

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

FEBRUARY 17, 1928.

I.—GENERAL; PLANT; MACHINERY.

Grinding processes. W. OSTWALD and W. STEINBACH (Kolloid-Z., 1927, 43, 355—359).—The grinding of substances is considered from the point of view of the structure of the material to be milled. Quantitative experiments on the grinding of a number of different types of substances, carried out between +50° and -15°, showed in all cases that the degree of subdivision is greater the lower the temperature. E. S. HEDGES.

Grain composition of dusts and powders. W. BALTRUSCH (Z. angew. Chem., 1927, 40, 1450—1451).—By sedimentation in a viscous solution of celluloid in anhydrous acetone, a dust may be classified into sized particles, the viscosity of the solution being chosen so that differences of density of the particles exercise only a small effect compared with that of particle size. An apparatus and method are described by which dust analyses may be carried out. S. I. LEVY.

New viscosimeter and stagonometer. J. TRAUBE and J. MAGASANIK (Z. angew. Chem., 1927, 40, 1449—1450).—The apparatus consists of several capillary tubes of increasing diameter, one end of each being bent at nearly a right angle. The tubes are calibrated by employing in the narrowest water and dilute glycerin solution, in the next the same glycerin solution and one less dilute, and so on. Instead of employing several tubes, one tube inclined at increasing angles to the horizontal as the viscosity increases, and calibrated for each angle by the same method, may be used. The same tubes with appropriate modifications may be used to measure surface tensions by the drop method. S. I. LEVY.

Measurement of viscosity, especially of egg-white. J. JOCHIMS (Kolloid-Z., 1927, 43, 361—366).—The viscosity of a liquid which forms threads on drawing is a constant characteristic which can be measured by the length of the thread produced under standard conditions. To replace the present technical method of taking a sample of the liquid between two fingers and then moving them apart until the thread of liquid breaks, the author has adapted the principle of Tammann and Tampke (cf. A., 1927, 618), and an apparatus is described which gives reproducible results and in which a measurement takes only a few minutes. The whites of various hens' eggs give the same value. The viscosity falls rapidly with rising temperature. Addition of a few drops of potassium hydroxide or sodium chloride solutions decreases the viscosity. A similar effect, but to a less degree, is produced by addition of distilled water. E. S. HEDGES.

Automatic humidity control. W. H. APHORPE

and J. J. HEDGES (J. Sci. Instr., 1927, 4, 480—483).—A control which has proved satisfactory in maintaining a room at constant humidity is described. The principle involved is that of the ordinary hair hygrometer, the elongations or contractions of a horsehair consequent on variations in the humidity operating a system of electrical relays which govern the supply of dry or moist air. J. S. CARTER.

PATENTS.

Conducting catalytic reactions and absorptions. I. G. FARBENIND. A.-G., Assees. of C. SCHNEIDER and K. DIETRICH (G.P. 445,252, 5.10.23).—A catalyst comprising the carbonised residues of lignite after removal of dust and loose ash is claimed. The material is made into balls or briquettes for use. A. R. POWELL.

Drying and burning material in shafts. I. G. FARBENIND. A.-G., Assees. of F. WINKLER (G.P. 444,847, 7.3.24).—The material is charged on to a grate at the bottom of a shaft, and a current of hot waste gases from a furnace is passed under pressure through the mass so as to keep the particles suspended in the gas stream and thereby ensure rapid drying or burning. When the operation is finished the pressure in the shaft is utilised in ejecting the material therefrom. A. R. POWELL.

Recovery of volatile solvents by means of inert gases. R. OERTEL (G.P. 444,913, 10.7.25).—In the process of recovering volatile solvents by means of a circulating stream of inert gas, any oxygen taken up in the circuit is removed by passing the gas through a washing and filtering device containing an alkaline solution of pyrogallol in a suitable solvent. In the recovery of volatile liquids from non-circulating gas streams the oxygen filter may be conveniently arranged to prevent resinification of the absorbent medium. A. R. POWELL.

Recovery of volatile solvents by adsorption. METALLBANK U. METALLURGISCHE GES. A.-G. (F.P. 622,147, 17.9.26).—The gases containing the vapours of the volatile solvent are diluted with a sufficient quantity of inert gas previous to being brought into contact with the adsorbent material. A. R. POWELL.

Apparatus for recovering organic vapours from air. I. G. FARBENIND. A.-G. (G.P. 444,955, 25.5.22).—The gas stream is passed under pressure through a vessel containing an absorbent material arranged in thin layers on trays which may be heated or cooled as desired. A. R. POWELL.

Separation of volatile liquids with high boiling points. SOC. ÉTABL. BARBET (F.P. 620,332, 21.12.25).—Calcium chloride is dissolved in the liquid containing,

for example, acetic acid, crude alcohol, fatty acids, etc., which is then subjected to fractional distillation.

A. R. POWELL.

Separation of liquids [e.g., oil from water]. COMP. DES FREINS WESTINGHOUSE (F.P. 621,638, 17.9.26).—The apparatus comprises a centrifuge in connexion with a storage vessel into which the treated liquid passes, and which is provided with an automatic valve through which the separated liquids are periodically discharged.

A. R. POWELL.

Separating mixtures of two liquids. E. MERCK, CHEM. FABR., Assees. of O. VON HEUSSLER (G.P. 445,240, 9.12.24).—The mixture is treated with a third liquid, with which it forms an azeotropic system, and the mixture is distilled under increased pressure.

A. R. POWELL.

Apparatus for the clarification of liquids. G. DURET (F.P. 621,744, 22.1.26).—The liquid is centrifuged together with a heavy liquid the density of which is greater than that of the densest particles, so that the suspended matter is forced to the surface of the heavy liquid, from which it may readily be removed.

A. R. POWELL.

Apparatus for treating liquids with gases or for roasting pyrites. M. DREES (G.P. 444,911, 3.9.25).—The apparatus comprises a large cylindrical vessel containing a series of superimposed annular troughs disposed regularly around the walls in such a manner that the bottom of one trough dips just below the surface of the liquid in the next lower trough. The troughs are provided with corrugated bottoms carrying stirring devices, and their side walls slope outwards in smooth curves. The troughs are alternately fixed to the side walls and to a rotating central axis, so that liquid-sealed chambers are formed between one pair of troughs and the side walls, and between the next pair and the centre column alternately; during use the gas is forced from the central axis through the liquid into the outer chambers, and passes back again through more liquid to inner chambers. The apparatus is adapted to the roasting of pyrites by providing the troughs with heating flues and suitable rables.

A. R. POWELL.

Apparatus for treating gases with liquids. M. DREES (G.P. 444,912, 3.9.25).—The apparatus comprises a series of S- or Z-shaped concentric bands attached to a rotating central axis and sloping in such a way that liquid supplied to the lower curved portion of one band is forced by the rotation of the band upwards over the top curve and falls into the lower curve of the next band. Liquid from the outermost band falls into a reservoir whence it is returned by pipes to the innermost band, so that the process is continuous. By perforating the top curves of the bands the lower sides are wetted, thus providing additional surface for washing or absorbing the gas.

A. R. POWELL.

Apparatus for washing and purifying gases. L. MOURGEON (F.P. 621,347, 6.1.26).—An apparatus for removing suspended solids from gases comprises a conical vessel in the middle of which is a tube for the introduction of the gas. The end of the tube, which dips below the washing liquid, is provided with a conical valve having a ring-shaped aperture through which the gas

passes, thereby forcing the liquid upwards against a baffle plate.

A. R. POWELL.

Apparatus for the purification of air and gases from suspended matter. DEUTSCHE GASGLÜHLICHT-AUER-GES.M.B.H. (G.P. 444,910, 29.11.24).—The air or gas is passed through a slit which directs it at an angle on to the surface of a porous plate consisting of material which will adsorb the suspended impurities. To ensure a more perfect removal of these particles they may be given an electrical charge as they pass through the aperture of the slit.

A. R. POWELL.

Drying of gases and vapours by means of active adsorbent material. I. G. FARBENIND. A.-G. (F.P. 621,964, 24.9.26. Ger., 14.10.25).—The gases and a suitable adsorbent material, e.g., silica gel, activated alumina or bauxite, or adsorbent charcoal, are passed on the counter-current principle through a heated rotating cylinder.

A. R. POWELL.

Lubricant. I. G. FARBENIND. A.-G., Assees. of W. WILKE (G.P. 445,116, 23.12.25).—Finely-divided ferric oxide obtained by the combustion of iron carbonyl is used as a lubricant, either alone or mixed with other substances. The material possesses lubricating properties equal to those of graphite.

A. B. MANNING.

Analytical centrifuge [for colloids]. T. SVEDBERG and J. B. NICHOLS (U.S.P. 1,648,369, 8.11.27. Appl., 10.9.23).—An apparatus for determining the minimum size of the dispersed particles in a colloidal solution comprises a horizontal glass tube which rotates in a horizontal plane through a vertical beam of light in a radial plane. The rate of rotation is sufficient to produce a continuous image. The speed at which the meniscus formed by the colloidal particles travels towards the outer end of the tube at a given rate of rotation is observed, and a modified form of Stokes' law is applied. Photographic determination of the variation in light absorption along the tube enables the volumes of the different sized particles of a non-uniform colloid also to be obtained.

T. S. WHEELER.

Laboratory tongs. E. H. FISHER, Assr. to FISHER SCIENTIFIC CO. (U.S.P. 1,653,803, 27.12.27. Appl., 31.3.27).—The tongs consist of two jaws, one being flat and the other trough-shaped and having at the far end an inturned flange; the flat jaw terminates short of the flange, thus enabling a casserole handle to be held without a rotating or longitudinal movement.

H. ROYAL-DAWSON.

Carrying on catalytic reactions. F. A. CANON and C. E. ANDREWS, Assrs. to SELDEN CO. (Re-issue 16,824, 20.12.27, of U.S.P. 1,614,185, 11.1.27).—See B., 1927, 175.

Recuperative furnace. C. STEIN, Assr. to SOC. C. M. STEIN & CIE. (Re-issue 16,826, 20.12.27, of U.S.P. 1,350,624, 24.8.20).—See B., 1920, 662 A.

Pulverising or grinding mill. B. SCHERBAUM (U.S.P. 1,653,472, 20.12.27. Appl., 17.12.25. Ger., 24.12.24).—See B.P. 245,097; B., 1926, 424.

Centrifugal machine. M. L. SANSARICQ (U.S.P. 1,655,774, 10.1.28. Appl., 29.5.26. Cuba, 29.4.26).—See B.P. 272,047; B., 1927, 639.

Centrifugal liquid atomiser. F. WREESMANN (U.S.P. 1,655,932, 10.1.28. Appl., 19.8.26. Ger., 13.11.24).—See B.P. 269,774; B., 1927, 689.

Separation of solid and liquid materials (B.P. 279,525).—See II.

II.—FUEL; GAS; TAR; MINERAL OILS.

Coal cleaning and its relation to the cost and quality of coke. G. W. J. BRADLEY (Fuel, 1928, 7, 31—36).—Tests have been carried out on a Coppée washer with a number of South Yorkshire coals, the effect of washing on the ash distribution in the various sizes of coal, as well as their salt and sulphur content and coking power, being examined. Screening tests show that in any fraction the shale particles are generally larger than the coal particles, due to their more elongated or flatter shape. Shale which passed a $2 \times \frac{1}{2}$ in. oblong mesh was retained on a $\frac{1}{2}$ in. sq. mesh. Washing begins to be unsatisfactory for sizes below $\frac{1}{8}$ in. It is concluded that the fine slurry-making material should be withdrawn from the coking slack prior to washing, and should not be remixed with the washed slack; remixing results in a coke the ash of which is variable within wide limits. Moreover, the elimination of fines results in some gain in output and quality as well as uniformity. It is suggested that the price of coal be based on quality as determined by the removable dirt. The economic considerations involved are briefly discussed.

A. B. MANNING.

Absorption of oxygen by preheated coal. G. COLES and J. I. GRAHAM (Fuel, 1928, 7, 21—27).—Three coals of different types were heated *in vacuo* at temperatures from 200° to 500°, and the effect of the preheating on the amount of oxygen which they absorbed at 100° (after 48 and 180 hrs., respectively) was studied. In general, the oxygen absorption increased with rising preheating temperature to a maximum, and then fell eventually to a value lower than that of the fresh coal. The maximum occurred in the region 300—400°, and varied greatly in amount with the different coals. The oxygen absorptions at 50° and 100° of a number of other coals were determined similarly before and after heating *in vacuo* at 300°. The bituminous coals all show a substantial increase in oxidation after such treatment. The oxygen absorption by the anthracites appears to be speeded up in rate, but unchanged in total amount. The oxygen absorptions of the untreated coals are greater the higher the oxygen content of the coal, but for the bituminous and lignitic coals the percentage increase in oxidation due to preheating is smaller the greater the oxygen content, and for lignites may be negative. The production of carbon monoxide and dioxide during the oxidations has also been measured. Preheating in nitrogen under pressure has the same effect on the oxygen absorption as heating *in vacuo*. The bearing of the results on the liability of coals to spontaneous firing is discussed.

A. B. MANNING.

Dispersoid chemistry of peat. V. Dehydration of peat at temperatures below 100°. W. OSTWALD and A. WOLF (Kolloid-Z., 1927, 43, 336—345).—A description is given of an apparatus for the investigation of the loss of water by peat at temperatures of 100°

and below, with or without pressure. Peat gives up its water spontaneously, the more readily the nearer the temperature is to 100°. Intermittent passing of air through the peat accelerates the drying only at lower temperatures (e.g., 80°), but a continuous air current produces a better effect. Water is lost much more readily at 100° in a current of air, but the rate is not proportional to the pressure of air. The results support the view that the high-temperature treatment causes a destruction of the humus gel and a loosening of the bound water.

E. S. HEDGES.

Utilisation of cob char as carburising agent. H. L. MAXWELL (Proc. Iowa Acad. Sci., 1926, 33, 174).—The residue from the distillation of corn cobs can replace bone char in the carburising process.

CHEMICAL ABSTRACTS.

Cracked-oil gas used for coastal lighting. R. DELAPLACE (Compt. rend., 1927, 185, 1469—1472).—A new French lighthouse illuminating gas has the composition: methane, 51.87%; ethane and homologues, 17.61%; ethylene, 10.15%; propylene and homologues, 7.76%; acetylene and homologues, 11.30%; hydrogen, 1.28%. It has a higher calorific value than the gas formerly used, and possesses the advantages without the disadvantages of the Dutch and German products (purified by liquefaction and rectification) in that it is stable, has a good lighting power, and is easily compressed without elimination of the higher ethylenic hydrocarbons.

J. GRANT.

Compression of town gas. J. CHAPPUIS and A. PIGNOT (Compt. rend., 1927, 185, 1486—1488).—Curves in which the percentage of oxygen in town gas is plotted against the pressure show that at 20° the region of inflammability increases rapidly when the pressure rises from 1 to 50 kg., but above this pressure the upper limit remains almost constant. The maximum amount of oxygen which may be safely mixed with town gas under a pressure of 150—200 kg. is less than 10%. At 40° and 80° the increase in the region of inflammability is small, and slow-stage compression must be used to keep the temperature below 80°.

J. GRANT.

Determination of hydrogen in complex gaseous mixtures by absorption in colloidal palladium solution. A. E. BEET (Fuel, 1928, 7, 44—46; cf. Hempel, B., 1912, 911).—A 1—2% solution of colloidal palladium, stabilised by sodium protalbinat and containing sodium picrate, forms a convenient reagent for the determination of hydrogen in gas mixtures with the Bone-Wheeler apparatus. An additional absorption vessel is attached to the apparatus for the purpose, the mercury trough resting on an electric heater so that the reagent may be warmed to 50°. At this temperature absorption is complete in about 10—15 min. Carbon dioxide, oxygen, olefines, and carbon monoxide interfere with the determination, and must first be removed from the gas mixture by the usual methods.

A. B. MANNING.

Graphical calculation of gas combustion analyses. R. JELLER (Z. anal. Chem., 1927, 72, 249—261).—Eight examples of a graphical method of calculating the composition of gas mixtures from the combustion results, i.e., contraction in volume, volume of carbon dioxide

formed, and volume of oxygen used, are given, together with details of the procedure used in constructing the graphs.

A. R. POWELL.

Determination of tarry substances in oil products. N. TSCHERNOSHUKOV (Neftjanoe Chozjajstvo, 1927, 12, 697—698).—Sulphuric acid (d 1.84, 5 c.c.) and the product (5 c.c.) are vigorously shaken for 5 min.; if a clear separation is not obtained, 1—2 drops of naphthenic acid are added and the mixture, after shaking, is centrifuged for 5 min.

CHEMICAL ABSTRACTS.

Determination of paraffin in petroleum products. N. TSCHERNOSHUKOV (Neftjanoe Chozjajstvo, 1925, 9, 77—80).—The sample (10 g.) is shaken until dissolved with petroleum (b.p. 780°, 10—15 pts.); sulphuric acid (d 1.84, 15—20 c.c.) is added, the mixture shaken for 5 min. and kept for 1 hr. The volume of the colourless, even turbid, petroleum layer is determined. Of this, 50—100 c.c. are evaporated to 10—15 c.c., ether (30—40 c.c.) is immediately added, and ethyl alcohol (30—40 c.c.), the temperature being maintained at -20° . The precipitate of paraffin is rapidly separated by filtering at the pump. A solubility correction is unnecessary. The ether-alcohol mixture can be replaced by butanone. Hard and soft fractions may be determined by precipitating at 0° and then at -21° . Turbid petroleum may be neutralised with 2.5% sodium hydroxide, or mixed with fuller's earth and extracted with light petroleum.

CHEMICAL ABSTRACTS.

Origin and constitution of naphthenic acids.

B. TIUTIUNNIKOV (Neftjanoe Chozjajstvo, 1926, 10, 797—806).—Theories of the origin of naphthenic acids are discussed, and experimental data bearing on the problem are recorded.

CHEMICAL ABSTRACTS.

Asphalt tars. I. Terminology, methods of testing, and standards. II. Characterisation of the asphalt tars of the U.S.S.R. [Russia]. A. SACHANEN and L. SHERDEVA (Neftjanoe Chozjajstvo, 1926, 10, 393—397).

Conversion of alcohols into petroleum.—MAILKE and RENAUDIE—See III.

PATENTS.

Coke ovens. R. E. ELLIS. From FOUNDATION OVEN CORP. (B.P. 279,955, 7.8.26).—In coke ovens where the oven is tapered from the pusher to the coke side, air is admitted through a wind box at each end of the regenerator extending from the front to the back of the oven, and uniform heating is obtained by the use of ports graduated in size to the taper of the oven. The air passes through the ports to vertical combustion flues arranged in pairs or groups and connected with regenerators. Each alternate flue acts either as a combustion flue or waste-gas flue, and after combustion the waste gases pass down through graduated ports to the regenerator and on to the waste-gas flues situated at each side of the battery.

A. C. MONKHOUSE.

Generator-oven for the production of coke and gas. R. GEIPERT (G.P. 444,476, 26.10.23).—Two recuperator channels are situated at the exit from the combustion chamber; one preheats the secondary air and the other the primary air to the producer. Efficient heat economy is thereby attained.

A. B. MANNING.

Transportable apparatus for the manufacture of charcoal. A. ENDERS, R. BILLEN, and CARBONISATION INDUSTRIELLE (SOC. ANON.) (B.P. 279,709, 9.4.27).—Wood is carbonised in a retort superimposed on a furnace. The gases from the furnace pass through the retort and the combined gases after passing through condensers are led beneath the grate of a second furnace where a conversion into carbon monoxide takes place. The gases are burnt and pass up through a similar retort where they dry and subsequently carbonise the contained wood. The periods of drying and carbonisation are 2 hrs. each. Working is continuous, both furnaces act in turn as a gas generator, and the retorts are connected alternately to the condensers during the carbonisation period. When sawdust or similar material is carbonised, the retort is fitted with concentric, perforated sheet metal tubes, and the hot gases circulate in the annular spaces.

A. C. MONKHOUSE.

Utilisation of pulverulent or powdered carbonaceous materials. J. J. C. BRAND and B. LAING (B.P. 279,767, 26.5.26).—In order to ensure intimate mixing of powdered fuel and air, and to prevent a flashback from the burner, one or more gauze diaphragms are inserted in the pipe line close to the burner nozzle. The gauze can be rotated or removed for cleaning purposes.

A. C. MONKHOUSE.

Separation of solid and liquid materials [washing of coal etc.]. A. E. LEEK, and WIGAN COAL & IRON CO., LTD. (B.P. 279,525, 22.4.26 and 8.1.27).—Liquid slurry (e.g., from coal washing) is fed into a tall container capable of withstanding up to 30 lb./sq. in., and in which are a number of dished trays consisting of a perforated plate and a wire mesh. When the container is full the trays are brought into a horizontal position and the slurry kept for some time to allow the solid material to settle on the trays. Air or water pressure is supplied at the top of the container, and the slurry of each layer is filtered through a bed of material on the tray slightly coarser than the material in suspension. The clear water is withdrawn from the interior of the trays and from the bottom of the container. Fresh slurry is then pumped in and the process repeated until the trays require emptying. Double trays capable of being rotated through 180° may also be used.

A. C. MONKHOUSE.

Treatment [washing] of coal etc. WIGAN COAL & IRON CO., LTD., and A. E. LEEK (B.P. 279,766, 22.4.26).—In a coal-washing plant the slurry is removed and treated as in B.P. 279,525 (preceding) and the clean water is returned to the washing plant. Using a Wigan coal, the cake obtained from the filtered slurry contained 15% of moisture, 8% of ash, and 77% of coal.

A. C. MONKHOUSE.

Washing of coal, ores, etc. L. HOYOIS (B.P. 265,202, 26.1.27. Belg., 26.1.26. Addn. to B.P. 258,753; B., 1926, 971).—As lighter particles tend to be carried with the current of liquid through the openings through which the denser particles pass, a second trough with an adjustable partition is used and the liquid is diverted without disturbing the separation. In order to classify the products more accurately, boxes are arranged beneath the discharge orifices with auxiliary currents

of liquid which prevent the liquid in the trough and the lighter fractions passing through the orifice.

A. C. MONKHOUSE.

Apparatus for the separation of volatile products from solid carbonaceous material. R. E. COTTERMAN (U.S.P. 1,650,191, 22.11.27. Appl., 20.8.25).—Fuel is carbonised in a horizontal cylindrical retort which is heated externally. The conveyor moving the fuel along the retort is operated in conjunction with the valve regulating the feed of fuel and also the valve withdrawing the carbonised fuel. A. C. MONKHOUSE.

Apparatus for recovering the volatile products from carbonaceous material. M. J. TRUMBLE (U.S.P. 1,651,647, 6.12.27. Appl., 11.7.22).—The material is fed by conveyor to a separator to which steam is admitted, and, after removal of the volatile products, is discharged by means of a water-cooled conveyor. The preheated water is used for steam generation, and the waste heat from the separator serves to preheat the feed material.

A. C. MONKHOUSE.

Facilitating the briquetting of coal. P. PETROFF (F.P. 621,742, 22.1.26).—Powdered coal is treated with acid solutions, *e.g.*, dilute formic or acetic acid, prior to briquetting in admixture with tar, pitch, or masut.

L. A. COLES.

Pressure regulation in the hydrogenation of coal. SOC. INTERNAT. DES COMBUSTIBLES LIQUIDES (F.P. 618,674, 8.7.26. Ger., 15.12.25).—The hydrogenation is carried out at 450° under a pressure of 150–200 atm. in three chambers. The partially hydrogenated product from the first chamber passes into a separating vessel, from which the volatile products are allowed to escape; the liquid, however, passes into the second chamber in which it is further hydrogenated. The process is repeated in the third chamber. The escaping volatile products are cooled and condensed.

A. B. MANNING.

Working-up residues produced in the liquefaction of coal. SOC. INTERNAT. DES COMBUSTIBLES LIQUIDES (F.P. 618,647, 7.7.26. Ger., 11.12.25).—After removal of the light hydrocarbons and water the solid residue is treated with about 20% of an aliphatic hydrocarbon, *e.g.*, crude petroleum. After heating at 200° for 1 hr. about 40% of hard asphalt is precipitated, and after a further 3–5 hrs. heating about 40% of a soft asphalt free from solid insoluble matter separates. A red-brown liquid oil of low asphalt content remains, and is purified by steam distillation. The same process can be applied to other bituminous material.

A. B. MANNING.

Purification of graphite by flotation. J. F. M. R. DE ROBILLARD (F.P. 621,414, 4.3.26).—The graphite is stirred with hydrocarbons and subjected to reduced pressure to remove absorbed gases under such conditions as to expose the smallest possible liquid surface, so that the graphite particles sink through a layer of water or other liquid on to a strainer.

L. A. COLES.

Production of synthetic fuel. C. LAILLET, A. CHAIX, and J. CHENAIL (F.P. 621,728, 21.1.26).—The superheated vapour of a volatile solvent such as acetone,

ether, benzene, toluene, carbon tetrachloride, petrol, etc. is passed at the ordinary pressure into a closed vessel containing powdered or granulated coal, anthracite, lignite, shale, asphalt, peat, etc., until the temperature reaches 450–500°. The solvent is recovered by evaporation from the liquid extract, and the residue is used as fuel.

L. A. COLES.

[Non-knocking] fuel composition. S. P. MARLEY and W. A. GRUSE, Assrs. to GULF REFINING CO. (U.S.P. 1,645,109, 11.10.27. Appl., 28.7.24).—An aminoaryl alkyl ether, *e.g.*, *p*-phenetidine (2.5%), is added to petrol to inhibit knocking.

T. S. WHEELER.

Fuel for internal-combustion engines. SOC. LEFRANC & CIE. (F.P. 622,077, 3.4.26).—Complex ketones prepared as described in F.P. 566,343 (*cf.* E.P. 216,120; B., 1925, 337) are added as stabilisers to mixtures of petroleum and alcohol etc.

L. A. COLES.

Working of gas retorts. KOHLENVEREDLUNG A.-G., Asses. of KOHLENVEREDLUNG G.M.B.H. (B.P. 267,153, 7.3.27. Ger., 5.3.26).—In the low-temperature distillation of brown coal the disadvantages due to fine dust in the fuel are overcome by removing the dust before carbonisation by means of wind sifters, sieves, or electrical dust removers. [Stat. ref. to B.P. 2513 of 1888.]

A. C. MONKHOUSE.

Gas producer. J. F. M. FAYET (F.P. 620,083, 10.8.26).—The air necessary for combustion is preheated by the hot gases and charged to a greater or less amount with water vapour before its introduction within the double walls of the producer.

A. B. MANNING.

Gas manufacture. W. S. YARD and E. N. PERCY (U.S.P. 1,649,640, 15.11.27. Appl., 4.2.24).—Carbon is heated to incandescence in a producer by means of a continuous air-blast and oil is injected on to the top of the fuel bed. The gases thus obtained then pass through particles of carbon heated by the passage of an electric current and further oil is added.

A. C. MONKHOUSE.

Recovery of gases and vapours from coke-oven gas. RHENANIA-KUNHEIM VER. CHEM. FABR. A.-G., Asses. of H. FRITZWEILER, W. GROB, and C. B. STUER (G.P. 444,136, 17.7.24).—The hot gases traverse a number of chambers which contain adsorbent material presenting a large surface, and which are fitted with means for their direct internal, or internal and external heating. The sensible heat of the gases is utilised in driving off the adsorbed gases and vapours from the saturated filling material in one chamber, and the gases then, before entry into the adsorbing chamber, are freed from impurities which would diminish the efficiency of adsorption.

A. B. MANNING.

Purification of gas of the kind derived from the distillation of coal or coke. "AMMONIA" (B.P. 263,830, 24.12.26. Fr., 4.1.26).—Coal gas is washed under pressure with cold water in a tower scrubber to remove carbon dioxide and hydrogen sulphide. The water leaving the scrubber is used to drive a turbine or Pelton wheel where some of the gases are evolved; the water is then pumped to a tower through which air is blown, the gases escape into the atmosphere, and the water is returned for circulation to the scrubber.

A. C. MONKHOUSE.

Gas-purification process. F. W. SPERR, JUN., and D. S. JACOBSON, Assrs. to KOPPERS Co. (U.S.P. 1,653,933, 27.12.27. Appl., 19.5.25).—Sodium thiosulphate formed in gas-purification liquors is fused in a furnace, and the product is mixed with carbonaceous material and limestone and further heated, whereby conversion into sodium carbonate takes place. H. ROYAL-DAWSON.

Apparatus for producing and treating gas. H. A. DREFFEIN (U.S.P. 1,650,614, 29.11.27. Appl., 30.9.22).—The gases are passed through a coke-filled scrubber consisting of a cylinder surmounted on and projecting into a short cylinder of larger diameter, which latter forms a circulating chamber for the gases.

A. C. MONKHOUSE.

Distillation of [carbonaceous] materials. H. B. CANNON (U.S.P. 1,651,994, 6.12.27. Appl., 11.4.24).—The finely-divided carbonaceous material falls through an elongated vertical chamber to which low-pressure saturated steam is admitted. The steam is heated by radiation from the lower walls of the chamber and effects a low-temperature distillation of the material in the upper portion.

A. C. MONKHOUSE.

Distillation of vegetable material with a high water content. M. FOURMENT (F.P. 622,052, 28.1.26).—The material is first dried and then distilled, the heat necessary for the first stage being supplied by burning the gases generated in the second stage, in which the material is heated by gas obtained from external sources.

L. A. COLES.

Suction-gas plant, producing tar as a by-product. E. MAHLKUCH (G.P. 445,334, 29.4.25).—The tar flows continuously through a still heated by the engine exhaust gases; the lighter distillation products are drawn away directly by the engine, but the heavier are separated. A separate heat supply for the still is unnecessary.

A. B. MANNING.

Preparation of lubricating oils. "REX" MINERAL-ÖLGES. STEPHAN, BOOK, & ZIEGLER (G.P. 444,958, 7.6.21).—High-boiling tar fractions are treated with alkali solutions, and, after separation of the caustic layer, are distilled, preferably *in vacuo*. The distillates are cooled to a low temperature and freed from the solid which then separates. Lubricating oils are obtained which are neutral, salt-free, stable, and miscible with mineral oils.

A. B. MANNING.

Electrically heating oils and hydrocarbons. K. HERING (G.P. 444,919, 31.1.22).—The oil passes through a coil inside an electrically-heated boiler so that the heat transmitted to the oil is dependent on the current used and on the pressure in the boiler. Overheating of the oil is thus avoided.

A. B. MANNING.

Preparation of petroleum hydrocarbons from methane. COMP. DE BÉTHUNE (F.P. 613,542, 27.7.25).—Methane or a gas containing it is heated at 200–600° under pressure with a catalyst, *e.g.*, ferric oxide, mixtures of metallic oxides, or the corresponding metals obtained by reduction of the oxides. Liquid hydrocarbons are obtained, the greater part of the product distilling between 38° and 100°. Butane and ethane are also produced. The methane used need not be pure, the presence of hydrogen, oxygen, or other gases appearing favourable to the reaction.

A. B. MANNING.

Distillation of petroleum oils. R. W. and R. J. HANNA, Assrs. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,653,431, 20.12.27. Appl., 2.10.22).—The oil is vaporised continuously and the vapours are fractionated by passage through three stages. In the first stage the vapours are subjected to the condensing action of the combined feed oil and condensate from the other stages, in the second the condensate from the third stage only is used as condensing agent, and in the third stage a separate liquid cooling medium at a controlled temperature is used. The condensates are combined with the feed oil, and the vapours are condensed as one product.

C. O. HARVEY.

Distillation of [mineral] oils and similar products. K. ZIMMERMANN (G.P. 444,985, 19.9.24).—The material is finely divided by energetic mechanical means, *e.g.*, by rotating discs, and is carried over by steam, or other gases or vapours, into a heated still filled with Raschig rings. In this way the oil can be completely vaporised without any separation of carbon. The vapours are then fractionally condensed.

A. B. MANNING.

Thermal decomposition [cracking] of hydrocarbons. G. O. CURME, JUN., Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,646,349, 18.10.27. Appl., 7.1.26).—Ferrochromium containing about 26% Cr is of value in the manufacture of cracking apparatus, since it does not catalyse the production of free carbon.

T. S. WHEELER.

Continuous process for solidifying liquid hydrocarbons. Y. DE PENIAGUA (Dutch P. 16,247, 5.1.23. Fr., 27.1.22).—Liquid hydrocarbons and a thickening agent flow continuously into a heated, well-stirred emulsion of the same materials, and a hardening agent, *e.g.*, formaldehyde, is added to the mixture in the same or in another vessel.

L. A. COLES.

Removal of sulphur from petroleum. F. C. AXTELL, Assr. to AXTELL RESEARCH LABORATORIES, INC. (U.S.P. 1,645,679, 18.10.27. Appl., 27.12.26).—Oleum is agitated with an excess of benzene, and the acid layer separating is employed to treat mineral oils containing sulphur. It has no polymerising or oxidising effects.

T. S. WHEELER.

Concentration of coal. W. W. STENNING, Assr. to MINERALS SEPARATION NORTH AMERICAN CORP. (U.S.P. 1,655,849, 10.1.28. Appl., 15.2.24. U.K., 16.2.23).—See B.P., 215,841; B., 1924, 587.

Production of stable aqueous emulsions of pitch and other saponified organic matter of mineral origin. F. C. THORNLEY, F. F. TAPPING, and O. REYNARD, Assrs. to THORNLEY & Co. (U.S.P. 1,653,026, 20.12.27. Appl., 21.7.23. U.K., 26.1.23).—See B.P. 219,348; B., 1924, 780.

Manufacture of mixed gas. H. NIELSEN and J. R. GARROW (U.S.P. 1,654,942, 3.1.28. Appl., 21.3.21. U.K., 23.2.20).—See B.P. 162,459; B., 1921, 425 A.

Treatment of fuel gas. E. H. BIRD, Assr. to KOPPERS Co. (U.S.P. 1,654,782, 3.1.28. Appl., 2.1.23).—See B.P. 209,379; B., 1924, 588.

[Paraffin] wax sweating and crystallising apparatus. H. L. ALLAN and J. MOORE, Assrs. to BURMAH

OIL Co., LTD. (U.S.P. 1,654,232, 27.12.27. Appl., 9.12.24. U.K., 29.8.24).—See B.P. 243,447; B., 1926, 147.

Removal of tar acids from ammonia liquor and other liquors. H. W. ROBINSON and D. W. PARKES (U.S.P. 1,653,783, 27.12.27. Appl., 23.6.26. U.K., 7.8.25).—See B.P. 260,686; B., 1927, 39.

Oil still. J. PRIMROSE, ASS. TO POWER SPECIALTY Co. (U.S.P. 1,654,347, 27.12.27. Appl., 28.12.20).—See B.P. 179,493; B., 1922, 489 A.

Apparatus for generating acetylene under pressure. R. MÜTSCHLE (B.P. 271,803, 24.7.26. Ger., 25.5.26).

Conducting catalytic reactions (G.P. 445,252).—See I. Purification of crude naphthalene (F.P. 583,270).—See III. Ammonium chloride etc. (G.P. 426,389). Ammonium sulphate crystals (B.P. 255,876). Lead tetraethyl (U.S.P. 1,645,375). Lead tetra-alkyl (U.S.P. 1,645,389 and 1,645,390). Hydrogenation of hydrocarbons (F.P. 621,902).—See VII. Pitch compositions (B.P. 256,640).—See IX.

III.—ORGANIC INTERMEDIATES.

Conversion of alcohols into petroleum spirit. A. MAILHE and RENAUDIE (Compt. rend., 1927, 185, 1598—1600).—When *n*-butyl alcohol vapour is passed over uranium oxide at 420—440° it yields gaseous products consisting of carbon dioxide, 11%; carbon monoxide, 5.8%; hydrocarbons C_nH_{2n} , 16.8%; hydrocarbons C_nH_{2n+2} , 30.6%; and hydrogen, 35.8% when a fresh catalyst is used (the corresponding proportions being 4.9%, 9.5%, 28.5%, 35.3%, and 21.3% respectively, with a used catalyst) and volatile liquid products consisting of butaldehyde and mixtures of paraffin and olefine hydrocarbons of b.p. ranges from 80° to 125°. These contain six or more atoms of carbon, and are probably formed by a crotonaldehyde type of condensation of the butaldehyde followed by loss of the carbonyl residue and fission of the hydrocarbons $CHPr:CHEt$ and $CHPr:CEt:CH:CHEt$ so obtained into lower homologues, which may be partially reduced to the corresponding saturated hydrocarbons by the hydrogen which is present. J. W. BAKER.

PATENTS

Production of formaldehyde. W. C. ARSEM, ASS. TO COMMERCIAL SOLVENTS CORP. (U.S.P. 1,648,602, 8.11.27. Appl., 4.8.26).—Formic acid vapour mixed with carbon dioxide is passed at 300—500° and 10—100 atm. pressure over a basic chloride or sulphate of zinc, tin, or magnesium. T. S. WHEELER.

Concentrating aqueous solutions of acetic or formic acid. W. N. HAWORTH and J. NELSON, LTD. (B.P. 281,827, 19.10.26).—Aqueous acetic acid mixed with anhydrous sodium (or potassium) acetate, or formic acid mixed with anhydrous sodium formate, is distilled under reduced pressure. In each case the bulk of the water distils off, and then on raising the temperature strong acid passes over. In examples, over 80% of 30% acetic acid is recovered as 98.6% acid, and over 80% of 30% formic acid as 98% acid. The operation is conducted in a single still provided with means to break the lumps of solid. B. FULLMAN.

Preparation of halogeno-fatty acid anhydrides. H. T. CLARKE and C. J. MALM, ASSRS. TO EASTMAN KODAK Co. (U.S.P. 1,648,540, 8.11.27. Appl., 10.12.26).—A halogeno-fatty acid (*e.g.*, chloroacetic acid) (2 mols.) is heated with acetic anhydride (1 mol.), the acetic acid produced being distilled off as formed. T. S. WHEELER.

Manufacture of unsymmetrically substituted di-aminopropanols [β -hydroxypropylenediamines]. I. G. FARBENIND. A.-G. (B.P. 275,622, 3.8.27. Ger., 3.8.26).—Compounds of the type, $NH_2 \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot NRR'$, are obtained from epichlorohydrin by the successive action of a secondary amine and ammonia. From diethylamine and epichlorohydrin there is obtained (*diethylaminomethyl*)ethylene oxide, b.p. 155—159°, or 40—50°/8 mm., which reacts with ammonia to give β -amino- β' -diethylaminoisopropyl alcohol, b.p. 223°, or 120—130°/30 mm., and with ethylamine to give triethyl- $\beta\beta'$ -diaminoisopropyl alcohol, b.p. 230—232°, or 100—120°/6 mm. (*Piperidinomethyl*)ethylene oxide, b.p. 72—77°/8 mm., β -amino- β' -piperidinoisopropyl alcohol, b.p. 148—150°/29 mm., (*methylamylinoisopropyl*)ethylene oxide, b.p. 132—135°/8 mm. or 160—162°/30 mm., and β -amino- β -methylamylinoisopropyl alcohol [*methyl- γ -amino- β -hydroxypropylaniline*], m.p. 71°, b.p. 205—210°, are similarly prepared. The diamino-alcohols are intermediates for therapeutic substances. C. HOLLINS.

Preparation of substituted guanidines. E. KLINE, ASSR. TO GRASSELLI CHEMICAL Co. (U.S.P. 1,648,184, 8.11.27. Appl., 6.10.24).—In the preparation of substituted guanidines, *e.g.*, diphenylguanidine, from the corresponding thiocarbamides by the action of a desulphurising agent in presence of alcoholic ammonia, the use of a water-soluble lead salt, *e.g.*, lead nitrate, as the desulphurising agent, is claimed. T. S. WHEELER.

Production of benzoic acid from phthalic anhydride. C. CONOVER, ASSR. TO MONSANTO CHEMICAL WORKS (U.S.P. 1,645,180, 11.10.27. Appl., 21.12.25).—Phthalic anhydride vapour and steam (50 pts.) are passed at 200—600° over zinc, copper, or aluminium oxide, to form benzoic acid in 90% yield. T. S. WHEELER.

Production of adipic acid and its alkyl substitution products. J. D. RIEDEL A.-G. (B.P. 265,959, 7.2.27. Ger., 12.2.26).—Catalysts (ammonium vanadate, mercuric oxide, molybdenum pentoxide) enable the oxidation of cyclohexanols or cyclohexanones to adipic acids by nitric acid to take place at 50—65° with production of fewer by-products. C. HOLLINS.

Purification of hydrocarbon compounds by hydrogenation and reduction. SOC. INTERNAT. DES COMBUSTIBLES LIQUIDES (F.P. 618,490, 5.7.26. Ger., 2.12.25).—Unstable hydrogenated organic compounds, or those readily hydrogenated, are used as hydrogen carriers. Inorganic compounds, *e.g.*, alkaline ferric oxide, or "lux," which catalyse the reaction may also be added. The readily oxidisable organic hydrogenated compounds are prepared as follows. Anthracene and solid potassium hydroxide are heated with hydrogen under pressure. At about 400° an active product is formed as a crystalline paste, which, on being distilled until the appearance of yellow fumes, yields 80—85% of a hydrogenated anthracene. This product acts as a

hydrogen carrier when heated with a "flaming" coal under 100 atm. pressure at 390° for 10 min. The pressure falls and on cooling to 15° reaches a final value of 65 atm. The yield is about the same as after 1 hr.'s heating, but the product with the shorter reaction time is of better quality and possesses a lower density and a smaller phenol content.

A. B. MANNING.

Conversion of phenols into hydrocarbons. SOC. INTERNAT. DES COMBUSTIBLES LIQUIDES (F.P. 618,520, 6.7.26. Ger., 2.12.25).—The phenol or mixture of phenols is heated at 470° with hydrogen under 90 atm. pressure for 1 hr. To obtain the maximum reduction the light oils and water formed should be removed continuously from the autoclave. The process yields 80% of light hydrocarbons distilling to 250°. Methane and water are formed as by-products. The unchanged phenol can be again submitted to the process.

A. B. MANNING.

Reduction of nitro-compounds [to hydrazo compounds]. R. A. NELSON and A. PRASIL, Assrs. to NAT. ANILINE & CHEMICAL Co., INC. (U.S.P. 1,644,483—4, 4.10.27. Appl., 22.6.20).—(A) An aromatic nitro-compound, e.g., *o*-nitroanisole, in alcoholic solution is treated gradually with zinc dust and a limited amount of sodium hydroxide solution. The product is recovered by distilling off alcohol and extracting the residue with benzene. (B) The nitro-compound dissolved in benzene is treated as in (A).

T. S. WHEELER.

Purification of crude naphthalene. OBERSCHLESISCHE KOKSWERKE & CHEM. FABR. A.-G., F. RUSSIG, and P. DAMM (F.P. 583,270, 3.7.24).—The impurities are polymerised by treatment with a suitable reagent, e.g., sulphuric acid, ferrous chloride, etc., their b.p. being thereby so far raised that the pure naphthalene can be separated by distillation or sublimation. E.g., the hot-pressed crude product is shaken for ½ hr. with 0.5% of sulphuric acid, the latter then neutralised, and the pure naphthalene recovered by vacuum distillation or sublimation. If ferrous chloride is used the mixture can be sublimed directly.

A. B. MANNING.

Manufacture of 2-aminoanthraquinone. D. G. ROGERS, Assr. to NAT. ANILINE & CHEMICAL Co., INC. (U.S.P. 1,644,494, 4.10.27. Appl., 9.11.22).—The production of aminoanthraquinones from the corresponding sulphonic acids by the action of ammonia solution in presence of an oxidising agent, e.g., nitrobenzene, is facilitated by addition of an ammonium salt, e.g., ammonium chloride.

T. S. WHEELER.

Manufacture of new derivatives of 2:3-hydroxynaphthoic arylamides. BRIT. DYESTUFFS CORP., LTD., J. B. PAYMAN, and H. WIGNALL (B.P. 281,795, 20.9.26).—2:3-Hydroxynaphthoic acid is condensed in presence of phosphorus trichloride etc. with an aminoarylsulphonamide to give hydroxynaphthamidoarylsulphonamides of the type, $\text{OH}\cdot\text{C}_{10}\text{H}_6\cdot\text{CO}\cdot\text{NR}\cdot\text{Ar}\cdot\text{SO}_2\cdot\text{NR}'\text{R}''$, where R, R', and R'' may be hydrogen or hydrocarbon radicals. *m*-2-Hydroxy-3-naphthamidobenzenesulphonamide (R = R' = R'' = H), m.p. 278°, is made from 2:3-hydroxynaphthoic acid, aniline-*m*-sulphonamide, and phosphorus trichloride in toluene at 60°. The preparation of *p*-toluidine-3-sulphonamide, *methyl*aniline-*p*-sulphonamide, and *ethyl*-*o*-toluidine-4-sulphonamide is mentioned; these

and aniline-*m*-sulphonamide are also condensed with 2:3-hydroxynaphthoic acid. The isolated hydroxynaphthoyl chloride may be used.

C. HOLLINS.

Manufacture of 2:3-hydroxynaphthoic acid. W. S. CALCOTT, A. R. HITCH, and H. W. MAHR, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,648,839, 8.11.27. Appl., 23.2.24).—Sodium β -naphthoxide is treated at 225–235° with carbon dioxide at 30–40 atm. pressure.

T. S. WHEELER.

Manufacture of 1-aminonaphthalene-8-carboxylic acid [8-amino- α -naphthoic acid]. R. HERZ and F. SCHULTE, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,646,290, 18.10.27. Appl., 12.7.26. Ger., 29.11.24).—See E.P. 276,126; B., 1927, 808.

Production of new *N*-alkylcarbazolephosphinous acids. A. VON WEINBERG and W. SCHMIDT, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,648,207, 8.11.27. Appl., 1.10.25. Ger., 7.10.24).—See B.P. 258,744; B., 1926, 996.

Oxidation of aldoses (U.S.P. 1,648,368)—See XVII.

IV.—DYESTUFFS.

Cacao-red. A. HEIDUSCHKA and B. BIENERT (J. pr. Chem., 1927, [ii], 117, 262–272).—Complete analyses of the cacao-bean, kernel, shell, and embryo have been made. Complete details for the extraction of cacao-red (cf. Schweitzer, A., 1899, i, 300; Reutter, *ibid.*, 1913, i, 1031; 1914, ii, 760) are given, together with the solubility of this substance in numerous organic solvents. When heated with water or dilute sulphuric acid, at 130–140°, there is formed a sugar (cf. Reutter, *loc. cit.*) which reduces Fehling's solution, gives a positive reaction for aldehyde with diazobenzenesulphonic acid, a violet coloration with α -naphthol and sulphuric acid, etc., and also a brown product resembling humic acid. Hydrolysis with potassium hydroxide solution yields acetic and protocatechuic acids, and probably dimethylphloroglucinol, m.p. 165° after browning at 150–160°. The colouring matter can be acetylated or benzoylated, and yields, on distillation with zinc dust, an unidentifiable oil. The formula $(\text{C}_{17}\text{H}_{16}\text{O}_7)_n$ is deduced, and the suggestion made that the compound is a polymeric 3:5:7:3':4'-pentahydroxy-6:8-dimethyl-2:3-dihydroflavonol. The brown compound obtained by the action of dilute sulphuric acid is probably a dehydrated flavonol.

H. BURTON.

Microchemical detection of Orange II. L. SOEP (Chem. Weekblad, 1927, 24, 623).—Several microchemical reactions of Orange II have been examined. The thallium salt forms in red needles, grouped starwise, which appear blood-red in polarised light.

S. I. LEVY.

Alizarin lakes. WEISER and PORTER. See XIII.

PATENTS.

New secondary disazo dyes [for viscose silks]. BRIT. DYESTUFFS CORP., LTD., J. BADDILEY, P. CHORLEY, and R. BRIGHTMAN (B.P. 281,767, 8.9.26).—Aminoazo compounds are diazotised and coupled in acid or alkaline media with sulphonic acids of 2:8-aminonaphthols, $\text{OH}\cdot\text{C}_{10}\text{H}_6\cdot\text{NHR}$, in which R is an aryl group of the benzene series or a carboxylic acyl group, but contains no amino-substituent. Black, brown, blue, and grey

level shades are obtained on viscose silks. Examples are: Aniline \rightarrow Cleve acid \rightarrow 4-*m*-xylyl- γ -acid [2-(4-*m*-xylylamino)-8-naphthol-6-sulphonic acid]; metanilic acid \rightarrow α -naphthylamine \rightarrow phenyl- γ -acid; technical aminosalicic acid \rightarrow α -naphthylamine \rightarrow benzoyl- γ -acid; *p*-aminoazobenzenesulphonic acid \rightarrow phenyl- γ -acid. Ten other couplings are listed. C. HOLLINS.

Preparation of 2-hydroxybenzanthrone. I. G. FARBENIND. A.-G., Assees. of FARBW. VORM. MEISTER, LUCIUS, & BRÜNING (B.P. 258,910, 28.9.26. Ger., 28.9.25. Addn. to B.P. 224,522; B., 1925, 583).—The nitro-group in 2-nitrobenzanthrone-3-diazonium sulphate is rapidly replaced by hydroxyl under the conditions of diazotisation, and the diazo group may be eliminated by means of boiling alcohol without special formation of the diazo-oxide. C. HOLLINS.

Manufacture of halogen derivatives of aromatic compounds. J. H. CROWELL, Assr. to NAT. ANILINE & CHEMICAL Co., INC. (U.S.P. 1,646,235, 18.10.27. Appl., 26.9.24).—Anthraquinone vat dyes can be readily halogenated by treatment with chlorine or bromine in presence of sulphur dioxide and a suitable organic solvent or diluent, *e.g.*, nitrobenzene. T. S. WHEELER.

Method of effecting caustic fusions [to produce indigo]. D. G. ROGERS, Assrs. to NAT. ANILINE & CHEMICAL Co., INC. (U.S.P. 1,644,493, 4.10.27. Appl., 17.6.21).—The caustic fusion of substances which yield indigo, *e.g.*, phenylglycine, is performed with a reduced amount of alkali in presence of a petroleum hydrocarbon liquid at ordinary temperatures and boiling above 200°. T. S. WHEELER.

Manufacture of benzanthrone derivatives containing sulphur. H. NERESHEIMER and H. EMMER, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,644,851, 11.10.27. Appl., 9.2.26. Ger., 7.3.25).—See B.P. 255,731; B., 1926, 867.

Preparation of 2-(or 3-)chloroquinizarin. I. GUBELMANN, Assr. to NEWPORT Co. (U.S.P. 1,655,863, 10.1.28. Appl., 2.11.25).—See B.P. 260,544; B., 1927, 838.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Cooking of spruce chips with sulphur dioxide solutions of high concentration. J. PALMEN (Pulp and Paper Mag., 1927, 25, 1547—1551).—A series of experimental cooks was made to determine the effect of high concentrations of sulphur dioxide (obtained by the use of ethyl alcohol as solvent) on the resolution of spruce wood. Acid liquors containing from 70.8% of alcohol and 26.5% of sulphur dioxide to 11.5% of alcohol and 4.6% of sulphur dioxide with addition of 0.7% of ammonia or up to 3.2% of lime were used at maximum temperatures varying from 105—136°. The results of these experiments indicate that (a) a black discoloration is characteristic of pulps cooked in the presence of alcohol, though the colour is removed to a large extent on washing with water, and in some cases an absolutely white pulp results; (b) the use of liquors containing high percentages of sulphur dioxide does not (in the presence of alcohol) effect any considerable reduction of the cooking time or temperature; and (c) a high percentage of alcohol slows down the cooking action

very considerably, the pulp obtained with a cooking liquor containing 70.8% of alcohol showing a lignin content of 23.8% after an effective cooking time of 18 hrs. with a maximum temperature of 130°.

D. J. NORMAN.

Caroá fibre as a papermaking material. M. B. SHAW and G. W. BICKING (U.S. Bur. Stand. Tech. Paper No. 340, 1927, 21, 323—346).—Experimental, followed by semi-commercial, cooks indicate that caroá fibre could be satisfactorily used for papermaking. The yield, soda consumption, and the character of the pulp depend to some extent on the preliminary treatment of the raw material. Retting appears to give the most favourable results, a 55.3% yield of pulp (dry pulp on dry material after cutting and dusting) being obtained by digestion with 25% of caustic soda for 4 hrs. at 172°. When bleached with 10% of bleaching powder the product compares favourably with rag pulp and is capable of furnishing paper of high strength. The semi-commercial trials were made on unretted fibre that had been beaten dry, and gave lower yields of bleaching pulp, *e.g.*, 49.5—51.5%. Caroá fibre has a fibre length of 2.25—5.75 mm. (average 4 mm.) and a thickness of 0.0046—0.0154 mm. (average 0.01 mm.), and should therefore have good felting properties. When less soda is used pulps are obtained which, though technically unbleachable, provide excellent wrapping papers equal in strength to those made from kraft pulp. There is no organised caroá industry at present, but the economic availability of the fibre for papermaking appears promising. The papermaking equipment and the technique employed in papermaking research are described in detail.

D. J. NORMAN.

Characterisation of cellulose preparations by the rotation method. E. HÄGGLUND and F. W. KLINGSTEDT (Annalen, 1927, 459, 26—38).—The optical rotation curves in cuprammonium solution for various specimens of cellulose have been plotted. The curves obtained in accordance with the method of Hess, Messmer, and Ljubitsch (A., 1925, i, 1246) with (a) cotton containing 95.2% of α -cellulose, ash content 0.19%, and free from pentosans and mannosans, (b) wood cellulose containing 87.7% of α -cellulose, 0.3% of ash, 1.9% of xylosan, and 3.2% of mannosan in the ash-free sample, and (c) mercerised cellulose which, owing to its treatment with alkali, is free from pentosans and mannosans, are almost identical, and the mean percentage deviations from the curve obtained with pure cellulose prepared from the crystalline acetate by the method of Hess are only 7.68%, 5.16%, and 7.49%, respectively. Xylosan itself in cuprammonium solution shows a higher lævotation than cotton cellulose. The authors, therefore, do not agree that this method is a reliable one for establishing the identity of cellulose preparations from different sources, or for following the course of the purification of the specimens.

J. W. BAKER.

Two natural processes of decomposition of the cellulose and lignin of lignified tissue by bacteria. R. FALCK (Cellulosechem., 1928, 9, 1—6; cf. Falck and Haag, B., 1927, 213).—In the decomposition of grain straw by the bacteria present in horse dung two distinct processes are observed. With a large mass of material bacteriological "destruction" takes place with evolu-

tion of heat, but if the temperature be lowered by laying out the material in small beds, a different type of decomposition—bacteriological “corrosion”—sets in. The effect of “destruction” on straw is to reduce the cellulose content and, more rapidly, the pentosan content, whilst the lignin content increases owing to the removal of cellulose, since the lignin is practically unaffected by this process. The amount of moisture present decreases, and the carbon content rises chiefly on account of the removal of cellulose, the residue being mainly lignin. The amount of alkali-soluble material present decreases and considerable gas evolution occurs. Carbon dioxide together with some ammonia is evolved, but methane is not formed in appreciable quantities even in the centre of the heap. Bacteriological corrosion, as in the case of wood corrosion (Falck and Haag, *loc. cit.*), results in the slow decomposition of both lignin and cellulose, and the pentosan content falls off at the same rate as that of cellulose. The carbon content decreases, carbon dioxide is continuously evolved, and nitrates are formed in appreciable quantity.

W. J. POWELL.

Economy of the sulphite-cellulose cooking process. A. FROBERG (*Papier-Fabr.*, 1928, 26, 17—22).—Possibilities for more economical working in the German cellulose industry are surveyed since progress lies chiefly in increased production and the cheapening of the final product. All cookers should be fitted with mechanical filling devices, and the processes of filling, steaming, lye treatment, and emptying should be shortened as much as possible. No great economy results from steam or sulphur recovery, but increase in the capacity of the cooker is advantageous. Improvement is best made in connexion with the wood, which accounts for 50% of the total costs. Higher cooking velocity can be obtained by increasing the concentration of acid and the temperature, but yields are poorer and the quality of the cellulose is affected. Further investigation into the mechanism of the cooking process is necessary. Kinetically, the latter depends on concentration and temperature (although the diffusion of sulphur dioxide and salts into the wood must also be considered), and it may be conceived as the hydrolysis of hemicellulose, together with the partial hydrolysis and saponification of lignin. It is uncertain at what stage sulphonation of the lignin occurs, but the latter reaction is slower than the hydrolysis. The velocity of decomposition of the wood is determined by the free hydrogen ions, which are proportional to the concentration, whilst the dissociation of the acid is influenced by the lime content. The decomposition of wood by sulphurous acid is similar to the inversion of sucrose and the hydrolysis of starch, and just as at high temperatures organic acids (such as formic and acetic) are produced with decomposition of the sugar, so with wood cooked at above 140° organic acids are formed, a smaller yield of cellulose is obtained, and its strength is reduced.

B. P. RIDGE.

Economic production of strong mechanical [and chemical] wood pulp of good colour. L. ENGE (*Papier-Fabr.*, 1928, 26, 1—3).—Ground wood, which becomes coloured when heated with steam, yields a pulp of good colour by this process when a small proportion of hydrochloric or sulphuric acid (1 in 3000—

10,000 pts. of steam) is introduced and the pulp is cooled and washed in the digester with the least possible exposure to air, the colour being further improved by the addition of a small percentage of acid to the wash water. Good results are also obtained by treatment with sulphur dioxide in the digester, through which steam is then circulated, a concentrated solution of sodium sulphite being introduced by means of a spray. A wood pulp substitute may be prepared from wood in the form of chips by heating at 100° for 6—8 hrs. with sulphur dioxide and steam, and the product, which is readily pulped and remains white, is still further improved by the introduction of a small quantity of hydrogen chloride into the gaseous mixture. Sawdust, after treatment first with sulphur dioxide and then with steam and concentrated sodium hydroxide solution introduced through a spray (15 kg./m.³ of digester), yields a completely pulped product.

W. J. POWELL.

Determination of the copper number of paper.

B. W. SCRIBNER and W. R. BRODE (U.S. Bur. Stand. Tech. Paper No. 354, 1927, 22, 9—14).—The method is a modification of those of Gault and Mukerji (B., 1924, 289) and of Staud and Gray (B., 1925, 841). Fine subdivision of the sample to pass 7-mesh is desirable in all cases and is essential with heavy, gelatin-sized papers if uniform and accurate results are to be obtained. A suitable grinder which has the advantage of not heating the paper is that described by Köhler and Hall (B., 1926, 268). 25 c.c. of copper sulphate solution (277.3 g. of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ dissolved in 4 litres of distilled water), 25 c.c. of tartrate solution (150 g. of sodium hydroxide and 500 g. of sodium potassium tartrate dissolved in 1500 c.c. of distilled water), and 125 c.c. of water are heated at 100° in a 30% calcium chloride bath maintained at 115—120°. 1.5 g. of the finely-ground sample are introduced and the mixture is gently boiled, with stirring, for about 30 min. The solution is then filtered hot through paper, and the residue, after washing with 250 c.c. of hot water, is treated with 25 c.c. of molybdate solution (100 g. of sodium molybdate [43% Mo], 75 c.c. of phosphoric acid [83%], 275 c.c. of concentrated sulphuric acid, and 1750 c.c. of distilled water). After keeping for a short time the mixture is diluted with 25 c.c. of water and stirred to disintegrate the filter paper, which is collected on a filter and washed with 200 c.c. of cold water. The filtrate and washings are finally titrated with standard permanganate solution (1.5625 g. per litre).

D. J. NORMAN.

[Caustic] soda recovery plant [for use with waste-liquors from esparto grass digestion].

J. HOLMES (*Proc. Tech. Sect. Papermakers' Assoc.*, 1926, 7, 27—45).—The low heat efficiency of soda recovery units of the usual design is discussed, and a description is given of the Holmes closed system of recovery in which a considerable economy of heat is realised by blowing the digester charge into a closed pressure tank, which also receives the relief steam from the digester during the cook. Feed liquor to the evaporator is withdrawn from the bottom of this tank, and the steam available from the pressure reduction is used to heat the first effect of the evaporator. Heat exchangers are placed in the vapour pipes of the evaporator to effect

the transfer of heat to the wash liquor and to fresh caustic liquor. The operation of the vacuum evaporator is dealt with in detail, and emphasis is laid on the reduction of efficiency caused by air leaks, gases dissolved in the liquor, and scale. The prospect of utilising the heat, which under the present system is dissipated in the roaster, is also discussed, and it is suggested that, given reasonably efficient plant, the total heat recovered should supply not only the soda recovery plant, but also the digesters.

D. J. NORMAN.

PATENTS.

Utilisation of bark and wood waste for the production of cellulose. C. ALLÈGRE, H. BRUNEL, G. P. GALINO, and J. E. LAURIAC (F.P. 622,007, 20.1.26).—The material, after it has been softened in water, is treated with chlorine for $1\frac{1}{2}$ hrs. in a closed vessel, and is then washed successively with water, sodium sulphite solution, and again with water. The process is repeated as often as is necessary.

L. A. COLES.

Manufacture of cellulose esters of organic acids. C. J. MALM, Assr. to EASTMAN KODAK Co. (U.S.P. 1,645,915, 18.10.27. Appl., 23.9.26).—The acylation, e.g., acetylation, of cellulose is catalysed by perchlorates, e.g., of copper, zinc, or magnesium.

T. S. WHEELER.

Utilisation of [recovery of plasticising and softening agents from] cellulose acetate waste. P. D. ARON (F.P. 622,074, 30.1.26).—The material is treated with solvents, e.g., trichloroethylene, alcohol, etc., which dissolve the plasticising and softening agents, but not cellulose acetate.

L. A. COLES.

Changing [lowering] the viscosity characteristics of nitrocellulosic material. P. C. SEEL, Assr. to EASTMAN KODAK Co. (U.S.P. 1,648,509, 8.11.27. Appl., 11.2.25).—Nitrocellulose is immersed in aqueous methyl-alcoholic pyridine solution at room temperature for 24 hrs.

T. S. WHEELER.

Production of viscose. F. KEMPTER (U.S.P. 1,656,120, 10.1.28. Appl., 25.8.24. Ger., 14.5.24).—See B.P. 234,039; B., 1925, 914.

Manufacture and spinning of derivatives of cellulose and formic acid. J. G. JURLING, Assr. to FABR. VAN CHEM. PRODUCTEN (U.S.P. 1,656,199, 10.1.28. Appl., 29.5.26. Holl., 4.6.25).—See B.P. 260,650; B., 1927, 103.

Precipitation of artificial threads, ribbons, films, etc. of viscose. A. KÄMPF (U.S.P. 1,654,818, 3.1.28. Appl., 27.1.26. Ger., 6.8.21).—See B.P. 184,450; B., 1923, 711 A.

Manufacture of chemical wood pulp. A. PEETZ (U.S.P. 1,653,730, 27.12.27. Appl., 29.1.25. Ger., 30.4.24).—See B.P. 233,318; B., 1925, 800.

Purification of zinc solutions (B.P. 263,809).—See VII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

[Printing of] reserves under indanthrene dyes. R. HALLER (Sealed Note No. 1768, 4.10.07. Bull. Soc. Ind. Mulhouse, 1927, 93, 497—498). Report by P. WERNER (*Ibid.*, 498—501).—Reserves under indanthrene dyes obtained by means of copper sulphate are improved

by the addition of picric acid to the reserve paste. *E.g.*, oil-prepared cotton fabric is printed with a reserve paste consisting of 1 litre of a 50% aqueous solution of gum, 200 g. of copper sulphate, 400 g. of water, 200 g. of picric acid, and 200 g. of pipe clay (talc powder), then stored for 1—2 days, slop-padded at 65° with a dye liquor consisting of 30 litres of water, 900 g. of Indanthrene (Blue) S double (B.A.S.F.), 15 g. of Flavanthrene (Yellow) R, 2.25 litres of caustic soda (*d* 1.261), and 4.5 litres of a solution of sodium hyposulphite (660 g. of sodium hyposulphite, 5 litres of water, and 350 g. of caustic soda, *d* 1.261), washed immediately, passed through dilute sulphuric acid (*d* 1.075), soaped, and dried. Coloured reserves may be obtained by means of direct dyes using a reserve paste consisting of 0.25 litre of Madras gum solution, 50 g. of picric acid, 50 g. of talc, 70 g. of water, and 30 g. of a direct dye (Chloramine Yellow, or Chloramine Orange, or Azophor Rose A). Werner reports favourably on the process, but points out that more satisfactory processes have been devised subsequently.

A. J. HALL.

Dyeing of dog skins. MACH.—See XV.

PATENTS.

Dyeing [regenerated cellulose silks] with azo dyes. BRIT. DYESTUFFS CORP., LTD., J. BADDILEY, P. CHORLEY, and R. BRIGHTMAN (B.P. 281,410, 7.9.26).—Viscose silks are dyed in level brown, blue, red, or violet shades by means of azo dyes having as end-components 2 : 8-aminonaphtholsulphonic acids, particularly 2-amino-8-naphthol-6-sulphonic acid ("γ-acid"), and their *N*-derivatives. Examples are: *p*-Chloro-aniline → γ-acid (reddish-brown); 5-nitro-*o*-anisidine → phenyl-γ-acid (blue); aniline → α-naphthyl-γ-acid (brown); *p*-nitroaniline-*o*-sulphonic acid → phenyl-γ-acid ← α-naphthylamine (blue-violet), etc. The preparation of 8-hydroxy-2 : 2'-dinaphthylamine-6-sulphonic and -3 : 6-disulphonic acids by the bisulphite method is described.

C. HOLLINS.

Dyeing and printing cellulose esters and ethers. I. G. FARBENIND. A.-G. (B.P. 269,934, 23.4.27. Ger., 23.4.26).—Non-phototropic yellow dyeings on acetate silk etc. are obtained by using monoazo dyes derived from a *p*-substituted phenol as coupling component, and containing not more than one sulphonic group. Examples are: *p*-phenylenediamine, *p*-aminoacetanilide, *p*-phenylenediaminesulphonic acid, or *m*-chloroaniline, coupled with 1 mol. of *p*-cresol.

C. HOLLINS.

Dyeing of cellulose esters. SOC. CHEM. IND. IN BASLE (GES. F. CHEM. IND. IN BASEL) (B.P. 261,423, 15.11.26. Switz., 14.11.25).—Fast blue-green to green shades on acetate silk are obtained by using indophenols in which the oxygenated nucleus carries one or more halogen atoms. Examples are the indophenols made by oxidation of 2-chloro-, 2 : 6-dichloro-, and 2 : 5 : 6-trichloro-*p*-aminophenols with dimethylaniline, diethylaniline, benzylmethylaniline, *N*-phenyl-*N*-ethylglycine, methyl-diphenylamine, *o*-toluidine, α-naphthylamine, etc. The di- and tri-chloro- are greener than the monochloro-compounds.

C. HOLLINS.

[Mercerisation etc. of] natural vegetable fibre. BRIT. DYESTUFFS CORP., LTD., and A. J. HAILWOOD (B.P. 281,473, 30.11.26).—In the mercerisation, parch-

mentisation, or lindenisation of cotton, all or part of the sodium hydroxide used may be replaced by a sulphonium hydroxide, e.g., trimethylsulphonium hydroxide.

C. HOLLINS.

Dyeing of artificial silk. J. BADDILEY, P. CHORLEY, and C. BUTLER, Assrs. to BRIT. DYESTUFFS CORP., LTD. (U.S.P. 1,653,757, 27.12.27. Appl., 2.4.27. U.K., 7.6.26).—See B.P. 276,757; B., 1927, 841.

Treatment of textile fibres, yarns, fabrics, etc. for obtaining effects of colour or lustre or both. H. J. J. JANSSEN, Assr. to N. V. NEDERLANDSCHE KUNSTZIJDEFABR. (U.S.P. 1,653,962, 27.12.27. Appl., 28.5.25. Holl., 7.4.25).—See F.P. 597,231; B., 1926, 437.

Fast dyeing on the fibre. T. KIRCHEISEN, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,646,296, 18.10.27. Appl., 12.10.25. Ger., 27.9.24).—See B.P. 262,537; B., 1927, 104.

Reserve dyeing on vegetable fibres. H. LEEMANN and G. TAGLIANI, Assrs. to MUNITEX CORP. (U.S.P. 1,649,710, 15.11.27. Appl., 27.4.25. Ger., 7.5.24).—See B.P. 233,704; B., 1925, 956.

Steaming or ageing machines for dyeing and like operations. J. S. WILSON, G. W. SHEARER, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 282,133, 9.9.26).

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

Denitration of waste acids under diminished pressure. A. SCHMID (Z. ges. Schiess- u. Sprengstoffw., 1927, 22, 354—358).—By the external heating of a waste acid under diminished pressure it is possible to avoid the dilution of the recovered sulphuric acid by water condensed from the live steam usually employed as a heating agent. Under suitable working conditions a water-white sulphuric acid, free from nitrogen oxides, of a 15% higher concentration can be obtained. The apparatus consists of a horizontal thermisilid retort at one end of which is a packed dephlegmator through which the waste acid is introduced. The part of the retort near this dephlegmator is heated, electrically if possible, otherwise by oil rather than by coal or coke. The acid passes along the retort to the end away from the dephlegmator and then returns through tubes arranged in the retort which act as a heat exchanger. The nitric acid from the waste acid passes through the dephlegmator and is condensed in a coil condenser. The nitrous gases and excess air pass to a tower system where the nitrous gases are recovered as dilute nitric acid. Owing to the smaller amount of reduction during denitration, the towers are smaller than those used in the ordinary denitration system.

S. BINNING.

Substitution of sodium for potassium compounds [as reagents]. A. R. SMITH and F. C. VILBRANDT (J. Elisha Mitchell Sci. Soc., 1926, 42, 118—121).—Sodium, potassium, barium, and calcium permanganates give identical results. Sodium iodide, hydroxide, chromate, dichromate, cyanide, sulphide, sulphate, nitrate, chlorate, and ferrocyanide may be substituted for potassium compounds in appropriate analytical methods. Alcoholic sodium hydroxide may replace potassium hydroxide

in determining the saponif. values of fats and oils, and for determining methyl esters in menthol, but not for determining the saponif. values of beeswax and rosin.

CHEMICAL ABSTRACTS.

Hydrogen in gas mixtures. BEET.—See II.

PATENTS.

Manufacture of sulphuric acid. H. PETERSEN (B.P. 281,551, 7.6.27).—Acid manufactured in towers etc. filled with small grains of quartzite is denitrated in one of the towers by sulphurous gases from the roasting ovens after they have been used for acid concentration, and are therefore partially cooled. The gases may be further cooled in a cooling and condensation apparatus to utilise their heat still more and to eliminate moisture.

W. G. CAREY.

[Reaction enclosures for use in the] manufacture of sulphuric acid. A. SHARP. From Soc. Gén. MÉTALLURGIQUE DE HOBOKEN (B.P. 281,510, 19.2.27).—Reaction vessels for use in the denitrating and nitrogen oxide absorption processes in the production of sulphuric acid have a horizontal cross-section larger than 50m.², and are filled with acid-resisting packing having an average diameter of 40 mm. The use of such enclosures gives a more steady state of thermal equilibrium inside the plant. [Stat. ref. to B.P. 249,914.]

W. G. CAREY.

Chambers for the manufacture of sulphuric acid. M. COLOMBO Y MANNI (B.P. 270,661, 31.3.27. Sp., 6.5.26).—Each chamber is of parallelepiped, rectangular, or truncated pyramid shape with a rectangular or polygonal base, and the upper part is provided with one or more sections of trapezoidal shape of the width of the chamber but of any suitable breadth and depth. The portions of the chamber at the top are connected by horizontal or inclined pipes, and are themselves connected by pipes communicating at the bottom with the top of the chamber, whilst the upper and lower portions of the chamber are connected by external pipes which may be cooled with water. All the pipes are provided with contraction and expansion cones, and may be smooth, corrugated, or provided with fins to increase the cooling surface.

W. G. CAREY.

Manufacture of nitric acid. J. H. SHAPLEIGH and C. A. BIGELOW, Assrs. to HERCULES POWDER CO. (U.S.P. 1,653,023, 20.12.27. Appl., 5.8.25).—Sodium nitrate, sulphuric acid not substantially in excess of the amount required to produce nitric acid and normal sodium sulphate, and sufficient sodium sulphate to prevent the conversion of sodium sulphate into the acid salt are fed continuously into a suitable horizontal furnace, the substances being agitated during their travel through the furnace. The temperature is so regulated as to produce gases condensing to strong nitric acid near the feed end and yielding weak nitric acid at the discharge end of the furnace.

W. G. CAREY.

[Apparatus for the production of] phosphoric acid. C. COTTE (F.P. 621,074, 3.9.26).—Phosphorus is charged through an adjustable opening leading from a supply vessel into the top of a combustion chamber, and falls on to a block of resistant material at the bottom of the chamber. A mixing chamber is attached to the combustion chamber.

L. A. COLES.

Purification of phosphoric acid. E. F. PEVERE and G. A. HENDRIE, Assrs. to PHOSPHORUS HYDROGEN Co. (U.S.P. 1,648,146, 8.11.27. Appl., 5.11.26).—Crude phosphoric acid is heated with coke and phosphate rock or tricalcium phosphate to form calcium metaphosphate, which reacts with the coke to give tricalcium phosphate, phosphorus, and carbon monoxide. The phosphorus is treated with steam as described in G.P. 406,411 (B., 1925, 242) to yield pure phosphorus pentoxide and hydrogen. T. S. WHEELER.

Separation of complex phosphotungstomolybdic acids. I. G. FARBENIND. A.-G., Assees. of E. HARTMANN (G.P. 445,151, 24.12.24).—The sodium salt of the acid, $3\text{H}_2\text{O}\cdot\text{P}_2\text{O}_5\cdot 24(\text{WO}_3+\text{MoO}_3)$, is crystallised from a solution containing about 12–18% (WO_3+MoO_3), and the acid, $3\text{H}_2\text{O}\cdot\text{P}_2\text{O}_5\cdot 18(\text{WO}_3+\text{MoO}_3)$ is salted out in the usual manner from the residual solution. L. A. COLES.

Production of acids and alkali solutions from salts by electrolysis. WÜRTEMBERGISCHES STATISTISCHES LANDESAMT, Assees. of F. GAISSES (G.P. 444,796, 24.2.26).—Acids and alkalis formed by the electrolysis of salt solutions are collected separately in apparatus comprising three or more cells provided with diaphragms; e.g., sulphuric acid is obtained from gypsum or anhydrite by decomposing it with an alkali carbonate and electrolysis of the alkali sulphate formed in apparatus comprising three cells. L. A. COLES.

Production of sodium hydroxide, chlorine or hydrochloric acid, and ammonium chloride in gas-works or coke-oven plants. R. MAND (G.P. 426,389, 29.1.24).—The waste heat of the chimney gases is used for concentrating sodium hydroxide solution obtained by the electrolysis of sodium chloride solution, and the chlorine formed during electrolysis is used for the production of chlorobenzene, or is combined with the electrolytic hydrogen to yield hydrochloric acid, which is used for the production of ammonium chloride from the ammoniacal liquor. L. A. COLES.

Neutralisation of [crude] ammonium sulphate crystals. W. DEMANN (B.P. 255,876, 21.7.26. Ger., 24.7.25).—Acid ammonium sulphate crystals are stirred with mother-liquor freed from iron by ammonia solution, or gas liquor containing hydrogen sulphide, and made alkaline with ammonium or sodium carbonate or bicarbonate. Pyridine and ammonia are recovered in a separate apparatus, or pyridine vapour free from ammonia is obtained by maintaining the working temperature of the neutraliser below the dissociation temperature of ammonium carbonate or bicarbonate and maintaining a proper concentration of alkali in the mother-liquor. W. G. CAREY.

Saturators for the manufacture of crystalline salts. (Mfs.) E. M. WEYMAN and R. P. WALLIS, Exors. of G. WEYMAN (B.P. 281,465, 18.11.26).—Liquid to be reacted on by a gas is admitted to the saturator in a number of small streams from a gutter or pipe into a space formed between the saturator walls and a partition, and the gas enters through a pipe fitted with nozzles of various sizes disposed to produce a swirling motion and an upward and downward movement of the gas in the liquid. So that partially formed crystals may develop,

the saturator has a large conical bottom space flanged at the top to support the gas inlet pipe. W. G. CAREY.

Washing and drying gelatinous substances [e.g., silica gel]. I. G. FARBENIND. A.-G., Assees. of W. J. MÜLLER, J. DRUCKER, and H. CARSTENS (G.P. 444,965, 3.11.25).—Silica gel is prepared by causing the sol to set to a jelly in thin sheets on a frame-work, and these are subjected to a suitable washing and drying process. A. R. POWELL.

Preparation of highly active porous silica gel. I. G. FARBENIND. A.-G., Assees. of F. STÖWENER (G.P. 444,914, 20.12.25).—A silica gel prepared from a feebly acid sol containing at least 50 g./litre of silica is washed thoroughly free from acid by means of a wash-water the p_{H} value of which is adjusted between 7 and 10 by the addition of a suitable electrolyte. A. R. POWELL.

Preparation of a base-exchange material from gels. F. K. LINDSAY, Assr. to ARIZONA MINERALS CORP. (U.S.P. 1,646,297, 18.10.27. Appl., 26.6.26).—The gel formed by the interaction of sodium silicate and aluminate solutions in presence of sand is subdivided into a number of blocks before hardening is complete. These blocks are dried by exposure in open air. T. S. WHEELER.

Production of colloidal calcium carbonate. T. SHIRAISHI (U.S.P. 1,654,099, 27.12.27. Appl., 3.8.26. Japan, 25.12.24).—To freshly prepared milk of lime, after treatment at 15° or less with carbon dioxide, a protective colloid is added, and the product is evaporated. H. ROYAL-DAWSON.

Purification and solidification of aluminium chloride. C. W. HUMPHREY and D. S. MCKITTRICK, Assrs. to C. W. HUMPHREY and H. I. LEA (U.S.P. 1,645,142—4, 11.10.27. Appl., [A] 29.5.23, [B, C] 31.5.23. Renewed [A] 18.8.27, [B, C] 6.11.26).—(A) Aluminium chloride is heated under pressure at 200–300° in one of two chambers of a retort, until liquefaction is complete. The second chamber is then cooled so that the chloride distils into it, and passes through the liquid form into a solid cake free from impurities. (B) Aluminium chloride containing ferric chloride is heated with aluminium under pressure as in (A) until the ferric chloride and aluminium have been converted into aluminium chloride and iron. The aluminium chloride is then distilled from the iron as described in (A). (C) An apparatus for performing the process described in (A) comprises a furnace in which is a retort containing two chambers. The retort can be moved so that one chamber is brought outside the furnace. T. S. WHEELER.

Manufacture of anhydrous chlorides and hydrogen chloride. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 281,491, 7.1.27).—Water-gas is treated with the equivalent amount of chlorine for the carbon monoxide and hydrogen, and the mixture, which evolves heat during the gaseous reaction, is led in counter-flow to the metallic oxide in a shaft or rotary furnace. Volatile chlorides, e.g., aluminium chloride, are deposited on cooling from the hydrogen chloride and carbon dioxide formed, from which the chlorides may be recovered completely by electrical means or by washing them with concentrated hydrochloric acid. Non-volatile

chlorides, *e.g.*, chromium chloride, are recovered from the residues. W. G. CAREY.

Manufacture of anhydrous salts of fatty acids. H. VON HOCHSTETTER, Assr. to HOLZVERKOHLUNGS-IND. A.-G. (U.S.P. 1,645,265, 11.10.27. Appl., 7.12.26. Ger., 18.12.25).—Anhydrous ethyl acetate or a homologue is agitated with anhydrous sodium or other metal hydroxide dissolved in absolute alcohol. T. S. WHEELER.

Manufacture of anhydrous fatty acid salts. H. VON HOCHSTETTER, Assr. to HOLZVERKOHLUNGS-IND. A.-G. (U.S.P. 1,648,516, 8.11.27. Appl., 8.12.26. Ger., 18.12.25).—An anhydrous lower fatty acid ester, *e.g.*, ethyl acetate, is vigorously agitated at ordinary temperature with pulverised anhydrous alkali hydroxides. T. S. WHEELER.

Purification of solutions of zinc salts. A. VOHL & Co., A.-G. (B.P. 263,809, 23.12.26. Ger., 24.12.25).—Waste liquors from the manufacture of parchment paper, artificial silk, etc. containing cellulose slimes and zinc salts are purified by first removing iron by oxidation with chlorine or peroxides in the presence of basic metal compounds corresponding to the metal ions of the solution to be purified, and, after filtration, destroying organic constituents before or during evaporation by oxidising agents, *e.g.*, chloric acid or chlorates, nitric acid, or permanganates. Zinc chlorate may be used to prevent the introduction of fresh ions, or barium chlorate, the barium being subsequently removed as barium sulphate. Any remaining traces of iron are rendered colourless by zinc and acid. W. G. CAREY.

Production of metals and their compounds free from phosphorus. OTAVI MINEN- U. EISENBAHN- GES. (G.P. 444,862, 14.1.23).—Metal salt solutions for use in the production of metals or their compounds are freed from phosphorus by the addition of solutions containing zinc salts. L. A. COLES.

Oxidation of metallic solutions. L. F. CLARK (U.S.P. 1,649,152, 15.11.27. Appl., 2.11.22).—The preliminary oxidising process described in U.S.P. 1,503,229 (B., 1924, 875) is claimed. T. S. WHEELER.

Production of phosphorus trioxide. L. WOLF (G.P. 444,664, 4.9.26).—Phosphorus is burnt in oxygen or in a mixture of it with small quantities of inert gases, and the phosphorus trioxide formed is cooled immediately below its decomposition temperature, the velocity of the gas mixture being reduced and the reaction being effected under reduced pressure. The apparatus is constructed of material not affected by rapid alterations in temperature, *e.g.*, of quartz, porcelain, or metal. L. A. COLES.

Manufacture of lead tetraethyl. H. W. DAUDT, A. E. PARMELEE, and W. S. CALCOTT, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,645,375, 11.10.27. Appl., 2.11.25).—In the manufacture of lead tetraethyl by the interaction of ethyl chloride and sodium-lead alloy, it is of advantage to add to the reaction mixture before distillation of the required product a substance which will form an insoluble film on the surface of the lead residues, *e.g.*, glue, benzene, sodium sulphide or sulphate. Agitation of the mass during the distillation is thus facilitated. T. S. WHEELER.

Manufacture of lead tetra-alkyl. K. P. MONROE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,645,389 and 1,645,390, 11.10.27. Appl., [A] 23.10.22, [B] 19.4.24).—(A) In the preparation of lead tetra-alkyl by the action of alkyl bromide on sodium-lead alloy in presence of pyridine or similar catalyst, it is of advantage to treat the reaction mixture with saturated magnesium chloride or potassium carbonate solution rather than with water as in the usual process. (B) The process claimed in (A) is modified by the addition of an alcohol (1%) to the alkyl bromide employed. T. S. WHEELER.

Preparation of pyrophosphates. W. H. DICKERSON, Assr. to INDUSTRIAL WASTE PRODUCTS CORP. (U.S.P. 1,654,283, 27.12.27. Appl., 15.11.23).—Particles of sodium hydrogen phosphate are heated while in suspension and motion. H. ROYAL-DAWSON.

Production of carbonic acid gas. B. LUNDIN (B.P. 278,304, 25.11.26. Swed., 28.9.26. Cf. B.P. 268,478; B., 1928, 14).—A vessel containing solid sodium bicarbonate is disposed centrally above a tank containing a solution of sodium bisulphate; a rotating shaft which passes through both vessels stirs the liquid in the lower tank and feeds bicarbonate from the upper vessel into the lower, which is kept at about 33°. The saturated solution of sodium sulphate so formed is withdrawn, cooled to 15°, and the crystals recovered. The pressure of the evolved gas is regulated by a pump or compressor, and air is expelled on starting the process by the introduction of carbon dioxide or steam, whilst at the end absorbed carbon dioxide is withdrawn from the solution by suction. W. G. CAREY.

Dehydration of ammonia vapours. C. COOPER and D. M. HENSHAW, Assrs. to W. C. HOLMES & Co., LTD. (U.S.P. 1,654,863, 3.1.28. Appl., 5.2.27. U.K., 16.12.25).—See B.P. 272,970; B., 1927, 652.

Preparation of titanic oxide from titanic ores. J. D'ANS and F. SOMMER (U.S.P. 1,655,940, 10.1.28. Appl., 28.4.23. Ger., 14.12.21).—See B.P. 214,483; B., 1924, 511.

Manufacture of pure zirconium sulphate. H. TRAPP (U.S.P. 1,648,569, 8.11.27. Appl., 2.10.24. Ger., 25.9.23).—See B.P., 222,486; B., 1925, 630.

Apparatus for roasting pyrites (G.P. 444,991).—See I. **Acetic and formic acids** (B.P. 231,827).—See III.

VIII.—GLASS; CERAMICS.

Brilliant gold. CHEMNITIUS.—See X.

PATENTS.

Tunnel kiln. W. L. HANLEY, JUN. (U.S.P. 1,653,174, 20.12.27. Appl., 30.8.26. Renewed 17.5.27).—A central zone of the tunnel is provided with direct firing means discharging its combustion products into the upper portion of the goods space, and spaced ports in the lower portion of this space communicate with eduction passages. Passages are also provided in line with the ports for viewing the goods in the lower portion from the exterior of the kiln. H. HOLMES.

Working of quartz. E. R. BERRY and P. K. DEVERS, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,645,086, 11.10.27. Appl., 20.9.23).—One end of a silica rod is heated and

expanded mechanically by a former and by gas pressure into a tube, the size of which is fixed by a mould. As formation proceeds, the rod progressively advances into the apparatus. T. S. WHEELER.

Production of high-grade vitreous silica. H. L. WATSON, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,645,080, 11.10.27. Appl., 24.6.26).—Silica treated as described in U.S.P. 1,536,821 (B., 1925, 548) is heated for 10 min. at atmospheric pressure at 2300°. T. S. WHEELER.

Manufacture of magnesite refractories. U.S. METALS REFINING Co., Assees. of A. MARKS (B.P. 276,016, 6.5.27. U.S., 8.6.26. Addn. to B.P. 244,391; B., 1926, 586).—Linseed oil or similar siccativ oil is rendered more viscous before or after admixture with the powdered magnesite by heating or drying. The mixture may also be conditioned before moulding by being kept, or after moulding. W. G. CAREY.

Formation of refractory crucibles. H. T. REEVE, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,648,149, 8.11.27. Appl., 24.3.26).—A paste of a refractory oxide is applied in a series of layers to a form coated with a paper separator, so that the crucible can be easily removed after drying; it is then fired. T. S. WHEELER.

Apparatus for the production of artificial jewels or precious stones. L. SCHMIDT, Assr. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 1,653,022, 20.12.27. Appl., 10.10.25. Ger., 12.7.24).—A gas flame flows round a pin which projects inside a vessel of refractory material and separately suspended particles of powdered aluminium oxide are applied to the point of the pin by compressed gas from a vessel containing powdered aluminium oxide kept in suspension by a rotary device in the vessel. W. G. CAREY.

Manufacture of a refractory article. A. J. JACKMAN, Assr. to VESUVIUS CRUCIBLE Co. (Re-issue 16,845, 3.1.28, of U.S.P. 1,577,124, 16.3.26).—See B., 1926, 542.

Production of molten liquid, coats of enamel, glass, etc. by spraying upon metal, stone, or other surfaces or bodies. A. PAHL (B.P. 281,885, 7.1.27).

Leer construction. PITTSBURGH PLATE GLASS Co., Assees. of H. S. HEICHERT (B.P. 275,169, 18.5.27. U.S., 29.7.26).

IX.—BUILDING MATERIALS.

Use of volcanic ash for the preparation of hydraulic cement. H. BRINTZINGER and W. BRINTZINGER (Z. anorg. Chem., 1927, 168, 93—95).—Cement freshly prepared from Guatemalan volcanic ash is of considerable mechanical strength, but on ageing in presence of air and moisture, both the free and the combined sulphur in the ash are oxidised to sulphate. Calcium and aluminium sulphates are thus formed, with a sufficient increase of volume to lower considerably the strength of the cement. Volcanic ash containing sulphur is therefore not a probable competitor of Portland cement.

H. F. GILLBE.

Measurement of moisture movements in building materials. F. L. BARROW (J. Sci. Instr., 1927, 4, 475—480).—Two extensometers for use in measuring the expansion or contraction of building materials under varying moisture conditions are described. Both instru-

ments are mechanical in principle and consist essentially of a lever mechanism, with an optical arm, to magnify the actual movement of the specimen. Movements may be recorded autographically. Both instruments may be used to record length changes with changing humidity of the surrounding air or on immersion in water.

J. S. CARTER.

PATENTS.

Rotary kiln and cooler [for cement manufacture]. P. T. LINDHARD, Assr. to F. L. SMIDTH & Co. (U.S.P. 1,653,050, 20.12.27. Appl., 19.11.25).—The discharge end of the kiln supports an inner and an outer annular series of cooling drums external to it. The clinker passes from the kiln through the inner series and thence into one end of the outer series, and is finally discharged from the other end. H. HOLMES.

Separation of fine sand from sludge. O. N. RIKOF (B.P. 278,468, 22.7.26).—A pipe for delivering clean water is led through the centre of a sludge pipe and opens in a downward direction over the outlet in the bottom of a hopper to prevent accumulation of sand near the outlet and to ensure a steady and uniform discharge. A diffuser in the form of a horizontal shield is fixed to the bottom of the pipe and additional water is supplied by radially disposed pipes immediately above the outlet. The upward flow of water causes the lighter particles to overflow at the top of the hopper.

W. G. CAREY.

Manufacture of a waterproof plastic Portland cement composition. H. V. WELCH, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,644,964—5, 11.10.27. Appl., [A] 26.2.24, [B] 5.1.25).—Portland cement is mixed with (A) bituminous kieselguhr or (B) oil shale.

T. S. WHEELER.

Prepared fireproof mortar. R. L. TAYLOR, Assr. to TOUPET-TAYLOR ENGINEERING Co. (U.S.P. 1,645,030, 11.10.27. Appl., 5.1.23. Renewed 13.8.27).—An intimate mixture of ferromanganese slag, the residue obtained by burning coal-mine slate and waste ("red dog"), and a small proportion of cement is claimed.

T. S. WHEELER.

Production of fire-resistant fibrous materials. A. WINOGRADOFF, Assr. to IMPROVED OFFICE PARTITION Co. (U.S.P. 1,645,172—3, 11.10.27. Appl., 22.12.26).—Wood impregnated with a solution containing magnesium sulphate and potassium hydrogen carbonate is heated at 60° to precipitate magnesium carbonate in the fibre.

T. S. WHEELER.

Manufacture of artificial stone or plaster. W. A. OAKLEY (B.P. 281,757, 6.9.26).—A hot aqueous solution of a metallic chloride capable of forming an oxychloride with magnesia, e.g., magnesium, ferric, or calcium chlorides, containing also 5—10% of an alkali silicate, is mixed with finely-divided magnesia or calcined magnesite and a finely-divided filler, e.g., metallic oxides, siliceous or aluminous clay, calcareous earth, etc. If the filler be a calcareous earth or alkaline clay, an alum or other metallic sulphate is added to the liquid metallic chloride instead of the silicate, and the product so obtained with the filler is set, powdered, and mixed with about double the amount of magnesite to form a cement.

W. G. CAREY.

Pitch compositions. PRODORITE, LTD., Assees. of CONTINENTALE PRODORIT A.-G. (B.P. 256,640, 6.8.26. Ger., 6.8.25).—Hard pitch, which does not soften below 40°, as indicated by the Brinell hardness test (cf. B.P. 201,650 and 237,010; B., 1923, 977 A; 1925, 762), is incorporated with 10–15% of asbestos fibre or flakes, preferably with the addition of stone dust, sand, etc. W. G. CAREY.

Asphalt or bitumen substitute. F. G. RENO, Assr. to AUSTRALIAN BITUMINOUS COMPOUNDS, LTD. (U.S.P. 1,649,545, 15.11.27. Appl., 7.9.27. Austral., 12.5.26).—A filling material is incorporated with a basic material consisting of oil-bearing shale and tar. A. C. MONKHOUSE.

Road making. J. RADCLIFFE (U.S.P. 1,655,240, 3.1.28. Appl., 26.12.24. U.K., 2.1.24).—See B.P. 236,050; B., 1925, 720.

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

Calculation of the carbon consumed in direct reduction [of the iron ore] in the blast furnace. E. MAURER (Arch. Eisenhüttenw., 1927, 1, 331–337; Stahl u. Eisen, 1928, 48, 7–8).—A review of the work of earlier investigators, in which an attempt has been made to explain the discrepancies in the various formulæ proposed. The most probable cause of the disagreement in the results obtained by the use of these formulæ is an error in the calculation of the quantity of air used, the figures for which based on the nitrogen content of the flue gases do not agree with those based on the oxygen content. A. R. POWELL.

Use of nickel in cast iron and steel. J. GALIBOURG (Rev. Mét., 1927, 24, 730–739).—Addition of nickel to molten iron for castings favours the transformation cementite \rightarrow graphite \rightarrow ferrite, and gives a more homogeneous distribution of graphite. Examples of the composition of a number of cylinders for various purposes and of nickel-steel castings are given. C. A. KING.

Use of nickel in armaments. G. CHARPY (Rev. Mét., 1927, 24, 715–721).—A review of the introduction and progress of armouring in naval warfare, including the discovery of differential tempering of nickel alloy steel plates. C. A. KING.

Use of nickel in automobile and aviation industries. L. GUILLET (Rev. Mét., 1927, 24, 722–729).—A review of alloy steels and their properties in use in motor and aviation industries. There are few special steels used in machine construction which do not contain nickel, the addition of which improves the mechanical properties and renders alloy steels more amenable to special treatments. C. A. KING.

Non-magnetic alloys of nickel. J. COURNOT (Rev. Mét., 1927, 24, 740–763).—Equilibrium diagrams and the physical properties of a number of non-magnetic alloys of nickel are given, including nickel with copper, cobalt, manganese, molybdenum, zinc, cadmium, tin, lead, aluminium, magnesium, silver, gold, platinum, also brasses, bronzes, and other triple alloys. C. A. KING.

Corrosion of nickel alloys. A. PORTEVIN (Rev. Mét., 1927, 24, 697–714).—After commenting on the difficulty of arriving at conclusions from results of corrosion tests and stating that there is no generalisation in the resistance of alloys to corrosion, nickel is regarded as the one metal which is particularly useful in resistant alloys, regarding these from the points of view of malleability, resistance to chemical attack, and oxidation on heating, and the commercial aspect of cost. C. A. KING.

Properties of electrolytic nickel. B. BOGITCH (Compt. rend., 1927, 185, 1467–1469).—The compositions and physical and mechanical properties of a number of samples of electrolytic nickel are tabulated and shown to be dependent on the method of preparation. The rates of corrosion of the metals by dilute hydrochloric, sulphuric, or nitric acids at 70°, or in air, follow the same order as their apparent densities, the heavier metals being the least attacked. Reheating lowers the hardness and increases the rate of corrosion. J. GRANT.

Causes of failure in heat-resisting alloys. R. SUTTON (Trans. Amer. Soc. Steel Treat., 1927, 12, 221–234).—Carburising boxes containing Ni 60%, Cr 18%, and Fe 15% are preferred. CHEMICAL ABSTRACTS.

Physical characteristics of commercial copper-zinc alloys. W. H. BASSETT and C. H. DAVIS (Amer. Inst. Min. Met. Eng. Tech. Pub., 1927, No. 26, 16 pp.).—Tensile, alternate bending, and hardness tests were performed on copper-zinc alloys, and the effect of annealing on the structure and grain size was investigated. Impurities, e.g., iron, lower the grain size and increase the hardness. CHEMICAL ABSTRACTS.

Heat treatment of aluminium-silicon alloys. R. S. ARCHER, L. W. KEMPF, and D. B. HOBBS (Amer. Inst. Min. Met. Eng. Tech. Pub., 1927, No. 23, 30 pp.).—Quenching from 565°, as compared with slow cooling, produces increased hardness and decreased plasticity and elongation. Ageing at elevated temperatures increases the hardness. Spheroidising and growth of the silicon particles are marked above 565°. CHEMICAL ABSTRACTS.

Equilibrium relations in aluminium-silicon and aluminium-iron-silicon alloys of high purity. E. H. DIX, JUN., and A. C. HEATH, JUN. (Amer. Inst. Min. Met. Eng. Tech. Pub., 1927, No. 30, 31 pp.).—The aluminium-silicon eutectic contains 11.82% Si. The position of the solidus at the aluminium end was determined. Examination of alloys prepared at the intersection of Al-FeSi₂ and of FeAl₃-Si on the phase diagram indicated that the line Al-FeSi₂ and FeAl₃-Si does not exist. The compound FeAl₃ exists. CHEMICAL ABSTRACTS.

Choice and co-ordination of electrolytic, gravimetric, and volumetric methods for the analysis of white metals, bronzes, and ordinary and special brasses. A. TRUCCO (Annali Chim. Appl., 1927, 17, 570–589).—Methods are given for the complete analysis of white metals, white metals rich in lead, white metals composed mainly of tin and antimony, bronzes, and brasses. T. H. POPE.

Treatment of complex raw speiss. W. F. KAISER (Continental Met. Chem. Eng., 1927, 2, 195–198, 238—

242).—A discussion of the electrolytic method of treatment, using basic or acid electrolytes. Direct electrolysis, after concentration, is permissible if copper, nickel, cobalt, and some arsenic are the chief metallic constituents.

CHEMICAL ABSTRACTS.

Effect of boiling orange-juice on various metals and alloys. A. L. BLOUNT and H. S. BAILEY (Trans. Amer. Inst. Chem. Eng., 1926, 18, 139—148).—A number of metals are classified in order of resistance to the corrosion.

CHEMICAL ABSTRACTS.

Brilliant gold. F. CHEMNITUS (J. pr. Chem., 1927, [ii], 117, 245—261).—A detailed account of the various substances used in the preparation of brilliant gold for pottery decoration.

H. BURTON.

Metallurgy of high-frequency induction furnaces. F. WEVER and G. HINDRICH (Arch. Eisenhüttenw., 1927, 1, 345—355; Stahl u. Eisen, 1928, 48, 11—13).—Tests with 30-, 50-, and 100-kw. high-frequency induction furnaces using magnesite-tar, fireclay, and fireclay-graphite crucibles showed that these furnaces are especially suitable for the manufacture of high-grade cutlery steel and high-speed tool steel. The current consumption in the largest furnace is 880 kw.-hr./ton starting from cold, and 1265 kw.-hr./ton in the smallest furnace. Soft iron and chromium-steel prepared in an acid crucible were free from hot-shortness and their mechanical properties were equal or superior to those of similar steels produced in an acid, open-hearth furnace. In a basic crucible the sulphur content is rapidly reduced to 0.008%, and the loss of tungsten and vanadium is relatively small.

A. R. POWELL.

PATENTS.

Furnace for roasting ore. M. MCGUINNESS (B.P. 281,837, 3.11.26).—An ore-roasting furnace, particularly suitable for treating cinnabar, is provided with means for aiding the passage of the ore through the furnace, which is heated by electric resistance bars placed in any suitable positions. The inlet and exit for solid residue of the furnace are preferably water-sealed to prevent the escape of mercury vapour.

C. A. KING.

Roasting [of sulphide ores]. J. B. READ and M. F. COOLBAUGH, Asss. to COMPLEX ORES RECOVERIES CO. (U.S.P. 1,644,692, 11.10.27. Appl., 29.7.25).—A furnace for performing the process of B.P. 200,852 (B., 1923, 1077A) contains a number of superposed hearths, each fitted with rotating rakes. All but a small portion of the air necessary for oxidation is introduced at about the third hearth from the top and travels downwards with the material under treatment; the remainder is circulated by a fan up through the first two hearths and back to the third to preheat the entering material.

T. S. WHEELER.

[Ore] flotation machine. F. DE MIER, Assr. to W. A. BUTCHART (U.S.P. 1,646,351, 18.10.27. Appl., 29.12.25).—The machine comprises a bladed cylinder rotating in a casing, in which are openings to permit of removal of the froth.

T. S. WHEELER.

Pickling, annealing, and otherwise treating metal sheets. J. C. DAVIES. From W. E. WATKINS (B.P. [A] 281,349, [B] 281,575, [C, D] 281,578—9, 16.6.26).—(A) Metal sheets are arched, pickled, washed, decrowned, dried, arched again, annealed, decrowned, cooled, arched

again, pickled, decrowned, and finally straightened by means of suitable automatic machinery. (B) For the pickling operation the sheets are arched transversely and passed, by means of suitable conveyors, through a steam-heated bath of dilute acid, thence through a washing vessel, where they are washed by hot-water sprays and from which they pass over a series of gas flames for drying, and finally through a decrowning press. (C) In the annealing operation the crown of the sheet is heated first to relieve the internal stress in that portion, and the whole sheet is then passed to the annealing furnace, which is maintained at 880° by means of hot, non-oxidising gases under slight pressure to prevent ingress of air. (D) The hot sheets from the annealing furnace are transferred to a cooling chamber through which the waste inert gases from the annealing furnace are passed to cool the sheets to such a temperature that they will not oxidise on exposure to the air. The chamber is provided with a cooling system of pipes through which cold water is passed.

A. R. POWELL.

[Blast furnace for] smelting of iron ores. Y. MURAKAMI (F.P. 621,588, 16.9.26. Japan, 28.9.25).—An iron blast furnace is provided with a lower crucible chamber which can be closed by means of a rotating device. Just above the latter are arranged tuyères for removing part of the gases, charging doors for introducing fuel, and pipes for the introduction of air and, if required, cooling gases. The process of combustion is so regulated that the ore is reduced in the upper zones by the partially burnt gases, too rapid melting is avoided, and the waste gases pass through the mass without interference. By closing the crucible chamber the molten iron can be subjected to a purification process before removal from the furnace.

A. R. POWELL.

Removal of phosphates from iron ores. L. P. BASSET (F.P. 619,218, 24.11.25).—The ore is leached with very dilute hydrochloric or sulphuric acid at the ordinary temperature, and the solution of phosphoric acid so obtained is utilised for the preparation of fertilisers. Coarse ores are roasted before treatment to render them pervious to the acid. The purified ore is washed thoroughly on the counter-current principle previous to smelting.

A. R. POWELL.

Manufacture of pure iron. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 281,963, 25.6.27. Addn. to B.P. 262,938; B., 1927, 144).—Iron carbonyl in the undiluted liquid or vaporous condition is passed through the heated liquid or melt at ordinary or under increased pressure, or brought into contact with the surface of the liquid or melt by blowing the vapour or spraying the liquid on to the agitated surface. Organic liquids of high b.p., melted salts, or metals may be used, and the working temperature should be between 100° and 400° or above 1000° in order to prevent extensive deposition of carbon as the result of the decomposition of carbon monoxide.

M. E. NOTTAGE.

Tempering of steel. J. F. EDWARDS (U.S.P. 1,648,044, 8.11.27. Appl., 29.10.25).—An aqueous quenching bath contains iodine, sodium chloride, and glycerol.

T. S. WHEELER.

Coating of iron articles with tin and zinc. T. LIBAN (B.P. 281,357, 20.7.26).—Articles which have been

cleaned mechanically or chemically are introduced into a bath of molten lead through a substantial covering layer of a mixture of fluorine compounds with zinc chloride or zinc ammonium chloride, and withdrawn through molten zinc (which may contain aluminium) floating on the surface of the lead at the exit end of the bath.

C. A. KING.

Decomposition of chromite. I. G. FARBENIND, A.-G., Assees. of C. MÜLLER, L. SCHLECHT, and A. CURS (G.P. 444,798, 21.10.24).—Chromite is first reduced in hydrogen or in a mixture of gases containing hydrogen and the product is heated above 200° with a slight deficiency of sulphuric acid in a closed vessel lined with hard lead containing preferably 3% Sb.

A. R. POWELL.

Manufacture of [high-percentage] ferrophosphorus. J. WARNER (U.S.P. 1,646,268, 18.10.27. Appl., 16.6.27; cf. U.S.P. 1,475,976; B., 1924, 60).—Coke, phosphate rock, and iron are smelted in a blast furnace to give ferrophosphorus containing 10–16% P. This is recharged to the furnace with iron, coke, and a restricted amount of phosphate rock. A product containing over 20% P is obtained.

T. S. WHEELER.

Treatment of ores of copper and other metals. F. DIETZSCH (B.P. 281,741, 7.7.26).—Prior to leaching, ores are roasted with a sulphate of an alkali or alkaline-earth metal, not exceeding 2% of the weight of ore.

C. A. KING.

Hardening of copper and copper alloys. O. W. GUSTAFSON (B.P. 281,799, 21.9.26).—The metal is plunged into a bath formed by an inorganic acid, e.g., nitric acid, and a neutral alkaline salt, e.g., ammonium chloride or borax, both metal and bath being at ordinary room temperature.

M. E. NOTTAGE.

Roasting of zinc sulphide ores. SOC. GÉN. MÉTALLURGIQUE DE HOBOKEN (B.P. 271,877, 23.5.27. Fr., 27.5.26).—The raw ore containing sulphur is mixed with a natural ore which does not contain sulphur, such as oxide or carbonate ore, or with a sulphur-containing ore which has been already sintered, and the mixture is treated direct in a roasting blast apparatus wherein it is completely desulphurised and subsequently reduced. By this means ores in a fine state of division, which would otherwise cause trouble in the subsequent operations of reduction and distillation in retorts, may be obtained in a well-sintered condition.

M. E. NOTTAGE.

Reduction of zinc ores. H. WITTEK (B.P. 279,370, 20.11.26. Ger., 23.10.26).—The ores are reduced by heating them for about 1 hr. with carbide in a current of nitrogen at a temperature of 1100–1150°, the rate of reduction being regulated by controlling the supply of nitrogen.

M. E. NOTTAGE.

Aluminium alloy. H. C. HALL and T. F. BRADBURY (B.P. 281,912, 17.3.27).—An alloy of aluminium contains 0.5–0.4% Cr, 0.2–1.5% Ni, 0.1–1% Mg, up to 0.5% Sb, up to 0.5% Ti, 0.2–1.5% Si, 0.7–1.5% Fe, and 2–5% Cu.

C. A. KING.

[Malleable] alloys. T. H. KELLY (B.P. 281,950, 31.5.27).—Malleable alloys of nickel, copper, and iron are produced by melting the metals rapidly in the non-oxidising atmosphere of an electric furnace. Suitable

proportions are 20–40 pts. of nickel, 20–40 pts. of copper, and 40–60 pts. of iron. To give greater hardness, up to 20% of the iron may be replaced by chromium.

C. A. KING.

Magnetic alloys. W. S. SMITH, H. J. GARNETT, and J. A. HOLDEN (B.P. 281,763, 8.9. and 17.12.26).—Magnetic alloys contain 10–17% (12.5–13.5%) Fe, 1.5–4% (1.5–2%) Si, 1–4% (2–2.5%) of a fourth element, e.g., chromium, tungsten, vanadium, or molybdenum, and the balance nickel.

C. A. KING.

Production of lamellar metallic deposits. W. A. F. PFANHAUSER (B.P. 274,426, 11.5.27. Ger., 14.7.26).—Lamellar metallic deposits, e.g., nickel, are produced on an endless belt acting as cathode and passing repeatedly through different solutions to separate the cumulative layers of metal. Thus the band might pass alternately through nickel and copper solutions, or through a nickel solution and a dilute solution of wax, the intermediate layers in each case being dissolved, leaving nickel flakes.

C. A. KING.

Treatment of articles [deposition of metal on articles] in metallic baths. N. J. BARBIER (U.S.P. 1,654,910, 3.1.28. Appl., 28.10.25. Fr., 31.10.24).—The portion of molten metal immediately surrounding the article immersed in the bath is heated to a temperature not less than that of the remainder of the molten metal by passing an electric current between the immersed article and the molten metal used as electrodes.

J. S. G. THOMAS.

Open-hearth furnace. F. B. MCKUNE, Assr. to OPEN HEARTH COMBUSTION Co. (Re-issue 16,837, 27.12.27, of U.S.P. 1,339,855, 11.5.20).—See B., 1920, 493 A.

Arrangement of the gas and air passages in reverberatory furnaces. H. MOLL (U.S.P. 1,653,405, 20.12.27. Appl., 6.5.22. Ger., 20.5.21).—See B.P. 177,812; B., 1923, 893 A.

Coating [of pipes etc.]. B. TALBOT, Assr. to TALBOT NON-CORROSIVE LININGS Co. (U.S.P. 1,653,746, 27.12.27. Appl., 12.5.25. U.K., 24.4.25).—See B.P. 255,546; B., 1926, 837.

Misch-metal wire. J. W. MARDEN and M. N. RICH, Assrs. to WESTINGHOUSE LAMP Co. (U.S.P. 1,653,367, 20.12.27. Appl., 29.1.25).—See B.P. 246,860; B., 1926, 884.

Coating of materials by metal spraying. F. G. COZENS, and METALLISATION, LTD. (B.P. 282,116, 17.7.26).

Roasting of pyrites (G.P. 444,911).—See I. **Washing of ores (B.P. 265,202).**—See II. **Detonator tubes (G.P. 443,727).**—See XXII.

XI.—ELECTROTECHNICS.

Treatment of raw speiss. KAISER. High-frequency induction furnaces. WEVER and HINDRICHS.—See X.

PATENTS.

Electric furnace. A. E. GREENE (U.S.P. 1,654,419, 27.12.27. Appl., 23.11.22).—An outwardly-bulged, horizontal, cylindrical shell has a refractory lining and cone-shaped metal ends. A moving door member abuts against a flat end surface on one cone-shaped end, and

a doorway opens through this end and the refractory lining. J. S. G. THOMAS.

Electric [reducing] furnace. P. L. J. MIGUET, Assr. to Soc. ELECTROMÉTALLURGIQUE DE MONTRICHER (U.S.P. 1,655,324, 3.1.28. Appl., 29.9.26. Fr., 31.12.25).—Sandwiched conductors are arranged within ducts arranged outside the furnace walls, and if desired air-cooled without the air entering the furnace lining. Transformer chambers are arranged in the ducts, and the apparatus is supported independently of the furnace walls. J. S. G. THOMAS.

Material for commutator brushes. F. C. ATKINSON (U.S.P. 1,644,703, 11.10.27. Appl., 25.4.23).—Pitch is heated with cuprous or cupric oxide to yield a mixture of copper and carbon, which is powdered, moulded with a binder of copper oxide and pitch, and baked. T. S. WHEELER.

Manufacture of a composition of matter [insulating material]. M. DARRIN, Assr. to F. N. BURT Co., LTD. (U.S.P. 1,644,711, 11.10.27. Appl., 10.6.24. Renewed 11.3.27).—Cellulose is impregnated with molten sulphur containing naphthalene or triphenyl phosphate to increase its fluidity. An insulating material capable of being machined is obtained on cooling. T. S. WHEELER.

Removal of enamel from electrical conductors. W. G. HOUSEKEEPER, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,653,805, 27.12.27. Appl., 10.2.26).—Enamel formed of a solid hydrocarbon and a non-drying vegetable oil subjected to destructive distillation, and fibrous insulation, are stripped from the conductor after the enamel has been softened by treatment with monochlorobenzene, and the insulation has been impregnated with wax. J. S. G. THOMAS.

Electrolytic treatment for the cylinders of rotary printing machines to eliminate polishing and wear. H. KUPPEL and L. SIMÉANT (B.P. 282,274, 10.5.27).—Engraved cylinders are employed successively as cathodes or anodes, respectively, in an electrolytic bath consisting of 78% of water, 18% of copper sulphate, 4% of sulphuric acid (*d* 1.14), in which copper sheets are suspended. The bath is operated with a voltage not exceeding 3 volts, and the current density is maintained constant at 0.4–0.5 amp. cm.² J. S. G. THOMAS.

Electrical purification of gases. SIEMENS-SCHUCKERTWERKE G.M.B.H., Assees. of H. LÜBKE (G.P. 445,032, 6.2.26).—The gas is mixed with the vapour of an insulating fluid, *e.g.*, an oil, which has a dielectric constant greater than 1, and the mixture is passed through the usual electrical purification plant. A. R. POWELL.

Corrugated sheet-metal electrodes for electrical gas-purification plant. SIEMENS-SCHUCKERTWERKE G.M.B.H., Assees. of G. KARKUTSCH (G.P. 444,963, 14.10.24).—The electrodes consist of thin, corrugated, sheet metal strengthened by means of cross-pieces joining the crests of the corrugations and arranged at regular distances apart. A. R. POWELL.

Electric lamp [with non-sagging filament]. A. DE GRAAFF, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,644,712, 11.10.27. Appl., 17.4.23. Holl., 27.4.22).—Sagging of the filament of gas-filled lamps is inhibited by mixing

hydrogen (0.5–4%) with the argon filling, and sealing in phosphorus suboxide (P₄O) to act as a drying agent. T. S. WHEELER.

Illuminating tubes. J. BRETTMON (F.P. 617,842–3, 3.11.25).—(A) Tubes, highly evacuated or filled with gases or metallic vapours and provided with electrodes, contain a small amount of radium salt or substance containing radium. Such tubes become luminous when consuming very much less electrical energy than is the case when radium is absent. (B) Tubes of glass or similar material, having a carbon and a metallic oxide electrode, are evacuated as completely as possible. When operated with a suitable voltage, the carbon electrode becomes incandescent and the metallic oxide is decomposed so that the tube is filled with metallic vapour and carbon monoxide or dioxide. A white or coloured incandescent results. The tubes can then be operated by means of indifferent electrodes. J. S. G. THOMAS.

Photo-electric cell. WESTINGHOUSE ELECTRIC & MANUF. Co., Assees. of V. K. ZWORYKIN (B.P. 271,476, 17.5.27. U.S., 20.5.26).—The active material of a photo-electric cell consists of an alloy of metals of the alkali and alkaline-earth groups, respectively, prepared by chilling the two metals to the temperature of liquid air, then mixing the constituents *in vacuo*, and heating. J. S. G. THOMAS.

Photo-electric cell. TELEFUNKEN GES. F. DRAHTLOSE TELEGRAPHIE M.B.H., and O. VON BRONK (G.P. 443,971, 15.8.24).—An electrode, thinly coated with selenium by sputtering or sublimation, and a heated cathode are arranged in a vessel which is either highly evacuated or filled with gas. Almost the whole of the selenium through which current is passed can be exposed to illumination. Illumination of the selenium surface by the hot cathode is reduced by employing for the latter a strongly electron-emitting material, *e.g.*, an oxide or thorium filament, which is operated at such a low temperature that it produces little or no luminous effect. J. S. G. THOMAS.

Electron tube. H. A. BROWN, Assr. to UNIV. ILLINOIS (U.S.P. 1,653,544, 20.12.27. Appl., 17.7.22).—To transform thermal into electrical energy, a conductor is heated and discharges electrons through an alkali-metal vapour (*e.g.*, of potassium-sodium alloy) towards a second conductor, and an electric current is established between the two conductors by the resulting difference of potential. J. S. G. THOMAS.

Production of metallic coatings on metal electrodes used in mercury vapour rectifiers. SIEMENS-SCHUCKERTWERKE G.M.B.H., Assees. of M. SCHENKEL (G.P. 444,597, 7.11.24).—Iron or steel rods, prior to use in mercury-vapour rectifiers, are amalgamated by exposure in a vacuum mercury arc. The use of such electrodes prevents short-circuiting and striking-back. J. S. G. THOMAS.

Manufacture of electrodes for batteries. D. PEPPER (U.S.P. 1,653,872, 27.12.27. Appl., 1.12.24).—The active paste is compressed, while plastic, between the supporting walls of the grid and cores of readily fusible material, and the cores are removed by fusion after the paste has set. J. S. G. THOMAS.

Electrolytic cell. H. O. SIEGMUND, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,653,879, 27.12.27. Appl., 22.10.24).—Tin electrodes, carried by aluminium supports, are immersed in a film-forming electrolyte contained in a casing, the whole forming an electrolytic condenser. J. S. G. THOMAS.

Depolariser. J. T. SZEK (F.P. 619,307, 26.7.26. Belg., 5.7.26).—Aluminium chloride is used in Leclanché and similar cells in place of, or in conjunction with, a small amount of graphite and manganese dioxide as depolariser. Thus a solution of aluminium chloride and, if desired, a compound of mercury or zinc chloride is added to a paste containing rice, powdered wood charcoal, and absorbents. J. S. G. THOMAS.

Production of arc-light electrodes. L. KAHL, Assr. to RÜTGERSWERKE A.-G., ABTG. PLANIWERKE (U.S.P. 1,654,046, 27.12.27. Appl., 31.5.23. Ger., 9.6.22).—See B.P. 199,018; B., 1924, 550.

Protection of carbon or graphite electrodes in fused electrolytes. E. A. ASHCROFT, Assr. to NEW METALLURGY, LTD. (U.S.P. 1,653,605, 20.12.27. Appl., 23.2.27. U.K., 27.11.25).—See B.P. 269,749; B., 1927, 492.

Electrolytic production of acids and alkalis (G.P. 444,796).—See VII. **Magnetic alloys** (B.P. 281,763). **Metallic deposits** (B.P. 274,426).—See X.

XII.—FATS; OILS; WAXES.

Behaviour of soaps of various oils on dilution. H. B. STOCKS (Oil Fat Ind., 1927, 4, 315—319).—Hydrolysis of soaps is maximal at a dilution of 1 in 150. There is no appreciable hydrolysis of the sodium salts of fatty acids up to and including lauric acid, but above this 50% of the alkali is liberated; with castor-oil soap only 5% is liberated, since sodium ricinoleate is not largely hydrolysed. For distinguishing castor oil, 5 g. are hydrolysed under a reflux condenser with excess of alcoholic potash, phenolphthalein is added, the liquid neutralised with hydrochloric acid, and the alcohol evaporated. The residue is dissolved in water and diluted to 100 c.c.; 10 c.c. are diluted to 250 c.c. with boiling, distilled water and titrated with 0.1*N*-hydrochloric acid, first with phenolphthalein and then with methyl orange. With castor oil, 0.5—0.8 c.c. are required in the first titration; other fats and oils (except butter, coconut, and palm-nut fats) require 8—9 c.c.

CHEMICAL ABSTRACTS.

Behaviour of fish oils with uranium nitrate and pyrogallol. W. H. DICKHART (Oil Fat Ind., 1927, 4, 326—328).—When fish oil (3 c.c.) is heated with occasional shaking on a steam-bath for 20 min. with uranyl nitrate (10 mg.) the following colour reactions are obtained: cod-liver oil (U.S.P.), amber, greenish with transmitted light; Norwegian sperm oil, light amber, no change with transmitted light; menhaden oil, crimson; pilchard oil, light red; whale oil, light brownish-red; herring oil, sardine oil, and Newfoundland cod oil, blood-red. CHEMICAL ABSTRACTS.

Grape seed oil. E. CARRIÈRE and BRUNET (Compt. rend., 1927, 185, 1516—1518; cf. André, A., 1922,

i, 908; 1923, i, 437).—The following acids were shown to be present in a commercial sample of grape seed oil: stearic (10%), palmitic (5%), erucic (5%), hydroxy-acids (10%), oleic (20%), and linoleic (50%).

H. BURTON.

Determination of the purity of olive oils. C. MILANI (Annali Chim. Appl., 1927, 17, 589—590; cf. B., 1927, 915).—A reagent prepared by dissolving a few drops of pyridine in a 0.5—1% solution of eosin in acetone gives no coloration with pure olive oil, a brown coloration with the commercial mixed oil, and a mauve coloration with sesamé oil. T. H. POPE.

Determination of iodine value [of oils]. E. RUPP (Apoth.-Ztg., 1927, 42, 281—282; Chem. Zentr., 1927, i, 2584).—The method of the German pharmacopœia is modified to avoid a high bromine pressure and sensitiveness to photochemical reduction. Potassium bromide (4 g.) is added to 0.2*N*-potassium bromate solution; after keeping in the dark for 2 or (for drying oils) 20 hrs., potassium iodide (0.5 g.) is added and the iodine titrated with 0.1*N*-sodium thiosulphate.

A. A. ELDRIDGE.

PATENTS.

Treatment of drying and semi-drying fats and oils. G. PETROFF (B.P. 281,896, 1.2.27).—Drying and semi-drying fats and oils mixed with not more than 15% of aromatic hydrocarbons, phenols, or hydrogenated hydrocarbons or phenols are treated with not more than 15% of concentrated sulphuric acid. After separation of the acid and removal of excess of solvent by distillation, the neutral glycerides are split in the usual way in the presence of sulpho-acids of high mol. wt. The introduction of hydrocarbons etc. effects reduction of the amount of acid used and improvement of the quality of the final product. S. S. WOOLF.

Production of neutral fat and soap from soap stock. ARTIEBOLAGET SEPARATOR (F.P. 621,112, 6.9.26. Swed., 18.11.25).—Neutral fat is separated from the stock, diluted with water if necessary, by centrifugal means, and soap is salted out of the remaining liquor.

L. A. COLES.

Flaking of soap. B. W. COLTMAN (U.S.P. 1,653,390, 20.12.27. Appl., 15.8.21).—Liquid soap is sprayed in a thin film which is then desiccated and disintegrated into flakes. H. ROYAL-DAWSON.

Oil hardening with nickel and copper formates. C. ELLIS (U.S.P. 1,645,377, 11.10.27. Appl., 1.2.24).—The presence of copper formate (10—20%) in nickel formate enables reduction of the latter by hydrogen, when suspended in oil, to be performed below 200°. Burning of the oil vehicle is thus avoided.

T. S. WHEELER.

Treatment of oils and fats to neutralise and remove their fatty acid content. J. W. SPENSLEY (U.S.P. 1,648,367, 8.11.27. Appl., 5.3.23. U.K., 5.5.22).—See B.P. 201,968; B., 1923, 962 A.

Preparatory treatment of cottonseed [for extraction of oil]. H. BOLLMANN, Assr. to M. F. FOSTER (U.S.P. 1,653,201, 20.12.27. Appl., 17.8.23. Ger., 29.8.22).—See G.P. 393,072; B., 1924, 603.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.**Water-resistance tests [on paints and varnishes].**

H. WOLFF (Farben-Ztg., 1928, 33, 921—923).—In a series of experiments on water-resistance of paints and varnishes under varying conditions, conflicting results were obtained according to whether the immersion was continuous or intermittent, and whether temporarily or permanently hard water or distilled water was used. The following standard method of procedure is suggested:—Films (one or two coats, according to the type of material) on clean glass and iron plate are half-immersed in water after 48 hrs. air drying. If tap water be used, it should be freed from temporary hardness. The immersion is continuous, daily examination being made for milkiness, softening, etc. A parallel series of tests should be run, the films being allowed to dry out after each 2 days' immersion, and the reversibility of any changes observed. S. S. WOOLF.

Ageing of boiled oil. F. WILBORN (Farben-Ztg., 1927, 33, 864).—Over a period of 10 months, samples of boiled oil were prepared monthly by incorporating a standard amount of lead-manganese resinate (the same "melt" being used throughout) in the same well-preserved linseed oil. A similar series was prepared using cobalt linoleate as drier. At the end of this time no appreciable sedimentation had occurred in any sample, and the drying times of the oils showed no significant "ageing" variation. This is contrary to previous statements to the effect that the driers in boiled oil gradually lose effectiveness by precipitation. S. S. WOOLF.

Influence of driers on the drying of oil of amber.

F. WILBORN (Farben-Ztg., 1927, 33, 862—864).—Additions of lead-manganese resinate and of cobalt resinate to redistilled oil of amber are graphically shown to accelerate the drying by catalysing resinification. The results are briefly discussed. S. S. WOOLF.

Physical chemistry of colour lake formation.

III. Alizarin lakes. H. B. WEISER and E. E. PORTER (J. Physical Chem., 1927, 31, 1824—1839).—The mechanism of the formation of alizarin lakes has been studied by measuring the adsorption of alizarin and alizarin SW by sols of the hydroxides of iron, chromium, and aluminium at varying p_H values. Lake formation is due to adsorption of the dye anion by the hydrous oxides in amounts depending on the composition of the dye bath. The adsorption curves for alizarin SW and the aluminium and chromium sols show no evidence of the formation of a compound between the dye and the mordant at any p_H value, the influence of which is similar to that on sulphate and oxalate (A., 1927, 1021), the decreasing order of adsorption from neutral and basic baths being alizarin SW, oxalate, and sulphate. Experiments on the adsorption from sodium alizarate baths show the dye anion to be adsorbed, leaving most of the sodium in the bath, thus disproving the suggestions of Bull and Adams (A., 1922, i, 355), Williamson (A., 1924, i, 1080), and Biltz (A., 1906, ii, 78) as to the nature of lake formation. The effects of the sulphate ion, the calcium ion, and of calcium sulphate at varying p_H values have also been studied. The sulphate ion replaces the dye if the bath is acid, but not if alkaline; the

calcium ion increases the charge on the mordant, thus permitting greater adsorption of the dye anion, and the data with calcium sulphate show that the effects of the individual ions are independent of each other, each, in turn, being dependent on the hydrogen-ion concentration. L. S. THEOBALD.

British standard specifications for pigments.

C. A. KLEIN (J. Oil and Colour Chem. Assoc., 1927, 10, 355—372).—A general account of the inception of the British Engineering Standards Association Subcommittee on paint materials, with special reference to the work of the Pigment Panel. The nature of the specifications evolved for dry pigments and oil-pastes is indicated, the various clauses being briefly discussed. S. S. WOOLF.

Nitro-oil- or combination-lacquers. F. KOLKE (Farben-Ztg., 1927, 33, 861—862).—The combination of nitrocellulose varnishes with oil varnishes is discussed. Curves are given showing the limits of compatibility of tung oil with 20% $\frac{1}{2}$ -sec. nitrocellulose solutions in butyl acetate and in hexalin acetate. S. S. WOOLF.

PATENTS.**Manufacture of composite titanium pigments.**

H. WADE. From TITANIUM PIGMENT Co., INC. (B.P. 281,459, 9.11.26).—A composite titanium oxide-calcium sulphate pigment is prepared by heating a solution of a titanium compound, *e.g.*, titanium sulphate, in which is suspended calcium sulphate previously prepared in acicular crystalline form (either by precipitation in alkaline or acid media or by calcination of natural or by-product calcium sulphate). The composite precipitate is neutralised, washed, and calcined in the presence of calcium phosphate or other agent inhibitive of deteriorative colour change. S. S. WOOLF.

Manufacture of [phenol-acetaldehyde] condensation products. H. W. MATHESON, ASSR. to CANADIAN ELECTRO PRODUCTS Co., LTD. (U.S.P. 1,653,302, 20.12.27. Appl., 19.8.22).—Phenol and acetaldehyde are condensed at 50—80° under pressure in the presence of less than 1% of a condensing agent comprising a halogen derivative of a non-metal. S. S. WOOLF.

Production of phenol-methylene resins and alcohols from methylals. C. B. CARTER, ASSR. to S. KARPEN & BROS. (U.S.P. 1,645,226, 11.10.27. Appl., 26.8.25).—A phenol is boiled at atmospheric pressure for a few minutes with a methylal in presence of concentrated sulphuric acid (10—20%) to give a hard, fusible, brittle resin and the alcohol corresponding to the methylal employed. T. S. WHEELER.

Manufacture of synthetic resins. B. N. LOUGOVY, ASSR. to ELLIS-FOSTER Co. (U.S.P. 1,648,852, 8.11.27. Appl., 23.10.24).—Benzotrighloride (1 mol.) is treated with a phenol, *e.g.*, *o*-cresol (3 mols.); the product (containing a dye) on being heated with formaldehyde solution yields a resin which can be moulded hot and hardened with hexamethylenetetramine. T. S. WHEELER.

Manufacture of plastic compositions. E. C. R. MARKS. From SELDEN Co. (B.P. 281,742, 7.7.26).—Ethyl phthalate or a similar normally liquid, non-resinifying ester of b.p. 250° or over is incorporated with a resinous substance capable of being hardened

by heat, *e.g.*, phenol-aldehyde condensation products, glyceryl phthalate, shellac, etc. The ester is added to the resinous material (in the fusible state) in amount precluding substantial separation of the components during the subsequent hardening process.

S. S. WOOLF.

Treatment of resins for making varnish, paints, etc. J. F. BENNETT and J. HADFIELD (B.P. 281,377, 31.8.26).—A varnish base is prepared by treating a resin, alone or admixed with linseed or other oil, with nitric acid, preferably of *d* 1.3. Heat may be used to start the reaction, but the temperature must be kept below 100°. After neutralisation, the product is dissolved in suitable solvents and mixed with nitrocellulose, oils, resins, bitumens, etc., pigments being incorporated if desired.

S. S. WOOLF.

Decolorising, treating, and dissolving shellac for bleaching purposes. F. C. RAWOLLE (U.S.P. 1,644,491, 4.10.27. Appl., 31.8.23).—Crude shellac after being shredded in hot water is treated with sodium carbonate solution in a vessel fitted with means for further subdividing the material to promote dissolution.

T. S. WHEELER.

[Manufacture of writing] ink. H. SCHLADEBACH and H. HÄHLE, Asssts. to I. G. FARBENIND. A.-G. (U.S.P. 1,645,117, 11.10.27. Appl., 8.1.26. Ger., 3.1.25).—See B.P. 267,633; B., 1927, 387.

[Manufacture of colour] lakes. E. HARTMANN, Assr. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,653,851, 27.12.27. Appl., 27.12.23. Ger., 22.5.23).—See B.P. 216,486; B., 1925, 78.

Manufacture of synthetic resin. A. BLUMFELDT and H. KAEGI, Asssts. to SOC. CHEM. IND. IN BASLE (U.S.P. 1,654,856, 3.1.28. Appl., 19.3.24. Switz., 9.4.23).—See G.P. 401,168; B., 1925, 216.

Manufacture of [urea-acr]aldehyde condensation product. A. GAMS and G. WIDMER, Asssts. to SOC. CHEM. IND. IN BASLE (U.S.P. 1,654,215, 27.12.27. Appl., 7.10.26. Switz., 22.10.25).—See B.P. 260,288; B., 1927, 419.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Influence of emarex (M.R.X.) on the physical properties of vulcanised rubber. L. STOLL (Gummi-Ztg., 1927, 42, 695—696).—When added to a mixture of rubber (100 pts.), zinc oxide (5 pts.), sulphur (5 pts.), and diphenylguanidine (1½ pts.) the above form of "mineral rubber" (up to 5% on the rubber) causes a distinct acceleration of vulcanisation and an increased extension of the product at 200 kg./sq. cm. With higher proportions the extension becomes less and then again increases without attaining the value for the standard mixing. The extension at break reaches a maximum at 30%. Permanent set increases and hardness decreases with rising percentages of the mineral rubber.

D. F. TWISS.

Transformation temperature for rubber at approximately 60—80°. L. STOLL (Gummi-Ztg., 1927, 42, 745—746).—As evidence of the existence of a transformation of rubber between 60° and 80°, instances are cited of the importance of this temperature range for

various processes and changes with latex and with raw vulcanised rubber.

D. F. TWISS.

PATENTS.

Manufacture of hydrocyclocaoutchouc. H. STAUDINGER (B.P. 263,862, 30.12.26. Switz., 31.12.25).—*cyclo*Caoutchouc, obtained by the action of heat on rubber, can be hydrogenated, preferably above 200° and under an increased pressure of hydrogen, in the presence of a catalyst, desirably a metal of the 8th series of the periodic system. A solvent may be used to keep the *cyclo*caoutchouc in solution during the reduction or to remove the resulting hydrocyclocaoutchouc subsequently from the catalyst. Hydrocyclocaoutchouc has n_D^{20} 1.5263 and is useful for the manufacture of plastic masses and as a substitute for gutta-percha.

D. F. TWISS.

Attaching rubber to metal, glass, wood, and similar rigid surfaces. R. M. WITHYCOMBE (B.P. 256,227, 26.7.26. U.S., 29.7.25).—Rigid surfaces, coated with a vulcanisable rubber solution or paint and dried, are subjected to a dry heat ranging from 105° to 260° at atmospheric pressure. The resulting coating may vary from a thin, hard, enamel-like layer to one of highly polished vulcanite. [Stat. ref. to B.P. 8757 of 1913.]

D. F. TWISS.

Method of deodorising [putrefaction products of rubber latex]. S. M. CADWELL, Assr. to NAUGATUCK CHEMICAL Co. (U.S.P. 1,648,259, 8.11.27. Appl., 18.2.26).—The putrefaction products of nitrogenous materials, *e.g.*, rubber latex, are deodorised by addition of a non-nitrogenous organic oxide, sulphide, or disulphide containing more than one carbon atom in the molecule, and also a double linking adjacent to a carbon atom, *e.g.*, benzoyl peroxide, acetic anhydride.

T. S. WHEELER.

Treatment [neutralisation] of rubber latex [containing ammonia]. H. W. KELLEY and W. D. WOLFE, Asssts. to UNITED SHOE MACHINERY CORP. (U.S.P. 1,644,730, 11.10.27. Appl., 16.3.25).—A mixture of boric acid and glycerol is employed.

T. S. WHEELER.

Manufacture of products resembling rubber. CONSORTIUM F. ELEKTROCHEM IND., G.M.B.H. (B.P. 261,748, 16.11.26. Ger., 23.11.25).—Polymerised vinyl compounds, *e.g.*, polymerised vinyl alcohol or a homologue or derivative such as a polymerised vinyl ester, ether, or acetal, are treated with a vulcanising agent such as sulphur (aided by heat and, if desired, an accelerator) or sulphur chloride. According to the nature of the original material and the conditions of treatment the products may be obtained with the characteristics of soft rubber or vulcanite and with other specific properties.

D. F. TWISS.

Treatment of rubber articles. GUTTA PERCHA & RUBBER, LTD., Assees. of J. J. MORIARTY (Can. P. 264,816, 11.12.25).—The sulphur content of the surface layer of articles constructed of soft rubber is increased by treating the articles with sulphur chloride solution.

L. A. COLES.

Manufacture of a caoutchouc derivative. H. STAUDINGER, Assr. to SOC. CHEM. IND. IN BASLE (U.S.P. 1,654,844, 3.1.28. Appl., 22.12.26. Switz., 31.12.25).—See B.P. 263,862; preceding.

Vulcanisation of caoutchouc. S. J. PEACHEY and A. SKIPSEY (U.S.P. 1,653,821, 27.12.27. Appl., 19.3.25. U.K., 26.3.24).—See B.P. 242,464; B., 1926, 68.

Vulcanising of caoutchouc. C. W. BEDFORD, Assr. to GOODYEAR TIRE & RUBBER Co. (U.S.P. 1,645,084, 11.10.27. Appl., 11.7.23).—See B.P. 130,857; B., 1919, 731 A.

Treatment of latex and products thereof. NAUGATUCK CHEMICAL Co., Asses. of J. MCGAVACK (B.P. 268,299, 31.1.27. U.S., 24.3.26).—See U.S.P. 1,647,805; B., 1928, 62.

XV.—LEATHER; GLUE.

Synthetic tannins. L. MEUNIER and C. GASTELLU (Bull. Soc. d'Encour., 1927, 126, 732—742).—Equal weights of phenol and sulphuric acid of 104.5% strength should be used in sulphonating phenol. The phenol is melted at 40° and poured in a thin stream into the sulphuric acid which is stirred meanwhile. The temperature rises quickly to 150°; the mixture is allowed to cool to 100°, at which temperature it is kept for 2½ hrs. Under these conditions, 200 pts. of phenol yield 400 pts. of a product which melts at 25—30° to a brown liquid, is entirely soluble in water, and contains 351 pts. of phenol-sulphonic acid, 4.8 pts. of free sulphuric acid, and 11 pts. of free phenol. When the crude product is condensed with formaldehyde, the phenol-sulphonic acid itself forms a soluble compound, whereas the free phenol condenses with formaldehyde to form insoluble resins which are partially peptised by the excess sulphuric acid and the other condensation products. In practice, crude phenol-sulphonic acids containing less than 5% of free phenol are condensed with formaldehyde to form products entirely soluble in water. The process is readily completed if 1 mol. of formaldehyde is used for every 2 mols. of phenol-sulphonic acid. The consistency of the product and its solubility in water diminish proportionately with the increase in the amount of formaldehyde used. These variations in the properties result from the increased degree of polymerisation. The condensation products should be neutralised until the total residual acidity corresponds to 14—15 g. of sulphuric acid per 100 g. of phenol originally used. With such a product, the fixation of the tannin by the skin takes place rapidly and attains a maximum of 14—15 pts. of tannin per 100 pts. of leather. D. WOODROFFE.

Tanning materials of the British Empire. II. (Bull. Imp. Inst., 1927, 25, 380—403).—A review of oak and larch barks, chestnut and cutch woods, and gambier and sumach.

Tanning, currying, and dyeing of [dog] skins. R. MACH (Gerber, 1927, 53, 61—62, 71—73; Chem. Zentr., 1927, II, 659).—The hides, which are shorn mechanically and the long hairs removed, are softened and fleshed, and a bate containing salt, alum, acids, and barley groats is brushed several times on to the skin. After drying, the skins are greased and pared, and then cleaned by treatment in heated rotating vessels with sawdust, white sand, and alabaster. The hair must be treated with salts and acids before dyeing. Ursol and Nako dyes are developed on the hair with oxidising agents, yielding brown, grey, or black shades; if a deep

black is required, dyewoods, Aniline Black, or vat dyes are used. L. A. COLES.

Gelatin. J. S. ALLAN (Proc. Tech. Sect. Paper-makers' Assoc., 1926, 7, 69—87).—The properties of gelatin, more especially in relationship to the sizing and coating of paper, are reviewed. D. J. NORMAN.

PATENTS.

Preparation of skins of fish, such as and in particular those of sharks, for tanning. A. EHRENREICH (B.P. 281,918, 24.3.27. Belg., 25.1.27).—The skins are limed for a considerably reduced period, then treated with enzyme products obtained from an intestinal gland of the fish or pancreatic extracts, respectively, alone or with the fluid gall or the urine of the fish. D. WOODROFFE.

Preparatory treatment of skins of fish, such as, and in particular, the plagiostomi. A. EHRENREICH (B.P. 281,919, 24.3.27. Belg., 26.1.27).—The skins are given a very short liming, treated with enzymes, then agitated in a pit or drum containing about 5% of gum tragacanth, extract of algae, or extract of fenugreek for about 6 hrs. at approximately 30°. The skins are afterwards tanned, and may be waterproofed by impregnating them after drying with a benzene solution of rubber or calcium stearate. D. WOODROFFE.

Tanning of white leather. H. MORIN (F.P. 615,126, 10.9.25).—The pelts are drummed for several hours in a solution containing 15 pts. of sodium hydrogen sulphate and 15 pts. of sodium chloride in 160 pts. of either cold or warm water. They are then drained and air- or machine-dried at a temperature not above 50°. After neutralising the dry hides with alkali (preferably sodium silicate) together with a little sodium chloride to facilitate the penetration of the alkali, the hides are piled in slightly moist sawdust. The product is a white soft leather, and the tannage is economical. D. WOODROFFE.

Neutralising leather after tannage or bleaching. L. JABLONSKI (G.P. 442,233, 5.9.22).—Vegetable-tanned leather is bleached by dipping it for a few seconds in a very dilute solution of sodium carbonate, and then plunging it into a very dilute solution of sulphuric or oxalic acid. It is then neutralised by immersion for 30 sec. or longer in a weak solution (2%) of aniline acetate, hydrazine compounds, or an organic base or its salts. Alum-tanned leather which has hitherto not been neutralised can be rendered more water-resistant by treatment with such compounds, e.g., aniline or pyridine salts. D. WOODROFFE.

Manufacture of chamois leather. A. J. CLERMONT (Addn. No. 31,603, 17.11.25, to F.P. 595,954; B., 1927, 758).—The sodium carbonate solution of the prior patent can be replaced by aqueous solutions of sodium, potassium, or magnesium hydroxides, potassium carbonate, or the sulphates, nitrates, chlorides, neutral or acid sulphites of the alkali metals and magnesium, as well as by sodium or potassium hypochlorite. After the hides or pelts have been treated on the flesh side with one of these solutions, and washed in water, they are treated with linseed oil, glucose, or the soluble commercial oils and finished. D. WOODROFFE.

Impregnating leather and pelts and rendering them elastic. L. J. DOUMEYROU (F.P. 609,296, 16.4.25).—Ammonium salts of the higher fatty acids are prepared by treating the fatty acids or fats with gaseous ammonia or with ammonium salts, *e.g.*, ammonium carbonate, which readily decompose. These salts are dissolved in benzene, benzene and alcohol, petroleum, or alcohol and ether and treated with water to form an emulsion, solution, or paste which is worked into the leather. The latter is washed and dried.

D. WOODROFFE.

Weighting of leather and production of a glossy surface thereon. ASSOC. PARISIENNE POUR L'IND. CHIM., Assees. of E. DESPARMET and F. SCHMITT (F.P. 615,952, 1.10.25).—The raw leather is treated with metallic salts (*e.g.*, aluminium, zinc, manganese, bismuth) of the higher saturated or unsaturated fatty acids (*e.g.*, caproic, caprylic, capric, lauric, palmitic, erucic acids, etc.), or mixtures of these with each other or with other substances. It is then ironed to produce a glossy surface. The process hides defects better and renders the leather firmer than does talc, bismuth salt, or zinc oxide, and varnishes or cellulose lacquers give a better finish.

D. WOODROFFE.

Drying of leather, hides, skins, etc. V. G. WALSH (B.P. 280,770, 7.3.27).—The epithelial surface of the tanned leather is treated with a solution of a protein such as gelatin to precipitate the surface tan, after which it may be oiled with the usual oils and the flesh side covered to a depth of 0.25 in. or more with a layer of anhydrous sodium sulphate alone or mixed with sand. The leather so treated is kept for 24–30 hrs., after which the layer is removed and the leather finished as usual. Untanned skins, hides, etc. may be dried out by applying a suitable drying agent to the flesh side.

D. WOODROFFE.

Treating [waterproofing] leather. T. BLACK-ADDER (U.S.P. 1,645,642, 18.10.27. Appl., 1.10.25).—An emulsion of a mineral oil in an aqueous sodium soap solution is reversed by treatment with aluminium sulphate solution, and the resulting water-in-oil emulsion containing an aluminium soap is employed to impregnate leather.

T. S. WHEELER.

Manufacture of artificial horn. J. ELLENBERGER, Assr. to BRIT. GLUES & CHEMICALS LTD. (U.S.P. 1,649,675, 15.11.27. Appl., 12.4.26. Ger., 9.1.25).—See B.P. 271,221; B., 1927, 565.

XVI.—AGRICULTURE.

Influence of calcium carbonate on the soil. A. A. RODE (Izvestia Leningrad Lesnogo Inst., 1927, 34, 119–180).—Experiments with podsol and artificially unsaturated chernozem soils show that on the addition of calcium carbonate the excess of acid is neutralised with disturbance of the chemical and biological equilibria, and that organic substances are thereby decomposed; the decomposition ceases when a new equilibrium is reached whereby the calcium ions decrease the dispersion.

CHEMICAL ABSTRACTS.

Effects of calcium compounds on the soil and on plant growth. W. T. H. WILLIAMSON (Scottish J.

Agric., 1927, 10, 180–184).—Mineral phosphate reduced the acidity and increased the exchangeable calcium content of soil, but not so effectively as calcium carbonate. Heavy applications of superphosphate or calcium chloride caused a temporary (6–12 months) increase in soil acidity (that from calcium chloride destroying all vegetation) and a considerable increase in exchangeable calcium.

CHEMICAL ABSTRACTS.

Effect of frost on soils. H. GORKA (Koll.-Chem. Beih., 1927, 25, 127–175).—On exposure to frost, clay suspensions undergo an increase in viscosity. This and the similar effect due to mechanical treatment are considered to be due to a disintegration of aggregated particles, with liberation of matter still capable of swelling. In agreement with the view expressed above, it was observed in sedimentation experiments that the total volume of material deposited was greater from a suspension which had been frozen than from an unfrozen suspension; also the rate of settling of the particles was greater in the suspension which had been frozen. Experiments on the velocity of cataphoresis of the particles showed that mechanical agitation of the suspension increases the velocity of migration, probably as a result of the liberation of electrolytes from inside the aggregates. Frost has the effect of reducing the velocity of cataphoresis, but this is raised to a value above the original by subsequent mechanical treatment.

E. S. HEDGES.

Influence of sulphur and soluble sulphur compounds in soil on nitrification. G. GUITONNEAU (Compt. rend., 1927, 185, 1518–1520).—Addition of sulphur to soil containing peptone and calcium carbonate causes an arrest in the nitrification up to about 60 days, after which nitrification begins and the intermediate sulphur compounds disappear. The effect of organisms on ammonium sulphate, ammonium sulphate + sulphur, and ammonium thiosulphate, in silica gels, has been studied, and it is found that sulphur does not stop nitrification when it is transformed directly into sulphate. Ammonium thiosulphate causes a hindrance in the microbial oxidation of ammonia.

H. BURTON.

Effect of liquid manure on soils and utilisation of the potassium and phosphoric acid of liquid manure by plants. J. C. FICK (J. Landw., 1927, 75, 215–256).—It is concluded from laboratory experiments with liquid manure and with the urine of farm animals that neither has a solvent action on soil nutrients, and that the nutrients present are absorbed by the soil. The physical condition of the soil is impaired by application of urine or liquid manure, hygroscopicity being increased and permeability diminished. The results of vegetation experiments with maize indicate that the phosphoric acid and potassium in liquid manure are less efficient than equivalent amounts supplied as mineral manures, owing probably to the harmful effect of the material on the physical condition of the soil.

C. T. GIMINGHAM.

Manuring of heavy soils rich in potash. DIENST (Ernährung der Pflanze, 1927, No. 6; Bied. Zentr., 1927, 56, 549–551).—Two stiff clay soils, shown by the Neubauer method to contain ample available potash,

nevertheless proved very responsive to potash fertilisers when cropped with roots and potatoes.

A. G. POLLARD.

[Manurial] investigations at the Königsmoor experimental station. B. TACKE (*Landw. Jahrb.*, 1927, **65**, 8—43; *Bied. Zentr.*, 1927, **56**, 545—549).—Manurial experiments on moorland meadows indicated the superiority of 40% potash salts over kainit. The amount of lime needed was unaffected by the nature of potash manures used. Excessive liming decreased hay yields. The hay crop was not noticeably improved by nitrogenous fertilisers or compost, and drainage reduced the crop. Chalking the subsoil improved the crop. On permanent pasture similar results were obtained. Periodical moving of the grazing cattle and intermittent mowing were without effect on the meat-producing power of the herbage. On cropped moorland soils sodium nitrate was a more effective fertiliser than ammonium sulphate, as the latter markedly lowered the lime reserve. Heavy liming reduced the yield of both grain and straw of oats, but increased the yields of potatoes.

A. G. POLLARD.

Influence of ammonium sulphate as a direct source of nitrogen for apple trees. M. B. DAVIS (*Sci. Agric.*, 1927, **8**, 41—55).—The nitrogen of ammonium sulphate becomes available only when nitrifying organisms are present. When these are absent, sodium nitrate is less toxic than cyanamide or ammonium sulphate.

CHEMICAL ABSTRACTS.

Nitrate utilisation by plants. I. Régime of nitrate nitrogen under natural conditions of plant development. A. SHMUK (*Ann. Kuban Agric. Inst. [Russia]*, 1925, **3**, 77—94).—Soils entirely covered with vegetation contain little or no free nitrates. The root-mass stimulates the activities of denitrifying organisms and the denitrifying enzymes of the plants. In solution, nitrates are reduced by roots to nitrites and ammonia; ammonia should therefore be a source of nitrogen for plants.

CHEMICAL ABSTRACTS.

Relation of the yield and protein content of wheat to the nitrogen content of the soil. R. E. NEIDIG and R. S. SNYDER (*Idaho Res. Sta. Bull.*, 1926, **5**, 3—32).—Under the prevailing conditions, the protein content of wheat was increased by manuring and by summer fallowing; the latter reduces the organic matter, increases the availability of plant foods (particularly nitrogen), and causes greater erosion. Manuring causes a better utilisation of water. The total plant foods are more rapidly depleted, crop for crop, by fallowing one year in three than by cropping every year with suitable rotation. The protein content of the wheat was 12.03—15.05%.

CHEMICAL ABSTRACTS.

Physiological reaction of "nitrophoska." R. W. BELING (*Z. Pflanz. Düng.*, 1927, **6B**, 562—567).—As a nutrient in water-culture experiments "nitrophoska" produces no change in the reaction of the nutrient. In soils, however, it shows definite physiological acidity, increasing both hydrolytic and exchange acidity and reducing the buffer capacity. This effect is considerably less than that of ammonium sulphate on an equivalent nitrogen basis.

A. G. POLLARD.

Utilisation of phosphorite phosphoric acid by plants. V. JOHANSON (*Bot. Arch.*, 1927, **14**, 319—454; *Chem. Zentr.*, 1927, **i**, 2558).—Physiologically acid fertilisers lead to poorer plant growth than physiologically neutral ones, in spite of a greater absorption of phosphorus. The effect of calcium and iron was examined.

A. A. ELDRIDGE.

Superphosphate as stimulant of [plant] growth. L. ZALESKI (*Mem. Inst. Nat. Pol. Econ. rurale Pulawy*, 1926, **7**, 27 pp.; *Chem. Zentr.*, 1927, **i**, 2598).—A study of the effect of the introduction of small quantities of superphosphate immediately under the seeds.

A. A. ELDRIDGE.

Three-year comparison of Neubauer analyses and field trials. T. ROEMER, DIRKS, and WOACK (*Z. Pflanz. Düng.*, 1927, **6B**, 529—562).—The Neubauer limiting values for root-soluble phosphate varied with the nature of the crop. Average values obtained were: rye and oats 4 mg.; potatoes 4—5 mg.; grass land 6 mg.; barley (varies considerably with season) 6 mg.; sugar beet 6—7 mg. There was a general agreement between Neubauer results and field trials, but marked divergences were apparent in some crops. In potash trials agreement was not quite so good, best results being obtained with potatoes. Neubauer values obtained for limiting values for potash were:—Oats (variable) and rye 20 mg.; grass 25 mg.; barley 25—30 mg.; wheat (very irregular) 30 mg.; potatoes 36—42 mg.; and sugar beet 25 mg. Neubauer results for available nutrients when differing from those of field trials were more often high than low. Differences are partially explicable when the different experimental conditions are considered. In the Neubauer method the effect of the subsoil nutrients is not considered, and, further, the preparation of the soil sample favours a temporarily increased bacterial activity resulting in higher nitrate contents than obtain in corresponding field soils. Temperature and moisture changes during the experimental period may differ considerably in the two cases. The p_H values of soils may be altered by the Neubauer treatment. This effect is not marked in nearly neutral soils, but more extreme values tend to be intensified by the experimental conditions. The Neubauer method is considered a valuable basis for the determination of fertiliser requirements, but needs further development.

A. G. POLLARD.

Temperature effects in the metabolism of wheat. W. E. TOTTINGHAM [with E. J. RANKIN, A. D. DICKSON, and H. W. LOUWSME] (*Plant Physiol.*, 1926, **1**, 307—336).—Atmospheric humidity has little influence on the protein content of wheat during seed development. In fully-nourished plants, illuminated by 530—1150 ft.-candles over a 12 hr. day, the production of dry matter was favoured by the lower temperature plane, and the percentage of protein was increased at the expense of the available carbohydrates. With 1560—2510 ft.-candles per 12 hr. day, plants harvested at one third and one fourth of full growth contained more sucrose and protein at lower temperatures; mature plants contained increased percentages of carbohydrates, and gave much greater yields, especially of grain, at the lower temperatures.

CHEMICAL ABSTRACTS.

Climatic effects in the metabolism of maize. W. E. TOTTINGHAM and H. W. KERR (*Plant Physiol.*, 1926, 1, 415—416).—The percentage of sucrose in the dry matter of the leaf greatly exceeded that of reducing sugars. Both sucrose and dextrin varied with solar radiation. The sugars and monoamino-acids in the stalk and ear varied independently of their proportions in the leaf. The stability of maize and sorghum compared with wheat towards climatic influences may be due to their higher content of sucrose and less soluble forms of protein and lower content of dextrose, soluble proteins, and other soluble nitrogenous compounds.

CHEMICAL ABSTRACTS.

Seasonal variations in the carbohydrate content of swedes. J. CALDWELL (*Scottish J. Agric.*, 1927, 10, 325—332).—The total carbohydrate content of Scotia swedes was highest in roots harvested early in December, but the highest percentages of dry matter and carbohydrate were present in roots harvested at the end of September.

CHEMICAL ABSTRACTS.

Determination of hardness in apple varieties and the relation of some factors to cold resistance. A. C. HILDRETH (*Minn. Agric. Exp. Sta. Tech. Bull.*, 1926, No. 42).—High reserves of carbohydrates and organic nitrogen are possibly correlated with greater hardness.

CHEMICAL ABSTRACTS.

Value of the chemical test in the identification of wild white clover. W. M. FINDLAY and G. DOWER (*Scottish J. Agric.*, 1927, 10, 219—224).—When crushed seedlings of wild white clover are incubated for several hours at 32°, hydrogen cyanide (detected with sodium carbonate-picric acid test papers) is produced. Large and small seeds of pure wild white clover give equally intense reactions.

CHEMICAL ABSTRACTS.

Petroleum oil as an insecticide for citrus trees. E. R. DE ONG, H. KNIGHT, and J. C. CHAMBERLAIN (*Hilgardia*, 1927, 2, 351—384).—A preliminary study. Injury is associated with a high percentage of unsaturated hydrocarbons.

CHEMICAL ABSTRACTS.

Determination of chlorophyll by Willstätter's method. T. SRECHE (*J. Landw.*, 1927, 75, 211—214).—As the result of a large number of determinations of chlorophyll in potato plants and grasses by the method of Willstätter and Stoll, some changes in the direction of simplifying and shortening the process are proposed. The plant material is treated directly with pure acetone, preliminary treatment with aqueous acetone being omitted, since the yellow-brown pigment is so little soluble in ether that it is completely extracted by the water used for washing out the acetone after addition of ether. Difficulties were met with in certain cases in the washing of the ether solution owing to the presence of colloidal material. The use of 100 c.c. of 1% potassium chloride solution for the first five washings and 100 c.c. of 3% solution for the sixth, instead of water only, flocculated the colloids and gave better separation. It was further found advantageous to carry out saponification of the chlorophyll in three stages, using 5 c.c. of a saturated solution of potassium hydroxide in methyl alcohol at each stage.

C. T. GIMINGHAM.

Determination of total carbon and carbon dioxide in small quantities of soil solutions. C. F. FLINT

(*J.C.S.*, 1927, 2975).—A wet combustion method used in steel analysis is adapted to the routine examination of soil solutions by employing in the combustion-furnace tube a cylinder of reduced copper gauze together with either copper oxide and a spiral of silver gauze or a cartridge of lead chromate. Oxidation of the test solution is carried out with a boiled-out mixture of chromic and sulphuric acids, all volatile organic matter and other volatile substances being disposed of by the reagents in the combustion furnace tube. The carbon dioxide is absorbed and weighed in soda-lime. Consistent results were given on repeated tests on soil solutions. In determining only carbon dioxide the furnace tube is removed. Dilute hydrochloric acid is used for the liberation of carbon dioxide from the test solution, its expulsion being assisted by the passage of a current of purified air and the simultaneous generation of hydrogen in the reaction flask. R. A. PRATT.

Dissolution and peptisation of humic acid by sodium hydroxide. W. OSTWALD and W. RÖDIGER (*Kolloid-Z.*, 1927, 43, 225—227).—Experiments were made to determine the solubility of humic acid in sodium hydroxide solutions of various concentrations and in presence of varying amounts of the solid phase, with the object of ascertaining whether the process is purely chemical or is due to peptisation. When the concentration of alkali is extremely small (0.0005*N* to 0.001*N*), and again at a higher concentration (0.025*N*), the curves connecting the amount of dissolved humic acid with the amount of solid phase show that the dissolution can be ascribed solely to the production of alkali humate. At intermediate concentrations the curves pass through a maximum, showing that peptisation occurs in addition to the chemical reaction. In working on the chemical reactions of humic acid it is recommended to use a large excess of the solid phase, so eliminating the effect of peptisation.

E. S. HEDGES.

Storage of beets. DOCHLENKO.—See XVII.

PATENTS.

Treatment of oat seed to destroy smut spores. I. G. FARBENIND. A.-G. (B.P. 275,539, 15.10.26. Ger., 5.8.26).—Treatment of oat seed with a dry powder consisting of a quinone, or quinone derivative, or an additive compound of a quinone and a phenol (*e.g.*, *p*-chlorophenoquinone), mixed with a diluent, renders it substantially free from living spores of smut fungi. The germinating capacity of the seed is unaffected.

C. T. GIMINGHAM.

Cultivation of edible fungi [mushrooms]. J. SZÜCS (B.P. 270,684, 27.4.27. Austr., 6.5.26).—A solid or semi-solid carrier, *e.g.*, peat, straw, sawdust, earth, dry leaves, pumice stone, agar-agar, etc., is mixed with nutrient materials such as molasses and salts containing phosphorus and nitrogen, and infected with cultures of suitable bacteria or mould fungi in order to produce a fermentation similar to that of horse-manure. The resulting nutrient medium, after sterilising if desired, preferably by heat, is spawned in the usual way by direct spore-culture methods (with spores or preliminarily germinated spores) or with mycelium not directly

derived from spores, when the fungi develop uniformly at room temperature. F. R. ENNOS.

Manufacture of insecticides. [A] H. P. CORSON and [B, C] W. K. SCHWEITZER, Assrs. to GRASSELLI CHEMICAL Co. (U.S.P. 1,648,577 and 1,648,595—6, 8.11.27. Appl., 29.9.24).—(A) The process of U.S.P. 1,591,795 (B., 1926, 743) is modified in that the product is heated with water and calcium hydroxide for 24 hrs. (B) The processes of (A) and of the patent cited are combined in one operation. (C) The process described in (A) is modified in that manganese carbonate is added with the calcium hydroxide. T. S. WHEELER.

Insecticide emulsion. P. R. JONES, Assr. to BALFOUR, GUTHRIE, & Co. (U.S.P. 1,646,149, 18.10.27. Appl., 20.8.25).—An emulsion of kerosene in a mixture containing water, calcium caseinate, dextrin, and bentonite, and, preferably, lignin liquor and maize oil soap is of value as a spray for fruit trees. T. S. WHEELER.

Insecticides (B.P. 280,256).—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Sugar losses in the storage of beets. J. J. DOCHLENKO (Zapiski, 1926—7, 4, 77—86).—The rolled portions of beets contain no sucrose, but much invert sugar and high acidity; mouldy beets contained less sucrose, more invert sugar, and higher acidity than sound beets. Treatment with lime milk (*d* 1.05) was most effective. On long storage the harmful nitrogen increased, the total and albumin-nitrogen decreased, and the amino- and ammonia-nitrogen remained unchanged.

CHEMICAL ABSTRACTS.

Desaccharification of molasses by the acetic acid method. G. MEZZADROLI, I. MUTTI, and A. PIOMBO (Zymologica, 1927, 2, 121—136).—The experimental results obtained confirm the possibility of desaccharifying molasses by the acetic acid process (cf. Rajtora, B., 1925, 254). The industrial feasibility of the process depends on the prices of sugar, molasses, and acetic acid, the extent of the loss of acetic acid, and the cost of redistilling and concentrating the recoverable acid.

T. H. POPE.

Testing of potato starch. O. WOLFF (Chem.-Ztg., 1927, 51, 1001—1003).—The suitability of potato starch for the preparation of adhesive paste is determined by means of two tests. The starch is ground with eleven times its weight of distilled water and the mixture kept for 24 hrs., after which time it is tested by impact with the hand. For the second test, a paste is prepared under standard conditions, using absolutely pure water, and the viscosity determined by the falling-ball method. A suitable starch is used as standard, and a numerical expression for the degree of suitability of the sample is obtained.

S. I. LEVY.

PATENTS.

Production of crystallised sugar from molasses and syrup. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES (F.P. 621,075, 3.9.26. Belg., 5.9.25).—Anhydrous ethyl acetate, or another alkyl acetate, is added slowly with stirring to a mixture of molasses or syrup with acetic acid, whereby the sucrose is rendered insoluble and inversion is prevented. L. A. COLES.

Oxidation of aldoses. A. STOLL and W. KUSSMAUL, Assrs. to CHEMICAL WORKS (FORMERLY SANDOZ) (U.S.P. 1,648,368, 8.11.27. Appl., 16.5.27. Ger., 12.6.25).—Sodium hypochlorite can be used in place of sodium hypobromite or hypoiodite for the oxidation of aldoses to the corresponding monocarboxylic acids if a small quantity of sodium bromide or iodide be added to the reaction mixture. T. S. WHEELER.

Preparation of sugar cane for extracting juice from cane stalks. W. H. MORGAN, SEN., Assr. to W. H. MORGAN, JUN. (U.S.P. 1,655,327, 3.1.28. Appl., 19.8.25).—See B.P. 267,235; B., 1927, 538.

Crystalliser [for sugar solutions]. F. LAFEUILLE (U.S.P. 1,653,712, 27.12.27. Appl., 10.7.25. Fr., 24.12.24).—See B.P. 245,114; B., 1926, 992.

XVIII.—FERMENTATION INDUSTRIES.

Physiology of *Bacillus acidificans longissimus* (*B. delbrücki*) in connexion with its possible use in the production of lactic acid. V. SHAPOSHNIKOV and A. V. MANTEIFEL (Trans. Sci. Chem. Pharm. Inst., 1923, No. 7, 3—23).—On the second day neutralisation is effected with magnesium oxide, magnesium carbonate, or zinc oxide. CHEMICAL ABSTRACTS.

Thermophilic species of *Penicillium arenarium* nov. sp. producing citric acid. V. SHAPOSHNIKOV and A. Y. MANTEIFEL (Trans. Sci. Chem. Pharm. Inst., 1923, No. 5, 3—27, 28—56).

Determination of pepsin. HOFFMANN.—See XX.

PATENTS.

Cooling device for use in the quick vinegar process. A. STEINMETZ (G.P. 443,802, 25.9.25).—The upper part of the apparatus is provided with straight or bent hollow plates, through which cooling water circulates, arranged to divide the space filled with the shavings into small compartments. L. A. COLES.

Cultivation of edible fungi (B.P. 270,684).—See XVI. **Lacto-drinkables** (B.P. 266,692).—See XIX.

XIX.—FOODS.

Variations in the proportion of solids-not-fat in milk. J. F. TOCHER (Scottish J. Agric., 1927, 10, 201—210).—Average, minimum, and maximum values were 8.80, 7.5, and 10.75%, respectively; average values for Ayrshire, Friesian, and other cows were 8.75, 8.62, and 8.86%, respectively. The daily values from a herd fluctuated between 8.4 and 9.7%. The values, which were minimal about 20 weeks after calving, increased with the yield and with the age of the cow.

CHEMICAL ABSTRACTS.

Non-protein nitrogen in certain dairy rations and partition of nitrogen in the urine produced thereon. W. E. KRAUSS (J. Dairy Sci., 1927, 10, 400—415).—The distribution, digestibility, and utilisation of the non-protein nitrogen in dairy rations was investigated. Rations composed of hay, silage, and grain contain a relatively large amount of non-protein nitrogen. CHEMICAL ABSTRACTS.

[Cow's milk.] M. H. CAMPBELL, M. J. PRUCHA, and J. M. BRANNON (Illinois Sta. Rep., 1926, 93—96).—A method for determining the size of fat globules is given. Edestin feeding did not increase the rate of milk secretion. The preparation of acidophilous milk is described.

CHEMICAL ABSTRACTS.

Addition of calcium chloride to milk for cheese-making. W. V. PRICE (J. Dairy Sci., 1927, 10, 373—376).—In presence of calcium chloride the action of rennin is more rapid; the coagulum is firmer and the loss of moisture after cutting is more rapid, although at the time of pressing the moisture content was normal.

CHEMICAL ABSTRACTS.

Increasing the yield of cheese by the addition of calcium chloride to milk. G. KNAYSI and J. D. NELSON (J. Dairy Sci., 1927, 10, 396—399).—Treatment of cheese with (anhydrous) calcium chloride before the addition of rennin increases the yield and reduces the amount of rennin necessary. There is also more complete precipitation of phosphate and calcium.

CHEMICAL ABSTRACTS.

Determination of age of eggs by means of ultra-violet fluorescence. J. E. H. VAN WAEGENINGH and J. E. HEESTERMAN (Chem. Weekblad, 1927, 24, 622—623).—The white of perfectly fresh eggs shows no fluorescence in ultra-violet rays, but, on keeping, a fluorescence develops and becomes stronger with time. The age of eggs may be determined by comparing the fluorescence with that given by gelatin solutions between 0.1 and 10% strength. At 16 days the fluorescence is equal to that of a 0.25% solution, and at 120 days to that of a 12.5% solution.

S. I. LEVY.

Fruit jellies. V. Rôle of pectin. 1. Viscosity and jellifying properties of pectin solutions. P. B. MYERS and G. L. BAKER (Univ. Del. Agric. Exp. Sta. Bull., 1927, No. 149).—The increase in viscosity of pectin solutions on increase of acidity is negligible in comparison with that caused by the addition of alkali. No indication of the isoelectric point of pectin is obtained by means of viscosity measurements. Jelly strength is a function of the viscosity of the pectin solution, and is independent of its concentration. The p_H at the optimum point of jelly formation varies with the concentration of pectin. The calcium pectate method for determining the jellifying power of a pectin is not considered trustworthy. Precipitation of pectin by ethyl alcohol is preferably effected by dropwise addition and constant stirring; prolonged heating is deleterious. Pectins obtained from pectin substances by extraction with distilled water are not necessarily of a better quality than those extracted with acid.

CHEMICAL ABSTRACTS.

Viscosity of egg-white. JOCHIMS.—See I. **Cacao-red.** HEIDUSCHKA and BIENERT.—See IV.

PATENTS.

Treatment of meal, flour, or other milling products. J. W. DOMBACH (B.P. 258,279, 10.9.26. Ger., 10.9.25).—The products from individual units of a milling plant are grouped according to their properties, and each group is separately treated, as required by its particular chemical and physical properties ascertained by test, by moistening, bleaching, dressing, or addition of chemical substances so as to improve the quality.

After further separate treatment in the milling process, the groups are mixed to form the finished product.

F. R. ENNOS.

Production of cereal and other food products. V. D. ANDERSON Co., Assees. of R. T. ANDERSON (B.P. 278,653, 19.3.27. U.S., 9.10.26).—Food, e.g., flour, is subjected to a gradually increasing pressure (5000—10,000 lb./in.²) whereby it is heated and partly cooked. Water is then forced into the compressed and heated mass, and the steam generated serves to complete the cooking process; the product is finally extruded from the press in any desired form.

F. R. ENNOS.

Manufacture of bread and other cereal baked foods. W. D. STEIN (B.P. 281,979, 28.9.26).—Flour is mixed with the product containing dextrinised starch acid esters, obtained by treating starch with acetic acid and heating, and the mixture is made into dough by addition of the usual ingredients, except sugar, and baked.

F. R. ENNOS.

Manufacture of butter and apparatus therefor. J. JOSEFSON, Assee. of T. A. WIBERG (B.P. 262,769, 4.12.26. Swed., 14.12.25).—Butter is produced in a continuous operation by feeding cream or whole milk between a rapidly rotating dasher and a stationary casing surrounding it, the intervening space being of considerable width where the material is first treated, but becoming constricted at the part through which the churned mass flows towards the outlet.

F. R. ENNOS.

Obtaining the total bodies containing phosphorus and iron which are derived from the proteids of egg yolk. S. POSTERNAK (B.P. 268,805, 31.3.27. Switz., 31.3.26).—The extract obtained by treating egg yolk with boiling alcohol is dried, ground, and subjected to pepsin digestion in the presence of mineral acid. After a predetermined time the reaction is arrested by addition of sodium carbonate or acetate, and the precipitated proteids are collected on a filter and subjected to trypsin digestion in a slightly alkaline solution, whereby the substances containing phosphorus are split off. The liquid is then acidified and filtered, and the mixture of the substances containing phosphorus is obtained from the filtrate as alkaline-earth salts by treatment with a soluble alkaline-earth salt and alcohol, or as alkali salts by precipitation and decomposition of the corresponding heavy-metal salts, the free acids as well as all other salts being obtained from these by the usual methods.

F. R. ENNOS.

Production of sour lacto-drinkables. S. MATSUBARA (B.P. 266,692, 9.2.27. Japan, 27.2.26).—Milk, after being sprayed into the air through a small nozzle, is heated below 70° for about 30 min. to remove odours and ensure sterilisation, and is then subjected to lactic fermentation for about 30 hrs. by means of *B. lacticum* until it contains 1.15% of lactic acid. A concentrated solution of sugar is then added, and the whole is cooled to 15° and thoroughly mixed by subjecting it to high-compressive shocks by forcing it, under air pressure of at least 5000 lb./in.², through an exceedingly small gap formed between a valve and its well-ground seating.

F. R. ENNOS.

Preservation of fruits etc. R. V. JELICOE (B.P. 281,380, 31.8.26).—The syrup or other preserving fluid

is made to circulate continuously in a closed path through the fruit etc. which is supported on a series of collapsible perforated trays in a heated, evacuated container. The concentration of the syrup is determined at intervals by measuring the volume of the condensed vapour from the container, and when the operation is complete the residual syrup is pumped off and the impregnated fruit removed.
F. R. ENNOS.

Manufacture of pectin products. SCHWARTAUER HÖNIGWERKE U. ZUCKERRAFFINERIE A.-G. (B.P. 281,513, 1.3.27. Ger., 1.2.27).—Fruit or vegetable material is alternately lixiviated with cold, acidified water and pressed out until the water drained off contains none of the constituents soluble in cold water. The material is then repeatedly extracted with hot solutions of tartaric or similar organic acid, and the fractions obtained, after clarifying and bleaching if desired, are either concentrated or dried under vacuum separately or together. Preferably the non-gel-forming pectin is first separated by filtration and the gel-forming pectin substances remaining on the filter are colloiddally dissolved to any desired concentration or are dried under vacuum, the p_H value of the concentrated solutions being so adjusted, by addition of suitable organic acids, that gelatinisation may occur.

F. R. ENNOS.

Coagulation or curdling of milk. H. A. KOHMAN, R. IRVIN, and E. S. STATELER, Asss. to G. S. WARD (U.S.P. 1,654,176, 27.12.27. Appl., 3.10.21).—See B.P. 186,923; B., 1923, 794 A.

Edible fungi (B.P. 270,684).—See XVI.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Removal of peroxides from anæsthetic ether. J. RAE (Pharm. J., 1927, 119, 693—694).—Ether which gave a very strong reaction for peroxides gave no reaction after being kept, with frequent shaking, in contact with powdered animal charcoal for 54 days.

E. H. SHARPLES.

Determination of pepsin. K. HOFFMANN (Pharm. Ber., 1927, 2, 45—47; Chem. Zentr., 1927, i, 2674).—Bachstetz's modification of Gross' method was employed. Various commercial pepsin preparations had scarcely any activity.

A. A. ELDRIDGE.

Causes of precipitation in tinctures and fluid-extracts. W. L. SCOVILLE (J. Amer. Pharm. Assoc., 1927, 16, 1136—1146).—Official aqueous-alcoholic tinctures of alkaloidal, astringent, cathartic, and miscellaneous drugs were treated with various agents (light, hydrochloric acid, sodium chloride, ammonia, hydrogen peroxide, hypophosphorous acid, carbon dioxide, and sodium acetate), in order to determine the causes of precipitation. Precipitation is mainly due to hydrolysis, and may be restrained by increasing the concentration of the alcohol.
B. FULLMAN.

Reactions of atophan and novatophan. L. EKKERT (Pharm. Zentr., 1927, 68, 797).—Both compounds in hydrochloric acid solution give red colorations with α - or β -naphthol.
S. I. LEVY.

Analysis and characterisation of neosalvarsan-amine [neosalvarsan]. A. E. JURIST and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1927, 16, 1149—1152).

—The method of Elvove (B., 1926, 27) for the examination of neosalvarsan is modified in that, after oxidation with iodine in neutral solution, the excess of iodine is reduced with excess of sodium arsenite. The resultant sulphate sulphur is determined in acid solution as barium sulphate. The sulphosalvarsan sulphur of Elvove is really nuclear sulphur introduced in the preparation of the base from which the neosalvarsan is made. Factors are given for the determination of the following constituents of neosalvarsan: free sulphoxylate, mono- and di-substituted neosalvarsan, free base, and sodium sulphate. The examination of numerous specimens of neosalvarsan from this point of view reveals the presence of a form of sulphur of unknown nature, oxidised by iodine only in strongly alkaline solution. Specimens of neosalvarsan may be classified in four groups according to the proportion present of mono- and di-substituted neosalvarsan, free sulphoxylate, and non-sulphoxylate sulphur.
B. FULLMAN.

Ethereal oils extracted from the principal native aromatic plants of Erythrea. P. ROVESTI (Annali Chim. Appl., 1927, 17, 553—570).—The seeds of *Carum copticum*, Benth., known as *azmuth* in Erythrea and as *camum* in Tigris, contain 3.65% of an orange oil of thymolic odour and burning taste, having d_{15}^{20} 0.9252, $\alpha_D^{20} + 1.47^\circ$, n_D^{20} 1.5085, solubility in 80% alcohol 1:1.3 at 25°; it contains 52% by volume of crystallisable thymol, together with *d*- α -pinene and *p*-cymene, but is free from carvacrol. The dried leaves, stems, and flowers of *Lippia adoensis*, Hochst, contain 0.753% of an orange-yellow oil having d_{15}^{20} 0.93395, $\alpha_D^{20} + 55.3^\circ$, n_D^{20} 1.4958, solubility in 75% alcohol 1:2.6 at 20°, and containing *d*-limonene and about 72% by vol. of carvone. *Andropogon connatus*, Hochst, yields 1.78% of a yellowish oil resembling Indian gingergrass oil, having d_{15}^{21} 0.9355, $\alpha_D^{20} - 54.5^\circ$, n_D^{20} 1.4951, solubility in 70% alcohol 1:2.1 at 20°, and containing a small proportion of an aldehyde of penetrating odour, α -phellandrene, geraniol, 30—35% of dihydrocumyl alcohol, and other hydrocarbons and sesquiterpenic compounds. *Ocimum menthaefolium*, Hochst, yields 0.327% of an almost colourless, pleasant-odoured oil, having d_{15}^{25} 0.9496, $\alpha_D^{20} + 1.4^\circ$, n_D^{24} 1.5165, solubility in 80% alcohol 1:3.1 at 25°, and composed mostly of methylchavicol, anethole, small proportions of free and esterified alcohols, hydrocarbons, and sesquiterpenes. *Meriandra benghalensis*, Benth., gives a yellow, semi-solid oil, d_{15}^{20} 0.9318, $\alpha_D^{20} - 6.2^\circ$, n_D^{21} 1.4687, solubility in 70% alcohol 1:2.1 at 20°, which furnishes a yield of 70—72% of camphor and a residual product capable of replacing Dalmatian or Spanish rosemary oil in soap-making.
T. H. POPE.

Esters of lemon and orange oils. H. R. JENSEN (Perf. Ess. Oil. Rec., 1927, 18, 510).—The ratio of aldehydes to esters (expressed as linalyl acetate) should be about 2.5 when the latter are determined by saponification with 0.5*N*-alcoholic potassium hydroxide and boiling for 15 min. only. Higher ratios indicate adulteration with citral.
S. I. LEVY.

Odoriferous principle of castoreum. H. WALBAUM and A. ROSENTHAL (J. pr. Chem., 1927, [ii], 117, 225—232).—Steam distillation of the alcoholic extract of castoreum yields an oil (2.1%) containing acetophenone, benzyl

alcohol, *l*-borneol, *p*-ethylphenol (α -*naphthylcarbimide* derivative, m.p. 128°), *o*-cresol or *o*-ethylphenol, either guaiacol or creosol, and a small quantity of benzoic acid.

H. BURTON.

PATENTS.

Calcium-sugar preparations. [A] H. A. SHONLE, [B] G. VAN SCOYOC and H. L. WEHRBEIN, [C] G. VAN SCOYOC, H. L. WEHRBEIN, and H. A. SHONLE, Assrs. to E. LILLY & Co. (U.S.P. 1,649,000, 1,649,269, and 1,649,270, 15.11.27. Appl., [A] 9.1.26, [B, C] 1.5.24).—(A) Dextrose solution is heated with calcium hydroxide until the greater portion of the latter has combined with the acid degradation products of the sugar. The solution is then neutralised with oxalic acid to remove excess of calcium. The filtrate from the precipitated calcium oxalate is of therapeutic value. (B) The addition of oxalic acid is omitted. (C) The total calcium in the solution is removed with oxalic acid. The filtrate, which is more stable than that obtained in (A), is treated with calcium hydroxide solution before use.

T. S. WHEELER.

Manufacture of β -amino- β' -dialkylaminoisopropyl alcohols. I. G. FARBENIND. A.-G. (B.P. 276,012, 12.8.27. Ger., 13.8.26).— β' -Halogeno- β -aminoisopropyl alcohols, $X \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot NH_2$, or the corresponding phthalimides, $X \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot NC_2O_2 : C_6H_4$, are treated with a secondary amine. γ -Chloro- β -hydroxypropylphthalimide reacts with diethylamine to give, after hydrolysis with acid, β -amino- β' -diethylaminoisopropyl alcohol, b.p. 114—115°/20 mm., also obtained from β' -chloro- β -aminoisopropyl alcohol hydrochloride. The diaminoalcohols reduce the amount of sugar in the blood, and are intermediates for other therapeutic compounds.

C. HOLLINS.

Production of active sedative, hypnotic, and sleep-producing compounds, and compounds produced by such process. A. E. VIDAL. From J. D. RIEDEL A.-G. (B.P. 281,365, 27.8.26).—Acids of the type, $CH_2 : CH \cdot CH_2 \cdot CHR \cdot CO_2H$, in which R = alkyl or alkylenyl, are converted by the usual methods into ureides useful as sedatives and hypnotics. α -iso-Propyl- Δ^2 -pentenoyl chloride, b.p. 63—64°/15 mm., obtained from the acid by the action of thionyl chloride, gives with carbamide a *ureide*, m.p. 190—191°, obtainable also from the acid *amide*, m.p. 107°, and cyanic acid. Hydrolysis and decarboxylation of ethyl allylbutylmalonate yields α -allylhexoic acid, b.p. 225—230° (chloride, b.p. 60°/12 mm.), from which the *ureide*, m.p. 147—148°, is prepared.

C. HOLLINS.

New therapeutic substances. WELLCOME FOUNDATION, LTD., T. A. HENRY, and T. M. SHARP (B.P. 281,582, 16.8.27).—Dilute hydrochloric acid extracts from the alcoholic extract of the fat-freed, ground seeds of *Picralima Klaineana* (Pierre) a mixture of three alkaloids, the free bases being precipitated by alkali carbonates. For the separation of the alkaloids the solution of the hydrochlorides is diluted with water until no further precipitation of *alkaloid-A* occurs. The remaining alkaloids, after precipitation with sodium carbonate, are extracted with dry ether, which leaves a further amount of *alkaloid-A* undissolved. The extract is evaporated to dryness and the dry residue macerated with twice its weight of cold alcohol; *alkaloid-B* goes

into solution, leaving *alkaloid-C* undissolved. *Alkaloid-A* after purification in boiling alcohol has m.p. 248°. *Alkaloid-B* is obtained from the above alcoholic solution by evaporation, dissolution in acid, and reprecipitation by carbonate; it has m.p. 140° (air-dry) or 167° (dried in a vacuum). *Alkaloid-C* is purified as *sulphate*, $B_3 \cdot 2H_2SO_4$, m.p. 221°, the free base, $C_{22}H_{28}O_4N_2$ (*hydrochloride*, B, HCl, H_2O , m.p. 227°, $[\alpha]_D^{20} - 26.6^\circ$; *hydrobromide*, B, HBr, H_2O , m.p. 228°, $[\alpha]_D^{20} - 26.05^\circ$), being precipitated with carbonate. The alkaloids, separately or as mixture, are used against malaria.

C. HOLLINS.

Manufacture of an ergot preparation. G. ERDMANN, Assr. to GEHE & Co. A.-G. (U.S.P. 1,645,096, 11.10.27. Appl., 28.5.26. Ger., 18.3.25).—Ergot is extracted with ether at ordinary temperature and the extract is treated with low-boiling petroleum hydrocarbons. The precipitate thus obtained is dissolved in dilute acetic acid, and, after washing with ether, the solution is precipitated with ammonia. Alternatively, the material extracted from the crude drug with ether is washed with ether containing an acid, and then treated with an alkali solution. The bases thus precipitated are dissolved in chloroform and reprecipitated with low-boiling petroleum hydrocarbons. T. S. WHEELER.

Arsenising of organic compounds. E. SCHELLER (B.P. 261,026, 5.11.26. Austr., 9.11.25).—Aromatic or heterocyclic compounds, prepared in glacial acetic acid, methyl alcohol, etc. in the absence of much water, react with arsenic halides (arsenic trichloride) to give products which are reduced by sodium hyposulphite to arseno-compounds, from which arsenic acids are obtained by oxidation. The arsenic halide may be present during diazotisation.

C. HOLLINS.

Manufacture of a [non-toxic] medical preparation containing arsenic. I. OSTROMISLENSKY, Assr. to OSTRO PRODUCTS CORP. OF AMERICA (U.S.P. 1,644,348, 4.10.27. Appl., 22.7.22).—The toxicity of arsenic compounds, e.g., phenylarsenious oxide, is reduced by dispersion in an aqueous solution containing a protective colloid, e.g., gum arabic, and, preferably, dextrose in quantity sufficient to render it isotonic with blood.

T. S. WHEELER.

Manufacture of water-soluble, neutral [lactose] derivatives of diaminodihydroxyarsenobenzene. H. M. WUEST, Assr. to HOFFMANN-LA ROCHE CHEMICAL WORKS (U.S.P. 1,648,926, 15.11.27. Appl., 28.5.23. Switz., 3.6.22).—Diaminodihydroxyarsenobenzene is dissolved in lactose solution, and the mixture is treated with alcohol to precipitate a relatively non-toxic product of therapeutic value and stable out of contact with air.

T. S. WHEELER.

Concentration of [radio]active deposit. H. B. PALMER (U.S.P. 1,644,350, 4.10.27. Appl., 15.4.25).—Pills containing non-toxic conducting material, e.g., carbon, are negatively charged and subjected to the action of niton immediately before use. T. S. WHEELER.

Preparation of phosphatides. A. GRÜN and R. LIMPÄCHER, Assrs. to G. SCHICHT A.-G. (U.S.P. 1,653,959, 27.12.27. Appl., 23.9.24. Czechoslov., 27.9.23).—See B.P. 222,463; B., 1925, 941.

Production of halogeno-albumin compounds. R. WOLFFENSTEIN (U.S.P. 1,649,051, 15.11.27. Appl., 2.2.24. Ger., 29.3.23).—See B.P. 213,536; B., 1924, 926.

Preparation of aliphatic di- or poly-hydroxy-arsinic acids. C. J. OECHSLIN (U.S.P. 1,654,224, 27.12.27. Appl., 26.1.25).—See B.P. 191,028; B., 1923, 861 A.

Benzoxazolonearseno-compounds. L. BENDA, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,648,214, 8.11.27. Appl., 2.6.24. Ger., 9.6.23).—See B.P. 239,951; B., 1925, 942.

Ampulla for the preparation of solutions, more particularly for medical and like purposes. PHARMAGANS PHARMACEUT. INST. L. W. GANS A.-G. (B.P. 280,838, 22.7.26. Addn. to B.P. 264,125; B., 1928, 37).

Substituted diaminopropanols (B.P. 275,622).—See III.

Insecticides etc. (B.P. 280,256).—See XXIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Intensification of the latent image on photographic plates and films. II. Decomposition of hydrogen peroxide and the mechanism of latent image intensification. E. P. WIGHTMAN and R. F. QUIRK (J. Franklin Inst., 1927, 204, 731—749; cf. B., 1927, 268).—Alkaline hydrogen peroxide in presence of gelatin-silver or gelatin-silver sulphide sol, with or without the presence of soluble bromide, is more easily decomposed than acid peroxide under the same conditions. Both acid and alkaline peroxide in the presence of soluble bromide react with silver sulphide in bulk to give sulphuric acid or a sulphate and colloidal silver bromide. Colloidal silver dissolves to a greater or less extent in gelatin-hydrogen peroxide solution with a p_H value of 5.5 or less, giving rise to silver ions which, when soluble bromide is also present, form colloidal silver bromide. These facts indicate that intensification of the latent image, and probably also the effect of peroxide on sensitivity or the production of latent fog, is chemical in nature as Clark has contended (B., 1926, 253), and that a chemiluminescence mechanism is not necessary to explain the phenomenon. A chemical mechanism is proposed, based on Hickman's theory of latent image formation. It is suggested that the bromine set free by the action of acid peroxide on the soluble bromide in the plate, being very limited in quantity, acts on the silver sulphide speck to form metallic silver, which in turn may be partly converted by the acid peroxide into silver ions, and if any soluble bromide is in the vicinity some colloidal silver bromide is formed containing on its surface adsorbed silver ions. It is believed that any one or all of these, metallic silver, silver ions, or colloidal silver bromide with silver ions adsorbed, produces a greater degree of developability of the grain than the original silver sulphide speck. The view is supported by the observation that if soluble bromide is largely removed from a plate by the action of silver nitrate (less than excess), hydrogen peroxide produces very little, if any, intensification of the latent image.

W. CLARK.

The photographic emulsion and its application in research. H. STINTZING (Z. angew. Chem., 1927, 40, 1423—1431).—A summary of the published work on the properties of the unexposed and the developed emulsion, including ripening grains and nuclei, the crystalline properties of the silver bromide grain, grain-size distribution, the latent image and the print-out image, physical development, sensitivity, gradation, resolving power, turbidity, etc.

W. CLARK.

Newer photographic problems. A. STEIGMAN (Kolloid-Z., 1927, 43, 400—402).—The photographic quality of gelatin is not defined simply by the content of sulphur which answers to the lead test. The degree of lability of the sulphur in the organic sensitiser or mixtures of desensitisers is of importance. Organic desensitisers also have an influence on the photographic quality, as is known to be the case with inorganic desensitisers. Different silver salts take the sulphur from thiosinamine at different rates at p_H 5.6. Serum albumin, added to gelatin before mixing, in the case of a chlorobromide emulsion, is a strong desensitiser and prevents ripening. The wash water from a good ripening gelatin also desensitises, as do also cystine and tyrosine. The action of cystine is probably due to its desensitising power.

W. CLARK.

PATENT.

Preparation of [non-phosphorescent] fluorescent material [for X-ray screens]. S. E. SHEPPARD, Assr. to EASTMAN KODAK Co. (U.S.P. 1,648,510, 8.11.27. Appl., 2.2.26).—The addition of sodium sulphide (0.5—2%) to the calcium tungstate used in the manufacture of intensifying X-ray screens inhibits phosphorescence of the screen.

T. S. WHEELER.

XXII.—EXPLOSIVES; MATCHES.

Laws of combustion of colloidal [explosive] powders. III. H. MURAOUR (Bull. Soc. chim., 1927, [iv], 41, 1451—1461; cf. B., 1926, 854).—Experiments on the combustion in a closed vessel of colloidal explosive powders with widely different explosion temperatures have shown that the rate of combustion, V , is related to the pressure, P , by the equation $V = a + bP$, where a and b are constants for a particular powder, and a is negligible at high pressures. At high pressures, the relation $V = Pe/K$ is approximately true, e being the thickness of the threads of explosive, and K the coefficient defined previously (B., 1926, 722). With decrease in the heat of combustion of the powder, the rate of combustion at a given pressure decreases also, but more rapidly.

R. CUTHILL.

Denitration of waste acids. SCHMID.—See VII.

PATENTS.

Detonator tube. W. ESCHBACH (G.P. 443,727, 1.8.26).—Iron coated with aluminium is used in the manufacture of detonator tubes. These tubes are unacted on by the detonator composition and have the additional advantage, as compared with aluminium tubes, of being more suitable for use in mines containing firedamp.

S. BINNING.

Liquid-air blasting cartridge. RUSSFABR. KAHL (G.P. 440,233, 1.2.25).—Sulphur-containing organic compounds, which may be solid (vulcanised rubber or

factis) or liquid (solutions of sulphur in linseed or turpentine oils), are added to the absorbent material. The life and strength of the cartridge are thereby increased.

S. BINNING.

Obtaining nitrocellulose from smokeless powder.

J. K. SPEICHER, Assr. to HERCULES POWDER CO. (U.S.P. 1,653,519, 20.12.27. Appl., 4.2.27).—Smokeless powder containing diphenylamine is dissolved in acetone, and the solution introduced into toluene heated to the b.p. of acetone. The nitrocellulose is recovered from the toluene.

B. FULLMAN.

Production of waterproofing composition [for explosives]. T. A. O'BARR, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,648,861, 8.11.27. Appl., 8.3.24).—A mixture of a vegetable drying oil, *e.g.*, tung oil, a resin, *e.g.*, colophony, and paraffin hydrocarbons, *e.g.*, petrolatum, is used as a waterproof coating for ammonium nitrate explosives.

T. S. WHEELER.

XXIII.—SANITATION; WATER PURIFICATION.

Effect of chlorination on the digestion of sewage solids. G. M. FAIR and C. L. CARLSON (Eng. News-Rec., 1927, 99, 1030—1031).—Chlorine introduced into sewage as a disinfectant or deodorant prior to the separation of suspended solids is shown by laboratory-scale experiments to favour the production of a sludge which is capable of digestion at an increased rate as measured by the rate of evolution of methane.

C. JEPSON.

Chlorination of screened sewage at Bridgeport, Conn. W. J. SCOTT and C. L. POOL (Eng. News-Rec., 1927, 99, 1033—1034).—Satisfactory reduction in bacterial content of this sewage after fine screening required the addition of 10—15 p.p.m. of chlorine and a contact period of 10 min. Careful chlorine control using the *o*-tolidine test so as to maintain a residual of 0.3 p.p.m. is necessary for economic application.

C. JEPSON.

Odour control [of crude sewage] by chlorination at Independence, Kan. G. H. HACKMASTER (Eng. News-Rec., 1927, 99, 1031—1033).—Aerial nuisance due to proximity of sewage treatment plant has been effectively prevented by the addition of chlorine to the sewage in doses varying from 3 to 10 pts. per million, when weather conditions favoured the nuisance. The average dose over a 56 day period was 3.32 p.p.m., and the average cost was \$3.32 per million gals. It was found more effective to add chlorine before rather than after separation of suspended solids.

C. JEPSON.

Five years of rapid sand filtration [of water] at Cambridge, Mass. M. C. WHIPPLE and H. C. CHANDLER (J. New England Water Works' Assoc., 1927, 41, 218—243).—The raw water, which is derived from several sources, is coloured with extract of dead vegetation, dull in appearance, impregnated with odours and tastes from dead and living plants, at times distinctly corrosive towards metals, and liable to entrance of germs of water-borne diseases. Purification comprises coagulation with sodium aluminate and aluminium sulphate, rapid filtration, aeration, corrective treatment to eliminate corrosive qualities, and chlorination. Coagulation demands careful study and regulation

owing largely to the changes in quantity and age of the organic matter contained in the water. Alum alone was formerly used as coagulant, but combined sodium aluminate (0.17 grain/gal.) and alum (0.8—1.25 grains/gal.) treatment is now preferred as it results in a treated water of lower corrosive properties. The cost of the combined treatment is slightly greater, but a substantial saving is effected in the amount of soda ash used for corrective treatment. Repeated observations have failed to indicate any advantage to be derived from chlorination of the raw water prior to coagulation. Hydrogen-ion concentration control for coagulation is not adequate to ensure the best results on all occasions. Rates of filtration range from 118—136 million gal. per acre per day. Mud balls are eliminated by occasional caustic soda treatment. The average colour of the raw water, settled water, and final effluent is 42, 31, and 4 p.p.m., respectively. The average numbers of *B. coli* in raw, settled, and filtered water, and final effluent are 10, 0.6, 0.1, nil per 100 c.c. samples.

W. T. LOCKETT.

Eliminating a source of error in the colorimetric determination of manganese. A. C. JANZIG (J. Amer. Water Works' Assoc., 1927, 18, 744—745).—Minute traces of manganese may be accurately determined, even in highly coloured or turbid waters, using the persulphate method described in "Standard Method of Water Analysis" (Amer. Public Health Assoc.), provided an excess of ammonium persulphate is maintained during the removal on a filter of insoluble matter which interferes with the comparison of the colours produced.

C. JEPSON.

PATENTS.

Accelerating the sludge digestion for sewage treatment. M. PRÜSS (B.P. 281,541, 23.5.27).—The sludge contained in digestion chambers is circulated periodically by drawing it through a pipe (by means of a pump or other suitable appliance) from the bottom of the digestion chamber and discharging it near the surface level. By this process, gases, *e.g.*, carbon dioxide, which are injurious to digestion and are dissolved in the sludge water at the bottom part of the digestion chamber, are eliminated according to the decrease in hydraulic pressure, and injurious liquid decomposition products are removed from the particles of sludge and diffused throughout the sludge water. By a reversal of the process, floating sludge may be drawn off from the surface and forced into the bottom part of the digestion chambers, and in consequence of the admixture with active settled sludge and impregnation with fresh active bacteria it becomes more easily decomposed.

W. T. LOCKETT.

Insecticides, sheep-dips, etc. McDougall & YALDING, LTD., and P. J. FRYER (B.P. 280,256, 24.11.26).—The water-insoluble, physiologically active extracts or resins, particularly tuba-toxin and tephrosin, from leguminous plants, *e.g.*, derris, are dissolved in a phenol (creylic acid) and mixed with hydrocarbon oil from mineral oil or from coal tar (preferably a medium lubricating oil fraction of American petroleum), and the whole is emulsified with water in presence of soap, glue, casein, etc. (cf. B.P. 229,773; B., 1925, 334).

C. HOLLINS.