccentric, and squeezes the intermediate

rings at a rotating point against a resiliently fixed outer ring, or (*b*) concentric, and squeezes the rings at one point between itself and an outer roll.

B. M. VENABLES.

Single-roll crusher. G. W. BORTON, ASSR. to PENNSYLVANIA CRUSHER Co. (U.S.P. 1,783,373, 2.12.30. Appl., 9.5.24).—A long single-roll crusher has the breaker plate divided into sections which can yield individually to uncrushable pieces.

B. M. VENABLES.

Hammer crusher. G. W. BORTON, ASSR. to PENNSYLVANIA CRUSHER Co. (U.S.P. 1,786,694—5, 30.12.30. Appl., 6.6.29).—Crushers of the type described in U.S.P. 1,772,533 (B., 1931, 370) are provided with means for hindering large pieces from entering the disintegrating zone, while permitting them to be struck by the hammers projecting through the grid forming the bottom of the hopper.

B. M. VENABLES.

Pulverising mill. F. J. BULLOCK, ASSR. to PAPEC MACHINE Co. (U.S.P. 1,785,435, 16.12.30. Appl., 21.1.30).—Hammer heads for a disintegrator are constructed of laminated metal, the outer sheets being harder than the inner ones; alternate sheets may be wider than the others.

B. M. VENABLES.

Automatic temperature control in pulverising mills. J. CRITES and W. A. KOREN, ASSRS. to RAYMOND BROTHERS IMPACT PULVERIZER Co. (U.S.P. 1,783,358, 2.12.30. Appl., 11.1.29).—In an air-borne grinding system operating in a closed circuit and effecting drying of the material by withdrawal of moist air and supply of a corresponding quantity of fresh preheated air, thermostats are provided both in the pulveriser and in the fresh-air supply pipe either of which will cut off the fuel from one of the burners effecting the air heating should the set temp. be exceeded. For coal the former temp. may be about 45° to remove part of the moisture, and the latter about 180° to prevent ignition.

B. M. VENABLES.

Separation of dry materials. C. W. H. HOLMES, and BIRTLEY Co., LTD. (B.P. 349,899 and 350,485, [A] 22.11.29, [B] 3.12.29).—Shaking tables with air currents upwards through the decks are described. In (*A*) the deck slabs of a twin table are independently adjustable; in (*B*) a table as described in B.P. 332,291 (B., 1930, 886) has both the spillage edge and the banking bar inclined to the line of reciprocation, the latter at the greater angle.

B. M. VENABLES.

Separation of dry materials. C. W. H. HOLMES, and BIRTLEY Co., LTD. (B.P. 350,497, 7.12.29).—The materials are allowed to slide down a shoot having adjustable inclination and to impinge upon a roller of glass or other resilient material; the substance having the lower coeff. of friction, *e.g.*, coal, acquires a greater velocity and bounces further. The roller is rotated at an adjustable speed, but in no case fast enough to produce centrifugal effect, and is provided with a brush or other means to remove dust.

B. M. VENABLES.

Mechanical [air-]separator. W. M. COOK, ASSR. to INTERNAT. COMBUSTION ENG. CORP. (U.S.P. 1,783,357, 2.12.30. Appl., 23.12.29).—A separator embodying a rotating distributor plate and upward and rotating air currents is described.

B. M. VENABLES.

Apparatus for extracting liquid from solid or semi-solid matter by pressure. R. T. BINNIE and W. MILLER (B.P. 350,509, 12.2.30).—The material is squeezed between chain conveyors. Two separate chains are used: the inner one is guided in a polygonal path by internal rollers; the outer is bent back on itself and almost embraces the inner chain, the part not so embraced serving for the feeding and withdrawal of material.
B. M. VENABLES.

Classifying and washing apparatus. H. W. NEWTON, Assr. to DORR Co. (U.S.P. 1,784,246, 9.12.30. Appl., 9.7.25).—A combination of a trommel and a rake classifier is described. The former may be set either longitudinally or transversely to the latter and is provided with a scoop feed and trunnion discharge having provision for draining the oversize.
B. M. VENABLES.

Continuous weighing of sediment [as precipitated]. A. SEMLER (B.P. 348,459, 14.7.30. Austr., 12.7.29).—Sediments are weighed as they are formed from suspensions etc. by means of a torsion balance with submerged pan. The arm which adjusts the torsion of the spring may either be continually adjusted to follow the wt. of sediment, or it may be set to a predetermined increment in wt. (the pan arm being prevented from following by a stop) and the time taken for the pan to acquire that wt. noted.
B. M. VENABLES.

Centrifugal machines for separation of materials. H. KAMMERL (B.P. 348,806, 1.4.30. Ger., 23.11.29).—A sieveless centrifuge is provided with a number of ring weirs which form pockets for the collection of heavy material, *e.g.*, impurities in kaolin or asbestos. Elastic bolsters may be formed in the pockets by the admission of material such as cotton fibre. [Stat. ref.]
B. M. VENABLES.

Centrifugal bowls. AKTIEB. SEPARATOR (B.P. 349,880, 26.9.30. Swed., 28.9.29).—In a separator having outlets for heavy matter together with an additional carrier liquid, the original material and the carrier liquid are supplied to separate chambers in the upper part of the bowl hood and led therefrom through closed passages to suitable points in the separating and discharge zones, respectively.
B. M. VENABLES.

System of filtration. J. PUGLIESE (U.S.P. 1,783,341, 2.12.30. Appl., 31.8.29).—Material such as sewage is passed through a tank with a bottom inclined in both directions and provided with a series of weirs to entrap heavy solids. The effluent then passes in order through a series of sand and charcoal filters arranged in cascade and finally through a second sloping tank. Closable apertures are provided in the weirs at different levels to discharge retained liquid and solids separately.
B. M. VENABLES.

Filtration system. C. T. CABRERA, Assr. to ELECTRO DIALYZER CORP. (U.S.P. 1,784,132, 9.12.30. Appl., 9.7.28).—The material, *e.g.*, sewage, is supplied downwards through an axial pipe to an intermediate level of a vertical vessel; from this zone the heavy solids settle out and the fluid rises through a filter bed supported on a foraminous shelf and kept clean by a squeegee or other device rotating against its lower

surface. At the top of the vessel the clear liquid is aerated by injected air, and by allowing it to flow over and through perforated shelves. The liquid may finally be allowed to fall through a considerable head and provide the energy to work the squeegee and air compressor.
B. M. VENABLES.

Cake-discharging means for pressure filters. J. A. McCASKELL (U.S.P. 1,784,372, 9.12.30. Appl., 7.10.25).—In a filter of the rotating-disc type the tank for prefill is formed of deep corrugations inside the pressure-tight casing. The top edges of the tank on the down-going side are provided with scrapers which remove the cake from the discs and cause it to fall between the corrugations into a longitudinal worm conveyor which, in the receiving portion of its length, has a single worm, but in the delivery portion the worm is double, is entirely surrounded by its casing, and compresses the cake through a restricted outlet, discharging it without allowing pressure medium (air) to escape. Excess moisture is allowed to escape to the prefill tanks through perforations in the worm casing.
B. M. VENABLES.

Filter-cake discharger. J. V. ZENTHOEFER, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 1,785,237, 16.12.30. Appl., 15.2.27).—A rotary brush or scraper for the removal of filter-cake is constructed of a number of U-shaped strips of rubber or similar material. In the construction of the hub care is taken, by the use of suitably rounded parts, to avoid severe bending stresses in the rubber.
B. M. VENABLES.

Liquid filter. SVENSKA ACKUMULATOR AKTIEB. JUNGNER (B.P. 336,122, 29.10.29. Swed., 30.10.28).—A filter is constructed of thin metal plates without distance pieces or projections from the surface, a pack of peculiarly shaped plates is assembled with odd numbers one hand and even numbers the other hand, and the filtering interstices can be cleaned by merely rotating the odd numbers relatively to the even.
B. M. VENABLES.

Centrifuge. G. B. PETSCHKE and A. E. DRISSNER, Assrs. to NAT. ACME Co. (U.S.P. 1,783,546, 2.12.30. Appl., 7.9.29).—The bowl comprises a number of concentric cylinders, passage of fluid being permitted only round their ends; the fluid is passed first through the inner compartment in a thin layer on the wall, then through the outer, and finally through the middle compartment. The apparatus is convertible from a clarifier into a machine capable of separating a larger quantity of heavy material, by altering the radius of discharge of the heavier component by effecting rotation of plugs with eccentric apertures.
B. M. VENABLES.

Mixer [for stiff materials]. K. ADAMS (U.S.P. 1,783,553, 2.12.30. Appl., 21.6.28. Renewed 6.1.30).—A mixer for stiff concrete and other materials comprises a rotating but non-tilting bowl with stirring blades, and a vertical shaft, also with stirring blades, rotated from the top through a screw device and connected at the bottom to a discharge door. For mixing, the bowl and shaft are rotated in such opposite directions that the shaft screws itself upwards and closes the door; afterwards the whole is reversed, the shaft screws itself downwards, the door is opened, and the material pushed out.
B. M. VENABLES.

Feeder and disintegrator or mixer. R. V. ARNOLD, E. E. FLICKINGER, and S. E. WANTZ (U.S.P. 1,786,556, 30.12.30. Appl., 3.7.29).—The apparatus comprises a cylindrical casing with apertures in the upper part at each end; above one aperture is a feeding hopper and below it a worm conveyor which extends towards the other (outlet) aperture. Under the latter are stirring blades or rods which effect a certain amount of throw-back and thoroughly mix the material before it is forced out by the action of the previous screw.

B. M. VENABLES.

Mixing apparatus. C. R. and A. B. SMITH (B.P. 350,644, 10.4.30).—An apparatus for purposes such as mixing foundry sand comprises a stationary pan with blades rotating in the space between the bottom of the pan and fixed inclined blades. The material is thus given a surging motion and is discharged through a slot in the side of the pan (which does not extend to the bottom), aided, if desired, by a paddle device.

B. M. VENABLES.

Emulsifying or homogenising apparatus. Q. MOORE (B.P. 350,716, 5.6.30).—The fluids are forced through a series of superposed spaced plates which are provided with grooves on one side; small apertures extend from some of the grooves through the plates, but no two apertures are opposite each other.

B. M. VENABLES.

Machines for mixing liquid, semi-liquid, or viscid materials. A. SONSTHAGEN (B.P. 350,689, 17.5.30).—Within a cylindrical, horizontally disposed casing, which may be heated, are rotated helical members having inwardly projecting teeth or blades which intercalate with other radial blades fixed to a central shaft. Both the inlet and outlet for material are in the upper part of the casing, at opposite ends. B. M. VENABLES.

Apparatus for the abstraction of heat from liquids. R. J. WATT (B.P. 350,632, 4.4.30).—The exchanger is especially suitable for the cooling of H_2O or oil on an aeroplane and consists mainly of a casing in stream-line form to the interior of which is attached corrugated sheets forming passages for the liquid to be cooled.

B. M. VENABLES.

Water-cooling towers. L. G. MOUCHEL & PARTNERS, LTD., and A. T. J. GUERITE (B.P. 350,081, 20.3.30).—A ferro-concrete tower is constructed of precast slabs having diagonal bars protruding from the corners; the bars are hooked or pinned to each other and the spaces filled with concrete cast *in situ*.

B. M. VENABLES.

Atomisers. C. FORTIER (B.P. 350,091, 24.3.30).—An atomiser of the type in which a spray of liquid is expelled by a stream of vapour of the same liquid from the same vessel is provided with a jet having means of closure, a mixing chamber, and two collecting pipes terminating at opposite ends both longitudinally and diametrically of the interior of the vessel, so that, whatever the position of the latter, one pipe will deliver vapour and the other liquid.

B. M. VENABLES.

Apparatus for mixing liquids. F. DUWE, Assr. to MASCHINENFABR. AUGSBURG-NÜRNBERG A.-G. (U.S.P. 1,786,009, 23.12.30. Appl., 28.5.29. Ger., 13.6.28).—Liquid in a tank is mixed by means of a propeller drawing upwards from the lower part of the tank and

distributing the liquid in a horizontal veil over the surface.

B. M. VENABLES.

Apparatus for producing aqueous dispersions [of thermo-plastic substances]. A. L. CLAPP, Assr. to BENNETT, INC. (U.S.P. 1,787,339, 30.12.30. Appl., 1.2.27).—The materials are heated separately and charged together into a conveyor-mixer of the worm type. Cold diluting H_2O may be added in the later part.

B. M. VENABLES.

Crystallisation [of sugar etc.]. J. R. and T. RAY (U.S.P. 1,785,530, 16.12.30. Appl., 18.1.28).—Four evaporators are operated in quadruple effect of the steam and the flow of solution is partly intermittent and partly continuous from No. 4 to No. 1, then to Nos. 2 and 3 together, No. 1 being operated at the highest temp. and No. 4 at the lowest.

B. M. VENABLES.

Treatment of fluids with solids. I. H. LEVIN, Assr. to GAS INDUSTRIES Co. (U.S.P. 1,785,273, 16.12.30. Appl., 1.6.25).—The apparatus is particularly suitable for the purification and dehydration of air by means of solid $NaOH$. It comprises a number of pressure-tight towers so connected that the gas may be passed through them in any cyclic order. Provision is made for the draining away of $NaOH$ solution and for flushing out one tower at a time with H_2O or other solvent.

B. M. VENABLES.

Carrying out gas reactions at high temperatures. IMPERIAL CHEM. INDUSTRIES, LTD., T. S. WHEELER, and W. B. FLETCHER (B.P. 349,958, 27.1.30).—Gases which react endothermically are passed at high velocity through unpacked chambers which are long and deep, but very narrow, and alternate with long and deep heating flues; by which the temp. is maintained above 1000° . A method of construction of a furnace with regenerators is described.

B. M. VENABLES.

Apparatus for chemical reactions. T. GRISWOLD, JUN., Assr. to DOW CHEM. Co. (U.S.P. 1,785,080, 16.12.30. Appl., 27.1.27).—The apparatus is suitable for reactions between vapours and consumable solid material or between fluids in the presence of a solid catalyst, an example of the former being the manufacture of CS_2 . A number of towers, preferably of ceramic material, are arranged in pairs in a heated setting; one tower of each pair is kept filled with the solid material, *e.g.*, charcoal, and is connected by a passage at the bottom to a second tower which contains a spiral shelf upon the upper end of which the other material, *e.g.*, S , is charged in the molten state through a swan neck, becoming vaporised as it trickles down the shelf and passing upwards through the C. The lower cross-passage also serves for removal of ash, and the heating flues are arranged so that the combustion gases may pass round either tube first and the other second or around both in parallel.

B. M. VENABLES.

Treatment of flue gases, residual trade gases, and the like. LONDON POWER Co., LTD., and S. L. PEARCE (B.P. 334,660, 16.7.29).—The gases are first passed through a chamber or conduit in which they are saturated by heated fluid and passed between baffle boards, then, after a change in direction, they are subjected in another chamber to douching with

substantial quantities of liquid, and finally they pass through scrubbers and again change their direction. Besides the usual dry grit catchers, the primary chamber may be adapted to collect grit, another set of scrubbers or moisture eliminators may be provided after the second change in direction, and last of all a quantity of hot air may be added. Catalytic oxidising agents may be provided in the primary chambers, or ozonised air added after pretreatment; the wash-water may be made alkaline.

B. M. VENABLES.

Condenser for mixed vapours. G. L. KOTHNY, Assr. to C. H. WHEELER MANUFG. CO. (U.S.P. 1,786,163, 23.12.30. Appl., 6.7.25).—The apparatus is suitable for the separate condensation within one shell of oil vapour and steam. The bundle of tubes is divided into sections through which the cooling H_2O passes in series, baffles in the vapour space being provided to ensure that the incoming vapours strike the warmest tubes first. The oil is condensed on these and floats on the surface of the H_2O which is condensed on the cooler tubes. The two liquids are withdrawn together in easily separable form.

B. M. VENABLES.

Apparatus for purifying gases. S. C. CUTLER (U.S.P. 1,786,150, 23.12.30. Appl., 22.10.26).—The apparatus comprises a tower or like vessel divided into two chambers each of which is provided with a number of atomising discs. In one chamber the gas is purified by contact with, *e.g.*, NaOH solution, in the other the caustic is regenerated by contact with air (*sic*).

B. M. VENABLES.

Gas-treating apparatus. W. L. SPALDING, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,785,792, 23.12.30. Appl., 5.10.25).—A gas, *e.g.*, ammonia vented from an autoclave, is bubbled into the lower part of a liquid circuit comprising a rising pipe including a cooling coil, a separating vessel from which permanent gases are vented, and a return pipe, the whole system being maintained under pressure to increase the solubility; provision is made for adding and withdrawing liquor.

B. M. VENABLES.

Filtering and cleaning of [air] filters. L. L. DOLLINGER, Assr. to STAYNEW FILTER CORP. (U.S.P. 1,784,278, 9.12.30. Appl., 1.4.25).—A number of air filters are divided into sections, each having a separate conduit leading to the exhaust fan, and hence the air during filtering passes through in parallel. By means of shutters which may be automatically operated by the increase of pressure across the filters, one section at a time is subjected to a high-velocity reverse current from the delivery side of the fan.

B. M. VENABLES.

Bag filters. W. SCHEIDT (B.P. 349,913, 27.2.30).—A framework for flat filter bags the sides of which are kept apart by chains, and also detachable means of connexion to the vacuum 'bus-pipe, are described.

B. M. VENABLES.

Steam dryers and separators and like apparatus for separating liquid particles from steam, air, or other gases. J. JONES, and A. MCCONWELL & Co., LTD. (B.P. 349,936, 1.3.30).—A separator of the deflexion type suitable for placing in the steam space of a boiler is described.

B. M. VENABLES.

Separation of the constituents of gaseous mixtures. C. C. VAN NUYS and J. L. SCHLITT, Assrs. to AIR REDUCTION CO., INC. (U.S.P. 1,784,120, 9.12.30. Appl., 23.10.26).—The original mixture in liquid form is subjected to primary rectification with the object of obtaining a liquid constituent of substantial purity. The effluent and other gaseous mixtures containing the constituents of the original are liquefied and passed through a secondary rectifier with the object of obtaining pure gaseous constituent. The impure liquid from the secondary is introduced into the primary at a point where the downflow liquid has a similar composition, and the pure liquid is subjected to heat exchange with the secondary rectifier to maintain the refrigeration.

B. M. VENABLES.

Arrangements for delivery of liquefied gases. L'AIR LIQUIDE SOC. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 350,882, 29.4.30. Fr., 30.4.29).—The delivery pump and suction chamber for delivering liquefied gas are made of non-corrodible metal and, as a precaution against access of air, are swept by the vapour given off from the upper part of the storage vessel. A shock absorber connected to the delivery of the pump comprises a long-length small-bore tube closed at one end and exposed to the heat of the atm. so that its contents are always gaseous.

B. M. VENABLES.

Defrosting of heat exchangers in apparatus for liquefaction, or separation by liquefaction, of gaseous mixtures. L'AIR LIQUIDE, SOC. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROD. G. CLAUDE (B.P. 350,057, 14.3.30. Fr., 15.3.29).—Two exchangers are used, one being in operation as such, while the other is being defrosted by a reverse current of a reheated constituent of the gas.

B. M. VENABLES.

Gas analysing apparatus. G. A. ALDRICH (B.P. 350,584, 3.12.30).—A gas burette is provided with a transparent gauge tube extending through it, which indicates the level of the H_2O or other displacing liquid in the pump chamber, to which it is connected by a tail taken downwards and sideways so that any air drawn in will not enter the burette; the upper end of the gauge is open to the atm.

B. M. VENABLES.

Hygrometers. NAT. FED. OF IRON & STEEL MANUFACTURERS (CORPORATE ORGANISATION), LTD., and L. REEVE (B.P. 349,941, 4.3.30).—A sample of the air is brought to a const. temp., which is above the dew point and preferably a few degrees above the room temp., by means of a thermostatically controlled heater and allowed to impinge at a const. and sufficient speed (preferably over 5 miles/hr.) upon a single wet-bulb thermometer, which may be calibrated to give direct readings of the moisture content.

B. M. VENABLES.

Viscosimeter. A. G. M. MICHELL (U.S.P. 1,786,574, 30.12.30. Appl., 20.7.28).—A viscosimeter (as described in U.S.P. 1,398,878) comprises a ball and a cup fitting on part of the surface, the time being noted for the ball to fall away from the cup under its own wt. when they are stuck together by a film of the liquid. To adapt the apparatus to liquids of high viscosity a collar is provided as an extra wt. for the ball.

B. M. VENABLES.

Pulverised-coal-burning furnaces. TODD DRY DOCK, ENGINEERING & REPAIR CORP. (B.P. 351,621, 11.4.30. U.S., 22.4.29).

[Cooled] furnace walls. BABCOCK & WILCOX, LTD. FROM TOYO BABCOCK KABUSHIKI KAISHA (B.P. 351,822, 5.9.30).

Reversing valves for regenerative furnaces. H. CROWE (B.P. 351,573, 18.10.30).

Heat-recuperating structures. H. DE GAILLARD & Co. (B.P. 351,863, 17.10.30. Fr., 17.10.29).

Process and apparatus for refrigeration. VOGT INSTANT FREEZERS, INC., ASSEES. OF C. W. VOGT (B.P. 352,125, 22.4.30. U.S., 13.5.29).

Refrigerating or freezing plants. DEUTS. WERKE KIEL A.-G., and P. SOMMER (B.P. 351,751, 7.7.30).

Heat-insulating walls or partitions. V. C. FROM and C. D. ROWLEY (B.P. 351,493, 26.3.30).

Lubricants.—See II. NH_3 detector for refrigerators. Refrigerant.—See VII. Coated Fe pipes. Boiler parts etc.—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Rational analysis of coal. R. V. WHEELER (Gas World, 1931, 94, Coking Sect., 13—16).—Chemical and microscopical studies of coal have indicated that the principal ingredients are (1) free hydrocarbons; (2) resins; (3) structured plant entities resistant to decay, such as spore exines and cuticles; and (4) ulmins, the degradation and condensation products of the cellular tissues and proteins of the plants. Methods are given for the approx. determination of these substances and of the reactivity of the ulmins. Modifications of these methods are necessary when dull coals (durains) are to be examined. Typical results of the rational analyses of a number of British coals are given. C. B. MARSON.

Microscopical and X-ray study of Pennsylvanian anthracite. H. G. TURNER and H. V. ANDERSON (Ind. Eng. Chem., 1931, 23, 811—815).—Coal constituents other than fusain are classified as anthraxylon (woody constituents) and attritus. Vitrain is anthraxylon, clarain and durain are mixtures of it with attritus. Coal samples containing anthraxylon bands were studied microscopically and radiographically, the anthraxylon being much more transparent to X-rays than the mineral matter. X-Ray diffraction photographs of anthraxylon show a fibre pattern resembling that of cellulose or graphite. Attritus shows no fibre pattern, but produces Debye-Scherrer rings due to SiO_2 , Fe_2O_3 , mica, etc. The anthraxylon particle is calc. to contain about 48 C atoms. C. IRWIN.

Catalytic hydrogenation of bituminous and anthracitic coal and their distillation products. B. HLAVICA and E. TRČA (Chem. Obzor, 1930, 5, 121—124; Chem. Zentr., 1931, i, 1997).—Hydrogenation of the coals is preferable to that of the products of low-temp. coking, much greater yields of tar and benzene being obtained. A. A. ELDRIDGE.

Tests with aluminium apparatus for determining the caking power of coal and other substances.

D. J. W. KREULEN (Chem. Weekblad, 1931, 28, 434—440).—A record of the effects of variations in details of manipulation, preparation of the sample, and conditions of test. S. I. LEVY.

Effect on certain measurable properties of coke of quenching with ammoniacal liquor. C. B. MARSON and H. V. A. BRISCOE (Gas World, 1931, 94, Coking Sect., 55—57).—Two series of tests in which cokes made from the same Durham coking coal were quenched (a) with H_2O and (b) with dil. ammoniacal liquor showed that the shatter index of the coke was slightly lowered by liquor-quenching. Examination of the cokes by a laboratory combustibility test in which a measured and const. blast of air was passed through an ignited column of sized coke indicated that the temp. developed and the rate of coke consumption were identical for both cokes. Liquor-quenching did not affect the size or colour of the coke or its behaviour in a domestic grate, and it is concluded that the quenching of such a coke with the dil. liquor is not likely to affect adversely its properties for metallurgical or domestic use or for use in the production of water-gas. It is emphasised that the tests deal only with the effects of quenching with dil. ammoniacal liquor and give no information as to the effects of using effluent liquors. C. B. MARSON.

Brown-coal gas. W. ALLNER (Gas- u. Wasserfach, 1931, 74, 305—311).—The analytical characteristics and effects of distillation of typical brown coals and of a bituminous coal are compared. Passage of brown- or bituminous-coal tar (alone or mixed with steam) over incandescent coke produces a gas intermediate in properties between oil gas and coal gas; the character of the liquid and gaseous products is largely determined by the temp. and reaction time. The experimental plant built at Kassel by the Braunkohlengas G.m.b.H. to produce town gas from brown coal on this basis is described in detail. Raw or briquetted brown coal is charged into a continuous vertical retort and the gas produced withdrawn near the bottom of the retort so that the steam and tar resulting from distillation undergo reaction at the surface of the incandescent coke; supplementary steam may also be injected. By variation of the speed of throughput and amount of added steam the composition of the gas may be controlled and, after washing to reduce the CO_2 content, a suitable town gas results. The composition of the gas and tar obtained in experiments with different brown coals is described. Appreciable amounts of benzol may be extracted from the gas. The character of the coke produced is dependent on the source of the coal, but it is generally suitable for briquetting with brown coal or for water-gas production, and the fine coke is suitable for boiler firing. The heat requirements and the economics of the process are discussed. H. E. BLAYDEN.

Gas from brown coal. A. THAU (Gas- u. Wasserfach, 1931, 74, 385—390).—Experiments at the Halle (Saale) gasworks showed that town gas comparable with that made from bituminous coal could be prepared by carbonising brown-coal briquettes in 7 retorts of a battery of 10 vertical retorts and cracking the resulting gas by passage through the remaining 3 retorts packed

with incandescent coke. The throughput was greater with brown coal than with ordinary coal and the coke size was dependent on that of the briquettes used. In the process designed by Seidenschmur, small brown coal is dried in a rotary dryer, briquetted in rotary presses, and the briquettes are transferred to a hopper above the retort and heated to 300° by waste gases, when they lose a large proportion of H₂O, CO₂, and H₂S. They then fall into the retort and are carbonised. The off-take pipe is placed in the hottest zone of the retort so that distillation products undergo a cracking effect at the surface of the incandescent coke. The coke may be used in the gas producer. Methods of removing CO₂ from brown-coal gas are briefly discussed. H. E. BLAYDEN.

Effect of properties of petroleum wash oil in removal of light oil from coke-oven gas. H. R. MATHIAS (Ind. Eng. Chem., 1931, 23, 804—807).—Plant trials with various petroleum wash oils indicate that sludge formation has no connexion with the olefine content of the fresh oil, but that this is minimised by keeping the sp. gr. and viscosity as low as possible. The pitch-like deposit sometimes produced in scrubbers is a mixture of coal tar and petroleum bitumens, and here again the olefine content of the oil is of little value as a guide. Oils of high viscosity were found in the laboratory to give rather higher percentage absorption, but the sludge question is the more important. The "oxidation sludge" test, in which 10 g. of oil are maintained at 162.8° for 5 hr. and the insol. residue is weighed, is of value, but tests for emulsification on steam-distillation, colour, boiling range (except initial b.p.), and olefines are of no use. C. IRWIN.

Determination of hydrogen and methane [in coal gas etc.] in the Orsat apparatus by Jäger's method of combustion over copper oxide. H. PAUSCHARDT (Gas- u. Wasserfach, 1931, 74, 613—616).—An Orsat apparatus is provided with a SiO₂ tube packed with CuO, which can be maintained at 290° or 900° by means of a gas burner, and communicates on one side with the water-jacketed gas burette and on the other through a three-way tap with an absorption pipette charged with NaOH solution. Between the tap and the pipette is a short length of glass tube which is calibrated and contains a float valve. In analysing a coal gas the CO₂, heavy hydrocarbons, O₂, and CO are absorbed in the usual manner. The combustion tube is then heated to 290°, the three-way tap being turned to allow the displaced N₂ to escape to air. When the temp. of the tube is const., connexion is made to the pipette and gas burette, and the residual gas is passed backwards and forwards until combustion is complete. The diminution in vol., giving the H₂ content of the gas, is measured, the temp. of the combustion tube being maintained const. The tube is then heated to 900°, the gas being allowed to expand into the pipette to an observed calibration mark. Combustion is then completed, and the diminution in vol. again measured, with the liquid level in the pipette at the observed calibration mark, while the temp. of the tube is maintained at 900°. The apparatus permits the determination of H₂ and CH₄ with accuracy, whilst, by avoiding the necessity of bringing the CuO tube to room temp.

before taking each reading, the time required is much shortened. A. B. MANNING.

Disposal of ammonia liquor. F. SCHUSTER (Gas- u. Wasserfach, 1931, 74, 318—319).—Disposal by injection into furnaces or by rejection after treatment is impracticable except in special cases [*e.g.*, when by the use of Fe (or Al) sulphate the liquid product may be used directly as a fertiliser]. The direct application of ammonia liquor for land fertilisation is briefly discussed. Distillation of the liquor without addition of CaO so as to recover volatile NH₃ and the use of the waste liquor as a fertiliser, or rejection after suitable treatment (*e.g.*, passage over active C), is considered a practical method. The NH₃ recovered might be utilised by passing it through a column of incandescent coke partly to decompose it, and mixing the gases produced (*i.e.*, N₂, H₂, and undecomposed NH₃) with the crude coal gas.

H. E. BLAYDEN.

Treatment of pyroligneous acid. H. GUINOT (Chim. et Ind., 1931, 25, 1354—1360).—Crude pyroligneous acid freed from the bulk of its tar is treated with AcOEt in small proportions to remove the residual tar. It is then treated in a second apparatus with twice its vol. of AcOEt, which dissolves all the AcOH, together with some H₂O. The extract is distilled, when higher acids, which form const.-boiling mixtures with H₂O, come over first. Each process is worked on the countercurrent principle in a battery of 6—10 units in series. The rectification column yields at the bottom a mixture composed of AcOH 2 pts. and AcOEt 1 pt., the components of which are finally separated in a second column, from which 98% AcOH is obtained as vapour at two trays from the bottom, the liquid residue consisting of oil and tar. It may be redistilled. The extract from the tar separator is distilled in another column into which vapour of a special petrol fraction (b.p. 100°) is blown. This forms a mixture of min. b.p. with 30% of AcOH and the tar is thus freed from acid. The aq. residues, which contain AcOEt, MeOH, and COMe₂, are distilled so as to remove the AcOEt as vapour and the other products are concentrated as usual. The yield of acid by this process is 95% and the steam consumption 10 kg. per kg. of acid. The loss of AcOEt is below 1% on the pyroligneous acid treated; the apparatus, which is constructed of bronze and Cu, requires only one attendant. C. IRWIN.

Comparison of liquid fuels in regard to knocking; methods of measurement and reference scales. C. BONNIER (Chim. et Ind., 1931, 25, 1339—1347).—The antiknock value of a fuel cannot be determined in the laboratory and is not measured by the temp. of spontaneous ignition. Test-bench measurement involves the use either of a motor of variable compression ratio or of one of high fixed compression ratio with controlled admission. All variables such as cooling-water temp., composition of mixture, etc. must be rigidly controlled and, even so, results vary with the wear of the engine. Reliable results can consequently be obtained only by comparison of the test result with that given under the same conditions by a standard fuel. This requires a mixture of two fuels of high and low antiknock values and the tendency is for the

general adoption of *isooctane* and heptane. It would be better if the scale could be prolonged, as C_6H_6 -EtOH mixtures have a much higher antiknock value than has octane. C. IRWIN.

Improved Engler-Heusler apparatus for the determination of sulphur in benzine, petrol, and benzene. J. FORMÁNEK (Chem.-Ztg., 1931, 55, 531).—The burner consists of two concentric glass tubes through the inner of which a gentle current of air is passed to assist combustion of the oil, the vapour of which is drawn up the annular space between the tubes. These tubes are pushed through the central opening of a perforated cork at the bottom of a conical cylinder, the top of which is connected to the absorption apparatus by a pipe which passes to the bottom and terminates in a fine jet. The absorption apparatus comprises a long cylinder with lower stopcock and is filled with glass beads covered with neutral 3% H_2O_2 solution.

A. R. POWELL.

Chemistry of the "doctor" sweetening process [for petroleum distillates]. A. LACHMAN (Ind. Eng. Chem., 1931, 23, 354–357).—On treating gasoline containing mercaptans with Na plumbite, Pb mercaptide is produced first, which is sol. in the petroleum phase. The addition of S then produces an org. disulphide and PbS. In the presence of air the PbS is reconverted into plumbite, but this takes place only when the Na_2S has been completely converted into sulphate or thiosulphate. PbS appears also to be able to act catalytically in bringing about the conversion of mercaptans into disulphides in the presence of S and NaOH. Experiments show that mercaptans can be oxidised to disulphides in the presence of NaOH and air without the addition of PbO or PbS. The knowledge of the reactions involved is useful in controlling the doctor process for sweetening gasoline. It is advantageous to remove H_2S before treating with doctor solution, and air for agitation should be finely divided. Efficient agitation is necessary. The calc. quantity of finely-divided S should be added at once and not in small amounts. T. A. SMITH.

Determining the refining degree of lubricating and transformer oils by means of the "sulphuric acid-absorption diagram." G. TOENNIES (Petroleum, 1931, 27, 527–534).—In determining the percentage of lubricating and transformer oils by the action of 90–100% H_2SO_4 and plotting the values for the amounts of absorption and concentration of the acid, curves of characteristic and individual shape for each kind of oil are obtained. Comparison of these diagrams with those given for the oxidising qualities of the oils indicates that there is a relationship existing between them.

E. DOCTOR.

Lubricating oils from crude oil with or without paraffin. H. ORDELT (Petroleum, 1931, 27, Motor-entz., 4, 3–9).—Temp.-viscosity diagrams for various kinds of paraffin and ceresin show a distinct relationship to the setting point, but no relation to the fraction of distillation. Oils containing paraffin are not always of inferior lubricating value. E. DOCTOR.

Solubility of water in liquid hydrocarbons. D. N. TARASENKOV and E. N. POLOSHINCEVA (J. Gen.

Chem. Russ., 1931, 1, 71–79).—The % solubility of H_2O at 20° is 0.053 in C_6H_6 , 0.035 in PhMe, 0.023 in xylene, 0.010 in *cyclohexane*, 0.008 in Grosny light petroleum, 0.06 in kerosene, 0.004 in paraffin oil. The H_2O content of hydrocarbons may be estimated from a determination of the temp. at which turbidity appears. R. TRUSZKOWSKI.

Effect of scrapers on heating etc. Tank insulation.—See I. **Partial oxidation of CH_4 .**—See III. **Bleaching clay.**—See VII. **Deterioration of structures. Asphalt fillers.**—See IX. **Agglomeration of Fe ore.**—See X. **C black.**—See XIII. **Soot for rubber compounding.**—See XIV.

PATENTS.

Combustion systems for powdered fuel. E. F. WEISS (B.P. 349,495, 20.2.30. U.S., 25.2.29).—An electric control system is provided for automatically starting and stopping the prime movers (steam turbines, electric motors, etc.) which operate the fuel and the combustion air supplies, in such a sequence as to prevent the accumulation of fuel or explosive mixture in the furnace. A. B. MANNING.

Combustion of fuel for production of high temperatures. H. WADE. From DEUTS. GOLD- u. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 349,585, 28.11.29).—The rate of flow of the combustible mixture (gas, atomised oils, or coal dust etc. and air) entering the combustion chamber is regulated, at a relatively low pressure, to at least 6–7 m./sec., the time during which the gases remain therein is maintained below 0.02 sec. (preferably about 0.01 sec.), and the combustion space is so designed that the ratio of surface area to vol. is at least 20 sq. dm./litre. Catalytic surfaces formed of substances of strong electronic emission, e.g., alkaline-earth oxides, may be introduced into the combustion chamber. Furnaces embodying these features are described. A. B. MANNING.

Combustion of fuel. H. A. GILL. From STRATTON ENG. CORP. (B.P. 349,915, 1.3.30).—Crushed fuel (up to $\frac{1}{4}$ -in. size) is burned in a chamber while held in suspension therein in a blast of air projected upwardly from a nozzle underneath the chamber. The nozzle can be moved laterally. The velocity of the air blast is insufficient to support the ash, which falls past the nozzle on to a grate which can be given a reciprocating motion in order to maintain the ash in a loose condition. By lowering the velocity of the air blast and permitting the accumulation of fuel in the lower part of the chamber the fire can be banked. A. B. MANNING.

Coke ovens. N.V. SILICA EN OVENBOUW MIJ., Assees. of DR. C. OTTO & Co. G.M.B.H. (B.P. 349,604, 27.2.30. Ger., 27.2.29).—A coke oven with pairs of regenerator chambers for preheating gas and air, alternating with other pairs for storing the waste heat, is provided with horizontal or vertical channels in the walls separating the pairs of regenerators. These channels communicate with the outside air and prevent leakage of air or gas from the preheating regenerators to the waste-heat regenerators. A. B. MANNING.

Coking retort oven. J. BECKER, Assr. to KOPPERS CO. (U.S.P. 1,784,414, 9.12.30. Appl., 2.1.23. Renewed

1.4.30. Cf. U.S.P. 1,374,546; B., 1921, 378 A).—The vertical combustion flues of each heating wall of the oven are connected in two or more sets by horizontal flues, which communicate with the corresponding flues of an adjacent heating wall. Below the coking chambers are tunnel structures extending longitudinally of the oven, and divided into individually regulable and reversible regenerators, which are connected with the flues of the heating walls in such a manner that the air and the heating gas, or the air only, when a rich gas is used, can be preheated therein.

A. B. MANNING.

Carbonisation of coal. N.V. SILICA EN OVENBOUW MIJ., Assees. of DR. C. OTTO & Co. G.M.B.H. (B.P. 350,262, 25.6.30. Ger., 25.6.29).—Swelling coals are carbonised without difficulty in ordinary retorts or coke ovens by maintaining their bulk density as low as possible. This is effected by charging the finely-ground coal, the H₂O content of which has been adjusted to lie between 6% and 10%, into the carbonising chamber as loosely as possible by means of a suitable mechanical device.

A. B. MANNING.

Operation of carbonising chambers. N.V. SILICA EN OVENBOUW MIJ., and W. HIBY (B.P. 349,459, 22.2.30).—Water or steam is introduced into the upper part of a carbonising chamber, *e.g.*, a coke oven, towards the end of the carbonising period, and flows down through the charge, the water-gas produced being withdrawn through apertures in the bottom or in the walls adjacent to the bottom of the chamber. The water or steam may be introduced through steel tubes sunk into the charge from the top of the chamber.

A. B. MANNING.

Carbonisation of bituminous materials. H. L. DOHERTY, Assee. of H. O. LOEBELL (B.P. 349,937, 1.3.30. U.S., 18.3.29).—The fuel is carbonised at 450–850° in a thin, moving layer which is subjected to a gradually increasing pressure during a part or the whole of the process. The layer of fuel is held in contact with the outer surface of an internally heated rotating drum by means of a tensioned endless conveyor constructed of heat-resisting material, the whole being enclosed in a suitable retort. The outer wall of the retort may also be heated if desired. Means are provided for feeding the fuel on to the conveyor and for discharging the coke from the retort after it leaves the rotating drum. The outer surface of the drum and the inner surface of the conveyor may be so designed as to form moulds for containing the coal, which is thereby briquetted as it is carbonised.

A. B. MANNING.

Bone-char drying apparatus. J. HAMILL and J. F. TADDIKEN (U.S.P. 1,784,626, 9.12.30. Appl., 25.6.25).—A pre-dryer for a char-reviving apparatus consists of a chamber traversed by heating flues so spaced as to divide the chamber into a series of narrow channels down which the char is passed. Fins extending from the heating flues form horizontal channels in the char through which air can be passed for the purpose of removing the evaporated moisture and gaseous impurities. The dryer is superposed on the reactivating kiln.

A. B. MANNING.

Manufacture of combustible gas. H. O. LOEBELL, Assr. to H. L. DOHERTY (U.S.P. 1,785,519, 16.12.30. Appl., 29.6.21. Cf. B.P. 132,488; B., 1920, 684 A).—

A mixture of coal and coke is passed continuously down a shaft in which the coal is distilled to form coal gas, and the coke produced, together with that admitted with the coal, is gasified to form blue water-gas. A comparatively long zone of high temp. is maintained in the mid-portion of the fuel column by periodically blasting air there-through, the blast gases being burned in regenerators used for preheating the air and for generating and superheating steam. During the gas-making operation, H₂O is supplied to the bottom of the fuel column to quench the coke and ash and thereby produce steam, which passes up through the high-temp. zone where it joins the steam from the regenerators to form gas. The water-gas so formed passes up through the column of fuel, its sensible heat being utilised in carbonising the coal, and the mixed gas is withdrawn from the upper part of the shaft.

A. B. MANNING.

Manufacture of carburetted water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of J. A. PERRY (B.P. 350,866, 20.10.30. U.S., 20.11.29).—The fuel bed of a water-gas plant is upwardly air-blasted and the blow gases are burned in the carburettor and superheater. During the subsequent up-run with steam the water-gas produced is partly carburetted in the generator by spraying the fuel bed with an oil which leaves a relatively large quantity of coke when cracked, carburetting being completed with a low-coke oil supplied in the ordinary way to the carburettor. The up-run may be followed by a down-run with steam passed backwards through the set as a whole.

A. B. MANNING.

Water-gas process. T. W. STONE, Assr. to WESTERN GAS CONSTRUCTION Co. (U.S.P. 1,784,765, 9.12.30. Appl., 22.11.23).—In a water-gas plant the carburettor and superheater are each divided into two compartments, and the process is carried out in the following cycle: the fuel bed is air-blasted and the blow gases are burned in parallel streams in both compartments of the carburettor and superheater; steam is then passed successively through a compartment of the superheater, a compartment of the carburettor, and upwardly through the fuel bed, the water-gas produced being passed through the other compartments of the carburettor and superheater in succession, and carburetted therein; the steam flow is then reversed, *i.e.*, passed through the compartments of the carburettor and superheater in which the water-gas was carburetted in the preceding step, and thence down through the fuel bed, the water-gas produced being carburetted in the other compartments of the carburettor and superheater.

A. B. MANNING.

Removal of carbon disulphide from gas. W. J. KLAIBER, Assr. to KOPPERS Co. (U.S.P. 1,785,415, 16.12.30. Appl., 22.4.27).—The gas is scrubbed with an oil which will absorb both C₁₀H₈ and CS₂, and the latter is extracted from the circulating oil by treating it with a solution of an alkaline sulphide.

A. B. MANNING.

Obtaining potassium and/or sodium ferrocyanide in the purification of coal gas. R. BRANDT (B.P. 349,692, 24.3.30).—Coal gas freed from tar and NH₃ is washed on the countercurrent principle with an alkaline suspension of Fe compounds, containing more than 25% of alkali in excess of that required for the formation of ferrocyanides, the excess alkali, which is

converted into carbonates and/or bicarbonates, being used again in making up fresh quantities of washing liquor. A. B. MANNING.

Refining of crude oils and the like. S. T. HENDERSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 350,494, 12.3.30).—Volatile hydrocarbon oils, adapted for use as motor fuels, *e.g.*, crude benzol, are refined by treatment in the liquid phase with nascent H, *e.g.*, by refluxing with Zn dust and dil. H₂SO₄, followed by treatment in known manner with H₂SO₄ or other refining agent.

A. B. MANNING.

Destructive hydrogenation of carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,892, 6.3.30. Cf. B.P. 340,470; B., 1931, 330).—Residues obtained in the industrial working up of crude heavy hydrocarbons with alkalis are subjected to destructive hydrogenation in the presence or absence of catalysts.

A. B. MANNING.

Manufacture of hydrocarbons rich in hydrogen from tars or like carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,588, 23.1.30).—The hydrogenation of tars etc. under pressure is carried out, without appreciable cracking of the initial hydrocarbons and without deterioration of the catalyst, by diluting the tars etc. with 20–100% of tetralin or other suitable polynuclear hydrogenated aromatic hydrocarbon as diluent. A. B. MANNING.

Manufacture of valuable products from carbonaceous materials wholly or mainly consisting of hydrocarbons of aromatic nature. H. D. ELKINGTON. From N.V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 349,470, 26.2.30).—The initial materials, *e.g.*, Edeleanu extracts, are treated with H₂ under pressure and at raised temp. in the presence of catalysts consisting of Mo compounds, preferably the oxide, adsorbed on activated carbon (cf. B.P. 331,199; B., 1930, 940). C₁₀H₈ and its homologues are readily hydrogenated under these conditions without cracking.

A. B. MANNING.

Conversion of hydrocarbons having a high b.p. into hydrocarbons having a lower b.p. by destructive hydrogenation. GAS LIGHT & COKE CO., and R. H. GRIFFITH (B.P. 349,991, 25.1., 8.3., and 29.3.30).—The process is carried out in the presence of a Mo catalyst activated by the addition of a promoter, *e.g.*, Si, B, Li, P, Ca, or compound thereof, the proportion of promoter to catalyst being chosen to correspond with the peak of the catalyst-activity curve. The curves with Si or B as promoter may exhibit two marked peaks. The catalyst and promoter are brought into intimate contact, *e.g.*, by mixing a solution or colloidal suspension of the latter into a paste with the finely-ground Mo compound, pressing the paste through a die, and drying the threads so formed.

A. B. MANNING.

Dehydrogenation, polymerisation, and condensation of hydrocarbons with the aid of a catalyst. GAS LIGHT & COKE CO., and R. H. GRIFFITH (B.P. 349,444, 25.1.30).—The catalyst consists of a metal, *e.g.*, Ti, W, or Cr, or compound thereof, activated by the addition of a suitable promoter, *e.g.*, Al, Zn, B, Mo, etc., or a compound thereof, the ratio of promoter to catalyst

being selected to correspond with the marked peak on the catalyst-activity curve. A. B. MANNING.

Production of low-boiling oils from higher-boiling oils. STANDARD OIL DEVELOPMENT Co., Assees. of W. C. ASBURY (B.P. 348,889, 20.5.30. U.S., 4.6.29).—Hydrogenation is carried out in a two-stage process. Heavy oil is first hydrogenated in the presence of a catalyst at 100–200 atm. and 400–510° in the vapour phase. The products are fractionated and the portion of the condensate which is too heavy to use as motor fuel is further hydrogenated in the vapour phase at 455–565° and 25 atm. The product of this hydrogenation is useful for blending purposes. T. A. SMITH.

Forming hydrocarbon compounds [during reduction of metal oxides]. W. H. SMITH (U.S.P. 1,775,700, 16.9.30. Appl., 28.10.26).—A fixed gas high in CH₄ is produced during the reduction of Fe ore, or similar metallic oxides, by adding to the ore a hydrocarbonaceous reducing agent and passing the mixture through a retort in which it is fed through a preheating zone in the presence of a continuously moving catalyst which catalyses the breaking up of the hydrocarbon. The liberated C is utilised in an ore-reducing zone at a temp. below the m.p. of the ore to promote the formation of spongy Fe. The H₂ and some of the C are subjected to a relatively low temp. and a slight pressure in the presence of a catalyst which catalyses the formation of CH₄, which is removed at a point above the reducing zone. H. S. GARLICK.

Production of hydrogen, carbon monoxide-hydrogen mixtures, or nitrogen-hydrogen mixtures [from hydrocarbon gases]. M. D. BONE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,471, 26.2.30).—Hydrocarbon gases are burned with an amount of O₂ or air insufficient for complete combustion, but sufficient to avoid the formation of C, and the resulting gases are passed over or through a mass of C at a temp. high enough to convert the steam in the gases into water-gas. The temp. of the C is maintained at the necessary level by utilising the heat generated in the primary combustion. Steam may be added to the initial gases before or after their combustion.

A. B. MANNING.

Improvement of hydrocarbons to be used as fuel for internal-combustion engines. L. MELLERSH-JACKSON. From H/H OIL Co. A./S. (B.P. 350,440, 7.3.30).—To the hydrocarbon fuel is added a small proportion of a product obtained by treating an aromatic hydrocarbon, *e.g.*, C₆H₆ or PhMe, successively with HNO₃ (*d* 1.41) and H₂SO₄ (*d* 1.84). The mixture is then subjected to the action of O₂ or O₃, preferably under pressure (1.5–2.5 atm.). A. B. MANNING.

[Oil] dehydrator having horizontal revolving electrodes. J. T. WORTHINGTON, Assr. to PETROLEUM RECTIFYING Co. OF CALIFORNIA (U.S.P. 1,783,595, 2.12.30. Appl., 11.11.26).—Within a horizontal shell are disposed a stationary, foraminous, cylindrical, live electrode and within that a rotating, foraminous, earthed electrode supported on a hollow shaft through which the material, *e.g.*, oil-water emulsion, is supplied to spraying apertures. The shell also acts as an earthed electrode,

and the water, after agglomeration by the electricity, settles to the bottom, the oil being drawn off in a pure state through a dome. B. M. VENABLES.

Cracking oil. W. BRINK and G. L. HESS, Assrs. to GEN. OIL PRODUCTS Co. (U.S.P. 1,783,697, 2.12.30. Appl., 9.11.27).—Oil is charged into a still near the bottom, whence it flows through a cycling drum and a series of pipes in parallel, inclined at an angle of 45°, and placed in a furnace. These pipes are continued outside the furnace and carry the oil into the still near the top. The vapours pass off through separating drums to a condenser and the oil flows down the still and is recirculated. Provision is made for the removal of the carbonaceous residues. D. K. MOORE.

[Cracking] treatment of oils. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,229, 2.12.30. Appl., 11.2.22. Renewed 14.9.28).—Raw oil and reflux from a condenser enter the bottom of the annular space of a still consisting of a cylindrical vessel inside a larger one, and flow through pipes from the top of this space into the lower part of the inner vessel. The latter is connected to the condenser and is fitted with a run-off pipe. D. K. MOORE.

Cracking of petroleum oil. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,228, 2.12.30. Appl., 8.10.20. Renewed 19.11.29).—Oil is partly cracked in the first of a series of stills each of which is connected to a condenser. The uncracked condensate, being more difficult to crack, flows into the second still maintained at a higher temp. than the first. The uncracked condensate from the second condenser flows into the third still maintained at a yet higher temp. The uncondensed vapour from the third condenser pass into the second and those from the latter into the first, whilst those from the first are condensed in another condenser. The formation of unsaturated compounds is reduced since no cracked product is submitted to a temp. above that necessary for its formation. D. K. MOORE.

Conversion of petroleum oil. G. EGLOFF and J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,231, 2.12.30. Appl., 1.12.22. Renewed 5.2.29).—Oil is heated to a suitable temp. in a furnace and then passed into a chamber from which the vapour passes through dephlegmators to a condenser. The uncondensed vapour is passed into a tower containing absorbent material, *e.g.*, charcoal, where the light hydrocarbons are absorbed. They are subsequently recovered by passing hot flue gas into the tower. D. K. MOORE.

Alkaline treatment of petroleum vapours. R. C. WHEELER and P. W. PRUTZMAN (U.S.P. 1,784,262, 9.12.30. Appl., 24.6.27).—Petroleum vapour, usually mixed with steam, is washed with NaOH solution of such concentration that it boils at the same temp. as the incoming vapour, in a bubbler type of scrubber. The Na salts of the phenolic and naphthenic acids form a layer on the unacted-on NaOH at the bottom of the scrubber and are separated; the NaOH is recirculated. D. K. MOORE.

Separation of fatty or wax-like bodies from their solutions. W. W. TRIGGS. From DEUTS. GASOLIN

A.-G. (B.P. 350,388, 6.3.30).—Wax-like substances which tend to crystallise badly or not at all, *e.g.*, paraffin wax, are separated from their solutions by adding to the latter while hot a substance which readily crystallises and is sol. in the same solvent, *e.g.*, C₁₀H₈, and then precipitating the two solids together by cooling the solution. The C₁₀H₈ (etc.) is separated from the wax by steam-distillation. A. B. MANNING.

Treatment of aqueous bituminous dispersions [for road construction]. H. D. ELKINGTON. From FLINTKOTE Co. (B.P. 350,040, 11.3.30).—A substance which will react with the CO₂ of the air to form a coagulating agent, but itself is not a coagulating agent, *e.g.*, Na₃AlO₃ or Na zincate, is incorporated with the emulsion. A. B. MANNING.

Liquids used for lubricating and hydraulic purposes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,642, 10.2.30).—Liquids for transferring energy are produced by mixing lubricants with ethers (excluding purely aromatic ethers) which meet below 0° and boil above 50°. A mixture of castor oil with its own wt. of ethylene glycol monoethyl ether is suitable. The change of viscosity with temp. is less with the mixture than with pure oils. T. A. SMITH.

Production of lubricants. STANDARD OIL DEVELOPMENT Co., Assees. of R. P. RUSSELL and G. H. B. DAVIS (B.P. 348,834, 11.4.30. U.S., 17.5.29).—Heavy oil is freed from asphalt and similar impurities by vacuum distillation. The distillate is then hydrogenated with or without pretreatment with H₂SO₄. The hydrogenation is carried out at pressures above 100 atm. and at 370–425°. The product is distilled. It gives lower Conradson C test and the viscosity shows less change with temp. than does untreated vacuum-distilled oil. T. A. SMITH.

Motor fuels. H. WADE. From STANDARD OIL Co. (B.P. 350,438, 5.3.30).—Cracked hydrocarbon motor fuels which tend to deteriorate in antiknock value and to develop gum on storage are stabilised by the addition of less than 0.05% of a substituted aminophenol, *e.g.*, methyl- or benzyl-aminophenol. A. B. MANNING.

Washing apparatus for coal and the like. A. WITZAL, A. G. RABEL, and H. F. STEVENS (B.P. 352,152, 9.5.30).—See U.S.P. 1,760,293; B., 1931, 8.

Pulverised-fuel furnaces [for locomotives]. STUG KOHLENSTAUBFEUERUNG PATENTVERWERTUNG G.M.B.H. (B.P. 352,340, 4.10.30. Ger., 9.10.29).

Predrying of fuel during its delivery to furnace grates. VESUVIO FEUERUNGSBAU GES.M.B.H. (B.P. 352,358, 4.11.30).

[Machine for] briquetting of wood waste and other pulverulent materials. C. J. GOUSPEYRE (B.P. 352,289, 7.8.30).

Acetylene generators. C. S. MILNE (B.P. 351,646, 30.4.30).

Gas burners. W. R. PAIGE (B.P. 352,121, 17.4.30).

Heating material to high temps. Separation of dry materials. Temp. control in pulverising mills. Condenser for mixed vapours. Gas-treating apparatus. Heat exchangers. Gas analysing

apparatus.—See I. Softening of filaments.—See VI. Adsorbent for C_6H_6 vapours etc.—See VII. Coated Fe pipes. Soldering fluxes.—See X. Oleaginous compositions. Detergents.—See XII. Insecticides.—See XVI.

III.—ORGANIC INTERMEDIATES.

Reaction between chlorine gas and acetylene gas, and catalytic preparation of tetrachloroethane. K. FUKAGAWA (Proc. World Eng. Congr., 1929, 31, 387—395).— Cl_2 and C_2H_2 combine to give tetrachloroethane without explosion in presence of Al or Fe filings or, better, an Fe-Al-Si alloy. The reaction is of the 1st order in relation to C_2H_2 . C. HOLLINS.

Cuprene (carbene), the commercially most important product of pyrogenic acetylene condensation. W. HERZOG (Chem.-Ztg., 1931, 55, 461—462, 478—479).—A review of the chemistry, technical prep. methods, and commercial applications of cuprene. C. HOLLINS.

Partial oxidation of methane in the presence of oxides of nitrogen. D. F. SMITH and R. T. MILNER (Ind. Eng. Chem., 1931, 23, 357—360).—The effect of adding small quantities of HNO_3 vapour, N_2O_4 , and NO in the oxidation of CH_4 shows that, under the various conditions tried, the production of CH_2O would not be commercially feasible. Mixtures of CH_4 , O_2 , and oxides of N were passed through quartz or pyrex glass tubes at temp. of 500—700° and the amounts of CH_2O , CO, and CO_2 produced were determined. Tabulated results show that a max. of 3.7% of the CH_4 was converted into CH_2O , the greater part of the changed CH_4 being converted into CO. A possible mechanism for the reaction is suggested. T. A. SMITH.

Nitration of chlorobenzene. Y. UYEDA (Proc. World Eng. Congr., 1929, 31, 93—101).—In the prep. of 1-chloro-2:4-dinitrobenzene 95—97% yields are obtained by nitrating initially below 10°, rising to 50—60°, to give mainly *p*-chloronitrobenzene, and then with more nitrating acid at 110—120°. Excess HNO_3 , good agitation, and a pure starting material are required. C. HOLLINS.

Constitution of Ciba naphthol RP. H. LEDERER (Textilber., 1931, 12, 461—462).—Ciba naphthol RP (S.C.I.) is a new naphthol for use (as naphthol AS) in producing fast insol. azo colours on cotton. It is 95% sol. in $COMe_2$ (the residue, 5%, consists of Na_2SO_4) and yields yellow needles, m.p. 163°, from C_6H_6 ; it is phenyl α -4-hydroxynaphthyl ketone and can be readily ethylated with NaOH and Et_2SO_4 to form 4-ethoxy-naphthophenone, m.p. 73°. A. J. HALL.

By-product fermentation gas.—See XVIII.

PATENTS.

Manufacture of dichloroethylene [from $\alpha\beta$ -trichloroethane]. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 348,346, 17.4.30. Ger., 20.4.29).— $\alpha\beta$ -Trichloroethane is passed rapidly over a heated surface, e.g., pumice, impregnated with catalyst ($CuCl_2$, $BaCl_2$, Fe salts) if desired, at 300—500°. *s*-Dichloroethylene usually predominate in the product. C. HOLLINS.

Manufacture of alkylene cyanohydrins. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,134, 31.1. and 8.5.30).—An alkylene oxide is treated at 10—30° with alkali or alkaline-earth cyanides dispersed in a hydroxylic solvent. The cyanides may be replaced in part by HCN, or HCN and alkylene oxide may be used alternately; in these cases hydroxides may replace the cyanides. An aq. solution of ethylene oxide, stirred into aq. $Ca(CN)_2$, gives 92% of ethylene cyanohydrin, b.p. 120—122°/20 mm., CaO being precipitated. Propylene (b.p. 94°/8 mm.) and α -butylene (b.p. 113—115°/20 mm.) cyanohydrins, $\beta\gamma$ -dihydroxybutyronitrile (from glycide), and γ -chloro- β -hydroxybutyronitrile, b.p. 124°/10 mm. (from epichlorohydrin), are similarly prepared. C. HOLLINS.

Separation of anhydrous organic [aliphatic] acids from their aqueous solutions. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES (B.P. 348,282, 14.3.30. Fr., 19.3.29. Addn. to B.P. 296,974; B., 1929, 349).—In applying the process of the prior patent to acids other than AcOH, a solvent which has b.p. higher than that of the acid and gives no azeotropic mixture with the anhyd. acid, and an entraining liquid which forms with H_2O an azeotropic mixture of lower b.p. than the solvent- H_2O azeotrope, are used. For $EtCO_2H$ the solvent may be amyl propionate, the entrainer Et propionate, and the accessory liquid (if any) a petroleum of b.p. 138—140°. For formic acid amyl formate may be the solvent, propyl formate the entrainer, and the accessory liquid (if any) *n*-heptane. C. HOLLINS.

Manufacture of amino-aldehydes. C. MANNICH (B.P. 348,382, 14.5.30).—An aliphatic or hydroaromatic aldehyde is condensed with CH_2O and a primary or secondary aliphatic or cyclic amine hydrochloride in boiling EtOH; the aldehyde may be generated *in situ*, e.g., from an acetal. β -Dimethylamino- α -dimethylpropaldehyde, b.p. 145° or 82°/88 mm. (hydrochloride, m.p. 152—153°), and the corresponding methylamino- (reduced to alcohol, m.p. 54°, b.p. 85°/12 mm.), diethylamino- (b.p. 175—177°), and piperidino- (b.p. 95°/12 mm.; hydrochloride, m.p. 164°) compounds are obtained from isobutaldehyde; β -dimethylamino- α -isopropylpropaldehyde, b.p. 66—68°/12 mm. (reduced to alcohol, b.p. 85—86°/15 mm.), from isovaleraldehyde; 1-(diethylaminomethyl)- and 1-(*N*-piperidinomethyl)-hexahydrobenzaldehydes, b.p. 120—122°/12 mm. and 141—142°/12 mm. (hydrochloride, m.p. 165°), respectively, from hexahydrobenzaldehyde. C. HOLLINS.

Regeneration of non-aqueous solvents, such as those employed in the dry-cleaning industry. W. Y. AGNEW (B.P. 350,904, 10.3.30).—The liquid is treated with < 0.05% of, e.g., conc. H_2SO_4 or H_3PO_4 or HCl gas, flocculated impurities are removed, and the liquid is neutralised, e.g., by filtration through CaO or a mixture of fuller's earth and NaOH or by treatment with anhyd. NH_3 . Residual solvent is recovered from the flocculated material by steam-distillation. L. A. COLES.

Manufacture of alkali salts of organic acids [from alcohols and alkali]. IMPERIAL CHEM. INDUSTRIES, LTD., Assees. of E. E. REID (B.P. 348,255, 27.2.30. U.S., 28.2.29).—An alcohol is treated with aq. caustic

alkali at 300°/above 100 atm., preferably for less than 4 hr. Examples are NaOAc from EtOH, EtCO₂Na from PrⁿOH, PrⁿCO₂Na from BuOH, and K octoate from octyl alcohol. C. HOLLINS.

Manufacture of 1:3[α]-butylene glycol. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,248, 22.2.30).—Crude aldol is reduced with H₂, or gases containing at least 80% H₂, in presence of a catalyst (Cu on SiO₂ gel) initially at 30–80° and subsequently at higher temp., the liquor being maintained acid (pH 4.8) throughout. The product is substantially free from BuOH. C. HOLLINS.

Manufacture of alkoxybenzophenone-di- and -tricarboxylic acids. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 348,037, 5.2.30).—An *o*-benzoylbenzoic acid carrying in the Bz group an alkoxy and one or two Me groups is oxidised with alkaline permanganate, preferably in excess. The following benzophenones are described: 4-methoxy-2:5'-dicarboxylic acid, m.p. 234–235° [from the Me ether, m.p. 187°, of 2-(6'-hydroxy-*m*-toluoyl)benzoic acid, m.p. 229–230°]; 2-methoxy-2':4-dicarboxylic acid, m.p. 249–250° [from the Me ether, m.p. 115°, of 2-(3'-hydroxy-*p*-toluoyl)benzoic acid, m.p. 211–213°]; 2-methoxy-2':5-dicarboxylic acid, m.p. 238–239° [from the Me ether, m.p. 156–158°, of 2-(4'-hydroxy-*o*-toluoyl)benzoic acid, m.p. 196–197°]; 5-chloro-2-methoxy-2':4-dicarboxylic acid, m.p. 202–204° [from the Me ether, m.p. 172–173°, of 2-(6'-chloro-3-hydroxy-*p*-toluoyl)benzoic acid, m.p. 205–207°]; 2-methoxy-2':3:5-tricarboxylic acid, m.p. 140–142° [from the Me ether, m.p. 123–126°, of 2-(2'-hydroxy-3':5'-dimethylbenzoyl)benzoic acid, m.p. 173–174°]; 3'-chloro-2-methoxy-2':5-dicarboxylic acid, m.p. 294–296° [from the Me ether, m.p. 186–187°, of 6-chloro-2-(4'-hydroxy-*m*-toluoyl)benzoic acid, m.p. 257–258°]; 3':5-dichloro-2-methoxy-2':4-dicarboxylic acid, m.p. 219–221° [from the Me ether, m.p. 198–200°, of 6-chloro-2-(2'-chloro-5'-hydroxy-*p*-toluoyl)benzoic acid, m.p. 232°]. C. HOLLINS.

Manufacture of *N*-methyl compounds of the pyridine series. I. G. FARBENIND. A.-G. (B.P. 348,345, 17.4.30. Ger., 19.4.29).—Pyridines are treated with MeCl below 200°, preferably under pressure and in presence of CuCl₂ or FeCl₃ and/or a diluent. Methochlorides of pyridine, α - and γ -picolines, 6-chloro- α -picoline, and 2-methoxypyridine are described. C. HOLLINS.

Manufacture of derivatives of the thiazolanthrone series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 348,241, 20.2.30).—Thiazolanthrones are oxidised with acid oxidants (H₂O₂, Cl₂, or CrO₃ in AcOH), whereby the S atom is converted into a sulphone group. Sulphones from thiazolanthrone, its 3-methyl, 3-carboxy-, and 6-chloro-derivatives, and 1:5-dithiazolanthrone are described. C. HOLLINS.

Manufacture of agents for use as wetting, cleansing, and dispersing agents. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,040, 26.10.29).—An aliphatic carboxylic acid below C₁₀ (or its halide or glyceride), containing at least 1 double linking or OH group, is esterified with a nitrogen-free alcohol

above C₅ (or its sulphuric ester), and sulphonated before, during, or after esterification. Examples are: 90% lactic acid, dehydrated at 180° in a current of gas, esterified with octodecyl alcohol, cyclohexanol, or benzyl alcohol, distilled at 1 mm., and sulphonated in Et₂O with ClSO₃H; hexahydrosalicylic acid, esterified with octodecyl alcohol at 180° in a current of N₂, and sulphonated with 100% H₂SO₄. [Stat. ref.] C. HOLLINS.

Apparatus for chemical reactions.—See I. CS₂ from gas. **Condensation of hydrocarbons.**—See II. Ca benzoate.—See VII. **Soldering fluxes.**—See X.

IV.—DYESTUFFS.

Azo dyes of the dinaphthyl series. H. TAKAOKA and H. YAMAUCHI (Proc. World Eng. Congr., 1929, 31, 103–104).—Di- β -naphthol [2:2'-dihydroxy-1:1'-dinaphthyl], obtained by heating an aq. alcoholic solution of β -naphthol and FeCl₃, is nitrated and the resulting 6:6'-dinitro-compound is reduced with hyposulphite to diamine, which is tetrazotised and coupled with J-acid (red), H-acid (blue-violet), or naphthionic acid (orange). The Me and Et ethers of di- β -naphthol, similarly treated, give dyes faster to soaping, but of poor tinctorial power. C. HOLLINS.

Fastness of dyestuffs in ultra-violet light. IV. G. A. BRAVO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 210–220).—Quant. measurements of the fastness of dyes to ultra-violet light (cf. B., 1931, 195) may be made by means of Pulfrich's step-photometer which, although not so accurate as the photoelectric-cell spectrophotometer, gives sufficiently exact results. Dyed filter paper is examined before and after exposure to the rays, the particular one of the three spectral filters, L1 (field of transparency 600–800 μ), L2 (510–570 μ), and L3 (430–485 μ), corresponding most nearly with the predominant colour being inserted. Black colours are examined without filter. A number of dyes have been investigated in this way. T. H. POPE.

PATENTS.

Manufacture of vat dyes [of the benzanthrone series]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 347,100, 16.12.29 and 21.5.30).— α -Amino-derivatives of the dipthaloylcarbazole from 1:1'-dianthraquinonylamine are condensed with 2- or 3-halogenobenzanthrones and the product is treated with alkaline or acid condensing agents. Examples are: carbazole from 4:4', 4:5', or 5:5'-diamino-1:1'-dianthraquinonylamine with 3-bromo- or 2-chloro-benzanthrone, fused with alcoholic KOH, or heated with pyridine and AlCl₃; carbazole from 5-amino-4'-benzamido-1:1'-dianthraquinonylamine with 2:10-dichlorobenzanthrone (1 mol.), fused with alcoholic KOH and hydrolysed with H₂SO₄. The products are brown to violet-brown vat dyes. C. HOLLINS.

Manufacture of vat dyes [of the benzanthrone series]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 347,236, 25.11.29. Addn to B.P. 306,874; B., 1929, 35).—The process of the prior patent is applied to products obtainable from halogenobenzanthrones and aminoaldehydoanthraquinones. Alkaline fusion of products from 9- or 11-chlorobenzanthrone

or dibrominated 4:4'-dibenzanthronyl and 1-amino-2-aldehydoanthraquinone gives grey to black vat dyes.

C. HOLLINS.

Manufacture of vat dyes [dibenzanthrones] containing halogen. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 347,234, 24.10.29. Addn. to B.P. 340,262; B., 1931, 338).—Chlorobromo-dibenzanthrones and -isodibenzanthrones are prepared by chlorination or bromination of bromo- or chloro-compounds or by successive chlorination and bromination, in an org. medium (PhNO_2 , $\text{C}_6\text{H}_3\text{Cl}_3$, $\text{C}_6\text{H}_4\text{Cl}_2$, Ac_2O , quinoline). The products are no longer sensitive to temps. used in dyeing.

C. HOLLINS.

Production of dyes [of the dibenzanthrone series]. C. SHAW, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 347,233, 17.10.29).—Nitrodibenzanthrone or nitroisobenzanthrone is converted into a grey to black vat dye by heating at 250–260° in molten phthalic anhydride, the latter being subsequently removed by extraction with hot H_2O .

C. HOLLINS.

Manufacture of vat dyes of the N-dihydro-1:2:2':1'-anthraquinoneazine [indanthrone] series. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,170, 9.1.30).—The condensation products from indanthrone and CH_2O are converted into greener vat dyes by heating, e.g., at 200–280°, alone or with inert org. or inert neutral, acid, or weakly alkaline inorg. media, e.g., in benzophenone, 27% H_2SO_4 , or H_3PO_4 .

C. HOLLINS.

Production and use of benzanthrone derivatives. S. THORNLEY, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 348,159 and 348,160, 31.10.29).—(A) A dibenzanthronyl is treated with NH_2OH etc. and FeSO_4 , preferably after sulphonation, and the product is fused with alkali to give grey vat dyes. Suitable starting materials are 2:2'- and 3:3'-dibenzanthronyls and their chlorination products. (B) The products are alkylated to improve their Cl fastness.

C. HOLLINS.

Manufacture of [stilbeneazo] dyes. SOC. CHEM. IND. IN BASLE (B.P. 348,283, 14.3.30. Switz., 16.3.29).—4:4'-Dinitrostilbene-2:2'-disulphonic or 4:4'-dinitrodibenzyl-2:2'-disulphonic acid is condensed under pressure with an amine, e.g., an aminoazo dye, and, if desired, oxidised and/or converted into metal compound. 4:4'-Dinitrostilbene-2:2'-disulphonic acid is condensed, e.g., with metanilic acid \rightarrow NH_2Ph (orange on cotton); with metanilic acid \rightarrow NH_2Ph and metanilic acid \rightarrow cresidine (red-orange); with 4-chloro-*o*-aminophenol \rightarrow J-acid (red-brown); or with *p*-aminoacetanilide \rightarrow salicylic acid, hydrolysed (orange, red-brown on coppering).

C. HOLLINS.

Production of [azo] colouring matters. J. F. TURSKI (B.P. 347,609, 28.1.30).—Aminoarylamides of hydroxynaphthoic, acetoacetic, and other hydroxy- or amino-acids capable of self-coupling, are treated in substance or on the fibre with HNO_2 and then with alkali or other medium to bring about self-coupling, which may be inter- or intra-mol. 2:3-Hydroxynaphthoic *m*-aminoanilide gives a red pigment for dyeing. The prep. of *m*-aminoanilides of 2:3-hydroxynaphthoic, salicylic, *m*-aminobenzoic, and 1-phenyl-5-pyrazolone-3-carboxylic acids, of the 4-amino-*o*-toluidide

of 2:3-hydroxynaphthoic acid, and of monosalicyloylbenzidine, is described.

C. HOLLINS.

Manufacture of vat dyes of the perylene series. F. Bensa (B.P. 347,099, 16.12.29. Austr., 9.1.29).—Perylene-3:9-dicarboxylic chloride is condensed with aminoanthraquinones or aminoperylenequinones, e.g., β -aminoanthraquinone (yellow-orange), 1:5-diaminoanthraquinone (gold-brown), 1-chloro-4-aminoanthraquinone (gold-orange), diamino-perylene-3:10-quinone (deep brown).

C. HOLLINS.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Porosity: a primary property of textiles. V. Porosity of fabrics and penetration problems. J. SCHOFIELD (J. Soc. Dyers and Col., 1931, 47, 166–168).—The mesh porosity (due to interlacing of weft and warp yarns) of a woven fabric calc. as before (B., 1931, 152) differs substantially from the porosity calc. from weaving settings and the area of a mesh cell thereby obtained. Penetration of yarns by liquors in wet processing is much more dependent on capillary porosity (the capillary channels between adjacent individual fibres) than on mesh porosity; such penetration is very much assisted by alternate immersions and squeezings.

A. J. HALL.

Preparation of a standard cotton cellulose. K. KANAMARU (J. Cellulose Inst., Tokyo, 1931, 7, 149–157).—Samples of American, Egyptian, and Indian cotton were cleaned by hand-picking, extracted with EtOH and then with Et_2O , and scoured with NaOH solutions under various conditions, and the purification process was followed by examination of tensile strength and elongation, Cu number, methylene-blue val., and viscosity of 1% sol. in cuprammonium. It is concluded that there are 3 types of non-cellulosic impurities in the raw cotton which cannot be easily removed and differ in the way in which they are progressively dissolved, viz., the material causing decrease of viscosity, that causing high Cu number, and that having a high methylene-blue absorption.

B. P. RIDGE.

Cellulose ethers. A. CAILLE (Chim. et Ind., 1931, 25, 276–285).—The differences between the amounts of water absorbed in non-saturated atm. by sulphocellulose and regenerated cellulose (B., 1928, 600) are maintained when the atm. is saturated. The degrees of swelling, as measured by Hofmeister's method, of sulphocellulose and sulphonitrocellulose are greater than those of regenerated cellulose and nitrocellulose, respectively. The H_2SO_4 contents in nitrocellulose and cellulose acetate precipitated by H_2O from the residues and filtrates after ultrafiltration of their COMe_2 solutions seem to show that the smaller micelles contain most H_2SO_4 . Cellulose acetate in a half-saturated atm. at 15° takes up 6% of moisture. The moisture taken up at saturations up to 0.95 are given also. The methods of Barthélemy and Schwalbe for the determination of acetate in cellulose acetate are criticised and the mechanism of the washing of nitrocellulose and cellulose acetate is discussed. Fractional precipitation by H_2O of COMe_2 solutions of nitrated paper containing 1.11% of combined H_2SO_4 indicates that, contrary to Bréguet and others, the last fractions are richer in combined

H_2SO_4 than the first. Under identical conditions, the fractional precipitation of $COMe_2$ solutions containing 1.13 and 0.17%, respectively, gives widely different results. Thus the addition of 50% of $COMe_2$ ppts. 4.8 and 14.0 g., respectively. A. RENFREW.

Swelling phenomena of beech wood. E. MÖRATH (Kolloidchem. Beih., 1931, 33, 131—178).—Experiments on the swelling of beech wood in different structural directions and its dependence on the H_2O content of the wood are described, and the results obtained are compared with the swelling of other woods. A saturation point is reached between 25 and 45% H_2O . Measurements of the diminution of resistance to pressure in a direction parallel to the fibre show that with increasing H_2O content the greatest change takes place at 25—35% H_2O . A rapid electrical method for determining H_2O in wood is described. Hygroscopicity isotherms for untreated wood at 20° and for samples heated for 2 hr. at different temp. show that an essential change in the hygroscopicity occurs in wood heated at 190°. The experiments on the variation of the H_2O content of wood with the R.H. of the atm. indicate that saturation is reached at 30% H_2O . E. S. HEDGES.

Bleaching of pulp.—See VI. **X-Rays in research.** See XI. **Air conditioning.**—See XXIII.

PATENTS.

Production of viscose. F. G. C. KLEIN (B.P. 350,515, 14.2.30. Ger., 14.2.29).—Cellulose is continuously treated according to the usual processes for conversion into viscose while being forwarded from one stage to the next by worm conveyors. F. R. ENNOS.

Preparation of artificial [viscose] silk filaments. LUSTRAFIL, LTD., and S. W. BARKER (B.P. 347,396, 6.3.30).—Dull-lustre viscose silk is made by spinning in the usual manner solutions of viscose to which up to 0.5% of rice starch has been added in the form of a cold aq. suspension. A. J. HALL.

Production of [curled or crimped] artificial silk from viscose. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 350,863, 14.10.30. Holl., 12.11.29).—Several freshly-spun filament bundles, which are produced from viscoses of either different composition or degree of ripening, or by the use of spinning baths of different composition, temp., or immersion length so that they differ in shrinkage capability, are united to form a twisted thread. F. R. ENNOS.

Improvement of artificial fibres made from viscose. HEBERLEIN & Co., A.-G. (B.P. 350,902, 10.3.30. Ger., 8.3.29. Addn. to B.P. 264,529; B., 1928, 295).—The fibres, directly after their formation or when in a finished condition, are subjected to swelling in presence of a Cu compound with alkali solution of mercerising concentration (not above 18%) at room temp. or below 0°. F. R. ENNOS.

Manufacture of artificial filaments, threads, ribbons, films, etc. [from cellulose derivatives]. H. DREYFUS (B.P. 346,793, 17.10.29).—Dull-lustre cellulose ester or ether threads etc. are manufactured by spinning by dry or wet processes solutions of the cellulose deriva-

tive containing natural or artificial resins, preferably those of m.p. above 250°. A. J. HALL.

Apparatus for manufacture of artificial filaments by the dry-spinning method. CELLULOSE ACETATE SILK CO., LTD., and P. C. CHAUMETON (B.P. 351,091, 25.3.30).—A cell is divided longitudinally into a heating chamber *A*, which may occupy a portion only of the length of the cell, and a spinning chamber *B*. The gaseous atm. passes upwards through *A* and downwards through *B* in the same direction as the filaments to a smaller chamber, and thence, through a main common to all the cells, to the solvent-recovery plant. F. R. ENNOS.

Manufacture of sulphate cellulose and soda cellulose. A. F. ZENNSTRÖM (B.P. 350,491, 6.3.30. Finland, 13.5.29).—Resinous wood shavings are treated for the recovery of the by-products in such a manner that volatilisation of the turpentine by steam and extraction of the resin by alkali are carried out in different zones of the same boiler; the hot lye saturated with resin soap is sprayed into an equivalent quantity of acid vapour or mist, and is afterwards treated with turpentine vapour or mist, the mixture being condensed rapidly and the solution of resin in turpentine decanted from the liquor and lignin. The leached shavings are washed and cooked by one of the above processes to yield cellulose. F. R. ENNOS.

Manufacture of nitrocellulose. H. C. HEIDE. From E. TSCHUDIN (B.P. 351,133, 8.4.30).—Cellulose in dense form, prepared as described in B.P. 322,998 and 323,019 (B., 1930, 184) or by treatment with small quantities of CS_2 and NaOH and subsequent hardening with acid, is nitrated with two acid mixtures, the proportions of HNO_3 , H_2SO_4 , and H_2O in the first being 60:20:20 and in the second 25:66:9. The product contains up to 13.4% N. F. R. ENNOS.

Changing the solubility of cellulose acetate. KODAK, LTD., Assees. of C. J. MALM (B.P. 350,417, 9.12.29. U.S., 12.12.28).—The $COMe_2$ -insol. ester is hydrolysed to the sol. form by treatment, for not less than 4 days below 40°, with excess (7 times its wt.) of AcOH and H_2O containing not more than 0.6% of H_2SO_4 or a corresponding amount of another acid catalyst. F. R. ENNOS.

Preparation of butyric cellulose esters. J. LEFRANÇ, and SOC. DES BREVETS ÉTRANGERS LEFRANÇ & CIE. (B.P. 350,906, 11.3.30).—Cellulosic material is rendered permeable by treatment with glacial AcOH under vac. in presence of BuOH or $COMe_2$ as diluent, and the AcOH retained by the material is removed by lixiviation with the diluting agent prior to esterification. F. R. ENNOS.

Coating of articles prepared from cellulose hydrate material. F. G. C. KLEIN (B.P. 313,410, 10.6.29. Ger., 9.6.28).—Articles of H_2O -swollen hydrated cellulose are treated with a substance such as (a) $COMe_2$, to replace the H_2O in the pores and to keep them open, and to serve as solvent for the coating material to be subsequently applied ($COMe_2$ solution of cellulose esters or ethers); (b) acetin, which is sol. in the coating solvent ($COMe_2$); or (c) $COMe_2$, which is

removed by treatment with another solvent (C_6H_6), the latter being the coating solvent. Coating may also be effected on the pretreated article by pressing thereon films of the coating material. F. R. ENNOS.

[Manufacture of] stencil sheets. S. HORII (B.P. 350,699, 22.5.30).—Fibrous material is coated with polysaccharide esters, sperm oil, and a tempering agent (fatty or hydrocarbon oils) dissolved in a suitable solvent mixture. F. R. ENNOS.

Production of variegated textile yarns [by twisting]. J. SYKES & SONS, LTD., and E. SYKES (B.P. 352,212, 19.6.30).

Non-aq. solvents.—See III.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Bleaching of pulp from maritime pine-wood. J. L. LUSSAUD (Bull. Inst. Pin, 1931, 17—21, 37).—Soda pulps have been prepared from maritime pine, employing 24—36% NaOH on the wt. of wood, digestion being for 6 hr. at 7 kg. per sq. cm. The effects of time and concentration of bleaching solution on these pulps are tabulated. T. T. POTTS.

Dyeing of [Bemberg] cuprammonium silk and of cotton fabrics containing it. ANON. (Rev. Gén. Mat. Col., 1931, 35, 201—204).—Bemberg silk differs from cotton and viscose silk in having the much stronger affinity for direct dyes. Curves are given showing the absorption by viscose, mercerised cotton, and Bemberg silk for a number of Diazol dyes over the temp. range 20—100°; in each case Bemberg silk has the greatest affinity at 20°, and whereas the affinities of viscose and mercerised cotton for these dyes increases rapidly from 80° to 100°, the affinity of Bemberg silk rapidly decreases. In order to secure level and well penetrated dyeings it is preferred to dye Bemberg silk at the boil; the dye bath should contain 3% of Turkey-red oil, 0.5—1.0% of soda ash, and 5—20% of Glauber's salt, and in dyeing deep shades the bath should be gradually cooled to about 60° after the first hr. Cotton goods containing Bemberg silk should be dyed at 90—100° so that equal depths of shade may be obtained on both fibres; a list of the most satisfactory dyes for this purpose is given. No instance has been found in which the fastness to light of a direct dye on Bemberg silk is less than that on cotton. Bemberg silk may be distinguished from viscose silk by immersion for 10 min. at 40° in a 0.05% solution of Wool Black N4B containing a small amount of Na_2SO_4 ; Bemberg silk becomes dyed a deep grey whilst viscose silk is only slightly tinted. A. J. HALL.

Coloured reserves under aniline black [by printing]. P. SEYDER (Bull. Soc. Ind. Mulhouse, 1931, 97, 141—143).—Clear, deep, and fast-to-rubbing pattern effects are obtained by printing fabric with a paste containing a Rapid Fast dye, e.g., Rapid Fast Scarlet LH, and finely-divided $CaCO_3$, steaming, then padding with an aniline-black liquor, and again steaming; the result is much better than when the coloured effects are over-printed on the fabric already padded with aniline-black as in the Prudhomme style. Multicolour effects may be obtained by simultaneously printing with vat dyes. A. J. HALL.

Action of boiling caustic soda (kier-boiling) on insoluble azo colours on the fibre. II. F. M. ROWE and F. H. JOWETT (J. Soc. Dyers and Col., 1931, 47, 163—166).—Previous investigations (B., 1931, 484) were extended to the 2- and 3-nitrobenzeneazo- β -naphthols, and Para Red (the 4-derivative) was again investigated but in greater detail. In the partial destruction of Para Red (mainly by reduction to 4-aminobenzeneazo- β -naphthol) a small quantity of *p*-nitroaniline is formed. The proportion of 4-aminobenzeneazo- β -naphthol formed increases as the original depth of the dyeing is decreased. Para Red is decomposed to a much less extent by boiling with a 1% Na_2CO_3 solution than with 0.36% NaOH, and no 4-aminobenzeneazo- β -naphthol is formed. Similarly 3-nitrobenzeneazo- β -naphthol is destroyed (to about the same degree as Para Red) with formation of equal quantities of 3-aminobenzeneazo- β -naphthol and azoxybenzenedisazobis- β -naphthol, but the proportion of pigment destroyed is dependent on the amount of cellulose-NaOH present and not on the depth of shade. Under similar conditions 2-nitrobenzeneazo- β -naphthol is almost completely destroyed with formation of phenylazoimino- β -naphthol oxide and a small quantity of *o*-nitroaniline. A. J. HALL.

Use of nitrites in the nitrate discharge of indigo. L. PAULUS (Bull. Soc. Ind. Mulhouse, 1931, 97, 216).—Priority for the discovery of the catalytic effect of nitrites as described by Vosnessensky (B., 1928, 478) is given to Freiberger (B., 1913, 696). A. J. HALL.

Iodine mercerisation test. W. F. A. ERMEN (J. Soc. Dyers and Col., 1931, 47, 161—163).—A modification of the Lange iodine test consists in immersing similar pieces of mercerised and non-mercerised cotton fabrics for a few minutes in a 6% solution of I in H_2O , saturated with KI, then washing the pieces with cold H_2O until the non-mercerised piece is colourless, and plunging them into a dil. boiling solution of Indigosol Black IB; after further washing and treatment in a boiling soap solution the non-mercerised piece remains almost white, whilst the mercerised piece is permanently coloured blue or black, the depth of shade being proportional to the degree of mercerisation. The test allows differentiation between cottons boiled with soda ash and with NaOH (*d* 1.01). Indigosol O4B may be used instead of Indigosol Black IB, but red and orange indigosol dyes are less satisfactory. A solution of $AgNO_3$ may be used instead of Indigosol Black IB, whereby the blue I coloration of the mercerised fabric is replaced by a pale cream-coloured deposit of AgI, but this is only satisfactory for thin fabrics. In testing unknown samples of fabric, pre-removal of starch is essential. A. J. HALL.

Method for determining the degree of mercerisation of cotton. K. SCHWERTASSEK (Textilber., 1931, 12, 457—458).—0.3 g. of the dry cotton material, previously freed from starch by treatment with a starch-liquefying enzyme, is kneaded for a few min. with 1.2 c.c. of an I + KI solution (5 g. of I and 40 g. of KI in 50 c.c. of H_2O), and the mixture transferred to 100 c.c. of a cold saturated solution of Na_2SO_4 (*d* 1.18). After 1 hr. (with shaking), the I removed from the cotton by the Na_2SO_4 solution is determined by titration with 0.02N- $Na_2S_2O_3$; from the result, taken in conjunction with a

similar blank experiment without cotton, the I absorbed by the cotton is calc. and is termed the "absorption number." Small differences in the degree of mercerisation produced by NaOH liquors ($d > 1.09$) are easily detectable. The absorption numbers of raw and bleached cottons after mercerisation with liquors of d 1.26, 1.16, and 1.09 were 81.6, 69.1; 66.8, 53.4; and 41.1, 38.2, respectively. A curve is given showing the absorption numbers obtained with liquors having d 1.00—1.26.

A. J. HALL.

PATENTS.

Treatment of [iron] vessels to render them suitable for bleaching textile goods. H. O. KAUFFMANN, and ELEKTROCHEM. WERKE MÜNCHEN A.-G. (B.P. 350,726, 18.6.30).—Fe vessels to be used in the bleaching of textiles with H_2O_2 solutions are protected by applying to their inside surface a thin coat of a slurry containing free CaO, Portland cement, and preferably also MgO , allowing this partly to dry for 12—24 hr., bringing in contact a hot solution of Na silicate and Na_2CO_3 , and allowing to dry completely.

A. J. HALL.

Desulphurisation and bleaching of viscose artificial silk. W. H. FRANCKE (B.P. 349,367, 22.7.30. Ger., 22.7.29).—The raw silk is treated at 60—70° with a bath or baths containing a solution of H_2O_2 and a dil. water-glass solution.

A. J. HALL.

Wet treatment of fabrics, particularly the cleaning and bleaching thereof. J. MAURER (B.P. 346,528, 25.2.30. Ger., 25.2.29).—The relative motion between fabrics and a detergent liquor which is necessary in cleaning and bleaching processes is produced by imparting to the liquor oscillations exceeding 2 per sec. by means of a vibrating diaphragm (preferably operated electrically) immersed in the liquor in which the fabrics are submerged.

A. J. HALL.

Production of insoluble azo dyes [ice colours] on cellulose esters or ethers. I. G. FARBENIND. A.-G. (B.P. 348,269, 6.3.30. Ger., 6.3.29).—The fibre is padded at 15—50° with a weakly alkaline 2:3-hydroxynaphthoic arylamide bath to which has been added a H_2O -miscible org. solvent or swelling agent (pyridine, EtOH, $COMe_2$, etc.) in which the arylamide or its alkali salt is sol., the quantity added being enough only to swell the cellulose ester or ether without dissolving it. The colour is developed with a diazo solution in the usual manner.

C. HOLLINS.

Coloration of textile materials [with sulphide and vat dyes]. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 347,682, 28.1.30).—Injury to acetate silk and other textiles by alkaline vats is prevented by maintaining the bath below 10°. Effects are thus obtained on acetate silk-cotton mixtures etc.

C. HOLLINS.

Printing of materials containing cellulose ethers or esters. IMPERIAL CHEM. INDUSTRIES, LTD., A. SHEPHERDSON, and L. SMITH (B.P. 351,056, 21.3.30).—Increased depth of shade is obtained in printing cellulose ethers and esters with H_2O -insol. azo and nitro-substituted diphenylamine dyes by the addition of up to 5% of a hydroxyethylamine (e.g., "triethanolamine") to the printing paste.

A. J. HALL.

Manufacture of agents for protection of textiles and the like from mildew and other fungoid growth.

IMPERIAL CHEM. INDUSTRIES, LTD., A. J. HAILWOOD, and A. STEWART (B.P. 350,642, 9.4.30).—The penetrative power and efficiency of the arylamides of salicylic acid (cf. B.P. 323,579; B., 1930, 238) as antiseptics in textile materials is increased by dispersing, before use, such substances with the aid of a wetting-out agent, e.g., the Na salt of the sulphonated condensation product of CH_2O and $C_{10}H_8$, whereby substantially all the particles of the arylamide are $< 2 \mu$ in linear dimensions.

A. J. HALL.

[Protective] treatment of animal fibre. DEUTS. GOLD- u. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 347,292, 27.1.30. Ger., 6.2.29).—Wool, hair, bristles, etc. are purified and rendered resistant to attack by bacteria and fungi by treatment with a solution of H_2O_2 followed by drying at 10—80° subsequent to a washing treatment sufficient to remove only a part of the H_2O_2 from the fibres.

A. J. HALL.

Treatment of [textile] materials to retard fading. E. W. GEISLER, Assr. to R. H. COMBEY BROOKLYN CO., INC. (U.S.P. 1,783,114, 25.11.30. Appl., 16.11.26).—White or coloured straw, straw braid, and other vegetable fibrous material, particularly that used in the manufacture of hats, is impregnated with a 5% solution of $Na_2S_2O_3$ and then dried, whereby its fastness to light is much increased.

A. J. HALL.

["Moiré"] treatment of [cellulose acetate] fabrics. A. MILHOMME (B.P. 346,561, 3.4.30. U.S., 13.4.29).—In the production of moiré scratch patterns in such fabrics, the fabric is moistened before scratching the pattern thereon and is thus protected from damage.

A. J. HALL.

Treatment of natural and artificial cellulosic fibres with alkali. CHEM. FABR. VORM. SANDOZ (B.P. 350,018, 7.3.30. Addn. to B.P. 279,784; B., 1928, 228).—The wetting-out power in alkalis of the mixtures of phenols with hydrogenated aromatic compounds described previously is much increased by the addition of aliphatic, aliphatic-aromatic, or ketone alcohols, such as Pr^oOH , Bu^oOH , Bu^pOH , amyl, benzyl, or diacetone alcohol.

A. J. HALL.

Treatment of textile materials. BRIT. CELANESE, LTD. (B.P. 346,511, 15.2.30. U.S., 25.2.29).—Materials consisting of cellulose or cellulose derivatives are coloured, delustrated, and made less liable to slip, ladder, or split by impregnation with a dispersion containing rubber latex and one or more insol. substances such as ZnO , Pb_3O_4 , $Al(OH)_3$, ZnS , and graphite, and preferably also a swelling agent (for cellulose acetate silk) such as a thiocyanate or $COMe_2$, followed by drying. Fast colouring of the cellulose materials may be obtained simultaneously by adding suitable insol. pigments to the dispersion used for impregnation.

A. J. HALL.

Manufacture of rubberised materials comprising organic derivatives of cellulose. BRIT. CELANESE, LTD. (B.P. 347,422, 25.3.30. U.S., 30.3.29).—A firmly adherent film of rubber is applied to cellulose acetate etc. fabric by coating one or both sides with a solution of rubber containing a vulcanising agent, e.g., S, and an accelerator, and afterwards vulcanising at a temp. of 100° or above, but below that at which the fabric is damaged by heat. Vulcanising may be effected

satisfactorily with SnCl_2 . Rubberised cellulose acetate fabrics have a decreased liability to crease.

A. J. HALL.

Waterproofing of materials. W. A. BRIDGEMAN, Assr. to WILBUR WHITE CHEM. CO. (U.S.P. 1,785,434, 16.12.30. Appl., 17.4.28).—The cloth is impregnated at about 40° with an emulsion of a solid fat (e.g., tallow, 6%), in a 0.5–1.5% soap solution (adjusted to pH 7.6) containing 0.5% of PhOH , and is then treated with a 3% aq. solution of $\text{Al}_2(\text{SO}_4)_3$. E. LEWKOWITSCH.

[Softening] treatment of filaments or yarns composed wholly or partly of organic derivatives of cellulose. BRIT. CELANESE, LTD. (B.P. 351,084, 25.3.30. U.S., 25.3.29).—The pliability and softness of cellulose acetate etc. yarn is improved so that it can be satisfactorily used in knitting fabrics containing 60 or more courses per in., by impregnation with a mixture of lubricating and softening agents dispersed in a suitable solvent. Suitable lubricants include vegetable and animal oils (e.g., castor, olive, and neatsfoot oils) and petroleum oils; softening agents include EtOH , BuOH , PhMe , or xylene. Usually, equal parts of lubricant, softener, and solvent are used.

A. J. HALL.

Dyeing machines. Dye beams. J. T. LANCASTER. (B.P. 351,593—4, 4.4.30).

Regeneration of solvents. Wetting etc. agents.—See III. **Benzanthrone derivatives.**—See IV. **Cleaning compositions. Wetting-out agents.**—See XII.

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

Production of thermo-phosphates from Khibinsk apatite. S. I. VOLFKOVICH and S. S. PERELMAN (Udobr. Urozhai, 1930, 2, 570—580).—Flotation afforded a product containing 40.5% P_2O_5 ; this was heated for 30 min. at 1200° with 45% of Na_2CO_3 . Optimal conditions for other samples (27.12, 19.47% P_2O_5) were also determined. Addition of SiO_2 (10%) or CaCO_3 slightly increased the amount of decomp. The fertiliser value of thermo-phosphate is equal to that of Thomas slag, but slightly inferior to that of superphosphate.

CHEMICAL ABSTRACTS.

Activated bleaching clays. O. BURGHARDT (Ind. Eng. Chem., 1931, 23, 800—802).—A typical German clay, "Isartone," suitable for activation with acid contains 52.9% SiO_2 , 16.3% Al_2O_3 , and loses 11.4% on ignition. If the combined H_2O is removed, the bleaching power of the treated product is lost, but other clays of similar composition may yet have no bleaching value. The clay is reduced to slime and boiled for 2–3 hr. with 28.30% of HCl (on the wt. of dry clay). The proportion of acid required varies with each clay. The acid sludge is filter-pressed and washed to neutrality. Pine wood is used for the apparatus required for these processes. The treated clay is dried in a rotary kiln and milled. The finished product is tested for bleaching power with linseed or soya-bean oil.

C. IRWIN.

Preparation of alums by action of oxides of nitrogen on dichromates. S. I. ORLOVA, N. N. PETIN, and A. L. SCHNEERSON (J. gen. Chem. Russ., 1931, 1,

31—38).—Chrome alums are prepared from NO_2 or NOHSO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 . HNO_3 is recovered as a by-product.

R. TRUSZKOWSKI.

[Preparation of] chromium acetate [for printing]. C. SUNDER (Bull. Soc. Ind. Mulhouse, 1931, 97, 205—215).—An investigation and comparison from the viewpoints of cost and technical difficulties of methods for preparing solutions of Cr acetate (suitable for mordanting) by reduction of a dichromate as alternatives to the method of precipitation of $\text{Cr}_2(\text{OH})_6$ and its dissolution in AcOH . About 50 kg. of glucose, 75 kg. of starch, 75 litres of MeOH , and 75 kg. of glycerin are required for reduction of the same wt. of $\text{Na}_2\text{Cr}_2\text{O}_7$. In the reduction of the dichromate with MeOH or EtOH a corresponding aldehyde is produced, and if this is recovered the cost of the process is much lower than that of Metzger and co-workers (B., 1931, 348) and of Richard (B., 1924, 507). A very convenient and comparatively cheap method for preparing a violet solution of Cr acetate consists in heating together $\text{K}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$ 300 pts., $\text{Na}_2\text{S}_2\text{O}_3$ 190 pts., H_2SO_4 (d 1.84) 27 pts., and glacial AcOH 180 pts.

A. J. HALL.

Analysis of cassiterite. S. TAMARU and N. ANDO (Z. anal. Chem., 1931, 84, 89—98).—By heating cassiterite for 1 hr. at 900° in a reducing atm. with CaCO_3 and C in the mol. ratio 1 SnO_2 : 5—7 CaO : 0.2 C all the Sn is converted into Ca_2SnO_4 , which is completely sol. in HCl . The cause of the incomplete attack of KOH on SnO_2 at 500° is shown to be the formation of an impenetrable film of K stannate on the cassiterite particles.

A. R. POWELL.

Preparation of stannous sulphate. F. C. MATHERS and H. S. ROTHROCK (Ind. Eng. Chem., 1931, 23, 831—832).— SnSO_4 may be prepared for use in electroplating by treating 15 pts. of Sn foil or finely-divided electrodeposited Sn in 40 pts. of 75% H_2SO_4 with a final temp. of 140° . Sn-Pb alloys remain undissolved. Feathered Sn is converted rapidly if alternately exposed to 50% H_2SO_4 and to air by tumbling, the stannic salt film being mechanically detached and the H_2 polarised.

C. A. KING.

Removal of oxygen from ferric and ferrous oxides by means of solid carbon in a vacuum. W. BAUKLOH and R. DURRER (Arch. Eisenhüttenw., 1930—1, 4, 455—460; Stahl u. Eisen, 1931, 51, 644—655).—An intimate mixture of finely-powdered Fe_2O_3 and graphite commences to evolve CO_2 in vac. at 300° with the formation of Fe_3O_4 , which is further reduced to FeO between 400° and 600° . FeO is reduced by solid C only above 700° at a rate which shows that the reaction proceeds from the surface inwards at the same rate at which C diffuses through Fe .

A. R. POWELL.

Alkalimetric titration of magnesium and determination of magnesium chloride in carnallite. A. RAUCH (Z. anal. Chem., 1931, 84, 336—347).—The method is based on the precipitation of $\text{Mg}(\text{OH})_2$ from a neutral MgCl_2 solution in 70% EtOH by addition of an excess of 0.5N- NaOH free from Na_2CO_3 and titration of the excess NaOH with 0.5N- HCl , using thymolphthalein as indicator. MgCl_2 is extracted from carnallite by grinding the salt with 96% EtOH and

shaking the suspension vigorously for 10 min.; after filtration of an aliquot part Mg is determined as above.

A. R. POWELL.

Anhydrous liquid sulphur dioxide. L. B. HITCHCOCK and A. K. SCRIBNER (Ind. Eng. Chem., 1931, 23, 743–749).—The use of SO_2 as an operating liquid in refrigerating plant is dependent on a low moisture content (< 25 p.p.m.). S is burned in a rotary burner to give an 8–15% SO_2 content, which is absorbed in a series of five towers by sea-water. The absorber liquor is then stripped by means of exhaust steam from a turbo-generator, the gaseous mixture of SO_2 and H_2O leaving at 35° under vac. The gases are compressed in stages, fractionated, and finally compressed to 120 lb. A liquid containing 10–15 p.p.m. of H_2O is obtained.

C. A. KING.

Huillard furnaces.—See I. Determining H_2 in coal gas.—See II. Acid-resistant linings.—See IX. Solid CO_2 .—See XVIII.

PATENTS.

Contact sulphuric acid process. SELDEN Co., Assees. of A. O. JAEGER (B.P. 348,669, 16.12.29. U.S., 22.1.29).—The catalyst comprises at least one catalytically active, non-base-exchanging silicate containing V^{IV} prepared in solutions within the range between neutrality and slight acidity to litmus. [Stat. ref.]

A. R. POWELL.

Production of concentrated gaseous hydrochloric acid. CHEM. FABR. KALK GES.M.B.H., and H. OEHME (B.P. 351,264, 3;7.30. Ger., 22.4.30).—Gases containing HCl are brought in contact with, e.g., anhyd. CuSO_4 to form $\text{CuSO}_4 \cdot 2\text{HCl}$, and the HCl is expelled by heat.

L. A. COLES.

Ammonia-gas detector [for refrigerating plant]. L. A. HAVENS, JUN. (U.S.P. 1,780,483, 4.11.30. Appl., 3.10.28).—The apparatus is covered with a hood (in which escaping NH_3 collects) provided at its upper end with a vertically swinging H_2O container closed at the bottom with a foraminous screen which actuates an alarm and/or closes the supply of NH_3 to the system. When NH_3 escapes from the plant the surface tension of the H_2O in the container is lowered, owing to absorption of NH_3 , and the liquid then passes through the screen and the consequent loss in wt. of the receptacle brings the alarm device into action.

A. R. POWELL.

Crystallisation process for recovery of borax [from Searles Lake brine]. W. E. BURKE, ASSR. to AMER. POTASH & CHEM. CORP. (U.S.P. 1,787,356, 30.12.30. Appl., 23.5.27).—The brine is concentrated at 110° until it is saturated with KCl and $\text{Na}_2\text{B}_4\text{O}_7$, then cooled rapidly to cause the KCl to crystallise, leaving a super-saturated solution of $\text{Na}_2\text{B}_4\text{O}_7$, which is mixed with some of the original brine, saturated with $\text{Na}_2\text{B}_4\text{O}_7$ but not with KCl, cooled further, and circulated upwardly through an agitated sludge of fine borax crystals. As these crystals grow they are removed from the bottom of the crystalliser and the mother-liquor is returned to the evaporators.

A. R. POWELL.

Recovery of cyanides [from waste solutions from gold extraction]. R. R. BRYAN, ASSR. to MERRILL Co. (U.S.P. 1,787,033, 30.12.30. Appl., 2.6.26).—The solution is treated with SO_2 and the mixture of CO_2 , SO_2 , and

HCN evolved is passed through further quantities of the original solution to remove SO_2 and CO_2 and neutralise the alkalinity of the solution. The HCN is eventually absorbed in $\text{Ca}(\text{OH})_2$ or NaOH.

A. R. POWELL.

Production of ammonium or potassium carnallite. KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 351,845, 26.9.30. Ger., 28.11.29).—Mother-liquors from the crystallisation of NH_4 (or K) carnallite are stirred with $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ and NH_4Cl or KCl in correct proportions to form the desired double salt.

A. R. POWELL.

Refrigerating composition. O. HANNACH, ASSR. to W. KASH (U.S.P. 1,786,842, 30.12.30. Appl., 2.6.26. Ger., 21.11.25).—A mixture of 2 pts. of NH_4Cl and 3 pts. of Na_2CO_3 is claimed; on dissolving this mixture in 6 pts. of H_2O a fall in temp. of 31° occurs.

A. R. POWELL.

Production of potassium nitrate. CHEMIEVERFAHREN-GES.M.B.H. (B.P. 351,271, 11.7.30. Ger., 14.8.29).—The liquor from the process, which contains NH_4Cl and $(\text{NH}_4)_2\text{SO}_4$ in solution and CaCO_3 in suspension, is treated with NH_3 in the presence of KCl equiv. to the $(\text{NH}_4)_2\text{SO}_4$; the ppt. of K_2SO_4 and the CaCO_3 are removed together and treated with HNO_3 to yield a ppt. of $\text{CaSO}_4 + \text{K}_2\text{SO}_4$ and a solution from which KNO_3 is recovered by evaporation or cooling. The mother-liquor from the K_2SO_4 and CaCO_3 is cooled to crystallise and remove part of the NH_4Cl , and the liquor is then treated with CO_2 and stirred with the $\text{CaSO}_4 + \text{K}_2\text{SO}_4$ ppt. to yield liquor for re-use.

L. A. COLES.

Solubilising of crude calcium phosphates. J. MARGOLES (B.P. 351,026, 17.1.30).—The phosphates are treated with HNO_3 , which may be mixed with another mineral acid except H_2SO_4 , in the presence of an oxide or oxidising agent, e.g., NaNO_3 .

L. A. COLES.

Treatment of borax ores. Production of calcium borate and sodium nitrate. H. BLUMENBERG, JUN. (B.P. 352,137, 28.4.30, and Addn. B.P. 352,138, 29.4.30).—(A) The ore is leached with H_2O and the conc. borax solution so obtained is treated with CaCl_2 solution to ppt. $\text{CaB}_4\text{O}_7 \cdot 6\text{H}_2\text{O}$. The ppt. is collected and calcined at $300\text{--}350^\circ$ to remove the H_2O . (B) $\text{Ca}(\text{NO}_3)_2$ is used as the precipitant and the filtrate from the CaB_4O_7 is conc. to recover NaNO_3 .

A. R. POWELL.

Manufacture of pure alumina by electrothermal reduction of the impurities in aluminiferous raw materials. H. SIEGENS (U.S.P. 1,787,124, 30.12.30. Appl., 22.12.27. Ger., 1.6.26).—Clay or bauxite mixed with a carbonaceous reducing agent is charged into the electric furnace in such a way that the proportion of C in the charge is below that required to reduce all the Fe, Si, and Ti compounds at the beginning of the process, but is gradually increased with successive charges until the fused mass contains a slight excess of C. The operation is carried out in a reducing atm. and at the end of the process a charge of highly ferruginous clay (free from Ti and Si) and sufficient C to reduce the Fe_2O_3 is added to provide a shower of fine Fe globules which collect suspended particles of reduced Si and Ti compounds. The Al_2O_3 is tapped when it is still light grey in colour, and is then of sufficient purity for the manufacture of Al.

A. R. POWELL.

Production of chromic acid. M. J. UDY, Assr. to ELECTRO METALLURGICAL CO. (U.S.P. 1,784,950, 16.12.30. Appl., 16.12.27).—Sol. chromates are treated with a suspension of PbSO_4 in H_2O and the resulting PbCrO_4 is collected, washed, and decomposed with hot H_2SO_4 (d 1.505). The ppt. of PbSO_4 is separated and returned to the first stage of the process, whilst the solution is evaporated for the recovery of H_2CrO_4 . A. R. POWELL.

Production of acid titanium sulphate. F. VON BICHOWSKY, Assr. to TITANIA CORP. (U.S.P. 1,783,684, 2.12.30. Appl., 20.11.28).—Powdered Ti nitride or cyanonitride is stirred into 2 : 1 H_2SO_4 at 80° and the mixture oxidised by gradual addition of HNO_3 . After filtration the liquid is evaporated in vac. until the temp. reaches 130° ; on cooling, a glassy solid sol. in H_2O and abs. MeOH is obtained corresponding with the formula $\text{H}_2\text{SO}_4 \cdot \text{Ti}(\text{SO}_4)_2 \cdot 4\text{H}_2\text{O}$. With K_2SO_4 a white cryst. ppt. of $4\text{K}_2\text{SO}_4 \cdot 5\text{TiOSO}_4 \cdot 2\text{TiO}_2$ is obtained. The use of NaNO_3 in place of HNO_3 affords needles of $\text{NaHSO}_4 \cdot \text{Ti}(\text{SO}_4)_2 \cdot 9\text{H}_2\text{O}$. A. R. POWELL.

Manufacture of titanium dioxide. METAL & THERMIT CORP., Assees. of S. J. LUBOWSKY (B.P. 351,841, 25.9.30. Ger., 28.9.29).—Finely-ground rutile is intimately mixed with half its wt. of MgO in a ball mill, the mixture is briquetted, and the briquettes are heated at 1400 – 1500° until a hard semi-vitreous product is obtained. This is ground through a 150-mesh sieve and heated with conc. H_2SO_4 (3 pts.) at 90° ; the slurry is diluted with 6 pts. of H_2O and the solution cooled to 0° , whereby $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ separates. The mother-liquor is further diluted and heated at 160° under pressure to hydrolyse the $\text{Ti}(\text{SO}_4)_2$, the H_2SO_4 being reconc. for use again. A. R. POWELL.

Production of calcium benzoate. T. GOLDSCHMIDT A.-G. (B.P. 351,548, 27.3.30. Ger., 3.4.29).—Commercial phthalic anhydride is ground with H_2O and $\text{Ca}(\text{OH})_2$ in the mol. ratio 1 : 1.5 and the mixture is fed continuously by means of a worm into a jacketed tubular reaction chamber provided with stirrers and heated at 440° in a bath of molten S. The Ca benzoate is extracted from the reaction product with hot H_2O and the residue is converted into Ca phthalate for use again.

A. R. POWELL.

Desilicification of liquids with regeneration of the desilicifying agent. I. G. FARBENIND. A.-G. (B.P. 351,021, 19.3.30. Ger., 21.3.29).— H_2O is treated with, e.g., $\text{Fe}(\text{OH})_3$ or $\text{Zn}(\text{OH})_2$ at p_{H} 7 or above, and the hydroxides are desilicified by treatment with a dil. mineral acid having p_{H} 6 or below. L. A. COLES.

Increasing the base-exchanging properties [of glauconite]. O. LIEBKNECHT, Assr. to PERMUTIT CO. (U.S.P. 1,787,008, 30.12.30. Appl., 2.2.27. Ger., 4.2.26).—Glauconite is heated at 100 – 250° , digested with a 10–30% solution of Na_2SiO_3 at 200° under pressure, washed, dried, and again heated at 100 – 350° .

A. R. POWELL.

Manufacture of a [silicate] mineral adsorbent [for benzene vapours etc.]. J. T. TRAVERS, C. H. LEWIS, and O. M. URBAIN, Assrs. to OHIO SANITARY ENG. CORP. (U.S.P. 1,783,396, 2.12.30. Appl., 20.10.28).—Kaolinite is mixed with 75% of its wt. of sawdust, 1.5 times its wt. of Na_2SiO_3 solution (d 1.38), and 2.4

times its wt. of H_2SO_4 (d 1.25) and the mixture set aside until gelation occurs. The stiff gelatinous product is then dried slowly at gradually rising temp. and finally maintained at 90° until no further moisture is expelled. The mass is then heated at 650° in a reducing atm. until volatile matter is no longer evolved, whereby it is converted into a hard porous mass of high adsorptive capacity. A. R. POWELL.

Manufacture of dry carbon dioxide products. DRY ICE CORP. OF AMERICA, Assees. of C. L. JONES (B.P. 346,367, 7.1.30. U.S., 21.2.29).—Liquid CO_2 at 25° and under 1000 lb./sq. in. pressure is allowed to expand through a nozzle at the upper part of a vertical cylindrical chamber so that the liquid is cooled to a temp. below 0° , but above the triple-point temp. and pressure of CO_2 . Surrounding the expansion nozzle is a long basket of fine-mesh gauze which serves to collect the small ice crystals formed by the freezing of the H_2O contained in the liquid. Means are provided for removing this strainer from the chamber and for melting the ice crystals and separately draining off the H_2O without removing the strainer. A. R. POWELL.

Device for detection of oxygen in hydrogen [in hydrogen-cooled dynamo-electric machines]. G. W. PENNEY, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. CO. (U.S.P. 1,778,834, 21.10.30. Appl., 30.4.26).—Use is made of the fact that the pressure developed by a fan running at a given speed in a gas is directly proportional to the density of the gas; hence any increase in the pressure of a fan running in H_2 indicates the leakage of air into the gas container. This increase of pressure serves to operate a relay or signalling device adapted to give visual or oral indication of such leakage in the case of turbo-generators cooled with H_2 .

A. R. POWELL.

Hydrogen generator [for the steam-iron process]. C. MIEDBRODT (U.S.P. 1,777,444, 7.10.30. Appl., 27.2.29. Ger., 22.2.28).—The apparatus comprises an ore chamber above which are a series of superimposed cells arranged radially round the central shaft. The reduction gas as well as the steam used in the subsequent generation of H_2 pass upwards through the central shaft, then through the cells in series so as to preheat it before it passes through the bed of ore or reduced Fe.

A. R. POWELL.

Gas-treating apparatus.—See I. Ferrocyanides from coal gas. H_2 , CO, etc. from hydrocarbons.—See II. Treatment of sulphide Fe ores. Treatment of lead-bearing material. Cd-containing material to Cd. Mg from its compounds. Reduction of metallic compounds.—See X. Fertilisers.—See XVI. Colloidal AgI.—See XX.

VIII.—GLASS; CERAMICS.

Permeability to gas of refractory materials, particularly at high temperatures. H. IMMKE and W. MIEHR (Sprechsaal, 1931, 64, 85–87, 107–109; Chem. Zentr., 1931, i, 2102).—The permeability is proportional to the gas pressure and is smaller at higher temp. Two methods of determination are described, and the application of the results to gases other than air is indicated. A. A. ELDRIDGE.

Manufacture and performance of slip-cast tank blocks. P. HALLER (J. Soc. Glass Tech., 1931, 15, 83—98 r).—The prep. of a satisfactory slip demands a nice adjustment of the ratio of Na silicate, which increases fluidity, to Na_2CO_3 , which increases the viscosity and stabilises the slip. There is no fixed optimum ratio. Only 0.5 in. of plaster is required as a lining to the moulds used in casting. The harder, denser, and less porous is the grog, the better it is suited for slip casting, calcined Indian sillimanite being almost ideal in these respects. Good results have been obtained with a grading: >5 -mesh I.M.M. 1.2, <5 but >10 -mesh 41.5, <10 but >20 -mesh 24.4, <20 but >40 -mesh 10.3, <40 but >80 -mesh 7.7, <80 -mesh 14.9%. Cast blocks are more tender as regards warping and yielding under pressure in the kiln. The porosity of cast blocks is not very much less (24—28%) than that of hand-made plastic ones (27—30) from the same clay composition. Addition of 4% of felspar may lower the porosity of the cast blocks to 18%. The cast blocks have considerably greater mechanical strength than ordinary ones, and a much more regular texture. In service, porosity was found to be of less importance than the formation of a mullitic layer on the face of the block in contact with the molten glass, and the addition of the felspar promoted this. Better service was given by the slip-cast blocks than by hand-made ones from plastic clay of the same composition.

M. PARKIN.

Standards for testing probable behaviour of tank blocks. W. MIEHR (J. Soc. Glass Tech., 1931, 15, 30—40 r).—The Bowmaker test (B., 1929, 815) alone was insufficient to determine probable durability of tank blocks, but was found of value in conjunction with a knowledge of (a) the solubility of the mullite-free portion, (b) the porosity, and (c) the chemical composition. The HF-solubility figures obtained by the author and his co-workers for German blocks varied from 4 to 20%, whilst those quoted by Bowmaker ranged from 18.9 to 59.8%. More definite relationships must be established before standard methods can be specified.

M. PARKIN.

Clay mixtures for glass-melting pots. I. Resistance to thermal shock. II. Shrinkage at high temperatures. J. H. PARTRIDGE and G. F. ADAMS

(J. Soc. Glass Tech., 1931, 15, 59—76 r).—Spalling tests of specimens prepared from clay mixtures containing 20—30% Al_2O_3 and having varying gradings of grog, indicated that silicious clays had less tendency to crack than aluminous ones under the same treatment. Too much fine grog increases the cracking tendency, and for any particular clay there is an optimal amount of the grog of given grading that it can carry. Prolonged firing of test pieces at 1320° showed the silicious mixtures to remain fairly const. in vol., whilst the aluminous ones decreased 12—20% over a considerable period of time (400—500 hr.). Practical results were also in favour of silicious pots, 19 of which gave one quarter of the service given by 156 aluminous ones. Proportion of grog affected strength in drying, a reduction from 50% to 40% in one case raising tensile strength from roughly 11 to 14 kg./sq. cm.

M. PARKIN.

Experimental firing of a Scottish fireclay material. A. T. GREEN and A. E. J. VICKERS (Trans. Ceram. Soc., 1930, 29, 169—181).—An account of the burning of a batch of 600 bricks to a time schedule in an experimental furnace fired by town's gas is given, with discussion of the results. The time schedule was devised from the following considerations. (a) Water-smoking, 0— 250° : Green and Theobald (B., 1925, 501) had expressed the opinion that 17 hr. would be adequate, but to test the abs. min. 11 hr. were decided on for these experiments and the result was still satisfactory. (b) Range 400— 800° , during which combined H_2O and carbonaceous matter (the latter was low) are eliminated and the kaolinite mol. is broken down: preliminary experiments with blocks 2 in. thick showed a large dark core after 4 hr. which disappeared after 8 hr.; 12 hr. was aimed at for the full-size bricks against the 30 or so commonly allowed by manufacturers. (c) Vitrification 850— 1450° : it was decided to raise the temp. at the rate of 40° per hr. up to 1285° , then 15° per hr. to 1450° , and to give a final soak for $3\frac{1}{2}$ hr. The total time of burning was 55 hr. The amount of H_2O vapour and of SO_2 in the furnace gases was determined from time to time: the former shows three peaks; the latter was steady till the later stages, then it rose rapidly. From an examination of the bricks for porosity etc., the authors consider that a determination of the sealed pores and the crushing strength would be useful to control vitrification. Actually the temp. was raised from 450° to 850° in only 9 hr., and although the bricks were still good the authors consider that the time could not safely be further reduced.

B. M. VENABLES.

Influence of water content of clays on their properties in drying and firing. V. P. ZUBCHANINOV and D. I. SMIRNOV (Trans. Ceram. Res. Inst. Moscow, 1930, No. 24, 30—62).—During drying, three periods are distinguished: (a) shrinkage and loss of H_2O proceed with const. velocity, (b) the decrease in H_2O (pore H_2O) proceeds with changing velocity while the vol. of the clay body remains const., (c) the hygroscopic H_2O is removed by heating at 110° . The quantity of shrinkage H_2O , but not that of the pore or hygroscopic H_2O , depends on the initial H_2O content. The relation between the amount of shrinkage and that of pore H_2O is characteristic for each clay. The relative content of pore H_2O in kaolins is greater than that in clays.

CHEMICAL ABSTRACTS.

Production of tridymite bricks. H. SALMANG and B. WENTZ (Ber. deut. Keram. Ges., 1931, 12, 1—29; Chem. Zentr., 1931, i, 2102—2103).

Acid-resistant ceramic linings.—See IX.

PATENTS.

Tempering of glass. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 341,218, 29.11.29. Fr., 2.9.29. Addn. to B.P. 340,108; B., 1931, 350).—Apparatus suitable for carrying out the process of air-queenching described in the prior patent is described.

M. PARKIN.

Manufacture of unsplinterable glass. A. V. JOHNSON (B.P. 351,257, 28.6.30).—The sheets, after

adhesion under high pressure, are subjected with their edges protected by rubber strips of U-section to light pressure, e.g., by compressed air in an autoclave.

L. A. COLES.

[Clay-free] refractory mortars [for use with silica bricks]. E. LUX, Assee. of H. KOPPERS A.-G. (B.P. 351,067, 22.3.30. Ger., 25.3.29).—A mixture of fine quartzite, an org. agglutinant (tragantine), and an insol. Ca salt, e.g., CaCO_3 , is mixed to a paste with H_2O .

L. A. COLES.

Manufacture of artificial grinding or abrading wheels. E. A. SNOWDEN (B.P. 351,182, 10.5.30).—The wheels are built up of a centre core, which may be reinforced, and an annular outer layer, both of which contain limestone particles bonded with Portland or high-aluminous cement, the outer layer containing abrasive material (e.g., Al_2O_3 , SiC) in addition.

L. A. COLES.

Manufacture of [sand-faced] ceramic articles. J. F. JORDAN (B.P. 351,122, 3.4.30).—The moulded clay is coated with a mixture of sand containing not more than 5% Fe (sea sand) with a pigment, e.g., Cr_2O_3 , and is then fired.

L. A. COLES.

Purification of natural and artificial matter. [Removal of iron from ceramic materials.] C. R. B. YOUNG (U.S.P. 1,786,383, 23.12.30. Appl., 30.8.26. Ger., 11.9.25).—Coarsely-ground quartz or felspar is freed from Fe, Mn, etc. by boiling it with a solution containing 18% H_2SO_4 , 2% NaCl, and 1% $\text{H}_2\text{C}_2\text{O}_4$.

A. R. POWELL.

Glass-bending furnaces. J. ZINGG (B.P. 351,862, 17.10.30. Ger., 13.12.29).

Tempering of glass. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNÉY, & CIREY (B.P. 352,359, 5.11.30. Fr., 6.1.30. Addn. to B.P. 340,108).

Rolling of glass. Y. BRANCART (B.P. 352,346, 16.10.30. Belg., 18.10.29).

Power press for pressing or shaping articles from clay dust or other material. W. F., E. J., and S. H. KENT (W. KENT) (B.P. 352,236, 28.6.30).

Sealing Cu to glass.—See X. **Glass for discharge tubes.**—See XI.

IX.—BUILDING MATERIALS.

Deterioration of structures in sea-water. ELEVENTH (INTERIM) REPORT OF THE COMMITTEE OF THE INST. CIVIL ENG. (Dept. Sci. Ind. Res., 1930, pp. 24).—A further inspection of painted steel plates which have now been exposed to aerial corrosion for more than 5 years showed that galvanised plates and plates with 2 or 3 coats of Fe_2O_3 paint are still very good. Dehydrated coal tar with or without red lead in addition is also good, but coal-tar varnish, bitumen, and asphaltum paint are all very bad. Tared plates completely immersed in sea-water were found to be more corroded than others at half-tide. Horizontal-retort tar was better than that from vertical retorts. The former was improved by the addition of slaked lime, the latter by paraffin wax. Tar is best applied at 200° to plates only slightly warmed. A summary of tests of roofing paint (graphite,

iron oxide, and "navy-grey") is given. Tests on wood blocks immersed in sea-water at various tropical stations showed that those treated with creosote were free from *Teredo* after 5 years' exposure. No advantage was thus obtained by adding chlorodihydrophenarsazine ("DM") to creosote, but this compound used in alcoholic solution was superior to other arsenical compounds. Fuel oil fails as a protective probably owing to poor penetration. A 2% solution of "DM" in fuel oil protected completely as far as it penetrated. Pintsch gas tar, manufactured from mineral colza, appears to penetrate and preserve effectively. Descriptions are given of repairs to concrete structures in sea-water. Iron and steel bars of varying composition have now been exposed to sea-water for 8 years. Cr- and Ni-steels are generally in the best condition. Reinforced concrete piles which have been exposed to (1) sea-water, (2) artificial sea-water of 3 times normal concentration, show little deterioration after 7 months. C. IRWIN.

Acid-resistant ceramic linings. L. KÖGEL (Chem. Fabr., 1931, 4, 285—287).—Linings for chemical plant built up of acid-resistant blocks and cement are porous to moisture. Nevertheless the corrosion of a lined Fe container filled with HCl soon stops, perhaps owing to the acid in the pores being held in place by capillary action and then neutralised. If the outer container is not liquid-tight the lining does not remedy this. Cements used consist of quartz, heavy spar, etc. made into a paste with Na silicate. The mineral grains must be completely covered with the silicate to give uniform setting. Hardening is complete when H_2O is entirely removed and all alkali is neutralised with a subsequent acid treatment. This process depends on the porosity of the blocks and is facilitated by warming to 50—60° for a few days, and H_2O must be excluded until the acid has been applied. The Höchst cements made by the I. G. Farbenind. have the special characteristic that setting proceeds even in absence of air. C. IRWIN.

Emulsifying action of asphalt fillers. A. R. EBBERTS (Roads, 1931, 9, 124—125).—Contradictions which have arisen in the correlation of grading and voids of the aggregate with the compressibility and resistance to H_2O action of paving mixtures are explained by the emulsifying action of the fillers. SiO_2 , Fe_2O_3 , and gypsum give asphalt-in- H_2O emulsions, whilst limestone, MgCO_3 , hydrated CaO, $\text{Mg}(\text{OH})_2$, and Portland cement give H_2O -in-asphalt emulsions. According to its composition slag may be in either class. Of the alkaline-earth compounds tried, only CaSO_4 gave an oil-in- H_2O emulsion, but emulsification was incomplete and not strictly typical. Depending on the proportion, a mixture of SiO_2 and limestone may give either type of emulsion. Limestone is the best aggregate for asphaltic concrete, and there is usually enough limestone surface to overcome the action of added filler. When trouble is experienced in getting the asphalt to stick to the aggregate, the addition of CaO to the mix will overcome the difficulty. Emulsions of either type will adhere to limestone chips or pea gravel, due to their adsorptive surface. The predominance of calcareous aggregates in various proprietary emulsions accounts for the success of such products. Actual

rubbing tests under water on compressed pavement specimens showed that a limestone filler decreased the tendency of the asphalt to be dispersed and lost by drainage. When silicious aggregates are the cheapest and most easily obtained it is advised that a small amount of calcareous material be added to render them neutral. J. A. SUGDEN.

Tank insulation.—See I.

PATENTS.

Floor and wall coverings [of cement and leather]. J. SEJVEL (B.P. 351,521, 24.3.30).

Grinding of materials. Mixer [for concrete].—See I. **Bituminous emulsions.**—See II. **Vessels for bleaching.**—See VI. **Refractory mortars.**—See VIII. **Slag. Metal-clad shingles.**—See X.

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

Agglomeration of Siegerland [iron] ore fines by coking with coal. W. LUYKEN and E. BIERBRAUER (Arch. Eisenhüttenw., 1930—1, 4, 505—511; Stahl u. Eisen, 1931, 51, 739—740).—Satisfactory agglomerates were obtained by coking a mixture of the fine ore (through a 5-mm. screen) with a good bituminous coal; less than 10% of the coked material passed a 40-mm. screen. With 43% of ore added to the coal 63% of the NH_3 and 16% of the C_6H_6 normally produced during coking were lost, whilst the calorific val. of the gas was reduced from 4800 to 4167 kg.-cal./cu. m. On the other hand, the ore coke was highly reactive and did not crush or pack in the blast furnace.

A. R. POWELL.

Influence of certain physical and chemical factors on the working of blast furnaces. A. PETERS (Chim. et Ind., 1931, 25, 1327—1338).—To obtain the greatest fuel economy it is desirable to increase indirect reduction of Fe_2O_3 (by CO) and decrease direct reduction by solid coke. Indirect reduction removes 50—70% of the O in the Fe_2O_3 in usual practice, according to the type of ore. This could, in theory, be improved by reducing the size of the pieces of ore charged, but this is not likely to be economical in practice in most cases. It may be improved by reducing the zone of combustion to a minimum, thus increasing the time of contact between the gas and the charge. Also by increasing the blast pressure in the tuyères the favourable effect of increased pressure more than compensates for the consequent reduction of time of contact. Reduction in the size of the coke is desirable as tending both to promote even gas distribution through the furnace and to reduce the oxidising zone before the tuyères. The latter purpose is also served by the use of a coke of low reactivity at below 900°. It is desirable that the coke should be weighed and not merely measured.

C. IRWIN.

Control of the excess air in open-hearth furnaces. A. HERBERHOLZ (Arch. Eisenhüttenw., 1930—1, 4, 461—468; Stahl u. Eisen, 1931, 51, 670—671).—Control is effected by systematically passing a definite vol. of flue gas through an automatic O_2 recorder in which the decrease in vol. after catalytic combustion

of the O_2 with pure H_2 is recorded and the results are used for the automatic regulation of the air supply to the furnace. Tests on numerous furnaces with various types of charges have shown that min. fuel consumption with max. output is obtained when the flue gas contains 2.5—4.5% O_2 , preferably about 3.8% O_2 . Under these conditions the furnace has a melting capacity of 11 tons/hr. with a heat consumption of 900 kg.-cal./kg.

A. R. POWELL.

Ternary system iron-sulphur-carbon. R. VOGEL and G. RITZAU (Arch. Eisenhüttenw., 1930—1, 4, 549—556; Stahl u. Eisen, 1931, 51, 793—794).—In this ternary system, besides the immiscibility gap in the liquid state, there are a secondary region of immiscibility in which when part of a homogeneous liquid phase has solidified drops of a second liquid phase (FeS) separate, and a tertiary region in which a second liquid phase separates in droplets which disappear again at lower temp. Only three cryst. constituents occur in the solid alloys, viz., binary solid solution of C in Fe, Fe_3C , and FeS . The temp. of the four-phase equilibrium liquid 1 \rightleftharpoons liquid 2 + γ + Fe_3C is 1190° and the compositions of the liquids are (1) 95.2% Fe, 4% C, and 0.8% S, and (2) 70.25% Fe, 29.5% S, and 0.25% C. The ternary eutectic, m.p. 975°, contains 0.15% C and 31% S, and consists of FeS and a binary solid solution of C in Fe. The decomp. of the solid solution of C in Fe into ferrite and cementite and the temp. of the pearlite point of the Fe-C system are not appreciably affected by the presence of C. The droplet shape of troilite in meteoric Fe is attributed to the presence of C in the Fe.

A. R. POWELL.

System iron-nitrogen. W. KÖSTER (Arch. Eisenhüttenw., 1930—1, 4, 537—539; Stahl u. Eisen, 1931, 51, 740).—Micrographical investigation of the nitrated layer on Fe heated for 8 hr. at 650° in NH_3 confirms the observation of Lehrer (A., 1930, 1121) that the system Fe-N contains two eutectoids (cf. also A., 1930, 996). The first eutectoid, braunite, is converted into martensite and austenite by quenching from 600°, whereas the second remains unchanged. Fe-N alloys with up to 3% N resemble closely in structure and behaviour on heat-treatment the Fe-C alloys.

A. R. POWELL.

Ternary system iron-carbon-vanadium. R. VOGEL and E. MARTIN (Arch. Eisenhüttenw., 1930—1, 4, 487—495; Stahl u. Eisen, 1931, 51, 715).—The γ -field of the Fe-C system extends only to 1.8% V in the ternary system and V raises the temp. of the magnetic transformation which can be detected in alloys containing up to 25% V. Only one V carbide, V_4C_3 , but no double carbide, exists in the partial system Fe-V- V_4C_3 - Fe_3C and a field of ternary γ -solid solution extends from the system Fe-C to the boundary of the system V- V_4C_3 . The saturated ternary γ -phase (3.4% C and 6.5% V) forms a ternary eutectic with Fe_3C and V_4C_3 containing 81.8% Fe, 6.2% C, and 12% V, m.p. 1095°. In steels with a low V content ternary γ decomposes on cooling with the separation of ferrite and pearlite composed of Fe_3C and ternary α with a variable content of V and C. In V-rich steels γ decomposes according to the composition into ferrite and (a) a ternary pearlite consisting of cementite, V_4C_3 , and ferrite with 0.2% C and 0.8% V,

this phase being formed at 700°, or (b) a binary pearlite consisting of V_4C_3 and ferrite with a high V and low C content. V even in small quantities retards the separation of cementite from pearlite, but the separation of V_4C_3 from the ternary phases is scarcely affected even by very rapid cooling. The increase in the hardness of steel produced by addition of V is ascribed to the greater hardness of the binary ferrite containing V in the pearlite eutectoid, to the more finely-dispersed condition of decomposed pearlite, and to the separation of finely-divided, very hard V_4C_3 . A. R. POWELL.

System iron-carbon-vanadium. H. HOUGARDY (Arch. Eisenhüttenw., 1930—1, 4, 497—503; Stahl u. Eisen, 1931, 51, 592—593).—In the Fe-V system the γ -field extends to 1.1% V, but the addition of C to the alloys extends the γ -range in such a way that the max. amount of V in the γ -phase is given by the equation $V = C/0.175 + 1.1$; this implies that the additional V is all present as V_4C_3 and that the system is pseudo-binary. V_4C_3 does not form a double carbide with Fe_3C , both being precipitated independently when sufficient C is present, and forms no solid solutions with α - or δ -Fe, but a limited series of solid solutions with γ -Fe. The Al point of the Fe-C system occurs at 10° above the normal temp. in the presence of V, independent of the amount present, provided that the alloy contains cementite or pearlite. The hardness of quenched ternary alloys ceases to increase above a definite V content dependent on the C present, and these alloys have a lustrous, coarsely cryst. fracture which cannot be changed by heat treatment; their microstructure shows the presence of V_4C_3 and ferrite only.

A. R. POWELL.

Hardened and tempered steels. I. Alkaline sodium picrate etching and its application to the study of the mechanism of tempering hardened steels. H. HANEMANN and A. SCHRADER. II. Mechanism of the formation of the martensite structure. H. HANEMANN, K. HERRMANN, V. HOFMANN, and A. SCHRADER. III. Carbon content of the η -phase. H. HANEMANN (Arch. Eisenhüttenw., 1930—1, 4, 475—477, 479—484, 485—486; Stahl u. Eisen, 1931, 51, 645, 646—647, 647—648).—I. Cementite is etched deep black by alkaline picrate solution whether present in the microstructure in a coarse form or as pearlite, sorbite, or quenched troostite. Ferrite, austenite, and the η -phase are not coloured by the reagent at 20°, but above 70° the last-named commences to decompose and it is then darkened by the picrate. The ζ -phase is slowly darkened by the reagent, but can be distinguished from cementite by etching at 40° for 40 min., when the cementite becomes deep black, but ζ is scarcely attacked. To distinguish between ζ and δ the steel is etched at 50—60°, when ζ is blackened in 50 min., but δ is darkened only above 70°. Thus suitable selection of temp. and time of etching with alkaline picrate serves to distinguish between all the constituents associated with the martensite transformations.

II. Röntgenographic and microscopical investigation of hardened steels indicates that the η -phase has a tetragonal lattice with the C atoms in the basal plane of the elementary cell, the structure of which slowly changes on ageing at the ordinary temp. or tempering

at 70° without any visible change in the microstructure. Tempering at 100° converts the η -phase into a pseudo-morph of α -Fe having a similar lattice structure but a different crystal form (δ -phase). Cementite is formed only above the second transformation temp. of martensite. The transition state, ζ , between the two transformations of martensite has a distorted α -Fe lattice containing adsorbed C atoms.

III. Quenching and tempering tests on austenitic and martensitic steels indicate that the η -martensite needles contain about 1.1% C. A. R. POWELL.

Some diagrams registered with a self-recording dilatometer during quenching [of steel], and the mechanism of nodular troostite formation in carbon steels. S. SATÔ (Sci. Rep. Tôhoku, 1931, 20, 260—267).—A new type of recording differential dilatometer has been used in quenching experiments on a steel of eutectoid composition. The efficiency of various quenching media and of "facing" upon the surface of the steel has been estimated from the form of the dilatometric curves and from the microstructure of the steel. Particular consideration is given to the mechanism of formation of nodular troostite in quenched steel.

E. H. BUCKNALL.

Fibrous structure of steel and its mechanical property. K. NAGASAWA (Sci. Rep. Tôhoku, 1931, 20, 299—312).—The fibrous macrostructure may be developed by etching in 40—60% HCl. This structure is shown to be related to the original dendritic form. The mechanical properties are superior along the direction of the fibres to those measured at right angles. Annealing at temp. below 1300° has little effect in removing fibre. Cracks formed by quenching tend to lie along the fibres.

E. H. BUCKNALL.

X-Ray analysis of the cementite obtained by tempering quenched steels. S. SEKITO (Sci. Rep. Tôhoku, 1931, 20, 313—322).—The presence of cementite in steel is indicated in X-ray spectra. By fastening a strip of Au to the steel specimen a comparison standard is obtained, and the % cementite may be measured by the relative intensity of the cementite line (113 $K\alpha$) to the Au line (220 $K\beta$). In steels of varying C content, the % cementite is proportional to the C content, given similar heat treatment. Formation of cementite in a quenched steel commences on tempering at 300° and development of the cementite lattice is complete at 550—600° with short annealings and at 350—400° with longer treatment.

E. H. BUCKNALL.

Hot-shortness of steel [produced] by [contact with] metals. H. SCHÖTTKY, K. SCHICHEL, and R. STOLLE (Arch. Eisenhüttenw., 1930—1, 4, 541—547; Stahl u. Eisen, 1931, 51, 769—770).—Metals insol. in Fe, e.g., Pb, Bi, Cd, and Ag, and metals completely sol., e.g., Ni, do not produce hot-shortness of steel when brought into contact with it at 1200°. On the other hand, hot-shortness is rapidly produced by contact with molten metals or alloys of metals which are completely miscible with molten Fe, but have only a limited range of solid solution in Fe, e.g., Sn, Zn, Sb, Al. Thus 35:65 Sn-Cu bronze produces hot-shortness at 740°, i.e., 10° above the m.p., but Sn, Sb, and Al produce hot-shortness only at 1000°. Ce and Si produce hot-short-

ness of high-C steels at 1200°, owing to the formation of ternary eutectics.

A. R. POWELL.

Properties of "degassed" and "gassy" cast steel. W. OERTEL and A. SCHEPERS (Stahl u. Eisen, 1931, 51, 710—715).—The properties and structure of steel containing 0.07% C, 0.3% Mn, 0.02—0.03% P, and 0.024—0.035% S cast without addition of Si or Al to the ladle have been compared with those of the same steel after treatment with Si and Al to remove gas. Segregation of S, P, and C towards the centre of the ingot was much more marked in the untreated steel, and this produced more rapid grain growth and recrystallisation after rolling and annealing. The tensile properties of the untreated steel approach those of the treated steel only at the bottom of the ingot; at the top they are much poorer owing to the presence of numerous small blowholes. The effect of the degassing treatment on the magnetic ageing of the steel is illustrated diagrammatically.

A. R. POWELL.

Decarburisation of carbon steels in fused salt baths. A. SEUTHE and E. H. SCHULZ (Mitt. Forsch.-Inst. Ver. Stahlwerke, 1931, 2, 61—76; Stahl u. Eisen, 791—793).—The decarburising action of the ordinary salt bath (NaCl, KCl, or BaCl₂) used in annealing steel is due entirely to dissolved O₂ derived from the air. Part of this O₂ is liberated when the bath solidifies as well as when the temp. is reduced by the introduction of cold steel. The formation of Fe₂O₃ on the steel surface is accompanied by contamination of the bath with particles of this Fe₂O₃ which flake off, and hence with prolonged use the decarburising action of the bath tends to increase. The presence of Na₂SO₄ or of alkali or alkaline-earth oxides or carbonates in the bath also accelerates decarburisation, but NaCl, KCl, or BaCl₂ in the absence of O₂ or oxides is entirely inert.

A. R. POWELL.

Corrosion prevention of ferrous metals. V. V. KENDALL and F. N. SPELLER (Ind. Eng. Chem., 1931, 23, 735—742).—In reviewing the principal developments in recent corrosion research, mention is made of the resistance of 0.25% Cu steel to atm. corrosion, the de-aeration of boiler-water supplies, the addition of Na₂Cr₂O₇ or other film-forming inhibitors to water-circulating systems, and improved paints and lacquers including synthetic resins.

C. A. KING.

Analysis of copper alloys and white metals. W. BERG (Chem.-Ztg., 1931, 55, 530—531).—Slight modifications are made in the well-known procedure for the analysis of brass, bronze, and white metals.

A. R. POWELL.

Age-hardening mechanism in aluminium-magnesium silicide alloys and in duralumin. S. KOKUBO (Sci. Rep. Tôhoku, 1931, 20, 268—298).—As a result of measurements of the density, electrical resistance, and hardness of the alloys after various thermal treatments, together with dilatometric and thermal study of the quenched materials, the author concludes that the precipitation theory of age-hardening is untenable. The main grounds for this conclusion are that precipitation would be accompanied by (a) an evolution of heat and (b) a decrease in resistivity, whereas age-hardening proceeds with absorption of heat and increase in resistivity. Annealing at higher temp. (450°) which

does not result in hardening results in the changes (a) and (b), which are ascribed to precipitation. It is therefore suggested that the hardening resulting from ageing of quenched Al-Mg₂Si alloys is brought about by lattice distortion arising out of local concentration of the stronger atoms in the lattice. Mg₂Si is not formed at this temp. Experiments with duralumin lead to the conclusion that the hardening in this case is due to similar causes, with the difference that Cu atoms also become conc. in some parts of the crystals, as is shown by their reaction to form CuAl₂ when the temp. is raised sufficiently.

E. H. BUCKNALL.

Refining of aluminium and its alloys by treatment with chlorine and nitrogen. W. KOCH (Metall-wirt., 1931, 10, 69—72, 85—88; Chem. Zentr., 1931, i, 2109).—By passing Cl₂ through the molten mass two periods are differentiated: (1) almost complete absorption of Cl₂, (2) escape of Cl₂ and volatile metallic chlorides. Various alloys were chlorinated and then degassed with N₂; the properties of the products are described. A finer structure is produced by separation of the foreign metals in a highly disperse form. Selective volatilisation of the impurities is impossible.

A. A. ELDRIDGE.

Corrosion of tin plate by fruit juice. A. PELLERIN and E. LASAUSSE (Chim. et Ind., 1931, 25, 1348—1353).—Experiments with dil. solutions of acid sealed into tinplate containers under conditions comparable with those of fruit packing show that the presence of air greatly promotes corrosion. NaCl acts as a partial protective agent in 2% concentration. Cold citric acid attacks the tin, whilst with AcOH chiefly Fe is dissolved. Na₂HPO₄.12H₂O prevents corrosion at *p*_H 7.7. The bursting of containers is most readily produced by AcOH. Double tinning or varnishing is useless as an additional protection against acid corrosion, but reduce corrosion by fatty materials or by neutral substances, e.g., peas. In all cases corrosion was measured by Sn and Fe found in solution after periods up to 2 years.

C. IRWIN.

Italian production of cadmium. L. CAMBI and V. TOJA (Giorn. Chim. Ind. Appl., 1931, 13, 281—286).—Calamines (0.051—0.056% Cd) are utilised at the Monteponi electrolytic Zn works. The cadmiferous Zn deposits are roasted in an Oxland furnace and the Cd oxides are recovered by volatilisation (yield 94—95% of the Cd content). The Cd is precipitated by cathodic Zn plates from H₂SO₄ solution (1—2.5 g. per litre). This ppt. oxidised in air for 48 hr. is dissolved in H₂SO₄ containing 0.2—0.3% HNO₃; the solution (74—83 g. Cd and 18—24 g. Zn per litre) is electrolysed in cells provided with pulsating cathodes (90 vibrations per min.) and the electrolyte is stirred every 30 min. The current is 50 amp. per sq. m. and 3.5 volts. The Cd deposits are fused first under heavy oil and then under NaOH. The annual output of the plant is 12 tons. The purity is 99.92% Cd.

O. F. LUBATTI.

Dip-sampling cyanide gold bullion at the Sons of Gwalia Gold Mine, Gwalia, W. Australia. C. O. A. THOMAS (Proc. Austral. Inst. Min. Met., 1931, 17—22).—An average sample of the bullion contains 82.5% Au, 6.7% Ag, 7.5% Cu, 2.6% Pb, 0.5% Zn,

and 0.2% Fe. When cast into 920-oz. ingots the outside bottom of the bar contains less Au and the outside top more Au than the average. Accurate samples were obtained by taking a dip from the molten metal by means of a hollow graphite rod and casting beneath castor oil in an Fe mould. A. R. POWELL.

Structures in sea-water.—See IX. **Purification of blast-furnace gas. Induction furnaces for steel. Magnetic induction of steels. Flue gas purification.**—See XI.

PATENTS.

Case-hardening furnace with charging device of worm type. H. LINDHORST (B.P. 350,812, 21.8.30. Addn. to B.P. 330,188; B., 1930, 823).—The feed hopper of the furnace previously claimed is in the form of an upright truncated cone and feeds the hardening powder to the worm charging device through an opening in the bottom, which slopes towards the centre. The powder is preheated by means of a coil in the hopper through which the hot furnace gases are passed and a double-bladed rotating scraper is provided at the bottom of the hopper to move the powder towards the opening and to prevent clogging. A. R. POWELL.

Metal-treating furnaces [for case-hardening]. W. FAIRWEATHER. FROM SINGER MANUFG. CO. (B.P. 346,924, 3.3.30).—The furnace comprises a tubular horizontal retort inside a heating chamber and provided with a conveyor on which the articles buried in a thin layer of carburising powder are passed through the retort, the mouth of which is so restricted that this layer forms a practically gastight seal. A. R. POWELL.

Heat treatment of metal articles. H. ROSENBERG (B.P. 349,902, 23.12.29).—A mechanically operated, totally enclosed furnace arrangement is claimed by means of which articles can be carburised in a cyanide bath and transferred directly to a quenching bath without coming in contact with the air, without appreciable fall in temp. during transfer, and without escape of dangerous fumes from the plant. A. R. POWELL.

Desulphurisation of cast iron. L. W. SPRING, ASSR. to CRANE CO. (U.S.P. 1,785,503, 16.12.30. Appl., 22.6.29).—The Fe from the cupola is passed through a trough into the top of a desulphurising chamber containing an alkaline flux and the treated metal is withdrawn from a trough leaving the bottom of the chamber and running parallel to and below the first trough and discharging into a ladle below the entrance into the first trough. A. R. POWELL.

Reduction of pyritic ores [for recovery of sulphur]. L. MELLERSH-JACKSON. FROM PATENTAKTIEBOLAGET GRÖNDAL-RAMÉN (B.P. 350,625, 31.3.30).—Pyritic ores are smelted with fluxes and such quantities of solid carbonaceous reducing agents that a complete or partial pyritic smelting takes place in the lower part of the furnace and the SO₂ and, if present, As₂O₃ formed in this zone are reduced to S and As, respectively, in the upper zones of the furnace, whilst any Cu collects as matte in the hearth. A. R. POWELL.

Treatment of ores and materials containing iron in combination with sulphur. Treatment

of [sulphide] iron ores. COMSTOCK & WESCOTT, INC., and E. W. WESCOTT (B.P. 348,664—5, 18.11.29. [B] Addn. to B.P. 306,107; B., 1930, 106).—(A) The ore, e.g., pyrites, is heated in a dil. Cl₂ atm. to convert the Fe into FeCl₂ and liberate the S as vapour, which is removed and condensed. The FeCl₂ is then treated with preheated air and Cl₂ to convert it into FeCl₃ which is volatilised and condensed and the Cl₂-N₂ gas mixture is used again in the first stage of the process. The FeCl₃ is revaporised and burned with air to form Fe₂O₃ and Cl₂, which is passed back to the process. (B) The Cl₂ gases from the combustion of the FeCl₃ together with fresh Cl₂ are passed partly into the chamber wherein the FeS₂ is converted into FeCl₂ and partly into the chamber wherein the FeCl₂ is converted into FeCl₃. A. R. POWELL.

Obtaining a highly porous, cellular, light material from blast-furnace slag and similar fused materials. C. H. SCHOL (B.P. 350,526, 7.3.30. Ger., 23.1.30).—The molten slag as it comes from the blast furnace runs down a short trough on to a water-cooled inclined plane from which it falls into the granulating trough where it meets a stream of preheated H₂O, which causes the slag stream to break up into a porous cellular mass. The granulating trough has only a short straight portion terminating in a long downwardly curved portion to allow the material to fall more readily as the H₂O is progressively evaporated. A. R. POWELL.

Manufacture of low-carbon chromium-steel. F. O. KICHLINE, ASSR. to BETHLEHEM STEEL CO. (U.S.P. 1,785,199, 16.12.30. Appl., 20.4.26).—Granulated pig Fe containing Cr and C is melted in an electric furnace with an excess of chromite over that required to oxidise the C and with sufficient CaO to form a highly basic slag; this slag is removed and the resulting Fe-Cr alloy low in C is refined by the usual methods. A. R. POWELL.

Manufacture of steel having good machining properties. F. BORGGRAFE (B.P. 350,888 and 350,919, 10.1.30).—(A) The process claimed in B.P. 318,177 (B., 1931, 207) is carried out in a normal large Bessemer converter. (B) The additions of Cu and S or FeS claimed in B.P. 340,529 (B., 1931, 301) are made in the refining furnace or in the ladle. A. R. POWELL.

Articles made of steel alloys and requiring high permanent strength, such as containers, pipes, boiler parts, etc. F. KRUPP A.-G. (B.P. 348,668, 14.12.29. Ger., 24.12.28).—The alloy comprises Fe with about 0.15% C and either 1—2.5% W, 0.5—2% Cr, and 0.4% Mo or 0.8% Mo and 1% Cr; in addition it may contain 0.2—6% Si, 0.2—5% V, and 0.2—5% Ti. After fashioning into pipes or pressure vessels the articles are annealed, quenched, and tempered, and will then withstand pressures of up to 300 atm. at 250—600°. A. R. POWELL.

Rolling and annealing of sheet metal [steel]. A. PATERSON (U.S.P. 1,785,786, 23.12.30. Appl., 26.3.28. Renewed 14.5.30).—After the usual hot-rolling process the sheet is allowed to cool within the "blue-short" zone (316—427°) and the rolling finished. The final annealing is effected by heating for a short

time in the "growth range," *e.g.*, just above the crit. point. A. R. POWELL.

[Ferronickel] magnetic material [for transformer cores]. W. F. BRANDSMA, P. R. DIJKSTERHUIS, G. J. SIZOO, and G. B. JONAS, ASSRS. to RADIO CORP. OF AMERICA (U.S.P. 1,785,246, 16.12.30. Appl., 1.8.28. Holl., 19.7.27).—Transformer core plates consisting of 50:50 Fe-Ni alloy with 0.095% C are heated in air at 900° until the C is reduced to 0.04%, and the material is partly oxidised so that it gives a substantially straight hysteresis curve. A. R. POWELL.

Rolling of alloy steel. H. M. GIVENS, F. B. FOLEY, and J. L. COX (U.S.P. 1,786,297, 23.12.30. Appl., 20.11.29).—Martensitic alloy steel is heated to 1260° and passed through the rolls until the temp. falls to about 1090°; the steel is then allowed to cool below its crit. temp., *e.g.*, to 815°, reheated to 1040°, and the rolling finished as usual, but at not below 760°. A. R. POWELL.

Salt-bath furnace for heat-treatment of steel. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 349,830, 19.7.30. Ger., 24.8.29).—The bath comprises a metal crucible which acts as one electrode and a second electrode in the form of a hollow cylinder projecting into the crucible and forming an annular space between the walls of the crucible and the cylinder. The heating devices for melting the salt and the materials to be heat-treated are introduced into the bath through the middle of the cylinder. A. R. POWELL.

Electrically heated salt-bath furnace for heat-treatment of steel. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 349,846, 7.8.30. Ger., 9.8.29).—The furnace is heated by means of three U- or W-shaped electrodes connected separately to the three poles of a three-phase current supply. The electrodes are so constructed that they can be used as resistance heaters for melting the salt, then as conductors for passing the current through the fused salt to maintain the temp. of the bath. A. R. POWELL.

Annealing. J. R. CAIN, ASS. to RICHARDSON CO. (U.S.P. 1,784,221, 9.12.30. Appl., 2.8.27).—The annealing vessel is half-filled with molten Pb on which floats a layer of hydrocarbon oil. The greater part of the Pb bath is disposed inside a Ni-Cr wire-wound electric furnace which maintains it at the correct annealing temp., whilst the upper part of the vessel is maintained relatively cool so that the sheet metal after annealing is withdrawn at a temp. below that at which its surface becomes discoloured by oxidation. A. R. POWELL.

Heat-treatment of cold-shaped manganese-steel articles. H. WADE. From TAYLOR-WHARTON IRON & STEEL CO. (B.P. 351,691, 23.5.30).—Super-hardness of steel containing 10–15% Mn and <5% Ni, induced by cold-work, is eliminated by heating the partly formed article for 5–15 min. at 700–710°, air-cooling, completing the cold-work, and again annealing for 5–15 min. at 650°. A. R. POWELL.

Working manganese-iron or -steel alloys. H. WADE. From TAYLOR-WHARTON IRON & STEEL CO. (B.P. 335,076, 4.10.29).—Shaped articles made of steel containing 10–15% Mn are subjected to surface

abrasion, with or without shock, to increase the surface hardness locally in the parts to be subjected to wear. A. R. POWELL.

Rust-proofing of iron, steel, and other metals. W. H. COLE (B.P. 352,202, 10.6.30).—The articles are heated at 500–600° in a mixture of 3000 pts. of emery, 2000 pts. of Zn dust, 1000 pts. of Al powder, 200 pts. of Cr₂O₃, 30 pts. of CuO, 5 pts. of Na₂B₄O₇, 5 pts. of C₁₀H₈, and 5 pts. of NH₄Cl. A. R. POWELL.

Manufacture and use of compositions for coating metals [iron]. PARKER RUST PROOF CO. (B.P. 346,401, 10.1.30. U.S., 10.1.29).—The coating bath comprises an acid phosphate solution containing MnH₄P₂O₈ and CuO in the ratio 40:1. A. R. POWELL.

Proofing of iron and steel against rust. W. H. COLE (B.P. 350,420, 10.12.29 and 20.5.30. Addn. to B.P. 289,906; B., 1928, 488).—The metal is boiled in a solution obtained by dissolving 50 g. of Fe, 60 g. of Zn, 10 g. of Al, and 10 g. of Cr in 1 litre of H₃PO₄ (*d* 1.09) and diluting to *d* 1.02. A. R. POWELL.

Coating metal articles [with an iron-chromium-silicon alloy]. F. M. BECKET, ASS. to ELECTRO METALLURGICAL CO. (U.S.P. 1,784,570, 9.12.30. Appl., 29.10.28).—The articles are heated in a reducing atm. with a powdered mixture of an alloy of 40% Fe, 40% Cr, and 20% Si with Al₂O₃ and Na₂SiF₆, whereby a corrosion-resistant film of the alloy is formed on the surface of the articles. A. R. POWELL.

Coating of metallic articles [iron pipes] with refractory materials. A. E. WHITE. From DOHERTY RES. CO. (B.P. 350,003, 1.3.30).—The pipe is coated internally with a refractory mixture containing ZrSiO₄ and bonded with FeCl₃, and the coated pipe is heated at 1370° until the FeCl₃ is completely decomposed and the Fe oxides formed by its action on the Fe of the pipe have diffused some distance into the refractory lining so as to form a firm joint between the pipe and the lining. Such pipes are useful for the transfer of corrosive liquids or hot gases. A. R. POWELL.

Production of ferromolybdenum and ferro-tungsten. P. SCHWARZKOPF (U.S.P. 1,786,393, 23.12.30. Appl., 29.4.29. Ger., 22.5.26).—MoO₃ or WO₃ vapour or the finely-divided product obtained by condensation therefrom (cf. U.S.P. 1,629,004; B., 1927, 528) is added directly to the bath of molten Fe. A. R. POWELL.

Solvent inhibitor for the acid treatment [pickling] of metals. W. S. CALCOTT and I. E. LEE, ASSRS. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,785,513, 16.12.30. Appl., 17.4.29).—Thiophenol, benzyl or isopropyl mercaptan, or similar substances are claimed as inhibitors in H₂SO₄ pickling baths. A. R. POWELL.

Facing of cutting, drilling, and boring tools, and welding rod [therefor]. H. J. C. FORRESTER. From STOODY CO. (B.P. 350,607–8, 22.3.30).—(A) The mild steel shank is first faced with a layer of hard steel, then with a layer of mild steel in which are embedded particles of WC. (B) The second operation is performed with an O₂-C₂H₂ flame and a welding rod comprising a mild steel tube packed with granular WC. A. R. POWELL.

Refining [the grain structure] of non-ferrous metals or alloys. D. R. TULLIS and P. OAKLEY (B.P. 351,177, 8.5.30).—Molten Al, Cu, Ni, or Pb, or their alloys, are treated with Cl_2 and the vapour of VOCl_2 .

A. R. POWELL.

[Copper-tin-zinc] alloy. H. KANZ (B.P. 350,889, 13.1.30. Switz., 18.1.29).—An alloy for the manufacture of acoustic instruments comprises Cu with 2—16 (6)% Sn, 10—46 (34)% Zn, 0.1—7.5% Al, Fe, Mn, or Ni (0.5% Ni), and 0.1—5% Pb, Sb, or Si (0.2% Si). The proportion of the constituents is so arranged that the structure of the alloy consists of α + eutectoid.

A. R. POWELL.

Copper alloys [containing sulphur]. A.-G. VORM. O. BRANDENBERGER METALLGIESSEREI U. HÜTTENPRODUKTE, Assees. of W. STRAUS (B.P. 350,775, 16.7.30. Ger., 17.7.29).—The addition of up to 4% S to high-Cu bearing metals is claimed.

A. R. POWELL.

Copper-silicon-zinc alloy. HIRSCH, KUPFER- U. MESSINGWERKE A.-G. (B.P. 350,750, 1.7.30. Ger., 27.5.30).—Alloys with 80—90% Cu, 2—5% Si, and the remainder Zn are claimed. Part of the Zn or Cu may be replaced by 1—3% of one or more of the metals Al, Mn, Co, Ni, Cr, Zr, W, Mo, Ti, and Sn. Alloys with 85% Cu, 5% Si, and 10% Zn, and with 81% Cu, 4.5% Si, 14% Zn, and 0.5% Sn are particularly suitable for the production of dense sand castings and for bearing metals.

A. R. POWELL.

Sealing [copper] wire and other metal parts to glass. WESTINGHOUSE LAMP CO., Assees. of D. F. WAY (B.P. 348,885, 19.5.30. U.S., 17.5.29).—The wire is dipped into a solution containing $\text{Na}_2\text{B}_4\text{O}_7$ and $\text{NaNH}_4\text{HPO}_4$ and the wet wire is dried and heated until the salts form a thin glaze over its surface. The wire can then readily be sealed into glass.

A. R. POWELL.

Treatment of nickel-copper-bearing material. INTERNAT. NICKEL CO., INC., Assees. of R. C. STANLEY (B.P. 351,150, 23.4.30. Appl., 17.8.29).—Bessemerised Cu-Ni matte is smelted with Na_2SO_4 and C, the top layer of Cu-Na sulphides is removed, and the bottom layer is again smelted with Na_2SO_4 and C. The combined top layers are treated in a converter to obtain blister Cu and the final bottom layer is ground, leached to remove Na_2S , and roasted to NiO , which is treated by the carbonyl process for the recovery of pure Ni.

A. R. POWELL.

Separation [of antimony from] and purification of metals [lead] and alloys. A. HANAK (U.S.P. 1,786,908, 30.12.30. Appl., 8.8.28).—Pb or Pb-Sn alloys are freed from Sb by melting at 450° with sufficient Na to form Na_3Sb , cooling to just above the m.p., stirring with molten NaOH, and skimming off the flux which contains all the Sb. On dissolving the flux in hot H_2O , the Sb separates as a powder containing over 90% Sb and the solution may be evaporated to recover NaOH for use again.

A. R. POWELL.

Removal of lead coatings from metallic articles. K. B. BOWMAN, ASSR. to REPUBLIC STEEL CORP. (U.S.P. 1,785,245, 16.12.30. Appl., 8.10.29).—The article is immersed in molten NaNO_3 to oxidise the Pb to PbO and the PbO is removed by pickling the article in HCl.

A. R. POWELL.

Treatment of lead-bearing material [waste battery paste etc.]. A. STEWART, ASSR. to C. L. CONSTANT CO. (U.S.P. 1,783,986, 9.12.30. Appl., 22.3.27).—The dry paste (1 ton) is heated with a solution of 600—700 lb. of NaCl in 100 gals. of H_2O and with 1000 lb. of H_2SO_4 (d 1.84) until copious fumes of H_2SO_4 are evolved; most of the As and Sb are thereby evolved with the Cl_2 and HCl vapours. The resulting PbSO_4 paste is washed with a boiling 20% NaHSO_4 solution to remove the remaining Sb and As, then with H_2O to remove acid, and dried.

A. R. POWELL.

Reduction of metallic compounds. G. N. KIRSEBOM (B.P. 351,653, 2.5.30. Swed., 14.5.29).—Oxides of Pb, Cd, Sn, Sb, or Bi are reduced to metal by fusion with NaOH and As. The process is particularly applicable to the treatment of flue dusts and the slags produced in the Harris process. If the latter contain NaNO_3 this is first reduced by the As to NH_3 , then with further quantities of As a Pb-Sb alloy is produced, and finally when the slag becomes very viscous Sn separates in prills which may be recovered by leaching out the sol. Na_3AsO_4 .

A. R. POWELL.

Production of aluminium alloys. RUSELITE CORP. (B.P. 350,357, 30.9.30. U.S., 25.4.30).—The alloys comprise Al with 3—10% Cu, 0.75—5% Cr, 0.1—5% Mo, and 0.05—1% Ti, with a min. of 85% Al. The Al is first melted under a slag containing Ca, B, and F, and the Cu, Cr, and Mo are added in that order.

A. R. POWELL.

Production of wires from aluminium alloys. H. BOHNER (B.P. 349,978, 5.3.30).—The alloy is drawn down to wire slightly larger than that required, annealed at 500 — 520° , quenched, tempered at 200 — 250° , and drawn down to the desired size. This treatment gives a wire of high strength and electrical conductivity.

A. R. POWELL.

Protection of aluminium and its alloys and/or other metals against corrosion. H. SUTTON and H. C. COCKS (B.P. 351,396, 22.2. and 16.4.30).—The articles are plated with Cd in a bath containing 62 g. of $\text{K}_2\text{Cd}(\text{CN})_4$ per litre or 52 g. of CdSO_4 and 64 g. of NaCN per litre, using Cd anodes. Addition of 15 c.c. of aq. NH_3 (d 0.88) per litre assists anodic corrosion and prevents the formation of anode slimes.

A. R. POWELL.

Production of aluminium and [silicon]-aluminium alloys. W. NEUMANN (B.P. 351,524, 24.3.30).—Bauxite or clay low in Fe is reduced electrothermally to produce a Si-Al alloy which is allowed to cool slowly in a liquation furnace. The crystals of Si which collect at the surface are removed, drained, and pressed, and the liquid eutectic of Al with 12% Si is liquated away from the heavy residue of Fe_3Al and TiAl_4 . Al is recovered from the eutectic by distillation in vac. and the residue is returned to the liquation furnace. The crude Si produced is returned to the electric furnace when bauxite with a low Si content is being reduced, to assist in the collection of the Al.

A. R. POWELL.

Manufacture of [copper-]plated [lead] shot. E. PUGSLEY, ASSR. to WINCHESTER REPEATING ARMS CO. (U.S.P. 1,785,493, 16.12.30. Appl., 9.1.29).—Pb shot is prepared in the usual way except that the molten drop-

lets are allowed to fall into a solution of CuSO_4 , *e.g.*, brass pickling liquor, containing metallic Fe.

A. R. POWELL.

Treatment of zinciferous materials containing lead and/or cadmium. L. E. TETER, Assr. to NEW JERSEY ZINC CO. (U.S.P. 1,779,862, 28.10.30. Appl., 22.9.28).—The roasted ore is mixed with fuel and 2.5–5% of NaCl and the mixture is sintered in the Dwight-Lloyd apparatus in layers about 4 in. thick. The bottom 1 in. of the sintered material is collected separately, as it contains the greater part of the Pb and Cd which were present in the ore.

A. R. POWELL.

Treatment of zinc ore [for recovery of zinc]. W. W. TRIGGS. From ST. JOSEPH LEAD CO. (B.P. 347,239, 17.12.29).—A granular charge of sintered Zn ore and carbonaceous material is fed continuously through an electrically heated shaft furnace built up of a series of independently supported sections, between which are provided outlets for the evolved gases, and provided with a number of spaced electrodes at the top of the furnace and a similar number at the bottom, by means of which a current is caused to pass through the charge sufficient to raise it to a temp. at which the Zn distils without fusion or slagging of the residue, but below that at which sulphides distil from the ore.

A. R. POWELL.

Coating zinc and cadmium. A. PACZ (U.S.P. 1,784,106, 9.12.30. Appl., 28.5.27).—Zn and Cd are coloured blue to black by immersion in a dil. solution of $(\text{NH}_4)_2\text{MoO}_4$ and $(\text{NH}_4)_2\text{SO}_4$.

A. R. POWELL.

Preparation of metals [*e.g.*, nickel] for use as catalysts. A. A. THORNTON. From SOC. D'ETUDES ET D'EXPLOIT. DES MATIÈRES ORGANIQUES (B.P. 350,451, 10.3.30).—Coiled Ni wires are heated at 150° in Cl_2 until they become coated with a layer of NiCl_2 , which is subsequently reduced to a porous Ni sponge by heating at 150° in NH_3 .

A. R. POWELL.

Production of protective metal coating [chromium-plate]. C. G. FINK and C. H. ELDRIDGE, Assrs. to CHEM. TREATMENT CO., INC. (U.S.P. 1,786,398, 23.12.30. Appl., 12.8.25. Renewed 6.5.30).—A gas-free Cr-plate is obtained by periodically raising the article being plated into a hood above the plating bath and therein subjecting it to reduced pressure.

A. R. POWELL.

Chromium-plating small articles in quantity. E. KRAUSE, and LANGBEIN-PFANHAUSER-WERKE A.-G. (B.P. 351,168, 5.5.30).—The apparatus used comprises a rotating metal drum containing an eccentric anode made in the shape of a ribbed sector of a cylindrical surface, the ribs consisting of flat parallel plates. The drum can be set in four positions by an adjusting device; in the first position the articles are Cr-plated, in the second the plated articles are allowed to drain, in the third they are rinsed, and in the fourth the drum is emptied and recharged. Provision is made for exhausting through the hollow central shaft the gases evolved during the plating operation.

A. R. POWELL.

Production of metallic magnesium from its compounds. OESTERR. AMERIKANISCHE MAGNESIT A. G. (B.P. 351,295, 30.7.30. Austr., 3.8.29).—A mixture of MgCO_3 and C is allowed to fall through a luminous electric arc through which a current of H_2 is passed.

The issuing gases are cooled below 1200° and passed through an electrostatic apparatus in which liquid Mg collects on the electrodes and falls continuously therefrom into a container. The issuing gases are cooled, freed from dust in another electrostatic apparatus, mixed with steam, and heated to convert CO into CO_2 , which is absorbed and the H_2 used again in the process.

A. R. POWELL.

Producing metallic cadmium from cadmium-containing material. H. H. MONROE, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,785,139, 16.12.30. Appl., 18.5.28).—Cd-rich residues obtained as by-products in the purification of ZnSO_4 solutions, in the smelting of Zn ores, or in the distillation of crude Zn are melted with NaOH and a powdered carbonaceous fuel at 420° , whereby the Pb, As, S, and Zn dissolve in the caustic slag and Cd of 98–99% purity can be tapped from below the flux.

A. R. POWELL.

Cleaning of liquid mercury and the like. B. L. NEWKIRK, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,786,312, 23.12.30. Appl., 14.12.27).—Hg containing particles of Fe or Fe oxides, derived, *e.g.*, from a Hg turbine, is passed through a chamber or chambers packed with steel balls about $\frac{1}{8}$ in. in diam., whereby there is formed on the balls a fine skin of Hg which retains all the suspended impurities.

A. R. POWELL.

Separation of gold, silver, and lead from (A, B) crude antimonial metal, or (C, D) oxidised antimonial ores, flue dusts, or by-products. (A–D) S. G. BLAYLOCK, (A–C) J. J. FINGLAND, (A–D) F. E. LEE, and (D) P. F. MCINTYRE, Assrs. to CONSOLIDATED MINING & SMELTING CO. OF CANADA, LTD. (U.S.P. 1,778,017–1,778,020, 14.10.30. Appl., 3.5.29. Can., 21.5.28).—(A) Crude Sb containing Au and Ag is melted with at least 100 pts. of Pb for every 2.25 pts. of Ag present and at least a further 100 pts. of Pb for every 4 pts. of Au present and the alloy is cast into large ingots, which are hung in a furnace and heated in a reducing atm. at 550 – 630° to allow the Pb–Ag and Pb–Au alloys to liquate out and drip into a collecting chamber. (B) After addition of Pb as in (A) the alloy is subjected to fractional crystallisation as in the Pattinson process of desilverising Pb. (C) The material is smelted with the necessary Pb to collect the Au and Ag and with fluxes and reducing agents to obtain a Pb–Sb alloy, which is cast into a large, heat-insulated mould and allowed to cool slowly. The Sb solidifies round the sides and top and the Pb–Au–Ag towards the centre of the mass. (D) The material is smelted with Pb and fluxes as in (C), but with only enough C to reduce 10–20% of the total metal content to obtain an antimonial slag and a rich Sb alloy containing the precious metals.

A. R. POWELL.

Gold alloy for jewelry. CARTIER (B.P. 351,811, 21.8.30. Fr., 14.6.30).—The alloy contains 75% Au, 0.1–2.5 (1) % Cr, and the remainder Cu and Ag in the ratio 1.4 : 1.

A. R. POWELL.

[Flotation] concentration of ores. G. H. WIGTON (U.S.P. 1,783,206–7, 2.12.30. Appl., [A] 21.6.28, [E] 3.7.29).—Oxidised Pb ores are floated with the reaction product of P_2S_5 and α -naphthylamine in (A) BuOH, or (B) *o*-toluidine.

A. R. POWELL.

Leaching and washing ores by the use of gas. A. B. STEVENS (U.S.P. 1,783,591, 2.12.30. Appl., 26.1.29).—The ore is leached in a tank containing a perforated false bottom forming a chamber below the ore body and the leaching solution is passed upwards from this chamber through the ore mass. Before reaching the chamber part of the leaching liquor is by-passed through a mixing chamber in which fine jets of gas are intermingled with the liquor and the mixture is passed first through a centrifugal pump to ensure thorough mixing of gas and liquor, and thence through pipes into various parts of the supply chamber below the ore, the pipes being backwardly directed against the main flow of leaching liquor to effect thorough mixing therewith. A. R. POWELL.

Complete washing of sulphur ores and other sulphur-containing substances. O. SALADIN (B.P. 350,086, 21.3.30).—Pyrites is roasted in a multiple-hearth furnace and the charge in the zone of highest temp. is transferred to an intermediate zone, between the combustion and cooling zones, which is protected from rapid cooling by by-passing the whole or a part of the air for roasting from the cooling zone, where it enters the furnace, directly to the combustion zone. The charge is thus kept at the highest temp. with the access of little or no air until the whole of the S is expelled. A. R. POWELL.

Lining compositions for permanent or chill moulds for magnesium and its alloys. I. G. FARBENIND. A.-G. (B.P. 348,470, 24.7.30. Ger., 10.8.29).—Mould dressings for Mg alloy castings comprise a mixture of equal parts of H_3BO_3 and MgO , Fe_2O_3 , Al_2O_3 , or $MgCl_2$. A. R. POWELL.

Manufacture of cores for castings. IMPERIAL CHEM. INDUSTRIES, LTD., and H. M. BUNBURY (B.P. 348,315, 29.3.30).—The cores are bonded with liquid rosin, with or without a drying oil and a catalyst, *e.g.*, Co linoleate. Glue or dextrin may also be added and the rosin may previously be esterified with glycerin. A. R. POWELL.

Zinc chloride-base fluxes [for soft soldering]. (A) G. LUTZ, (B) W. K. SCHWEITZER, (C) E. A. TAYLOR, and (D) H. P. CORSON and E. S. RIDLER, Assrs. to GRASSELLI CHEM. CO. (U.S.P. 1,785,131, 1,785,147, 1,785,155, and 1,785,181, 16.12.30. Appl., 26.12.29).—The flux comprises a mixture of $ZnCl_2$ solution in aq. EtOH and HCl with (A) sulphonated castor oil, (B) sulphonated mineral oil, (C) the Na salt of butylnaphthalenesulphonic acid, or (D) an aldehyde, *e.g.*, butaldehyde. A. R. POWELL.

Soldering. Flux for soft soldering. H. S. McQUAID, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,785,134—5, 16.12.30. Appl., 26.12.29).—The flux comprises (A) a hydroxyalkylamine, *e.g.*, ethanolamine, or (B) an org. amine soap, *e.g.*, ethanolamine oleate. A. R. POWELL.

Soldering flux. H. C. MOUGEY, Assr. to GEN. MOTORS RES. CORP. (U.S.P. 1,783,925, 2.12.30. Appl., 19.8.29).—The flux comprises a solution of $ZnCl_2$ and a H_2O -sol. oil solvent, *e.g.*, di-, tri-, or tetra-ethylene glycol, EtOH, BuOH, the monoacetates of mono- or di-ethylene glycol or of the Me or Et ethers of ethylene

glycol, Et lactate, Et hydroxybutyrate, or diacetone alcohol. A. R. POWELL.

Soldering flux. H. P. CORSON, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,785,180, 16.12.30. Appl., 26.12.29).—The flux comprises a sulphonated vegetable oil or one of its H_2O -sol. salts, *e.g.*, "Monopole" soaps. A. R. POWELL.

Metal-clad shingles. INTERNAT. COPPERCLAD CO., Asses. of W. McI. SHAKESPEARE (B.P. 348,128, 28.12.29. U.S., 29.12.28).—The shingles comprise plates of a cellular fibrous material, *e.g.*, celotex, insulite, or masonite, coated with a waterproofing material or a water-repellent film and the outer surface is covered with a thin sheet of Cu which is trimmed round the edges. A. R. POWELL.

Lead alloys, more particularly for sheathings of electric cables. M. THIELERS (B.P. 351,449, 25.2.30).—See U.S.P. 1,779,784; B., 1931, 548.

Electrodeposition of metals and alloys of the platinum group. W. W. TRIGGS. FROM BAKER & CO., INC. (B.P. 348,919, 13.6.30).—See U.S.P. 1,779,436; B., 1931, 593.

Annealing pots and the like. E. L. JAMES (B.P. 352,061, 2.4.30).

Electroplating apparatus [for depositing metal on small iron articles]. W. CANNING & CO., LTD., and G. A. POPE (B.P. 351,659, 9.5.30).

Hydrocarbons during ore reduction.—See II. **Fe vessels for bleaching goods.**—See VI. **Recovery of cyanides [from Au working].** Pure Al_2O_3 . **H_2 generator.**—See VII. **Annealing furnaces.** **Metallic-vapour rectifiers.** **Re filaments.**—See XI.

XI.—ELECTROTECHNICS.

Relation between the magnetic induction of constructional steels and the chemical composition. E. GEROLD (Stahl u. Eisen, 1931, 51, 613—615).—The magnetic induction of plain C steels decreases linearly with increasing C content, the slope of the curves decreasing with increasing field strength. A similar relation holds in the case of Si, but the curves are more nearly horizontal. For steels with 1% Al, Si, Cu, Mo, Mn, or Cr, the induction decreases hyperbolically with increase in field strength. From the curves given it is possible to calc. the magnetic induction of any steel containing small proportions of the above metals from the chemical analysis. A. R. POWELL.

Advances in the construction and operation of coreless induction furnaces for production of steel. N. BROGLIO (Stahl u. Eisen, 1931, 51, 605—613, 635—638).—A review of recent developments in the construction of the electric gear and melting crucibles is followed by tables and diagrams showing the energy balance in the manufacture of various types of steel in comparison with other methods of steel manufacture. The temp. of the charge can readily be measured and controlled within narrow limits during the whole of the melting operation, and the life of the crucibles is much longer than that of crucibles heated in fuel-fired furnaces as all the heat is generated in the metal. A. R. POWELL.

Industrial and chemical research with X-rays of high intensity and with soft X-rays.

G. L. CLARK and K. E. CORRIGAN (*Ind. Eng. Chem.*, 1931, **23**, 815—820).—A modified Ott-Selmayr tube with a moving-picture camera will photograph diffraction patterns showing the stronger spots with exposures of less than 1 sec. This makes possible the study of such phenomenon as efflorescence, of unstable compounds such as KI_3 , or of substances at the temp. of liquid air, and any rapidly proceeding chemical action can be followed. A tube capable of developing a ray of long wave-length is desirable for the study of complex substances. The tube, pinhole, specimen, and camera must be in one unit so that the beam travels in vac. throughout. This has been used on rubber and cellulose. Measurements support the long-chain micellar structure of cellulose. C. IRWIN.

Some chemical and physical problems of light technology. M. PIRANI (*Z. angew. Chem.*, 1931, **44**, 395—404).—A review of recent work on the production of light in filament bulbs and in gas-discharge tubes. A. R. POWELL.

Electrical purification of blast-furnace gas by the Lurgi process at the Lübeck ironworks. J. DREHER (*Stahl u. Eisen*, 1931, **51**, 577—582).—The plant is designed to treat 40,000 cu. m. of gas per hr. in two stages; most of the dust is precipitated from the hot gas (150—300°) in the first purifying chamber; the gas is then cooled to 20—30°, and passed through the second chamber in which the remainder of the dust and all the excess moisture are removed. The electrodes in both chambers are made of Armeo Fe, which have proved to have a longer life than Ni-Cr alloy wires. Working data and costs over a long period are given diagrammatically, and it is claimed that gas of high purity and low humidity is obtained independently of the method of operating the blast furnace and of the impurities present in the flue gas. A. R. POWELL.

Thermal supervision of an electrical flue-gas purification plant. S. HINRICHS (*Stahl u. Eisen*, 1931, **51**, 788—790).—Efficient electrical purification of flue gas depends to a large extent on the careful regulation of the temp. and pressure in the plant, the most satisfactory results being obtained when the gas enters the dust precipitator at 80°. Apparatus in use at a German steelworks for maintaining const. temps. throughout the purifiers, for maintaining the insulators at 225°, and for regulating the temp. (30°) and purity of the gas passing to the gas machines and the pressure in the filters is described with reference to diagrams. A. R. POWELL.

Dielectric losses and electric dipole moment in transformer oil. L. S. ORNSTEIN and G. J. D. J. WILLEMSE (*Z. tech. Physik*, 1930, **11**, 345—349; *Chem. Zentr.*, 1931, i, 2022).

$SnSO_4$.—See VII. Cd.—See X.

PATENTS.

Electrodes for electric furnaces. SIEMENS PLANIWERKE A.-G. F. KOHLEFABRIKATE (B.P. 351,151, 26.4.30. Ger., 1.8.29).—Annular grooves and corresponding annular ribs are provided in the centre of the ring-shaped

face lying between the screw and socket and the periphery of the electrodes, so that an airtight joint which can be filled with fine graphite powder is made when the electrode is screwed into its socket. A. R. POWELL.

Electric continuous annealing furnaces. UGINE-INFRA (B.P. 351,176, 7.5.30. Fr., 8.5.29).—The furnace comprises a refractory wire-wound muffle into the floor of which at one end are inserted the pole-pieces of two electromagnets made of an alloy, e.g., ferrocobalt, which loses its magnetism only at a high temp. The magnets are energised by direct or alternating current in such a way that the articles to be annealed are drawn into the furnace as a magnetic chain, the forward movement of which pushes the annealed and demagnetised articles out at the other end of the furnace. A. R. POWELL.

Electron-emitting cathodes. W. W. TRIGGS. From Q.R.S.-DE VRY CORP. (B.P. 351,006, 15.3.30).—Ni, Ni-Si, or Pb cathodes are coated thinly with graphite, then with an oxide or carbonate of an alkali or alkaline-earth metal, and finally with another coating of graphite. The cathodes are then heated to incandescence in vac., whereby a tenacious vitreous coating of high electron-emitting power is produced. A. R. POWELL.

[Glass for] luminous electric-discharge tubes. GEN. ELECTRIC CO., LTD., ASSEES. OF PATENT TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 351,245, 24.6.30. Ger., 29.8.29).—The bulb comprises an outer envelope of ordinary glass, which is very absorbent for the infra-red and may be coloured or frosted, and an inner layer or independent bulb made from a borosilicate glass containing 4—5% Na_2O , 11—13% Al_2O_3 , 10—11% CaO , 40—60% B_2O_3 , and 10—25% SiO_2 . Part, up to one half, of the SiO_2 may be replaced by La_2O_3 or Di_2O_3 . The inner bulb is filled with Na vapour. A. R. POWELL.

Manufacture of filaments and other bodies from rhenium. L. MELLERSH-JACKSON. From SIEMENS & HALSKE A.-G. (B.P. 351,216, 4.6.30).—Fine Pt or W wires are heated in an atm. containing vapours of a Re halide. [Stat. ref.] A. R. POWELL.

Metallic-vapour rectifiers. INTERNAT. GEN. ELECTRIC CO., INC., ASSEES. OF ALLGEM. ELEKTRICITÄTS-GES. (B.P. 351,164, 2.5.30. Ger., 3.5.29).—The cathode receptacle is insulated from the Fe container by means of a ring or rings composed of Al or Mg or an alloy of these metals, the surface of the rings being coated with a film of the oxide of one of the constituent metals. A. R. POWELL.

Products [filters] for the absorption of ultra-violet rays. SOC. DES ÉTABL. GAUMONT (B.P. 351,029, 20.2.30. Fr., 14.3.29).—The filter comprises a solution of *p*-nitrophenol in H_2SO_4 or $KHSO_4$. A. R. POWELL.

[Cover for] electric accumulators. BRITANNIA BATTERIES, LTD. (B.P. 352,055, 28.3.30. Ger., 28.3.29).

[Plate supports for] electric storage batteries. J. LUCAS, LTD., and G. D. SPENCER (B.P. 351,542, 27.3.30).

Luminous electric-discharge tubes. GEN. ELECTRIC CO., LTD., ASSEES. OF PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 352,352—3, 24.10.30. Ger., [A] 29.11.29, [B] 30.11.29).

Light-sensitive cells. F. H. CONSTABLE, and RADIOVISOR PARENT, LTD. (B.P. 351,468, 24.3.30).

Electric gas- or vapour-filled arc-discharge tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 351,894, 28.11.30. Holl., 9.1.30).

Combustion systems for fuel. Oil dehydrator.—See II. Pure Al_2O_3 . Detecting O_2 in H_2 .—See VII. Magnetic material. Salt-bath furnace for steel. Annealing. Zn from its ore. Al and its alloys. Protecting Al etc. Mg from its compounds. Treatment of waste battery paste. Cr-plate.—See X. Insulating varnish films.—See XIII.

XII.—FATS; OILS; WAXES.

Anti-oxidants in edible oil preservation. II. Resistance to oxidation attributable to presence of minute quantities of added or natural inhibitory catalysts. F. C. VIBRANS (Oil & Fat Ind., 1931, 8, 263—264, 277).—Rates of O_2 absorption (at 90°) of lard containing anti-oxidants were observed; optimal concentrations of "Agerite" and thymol were 0.5 and 0.2%, respectively. E. LEWKOWITZSCH.

Report of Committee on the Kreis test for rancidity [of edible fats and oils]. A. S. RICHARDSON (Oil & Fat Ind., 1931, 8, 269—270).—The test is too erratic to be recommended for inclusion in the A.O.C.S. official methods: if used, quant. colorimetric measurement of the depth of tint is suggested. E. LEWKOWITZSCH.

Analysis of degreas. M. AUERBACH (Collegium, 1931, 311—314).—A scheme for the analysis of degreas or moellon is outlined, the values determined including the contents of H_2O , unsaponifiable matter, oxidised and total fatty acids, and free acid. Tests are also described for indicating the presence of resin, wool fat, mineral oil, naphthenic acid, and resin sulphate in the emulsion. D. WOODROFFE.

Oil seeds of Angola forest trees. C. DE M. GERALDES [with A. D'ALMEIDA and C. DUARTE] (Bull. Mat. Grasses, 1930, 14, 332—342; Chem. Zentr., 1931, i, 2136).—*Allanblackia Floribunda*, Oliv., seeds contain 57.5% and the kernels 69.3% of yellowish-white, odourless fat, d^{15} 0.9187 (0.8948), n_D^{20} 1.4529, m.p. 40.7° , m.p. of fatty acids $60-62^\circ$, f.p. $39.5-40.5^\circ$, titre $58-60^\circ$, saponif. val. 195, I val. $33.3-36$, acid val. $3.6-7.5$. *Allanblackia Sacleuxii*, Nua., seeds contain 68.9% and the kernels 72.1% of oil, d^{15} 0.9194, n_D^{20} 1.4551, m.p. $41.8-42.8^\circ$, m.p. of fatty acids $61-63^\circ$, f.p. $41-42^\circ$, titre $59-61^\circ$, saponif. val. 207.85, I val. 29.5, acid val. 35.3. *Iringia Robur*, Mildbr., seeds contain 64.9% of fat. *Balanites Mayumbensis*, Exell., seeds contain 35.4%, and the kernels 39.1%, of a reddish-brown oil having a disagreeable odour, d^{15} 0.9172, n_D^{15} 1.4602, saponif. val. 204.61, I val. 101, acid val. 71.12. *Strombosia Scheffleri*, Engl., kernels contain 18.1% of a similar oil, d^{15} 0.9353, n_D^{20} 1.4716, saponif. val. 216.2, I val. 83.6, acid val. 39.08. *Mimusops Ebolowensis*, Engl. et Krause, kernels contain 4.8% of oil. A. A. ELDRIDGE.

Sapote (mammy apple) seed and oil. G. S. JAMIESON and R. S. MCKINNEY (Oil & Fat Ind., 1931, 8, 255—256).—Sapote seed (*Calocarpum mammosum*) from Honduras contained 9.4% H_2O and 57% of oil, suitable for

edible purposes or soap manufacture. The bright yellow expressed oil, after 8 yrs. in cold storage, possessed a faint almond odour and pleasant taste, solidified at 15° , and deposited stearine at $23-27^\circ$. It had: d_{20}^{25} 0.9105, n_D^{25} 1.4652, I val. (Hanus) 70.2, saponif. val. 189.5, acetyl val. 12.2, unsaponifiable matter 1.39%, Reichert-Meissl val. 0.15, Polenske val. 0.3, saturated acids (Pb salt- Et_2O method) 30.37%, unsaturated acids 63.73%. The composition is given as (acids %): oleic 52.15, linoleic 19.8 (calc. from I val. etc.), palmitic 9.4, stearic 20.95, arachidic trace. E. LEWKOWITZSCH.

Decolorisation of green tallow. F. E. CHAPMAN (Chem. Eng. Min. Rev., 1931, 23, Chem. Sect., 355—356).—The green colour of gut tallows, due to chlorophyll, may be removed by digesting with 10—15% of fuller's earth at $130-140^\circ$ for about 1 hr. and filtering (cost £1 per ton). Bleaching by air or H_2O_2 is too expensive and chlorination is liable to proceed too far. E. LEWKOWITZSCH.

Use of fish oils in the soap industry. H. ENGELHARDT (Proc. World Eng. Congr., 1929, 31, 105—118).—Processes for deodorising and hydrogenating fish oils are reviewed. The results of the Engelhardt process for deodorising fish oil fatty acids (preferential saturation of malodorous components) and the prep. of oleine from them are discussed. The d of deodorised fish oils ranges from 0.9494 to 0.9384, and of the acids from 0.9314 to 0.9373; the Tortelli-Jaffe reaction as a rule is positive. E. LEWKOWITZSCH.

Soap analysis Committee report. H. P. TREVITHICK (Oil & Fat Ind., 1931, 8, 257—261).— Et_2O is unsuitable for the determination of unsaponified and unsaponifiable material in soaps; extraction with light petroleum from solution in 50% $EtOH$ is recommended and a standard (F.A.C.) procedure is detailed. E. LEWKOWITZSCH.

Effect of p_H on the detergent action of soap. F. H. RHODES and C. H. BASCOM (Ind. Eng. Chem., 1931, 23, 778—780).—Actual washing tests (at 40°) indicate that the detergent effect of soap solution (0.25%) increases and then decreases with increasing alkalinity (although the surface tension decreases continuously); the max. detergent effect is obtained at p_H 10.7 with $NaOH$, Na_2CO_3 , and Na_3PO_4 , but the magnitude of the increase of detergent power at the optimum appears to increase with the valency of the anion. Borax reduces the p_H of neutral soap solution and does not increase detergency. E. LEWKOWITZSCH.

Bleaching clay.—See VII. Determination of fat in leather and tanning products.—See XV. Soaps in spirituous preparations.—See XX.

PATENTS.

[Stabilised] oleaginous compositions. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of F. M. CLARK (B.P. 351,171, 6.5.30. U.S., 6.5.29).—Addition of about 0.5% of phenyl- α -naphthylamine protects compositions of fatty or mineral oils, waxes, pitches, etc. from atm. oxidation at raised temp., e.g., $125-150^\circ$. E. LEWKOWITZSCH.

Fatty oil [stabilising] composition. C. F. KARGE-BEHN, Assr. to R. T. VANDERBILT CO., INC. (U.S.P. 1,784,360, 9.12.30. Appl., 31.1.29).—0.3—0.5% of a

phenol having an aryl group substituted in the nucleus, e.g., 2- or 4-hydroxydiphenyl, is added to stabilise fats etc. against (atm.) oxidation. E. LEWKOWITSCH.

Preparations for use as emulsifying and wetting-out agents or soaps, and products obtained with the aid thereof. G. B. ELLIS. From CHEM. FABR. VORM. SANDOZ (B.P. 350,379, 6.12.29).—Monoaryl ethers of glycerol or glycol, mixed with aromatic, aliphatic, or hydroaromatic carboxylic or sulphonic acids, or their salts or substitution products (e.g., the monoxylyl glycerin ether and soaps or sulphonated oils), give clear solutions or stable emulsions, with which hydroaromatic hydrocarbons etc. may be incorporated. The products may be added to soaps to improve the wetting-out powers. E. LEWKOWITSCH.

Production of soap powder from soap stock high in fatty acid. C. K. STODDER (U.S.P. 1,785,054, 16.12.30. Appl., 28.8.28).—The semi-plastic, crude, acid soap stock is divided into small fragments, e.g., acid soap stock is divided into small fragments, e.g., by extrusion, mixed with powdered soda ash (e.g., 50 wt.-%), and aged until the alkali has absorbed sufficient H₂O to leave the soap in a brittle condition suitable for powdering. E. LEWKOWITSCH.

Detergents. L. MELLERSH-JACKSON. From TWITCHELL PROCESS CO. (B.P. 350,505, 3.2.30).—A mixture of "mahogany sulphonates" (preferably oil-free) and sludge-layer mineral-oil sulphonates can be used in neutral, acid, alkaline, or hard water.

E. LEWKOWITSCH.

[Paste] cleaning composition. L. KIRSCHBRAUN, Assr. to F. L. BELKNAP (U.S.P. 1,786,249, 23.12.30. Appl., 9.2.20. Renewed 21.11.27).—An aq. emulsion of a volatile hydrocarbon, e.g., gasoline, stabilised with soap, is passed through a homogeniser to yield a creamy paste which does not flash before an open flame.

E. LEWKOWITSCH.

Softening of filaments. Waterproofing.—See VI. **Soldering fluxes.**—See X. **Pine-tar oils etc. Esters for varnishes.**—See XIII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Proportioning the oil in industrial paints. P. DAUMER (Peint., Pig., Ver., 1931, 8, 1458—1462, 1482).—The quantity of any pigment which will give 100 kg. of paint of correct viscosity, when mixed with a linseed oil medium, may be calc. from the formula $x = 100y/(y + 45)$, where x is the wt. of pigment and y its sp. gr. $\times 50$. The medium consists of linseed oil 70%, liquid driers 15% of the oil, and the remainder thinners. Solid driers possess distinct disadvantages, but when used must be counted as pigment. Practical details of the prep. of paints and lacquer paints are given, together with a description of a simple method of obtaining the density of the dry colour. A diagram shows the quantities of all the constituents required for pigments of varied sp. gr.

F. C. HARWOOD.

Relation between oil content and protective action [of paints]. H. WOLFF (Farben-Chem., 1931, 2, 297—300).—The "critical oil contents" of mixtures of each of two red leads with BaSO₄ in increasing proportions were determined by the author's method, and

accelerated weathering tests were carried out on paints based on such mixtures. The two red leads show marked differences in behaviour in these tests, but the results of exposure show parallelism with the variation in "critical oil content." S. S. WOOLF.

Action of ultra-violet rays on the ageing of paints. H. MASSEILLE (Peint., Pig., Ver., 1931, 8, 1478—1482).—Coatings of paints under test are placed on plates of sheet Fe, 10 cm. \times 12 cm., fixed above a watertight box through which cooling H₂O is circulated. The quartz Hg-vapour lamp used is generally placed at 20—30 cm. from the plates and the whole apparatus is housed in a closed container. Exposure for 15—20 hr. to ultra-violet rays is found to be analogous to 6 months' exposure to sunlight, when testing the superficial ageing of the film; for deeper ageing, where the elasticity, resistance, and adherence of the film are affected, exposure to ultra-violet rays for 24 hr. gives results analogous to 1 month's exposure to weather.

F. C. HARWOOD.

Influence of physical properties of carbon black on its tinting strength. E. P. W. KEARSLEY and G. L. ROBERTS (Ind. Eng. Chem., 1931, 23, 835—837).—The value of C black as a pigment does not depend entirely on the particle size, but varies with the thickness of the film of adsorbed gases. Heating C to even 110° to expel H₂O resulted in improved tinting strength, but complete displacement of gases is possible only by reducing the surface tension, to ensure complete wetting of the particles by the dispersing medium. The volatile matter present and oil-adsorption properties indicate the tinting characteristics. C. A. KING.

Chemical processes during the formation and drying of linseed oil leather varnishes. C. SCHIFFKORN (Chem. Umschau, 1931, 38, 169—175, 185—191).—The processes occurring during the heating of linseed oil in the presence of Fe⁺⁺⁺ salts are represented as: (1) a dehydrogenation (oxidation in the Wieland sense) of the ethylenic linking of the unsaturated acids producing acetylenic linkings in their place: the Fe⁺⁺⁺ salts act as H acceptors and are subsequently reoxidised by the air to the Fe⁺⁺⁺ state, thus re-entering the cycle; (2) the acetylenic linkings are then oxidised to CO·CO groups; and (3) such polyketonic acids condense with CH₂·CH₂ groups in adjacent fatty acid chains with the elimination of H₂O and formation of unsaturated bridging linkings. These intra- or extra-mol. carbocyclic polymericides condition the colloidal nature of the product. During the drying of the solvent-free film of leather varnishes under the influence of ultra-violet light, activated O acts as H acceptor and removes (as H₂O₂) activated H from (original?) unsaturated linkings, oxidation and condensation following as above. O₃ in the air may produce ozonolysis of the fatty acids, whilst H₂O may add on to the double linkings instead of O₂, reducing the degree of oxidation and polymerisation.

E. LEWKOWITSCH.

Initial condensation products of phenol with formaldehyde in presence of ammonia as catalyst. T. SHONO (Proc. World Eng. Congr., 1929, 31, 533—536).—From a mixture of PhOH, aq. CH₂O, and 29% aq. NH₃ after 24 hr. at 35° there are isolated 2:2'- and

4:4'-dihydroxydibenzylamines, m.p. 168° and 137—138°, respectively, and after heating to 140° the resin contains a compound, $C_{14}H_{15}O_2N$, which is probably ω -amino-*o*-tolyl *o*-hydroxybenzyl ether. C. HOLLINS.

Deterioration of structures.—See IX. **Corrosion prevention.**—See X. **Varnishing of goloshes.**—See XIV.

PATENTS.

Production of [inert] pigment. D. V. AULT (U.S.P. 1,784,411, 9.12.30. Appl., 4.2.29).—A clay-like material (found native in Manheim, Pa.) containing finely-divided sericite is dried and the sericite air-separated from grit. S. S. WOOLF.

Ink. C. E. BIVINS (U.S.P. 1,787,233, 30.12.30. Appl., 6.4.25).—Mixtures of colouring matter, ingredients for giving permanency to writings made with the ink, e.g., tannic acid, gallic acid, $FeSO_4$, one or more cryst. org. acids, e.g., citric or salicylic, for avoiding undue precipitation of sediment, BzOH as preservative, and H_2O , EtOH, and glycerin to reduce the other constituents to paste are claimed. S. S. WOOLF.

Converting turpentine and pine-tar oils into heavier oils. E. B. SMITH, Assr. to E. W. COLLEDGE (for NAT. TURPENTINE PRODUCTS Co.) and AMER. TURPENTINE & TAR Co., LTD. (U.S.P. 1,784,949, 16.12.30. Appl., 6.6.27).—Turpentine etc. is refluxed while allowing both the vapours and returning condensate to pass over fuller's earth until the requisite viscosity and sp. gr. are attained. The product has drying properties. E. LEWKOWITSCH.

Treatment of rosin. R. C. PALMER, Assr. to NEWPORT Co. (U.S.P. 1,787,281, 30.12.30. Appl., 28.6.28).—An original rosin product in liquid phase, e.g., a solution of wood rosin, is treated with caustic alkali in amount required to neutralise approx. 6% of the abietic acid content of the rosin. The homogeneous mixture of abietate and rosin obtained therefrom is free from crystallising tendency. S. S. WOOLF.

Cracking of rosin. G. EGLOFF and H. P. BENNER, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,230, 2.12.30. Appl., 20.12.20. Renewed 15.3.28).—A mixture of rosin and H_2O is heated to above 370° under pressure (1000 lb./sq. in. or more), whereby at least 20% of the solid material is converted into oily constituents of $d < 0.875$. S. S. WOOLF.

Improvement of agatho-copals. W. DUX (B.P. 350,764, 10.7.30. Ger., 9.11.29).—Such copals, e.g., Manila or kauri, are incorporated with polyhydroxy-fatty acids, e.g., trihydroxystearic acid, by direct heating or by heating and then acidifying mixed solutions of the copal and fatty acid in alkali. The product is EtOH-sol. and can be used as a shellac substitute. S. S. WOOLF.

Crystallising varnishes. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. DU PONT DE NEMOURS & Co. (B.P. 350,641, 9.4.30).—“Glyptal”-type resins, containing drying oil acids if desired, are dissolved in hydrocarbon solvents, a bodied (e.g., blown) tung oil is added, and driers and volatile aliphatic thinners are incorporated as necessary. S. S. WOOLF.

Drying of [insulating] varnish films. P. B. COCHRAN, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,786,824, 30.12.30. Appl., 16.1.28).—Fibrous insulated conductors are preheated in ozonised air (0.1—2% O_3) at 70—135° for $\frac{1}{2}$ —32 hr. and after cooling to 70° are impregnated with insulating varnish and the heating is continued until the varnish is dry. The O_3 -saturated state of the fibre hastens the oxidation of the drying oil in the varnish. S. S. WOOLF.

Coating composition. C. H. SIEVER (U.S.P. 1,785,367, 16.12.30. Appl., 2.2.27).—Rubber is heated with an acid reagent of formula $R \cdot SO_2 \cdot X$, where R is an org. radical or a OH group, and X is a halogen or OH group. A solution in C_6H_6 or PhMe of the artificial isomeride of rubber thus obtained is added to a solution of low-viscosity nitrocellulose, the solvent of which contains PhMe. S. S. WOOLF.

Coating composition. R. H. KIENLE and L. V. ADAMS, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,783,364, 2.12.30. Appl., 29.1.27. Renewed 9.4.30).—Unslaked CaO, soda ash, soda-lime, $Ba(OH)_2$, etc. are suspended in granular form in solutions of “alkyd” resins in $COMe_2$, EtOH- C_6H_6 , glycol diacetate, butyl phthalate, etc. After agitation to permit neutralisation of the free acid constituents of the resin, the clear separated solution will not coagulate with basic or other pigments or fillers. S. S. WOOLF.

Coating compositions. IMPERIAL CHEM. INDUSTRIES, LTD., Asses. of E. F. ARNOLD (B.P. 350,463, 7.12.29. U.S., 7.12.28).—“Glyptal”-type resins of high drying oil content are incorporated with low-viscosity nitrocellulose in the absence of softeners, and pigments, solvents, and diluents are added if desired, the products being used as striping enamels etc. S. S. WOOLF.

Resinous condensation products. IMPERIAL CHEM. INDUSTRIES, LTD., and N. STRAFFORD (B.P. 350,896, 15.2.30).—Thermo-hardening compositions (e.g., for stoving insulating varnishes) are produced by heating a phenol and CH_2O with tung or castor oil (with or without rosin) in a closed vessel at 100—150° in the absence of a catalyst, the reaction product being dehydrated by heating in vac. up to 100°. E. LEWKOWITSCH.

Preparation of resitols. A. NOWACK A.-G., and R. HESSEN (B.P. 350,427, 3.3.30. Ger., 7.2.30).—Solid $PhOH-CH_2O$ -type condensation products in the “resol” stage are converted into “resitols” by heating in thin layers at 100—200° for one or more short periods, e.g., 15—30 sec., and rapidly cooling. Most of the volatile constituents are removed, whilst the proportion of “resol” remaining assists the further working up of the “resitol.” Hardening agents such as CH_2O or hexamethylenetetramine may be used if desired. S. S. WOOLF.

Resinous composition. T. F. BRADLEY, Assr. to ELLIS-FOSTER Co. (U.S.P. 1,785,930, 23.12.30. Appl., 5.6.25).—A polyhydric alcohol, e.g., glycerol, a polybasic carboxylic acid, e.g., phthalic anhydride, and a hydroxy-fatty acid glyceride, e.g., castor oil, are heated together at 200—300°. A monobasic acid, e.g., BzOH, or rosin may also be incorporated. Pale resins compatible with nitrocellulose are obtained. S. S. WOOLF.

Manufacture of condensation products [esters for varnishes etc.]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 350,992, 16.12.29).—Sorbitol, or a mixture of it with other polyhydric alcohols (excluding carbohydrates) containing more than three OH groups, is condensed with higher fatty acids; the products may be polymerised, oxidised, etc. as desired. The esters so obtained from linoleic acid have a high viscosity and dry more quickly than does linseed oil. E. LEWKOWITSCH.

Moulding mixtures. BAKELITE CORP., Assees. of C. A. NASH (B.P. 350,899, 7.3.30. U.S., 9.3.29).—Articles moulded from mixtures consisting of an absorbent filler and a phenolic resinoid, with which 3–5% of an insol. liquid, e.g., H₂O (which is capable of swelling the material of the filler), has been incorporated, do not crack or distort when exposed to liquids. E. LEWKOWITSCH.

Treatment of filling and reinforcing materials used in plastic compositions. IMPERIAL CHEM. INDUSTRIES, LTD., A. R. STEELE, and A. STEWART (B.P. 350,895, 14.2.30).—Wood meal etc. (free from CaO and hypochlorites etc.) is treated with a simple alkaline solution, e.g., aq. NaOH, and after removal or neutralisation of the free alkali is incorporated in a synthetic resinous product, giving a composition of improved bulk density. E. LEWKOWITSCH.

Production of cellulose lacquer [lettered] surfaces. C. S. JOHNSTONE (B.P. 351,183, 10.5.30).

Sulphate-cellulose.—See V. Cores for castings. —See X.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Behaviour of soot as a compounding ingredient for rubber relative to its adsorption of methyl-violet. E. VON REUTER (Kautschuk, 1931, 7, 132–134).—Various forms of lampblack or C black influence the tensile strength of rubber not merely by surface phenomena; chemical influence on the vulcanisation process is also responsible. The surface activity of the C is measured most conveniently by adsorption of methyl-violet from aq. solution; the degree of "wetting," however, in these circumstances is greater than that obtaining when such amorphous C is mixed into rubber in the ordinary manner, but the test with methyl-violet places a range of samples in substantially the same order as their reinforcing effect in rubber. Assuming that each type of amorphous C consists of cylindrical particles of uniform size, it is possible from the apparent density and the surface vol. (indicated by the adsorptive power) to calculate for each the diameter and length of the particles and the number per g. D. F. TWISS.

New condensation products of rubber hydrocarbons with the aid of benzyl chloride. F. KIRCHHOF (Kautschuk, 1931, 7, 128–132).—The application of the Friedel-Crafts reaction by the rapid addition of a suspension of AlCl₃ in CCl₄ to a cooled solution of rubber and benzyl chloride in the same solvents yields a pale yellow, amorphous, feebly thermoplastic product of *d* 1.10, approx. composition (C₁₉H₂₀)_x, believed to be *benzylidenecaoutchouc*. If, however,

the benzyl chloride is introduced into a solution of rubber in CCl₄ containing suspended AlCl₃, the product appears to be *cyclocaoutchouc*, the formation of which prevents further reaction with the benzyl chloride. The *benzylidenecaoutchouc* products contain between 3 and 5 benzylidene groups to one isoprene nucleus; their chemical, thermochemical, and physical properties are distinct from those of a mixture of polybenzylidene and *cyclocaoutchouc*. Structural formulæ are tentatively suggested for the polybenzylidene and *benzylidenecaoutchouc* hydrocarbons. D. F. TWISS.

Varnishing of goloshes. H. KOCH (Gummi-Ztg., 1931, 45, 1683–1686).—A description of the nature, production, and use of sulphurised linseed oil varnish for rubber over-shoes together with an indication of possible working difficulties and their remedies. D. F. TWISS.

X-Rays in research.—See XI.

PATENTS.

Vulcanisation of rubber. S. M. CADWELL, Assr. to NAUGATUCK CHEM. CO. (U.S.P. 1,777,960, 7.10.30. Appl., 1.2.21).—Rubber is vulcanised at low temp. with the aid of a powerful combination of vulcanising ingredients introduced in such a way that only a part of the entire combination is present in any one portion of the rubber until after the preliminary mixing operations; the vulcanising combination is then completed and vulcanisation effected without further altering the form of the mass. E.g., two mixings may be made containing: (a) rubber 100, ZnO 10, "oxy-*n*-butylthiocarbonic acid disulphide" 6, S 3 pts.; (b) rubber 100, ZnO 10, S 3, aniline 4 pts. On bringing these mixings into contact when desired, e.g., by milling, or by superposing alternate layers of each, vulcanisation ensues in about 1 day at room temp. An alternative method of effecting vulcanisation is to submit the first of the above mixtures to an atm. containing aniline for 4 days or to treat it with liquid aniline for 1 day. Another pair of mixings suitable for joint use contains: (a) rubber 100, Zn butylxanthate 3 pts.; and (b) rubber 100, ZnO 10, S 3, *p*-toluidine 4 pts. D. F. TWISS.

[Metal-foil]-lined rubber tubing and its manufacture. L. RADO (B.P. 352,198, 4.6.30. Ger., 7.11.29).

Rubberised fabrics. Treatment of textiles.—See VI. Coating compositions.—See XIII.

XV.—LEATHER; GLUE.

Physical properties of sole leather. C. SCHIAPARELLI (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 94–199).—A general discussion, under the headings: generalities, mechanical testing, vegetable tanning, manufacture, "standard" sole leather, H₂O-solubles, permeability, resistance to wear and apparatus for measuring it, sp. gr., finishing, hardness, flexibility, cracking, secondary properties, tanning number, microscopical examination, and sampling. T. H. POPE.

Free [mineral] acids in the analysis of vegetable [tanned] leathers. I. V. KUBELKA and R. WOLLMARKER (Collegium, 1931, 96–111).—Free mineral acid was not found when the Innes, Procter-Searle, and Balland-Maljean methods for its determination

were applied (a) to leathers prepared from hides limed with Na_2S -CaO liquors and/or delimed with HCl and tanned, respectively, with extracts free from sulphites, or (b) to similar leathers, which had absorbed $< 0.5\%$ SO_3 . Positive results were given by the above methods of analysis on leathers tanned with synthetic tans and sulphited quebracho extract, or by the former leathers if they had been so treated as to contain $> 0.5\%$ SO_3 . Negative results were obtained by the van der Hoeven (B., 1923, 109 A) and von Schroeder (B., 1930, 574) methods of determining free mineral acid on the leathers which had been tanned with sulphited extracts and synthetic tannins, but on which no H_2SO_4 had been employed, and a higher result for the free mineral acid in leathers which had been treated with H_2SO_4 was provided by these methods than by the former ones. The results were all lower than the actual amount of acid which had been absorbed by the leathers.

D. WOODROFFE.

Determination of fat and moisture in leather.

B. AVENATI-BASSI (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 200—209).—For extracting fat from leather CCl_4 serves as well as light petroleum. In drying the residue left after distillation of the bulk of the solvent from the fat, most of the solvent is eliminated during the first 5 hrs. heating at 100° , increase in the wt. due to oxidation of the fat, followed by slight diminution to const. wt., then taking place. Chambard's method for determining the extraneous matters dissolved from the leather with the fat is modified by dissolving the extracted fat in light petroleum instead of in COMe_2 ; the solution thus obtained may be washed with H_2O , which dissolves the extraneous matters, and two layers, readily separable, are formed.

T. H. POPE.

Determination of fatty substances in products used in tanning and in finished tanned materials. S. CAMILLA (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 236—239).—The modification of Marchand's method (B., 1931, 133) may be applied to the determination of fat in leathers and in egg-yolk, degreas, and other fatty materials used for treating hides. The material, dehydrated if necessary with calcined gypsum, is left in contact with Et_2O for 15—20 hr., 10 c.c. of the ethereal extract being then treated in the lacto-butyrometer with 10 c.c. of 95% EtOH and 10 c.c. of H_2O rendered alkaline with 2 drops of 2N- Na_2CO_3 . If 10 g. of the comminuted leather are used, failure of the ethereal fat layer to separate in the lacto-butyrometer indicates sole leather, in which only 1% of fat is allowed. The above procedure gives results in good agreement with those of the more prolonged official method, in which the material is extracted with light petroleum in a Soxhlet apparatus. T. H. POPE.

Quantitative analysis of tanning substances.

G. BALDRACCO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 82—89).—Details of the procedure to be followed in determining insol. matters and non-tans are given, together with the results obtained on various tanning materials by different methods. T. H. POPE.

Qualitative detection of sulphiting in tannin extracts. F. STATHER and R. LAUFFMANN (Collegium, 1931, 314—315).—2 g. of the extract are dissolved in

25 c.c. of H_2O , treated with 5 c.c. of 30% NaOH , boiled for 10—15 min., neutralised with H_3PO_4 , heated to boiling with 10 c.c. of dil. H_3PO_4 , and the vapour passed through a mixture of 2 c.c. of I-KI solution (1% I), 2 c.c. of BaCl_2 solution (10%), and 10 c.c. of H_2O for 3 min. Sulphiting or the presence of sulphites in the extract is indicated by the formation of a turbidity or a ppt. of BaSO_4 in the solution on keeping.

D. WOODROFFE.

Acidity of tanning extracts. F. BALDRACCO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 223—235).—By means of apparatus and methods described, measurements of $[\text{H}^+]$ and electrometric titrations of extracts of a number of tanning materials have been made.

T. H. POPE.

Leather varnishes.—See XIII.

PATENTS.

Obtaining gelling colloids in the form of little plates, sticks, or the like. F. SELTSAM NACHFOLGER A.-G. FÜR CHEM. IND., G. SANDER, and T. HOFFMANN (B.P. 350,962, 15.3.30).—Glue, gelatin, dextrin, etc. are obtained in the form of small plates and the like by allowing thin jets of the colloid liquor to flow on to an endless, smooth, travelling surface free from grooves, notches, or ribs, passing round cooling drums; the plates etc. are cut off the solidified strips.

E. H. SHARPLES.

Protecting animal fibre.—See VI.

XVI.—AGRICULTURE.

Significance of the lime and acid status of soils and its determination by electrometric titration. S. GOY (Ergeb. Agrik.-chem., 1930, 2, 35—52; Bied. Zentr., 1931, 60A, 234—235).—A summary and discussion of earlier papers by the same author.

A. G. POLLARD.

Manurial experiment with cacao. T. H. HOLLAND (Trop. Agric., 1931, 74, 263—268).—Phosphatic and potash manures had little influence on the crop yield of cacao or on the incidence of pod canker.

A. G. POLLARD.

Fertilisation of grass with liquid manure. II. E. RITTER (Landw. Jahrb. Schweiz, 1930, 44, 641—706; Chem. Zentr., 1931, i, 1961).—Clover was favoured by K and P; high N applications often caused the complete disappearance of clover and markedly increased the growth of grass. The K and P requirement was calc. from the composition of the crop. A. A. ELDRIDGE.

Relation of composition of cultivated and wild green-manure plants to decomposition of the nitrogenous constituents. H. MISU, I. OMAI, and T. HIBINO (Ann. Agric. Exp. Sta. Chosen, 1930, 5, 1—126).—The plants were fermented for 48 days under conditions simulating those in soil with upland and lowland systems of culture. Max. ammonification is favoured by increase in total N, ash, CaO, or $\text{CaO} + \text{MgO}$; nitrification by that in total N, K_2O , and $\text{CaO} + \text{MgO}$; and titratable acidity by that in total N and $\text{CaO} + \text{MgO}$. Disturbance in the attainment of maxima was caused by increase in crude fibre, N-free extract, and N-free extract/protein.

CHEMICAL ABSTRACTS.

Changes in the nitrogen of green plants. G. KLEIN (Ergeb. Agrik.-chem., 1930, 2, 143; Bied. Zentr., 1931, 60A, 200).—In special sterile-culture apparatus plants assimilated NH_4 salts and utilised these directly for protein production. Amino-acids were absorbed by the plants, but were not equally utilisable, glycine and alanine being inferior to asparagine and aspartic and glutamic acids in this respect. Nitrates were, in part, reduced in the plant roots and the N was translocated in org. combination. Protein decomp. was of a varied nature. The principal N-decomp. product was NH_3 , the toxic action of which was prevented by its combination with org. acids. Urea, principally as ureide, was also detected and amines occurred in the flowers and, to a smaller extent, in the leaves.

A. G. POLLARD.

Possible effect of fungicides on the composition of apples. W. A. DE LONG and A. D. PICKETT (Science, 1931, 73, 649—650).—A slightly lower reducing power has been detected in apples sprayed with S fungicides during the growing season as compared with unsprayed fruit or with that treated with Bordeaux mixture. Variations in acidity showed no definite trend.

L. S. THEOBALD.

Fungicidal action of sulphur. II. Production of hydrogen sulphide by sulphured leaves and spores and its toxicity to spores. S. E. A. McCALLAN and F. WILCOXON (Contr. Boyce Thompson Inst., 1931, 3, 13—38; cf. A., 1930, 1068).—Formation of H_2S from S occurred in the presence of leaf tissue and fungus spores (0.002 mg. H_2S per hr. per sq. dm. of leaf surface of strawberry and up to 9.8% of the wt. of spores in 12 hr.). The optimum temp. for H_2S production was 35° and the action ceased at 60°. H_2S was formed at p_{H} 4.0—8.0 with no definite optimum. Actual contact of S and spores was not necessary, the action taking place through a membrane or over an air space of 3—4 mm. The gas appeared on the spores and not on the S. Substances having the S-reducing SH group were detected in certain fungus spores. The sensitivities of various spores to injury by S and by H_2S were of the same relative order. On the basis of units of toxicity (H_2S required to reduce germination to 50%) spores sensitive to S produce more, and S-resistant spores less, than 1 unit. The diffusion of S vapour from S to the spores and its reduction on or in the spores is postulated.

A. G. POLLARD.

Efficiency of contact insecticides. I. Surface forces as related to wetting and tracheal penetration. F. WILCOXON and A. HARTZELL (Contr. Boyce Thompson Inst., 1931, 3, 1—12).—Many spray liquids do not form a film over an insect nor penetrate the tracheal tubes in the absence of spreading agents. The toxicity of nicotine solutions to *Aphis rumicis* varied with the spreader used, the efficiencies being in the order Ca caseinate < Penetrol < Na oleate. The spreading coeffs. of the solutions as determined by measurements of surface tension and angles of contact were in the same order. Spray solutions, even when containing soap, did not penetrate the trachea of dead insects.

A. G. POLLARD.

Fertilisation experiments with phosphorites. G. TOMMASI and S. D. DI DELUPIS (Ann. Staz. chim.-

agrar. sperim. Roma, 1930, [ii], 13, 39 pp.; Chem. Zentr., 1931, i, 2104).

Ammonia liquor.—See II. Thermo-phosphates. —See VII.

PATENTS.

Superficial treatment of granular chemical fertilisers. A. MENTZEL (B.P. 351,098, 26.3.30. Ger., 26.3.29).— NH_4HCO_3 crystals are fed from a hopper on to a rotating disc which throws the crystals against a spray of NaCl fed in an annular disperse stream round the disc so that the surface of the crystals becomes coated with a thin protective layer of NaHCO_3 containing a little NH_4Cl . The remainder of the latter formed by the reaction is obtained as a solution when the treated crystals are drained.

A. R. POWELL.

Apparatus for manufacture of nitrogenous fertilisers. ADCO, LTD., and J. ASHEN (B.P. 341,425, 14.10.29).—The apparatus comprises a conveyor belt, on which is fed the org. material, e.g., straw, to be treated, and a hopper above the belt for delivering a thin even layer of nitrogenous material over the straw. The hopper is provided with two rollers, one of which is axially grooved to deliver the material in fine streams, and below the hopper is arranged a series of jets for spraying H_2O into the falling stream of N-material. The apparatus is intended for the manufacture of fertilisers from straw by the processes described in B.P. 152,387 and 219,384 (B., 1920, 827 A; 1924, 810).

A. R. POWELL.

Insecticidal, insect-repelling, and fungicidal compositions. C. ARNOLD. FROM STANDARD OIL DEVELOPMENT Co. (B.P. 350,897, 15.2.30).—The prep. consists of petroleum white oil, an emulsifying agent such as an alkali sulphonate derived from petroleum, and an extract of a plant having insecticidal properties, e.g., "fish poisons" (*Derris*, cubé, etc.) or pyrethrum and the like. The product may be diluted with H_2O and anti-oxidation catalysts may be added.

E. H. SHARPLES.

XVII.—SUGARS; STARCHES; GUMS.

Oxidation of dextrose, lævulose, and sucrose with bleaching powder. S. OCHI and M. NAKAMURA (Proc. World Eng. Congr., 1929, 31, 537—542).—At 15—45° aq. bleaching powder oxidises dextrose to the extent of 94%, lævulose 37%, sucrose 43—46%; it is possible to oxidise dextrose selectively in admixture with lævulose (in invert sugar) or sucrose. C. HOLLINS.

Influence of sodium chloride on the determination of starch by the fermentation method. B. LAMPE and W. KILP (Z. Spiritusind., 1931, 54, 167—168).—When starch in potato flakes is determined from the yield of EtOH produced by a fermentation for 72 hr. of the starch hydrolysed by approx. 2.5% HCl and subsequently neutralised by NaOH, the value is approx. 2—3% lower than when the starch is hydrolysed by a malt infusion. The decreased yield of EtOH with the acid-inversion method is due to the inhibiting effect on the fermentation of the 3.5% of NaCl produced by the neutralisation. The yield of EtOH is not affected by higher rates of seeding yeast, but decrease in the amount of HCl and greater dilution of the mash before fermentation

yields an amount of EtOH equal to that given by the enzymic method.

C. RANKEN.

Determination of the starch value and distillation value of potato flakes. B. LAMPE and W. KILP (*Z. Spiritusind.*, 1931, 54, 173—174).—Provided the potato flakes are fresh and normal, their starch values as determined from the yield of EtOH by fermentation of the flakes hydrolysed by the modified acid-inversion method are the same as those given by the mash method of hydrolysis (distillation values), but with old and especially with over-roasted flakes the yield of EtOH is 5—10% higher with the acid-inversion method, so that the distillation value cannot be calc. from the starch value.

C. RANKEN.

Preparation of soluble starch with hypochlorites. B. RASSOW (*Textilber.*, 1931, 12, 468).—Solutions of NaOCl react with starch, thereby liberating heat and modifying the starch so that the viscosity of its aq. solution is much less than that of the untreated starch; the treated starch also has increased reducing and acidic properties. Untreated and treated starches may be well coloured by basic dyes (the untreated starch better than the treated), but acid and direct dyes have little affinity for either starch; treated starch gives very level shades with direct dyes.

A. J. HALL.

PATENT.

Cryst. sugar.—See I.

XVIII.—FERMENTATION INDUSTRIES.

Production of malt and wort. L. R. BISHOP (*J. Inst. Brew.*, 1931, 37, 345—359).—With “stocking malts” made under average malting conditions, the amount of permanently sol. N in the standard laboratory hot mash prepared from English 2-rowed malt is 35% of the total N content of the original dry barley. With 6-rowed barleys the value is approx. 29%. For “bulk malt” the corresponding values are 33 and 28%, respectively, for normal modification. The higher permanently sol. N of malts with higher N content is due to increased amounts of “peptide” and “undetermined” N. With rising mashing temp. the contents of ammonia-, amide-, and amino-N are const., whilst that of peptide-N and, consequently, the total sol. N increases to a broad optimum zone at 50°. The amount of “apparent maltose” in the wort increases rapidly from 40° to a sharply defined optimum at 60°, and then rapidly falls. The content of dextrin rises more slowly to an optimum above 70°. The content of “peptide N” obtained from 6-rowed barley is smaller than that from 2-rowed barley.

C. RANKEN.

Metallic contamination of beer. G. HAGUES (*J. Inst. Brew.*, 1931, 37, 366—372).—The first-runnings of beer through a bottling plant constructed of Cu contained a max. of 1.9 grains Cu per gal. due to the corrosion of the Cu piping and Cu gauze in the filter, which were kept bright by sand and H₂SO₄. In the later runnings the Cu content decreased to 0.1 grain per gal. Corrosion was diminished if the plant was cleansed by brushing and sterilised by steam. Ni fermentation vessels were corroded where the yeast head was in contact with the metal. The resulting beers contained 0.12—0.17 grain Ni per gal. and the yeast 0.14—1.0 grain per lb. With fermentation vessels constructed of monel metal the content of Ni in the beers was reduced to 0.02—0.04

grain per gal. and that of the yeast to 0.05—0.11 grain per lb.

C. RANKEN.

Solid carbon dioxide from by-product fermentation gas. C. L. JONES (*Ind. Eng. Chem.*, 1931, 23, 798—800).—The waste gases from starch fermentation contain 60% CO₂ and 40% H₂. They are stripped from solvents in an adsorption purifier, the CO₂ is absorbed in H₂O under pressure, and the remainder used for MeOH synthesis. Odour is removed by the Reich system from the separated CO₂, which is of 96—97% purity, and H₂ from the top of a refrigerated fractionating column. The plant is designed for all-the-year-round operation with a large storage for the winter's output. The evaporation loss from this when full is less than 0.1% per day. The supply of these waste gases is much in excess of the present demand for solid CO₂.

C. IRWIN.

Determination of lactic acid in wine in presence of sugar. P. BERG and G. SCHULZE (*Wein u. Rebe*, 1931, 12, 433—445; *Chem. Zentr.*, 1931, i, 2131).—Use of BaCO₃ instead of Ba(OH)₂ during evaporation avoids formation of lactic acid from sugar, but permits conversion of anhydride into acid. In ashing the alcoholic solution after removal of Ba, ignition at too high a temp. must be avoided. Tillmans and Weil's stepwise method of titration is criticised.

A. A. ELDRIDGE.

Dehydration of alcohol under pressure. W. SCHNACK (*Z. Spiritusind.*, 1931, 54, 179—180).—Abs. EtOH is manufactured economically by heating the raw spirit with CaO in an autoclave at 4 atm. and subsequently distilling in a vac. the EtOH from the residual CaO. By suitable modifications only 50 kg. of steam are required to yield 100 litres of abs. EtOH. In the azeotropic method, the dehydrating power of benzine and benzol is doubled at 10 atm., and less of these liquids is required. With 94% raw spirit the amount of steam required for the manufacture of 100 litres of abs. EtOH is reduced from 160 to 130 kg. by the use of pressure.

C. RANKEN.

Determination of starch. Starch in potato flakes.—See XVII.

PATENT.

Protection of enzymes against the damaging action of metals. S. SOKAL. From KALLE & Co. A.-G. (B.P. 351,315, 22.8.30).—Enzymes are protected against the inhibiting action of metals by the addition of compounds having the atomic grouping ·N·C·S, e.g., thio-carbamide or KCNS.

C. RANKEN.

XIX.—FOODS.

Proteins of vitreous barley. E. EHRICH and E. KNEIP (*Z. ges. Brauw.*, 1931, 54, 1—7, 9—13; *Chem. Zentr.*, 1931, i, 2129).—The hordein content appears chiefly to determine the vitreous condition.

A. A. ELDRIDGE.

Wheat, flour, and their by-products. P. BRUÈRE (*J. Pharm. Chim.*, 1931, [viii], 14, 5—22).—Methods of milling, as carried out in France, are explained, and the chemistry and analysis of wheat and flour are described. For the determination of cellulose 5% HCl, followed by 10% KOH, is employed, and for that of acidity the flour is extracted with 90% EtOH.

T. McLACHLAN.

Composition of kitchen waste. B. THOMAS and J. HARGRAVE (*J. Min. Agric.*, 1931, 38, 366—373).—

Kitchen refuse from different sources varies considerably in composition, but represents broadly a food of the same type, *i.e.*, a medium protein concentrate containing excessive amounts of oil. E. LEWKOWITSCH.

Corrosion of tinfoil by fruit juice.—See X. Rancidity test for fats etc. Edible oil preservation. Sapote oil.—See XII. Manures for cacao.—See XVI. Air conditioning.—See XXIII.

PATENTS.

Pasteurising. F. B. DEHN. From BARRY-WHELMILLER MACHINERY CO. (B.P. 350,627, 2.4.30).—In a process of pasteurising milk in bottles on a zig-zag chain conveyor, a large quantity of H₂O is used to effect rapid cooling, and part only of this H₂O passes on to the pasteurising and preheating compartments, counter-current to the milk. B. M. VENABLES.

Milk preparation and its production. W. R. B. ST. J. GATES, J. TAVROGES, and Cow & Gate, Ltd. (B.P. 350,670, 5.5.30).—Milk powder, sugar, and H₂O, with or without an emulsifying agent, are mixed and evaporated in vac. to a consistency suitable for pressing into moulds. E. B. HUGHES.

Production of solid milk and cream preparations. P. BORN, Assr. to N.V. NEDERLANDSCHE GRUYÈRE-BLOKMEK FABRIEK (U.S.P. 1,786,559, 30.12.30. Appl., 26.2.26. Ger., 27.2.25).—Milk or cream, with or without added sugar, is condensed in vac. to form a mass capable of being pressed into blocks, which may be coated with a protecting material such as cacao butter. E. B. HUGHES.

Continuous production of ice-cream and other [edible] plastic substances. VOGT INSTANT FREEZERS INC., Assignees of C. W. VOGT (B.P. 350,660, 22.4.30. U.S., 13.5.29).—Ice-cream (etc.) is produced from the liquid state by passing along tubes subjected to the action of a temp.-changing medium, the temp. of which is controlled by the resistance offered by the plastic substance being treated. E. B. HUGHES.

Manufacture of chocolate. V. WAYAFFE (B.P. 351,928, 30.12.29).

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Improvement of tobacco. Taste improvement and bleaching. H. JORDT (Chem.-Ztg., 1931, 55, 462—463).—Attempts to bleach tobacco after fermentation either are too costly (H₂O₂ or O₃) or spoil the flavour (SO₂, HNO₃, Cl₂). Removal of SO₂ etc. by warming the treated tobacco slowly to 70—90° (rapid fermentation temp.) failed to remove the S compounds, which are apparently a cause of the bad flavour. On the other hand, fermentation in presence of O₃ gives good results. Under carefully regulated conditions of moisture, temp., and O₃ concentration, a golden-yellow to clear brown tobacco with a mild, pleasant flavour was obtained. It is possible that nicotine is partly or wholly eliminated. In absence of O₃ the tobacco was black-brown. Tobacco fermentation (which is almost without effect on the essential tobacco constituents) appears to include a reducing process resulting in the production of dark colouring matters difficult to remove subsequently; the formation of these is prevented by

the O₃. The drying of the green tobacco leaf in presence of O₃ before fermentation is also suggested.

C. HOLLINS.

Examination of myrrh. P. BOHRISCH (Pharm. Ztg., 1931, 76, 787—790, 800—802).—The history, origin, properties, purification, and uses of myrrh are described together with the physical and chemical characteristics and colour reactions of 9 different varieties and of Bisabol myrrh and Bdellium. Methods for their differentiation are suggested and compared.

E. H. SHARPLES.

Preparation of Tinctura Chinæ composita by diacolution. H. BREDDIN (Pharm. Ztg., 1931, 76, 802).—Procedure for successful diacolution is described.

E. H. SHARPLES.

Examination of soap-containing spirituous [medicinal] preparations. W. MEYER (Chem.-Ztg., 1931, 55, 518—519).—Exact and routine methods for the analysis of such preparations are described. Commercial samples are shown to vary considerably in composition; some contained linseed oil instead of olive oil, although conforming outwardly to the scanty requirements of the D.A.B. More stringent tests should be officially specified (cf. B., 1930, 1045).

E. LEWKOWITSCH.

Hungarian coriander oil. P. S. JÓNÁS (Magyar Gyóg. Társas. Ert., 1931, 7, 24—29; Chem. Zentr., 1931, i, 2129).—The average essential oil content is 0.17—0.49%. For the determination 500 g. are distilled with steam and the oil is weighed; the method of D.A.B. VI gives low results. A. A. ELDRIDGE.

PATENTS.

Manufacture of quinoline and acridine compounds [bactericides]. I. G. FARBENIND. A.-G. (B.P. 347,515, 29.5.30. Ger., 10.6.29).—Benz-thiazoles, -oxazoles, and -iminazoles carrying in 2-position a substituted quinoline or acridine residue, and having at least one NH₂ group, are valuable bactericides, especially against spherobacteria. 4-Chloro-6-(6'-methyl-2'-benzthiazolyl)quinaldine, m.p. 196—197°, obtained from dehydrothiolutidine by condensation with Et acetoacetate followed by treatment with POCl₃, is condensed with alcoholic NH₃ to give the 4-amino-compound, m.p. 297—298°; the 4-ethylamino- (m.p. 204°), piperidino- (m.p. 166°), γ -diethylamino- β -hydroxy-*n*-propyl- (m.p. 180°), *p*- β -diethylaminoethoxy-anilino- (m.p. 215°), and carboxymethylamino- [hydrochloride, m.p. 300° (decomp.)] compounds are similarly prepared. Other examples are: 4-amino-6-(6'-methoxy-2'-benzthiazolyl)quinaldine, m.p. 272°, and the 4-isoamylamino-compound, m.p. 149—150°; 4-amino-6- and -7-(6'-ethoxy-2'-benzthiazolyl)quinaldines, m.p. 268° and 236°, respectively; 10-amino- (m.p. above 300°) and 10- γ -diethylamino- β -hydroxy-*n*-propylamino- (m.p. 172°) derivatives of 8-(6'-methyl-2'-benzthiazolyl)acridine; 10-amino-8-(6'-ethoxy-2'-benzthiazolyl)acridine, m.p. above 300°; 2-amino- (m.p. 188°) and 2- γ -dimethylamino- β -hydroxy-*n*-propylamino- (m.p. 137°) derivatives of 4-(6'-ethoxy-2'-benzthiazolyl)quinoline; 4-amino-3-(6'-ethoxy-2'-benzthiazolyl)quinoline, m.p. 248°; 4-amino-6-(6'-methyl-2'-benzoxazolyl)quinaldine, m.p. 288°; 2-ethylamino-4-(6'-methyl-2'-benzimidazolyl)quinoline, m.p. 145°;

2-ethylamino-4-(6'-ethoxy-2'-benzthiazolyl)quinoline, m.p. 191°; 8-amino-6-(6'-ethoxy-2'-benzthiazolyl)quinoline, m.p. 176°; 4-amino-6-(6'- β -diethylaminoethoxy-2'-benzthiazolyl)quinoline, m.p. above 300°; and the 6'-allyloxy- (m.p. 220—222°) and 6'-isoamyloxy- (m.p. 236—237°) compounds; 4-methylanilino-6-(6'-methyl-2'-benzthiazolyl)quinoline, m.p. 199°; 4-diethylamino-6-(nitro-6'-methyl-2'-benzthiazolyl)quinoline, m.p. 110° (decomp.), and the corresponding amine, m.p. 108°; the 4-amino-compounds, m.p. 270° (decomp.) [glycollate, m.p. 228° (decomp.)] and 325° (decomp.), respectively; 10-amino-8-(nitro-6'-methyl-2'-benzthiazolyl)acridine, m.p. above 300°, and the corresponding diamine, m.p. above 300°. The various intermediates are described. C. HOLLINS.

[Manufacture of] barbituric acid derivatives. COMP. DE BÉTHUNE (B.P. 348,140, 5.2.30. Fr., 5.2.29).—Barbituric acids having Δ^2 -cyclopentenyl and aryl or alkyl groups in position 5 are synthesised by the usual methods. Examples are the Et, m.p. 161—162°, allyl, m.p. 139—140°, phenyl, m.p. 183—184°, compounds and mono- (m.p. 197—198°) and di- (m.p. 156—157°) Δ^2 -cyclopentenylbarbituric acids. [Stat. ref.] C. HOLLINS.

Manufacture of solutions of cholesterol or its esters or mixtures of these. F. PASSER (B.P. 348,082, 28.11.29. Addn. to B.P. 328,922; B., 1930, 626).—Glycol or glycerol is added to solutions prepared as in the prior patent in order to improve the effect on the skin. C. HOLLINS.

Manufacture of a colloidal silver iodide compound. H. S. KEELAN, Assr. to E. R. SQUIBB & SONS (U.S.P. 1,783,334, 2.12.30. Appl., 13.1.27).—Gelatin is hydrolysed by boiling with 4% of NaOH in a 3% solution and, after filtration, equiv. quantities of aq. AgNO₃ and NaCl solutions are added simultaneously with const. stirring to produce a colloidal solution of AgCl which is then treated with the equiv. of NaI to convert the AgCl into AgI. The solution is dialysed through collodion membranes to remove Na salts and then evaporated to dryness in vac. The product forms yellow scales readily sol. in H₂O to give a colloidal solution of high germicidal power. A. R. POWELL.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

PATENTS.

Manufacture of [photographic] bleaching-out layers. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 348,232, 18.2.30).—The light-sensitiveness of azine, oxazine, and other dyes for photographic layers is regulated by hydrogenation or substitution in an aromatic residue external to the chromogenic ring system, so that dyes in a multi-coloured system bleach out at the same or any desired rates. Introduction of H, halogen, CN, CNS, NO₂, CHO, COR, or CO₂R increases the sensitiveness; alkyl, aryl, OH, OAr, OR reduce it. In both cases substitution *ortho* to the linking with the chromogen is more effective than *meta*, and *meta* than *para*. To correct the reddish greys due to insufficient sensitiveness of phenylrosinduline (purple component) and too great sensitiveness of 5-anilino-9-dimethylaminopheno- β -naphthazoxonium chloride (blue-

green component) in a mixture of these with phenanthrophenazine methonitrate (yellow component), the first is replaced by *m*-chlorophenylrosinduline, the second by the 5-*o*-anisidino-compound. C. HOLLINS.

Photochemical production of screen diapositives for production of photomechanical printing surfaces. DR. BEKK & KAULEN CHEM. FABR. G.M.B.H. (B.P. 351,201, 26.5.30. Ger., 27.5.29).—A AgBr (etc.) gelatin emulsion is reduced in sensitivity by pretreatment with an alkali dichromate solution, so that exposures up to 4 min. may be given. After development of the Ag image the screen points are reduced, but, if necessary, may be re-enlarged by intensification after washing out the unhardened gelatin. Reduction and enlargement are repeatable. J. LEWKOWITSCH.

Photomechanical screens. J. HEIDENHAIN (B.P. 351,626, 14.4.30. Ger., 10.8.29).—A transparent plate (glass, celluloid, or "Cellon") is coated with a PbS mirror on which an albumin-(NH₄)₂Cr₂O₇ layer is applied. The plate is then exposed through a ruled plate, and developed and etched in the normal manner. J. LEWKOWITSCH.

Coloured photographic pictures. H. VON PASSOW and L. BANG (B.P. 352,192, 30.5.30. Ger., 31.5.29).

[Filter-screen supports for] colour photography and cinematography. P. W. SMITH (B.P. 351,498, 26.3.30).

Filters for ultra-violet rays.—See XI.

XXII.—EXPLOSIVES; MATCHES.

Air conditioning.—See XXIII.

PATENTS.

Blasting fuses. W. ESCHBACH (B.P. 351,930, 22.2.30).

Nitrocellulose.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Loss of ammonia nitrogen from [sewage] trickling filters. W. RUDOLFS and N. CHAMBERLIN (Ind. Eng. Chem., 1931, 23, 828—830).—The loss of NH₃ not accounted for by microbial re-assimilation was not uniform for the different levels of the filters nor affected by the time of contact with the different filtering media. The loss in an experimental stone filter was 14—70% and from a wire-mesh filter 9—41%, a comparatively small quantity of which escapes into the air as NH₃; the greater loss is in the form of volatile NH₄ compounds and volatile oxides indicated by the decrease in the biochemical O demand. C. A. KING.

Rise of air conditioning [in chemical operations]. W. L. FLEISHER (Ind. Eng. Chem., 1931, 23, 732—735).—The influence which the control of temp. and humidity of the atm. exerts, not only on human comfort, but on industrial processes, e.g., manufacture of confectionery, matches, textiles, etc., is outlined. C. A. KING.

Corrosion prevention.—See X.

PATENTS.

Filtration systems. Treatment of flue gases etc.—See XI. **Glauconite.**—See VII. **Insecticides.** See XVI. **Bactericides.**—See XX.