BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUG. 16, 1929.

I.—GENERAL; PLANT; MACHINERY.

Mass circulation in carbon dioxide refrigerating machines. H. MAWSON (Inst. Mech. Eng., June, 1929. Advance copy. 33 pp.).—The relative advantages of various compression cycles in carbon dioxide refrigerating machines are discussed. It is shown that both compound compression and multiple-effect compression cycles give greater refrigerating effects than is given by the ordinary single-acting cycle operating with the same temperature of the cooling water and between the same limits of temperature. It is concluded that this is mainly due to the greater mass circulation to the condenser and only slightly to the effects of gas cooling. The coefficient of performance is also higher, but the refrigeration per unit of power can only be increased by making more expensive machines than the ordinary double-acting compressor giving the same refrigeration. C. J. SMITHELLS.

Jena glass filtering crucibles. R. H. SIMON (J. Assoc. Off. Agric. Chem., 1929, 12, 209–211).— Glass filtering crucibles with fixed plate of porosity less than 4—5 μ have been used successfully in determinations of phosphorus and potassium. Ammonium phosphomolybdate precipitated by the method of Ames and Bollz (cf. Ohio Agric. Exp. Stat. Bull. No. 285, 1915, 206) can be collected rapidly with little suction and readily redissolved for reprecipitation or titration. Larger porosity has been used for potassium chloroplatinate. The crucibles can be readily cleaned and restored for use. W. J. BOYD.

See also A., July, 774, Topochemical reactions (Kohlschütter). 785, Viscosimeter (Van Linge).

PATENTS.

Furnaces. AMER. ENGINEERING Co. (B.P. 297,094, 2.4.28. U.S., 15.9.27).—Those portions of the side walls of a mechanical stoker that are subjected to the abrasion and clinkering action of the fuel are constructed of water-cooled refractory blocks. B. M. VENABLES.

Furnaces. A. SMALLWOOD and J. FALLON (B.P. 312,391, 25.2.28).—The heating gases after leaving the work chamber (or flues round the muffle, if the furnace is of that type) pass through one of two alternative paths. In the stage of heating up they are sent upwards through flues in the hollow arch of the furnace, thus obtaining quick heating, and afterwards downwards to recuperators below the furnace, thus obtaining fuel economy. These paths are controlled by dampers in separate exit flues. B. M. VENABLES.

Utilisation of pulverulent or powdered carbonaceous fuel in boiler furnaces. J. J. C. BRAND and B. LAING (B.P. 313,225, 19.3.28).—A tubular air heater is placed in the return flue of a Lancashire or Cornish boiler, and air blown through this by a fan is supplied as primary and/or secondary air to the same boiler. The primary air may go to the burner or to the pulveriser. B. M. VENABLES.

Preventing foaming and entrainment of liquid in steam generators. "EUKAMA" EIS- U. KÜHL-MASCHINEN GES.M.B.H. (B.P. 291,343, 29.5.28. Ger., 28.5.27).—Steam formed in a steam generator is raised to a slightly higher pressure (e.g., by a small turboblower), and caused to blow upon the boiling liquid in the same boiler, approximately evenly over the whole surface thereof. If a group of boilers is available, it is preferable to work one of them at a slightly higher pressure than the others and use its steam for the foampreventing blast. B. M. VENABLES.

Non-heat-conducting coverings for steam pipes etc. WÄRME- U. KÄLTESCHUTZ G.M.B.H. ALTHOFF & SCHOENAU, and P. ALTHOFF (B.P. 313,364, 13.8.28).— Heat-insulating material of known composition is attached to pipes etc. by a skeleton comprising stripiron brackets supporting iron rings, which in turn support wire netting. A concrete sheath may be formed on the skeleton, and other better insulators placed in the space between the concrete and the pipe. B. M. VENABLES.

Heat accumulators. RUTHSACCUMULATOR AKTIE-BOLAGET (B.P. 298,601, 15.9.28. Ger., 12.10.27).—A tall steam accumulator is provided with an auxiliary circulation, for use when discharging steam, which prevents the difference in temperature due to the static head of the column of water in the accumulator. A gaseous or vaporous medium, preferably a minor quantity of steam, is injected through a number of fine jets at the bottom of a circulation guiding pipe. This fitment is preferably separate from the main injection device which is used when charging the accumulator.

B. M. VENABLES.

Heat exchangers. W. H. OWEN (B.P. 312,702 and 313,114, 6.3.28).—(A) Cells for use in the construction of heat exchangers are formed from two metal sheets only slightly separated and joined round their edges. The major part of one or both sheets is corrugated, but an uncorrugated border is left all round for use in forming the inlet and outlet passages and for the attachments necessary to build up the complete interchanger. If both plates are corrugated the peaks of the corrugations may be opposite each other or staggered as desired. (B) In a heat exchanger as above, in which the fluids move in opposite directions, the corrugations on adjacent plates are transverse to each other, and the ridges may touch at the points of intersection. B. M. VENABLES. British Chemical Abstracts-B.

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CL. I .-- GENERAL; PLANT; MACHINERY.

Apparatus for treating materials, particularly for the heating and drying of pasty masses. M. McGuinness (B.P. 312,699, 11.2., 9.3., and 25.9.28).-A number of polygonal (say four-sided) drums with concave faces are arranged in a row with parallel axes so that the edges of one drum when rotated 90° will scrape the concave faces of its two neighbours which are held stationary. Transfer of material is produced by alternately moving the odd-numbered and even-numbered drums of a row. The row of drums need not be in a straight line, but may turn at right angles as often as desired. The containing casing may either have an undulating form closely following the edges of the drums or be of simpler form with large clearances. In the former case escape of evolved gases may be permitted through slots cut in the ends of the drums, the slots being kept clear by corresponding fixed studs.

B. M. VENABLES.

Drying devices. N. TESTRUP, O. SODERLUND, T. GRAM, and TECHNO-CHEM. LABS., LTD. (B.P. 312,964, 1.3.28).—A dryer for material which is suspended in air or in a gas and is dried by heat transmitted from surfaces over which it passes is constructed so that the material continuously impinges on the heating surface throughout its length of travel. The stream of air and material may pass through tubes which are provided with "rifling," so that the material travels in close proximity to the walls owing to centrifugal force. The "rifling" is preferably formed so that the thickness of the tube is not increased anywhere, *e.g.*, by drawing the tubes in non-circular shapes and at the same time twisting them. It is considered to be insufficient to whirl the stream merely at the beginning of its travel.

B. M. VENABLES.

Pulveriser. J. Molz, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,714,132, 21.5.29. Appl., 30.6.23. Ger., 14.8.22).—The pulveriser comprises one or more pulverising units and a double fan on one shaft. One part of the fan draws air and ground material through the pulveriser, the other part creates a partial vacuum at the end of the casing, so that every point within the casing is below atmospheric pressure and no dust can escape. Incidentally the two fans have a common outlet so that there is an excess of air to effect transport of the material. B. M. VENABLES.

Pulverising mill. S. DUVALL (U.S.P. 1,713,957, 21.5.29. Appl., 20.6.28).—An impact pulveriser has two staggered groups of hammers each side axially of a set of radial arms, and all being on the same shaft and in the same casing. The radial arms are twisted alternately in opposite ways so as to form propellers which force the material alternately towards each group of hammers. B. M. VENABLES.

Beaters for impact pulverising mills. HARTSTOFF-METALL A.-G. HAMETAG (B.P. 305,469, 29.1.29. Ger., 4.2.28).—The beaters are of special toothed form, with the object of preventing useless sliding of material along them and cushioning of the blows. B. M. VENABLES.

Centrifugal air-float pulveriser. O. OLSTON (U.S.P. 1,713,297, 14.5.29. Appl., 26.3.28).—In a pulveriser comprising a stationary breaker-ring with co-operating impeller rotated by a vertical shaft, the

breaker-ring is spaced apart from the containing casing, leaving passages for currents of air-borne ground material, and the feed material is guided to the centre of the impeller by means of a hopper-shaped diaphragm above, which also acts as a baffle to create the exhaust draught. A number of grinding units, each comprising the above-mentioned three parts, may be superposed in one casing. B. M. VENABLES.

Impact mills. DEUTS. BABCOCK & WILCOX DAMPF-KESSEL-WERKE A.-G., and L. KOLLBOHM (B.P. 306,848, 25.2.29. Ger., 23.2.28).—In a pulveriser where the material is blown in by compressed air, this being the sole means of causing impact, the apparatus is maintained under partial vacuum (say 50—80 mm. of water) by means of a suction blower. B. M. VENABLES.

Disintegrating apparatus. J. E. KENNEDY (U.S.P. 1,714,312, 21.5.29. Appl., 31.3.24).—A main body of air is kept in circulation through a revolving drum (e.g., a ball mill), a fan, a cyclone separator, and back to the drum. Excess air, due to leakage, is drawn off between the separator and the mill through a chamber with flexible screening walls, from which the dust may be dislodged by shaking. B. M. VENABLES.

Grinding or crushing mills. M.A.G. MASCHINEN-FABR. A.-G. GEISLINGEN (B.P. 300,213, 8.11.28. Ger., 8.11.27).—A disintegrator is provided with a revolving grinding member which also acts as a fan. The airborne ground material passes over deflectors to a screen where oversize is taken out; the undersize passes up an ascending pipe provided with annular baffles which cause eddies by which another size of product is removed. The dusty air is exhausted through a filter sleeve surrounding the ascending pipe, and there is also a passage from inside the filter leading back to the disintegrator, to relieve the pressure on the filter. B. M. VENABLES.

Separation of the powder from granular or like material. K. ORTMANN (B.P. 309,361, 13.8.28).—The comminuted material falls in thin streams over the surfaces of deflectors arranged in staggered rows. The deflectors are of Λ -shape in section, but longitudinally the lower edges are cut away and provided with closely adjacent under plates. Suction draughts are produced underneath the ridges, the air and dust exhausting through passages in the walls of the casing at the ends of the ridges. B. M. VENABLES.

Centrifugal concentrator. R. M. WENDEL (U.S.P. 1,712,184, 7.5.29. Appl., 19.12.27. Swed., 7.10.26).— A centrifugal separator for solids suspended in a liquid comprises a vertical, tapering, rotary drum the small end of which is downwards, has a central opening, and dips into the feed pulp. The conicity of the drum causes the material to rise as well as stratify, and each stratum is drawn off at the top by conical dividing plates which are within and parallel to, and rotate with, the drum. One form of the apparatus may have two concentric rotary drums, the outer one receiving partly separated product from the inner.

B. M. VENABLES.

Separation of impurities from circulating air, gas, or vapour [by "electret" filter]. Platen-MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG (B.P. 292,479, 18.6.28. Ger., 18.6.27).—The gas is passed through filters or over contact surfaces made of insulating substances (e.g., carnauba wax) which have been melted and solidified while in a strong electric field, whereby they obtain a charge which is retained for long periods. The "electrets" may be divided into grains or powder and attached to fabric or other supports if desired, and may be washed or disinfected without losing their charge. B. M. VENABLES.

Apparatus for centrifugal separation. C. E. FAWKES (U.S.P. 1,700,928, 5.2.29. Appl., 25.8.22). -The mixture, e.g., liquid air, is charged through Venturi nozzles into the middle compartment (A) of medium centrifugal pressure in a series of separating chambers mounted vertically and containing rapidly rotating discs. The heavier component, e.g., oxygen, is thrown out into a collecting chamber connected with the region of medium centrifugal pressure in the next lower separating chamber (B), while the lighter components, e.g., nitrogen, are drawn off from their axial position to the region of medium pressure in the next higher separating chamber (C). Lighter components separated in C are drawn back upwards into A with fresh air supply through the Venturi nozzle, while heavier (oxygen) components from B are similarly returned downwards, relatively pure nitrogen being ultimately delivered at the top and oxygen at the bottom of the apparatus. R. BRIGHTMAN.

Continuous filter. J. D. COMPAIN (U.S.P. 1,712,258, 7.5.29. Appl., 28.11.27. Cuba, 21.12.26).—A rotating cylindrical strainer or filter, to the interior of which the prefilt is supplied, is provided with radial lifting vanes on the interior circumference; the vanes are hinged about lines intermediate their radial depth, and work in conjunction with fixed circular guides, which, during part of a rotation, bend the vanes to form buckets which fall open at the highest point of their travel, and tip collected refuse into a discharge hopper.

B. M. VENABLES.

[Metallic edge-]filters. J. A. PICKARD (B.P. 312,944, 2.12.27, 28.1. and 1.8.28).—An edge-filter is constructed of non-fibrous plates in such a way that the passages for the flow of liquid become thinner in the direction of travel. The metallic discs or strips are formed with a taper for this purpose, and may be provided with embossed studs or ribs to maintain the correct distance apart. Filter aids may be used. Cleaning by reverse flow is facilitated by the taper of the passages. B. M. VENABLES.

Filter presses or pressure-filter elements. L. A. J. REVEL (B.P. 292,117, 15.3.28. Fr., 14.6.27).— A form of construction for filter plates is described whereby both inlet and outlet plates are identical in manufacture, but are assembled at right angles to each other. B. M. VENABLES.

Testing and indicating the condition of filters. E. C. R. MARKS. From A.C. SPARK PLUG Co. (B.P. 313,179, 8.12.27).—Used motor oil or other fluid under pressure is passed in turn through a constriction and the filter. Leads to pressure gauges are taken off before and after the constriction; as long as the filter is passing oil there will be a difference in the readings of the gauges, but when the filter is completely choked the readings will be equal. Suitable arrangements of gauges are described. B. M. VENABLES.

Apparatus for determining gas content of solid bodies. C. LORENZ A.-G., Assees. of W. HESSENBRUCH (B.P. 299,303, 22.9.28. Ger., 22.10.27).-A furnace with air-lock device preferably consists of a graphite crucible within a magnesia crucible, the whole being enclosed in a silica container and heated by electrical or other means. The silica container is connected in an air-tight manner, through a valve large enough to pass the material, to a material feeding chamber and to a vacuum pump. In operation, firstly, the whole empty apparatus is subjected to vacuum and the crucibles are heated ; after the gas has been removed, the crucible valve is closed, the vacuum released (but not in the crucible owing to the closed valve), the feed chamber charged with material, and the vacuum restored. When fully restored, the crucible valve is opened and the material dropped into the crucible, the gases evolved being collected and assayed by known means.

B. M. VENABLES.

Apparatus for heating liquids by steam or the like. R. MORTON & Co., LTD., and P. ROBINSON (B.P. 313,345, 11.7.28).—When a mass of liquid is heated by a submerged heater, such as a bundle of steam tubes, the heater is surmounted by a hood within which the convection currents are concentrated. The hood may be provided with doors, or may be entirely swung aside or lifted out so that the heater may be cleaned.

B. M. VENABLES.

Distilling liquids by introduction of another liquid into the heated liquid to be distilled. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,254, 10.4.28).-When, for example, peanut oil is heated at 280° in vacuo, and it is desired to introduce water (without steam) at 175°, the water is supplied under a pressure of 8 atm. through a device comprising a double concentric tube to the inner of which water is fed, and from the outer tube part of the water is exhausted at the same end. At the further end, where the water turns back, is situated a finely-adjustable valve which permits some of the water to pass out into the liquid to be distilled. The returning water insulates the feed water from the excessive heat of the oil in which B. M. VENABLES. the device is submerged.

Apparatus for the distillation and other hot treatment of liquids. A. E. BIANCHI and G. GUARDA-BASSI (B.P. 312,399, 27.2.28).—In apparatus comprising externally-heated retorts provided with stirrers and chain agitators, the shafts of the stirrers are made hollow, and the incoming liquor is passed through them in series; the liquor is thereby preheated and the shafts are kept cool. A loaded valve may be used to regulate the pressure and rate of flow of liquid, which issues in the form of a spray to the interior of the retort (cf. B.P. 277,404 and₁278,041; B., 1927, 930).

B. M. VENABLES.

Desiccation of liquids. J. A. REAVELL (B.P. 312,400, 27.2.28).—In the process of Idesiccation by spraying into heated gas, the bulk of the powder is

recovered from the lower part of the spraying chamber; the exhaust gas, which contains dust in suspension, is scrubbed by the liquor before desiccation, the liquor preferably being kept in comparatively rapid countercurrent circulation through a tower, while a smaller proportion (the net feed) is sent forward to the spray. If desired, an intermediate step of ordinary evaporation may be interposed. B. M. VENABLES.

Sterilisation of liquids. C. A. HARTUNG (U.S.P. 1,714,366, 21.5.29. Appl., 8.5.26. Ger., 25.3.26).— The liquid is repeatedly circulated through a heat interchanger, the heating fluid being maintained slightly hotter than the liquid at all points in its course.

F. G. CLARKE.

Apparatus for spraying or atomising liquids. C. E. GARDNER (B.P. 313,212, 9.3.28).—The apparatus comprises one or more mixing chambers, terminated by one or more spraying nozzles. The liquid is supplied under pressure through a lateral inlet to the first mixing chamber, and air or other fluid under pressure to an opposite lateral inlet, and a plug cock with two separate passages is situated between the three last-mentioned parts. B. M. VENABLES.

Drying of gases. O. Y. IMRAY. From ALLGEM. GES. F. CHEM. IND.M.B.H. (B.P. 312,457, 18.4.28).-The gases are dried by contact with a liquid such as sulphuric acid. The apparatus comprises a vertical casing in the lower part of which is a bundle of tubes forming a shallow liquid seal in a bath of the absorbent liquor. The gas is blown through the tubes in the reverse way to an ordinary liquid seal, and in consequence gas and finely-divided spray ascend through the tubes to a plain intermediate chamber, and thence to an upper chamber with filling such as Raschig rings, which form a spray trap. Liquor drains back to the base chamber through one or more pipes of large bore forming deep liquid seals, and is circulated by a pump or air lift to the top of the filling. Part of the liquid is removed for reconcentration.

B. M. VENABLES.

Regulating the density of mixed gases. SMOOT ENGINEERING CORP., Assees. of C. H. SMOOT (B.P. 284,647, 23.1.28. U.S., 2.2.27).—This invention is described as used for keeping the carbon dioxide content of boiler gases constant; it is also suitable for other purposes. A single motor drives two equal suction fans which are fed through restricted inlets with air and with flue gases, respectively, after each has passed through a saturator and temperature equaliser; the fans are also water-jacketed as a further precaution. The air may then be taken as a standard of density, and the relative density of the flue gas will only be affected by its chemical composition, i.e., its carbon dioxide content. The exhaust from the fans passes freely to atmosphere, but from points that may be accurately adjusted with regard to their distance from the axes of the fans other pipes lead to above (for air) and below (for gas) a bell floating in liquid, the position of which through other pneumatic mechanism regulates the air and/or fuel supply to the boiler furnace.

B. M. VENABLES.

Treatment of noxious and other fumes. L. S. FRASER and F. L. RICH (B.P. 312,200, 19.12.27).-

Exhaust gas from an engine (or other gas) passes through an ejector device which draws in and mixes a quantity of air or oxygen, and the mixture passes on to an enlarged part of the apparatus where it passes over a catalyst such as copper or other metallic oxide. The apparatus may be heat-insulated, and the air inlets may have non-return valves. B. M. VENABLES.

Apparatus for indicating the presence of gases. B. TREBITSCH (B.P. 313,355, 26.7.28).—The apparatus comprises a vessel with double, porous walls through which gases will diffuse at different rates according to their density. At one end the walls are rendered non-porous, and here is inserted a tube affording communication between the inner vessel and a manometer, the latter of which may be used to operate electrical contacts. Preferably the inner wall has a greater porosity than the outer. B. M. VENABLES.

Catalytic apparatus [for gaseous-phase oxidations, reductions, etc.]. SELDEN Co., and A. O. JAEGER (B.P. 306,519, 27.4.28. U.S., 23.2.28).—The temperature of reaction is controlled by a non-boiling, circulating liquid the temperature of which is controlled by heat-conducting elements which may be metal rods or metal tubes containing a liquid boiling at about the desired reaction temperature. These elements extend beyond the circulating liquid and come into contact with the reacting or reacted gases. A suitable apparatus is figured. C. HOLLINS.

High-pressure drum and its manufacture. W.H. LEWERS. From SUPERHEATER Co. (B.P. 313,222, 15.3.28). -Since the longitudinal stress in a cylinder under pressure is only half the circumferential stress, a highpressure drum is formed of two concentric cylinders, the larger being pressed on the smaller. One of them, preferably the inner, is left longer and the ends are swaged down in a conical or other shape to form the ends of the drum. The swaging will increase the thickness of the metal, and for this and mathematical reasons connected with the angle of the conical ends, the inner drum may be even less than half the combined thickness. The cylinders may be formed from sheets, rolled and welded longitudinally, the seams of the separate cylinders being placed well apart circumferentially. Holes for tubes may be drilled of equal diameter through both drums and the joints exposed half way through the holes welded up, or the holes in the inner drum may be drilled slightly smaller than those in the outer, and the tubes expanded into the inner drum only. B. M. VENABLES.

Aeration process for drying, carbonising, and oxidising plants and apparatus therefor. R. GLINKA (U.S.P. 1,715,830, 4.6.29. Appl., 13.10.27. Ger., 18.10.26).—See B.P. 303,572; B., 1929, 307.

Centrifugal separator. B. C. CARTER (U.S.P. 1,714,658, 28.5.29. Appl., 10.12.28. U.K., 28.10.27).— See B.P. 310,550; B., 1929, 498.

Clarification of liquids and recovery of solids therefrom. R. J. MARX (U.S.P. 1,717,111, 11.6.29. Appl., 22.6.27. U.K., 2.2.27).—See B.P. 272,130; B., 1927, 591.

Separation and recovery of gases and vapours by solid absorbents. A. Godel, Assr. to Soc. DE Recherches & d'Exploitations Pétrolifères (U.S.P. 1,717,103, 11.6.29. Appl., 23.6.26. Ger., 8.6.26).— See B.P. 267,369; B., 1927, 689.

Doors for furnaces, retorts, etc. S. R. ILLING-WORTH, and ILLINGWORTH CARBONIZATION CO., LTD. (B.P. 313,021, 29.2.28).

Furnace walls [for steam boilers]. BABCOCK & WILCOX, LTD. From BABCOCK & WILCOX Co. (B.P. 312,846, 12.7.28).

[Grooved] filling blocks for heat exchange, reaction, and absorption apparatus. J. H. JACK. From Stellawerk A.-G. VORM. Willisch & Co. (B.P. 313,226, 19.3.28).

Reversing mechanism for washing and like machines of the rotary-drum type. A. F. TULLIS (B.P. 312,973, 3.4. and 24.8.28).

Fire-extinguishing liquid (U.S.P. 1,716,476).— See VII. Furnace for fusing finely-divided materials (B.P. 294,639).—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Carbonisation. IV. Influence of various factors on ignition temperature, reactivities, and structure of coke. V. Temperature, size of coal, blending with inorganic compounds. 22ND AND 23RD REPTS. OF JOINT RES. COMM., INST. GAS ENG. AND UNIV. LEEDS (Gas J., 1929, 186, 766-770, 772-775; cf. B., 1928, 555).-IV. The ignition temperatures, and reactivities to carbon dioxide and steam, of a number of cokes have been measured by passing 10 litres per hr. of (a) oxygen, (b) carbon dioxide, and (c) steam, respectively, over standard quantities of graded coke in three similar types of apparatus. It is found that (1) the size of the coal carbonised has no marked effect on the ignition temperature or the carbon dioxide or steam reactivities of the coke; (2) the ignition temperatures of cokes decrease as their carbonisation temperature is lowered or as their percentage of volatile matter is increased; (3) addition of coke breeze to a Nottinghamshire coal does not influence the ignition temperatures or reactivities of the resulting cokes; (4) addition of sodium carbonate to the coal lowers the ignition point of the coke produced when the mixtures are carbonised above 600°, but below this temperature it has no effect; at carbonisation temperatures of 915° calcium carbonate and iron oxide also lower the coke-ignition temperature, but their effects are not so marked as is that of sodium carbonate; (5) admixture of sodium carbonate, calcium carbonate, and iron oxide, respectively, to the coal prior to carbonisation increases the reactivity of the coke made; (6) for high-temperature cokes a low ignition temperature corresponds with high steam and carbon dioxide reactivities; (7) certain of the conclusions given above must be modified if the charge of coal is not uniformly carbonised; (8) examination of a number of cokes by macro- and micro-inspection of "Rose's" sections does not give any indication of the possibility of correlation of visible structure with ignition temperature and reactivity.

V. The results previously recorded (*loc. cit.*) obtained when a Nottinghamshire moderately coking coal was

carbonised in 30-lb. charges in an experimental gas plant furnished by a highly coking Durham gas coal, carbonised under similar conditions, are compared. The Durham coal was graded into three sizes, 11-3 in., 1-1 in., and 8-30-mesh, and examined at carbonisation temperatures of 920° and 815°. It was found that (a) the size of the coal had no effect on the ultimate yields of gas, coke, and therms; the size of the coal, when carbonised at 920°, affected the rate at which gas was evolved, the mixture of sizes and the smallest grade giving the slower rates; (b) reduction of the carbonising temperature from 920° to 815° lowered the thermal yield and altered the composition of the gas; the volume of gas obtained from the 8-30-mesh coal decreased from 12,007 cub. ft. at 920° to 9959 cub. ft. at 815°, the calorific value increased from 597 to 649 B.Th.U. per cub. ft., and the final thermal yield per ton of coal fell from 71.7 to 64.6; (c) temperature of carbonisation had a marked effect on the rate of gas evolution; after 1 hr. the volume of gas evolved from the coal carbonised at 815° was approx. 50% of that obtained at 920°; (d) the yields of tar, ammoniacal liquor, and coke increased as the carbonisation temperature was lowered; (e) addition of coke breeze (10-30%)increased the rate of gas production (per lb. of coal but not per lb. of charge) at both temperatures, this effect being the more marked with Durham than with the Nottinghamshire coal : (f) the results obtained when calcium carbonate, calcium oxide, iron oxide, and sodium carbonate (2% of corresponding oxide) were added to the coal before carbonisation again indicated the marked effect of these substances on the amount and rate of gas evolution, thermal, tar, ammonia, and hydrogen sulphide yields. C. B. MARSON.

Low-temperature carbonisation of blended New Zealand coals. W. G. HUGHSON (New Zealand J. Sci. Tech., 1929, 10, 263—274).—Gray-King assays have been carried out on a number of bituminous and brown coals, and on blends of the two. Low-temperature carbonisation of the former yield swollen friable cokes, and of the latter non-coherent powders, but semi-cokes of a satisfactory texture and hardness are obtained from suitable blends of the two. A. B. MANNING.

Factors influencing the reactivity of coke. F. J. DENT and J. W. COBB (Gas J., 1929, 186, 776-782, 811; cf. B., 1928, 555).-Experimental evidence indicates that the combustible portion of coke is not homogeneous, but is composed of constituents with different properties which can be divided into two groups, and are the decomposition products from two corresponding groups of constituents of the original coal, viz., those which fuse, or do not fuse, when the coal is carbonised. On carbonisation the fusible portion of the coal first melts, spreading over the non-fusible constituents, and on further heating decomposes, with loss of volatile matter, gradually becoming more and more viscous until it finally resolidifies. This " binder " is unreactive compared with the residue from the nonfusible components and lowers the reactivity of the coke towards carbon dioxide and steam at high temperatures; the amount of binder in strongly coking coals is comparatively large and accounts for the low

reactivity of their cokes, whereas anthracites and lignites. which contain only small quantities of binder, when carbonised produce more reactive cokes. The influence of heat on the binder is much more pronounced than on the non-binding material; heating for a few hours at 900° converts the binder into still more unreactive graphitic carbon. When a coke is gasified at high temperatures its more reactive components are gasified more rapidly than is the main body of the material, hence its reactivity decreases as gasification proceeds, but other factors, such as graphitisation of the surface. the presence of reducible oxides, etc., may mask this effect. Reactivities and ignition points determined at low temperatures cannot be regarded as a means of forecasting the behaviour of coke at higher temperatures, and it therefore follows that the reactivity of a coke should be determined under conditions corresponding as nearly as possible with those under which the coke is intended to be used in practice. It is concluded that for the examination of the influence of various factors on the reactivity of coke, a knowledge of the nature of " parent " coal is of the greatest importance.

C. B. MARSON.

Reactivity of coke. II. Metallurgical cokes. J. H. JONES, J. G. KING, and F. S. SINNATT (Dept. Sci. Ind. Res., Fuel Res., 1929, Tech. Paper No. 22, 30 pp.) .---Fifty samples of metallurgical cokes made from a variety of coals and in different types of ovens were examined by a method previously described (cf. B., 1928, 146) to obtain evidence of the influence of the coal carbonised and of the carbonising conditions on the reactivities (to carbon dioxide) of the coke produced ; an attempt was also made to correlate the shatter indices of the cokes with their reactivities. It was found that, in general, high reactivity corresponded with low resistance to shatter ; cokes may be placed in the order S. Wales \rightarrow Durham \rightarrow Yorkshire for increasing reactivity and decreasing shatter index ; cokes with high shatter indices gave the most regular results, when tested for reactivity. No definite relationship between compression of the charge and change in reactivity or shatter index was observed ; beehive coke was characterised by little variation in its reactivity as the experiment proceeded, and by a uniformity of quality. Insufficient data are available to enable conclusions to be drawn as to the blast-furnace value of the cokes, but there are indications that low reactivity and regularity of behaviour are desirable. Preliminary experiments are also described in which the influence of the inorganic constituents, especially iron, has been examined.

C. B. MARSON.

Disposal of liquor effluents from gas works. 3RD REP. INST. GAS ENG. LIQUOR EFFLUENTS RES. COMM. (Gas J., 1929, 186, 783-793; cf. B., 1928, 556). —The installation and trial of a Lodge-Cottrell electrostatic tar precipitator attached to a new setting of continuous vertical retorts is described, and it is shown that the apparatus is highly efficient as a tar separator and reduces the higher tar acids in the liquor to a comparatively small amount; the liquor is consequently much paler in colour, but the monohydric phenol content is increased, as is also the total oxygenabsorption value. Observations show that in the liquor obtained from the new setting of vertical retorts the low oxygen content of the crude gas causes a diminution in the quantities of thiosulphate and thiocyanate in the condensed liquor. Systematic tests on the method of purifying liquor effluents by percolating filter beds (cf. previous report, *loc. cit.*) are described. From August, 1928, the whole of the spent liquor made at a gas works has been treated on the beds, 1 pt. of spent liquor being diluted with 23 pts. of purified effluent and fed to the beds in rotating sprinkers. In the first 12 weeks 3 million gallons of spent liquor were purified, with an efficiency of 93%; the running costs after 1 year's working were £828 per annum, or 10s. 9d. per ton of ammonium sulphate made. C. B. MARSON.

Economies in the recovery of ammonia [from gas-works' liquor] by the indirect process. H. HOLLINGS and S. PEXTON (Gas J., 1929, 186, 793-796). -The aim in indirect ammonia recovery should be to produce as concentrated a liquor as possible; a suitable washing medium to replace water may be obtained by the fractional condensation of the virgin liquor, and such replacement does not adversely affect the quality of the ammonia-still effluent liquor. The partial or complete elimination of water used in the extraction of ammonia from gas is dependent on efficient cooling of the gas and on the provision of washers of adequate capacity. It is concluded that, in general, the capacity of condensing and washing plant could be increased, if necessary by 25%, at an increased cost of 5s. to 6s. per ton of ammonium sulphate made; this increased cost may be offset by the economies resulting from the production of a more concentrated liquor, without any reference to the other advantages associated with the use of an efficient condensing plant.

C. B. MARSON.

Methods of refining sulphurous oils. C. J. WRIGHT (J. Inst. Petroleum Tech., 1929, 15, 214-244).-The cost of removing hydrogen sulphide from straightrun benzine by soda-washing is materially reduced by maintaining the condenser worm end temperature as high as 32-38°. Soda which has been used for absorbing hydrogen sulphide, and which contains sodium hydrogen sulphide, can be partially recovered by the Koppers aeration process, in which hydrogen sulphide is liberated and sodium sulphide formed. Working to about a 5% recovery with a large volume of liquor, hydrogen sulphide can be alternately absorbed and expelled. The "soda" recovered by this process will not dissolve mercaptans. Soda containing sodium mercaptides, but not sodium sulphide or sodium hydrogen sulphide, can be recovered almost quantitatively by boiling off the mercaptans; the economical limit is reached after about eight recoveries of the same lot of soda. If soda were the only alkali available, it would be economical to segregate it into two distinct cycles for removal of hydrogen sulphide and mercaptans, respectively. It is not economical to recover lime which has been used for removal either of mercaptans or of hydrogen sulphide. For the removal of mercaptans, a given weight of sodium hydroxide is the more efficient the greater the dilution : moreover, more dilute alkali is more readily recovered by boiling. Sodium sulphide, derived from sodium hydroxide and hydrogen sulphide in refinery practice, is of use in removing elementary sulphur from petroleum. In refining straightrun benzine by means of calcium hypochlorite, the latter is employed in a solution containing 0.9-1.1 g. of lime per litre. The use of sodium plumbite, sulphuric acid, liquid sulphur dioxide, and bauxite is discussed.

W. S. NORRIS.

Determination of tar-forming value of transformer and switch oils. E. LOCHER (Chem.-Ztg., 1929, 53, 470).—The oil is heated at 120° for 24 hrs. with sodium hydroxide solution of specified concentration, instead of for 70 hrs. in a stream of oxygen. S. I. LEVY.

Technical destruction methods of crude oil emulsions. A. LOTTERMOSER and N. CALANTAR (Kolloid-Z., 1929, 48, 179—184).—Existing technical methods of destroying oil emulsion are examined. They are grouped as electrical methods, mechanical methods (centrifugal, thermal, filtration), and addition of various agents including adsorption media (charcoal, fuller's earth, kaolin, etc.), electrolytes, colloids, and the byproducts of petroleum refining. It is concluded that there is no universal method, each emulsion requiring its own special type of treatment. E. S. HEDGES.

Explosibility of atmospheres. Coward.—See XXII.

See also A., July, 803, Pyrogenic decomposition of perhydrides of fluorene and acenaphthene under pressure of hydrogen (ORLOV and BELOPOLSKY).

PATENTS.

Coke ovens. J. VAN ACKEREN, ASST. to KOPPERS CO. (U.S.P. 1,714,933-4, 28.5.29. Appl., 13.4.26).-(A) Each heating wall of a coke oven is provided with vertical flues which communicate with a horizontal flue passing through the upper portions thereof. Ducts connect the horizontal flue in one wall with that in another. (B) An oven with a horizontal flue in each heating wall passing through the upper parts of and communicating with the vertical flues is provided with regenerators arranged to serve the vertical flues on one half of each of the heating walls as up-flow flues, and other regenerators arranged to serve the vertical flues on the other half as down-flow flues simultaneously.

A. B. MANNING.

Producing a solid fuel in coarse lumps from finely-granular anthracite or similar lean coals and bituminous coal. CHEM. TECHN. GES.M.B.H. (B.P. 288,235, 13.1.28. Ger., 7.4.27).—Mixtures of finely-divided anthracite or other lean coal and a caking bituminous coal are carbonised by external heating at 500—600° in stationary layers of 6—15 cm. thickness, packed as closely and evenly as possible. The coal is packed into the retorts preferably by means of wormconveyors. A. B. MANNING.

Preparing and subsequently briquetting noncaking fuels. E. FRIEDLÄNDER & Co., Assees. of P. FUCHS (B.P. 281,326, 26.11.27. Ger., 27.11.26).— Non-caking fuels, with the exception of low-temperature coke, are briquetted with both an inorganic and an organic binding agent. Sorel cement (6-7%), or lime slaked with magnesium sulphate solution, may be used as the former, and 2-3% of sulphite-liquor pitch, naphthalene, tar oils, etc. as the latter. A. B. MANNING.

Carbonisation of coal and like material. I. F. LAUCKS, ASST. to OLD BEN COAL CORP. (U.S.P. 1,713,840, 21.5.29. Appl., 23.6.20; cf. Laucks, B., 1927, 177).— A coal which becomes plastic on heating is conveyed through an externally heated cylindrical retort by means of a screw. The latter, which is hollow, is also heated in such a manner that at the zone where the coal commences to set the screw is hotter than the retort, and the setting process is completed at the rotor while the plastic coal adheres to the wall of the retort.

A. B. MANNING.

Heating substances susceptible to oxidation. H. KOPPERS, ASST. to KOPPERS DEVELOPMENT CORP. (U.S.P. 1,713,834, 21.5.29. Appl., 6.7.21. Ger., 13.5.28).—By intimate admixture of the substances with not too easily combustible carbon a reducing atmosphere is maintained in their immediate environment while they are being heated or carbonised, and the necessity for using an excess of fuel gas in the furnace is avoided. A. B. MANNING.

Treatment of combustible material [for use as pulverised fuel]. H. P. PETERSEN (B.P. 312,707, 6.3.28).—The material is simultaneously dried and pulverised by the passage of hot combustion gases through the mill. The gases then convey the pulverised material to a centrifugal or cyclone separator. The blower is so placed that the gases are drawn from the combustion chamber through the mill and separator, and then, issuing from the blower, serve to inject the fuel, which is discharged from the separator, into the combustion chamber. By drawing the gases from different points of the combustion chamber or smoke passage the temperature in the mill can be suitably adjusted. A. B. MANNING.

Treatment of lamp blacks and other carbon blacks and their industrial applications. COMP. LORRAINE DE CHAREONS POUR L'ELECTRICITÉ (B.P. 300,610, 31.10.28. Fr., 16.11.27).—Amounts up to 10% of pine tar, natural asphalt, etc. are incorporated with lamp black in order to convert it into a pulverulent form which is not dusty. If possible the added material is one of the necessary ingredients of the industrial product for the manufacture of which the lamp black is subsequently to be used. Examples are its uses in rubber compounding, and in inks and paints.

A. B. MANNING.

Gas producers. MORGAN CONSTRUCTION Co., Assees. of P. S. HULT (B.P. 303,784, 20.9.28. U.S., 9.1.28).— A rotary producer is described in which the shell is supported by three radial arms from the blast duct which rises through the centre of the ash pan. This arrangement allows free passage of the ash from the shell into the pan and the free working of an ash plough therein. The radial arms are cooled by the water seal between the ash pan and shell. J. A. SUGDEN.

Gas producers having means for removal of residues therefrom. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,709, 30.4.28).—The stationary grate is provided with an adjustable rotating stirrer which discharges the ash through one or more

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central ash holes. The system is specially suitable for use in conjunction with the process described in B.P. 214,544 (B., 1924, 549). J. A. SUGDEN.

Gas retort. H. KOPPERS, Assr. to KOPPERS DEVELOP-MENT CORP. (U.S.P. 1,716,643, 11.6.29. Appl., 7.7.21. Ger., 1.9.19).-The flue and regenerator system for a horizontal bed is described. J. A. SUGDEN.

Gas absorber for products of combustion. J. BILSKY (J. G. BILLINGS) (U.S.P. 1,716,479 and 1,716,480, 11.6.29. Appl., [A] 9.2.27, [B] 18.5.27).-(A) The absorbents comprise separate layers of active carbon, cuprous and palladium chlorides, hexamethylenetetramine, and an oxidising catalyst. (B) The absorption chamber is provided with a trap to separate liquids from the gas before passing through the absorbent baffle plates, and with a small pump to maintain reduced pressure within the chamber in order to reduce back-J. A. SUGDEN. pressure.

Gas manufacture. W. E. TRENT, Assr. to TRENT PROCESS CORP. (U.S.P. 1,716,673, 11.6.29. Appl., 8.3.22).-Comminuted coal (with oil as a bond) is compressed into a mass having a number of channels throughout its length. While the mass is in a suitable retort hot gases are passed through the channels, thereby gasifying the volatile products, which are collected in admixture with the hot gases. J. A. SUGDEN.

Manufacture of coal gas. E. REES and G. GARDI-NER (B.P. 312,727, 19.3.28).-Means are provided for controlling and varying in any desired manner the vacuum or pressure to which each retort in a setting is subjected during the period of carbonisation.

A. B. MANNING.

Continuous oil-gas process. W. S. YARD and E. N. PERCY (U.S.P. 1,703,506, 26.2.29. Appl., 1.12.24). -Air is blown through a deep bed of fuel in a gas producer, at the top of which are oil inlets so arranged that the fuel bed may be continuously and uniformly replenished by the deposition of carbon formed by the cracking of the oil introduced at suitable rates through the inlets. A. B. MANNING.

Manufacture of mixed water-gas and oil gas. W. D. WILCOX (U.S.P. 1,716,676, 11.6.29, Appl., 31.12.24).-A fuel bed is blasted from the top and the gases pass on to be burned in a regenerator. The fuel bed is then steamed from the bottom and the watergas is collected. Finally, steam and oil, vaporised by passing through the regenerator, are passed through the fuel bed to generate mixed water-gas and oil gas.

J. A. SUGDEN.

Manufacture of fixed gases and condensable hydrocarbon fluids from bituminous materials by fractional disintegration. A. G. MEEZE (B.P. 312,533, 10.7.28).-The fuel bed of a water-gas generator is first blown to incandescence with air enriched with pulverised bituminous coal (cf. B., 1912, 1172), the air blast being followed by a run of superheated steam which, instead of being cut off when the production of carbon monoxide falls off, is continued, the gas, however, being then diverted into a storage vessel and subsequently again passed through the fuel bed of the same or another generator which has been reblown to incandescence.

During the second stage of the steam run pulverised bituminous material may be injected into the generator, the gas being then passed through a condensing system for the recovery of liquid hydrocarbons therefrom before being collected for retreatment in the generator. A. B. MANNING.

Recovery of gases or vapours taken up by absorbents. N. V. NORITVEREENIGING VERKOOP CENTRALE (B.P. 283,508, 11.1.28. Ger., 11.1.27).-The absorbed substance is removed by circulating the scavenging gas at a rate greater than that used during the absorption process. The scavenging gas may be the original gaseous mixture or an indifferent gas charged with steam. A suitable closed system of absorption and condensation vessels is described which gives a greatly increased J. A. SUGDEN. efficiency and economy.

Purifying gases [from distillation of wood]. E. PIRON, ASST. tO PIRON COAL DISTILLATION SYSTEMS, INC. (U.S.P. 1,701,054, 5.2.29. Appl., 7.1.25).-The gases are scrubbed first with, e.g., "green liquor" or crude pyroligneous acid, and then at above 100° with sulphuric acid, d 1.263, affording on condensation tar-free pyroligneous acid. The residual gases are returned through an exhauster to heat the retort, a portion being by-passed through a preheater into the sulphuric acid scrubber to maintain the temperature above 100°.

R. BRIGHTMAN.

Purifying the exhaust gases of internal-combustion engines. DEUTS. GASGLÜHLICHT-AUER-GES.M.B.H. (B.P. 287,106, 28.2.28. Ger., 15.3.27) .- The first discharge of exhaust gases is passed through an adsorptive filter (such as active carbon or silica gel, which is active only at low temperatures) for the removal of hydrocarbons. The remaining carbon monoxide is oxidised to carbon dioxide by its passage through a layer of a catalyst such as "hopcalite"-a prepared mixture of oxides of copper, manganese, cobalt, and silver-which oxidises only carbon monoxide at low temperatures, but hydrocarbons as well at high temperatures. As the heat of the gases warms up the adsorptive filter the adsorbed hydrocarbons are driven off from it and pass along with the exhaust gases. This filter is automatically cut out and, when cool, is again in an active state to deal with the first discharge of gases. Meanwhile the "hopcalite " has been heated (by the heat of reaction and of the gases) to the temperature at which it is capable of oxidising both the carbon monoxide and the hydrocarbons. J. A. SUGDEN.

Purifying the exhaust gases from internalcombustion engines. J. BILSKY (J. G. BILLINGS) (U.S.P. 1,716,481, 11.6.29. Appl., 13.7.27).-Heavymetal compounds are removed by passing the gases

through masses containing sodium chromate. J. A. SUGDEN. Desulphurisation of gases. J. Y. JOHNSON. From I. G. FARBENIND, A.-G. (B.P. 312,769, 26.4.28).-Industrial gases which are laden with flue dust, combustion residues, or unconsumed particles of coal etc. are freed from sulphur compounds by adding oxygen, or gases containing oxygen, and ammonia, if sufficient is not already present, and heating the gases at 100-200° until the sulphur compounds are oxidised to sulphur,

which is then removed with the dust by any convenient mechanical or electrical device. Gases containing dust in excess of that necessary to catalyse the oxidation and take up the sulphur may be freed from the excess before undergoing treatment. A. B. MANNING.

Separation of tar from gases. KOPPERS Co., Assees. of J. BECKER (B.P. 289,768, 20.2.28. U.S., 30.4.27).-The cooled gas is "wire-drawn" through a number of perforated baffles in order to convert the very finely-divided tar into a suspension of relatively large particles. These are condensed by passage of the gas through a conduit provided with vanes shaped to give it a whirling motion. The gas is finally reheated by means of a steam coil before its passage to the saturator for recovery of the ammonia. In a preferred form of apparatus, the perforated baffles are arranged in an annular chamber in the upper part of a cylindrical tower, and the steam heating coils in a corresponding chamber below, the centre of the tower being occupied by the conduit on the surface of which the tar globules are deposited by centrifugal force. A. B. MANNING.

Distillation of tar. BARRETT Co., Assees. of F. OSBORNE (B.P. 285,907, 18.2.28. U.S., 26.2.27).—Tar is sprayed into the uptake pipes of a section of the coke oven, and the gases are passed through a short collector main where the heavy oils are separated. The enriched gases are then mixed with the gases from the rest of the battery, and passed through the ordinary condensing system. In this way the accumulation of heavy oils in the tar is avoided. A suitable system of collector mains and condensers is described. J. A. SUGDEN.

Distillation of tar and the like. BARRETT Co., Assees. of S. P. MILLER (B.P. 282,826, 30.12.27. U.S., 31.12.26).—Distillation is effected by bringing the tar directly into contact with hot coke-oven gases as described in B.P. 282,367 (B., 1929, 507). A limited number of ovens in the battery are provided with "uptake pipe stills," and with their own collecting, cooling, and condensing system, so that the gases and vapours from the distillation are kept separate from those from the main portion of the battery. The tar from the latter may be condensed in two separate fractions, and one or both of these then subjected to distillation as above. Mixed tars may be distilled in this manner in order to produce composite pitch residues and distillates of any desired properties.

A. B. MANNING.

Distillation of tar, oils, etc. W. B. DAVIDSON, A. C. MICHIE, and E. W. MUDDIMAN (B.P. 312,722, 14.3.28. Addn. to B.P. 255,919; B., 1926, 815).— Enriched wash oil is fed into a primary still in which the removal of any water and a portion of the light oil takes place. The hot oil leaving the still passes to an annexe and over bubble trays, where it is subjected to the scrubbing action of upward-passing steam jets. Light oils and vapours thereby removed pass through an aperture into the primary still at a position above the level of the oil therein and below the upper steam pipes. By such means any froth is broken up and prevented from contaminating the distillate leaving the still.

H. S. GARLICK.

Tar products [for road making]. J. J. V. ARM-STRONG. From G. PLAUSON (B.P. 312,372, 18.11.27).— Tar is hardened by dispersing 10—50% of hard pitch, hard bitumen, or hard natural resin therein, using a synthetic resin as a dispersing agent. Sulphur may also be incorporated with the tar if desired. The ingredients are preferably mixed in a colloid mill. The synthetic resins may be formed *in situ,e.g.*, by the action of formaldehyde on the phenols in the tar, in the presence of a condensing agent, or by the addition of solvent naphtha and the production of coumarone resin by heating with or without a condensing agent. Lime, baryta, etc. or pulverised brown coal may be added to the product to neutralise or absorb any free acidity.

A. B. MANNING.

Manufacture of asphaltic products. L. KIRSCH-BRAUN, ASST. to F. L. BELKNAP (U.S.P. 1,715,069, 28,5.29. Appl., 27,1.23).—Petroleum residuum is mixed with air and gradually heated as it is passed, by a long route, to a bulk receptacle. After agitation therein the liquid oxidised asphalt is discharged. F. G. CLARKE.

Waterproofing composition. W. B. VAN ARSDEL, Assr. to BROWN Co. (U.S.P. 1,714,702, 28.5.29. Appl., 3.9.26).—Petroleum asphalt, a mineral wax, and finelydivided inert material are mixed. The product becomes hard, non-sticky, and wax-like, and melts to a thin fluid at 177°. F. G. CLARKE.

Separation from solid residues of oils obtained in the destructive hydrogenation of coal, tars, mineral oils, etc. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 312,657, 20.2.28) .- The hot sludge from the hydrogenator passes through a heat interchanger where the solvent is distilled off from the oil-laden solvent for recirculation through the apparatus. The sludge is then allowed to fall down a long extraction chamber (provided with stirrers) in which it meets an upward-flowing stream of solvent and is discharged at the bottom through a worm-feed. Solvent adhering to the discharged solid is recovered by distillation. The stream of solvent when it reaches the top of the chamber passes into a wider settling chamber where fine solid particles are deposited, and then flows into the heat interchanger for the separation of solvent and extracted J. A. SUGDEN. oil.

Manufacture of apparatus for use in distillation and cracking of oils. C. ARNOLD. From STANDARD OIL DEVELOPMENT CO. (B.P. 313,057, 31.12.27).—The interior of pressure stills, digestion chambers, soaking drums, and other apparatus of large volume used at high temperatures in the commercial refining of petroleum is protected from corrosion by fusing by means of an electric arc a ribbon or plate of a relatively non-corrodible metal, *e.g.*, a chromium-iron or chromium-steel alloy such as that containing Fe 70—73%, Cr 16—18%, Si 1.25—1.75%, and C about 0.1%, and depositing the molten metal upon the surface to be protected at a temperature sufficient to cause bonding by fusion. [Stat. ref.] H. S. GARLICK.

Manufacture of hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 312,717, 10.3.28).— High continuous yields of hydrocarbons (etc.) containing more than one carbon atom may be obtained from mixtures of oxides of carbon and hydrogenous gases if the catalyst (oxides of iron, cobalt, nickel, etc.) contains 0.4 - 0.6% of alkali, calculated as metals. Such catalysts, composed of single or mixed metals, may be prepared either by precipitating the appropriate solution with ammonia, drying the precipitate, and subsequently adding the necessary amount of a solution of the alkali salt, or by precipitating the solution with alkali hydroxide or carbonate, and washing the precipitate until the necessary amount of adsorbed alkali remains.

J. A. SUGDEN.

Obtaining gaseous and low-boiling olefines and diolefines from bituminous coal, tars, mineral oils, etc. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,756, 23.6.28. Addn. to B.P. 268,599; B., 1927, 100).—The raw materials are subjected to the action of an electrically heated zone in which granular, electrically conductive materials, which may themselves be carbonaceous or non-conductive materials rendered conductive by impregnation with electrolytes, are kept in a state of agitation by means of gases or vapours, *e.g.*, hydrogen or hydrocarbon vapours, blown through them at a sufficiently high rate, and which must consist of hydrocarbon vapours in case the granular material is non-bituminous. Suitable apparatus for the production of mixtures of olefines rich in butadiene is described.

H. S. GARLICK.

Catalytic conversion of mixtures of carbon monoxide and hydrogen into valuable organic compounds containing more than one carbon atom in the molecule. J. Y. JOHNSON. From I. G. FARB-ENIND. A.-G. (B.P. 313,467, 9.2.28. Addn. to B.P. 266,405; B., 1927, 316).— The gaseous mixture contains at least 40% of an inert gas. As the products of the reaction are removed, fresh gases, free from inert gas, are introduced into the circulatory system. In this way the deposition of carbon on the catalyst is avoided. The injurious effect of the heat of reaction is reduced by bringing about a heat interchange between the catalyst and the incoming cold gases. J. A. SUGDEN.

Production of lubricating oil from gases containing hydrocarbons. C. EPNER (B.P. 294,099, 8.6.28. Ger., 16.7.27).—Gaseous hydrocarbons of low mol. wt. are subjected to the prolonged action of an alternating current of high frequency and high tension, *e.g.*, by passage through one or more Siemens tubes at 10,000 cycles and 8000 volts. The resulting viscous product may be hydrogenated in order to obtain greater chemical constancy. H. S. GARLICK.

Manufacture of white petrolatum. E. B. COBB and A. HOLMES, ASSTS. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,707,187, 26.3.29. Appl., 27.10.25).—A naphtha or other solution of crude petrolatum, after treatment with fuming sulphuric acid, is extracted with a solvent, *e.g.*, *iso*propyl alcohol, to remove the sulphonated compounds. The solvents are recovered by distillation and the petrolatum is passed through a decolorising agent, *e.g.*, clay. F. G. CLARKE.

Petroleum distillates and treatment of same with respect to discoloration. C. H. JOBSON. From STAN-DARD OIL Co. (B.P. 312, 774, 30.4.28).—Discoloration due to auto-oxidation is removed from, or prevented from forming in, kerosene and gasoline by the addition of an aromatic or aliphatic dihydroxy-compound, aromatic amine, phenol, urea or urea derivative, or an alkaloid, in the proportion of not more than 1 pt. per 10,000 pts. of petroleum distillate. Suitable compounds are quinol, pyrogallol, resorcinol, pyrocatechol, thiourea, etc. Where the treating agent is a solid, it is preferably dissolved in an aliphatic or aromatic alcohol (e.g., butyl or benzyl alcohol) before being added to the oil. H. S. GARLICK.

Purification of hydrocarbon oil. L. M. JOHNSTON and J. L. FARRELL (U.S.P. 1,706,614, 26.3.29. Appl., 22.8.25).—The treating medium, *e.g.*, fuller's earth, bentonite, is made into a thin paste and charged through steam-jacketed nozzles by means of a mud press into the top of a tower up which the hot hydrocarbon vapours ascend. The mud threads are partly dried by the vapours and form a hard column through which the vapours continuously pass to a condenser. The spent material is removed continuously through a shaking grate and periodically extracted or distilled to recover entrained oil. R. BRIGHTMAN.

Removal of wax from hydrocarbon oils. R. S. LANE, ASST. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,706,120, 19.3.29. Appl., 2.1.26).—Cylinder stock or lubricating oil distillate is mixed with 50-75% of a diluent containing 35-60% of naphtha, 25-35% of butyl alcohol, and 12-35% of acetone, this mixture cooled to -7° or lower, and the petrolatum removed by settling or centrifuging. R. BRIGHTMAN.

Refining of mineral oil. H. BLUMENBERG, JUN. (U.S.P. 1,716,103, 4.6.29. Appl., 12.1.27).—The oil is treated with aluminium sulphite, the mixture is heated to 71°, and the volatile constituents are then removed by distillation. F. G. CLARKE.

Handling heavy oil residues. O. E. BRANSKY and F. M. ROGERS, ASSTS. to STANDARD OIL CO. (U.S.P. 1,698,471, 8.1.29. Appl., 18.1.23).—Crude oil residues from the non-cracking distillation of asphalt-bearing petroleum is diluted with light hydrocarbon oil, *e.g.*, naphtha, b.p. 88—165°, the undissolved asphaltenes are separated, and the naphtha solution is treated, *e.g.*, with sulphuric acid, $d \ 1.84$, filtered through fuller's earth etc., and chilled to remove wax etc. if desired, before distilling off the naphtha. R. BRIGHTMAN.

Pitch-coking process. H. KOPPERS, Assr. to KOPPERS DEVELOPMENT CORP. (U.S.P. 1,715,240, 28.5.29. Appl., 31.8.21).—Liquid pitch is gradually introduced at the top of one end of a hot retort of oval section until full. The coking is then continued until completed, the retort emptied, and the process repeated, the retort being heated continuously. By avoiding large changes in temperature, contamination of the carbon product with silica, from the joints and lining, is avoided.

F. G. CLARKE.

Revivifying fuller's earth [from treatment of hydrocarbon oils]. F. W. HALL, Assr. to TEXAS Co. (U.S.P. 1,709,261, 16.4.29. Appl., 20.4.21. Renewed 15.1.25).—Occluded asphalt is removed by washing with a mixture of petrol and alcohol. W. G. CAREY. Apparatus for drying, charring, and otherwise treating loose material. O. DOBBELSTEIN (U.S.P. 1,714,853, 28.5.29. Appl., 29.3.26. Ger., 4.4.25).— See B.P. 250,224; B., 1926, 904.

Benzene safety lamp for indicating fire-damp. H. FLEISSNER (U.S.P. 1,716,374, 11.6.29. Appl., 31.8.26. Ger., 12.9.25).—See B.P. 443,269; B., 1928, 44.

[Oil] filters (B.P. 313,179). Distilling liquids (B.P. 313,254).—See I. Oil-soluble sulphonates (U.S.P. 1,707,506).—See III. Bituminous emulsions (U.S.P. 1,707,809). Materials for road construction (B.P. 313,824).—See IX. Artificial shellac (B.P. 309,384). Coumarone-indene resins (U.S.P. 1,705,857).—See XIII. Synthetic rubber (B.P. 312,741).—See XIV. Materials for toilet baths (B.P. 285,356).—See XXIII.

III.—ORGANIC INTERMEDIATES.

Methyl- and ethyl-protocatechuic aldehydes. L. KLOTZ (Amer. J. Pharm., 1929, 101, 442-447).— The colour reactions given by methylprotocatechuic aldehyde (vanillin) and 4-hydroxy-3-ethoxybenzaldehyde are due to either the hydroxyl or aldehyde groups, and in the twelve tests examined marked similarity is observed. *p*-Hydroxybenzaldehyde also gives the vanillin reactions, indicating that a substituent in the *meta*position has little or no effect on the coloration produced. The similarities in the above colour reactions for the protocatechuic aldehydes are interpreted as being due to the presence of the same number of chromophoric groupings, and the probable uniformity of the absorption spectra of methoxyl and ethoxyl groups.

H. BURTON.

[Preparation of] diphenylamine from chlorobenzene and aniline. P. P. KARPUKHIN (J. Chem. Ind. Moscow, 1928, 5, 1106—1107).—When aniline (46 \cdot 5 g.), chlorobenzene (66 g.), and soda-lime (40 g.) are heated for 7 hrs. at 300°, the yield of diphenylamine is 12 \cdot 3% of the theoretical. When the quantities are 37 g., 44 g., and 40 g., respectively, the yields are : 320°, 23—25%; 360°, 32%; 34 hrs. at 360—370°, 41% of the theoretical. On substitution of glass tubes for the steel autoclave, the results were : 300°, 60%; 320°, 72%.

CHEMICAL ABSTRACTS.

Anthracene. I. Methods of analysis. H. A. J. PIETERS and T. H. KOENEN (Chem. Weekblad, 1929, 26, 222-224).-The modification of Luck's anthraquinone method of analysis of crude anthracene by Sielisch (Z. angew Chem., 1928, 41, 231) does not give accurate results, since phenanthrene is partly converted into phenanthraquinone under the same conditions. The treatment with sulphuric acid, the drying, and the sublimation each gives rise to loss, which by trial with pure anthracene was found to amount to 10.7% in all. The method is therefore modified by first treating the crude anthracene with 4N-sulphuric acid to remove bases, and extracting the residue with toluene (100 c.c. to 50 g. sample) to remove phenanthrene; 1 g. of the residue is then oxidised and weighed as anthraquinone, which is dried at 90° and neither treated with sulphuric acid nor resublimed. S. I. LEVY.

Absolute alcohol. SZILAGYI.—See XVIII.

See also A., July, 757, Adsorption from aqueous solution by silica (BARTELL and FU). 775, Electrosynthesis of hydrocarbons (BERMEJO and BLAS). 803,

Perylene and its derivatives (ZINKE and SCHNIDER-SCHITSCH). 805, Introduction of triphenylmethyl group into phenols (HARDY). 823, Thionaphthens (FRIES and HEMMECKE). 826, Arylamides of aromatic carboxylic and sulphonic acids (HELLER).

PATENTS.

Process and catalyst for synthesis of methyl alcohol. H. H. STORCH, Assr. to ROESSLER & HASS-LACHER CHEM. Co. (U.S.P. 1,707,331, 2.4.29. Appl., 2.8.27).—Catalysts consisting of 10—50% of reduced copper and a fluoride of the cerium group are used for the synthesis of methyl alcohol from hydrogen and carbon monoxide, at, e.g., 300—400°, and 200—300 atm. Thus the precipitate obtained on adding a solution of potassium fluoride and hydroxide to a solution of copper nitrate and cerium, thorium, or neodymium nitrate is dried, granulated, and reduced at 150—200° with a mixture of hydrogen and methyl alcohol in nitrogen. R. BRIGHTMAN.

Manufacture of esters of vinyl alcohol. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 285,095, 11.2.28. Ger., 12.2.27).—Acetylene and organic (acetic) acid vapour are preheated and passed rapidly $(4-5 \text{ m.}^3 \text{ of}$ acetylene and 5 kg. of acetic acid per hour) over a catalyst (active carbon or silica gel impregnated with zinc acetate or cadmium acetate), the rate being such that about 0.5-0.7 kg. of vinyl acetate per hour is produced.

C. HOLLINS.

Manufacture of higher alcohols. W. G. DAVIS, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 310,623, 21.3.28).—Crude liquor from the hydrogenation of carbon monoxide is distilled until the residue contains 75% of higher alcohols. The residue is extracted with brine and distilled to give *iso*butyl alcohol etc. A continuous process is described. C. HOLLINS.

Distillation of glycerol. E. I. DU PONT DE NEMOURS & Co. (B.P. 300,254, 9.6.28. U.S., 11.11.27).— The spray-still for concentration of glycerol slop is lined with copper or other non-ferrous non-catalysing material at all parts above 225°. C. HOLLINS.

Manufacture of organic oxygen compounds [ketones, acids]. J. Y. JOHNSON. From I. G. FARB-ENIND A.-G. (B.P. 310,438, 23.1. and 24.8.28).—Carbon monoxide under pressure reacts with non-aromatic hydrocarbons or their derivatives in presence of aluminium chloride at 30—60° or boron fluoride or chloride at 180°, in absence of air. *n*-Petane gives ethyl *iso*propyl ketone, b.p. 114—116°, mixed higher ketones, b.p. 116—250°, having a menthol odour, and hexoic and other acids. *cyclo*Hexane yields an oil, b.p. 100—150°, and products are similarly obtained from *n*-butane, light petroleum, heavy benzine, petroleum of b.p. 150—300°, butyl chloride, ethyl chloride, and methyl or ethyl ether, the last two compounds giving acetic and propionic acid, respectively. C. HOLLINS.

Manufacture of aliphatic acid [acetic] anhydrides. BRIT. CELANESE, LTD., S. J. GREEN, and R. R. WIDDOW-SON (B.P. 310,863, 28.1.28).—The vapours from the

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thermal anhydrisation of acetic acid in presence or absence of catalysts are met by a liquid stream, preferably at $0-20^{\circ}$, of solvent, especially a mixture of ether and light petroleum. The solution of acetic anhydride is separated from the water layer and distilled.

C. HOLLINS.

Manufacture of maleic acid and maleic anhydride. A. BOEHRINGER (B.P. 285,426, 3.2.28. Ger., 16.2.27).—Crude furfuraldehyde vapour is passed with diluted oxygen over an oxidising catalyst (zinc vanadate on a granular aluminium carrier) at 300—350°.

C. HOLLINS.

Oxidation of aliphatic compounds of high mol. wt. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 310,069, 17.12.27).—Paraffin wax is oxidised with air etc. at $80-180^{\circ}$ in presence of an organic salt of an alkaline-earth metal, magnesium, or aluminium (e.g., barium stearate, calcium cinnamate) in conjunction with an inert filler (e.g., aluminium packing rings) to give almost colourless acid products. C. HOLLINS.

Manufacture of reduction products of vat dyes and other reducible organic compounds. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 310,437, 21.1.28. Addn. to B.P. 299,899; B., 1929, 12).—Vat dyes and other reducible quinones are reduced to leucocompounds, suitable for direct conversion into sulphuric esters, by treatment with metals (copper, zinc) in dry pyridine or other organic base containing 20% of its weight of sulphur dioxide. If iron, aluminium, etc. be used the presence of a little water is advantageous.

C. HOLLINS.

Manufacture of oil-soluble sulphonates. H. E. BUC, ASST. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,707,506, 2.4.29. Appl., 26.9.27).—Crude sodium sulphonates obtained from petroleum distillates are heated at 150—220°, *e.g.*, at 200° for 2 hrs., in the presence of about 3% of sodium hydroxide, or other alkali, and the product is dissolved in an organic solvent (88% *iso*propyl alcohol), settled, and the solvent evaporated.

R. BRIGHTMAN.

Dye intermediates [dry leuco-compounds]. R. S. BARNES, J. E. G. HARRIS, B. WYLAM, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 309,970, 17.1.28).—Pastes of leuco-compounds of vat dyes are dried by mixing with an organic liquid (chlorobenzene, dimethylaniline, nitrobenzene) and distilling off water and the liquid at suitable pressure (e.g., in a vacuum). The product is suitable for conversion into sulphuric esters. C. HOLLINS.

Manufacture of [nuclear] alkylated phenols. SCHERING-KAHLBAUM A.-G. (B.P. 294,238, 15.6.28. Ger., 21.7.27).—Phenol ethers are heated under pressure, especially in presence of a surface catalyst. Phenetole at $280-320^{\circ}/50-60$ atm. gives *p*-hydroxyethylbenzene ; *m*-tolyl *iso*propyl ether, b.p. 193-194°, yields at $320-350^{\circ}/60$ atm. a product containing thymol.

C. HOLLINS.

Condensation product from *p*-halogenated phenols and aldehydes. M. WELLER, B. WENK, and H. STÖTTER, ASSIS. to I. G. FARBENIND. A.-G. (U.S.P. 1,707,181, 26.3.29. Appl., 13.3.28. Ger., 25.3.27). *p*-Halogenated phenols containing at least one free *ortho*-position to the hydroxyl group are condensed with aldehydes in presence of, e.g., sulphuric acid, hydrochloric acid and glacial acetic acid, zinc chloride at 15—70° to give products, $X \cdot CH(R' \cdot OH) \cdot R'' \cdot OH$, where R' and R'' are residues of p-halogenophenols, and X = hydrogen, alkyl, or aryl, the hydroxyl groups being ortho to the CHX group, which are effective for proofing material against moths etc. The following are described : 3 : 3' : 5 : 5'-tetrachloro-2 : 2'-dihydroxydiphenylmethane, 5:5' - dichloro - 2 : 2' - dihydroxydiphenylmethane, 4 : 5' : 5''-trichloro-2' : 2''-dihydroxytriphenylmethane, and 5 : 5'-dichloro-2 : 2''-dihydroxytriphenylmethane, 2''-sulphonic acid. R. BRIGHTMAN.

Manufacture of condensation products from [phenols and] unsaturated higher fatty acids or their glyceryl esters. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 310,562, 28.1.28).—Phenols (phenol, resorcinol) are condensed at 100° in presence of acid (50% sulphuric acid) with unsaturated fatty acids or fats, *e.g.*, tung oil, linseed oil. Some of the products are sulphonated with 100% sulphuric acid to give auxiliary materials for the textile industry.

C. HOLLINS.

Manufacture of 3-methyl-6-isopropenylphenol [4-isopropenyl-m-cresol]. SCHERING-KAHLBAUM A.-G. (B.P. 293,863, 3.7.28. Ger., 14.7.27. Addn. to B.P. 273,686; B., 1929, 236).—The condensation product of m-cresol with acetone (B.P. 308,741; B., 1929, 467) is heated at 250° in liquid or vapour form with or without an inert, porous contact mass. C. HOLLINS.

Treatment [reduction] of aromatic nitrosocompounds [and indophenols etc.]. R. VIDAL (B.P. 283,467, 9.1.28. Fr., 8.1.27).—For the isolation of aminophenols, leucoindophenols, etc. formed by reduction of nitroso-compounds or mixtures of nitrosocompounds and phenols or amines by means of sodium sulphide, ammonium chloride or sulphate is added.

C. HOLLINS. Manufacture of aromatic acid chlorides. B. W. HENDERSON, J. G. PERCIVAL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 310,909 and 310,910, 2.2.28).— Benzoyl chloride is obtained by the action (A) of chlorine or chlorine and hydrochloric acid on benzyl alcohol or hydrolysed crude benzyl chloride, (B) of benzoic acid on benzylidene chloride and subsequent treatment with chlorine. The process is also applicable to the preparation of o- and p-chlorobenzoyl chlorides from corresponding starting materials. C. HOLLINS.

Alkoxy-esters of polybasic organic acids. R. H. VAN SCHAACK, JUN., and R. CALVERT, ASSTS. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,706,639, 26.3.29. Appl., 31.10.27).—Esters of polycarboxylic acids, e.g., phthalic, citric, tartaric, succinic, phenylmalonic, or trimesic acid, in which at least one carboxylic hydrogen is replaced by an alkoxyalkyl radical containing at least four carbon atoms, are used as solvents and plasticisers for pyroxylin. Examples are β -ethoxyethyl phthalate, b.p. 200—202°/4 mm. (from phthalic anhydride and glycol monoethyl ether), and β -ethoxyethyl butyl phthalate, b.p. 182—185°/5 mm., d^{20} 1.08.

R. BRIGHTMAN.

Manufacture of borneol. G. AUSTERWEIL (B.P. 311,085, 2.5.28).—Nopinene in an inert diluent (toluene,

xylene, pinene) is heated, *e.g.*, at 145°, with phthalic anhydride, and absolute alcohol is added drop by drop, so as to generate ethyl hydrogen phthalate, which reacts with nopinene (but not with pinene) to form bornyl ethyl phthalate, which gives a 70% yield of borneol on hydrolysis. The reaction gives better results under pressure. C. HOLLINS.

Salts of *β*-naphtholsulphonic acids and their manufacture and separation. M. L. CROSSLEY and G. S. SIMPSON, ASSTS. to CALCO CHEM. CO. (U.S.P. 1,701,259, 5.2.29. Appl., 14.10.22).-Solutions containing B-naphtholdisulphonic acids are neutralised with an alkaline-earth compound and the neutral salts are converted into basic salts by treatment with an alkaline hydroxide. The sparingly soluble salt, e.g., R-salt, is crystallised out and the mother-liquor treated with an ammonium salt which gives an insoluble salt with an alkaline-earth metal. The insoluble salt is filtered off, the solution concentrated, and the ammonium salt of, e.g., the β-naphtholdisulphonic acid crystallised, the mother-liquors being returned to a subsequent batch. The following salts are described, the figures denoting solubility in 100 c.c. of water at 25°: R-salts (β-naphthol-3: 6-disulphonates) :- ammonium hydrogen, 73.4; ammonium, 64.7; sodium potassium, yellow, 23; cupric, greyish-white, 41.4; nickel, light green, 15.4; ferrous, bluish-grey, 17.5; cobaltous, pink, 17.4; tricalcium, 2.5; potassium disodium, yellow, 24.6; sodium dipotassium, 31; dipotassium dicalcium, 0.77; disodium dicalcium, $2 \cdot 8$; diammonium dicalcium, 3; calcium tetrasodium, $7 \cdot 4$; trisodium, yellow, 21; tripotassium, golden-yellow, $34 \cdot 6$; triammonium, 69; G-salts (β naphthol-6 : 8-disulphonates) :---ammonium hydrogen, 30.1; ammonium, 30.2; triammonium, 69; tricalcium, 22.6; trisodium, 59; tripotassium, 23.5; ammonium calcium, 35.4; potassium calcium, 27.4.

R. BRIGHTMAN.

Purification of anthraquinone. H. F. LEWIS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,701,186, 5.2.29. Appl., 27.1.22).—The crude anthraquinone is heated to 275—350° by superheated steam and the resulting vapours are cooled first at 175—275° to separate most of the anthraquinone, and finally at below 100°. R. BRIGHTMAN.

Manufacture of condensation products of the anthraquinone series [1:1'-dihydroxy-2:2'-di-anthraquinony1]. A. CARPMAEL. From I. G. FARB-ENIND. A.-G. (B.P. 310,353, 24.1.28).— α -Hydroxy-anthraquinone is heated at 100—130° with aluminium chloride in dry pyridine to give 1:1'-dihydroxy-2:2'-dianthraquinony1. C. HOLLINS.

Manufacture of condensation products of the anthraquinone series [dibenzpyrenequinones]. I. G. FARBENIND. A.-G. (B.P. 294,550, 25.7.28. Ger., 25.7.27. Addn. to B.P. 205,502; B., 1924, 627).—Aryla-naphthyl ketones (e.g., 1-benzoylnaphthalene) are converted into 3:4:8:9-dibenzpyrene-5:10-quinones by heating at 120—130° with an aroyl chloride (e.g., benzoyl chloride) and aluminium chloride or sodium aluminium chloride in a current of air or oxygen. C. HOLLINS.

Production of mercaptans of the furfuryl series. H. STAUDINGER and T. REICHSTEIN, ASSIS. to INTERNAT. 637

NAHRUNG- & GENUSSMITTEL A.-G. (U.S.P. 1,715,795, 4.6.29. Appl., 22.7.27. Ger., 16.12.26).—See B.P. 286,152; B., 1928, 327.

Benzanthrones substituted in the Bz nucleus and their manufacture. G. KRÄNZLEIN, H. VOLLMANN, H. GREUNE, and A. WOLFRAM, ASSTS. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,705,868, 19.3.29. Appl., 31.3.27. Ger., 3.4.26).—See B.P. 268,830; B., 1928, 666.

Catalytic apparatus (B.P. 306,519).—See I. Organic compounds from gases (B.P. 313,467). Olefines and diolefines (B.P. 313,756).—See II. Polymerisation products of diolefines (B.P. 312,949 and 313,188).—See XIV. Pentaerythritol tetranitrate (U.S.P. 1,705,669).—See XXII.

IV.-DYESTUFFS.

See A., July, 762, Peptisation of dyes by neutral salts (OSTWALD). 804, Azo dyes of dinaphthyl series (KUHN and GOLDFINGER). 822, Fluorescein derivatives (ORNDORFF and WILLARD). 823, Colouring matter from alkekengi (*Physalis alkekengi* and *P. franchetti*) (KUHN and WIEGAND).

PATENTS.

Manufacture of derivatives of the anthraquinone series containing nitrogen [dyes for acetate silk]. I. G. FARBENIND. A.-G. (B.P. 284,242, 24.1.28. Ger., 25.1.27).—Anthraquinones containing at least two parahydroxyl groups (quinizarin, purpurin, 1:4:8-trihydroxy- and 1:2:4:5:8-pentahydroxy-anthraquinones) are condensed with ethylenediamine to give nitrogenous products, which are in many cases dyes for acetate silk. C. HOLLINS.

Manufacture of [nitro-]dyes [for wool]. I. G. FARBENIND. A.-G. (B.P. 285,504, 18.2.28. Ger., 18.2.27). —Diaminodiphenyls are condensed with halogenated, nitrated benzenesulphonic acids (2 mols.) to give wool dyes. The condensation of 1-chloro-2: 6-dinitrobenzene-4-sulphonic acid with benzidine (orange), diphenyline (golden-yellow), dianisidine (reddish-brown), 2-nitrobenzidine (orange), of 1-chloro-2: 4-dinitrobenzene-6-sulphonic acid with dianisidine (reddish-brown), and of 1-chloro-2-nitrobenzene-4-sulphonic acid with benzidine (yellowish-brown), dianisidine (reddish-brown), and 2-nitrobenzidine (brownish-yellow) is described.

C. HOLLINS.

Manufacture of cotton [azo] dyes [and pigments]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 310,354, 24.1.28).—Dehydrothiotoluidinesulphonic acid is diazotised and coupled in substance or on a substrate (blanc fixe) with an acetoacetic sulphoarylamide, or with an acetoacetic arylamide with subsequent sulphonation. Pigments may also be prepared from solutions of the dyes in the usual manner. C. HOLLINS.

Manufacture of water-insoluble azo dyes. I. G. FARBENIND. A.-G. (B.P. 284,247, 25.1.28. Ger., 25.1.27). -2: 3-Hydroxynaphthoic arylamides are coupled in substance or on the fibre with diazotised *m*-4-xylidines containing in position 6 a group ·NRR' in which R is alkyl or hydrogen, and R' is a benzoyl or substituted benzoyl group. 6-Benzamido-4-m-xylidine, m.p. 175°, prepared by reduction of the nitration product, m.p. 184—185°, of benz-4-m-xylidide, m.p. 190—192°, gives with 2:3-hydroxynaphthoic α -naphthylamide a bluishred. 6-Benzmethylamido-4-m-xylidine, m.p. 177°, and 6-op-dichlorobenzamido-4-m-xylidine, m.p. 194—195°, give similar shades with 2:3-hydroxynaphthoic 5-chloro-o-toluidide. C. HOLLINS.

Manufacture of complex chromium compounds of azo dyes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 310,343, 24.10.27).—Dyes obtained by coupling *m*-phenylenediamine-5-sulphonic acid with diazotised *o*-aminophenols containing two or more negative substituents (picramic acid, 4-nitro-*o*-aminophenol-6-sulphonic acid) are prechromed by the usual methods. [Stat. ref.] C. HOLLINS.

Vat dyes of pyridazine-anthraquinone series. A. JOB, ASST. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,690,786, 6.11.28. Appl., 17.8.27. Ger., 25.8.26).— See B.P. 300,683; B., 1929, 124.

Reduction products of vat dyes (B.P. 310,437).— See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Flax retting. I. Aerobic spore-bearing bacteria isolated from retted flax fibre. II. Pure culture flax retting. III. Acidity in retting flax. A. TREVETHICK, B. B. ROBINSON, and R. M. SNYDER (Mich. Agric. Exp. Sta. Tech. Bull., 1928, 95, 1-26, 24-37, 38-49).—The principal organisms concerned are clostridia similar to *C. butyricum*. Certain members of the *mesentericus-megatherium* group ret flax. Organic substances, colouring matter, and by-products produced in retting retard the process. The optimum temperature is 30°; neutrality is preferable. The control of acidity is discussed. CHEMICAL ABSTRACTS.

Hydration, paper-formation, and strength. G. PORRVIK (Papier-Fabr., 1929, 27, 372-383).-The degree of greasiness (which is considered synonymous with "degree of hydration") is determined by means of the water content of pulp. The water content is divided into three kinds: external capillary water, internal capillary water, and fibre-wall water, and their importance during grinding is discussed. The combining together of fibres to form paper is really not a mechanical felting process, but a colloid-chemical sizing phenomenon. The importance of grinding lies in increasing the degree of swelling of the fibre wall by mechanical means, whereby the latter is rendered partly more adhesive and partly more plastic. The fibre wall consists of several layers. By swelling the outer one the adhesive capacity of the fibres, and therefore the strength of the paper, is increased, whereas if the sub-layer swells, the fibre is split up into fibrils, and a weaker paper results. Grinding is not a uniformly continuous process, but takes place in three stages with which distinctly different processes are associated. B. P. RIDGE.

Determination of chlorine-consumption number (Sieber number) of sulphite-celluloses. W. HUMM (Papier-Fabr., 1929, 27, 387–389).—The Sieber number is the ratio of chlorine consumed to that originally

present (expressed as a percentage) when 5 g. of dry cellulose are treated with a bleaching powder solution of standard chlorine and alkali concentrations under controlled conditions (cf. B., 1921, 382 A; 1922, 409 A). Within narrow limits (e.g., $4 \cdot 8 - 5 \cdot 3$ g.), the weight of cellulose taken does not materially affect the Sieber number, but beyond these limits too small a weight gives too high, and too large a weight too low, values. The suitability of the measurement for classifying sulphite-celluloses is discussed. B. P. RIDGE.

See also A., July, 796, Sulphite-cellulose process (MARUSAWA and others). 856, Pine-wood lignin (Hägg-LUND and URBAN).

PATENTS.

Production of fibre. A. TINGLE (U.S.P. 1,714,831, 28.5.29. Appl., 25.1.24).—After digesting with aqueous lime and sulphur, fibrous vegetable material is treated with a lime-eliminating agent, *e.g.*, aqueous mineral acid or sulphite-cellulose waste liquor, and washed to remove colouring matter. F. G. CLARKE.

Softening of vegetable fibres. S. D. WELLS, Assrto PAPER MILL LABS., INC. (U.S.P. 1,714,459, 21.5.29-Appl., 25.9.26. Cf. B.P. 285,277; B., 1928, 330).— Liquors containing sodium carbonate and sulphur compounds are used, so that the waste liquors from pulping processes employing caustic soda are available without first causticising. F. G. CLARKE.

Treatment of [oil-soaked] hemp waste. C. C. BEETH (U.S.P. 1,710,914, 30.4.29. Appl., 23.1.28).— The material is soaked in sodium hydroxide solution and then thoroughly cooked by the introduction of steam. After removal of the liquid, from which the oil is recovered, the product is pressed into sheets.

F. R. ENNOS.

Treatment of outer covers for aircraft. GOOD-YEAR-ZEPPELIN CORP., Assees. of K. HURTTLE (B.P. 296,342, 22.5.28. U.S., 29.8.27).—The interstices between the fibres are closed by application of a moisturerepelling substance, *e.g.*, paraffin, aluminium oxide, to the inside surface of the cover, which is then secured to the framework of the airship and its outer surface coated with one or more layers of protective dope. In this way, the fabric is tautened and the necessity of a mechanical smoothing process is obviated.

F. R. ENNOS.

Production of chemical wood pulp. D. B. BRADNER, Assr. to CHAMPION COATED PAPER Co. (U.S.P. 1,711,584, 7.5.29. Appl., 24.1.27).—Sulphite-pulp obtained by the acid digestion of raw cellulosic material with sodium sulphite is digested in an alkaline liquor containing sodium sulphide, thus giving a pulp rich in α -cellulose. The waste alkaline liquor obtained together with some fresh alkaline liquor is used for the digestion of a further quantity of cellulose to yield sulphate-pulp and waste sulphate liquor; the latter, after concentration, is smelted to recover the sodium compounds and causticised to produce an alkaline cooking liquor for the treatment of more sulphite-pulp. F. R. ENNOS.

Manufacture of cellulose esters. VER. F. CHEM. IND. A.-G. (B.P. 303,485, 8.2.28. Ger., 5.1.28).—To ensure thorough mixing during esterification in a rotatable reaction drum, it is provided with bars or beams traversing the interior and fixed at both ends to the inner wall of acid-resisting material, so as to exert a cutting action on the heart of the reacting mixture. F. R. ENNOS.

Manufacture of threads, filaments, bands, or films of a polished and transparent nature, composed of plastic substances. Z. LANDUCCI, Assr. to DU PONT-PATHÉ FILM MANUFG. CORP. (U.S.P. 1,713,289, 14.5.29. Appl., 18.4.27. Fr., 29.4.26).—The solution of the cellulose derivative in an organic liquid is given the desired shape and coagulated in an aqueous bath, whereby a more or less opaque product is obtained, which is then subjected, before any other treatment, to a hot air-drying at 40—80° for sufficient time to render it transparent and polished. F. R. ENNOS.

Manufacture of hollow artificial textile threads from viscose. ALSA Soc. ANON. (B.P. 289,796, 30.4.28. Ger., 30.4.27).—Viscose containing about 4% of sodium carbonate is coagulated in an acid bath, which contains a high proportion (10—35%) of zinc sulphate. F. R. ENNOS.

Manufacture of hollow rayon [artificial silk] fibres. W. O. SNELLING (U.S.P. 1,713,679, 21.5.29. Appl., 21.5.27).—A preliminary fibre which is made from sugar, sulphur, glue, rosin, or casein is covered with a thin film of cellulose acetate, xanthate, or cuprammonium cellulose solution carried on a suitable coating wheel. After coagulation of the coating, the preliminary fibre is dissolved out. F. R. ENNOS.

Manufacture of films from aqueous cellulose solutions, particularly viscose. FELDMÜHLE PAPIER-U. ZELLSTOFFWERKE A.-G. (B.P. 290,234, 10.5.28. Ger., 10.5.27).—After coagulation, the films are passed through a number of treatment baths, viz., for hardening, washing, bleaching, and dyeing, on cylinders which are so arranged that the same surface of the film is in contact during the whole time of each successive treatment with the corresponding cylinder; each of these has a polished surface and is provided with an adjustable drive in order to allow for shrinkage of the film during treatment.

F. R. ENNOS.

Spinning bath for viscose silk. A. L. MOND. From H. KINDERMANN & Co. (B.P. 311,112, 27.6.28).— An aqueous solution containing at least 80% of free acid and consisting of 35—44% of sulphuric acid and upwards of 36% of an organic acid (e.g., acetic, lactic, or formic acid) is used. F. R. ENNOS.

Paper making. L. M. BOOTH (U.S.P. 1,713,642, 21.5.29. Appl., 8.2.28).—After adding the size and size precipitant, a metal hydroxide is precipitated in the pulp, at or before delivery to the paper-making machine. F. G. CLARKE.

Production of cellulose and paper from straw, esparto, reed, and similar raw materials. E. L. RINMAN (U.S.P. 1,716,006, 4.6.29. Appl., 28.3.27. Swed., 7.4.26).—See B.P. 269,154; B., 1927, 873.

Cellulose hydrolysis products (B.P. 313,258).— See XVII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Measurement of colour at lustrous surfaces. A. KLUGHARDT (Seide, 1928, 33, 333-340; Chem. Zentr., 1929, i, 148).

See also A., July, 777, Influence of light on bleaching of neocyanine (BHATTACHARYA and DHAR).

PATENTS.

Manufacture of solutions for dyeing purposes. A. CARPMAEL. From I. G. FARBENIND A.-G. (B.P. 307,777, 13.12.27).—Clear and stable solutions of 2:3hydroxynaphthoic arylides in an acid, neutral, or alkaline medium can be obtained by mixing them with sulphonated fatty acids derived from wool fat. Such solutions are stable in the presence of calcareous water, and by their use difficultly soluble arylides such as the β -naphthalide can be easily brought into solution.

L. G. LAWRIE.

Wetting-out agents or emulsifiers for use in textile and other industries. BRIT. DYESTUFFS CORP., LTD., J. BADDILEY, and E. CHAPMAN (B.P. 311,385, 30.3.28. Addn. to B.P. 274,611; B., 1927, 841).—The process described in the chief patent is simplified, and an improved yield of a lighter coloured product obtained, by adding the alcohol to the sulphonation mixture (which may contain chlorosulphonic acid) and effecting the sulphonation at below 100° (preferably at 60—65°).

A. J. HALL.

Dyeing of cellulose derivatives. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 307,813, 13.12.27).— Alkoxyanthraquinones without further substituents in the nucleus or in the alkyl group are suitable dyes for cellulose ethers and esters, and are applied as aqueous dispersions. Examples are: 1:4-dimethoxyanthraquinone (golden-yellow) and 1:4:5-trimethoxyanthraquinone (greenish-yellow). A. J. HALL.

Production of water-resisting colouring on pellicles of cellulose derivatives. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 284,999, 7.2.28).— A solution of cellulose ester or ether containing a colouring matter is applied locally to the pellicle of cellulose derivative, which may consist of one of the regenerated celluloses or esters or ethers of cellulose. F. R. ENNOS.

Washing, dyeing, carbonising, and otherwise treating textiles. J. Y. JOHNSON. From I. G. FARB-ENIND. A.-G. (B.P. 307,944, 10.9.27).—The addition of cyclohexanone or its homologues to aqueous baths for treating textiles is claimed to increase the efficiency of the process. [Stat. ref.] L. G. LAWRIE.

Preparing [colouring] foliage. D. S. ANDERSON (U.S.P. 1,714,838, 28.5.29. Appl., 20.1.26. Renewed 24.10.28).—The foliage is impregnated with a solution containing calcium chloride, acetic acid, glycerin, and alcohol, and immersed first in a solution containing the above substances together with an aniline dye, gum arabic, camphor, and water, and then in an aqueous solution of gum arabic, an aniline dye, and the ingredients of the first-named solution. A. J. HALL.

Improvement of animal or vegetable materials. Soc. CHEM. IND. IN BASLE (B.P. 294,890, 30.7.28. Ger., 28.7.27).—The mono- and di-acylated diamines described

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in B.P. 219,304 (B., 1925, 899), and the corresponding quaternary ammonium compounds obtained by treating such products with alkylating or aralkylating agents, are useful wetting-out agents, particularly in acid liquors such as are used in the carbonisation and fulling of wool, dyeing with acid dyes, and the bleaching of straw fibre. If chrome-tanned skins are impregnated with an aqueous solution of such wetting-out agents before drying, they may afterwards be fulled with warm water so as to regain their original properties before drying. Oleyldiethylenediamine hydrochloride is a satisfactory wetting-out agent; it does not form a precipitate with aluminium chloride under the conditions used in carbonising wool materials. A. J. HALL.

Finishing of fabrics and fibrous materials. Н. Т. Вёнме А.-G. (В.Р. 293,746, 19.6.28. Ger., 11.7.27).—Highly lustrous finishes are obtained by calendering cotton or other fabric impregnated with a filling or weighting agent, such as an inorganic salt, and a lustre-imparting agent, such as paraffin, waxes, and stearic acid, it being possible to apply both these types of agent by means of a stable emulsion containing them, provided it contains a highly sulphonated vegetable oil (the degree of sulphonation must be considerably higher than that which characterises Turkey-red oil) or an aromatic sulphonic acid. A satisfactory homogeneous emulsion consists of 50 kg. of Epsom salts, 20 kg. of dextrin, 150 kg. of water, and 10 kg. of a wax emulsion prepared with dipropylnaphthalenesulphonic acid. A. J. HALL.

Dressing medium for textiles [silk or artificial silk]. CHEM. FABR. JACOBUS GES.M.B.H., and I. BUDOWSKI (B.P. 309,100, 30.12.27).—A dressing suitable for restoring the original lustre and new appearance of used textile materials (e.g., of artificial silk) consists of an emulsion of a fatty acid, a weak organic or inorganic acid, and an emulsifying agent such as casein, an organic sulphonic acid, or saponins. The textile materials are immersed in the dressing diluted with water and then dried. Thus an emulsion of boric, tartaric, and oleic acids with *iso*propylnaphthylsulphonic acid is stabilised by the addition of paraffin oil. A. J. HALL.

Delustring of artificial silk fibres. O. F. MULLER, Assr. to NYANZA COLOR & CHEM. Co., INC. (U.S.P. 1,705,490, 19.3.29. Appl., 14.7.28).—The fibres are treated with an emulsion of olive oil soap, glue, and paraffin in water at $30-35^{\circ}$, centrifuged, washed, and treated with an aqueous suspension of $5-10^{\circ}/_{\circ}$ of infusorial earth or other mineral abrasive, *e.g.*, chalk, fuller's earth, zinc oxide, at $30-35^{\circ}$ for 30 min. In place of the paraffin emulsion, a solution of aluminium stearate in carbon tetrachloride may be used. R. BRIGHTMAN.

Mercerising textile materials containing both viscose and cellulose acetate silks. SLIVER SPRINGS BLEACHING & DYEING CO., LTD., and A. J. HALL (B.P. 309,280, 2.3.28).—Mercerisation is effected with caustic potash (d not less than 1.40, preferably 1.50), and the alkali is removed by washing with water at 10—20°. The period of impregnation, stretching, and washing occupies about 1 min.; saponification of the cellulose acetate silk does not occur and the soft handle and lustre of the viscose silk are unchanged. A. J. HALL.

Treatment of fabrics consisting of or containing acetyl silk. BLEACHERS' ASSOC., LTD., W. KERSHAW, F. L. BARRETT, and R. GAUNT (B.P. 311,306, 9.2.28. Addn. to B.P. 303,286; B., 1929, 204).—The prior patent is modified by impregnating the "blinded" fabric with a solvent for cellulose acetate before embossing or subjecting it to a localised heat-treatment to restore the original lustre in selected areas. Suitable solvents include ethyl acetate, ethyl lactate, lactic and acetic acids, but ethylene glycol monoethyl ether is preferred. The embossed portions of the fabric have an increased affinity for the usual dyes applied to cellulose acetate silk, so that two-tone colour effects may be obtained. A. J. HALL.

Treating the surfaces of hat bodies. V. BÖHM (U.S.P. 1,713,641, 21.5.29. Appl., 2.10.25. Austr., 20.11.24).—The surfaces are treated with a neutral solution of an aldehyde or ketone, *e.g.*, formaldehyde or benzophenone, and are then oxidised preferably with peroxides or permanganate. F. G. CLARKE.

Dyeing process [for animal fibres]. A. ESCAICH and J. P. WORMS (U.S.P. 1,716,218, 4.6.29. Appl., 20.11.23. Ger., 25.11.22).—See B.P. 230,128; B., 1925, 352.

Dyeing and printing. H. Müller, Assr. to J. R. GEIGY Soc. ANON. (U.S.P. 1,717,242, 11.6.27. Appl., 19.9.25. Ger., 23.7.23).—See G.P. 400,684; B., 1925, 8.

Treatment of vegetable fibrous materials to produce wool-like effects. G. HEBERLEIN, ASST. to HEBERLEIN PATENT CORP. (U.S.P. 1,717,316, 11.6.29. Appl., 30.10.26. Ger., 19.8.26).—See B.P. 276,352; B., 1928, 260.

Treating cotton fibres to produce wool-like effects. A. BODMER, Assr. to HEBERLEIN & Co. A.-G. (U.S.P. 1,717,322, 11.6.29. Appl., 8.9.26. Ger., 16.9.25). —See B.P. 258,598; B., 1927, 475.

Treatment of fibres of acetylcellulose to produce wool-like effects. R. CLAVEL (U.S.P. 1,716,423, 11.6.29. Appl., 27.9.23. Fr., 9.11.22).—See B.P. 206,818; B., 1924, 743.

Treatment of yarns and fabrics. Treatment of cellulose derivatives. G. H. ELLIS, ASST. to CELAN-ESE CORP. OF AMERICA (U.S.P. 1,716,720—1, 11.6.29. Appl., [A] 22.1.26, [B] 17.3.27. U.K., [A] 7.9.25, [B] 10.4.26).—See B.P. 262,506 and 273,819; B., 1927, 105, 650.

[Spraying] apparatus for treating fabrics with liquors. HUNT & MOSCROP, LTD., and E. W. and E. F. HUNT (B.P. 313,378, 19.9.28).

Treatment of textile fabrics with fluids. J. BRANDWOOD (B.P. 313,104, 7.2.28).

Manufacture of yarn from [mixed] artificial and natural silk fibres [suitable for cross-dyeing]. I. G. FARBENIND. A.-G., Assees. of M. F. THOMA (B.P. 286,275, 2.3.28, U.S., 2.3.27).

Baths or vats for use in dyeing, soaping, washing, and other finishing operations [for fabrics]. T. PARKINSON and J. A. O'LOUGHLIN (B.P. 313,243 31.3.28). Apparatus relating to bleaching, washing, or dyeing of woven fabrics. FÄRBEREI WEIDMANN A.-G. (B.P. 302,598, 17.12.28. Ger., 17.12.27).

Coating, charging, or treating yarn or thread, cord, twine, wire, etc. with solid or liquid substances in being wound on to or into bobbins, skeins, etc. A. SEALEY (B.P. 312,590, 25.2. and 24.12.28).

Staining wood (U.S.P. 1,714,701).—See IX.

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

Preparation of rubidium compounds from carnallite. G. JANDER and H. FABER (Z. anorg. Chem., 1929, 179, 321-331).-Addition of a solution of sodium silicomolybdate to an. acidified solution of recrystallised carnallite precipitates the sparingly soluble rubidium salt, which may be largely freed from potassium by washing with dilute hydrochloric acid. By heating the complex salt in a current of gaseous hydrogen chloride molybdenum oxychloride distils over and may be worked up again as sodium silicomolybdate, whilst the non-volatile material consists only of silica and rubidium chloride, together with some potassium chloride. Various methods may be employed to remove the potassium from the mixed chlorides, such as reprecipitating the silicomolybdate, dissolving it in sodium hydroxide solution, and reprecipitating by acidifying with hydrochloric acid. The sodium silicomolybdate solution is prepared by adding gradually 190 g. of molybdic acid in 550 c.c. of water to a solution of 33 g. of crystallised sodium silicate in 2200 c.c. of water; the molybdic acid which remains undissolved after heating the mixture for a short time is dissolved by adding about 300 c.c. of 2N-sodium hydroxide. After adding 200 c.c. of concentrated sulphuric acid and allowing the mixture to settle, the clear solution is decanted and evaporated on the water bath to 700 c.c.

H. F. GILLBE.

Preparation of beryllium chloride from beryl. R. W. WINTERS and L. F. YNTEMA (Amer. Electrochem. Soc., May, 1929. Advance copy. 3 pp.).—An intimate mixture of beryl and carbon is heated at 800° in a graphite chamber and chlorine, carbon tetrachloride vapour, or a mixture of the two is led into the chamber. From the resulting vapour crystals of beryllium chloride, free from aluminium, iron, and silicon, are deposited on passing through a condenser maintained at 375°. The yield of beryllium chloride may be as high as 80%.

H. J. T. ELLINGHAM.

Manufacture of zinc chloride and sulphate from Russian whiting. J. E. ADADUROV and K. U. BRODO-VICH (J. Chem. Ind. Moscow, 1928, 5, 1018—1019).— Russian whiting (a mixture of zinc carbonate, oxide, and sulphide, sodium carbonate, thiosulphate, and sulphate, containing $38 \cdot 8\%$ Zn and $17 \cdot 7\%$ H₂O) is freed from sodium salts by extraction with water, the residue (46 $\cdot 8\%$ Zn) being dissolved in 30% hydrochloric or sulphuric acid. CHEMICAL ABSTRACTS.

[Determination of] lead in white arsenic. H. W. JONES (Chemist-Analyst, 1929, 18, No. 2, 11).—The

arsenic is removed by boiling with hydrochloric acid, and the lead is precipitated in neutral solution with sodium sulphide; it is then oxidised to sulphate, dissolved in ammonium acetate solution, and precipitated as chromate. CHEMICAL ABSTRACTS.

Electrothermic manufacture of yellow phosphorus. J. E. SHIKHUTZKI (J. Chem. Ind. Moscow, 1928, 5, 979–982).—The charge is preferably finely divided and preheated at 200–300°, and the operation is continuous. Amorphous silica from kaolin is preferred to sand. CHEMICAL ABSTRACTS.

Nitrogen determinations. SPEARS and TERRELL.— See XIX. Collargol. GERASIMOV.—See XX.

See also A., July, 774, Electrolytic formation of sodium arsenate (Essin). 779, Antimony phosphate (HORSCH). Selenic acid and its salts (HUFF and McCrosky). Molybdates (ARANDA). Silicotungstic acid (Scroggie). 782, Determination of chloride in bromides (MCALPINE). Iodo-oxidimetry (SCHWICKER). Volumetric determination of sulphate ion (Köszegi). Electrolytic analysis of nitrates (RABINOVITSCH and FORIN). Colorimetric determination of phosphoric acid (BORDEIANU). 783, Analysis of phosphoric acid Detection and determination of (ISHIBASHI). sodium (KOLTHOFF). Test for magnesium (RUIGH). Indirect determination of lead (FURMAN and WAL-LACE). Determination of thallous salts (JILEK and LUKAS). 784, Determination of traces of mercury (STOCK and ZIMMERMANN). 785, Detection of elements of groups II-IV (AGOSTINI). Determination of tungsten in presence of vanadium (JILEK and LUKAS). Micro-determination of uraniam salts (TISSIER and BÉNARD). Volumetric determination of vanadium (Swift and HOEPPEL). Electrode for determination of halogens (JOASSART and LECLERC).

PATENTS.

Manufacture of sulphuric acid. Soc. GEN. MÉTALL. DE HOBOKEN (B.P. 296,662, 28.6.28. Ger., 3.9.27).— Reaction towers, packed with filling materials, are inserted between the usual lead chambers, and are irrigated with nitrous sulphuric acid in such amount that the nitrous content of the acid discharged from the towers is at least 0.5% (calc. as nitric acid of d1.33), *i.e.*, the same as, or higher than, that of the acid introduced therein. W. G. CAREY.

Joint production of sulphuric acid and cement. G. J. HARRIS, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 309,661, 6.2.28).—A mixture of sand, clay, and calcium sulphate is ground with water, the slurry is dried, and the powder is fed into a kiln or furnace so that it comes into direct contact with a hot stream of gas, preferably generated by the combustion of powdered fuel in the kiln. W. G. CAREY.

Conversion of sulphur dioxide into sulphur trioxide. J. G. MELENDY, Assr. to GEN. CHEM. Co. (U.S.P. 1,716,498, 11.6.29. Appl., 26.1.27).—Catalytic oxidation is carried on in adiabatic stages by controlling the temperature of the gases entering the conversion stages by positive cooling, so that the reaction in all but the final stage proceeds only to the point where the reaction begins to fall off rapidly, and in the final converter is carried to equilibrium. W. G. CAREY.

Production of nitric acid. A. E. MITCHELL, C. C. SMITH, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 311,934, 10.5.28).—Gases containing oxides of nitrogen and oxygen are exposed under pressure to moving, continuous, turbulent films of water or dilute nitric acid produced on one side of a vertical surface, heat being removed from the other side by a turbulent film of water. A nest of tubes, internally cooled by a film of water, may be used, the gases and absorption liquid circulating round the outside of them. W. G. CAREY.

Manufacture of silicic acid sols. I. G. FARBENIND. A.-G. (B.P. 294,264, 21.7.28. Ger., 21.7.27).—A silicic acid gel $(10-15\% \text{ SiO}_2)$, made and purified from soluble constituents by known means, is treated with a small proportion of ammonia and is heated without dilution or evaporation until dissolution takes place.

W. G. CAREY.

Manufacture of silica and like gels. H. WADE. From SILICA GEL CORP. (B.P. 313,242, 30.3.28).— Silica hydrogels prepared as described in B.P. 136,543 and U.S.P. 1,297,724 (B., 1919, 363 A) are purified by successive washing with water, treatment with a strong acid, e.g., sulphuric acid, d 1.71, and a final washing with water. Alternatively, the gel, after the first washing with water, may be treated with sulphuric acid of progressively increasing (d 1.45—1.71) and then of decreasing (d 1.71—1.45) concentration.

L. A. Coles.

Preparation of catalytic gels. SILICA GEL CORP., Assees. of M. LATSHAW and W. L. JUDEFIND (B.P. 286,309, 2.3.28. U.S., 3.3.27).—Silica gels etc. are charged with a reducing gas other than hydrogen, *e.g.*, carbon monoxide, sulphur dioxide, or hydrogen sulphide, and then sprayed with a solution of a compound, *e.g.*, platinic chloride, which, by interaction with the gas, causes deposition of the desired metal within the pores of the gel. L. A. COLES.

Catalytic and absorbent gel. W. A. PATRICK, Assr. to SILICA GEL CORP. (U.S.P. 1,696,644—5, 25.12.28. Appl., 15.3.26).—Hard absorbent gel having a porous structure similar to that of the silica gel of U.S.P. 1,297,724 (B., 1919, 363 A) and containing (A) copper or copper oxide or (B) nickel or nickel oxide is prepared from a soluble silicate, (A) a copper or (B) a nickel salt, and acid, the $p_{\rm H}$ after mixing being 0.3—0.9; the hydrogel is subsequently washed and dried.

R. BRIGHTMAN.

Manufacture and use of adsorbing agents containing silica. G. E. VAN NES (U.S.P. 1,715,439, 4.6.29. Appl., 30.4.27. Holl., 26.7.26).—A soluble silicate is added to a liquid to be decolorised, and an acid and a base which react together to give a precipitate are then introduced. Thus, after adding water-glass to molasses, milk of lime, magnesia, or aluminium hydroxide and carbon dioxide, sulphur dioxide, or phosphoric acid are introduced. F. G. CLARKE.

Manufacture of adsorbing agents. A. ROSEN-HEIM (B.P. 284,245, 25.1.28. Addn. to B.P. 275,203; B., 1928, 659).—The zeolites etc. are heated, suspended

in water, and treated at raised temperature with sufficient acid to remove only the bases, leaving the silicic acid and the physical structure of the zeolitic material unchanged. The products are bonded together by pressure or by means of a binding agent (water-glass, resins). W. G. CAREY.

Production of base-exchange materials. F. B. DEHN. From GEN. ZEOLITE CO. (B.P. 313,206, 9.3.28).— Non-friable artificial zeolites are prepared by mixing solutions of alkali silicates and alkali aluminates in the presence of sufficient acid to neutralise all or nearly all the free alkali produced, yielding a mixture alkaline to phenolphthalein or to methyl-orange, and subsequently drying and leaching the gel produced when the mixture sets. L. A. COLES.

Manufacture of alkali of high concentration. F. BENCKER, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,704,909, 12.3.29. Appl., 19.2.26. Ger., 14.5.25).— Amalgams are decomposed with water in presence of an organic nitro-compound; *e.g.*, sodium amalgam decomposed at $80-100^{\circ}$ by rapid agitation with a mixture of nitrobenzene and water affords a soda lye from which the hydrate, $3NaOH, 4H_2O$, crystallises out, a mixture of azo- and hydrazo-benzene being obtained almost quantitatively as by-product.

R. BRIGHTMAN.

Production of ammonia by synthesis from its elements. F. W. DE JAHN, ASST. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,701,478, 5.2.29. Appl., 18.2.26).—The incoming gases from the purifiers are passed in cold exchange to the ammonia liquefiers, the uncondensed gases returning through the cold exchangers and passing thence in heat exchange with the hot reaction gases to the catalytic chamber. The preheated gases are finally brought to reaction temperature by passing them in free thermal contact with the catalyst, and then by reverse flow into direct contact with the catalyst, the cool uncatalysed gas serving to protect the walls of the reaction chamber against excessive temperatures. R. BRIGHTMAN.

Concentration of brine. W. E. BURKE and H. DE ROPP, Assrs. to AMER. POTASH & CHEMICAL CORP. (U.S.P. 1,712,787, 14.5.29. Appl., 6.2.24).—Brines containing carbonates, sulphates, and chlorides of sodium and potassium which are substantially saturated with sodium chloride and contain less than the amount of sodium carbonate necessary to saturate the brine are evaporated to a concentration less than that at which glaserite forms, the temperature is raised, and the evaporation continued. W. G. CAREY.

Manufacture of anhydrous sodium acetate. COURTAULDS, LTD., F. ADCOCK, N. G. BAGULEY, and D. L. WILSON (B.P. 313,352, 23.7.28).—Anhydrous acetic acid is treated at a raised temperature $(30-60^{\circ})$ with sodium or with electrolytic sodium amalgam; sodium acetate combined loosely with, *e.g.*, 1 or 2 mols. of acetic acid is precipitated by cooling the solution. The combined acetic acid may be expelled by heating the crystals after removal from the mother-liquor.

L. A. Coles.

Production of a disodium phosphate having two molecules of water of crystallisation. T. BENCKISER, A. REIMANN, SEN., and A. REIMANN, JUN. (B.P. 308,566, 5.10.28. Ger., 23.3.28).—Pure phosphoric acid containing 600—700 g. P_2O_5 per litre is neutralised with the calculated amount of soda and the phosphate is crystallised above 50°. A more dilute solution may be used if the crystallisation is carried out at reduced pressure. W. G. CAREY.

Manufacture of crystallised non-caking trisodium phosphate [deca]hydrate. L. R. WESTBROOK, ASST. to GRASSELLI CHEM. Co. (U.S.P. 1,711,707, 7.5.29. Appl., 27.1.28).—An aqueous saturated solution of the dodecahydrate is heated above its crystallisation temperature, seeded with decahydrate crystals, and the resulting decahydrate crystals are removed.

W. G. CAREY.

Production of sodium perborate. H. R. CARVETH, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,716,874, 11.6.29. Appl., 27.9.27).—Sufficient sodium peroxide is added to an aqueous solution of borax to convert it into a mixture of metaborate and perborate, oxidation being completed by the addition of hydrogen peroxide. H. ROYAL-DAWSON.

Production of dry ferric chloride, manganic chloride, or the like metallic chlorides. VEREIN. STAHLWERKE A.-G. (B.P. 290,568, 3.5.28. Ger., 14.5.27). –Volatilised chlorides obtained by the chlorination of appropriate ores are purified from hydrochloric acid and steam by passing through magnesium oxide or similarly acting oxides at a temperature near that of vaporisation of the chloride. By-product magnesium oxide from the "abraum-salts" of the potash industry may be used.

Production of aluminium sulphate. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 312,726, 19.3.28).—Clay, bauxite, etc. is treated in a rotary kiln in countercurrent with a stream of gases containing sulphur trioxide or sulphur dioxide and oxygen at a temperature below the decomposition temperature of ferric sulphate, and the mass subsequently heated to a higher temperature to decompose the ferric sulphate and form aluminium sulphate. W. G. CAREY.

Production of aluminium chloride. H. BLUMEN-BERG, JUN. (U.S.P. 1,716,102, 4.6.29. Appl., 31.8.26).— A mixture of aluminium sulphide and an alkali chloride is dehydrated, carbonaceous material is mixed therewith, and aluminium chloride is distilled off, in a closed retort, below the volatilisation point of the alkali chloride. F. G. CLARKE.

Preparation of Epsom salts. S. B. HEATH, Assr. to Dow CHEM. Co. (U.S.P. 1,709,398, 16.4.29. Appl., 23.2.25).—When making magnesium sulphate from magnesium hydroxide containing chloride impurities, an excess of sulphuric acid is heated with concentrated mother-liquor from a previous run to remove hydrochloric acid as gas, and the liquid is then added to magnesium hydroxide. W. G. CAREY.

Manufacture of barium compounds [silicates]. S. WITTOUCK (B.P. 312,975, 3.3.28).—Barium compounds other than the carbonate, *e.g.*, barium sulphate, are calcined at about 1500° with silica and, if desired, carbon, in the presence of a portion of the product obtained by a previous calcination in quantity sufficient to prevent fusion. L. A. COLES.

Calcination of lime. K. M. NAHIKIAN, R. W. FOSTER, and E. T. BELDEN, ASSTS. to BREWER & Co., INC. (U.S.P. 1,709,226, 16.4.29. Appl., 27.4.28).— A mixture of an alkaline-earth oxide or hydroxide and water is introduced as a spray into the bottom of a vertical kiln so that it comes into contact with the products of combustion from the fuel before they reach the limestone to be treated and precipitates hard and non-plastic products. W. G. CAREY.

Solidification of nitrate of lime by rotary cooling drums. APPAREILS ET EVAPORATEURS KESTNER (B.P. 292,532, 23.5.28. Fr., 21.6.27).—Adherence of the nitrate to the drum is reduced by interposing a skin of supersaturated solution free from crystals between the drum and a layer of partially crystallised nitrate solidified on it, by heating the surface of the solution primed for crystallisation contained in the basin of the drum, or by heating the surface of the drum between the scraper and the line at which the drum enters the solution. L. A. COLES.

Treatment of acidulous by-product calcium sulphate. R. S. EDWARDS, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,713,868, 21.5.29. Appl., 18.7.28).— The slurry of calcium sulphate from the manufacture of phosphoric acid is simultaneously ground and neutralised, and is then passed to ovens for the production of an acid-free plaster. F. G. CLARKE.

Fire-extinguishing liquid. R. W. AUSTIN (U.S.P. 1,716,476, 11.6.29. Appl., 18.7.25).—A solution of calcium chloride and potassium carbonate is claimed for anti-freezing extinguishers. J. A. SUGDEN.

Manufacture of calcium hypochlorite. MATHIE-SON ALKALI WORKS, INC., Assees. of [A, C, D] A. GEORGE and R. B. MACMULLIN, [B] J. A. GUYER (U.S.P. 1,713,650, 1,713,654, and 1,713,668—9, 21.5.29. Appl., [A-D]4.8.26).—(A) The crude hypochlorite, in the form of a slurry, is agitated with alkali hypochlorite equivalent in quantity to the calcium chloride present. When well mixed, the product is dried. (B) Caustic alkali is used in place of alkali hypochlorite. (c) An aqueous mixture of lime and caustic alkali, the latter being in excess, is chlorinated. A calcium compound equivalent in quantity to the alkali is added, and the calcium hypochlorite separated. (D) Milk of lime is chlorinated, caustic alkali added, and the mixture further chlorinated, when the calcium hypochlorite is separated.

F. G. CLARKE.

Manufacture of complex tungsten and molybdenum compounds [and pigments, colour lakes, etc. containing them]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,209, 9.3.28).—Mixtures giving rise to the complex compounds, e.g., aqueous solutions containing sodium tungstate, sodium phosphate, and sodium molybdate, are treated with reducing agents, e.g., sodium hyposulphite, sodium bisulphite, or dextrose, preferably in an acid medium; or, alternatively, the tungstates and molybdates are reduced before admixture with sodium phosphate etc. The complex compounds may be precipitated by salting

W. G. CAREY.

out or by treatment with hydrogen chloride, or may be recovered by concentration; or pigments etc. may be precipitated by adding to the solutions basic dyes or aromatic amines free from acid groups together, if desired, with substrata and/or dispersive agents.

L. A. COLES.

Colloidal sulphur and its manufacture. A. HARTZELL and F. H. LATHROP, Assrs. to W. C. O'KANE and P. MOORE (CROP PROTECTION INST.) (U.S.P. 1,705,862, 19.3.29. Appl., 10.6.24).—Sulphur is dissolved in naphthalene or other solid distributing agent, *e.g.*, paraffin wax, and disintegrated to a fine dust or emulsified, *e.g.*, in a solution containing fish-oil soap.

R. BRIGHTMAN.

Manufacture of pure hydrofluoric acid from polluted fluorspars. M. BUCHNER, Assr. to A. F. MEYERHOFER (U.S.P. 1,701,225, 5.2.29. Appl., 5.1.26. Ger., 16.1.25).—See B.P. 234,852; B., 1925, 670.

Manufacture of alkali hydroxides. L. P. CURTIN (B.P. 312,732, 20.3.28).—See U.S.P. 1,678,767; B., 1928, 746.

Treatment of solutions containing tin and arsenic for precipitation of tin. H. HARRIS (U.S.P. 1,714,667, 28.5.29. Appl., 9.9.25. U.K., 18.9.24).— See B.P. 244,526 ; B., 1926, 156.

Phosphorescent or luminous mass or compounds. H. M. MINES, ASST. to F. CURD (U.S.P. 1,716,972, 11.6.29, Appl., 10.5.26, U.K., 18.5.25).— See B.P. 245,612; B., 1926, 248.

Production of hydrogen-nitrogen mixtures. L. CASALE (M. CASALE-SACCHI, adtrix.) (U.S.P. 1,716,813, 11.6.29. Appl., 15.6.27. It., 24.6.26).—See B.P. 292,342; B., 1928, 603.

Apparatus for centrifugal separation (U.S.P. 1,700,928).—See I. Brazing flux (U.S.P. 1,717,250).— See X. Piezo-electric substances (B.P. 311,055). Electrolysis of chlorides (B.P. 309,408).—See XI.

VIII.-GLASS; CERAMICS.

Use of trachyte in the manufacture of glass. I. I. KITAIGORODSKI and S. V. RODIN (Trans. State Exp. Inst. Silicates, Moscow, 1928, 3—62).—Trachyte, containing $(K_2O + Na_2O)$ 5—17, SiO₂ 63—73, Al₂O₃ 12—25, Fe₂O₃ 1—4, (CaO + MgO) 1—5%, although high in alumina, was used in glass manufacture in proportions of 85—88%, with lime or dolomite and 0—5% of sand. Barium could be added as the carbonate, but the sulphate produced a poor glass. Trachyte glass is resistant to acids and alkalis, and has a low linear coefficient of expansion and good mechanical properties. CHEMICAL ABSTRACTS.

Colouring of glass. K. FUHA (J. Mazda Res. Lab., 1928, 3, 21-49).—Ammonium molybdate does not colour glass, but sometimes causes opalescence on reheating. Tungstic oxide and tungstates do not impart a colour, but produce opalescence. Metallic tungsten produces a grey colour. For the preparation of fluorescent glass with uranium compounds, potassium and boric acid should be present; potash-magnesia and potash-zinc-boron-silica glasses acquire a strong fluorescence. CHEMICAL ABSTRACTS. Properties of simple enamel glasses. A. I. ANDREWS (J. Amer. Ceram. Soc., 1929, 12, 390–394).— The two systems $Na_2O-B_2O_3$ -SiO₂ and $Na_2O-PbO-SiO_2$ were tested for acid-resistance (spot test with 70% citric acid, also treatment of powder with constantboiling hydrochloric acid at 100°) and for general qualities. Such glasses were successfully applied to cast iron by the dry process and made into enamels by the addition of tin oxide. An increase in silica content generally (but not always) increases the acidresistance. The effect of soda, boric acid, and lead oxide is dependent on the composition to which they are added. J. A. SUGDEN.

Importance of the glass phase in porcelain. H. M. KRANER (J.Amer. Ceram. Soc., 1929, 12, 383—389). —The properties of a body depend as much on the nature of the glass as, or more so than, on the crystal structure. Support is given to the idea that dissolution of mullite and quartz may cause weakening of porcelain with excessive fire and may consequently lower the resistance to thermal shock in spite of a decrease in the coefficient of expansion. Small changes in chemical composition cause vital changes in the properties of the glass. J. A. SUGDEN.

Determination of air in plastic [clay] mixes. V. CARTWRIGHT (J. Amer. Ceram. Soc., 1929, 12, 395—398).—The sample is boiled with water in a vessel sealed at the bottom with mercury, and the air evolved is measured in a burette so arranged that a definite temperature and pressure can be applied.

J. A. SUGDEN.

Clay sewer-pipe manufacture. VI. Heat-balance determinations. VII. Low-temperature oxidation [of clays etc.]. R. E. ARNOLD and G. H. DUNCOMBE, JUN. VIII. Measurement of draught distribution. C. E. PARMELEE (J. Amer. Ceram. Soc., 1929, 12, 410-422, 423-428, 429-433).—VI. The method of calculation of kiln efficiency is described and the results of a large number of tests are given. The efficiency was found to vary from approx. 15% to 29%, although over some ranges of temperature a value as high as 40% was found. In general, the efficiency decreases with increase of temperature.

VII. Plant experiments showed that " black cores " are most readily eliminated by slow heating over the range 250—550°. Tests showed that the black core material consisted chiefly of carbon with some magnetic oxide. Laboratory tests showed that some forms of carbon burn much more readily than others, and it is suggested that oxidation in plant practice takes place with difficulty at higher temperatures because at such temperatures the carbon is converted into a slowerburning variety. The catalytic effect of certain metallic oxides on the oxidation of carbon has been studied, and the "accelerators" are found to be those usually occurring in clays.

VIII. The methods of measurement and calculation and possibilities in the correction of faulty conditions are described. J. A. SUGDEN.

See also A., July, 762, Colloid-chemical properties of kaolin (Shukov and Sokolova). 766, Ceramics of refractory substances : system ZrO_2 -ThO₂ (RUFF and others).

PATENTS.

Lehrs, annealing furnaces, etc. UNITED GLASS BOTTLE MANUFRS., LTD., T. C. MOORSHEAD, and F. A. HURLBUT (B.P. 312,890, 2.11.28).—A continuous, wirewoven or similar conveyor belt is preheated by passing the return belt in close proximity to the upper portion. This is accomplished by supporting the return belt on rollers and allowing it in turn to support the upper belt through a series of transverse floating rollers. In addition, the belt passes around a hollow preheating drum. A. COUSEN.

Glass. CHANCE BROS. & CO., LTD., C. E. GOULD, W. M. HAMPTON, and H. S. MARTIN (B.P. 312,728, 19.3.28).—A non-solarising, ultra-violet light-transmitting glass is made from such ingredients as silica and anhydrous borax together with a powdered metal such as zinc, aluminium, or tin, which acts as a reducing agent and prevents the presence of deleterious gaseous impurities, such as carbon dioxide, in the glass.

A. COUSEN.

Manufacture of compound glass. E. GEISEL (B.P. 313,269, 2.5.28).—Condensation products of formaldehyde and urea, thiourea, or other urea derivatives are applied in liquid form between glass plates and allowed to harden, with or without addition of accelerating catalysts. A. COUSEN.

Non-splintering glass sheets or plates. J. TALBOT (B.P. 313,273, 7.5.28).—A single sheet of glass is sealed between sheets of cellulose acetate, and the edges are sealed by coating with a viscous solution of the latter material. A. COUSEN.

Bubble or blister glass. R. HALEY (U.S.P. 1,715,130, 28.5.29. Appl., 7.10.27).—A core of glass gathered on the blow pipe is coated with finely-divided bubble-forming material which is covered with a further layer of glass. The mass is then blown to shape.

J. A. SUGDEN.

Tunnel ovens and the like. GIBBONS BROS., LTD. From AMER. DRESSLER TUNNEL KILN, INC. (B.P. 312,786, 16.5.28).—The oven comprises preheating and firing zones, and products of combustion passing out from the latter by side-wall ports are caused to flow through banks of horizontally extending pipes placed along the sides of the preheating zone. These pipes pass through chambers formed in the walls of the kiln which serve to heat the preheating air. Circulation of the air is obtained by exhaust fans which draw it into pipes placed along the crown of the kiln and drive it down into the preheating chambers, whence it flows once again into the kiln by a series of injector nozzles suitably placed in the wall. A. COUSEN.

Production of clear, vitreous silica. BRIT. THOM-SON-HOUSTON CO., LTD., Assees. of B. F. NIEDERGESASS (B.P. 296,059, 22.8.28, U.S., 24.8.27).—Finely-powdered silica is introduced into the flame of a gas burner and is made to impinge on to an opaque silica foundation, which is maintained at 800°. The clear layer thus deposited may be ground and polished to the desired shape while still adhering to the foundation.

F. SALT.

Ceramic product moulded by casting in a hot state. PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H., Assees. of R. MOHR and H. BECKER (B.P. 281,249, 3.11.27. Ger., 26.11.26).—A readily fusible siliceous rock, such as phonolith or its decomposition products, is melted with at least 20% of fluorspar or other mineral containing fluorine, alumina being added, if necessary, in the form of clay or kaolin in the proportion of 5—20%. The melting operation is interrupted before a homogeneous glass is formed. F. Salt.

Manufacture of refractory compositions. T. S. CURTIS, ASST. to PACIFIC-SOUTHWEST TRUST & SAVINGS BANK (U.S.P. 1,715,449, 4.6.29. Appl., 11.12.24).—A mixture of magnesia (not less than 35%) and iron oxide (not more than 50%) is heated to a temperature sufficient to sinter the mass. J. A. SUGDEN.

Manufacture of refractory composition and articles therefrom. L. J. TROSTEL, ASST. to GEN. REFRACTORIES CO. (U.S.P. 1,716,395, 11.6.29. Appl., 7.6.26).—Cyanite is added to a highly aluminous clay mix in order to compensate for the firing shrinkage of the clay. J. A. SUGDEN.

Refractory materials. J. A. JACK (B.P. 312,700, 6.3.28).—A material resistant to slagging by alkalis (to be used in the removal of sulphur and silicon from metals) is prepared by adding 5—25% of carbon to a highly siliceous (ganister) mix. J. A. SUGDEN,

Kiln box or support for firing bull-nose and other curved glazed tiles in the oven or kiln. W. R. BROAD, A. E. LOVATT, and G. G. PETRIE (CROMLECH TILE CO.) (B.P. 313,026, 5.3.28).

Saggers or receptacles for use in firing pottery. A. HEATH and H. COLCLOUGH (B.P. 312,794, 21.5.28).

Feeding of [molten] glass. W. J. MILLER (B.P. 312,887, 18.10.28).

Drawing of sheet glass. P. HADDAN. From VIRGINIA PLATE GLASS CORP. (B.P. 313,821, 24.9.28).

Manufacture of compound sheets of glass and cellulose derivatives. G. E. HEYL (B.P. 313,695, 19.4.28).

Refractory brick (U.S.P. 1,714,506).-See IX.

IX.-BUILDING MATERIALS.

Use of plaster of Paris and allied substances for dental models. R. N. JOHNSON and C. S. GIBSON (Brit. Dental J., 1929, 50, 681-696; cf. Sodeau and Gibson, B., 1927, 878) .- The setting of ordinary "fine" plasters and artificial stone compositions has been studied. The compositions included both the anhydrous calcium sulphate (AS7) and the cement plaster (AS8) types. Measurements were made of setting time, expansion, hardness (Brinell), and crushing strength. A decrease in the amount of mixing water (compatible with good mixing) causes an increase in hardness, strength, and expansion, and an acceleration of setting. "Over-stirring" greatly increases the expansion. When anti-expansion solution is used the amount of liquid or time of mixing has little effect on the expansion. Air-drying at room temperature increases the hardness, strength, and expansion. Maximum hardness of plaster

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and AS8 (mixed with water or anti-expansion solution) is reached in two or three days, but the AS7 type continues to harden for seven days or more. Plaster and artificial stone, mixed with water, show the maximum expansion, hardness, and strength at about the same time, but when plaster is mixed with anti-expansion solution the maximum expansion is reached in several hours. Increase in hardness continues to take place after the material has reached complete dryness. Drving in an oven causes the hardness and strength to increase to a maximum and then decrease again. The higher is the temperature the sooner the reversion occurs. A new anti-expansion solution (4% of Rochelle salt and 0.2%of borax) makes a harder material which shows smaller dimensional changes in the vulcaniser. The hardness and strength of all materials are greatly reduced in the vulcaniser, and the dimensional changes are not uniform in all directions. Freshly cast material shows greater change in dimensions than that which has been allowed to air-dry. The formation of a coarse granular product in the vulcaniser is governed by the temperature. The granular product has a high combined water content, but the normal product is almost anhydrous. A tentative explanation of this change is suggested.

J. A. SUGDEN.

PATENTS.

Burning of lime. C. J. WRIGHT, ASST. to COM-BUSTION UTILITIES CORP. (U.S.P. 1,716,572, 11.6.29. Appl., 15.8.23).—As the limestone passes down a shaft it is decomposed by an upward current of steam and carbon dioxide, which is introduced circumferentially into the mid-portion of the shaft; the resulting lime is cooled to a point just above the dissociation temperature of the hydrate, as it passes to the exit at the base, by a current of saturated steam introduced at the bottom. F. G. CLARKE.

Manufacture of hydraulic cement. R. DE LUCE (U.S.P. 1,713,172, 14.5.29. Appl., 11.1.27).—A mixture of lime, silica, alumina, and water in proportions suitable for the production of Portland cement is violently agitated at 100° under pressure until an insoluble calcium aluminium silicate is formed, which is subsequently heated to incipient fusion. W. G. CAREY.

[Refractory] brick and cement for furnace use. R. P. HEUER, ASST. to GEN. REFRACTORIES CO. (U.S.P. 1,714,506, 28.5.29. Appl., 29.12.24).—Small amounts of clay, magnesia, and a solution of a magnesium salt are added to chrome ore body. J. A. SUGDEN.

Utilisation of molten slag and production of cast slag in a form suitable for use in road-making. C. A. MIDGLEY and J. T. GOODWIN (B.P. 312,838, 29.6.28). —A mould for casting slag consists of a shallow frame with detachable sides and perforated cross-partitions. The base of the mould may be of broken chippings of granite or other material suitable as a facing material for the blocks. C. A. KING.

Binding agent for materials used for road construction. F. C. HOPKIRK, and C. TENNANT & Co., LTD. (B.P. 313,824, 29.9.28).—Tar (61%) and light coal-tar oil (5%) are mixed and hot bitumen (34%) is added at not above 150°, the mixture being agitated by revolving beaters. W. G. CAREY. [Bituminous] emulsion and its manufacture. L. KIRSCHBRAUN (U.S.P. 1,707,809, 2.4.29. Appl., 17.1.21).—Bituminous material, *e.g.*, asphalt, is melted and mixed at 150—190° with an aqueous suspension of colloidal clay, containing talc, or other protecting agent. The clay etc. may also be added to the mixture after emulsification. R. BRIGHTMAN.

Impregnation [staining] of wood. H. P. VANNAH and J. G. GOSSELINK, ASSTS. to BROWN CO. (U.S.P. 1,714,701, 28.5.29. Appl., 20.5.27).—An acid solution of a dye intermediate, which precipitates a pigment on oxidation in an alkaline medium, e.g., 2:4-diaminophenol hydrochloride or 2-naphthylamine-1-sulphonic acid, and then an aqueous alkali are successively sucked through the wood, preferably after air has been removed therefrom. F. G. CLARKE.

Mixing of quick-setting cementitious materials. G. M. THOMSON (В.Р. 313,018, 31.1.28).—See U.S.P. 1,660,242; В., 1928, 334.

Manufacture of aluminous cements. E. MARTIN (U.S.P. 1,716,527, 11.6.29. Appl., 27.4.26. Fr., 30.4.25). —See F.P. 597,978; B., 1926, 409.

Rotary mixing machines [for concrete etc.]. FILS DE JULES WEITZ (B.P. 306,504, 11.9.28. Fr., 22.2.28).

Manufacture of artificial stone specially applicable to concrete tiles. R. ABRAHAM, LTD., and R. A. ABRAHAM (B.P. 313,295, 26.5.28 and 26.3.29).

Manufacture of [hollow] tiles. NAT. FIRE PROOF-ING CO., Assees. of R. A. SHIPLEY (B.P. 296,369, 31.7.28. U.S., 30.8.27).

Preservation of wood [*in situ* and under reduced pressure]. W. B. MAKINS, and BROWN & MAKINS, LTD. (B.P. 312,719, 13.3.28).

Tar products (B.P. 312,372).—See II. Sulphuric acid and cement (B.P. 309,661). By-product calcium sulphate (U.S.P. 1,713,868).—See VII.

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

Metallisation of the oxide of iron in ilmenite. R. J. TRAILL and W. R. MCCLELLAND (Amer. Electrochem. Soc., May, 1929. Advance copy. 10 pp.).-A process for recovering iron and a titanium dioxide concentrate from ilmenite or titaniferous magnetite has been investigated on a semi-large scale. The crushed ore mixed with crushed coal and coke is heated at about 1000° in a rotary kiln with exclusion of excess air. By magnetic separation the reduced product yields a magnetic concentrate consisting of metallic iron and titanium dioxide. The iron can be removed by leaching with sulphuric acid or, if it is to be recovered as electrolytic iron, by leaching with ferric chloride solution. The residue is a high-grade concentrate of titanium dioxide low in iron. H. J. T. ELLINGHAM.

Sponge iron, a raw material for electric steel. N. K. G. THOLAND (Amer. Electrochem. Soc., May, 1929. Advance copy. 22 pp.).—Sponge iron is now produced on a commercial scale at Höganäs, Sweden, from the purest Swedish magnetite. The product contains over 95% Fe (usually 96-97.5%), with an average of 0.014% P and 0.025% S. Sponge iron is advantageous as a base for fine steels and alloy steels owing to its comparative purity. Comparative figures for the properties of steels manufactured from sponge iron, high-grade scrap, and pig iron are quoted, and the advantages and future prospects of sponge iron are discussed.

H. J. T. Ellingham.

Mechanical and metallurgical properties of spring steels as revealed by laboratory tests. G. A. HANKINS and (MISS) G. W. FORD (Iron and Steel Inst., May, 1929. Advance copy. 28 pp.; cf. B., 1926, 827) .- Endurance fatigue limits were determined on low-chromium, high-chromium, nickel-chromium, and two water-quenched carbon steels in various conditions of heat treatment, the quenching temperatures being arranged to produce the desired hardening conditions. The fatigue limits so obtained on polished specimens are higher than those given by spring plates and wires under normal conditions; this is probably due to the presence of a thin layer of soft decarburised material at the surface of the latter, and also to lines and scratches which reduce the effective resistance. The endurance fatigue limit of any particular steel under any particular heat treatment is closely related to the tensile strength and Brinell number, and is little affected by the composition. Generally, the proportional limits increase with increasing tensile strength and Brinell number, but variations are much more marked than for fatigue limits. For each steel the Izod numbers decrease with increasing tensile strength and Brinell numbers. Other things being equal, the highest Izod number is the best one to select. A good combination of properties is exhibited by chromium-vanadium and water-quenched silicon-manganese steels; the water-quenched 0.46% carbon steel is definitely inferior to the alloy steels and to the 0.6% carbon steel oil-quenched from 950°. It is suggested that the mean values of 30.1×10^6 lb./in.² for the elastic modulus and 11.6×10^6 lb./in.² for the modulus of rigidity may be used with safety for all spring steels, irrespective of composition or heat M. E. NOTTAGE. treatment.

Recovery of hyper-tempered steels. P CHEVE-NARD and A. PORTEVIN (Compt. rend., 1929, 188, 1670— 1672).—Priority is claimed for the two types of dilatometric recovery-cycle of austenitic steels in the nonequilibrium state (hyper-tempered) described by Michel and Benazet (B., 1929, 358). Examples are : (1) a hyper-tempered manganese-carbon steel $(2 \cdot 26\%)$ Mn, $1 \cdot 5\%$ C) in which austenite is converted by heat into (Fe₃C + Fe_a) or sorbite, on cooling of which there is no further reaction; and (2) a hyper-tempered chromiumcarbon steel $(2 \cdot 26\%)$ Cr, $1 \cdot 5\%$ C) in which austenite is converted by heat into a less carburised form and a complex iron chromium carbide, whilst cooling produces martensite (secondary tempering). In both cases there is an increase in hardness of about 200 Brinell. J. GRANT.

Normalising of sheet steel. W. PARKER (Engineering, 1929, 127, 799).—Lack of uniformity of annealing of steel sheets by the older methods in boxes has led to the development of single-sheet annealing now almost entirely used in the United States. Steel sheets, singly or at most in packs of two or three, are conveyed through an open furnace on power-driven discs forming a conveyor. The furnace is gas-heated and the various conditions of heating, cooling, and atmosphere can be controlled to give the most uniform crystal structure throughout the material. The time required for the complete cycle is about 8 min. as compared with about 32 hrs. by the box method. C. A. KING.

Influence of various elements on the nitrogenation of steel. T. NAKAYAMA (J. Study Met., 1928, 5, 413-427) .- When iron is heated in a current of ammonia, the increase in weight corresponds with the nitrogen content. The velocity of nitrogenation is small at 300°, and increases rapidly with rise of temperature above 400°. The nitrogen absorption in 1 hr. is maximal (10%) at 450°, decreasing nearly to zero at 750°. For large particles the velocity is small. Elements which form stable nitrides (aluminium, silicon, titanium, chromium), when alloyed with the iron accelerate nitrogenation (max. after 1 hr. at 500°). With copper, nickel, or cobalt, as also with manganese, the maximum is at 600°. When aluminium, silicon, titanium, chromium, or manganese is present, much nitrogen is retained at a high temperature.

CHEMICAL ABSTRACTS.

Rapid determination of vanadium in ferrovanadium. J. SILBERSTEIN (Chemist-Analyst, 1929, 18, No. 2, 11) — The material is fused with sodium hydroxide in a nickel crucible, and an aliquot part of the aqueous extract is treated with potassium iodide in presence of phosphoric acid. After 5 min. the quadrivalent vanadium is titrated with 0.05N-sodium thiosulphate. CHEMICAL ABSTRACTS.

Thermal and electrothermal reduction of zinc oxide. O. DONY-HENAULT (Amer. Electrochem. Soc., May, 1929. Advance copy. 4 pp.).—Electrical heating by means of a resistor consisting of a single piece of soft iron proved satisfactory up to 1200°. Furnaces of this type have been used in a study of the velocity of reduction of zinc oxide by carbon monoxide at various temperatures and pressures. H. J. T. ELLINGHAM.

Rapid determination of tin in lead-base alloys containing antimony. T. B. DIANA (Chemist-Analyst, 1929, 18, No. 2, 8).—The alloy, mixed with sufficient tin to increase the tin content to at least three times that of the antimony, is decomposed with $7 \cdot 5N$ -nitric acid; the excess of acid is boiled off, and 40 c.c. of water are added. The precipitate is collected and washed ten times with hot water and $1 \cdot 5N$ -nitric acid, alternately. The weight of antimony tetroxide, separately determined, is subtracted from that of the residue, giving the weight of stannic oxide. Some lead is usually present.

CHEMICAL ABSTRACTS.

Preparation and mechanical properties of duralumin. M. GOTO, S. FUKATU, S. HORIGUCHI, and T. NAGAI (Rep. Aeronaut. Res. Inst. Tokyo, 1928, 3, 273-403).—The cast metal can be rolled at $450 \pm 20^{\circ}$. Iron improves the pouring and rolling qualities, but is otherwise undesirable; 1% of silicon improves the mechanical properties, but large quantities are undesirable. Zinc up to 3% is advantageous. Alkalis are undesirable. Silver improves the malleability of the poured metal, which normally contains Cu 3-4, Mg 0.5-0.75, Mn 0-0.5, Al 96.5-94.75%. A new hypothesis of the ennoblement of aluminium alloys is developed. CHEMICAL ABSTRACTS.

Tungsten carbide alloys. J. L. GREGG and C. W. KÜTTNER (Amer. Inst. Min. Met. Eng. Tech. Pub., 1929, No. 184, 3—12).—Of five commercial alloys, four consisted of W₂C and WC, the fifth being almost entirely WC. CHEMICAL ABSTRACTS.

Electrolytic zinc refining. II. Influence of foreign elements on the hydrogen overvoltage. H. SETO (Hokko, 1928, 24, 1-22).-The relation between the overvoltage of platinum, copper, iron, lead, zinc, cadmium, nickel, and cobalt in 2N-sulphuric acid and their surface condition was examined. There is no great difference in the overvoltage when the plated surface is smooth or crystalline, whilst that obtained with spongy platinum, spongy nickel, or platinised platinum is much smaller. Addition of gelatin or cinchonine increases the hydrogen overvoltage. Dextrose, tannin, and particularly gelatin, when added to a zinc sulphate solution, decrease the overvoltage at the surface of the deposited zinc, probably owing to small adsorption of CHEMICAL ABSTRACTS. gas.

Measurements of hydrogen-ion concentration in plating baths. R. E. BREWER and G. H. MONTILLON (Amer. Electrochem. Soc., May, 1929. Advance copy. 26 pp.).-The suitability of electrometric and colorimetric methods of measuring the $p_{\rm H}$ value of typical baths for plating zinc, iron, cobalt, nickel, and chromium has been investigated. Electrometric measurements were made with the hydrogen, oxygen, quinhydrone, antimony-antimony trioxide, and lead dioxide electrodes, employed either in combination with the corresponding electrode in a standard buffer solution or with a standard calomel electrode. The oxygen electrode functioned satisfactorily in all cases except in acid iron baths, where oxidation of the bath occurred, and in chromium-plating baths. The antimony-antimony trioxide electrode is unsuitable for baths of high acidity and was found to be unsatisfactory in the cobalt bath examined, but this electrode and the lead dioxide electrode are the only two which are suitable for the highly oxidising chromium bath. Otherwise the quinhydrone electrode is recommended for general usefulness and ease of measurement. The accuracy of Thompson's colorimetric drop-ratio method (B., 1922, 469) is checked by electrometric titrations using oxygen or quinhydrone electrodes. The variation of the potentials of oxygen and antimony-antimony trioxide electrodes with change of $p_{\rm H}$ has been re-examined and empirical relations are given. H. J. T. ELLINGHAM.

Electrolysis of chromium sesquioxide. Ewing and others.—See XI.

See also A., July, 766, System cadmium-antimony (MURAKAMI and SHINAGAWA). 774, Electrodeposition of chromium (ROUDNICK). 775, Electrolytic copper (MARIE and JACQUET).

PATENTS.

Furnace for fusing finely-divided materials, and agglomeration of dust from blast-furnaces. A.

DAWANS (B.P. 294,639, 15.6.28. Belg., 29.7.27).— In an L-shaped furnace chamber finely-divided material is melted on the hearth by means of a blast burner, and is discharged down the inclined hearth. The upright limb of the furnace forms a chimney inside of which is a separate duct to preheat the fine material and to feed it on to the hearth. C. A. KING.

Making of castings. ANNENER GUSSSTAHLWERK A.-G. (B.P. 311,393, 22.10.28. Ger., 12.5.28).—For castings which in certain parts are subject to heavy wear, e.g., tram and railway rails, crossings, etc., a hard wear-resisting alloy is first cast in a mould to the required thickness, and as soon as it has cooled to a pasty consistency the mould is filled with a softer supporting metal. C. A. KING.

Case-hardening of iron. C. HUMMEL (B.P. 312,759, 16.4.28).—A liquid cementation medium is atomised and injected into a retort by means of a gas under pressure, which itself acts as an accelerator of the process. C. A. KING.

Fire-resistant [iron] alloy with high electric resistance. H. G. A. VON KANTZOW (U.S.P. 1,717,284, 11.6.29. Appl., 19.12.27. Swed., 15.12.26).—An alloy containing iron alloyed with 0.5—14% Al, up to 30% Cr, and 0.5—6% Co is claimed. H. ROYAL-DAWSON.

[Corrosion-resistant steel] alloys. (SIE) R. A. HADFIELD (B.P. 313,471, 10.3.28).—The alloy contains, in addition to iron, 0.05—1% C, 2—20% Ni, 5—30% Cr, 1—10% W, and 0.20—5% Cu, with or without 0.05—4% Si and 0.10—4% Mn; the combined nickel and chromium content should be 18—32%.

M. E. NOTTAGE.

Refining of copper. H. H. ALEXANDER (B.P. 313,270, 3.5.28).—Copper is refined in a furnace by excluding any air above the molten metal by the introduction of superheated steam, which may also be caused to inject a reducing agent on to the metal. C. A. KING.

Mechanically-worked zinc product. W. M. PEIRCE and E. A. ANDERSON, ASSTS. to NEW JERSEY ZINC Co. (U.S.P. 1,716,599, 11.6.29. Appl., 9.2.28).— A zinc-base alloy, free from aluminium, is used containing at least 92% Zn, 0.005—0.5% Mg, and 0.05—5% Cu. F. G. CROSSE.

Metal foil. E. C. R. MARKS. From AMER. MACHINE & FOUNDRY Co. (B.P. 313,300, 29.5.28).—To replace tin foil an alloy of lead containing 0.25-0.5% Mg is rolled down to less than 0.0005 in., preferably 0.00045 in. in thickness. C. A. KING.

Metallic alloy. C. A. BOULTON (B.P. 312,845, 11.7.28).—An alloy resistant to acids and alkalis contains 8—15% (11·3%) Sn, 64—81% (73·2%) Cu, 10—20% (15·4%) Pb, 0·06% P, and 0·04% Zn, by wt. F. G. CROSSE.

Chilled-roll alloy. F. D. TAGGART (U.S.P. 1,707,332, 2.4.29. Appl., 16.7.27).—The alloy contains approx. $3\cdot5\%$ C, $1\cdot75\%$ Cr, $0\cdot2\%$ V, 1% Si, $0\cdot5\%$ Mn, and traces of sulphur and phosphorus.

H. ROYAL-DAWSON.

Non-ferrous welding rod. A. R. LYTLE, Assr. to UNION CARBIDE & CARBON RES. LABS., INC. (U.S.P. 1,716,590, 11.6.29. Appl., 6.12.27).—The rod contains Flux for welding or soldering of aluminium and other metals. W. REUSS (B.P. 310,226, 16.6.28. Addn. to B.P. 296,923; B., 1928, 821).—Common salt (15 pts.) and sulphuric acid (1 pt.) are added to 30 pts. of the flux described in the prior patent.

H. ROYAL-DAWSON.

Brazing flux. J. J. PHELAN, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,717,250, 11.6.29. Appl., 19.6.28).—The flux consists of not less than 25% of potassium hydrogen fluoride and at least 40% of potassium tetraborate.

H. ROYAL-DAWSON.

Metal cleaning. J. H. GRAVELL, ASST. to AMER. CHEM. PAINT CO. (U.S.P. 1,713,653, 21.5.29. Appl., 22.6.26).—A mixture for cleaning metal, e.g., motor bodies, comprising an acid and an alcohol, or other solvent for grease, contains arsenic, so that the latter is deposited upon the cleaned metal, and rusting prevented. F. G. CLARKE.

Metallurgical furnace. B. TALBOT (U.S.P. 1,716,391, 11.6.29. Appl., 31.1.25. U.K., 24.4.24).—See B.P. 235,346; B., 1925, 638.

Manufacture of malleable-iron castings. Nat. Malleable & Steel Castings Co., Assees. of H. A. Schwartz (B.P. 282,671, 16.12.27. U.S., 23.12.26).— See U.S.P. 1,688,438 ; B., 1928, 931.

Rendering iron pipes immune from attack by water and apparatus therefor. C. BÜCHER (U.S.P. 1,716,205, 4,6.29. Appl., 3.2.27. Ger., 12.2.26).—See B.P. 265,932; B., 1928, 590.

De-rusting of ferrous metals. W. H. COLE (U.S.P. 1,715,695, 4.6.29. Appl., 31.12.27. U.K., 22.8.27).— See B.P. 298,328; B., 1928, 898.

Reduction of metallic oxides. A. J. F. J. COUSIN, Assr. to Soc. ANON. J. COCKERILL (U.S.P. 1,714,767, 28.5.29. Appl., 14.3.23. Belg., 18.5.22).—See B.P. 197,903; B., 1924, 474.

[Flanged] annealing pot. G. MORGAN (B.P. 312,886, 13.10.28).

Refractory materials (B.P. 312,700).—See VIII. Slag for road-making (B.P. 312,838).—See IX.

XI.—ELECTROTECHNICS.

Behaviour of solutions of chromium sesquioxide on electrolysis. D. T. EWING, J. O. HARDESTY, and T. H. KAO (Mich. Eng. Exp. Sta. Bull., 1928, No. 19, 3-13).—In experiments with solutions of chromic oxide (250 g. per litre), the percentage of current expended in the deposition of chromium increased, whilst that used in generating hydrogen decreased, with rise of temperature and increase of current density.

CHEMICAL ABSTRACTS.

Frequency and arcing in the alternating-current electrolysis of water. J. W. SHIPLEY (Amer. Electrochem. Soc., May, 1929. Advance copy. 21 pp.).—See A., 1928, 245, 1337. H. J. T. ELLINGHAM.

Transformer and switch oils. LOCHER.—See II. Yellow phosphorus. SHIKHUTZKI.—See VII. Sponge iron for electric steel. THOLAND. Reduction of zinc oxide. DONY-HENAULT. Zinc refining. SETO. Measurement of hydrogen-ion concentration in plating baths. BREWER and MONTILLON.—See X.

See also A., July, 774, Electrolytic formation of sodium arsenate (ESSIN). Electrodeposition of chromium (ROUDNICK). 775, Electrolytic copper (MARIE and JACQUET). Electrosynthesis of hydrocarbons (BERMEJO and BLAS).

PATENTS.

Electrostatic condenser. S. RUBEN (U.S.P. 1,714,319, 21.5.29. Appl., 22.8.27).—The dielectric is formed by a suspension of a metal powder in a saturated solution of potassium fluoride, or other electrolyte giving rise to a current-blocking film. The suspension is preferably applied to a porous spacing element.

F. G. CLARKE.

Gaseous conduction apparatus. C. G. SMITH, Assr. to RAVTHEON, INC. (U.S.P. 1,714,407, 21.5.29. Appl., 30.7.23).—By using cathodes, *e.g.*, of tin or potassium-sodium alloy, which are liquid at the operating temperature, the life of the apparatus is prolonged, since the gas pressure, *e.g.*, of helium, remains constant.

F. G. CLARKE.

P. FREEDMAN and Piezo-electric substances. W. J. RICKETS (B.P. 311,055, 29.3.28) .- Durable piezoelectric masses of any desired shape or size, consisting of large numbers of oriented hemihedral crystals either in juxtaposition or embedded in a suitable medium, are made from such substances as beeswax, Japan wax, carnauba wax, Chinese insect wax, hydrogenated fats and oils, natural resins, zinc oxide, nickel sulphide, cinchonine sulphate, cupreine sulphate, dicamphahexanedione, dicamphahexadiene peroxide, etc. The crystals may be oriented by crystallisation in an electrical field from the melted solid; this method is applicable to the waxes, which are to some extent conductors when melted and insulators when solid. Zinc oxide or nickel sulphide may be oriented by electrolytic deposition. Alternatively, the substance may be deposited from solution on a medium of m.p. 45-85°. Repeated rolling or other mechanical working orients optically active substances in solid solution in celluloid. The piezo-electric masses produced by these methods may be used as diaphragms in telephonic receivers, or for C. HOLLINS. television purposes.

Metallic-vapour lamps for producing ultraviolet radiation. P. FREEDMAN (B.P. 313,726, 22.5.28). —A metallic-vapour arc or spark device having two or more electrodes, of which at least one is composed of vaporisable material, *e.g.*, mercury, and is enclosed within a glass envelope transparent to ultra-violet radiation, *e.g.*, of Uviol or Vitaglass, is arranged in an atmosphere containing, in addition to metallic vapours, one or more gases transparent to ultra-violet radiation, *e.g.*, argon, helium, hydrogen, at a pressure of a few mm. to 60 cm. of mercury. J. S. G. THOMAS.

Metallic-vapour lamps and gaseous-discharge devices. P. FREEDMAN (B.P. 313,292, 23.5.28).—The passage of current from mains at ordinary domestic voltages through the lamp causes a glow discharge which is replaced by an arc discharge owing to liberation of gas or metallic vapour from a suitable source, *e.g.* charcoal or palladium-black, arranged within the lamp and heated by the glow discharge. The gas or vapour evolved is re-absorbed on interrupting the current.

J. S. G. THOMAS.

[Gas-filled] electric discharge tubes [containing mercury]. S. G. S. DICKER. From N. V. PHILIPS' GLOELLAMPENFABR. (B.P. 313,184, 30.1.28).—The quantity of mercury in the filling is so small that its condensation on the wall of the tube does not substantially affect the transmission of ultra-violet radiation. [Stat. ref.] J. S. G. THOMAS.

Carrying-out the oxidation or reduction of electrolytes. SIEMENS & HALSKE A.-G. (B.P. 298,461, 13.3.28. Ger., 8.10.27).—A hollow container having perforated walls and lined with close-mesh wire netting is filled with the oxidising or reducing agent and immersed in the electrolyte. J. S. G. THOMAS.

Partitions for separating the electrolytic products in the fusion electrolysis of chlorides, particularly of magnesium. I. G. FARBENIND. A.-G. (B.P. 309,408, 27.4.28. Ger., 23.12.27).—Wedge-shaped plates of a dense non-conducting ceramic material, *e.g.*, porcelain, having tongue-and-groove joints are built in a straight arch. J. S. G. TROMAS.

[Cutting of] piezo-electric crystals. Assoc. Elec-TRICAL INDUSTRIES, LTD., Assees. of D. G. LITTLE (B.P. 289,471, 25.4.28. U.S., 28.4.27).

[Frosted] electric incandescence lamps [for automobiles]. F. J. ALDERSON (B.P. 298,077, 25.9.28. Can., 1.10.27).

Electric discharge tubes. J. Allen (B.P. 312,971, 3.3.28.)

[Automatic] device for testing the sensitiveness of human skin, substances, and fabrics to irradiation. J. SAIDMAN (B.P. 313,801, 7.8.28).

Purification of gases etc. (B.P. 292,479).—See I. Lubricating oil (B.P. 294,099). Olefines and diolefines (B.P. 313,756).—See II. Cellulose hydrolysis products (B.P. 313,258).—See XVII.

XII.-FATS; OILS; WAXES.

Determination of saponification value [of fats and oils]—a more stable alcoholic potash reagent. D. T. ENGLIS and V. C. MILLS (J. Assoc. Off. Agric. Chem., 1929, 12, 248—250).—The addition of 5 g. of sodium hyposulphite per litre of the alcoholic potash otherwise prepared according to the official method (cf. *ibid.*, 1925, 288) is effective in preventing coloration of the solution. The mixture is shaken, the solid allowed to settle, and the clear supernatant liquid is used. The values obtained with this reagent agree with those obtained with the official reagent. An attempt to find a general inhibitor of colour development during the saponification was unsuccessful. W. J. Boyp.

See also A., July, 785, Apparatus for extraction with filtration (KULMAN). 789 and 790, Oils of elasmobranch fish (HEILBRON and others). 793, Unsaturated acids of sardine oil (TOYAMA and TSUCHIYA). 809, Isomeric ergosterols (HEILBRON and others). Zymosterol from yeast (PENAU and TANRET; FABRE and SIMONNET). 818, Congo copal oil (WESTEN-BERG). 851, Antimony trichloride reaction of fish oils (VON EULER and others). 855, Seeds of Euphorbia Paralias (GILLOT). Composition of spinach fat (SPEER and others). Seed fats of the Umbelliferæ (CHRISTIAN and HILDITCH).

PATENTS.

Saponification of fats and oils. C. BERGELL (B.P. 313,019, 2.2.28).—Complete and rapid saponification is effected by boiling with lye (1-2%) of electrolyte to 56% of fatty acids), and in the second stage adding sufficient water to reduce the fatty acid content to 50% and boiling for a short time. E. LEWKOWITSCH.

Purification of [fatty] oils. H. ODEEN (U.S.P. 1,705,824—5, 19.3.29. Appl., 14.7.26).—Liquid (A) and solid (B) fatty oils containing less than 4% of water are refined by treatment below 60° , e.g., at $30-35^\circ$ for liquid or at $40-55^\circ$ for solid oils, with 2-10% of a dry reagent consisting of sodium hydroxide intimately incorporated with a finely-divided absorbent material, sufficient water being added separately to promote rapid reaction or "break" but leave the oil substantially anhydrous. R. BRIGHTMAN.

Manufacture of vulcanised products from [fatty] oils. IMPERIAL CHEM. INDUSTRIES, LTD., and W. J. S. NAUNTON (B.P. 313,252, 5.4.28).—Largely unsaturated fatty oils are emulsified with water or other non-solvent (e.g., glycerin) with the aid of a suitable emulsifier (e.g., ammonium oleate) and a protective colloid, and vulcanised at above 100° (160—170°) by (colloidal) sulphur or other sulphurising agent; suitable organic accelerators (e.g., reaction product of aniline and heptaldehyde) and activators (e.g., zinc oxide) may be added. E. LEWKOWITSCH.

Manufacture of soap [flakes]. E. FLAMMER and C. KLEBER (U.S.P. 1,715,999 and 1,716,000, 4.6.29. Appl., [A, B] 16.8.26).—See B.P. 265,714; B., 1927, 304.

Production of vitamin preparations. A. W. Owe (U.S.P. 1,715,945, 4.6.29. Appl., 11.3.26. Norw., 11.10.24).—See B.P. 266,905; B., 1927, 339.

Distilling liquids (B.P. 313,254).—See I. Glycerol (B.P. 300,254). Condensation products from fatty acids etc. (B.P. 310,562).—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Determination of active oxygen in oxidising Russian turpentine. K. N. KOROTKOV (Mem. Beloruss. State Acad. Agric., 1927, 5, 16—24).—Oxidation is more rapid in sunlight than in artificial light; Russian turpentine has a higher oxidising value than French. The products (not hydrogen peroxide) are thermostable. CHEMICAL ABSTRACTS.

Composition of oleoresin and colophony from Pinus sylvestris. V. SHKATELOV (Mem. Beloruss. State Acad. Agric., 1927, 4, 113—127).—Fresh oleoresin gave a dextrorotatory product, $[\alpha]_D + 5 \cdot 26^\circ$, which afforded four isomerides. CHEMICAL ABSTRACTS.

Peru balsam. ROTHENHEIM.-See XX.

See also A., July, 746, Determination of particle size by X-rays (BRILL).

PATENTS.

Manufacture of fireproofing material for paints. F. S. VIVAS, ASST. to INTERNAT. FIREPROOF PRODUCTS CORP. (U.S.P. 1,707,587, 2.4.29. Appl., 11.3.27).— Boric acid, zinc sulphate, borax, and sodium tungstate are successively dissolved in water at 55°, and an aqueous solution of gelatin is added; followed by asbestine pulp, titanium oxide, and silica; the paste is mixed with fireproof drying oil, *e.g.*, linseed oil, obtained by dissolving borax, ammonium chloride, boric acid, and sodium tungstate in an equal weight of water and mixing the solution with drying oil at 120°.

R. BRIGHTMAN.

Fireproofing and weather-resisting paint. N. M. HOPKINS, ASST. to BURNOT FIREPROOFING PRODUCTS, INC. (U.S.P. 1,706,733, 26.3.29. Appl., 1.7.22. Renewed 29.5.25).—Upwards of 50% by wt. of borax is incorporated with pigments in a suitable vehicle; *e.g.*, a mixture of borax, white lead, zinc oxide, asbestine, barytes, lead and zinc borates in a medium of boiled linseed oil, treated tung oil, Japan drier, and varnish is claimed.

R. BRIGHTMAN.

Preparation of dammar resin for use in cellulose ester lacquers. H. E. POTTS. From J. SCHEIBER, and L. BLUMER CHEM. FABR. (B.P. 309,701, 15.3.28).— Certain binary or ternary mixtures of solvents of constant b.p. have been found to dissolve the dammarolic acid and α -resene constituents of dammar resin in a condition suitable for immediate use in cellulose ester varnishes, leaving the β -resene in a substantially unswollen state. Suitable mixtures are : benzene-alcohol (67.64:32.36), b.p. 68.25°; toluene-alcohol (38:62), b.p. 76.5°; benzene-alcohol-water (74.1:18.5:7.4), b.p. 64.85°; and toluene-alcohol-water (49:46:5), b.p. 75.1°.

E. HOLMES.

Artificial shellac and its manufacture. E. C. R. MARKS. From Alox Chem. Corp. (B.P. 309,384, 6.10.27). -When a petroleum hydrocarbon mixture in the liquid state, preferably a fuel-oil distillate ($d \ 1 \cdot 38 - 1 \cdot 33$), is treated with air or oxygen-enriched air at 130-160° and at 150-350 lb./in.2, in the presence of about 0.1% of an oxidising catalyst such as a compound of manganese, copper, or iron, petroleum-soluble carboxylic acids followed by petroleum-insoluble hydroxycarboxylic acids are formed. The reaction is continued until the reaction mixture consisting of three layers contains 20-40% of these latter compounds. The top and bottom layers, containing unchanged hydrocarbons and numerous petroleum-soluble materials, and an aqueous solution of acids, respectively, are removed, and the residue is washed, dried, and then distilled at a pressure of 10-20 mm. of mercury and at 140-275°. The higher temperatures give harder and more brittle products, but the less brittle, even "tacky" products E. HOLMES. have high dielectric properties.

Phenol-acetylene resin. H. W. MATHESON and J. A. NIEUWLAND, ASSTS. to CANADIAN ELECTRO PRODUCTS Co., LTD. (U.S.P. 1,707,940, 2.4.29. Appl., 13.5.22).— Phenol is condensed with acetylene, preferably in presence of a mercury salt or oxide as catalyst, at 50—150°. *E.g.*, dry acetylene is passed into phenol (or cresol) containing $2\cdot4-4\%$ of mercurous sulphate and 1-2% of sulphuric acid at 90-115°, until approx. 14% of acetylene has been absorbed. Glacial acetic acid may be used as solvent and the temperature raised to 120-150° at the finish. The product may be combined with aldehydic hardening agent.

Manufacture of coumarone-indene resins. R. L. EMERV, Assr. to NEVILLE CHEM. Co. (U.S.P. 1,705,857, 19.3.29. Appl., 3.3.28).—Crude solvent naphtha No. 2, or other coal distillate containing at least 80% of indene and coumarone, is polymerised with sulphuric acid, and the product is diluted with light petroleum. The resin solution is decanted, washed from acid, and distilled under high vacuum, using live steam to remove heavy oil if required. R. BRIGHTMAN.

Lead [paint] coating of articles. O. BRANDEN-BERGER, Assr. to ZAHNER & SCHIESS & Co. (U.S.P. 1,717,140, 11.6.29. Appl., 17.8.27. Ger., 30.8.26).— See B.P. 276,643; B., 1928, 936.

Printing ink for producing designs [in colour] on rubber or other like materials. H. N. MORRIS (U.S.P. 1,715,209, 28.5.29. Appl., 8,8.28. U.K., 3.5.27). —See B.P. 296,461; B., 1928, 827.

Treatment of lamp blacks etc. (B.P. 300,610). Tar products (B.P. 312,372).—See II. Esters of organic acids (U.S.P. 1,706,639).—See III. Pigments (B.P. 310,354).—See IV. Tungsten and molybdenum pigments (B.P. 313,209).—See VII. Piezo-electric substances (B.P. 311,055).—See XI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Coagulation phenomena in Hevea [rubber] latex. VIII. Influence of some heavy-metal salts on coagulation and coalescence. O. DE VRIES and N. BEUMÉE-NIEUWLAND (Med. Proefstat. Rubber, No. 40; Arch. Rubbercultuur, 1929, 13, 125-218).-Manganese sulphate and nickel sulphate exhibit normal coagulation phenomena, having no influence on the spontaneous coagulation of latex by bacterial action, distinct coagulating power of their own, and accelerative influence on coagulation by acetic acid; except in the case of the nickel salt at higher concentrations they also fail to inactivate coalase. On the other hand, copper sulphate and mercuric chloride are abnormal in inhibiting spontaneous bacterial coagulation, inactivating coalase and retarding coalescence in acetic acid coagulation. Of all these salts mercuric chloride has the most marked coalescing power in itself.

D. F. Twiss.

Thermal changes accompanying the spontaneous contraction of raw rubber. H. SACHSE (Gummi-Ztg., 1929, 43, 2216—2218).—Making use of a modified "ice calorimeter" employing diphenyl ether instead of water, measurement is made of the heat of swelling (with toluene) of samples of rubber of different age or pretreatment; from a comparison of the results with these in their natural state and after moderate heating it is possible to assess the heat change associated with the change in density which occurs spontaneously in storage. The greatest value, 6·4 g.-cal./g., was obtained with a sample of unworked crêpe rubber 10 years old. D. F. Twiss.

R. BRIGHTMAN.

PATENTS.

Production of synthetic rubber. E. KLEIBER and P. GILARDI (B.P. 312,741, 26.3.28).-Petroleum is treated with an oxidising agent, e.g., nitric acid, and, after neutralisation, is distilled repeatedly over rosin. After treatment of the distillate with alkali and removal of the aqueous lowermost layer the liquid can be converted by acetic acid or formaldehyde, together with rubber or the like as catalyst, into a syrupy liquid from which a vulcanisable elastic mass is obtainable by D. F. Twiss. precipitation with acetone or alcohol.

Manufacture of synthetic rubber. I. G. FARBENIND. A.-G. (B.P. 286,272 and Addn. B.P. 300,167, [A, B] 1.3.28. Ger., [A] 2.3.27, [B] 7.11.27).-Isoprene, butadiene, dimethylbutadiene, or analogues or mixtures of these are polymerised in the presence of an aqueous suspension or a colloidal solution or an aqueous dispersion medium, containing, e.g., soaps, albumins, or carbohydrates, in the presence of suitable electrolytes (excluding alkalis) and, if desired, in the additional presence of oxygen, ozone, or a substance yielding oxygen, or of other accelerators of polymerisation, or of an inert gas. D. F. Twiss.

Manufacture of artificial rubber. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 312,949, 2.1.28).-Diolefines are polymerised in the form of creamy or gelatinous mixtures with aqueous solutions, these mixtures containing at least 75% by vol. of the hydrocarbons. Additional substances may also be present, e.g., polymerising agents such as oxidising agents, buffer mixtures, and materials capable of modifying the surface tension of emulsions. D. F. Twiss.

Manufacture of polymerisation products of diolefines. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,188, 9.2. and 6.7.28).-The polymerisation of diolefines in the presence of latex or similar vegetable saps is effected in the presence of oxidising or emulsifying D. F. Twiss. agents.

Manufacture of an elastic caoutchouc-like body. J. BAER (B.P. 298,889, 1.6.28. Switz., 15.10.27).-An elastic mass capable of being milled, compounded, moulded, and vulcanised like rubber is obtained by submitting an aldehyde, preferably formaldehyde, or a mixture with halogen-substitution products of paraffin hydrocarbons, to treatment with solutions of polysulphides of the alkali or alkaline-earth metals.

D. F. Twiss.

Manufacture, from latex, of an artificial guttapercha and a non-hygroscopic rubber. E. S. ALI-COHEN (B.P. 313,373, 5.9.28) .- By mixing an emulsion of resins or waxes (> 100 pts.) in a soap solution with latex (rubber 100 pts.) and coagulating with alum so as to get more than 15 pts. of aluminium soap in the product, a material resembling gutta-percha is obtained. With other proportions the product is less satisfactory as a substitute for gutta-percha, but is still water-repellent and possesses outstanding technical and electrical properties. D. F. Twiss.

Incorporation of fillers and other compounding ingredients, and of gas black, into rubber latex or the like. DUNLOP RUBBER CO., LTD., W. H. CHAPMAN, and P. D. PATTERSON (B.P. 313,027-8, 5.3.28).-(A) Compounding ingredients such as softeners, vulcanising agents and accelerators, reinforcing agents, etc. are incorporated in a water-insoluble plastic carrier such as rubber, reclaimed rubber, bitumen, or clay, or a mixture of these, the resulting mass then being dispersed in an aqueous medium; this dispersion is then mixed with latex. (B) Gas black is introduced into latex as in (A). D. F. Twiss.

Heat-plastic derivative of rubber. W. C. GEER and H. A. WINKLEMANN, Assrs. to B. F. GOODRICH Co. (U.S.P. 1,705,757, 19.3.29. Appl., 28.4.25).-Crude rubber is mixed with 3-5% of a softener, e.g., pine tar, turpentine, coal-tar distillates, phenol, naphthalene, petroleum distillates, vegetable oils and waxes, etc., the isomerising agent, e.g., sulphuric acid, is added, and the mix is heated and finally masticated. Alternatively, organic sulphonic acids or sulphonyl chlorides may be used in place of the sulphuric acid and part of the softener. R. BRIGHTMAN.

Thickening and treatment of latex. D. S. SUTTON, and VEEDIP, LTD. (B.P. 312,947, 2.1.28) .- By adding adjusted proportions of zinc oxide to latex, e.g., 1% to latex containing 0.75-1% of ammonium hydroxide, the viscosity of latex can be increased. It is convenient first to form a paste of the zinc oxide with ammonia solution and to mix this intimately with a portion of the latex before introducing it into the bulk. The thickening is assisted by heating to 95° and stirring. If the proportion of ammonia in the latex is undesirably high it can be previously reduced by heating or neutralisation with dilute acids. D. F. Twiss.

Vulcanisation of rubber. M. L. WEISS, Assr. to DOVAN CHEM. CORP. (U.S.P. 1,705,948, 19.3.29. Appl., 25.7.25).-s-Diarylguanidines, in which at least one of the aryl groups is disubstituted, are used as accelerators. The compounds claimed include the s-di-m-xylyl-, s-di-a-naphthyl-, s-phenyl-m-xylyl-, s-phenylcumyl-, s-dicumyl-, and s-phenyl-a-naphthyl-guanidines.

R. BRIGHTMAN.

Treatment [vulcanisation] of rubber. E. G. BRIDGWATER and A. S. SLACK, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,705,712, 19.3.29. Appl., 3.7.26).-The products obtained by condensing 2 mols. of a primary aromatic amine with 1 mol. of an aliphatic aldehyde and treating the resultant methylenedi-imine with a higher fatty acid are incorporated in rubber mixes for vulcanisation. E.g., methylenediphenylimine, CH₂(NHPh)₂, from aniline and formalin at 70-80°, is mixed at 70-80° with molten stearic acid, and, after cooling, the mixture is incorporated with rubber stock.

R. BRIGHTMAN.

Manufacture of vulcanised rubber. GOODYEAR TIRE & RUBBER CO., Assees. of J. TEPPEMA (B.P. 298,622, 5.6.28. U.S., 13.10.27).-Vulcanisation is accelerated by a condensation product of an amine, e.g., aniline, and a hydroxyaromatic aldehyde such as $\beta\-hydroxy-$ naphthaldehyde. D. F. Twiss.

[Rubber] tube lining. J. SCHWAB, JUN. (U.S.P. 1,715,213, 28.5.29. Appl., 4.1.25. Renewed 6.10.28). -A vulcanising rubber solution (30 pts.) is mixed with melted vulcanised rubber (30) and then with honey

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(40), the mixture then being heated to approx. 127° to produce a self-healing composition for inflatable rubber tubes. D. F. Twiss.

Manufacture of rubber articles. U. PESTALOZZA, Assr. to Soc. ITAL. PIRELLI (U.S.P. 1,717,248, 11.6.29. Appl., 8.7.27. It., 31.1.27).—See B.P. 284,608; B., 1929, 612.

Manufacture of sponge rubber. R. J. NOAR (U.S.P. 1,717,168, 11.6.29. Appl., 1.6.28. U.K., 19.7.27). --See B.P. 284,938; B., 1928, 277.

Treatment of lampblacks etc. (B.P. 300,610).—See II. Vulcanised products from oils (B.P. 313,252). See XII.

XV.—LEATHER; GLUE.

Acidity control of chrome[-tanned] leather. J. S. MUDD and P. L. PEBODY (J. Soc. Leather Trades' Chem., 1929, 13, 205-214).—For the determination of acid sulphates in the aqueous extract, 15 g. of the fatfree leather are soaked overnight in 150 c.c. of distilled water, boiled under a reflux for 45 min., cooled to 18°, filtered, and after determining its $p_{\rm H}$ value, an aliquot portion of the filtrate is titrated with 0.1N-sodium hydroxide, using phenolphthalein as indicator. The content of acid sulphates is calculated from the value obtained by titration. In determining the ionogenic sulphate groups (cf. B., 1927, 261), 3 g. of the original leather are extracted with 50 c.c. of a 4% solution of pyridine for 1 hr. in a shaking machine, the used solution is filtered, and the extraction repeated. After filtering, the leather is washed with water, the combined extracts and washings are concentrated, acidified with hydrochloric acid, and the sulphate is determined gravimetrically. Tests on different experimental chrome-tanned leathers have shown that the $p_{\rm H}$ value of the aqueous extract varies inversely with the ionogenic sulphate groups and increases with increase in the basicity of the chrome tanning liquors used. It is also shown that as the amount of neutralising agent was increased, the ionogenic sulphate groups were diminished in inverse proportion, but the "complex-bound" sulphate groups decreased only slightly. The quantity of fat entering the leather during fat-liquoring diminished rapidly at first (up to 2% of borax) and then increased slightly. Sodium hydroxide, sodium carbonate, and borax had similar neutralising powers, but sodium phosphate had very little. The sodium hydroxide did not attack the complex-bound sulphate radicals at the concentration D. WOODROFFE. used.

Differentiation of skin- and bone-glue with the aid of sulphosalicylic acid precipitation, and the applicability of the sulphosalicylic acid test in the testing of glutin preparations. O. GERNGROSS and H. MAIER-BODE (Kolloid-Z., 1929, 48, 184—191).—Experiments on 17 different kinds of glue show that precipitation with sulphosalicylic acid provides a simple and safe method of distinguishing between skin- and bone-glue, for whilst the former gives a viscous liquid precipitate of relatively small volume, bone-glue gives a flocculent precipitate of large volume. The test can further be used to assess the value of a mixed glue, according to the volume of precipitate obtained. The different effects obtained with skin- and bone-glue are probably not due to differences in the chemical substance of the original material, but are caused by the different kinds and quantities of degradation products of glutin produced under the different conditions of manufacture. Other precipitation reagents, such as thiocyanate and sulphuric acid, acid sulphite-cellulose liquor, and neutral sodium sulphate, also distinguish between these glues, but their use is not so advantageous as that of sulphosalicylic acid. E. S. HEDGES.

See also A., July, 764, Theory of vegetable tanning (DE JONG).

PATENTS.

[Autoclave] treatment of hides in production of leather. C. W. NANCE (B.P. 310,823, 1.12.27).-Hides are suspended in an autoclave provided with a ram to compress any liquid and with internal tubes extending from below a false bottom to a spray pipe in the upper part of the autoclave for the circulation of the liquors with the aid of heat. After pretreatment, which may or may not be carried out in the autoclave, the hides are subjected to a high vacuum, and while still in the autoclave are treated with a tan liquor from which all the air has been removed, and then, while still in contact with the liquor, are subjected to high pressure. A subsidiary autoclave may be provided above the main one to contain a supply of tan liquor under vacuum for the latter. A chamber having a baffle plate is fitted between the main autoclave and the vacuum apparatus to act as D. WOODROFFE. a foam trap.

Manufacture of glutinous products [adhesives]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 313,101, 5.1.28).—Yeast or the product of yeast autolysis is heated for less than 1 hr. with water, under pressure if desired, or for less than $\frac{1}{2}$ hr. with aqueous solutions of weak alkalis, *e.g.*, ammonia, alkaline-earth hydroxides, of weak acids, *e.g.*, carboxylic acids, phosphorus acids, hydrogen sulphide, or of salts of these acids and bases. The solutions obtained are filtered and concentrated, the products being used alone or in admixture with other adhesives. L. A. Coles.

Production of leather, [gas-tanned] leather, and chrome-tanned leather for dyeing. R. H. PICKARD, D. J. LLOYD, and A. E. CAUNCE (U.S.P. 1,715,621-3, 4.6.29. Appl., [A-c] 22.8.25. U.K., [A-c] 27.8.24).--See B.P. 243,089-243,091; B., 1926, 101.

Production of washable printings on leather. C. S. FRIEDMAN, ASST. to ANC. ETABL. A. COMBE & FILS & CIE. (U.S.P. 1,716,120, 4.6.29. Appl., 13.4.23. Fr, 30.11.22).—See B.P. 207,778; B., 1924, 268.

Improving animal materials (B.P. 294,890).— See VI.

XVI.—AGRICULTURE.

Composition of some Montenegrin soils. E. BLANCK and H. KEESE (Chem. Erde, 1929, 4, 157—166). —Chemical and mechanical analyses of a number of surface soils from Montenegro show that these with only a few exceptions belong to the usual Mediterranean redearth type, characterised by low silica and relatively high alumina and ferric oxide. H. F. HARWOOD. Do soil samples become acid on drying ? B. AARNIO (Z. Pflanz. Düng., 1929, 8B, 37—39).—A reply to Brenner (cf. B., 1927, 309; 1928, 618, and following abstract). The reaction of certain Finland soils alters considerably on drying, particularly those containing sulphides from the region examined by Brenner. The necessity for using fresh soil samples for examination is emphasised. A. G. POLLARD.

Alleged acidification of soil samples on drying. W. BRENNER (Z. Pflanz. Düng., 1929, 8B, 39-42) — The notable changes in the reaction of soils during drying recorded by Aarnio (B., 1929, 569) are ascribed to the use of an enclosed drying chamber, in which, and in the laboratory containing it, substantial amounts of sulphur dioxide were present. Experimental data are given and the relatively insignificant changes of reaction resulting from drying are confirmed. A. G. POLLARD.

Chemical analysis of soils and the molecular ratios. K. UTESCHER (Z. Pflanz. Düng., 1929, 13A, 265-274).-Methods of examination previously described (B., 1928, 582) are extended to some Swedish and Dutch soils. In these soils the methods of the Prussian Geological Institute yield similar results to those of the International Society, in which the sample is treated with ten times its weight of 20% hydrochloric acid. The former process is simpler, but may be affected by the presence of acid-soluble minerals which are but slightly weathered. Hot concentrated hydrochloric acid decomposes the weathered silicate complexes, but weaker acids cannot be utilised successfully for this purpose. A. G. POLLARD.

Use of dialysis and electro-ultrafiltration for the determination of the nutrient requirement of soils. P. KÖTTGEN and R. DIEHL (Z. Pflanz. Düng., 1929, 8B, 65-105).-The principles of electrodialysis are applied to a study of the rate of dissolution of soil constituents concerned in plant nutrition. The apparatus of Gutbier and Schieber, of Golodetz, and, more particularly, a modification of the Bechhold electro-ultrafiltration apparatus are utilised for the purpose. Buffer curves are prepared from measurements of the rate of dialysis of hydrogen ions from the soil complex, and similar measurements for phosphates are indicative of the soil's capacity to maintain a supply of soluble pho phate for plant growth. The immediate need of soils for the other, more soluble plant nutrients may rapidly be determined by this means. Fertiliser requirements so calculated were more closely in accord with the results of field trials than values obtained by the customary chemical methods or by Neubauer's seedling method. The methods and apparatus described are suitable for the examination of both mineral and forest soils, and in the latter may be utilised to examine the state of humification of the organic matter.

A. G POLLARD.

Methods for the determination of the nutrient requirement of soi's for phosphate and potash. E. BECKER (Z. Pflanz. Düng., 1929, 13A 274-294).— There is a general agreement between the results obtained by the methods of Sigmond, of Lemmermann, and of Neubauer, but certain discrepancies are observed and

examined. The percentage solubility and the "relative solubility" by Sigmond's and Lemmermann's methods agree well in acid soils, but diverge as the chalk content of the soil increases. Citric acid dissolves much less soil phosphate than nitric acid even when the quantities used are calculated on a basicity basis. Sigmond's values give the better representation of the phosphate actually utilisable by plants. Neubauer's method indicates that acid soils contain more soluble phosphate than alkaline ones, whereas in Sigmond's process the reverse is indicated. The Sigmond values are considered the more satisfactory. The secondary effect of the soil reaction on the ability of the plant to utilise nutrients, even when present in a normally assimilable form, must be considered in these cases. The presence of much carbonate in soil reduces the plant's power of utilising phosphate, although such conditions are coincident with apparently high solubility. The exchangeable potash in soil (Hissink) is so closely related to the assimilable potash as to afford a satisfactory means of calculating this latter value. The methods of Sigmond and of Neubauer yield generally parallel results for assimilable potash. No relationship exists between the amounts of assimilable potash and the reaction or the "lime condition" of soils. A. G. POLLARD.

Utilisation of increasing applications of nitrogen by various species of winter wheat. J. WEIGERT and F. Fürst (Z. Pflanz. Düng., 1929, 8B, 265-303).-Numerous field trials extending over 7 years with a number of varieties of winter wheat are recorded. The effect of nitrogen manuring is most apparent in the period from the middle to the end of April. The effects on the characteristic growth of the different varieties is recorded. The variations in crop yields following fertiliser treatment were generally similar to those obtained with rye (B., 1929, 447), but the relative yields were increased to a much greater extent in the case of wheat. The weight per 1000 grains of wheat increased with the smaller dressings of nitrogen (25-40 kg./hectare), but with larger applications there was a steady decline. A. G. POLLARD.

Effect of one element of plant food on the absorption by plants of another element. J. F. BREAZEALE (Ariz. Agric. Exp. Sta. Tech. Bull., 1928, 19, 465-480). —With wheat, nitrate stimulates the absorption of potassium on account of the demand for the building-up process Absorption of nitrogen is not affected by the presence of potassium, phosphorus, or calcium sulphate, nor that of calcium by nitrogen, potassium, or phosphorus. The absorption of phosphorus is slightly increased by the presence of nitrogen, and diminished by an excess of calcium sulphate.

CHEMICAL ABSTRACTS.

See also A., July, 854, Influence of complete fertiliser on cultivated plants (BLANCHARD and CHAUSSIN). 855, Effect of boron deficiency on growth of tobacco plants (MCMURTREY).

PATENTS.

Colouring foliage (U.S.P. 1,714,838).—See VI. Colloidal sulphur (U.S.P. 1,705,862).—See VII. Seed grain immunising media (B.P. 287,093).—See XX.

XVII.—SUGARS; STARCHES; GUMS.

Pan-boiling control [of cane syrups]. S. J. SAINT (Tropical Agric., 1928, 5, 279-283).-Pan-boiling control according to Claassen's methods was instituted in a West Indian factory, the concentration of the motherliquors being determined by the Zeiss pan refractometer. The optimum coefficient of supersaturation was found to be 1.15 for first strikes, and 1.2 for seconds and thirds. Tables were constructed for the three strikes, from which, given the level of the massecuite in the pan and the vacuum, the Brix could be read, which figure was compared by the panman with that found from the refractometer. If the concentration as shown by the refractometer was too high, then the inlet valve was opened more, whilst if the concentration was too low the valve was closed until the correct concentration was registered. J. P. OGILVIE.

Prevention of sugar losses during milling using chlorine. J. N. SARKAR (Rev. Agric., Mauritius, 1928, 258—263).—Disinfection by chlorine has been found of great practical benefit in lessening losses during extraction and manufacture (cf. Haldane, B., 1927, 920). A wash-down of the crusher, mills, gutters, channels, mill-beds, and strainers with a solution of 1 pt. of chlorine in 500 pts. of water before starting operations and every time after stopping work is recommended. Similarly, measuring tanks, juice-heaters, and defecators should be washed with the same solution at least once a day. J. P. OGILVIE.

Clarifying diffusion juice with magnesium sulphate. V. I. KUZNETZOV (Nauch. Zapiski, 1928, 7, 158—163).—Magnesium sulphate may replace carbon dioxide; magnesium hydroxide and calcium sulphate are precipitated, the latter being eliminated at the b.p. The amount of lime required is small.

CHEMICAL ABSTRACTS.

New method of defecating cane juices. G. H. DE VRIES (Archief, 1928, 36, 263-267; Internat. Sugar J., 1929, 31, 320).—Instead of adding milk of lime to the juice, the procedure in which this order is reversed is considered advantageous, laboratory tests having shown that the clarification was improved, there being a greater volume of precipitate, pointing to a more thorough elimination of non-sugars. Moreover, the juice finally obtained was both lighter in colour and clearer. J. P. OGILVIE.

Determination of the end-point in carbonatation [of beet juice]. O. SPENGLER and C. BRENDEL (Z. Ver. deut. Zuckerind., 1929, 79, 39—43).—In order to determine the point at which in the carbonatation of beet juice all the alkalis are converted into carbonates (the optimum alkalinity for the precipitation of calcium salts), Winkler's method of titrating the alkalinity before and after the addition of barium chloride cannot be used, owing to the reaction being incomplete, but the following process is recommended :—To the still hot liquid are added 5 drops each of phenolphthalein solution (1:100) and of a 15% solution of calcium chloride, and, after shaking, the colour of the solution is observed after 15—30 sec. If this is a dull pink, the carbonatation has reached the right stage; if colourless, less carbon dioxide is required; whilst if a distinct pink or red colour is observed, further carbonatation is necessary. J. P. OGILVIE.

Sugar content of carbonatation scums. O. SPENGLER and C. BRENDEL (Z. Ver. deut. Zuckerind., 1929, 79, 61—76).—Filter-press cake was triturated with hot water for 1 hr., filtered and washed, and the sugar determined in the total liquid obtained, when the amount was found to be considerably more (about 150%) than in the original press-cake when examined by the usual way, e.g., using the ammonium nitrate method (cf. Kunz., B., 1925, 255; Orth, B., 1927, 711), the discrepancy being now explained by the presence in the cake of colloidal matter which had the effect of retaining a large proportion of sugar unless digested with an excess of hot water. J. P. OGILVIE.

Occurrence of zinc in products of sugar manufacture. O. SPENGLER and K. ZABLINSKY (Z. Ver. deut. Zuckerind., 1929, 79, 251-262) .- Sugars of various kinds from German refineries contained 0.6-3.3 mg. of zinc per kg. Molasses from raw beet-sugar factories, white-sugar factories, and refineries contained 49, 15, and 18 mg./kg., respectively. The zinc is derived mainly or entirely from the original beets, which contain about 2-3 mg./kg. Prohibition of the use of zinc-coated vessels in the manufacture of foodstuffs, as has been suggested [in Germany], would therefore not result in zinc-free sugar, and it would greatly embarrass the refineries. Experiments described show that a zinc coating forms a practically perfect protection for iron against attack by sugar solutions, whilst tinned iron corrodes very readily and colours the sugar solutions. Zinc in traces is a normal constituent of foodstuffs, and the proportions found in refined sugar are much less than those found in grain products and eggs, and no greater than those naturally present in milk.

J. H. LANE.

Determination of hydrogen-ion concentration; application in sugar manufacture. I. A. KUKHARENKO and B. G. SAVINOV (Monograph, 1928, 11–147).— A review. CHEMICAL ABSTRACTS.

Limit of sugar extraction from cossettes in the diffusion process. S. S. KUTZEV (Bull. Sakharotresta, 1928, No. 9, 65-68).

Quality and quantity of [sugar liquor] washwater from bone-black filters. M. I. NAKHMANO-VICH and J. F. ZELIKMAN (Nauch. Zapiski, 1928, 7, 201-222).

Waste waters from beet-sugar factories. BACH.— See XXIII.

See also A., July, 772, Concentration of sugar and rate of hydrolysis in an acid medium (Colin and CHAUDUN). 796, Action of hydrogen sulphite solutions on sugars (MARUSAWA and others). 797, Compounds of alkaline-earth hydroxides with sugars. (MACKENZIE and QUIN).

PATENTS.

Treatment of sugar solutions to increase the sucrose content. W. H. DICKERSON, ASST. to INDUSTR. WASTE PRODUCTS CORP. (U.S.P. 1,713,118, 14.5.29. Appl., 29.1.23. Renewed 2.10.28).—The sugar solution is sprayed into a drying gas heated to a temperature above the b.p. of the solution, and the desiccated product, in which the ratio of sucrose to invert sugar is greater than that of the original sugar solution, is immediately cooled to prevent decomposition.

F. R. ENNOS.

Clarification of cellulose hydrolysis products. INTERNAT. SUGAR & ALCOHOL CO., LTD. From Soc. INDUSTR. DE LA CELLULOSE (B.P. 313,258, 14.4.28).— After conversion of cellulose into sugar by means of hydrochloric acid, the whole is clarified by electrolysis at a low potential of 2—3 volts in a diaphragm cell. The sugar solution flows continuously into the anode chamber, whilst the cathode space contains hydrochloric acid, or sugar and hydrochloric acid, at a concentration corresponding to that of the product under treatment.

F. R. Ennos.

Manufacture of extra-fine soft granulated sugar. B. H. VARNAU and T. B. WAYNE (U.S.P. 1,715,049, 28.5.29. Appl., 4.9.26).—See B.P. 294,800; B., 1928, 832.

Adsorbing agents (U.S.P. 1,715,439).-See VII.

XVIII.—FERMENTATION INDUSTRIES.

Technological method for the study of yeast. E. E. WERNER and W. SIEDHOFF (Cereal Chem., 1929, 6, 196—201).—The quality of the yeast is judged from a modified baking test, carried out on the Werner system, in which two loaves are baked, one with excess of sugar, and one without sugar. The interpretation of the results is discussed. E. B. HUGHES.

Determination of the reliability and fermentative powers of wine yeasts. E. ARAUNER (Pharm. Ztg., 1929, 74, 713).—Two 150 c.c. samples of sweetened must are sterilised in boiling water and cooled. One is then treated with the ferment under examination and the other with a standard culture, and the specimens are then placed side by side in a warm place at 20—25°. Satisfactory yeasts ferment in 5—6 days and the fermentation is finished in 8—10 days. If fermentation is not evident in 8 days, moulds may appear on the surface and acetic acid may be detected by its smell. The fermented liquors must possess a pleasant odour.

S. COFFEY.

Brewing barley. Y. NAKAMURA (J. Fac. Agric. Hokkaido, 1928, 23, [2], 29-86).—Determinations of protein, nitrogen, ash, and mol. wt. of Chevalier, Hokudai No. 1, and Golden Melon barleys are recorded, and the fats and starches were examined.

CHEMICAL ABSTRACTS.

Direct production of absolute alcohol from the fermented mash. E. SZILAGYI (Z. Spiritusind., 1929, 52, 199).—The apparatus designed by Guinot has been improved, and it is now possible to obtain pure absolute alcohol directly from a mash containing 6—7% of alcohol with a consumption of 350 kg. of steam per hectolitre of alcohol. The improvement consists in the method of connecting the distillation column to the dehydrating column so that the latter may be completely heated by the highly concentrated alcoholic vapour from the former. In the ordinary form of plant the temperature of the alcoholic vapour is 78°, and is sufficiently high to ensure the partial heating of the dehydrating column, which varies in temperature in the azeotropic method from 60° to 81° according to the nature of the liquid added for the withdrawal of the water. By moderately increasing the pressure of the vapour by means of a column of water 5 m. high, the temperature of the alcoholic vapour is raised to 89°, which is sufficiently high to allow complete heating of the dehydrating column. C. RANKEN.

Determination of the volatile acidity of wines. D. COSTA [with C. CANNELLA and F. TROST] (Annali Chim. Appl., 1929, 19, 189-213).-The various methods and forms of apparatus suggested for this determination are discussed, and experiments are described which show that, from 50 c.c. of wine containing up to 0.5%of volatile acidity, all the acetic acidity passes over in 300 c.c. of distillate. The recommendation that, even with wines containing 0.2% of volatile acid, 25 c.c. diluted to 50 c.c. should be distilled, is hence unnecessary. To obtain rapid elimination of the acetic acid it is advisable to distil 50 c.c. directly to about 25 c.c. before the current of steam is started. The whole operation should be completed in 30-40 min., and during the distillation the intensity of the heating should be maintained as nearly constant as possible and steam pressure should be the minimum necessary.

T. H. POPE.

See also A., July, 847, Fermentative formation of allantoic acid from allantoin (Fosse and BRUNEL). Influence of formaldehyde on dilute malt extracts (MÜLLNER). Activation of oxidase preparations (PUGH). Influence of $p_{\rm H}$ on glycerophosphatase (INOUYE). Cataphoresis of glycerophosphatase (KOBAYASHI). 849, Mechanism of alcoholic fermentation (KLUYVER). Yeast stable towards boiling (RENNING). Co-zymase (VON EULER and MYRBÄCK). Growth and fermentative power of wine yeasts (KROEMER and KRUMBHOLZ; KRUMBHOLZ and SOOS). Accelerating action of lanthanum salts on fermentation (RICHET and BRAUMANN).

PATENTS.

Preparation of yeast compositions. B. M. DAwson, Assr. to FLEISCHMANN Co. (U.S.P. 1,706,564—6, 26.3.29. Appl., 30.6.22).—Mixtures, preferably freshly prepared, of yeast with (A) milk and possibly malt extract, (B) fruit juice and possibly milk, and (c) malt extract and possibly fruit juice, are atomised into a hot, but not lethal, gas, whereby the yeast is dried without being killed. The compositions are stable since the dry particles of live yeast are coated with the other dried ingredients. F. G. CLARKE.

Glycerol (B.P. 300,254).—See III.

XIX.-FOODS.

Manganese in cereals and cereal mill products. J. DAVIDSON (Cereal Chem., 1929, 6, 128-133).--No correlation was found between manganese and ash contents or between manganese content and diastatic properties of the cereals studied. Hard winter and red spring wheats were higher in protein and lower in manganese than soft wheats. Large variations in manganese content of oats and maize were probably due to effect of locality. The removal of the germ and outer parts of the grain in milling results in low content of ash and manganese. Both uncoated rice and maize, which are associated with beri-beri and pellagra, respectively, are extremely poor in manganese. W. J. Boyp.

Phosphorus of grains. J. E. GREAVES and C. T. HIRST (Cereal Chem., 1929, 6, 115—120).—The total phosphorus of wheat, oats, and barley increases as the irrigation water applied during the growing stage increases, the increase being mainly organic phosphorus. It also varies with the soil on which the grain is grown. In maize the increase on increased irrigation is slight and mainly due to inorganic phosphorus. In wheat about $6\cdot3\%$ of the total phosphorus is inorganic, in oats $9\cdot8\%$, in barley $9\cdot6\%$, and in maize $12\cdot2$ —16%. The addition of barnyard manure to the soil increases the proportion of inorganic phosphorus in the maize kernel. W. J. BOYD.

Carotinoid pigments of flour. C. G. FERRARI and C. H. BAILEY (Cereal Chem., 1929, 6, 218-240).-It is considered that for the colorimetric examination of flour such methods as those using the Lovibond tintometer or comparing the colour of petroleum spirit extracts of the flour with that of standard colour preparations are not sufficiently accurate. Careful measurements have been made by means of a spectrophotometer, the instrument used being the Keuffel and Esser colour analyser (cf. A., 1925, ii, 1193). By measuring the transmittancy of petroleum spirit solutions of carotin for a wave-length $\lambda = 435 \cdot 8$ mµ, the concentration of carotin can be calculated from the expression $bck = -\log_{10}T$, where b is the thickness in c.c. of the layer of solution, c is the concentration of substance (carotin) in mg. per litre, k the specific transmissive index, and T is the transmission (%). A graph is given for this expression calculated from the data obtained by Schertz (cf. B., 1924, 288), and from which the carotin content of a solution in petroleum spirit can be obtained in mg. per litre, and thence calculated back to the flour used. The absorption spectra of carotin in petroleum spirit and petroleum spirit extracts of flour have been compared, and results confirm the work of Monier-Williams (B., 1912, 1144) that these are practically identical. It is also shown that the presence of a small quantity of another pigment like xanthophyll would not cause any appreciable error in the method described for the colour measurement of flour. Details of procedure for the determination are to be given in a later paper. E. B. HUGHES.

Wheat and flour studies. XV. Use of the viscosimetric method for measuring the proteoclastic activity of flours. A. H. JOHNSON, B. L. HERRINGTON, and S. G. SCOTT (Cereal Chem., 1929, 6, 182–196).—After auto-digestion of the flour (12 or 18 g. in 100 c.c. of water with toluene) it is made up to 1 litre. It is thrice washed, once at 40° and twice at 25°, with 1 litre of water rendered free from carbon dioxide, decanting between each washing. The residue is made up to 100 c.c., acidulated with 0.5 c.c. of 20% lactic acid, and its viscosity determined by the MacMichael viscosimeter. The changes in viscosity produced by auto-digestion are appreciable, the decrease being rapid in the early stages. The change in viscosity is much greater than the degree of change in the aminonitrogen. Low-grade flours give the greatest changes in viscosity. E. B. HUGHES.

Modifications of Rumsey's method for determination of diastatic activity in flour. J. G. MALLOCH (Cereal Chem., 1929, 6, 175-181).-The following modifications of Rumsey's method (Amer. Inst. Baking, Bull. No. 8, 1922) are proposed: (a) Control of acidity, using a buffer solution composed of 2 pts. of 0.1N-hydrochloric acid, 8 pts. of a solution of 21.008 g. of crystallised citric acid and 200 c.c. of Ncaustic soda in 1 litre, in order to produce the optimum $p_{\rm H}$ of 4.7. The buffer reagents have no other effect on the diastatic activity. (b) Correction for volume of flour. The correction for 10 g. of flour is taken as 7 c.c. (c)The procedure for determination of the blank is altered by using acid in this as in the determination itself, allowing the reaction to proceed for 60 min. at 27° and then determining reducing sugars immediately. A method is also given for obtaining diastase-free flour. E. B. HUGHES.

Hydrogen-ion determination in flour and bakery products. E. O. WHITTIER and E. GREWE (Cereal Chem., 1929, 6, 153-162) .-- Watson's method (B., 1928, 33) for the determination of the $p_{\rm H}$ of cheese has been applied to flour and bakery products. The flour or crumb is mixed with sufficient quinhydrone to give the mix a grey-black colour, water being added to form a stiff dough if the crumb itself will not cohere. Portions of this mixture are pressed on to the gold electrode and then moulded into " cocoons " about 2.5 cm. long and 1 cm. diam., so that the electrode extends about 2 cm. into the cocoon, and after 1 hr. the $p_{\rm H}$ is measured. The water added to aid coherence does not affect results, identical values having been obtained for dry and moistened crumb. This "ball" method gave results with various bakery products differing from those given by aqueous extracts of the material, both by the Bailey hydrogen electrode and the capillary quinhydrone electrode, though relative values for the different materials were of the same order whichever electrode was used. It is concluded that results obtained by the "ball" quinhydrone method are more truly representative of actual hydrogen-ion concentration. E. B. HUGHES.

Determination of degree of acidity of flours by colorimetric spot-test. R. HERTWIG and J. S. HICKS (Cereal Chem., 1929, 6, 162—163).—The progress of the "maturing" of flours with "Beta Chlora" is followed by means of the coloration produced by drops of dye reagents of various $p_{\rm H}$ ranges when placed on the surface of samples of standard and test flours placed in depressions of porcelain test plates. F. G. CROSSE.

Hygroscopicity in flour ash and a discussion of direct ash weighing. L. U. LIDDEL (Cereal Chem., 1929, 6, 134-139).—The hygroscopicity of flour ash affects the results of ash determinations very little, and direct weighing of the ash, dumped on the balance pan, gives more uniform results than weighing the ash in the crucible. W. J. BOYD.

[Laboratory] gluten-washing machine. T. R. JAMES (Cereal Chem., 1929, 6, 244-246).—A machine

for analytical washing of flour glutens takes a 10-g. sample of flour, which is made up into a dough and allowed to remain under water as usual. It is then placed in the machine, which imitates the action of squeezing a dough ball by hand in a flow of water. E. B. HUGHES.

Single-figure estimates of baking scores. R. K. LARMOUR (Cereal Chem., 1929, 6, 164-174).—The numerical score values to be given to the various characteristics of a loaf (such as loaf volume, texture, colour, etc.) in order to arrive at a total from which the relative value of the flour for bread baking purposes can be judged are discussed. E. B. HUGHES.

Serodensimetric constant (C.S.D.) for detecting the watering of milk. F. OLIVARI (Annali Chim. Appl., 1929, 19, 214-233).-Consequent on the lactosechloride equilibrium established by Porcher (Rev. gén. du Lait, 1906), the density Q (excess over 1000) and the parts per 1000 of chlorides (as sodium chloride) C in milk serum are connected by a relationship expressible by the formula: $Q + 3 \cdot 85C = K$. This constant sum, known as the serodensimetric constant, is more useful than the mere density in the detection of watering as it exhibits for smaller variation and a better statistical distribution about the typical value for milks of any origin. For acetic serum the mean value of K is $35 \cdot 1$. This constant is more simply and more rapidly determined than the simplified molecular constant of Mathieu and Ferré (B., 1914, 214; 1916, 613), and serves to detect small degrees of watering in a larger number of cases. Dilution of milk with isotonic solutions of dextrose, glycerol, sodium bicarbonate, etc. alters the value of the serodensimetric constant, whereas the cryoscopic index remains unchanged. T. H. POPE.

Microscopical identification of malted milk and its flavoured products. F. HILLIG and B. G. HARTMANN (J. Assoc. Off. Agric. Chem., 1929, 12, 238—240).—The microscopical appearance of various preparations is described and illustrated by photomicrographs. In genuine malted milk the malt extract solids and milk solids are incorporated into homogeneous irregular fragments having a stippled surface. These are readily recognisable even in admixture with cocoa, sugar, etc. Mechanical mixtures of spray-dried whole milk and spray-dried malt extract are easily distinguishable from the genuine product. W. J. BOYD.

Margarine containing egg yolk. J. ANGERHAUSEN and G. SCHULZE (Pharm. Zentr., 1929, 70, 389-392).--Heating of egg yolk at 90° for 3 hrs. or at 65° for 6 hrs. renders it insoluble in 2% salt solution (cf. B., 1929, 338). Dry egg yolk added to margarine without previous swelling or dissolution in milk or salt solution is extracted only with difficulty by means of 2% salt solution. If the yolk is added to the mixes as a suspension in milk, salt solution, or molten fat, there may be sedimentation resulting in uneven distribution of the proteins in the margarine. Under these circumstances the Fendler test is not reliable. The compositions and properties of dried egg yolk, "Heliozithin" (a lecithin product of animal origin), and soya-bean phosphatide are compared. "Heliozithin" reacts negatively to Fendler's tests, whereas soya-bean phosphatide gives a

positive reaction on boiling the salt solution extract with hydrochloric acid and a negative result for the dialysis test. The presence of egg yolk in margarine may in some cases be detected by determining the nitrogen content of the product. This may be increased from 1% due to milk proteins to 1.35% according to the amount of yolk added. In many cases it may be detected by determining the lecithinphosphoric acid. W. J. BOYD.

Comparative results with Arland's potato starch tester and Reimann's potato balance. A. ARLAND (Z. Spiritusind., 1929, 52, 206–207). B. LAMPE (*Ibid.*, 207).—Opposing Ekhard's statement (*ibid.*, 1928, 51, 317–318) that potatoes tested in his apparatus need not be air-dried, the author gives the results obtained by testing several series of samples both dry and after treatment with water for various periods and wiping. The results, both with his own and Reimann's apparatus, show variations after moistening up to 0.75% of starch, and these not always higher, as stated by Ekhard. Reimann's scale is said soon to become untrustworthy with use.

LAMPE adversely criticises Arland's apparatus, since it does not admit of a dirt determination, his conclusions, as expecting too great accuracy of the methods, and his statement regarding Reimann's scale. F. E. DAX.

Bull's rapid method of determining fat in fish, meat, and other animal or vegetable products. J. SEBELIEN (Chem.-Ztg., 1929, 53, 489-490).-The material is thoroughly minced and mixed, 5 g. are weighed out (on a "per cent. balance " described below), and 7.5 g. of anhydrous sodium sulphate (for unsalted wares) or 15 g. of ignited gypsum (for salted wares) are incorporated therewith in a mortar and pestle. The mixture is placed in a wide-mouthed bottle with ground stopper and shaken with exactly 40 c.c. of benzene at intervals during 1 hr. After settling, 16 c.c. of the clear fat solution are withdrawn by means of a pipette fitted with a filter consisting of a short tube filled with cotton wool, run into the warm balance pan, evaporated to dryness, and the fat is weighed. In the case of milk more sodium sulphate should be used. For dry meals no addition of water-binding salt is necessary, but longer time of extraction is allowed. The "per cent. balance" consists of a beam suspended on the edge of a cylindrical container so that the projecting arm is thrice the length of that hanging over the container. The short arm carries a pan suspended within the container by a rod passing through a hole in the lid. In the lower part of the container is an electrical heater, whereby the pan can be warmed. The weighings are made by means of suitable riders hung on the graduated longer arm of the beam, and adjustment of the balance is by means of a screw on the end of the shorter arm. Sample and salt are weighed out on the cold pan, and the latter is then warmed in readiness for evaporation of the solvent from the fat. W. J. BOYD.

Shortening the time of [Kjeldahl] nitrogen determinations by the use of the grid burner. H. D. SPEARS and W. G. TERRELL (J. Assoc. Off. Agric. Chem., 1929, 12, 250).—Using copper sulphate as catalyst in Kjeldahl determinations of the nitrogen in feeding stuffs it was found that the time of digestion could be shortened to $1\frac{1}{2}$ hrs. by using a Fisher grid burner (cf. Shedd, B., 1927, 954). W. J. BOYD.

Labour-saving devices for the commercial protein-testing laboratory. W. O. WHITCOMB (Cereal Chem., 1929, 6, 215-217).

Phosphorus of grains. GREAVES and HIRST.— See XVI. Zinc in sugar products. SPENGLER and ZABLINSKY.—See XVII. Quality of yeast. WERNER and SIEDHOFF.—See XVIII.

See also A., July, 852, Comparative vitamin-Bvalues of pulses and nuts (PLIMMER and others). 853, Distribution of vitamin- B_2 in certain foods (AYKROYD and ROSCOE). 854, Chemical changes in pears on storage (EMMETT). 855, Titanium in phanerogamic plants (BERTRAND and VORONCA-SPIRT). 857, Glutelins of rye and barley (CSONKA and JONES).

PATENTS.

Manufacture of milk powders; cream powders, and the like. J. E. NYROF (B.P. 312,875, 30.8.28. Addn. to B.P. 297,256; B., 1928, 825).—To prevent the development of "powder taste" when milk powder is stored, the powder is subjected, before packing, to additional drying by evacuating the containers in the presence of drying agents; a dry inert gas such as carbon dioxide may subsequently be admitted to the container. E. B. HUGHES.

Ice-cream mixture and its preparation. J. R. HATMAKER (B.P. 309,417, 7.11.27).—A suitable proportion, e.g., 40%, of a given quantity of natural milk is dried and the solids are incorporated with the remainder of the milk. Cream, sugar, and/or other flavouring materials, with or without a stabilising agent are added, and the whole is mixed. The product should contain about 60% of water. W. J. BOYD.

Manufacture of ice cream or similar frozen food product. C. E. GRAY and G. D. TURNBOW (B.P. 312,804, 26.5.28).—Ice cream containing a larger amount of solids-not-fat than can ordinarily be used without development of "sandiness" due to the crystallisation of lactose is prepared by adding to a partly-frozen mix rather low in content of solids-not-fat the required additional milk solids, such as skim-milk powder, in which the lactose is in an undissolved and finely-divided condition. E. B. HUGHES.

Emulsified [food] products and their manufacture. A. K. EPSTEIN and M. C. REYNOLDS (B.P. 313,237, 26.3.28).—A modified egg beater is described in which emulsions such as mayonnaise are prepared in an atmosphere of inert gas, *e.g.*, carbon dioxide, under slight pressure. E. B. HUGHES.

Leaching-out protein-containing substances such as [salt-containing] fish waste and the like. M. STERN (CHEM. FABR. SCHLUTUP DR. M. STERN) (B.P. 282,068, 7.12.27. Ger., 7.12.26).—To remove the salt the extraction liquid is deprived of its solvent power for proteins, before or during the extraction, by the addition of metallic salts (e.g., of iron, aluminium, zinc, or chromium) or colloids capable of precipitating protein. Protein and fat removed by extraction with untreated liquid may be precipitated by the addition of such precipitants to the liquid after the extraction, and recovered.

W. J. BOYD.

Preservation of citrus fruit juices. V. R. KOKAT-NUR (U.S.P. 1,715,932, 4.6.29. Appl., 14.1.27).—To the juice of the fruit is added an aqueous extract of the skin, and the whole is then heated at $45-55^{\circ}$ for at least $2\frac{1}{2}$ hrs. No preservative is added.

E. B. HUGHES.

Production of food preservatives, food adjuncts, condiments, etc. R. HADDAN. From SMOKED PRO-DUCTS Co. (B.P. 309,519, 9.1.28).—Salt is agitated in presence of smoke produced by burning carbonaceous material, preferably hickory wood. The smoke may be submitted to the action of an electrical field in order to precipitate certain constituents on the wall of the rotating chamber through which it is passing and in which the salt is agitated. The precipitate is removed from the wall by a scraper or by the abrasive action of the salt, and mixed with the latter, which is not subjected to the electrical action. W. J. BOYD.

Ovens for baking, roasting, and drying purposes. J. B. Cox (B.P. 312,016, 3.10.28).

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Collargol. A. F. GERASIMOV (Trans. Sci. Chem. Pharm. Inst. Moscow, 1926, No. 16, 69—108).—The preparation of collargol from egg-white and silver oxide is described. In low concentrations, ammonium chloride and thiocyanate, potassium iodide and bromide, calcium chloride, and ferric chloride hinder coagulation by acetic acid, whilst these salts in high concentrations, or potassium chlorate, potassium nitrate, sodium sulphate, ammonium sulphate, or magnesium sulphate in any concentration, induce coagulation. The results are discussed. CHEMICAL ABSTRACTS.

Salicylsulphonic acid. J. RAE (Pharm. J., 1929, 122, 618).—Examination of various specimens of sulphosalicylic acid (purity $86 \cdot 3 - 98 \cdot 7\%$, water content $0 \cdot 7 - 14 \cdot 4\%$, free salicylic acid content $0 - 1 \cdot 1\%$) indicates that it exists in two forms, m.p. (anhyd.) about 110° and $120 - 124^{\circ}$, respectively. H. BURTON.

Determination of camphor in camphor liniment. I. U.S.P. X. method. C. F. POE, G. LIPSEY, and C. L. VAUGHN (J. Amer. Pharm. Assoc., 1929, 18, 580—586).— The method given in the U.S.P. X. gives consistently low results due to the oxidation of the triolein present in the cotton-seed oil used for making the liniment. Dishes made from different materials were used, but none of them was satisfactory. A more satisfactory method has been developed, using a vacuum oven, and will be published later. C. C. N. VASS.

Bioassays. Tincture of Strophanthus. C. W. EDMUNDS, H. W. LOVELL, and S. BRADEN (J. Amer. Pharm. Assoc., 1929, 18, 568—573).—The assay of various tinctures of Strophanthus by the 1-hr. frog (U.S.P.), 4-hr. frog, the intravenous, and cot methods gives results varying from 2.45 to 8.00 mg. of ouabain (limits). The results for any one preparation do not agree, and are usually lowest by the cot method and highest with the 4-hr. frog method. It is considered that the U.S.P. standard requires revision.

C. C. N. VASS.

Examination of Peru balsam by the extended capillary diagram and the analytical quartz lamp. C. A. ROTHENHEIM (Pharm. Ztg., 1929, 74, 712—713; cf. Rapp, B., 1929, 110).—A number of balsams, natural resins, and esters were tested by this means in the presence of ether, ethyl acetate, ligroin, alcohol, acetone, petrol, benzene, chloroform, methyl alcohol, and water, but only aqueous extracts of Peru balsam gave a characteristic electric-blue fluorescence in ultra-violet light. This may be used as a test for Peru balsam.

S. COFFEY.

Examination of bogs for medicinal purposes. K. STOCKFISCH and W. BENADE (Z. angew. Chem., 1929, 42, 663-668).—Some properties of earths used for medicinal baths and treatments have been examined. S. I. LEVY.

Essential oils of *Heracleum villosum*, Fisch. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 119—126).— As the fruit ripens, the aldehydes disappear and alcohols appear. Saponification of the oil affords octyl alcohol and acetic and butyric acids. CHEMICAL ABSTRACTS.

Borneol values of the Siberian pine oil of Altai. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 127—130).— A sample had d_{20}^{20} 0.9581, $[\alpha]_{\rm D}$ —39.59°, n^{20} 1.4748, acid value 9.67, ester value 139.21 (after acetylation 190.84); α -pinene and camphene were present. Borneol (40%) was obtained by saponification (18%), distillation with steam (2%), and treatment with phthalic anhydride (20%). CHEMICAL ABSTRACTS.

Essential oils from Caucasian Citrus species. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 69–85).— Oil from leaves of Citrus bigardia, Risso, contained camphene, limonene, dipentene, α -terpineol, geraniol, and nerol. Oil from leaves of a Japanese orange (Unshiu) was also examined. CHEMICAL ABSTRACTS.

Essential oils of Hyssopus officinalis. L. P. GUSEVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 159—167).— α -Pinene, *l*-pinocamphone, an aldehyde (semicarbazone, m.p. 202—203°), alcohols, and a sesquiterpene are present. CHEMICAL ABSTRACTS.

Essential oils of peppermint from Poltava Government. V. A. KUZMIN (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 168–182).—Yields are tabulated, and constants of the oils are recorded.

CHEMICAL ABSTRACTS.

Essential oils of leaves and stems of camphor from the Sukhum district. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 25—38).—The oil contained d- and dl- α -pinene, cineole, limonene, dipentene, d-camphor, borneol, d-camphene, and unidentified phenols. CHEMICAL ABSTRACTS. Essential oils of Crimean junipers. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 142—150).—Oil from twigs and needles of *Juniperus excelsa*, M.B., d_4^{30} 0.8812, $[\alpha]_D + 31.5^\circ$, $n_D^{\infty} 1.4769$, acid value 2.52, ester value 5.52 (after acetylation 28.49), contained α -pinene, an aldehyde, a hydrocarbon having d_4^{20} 0.9286, $[\alpha]_D$ -6.75° , $n_D^{\infty} 1.500$, cedrene, and a cedrol, m.p. 82— 84° , $[\alpha]_D + 9.8^\circ$. CHEMICAL ABSTRACTS.

Essential oils of Crimean salvias. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 109—118).—Oil from *Salvia* grandiflora, Ettl., contained α - and β -pinene, camphene, *d*-camphor, and caryophyllene.

CHEMICAL ABSTRACTS. Essential oils of Abies nordmanniana, Spach, and Abies cephalonica, Link. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 131—141).—The oil of Abies nordmanniana, Spach, d_{22}^{20} 0.8816, $[\alpha]_{\rm D}$ -22.40°, n^{20} 1.4775, acid value 1.08, ester value 28.24 (content 9.89%), ester value after acetylation 48.53 (total alcohols 13.84%), contained α - and β -pinene and camphene. The oil of Abies cephalonica, Link, d_2^2 0.8995, $|\alpha]_{\rm D}$ -20.00°, n^{20} 1.4773, acid value 3.29, ester value 48.14 (after acetylation 73.3), contained α -pinene, dl- α -pinene, and camphene. Borneol was obtained by saponification. CHEMICAL ABSTRACTS.

Essential oil from Artemisia annua, L. B. N. RUTOVSKI and I. V. VINOGRADOVA (Trans. Sci. Chem.-Pharm. Inst. Moscow, 1927, No. 17, 15—24).—The oil contains α -pinene, cincole, two ketones $(d_{20}^{20} \ 0.8755,$ $[\alpha]_{\rm D} - 2.04^{\circ}, n^{20} 1.4702$, semicarbazone, m.p. 94—96°; and semicarbazone, m.p. 68—71°), a camphor (m.p. 175—177°, $[\alpha]_{\rm D}$ —44.52°), borneol, cuminaldehyde, a phenol, and acetic and butyric acids.

CHEMICAL ABSTRACTS.

See also A., July, 806, Germicidal action of hydroxydiaryl sulphides (HILBERT and JOHNSON). 819, New dihydroterpene (BLANCO). 829, Microchemical reactions of piperine (WAGENAAR). New reaction of hydrastine and papaverine (ROJAHN and STRUFFMANN). 830, Belladonnine, bellatropine, and chlorotropan (M. and M. POLONOVSKI). Colour reactions of sinomenine and sinomenol (Goto). Strychnine and brucine (PERKIN and ROBINSON). 832, Determination of ergot preparations (VAN URK). Use of vanillin as alkaloidal reagent (PORTNOV). 833, Chemotherapy of bromine derivatives of phenylarsinic acids and arsenobenzenes (HAYTHORN-THWAITE). Reagent for identifying arsinic acids. (BARBER). 836, Micro-determination of chloroform (YODOMIGAWA). Determination of citric and tartaric acids (PIRRONE). 846, Reagent for detection and determination of quinine (STERKIN and HELFGAT). Micro-determination of morphine (FLEISCHMANN). Buffer antiseptics (GJALDBAEK). 850, Diphtheria toxin (LEULIER and others). Purification of vaccine virus (YAIO and KASAI). 851, Crystalline insulin (JENSEN and others.) Insulin; physiological assay (CULHANE and others). 852, Purification of antineuritic vitamin-B (DE CUGNAC). Separation of vitamin- B_2 from $-B_1$ in yeast (CHICK and ROSCOE). 853, Vitamin- B_2 in certain foods (AYKROYD and ROSCOE). 855, Water in tobacco (GAVRILOV and EVSLINA). 857, Alkaloidal constituent of *Artabotrys suaveolens*, Blume (MARAÑON; SANTOS).

PATENTS.

Medicinal preparation. E. W. LIPSCHUTZ, ASST. to BROOKLYN SCIENTIFIC PRODUCTS CO., INC. (U.S.P. 1,714,430, 21.5.29. Appl., 24.5.27).—A mixture comprising oleic acid and bile salts is used for the treatment of diseases of the biliary tract. F. G. CLARKE.

Manufacture of tuberculin preparations. I. G. FARBENIND. A.-G. (B.P. 285,087, 9.2.28. Ger., 11.2.27). --Albumins are precipitated from solutions of tuberculin preparations, *e.g.*, those obtained from Koch's broth by precipitation with alcohol, by the addition of heavymetal compounds other than complex metal compounds, *e.g.*, dialysed ferric chloride or lead acetate, and the active constituents are precipitated from the solutions after filtration by the addition of, *e.g.*, picric acid or acetone. L. A. COLES.

Separation of active ovarian hormones. N. V. ORGANON TOT BEREIDING VAN ORGAANPREPARATEN OP WETENSCHAPPELIJKEN GRONDSLAG (B.P. 291,081, 3.4.28. Holl., 28.5.27).—The urine of pregnant women or female animals is extracted with a fat solvent and the residue left after evaporation of the solvent is extracted with water, insoluble constituents being removed.

L. A. Coles.

Manufacture of 8-amino-6-alkoxyquinolines. I. G. FARBENIND. A.-G., W. SCHULEMANN, F. SCHÖN-HÖFER, and A. WINGLER (B.P. 310,559, 27.1.28. Addn. to B.P. 267,457; B., 1927, 379).—6-Alkoxyquinoline-8carboxylic esters are subjected to the Curtius reaction. *Methyl* 6-methoxyquinoline-8-carboxylate, m.p. 77—79°, b.p. 163—165°/1 mm., is converted by way of the hydrazide, m.p. 178—179°, azide, and urethane, m.p. 76—77°, into 8-amino-6-methoxyquinoline.

C. HOLLINS.

Manufacture of organic arsenic preparations and the application thereof as seed grain immunising media. I. G. FARBENIND. A.-G. (B.P. 287,093, 13.3.28. Ger., 14.3.27).—The products comprise compounds, insoluble or sparingly soluble in water, containing arsenic attached to an aromatic nucleus and produced in a colloidal form as described for the manufacture of colloidal organic mercury compounds in B.P. 243,361 (B., 1926, 691), the compounds being used alone or in admixture with other fungicides or bactericides.

L. A. Coles.

Manufacture of organic mercury compounds. "TASCH" LAB., LTD. (LABORATORIUM "TASCH" A.-G.) (B.P. 301,023, 8.11.28. Ger., 23.11.27).—The sulphamic acid of antipyrene (4-amino-1-phenyl-2: 3-dimethylpyrazolen-5-one) is treated with mercuric oxide and sulphuric acid to give a soluble compound having spirillocidal properties. C. HOLLINS.

Extraction of essential oils or odorous substances. VIANOVA GES.M.B.H. F. CHEM. IND. (B.P. 292,982, 26.6.28. Ger., 28.6.27).—Natural material containing the oils etc. is extracted with liquid carbon dioxide. L. A. Coles.

Immunising product and its production. N. S. FERRY, Assr. to PARKE, DAVIS & Co. (U.S.P. 1,717,198, 11.6.29. Appl., 2.6.24. Renewed 8.12.28).—See B.P. 293,401; B., 1928, 692.

Manufacture of salts of inositolhexaphosphoric acid. F. GOEDECKE (U.S.P. 1,715,031, 28.5.29. Appl., 14.11.27. Ger., 11.8.25).—See B.P. 308,403; B., 1929, 453.

Manufacture of esters and other valuable organic products. F. C. ZEISBERG, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,708,460, 9.4.29. Appl., 26.3.27).—See B.P. 287,846; B., 1929, 549.

Alkoxyacridines. L. BENDA and W. SCHMIDT, Assrs. to WINTHROP CHEM. Co., INC. (U.S.P. 1,715,332, 28.5.29. Appl., 26.4.23. Ger., 24.5.22).—See B.P. 217,715; B., 1924, 768.

Products of the benzodiazine series (B.P. 310,076). —See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Production of direct positives. R. SESMA (Bull. Soc. franç. Phot., 1929, 16, 108—110).—The exposed film is preferably treated with a desensitiser, developed, transferred to an acid bath, washed, and then immersed in a bath which at the same time removes the reduced silver and hardens the surrounding gelatin. The bath contains copper sulphate (10 g.), potassium bromide (8 g.), chromic acid (1 g.), and water (1 litre). When reduction is complete, the film is washed, dried, and then redeveloped to a positive by a rapid developer. Incomplete drying leads to general fog. J. W. GLASSETT.

See also A., July, 741, Photographic sensitivity (MASAKI). 771, Photographing explosion waves in carbon monoxide-oxygen mixtures (BONE and FRASER). 777, Photochemical reactions with ferric thiocyanate and with neocyanine (BHATTACHARYA and DHAR).

PATENT.

Photographic developers [in tablet form] and developing processes. J. HALDEN & Co., LTD., and J. HOLDEN (B.P. 311,546, 4.5.28).

XXII.—EXPLOSIVES; MATCHES.

Explosibility of atmospheres behind [mine] stoppings. H. F. COWARD (Trans. Inst. Min. Eng., 1929, 77, [2], 94—115).—A graph is given, based on previously published data (Coward and Harwell, B., 1926, 426), from which it can be predicted whether a given mixture of methane, oxygen, and nitrogen is explosive or not. The error introduced by reckoning the carbon dioxide usually present as nitrogen is very small and on the side of safety. The limits of inflammability of the above gas mixture, as deduced from the graph, are tabulated. Similar graphs are also given for mixtures of oxygen and nitrogen with hydrogen and also with carbon monoxide, based on unpublished results of Jones, and a method of calculating by means of these curves the explosive ranges of complex mixtures of these gases with methane is described. Curves showing the lower limits of inflammability of all mixtures of methane, hydrogen, and carbon monoxide in air are appended to the paper. S. K. TWEEDY.

See also A., July, 771, Ignition temperatures of carbon monoxide-air mixtures (PRETTRE and LAFFITTE). Photographic study of flame movement in carbon monoxide-oxygen explosions (BONE and FRASER). Explosion of combustible gases mixed with air (HABER).

PATENTS.

Explosive. C. O. BLACK and W. A. MOORE, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,713,816, 21.5.29. Appl., 18.7.27).—A moss, *e.g.*, sphagnum, is used as the absorbent in a dynamite or other composition containing a liquid explosive such as nitroglycerin. F. G. CLARKE.

Explosive for signalling. W. O. SNELLING, Assr. to TROJAN POWDER CO. (U.S.P. 1,709,636, 16.4.29. Appl., 11.12.24).—A composition of nitrated starch and a non-explosive signalling material is detonated.

W. G. CAREY.

Propellant powder charge. J. B. FIDLAR (U.S.P. 1,716,434, 11.6.29. Appl., 5.12.21).—The propellant powder includes 35 pts. of nitrocellulose, 25 pts. of nitroglycerin, 5 pts. of dinitrotoluene, 20 pts. of trinitrotoluene, and 10 pts. of flame-reducing materials.

F. G. CROSSE.

Preparation of pentaerythritol tetranitrate. H. A. AARONSON (U.S.P. 1,705,699, 19.3.29. Appl., 8.11.23).— Pentaerythritol is stirred into about 6 pts. of nitric acid (at least 90%) at about 15°. After 15 min. the spent acid is withdrawn and the pentaerythritol tetranitrate washed with water and soda and crystallised.

R. BRIGHTMAN.

XXIII.—SANITATION; WATER PURIFICATION.

Proposal to render innocuous the waste waters from beet-sugar factories. H. BACH (Z. Ver. deut. Zucker-Ind., 1929, 79, 241-250).-In cases where sufficient suitable land is not available for the disposal of the factory effluent by irrigation, it is proposed that after a preliminary purification from suspended matters in settling tanks the effluent should be discharged without further t:eatment, and that the river or stream into which it flows should be aerated for a sufficient distance from the point of discharge to maintain the normal amount of dissolved oxygen in the water. It is claimed that this would prevent injury to fish and also odours due to putrefaction, both being the result of abstraction of dissolved oxygen from the water by the organic matters in the effluent. The plant suggested is a pipe supplied with air from a compressor and extending along the bank of the stream in the direction of flow for a distance of a mile or more, if necessary, with branch pipes at intervals leading to air-discharge boxes of finelyperforated or porous material immersed at a sufficient depth in the stream. J. H. LANE.

Determinaton of hardness in water by means of soap solution. G. BRUHNS (Chem.-Ztg., 1929, 53, 469-470).—The calcium hardness and the magnesium hardness may both be determined in the same sample by a slight modification of the Boutron-Boudet method. The sample is first treated with 0.1N-sodium hydroxide in presence of phenolphthale in to neutralise free carbonic acid, and then titrated with the solution very slowly. A faint rose colour and a permanent lather mask the calcium hardness point; on further addition the colour deepens, but the lather breaks, until the end-point for magnesia hardness is reached with a red colour and a renewed permanent lather. S. I. LEVY.

PATENTS.

Manufacture of materials suitable for addition to toilet baths. C. DRANGSHOLT (B.P. 285,356, 13.2.28. Norw., 12.2.27).—When the mixture of humic acids obtained n known manner from peat etc., by treatment with alkalis, is extracted by alcohol or other suitable solvent, hymatome'an'c acid is obtained, the use of which, in the form of its sodium or ithium salt, in baths is claimed. C. JEPSON.

Purification of polluted liquids. H. D. ELKINGTON. From TRAVERS-LEWIS PROCESS CORP. (B.P. 312,754, 10.4.28).—If the colloidal matter present in a polluted liquor be given a negative charge by maintaining a $p_{\rm H}$ value of 8-11 it becomes capable of combining with or adsorbing positively-charged ions from any electrolyte producing material which is able to function without precipitation in an alkaline solution, e.g., calcium sulphate. The suspensoids thus produced may be coagulated, e.g., by means of an iron salt, with the removal of the bulk of the organic matter present and consequent purification of the polluted liquid. Waste material containing calcium carbonate and/or sulphate, and an iron salt, e.g., cement dust, sludge from the purification of iron pickle, or from alkali plants, may be utilised for this purpose, the composition being adjusted, if necessary, to approximate to 50% of electrolyte and 15% of coagulant. The amount of such material to be used depends on the quantity of colloidal matter present, which it is suggested should be determined by dialysis in the presence of an inert gas (cf. B., 1928, 732). C. JEPSON.

Treatment of acidified mine water. J. T. TRAVERS, Assr. to TRAVERS-LEWIS PROCESS CORP. (U.S.P. 1,714,828, 28.5.29. Appl., 9.7.28).—The acid water falls upon, and percolates through, successive masses of travertine. F. G. CLARKE.

Purification of polluted liquids and industrial waste. J. T. TRAVERS, ASST. to TRAVERS PROCESS CORP. (U.S.P. 1,715,877, 4.6.29. Appl., 17.10.27).— See B.P. 312,754; preceding.

Respiratory gas masks or face pieces. F. C. JONES B.P. 312,594, 28.2.28).

Refuse destructors. HEENAN & FROUDE, LTD., and A. E. W. JAMES (B.P. 313,757-8, 25.6.28).

Base-exchange materials (B.P. 313,206).—See VII.