

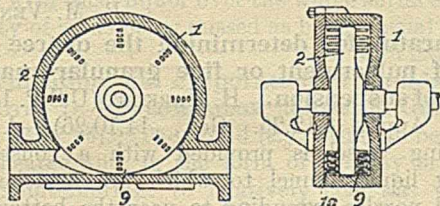
BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 20, 1928.

I.—GENERAL; PLANT; MACHINERY.

New colloid mill. O. AUSPITZER (Ind. Eng. Chem., 1928, 20, 413—415).—The material to be milled is premixed in a tank fitted with an agitator, and is conducted through the mill chamber tangentially to the beaters as shown in the figure. The exit pipe follows the line which would be naturally taken by the material, so that friction losses, both within and without the mill



chamber, are minimised, and the power consumption is only one seventh of that of a Plauson mill for equal duty. For any given material there is a critical speed of rotation (6000—9000 r.p.m.) of the beaters which is requisite for economical work. The mill is suitable for increasing the covering power of red lead, makes kaolin available for dusting purposes in the rubber industry, and facilitates the preparation of colloidal sulphur, arsenate solutions, etc. C. IRWIN.

Insulation against heat and cold. I. S. CAMMERER (Chem. Fabr., 1928, 318—320).—Estimates of thermal losses from steam pipes etc. with and without insulation are given. All insulating materials depend for their properties on a porous structure with air spaces, but if such spaces are not quite small convection currents are set up. Qualities desirable for insulating materials for various purposes are described. Whilst a variety of inorganic and organic materials are used for heat insulation, only cork and peat have hitherto found much application for cold-storage insulation. Practical tests are particularly valuable in choosing an insulating material. C. IRWIN.

Modern methods of insulation. I. S. CAMMERER (Chem. Fabr., 1928, 341—342).—Approximate data are given for the economical degree of insulation for varying pipe diameters and temperature differences. For the accurate determination of the efficiency of insulating materials the Schmidt method employs an auxiliary surface consisting of a rubber sheet of given dimensions provided on both surfaces with a large number of thermo-elements. This is laid on one side of the material to be tested. A recording millivoltmeter is of great assistance, providing a continuous record of heat loss. C. IRWIN.

What constitutes an adequate sample? J. C. MUNCH and G. L. BIDWELL (J. Assoc. Off. Agric. Chem., 1928, 11, 220—222).—In the sampling of material such as flour or feed, which consists of a number of separate lots, the number of portions to be taken and mixed to give an adequate sample should be equal to the square root of the total number of lots. T. M. A. TUDHOPE.

Apparatus for measuring hydrogen-ion concentrations. P. HANSEN (Dansk Tidsskr. Farm., 1928, 2, 139—140).—The principle of the apparatus (Wulff's strip colorimeter) depends on the fact that hydrogen and hydroxyl ions diffuse much more rapidly into a colloidal membrane when this is placed in a solution of definite p_H value than an organic dyestuff of high mol. wt. with which the membrane is impregnated will diffuse outwards into the solution. The solution to be tested is placed in a glass vessel and a strip of membrane coloured with a suitable indicator immersed in it. After a few minutes the strip is removed, washed with distilled water, dried with filter paper, and placed in a small frame like the cursor of a slide rule. This is slid over a series of prepared coloured transparent strips of membrane until the colour is matched, when viewed by transmitted light. The intervals between the strips correspond to a difference of 0.2 in p_H value, so that an accuracy of 0.1 is obtainable. Experiments carried out on the determination of the p_H values of solutions by means of the above apparatus gave results which agreed to 0.1 with those obtained by the electrometric method. An advantage of the method over the usual colorimetric ones lies in the fact that it can be employed with coloured or turbid solutions. H. F. HARWOOD.

PATENTS.

Furnaces. G. A. KOHOUT (B.P. 290,027, 20.4.27).—Fuel containing particles of different sizes (*e.g.*, screenings) is charged over a shelf above a blast of air and/or steam which distributes the fuel over a firegrate below, according to the size of the particles, the largest lumps forming the thickest layer near the front; the smaller lumps pass to the back, and the dust does not settle at all, but is burned in suspension. Means are provided (*e.g.*, an inclined grate with rocking firebars) by which the fuel and ash are fed towards the back of the firegrate at such a rate that ash only is left on arrival at the dumping plate at the extreme back. B. M. VENABLES.

Rotary furnaces. G. BOJNER and A. H. PEHRSON (B.P. 269,892, 12.4.27. Swed., 24.4.26).—A rotary furnace is provided with longitudinal gas passages with outlets to the interior of the furnace, and those passages

which are covered by material under treatment are supplied with gas by means which are not described. The passages are formed by overlapping louvre-like members so arranged that the material tends to fall out of them.

B. M. VENABLES.

Furnace. C. V. A. ELEY (B.P. 285,126, 9.11.26).—Air is blown through a number of troughs or tubes with openings in the upper side arranged under the fire. Linked fire bars or a chain grate travel over the troughs and are supported by them on the horizontal inward run. The ash drops off the chain grate at the inner end and falls through a pair of rollers or swinging jaws (by which it is crushed) into a helical conveyor that brings it back to the firing end below the other parts of the apparatus.

B. M. VENABLES.

Furnace and kiln. F. NOVELLI (B.P. 271,889, 26.5.27. It., 27.5.26).—A Hoffmann or other form of kiln for burning bricks, lime, etc. is fired by solid fuel which is charged into vertical retorts within the kiln. The retorts have holes in their walls through which the distillation products pass into the kiln and are there burnt. The coke may either be left in the retorts and removed therefrom as such after the discharging of the kiln, or it may be burnt *in situ* by means of air entering through the holes.

B. M. VENABLES.

Heat exchanger. C. H. POTTS (B.P. 285,524, 8.10.26).—A form of construction of heat exchanger or radiator in which one fluid flows in zig-zag fashion through light, thin, metal elements individually very narrow in one dimension.

B. M. VENABLES.

Incinerators. G. WATSON (B.P. 289,948, 3.2.27).—A boiler occupies one corner of the combustion space of an incinerator and the flue for products of combustion is inside the boiler.

B. M. VENABLES.

Ovens for chemical, metallurgical, and like processes. R. HADDAN. FROM STETTINER CHAMOTTE-FABR. A.-G. (B.P. 289,128, 17.1.27).—The material is heated while sliding down a sloping hearth, and melts in a chamber at the lower end. Any combustible gases given off during treatment are burnt over the charge or in a chamber underneath the sloping hearth.

B. M. VENABLES.

Crushing or pulverising mills. W. R. HUMF (B.P. 289,721, 10.11.27).—A roller works in conjunction with another crushing member (which may also be a roller) and besides its rotation it is caused to have a reciprocating motion towards and from the other crushing member. The reciprocation may be produced by an eccentric roller pressing against the idle side of the crushing roller, the two being held together by springs.

B. M. VENABLES.

Grinding mill. R. SHEPHEARD (U.S.P. 1,659,668, 21.2.28. Appl., 7.8.26).—A rotary shaft extends through a housing provided at one end with means for supplying the material to be ground, and at the other end with means for discharging the ground material. Discs rotating with the shaft have radial slots enabling them to move outwards against the wall of the housing under the centrifugal action. The discs are arranged in pairs, those of each pair being of complementary shape and so nested together that their peripheries travel in the same circumferential path.

H. HOLMES.

Mixing and crushing machine. C. R. DIMM, ASSR. to ROBINSON MANUF. CO. (U.S.P. 1,660,221, 21.2.28. Appl., 26.5.26).—A cylinder having an inlet and an outlet both spaced from its ends is provided with a rotary mixing device. Crushing devices are arranged at different angles to the mixing device throughout its length, their side portions being in operable overlapping relation along the cylinder wall.

H. HOLMES.

Production of finely-distributed mixtures of mutually insoluble bodies. M. POLANYI and S. VON BOGDANDY (B.P. 269,586, 14.4.27. Ger., 16.4.26).—The substances to be mixed are vaporised (or cathodically atomised) and then precipitated on a cooled surface; they may be mixed before precipitation, or the effect of rapid alternate precipitations may be produced by allowing the constituents to impinge at different radii on a rapidly rotating cooled drum from which the solid mixture is removed by centrifugal force or scrapers.

B. M. VENABLES.

Apparatus for determining the degree of fineness of pulverulent or fine granular masses by means of suspension. H. HARKORT (U.S.P. 1,667,783, 1.5.28. Appl., 8.12.26. Ger., 14.10.26).—A conical elutriating vessel is provided with a constant-level washing liquid funnel to which are attached easily changed nozzles extending to near the bottom of the elutriating funnel. Adjustments are made by the height and diameter of the nozzles.

B. M. VENABLES.

Drying apparatus. KILMARNOCK ENGINEERING CO., LTD., W. SHAW, and J. S. WILLIAMSON (B.P. 289,655, 26.5.27).—The material passes in succession through a number (say three) of superposed rotating drums, and drying or cooling gases pass through the drums simultaneously. The outlet end of each drum makes a running joint with a female hopper which is extended downwards as a male feed-chute for the next drum below, and the material is caused to accumulate in the hopper and chute to prevent passage of gas therethrough. By this means separate streams of gases may be used, e.g., hot drying gases in the two upper drums and cooling gases in the lowest.

B. M. VENABLES.

Humidification of materials. INDUSTRIAL DRYER CORP., ASSEES. of G. D. HARRIS (B.P. 264,538, 17.1.27. U.S., 15.1.26).—An unchanged supply of air is circulated over the goods (e.g., leather) through a heater, over a large surface kept moist with cold water, through a fan, and over the goods again. The cold, wet surface is formed by a water-tank below the goods chamber with wicks depending therein.

B. M. VENABLES.

Apparatus for filtering. E. J. SWEETLAND (U.S.P. 1,670,319, 22.5.28. Appl., 10.5.22).—Horizontal, circular filter-leaves are assembled about a central, vertical, perforated sleeve, the perforations communicating with the edges of the filter-leaves. Within the sleeve is a hollow perforated shaft on which it is removably mounted.

F. G. CLARKE.

Continuous filtering apparatus. G. GRÖNDAL (U.S.P. 1,668,557, 8.5.28. Appl., 7.6.23. Swed., 23.4.21).—A number of vacuum filtering elements are arranged and charged similarly to the buckets of an overshot water-wheel, but they are kept horizontal

except for a period on the upward journey, when they are overturned to discharge the filter cakes.

B. M. VENABLES.

Filters for air or gases. A. C. HANDLEY (B.P. 285,561, 17.11.26).—A number of openwork holders are removably supported in a frame. Each holder is charged with coir fibre and may, if desired, be covered with coconut matting. Means are provided for moistening the fibre.

B. M. VENABLES.

Cake-washing means for rotary drum filters. DUNCAN STEWART & Co., LTD. From W. MAUSS (B.P. 284,960, 24.9.27).—On the outgoing side of the drum, partly submerged in the prefiltrate, is resiliently pressed a segmental shield or container closed at the ends but open at top and bottom, thus creating a vessel of which one side is formed by the filter cake itself. The shield is kept nearly filled with wash liquor in hydrostatic equilibrium with the prefiltrate pulp, so that the cake is supplied with wash liquor over the whole surface without possibility of areas being missed as by the usual sprays.

B. M. VENABLES.

Concentration and evaporation of liquids. SALT UNION, LTD., D. V. PLUMBRIDGE, and W. E. GIBBS (B.P. 289,116, 23.12.26).—The liquid (*e.g.*, brine) to be evaporated is heated and, in the form of a spray or film, is passed countercurrent to relatively cool air, which is heated by the brine and subsequently cooled to condense its moisture and re-used. The crystals from the brine are recovered by a conveyor or collected in a box and the excess brine is returned with new brine to the heater of the same evaporator, even when several effects are used in series, but in multiple effects the condenser of one effect forms the heater of the next. B. M. VENABLES.

Concentrators, dehydrators, and like apparatus. [Evaporation by submerged flame.] C. F. HAMMOND and W. SHACKLETON (B.P. 289,159, 22.1.27).—The apparatus comprises a nest of stoneware burner tubes and inner and outer pots, so arranged that the gases of combustion form an air-lift circulator, and the concentrated solution is kept separate from the weak. Several evaporators may be arranged in series with a float-controlled inlet on the first and a regulatable draw-off valve on the last.

B. M. VENABLES.

Evaporators. J. HOLMES and H. A. KINGCOME (B.P. 289,717, 1.11.27).—An evaporator of the type comprising a (usually) cylindrical casing containing a nest of tubes heated externally by steam, with a large downcomer to one side of the heating tubes, is erected in an inclined position with the downcomer on the lowest side, and the lower end is suitably shaped for the ready discharge of crystals.

B. M. VENABLES.

Distillation apparatus. J. SCHNEIBLE (B. S. INGRAM, adtrix.), Assr. to SCHNEIBLE TRUST (U.S.P. 1,670,743, 22.5.28. Appl., 12.11.23).—The heating, distilling, and condensing sections of the still are arranged in the form of a vertical column, and the liquid to be distilled is introduced at an intermediate point in the distilling section. Somewhat above this point is a device, controlled by the temperature, which regulates the supplies of cooling and heating media to the condensing and heating sections, respectively.

F. G. CLARKE.

Separation of liquids of different specific gravities. W. A. WHITE, and WHITE OIL SEPARATORS, LTD. (B.P. 285,707, 7.6.27).—The mixed liquids (*e.g.*, oil and water) are caused by baffles to flow up and down several times within a tank, oil being drawn off at each upward flow. The baffles are so inclined that during each flow the passage converges in the direction of motion.

B. M. VENABLES.

Separation of liquids. O. L. BARNEBEY, Assr. to AMER. SOLVENT RECOVERY CORP. (U.S.P. 1,661,403, 6.3.28. Appl., 9.9.20).—Liquid mixtures are separated into their constituents by adsorption in a solid adsorption material, removal of unadsorbed diluent gases, and fractional evaporation.

C. O. HARVEY.

Centrifugal apparatus for the separation of suspended particles in a liquid. K. T. R. LUNDGREN (B.P. 282,681, 20.12.27. Swed., 22.12.26).—The separation is effected in tubes with closed ends supported on a link work so that their angle to the axis may be varied. The tubes may also be of flattened cross-section with the long axis radial or tangential as desired.

B. M. VENABLES.

Centrifugal separators [for the solid constituents of pulp]. F. M. COX (B.P. 289,681, 3.8.27).—The pulp is admitted to a centrifugal bowl rotating about a vertical shaft, and subjected to horizontal pulsations either by means of a piston-like baffle plate which is reciprocated vertically within the bowl or by pressure-water admitted intermittently, under control of a rotary valve, to a space between the wall of the bowl and an inner perforated wall. The heavier portions are discharged through ports which may be controlled by valves, and the lighter over the inner rim of the bowl.

B. M. VENABLES.

Machines for expressing liquids from solids. H. J. L. DUNLOP and A. J. SIBBALD (B.P. 289,954, 4.2.27).—The material is pressed by being caused to travel through an annular space, tapering in longitudinal cross-section, between a rotating member and a fixed member, the liquid emerging through channels left in the fixed outer member. The pressing action is obtained from another member rotating on an axis inclined to that of the machine in general, and at the same speed as the first-mentioned rotating member, giving a wobbling action.

B. M. VENABLES.

Apparatus for spraying and treating liquids. C. O. LAVETT, Assr. to BUFFALO FOUNDRY & MACHINE CO. (U.S.P. 1,667,291, 24.4.28. Appl., 11.8.24).—A horizontal cylinder, having shallow circumferential ribs, rotates in an axially disposed trough containing the liquid. In order to confine the adhering film of liquid in contact with the cylinder, so that the latter imparts its velocity to the liquid, a concentric, adjustable baffle is placed close to the rising surface of the cylinder. Above the baffle is a horizontal blade, which, by radial adjustment, enables the thickness of the film to be controlled; the surplus liquid falls into an adjacent receptacle which supplies the trough. The spray produced above the horizontal blade may enter a drying chamber, through which a current of hot air is passed, or it may impinge upon an internally-heated rotating

cylinder. By causing the spray to impinge upon a cooled surface, a liquid may be crystallised.

F. G. CLARKE.

Apparatus for cooling of fluids. O. SIMMEN (B.P. 282,717, 3.11.27. Switz., 28.12.26).—A casing contains a number of pipes of different diameter, the cooling agent being introduced through nozzles within the larger pipes and continuing through the smaller pipes, whilst the fluid to be cooled passes over the outside of the pipes and is guided by partitions so as to be subjected to a number of changes of direction.

B. M. VENABLES.

Treatment of gases. O. L. BARNEBEY, ASSR. to AMER. SOLVENT RECOVERY CORP. (U.S.P. 1,661,104 and 1,661,149, 28.2.28. Appl., 21.1.25).—(A) In a tower containing activated carbon and provided with gas inlet and outlet, the temperature of the carbon is controlled by a pipe, in close proximity thereto, having separate connexions to heating and cooling supplies. (B) A mixture of gases to be separated is passed into activated carbon which retains the adsorbable constituents. The latter are subsequently expelled by applying heat indirectly to the interior of the carbon, and are cooled and collected.

H. HOLMES.

Dust catcher [for gases]. F. R. MCGEE (U.S.P. 1,659,607, 21.2.28. Appl., 18.12.25).—A main casing is provided near one end with an inlet for gas to be purified, and on opposite sides of the casing are arranged a conduit for distributing the gas and a main conduit for collecting the purified gas. Partitions prevent direct access from the inlet to the distributing conduit, and define first and second expansion chambers connected by a constricted passage in which is mounted a concave nozzle adapted to cause a sudden change in the direction of flow. The second expansion chamber is of a size to decrease the rate of flow considerably. Other separating chambers are provided, each communicating independently with the distributing conduit.

H. HOLMES.

Air filter. G. HAIN (U.S.P. 1,670,348, 22.5.28. Appl., 23.4.25).—The inlet and outlet have expanded inner ends, but the former has four radial ribs extending nearly to the centre. A screen to retain the filtering material is releasably secured over the outlet at its inner expanded end. An opening at the top of the filter has a cover and is large enough to permit removal of the screen.

F. G. CLARKE.

Air cleaner. J. HAASE and O. HIBNER, ASSRS. to J. HAASE (U.S.P. 1,670,660, 22.5.28. Appl., 27.6.27).—A receptacle containing water has a horizontal, submerged, perforated partition, below which constitutes a sediment chamber. The air from a vertical supply pipe, supported by the detachable lid of the receptacle, strikes a baffle-plate below the submerged end of the supply pipe and bubbles through the water. The upper portion of the cleaner contains fibrous packing upon a reticulated support and an anti-splash screen is placed at the water level.

F. G. CLARKE.

Recovery of absorbable substances from gaseous mixtures. E. C. R. MARKS. From CARBIDE & CARBON CHEMICALS CORP. (B.P. 291,277, 22.10.27).—Air charged with alcohol vapour, ether vapour, etc. is passed

upwards through a horizontal bed of active charcoal supported in a horizontal cylinder in such a manner as to leave spaces above and below it. When absorption is complete, the residual air in the spaces is expelled by evacuation or by a current of steam and passed together with fresh supplies of the charged air through a second absorber working alternately with the first. As soon as the air is expelled, steam is passed through the charcoal to expel the liquid condensed therein, and the mixed vapours pass to rectifying and condensing apparatus.

L. A. COLES.

Gas-analysis apparatus. ELECTROFLO METERS CO., LTD. From REPUBLIC FLOW METERS CO. (B.P. 288,510, 5.12.27).—An apparatus for the determination of a single constituent by absorption, in which the measuring burette is filled by a hand-operated, aspirator rubber bulb, and the contents of the burette are transferred to the absorber and back again by another water-filled rubber bulb.

B. M. VENABLES.

Anti-friction facing material for bearings etc. SOC. ANON. FRANÇ DU FERODO (B.P. 275,648, 5.8.27. Fr., 7.8.26).—A mixture of synthetic resin and fibrous filling materials is claimed; metal and graphite are excluded as fillers.

F. G. CROSSE.

Centrifuge. L. ALTPETER (U.S.P. 1,661,782, 6.2.38. Appl., 26.1.27. Ger., 8.7.25).—See B.P. 284,831; B., 1928, 320.

Treatment of steam to reduce or prevent corrosion. R. W. BAILEY, ASSR. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,666,523, 17.4.28. Appl., 17.12.21. U.K., 20.12.20).—See B.P. 177,234; B., 1922, 358 A.

Fluid filters [for lubricants]. AC SPARK PLUG CO., ASSEES. of C. W. MCKINLEY (B.P. 267,485, 21.2.27. U.S., 11.3.26).

Extraction of extraneous material from fluids or gases. [Steam separator.] J. GORDON & CO., LTD. From HAGAN CORP. (B.P. 289,192, 9.2.27).

Distillation of liquids (B.P. 276,302).—See II. **Alloys for pistons** (B.P. 275,985).—See X. **Precipitation of particles from gases** (B.P. 290,030). **Pyrometers** (B.P. 290,493).—See XI. **Dehydration of liquids** (U.S.P. 1,670,101).—See XVII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Heat of coking of gas coals and coking coals. II. E. TERRES and M. MEIER (Gas- u. Wasserfach, 1928, 71, 457—461, 490—495, 519—523; cf. B., 1927, 177).—The method of calculating the heat of coking described previously (*loc. cit.*) needs correction; the heat given up by the volatile products should not be included. The results have been recalculated, making use also of the more accurate recent determinations of the specific heats of coke (B., 1928, 392). The new values are slightly lower, but, in general, the form of the curves showing the variation of the heat of coking with temperature is unchanged. The method of calibrating the apparatus is discussed; in determining the heat content of the empty system at 600° graphite is preferable to quartz as filling material. The heats of coking of

another nine gas coals, including three English coals (Easington, Ravensworth-Pelaw, and Boldon), have been determined for temperatures of carbonisation from 650° to 1050°. At the same time measurements have been made of the yield, composition, and calorific value of the gas evolved. Each coal appears to possess its own specific heat of coking-temperature curve, and it is impossible at present to formulate any general rules relating the heat of coking to coal composition or to temperature.

A. B. MANNING.

Replaceable bases in roofs of lignite seams. E. McK. TAYLOR (Fuel, 1928, 7, 227—228; cf. B., 1928, 288).—The p_H values of clays forming the roofs of lignite seams are generally lower than those of the roofs of bituminous coal seams, the main replaceable base present being calcium. Bacterial decomposition under a roof containing calcium aluminosilicic complex is limited by the acidity of the medium and the aerobic conditions; such decomposition results in the formation of lignite. If lignite is to be regarded as a stage in the formation of coal, it seems probable that, before the lignite can be converted into bituminous coal, base exchange between the roof and a solution of sodium chloride must take place, followed by hydrolysis of the product in fresh water, in order to provide a suitable medium and anaerobic conditions for the bacterial action.

A. B. MANNING.

Replaceable bases in roofs of anthracite seams. E. McK. TAYLOR (Fuel, 1928, 7, 228—229; cf. preceding abstract).—The roofs of anthracite seams, like those of bituminous coal seams, are alkaline and contain sodium as the main replaceable base. The conditions controlling bacterial activity during the formation of anthracite and bituminous coal respectively are therefore similar, and it is concluded that the differences in the type of coal formed must have their origin in differences in the starting material.

A. B. MANNING.

Base exchange and the formation of coal. E. McK. TAYLOR (Fuel, 1928, 7, 230—238; cf. preceding abstracts).—A theory of the formation of coal, based on investigations of the roofs of a large number of seams, aspects of which have already been discussed, is developed in more detail. Plant debris may undergo three different types of decomposition: (1) under acid conditions without a roof, leading to peat formation; (2) under acid conditions under a roof containing calcium aluminosilicic complex, leading to lignite formation; (3) under alkaline anaerobic conditions under a roof containing sodium aluminosilicic complex, leading to the formation of the members of the bituminous coal-anthracite series. The length of the peat stage preceding the third type of decomposition determines the type of coal ultimately formed. The theory is discussed in relation to the South Wales coal-field.

A. B. MANNING.

Microstructure of New Zealand lignites. W. P. EVANS (New Zealand J. Sci. Tech., 1928, 9, 339—359).—A further account of the Broken River lignites (see B., 1927, 690).

Use of graphical methods in the control of a coke-oven plant. G. W. J. BRADLEY (Fuel, 128, 7, 258—267).—The value of the use of graphical methods

is shown by their application to (a) the control of a crude benzol plant, (b) cost estimation, and (c) the calibration of storage tanks for stocktaking.

A. B. MANNING.

Determination of volatile matter in coke. F. J. EATON and S. PEXTON (J.C.S., 1928, 1215—1217).—Dry, finely-ground coke (1 g.), contained in a platinum crucible, is heated at 950° for 7 min. Oxidation losses are avoided by heating in an atmosphere of nitrogen. The results are consistent to within $\pm 0.05\%$.

F. J. WILKINS.

Isolation and detection of cellulose in peat. K. HESS and W. KOMAREVSKY (Z. angew. Chem., 1928, 41, 541—542).—A method for the isolation of cellulose from peat has been developed and applied to a sample of peat from the environs of Moscow. The air-dry material (8—10% of moisture) is extracted with ether (loss, 6%) and then with an alcohol-benzene (1:2) mixture (loss [bitumen], 10%). The extracted material is next shaken with 1% sodium hydroxide solution until no more coloured substances are removed (loss, 49%), and then subjected several times to the alternate action of a dilute (0.3—1%) solution of chlorine dioxide and 2% sodium sulphite solution (loss, 23%). The white, fibrous residue is dissolved in cuprammonium hydroxide and cellulose precipitated, after addition of alcohol, with acetic acid. The cellulose is washed with dilute acetic acid, water, alcohol, and, finally, ether. The purity of the sample is determined by measuring the rotatory power in cuprammonium hydroxide solution, or the rotatory power of the acetate in chloroform or pyridine-acetone solution. The present sample contained 10% of cellulose, calculated on the air-dry material. Whenever possible the purity of the cellulose obtained should be confirmed. The failure of Odén and Lindberg (B., 1926, 568) and Marcusson (B., 1927, 129) to do this renders their results open to criticism.

J. S. CARTER.

Formation of condensate in the transmission of gas under high pressures. K. BUNTE and A. KAMMÜLLER (Gas- u. Wasserfach, 1928, 71, 25—28).—Theoretical considerations governing the formation of condensate are discussed, but it is pointed out that compressor oil or tar acts similarly to benzol wash-oil and is capable of removing hydrocarbons from gas at partial pressures below saturation. The volume of a vapour such as naphthalene corresponding to saturation at any temperature is proportional to the ratio of the partial pressure to the total pressure. Hence with high compression the weight per unit volume of a vapour which the gas will carry is decreased proportionally. The average composition of town gas is discussed, and it is concluded that condensation of liquid hydrocarbons is unlikely at pressures below 35 atm. (This refers to gas which has been scrubbed for benzol.) Condensation of water and naphthalene is to be expected, and owing to the variable composition of town gas no general rule can be given. The conditions with oil gas are quite different. Whilst the use of 30 atm. is now proposed, pressures at present used in Germany do not exceed 4.5 atm. General experience in these cases shows for the most part that only a watery condensate is formed.

C. IRWIN.

Determination of the unburnt constituents of flue gases by combustion over copper oxide. H. MIES (Gas- u. Wasserfach, 1928, 71, 509—515).—The influence of temperature, time of contact, and other factors on the rate of combustion over copper oxide of a methane-nitrogen mixture containing 2% of methane has been studied. With a tube 18 mm. in diam. the temperature required for complete combustion with one passage of the gas varied from 770° to 900°, depending on the length of the copper oxide layer (40—10 cm.) and the gas velocity (2.5—10 litres/hr.). The presence of hydrogen, carbon monoxide, water vapour, or carbon dioxide does not affect the rate of combustion of the methane at these temperatures, but at lower temperatures the presence of hydrogen has a retarding influence. The rate of combustion is greatly influenced by the condition of the copper surface, increasing with successive reductions and oxidations. Before each series of measurements, therefore, the oxide was alternately reduced and oxidised until no further increase was observed. The results, however, indicate that there still exists a variation in the activity of the oxide along the tube. A. B. MANNING.

Gas-works effluent. W. P. SMITH (Gas J., 1928, 181, 690—692).—A review of the present situation concerning disposal of gas-works effluents shows that the difficulty is chiefly due to the presence of phenolic substances and certain salts which are found in the waste from ammonium sulphate plants. Reduction of phenolic contamination follows separation of the tar from the gas before condensation of the liquor, and, conversely, prolonged contact of tar and liquor will increase the phenolic content of the latter. Other methods of plant operation and treatment of condensates are described which will reduce the toxicity of the effluent. R. H. GRIFFITH.

Partial dehydrogenation process for certain hydrocarbons which favours the binding of the carbon. A. LEAUTÉ and G. DUPONT (Compt. rend., 1928, 186, 1558—1560; cf. B., 1927, 737).—Fuel oil, coal tar, and similar mineral products, when heated at 250—350° in the presence of sulphur (2—10.5%) for a short time, lose almost all the admixed sulphur as hydrogen sulphide and yield highly viscous substances. G. A. C. GOUGH.

Behaviour of Emba crude oil in the refinery. E. RYHÄLÄ (J. Inst. Petroleum Tech., 1928, 14, 330—350).—Crude oils from the Emba region have d^{15} 0.845—0.904, and contain gasoline 0.26—7%, and kerosene 1.8—27.5%. The mazouts, like the original crude oils, are practically free from paraffin, and have, in consequence, very low setting points (—20°). Nevertheless, special precautions must be taken in distilling the mazouts if lubricating oils of low setting point are to be obtained. An Emba mazout having d^{15} 0.8843, flash point (Brenken) 136°, (Pensky-Martens) 113°, viscosity at 50° 2.4° (Engler), 0.165% of paraffin (Zaloziecki) of m.p. 56°, and 10% of asphalt (Akzise), was distilled (1) in a Nobel battery, (2) in the laboratory. The residues were 11.7 and 12.1% respectively; thus practically all the non-asphaltic constituents were removed in each of the distillations, which were there-

fore comparable. A kerosene fraction (13.8%) was produced in (1) but not in (2). Machine oil and cylinder oil fractions from (1) had lower sp. gr., lower viscosities, much higher setting points, and lower flash points; moreover, there was great difference in the flash points of these fractions from (1) as determined by the methods of Brenken and of Pensky-Martens. Apparently overheating had occurred during the large-scale distillation. This was confirmed by treating the machine oil and cylinder oil from the large-scale distillation with superheated steam for 2 hrs., whereby highly unsaturated impurities of low viscosity and low flash point were removed, leaving oils which compared favourably with the corresponding fractions produced on the small-scale distillation; moreover, the flash points of the purified oils now agreed. After being refined with 3.75% of 94% sulphuric acid, the machine oil distillate, although quite dry, was turbid at room temperature. Filtration gave a vaseline-like substance, which, after being washed with amyl alcohol and ethyl alcohol, was identified as ceresine, m.p. 72.5°. Ozokerite was found to be fairly volatile in superheated steam at 200°, and to be converted into ceresine thereby. Nevertheless it is impossible that the ceresine in the machine oil could be derived from the ozokerite; it is probable that ceresine was formed during distillation of the mazout, possibly from asphaltic-like and resinous constituents which the Emba crude oil also contains. Machine oils free from asphalt have been produced from Emba crude oils by treatment with sulphuric acid (e.g., 5% of acid containing 20% SO₃), and concentration by means of steam at 180—200°; the viscosity at 0°, but not at 50°, is thereby considerably raised. Acid-refined machine oils from Emba crude oil, although good in colour and other physical properties, show great tendency to emulsify, and cannot, therefore, be used in turbines. Such emulsifying agents may be removed by agitating the oil with an aqueous solution of the alkali soap derived from kerosene-naphthenic acids. In order that this treatment may not affect the flash point the naphthenic acids must first be freed from kerosene by steam-blowing the kerosene lye. W. S. NORRIS.

Recovery of gasoline from field and refinery gases with special reference to the Bayer charcoal process. I. EDELEANU (J. Inst. Petroleum Tech., 1928, 14, 296—313).—Further developments of natural gas production in Rumania are indicated. In a transportable plant having a daily production of 7 metric tons and weighing (building etc. included) only 60 tons, the gas is filtered and introduced at the bottom of one of several absorption vessels, containing the charcoal. These vessels are arranged in parallel; operations on them are scheduled so that adsorption periods in different adsorbers are evenly overlapping, and rinsing periods occur at equal time intervals and do not coincide in different adsorbers. If the gas is rich the heat generated may necessitate the circulation of cold water through internal coils to keep the temperature below 50°. The charcoal exhibits selective adsorption. Heavier gasoline fractions displace adsorbed lighter fractions; the lighter constituents of the portion of gasoline first adsorbed are gradually displaced upwards. The whole charge thus becomes saturated first towards

methane, then towards ethane, propane, etc. Gasoline fractions being mutually soluble, the fractionation thus obtained is not very sharp, but it is sufficiently so to be of practical use in determining the "end-point" of the gasoline which finally will be recovered. When the desired charge is reached, closed steam at about $2\frac{1}{2}$ atm. and 127° is used for steaming out. Later open steam is introduced at the top of the adsorber; the steam-vapour exit mixture is consequently rich in gasoline vapour until the end of the "rinsing" process. Economy in open steam is attained by passing the effluent vapours, on their way to the condenser, through the coils of a heat-interchanger or "evaporator" charged with water, which is thereby heated to $80-85^\circ$. The dome of the "evaporator" is connected with a steam ejector operated by the open steam used in rinsing. The resulting reduction of pressure in the evaporator to about 0.55 atm. causes the water therein to boil. Nearly half the steam for rinsing is regenerated, condensing equipment and cooling water consumption are diminished, and the feed of rinsing steam is, moreover, automatically regulated. If very rich gas is being treated, e.g., well trapped, uncondensed, still vapours, fresh gas is turned directly on to the wet charcoal, evaporation of the retained water then assisting the regulation of the temperature of reaction. Otherwise the continued use of closed steam and blowing with air serve to dry the adsorbent. During the entire process the charcoal is never heated above 140° , yet the extracted gasoline may have an "end-point" as high as 160° . This is largely due to the fact that the open steam furnishes an atmosphere in which the partial pressure of the gasoline is practically zero. The initial b.p. of the recovered gasoline may vary between 25° and 33° ; volume of distillate at 40° between 3% and 46%; and final b.p. between 103° and 163° . Overall steam requirements of the plant are 3– $4\frac{1}{2}$ tons per ton of recovered gasoline, or 2– $3\frac{1}{2}$ tons per ton in the actual process. The make-up of charcoal does not exceed 1 kg./ton of gasoline. A high sulphur content of the gas necessitates a previous scrubbing with lower-grade charcoal.

W. S. NORRIS.

Flame characteristics of "pinkish" and "non-pinkish" fuels. G. B. MAXWELL and R. V. WHEELER (J. Inst. Petroleum Tech., 1928, 14, 175–182).—Photographs have been obtained of the explosions of gaseous air-pentane and air-benzene mixtures, ignited by means of a sparking plug placed centrally in one end of a steel cylinder of variable length, fitted with a longitudinal glass window and with a Bourdon pressure gauge. Time-calibration of the photographs was obtained by recording, simultaneously with the explosion, a series of sparks from an electrically maintained mercury-break tuning fork. Pentane-air mixtures contained 2.8–3.8% of pentane by vol.; benzene-air mixtures about 3–3.5% of benzene. Initial pressures were from 1 to 2 atm. The following differences were revealed between an (audible) pinkish and an (inaudible) non-pinkish explosion. In the former, such as that of a pentane-air mixture at, say, 2 atm. initial pressure, a delay occurs in the process of combustion initiated in or immediately behind the flame front. Some additional shock or impulse is, apparently, required to complete

the process, and this is provided by the sudden arrestment of the accelerating, vibrating flame front at the end of the cylinder; the shock wave set up causes an almost instantaneous completion of the combustion throughout the cylinder, with a consequent very rapid increase in pressure. In a non-pinkish explosion (e.g., that of an air-benzene mixture) there is no delay in the combustion process, which is continuous and protracted, behind the wave front. Pinkish, in fact, is due not to pre-ignition, but to very rapid, delayed after-burning. The longer the cylinder, the more readily was a pinkish explosion produced. Turbulence, maintained by means of a fan, reduced the tendency to pink. Addition of lead tetraethyl vapour caused violent pinkish, but the tendency to pink was eliminated by causing thermal dissociation of the lead tetraethyl, with formation of a smoke of metallic lead, previous to ignition of the mixture.

W. S. NORRIS.

Action of light on transformer oils. G. INCZE (Petroleum, 1928, 24, 743–744).—Increases have been observed in the tar numbers, tar-formation numbers, tar-formation numbers in presence of copper, and acid numbers of American, Russian, and Galician transformer oils which had been exposed to sunlight for periods up to 3 years, but no appreciable change was detected in samples of the same oils which had been preserved in the dark in the absence of air.

W. S. NORRIS.

"Gas benzine" of the Gelsenkirchener Bergwerks-A.-G. tar works. F. KROLLPFEFFER and H. SEEBAUM (J. pr. Chem., 1928, [ii], 119, 131–156).—The "gas benzine," the volatile fraction condensed after the separation of the tar, after treatment with alkali, yielded the following fractions on repeated distillation: (1) b.p. $33-36^\circ$ (2.9%), containing a pentane C_5H_{12} and Δ^{β} -pentene, (2) $36-40^\circ$ (1.5%), containing *n*-pentane and trimethylethylene, (3) $63-67^\circ$ (4.0%), containing β -methylpentane and hexene, (4) $67-70^\circ$ (4.2%), containing *n*-hexane and β -methyl- Δ^{β} -pentene (the latter was synthesised by the elimination of water from dimethyl-*n*-propylcarbinol and from ethylisopropylcarbinol), (5) $79-82^\circ$ (1.6%), consisting of a mixture of hexane and heptane (?) and benzene. In addition, the presence of cyclopentadiene (identified as dimethylfulvene) in fraction (2), of carbon disulphide in the fraction of b.p. $40-50^\circ$, of methyl ethyl ketone, and of minute amounts of acetone in practically all the fractions, was demonstrated. The physical characteristics of the isolated hydrocarbons are recorded.

I. VOGEL.

Development problems in exploitation of natural gas. S. J. M. AULD (J. Inst. Petroleum Tech., 1928, 14, 190–214).—For greater control the provision of high-pressure gas separators between the oil-collecting lines and the final low-pressure separators is desirable. The measurement of gas volume by observations of pressure drop in lines is discussed. Low-pressure gas may be measured by means of an orifice meter. Highly sulphurous gas, e.g., that of Masjid-i-Suleiman, containing up to 12% by vol. of hydrogen sulphide, can be used as fuel for boiler firing without preliminary desulphurising. Corrosion is only to be feared if there is direct impingement of incompletely burnt gas (which may contain elemental sulphur) on corrodible metal

parts, or if a cool metallic surface is present on which momentary condensation may occur of sulphurous or sulphuric acid. The presence of hydrogen sulphide renders the use of solid adsorbents impossible, either for the main extraction of condensable hydrocarbons from natural gas or for the final stripping; traces of air admitted with the gas, or with the steam during the regenerating process, cause deposition of sulphur in the pores of the adsorbent. The oil-absorption process for extracting gasoline from natural gas is discussed.

W. S. NORRIS.

Cracking of hexadecane in presence of catalysts. H. GAULT and R. SIGWALT (Ann. office nat. comb. liq., 1927, 2, 309—323, 543—584).—Comparable results are obtained only when identical volumes of hexadecane are employed; the light products eventually undergo polymerisation and resinification. The cracking reactions take place irregularly, centres of dissociation being formed. Aromatic hydrocarbon are produced from light ethylenic hydrocarbons, and not from acetylene. In the absence of chemical catalysts, fracture of the chain occurs indifferently at any point, the point tending to approach the end of the chain with rise of temperature; the resulting double linking is preferably located in the shorter chain. The composition of the gases varies within narrow limits for particular temperatures; differences in the composition of the final products are mainly due to secondary reactions. Deposits of carbon on pumice reduce the activity of the catalyst at 400° and 450° without exerting any specific action; at higher temperatures the effect is less noticeable. The gases obtained by cracking hexadecane in presence of nickel consist almost exclusively of methane and hydrogen; the liquid products consist of aromatic and saturated acyclic hydrocarbons, ethylene hydrocarbons being found only at 350°. The activity of reduced nickel at first increases and then diminishes. Cracking of hexadecane in presence of anhydrous aluminium chloride yields butane with a little propane and heavier vapours, and an asphaltic residue of low hydrogen content; the hexadecane molecule yields approximately three butane molecules. CHEMICAL ABSTRACTS.

Decomposition of paraffin wax on heating. H. I. WATERMAN, J. N. J. PERQUIN, and H. A. VAN WESTEN (J. Inst. Petroleum Tech., 1928, 14, 318—327).—The mol. wt. of Rangoon paraffin found by the Rast method (B., 1922, 393 A) was 427 and 417. Residues from Engler distillations carried out during experiments on cracking and berginisation of wax (cf. Waterman and Perquin, B., 1927, 643; 1925, 746) showed little difference in mol. wt., which was, however, lower than that of the original wax. Rangoon wax of mol. wt. 410 has been heated in an atmosphere of dry nitrogen at 327—370° for periods up to 20 hrs. The wax is comparatively stable up to 370°. Heating for 20 hrs. at 360° or for 10 hrs. at 370° caused the elimination of an unsaturated distillate, leaving unsaturated residues of mol. wt. 369 and 364, respectively, and correspondingly lowered molecular refractions. This treatment caused a decided lowering of the setting point (Shukoff) of the residue (from 58° to about 54°), an effect which was brought about to a less pronounced degree even at 327° by prolonged heating (16 hrs.).

Extraction and refining of paraffin wax. W. ALLAN (J. Inst. Petroleum Tech., 1928, 14, 328).—Extraction of wax is usually accomplished by pressing a chilled, cracked distillate, which has preferably been redistilled rapidly, using a minimum of steam. The scale is then melted, sweated to the required m.p., and refined.

W. S. NORRIS.

Determination of paraffins in commercial benzole and motor petrols. R. HEILINGÖTTER (Chem.-Ztg., 1928, 52, 437—438).—Examination of hydrocarbon mixtures such as motor spirit depends chiefly on solubility of aromatic or paraffin constituents in various solvents, or their behaviour with sulphonating agents, methyl sulphate, etc.; the latter does not give quantitative results, nor is treatment with acetic anhydride satisfactory. Mixtures containing benzene can be tested by use of a refractometer, provided no substances such as acetone, alcohol, or tetralin are present; curves are given showing the relation between refractive index and the benzene content.

R. H. GRIFFITH.

Physico-chemical basis for the cementing of oil wells with Portland cement. I. A. ALEKSANDROV (Nef. Khoz., 1927, 13, 429—438).—Crude oil forms emulsions with cement; gum arabic prevents the formation of emulsions. The effect of various constituents of the oil or of substances produced by the oil-cement mixture on the formation and stability of the emulsions is considered.

CHEMICAL ABSTRACTS.

Action of coal on photographic plates. HASLAM.—See XXI. **Disinfectants.** TAYLOR.—See XXIII.

PATENTS.

Method of saving fuel. J. M. W. KITCHEN (U.S.P. 1,659,692, 21.2.28. Appl., 17.6.24).—The fuel is composed of a mixture of relatively large hard coal particles and a matrix of smaller particles of moistened coal relatively rich in volatile matter and occupying only a portion of the interstices between the larger particles.

C. O. HARVEY.

Treatment of flue dust. K. M. SIMPSON (U.S.P. 1,661,636, 6.3.28. Appl., 7.4.26).—Flue dust is mixed with a pulverised carbonaceous fuel and a hydrocarbon and briquetted. The mixed materials are heated first in air and then at a higher temperature in the absence of oxygen, whereby the bulk of the volatile matter is removed and the materials are bonded together.

A. B. MANNING.

Coke and gas-oven and process for heating the same. C. WESSEL (B.P. 284,606, 26.1.28. Ger., 31.1.27).—Coke ovens with vertical heating flues have a mixing chamber beneath each flue in which an initial volume of preheated air is supplied to the gas, for the purpose of dilution and partial combustion. From each mixing chamber a pipe provided with lateral openings at various heights extends into the heating flue, the gas as it issues from these openings being burnt with secondary air supplied to the lower end of the flue. If a weak gas, e.g., producer gas or blast-furnace gas, is used for heating, it is preheated by passage through a regenerator and passed directly through the mixing chambers to the flues without admixture with primary air.

A. B. MANNING.

Semi-portable carbonising oven for fuel balls made of sawdust or other wood waste. L. DUPONT (B.P. 282,058, 6.12.27. Fr., 8.12.26).—The oven comprises a furnace capable of heating simultaneously (a) a tunnel chamber open at both ends, in which the fuel balls of sawdust or other waste material are semi-carbonised, (b) retorts in which the carbonisation of the fuel balls can be completed, and (c) chambers maintained at a lower temperature for reheating the fuel balls after semi-carbonisation. The fuel passes successively through a dryer, a stirring apparatus, and a hopper to the moulds, which are arranged on a moving endless horizontal belt, and in which the fuel is conveyed through the tunnel chamber. The distillation gases are passed through a tar remover and are returned thence to the furnace. A. B. MANNING.

Composition of fuel briquettes. R. LESSING (B.P. 290,380, 21.2.27).—In the manufacture of briquettes containing a small proportion of a salt or oxide of a multivalent metal as a catalyst, a coal is used which has been separated by flotation, and the bath liquor is removed by displacement with a continuous body of liquid of which the last portion is a solution or suspension of the catalyst to be added. A. B. MANNING.

Apparatus for making carbon and generating steam. L. J. McNUTT (U.S.P. 1,670,686, 22.5.28. Appl., 10.2.26).—The flame from a gas burner impinges upon a revolving, horizontal cylinder, which constitutes the steam generator. The deposited carbon is removed from the outside of the cylinder, and is collected in a receiver placed below. The steam leaves the cylinder through its hollow axle, and passes into a discharge pipe supported by the bearings and extending along the top of the cylinder. A battery of cylinders may be arranged above a single carbon receiver.

F. G. CLARKE.

Operation of internal-combustion engines I. G. FARBENIND. A.-G. (B.P. 274,462, 11.7.27. Ger., 13.7.26).—Engines of the Diesel type are operated on a pulverulent mixture of mineral coal and lignite, containing up to 80% of the former. A. B. MANNING.

Manufacture of mixed water-gas and distillation gas from fuels of volatile content. HUMPHREYS & GLASGOW, LTD., Asses. of C. S. CHRISMAN (B.P. 279,059, 27.9.27. U.S., 13.10.26).—The plant comprises two generators, two superheaters, and two combined carburettors and regenerators. The fuel bed in each generator has a lower gasification zone and an upper carbonisation zone. In operation, the two generators are blasted in parallel, the blast traversing the gasification zones only, and the blast gases passing successively through the respective superheaters, in which they are burnt with secondary air, the carburettors and regenerators, to the stack. After the blasting operation a down-run with steam is made on one generator and an up-run with steam on the other. The water-gas from the former is carburetted, and then passes through the superheater to the second generator, traversing the carbonising zone of the latter in admixture with the water-gas from the lower zone of the same generator. Some alternative methods of operation involving the same basic idea are described. A. B. MANNING.

Generation of water-gas. L. B. MOORHOUSE (U.S.P. 1,660,202, 21.2.28. Appl., 19.7.20).—Streams of air and steam are alternately passed diagonally downwards through a mass of incandescent fuel, the direction of flow being varied so that the path of one stream of air crosses that of the next. C. O. HARVEY.

Catalytic gas reactions. I. G. FARBENIND. A.-G. (B.P. 274,904, 25.7.27. Ger., 24.7.26).—In catalytic gas reactions, especially those carried out under pressure, and in particular in the destructive hydrogenation of carbonaceous materials, the finely-divided or granular catalyst is brought into suspension uniformly throughout the reaction space by means of an eddying gas current. Any dust evolved from the catalyst is removed from the reaction gases, by means of baffles or a dust separator, before they reach the cooler parts of the apparatus. A. B. MANNING.

Cracking of hydrocarbons. Crude-oil preheater. W. L. GOMORY, Assr. to C. M. LEONARD (U.S.P. 1,670,804—5, 22.5.28. Appl., [A] 14.2.20, [B] 30.4.21).—(A) 80–85% of a mixture of hydrogen and hydrocarbons is vaporised by forcing it through a conduit at about 538° and under about 150 lb. (B) Crude oil to be preheated passes down a hollow column and chamber situated centrally in a heated, vertical, cylindrical tank, and is then discharged uniformly into the tank, near the top of which the outlet tube is situated. C. O. HARVEY.

Refluxing tower [for mineral oils]. R. CROSS, Assr. to GASOLINE PRODUCTS Co. (U.S.P. 1,670,762, 22.5.28. Appl., 29.9.24).—In a dephlegmating tower of the type wherein vapours are bubbled through pools of oil contained in trays, the vapours are used to preheat the oil stock, which may also be partially diverted to any or all of the trays. C. O. HARVEY.

Distillation of liquids, more particularly of liquid hydrocarbons. M. SINGER (B.P. 276,302, 19.4.27. Ger., 19.8.26).—The oil, preheated in a tubular still, is automatically fed, with or without steam or a gas, and intermittently in predetermined quantities at regular intervals, to an evaporating tower. A number of such towers may be used. C. O. HARVEY.

Treatment of oil. F. A. KORMANN, Assr. to UNITED REFINERIES Co. (U.S.P. 1,661,804, 6.3.28. Appl., 14.2.21).—Oils of high b.p. are converted into lower-boiling products by distilling in the presence of steam in a still containing a mass of highly-absorbent brickwork, into the pores of which steam is introduced. C. O. HARVEY.

Catalytic apparatus [for oils]. E. T. HESSLÉ and W. LELGEMANN (U.S.P. 1,661,827, 6.3.28. Appl., 26.4.26).—Oil in the form of vapour or "fog" is treated by passing it through a fluid catalyst. C. O. HARVEY.

Distillation of hydrocarbons. M. R. MEACHAM, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,661,189, 6.3.28. Appl., 25.6.23).—A still provided with perforated steam-inlet pipes has a vertical tubular circulator fitted with a steam jet, whereby the oil is forced upwards into a tray, whence it flows downwards again in a number of small streams. C. O. HARVEY.

Oxidation of hydrocarbon oils. E. E. REID, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,663,523,

20.3.28. Appl., 5.7.21).—A gas containing oxygen issues in fine streams from a member rotating at a speed of over 1000 r.p.m. and situated below the surface of the hot oil. C. O. HARVEY.

Production of acids [by oxidation of hydrocarbon oils]. E. E. REID and C. E. BURKE, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,663,524, 20.3.28. Appl., 14.2.25).—A gas containing oxygen is passed into the oil, which is heated at below 300° and rapidly stirred. An intimate mixture of oil and gas is produced by causing the streams of gas to impinge on the stirrer and the oil in close proximity thereto. C. O. HARVEY.

Manufacture of unsaturated hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 290,322, 10.1.27).—Unsaturated hydrocarbons, in particular acetylene, are produced from heavy oils by spraying the latter into a combustible gas, or admixed with such a gas, in such a way that they pass through a high-temperature zone formed by the combustion of part of the mixture with oxygen or gases rich in oxygen, the combustion being so effected as to produce a disc-shaped flame. A. B. MANNING.

Preservation of mineral oils. F. HOFMANN and M. DUNKEL (B.P. 289,909, 5.11.26).—The rate of oxidation of mineral oils such as transformer and lubricating oils is retarded and their liability to form sludgy deposits is lessened by the addition of about 0.1% of a cyclic amine or similar highly basic compound (*e.g.*, piperidine, diethylaniline, phenylenediamines). [Stat. ref.]

C. O. HARVEY.

Retort for carbonising bituminous fuels. J. PLASSMANN (U.S.P. 1,671,448, 29.5.28. Appl., 10.7.25. Ger., 30.9.24).—See B.P. 240,800; B., 1926, 228.

Production of high-grade products from raw coal. CHEM. FABR. IN BILLWÄRDER VORM. HELL & STHAMER A.-G., and F. L. KÜHLWEIN (B.P. 286,456, 5.3.27).—See U.S.P. 1,660,009; B., 1928, 325.

Coke-extracting mechanism for vertical retorts for distillation of carbonaceous materials. F. J. and E. WEST (U.S.P. 1,672,442, 5.6.28. Appl., 6.6.27. U.K., 28.6.26).—See B.P. 272,691; B., 1927, 674.

Calcining of coke [for electrodes]. V. C. DOERSCHUK and F. C. FRARY, Assrs. to ALUMINUM Co. OF AMERICA (U.S.P. 1,671,673, 29.5.28. Appl., 22.4.26).—See B.P. 269,849; B., 1928, 6.

Fuel for use in internal-combustion engines etc. E. G. E. MEYER (U.S.P. 1,671,158, 29.5.28. Appl., 5.6.26. U.K., 12.6.25).—See B.P. 262,363; B., 1927, 134.

Production of filling for dissolved gas [storage of explosive gases]. J. POMMÉE (U.S.P. 1,672,688, 5.6.28. Appl., 8.5.25. Ger., 5.5.24).—See B.P. 241,468; B., 1926, 40.

Conversion of hydrocarbons. H. NIELSEN, Assr. to B. LAING (U.S.P. 1,672,081, 5.6.28. Appl., 7.3.25. U.K., 3.12.21).—See B.P. 198,385; B., 1923, 760 A.

Distillation and cracking of hydrocarbon oils. H. J. JANSEN (U.S.P. 1,672,459, 5.6.28. Appl., 13.7.25. U.K., 18.7.24).—See B.P. 278,235; B., 1927, 900.

Catalyst for manufacture of hydrocarbons. L. EDELEANU, Assr. to ALLGEM. GES. F. CHEM. IND.

(U.S.P. 1,671,517, 29.5.28. Appl., 23.2.26. Ger., 19.12.24).—See B.P. 244,697; B., 1926, 396.

Tanks for transportation of volatile liquids. E. BRAINICH (B.P. 291,321, 18.1.28. Ger., 30.6.27).

Gas-analysis apparatus (B.P. 288,510).—See I. Lead and tin tetra-alkyls (B.P. 290,444). Hydrogen from hydrocarbons (B.P. 291,244).—See VII. Asphaltic mixture (U.S.P. 1,671,070).—See IX. Polishes and soaps (B.P. 261,039 and 287,114).—See XII. Oil varnishes (B.P. 287,115—6).—See XIII.

III.—ORGANIC INTERMEDIATES.

Preparation of acetic acid and its derivatives. E. TERLINCK (Chem.-Ztg., 1928, 52, 249—250, 270—272, 307—309, 326—328).—Barium acetate can be readily prepared anhydrous by evaporation of its solution over an oil-bath. For the preparation of barium acetate from commercial "grey acetate" the latter is dissolved in 3—3.5 pts. of water, and the filtered solution is treated with the theoretical quantity of sulphuric acid to liberate all the acetic acid present. The calcium sulphate precipitate is removed and the solution treated with a small quantity of barium acetate solution to remove sulphuric acid, filtered, and neutralised with barium carbonate. The clear yellow liquid is evaporated to *d* 1.40; on cooling, coarse crystals of barium acetate separate out. They are separated from the slightly warm syrupy mother-liquor by centrifuging, washed with a saturated solution of the pure salt, heated at 260° to decompose any tarry matter, redissolved, and recrystallised by evaporation of the filtered solution. The crude mother-liquor from the first crop is evaporated, the dry residue heated at 260° and dissolved in water, and the solution decolorised with charcoal and added to that obtained from the crystals. Barium acetate may also be prepared directly from crude pyrolygneous acid by treating it with an excess of baryta to precipitate tarry matter, evaporating the filtrate to a syrup, again filtering or centrifuging, and proceeding as before. Sodium acetate of high purity is readily prepared from the barium salt by double decomposition with sodium carbonate, and the regenerated barium carbonate is available for the preparation of further quantities of barium acetate. Glacial acetic acid (m.p. 15.7—16.0°) may be obtained directly from the granular barium salt by passing a current of dry hydrogen chloride through a copper tube packed with the granules and redistilling the acid over a small quantity of barium acetate, or by treating a saturated solution of barium acetate in glacial acetic acid (510 g./litre) with dry hydrogen chloride or with anhydrous sulphuric acid. Acetic anhydride is prepared from barium acetate by passing carbonyl chloride through the granulated salt in a copper still or through a suspension of the finely-divided acetate in acetic anhydride. The recovery of barium carbonate from the chloride or sulphate produced in the processes described above may be effected as follows: barium sulphate is reduced at 800° in a stream of water-gas, and the solution of barium sulphide is precipitated with sodium carbonate to obtain barium carbonate and pure sodium sulphide; barium chloride is treated with ammonia and carbon dioxide obtained by calcining

magnesite, whereby barium carbonate is precipitated, the ammonium chloride produced is distilled with sulphuric acid to regenerate hydrogen chloride for use again in the process, and, finally, the ammonium sulphate is heated with magnesia to regenerate ammonia and form magnesium sulphate. A. R. POWELL.

Determination of the cresols. II. K. K. JÄRVINEN (Z. anal. Chem., 1928, 73, 446—451; cf. B., 1927, 596).—To obtain a quantity of the pure cresols from lysol for standardising the bromide-bromate solution used in the method previously described, the following procedure is recommended: 50 g. of lysol are dissolved in 25 c.c. of 15*N*-sodium hydroxide and 100 c.c. of water, and the hot solution is precipitated with 20 c.c. of 3*N*-barium chloride solution, diluted to 250 c.c., and filtered. The filtrate is treated with 35 c.c. of hydrochloric acid (*d* 1.18) and 40 g. of sodium chloride in a separating funnel. The cresols which separate are collected and distilled, the fraction coming over above 180° being collected, heated to boiling for a few minutes to expel moisture, and used immediately for making a standard solution of 10 g./litre. For the determination of cresols in relatively pure preparations, 10 g. are dissolved in 7 c.c. of 15*N*-sodium hydroxide. The solution is diluted to 100 c.c. and filtered, 10 c.c. of the filtrate are transferred to a butyrometer tube and treated with 11 c.c. of 1:1 hydrochloric acid previously saturated with cresol and 2 g. of sodium chloride, the mixture is shaken vigorously, heated at 50° for 15 min., and centrifuged, and the volume of separated cresol read off; 7.68 butyrometer degrees are equivalent to 1 g. of cresol. A. R. POWELL.

PATENTS.

Manufacture of acetic anhydride. CONSORT. F. ELEKTROCHEM. IND., G.M.B.H. (B.P. 272,951, 17.6.27. Ger., 17.6.26).—Prior to contact with a catalyst (*e.g.*, molten alkali phosphate) giving rise to the formation of anhydride, acetic acid vapour is preheated at 400—800° in a chamber lined with material such as chromium or nickel alloys, silicon carbide, carbon, or graphite. The output of anhydride is greatly increased. Preheating may be external by means of hot gases, or internal by means of electrically heated resistances of carbon, graphite, chromium or nickel alloys, etc. B. FULLMAN.

Manufacture of the anhydrides of acetic acid, its homologues, and halogen derivatives. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,959, 4.2.27).—Sodium acetate (328 pts.), acetic acid (100 pts.), and silicon tetrachloride (170 pts.) are mixed in a closed vessel, and when the pressure has become normal again acetic anhydride and acetic acid are distilled off, the former in 98% yield. The ratio of sodium acetate to silicon tetrachloride (part of which may be replaced by titanium or tin tetrachlorides) must be substantially as given. C. HOLLINS.

Manufacture of anhydrides of aliphatic acids. H. DREYFUS (B.P. 289,972, 8.2.27).—Acetic (or other aliphatic) acid of any strength is passed through a copper or fireclay tube at 800—1000° and then over sodium pyrosulphate, sodium hydrogen sulphate, phosphoric acid, or other suitable dehydrating agent at 150—200°. C. HOLLINS.

Production of aldehydes from dicarboxylic acids. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 290,319, 7.1.27).—The acid or its anhydride is passed with a reducing gas (hydrogen, carbon monoxide) over a catalyst (iron, chromium, copper, manganese, cobalt, or their oxides) at 250—400°. Phthalic anhydride gives benzaldehyde, succinic anhydride propionaldehyde. Maleic anhydride may be converted first into succinic anhydride by hydrogenation at 180°.

C. HOLLINS.

Manufacture of crotonaldehyde. ELEKTRIZITÄTSWERK LONZA, Assees. of E. LUSCHER (B.P. 270,764, 9.5.27. Switz., 8.5.26).—Acetaldehyde free from acid is treated with 0.02% of caustic alkali in the form of 5% solution in an atmosphere free from oxygen. After aldolisation at 30—40°, the alkali is neutralised with phosphoric acid (no precipitation of salt occurs), and the product distilled directly at about 130°. The yield of crotonaldehyde is 95—98%. C. HOLLINS.

Aldehyde-amine condensation products. GRASSELLI CHEM. Co., Assees. of W. B. BURNETT and I. WILLIAMS (B.P. 265,931, 29.12.26. U.S., 12.2.26; cf. B.P. 265,930, B., 1928, 420).—An amine (aniline, *o*-toluidine, *n*-butylamine, methylamine, ethylenediamine, *o*-tolylidiguamide, ethylaniline, diethylamine, etc.) is condensed with 2 or more mols. of an aldehyde containing more than two carbon atoms, in presence of acids or acidic condensing agents (acetic, propionic, butyric, valeric, stearic, oleic, picric, salicylic, hydrochloric, sulphuric, and phosphoric acids, or their amine salts, or zinc chloride, acid anhydrides, acid halides, etc.), the amount of the latter being preferably about 0.2 mol. for each mol. of amine. The products from primary amines and aldehydes other than α -unsaturated aldehydes are vulcanisation accelerators distinguished from those of B.P. 263,853 (B., 1927, 757) in that they are unaffected by the presence of carbon black in the rubber mix. Examples are: aniline with 5 mols. of *n*-butaldehyde and 0.05—0.15 mol. of *n*-butyric acid, or 0.5 mol. of sulphuric acid, or 1 mol. of stearic acid, or 0.15 mol. of acetic acid; aniline with 3 mols. of *n*-butaldehyde and 0.15 mol. of *n*-butyric acid; *o*-toluidine with 5 mols. of *n*-butaldehyde and 0.15 mol. of *n*-butyric acid; *n*-butylamine with 3 mols. of heptaldehyde and 0.15 mol. of *n*-valeric acid. C. HOLLINS.

Manufacture of diazotised monoamines of the cyclic series. I. G. FARBENIND. A.-G. (B.P. 268,789, 30.3.27. Ger., 30.3.26).—Arylamines containing negative substituents which make diazotisation difficult are converted into sulphamic acids, which are readily diazotised (with expulsion of the sulphonic group) in aqueous solution or suspension. Examples are: 2:5-dichloroaniline, 2:3- and 2:5-dichloro-*p*-toluidines, 3:4:5-trichloroaniline, picramic acid, aminoazo-benzene and -toluene. C. HOLLINS.

Manufacture of new depolymerisation products from carbohydrates of high mol. wt. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 290,377, 15.2.27).—Carbohydrates are heated in boiling glycol or ethylene chlorohydrin or mixtures of these until the desired degree of de-association is reached ($\frac{1}{4}$ to $2\frac{1}{2}$ hrs.), and

the solvent is removed by distillation in a vacuum. The chlorohydrin dissolves about 8% of cellulose.

C. HOLLINS.

Introduction of sulphocyanide [thiocyano-] groups into organic compounds. I. G. FARBENIND. A.-G., Assees. of H. P. KAUFMANN (B.P. 257,619, 26.8.26. Ger., 27.8.25).—Organic compounds are converted into thiocyanate-derivatives by treatment with a solution of a thiocyanate and a halogen. Ethylene and chlorine are led into a solution of sodium thiocyanate in 96% acetic acid to give dithiocyanoethylene, m.p. 90°, which is also formed by passing ethylene and bromine into a solution of sodium thiocyanate in 15% hydrochloric acid. $\alpha\beta$ -Dithiocyanophenylethane, m.p. 101°, is obtained from styrene, $\alpha\beta$ -dithiocyano- β -*p*-anisylpropane, m.p. 81°, from anethole, 4:4'-dithiocyanodiphenylamine, m.p. 120°, from diphenylamine, 5-thiocyanosalicylic acid, m.p. 165°, 4-thiocyano- α -naphthol, m.p. 113°, 2:4-dithiocyano- α -naphthol, m.p. 118—119°, 2:4-dithiocyano- α -naphthylamine, m.p. 204°, and 1-thiocyano- β -naphthol, m.p. 261° (decomp.), are similarly prepared. Antipyrine gives a 4-thiocyano-derivative, which may be hydrolysed in solution with dilute alkali to the 4-thiol compound, isolated as the 4:4'-disulphide, m.p. 256°.

C. HOLLINS.

Preparations suitable for production of aqueous solutions of organic compounds insoluble or difficultly soluble in water. I. G. FARBENIND. A.-G. (B.P. 290,554, 26.10.26. Addn. to B.P. 261,720; B., 1928, 455).—Mixtures of the sulphonic acids (or salts) mentioned in the prior patent with water-soluble salts, such as sodium sulphate, sodium chloride, etc., are used for solubilising organic liquids insoluble in water. An example is naphthalene, sulphonated and condensed with *sec*-butyl alcohol, and the reaction product neutralised with alkali and evaporated. [Stat. ref.]

C. HOLLINS.

Purification of aromatic hydrocarbons. H. G. C. FAIRWEATHER. From SELDEN Co. (B.P. 290,840, 7.6.27).—The crude aromatic oil, freed from bases and phenols, is given a partial wash with sulphuric acid, and is then treated with chlorine, in presence or absence of a carrier or catalyst, washed with water, and the purified hydrocarbons are distilled off. The chlorinated residue may be used as a solvent.

C. HOLLINS.

Preparation of H-acid [8-amino- α -naphthol-3:6-disulphonic acid]. I. GUBELMANN and J. M. TINKER, Asss. to NEWPORT Co. (U.S.P. 1,670,406, 22.5.28. Appl., 4.11.25. Cf. U.S.P. 1,573,056; B., 1926, 528).— α -Naphthylamine-3:6:8-trisulphonic acid is fused with caustic alkali in the presence of added ammonia.

B. FULLMAN.

Manufacture of ketones of the anthracene series. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 289,585, 16.2.27).—Anthracene is condensed with aliphatic acid halides in presence of aluminium chloride to give, according to conditions, 9-anthracyl alkyl ketones or a separable mixture of 1- and 2-anthracyl alkyl ketones, the latter predominating. The 1- and 2-anthracyl compounds are oxidised to the corresponding anthraquinonyl ketones; the *meso*-compounds yield anthraquinone on oxidation, or are isomerised to

1- and 2-compounds by treatment with aluminium chloride. *Anthracyl methyl ketones* (1-, m.p. 103—105°; 2-, m.p. 183—185°; 9-, m.p. 80°), 1- and 2-*anthraquinonyl methyl ketones*, m.p. 158—160° and 140—142°, respectively, 1- and 2-*anthracyl ethyl ketones*, m.p. 150° and 162—163°, respectively, and a *diacetylanthracene*, m.p. 212—215°, which is oxidised to a *diacetylanthraquinone*, m.p. 318—319°, are described; a second *diacetylanthracene* has m.p. 173°.

C. HOLLINS.

Manufacture of tetranitrodianthrone and of 2:7-dinitroanthraquinone therefrom. W. CARMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,958, 4.2.27).—Dianthrone, nitrated at 0—5° with mixed acid, yields tetranitrodianthrone, the dienolic form of which (obtained by action of pyridine, aniline, dilute alcoholic alkali, etc. on the diketone) is oxidised with nitric acid or chromic-acetic acid to 2:7-dinitroanthraquinone, m.p. 284—285°.

C. HOLLINS.

Preparation of ethylidene diacetate. M. J. L. LEDRU and E. J. BACHMANN, Asss. to SOC. CHIM. DES USINES DU RHÔNE (U.S.P. 1,672,646, 5.6.28. Appl., 22.1.26. Fr., 18.9.25).—See B.P. 252,640; B., 1926, 692.

Preparation of dithiazyl disulphide. C. M. CARSON, Assr. to GOODYEAR TIRE & RUBBER Co. (U.S.P. 1,661,998, 6.3.28. Appl., 7.9.26).—See B.P. 277,338, B., 1928, 361.

Manufacture of 3:4-diaminobenzoyl-*o*-benzoic acids. NEWPORT Co. (B.P. 277,285, 10.1.27. U.S., 13.9.26).—See U.S.P. 1,663,229; B., 1928, 440.

Manufacture of alkyl derivatives of diphenol-isatin. A. BLANKART, Assr. to HOFFMANN-LA ROCHE CHEM. WORKS (U.S.P. 1,667,239, 24.4.28. Appl., 7.7.27. Switz., 9.10.26).—See B.P. 278,672; B., 1928, 548.

Production of anthraquinonesulphonic acids. J. THOMAS, Assr. to SCOTTISH DYES, LTD. (U.S.P. 1,671,455, 29.5.28. Appl., 19.6.24. U.K., 31.8.23).—See B.P. 229,719; B., 1925, 349.

Catalyst carrier [for oxidation of organic compounds]. C. R. DOWNS (U.S.P. 1,672,308, 5.6.28. Appl., 13.11.19).—See B.P. 153,877; B., 1922, 197.

Unsaturated hydrocarbons (B.P. 290,322).—See II. **Catalysts** (B.P. 290,399).—See VII.

IV.—DYESTUFFS.

PATENTS.

Readily dispersible dye preparations. BRIT. DYESTUFFS CORP., LTD., J. BADDILEY, A. SHEPHERDSON, and A. J. HAILWOOD (B.P. 290,542, 22.7.27).—The products obtained by moderated oxidation of ligninsulphonic acid (cf. F.P. 374,162) possess in an enhanced degree the dispersing and solubilising properties of the starting-material, and are non-hygroscopic. When they are incorporated with a finely-divided dye paste, the latter may be dried at moderately high temperatures without losing its ready dispersibility in water.

C. HOLLINS.

Manufacture of water-soluble dinitroarylamino-diarylamines. I. G. FARBENIND. A.-G. (B.P. 279,133, 18.10.27. Ger., 18.10.26).—A *p*-aminodiphenylamine is

condensed with a 1-halogen-2:4- (or 2:6-)dinitrobenzene containing in position 6 (or 4) a carboxyl, carbalkoxyl, carbonarylalkylamide ($\cdot\text{CO}\cdot\text{NArR}$), sulpharylalkylamide ($\cdot\text{SO}_2\cdot\text{NArR}$), or sulphonic aryl ester group, to give yellow to reddish-brown dyes for wool, silk, and particularly for cellulose esters and ethers. From 4-amino-4'-methyldiphenylamine-2-sulphonic acid and 4-chloro-3:5-dinitrobenzenesulphonmethylanilide a brown wool dye is obtained. Other condensations are: 4-amino-4'-methyldiphenylamine-2-sulphonic acid with 4-chloro-3:5-dinitrobenzoic acid (yellow-brown on wool); *p*-aminodiphenylamine with 4-chloro-3:5-dinitrobenzoic acid (intense brown on acetate silk); 4-amino-4'-methoxydiphenylamine-2-carboxylic acid (prepared from 2-chloro-5-nitrobenzoic acid and *p*-anisidine) with 4-chloro-3:5-dinitrobenzoic acid; 4-amino-2-sulphodiphenylamine-2'-carboxylic acid with 4-chloro-3:5-dinitrobenzomethylanilide; *p*-aminodiphenylamine with 2-chloro-3:5-dinitrobenzoic acid.

C. HOLLINS.

Manufacture of sulphur dyes. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 289,241, 29.3.27).—Sulphur is introduced in the form of thiocyanogroups into intermediates for sulphide dyes by treatment with thiocyanogen (or substances yielding thiocyanogen), and the products are boiled with alkali or an alkali sulphide to give sulphide dyes. 1-Hydroxy- α -naphthaphenazine, 1:13-dihydroxy- $\alpha\alpha'$ -dinaphthazine, 4:4':4''-trianilino-triphenylmethane, and toluosafranine give sulphide dyes in this way. The method is applicable to substances which are not thionated satisfactorily by the usual sulphide treatment; aromatic amino- and/or hydroxyl groups must be present.

C. HOLLINS.

Manufacture of vat dyes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 289,980, 14.2., 12.9., and 29.9.27).—The nitrobenzanthrone of B.P. 12,518 of 1906 (B., 1906, 844) is reduced to aminobenzanthrone and heated with caustic alkali under mild conditions, *e.g.*, potassium ethoxide at 140–150°, to give a green vat dye. Similar or identical dyes are obtained from certain derivatives of the aminobenzanthrone, namely, the bromo-compound prepared by acetylation, bromination, and hydrolysis, the *p*-tolylthiol derivative obtained from this bromo-compound and thio-*p*-cresol, and the methylthiol derivative resulting from methylation of aminothiobenzanthrone (a by-product of the sodium sulphide reduction). The green dyes may be oxidised, in substance by chromic-acetic acid, or on the fibre with bleaching powder, to give a fast brown vat dye. A similar brown dye is obtained by heating the nitrobenzanthrone with alcoholic alkali at 140°, and may be purified by oxidation with hypochlorite; this brown dye becomes reddish-orange when chlorinated on the fibre. C. HOLLINS.

Vat dye preparation and utilisation. R. F. THOMSON, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 289,103, 13.10.26).—The 3-chloroaminobenzanthrone, m.p. 280–281°, obtained by reducing 3-chloronitrobenzanthrone (B.P. 256,281; B., 1926, 868) is heated with an alkali (alcoholic alkali or an alkali alkoxide), preferably in presence of a thiophenol (*e.g.*, thio-*p*-cresol), to give a vat dye yielding reddish-blue dyeings becoming bright blue when treated with bleaching

powder. The vat dye may be purified by fractional precipitation from sulphuric acid. The process of B.P. 254,742 (B., 1927, 550) is disclaimed.

C. HOLLINS.

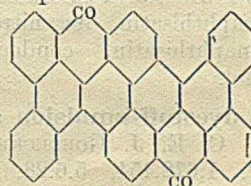
Dyes and dyeing [soluble vat dye derivatives]. B. WYLLAM, J. E. G. HARRIS, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 290,690, 17.12.26).—A vat dye (dimethoxydibenzanthrone, indigo, flavanthrone) is treated with a metal (zinc) in boiling pyridine or other tertiary base in presence of an alkyl halide (ethyl bromide), or acid halides (benzoyl chloride), or acid anhydrides (acetic, phthalic). The products are insoluble in water, soluble in pyridine. Some are readily hydrolysed by sulphuric acid, regenerating pure vat dyes. A few may be fixed on the fibre by acid oxidation.

C. HOLLINS.

Manufacture of new vat dyes. I. G. FARBENIND. A.-G. (B.P. 273,247, 7.3.27. Ger., 22.6.26).—The higher alkyl ethers of hydroxylated dibenzanthrones or isodibenzanthrones have poor light-fastness properties. This disadvantage is not shown, however, by the β -alkoxyethyl ethers even when the alkoxy-group contains several carbon atoms. The new derivatives, obtained best by alkylation with the appropriate toluenesulphonic ester, are surprisingly soluble in benzene etc. and are useful both as vat dyes and as pigments for cellulose ester lacquers. The β -methoxyethyl ether of dihydroxybenzanthrone gives fast blue-green dyeings on cotton; the β -*n*-butoxyethyl ether is a green pigment. Glycol ditoluenesulphonate present in β -*n*-butoxyethyl toluenesulphonate gives a blue vat dye (easily separable from the main product), which is also obtainable from dihydroxydibenzanthrone and ethylene dibromide.

C. HOLLINS.

Manufacture of vat dyes. I. G. FARBENIND. A.-G. (B.P. 282,629, 16.9.27. Ger., 23.12.26).—5:13-Diphenylpyranthrene, treated with acid condensing agents (sulphuric acid and manganese dioxide, or aluminium chloride followed by air oxidation), gives a bright orange vat dye of probable constitution



C. HOLLINS.

Manufacture of new [vat and acid] dyes. BRIT. DYE STUFFS CORP., LTD., J. BADDILEY, P. DOOTSON, A. SHEPHERDSON, and S. THORNLEY (B.P. 289,188, 8.2.27).—An aminoflavanthrone is condensed with a polynuclear aromatic halogen compound having a ring-system of at least three fused nuclei, such as halogenated acenaphthaquinones, flavanthrones, pyranthrones, etc., to give vat dyes or, if carboxyl or sulphonic groups are present, acid dyes. *E.g.*, aminoflavanthrone (from flavanthrone and hydroxylamine) is condensed with dibromopyranthrene for a brown vat dye.

C. HOLLINS.

Manufacture of new [vat] dyes. SOC. CHEM. IND. IN BASLE (B.P. 262,774, 7.12.26. Switz., 8.12.25).—Violanthrone, trichlorinated in nitrobenzene at 135–140°;

yields a navy blue vat dye fast to water (cf. B.P. 22,519 of 1905; B., 1906, 634).

C. HOLLINS.

Manufacture of vat dyes. BRIT. DYESTUFFS CORP., LTD., H. M. BUNBURY, H. EVANS, and A. SHEPHERDSON (B.P. 289,191, 9.2.27).—Dyes of increased tinctorial powder are obtained from dibenzoyl-4:4'- and 4:5'-diamino-1:1'-dianthrimides and sulphuric acid by adding an oxidant (perborate, persulphate, or hypochlorite) to the reaction mixture, or treating the reaction product with an oxidant.

C. HOLLINS.

Manufacture of new azo dyes which are insoluble in water. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 290,733, 18.2.27).—A 2:7-diaminocarbazole is tetrazotised and coupled with components other than β -naphthol, either on the fibre or other substrate or in substance. Examples are: 2:7-diaminocarbazole with 5-hydroxy- β -naphthacarbazole (from 2:7-dihydroxynaphthalene; black), or bisacetoacetyltolidine (yellowish-brown), or 2:3-hydroxynaphthoic anilide (navy-blue); 2:7-diamino-3:6-dimethylcarbazole with 2:3-hydroxynaphthoic α -naphthylamide (bluish-black); 3:6-dichloro-2:7-diaminocarbazole with 2:3-hydroxynaphthoic anilide.

C. HOLLINS.

Manufacture of new mordant disazo dyes. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,135, 18.1.27).—A disazo dye of the type: *p*-phenylenediamine (or homologues or substitution products) \rightleftharpoons 2 mols. of salicylic acid (or derivatives having 3- and 5-positions unsubstituted), is sulphonated, e.g., with 20% oleum at 130–135°, to give a chrome-printing yellowish-orange dye of especially good fastness to light, soap, and chlorine.

C. HOLLINS.

Manufacture of new [thio]indigoid dyes. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,154, 21.1.27).—A halogenated $\beta\beta$ -naphthisatin anil or chloride is condensed with a monoether of 1:4-dihydroxynaphthalene to give green dyes fast to chlorine. Examples are the 2-chlorides of 9-chloro-6- (or 7)-bromo- $\beta\beta$ -naphthisatin, its nitration product, and 9-chloro- $\beta\beta$ -naphthisatin, condensed with 4-methoxy- α -naphthol.

C. HOLLINS.

Production of dyestuff emulsion and of colour lake therefrom. C. E. J. GOECKE, Assr. to W. EBERLEIN (U.S.P. 1,672,454, 5.6.28. Appl., 8.5.25. U.K., 16.8.24).—See B.P. 241,332; B., 1925, 983.

Manufacture of [vat] dyes [from polyhalogeno-violanthrones]. SOC. CHEM. IND. IN BASLE (B.P. 263,826, 24.12.26. Switz., 24.12.25).—See U.S.P. 1,659,145; B., 1928, 293.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Production of strong threads from silk coagula. P. P. VON WEIMARN (Kolloid-Z., 1928, 45, 36–39).—Strong fibres of silk are produced when the viscous, highly concentrated solution formed by heating silk in aqueous solutions of very soluble salts (e.g., sodium thiocyanate) is poured into concentrated solutions of coagulating salts such as sodium citrate and potassium sodium tartrate. The threads gradually become brittle on keeping, but a portion can be kept for more than a year

without change. This is discussed in regard to the factors affecting the brittleness of natural silk threads.

E. S. HEDGES.

Properties of silk coagula formed by pouring colloidal silk solutions into concentrated tannin solutions. P. P. VON WEIMARN (Kolloid-Z., 1928, 45, 39–42).—Natural silk readily adsorbs tannin, which can be removed only with difficulty by treatment with water. Coagula containing both fibroin and tannin were made by dispersing silk in concentrated aqueous solutions of very soluble salts (e.g., sodium iodide) and pouring into a 30–40% solution of tannin. The consistency of the coagulum is such that it can be drawn into threads exceeding 1 m. in length, and can be spread into a transparent film covering a large area. On drying the film becomes cloudy, but later is transparent once more and becomes brittle. The coagulum dissolves to a colloid when boiled in concentrated tannin solution, and is regenerated by addition of water. If the disperse system is cooled to the ordinary temperature without addition of water it separates into two layers, and on keeping gives a sticky, viscous mass. The coagulum also disperses in a large volume of boiling soap-solution but is not dispersed by weak tannin solutions or by water. In boiling water threads of the coagulum are broken up into small pieces, which in time lose the greater part of their adsorbed tannin. The strength of the threads increases with progressive washing out of the tannin with cold water. Solvents which can remove the tannin from the coagulum without affecting the fibroin aid in the production of strong threads.

E. S. HEDGES.

Detection of damaged wool. W. SIEBER (Textilber., 1928, 9, 326–328).—Mechanical and chemical damage in wool may be detected by immersing the wool in a boiling 1% aqueous solution of benzopurpurin 10B for a few minutes, then washing with boiling water until no further colour is removed from the wool, and examining under a microscope; undamaged raw wool remains colourless, mechanically damaged portions become pink, and wool deteriorated by treatment with an alkali or acid becomes yellowish-pink to red and bluish-pink to red, respectively. The colour changes are more evident in ultra-violet light than in daylight.

A. J. HALL.

[Method for] distinguishing raw and bleached cotton fibres in yarns spun from mixtures of the same. W. SIEBER (Textilber., 1928, 9, 404–406). Bleached cotton is much more easily wetted than raw cotton; it also becomes pink when immersed in a cold solution of benzopurpurin, whereas raw cotton under similar conditions remains colourless. Raw cotton differs from bleached cotton in having a strong affinity for Victoria Blue B; a similar but less marked difference is shown towards Magenta and Malachite Green. The presence of raw cotton in a mixed yarn is detected by immersing the yarn (about 0.1 g.) for $\frac{1}{2}$ –1 min. in 10 c.c. of a boiling solution containing 3% (calc. on wt. of yarn) of Victoria Blue B, then washing with cold water, immersing for $\frac{1}{2}$ –1 min. in boiling water, washing in cold water, and drying; the raw fibres appear uniformly coloured, whereas the bleached fibres are but slightly stained, and the lumen remains uncoloured.

except in isolated places. It is suggested that this test may be helpful in determining the efficiency of a bleaching process and also in investigating the fine structure of plant fibres.

A. J. HALL.

Bemberg [cuprammonium] silk. TEDE (Textilber., 1928, 9, 230—232).—Bemberg silk is manufactured by forcing a cuprammonium solution of cellulose (prepared from cotton linters) through orifices, drawing (with stretching) the resulting filaments through water, treating with sulphuric acid, washing, and winding the silk in hank form; bleaching is not necessary when cotton is used as a raw material. Bemberg silk filaments have a denier not exceeding 1.25 and their cross-sections are circular, but not irregular as with viscose silk; it is softer and has a more silk-like lustre than viscose silk. Bemberg silk becomes deep blue and viscose silk red when dyed for 5 min. in a cold solution consisting of 20 c.c. of a 0.5% solution of eosin, 15 c.c. of pelican ink (No. 4001, G. Wagner), and 65 c.c. of water. Bemberg, viscose, Chardonnet, and cellulose acetate silk yarns of 100 denier have dry and wet strengths of 200 and 100, 150 and 45—50, 150 and 50—80, and 125 and 75, respectively. Commercial Bemberg silk is usually sized with oil, and this should be removed before dyeing by treatment in a liquor at 60° containing 5 g. of soap, 5 g. of ammonia, and 2% (calc. on wt. of silk) of Nekal AEM per litre. Turkey-red oil must not be used as an assistant in dyeing Bemberg silk since it promotes unevenness ("Finkenbildung"). The strong affinity which Bemberg silk has for basic dyes should be reduced by soaping the silk immediately after mordanting with tannic acid and tartar emetic preparatory to dyeing.

A. J. HALL.

Cellulose acetate and its solutions. I. Composition of cellulose acetate lacquer for aeroplane dope. K. ATSUKI and R. SHINODA. **II. Stability of cellulose acetate.** K. ATSUKI. **III. Stabiliser for cellulose acetate.** Y. TANAKA and K. ATSUKI. **IV. Acetylation of cellulose.** **V. Relation of temperature and time of ripening to viscosity of cellulose acetate.** K. ATSUKI and R. SHINODA (Rept. Aeronautical Res. Inst. Tokyo, 1928, 3, 49—68, 71—88, 91—100, 103—111, 115—123).—I. The examination of various mixed solvents for cellulose acetate by determinations of the solvent power, viscosity of the cellulose acetate solution, and the tensile strength and elongation of the film produced on drying, proves that that solvent which has the highest solvent power yields a solution of minimum viscosity and a film of maximum strength and elongation. Using the most common solvents, the optimum composition is acetone 60%, ethyl alcohol 15—17%, benzene 19—21%, benzyl alcohol or triacetin 1—2%, triphenyl phosphate 1—2%; and the optimum concentration of cellulose acetate is 7—9%. With acetone-ethyl alcohol mixtures minimum viscosity is obtained when the content of alcohol is about 17%; with acetone-benzene mixtures the optimum point is at 20% of benzene; whilst with acetone-alcohol-benzene mixtures it is at 10% of alcohol and 30% of benzene. Addition of triacetin, benzyl alcohol, and triphenyl phosphate tends to increase the viscosity of solvent and solution, and the solvent power. Solutions

containing more than 8% of cellulose acetate show appreciable plasticity.

II. Spontaneous decomposition of cellulose acetate is accelerated by sulphuric acid, which may be present in the incompletely purified product in the free state, as an adsorption compound, or as a cellulose ester, since it is used as a catalyst in the acetylating bath. The amount of sulphuric acid retained decreases as the ripening of the cellulose acetate proceeds, owing to hydrolysis of the sulphuric ester and the more ready diffusion of acid through the material. Details are given for four suggested stability tests for cellulose acetate, viz: 100° heat test, decomposition and carbonisation temperature determinations, and an acetic acid evolution test.

III. Owing to the presence in cellulose acetate of traces of cellulose sulphuric esters, it is desirable to add a stabiliser such as calcium naphthenate. This stabiliser reacts with the sulphuric esters present yielding naphthenic acid, which, like the calcium salt, is a gelatiniser and improves the mechanical properties of the cellulose acetate film. The amount of stabiliser required is usually 1—2%.

IV. On acetylation the cellulose fibre at first swells uniformly, and then locally. The swollen parts gradually disperse into the bath, and the residual short fibres slowly disappear. The triacetate is formed directly without intermediate formation of a mono- or di-acetylated product. If the acetylation is prolonged, the acetic acid content of the ester falls to a minimum and then increases. The most uniform material is obtained by continuing the acetylation until the solubility in acetone is a minimum. The velocity of acetylation is doubled by a rise of 10° between 30° and 50°, but above 50° a rise of over 20° is required to produce the same effect, since decomposition of the cellulose disturbs the relation between velocity increase and temperature.

V. The degree of ripening of cellulose acetate may be followed by determinations of viscosity, which varies with the time and temperature of ripening. The experimental results obtained may be expressed by the equation $T = ae^{kz}$, where T is the temperature, z the time of ripening required to obtain a given viscosity, and a and k are constants; but as the viscosity decreases the temperature range through which this formula holds also decreases.

W. J. POWELL.

Cellulose ester solvents. H. WOLFF [with G. ZEIDLER and W. TOELDT] (Farben-Ztg., 1928, 33, 2228—2232, 2301—2304).—In dealing with cellulose ester solvents in connexion with lacquer manufacture, considerable misapprehension has been caused by confusing "solvent power" of a solvent with the more important factor of "power to withstand dilution by non-solvents without precipitation of the nitrocellulose." This dilution factor should be correlated with a definite end-concentration of nitrocellulose in the solution, results being obtained indirectly by graphical methods exemplified in the present communication by the behaviour of solvents of the glycol type with respect to various diluents and qualities of nitrocellulose. In this respect as well as in considering viscosity of solution and rate of evaporation of solvent, it is shown

that the influence of non-solvent and of concentration of solution must be taken into account if results of any practical value in lacquer technology are sought. The relative softening effect of solvents on oil undercoats is also discussed.
S. S. WOOLF.

Lignin. R. WIGGINTON (Fuel, 1928, 7, 268—272).—An account is given of recent work on the chemistry of lignin; Kürschner's investigations are described in some detail.
A. B. MANNING.

Cellulose in peat. HESS and KOMAREVSKY.—See II.

PATENTS.

Carroting or preparation of hair for making it capable of being fulled or felted. E. BÖHM (B.P. 285,028, 21.1.28. Austr., 9.2.27).—Hair is treated in a neutral or acid solution containing hydrogen peroxide and a salt, not of mercury, which is capable of acting as an oxygen conveyor to the hair. Suitable substances are the water-soluble salts of iron, nickel, cobalt, lead, zirconium, bismuth, manganese, cadmium, cerium, copper, chromium, molybdenum, aluminium, and tungsten. *E.g.*, the hair of skins is wetted with a solution containing 6—10% of hydrogen peroxide (or 5—10% of nitric acid and 2—5% of hydrogen peroxide) and 1—2% of an oxygen carrier, then dried at 70—100°, and subjected to the usual after-treatments.
A. J. HALL.

Chlorination of hair and wool and of articles made therefrom. E. BÖHM (B.P. 281,646, 24.11.27. Austr., 1.12.26).—Chlorination is effected by nascent chlorine produced in predetermined quantity, if desired by the action of oxidising agents on a solution containing a chloride and an acid.
D. J. NORMAN.

Treatment of cotton fabric. L. LILLENFELD, Assee. of H. I. HUEY (B.P. 274,860, 18.7.27. U.S., 20.7.26).—A wool-like character is imparted to cotton fabric by treating the bleached or unbleached material under conditions which allow free shrinkage in both directions first with carbon disulphide (gaseous, liquid, or in solution in, *e.g.*, benzene) and then with caustic alkali solution of not less than 12% strength. Alternatively, an emulsion of 12—20% caustic alkali solution with about 30% of carbon disulphide may be used. After a suitable time, which may vary from a few minutes to several hours, the fabric is washed with water, optionally after treatment with a dilute acid solution, and dried.
D. J. NORMAN.

Treatment of yarns and fabrics. OBERRHEINISCHE HANDELSGES. M.B.H. (B.P. 266,367, 17.2.27. Ger., 17.2.26).—Yarns or fabrics of cotton, wool, artificial silk, etc. show increased strength and softness and a reduced gloss and thermal conductivity if they are treated in a wet or dry condition with, *e.g.*, kieselguhr, silica gel, chalk, etc. preferably in the presence of soap solutions, oils, etc.
D. J. NORMAN.

Cellulose derivatives for use in the manufacture of artificial textile threads, plastic and like products. SOC. LYONNAISE DE SOIE ARTIFICIELLE, and P. CHEVALET (B.P. 266,300, 10.1.27. Fr., 22.2.26).—Acetoformates of hydrocellulose are prepared by treating cellulose at a low temperature first with formic acid in admixture with less than 50% by wt. of sulphuric

acid (*d* 1.842), and then with acetic acid mixed with more than twice its weight of sulphuric acid. When the desired degree of esterification has been attained, the product is precipitated in water or alcohol. The resulting ester has all the plastic qualities of cellulose acetates, and is soluble in formic acid up to a dilution of 40%, formaldehyde and its polymerides and derivatives, pyridine, and ureas, cyanates, thiocyanates, calcium chloride, etc. The strength of threads or films made from these esters can be considerably increased by soaking them in a bath of 10% ammonium carbonate solution.
D. J. NORMAN.

Manufacture or treatment of cellulose esters. BRIT. CELANESE, LTD. (B.P. 273,743, 1.7.27. U.S., 2.7.26).—The viscosity of cellulose esters can be reduced by treating the ester in suspension or solution with hydrogen peroxide and an iron salt, *e.g.*, ferrous acetate. In the case of cellulose acetate acetylation may be effected in an iron vessel, or iron salts may be added to the acetylating mixture, the hydrogen peroxide being subsequently added when acetylation is complete.
D. J. NORMAN.

Manufacture of cellulose esters and conversion products therefrom. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,973, 8.2.27).—A halogen derivative of sulphurous acid, *e.g.*, thionyl chloride, and a heavy-metal salt which would of itself act as a catalyst are used conjointly as the catalytic agent in the esterification of cellulose. *E.g.*, 25 pts. of cotton cellulose can be completely acetylated in about 6 hrs. by using a mixture containing, by wt., 75 pts. of acetic anhydride, 100 pts. of glacial acetic acid, 0.25 pt. of zinc chloride or cuprous chloride, and 1.4 pts. of thionyl chloride at 65°.
D. J. NORMAN.

Manufacture of artificial [silk] filaments. O. SILBERRAD (B.P. 289,233, 23.3.27).—In the manufacture of artificial silk by the dry-spinning process the difficulties arising from the inrush of air at the point where the filaments leave the spinning chamber may be obviated by the provision of a liquid seal.
D. J. NORMAN.

Manufacture of artificial silk. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 289,942, 2.2.27).—Cuprammonium artificial silk, particularly that produced by stretch-spinning, shows increased strength and elasticity if free carbon dioxide or a bicarbonate, *e.g.*, 2 g./litre of sodium bicarbonate, be added to the water into which the filaments are spun. The use of carbon dioxide in the spinning water also minimises the deposition of copper salts on the walls of the spinning funnel.
D. J. NORMAN.

Conversion of carbohydrates. R. A. KOCHER (U.S.P. 1,670,727, 22.5.28. Appl., 5.2.20. Renewed 21.3.25).—Cellulosic material is mixed with hydrochloric acid in one container, and this mixture is then transferred to a second container where it is treated with gaseous hydrochloric acid under pressure. The product is transferred to a third container and heated, the hydrochloric acid from this operation being led back for the treatment of a further quantity of raw material. Access of air is avoided throughout.
D. J. NORMAN.

Stencil sheets. S. HORII (B.P. 289,511, 24.1.27).—Alcohols derived from oils and waxes of marine animals,

e.g., oleyl and selachyl alcohol (from sperm oil) and cetyl alcohol, are incorporated with esters of polysaccharides in the manufacture of stencil sheets by the process of B.P. 250,798 (B., 1926, 534). D. J. NORMAN.

Recovery of the paste, and in particular wood pulp, from printed paper by the removal of the ink therefrom. L. GRENAUDIER (B.P. 279,516 and Addn. B.P. 282,829, [A] 25.10. and [B] 30.12.27. Fr., [A] 25.10. and [B] 30.12.26).—(A) The paper is shredded and agitated with a boiling 0.1% soap solution until the scum, which must be removed as fast as it is formed, becomes almost white. After rinsing with water, the material is opened up in a beater and the resulting pulp agitated with a boiling alkaline solution, preferably sodium carbonate solution (1:1000). Meanwhile the mixture is stirred, skimmed, and gradually diluted with hot water so that on completion of the process, as indicated by the scum becoming white, the dilution is 1:1500. The pulp is then washed with water and, if necessary, lightly bleached. (B) The pulp is agitated with boiling dilute sodium carbonate (1:800), and suitable reagents, *e.g.*, metal salts or acids, are added to promote scum formation. If desired, the alkaline solution may contain soaps, printing ink solvents, products, such as gelatin, glucose, etc., which favour the formation and separation of scum, loading agents, or bleaching agents.

D. J. NORMAN.

Preparation of modified cellulose for use in the manufacture of cellulose acetate. M. CUSIN, P. A. A. CHEVALET, and SOC. LYONNAISE DE SOIE ARTIFICIELLE (U.S.P. 1,671,513, 29.5.28. Appl., 7.1.27. Fr., 11.1.26).—See B.P. 264,181; B., 1928, 258.

Manufacture of artificial silk or the like. J. L. RUSHTON (U.S.P. 1,671,785, 29.5.28. Appl., 22.9.26. U.K., 29.10.25).—See B.P. 264,929; B., 1927, 248.

Manufacture of artificial threads etc. C. F. TOPHAM, Assr. to COURTAULDS, LTD. (U.S.P. 1,671,878, 29.5.28. Appl., 30.7.27. U.K., 11.10.26).—See B.P., 278,881; B., 1927, 935.

Production of proofed paper. SCUTAN Co. (B.P. 281,316, 24.11.27. U.S., 26.11.26).—See U.S.P. 1,667,691; B., 1928, 444.

Products from carbohydrates (B.P. 290,377).—See III.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Primary action of chromic acid on wool fibre. M. ILJINSKY and D. KODNER (Z. angew. Chem., 1928, 41, 283—285).—Wool fibre absorbs chromic acid from solution, even in presence of mineral acids, to form a complex in which the wool substance acts as a base, combining with about 10% of chromic acid. This is about the equivalent quantity on the assumption that the molecule contains two basic (NH₂) groups. The complex is stable towards water.

S. I. LEVY.

Indigo losses in the indigo-vat. M. TSCHILIKIN (Textilber., 1928, 9, 318—322).—Indigo losses of 4.38 and 7.17% were observed when air free from carbon dioxide was bubbled through a caustic soda-hyposulphite indigo vat maintained at 45° for ½ and 3½ hrs., respectively, these losses differing considerably from

those previously observed. Under similar conditions the loss of thioindigo was 10.97—12.84%. Hydrogen peroxide is formed when air is passed through an indigo vat, and the resulting loss of indigo is due to the action of the hydrogen peroxide on the keto- (not the enolic) form of the indigo-white present, whereby equimolecular quantities of isatin and dioxindole are first formed, the last-named substance being then further oxidised to isatin. The loss of indigo due to the formation of isatin is thus dependent on the relative proportions of the enolic and keto-forms of the indigo-white present. The formation of isatin is not due to the oxidising action of hydrogen peroxide on indigo, or dehydroindigo, or by intermediate formation of indoxyl by excessive reduction as suggested by Crowther (B., 1911, 799).

A. J. HALL.

Raw and bleached cotton fibres. SIEBER. Bemberg silk. TEDE.—See V.

PATENTS.

Dyeing of pelts, hairs, feathers, etc. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 290,126, 30.11.27).—The pelts, hairs, feathers, etc., with or without mordanting, are treated with a *p*-aminophenyl-naphthylamine salt, which is then oxidised. *p*-Aminophenyl-β-naphthylamine gives a blue-green, or with a copper mordant a black-blue; the α-isomeride produces red-violet to corinth shades. Other examples are 2-*p*-aminoanilino-6-naphthol (grey), 2:6-bis-*p*-aminoanilinonaphthalene (greenish-grey), 1:5- or 2:7-isomeride (violet-grey), 1-*p*-aminoanilino-5-naphthol (blue-violet), 2:7-isomeride (blue-violet). The phenyl group may carry an alkyl or halogen substituent.

C. HOLLINS.

Dyeing of fabrics containing previously immunised cotton fibres mixed with other fibres. SOC. ANON. DES ÉTABL. PETITDIDIER [ANC. MAISON JOLLY-BELIN] (B.P. 268,327, 15.3.27. Fr., 29.3.26).—The process of B.P. 261,399 (B., 1928, 365) is applied to the dyeing of fabrics composed substantially of immunised cotton.

C. HOLLINS.

Dyeing of esters and ethers of cellulose and its conversion products. W. CARMAEL. From I. G. FARBENIND. A.-G. (B.P. 290,720, 16.2.27).—Acetate silk (etc.) is dyed from a neutral or weakly acid bath with azo dyes of the type: dinitroaminophenol → aminonaphthol. Examples are: 4:6-dinitro-*o*-aminophenol with 1:8-aminonaphthol (a water-soluble black dye), or with 1:6-, 2:8-, and 1:5-aminonaphthols for brown shades, intensified by diazotisation on the fibre and development; 2:4-dinitro-6-amino- and 1:7-aminonaphthol for a violet-brown dyeing which may be diazotised and developed with β-naphthol (brown-black), ethyl-β-naphthylamine (green), or 2:4-tolylene-diamine (brown).

C. HOLLINS.

Production of fast tints on cellulose esters or ethers. SOC. CHEM. IND. IN BASLE (B.P. 281,704, 2.12.27. Switz., 4.12.26).—Acetate silk is dyed with a diaminoazo dye (*e.g.*, hydrolysed *p*-aminoacetanilide → cresidine) in presence of a dispersing agent, and then diazotised and developed in weak acid medium with 2:3-hydroxynaphthoic acid (deep black) or β-naphthol

(deep black). Navy-blue shades are obtained by using less diaminoazo compound. C. HOLLINS.

Wetting and degreasing agents [for textiles]. G. ZIMMERLI (U.S.P. 1,672,292, 5.6.28. Appl., 15.6.25. Switz., 27.6.24).—See B.P. 236,209; B., 1926, 404.

Apparatus for printing fabrics in several colours. M. RATIGNIER (B.P. 277,320, 30.8.27. Fr., 11.9.26).

Vat dye (B.P. 289,103). Soluble vat dye (B.P. 290,690).—See IV.

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

Ammonia synthesis with catalysts obtained from complex cyanides of iron. A. MITTASCH and E. KUSS (Z. Elektrochem., 1928, 34, 159—170).—In a catalyst prepared from potassium aluminium ferrocyanide the presence of free iron, iron carbide and nitride, free carbon, and aluminium carbide, nitride, and oxide was established. By a characterisation of the ferromagnetic portion of the catalyst it is shown that the free iron is present as α -iron. The active catalyst is free iron and not iron carbide; the presence of the latter even after prolonged use may be due to the attack of the surface of carbide particles by hydrogen, yielding a protective coating of iron. The complex cyanides in producing the catalyst may either be reduced or pass through a series of decompositions giving: $\text{Fe}(\text{CN})_2 \rightarrow$ "carbide X" + N_2 + iron nitride; "carbide X" \rightarrow Fe + C and $\text{Fe}_3\text{C} + \text{C}$. Thus the formation of Fe_3C without simultaneous production of metallic iron cannot take place. H. INGLESON.

Determination of ammonia. K. TÄUFEL and C. WAGNER (Z. angew. Chem., 1928, 41, 285—287).—The details of manipulation and of the precautions to be taken in the determination of small quantities of ammonia, in presence of nitrogenous materials readily decomposed with formation of ammonia, are discussed for the methods of blowing through large quantities of air and of distilling with excess of magnesium oxide. In the latter method low results are obtained if the solution to be distilled contains a high proportion of magnesium salts. S. I. LEVY.

Plasticity measurements on milk of magnesia. S. ARZOOMANIAN (J. Amer. Pharm. Assoc., 1928, 17, 443—449).—Data and results from plasticity measurements on milk of magnesia are submitted as a practical application of the burette consistometer (cf. Herschel and Bulkley, B., 1927, 127). No definite empirical relationships between yield value or mobility or the settling or assay of a milk were found. The penetrativity method indicated that milk of magnesia is a plastic with a low yield value and high mobility. Flow-pressure curves are given and the average pressure, surface tension, and kinetic energy corrections are discussed. E. H. SHARPLES.

Comparison of the methods of determining potassium ferrocyanide. P. P. BUDNIKOV (Z. anal. Chem., 1928, 73, 433—438).—Volumetric determination of ferrocyanide by precipitation with solutions of zinc or silver salts gives erratic results due to the difficulty of ascertaining the end-point, the iodometric method

gives high results and is influenced by a time factor, and the gravimetric methods are too tedious for technical purposes. Accurate results are obtained by titration with permanganate provided that the ferrocyanide solution is more dilute than 0.05N. A. R. POWELL.

Evolution of acetylene from calcium carbide by the action of water, hydrogen sulphide, and hydrogen chloride, in the liquid and gaseous conditions. E. BIESALSKI and H. VAN ECK (Z. angew. Chem., 1928, 41, 278—282).—The extent of the gas evolution depends on the extent to which the reacting vapour is absorbed by the carbide, and on the degree to which the solid products formed protect the remaining carbide from further attack. Dry steam decomposes 20% of the carbide present in 2 hrs. at 130°; at 450° there is no attack. This is due to the formation of carbon by dissociation of acetylene, the carbon protecting the carbide from further attack. Hydrogen sulphide and chloride both react exceedingly slowly in the gaseous state; even the liquefied gases react very slowly, since in both cases the solid products protect the carbide from further attack. S. I. LEVY.

Acetic acid and its derivatives. TERLINCK.—See III. **Analysis of phosphate rock.** REYNOLDS and others, also JACOB and REYNOLDS.—See XVI.

PATENTS.

Manufacture of chromic acid in a solid form soluble in water. R. SCHUSTER (B.P. 291,249, 23.6.27).—A mixture of chromium trioxide or sodium or potassium dichromate, sulphuric acid, sodium and/or potassium silicate, and water is concentrated until a test portion sets to a crystalline mass on cooling. L. A. COLES.

Production of compounds of nitrogen and oxygen from ammonia. N. CARO and A. R. FRANK (B.P. 274,099, 7.7.27. Ger., 8.7.26).—Gaseous mixtures of ammonia and air or oxygen, together with hydrogen, are subjected to catalytic combustion under pressure according to the method described in B.P. 273,718 (B., 1928, 402). W. G. CAREY.

Manufacture of ammonia. SOC. D'ÉTUDES MINIÈRES & INDUSTRIELLES (B.P. 274,023, 14.1.27. Fr., 6.7.26. Addn. to B.P. 253,540; B., 1927, 218).—Alkali or alkaline-earth halides, oxyhalides, oxides, ferrocyanides, or ferricyanides, separately or in mixture, are used instead of alumina, magnesia, or lime, thus lowering the reaction temperature to 380—450°. The lithium amide employed has the formula Li_3NH_2 . W. G. CAREY.

Apparatus for use in the manufacture of alkali and alkaline-earth hydroxides. W. CARMÆL. From I. G. FARBENIND. A.-G. (B.P. 290,719, 16.2.27).—Amalgams of alkalis or alkaline earths are stirred or propelled in water by means of charcoal, coke, or graphite stirrers or scoop wheels, or such carbonaceous material mixed with an alloy chiefly containing iron, chromium, or nickel. W. G. CAREY.

Recovery of sodium nitrate. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 290,860, 21.7.27).—Sodium nitrate is recovered from solution, e.g., that obtained in the treatment of caliche, by adding sodium

sulphate to form with the nitrate a double salt sparingly soluble at ordinary temperature, separating the double salt, and heating it at above 70° with just sufficient water or dilute nitrate solution to dissolve the sodium nitrate and leave the sodium sulphate. W. G. CAREY.

Manufacture of alkali iodates. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 290,749, 22.2.27).—Oxygen is caused to react on (a) a melt of 3 pts. of caustic alkali and 1 pt. of alkali iodide at 400° and 5–15 atm., or (b) well-stirred alkali iodide at above 400° and 100 atm., or (c) a solution of alkali iodide above 100° and 1 atm. in presence of a catalyst providing hydroxyl ions, *e.g.*, caustic soda or caustic potash lye.

W. G. CAREY.

Preparation of ammonium sulphate. S. ROBSON (B.P. 289,950, 3.2.27).—Ammonia, sulphur trioxide direct from the contact plant, and water are allowed to react together in the form of vapour or mist, and the resulting ammonium sulphate is collected in settling chambers and in a bag-filtration plant. The ammonia and sulphur trioxide may be mixed together in a reaction chamber and combination brought about by the introduction of steam or a fine spray of water, or either of the gases may be introduced together with moisture into an atmosphere of the other.

A. R. POWELL.

Electrolytic manufacture of compounds containing active oxygen. W. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 290,750, 22.2.27).—Per-compounds are produced simultaneously at the anode and cathode of an electrolytic cell. For example, ammonium persulphate is produced in the anode chamber and hydrogen peroxide in the cathode chamber by using saturated ammonium sulphate in the anode chamber separated by a porous diaphragm from 0.5% sulphuric acid through which a vigorous stream of oxygen is passed in the cathode chamber. Platinum anodes and amalgamated gold cathodes are used. Percarbonate and perborate can also be produced simultaneously.

W. G. CAREY.

Production of manganese peroxide and other manganese oxides from manganese-containing ores and substances. K. E. DITTMANN, K. FAERBER, and GELSENKIRCHENER BERGWERKS A.-G. (B.P. 290,491, 10.9.27).—The material containing manganese is decomposed in a fine dispersive form with dilute sulphurous acid, the resulting manganese sulphate lye is separated, evaporated, and the sulphate roasted with coke and sintered with the admission of air. The processes are conducted in closed vessels to recover the sulphurous acid for use again in the process.

W. G. CAREY.

Catalysts for the catalytic production of methyl alcohol and other oxygenated organic compounds from oxides of carbon and hydrogen. SYNTHETIC AMMONIA & NITRATES, LTD., and R. G. FRANKLIN (B.P. 290,399, 15.11.26).—A mixed zinc-chromium catalyst is prepared by boiling zinc carbonate (precipitated alone or on a carrier) with a solution of chromic acid or its salts. The ratio Zn:Cr in the product is about 9:1 and may be adjusted by washing. If zinc chromate is the chromate used the product is dried in hydrogen or reducing gases.

C. HOLLINS.

Separation of tin and arsenic compounds. W. T. LITTLE (U.S.P. 1,670,307, 22.5.28. Appl., 27.11.25).—A mixture of sodium stannate and arsenate is leached with a liquid sufficiently hot to melt the sodium arsenate.

H. ROYAL-DAWSON.

Manufacture of organometallic compounds [lead and tin tetra-alkyls]. C. ARNOLD. From STANDARD DEVELOPMENT Co. (B.P. 290,444, 21.5.27).—Sodium-lead is treated with ethyl chloride or bromide in a hydrocarbon solvent (naphtha) in a rotating autoclave at 40–70° and finally at 100°; lead tetraethyl is isolated in the usual manner. The process is applicable to the preparation of other lead alkyls and tin alkyls.

C. HOLLINS.

Production of hydrogen from methane hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 291,244, 18.6.27).—Mixtures of methane etc. with steam are passed successively over a catalyst and material capable of absorbing the carbon dioxide formed, *e.g.*, calcium or cerous oxide, at a temperature sufficiently high to prevent condensation of water, the process being repeated if necessary. The oxide is subsequently regenerated by heating the carbonate.

L. A. COLES.

Manufacture of carbon dioxide. P. E. HAYNES (B.P. 277,938, 15.7.27. U.S., 27.9.26).—Limestone is calcined and the carbon dioxide is drawn over limestone subsequently to be calcined to preheat it. Steam which has already operated a compressor for condensing and solidifying the carbon dioxide passes in counter-current to the quicklime formed, hydrating and cooling it, while the excess steam reduces the dissociation temperature of the limestone and takes up the sensible heat and the heat of hydration of the lime to preheat further limestone.

W. G. CAREY.

Catalytic oxidation of sulphur dioxide. H. G. C. FAIRWEATHER. From SELDEN Co. (B.P. 290,316, 4.1.27).—The catalyst comprises an artificial zeolite containing the pentoxides of phosphorus, arsenic, or vanadium, the trioxides of chromium, molybdenum, or tungsten, or manganese heptoxide or dioxide in a non-exchangeable form, together with a catalytically active base, other than vanadium, in an exchangeable form. The catalyst may be diluted with a porous siliceous material, *e.g.*, kieselguhr, or may be coated on to massive granular fragments of ferro-alloys, quartz, ilmenite, or metal oxides. These catalysts are not affected by substances which poison platinum.

A. R. POWELL.

Production of sulphur dioxide-containing gas currents for the manufacture of sulphuric acid. R. VON ZELEWSKI (B.P. 277,382, 13.9.27. Ger., 13.9.26).—The gas mixtures are produced by passing air under pressure downwards through the grate of Dwight-Lloyd or similar apparatus for roasting sulphide ores etc., and are passed directly into the Glover tower without cooling.

L. A. COLES.

Manufacture of phosphorus, phosphoric acid, and hydrogen. COMP. NAT. MAT. COL. & MANUF. PROD. CHIM. DU NORD RÉUNIES, ÉTABL. KUHLMANN (B.P. 286,290, 20.1.28. Fr., 3.3.27).—The condensate from a phosphate reducing furnace is treated with superheated steam at ordinary or reduced pressure

and below the b.p. of phosphorus in a container suitably heated. The latter may be used for cooling and condensing the vapours passing from the furnace to the condenser, the phosphorus being condensed or the vapour used direct to prepare phosphoric acid and hydrogen. W. G. CAREY.

Preparation of catalytic materials [for synthesis of ammonia]. G. CLAUDE, Assr. to LAZOTE, INC. (U.S.P. 1,671,345, 29.5.28. Appl., 21.10.20. Fr., 28.10.19).—See B.P. 153,254; B., 1922, 215 A.

Production of iron-free alumina. H. SPECKETER, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,672,788, 5.6.28. Appl., 17.9.25. Ger., 13.10.24).—See B.P. 241,184; B., 1926, 51.

Catalytic oxidation of sulphur dioxide. H. G. C. FAIRWEATHER. From SELDEN Co. (B.P. 290,089, 14.9.27).—See U.S.P. 1,660,511; B., 1928, 320.

Evaporation of liquids (B.P. 289,116).—See I. Ammonium phosphate (B.P. 290,518). Fertilisers (B.P. 282,330, 283,908, and 280,226).—See XVI.

VIII.—GLASS; CERAMICS.

Danger to health of antimonial enamels. B. REWALD (Z. angew. Chem., 1928, 41, 287—288).—A criticism of the conclusions of FLURY (B., 1927, 877). Stress is laid on the innocuous character of sodium metantimonate and compounds of quinquevalent antimony generally. In a rejoinder FLURY points out that compounds of quinquevalent antimony may be reduced in the actual process of manufacture of the enamel, and that enamels made from such compounds have in fact been shown to yield salts of trivalent antimony to acid solutions. S. I. LEVY.

Standards Report of the American Ceramic Society (J. Amer. Ceram. Soc., 1928, 11, 334—534).—Definitions, methods of analysis, testing apparatus, standard specifications, etc. are discussed.

PATENTS.

Manufacture of fused silica. QUARTZ & SILICE (B.P. 283,148, 23.12.27. Fr., 5.1.27).—Silica containing no carbon or free silicon is obtained by moistening sand etc. with about 2% of water before it is charged into the melting furnace. L. A. COLES.

Melting of enamels, frits, and glazes. T. J. VOLKKOMMER (B.P. 280,895, 2.11.27).—A rotary furnace for melting enamels etc. in which the geometric axis is inclined to the axis of rotation is provided with a tapping hole at one of the lowest points of the drum which can be reached during the rotation, and with a charging opening arranged axially with respect to the rotation, which also serves as an outlet for the furnace gases. The furnace is mounted on a travelling frame on which it can be transported from the furnace to the charging apparatus. L. A. COLES.

Manufacture of refractory articles of clay. J. HOCHHUT (B.P. 291,305, 12.12.27).—A mixture of clay and "shortening" material moistened with sufficient water to produce a loose coherent mass, with or without the addition of a little oil, preferably formed by mixing the whole of the water with the shortening material

and subsequently incorporating the clay, is introduced in small portions into an open mould, each portion being stamped down before adding the next. The moulded article, containing about 8.8% of water, is dried and fired in the usual way. L. A. COLES.

Kilns for burning clay products, glazed ware, and pottery. H. WEBSTER (U.S.P. 1,671,559, 29.5.28. Appl., 15.10.26. U.K., 17.10.25).—See B.P. 269,344; B., 1927, 524.

IX.—BUILDING MATERIALS.

PATENTS.

Employment of cement and the like. G. N. WHITE, E. G. BECKETT, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 290,309, 10.11.26 and 12.9.27).—The formation of incrustations on the surface of cement and concrete is prevented by the addition to the cement of commercial ammonium carbonate in such quantity that at least 5%, calculated on the weight of the dry cement, remains unattacked by the constituents of the cement. The ammonium carbonate is preferably incorporated as a saturated solution after the cement has been gauged with water. Mineral pigments or vat dyes, e.g., Caledon brilliant purple RR, Caledon red BN, or Caledon blue RC, may also be incorporated with the mixture. Cement washes may contain 25—50% of ammonium carbonate or the cement may be brushed with saturated ammonium carbonate solution immediately after application. L. A. COLES.

Manufacture of cement. E. C. R. MARKS. From INTERNAT. CEMENT CORP. (B.P. 290,890, 26.9.27).—Volume-constant Portland cement of improved tensile strength is obtained by subjecting normal cement clinker to one or more burning operations after it has been ground and mixed with lime, calcium carbonate, etc., in quantity not exceeding that required for the formation of tricalcium silicate, and, if desired, gypsum. L. A. COLES.

Manufacture of finishing lime. E. O. SCHNELL (U.S.P. 1,670,425, 22.5.28. Appl., 1.2.26).—In making a highly plastic finishing lime, burned limestone is pulverised, hydrated with an emulsion of colloidal clay and earth in water, and to the cooled product is added a further amount of the colloidal mixture in a dry state. H. ROYAL-DAWSON.

Paving materials. F. RASCHIG (Dr. F. RASCHIG) (B.P. 291,276, 20.10.27).—A hard, lumpy material which emulsifies readily with water is prepared by adding molten pitch etc. to a mixture of clay with sufficient water to form an emulsion, e.g., about equal pts. by wt., at 40—50°, and allowing the product to cool. Fillers may also be added. L. A. COLES.

Manufacture of asphaltic material [for roads]. J. D. FORRESTER, Assr. to P. J. McINERNEY (U.S.P. 1,671,070, 22.5.28. Appl., 26.6.25).—To crushed stone aggregate, previously dried, is added, while still hot, a light oil, the flash point of which is above the drying temperature; the mixture is finally incorporated with an asphaltic binder. H. ROYAL-DAWSON.

Production of road-surfacing material. F. W. VALLÉ-JONES (B.P. 290,323, 10.1.27).

Manufacture of material for road surfaces, floors, etc. F. CARL and C. RIEDEL (B.P. 279,093, 13.10.27. Ger., 15.10.26).

Mixture for use in the construction of cold asphalt road pavements. A. C. BROWN (B.P. 290,725, 17.2.27).

Manufacture of building slabs or panels. S. TCHAYEFF (B.P. 290,827, 17.5.27).

Feeding of muddy material into rotary [cement] kilns and the like. J. S. FASTING (B.P. 284,276, 7.11.27. Denm., 27.1.27).

Preservation of wood. B. R. V. MALENKOVIC (B.P. 263,173, 16.12.26. U.S., 16.12.25).—See U.S.P. 1,656,863; B., 1928, 266.

Preservation of stone, wood, etc. (B.P. 290,331).—See XIII.

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

Effect of phosphorus and sulphur in steel. Effect of sulphur on plate material. G. K. BURGESS and others (Proc. Amer. Soc. Testing Materials, 1927, 27, i, 135—138).—Results of tensile, shear, and bend tests are not systematically related to the sulphur content (up to 0.077%). CHEMICAL ABSTRACTS.

Grain growth in low-carbon steel. H. L. PUBLOW and L. J. WALDRON (Mich. Eng. Exp. Sta. Bull., 1927, No. 9, 30 pp.).—The crystallisation of steel is described by reference to the equilibrium diagram. Samples of steel (0.2% C) of various grain sizes, when heated at 1010° for 1—4 hrs. and slowly cooled, exhibited the same grain size. CHEMICAL ABSTRACTS.

Grain formation in low-carbon steel within the critical range. H. L. PUBLOW and L. J. WALDRON (Mich. Eng. Exp. Sta. Bull., 1927, No. 14, 27 pp.).—Low-carbon steels were normalised at 1010°, then reheated to various temperatures, and slowly cooled. A decrease in grain size was observed with those heated at 832—927°. The changes are discussed in detail. CHEMICAL ABSTRACTS.

Potentiometric analysis of the hardening elements in special steels. II. Determination of chromium and vanadium in iron alloys and superior steels. E. ZINTL and P. ZAIMIS (Z. angew. Chem., 1928, 41, 543—546; cf. B., 1927, 939).—In the determination of chromium and vanadium by the authors' potentiometric method, the presence of iron is not essential. Small quantities of manganese must, however, be present. Tungsten interferes with the determination of vanadium, but not in the presence of phosphoric acid. The sample taken for analysis (0.5—5 g., depending on the chromium and vanadium content) is fused with 6—10 times its own weight of sodium peroxide and, after cooling, extracted with 2*N*-sodium hydroxide. A few c.c. of hydrogen peroxide are added to decompose manganate and ferrate, and the whole is boiled. After filtration, the filtrate, which contains the whole of the chromium, vanadium, molybdenum, and tungsten as chromate, vanadate, molybdate, and tungstate, respectively, is diluted to an appropriate volume. A suitable aliquot is acidified with 100 c.c. of

1 : 1 (vol.) sulphuric acid, 2—3 c.c. of a dilute manganese sulphate solution (120 mg. of crystals/litre) are added, and after dilution to 200 c.c. the titration is effected as described. If tungsten is present, the aliquot is treated with 30 c.c. of phosphoric acid (*d* 1.74) before the addition of the sulphuric acid. The catalytic effect of the small amount of manganese is discussed.

J. S. CARTER.

Development of some fundamentals in the ferric sulphate-sulphuric acid process [for copper ore]. F. S. WARTMAN and H. E. KEYES (U.S. Bur. Mines Rep. Invest., 1927, [2839], 11 pp.).—A study of the oxidation stage of the process of making mixed solutions of ferric sulphate and sulphuric acid suitable for leaching certain low-grade copper ores. CHEMICAL ABSTRACTS.

Dependence of the elastic coefficient of extension (α) of copper on the previous [heat and mechanical] treatment. W. KUNTZE (Z. Metallk., 1928, 20, 145—150).—The coefficient of extension, α , is the reciprocal of the modulus of elasticity, *i.e.*, the increase in unit length caused by unit load. In copper test-pieces that have just previously been subjected to plastic deformation, the value of α is subject to hysteresis with loads up to $\frac{1}{4}$ — $\frac{1}{3}$ of the limit of proportionality in the ordinary tensile test, but increases linearly with the load. With greater loads the value of α increases at a greater rate. The effect of drawing on this value is to cause a rapid increase up to a 3% reduction in area, and then a steady decrease. Tempering at low temperatures to remove internal stress decreases α , and severely drawn and tempered wires give a lower value for α than annealed wires. Storing at the ordinary temperature for long periods has the same effect on α as a low-temperature tempering. A. R. POWELL.

Season-cracking of small-arms cartridge cases [in India] during manufacture. F. S. GRIMSTON (Inst. Metals, March, 1928. Advance copy, 24 pp.).—Bursting of cartridge cases when fired is due to the season-cracking of the brass case during the drawing or after-processes of manufacture. Variation in temperatures of annealing, strength of lubricant on the drawing machines, or contact with soapsuds during storage did not cause cracking, which made its appearance, however, if the cases were stored in contact with even extremely dilute sulphuric acid. More severe internal stresses are caused by a die of conical form than by a bell-shaped die, and cartridge cases formed in a conical die were more prone to season-cracking, a defect which is accelerated also by hot moist climates such as prevail in India during the monsoon. C. A. KING.

Concentration of Britannia ores. H. A. PEARSE (Trans. Canad. Inst. Min. and Met., 1927, 30, 915—928).—The ore consists of a mixture of chalcopyrite and iron pyrites in a hard quartz-porphyrty gangue. The constituents being relatively coarse are readily freed from one another by grinding to 60-mesh. During the coarse-grinding stages in gyratory crushers and rolls the slime and fine ore are periodically washed out through screens in order to remove soluble salts which interfere with the subsequent flotation. The final grinding is effected in wet ball-mills using a pulp containing 6.5% of solids, and the discharge after addition of a small

quantity of lime passes directly to the rougher cells in which the sulphide minerals and the gold and silver are separated from the gangue. The flotation agents used are 0.05 lb./ton of potassium xanthate, added partly at the head and partly in the middle of every rougher, and 0.15 lb./ton of a mixture of 80% of coal tar and 20% of Canadian hardwood creosote added at the grinding mills. To produce a stable froth 0.25 lb./ton of steam-distilled pine oil is added with the xanthate, and sometimes small quantities of sodium resinate are added at various points along the roughers. The primary slimes obtained in the early stages of crushing are washed, treated with 8 lb./ton of sodium carbonate, and floated with 0.3 lb./ton of xanthate, 0.15 lb./ton of pine oil, and 0.05 lb./ton of fumol (a condensation product of acetaldehyde). The average concentrate from the rougher cells contains 9–11% Cu; it is classified and the underflow is reground with 1.5–2 lb./ton of slaked lime. The overflow from the classifiers and the discharge from the regrinding mill are refloated with the addition of a little pine oil; the concentrates from this operation average 20% Cu, the pyrite having been deadened by the addition of lime, and the tailings 3% Cu. The latter are retreated in a Forrester pneumatic machine to obtain a middling product with 12% Cu which is re-treated with further quantities of rougher concentrates. The tailings from the Forrester machine are passed over blanket tables to recover free gold, then passed to other Forrester machines in which the pyrite is floated with 0.3 lb./ton of xanthate. The recovery of pyrite is 60% of that in the mill feed, and the product assays 49.8% S, 44% Fe, 0.35% Cu, and 4.5% of insoluble material; the recovery of copper in the first concentrates is 91.3% and the recovery of gold on the blankets about 62%. The cost of treatment of the ore is 42.6 cents/ton, of which 4.5 cents is the cost of flotation reagents and 16.1 cents the labour cost.

A. R. POWELL.

Leaching raw and roasted tin concentrates and tin oxides. C. G. FINK and C. L. MANTELL (Eng. Min. J., 1928, 125, 201–206).—Attempts to extract stannic oxide from ores are described. CHEMICAL ABSTRACTS.

Thermic reduction with metals of Bolivian tin concentrates. C. G. FINK and C. L. MANTELL (Eng. Min. J., 1928, 125, 325–328).—Powdered aluminium, but not iron, lead, bismuth, or copper (present in the concentrates), reduces stannic oxide to tin. The presence of ferric or bismuth oxide markedly reduces the m.p. of stannic oxide. CHEMICAL ABSTRACTS.

Certain alloys of the lead-tin-cadmium system and their use as solders. C. E. SWARTZ (Amer. Inst. Min. Met. Eng. Tech. Pub., 1928, No. 85, 11 pp.).—In general, solders having compositions in the neighbourhood of the ternary lead-tin-cadmium eutectic are best; the addition of 1.5–2.0% of zinc is favourable. CHEMICAL ABSTRACTS.

Thermodynamic study of fundamental corrosion reactions. W. J. SWEENEY (Amer. Electrochem. Soc., April, 1928, 53. Advance copy. 11 pp.).—From a critical survey of data available in the literature the following values for the decrease of free energy ($-\Delta F$) of reactions have been calculated: (1) $\text{Fe} + 2\text{H}^+ = \text{Fe}^{++} + \text{H}_2$

(1 atm.); $-\Delta F = 20,350 + 1365 \log (a_{\text{H}^+}/a_{\text{Fe}^{++}})$ g.-cal., where a_{H^+} and $a_{\text{Fe}^{++}}$ are the activities of the corresponding ions; (2) $\text{Fe} + \text{O}_2 + \text{H}_2 = \text{Fe}(\text{OH})_2$; $-\Delta F = 120,900$ g.-cal. at 25°; (3) $\text{Fe} + 2\text{H}_2\text{O} = \text{Fe}(\text{OH})_2 + \text{H}_2$ (1 atm.); $-\Delta F = 7780$ g.-cal. Hence even in the absence of dissolved oxygen there is a small tendency for iron to form ferrous hydroxide. In a solution of given hydrogen-ion concentration the concentration of ferrous ions corresponding to equilibrium of reaction (1) is much greater than can exist if the solution is saturated with ferrous hydroxide. Hence the reactions (1) and (3) cannot be at equilibrium at the same time.

H. J. T. ELLINGHAM.

Metal-spraying process and the prevention of corrosion. R. HOPFER (Chem. Fabr., 1928, 316–318).—The process consists of the melting of a wire in an oxy-hydrogen flame and the atomisation of the molten drops by a current of air. Plated surfaces not more than 0.02 mm. thick and of reasonable strength can be made in this way. It is essential that the droplets should be hot when they strike the surface to be plated, and that the latter should be roughened. All metals can be sprayed which have m.p. below 1600° and are available as wire. The surfaces produced are, however, porous, and the process is only useful when they can be improved by chemical or mechanical means. In the case of iron covered with zinc, the porosity is no disadvantage, as the zinc acts as an electrical protector. Aluminium coatings have found an extended use. The plated material is heated in absence of air, when alloying at the surface of contact takes place and the coating becomes non-porous. A partly alloyed aluminium coating, especially with an additional zinc coating, is a good protection against sulphur dioxide. A more completely alloyed aluminium coat is protective against oxidising gases at temperatures up to 1000°.

C. IRWIN.

Electrolytic production of heavy metals from fused electrolytes. II. G. NEUENDORFF and F. SAUERWALD (Z. Elektrochem., 1926, 34, 199–204; cf. B., 1926, 131).—The preparation of iron, chromium, and manganese from melts of oxides and silicates has been carried out to ascertain how the current yield depends on the temperature and duration of electrolysis. Various difficulties met with in obtaining measurements of the current yield are mentioned, and the advantages of the use of high temperatures are pointed out. The current yields (calculated as Fe^{++}) depend on the duration of electrolysis and on the corresponding changes in concentration in a manner which is not entirely clear. Practically pure carbon-free iron, steel, and pig iron can be obtained under suitable conditions. The iron silicates used suffer loss of oxygen by thermal decomposition. By electrolysis chrome iron ore, iron-chromium-carbon alloys are obtained in high current yields. A mixture of manganese and iron ores gives an alloy very poor in manganese. H. INGLESON.

X-Ray studies of high-speed steel. A. ST. JOHN (Proc. Amer. Soc. Testing Materials, 1927, 27, i, 247–251).

PATENTS.

Roasting furnace. D. BAIRD, Assr. to NICHOLS COPPER Co. (U.S.P. 1,669,925, 15.5.28. Appl., 8.10.26).

—A mechanically rabbled, multiple-hearth roasting furnace contains a hollow revolving shaft carrying on every hearth hollow toothed rables supported on annular hollow protuberances on the shaft. Means are provided for circulating cooling water through the shaft and rables. A. R. POWELL.

[Dry-ore] concentrator. W. YOUNG, Assr. to M. E. YOUNG (U.S.P. 1,659,935, 21.2.28. Appl., 17.4.26).—The frame of the concentrator is actuated from a rotary shaft mounted in the base. One end of the frame is movably connected to the base, a forked portion at the other end terminates in brackets having a third bracket between them, and an eccentric connexion is provided between each bracket and the shaft. H. HOLMES.

Ore-roasting apparatus. D. W. BOWERS (U.S.P. 1,662,811, 20.3.28. Appl., 6.8.27).—Into the upper part of a vertical, cylindrical retort a mixture of finely-divided ore and high-pressure air is blown at such an angle that the mixture rotates round the walls of the furnace where it meets a stream of fuel directed at right angles to its path. The retort is surrounded with a washing condenser through which the gases pass from the lower end of the retort. A. R. POWELL.

Annealing and heat-treating furnace. A. T. KATHNER (U.S.P. 1,669,902, 15.5.28. Appl., 26.5.26).—The furnace comprises a heating chamber and a cooling chamber in alinement with each other and separated by a refractory wall provided with a communication passage in its lower portion and means for deflecting the flue gases away from the passage. The chambers are provided with a continuous conveyor device, the heating chamber with a damper-controlled stack at its forward end, and the cooling chamber with removable partitions in the roof to facilitate cooling. A. R. POWELL.

Furnace [for heat-treating galvanised sheets]. H. W. THEISS, Assr. to SUPERIOR SHEET STEEL CO. (U.S.P. 1,670,754, 22.5.28. Appl., 23.5.27).—The furnace comprises a heat-treating chamber open at both ends, below which is the combustion chamber provided with flues opening into the upper chamber at the charging end and with an inclined body portion to overlie the galvanising bath. An endless carrier circulates on guide-ways through the furnace and below the combustion chamber. A. R. POWELL.

Casting of ingots. E. C. WASHBURN (U.S.P. 1,670,329, 22.5.28. Appl., 26.3.26).—The bottom and sides of the ingot are cooled by streams of air, but the cooling of the top portion is retarded by applying the heat of the ingot itself. F. G. CLARKE.

Manufacture of steel. J. W. HORNSEY (B.P. 290,317—8, 5.1.27).—In the manufacture of steel in a basic open-hearth furnace by melting sponge iron reduced from iron ore, (A) phosphorus is prevented from entering the steel by leaving a proportion of unreduced iron oxide in the sponge or by adding a proportion of unreduced ore to the sponge, previous to melting, and (B) sulphur is prevented from entering the steel by adding about 5% of limestone to the raw ore before it enters the pre-heater previous to reduction. A. R. POWELL.

Direct production of steel or steel alloys from titaniferous ores and iron sands. F. A. DE SILVA

and C. G. CARLISLE (B.P. 290,442, 18.5.27).—The ore or sand is treated on a magnetic separator and the magnetic product melted at 1600° with 20—33% of anthracite, 7.5% of lime, and 1.5—3.0% of fluorspar in an arc furnace of the type provided with overhead electrodes. The products are pig iron and a fluid slag containing all the titania. The iron is decarburised, refined, and converted into steel or a steel alloy in the same or in an auxiliary electric furnace. During the reducing and refining processes the furnace is rotated or the bath may be rotated relatively to the body of the furnace. A. R. POWELL.

Corrosion-resistant ferrous alloy. J. T. HAY (B.P. 290,487, 5.9.27).—The alloy contains 0.2—0.5% Cu, up to 0.2% C and Mo (preferably less than 0.1% of each), and other inclusions less than 0.25%.

C. A. KING.

Treatment of alloys. N. B. PILLING, Assr. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,671,484, 29.5.28. Appl., 2.9.22).—Iron-silicon alloys (4—8% Si) are mechanically treated at temperatures above 30° and below visible heat. F. G. CROSSE.

Hard-alloy-steel process. C. L. DELACHAUX (U.S.P. 1,671,572, 29.5.28. Appl., 8.12.24. Fr., 8.12.23).—Manganese steel and ordinary carbon steel are welded together by means of an alumino-thermic mixture containing 18—20% Ni. F. G. CROSSE.

[Welding] alloy. W. F. STODY (U.S.P. 1,671,384, 29.5.28. Appl., 12.11.25).—Iron is alloyed with 15—35% Cr, 4—16% Mn, and 1—4% Si. F. G. CROSSE.

Cleaning and pickling of metals. G. D. CHAMBERLAIN, Assr. to R. T. VANDERBILT CO., INC. (U.S.P. 1,671,627, 29.5.28. Appl., 19.2.27).—A bath containing sulphuric acid and a small proportion of a thiazole is claimed. F. G. CROSSE.

[Copper-silicon] alloys and method of working and heat-treating the same. M. G. CORSON (B.P. 278,355, 26.9.27. U.S., 4.10.26).—Alloys of copper containing 3.7—6.7% Si are heat-treated at 500—800° to form a solid solution, hot-worked to the desired form, and quenched from above 500°. Particular alloys containing 5% Si and 6.5% Si are treated at temperatures above 700° and 720° respectively. C. A. KING.

Production of metals [zinc] from ores. H. G. S. ANDERSON (U.S.P. 1,669,406, 15.5.28. Appl., 11.9.24).—Zinc sulphide ores are mixed with finely-divided iron and the mixture is heated at such a temperature that the zinc reduced from the ore is volatilised without melting the ferrous sulphide formed in the reaction. A. R. POWELL.

Magnesium alloys for use with pistons for internal-combustion engines. I. G. FARBENIND. A.-G. (B.P. 275,985, 8.8.27. Ger., 13.8.26).—Magnesium alloys containing up to 15% Al and 1—6% Si are claimed. F. G. CROSSE.

Production of aluminium in electric furnaces. V. VERNAY, and SOC. ITAL. ELETTROCHIMICA (B.P. 291,219, 19.5.27).—The metal is produced from aluminium hydroxide obtained by complete decomposition of hydrated aluminium chloride by means of heat. F. G. CROSSE.

[Non-corrosive] aluminium alloys. H. SCHORN, Assce. of R. MÜLLER (B.P. 277,702, 19.9.27. Ger., 18.9.26).—Aluminium is alloyed with 0.05–0.4% of titanium either by direct melting or during the electrolysis of alumina containing titanium compounds or titanate acid in the required proportions. F. G. CROSSE.

Metal alloy. L. R. BRINK, Assr. to BARNHART BROS. & SPINDLER (U.S.P. 1,671,952, 29.5.28. Appl., 7.6.26).—The alloy contains 90% Al, 5% Cu, and 5% Ni, approximately. F. G. CROSSE.

Alloy. M. G. CORSON, Assr. to ELECTRO METALLURGICAL Co. (U.S.P. 1,671,408, 29.5.28. Appl., 13.4.26).—A non-ferrous alloy contains 15–25% Mn, 0.1–3% of an element having the properties of phosphorus and silicon, and the balance copper. F. G. CROSSE.

Welding rod. R. FRANKS, Assr. to OXWELD ACETYLENE Co. (U.S.P. 1,671,417, 29.5.28. Appl., 21.1.26).—An alloy contains 1–12% W, 25–35% Cr, 0.1–1% B, 1–3.5% C, 0.5–3% Si, and sufficient manganese to deoxidise the alloy, the ratio of silicon to manganese being at least 0.9. F. G. CROSSE.

Extraction of tin mixture from lead and tin alloys. M. SPEICHERT (U.S.P. 1,669,580, 15.5.28. Appl., 18.9.26. Ger., 11.10.24).—Scrap bearing metal containing lead, tin, antimony, copper, and other metals is heated until completely liquid, then cooled slowly to just above the m.p. of the eutectic, and the still liquid portion, consisting of a tin-lead alloy with 54.5–55% Sn, up to 3.6% Sb, and up to 0.2% Cu, is separated from the remainder. A. R. POWELL.

Preparation of solder [in flake form]. H. CHAPMAN (B.P. 290,891, 27.9.27).—Molten solder is poured through a sieve into cold water. The flakes so produced are dried and mixed with flux. F. G. CROSSE.

Metal reclaiming process. W. G. NORDLING and A. STEWART, JUN. (U.S.P. 1,669,485, 15.5.28. Appl., 17.3.26).—The metallic mixture is subjected to such a temperature that one constituent is melted; the whole is then agitated and the molten metal removed. The residue is then immersed in a bath of molten flux at a temperature below the m.p. of the residue, but above that of the low-melting constituent, whereby a further quantity of the latter is extracted. A. R. POWELL.

Electrolytic deposition of tin from alkaline solutions. SIEMENS & HALSKE A.-G. (B.P. 290,552, 19.3.28. Ger., 13.10.27. Addn. to B.P. 286,673; B., 1928, 452).—In the recovery of tin by electrolysis a solution of sodium stannate, soluble or insoluble anodes may be used, and an adherent coating of tin may be deposited on a metal cathode, e.g., iron plates. C. A. KING.

Manufacture of rust-proofing material. PARKER RUST-PROOF Co., Assces. of H. H. WILLARD and M. GREEN (B.P. 270,680, 25.4.27. U.S., 10.5.26).—See U.S.P. 1,660,661; B., 1928, 373.

Recovery of zinc from ores. R. T. D. WILLIAMS and S. W. ROSS, Assrs. to ELECTROLYTIC ZINC Co. OF AUSTRALASIA, LTD. (U.S.P. 1,672,016, 5.6.28. Appl., 11.9.26. Austral., 17.9.25).—See B.P. 258,575; B., 1927, 528.

Casting of ingots. (SIR) C. A. PARSONS and H. M. DUNCAN (U.S.P. 1,671,253, 29.5.28. Appl., 6.10.27. U.K., 29.4.26).—See B.P. 278,032; B., 1927, 912.

Treatment of metal surfaces [against corrosion]. W. SMITH, Assr. to EXPANDED METAL Co., LTD. (U.S.P. 1,672,180, 5.6.28. Appl., 3.3.27. U.K., 17.3.26).—See B.P. 272,610; B., 1927, 606.

Production of designs on celluloid, metal, etc. D. A. TUCK, A. FORT, and R. TUCK & SONS, LTD. (B.P. 290,871, 24.8.27).

Blast tuyères for shaft furnaces. GUTEHOFF-NUNGSHÜTTE OBERHAUSEN A.-G., A. WAGNER, and E. POHL (B.P. 290,861, 22.7.27).

Ovens (B.P. 289,128).—See I. Amalgamator (U.S.P. 1,669,430).—See XI.

XI.—ELECTROTECHNICS.

Improvement in the technique of setting up standard cells. M. EPPLEY (Amer. Electrochem. Soc., April, 1928, 53. Advance copy. 11 pp.).—An improved technique for the preparation of normal cadmium cells is described. The methods are devised with the object of removing any atmospheric oxygen which might be trapped between the mercury and the H-vessel, or air from the inside walls of the latter. Measurements of the *E.M.F.* indicate a high degree of uniformity and values in good agreement with existing standards. H. J. T. ELLINGHAM.

Cathode equilibrium in the cadmium standard cell. M. EPPLEY (Amer. Electrochem. Soc., April, 1928, 53. Advance copy. 13 pp.).—Experiments have been carried out with the object of explaining the irregularities observed by Hulett on rotating the cathode system of the standard cadmium cell. It is concluded that the irregularities are not due to hydrolysis of the mercurous sulphate to a basic sulphate when the sulphuric acid concentration in the electrolyte is greater than about 0.002*M*. The equilibrium in the system containing mercury, mercurous sulphate, hydrated cadmium sulphate, and saturated cadmium sulphate which is 0.002–0.12*M* to sulphuric acid is not the same as that in the same system with mercury omitted. Mercury affects the equilibrium, as shown by *E.M.F.* measurements, but does not appreciably alter the mercury concentration as shown by analysis. Hence a new compound of low solubility is probably formed. Its formation is less rapid the lower the acid concentration. The existence of three forms of mercurous sulphate is indicated by solubility data. One of these should be the basic mercurous salt of Gouy (B., 1900, 683) and Cox (B., 1904, 758). H. J. T. ELLINGHAM.

Tests on paints. BECKER.—See XIII. Ash in sugar. ŠANDERA and ZIMMERMANN.—See XVII.

PATENTS.

Electric furnace. C. H. GAGE, Assr. to L. W. SEARLES (U.S.P. 1,671,026, 22.5.28. Appl., 12.2.26).—Spaced electrodes are arranged at the longitudinal axis of a furnace chamber comprising upper and lower parts, which is substantially elliptical in longitudinal section and circular in cross-section. End electrodes

terminating at the longitudinal axis of the chamber are spaced from the ends of the chamber for a distance equal to the radius of cross-section of the chamber, and a co-acting electrode element is arranged in the bottom of the chamber with its top near the central longitudinal axis of the chamber and with its sides inclined and converging upwards so that the greater part of the bottom of the chamber is uncovered.

J. S. G. THOMAS.

[Filaments for] electric incandescence lamps. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHANDGES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 283,848, 15.12.27. Ger., 17.1.27).—The surface of the coiled lamp filament is roughened by sand-blasting, by slow chemical or electrolytic etching (*e.g.*, with a 3% potassium ferricyanide solution), or by deposition of material upon the wire from the gaseous state, *e.g.*, by deposition of tungsten from tungsten hexachloride.

J. S. G. THOMAS.

Treatment of filaments for incandescence lamps etc. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of G. E. INMAN and W. P. ZABEL (B.P. 282,812, 29.12.27. U.S., 31.12.26).—Filaments are cleaned and fired in a container in which they are maintained in definite relation to one another.

J. S. G. THOMAS.

Preparation of a tungsten filament. F. BLAU, F. KOREF, and K. MOERS, Assrs. to GEN. ELECTRIC CO. (U.S.P. 1,670,292, 22.5.28. Appl., 29.11.24. Ger., 14.2.24).—In a filament that does not readily assume the macro-crystalline form when heated, strains sufficient to form nuclei of crystallisation are produced at several points along the filament, which is then heated to allow macro-crystallisation to set in. H. ROYAL-DAWSON.

Electron device and method of activation. H. C. RENTSCHLER, Assr. to WESTINGHOUSE LAMP CO. (U.S.P. 1,670,483, 22.5.28. Appl., 4.5.23).—The refractory-metal filament of an electron tube is activated by means of a coating of radium oxide.

H. ROYAL-DAWSON.

Electrical, gas-filled discharge tubes. F. MEYER, H. J. SPANNER, and E. HERFURT (B.P. 275,552, 18.2.27. Ger., 6.8.26).—The gas or vapour pressure in an incandescent cathode rectifier is maintained by means of activated carbon, completely saturated with gas, *e.g.*, neon placed in a container, and, if desired, connected with an electrode.

J. S. G. THOMAS.

Electrical precipitation of small particles from gases. LODGE-COTTRELL, LTD., and L. LODGE (B.P. 290,030, 23.4.27).—The high-tension electrode is hollow and the gases are supplied to its interior through a length of insulating pipe; the gases emerge through a large number of small orifices provided with sharp edges or a number of points to ensure an effective charge being given to the dust particles in the gas currents, which must move at fairly high speed to keep the orifices clear. The high-tension electrode is surrounded by the other (preferably earthed) electrode, which rotates against a fixed scraper on its inner surface, or a moving scraper rotates against the inner surface of a fixed electrode. Several means are suggested for cooling the outer surface of the earthed electrode.

B. M. VENABLES.

Centrifugal amalgamator. R. THAYER (U.S.P. 1,669,430, 15.5.28. Appl., 1.5.22).—The apparatus comprises a hollow revolving cathode, which serves as the outer wall of the centrifugal basket, and an axial pulp intake provided with a metal deflector across its outlet to act also as an anode, so that the centrifugal repulsion of the amalgam and particles of valuable metal is assisted by the current flowing from the anode to the cathode.

A. R. POWELL.

Thermo-electric pyrometers. J. L. ORCHARD and CAMBRIDGE INSTRUMENT CO., LTD. (B.P. 290,493, 14.9.27).—In an indicating thermo-electric pyrometer for use over a definite narrow range of temperature, a bimetallic compensator used to compensate for variations of temperature of the cold junction is arranged also to compensate for temperature changes of the indicator within the temperature range.

J. S. G. THOMAS.

Precipitation of metals on an incandescent body. A. E. VAN ARKEL and J. H. DE BOER, Assrs. to N. V. PHILIPS' GLOEILAMPENFABR. (U.S.P. 1,671,213, 29.5.28. Appl., 12.3.26. Holl., 14.3.25).—See B.P. 249,067; B., 1927, 195.

Manufacture of carbons for use as anodes of electric cells. COMP. LORRAINE DE CHARBONS, LAMPES, & APPAREILLAGES ELECTRIQUES (B.P. 285,415, 17.3.27. Fr., 16.2.27).

[Portable apparatus for] electrodeposition of metals. J. F. BENNETT and J. HADFIELD (B.P. 290,704, 22.1.27).

Discovering and determining the position, configuration, and nature of ores, solutions of salts, or other bodies. AKTIEBOLAGET ELEKTRISK MALMLETNING (B.P. 271,871, 23.5.27. Swed., 26.5.26).

[Sheaths for] electrodes of secondary batteries. "HART" ACCUMULATOR CO., LTD., and W. SCHOFIELD (B.P. 291,138, 22.2.27).

Per-compounds (B.P. 290,750).—See VII. Tin. (B.P. 290,552).—See X. Insulating varnishes etc. (B.P. 273,756).—See XIII.

XII.—FATS; OILS; WAXES.

Utilisation of the soya bean. II. Y. TAKAYAMA (J. Soc. Chem. Ind. Japan, 1928, 31, 319—322).—The bean was ground to powder after the removal of oil and bran, and digested with sulphuric acid (1—0.025*N*) at 100° for from 1 to 19 hrs. The amounts of dissolved protein and reducing sugar increased as the total amount of acid added increased; the concentration of the acid did not affect the time required for the dissolution.

S. OKA.

Pracaxy and owala kernels and their oils. L. MARGAILLAN, A. DUPUIS, and J. ROSELLO (Ann. Musée Colonial Marseille, 1925, 3, 23—28; Chem. Zentr., 1928, i, 435).—Pracaxy (pracachy) kernels, from *Pentaclethra filamentosa* (Brazil), contain water 10.6, ash 1.4, protein 14.4, fat and resin 48.3, cellulose 4.2, and nitrogen-free extract 21.1%. The yellow, slightly bitter fat has m.p. 28°, n_D^{20} 1.4561, saponif. value 182, acid value 3.6, iodine value 67.3, Reichert-Meissl value 1.2, acetyl value 54.2, resin content

(mol. wt. 470) 0.7%. Owala kernels, from *P. macrophylla* (Congo), contain water 8.5, ash 2.1, protein 25, fat 41, cellulose 5, and nitrogen-free extract 18.4%. The oil has m.p. 24°, f.p. 23–10°, n_D^{20} 1.4682, d_4^{20} 0.902, saponif. value 181, acid value 3.7, iodine value 98.9, Reichert–Meissl value 1.27, acetyl value 0, resin 0.5%. The average mol. wt. of the fatty acids was 309.

A. A. ELDRIDGE.

Jaboty kernel oil. L. MARGAILLAN (Ann. Musée Colonial Marseille, 1925, 3, No. 3, 37–38; Chem. Zentr., 1928, i, 435).—Jaboty kernels (Brazil) contain water 5.7, ash 4, protein 7.9, oil 53.7, cellulose 12.4, nitrogen-free extract 16.3%. The oil has m.p. 45°, f.p. 36°, n_D^{20} 1.4553, saponif. value 228, iodine value 23.1, Reichert–Meissl value 1.3, acetyl value 32, unsaponifiable matter 1.6%, resin 3%. The insoluble fatty acids (94.3%) have f.p. 35.1°, mean mol. wt. 259, and contain liquid acids 25%, stearic acid 3.4%, palmitic acid 43.6%, myristic acid 28%.

A. A. ELDRIDGE.

Properties of "Yamagobo" oil. M. OGURA (J. Soc. Chem. Ind. Japan, 1928, 31, 60).—The oil, obtained from the seed of "yamagobo" (*Phytolacca acinosa*, Roxb.), has d_4^{25} 0.9148, n_D^{20} 1.4713, saponif. value 186.2, iodine value 104.6, and unsaponifiable matter 1–73%. The fatty acids separated from the oil are liquid, have acid value 198.5, iodine value 105.7, and contain 92.3% of liquid acids and 7.7% of solid acids. The fatty acids give 35.9% of a solid bromide, having m.p. 113–114°, which corresponds to that of tetrabromo-stearic acid.

K. KASHIMA.

Comparative antirachitic value of various marine animal oils and of cod liver oil. L. RANDOIN, E. ANDRÉ, and R. LECOQ (J. Pharm. Chim., 1928, [viii], 7, 529–539).—Rat-feeding experiments indicate that the antirachitic values of the liver oils of *Merluccius merluccius*, L. (hake), and of *Galeus canis*, Rondelet (dogfish), are, respectively, 10 and 5% of that of cod liver oil. The blubber oil of *Macrorhinus leoninus*, L. (sea-elephant), gave negative results. The constants of the oils used are given.

B. FULLMAN.

Reaction of [edible] oils to ultra-violet light. R. MARCILLE (Ann. Falsif., 1928, 21, 189–197).—Certain edible oils give characteristic fluorescence in ultra-violet light. The application of this property to the detection of adulterants in olive oil is discussed.

T. M. A. TUDHOPE.

Occurrence of disperse phases in drying oils. H. EIBNER and A. GRETH (Chem. Umschau, 1928, 35, 97–100; cf. B., 1928, 340, 375).—The experimental basis of Auer's isocolloidal theory of the drying of oils has been reinvestigated by submitting representative specimens to the action of 95%, 47%, and absolute formic acid. Using unoxidised linseed oil, cold-pressed from the seed and preserved in an atmosphere of carbon dioxide, commercial raw linseed oil, or a fresh, light, air-bleached linseed oil, it was impossible to detect the formation of three layers or to isolate a disperse phase. Under the same treatment varnishes and polymerised stand oils separated into three layers, the middle one affording a lower disperse phase insoluble in acetone. The disperse phase had a lower iodine value and a much

more rapid rate of drying than the oily disperse medium. Fresh perilla oil furnished no disperse phase in spite of its rapid rate of drying, whilst fresh wood oil and various polymerised wood oils afforded three layers, and the disperse phase could be isolated in some cases by filtration. There are no grounds for assuming the presence of two phases in freshly-prepared drying oils; the disperse phase makes its appearance only on heating in an amount proportional to the time of heating. In the case of polymerised oils, "drying" is a colloid-chemical phenomenon. Stand oils afford more disperse phase than linseed oil varnishes. The occurrence of a disperse phase in Chinese wood oil as it appears on the European market is due to the fact that it is heated during manufacture in China. Auer's purely colloid-chemical theory of the drying process is too general.

S. COFFEY.

Determination of iodine values [of oils] by Hanus' method. M. WIERNIK (Farben-Ztg., 1928, 33, 1973).—Linseed and Chinese wood oils have been found to give different iodine values by the Hübl–Waller and Hanus methods, the latter usually being much higher. Polymerised oils show bigger deviations than unpolymerised oils.

S. COFFEY.

PATENTS.

Transference of vitamins [from fatty materials].—S. GRÖNNINGSAETER, and FISCHER-HOLLINSHED Co., Inc. (B.P. 280,212, 2.11.27. U.S., 2.11.26).—The vitamins obtained as an extract on treating a saponified, vitamin-rich, fatty material with an organic solvent may be transferred directly to a vitamin-deficient fatty material by adding the foregoing mixture to the substance to be enriched and then adding a diluent. Thus, if the solvent be alcohol, simple addition of water to the resulting mixture is sufficient to cause the separation of the required enriched fatty oil from the alcohol and the soap of the original fatty material. It is desirable to carry out these operations at moderate temperatures.

E. HOLMES.

Floor, boot, and like polishes. Benzene soaps. I. G. FARBENIND. A.-G. (B.P. 261,039 and 287,114, 8.11.26. Ger., 9.11.25).—(A) Hydrogenation benzene or its cracked, polymerisation, dehydrogenation, or demethylation products are suitable for incorporation with floor and boot polishes; they have enhanced miscibility with other organic solvents and are less inflammable. (B) Benzene soaps made with hydrogenation benzene or its products are claimed to have a good solvent power for dirt and impurities.

E. HOLMES.

Treatment of crude cottonseed oil. D. McNICOLL, Assr. to BRIT. OIL & CAKE MILLS, LTD. (U.S.P. 1,671,834, 29.5.28. Appl., 12.1.25. U.K., 6.2.24).—See B.P. 232,361; B., 1925, 557.

Expressing liquids from solids (B.P. 289,954).—See I. Phosphatides (U.S.P. 1,667,767).—See XIX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

"Wetting-out agents" for the paint industry and their investigation. A. NOLL (Farben-Ztg., 1928, 33, 2293–2299).—A general dissertation on the chemical nature of wetting-out and emulsifying agents used in

water-paint manufacture (chiefly sodium salts of complex organic sulphonic acids). Details of the composition, properties, purification, and fluorescence characteristics of various commercial products of this type, *e.g.*, Nekal, Leonil, Betan, Majamin, Algosol, etc., are given, and the stability of emulsions formed by the aid of various combinations of these is tabulated. S. S. WOOLF.

Ultra-violet light and its use in accelerated weathering tests on paints. E. BECKER (*Farben-Ztg.*, 1928, 33, 2232—2234).—In a general theoretical discussion on the nature of electromagnetic waves it is shown that the use of the light emitted by the mercury-vapour lamp to represent the action of sunlight in accelerated weathering tests on paints etc. must give erroneous results. The mercury vapour lamp emits short-wave radiation down to λ 185 $\mu\mu$, whilst the radiation from the sun contains no waves shorter than 300 $\mu\mu$. It follows, therefore, that the greater energy quanta liberated by the former source induce reactions that cannot occur under the influence of sunlight. It is suggested that filtration of the mercury-vapour emission through suitable glass filters in order to eliminate the wave region not present in sunlight would render the artificial source applicable to accelerated weathering tests. S. S. WOOLF.

Colloid-chemical problems [in paint industry]. A. V. BLOM (*Farben-Ztg.*, 1928, 33, 1969—1972).—A lecture dealing with general aspects of wetting power and interfacial tension applied to pigments and paints. S. COFFEY.

Cellulose acetate. ATSUKI and others. **Cellulose ester solvents.** WOLFF.—See V. **Disperse phase in drying oils.** EIBNER and GRETH.—See X.

PATENTS.

Water paints, wood finishes, and the like. W. W. TAYLOR (B.P. 290,700, 20.1.27).—A water-resisting emulsion is made by adding a drying oil having free fatty acid to an aqueous solution of a primary or single alkaline alginate or a mixture of two or more alginates, with or without pigment. B. FULLMAN.

Materials for use in painting or varnishing [or as impregnating agents]. G. KING and R. THRELFALL (B.P. 290,717, 16.2. and 15.3.27).—Silicic acid esters are treated with a solvent, *e.g.*, alcohol or acetone, containing in solution or suspension water in quantity not exceeding that required for hydrolysis, a smaller quantity being used if desired. The product, after expulsion of hydrogen chloride by treatment at about 100° with a current of air, may be mixed with other material, *e.g.*, a pigment or a mixture of such with a solvent, *e.g.*, cyclohexanol, which does not interfere with the usual setting time of the silica solution. L. A. COLES.

Painting and preserving stone, wood, metal, etc. in buildings and sculptures. H. SCHMID (B.P. 290,331, 7.2.27).—A mixture of a neutral wax, *e.g.*, beeswax, with colouring material is applied, molten or in solution, and is then heated. A further coat of an oil colour mixed with wax is given, and, finally, a coating of wax. L. A. COLES.

Manufacture of a red oxide of iron, suitable for use as a pigment. T. STORER and C. J. A. TAYLOR (B.P. 290,421, 9.4.27).—A solution containing a ferrous salt, *e.g.*, galvanisers' or enamellers' waste liquor neutralised with scrap iron, is heated under pressure with manganese dioxide or other suitable non-gaseous oxidising agents, with or without the addition of lime or calcium carbonate, and the precipitate is collected, washed, and dried. Alternatively, the reaction is allowed to proceed at the ordinary temperature, and the precipitate, after removal of the supernatant liquor, is heated under pressure. L. A. COLES.

Manufacture of white lead. HOLZVERKOHLUNGS-IND. A.-G., and J. SEIB (B.P. 290,844, 9.6.27).—Basic lead carbonate containing 13.6% CO₂, obtained by the addition of sodium carbonate to a solution containing 0.25 mol. of lead oxide per mol. of lead acetate, is heated under pressure, with or without removal of the lead acetate lye, until the product contains about 11.4—11.5% CO₂. L. A. COLES.

Manufacture of lacs, varnishes, and enamels suitable for insulating purposes. L. LEVY (B.P. 273,756, 1.7.27. Fr., 3.7.26).—"Thiolite" (*cf.* B.P. 184,164; B., 1923, 560 A), prepared at a low temperature and under conditions favourable for the formation of a minimum of free sulphur, is finely ground and washed, after which it is dissolved in a suitable solvent. The resultant varnish is dried, after application, at 110—160°. L. A. COLES.

Manufacture of varnishes, lacquers, and the like. L. MCG. FRASER and W. S. SMITH (B.P. 290,707, 8.2.27).—Apparatus is described which effectively encloses the components during the operations, and mixing etc. is carried out in an entirely enclosed, rotatable drum with internal vanes, with means for filling and emptying it by pressure. Vapours arising are condensed and returned by reflux condenser or otherwise. B. FULLMAN.

Oil varnishes containing resins. Cellulose ester lacquers. I. G. FARBENIND. A.-G. (B.P. 287,115—6, 8.11.26. Ger., 9.11.25).—(A) Benzines obtained by destructive hydrogenation (*e.g.*, from lignite tar or crude American mineral oil) or the products obtained from them by cracking, polymerisation, dehydrogenation, or demethylation, are used in making oil varnishes containing resins. For example, 10 pts. of a linseed oil-kauri gum varnish (oil:gum = 1:2, 1:1, or 2:1) are mixed with 10 pts. of benzine. (B) Similar products are used as diluents in making cellulose ester lacquers. B. FULLMAN.

Preparation of surfaces for the reception of cellulose lacquers. I. G. FARBENIND. A.-G. (B.P. 281,310, 24.11.27. Ger., 24.11.26).—The surfaces are coated with an intermediate layer consisting of a protein, a resin, and a softening agent (*e.g.*, casein glue, shellac, and camphor in ammoniacal aqueous alcohol). B. FULLMAN.

Production of porous artificial compositions. KUNSTHARZFABR., and Dr. F. POLLAK GES.M.B.H. (B.P. 261,409, 13.11.26. Austr., 14.11.25).—The gelatinous product obtained by the condensation of carbamide

and formaldehyde is allowed to harden without removal of the water, the bulk of the water is then removed below 30°, and the final hardening and drying is effected at a high temperature. The appearance of the product depends on the size of the pores, which is of the order of 0.4–4.0 μ , and is varied by the degree of dilution during condensation.

L. A. COLES.

Manufacture of condensation products of urea and formaldehyde. I. G. FARBENIND. A.-G. (B.P. 261,029, 6.11.26. Ger., 7.11.25).—Dimethylolurea dissolved or suspended in an organic solvent which may consist of or contain phenols, but is free from water, is heated in the presence of an acid condensing agent, *e.g.*, alcoholic hydrogen chloride solution.

L. A. COLES.

Manufacture of condensation products of urea and its derivatives and formaldehyde. I. G. FARBENIND. A.-G. (B.P. 264,466, 10.12.26. Ger., 12.1.26. Addn. to B. P. 259,950; B., 1928, 165).—The condensation products are hardened by exposure to acids (*e.g.*, formic, hydrofluoric) or acid anhydrides, gaseous or dissolved, and, if desired, under high or low pressure.

B. FULLMAN.

Production of resinous media. R. ARNOT (B.P. 290,327, 15.1., 26.3., and 2.5.27).—An aldehyde (formaldehyde) is condensed in one or in two stages with an organic amino-compound (carbamide, calcium cyanamide, aromatic or aliphatic amines) and an organic acid or salt or a phenol or naphthol. Acid or alkaline catalysts may be used. Carbamide, formaldehyde, and salicylic acid give according to proportions used clear oils, white solids, or gums. With sodium salicylate adhesives are obtained. The amount of formaldehyde necessary for condensing with a mixture of phenoxides and carbamide is much less than for carbamide alone. Formaldehyde condensed with hydroxy-acids and then with carbamide gives glassy products, and very tough resins are obtained when arylamines are a constituent. Succinic or cinnamic acid with formaldehyde and carbamide gives transparent, glass-hard products.

C. HOLLINS.

Production of unsaturated organic compounds [artificial resins]. E. FREUND, ASS. TO CHEM. FABR. AUF ACTIEN VORM. E. SCHERING (U.S.P. 1,672,378, 5.6.28. Appl., 1.9.22. Ger., 22.9.21).—See G.P. 417,667; B., 1926, 100.

Vat dyes (B.P. 273,247).—See IV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Vulcanisation of rubber. N. BACON (J. Physical Chem., 1928, 32, 801–828).—Experiments are described such as the heating of a mixture of purified vulcanite (shavings or solution, *e.g.*, in cresol or aniline) and raw rubber (solid or solution), the fractional extraction of vulcanised rubber or of a mixture of this and unvulcanised rubber by benzene or xylene, and also the heating of rubber with an organic accelerator and sulphur in butyl alcohol. The results confirm, in its essential features, the early theory of Weber which regards the union between rubber and sulphur in vulcanisation as a chemical one. From the homogeneity of vulcanisates

containing as little as 0.1% S, the view is expressed that the mol. wt. of caoutchouc is at least 32,000.

D. F. TWISS.

Fineness and reinforcing power of rubber fillers. W. ESCH (Gummi-Ztg., 1928, 42, 1921).—The degree of fineness of a compounding ingredient as measured by dividing the weight of 1 c.c. of the closely packed powder by the true sp. gr. falls approximately in the reverse order to its reinforcing power in rubber. The indication is of greater significance in the comparison of fillers of similar chemical composition, the relationship being complicated, apparently, by the chemical action of the natural resin acids on some types of filler.

D. F. TWISS.

Lamellar packing of caoutchouc. M. KRÖGER (Kolloid-Z., 1928, 45, 46–52).—A description is given of experiments on the properties of caoutchouc under lamellar deformation and under stretching. The course of the increase in potential energy, the capacity for such increase, the optical and thermal effects, together with the changes in density and electrical conductivity were investigated for different degrees of deformation and of vulcanisation and at different temperatures: the effect of added substances was also examined. The microscopical appearance of the surface was examined, and an apparatus for its measurement is described.

E. S. HEDGES.

PATENTS.

Manufacture of rubber and similar vegetable resins. DUNLOP RUBBER Co., LTD., D. F. TWISS, and E. A. MURPHY (B.P. 290,313, 13.11.26 and 10.3.27).—Compounding ingredients such as fillers, reinforcing agents, softeners, and agents and accelerators of vulcanisation, previously dispersed in water if desired, are mixed with latex in the presence of one or more stabilisers, *e.g.*, alkali, glue, gelatin, or casein, and the mixtures are concentrated by evaporation while being continuously subjected to dispersive agitation. The introduction of vulcanising agents may be made during the concentration process. Smooth stable creams containing up to 80% of total solids may be thus obtained; their stability and fluidity may be increased by the addition of ammonia; they are especially suitable for the manufacture of articles by spreading, dipping, or deposition processes.

D. F. TWISS.

Production of rubber mixings from latex and filling materials. K.D.P., LTD. (B.P. 277,374, 12.9.27. Ger., 10.9.26).—Latex, preferably concentrated to a paste, is mixed with filling materials, especially lamp black, while constantly forming new surfaces over which the filling materials can be uniformly distributed; the mixture is simultaneously dried. Two heated rollers, one of which is fluted, constitute a convenient device for the operation. It is possible in this way to obtain a mixture containing rubber with twice its weight of gas black.

D. F. TWISS.

Manufacture of cellular rubber and elastic tyres therefrom. F. RINGER (B.P. 290,447, 26.5.27).—Cellular rubber is produced by intimately incorporating carbonates or bicarbonates of heavy metals, *e.g.*, white lead, in a plastic rubber mass and vulcanising

by heat, whereby carbon dioxide is concurrently liberated giving rise to closed cells. By effecting vulcanisation of the mass when occupying part of the internal space of a tube of rubber and/or fabric, the mass swells so as to fill the available space. The unvulcanised mass also may be introduced inside a mould lined with an ordinary rubber mixing; on vulcanisation a rubber tyre is obtained with a cellular interior encased in a solid rubber shell.

D. F. TWISS.

Preservation of [rubber] latex. I. G. FARBENIND. A.-G. (B.P. 289,022, 30.3.28. Ger., 20.4.27).—Coagulation of latex is prevented by the addition of water-soluble, neutral, or alkaline salts of ester acids, e.g., diarylphosphoric acids or methylsulphuric acid; sodium dicresyl phosphate, ammonium diphenyl phosphate, and potassium methyl sulphate are mentioned.

D. F. TWISS.

Preparation of age-resisting rubber compositions. E. I. DU PONT DE NEMOURS & Co., Asses. of H. W. ELLEY (B.P. 276,968, 26.7.27. U.S., 31.8.26).—Secondary aromatic amines, preferably diarylamines, containing substituted or unsubstituted phenyl or naphthyl groups, which are substantially without accelerative action on vulcanisation, are used to impart age-resisting qualities to rubber. Phenyl- and tolyl- α -naphthylamine and diphenyl-, ditolyl- and dixylylamine are mentioned. They are easily dispersed in rubber, and do not lead to "spotting" in the rubber when stored.

D. F. TWISS.

Vulcanisation of rubber. C. O. NORTH and C. W. CHRISTENSEN, Asses. to RUBBER SERVICE LABORATORIES Co. (U.S.P. 1,670,312, 22.5.28. Appl., 19.5.24).—Vulcanisation is effected with the aid of the reaction product of aniline and crotonaldehyde.

D. F. TWISS.

Manufacture of rubber-like products. W. O. HERRMANN and W. HAEHNEL, Asses. to CONSORT. F. ELEKTROCHEM. IND. (U.S.P. 1,672,157, 5.6.28. Appl., 8.11.26. Ger., 23.11.25).—See B.P. 261,748; B., 1928, 132.

Concentration of caoutchouc and the like latices. A. PETERSON (U.S.P. 1,670,900, 22.5.25. Appl., 12.11.25. Ger., 14.11.24).—See B.P. 243,016; B., 1926, 956.

Aldehyde-amine condensation products (B.P. 265,931).—See III.

XV.—LEATHER; GLUE.

Capacity of chrome-tanned leather for absorbing sulphonated and non-sulphonated fats. E. MEZEY (Collegium, 1928, 209—213).—Samples of chrome-tanned leather were fat-liquored with mixtures of sulphonated neatsfoot and untreated neatsfoot oil, sulphonated neatsfoot and mineral oils, sulphonated fish oil and fish oil, and sulphonated fish oil and mineral oil, respectively. The total amount of fat used was constant, and the dry leather was analysed. It is shown that the amount of fat absorbed increases with increase in the proportion of non-sulphonated oil to a maximum beyond which the amount of sulphonated oil is insufficient to emulsify the other oil. The efficacy of a fat-liquor depends not only on the amount but on its composition. The non-sulphonated oil is absorbed

much more readily by chrome leather than is the sulphonated oil.

D. WOODROFFE.

Migration of the masked sulphate groups in chrome alum liquors. W. SCHINDLER and K. KLANFER (Collegium, 1928, 97—107).—Boiled green solutions of chrome alum slowly give up a part of their masked sulphate groups. Additions of sodium carbonate lowered the amount of such groups. The latter depends to a great extent also on the age of the solution before it is made basic. A 43% basic liquor is much more labile than are less basic liquors. This is particularly so with liquors which have been prepared from fresh green chrome alum solutions, an important point in connexion with their tanning properties (cf. Stiasny, B., 1925, 560; Grasser, B., 1921, 709 A). Such changes can be explained by the size of the particles and the degree of "verolung." Dilution does not affect the labile 43% basic liquor. There were occasional increases in the amount of sulphate groups in the chromium complexes, especially with a liquor of 28% basicity, due, possibly, to the decomposition of the carbonato-compounds first formed; in other cases it was caused by variations in temperature. The whole of the sulphate groups in the chromium complex could not be removed by increasing the basicity, even up to 60%. In a few cases on ageing a violet solution there was a migration of sulphate groups into the complex. Chromium chloride liquors behaved differently (cf. Stiasny and Balányi, B., 1927, 393). An addition of potassium oxalate removed all the sulphate groups from the chromium complex. Neutral salts and neutral organic compounds are in part very effective in this respect. In tanning pelt there is always an appreciable diminution in the amount of sulphate groups in the chromium complexes in the chrome liquor. Different amounts of sulphate groups in the chromium complex were found in commercial chrome liquors of similar analytical composition. There were roughly two groups, one containing 0.6 mol. of masked (SO₄) per atom of chromium, and the other 0.8 mol. D. WOODROFFE.

Properties of leather. Retan sole leather. A. C. ORTHMANN (J. Amer. Leather Chem. Assoc., 1928, 23, 184—187).—The water-resisting properties of samples of chrome sole leather, which had been retanned with vegetable tannin, have been determined by the water-absorption method and by making and wearing a sandal. The latter is used on a concrete floor covered with water, and the time noted for the feet to become wet. There was no connexion between the water absorbed in $\frac{1}{2}$ hr. or 3 hrs. and the wearing test. Eight leathers advertised as water-resisting wet the feet in 8—43 min. when tested. The content of fatty matter varied from 2% to 21%, but there was no direct relationship between it and the water-resisting properties. D. WOODROFFE.

Analysis of synthetic tannins. Technical condensation products of aromatic sulphonic acids. I. BERKMANN and A. KIPRIANOV (Collegium, 1928, 177—197).—Total sulphur in the dry synthetic tannin is determined by fusion with sodium carbonate followed by treatment with bromine and precipitation with barium chloride in the usual way. The ash and sulphur present in the product obtained by neutralising the synthetic tannin are also determined. Losses due to

reduction of sodium sulphate to sulphide and volatilisation of the ash are negligible. The results are calculated to SO_3 in the dry product. If A is the total SO_3 in the original product and a that in the ash, x the SO_3 in sulphonic groups and y that as sulphate, then $x = 2(A - a)$ and $y = 2a - A$. Dennstedt's method is also applicable, but is more complicated. The value of a can also be derived by adding the percentage of the ash of the original dry product to the acidity of the dry synthetic tannin calculated as SO_3 . The acidity is determined by titration to p_{H} 7—7.5. When sodium chloride is present in the synthetic tannin, a sample is moistened with sulphuric acid and ashed. To the value obtained is added the acidity of the synthetic tannin. The total chlorine is then determined, and thus the sodium chloride, and expressed as sodium sulphate. This figure is deducted from the sum of the other two determinations and gives a . The purely organic substances of the type $\text{CH}_2(\text{RH})_2$ can be obtained by deducting the percentage of mineral salts from that of the dry neutralised tannin, which gives the pure sulphonated salt, from which the hydrocarbon radical can be calculated. The degree of sulphonation is given by the ratio of combined SO_3 to organic matter, or is better expressed as the average mol. wt. of the sulphonic acid present in the synthetic tannin. The composition of the various commercial products is discussed.

D. WOODROFFE.

Biochemistry of soaking. I. Changes occurring within the skin. E. R. THEIS and E. L. McMILLEN (J. Amer. Leather Chem. Assoc., 1928, 23, 226—233).—Portions of salted hide were soaked for from 0 to 120 hrs. at 25° in water, then surface-washed, digested for 24 hrs. with 20% hydrochloric acid, and the excess acid removed, the residue being taken up in ammonia-free water and separated into the four nitrogen groups (cf. Osborne and Harris, B., 1903, 655). During soaking the amino-nitrogen remains constant, the basic nitrogen decreases greatly during the first 24 hrs. and then only slowly afterwards, and the non-basic nitrogen increases greatly corresponding to the decrease of the basic nitrogen. Analysis of the soaked hide pieces by Van Slyke's method shows that the amount of arginine, lysine, histidine, and imino-nitrogen all decrease, whereas the amino-nitrogen increases correspondingly. It is suggested that the basic amino-acids, particularly arginine, are easily converted by enzymes and bacteria into simpler acids, with the subsequent production of carbamide, which, with the amines, is soluble in the water used for soaking.

D. WOODROFFE.

Determination of insoluble [matter] in tanning extracts. A. TURNBULL (J. Amer. Leather Chem. Assoc., 1928, 23, 224—225).—A method depending on the formation of a suitable filtering medium is described, in which a Schott filter marked "17 G with porous septum No. 1" is fitted into a filter flask and the whole evacuated to a pressure of 15 in. 1 g. of kaolin is then added to 75 c.c. of the tan liquor, stirred, and poured on to the filter, stirring being continued so that the glass rod used gently rubs the whole of the upper surface of the porous septum as the liquor filters through. The liquor is then returned and the process repeated.

D. WOODROFFE.

Measurement of colour of leather with the Pulfrich photometer. F. LÖWE (Collegium, 1928, 197—203).—Applications of this instrument to various samples of leather are described, the particular colour field, percentage of full colour, black, and white, being reported.

D. WOODROFFE.

PATENTS.

Tanning of hides. M. M. MERRITT, Assrs. to UNITED SHOE MACHINERY CORP. (U.S.P. 1,668,652, 8.5.28, Appl., 1.4.22).—Hides are suspended in tanks through which the tan liquor is flowing continuously past them at the rate of over 100 gals./min. The liquor enters the tank at a point below the surface of the liquor near one end and is withdrawn at the other end. A mechanism is arranged to lift the hides into the atmosphere, allow some of the water in the liquor on the hides to evaporate, and then lower them again into the tan liquors.

D. WOODROFFE.

Production of decorative leather from fish skins. S. STRANSKY (B.P. 287,918, 29.3.28. Austr., 29.3.27).—The skins are limed, then two pieces of equal size are fastened together, the inside to the inside, so that they can be readily separated later, and the skins are tanned.

D. WOODROFFE.

Humidification of materials (B.P. 264,538).—See I.

XVI.—AGRICULTURE.

Relation between concentration of mineral elements in a culture medium and absorption and utilisation of those elements by plants. F. W. PARKER and W. H. PIERRE (Soil Sci., 1928, 25, 337—343).—A series of solution culture experiments was set up to determine the minimum concentration necessary for the full growth of maize and soya beans. The values so obtained were compared with the concentrations of these radicals found in displaced soil solutions. The indications are that the soil solution normally contains enough potassium for the complete nutrition of plants, provided that the concentration is maintained during the growing season. The phosphate concentration of the soil solution in many soils is too low, although satisfactory yields of maize are obtained on these soils. This would indicate that root-soil contact is necessary for the phosphate nutrition of plants.

H. J. G. HINES.

Crop-producing power of limited quantities of "essential" plant nutrient. C. HARTMAN, JUN., and W. L. POWERS (Soil Sci., 1928, 25, 371—377; cf. Parker and Pierre, preceding).—Lucerne and wheat were grown in series of water cultures wherein the concentrations of nitrogen, calcium, magnesium, potassium, phosphorus, and sulphur, respectively, varied from nil to a more than adequate amount. It is intended in a further paper to use the results so obtained in comparison with corresponding values for soil solutions in an attempt to discover the minimum and optimum values for plant growth.

H. J. G. HINES.

Relation of concentration of calcium ion required by lucerne to amount present in soil solution. H. W. E. LARSON (Soil Sci., 1928, 35, 399—408; cf. Hartman and Powers, preceding).—Water cultures demonstrated that the minimum concentration of calcium necessary for the growth of lucerne was about 16 p.p.m.

and that the most economical concentration was 32 p.p.m. Determinations of the water-soluble calcium in soils showed that the concentration often fell short of this standard, and that the application of limestone and sulphur remedied this deficiency. Calcium is needed not only to amend the soil reaction, but also as an essential plant nutrient.

H. J. G. HINES.

Influence of soil, season, and manuring on quality and growth of barley, 1926. V. E. J. RUSSELL (J. Inst. Brew., 1928, 34, 307—320; cf. B., 1927, 310).—The year 1926 was abnormal, particularly in its lack of sunshine, and the effect of nitrogenous manure was not quite the same as in the previous four years. At about half the farms the nitrogenous fertiliser gave no increase of crop and in some cases had a harmful effect on the yield. It tended to lower the valuation of the barley and the malt, and to raise the percentage of nitrogen in the barley and lower the 1000-corn weight. The diastatic power of the malts was higher where the barley had received ammonium sulphate, and it was indicated that the diastatic power increased when the nitrogen content of the grain increased. The percentage of nitrogen in the barley did not differ much from those of the previous years, and appeared to be affected more by the soil than by the season or manuring, provided the latter was not too heavy. When the rates of ammonium sulphate were increased there was no increase in barley nitrogen or decrease in the valuation until the amount of manure exceeded 1 cwt. per acre. As in previous years, ammonium chloride proved rather better than the sulphate, since it brought the barley into ear sooner and so made possible a longer ripening period.

C. RANKEN.

Stimulation, toxicity, and antagonism of calcium nitrate and manganese chloride as indicated by growth of wheat roots. L. V. BARTON and S. F. TRELEASE (Bull. Torrey Bot. Club, 1927, 54, 559—577).—Manganous chloride is a stimulant in 0.00001M-solution, and toxic at higher concentrations; calcium nitrate is without effect below 0.00001M, and is toxic above that concentration. Mutual antagonism in mixtures was studied.

CHEMICAL ABSTRACTS.

Comparison of the toxicity and diffusion in a column of grain of chloropicrin, carbon disulphide, and carbon tetrachloride. A. L. STRAND (Minn. Agric. Exp. Sta. Tech. Bull., 1927, 49, 1—59).—A study of relative toxicity to the flour beetle, *Tribolium confusum*, Duv., in relation to concentration, time, and temperature.

CHEMICAL ABSTRACTS.

Susceptibility of wheat to mildew as influenced by salt nutrition. S. F. and H. M. TRELEASE (Bull. Torrey Bot. Club, 1928, 55, 41—68).—Low susceptibility of wheat plants to *Erysiphe graminis* is associated with a high content of potassium dihydrogen phosphate and a low content of calcium nitrate in the culture solution, and *vice versa*. Host vigour and susceptibility are not closely related.

CHEMICAL ABSTRACTS.

Growth of seedlings of conifers in crude humus. I. Transformation of nitrogen in crude humus. H. HESSELMANN. II. Formation of mycorrhiza in connexion with seedlings of *Pinus sylvestris* in different kinds of crude humus. E. MELIN (Rep.

Swedish Inst. Exp. Forestry, 1927, 23, 337—432, 433—494; Proc. Internat. Soc. Soil Sci., 1928, 3, 138—139).—I. The growth of conifer seedlings in sand containing crude humus showed the latter to contain nitrogen in a form capable of rapid conversion into nitrate on exposure. Artificial inoculation with the requisite organisms was important. Crude humus from birch forests proved better than that from pines. There was a very definite connexion between the rate of nitrification of the crude humus, the development of seedlings, and the growth of associated mycorrhiza. The last-named varied with the nature of the humus.

II. The general parallelism between the growth of pine seedlings in humus and the production of mycorrhiza is a direct consequence of the nitrification of the humus, and the rate at which this occurs tends to regulate the symbiotic relationship. A. G. POLLARD.

Calcium ion and root-growth. W. MEWIUS (Jahrb. wiss. Botanik, 1927, 66, 183; Bied. Zentr., 1928, 57, 112—114). O. LOEW (Forts. Landw., 1927, 2; *ibid.*).—The classification of plants according to the effect of calcium salts on their growth is considered in view of the results of treatment with potassium chloride and magnesium sulphate as influenced by reaction and temperature. The theory of the "lime factor" (Loew) is not fully supported by the author's results, which accord more closely with the Hanstein-Cranner conception of the effect of the calcium ion in reducing the permeability of the protoplasm. Other injurious effects follow this action. The stability of protoplasmic permeability is specific to plants.

Loew observes that the death of cells brought about by treatment with salts which precipitate calcium can be watched microscopically, and asserts that the cell nucleus contains important calcium compounds, and when these are decomposed by precipitation the cell must die. This view does not conflict with the fact that potassium carbonate and sodium orthophosphate are less active in destroying protoplasm than are potassium oxalate, sodium fluoride, and sodium pyrophosphate.

A. G. POLLARD.

Action of soil acids on cultivated plants. H. FORKERT (Diss., Hamburg, 1925; Bied. Zentr., 1928, 57, 108—110).—The exchange acidity plays a prominent part in the effect of soil acids on plant growth. In water cultures, nutrient solutions having a p_H value below 5 are injurious. In ranges of less acidity crop increases are obtained. Corresponding effects are observed in soils. Among plants examined in the seedling stage, oats are the most sensitive to acidity, followed in order by barley, rye, and wheat. Peas, flax, and sugar beet are but slightly affected by soil acids. Among cereals, acidity brings little change in straw yields, and the relative grain yield is affected only when the total acidity is above 10 c.c. No morphological differences are noted.

A. G. POLLARD.

Effect of potassium salts on availability of nitrogen in ammonium sulphate. W. B. MACK and D. E. HALEY (Soil Sci., 1928, 25, 333—336).—Potassium chloride appeared to decrease the availability of the nitrogen in ammonium sulphate as judged by the crop yields of a ten-year manurial experiment on crops in

rotation. Laboratory experiments showed that potassium salts had no consistent inhibitory effect on nitrification, and that their adverse effect could not be ascribed to this cause.

H. J. G. HINES.

Technique of pot experiments [with plants]. K. MAIWALD (*Landw. Versuchs-Stat.*, 1928, **107**, 342—363).—A review of the whole technique wherein several sources of minor errors are revealed. The Wiley mill is recommended for preparing crops for analysis.

H. J. G. HINES.

Sodium hydroxide rather than sodium carbonate the source of alkalinity in black alkali soils. J. F. BREAZEALE and W. T. McGEORGE (*Arizona Agric. Exp. Stat. Tech. Bull.*, 1927, [13], 307—334).—There is an apparent decrease in the hydroxyl and hydrogen carbonate ions (expressed in terms of dry soil) as the ratio of extracting water to soil is decreased. The true soil solution in most black alkali soils contains few or no hydroxyl ions, no sodium carbonate, and usually very little sodium hydrogen carbonate. Electrometric or colorimetric titration of the soil solution indicates the nature of the components producing the alkaline reaction. The alkalinity of sodium hydroxide produced by the hydrolysis of sodium zeolite is usually mistaken for that of sodium carbonate. In the reclamation of black alkali soils by leaching there is a gradual interaction between sodium zeolite and calcium carbonate. The presence of a common ion, *e.g.*, as sodium chloride, depresses the ionisation of sodium zeolite, and prevents the appearance of hydroxyl ions. If a black alkali soil contains excessive amounts of sodium salts, application of gypsum has little or no effect until the sodium salts are removed by leaching. Free carbon dioxide does not exist in a black alkali soil solution or atmosphere.

CHEMICAL ABSTRACTS.

Toxicity of salines that occur in black alkali soils. J. F. BREAZEALE (*Arizona Agric. Exp. Stat. Tech. Bull.*, 1927, [14], 337—357).—The presence of finely-divided insoluble substances does not affect the toxicity of alkali salts in solution. The endurance limit of a plant for an alkali should be based on the composition of the soil solution at the wilting-point. The toxicity of alkali salts is a function of both molecules and ions. Colloids do not affect the toxicity of sodium carbonate, which does not exist in toxic concentrations in ordinary black alkali soils. Both sodium hydroxide and sodium carbonate act as stimulants to plants in all concentrations usually present in the soil solution of such soils. The infertility of black alkali soils is due to their not readily taking up water, not draining rapidly, and to the fact that they often contain toxic amounts of sodium chloride and sulphate.

CHEMICAL ABSTRACTS.

Aluminium hydroxide in alkaline soils and its effect on permeability. W. T. McGEORGE, J. F. BREAZEALE, and P. S. BURGESS (*Arizona Agric. Exp. Stat. Tech. Bull.*, 1927, [12], 1257—1305).—The appreciable amounts of water-soluble aluminates present in black alkali soils result from the solvent action of alkali hydroxide; when the alkalinity is lowered, *e.g.*, by leaching, colloidal aluminium hydroxide is precipitated, greatly reducing the capillary movement of water and the permeability of the soil for water. For

the reclamation of alkali soils, intermittent leaching and drying, or leaching during the summer when the water is warmer, is advocated.

CHEMICAL ABSTRACTS.

Replaceable bases in some soils from arid and humid regions. M. D. THOMAS (*Soil Sci.*, 1928, **25**, 379—392).—Eight clay soils and a natural mineral colloid similar to bentonite were treated so as to exchange their bases for a single base. They were then washed until soluble salts were removed as indicated by the tendency of the soil to disperse. Successive water extracts were then made and analysed, and were compared with water extracts of the untreated soil. The alkali soils showed marked differences in behaviour from the soils from humid regions. These were in the main due to the presence of soluble silicates and the ease with which sodium came into solution after the removal of soluble salts.

H. J. G. HINES.

Exchangeable bases in soil. V. NOVÁK and B. MALÁČ (*Bull. Czechoslov. Acad. Agric.*, 1927, No. 5; *Proc. Internat. Soc. Soil Sci.*, 1927—8, **3**, 73—74).—*Carbonate free soils.* The methods of Hissink, Gedroiz, and Kelley for determining exchangeable bases in soils give comparable results. By the Kelley method the sum of the individual bases agrees with the amount of ammonia absorbed from ammonium chloride. In podsol profiles iron and aluminium must be included in the calculation of exchangeable bases. The Gedroiz (0.05*N*-hydrochloric acid) method in many cases involves some decomposition of the absorbing complex, and in neutral soils the liberation of detectable amounts of iron and aluminium. During the operation of all methods (Hissink not examined) considerable amounts of silica may be rendered soluble. In degraded tchernosem profiles, where the A_1 and A_1' horizons are carbonate-free and the C horizon contains much chalk, only sodium, potassium, magnesium, and calcium were found among the absorbed bases. Iron and aluminium only appeared when the Gedroiz method was adopted. Calcium was usually present in greatest amounts, and sodium and potassium only to a small extent. Podsol profiles with acid reaction differ from tchernosem in having only a small content of total exchangeable bases and by the presence among these of iron and aluminium. In horizons A and A_1 the sum of replaceable iron and aluminium represents 60—70% of the total replaceable bases, whereas in horizons B and C_1 calcium and magnesium are predominant, and the iron and aluminium content falls to 5—9%.

With soils containing carbonates the Hissink and Kelley methods diverge considerably, the former giving values averaging twice those of the latter. Bobko-Askinas's method agrees with Hissink's. Gedroiz's method using 0.05*N*-ammonium chloride yields irregular results. Using *N*-ammonium chloride the Gedroiz method gives values double those by Hissink's. Generally speaking, for carbonate-free soils, the Gedroiz simplified method (0.05*N*-ammonium chloride) is recommended for speed and ease of working. For determining total bases without individual identification, Kelley's method is better. None of the processes examined gives a reliable and satisfactory result for soils containing carbonate.

A. G. POLLARD.

(To be concluded on July 27.)