

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 28 and APRIL 4, 1930.*

L—GENERAL; PLANT; MACHINERY.

Reliability of fusible tin boiler plugs in service.

J. R. FREEMAN, JUN., J. A. SCHERRER, and S. J. ROSENBERG (Bur. Stand. J. Res., 1930, 4, 1—22).—Examination of 184 fusible plugs from ships' boilers showed that 10% would not operate owing to the formation of an infusible crust consisting mainly of tin oxide. The incrustation is the result of leakage past the plug. The specification of the U.S. Steamboat Inspection Service limits the copper content of the tin to below 0.3%, which necessitates pouring the tin into the bronze cup at a low temperature and leads to imperfect filling. It is recommended that a maximum copper content of 0.5%, with total impurities not exceeding 0.7%, should be permitted and higher pouring temperatures employed.

C. J. SMITHELLS.

Differential thermostat for use in calorimetry.

S. WITHEYCOMBE (Gas J., 1930, 189, 378—379).—For water-flow calorimeters, used with gas, where the water temperature must not be more than 5° below that of the room, a differential thermostat is available. Its action depends on the movement of two rods, made of a special brass with a high coefficient of linear expansion, one of which is immersed in the water supply and the other is surrounded by air. This movement, due to expansion or contraction, is transmitted, with suitable magnification, to a gas governor which controls the supply of heat to a small boiler, or to a valve which regulates the amount of steam passing through a heating coil.

R. H. GRIFFITH.

Simple control stopcock for gas-analysis apparatus. M. SHEPHERD (Bur. Stand. J. Res., 1930, 4, 23—26).—An improved stopcock is described in which the plug has two bores, one of which has a fine constriction. It is used for controlling the flow of mercury and reagents, a rough balance being obtained through the wide bore, and the cock then turned so that the final adjustment is made through the capillary bore.

C. J. SMITHELLS.

Mixture formulæ. K. K. JÄRVINEN (Suomen Kem., 1929, 2, 80—86).—Variations of the simple mixture formula are discussed, together with their uses and applicability.

S. K. TWEEDY.

See also A., Feb., 185, **Extraction apparatus with fritted glass filter-plates** (SCHÖBEL). 186, **Apparatus for determination of moisture in solids** (KUENTZEL). **Cochius viscosimeter** (SCHULZ). **Claisen fractionating apparatus** (FRIEDRICHS).

PATENTS.

Furnaces with revolving firegrates. K. PETERSEN (B.P. 299,313, 20.10.28. Denm., 22.10.27).—A revolving grate for boiler and other furnaces is divided into seg-

ments, each with its own chamber, below, for forced draught, which is regulated according to the depth of fuel on each segment; dampers transverse to the radius of a segment may also be provided. The furnace is conveniently stoked by an underfeed device which pushes the fuel and ash inwards so that the decrease in bulk as combustion proceeds is compensated for.

B. M. VENABLES.

Continuous [heat-treatment] furnace. F. T. COPE and A. H. VAUGHAN, ASSTS. to ELECTRIC FURNACE CO. (U.S.P. 1,738,039, 3.12.29. Appl., 29.3.28).—In a furnace of rectangular shape, trays of the material under treatment are conveyed along one side, across one end, and back along the other side. Discharge of the trays is effected by tilting them at a point which is near the point of charging. The trays may remain continuously in the furnace or be brought outside for the purpose of filling and emptying.

B. M. VENABLES.

[Boiler] furnaces. H. S. HORSMAN (B.P. 323,836, 26.10.28).—A combustion chamber separate from the boiler proper is provided with walls composed of water-cooled tubes connected to headers which are separate from the boiler drums, but are connected to them by tubes so that the main separation of steam and water is in the latter. The tubes forming one wall are brought over the top of the combustion chamber to a header which is common to the other wall. Part of the roof thus formed is left unobstructed by the brickwork baffles so that the gases can emerge to the boiler proper.

B. M. VENABLES.

[Self-regulating] apparatus for supplying steam or other vapours. P. M. CABELL (U.S.P. 1,737,826, 3.12.29. Appl., 1.5.25. Renewed 1.3.29).—The apparatus is intended to supply a small quantity of steam at a constant pressure irrespective of the demand. Water is supplied from a closed high-level tank under air pressure (maintained constant by a hand inflator) through a long vertical pipe which turns back on itself twice at the lower end and is there provided with a number of restrictions. The water enters a flash boiler which is supplied with an excess of heat, so that water can only enter the boiler (and steam be made) when the pressure is allowed to drop very slightly below the air plus hydrostatic pressure. Steam is prevented from blowing back into the feed tank by the restrictions and bends.

B. M. VENABLES.

Apparatus for heat exchanging. G. T. MOTT (U.S.P. 1,738,914, 10.12.29. Appl., 4.8.26).—A form of tubular heat exchanger with provision for differential expansion between the tubes and the casing is described. Longitudinal baffles are also provided to divide the bundle of tubes into groups.

B. M. VENABLES.

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

Heat-transfer apparatus. J. N. JACOBSEN, Assr. to PFAUDLER CO. (U.S.P. 1,737,849, 3.12.29. Appl., 6.6.27).—In a heat exchanger of the bundle-of-tubes type, the inner fluid passes through the tubes in series, and the outer fluid is given a whirling motion by causing it to enter through suitably inclined orifices.

B. M. VENABLES.

[Fibrous, heat-insulating material [suitable also for acid-resistant filters]. ISOLA-GES.M.B.H. (F.P. 634,542, 17.5.27).—Materials containing magnesite, *e.g.*, dolomite, magnesite, hornblende, are melted and drawn out into fibres. The "wool" so obtained will withstand temperatures up to 1600°. A. R. POWELL.

Conducting thermal reactions between pulverised substances and a gas. G. S. LOY (F.P. 569,342, 17.10.22).—The powdered material is fed into a flue where it meets a stream of hot gas which carries the finer particles into the reaction chamber; the coarser particles collect on the sloping floor of the flue and are returned to the grinding machine. The process is suitable for the distillation of fuel, for the manufacture of calcium cyanamide, and for the roasting of ores.

A. R. POWELL.

Carrying out of exothermic gas reactions. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 324,158, 19.11.28).—The apparatus is suitable for reactions between materials of which at least one is liquid at the ordinary temperature, and provides for effective heat-interchange between the initial and final materials, and also in the catalyst tubes, all in one casing. Examples of its application are the catalytic conversion of acetylene into acetone, and of methane into hydrogen and oxides of carbon, by means of a large excess of water vapour. Thus, in the latter example, some of the steam is generated in open-ended jackets surrounding the lower parts of the reaction tubes and upstanding from a reservoir of water which effects the final cooling of the issuing products. The water-gas enters round the jackets, passes upwards, mixes with the steam, passes upwards round the actual reaction zone, then turns back downwards through the reaction tubes. Just before the turn-back additional steam may be admitted from an external boiler.

B. M. VENABLES.

Drying drum with attachment for cooling the material before discharge. BÜTTNER-WERKE A.-G. (G.P. 458,071, 28.12.26).—The device at the discharge end of the drying drum which serves to prevent ingress of air into the drum is provided with a closed cover which is surrounded by a cylindrical or conical sheath so as to form an annular chamber in which the discharge from the drum is cooled by means of a current of cold air passing countercurrent to the stream of dried material. The cooling chamber is closed at the end at which the material enters it from the drying drum by a wall provided with openings to allow the cooling and drying air to escape, and at the opposite end with adjustable openings for the admission of regulated quantities of cooling air.

A. R. POWELL.

Drying and pulverisation of slimy or tacky substances suspended in liquids. SOC. ALSACIENNE DE CONSTRUCTIONS MÉCANIQUES (F.P. 634,981, 28.9.26).—

The mass is mixed with small spheres, cylinders, or rings which are kept in motion while the mixture is heated to expel the liquid. As the material dries, the motion of the spheres etc. breaks up the clots which would otherwise form hard cakes. A. R. POWELL.

Method and apparatus for dehydrating. G. A. SYKES (B.P. 323,740, 8.10.28).—The foodstuff, wood, hide, or other fibrous material is contained in trays between partitions and surrounded by flues within a common casing. Dampers are provided so that hot gases may be drawn (a) through the partitions in contact with the material in either direction, or (b) past the ends of the partitions, leaving the material in a still atmosphere. In the latter case heat is supplied by combustion of gas within the same casing and reaches the material mainly by "radiation," while the atmosphere in contact with the goods tends to become saturated with moisture from the goods, aided in the early stages by trays of water if necessary. These periods of "closed" heating alternate with periods when the gases are drawn over the material and effect the removal of moisture.

B. M. VENABLES.

Pulverising apparatus. O. CRAIG, Assr. to RILEY STOKER CORP. (U.S.P. 1,739,213, 10.12.29. Appl., 19.10.26).—Two pulverisers (with feeders) and one mixing and conveying fan are driven by the same motor. The apparatus is suitable for a mixture of anthracite and bituminous coal which need different designs of pulverisers for efficient operation.

B. M. VENABLES.

Apparatus for pulverising material. W. J. A. LONDON, Assr. to PEABODY ENG. CORP. (U.S.P. 1,737,800, 3.12.29. Appl., 9.5.28).—In an air-borne system a coarse pulveriser operates on open circuit with a separator, and a fine pulveriser operates in closed circuit with the same separator. The mills may be of different types; *e.g.*, the first may be of the impact type and suitable for comparatively moist coal, the second an attrition mill which, as a rule, will only operate successfully on coal that has been partly dried by the air current.

B. M. VENABLES.

Centrifugal pulveriser. O. A. KREUTZBERG (U.S.P. 1,737,854, 3.12.29. Appl., 7.6.23).—From a centrifugal pulveriser the powdered material is drawn out in an air current through an axial hole in one end of the casing, the conduit rises to a separator, and the elbow is formed with a sloping lower side, which forms a chute down which the oversize from the separator will slide back to the mill against the air current.

B. M. VENABLES.

Mixing mill. D. C. HEIM (U.S.P. 1,739,149, 10.12.29. Appl., 4.1.29).—A mill for proportioning and mixing powdered materials, such as dusting powders, insecticides, etc., is described. The minor constituents of the mixture are measured into tall vessels with hinged bottoms, and are placed upright in a hopper. The main constituent is distributed around them, and, on withdrawal of the tall vessels, columns of the minor constituents are left surrounded by the bulk material. The whole is then withdrawn from the hopper by rotating brushes, and falls through a screen into a container (preferably a shipping drum) containing a

collapsible dasher or loose framework (removed before shipment). The drum is then closed and rotated horizontally by another part of the same machine, while the blending and sifting operations are performed on the next batch. B. M. VENABLES.

Mixing apparatus. A. D. MACLELLAN (U.S.P. 1,738,440, 3.12.29. Appl., 18.8.26).—A rotating drum has buckets attached to the interior of both ends and radial pans at the middle of the length; the latter catch a portion of the material spilt by a bucket and deliver it to a later bucket at the other end. A screw conveyor in a tube runs right through the drum, the casing of which is cut away at one side only, within the drum, and is capable of rotation through 180° by hand, so that when the opening is up the screw will receive mixed material from the pans and deliver it out of the mixer; when the opening is down the screw will receive feed material from the other end and deliver it into the mixer. B. M. VENABLES.

Mixing machine. J. F. FIELD (U.S.P. 1,739,066, 10.12.29. Appl., 1.11.28).—A screw-conveyor in a trough runs axially through a mixing drum, the screw and drum revolving in opposite directions and being reversible together. The drum is provided with longitudinal, radial blades upon which are inclined vanes. The screw-conveyor is surrounded by a hopper outside the drum at one end, to the open top of which the unmixed material is supplied and from which it is conveyed into the drum. After mixing and on reversal the material is brought back to the same hopper, whence it falls through a spout which was previously closed by a slide. B. M. VENABLES.

Feed re-pulper for sedimentation apparatus. J. GREGORICH, Assr. to DORR Co. (U.S.P. 1,739,302, 10.12.29. Appl., 21.7.27).—The apparatus described is suitable for insertion in the feed launders of the intermediate stages of a continuous, countercurrent decantation plant, and may be driven from the shaft of the appropriate pump for thick pulp. It comprises a rocking shaft with stirring arms depending into the feed launder conveying a mixture of thick pulp from the next lower thickener and clear liquor from the one above. The motion of the arms is transverse to the flow of pulp. B. M. VENABLES.

Apparatus for conveying solid materials through pipes by means of compressed air. T. F. MILLER (B.P. 324,103, 18.10.28).—Means for charging pulverulent material into the conveying conduit containing compressed air are described. The material passes in succession through a charging hopper, an air-lock chamber, an equalising chamber where the intermittent discharge of the air-lock is converted into a steady discharge by means of a worm-conveyor, a further paddle conveyor which also serves to aerate the material, and finally into the main air-stream. B. M. VENABLES.

Apparatus for distillation of finely-divided material. G. SAUERBREY MASCHINENFABR. A.-G. (G.P. 457,478, 9.10.23. Addn. to G.P. 456,891; B., 1930, 176).—The apparatus of the prior patent is modified by the provision of several inclined drums arranged one above the other in such a manner that the

material to be distilled falls directly from the outlet of one drum to the inlet of the next lower drum.

A. B. MANNING.

Mechanical dissolution apparatus. E. LE BOS (F.P. 635,285, 2.5.27).—The apparatus comprises a trough in which the dissolution takes place, a funnel for charging the trough with a regular supply of solid material, and a flap-valve for regulating the supply of solvent, the whole being adapted for automatically regulating the density of the solution. A. R. POWELL.

Rotating extraction drum. V. HÄNIG & Co., (G.P. 458,997, 11.10.23).—The drum is provided with a removable plane or slightly curved sieve plate, so arranged that it may be inserted at any time during the extraction process and permits the complete removal of all the liquid from the drum before air is drawn through the filter cake. A. R. POWELL.

Centrifugal separators. AKTIEB. SEPARATOR (B.P. 317,827, 19.8.29. Swed., 23.8.28).—A separator of the "purifier" type, with two outlets, is convertible into a "clarifier," with one outlet, by fitting a dome round the neck of the bowl instead of by taking it apart and changing the top inner disc. B. M. VENABLES.

Centrifugal separator. H. NÆSS (U.S.P. 1,738,258, 3.12.29. Appl., 20.2.28. Norw., 18.6.25).—A form of centrifugal separator (with internal cones) adapted to cleaning by flushing without taking apart is described. B. M. VENABLES.

Centrifugal liquid purifiers. PRESTON STREET COMBING Co., LTD., and J. W. ADAMS (B.P. 323,914, 4.1.29. Addn. to B.P. 296,178; B., 1928, 773).—In modification of the prior patent, the interior of the bowl is shaped so as to give a fair lead for the solid material to each jet from any internal direction, and the guiding surfaces may be continued between the cones by means of ribs or the like. B. M. VENABLES.

Apparatus for treating liquids. A. JENSEN (U.S.P. 1,738,953—4, 10.12.29. Appl., [A] 9.11.26, [B] 6.6.27).—A helical tubular stirrer is rotated in a liquid of which the temperature is to be rapidly changed, a heating or cooling fluid being forced through the tube by external means. In (A) the container of liquid is adjusted to the stirrer; in (B) the reverse process takes place, the stirrer being carried on a crane-like structure, counter-weighted, and with flexible connexions to the fluid pump, so that the stirrer may be lowered into the container in any position within range. B. M. VENABLES.

Apparatus for dephlegmation. P. J. DUNCAN, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,738,766, 10.12.29. Appl., 16.5.27).—A fractionating tower is provided with "trays" in which no bubbling takes place, and hence the back-pressure is low. The "trays" are formed from two or more plates, curved in such a way that the gases whirl as they pass through; the liquid descends through holes in the plates, which are small enough to remain drowned. B. M. VENABLES.

Fractional-distillation apparatus. R. B. CHILLAS, JUN., Assr. to ATLANTIC REFINING Co. (U.S.P. 1,738,036, 3.12.29. Appl., 22.9.25).—In a tower each bubbling plate is formed of a number of separate receptacles with up-turned edges which are spaced apart from each other.

The junctions are covered by caps, some of which have deeply depending flanges and prevent upward passage of the vapours, whilst others have shallower flanges and permit bubbling.

B. M. VENABLES.

Gas separator [cleaner]. A. H. RUBY, Assr. to CONTINENTAL OIL CO. (U.S.P. 1,739,093, 10.12.29. Appl., 17.6.26).—A filter for insertion in pipe-lines for natural gas (or for other purposes) is described. The filtering medium is steel wool or other fibrous material, and is contained in trays supported clear of the sides of the container by a central rod which also supports baffle plates extending to the walls of the casing; the plates are perforated over a portion, the perforations being staggered in different stories. On removal of the top dome the whole interior can be lifted out by the central rod and replaced by a clean one.

B. M. VENABLES.

Dust and like separators. MATTHEWS & YATES, LTD., and O. STOTT (B.P. 324,204, 1.1.29).—The volute of a fan is continued as a circular conduit surrounding the fan. The conduit, but not the volute proper, is divided by plates which are parallel to the course of the air and are provided with skimming devices to remove the layers of air in which the dust has been concentrated centrifugally.

B. M. VENABLES.

Apparatus for separating and/or classifying suspended matter from fluids. H. WARING, and ASSOCIATED LEAD MANUFACTURERS, LTD. (B.P. 323,719, 4.9.28).—The dusty gases are blown tangentially into the top (base) of a space between imperforate outer and perforated inner inverted cones having separate outlets at their apices for coarse and fine dust. The base of the cones is closed by an apertured disc, and above each aperture extends a slightly conical filter-bag, the upper ends of the bags being flexibly supported by, e.g., a lever and weight. Each bag in turn is shut off from the air pressure by means of an obturating plate rotating under the apertures in the disc.

B. M. VENABLES.

Filter for air, gases, and vapours. S. CANTEAU (F.P. 634,377, 14.5.27).—The apparatus comprises a number of filter discs laid one above the other in a canalised container in such a manner that the air can circulate around them, and between the lower and upper disc of each element is fixed a perforated metal ring.

A. R. POWELL.

Manufacture of filter material with a rough surface for air and gas filters. DELBAG-ENTSTAUBUNG GES.M.B.H. (G.P. 458,249, 24.8.24).—Filling rings for gas-cleaning towers are given a rough surface by coating them with sand, powdered porcelain, or the like, mixed with a binding material. The dust is said to adhere more efficiently to a rough than to a smooth surface.

A. R. POWELL.

Filling material for gas-washing towers. I. G. FARBENIND. A.-G. (G.P. 457,966, 3.7.25).—The material consists of small pressed-metal funnels with corrugated walls. This shape admits of almost complete utilisation of the surface, as the individual funnels touch one another only in certain spots and not over appreciable areas as with the usual type of filling rings.

A. R. POWELL.

Preparation of mixtures of compressed gases. ROMBACHER HÜTTENWERKE, and J. I. BRONN (G.P. 458,125,

16.9.22).—Cylinders containing the compressed gases to be mixed at a uniform pressure are connected through one or more similarly operating reducing valves or pressure regulators with a high-pressure pipe-line connected with the containers to which the mixture is to be supplied. The desired proportion of the individual gases delivered to the pipe-line is obtained by using cylinders having volumes in this desired ratio or by using cylinders of equal size, but in numbers corresponding with this ratio.

A. R. POWELL.

Mixing gases and liquids. T. W. BARBER (B.P. 323,758, 8.10.28).—One fluid is delivered in the form of a thin sheet and the other through jets which impinge on the sheet. The former may be pumped through an annular nozzle, and the latter axially through the same nozzle and then through small apertures in the dividing wall. The feed conduits may communicate with opposite ends of a balance chamber with floating piston to equalise the pressures.

B. M. VENABLES.

Apparatus for recovery [with adsorbent carbon] of gases and vapours. O. L. BARNEBEY, Assr. to AMER. SOLVENT RECOVERY CORP. (U.S.P. 1,737,822, 3.12.29. Appl., 2.7.24).—The solid absorbent is supported between upper and lower mesh-work across the middle part of a cylindrical vessel with horizontal axis. Pipes for media for regulation of temperature during absorption, for heating during regeneration, and for subsequent cooling are evenly spaced throughout the absorbent, and the ends are so connected that there is equal flow through each. Precautions are also taken for even distribution of the in- and out-going gases.

B. M. VENABLES.

Apparatus for dissolving gases in liquids, especially for the preparation of chlorine water. G. BRAAM (Dutch P. 17,747, 7.7.19).—The water in the absorption apparatus is forced by the pressure of the chlorine into an upper reservoir from which it automatically cascades back into the absorption vessel and is there agitated by an automatic stirring device.

A. R. POWELL.

Apparatus for spectral analysis of liquid mixtures. CHARBONS ACTIFS & PROC. E. URBAIN (B.P. 313,438, 30.5.29. Fr., 11.6.28).—The substances are examined in a light-absorption chamber which is maintained at a temperature high enough to ensure that all constituents present are vaporised, while the sample is introduced into, and volatilised in, a side chamber which is heated gradually so that constituents may be volatilised in succession. Both chambers are heated by surrounding electric resistors, separately controllable, and a connexion is provided through which the pressure may be regulated. To break the capsule containing the sample the apparatus may be rotated round the axis of the absorption chamber.

B. M. VENABLES.

Flow pyrometer. A. SCHACK and M. WENZL, Assrs. to SIEMENS & HALSKE A.-G. (U.S.P. 1,746,012, 4.2.30. Appl., 2.7.27. Ger., 8.7.26).—See B.P. 274,096; B., 1928, 42.

Apparatus for disintegrating, grinding, reducing to fibres, mixing, or felting humid or dry materials. E. STERZL (U.S.P. 1,745,727, 4.2.30. Appl., 9.8.27. Ger., 20.8.26).—See B.P. 276,356; B., 1928, 657.

Production of water from steam. P. FABER, Assr. to A.-G. BROWN, BOVERI & Co. (U.S.P. 1,745,364, 4.2.30. Appl., 4.1.28. Ger., 5.1.27).—See B.P. 283,158; B., 1929, 456.

Furnace walls. A. REPPMAN (B.P. 324,346, 22.10.28).

[Cinder trap for boiler] furnaces. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of A. R. SMITH (B.P. 303,009, 18.12.28. U.S., 24.12.27).

Refrigerating machines. INTERNAT. GEN. ELECTRIC Co., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 303,864, 10.1.29. Ger., 11.1.28).

Heat-insulating material (F.P. 636,263).—See IX. **Purification of gases** (G.P. 458,876 and 458,948).—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Moisture and combined water contained in coal. S. IKI (J. Soc. Chem. Ind., Japan, 1929, 32, 371—372 B).—Water absorbed by coal at a certain humidity cannot all be equally driven off by drying. The four constituents of coal (α , β , γ , and ulmin) have characteristic absorbing properties, their absorptive power increasing in the order γ , β , α , and ulmin. The lower the caking power and the degree of natural carbonisation, the larger is the total amount of absorbed moisture and chemically combined water. The relation of weathering to water content has been studied. Weathering increases the total water content and decreases the ratio of absorbed moisture to combined water. F. J. WILKINS.

Working of horizontal retorts. G. PERCIVAL (Gas J., 1930, 189, 319—323).—The horizontal retort setting at H.M. Fuel Research Station is of regenerator type, and may be heated from a built-in producer or by gases obtained from external sources. A main chimney damper is fitted so that a slight pressure can always be maintained without alteration of dampers at the regenerator outlet. All control was eventually obtained from the chimney damper, breeze from the fire-front being removed and the primary air-slides full open. Secondary air was adjusted to give 18—19% CO₂ in the waste gas, and spray water was 0.6 lb. per lb. of coke gasified; these conditions avoided possible overheating and made the clinker easier to handle. When water-gas was used for heating it was found that the temperature of the waste gas was 430°, of the combustion chamber 1350°, and of the retort (internal) 1050°, compared with 490°, 1350°, and 1100—1130°, respectively, in the case of producer gas. Only when the carbon dioxide content of the waste gas was reduced to 14%, by admission of more secondary air, was the waste gas temperature raised to 490° when using water-gas. The rate of carbonisation, depending on internal retort temperature, was shown to vary with the waste gas temperature, and to be raised by increasing the volume alone of the waste gas. Heating by coal gas has been accomplished by mixing it with about 2½ vols. of flue gas drawn in by means of a suitable injector. Experiments are also briefly recorded in which attempts were made to use breeze as producer fuel; the resistance of the fire was overcome by forcing in air with a steam-jet, but the loss of fuel through the bars was excessive unless it was mixed with some coal. R. H. GRIFFITH.

Heating of retorts by gas from a low-temperature carbonisation plant. A. A. MCFARLANE (Gas J., 1930, 189, 383—384).—A setting of 40 Glasgow retorts, normally heated by producer gas, has been adapted to burn gas from a Maclaurin plant, and comparative tests have been carried out with both systems. It is found that the modified form gives higher and more uniform temperatures and an increase from 67.97 to 72.92 therms per ton of coal; further advantages are due to absence of clinker and of producer repairs. A second retort setting is being modified to work either with Maclaurin or producer gas. R. H. GRIFFITH.

Present requirements of coke ovens. L. H. SENSIBLE (Gas J., 1930, 189, 260—261).—Attention is called to developments which reduce heat losses from coke-oven settings, particularly shortening of the time of carbonisation by improvements in heat transfer, and dry-quenching of coke. The latter may provide steam equivalent to about 6.5 therms per ton of coal carbonised. R. H. GRIFFITH.

Comparisons of silica-walled ovens and semi-silica-walled ovens in the same battery. E. C. DIXON (Gas World, 1930, 92, Coking Sect., 14—16).—In a battery of 21-in. Otto ovens, some have been relined with silica. It was found that with these the flues were hotter at the end of the carbonising period, and that the duration of each charge was less than with semi-silica walls. Using the same coal, the time of heating was reduced by 2—5 hrs. and the coke produced was of more uniform size and contained less volatile matter. R. H. GRIFFITH.

Mine rescue apparatus: the S.M.R.B. gas mask. S. H. KATZ and C. S. W. GRICE (Safety in Mines Res. Bd., 1930, Paper No. 57, 37 pp.).—An investigation, undertaken jointly with the U.S. Bureau of Mines, to develop a gas mask which would afford protection against irrespirable mine atmospheres as long as they contained sufficient oxygen to support life, a condition indicated by continued burning of a flame safety lamp, is described. It is concluded that if the use of the gas mask is permitted, the design, operation, and testing of which is described in detail, it should prove of considerable advantage in facilitating rescue and recovery work and in any operations where respiratory protection is required. C. B. MARSON.

Review of the Koppers "C.A.S." process as applied to British conditions. H. KOPPERS (Gas World, 1930, 92, Coking Sect., 13).—The author replies to criticisms of the above process by Smith (B., 1930, 89). R. H. GRIFFITH.

Catalytic reduction of carbon monoxide at ordinary pressure. III. **Production of liquid hydrocarbons with cobalt-copper-thoria catalyst.** S. KODAMA (J. Soc. Chem. Ind., Japan, 1929, 32, 285—286 B; cf. A., 1929, 773).—Carbon monoxide is reduced by hydrogen in presence of a catalyst consisting of 3 pts. of cobalt, 1 pt. of copper, and 0.45 pt. of thoria at a lower temperature than when a copper or copper-cobalt catalyst is used. Water, benzene, and petroleum are formed; unless the gas velocity is less than 2 litres/hr. the amount of carbon dioxide and methane hydrocarbons formed is very small, so that the final gas may

be repeatedly used in order to raise the oil yield and to reduce the gas loss. The reaction first occurs at 160°; the most suitable temperature is 250°.

S. K. TWEEDY.

Catalytic processes for utilisation of coal-tar crudes. A. O. JAEGER (Gas J., 1930, 189, 262—263).—A lecture. Selective catalytic oxidation can be successfully applied to coal-tar fractions, particularly those containing anthracene, in order to remove non-aromatic substances. When crude anthracene is treated thus, it is possible to carry the process still further and obtain anthraquinone, and naphthalene may similarly be converted into naphthaquinone, phthalic anhydride, or maleic acid.

R. H. GRIFFITH.

Amounts of aromatic hydrocarbons in petrol-eums from Niigata Prefecture. Extraction of xylenes from crude petroleum. S. IMORI and U. KIKUCHI (Bull. Inst. Phys. Chem. Res., Tokyo, 1929, 8, 984—991).—Maki petroleum (Niigata, Echigo Prov.) contains 0.07% of benzene, 0.59% of toluene, and about 5% of xylenes; Amazé petroleum contains 0.07, 0.53, and about 2% in the same order. The xylenes can be extracted from the crude oils by means of sulphonation of the 145—165° fraction.

R. A. MORTON.

Analysis of the benzene fractions of Polish petroleum, and its chemical composition. J. WINKLER (Przemysl Chem., 1930, 14, 1—18).—The use of 92—94% sulphuric acid is recommended for the determination of unsaturated constituents of straight-run benzene; in the case of benzene produced by cracking, the distillate after removal of unsaturated hydrocarbons by this method (cf. Kattwinkel, B., 1928, 78) still contains about 4% of these substances, which should be removed by the former method. Aromatic hydrocarbons can be removed only by the use of 100% sulphuric acid, or by Kattwinkel's phosphorus pentoxide-sulphuric acid reagent. Naphthenes are determined from the depression of the aniline point (Minchin and Nixon, B., 1928, 699). The average percentage composition of 8 straight-run Polish benzines is: unsaturated hydrocarbons 0.3—2.8, aromatic hydrocarbons 7.5—17.0, naphthenes 13.1—28.2, paraffins 61.1—77.7; the corresponding values for a sample of Cross-cracked benzene are 31.5, 9.4, 4.8, and 54.3. The Riccardo toluene value of these benzines varies from 11.7 to 21.1, so that in most cases the addition of benzene is not necessary.

R. TRUSZKOWSKI.

Sakhalin crude oils. S. S. NAMETKIN and E. M. SHAKHNAZAROVA (Nef. Choz., 1929, 16, 419—421).—Characteristics of crude oils from West and East Nutovo are described.

CHEMICAL ABSTRACTS.

Sludge of transformer oils. I. Formation factors of sludge. T. YAMADA (J. Soc. Chem. Ind., Japan, 1929, 32, 317 B).—Sulphur and unsaturated hydrocarbons are both necessary for sludge formation. The former resists acid formation.

C. W. GIBBY.

Influence of added sulphur on the oxidation of the less refined transformer oils. S. MIZUSHIMA and T. YAMADA (J. Soc. Chem. Ind., Japan, 1929, 32, 316—317 B).—Added sulphur increases sludge formation in the case of the less refined transformer and switch

oils. The sludge is not formed by the same reaction as that which causes acidity.

C. W. GIBBY.

Universally applicable substance for the calibration of calorimeters. W. A. ROTH (Chem.-Ztg., 1930, 54, 77—78).—Technical petroleum which has been freed from readily volatile constituents by means of a current of heated air passed through it serves as an excellent standard material for the determination of the water equivalent of calorimeters. Its heat of combustion can be determined with great accuracy; furthermore, the addition of a few drops (accurately weighed) to such difficultly combustible materials as blast-furnace coke and gas carbon in the calorimetric bomb greatly facilitates the determination of the heats of combustion of these substances.

H. F. HARWOOD.

Differential thermostat. Withycombe. Stopcock for gas-analysis apparatus. SHEPHERD.—See I. **Density of mineral oils.** JÄRVINEN.—See XII.

See also A., Feb., 166, **Gaseous combustion** (DAVID and DAVIES). 167, **Upper explosive limits of methane-oxygen mixtures** (COOPER and WIEZEVICH). **Spontaneous inflammation of gaseous mixtures** (MONDAIN-MONVAL and QUANQUIN). **Effect of pressure on inflammable mixed gases** (BERL and BAUSCH). **Gaseous explosions** (SOUDERS and BROWN). 168, **Oxidation processes in motor fuel** (BERL and WINNACKER). 169, **Rate of oxidation of ferrous hydroxide and sulphide to ferric hydroxide** (GLUUD and RIESE). 190, **Origin of coal and petroleum** (STADNIKOV). 202, **2:3-Dimethylnaphthalene from coal tar** (KRUBER). 203, **Pyrogenic decomposition of chrysene with hydrogen at high pressures** (ORLOV and LICHATSCHEV).

PATENTS.

Method and apparatus for low-temperature distillation. A. E. WHITE. From INTERNAT. BITUMEN OIL CORP. (B.P. 323,523, 30.7.28).—The material is passed continuously through an inclined rotary retort wherein it is heated at a relatively low temperature (e.g., 290°) at the feed end, and at a higher temperature (e.g., 500—600°) towards the discharge end. The water vapour and lighter volatile products are withdrawn by suction from the feed end of the retort, while the fixed gases and higher-boiling volatile products are simultaneously withdrawn by suction from the discharge end of the retort, whereby a neutral point at substantially atmospheric pressure is maintained within the retort between the two zones. A current of air and/or inert gas may be passed through the low-temperature zone, if desired, in order to modify the caking properties of the coal. A current of steam may be passed through the high-temperature zone to prevent undue cracking of the volatile products evolved.

A. B. MANNING.

Carbonisation of material containing oil, fat, tar, etc. P. PLANTINGA (U.S.P. 1,738,202, 3.12.29. Appl., 26.4.24).—The apparatus comprises a carbonising chamber and a communicating auxiliary chamber so arranged that any liquids produced in the latter will not run by gravity into the former, but may be drawn off and collected. The material is fed into the auxiliary chamber, and passes thence into the carbonising cham-

ber. Hot inert gas is circulated continuously through one of the chambers countercurrent to the flow of the material therein, and through a heater. The other chamber is externally heated. The process may be applied to garbage.

A. B. MANNING.

Carbonisation apparatus for vegetable matter.

SOC. D'ETUDES POUR LES COLONIES ET L'ETRANGER, and M. JUHEL (F.P. 635,682, 8.6.27. Belg., 18.6.26).—The carbonising chambers consist of U-tubes terminating in a heating chamber.

A. R. POWELL.

Gasification of finely-divided, earthy, brown coal. STAATLICH SÄCHSISCHE HÜTTENWERKE, and P. ROSIN (G.P. 457,726, 30.11.23).—The generator is provided with a grate which produces a fine and uniform subdivision of the air blast. The material is fed on to the grate to a height not greater than 40 cm., and the air pressure is maintained sufficiently low to prevent any crater formation.

A. B. MANNING.

Production of carbon black. C. MATLOCK, ASSR. to MONROE-LOUISIANA CARBON CO. (U.S.P. 1,738,716, 12.12.29. Appl., 5.1.21).—A hydrocarbon gas, *e.g.*, natural gas, preferably preheated, is burned in a regulated quantity of preheated air, insufficient for complete combustion. The products are cooled and the carbon black is separated therefrom by filtration or by electrical precipitation. Suitable apparatus is described and figured.

A. B. MANNING.

Active carbon of high density. SOC. ANON. DES ENGRAIS ET NOIR ANIMAL (F.P. 635,832, 6.10.26).—Sawdust, wood shavings, or other cellulosic material is heated with concentrated sulphuric acid and a small quantity of nitric acid.

A. R. POWELL.

Regeneration of absorptive carbon. SOC. ANON. DES ENGRAIS ET NOIR ANIMAL (F.P. 636,165, 12.10.26).—The adsorbed liquid, *e.g.*, benzene, is removed by means of steam in a closed circuit. For the removal of adsorbed water superheated steam is used. Provision is made for the condensation of part of the water in the circuit, the remainder being reheated and used again.

A. R. POWELL.

Manufacture of carburetted water-gas. P. T. DASHIELL, ASSR. to U.G.I. CONTRACTING CO. (U.S.P. 1,738,493, 3.12.29. Appl., 28.10.21).—A heavy oil in a finely-divided form is subjected to the action of radiant heat in a vertical carburettor devoid of chequer brick. The gases and vapours formed enrich the current of water-gas passing through, whilst the solid residue is deposited in granular form on the bottom of the chamber, from which it may readily be removed. After each carburetting period the carburettor is reheated by the combustion of fuel gas therein.

A. B. MANNING.

Emulsions and other mixtures of tars, bitumens, oils, etc. P. GLOESS and M. MARINI (F.P. 633,687, 6.9.26).—The tars etc. are mixed with algin and worked up into emulsions with water or other materials. The products are more stable, plastic, and adhesive, etc. than those not containing algin; they are especially valuable for road-construction purposes.

A. B. MANNING.

Heat exchange between two non-miscible liquids of similar density, *e.g.*, benzol wash oil and

water. A. OTT (G.P. 457,967, 15.3.25).—First direct and then indirect cooling is used. A device provided with cooling surfaces is connected to the vessel wherein the direct cooling of the wash oil is brought about. The cooling device may be placed below the other vessel and the two may be combined within a single containing vessel.

A. B. MANNING.

Conversion of hydrocarbon oils. E. E. BARTELS, ASSR. to STANDARD OIL CO. (U.S.P. 1,741,045, 24.12.29. Appl., 29.11.26).—Oil is passed through a heating coil under 250–500 lb. pressure, at such a speed that no carbon is deposited, and is heated to temperatures ranging from 410° to 540°, according to the nature of the oil. From this coil the oil is passed into the first of a series of four vertical chambers maintained at conversion temperature and containing a supply of oil. Vapours are taken from the top of each chamber to a common main leading to a dephlegmator. Oil is passed from the first chamber to the succeeding chambers by an overflow line which delivers into distributing devices contained in the second and third chambers. These devices divide the oil between the chambers in such a way as to give the best results. The cracking stock is preheated by bringing it in contact with the vapours in the dephlegmator before passing it through the heating coil.

T. A. SMITH.

Treatment of oil. E. W. GARD, B. G. ALDRIDGE, and H. J. MULTER (U.S.P. 1,739,898, 17.12.29. Appl., 16.11.26).—The removal of finely-divided tar from acid-treated lubricating oils is facilitated by passing the oils through capillary filters. The tar particles on passing through the filter are caused to agglomerate and separation is then possible. The apparatus used consists of a series of filter-plates separated by settling chambers from which tar can be removed. The plates may be of natural pumice or "Filtros" plates, made by fusing together a mass of silica particles at their points of contact. During oil refining the oil is passed through apparatus of this type for each of the operations of dehydration, acid tar and alkali removal. Similar apparatus may be used for acid-treated gasoline.

T. A. SMITH.

Purification and hydrogenation of heavy mineral oils, tars, and suspensions of coal in oil. INTERNAT. BERGIN COMP. VOOR OLIE EN KOLEN CHEMIE (Addn. F.P. 32,509, 7.7.26, to F.P. 559,787. Cf. B.P. 213,661; B., 1924, 503).—The oils etc. are first freed roughly from oxygen, nitrogen, and sulphur compounds by heating with strong alkalis or alkaline earths under hydrogen pressure, and are then refined by treatment with sodium under hydrogen pressure. Porous materials, *e.g.*, fuller's earth, and also metallic oxides may be added to the alkalis or alkaline earths. By using several autoclaves in series the process may be made continuous.

A. B. MANNING.

Dehydration of oil. E. W. GARD, B. G. ALDRIDGE, and H. J. MULTER (U.S.P. 1,739,834, 17.12.29. Appl., 16.11.26).—Crude oil emulsion is first freed from mud by passing it slowly through a downwardly flowing stream of water. It is then passed through heat exchangers and up through a filter-plate to remove any solid matter which has escaped the water wash. This filter can be

cleared by forcing water, steam, or air through it in the reverse direction to the oil flow. The oil is then passed through a series of "Filtros" plates, the capillaries in which cause the water particles to agglomerate. The water collects in the chambers between the plates and is run off.

T. A. SMITH.

Prevention of knocking in internal-combustion engines. IMPERIAL CHEM. INDUSTRIES, LTD., and S. COFFEY (B.P. 323,463, 26.6.28).—Organic radicals which are capable of existence in the free state, *e.g.*, the triaryl-methyls, or substances which can generate such free radicals at elevated temperatures, *e.g.*, hexa-arylethanes, triarylmethyl-diarylamines, tetra-arylhydrazines, diaryl-nitrosoamines, etc., but which do not contain metals or metalloids, are added to motor spirits in order to prevent knocking.

A. B. MANNING.

Manufacture of high m.p. wax. F. W. SULLIVAN, JUN., ASSR. to STANDARD OIL CO. (U.S.P. 1,740,125, 17.12.29. Appl., 23.7.24).—Crude paraffin wax containing not more than 5% of oil is refined by distillation in a vacuum (5 to 10 mm.) or with copious steam, at temperatures below 345°. If steam-distillation is used, the condensed water should be at least twice the volume of the wax distilled. A wax melting at 50–51° gives 68% of residual wax of m.p. 54°, whereas only 5–15% is obtained by "sweating." The distillate melts at about 45.5°.

T. A. SMITH.

Apparatus for manufacture of carbonised fuel. S. R. ILLINGWORTH, ASSR. to ILLINGWORTH CARBONIZATION Co., LTD. (Re-issue 17,572, 28.1.30, of U.S.P. 1,645,861, 18.10.27).—See B., 1927, 868.

Treatment of bodies [active carbon] of highly porous character. E. BERL (U.S.P. 1,744,735, 28.1.30. Appl., 8.3.24. Ger., 16.3.23).—See G.P. 411,953; B., 1925, 619.

Biological purification of waste liquors from gas works, ammonia-recovery plants, tar factories, and similar industries. H. BACH (U.S.P. 1,745,397, 4.2.30. Appl., 2.12.25. Ger., 10.12.24).—See G.P. 426,422; B., 1926, 646.

Trucks for use in quenching coke. DR. C. OTTO & Co. G.M.B.H. (B.P. 303,376, 31.12.28. Ger., 29.12.27).

Automatic control apparatus for use in manufacture of water-gas and other cyclic processes. HUMPHREYS & GLASGOW, LTD., ASSEES. of SOC. DE CONSTRUCTION D'APPAREILS POUR GAZ À L'EAU ET GAZ INDUSTRIELS (B.P. 310,508, 4.3.29. Fr., 27.4.28).

Gas burners. H. GUHL (B.P. 309,580, 21.3.29. Ger., 13.4.28).

Thermal reactions (F.P. 569,342 and B.P. 324,158). **Pulverisers** (U.S.P. 1,739,213 and 1,737,800). **Gas separator** (U.S.P. 1,739,093).—See I. **Light hydrocarbons** (B.P. 308,712).—See III. **Contact material**. (B.P. 324,541).—See VII.

III.—ORGANIC INTERMEDIATES.

Determination of acetone in air. N. P. KOMAR (Ukrain. Chem. J., 1929, 4, 349–360).—The accuracy of Messinger's method for the determination of small amounts of acetone is demonstrated, and details are

given for the determination of acetone in air. The air is passed into an evacuated absorption flask, into which iodine and sodium hydroxide solutions are introduced by means of a tap-funnel. After about 30 min. the acetone is completely absorbed by the alkaline iodine solution and is then determined in the usual way.

T. H. POPE.

Detection of benzene in mixtures. E. STOCK (Farben-Ztg., 1930, 35, 897).—On shaking benzene or mixtures containing it with an ammoniacal solution of nickel cyanide that has been rendered turbid by addition of acetic acid, a bluish-white precipitate of $\text{Ni}(\text{CN})_2\text{NH}_3\text{Ph}$ is obtained. Details of the preparation of the reagent and carrying out of the test, which may be used for detection and determination of benzene, are given.

S. S. WOOLF.

Utilisation of coal-tar crudes. JAEGER.—See II. **Higher alcohols from waxes.** HIROSE.—See XII. **Glycerin by fermentation.** TOMODA.—See XVIII.

See also A., Feb., 172, **Catalytic dehydrogenation of methyl alcohol and formaldehyde** (GHOSH and BAKSHI). 191, **Pyrolysis of hydrocarbons: isobutene** (HURD and SPENCE). 192, **Identification of mercaptans** (WERTHEIM). 202, **2:3-Dimethylnaphthalene from coal tar** (KRUBER). 203, **Preparation of primary and secondary amines** (GUYOT and FOURNIER). 205, **Degradation of nitrated 1-diazo-2-naphthol-4-sulphonic acid** (RUGGLI and others). 225, **Quinazolines** (AGGARWAL and others).

PATENTS.

Decomposing and hydrogenating heavy organic compounds to produce light hydrocarbons. J. M. F. D. FLORENTIN and A. J. KLING (B.P. 308,712, 30.1.29. Fr., 27.3.28).—The whole or a part of the heat required for the reaction is supplied by preheating the compressed hydrogen, which is introduced into the reaction chamber at a temperature somewhat above that at which the reaction is carried out. After separation of the light hydrocarbons from the issuing current of gas and vapour, the unused hydrogen is re-introduced into the reaction chamber. Part of the gas, however, is withdrawn from the apparatus and purified before being re-admitted with the fresh hydrogen.

Manufacture of halogen derivatives of organic compounds. M. PÓLÁNYI and S. VON BOGDANDY (B.P. 296,021, 26.7.28. Ger., 23.8.27. Addn. to B.P. 289,795; B., 1930, 182).—In the process of the prior patent vapour of cadmium or zinc is used to initiate the reaction.

C. HOLLINS.

Production of oxygen-containing organic compounds [formic acid etc. by hydration of carbon monoxide]. SOC. CHIM. DE LA GRANDE-PAROISSE AZOTE ET PROD. CHIM. (B.P. 296,049, 17.4.28. Fr., 24.8.27).—Special catalysts for hydration of carbon monoxide at high temperatures and pressures comprise mixtures containing (a) one of the elements aluminium, silicon, cerium, titanium, zirconium, thorium, and (b) one of the elements potassium, sodium, magnesium, chromium, molybdenum, manganese, copper, silver, zinc, cadmium, mercury, lead, arsenic, antimony, bismuth, and vanadium. Temperature and pressure

are adjusted to preclude formation of hydrogen. Preferably one or more of the reaction products is introduced into the reaction zone. [Stat. ref.]

C. HOLLINS.

Manufacture of acetaldehyde. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 288,213, 4.4.28. Ger., 4.4.27).—Vinyl acetate is boiled with aqueous acetic acid and phosphoric acid (or other acid catalyst) and the acetaldehyde formed is removed by distillation through a column. A continuous process is described.

C. HOLLINS.

Manufacture of acetaldehyde and acetic acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,241, 9.8.28).—Acetylene saturated with water vapour is passed at 100–200° over a mercury catalyst, e.g., mercuric orthophosphate, or mercuric vanadate, or a mixture of mercuric sulphate and silver or tin vanadate.

C. HOLLINS.

Production of concentrated acetic acid. H. SUIDA (B.P. 295,641, 15.8.28. Ger., 15.8.27).—For the extraction of acetic acid in the liquid phase, phthalic and other aromatic esters are used as solvents. Butyl and ethyl phthalate are mentioned specifically.

C. HOLLINS.

Continuous extraction of acetic acid from its aqueous solutions. SOC. ANON. DES DISTILLERIES DES DEUX SÈVRES (B.P. 307,868, 2.6.28. Belg., 15.3.28).—Aqueous acetic acid and the extracting solvent circulate in countercurrent through alternate mixing and settling vessels, the aqueous layer from each settler passing forward to the next mixer and the solvent layer backward to the previous mixer.

C. HOLLINS.

Manufacture of acetone [from acetic acid]. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 299,720, 29.10.28. Ger., 29.10.27).—In the catalytic preparation of acetone the effect on the catalyst (ceria) of variations in temperature or in rate of gas flow is avoided by diluting the acetic acid vapour either with excess of acetic acid or with steam. The vapours may be preheated before entering the catalyst chamber.

C. HOLLINS.

Manufacture of ethyl acetate free from alcohol. F. SCHEUERMANN (G.P. 455,584, 25.12.24).—The ester is freed from alcohol by washing with 10% acetic acid and then distilled, whereby a product containing 95–97% of ester free from alcohol is obtained together with a residual liquor consisting of 50–80% acetic acid, which is returned to the esterification still. Fractional distillation of the wash-liquors from the first-named treatment affords alcohol and further quantities of ester.

A. R. POWELL.

Manufacture of urea and substitution products thereof. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,566, 19.11.28).—Ammonia or amines are passed with carbon monoxide or dioxide over carbides of silicon, iron, nickel, cobalt, titanium, or alkaline-earth metals at 450–500°.

C. HOLLINS.

Hydrogenation of crotonaldehyde. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 321,253, 22.8.28).—Hydrogen introduced through a perforated central pipe-lead mixes gradually with crotonaldehyde vapour (to which steam and/or hydrogen

may be added) in the catalyst chamber; over-heating is thus avoided.

C. HOLLINS.

Dry distillation, especially of calcium butyrate. H. DOLTER (F.P. 634,959, 23.9.26).—The material, mixed with a volume greater than its own of spheres constructed of metal, kieselguhr, clay, etc., is treated in a rotating horizontal drum with a current of a non-reacting gas preheated to a temperature sufficiently high to effect the distillation. The gas, after it leaves the drum, is cooled to condense the distillation products and is returned to the process.

L. A. COLES.

Manufacture of ketonic acid esters. DR. A. WACKER GES. F. ELEKTRO-CHEM. IND. G.M.B.H. (B.P. 304,118, 6.11.28. Ger., 14.1.28).—Butyl and higher esters of acetic and higher acids react readily with the corresponding sodium alkoxide to give butyl and higher alkyl acetoacetates, the alcohol being distilled off (with some alkyl acetate etc.) as formed. Butyl acetoacetate, b.p. 100–103°/16 mm., and amyl acetoacetate, b.p. 105–108°/16 mm., are obtained in 90% and 80% yield, respectively.

C. HOLLINS.

Manufacture of nitrogenous condensation products from acetylene and ammonia. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,177, 27.7.28).—Pyridine bases suitable for denaturing alcohol are the main products when acetylene and ammonia are passed at 250–300° over a catalyst containing highly dispersed metallic cadmium, lead, gold, or bismuth, preferably on a porous carrier-promoter; e.g., active silica is impregnated with cadmium nitrate, with or without aluminium nitrate, dried, and reduced with hydrogen at 300–400°.

C. HOLLINS.

Manufacture of carboic acid [phenol]. S. J. LLOYD and A. M. KENNEDY, ASSES. TO FEDERAL PHOSPHORUS Co. (U.S.P. 1,735,327, 12.11.29. Appl., 21.3.25. Renewed 28.10.26).—Chlorobenzene vapour is passed with steam over silica gel.

C. HOLLINS.

Manufacture of [nuclear] alkylated phenols and their hydrogenation products. W. P. WILLIAMS. From SCHERING-KAHLBAUM A.-G. (B.P. 320,638, 17.7.28).—In the processes of B.P. 254,753 and 274,439 (B., 1928, 740; 1929, 164) ordinary hydrogenation catalysts may be employed if the temperature is above the decomposition point of the dihydroxydiarylmethane, or just below it if a porous catalyst is used. Thymol is produced from $\beta\beta$ -(2:2'-dihydroxy-4:4'-dimethyldiphenyl)propane.

C. HOLLINS.

Catalytic hydrogenation of aromatic bases. I. G. FARBENIND. A.-G. (B.P. 295,033, 1.8.28. Ger., 6.8.27).—For hydrogenation of arylamines (e.g., ethylaniline, o-toluidine) in the liquid phase, the nickel or cobalt catalyst is mixed with alkali, e.g., sodium carbonate or calcium oxide.

C. HOLLINS.

Manufacture of [halogenated] derivatives of terephthalic acid. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 321,548, 7.11.28).—2-Chloro- or 2:5-dichloro-p-xylenes are completely chlorinated in the side-chains and the products are converted into chloro- and dichloro-terephthalic acids by warming with concentrated sulphuric acid. Bromoterephthalic acids are similarly prepared. The 2-chloro- and 2-bromo-tere-

phthalic acids may be nitrated to give the corresponding 5-nitro-acids, m.p. 265° and 260—262°, respectively.

C. HOLLINS.

Production of halogen-substituted organic sulphonic acids and their salts [wetting-out and emulsifying agents]. ORANTIENBURGER CHEM. FABR. A.-G., Assees. of CHEM. FABR. MILCH A.-G. (B.P. 289,841, 3.5.28. Ger., 3.5.27).—Chlorosulphonic acid is used in presence of manganese dioxide for the simultaneous condensation, halogenation, and sulphonation of aliphatic, aromatic, or hydroaromatic compounds, especially of castor oil or a mixture of ground-nut oil fatty acid, wool fat, and benzene, to give wetting-out and emulsifying agents. The process is also useful for preparation of chloronaphthalenesulphonic acids.

C. HOLLINS.

Production of styrene and homologues thereof. NAUGATUCK CHEM. CO., Assees. of O. H. SMITH (B.P. 298,152, 7.7.28. U.S., 4.10.27).—Ethylbenzene is chlorinated below 30° to give a mixture of α - and β -chloroethylbenzenes, which is passed without separation through a hot tube at 500—725°; nuclear homologues of ethylbenzene are similarly treated. *o*-, *m*-, or *p*-Chloroethylbenzene also yields styrene by elimination of the nuclear chlorine at the same temperature.

C. HOLLINS.

Manufacture of salts of the urea of *m*-aminobenzoyl-*m*-amino-*p*-toluyl-1-naphthylamine-4:6:8-trisulphonic acid. G. M. DYSON and A. RENSHAW (B.P. 321,580, 5.12.28. Cf. B.P. 314,909; B., 1929, 807).—The alkali salts are converted by means of lead acetate and ammonia into lead salts, which are treated with dilute sulphuric acid in calculated amount; after removal of lead sulphate by filtration the solution is neutralised with ammonia and evaporated in a vacuum.

C. HOLLINS.

Manufacture of arylcarboxylic acid amide-o-thioglycollic acids and hydroxythionaphthens [o-amidocarbonylarylthioglycollic acids and thioindoxyls]. I. G. FARBENIND. A.-G. (B.P. 295,694, 17.8.28. Ger., 17.8.27).—*o*-Cyanoarylthioglycollic acids are converted by alkaline hydrogen peroxide at 40—70° into the corresponding amides, which give thioindoxyls by the action of caustic alkali at 95°, no isolation of the amide being necessary. The conversion of 5-ethoxy-2-cyanophenylthioglycollic acid into 6-ethoxythioindoxyl by way of the amide is described. C. HOLLINS.

Manufacture of condensation products of naphthalene and naphthalene derivatives. I. G. FARBENIND. A.-G. (B.P. 295,990, 1.8.28. Ger., 22.8.27. Addn. to B.P. 265,601 and 273,665; B., 1928, 740).—Naphthalene or tetrahydronaphthalene is condensed with propylene, butylene, or higher olefine in presence of aluminium chloride.

C. HOLLINS.

Production of borneol and isoborneol. J. A. TINLING (B.P. 321,442, 2.8.28).—In the manufacture of borneol from pinene or camphene, improved yields are obtained by using *o*-benzoylbenzoic anhydride or the mixed acetic anhydride as esterification agent.

C. HOLLINS.

Purification of benzanthrone. NEWPORT Co. (B.P. 305,536, 25.1.29. U.S., 6.2.28).—A solution of

crude benzanthrone in concentrated sulphuric acid is diluted with water to 65% acid concentration and pure benzanthrone is extracted with toluene at 60°.

C. HOLLINS.

Production of highly halogenated derivatives of pyranthrone. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,161, 30.7.28).—More than 4 halogen atoms are introduced by halogenating (especially brominating) pyranthrone in chlorosulphonic acid in presence of iodine, selenium, etc. at 65—70°. Pentabromopyranthrone is a fast scarlet vat dye. [Stat. ref.]

C. HOLLINS.

Conversion of gaseous aliphatic ethylene hydrocarbons into liquid hydrocarbons. E. RICARD, Assr. to SOC. RICARD, ALLENET & CIE. (U.S.P. 1,745,028, 28.1.30. Appl., 24.7.23. Belg., 9.8.22).—See B.P. 202,311; B., 1925, 64.

Production of *N*-monoalkyl derivatives of aminophenols. W. TRAUBE and E. HELLRIEGEL (U.S.P. 1,746,064, 4.2.30. Appl., 9.9.27. Ger., 15.11.26).—See B.P. 280,553; B., 1929, 236.

[Manufacture of] acid diazonium salts of arylsulphonic acids. F. KELLER and K. SCHNITZSPAHN, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,744,903, 28.1.30. Appl., 24.12.25. Ger., 19.1.25).—See B.P. 269,212; B., 1927, 647.

Production of hydroxyanthraquinones. J. THOMAS and H. W. HEREWARD, Assrs. to SCOTTISH DYES, LTD. (U.S.P. 1,744,815, 28.1.30. Appl., 5.5.24. U.K., 18.2.24).—See B.P. 246,529; B., 1926, 312.

IV.—DYESTUFFS.

See A., Feb., 205, Azo dyes (RUGGLI and others). 215, New vat dyes from β -aminoanthraquinone (RIESZ and FEIKS).

PATENTS.

Manufacture of xanthen dyes and their use. IMPERIAL CHEM. INDUSTRIES, LTD., A. COULTHARD, and E. H. RODD (B.P. 320,345, 7.7.28).—The xanthenes of B.P. 314,825 (B., 1929, 711) are condensed in presence of phosphoryl chloride etc. with secondary or tertiary arylamines having a free *p*-position, yielding rhodamines with three basic groups. The products may be sulphonated to give acid dyes. 3:7-Tetramethyl- or -tetraethyl-diaminoxanthone is condensed, for example, with ethyl- α -naphthylamine or *p*-tolyl-*m*-phenetidine.

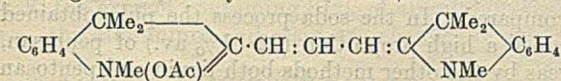
C. HOLLINS.

Bromination products of 6:6'-dichloro-4:4'-dimethylthioindigo and their manufacture. NEWPORT Co. (B.P. 292,904, 23.4.28. U.S., 25.6.27).—The thioindigo named is brominated in concentrated sulphuric acid to introduce less than 2 atoms of bromine.

C. HOLLINS.

Manufacture of dyes of the polymethine series. O. Y. IMRAY. From SOC. CHEM. IND. IN BASLE (B.P. 321,155, 27.6.28).—The condensation product from formaldehyde and 2 mols. of a cycloammonium salt having a reactive α -methylene or α -methyl group is oxidised in a non-alkaline medium, and the product is treated with alkali to eliminate acid. Thus 2-methylene-1:3:3-trimethylindolenine is condensed with formalde-

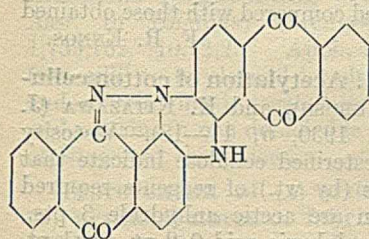
hyde and oxidised in benzene or chloroform solution with *p*-benzoquinone or lead peroxide in presence of acetic acid to give the indocyanine acetate (annexed formula).



Similarly, methylenediquinaldine methiodide is oxidised to pinacyanol base.

C. HOLLINS.

Manufacture of vat dyes [of the pyrazolanthrone series]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,585, 15.12.28, 27.2. and 6.4.29).—Pyrazolanthrone having a free 3-position are condensed with 2-halogeno-1-aminoanthraquinones, or 3-halogenopyrazolanthrone with 1-aminoanthraquinones, in nitrobenzene in presence of copper and an acid-binding agent.



The products may be improved by halogenation. The vat dye (annexed formula) from pyrazolanthrone with 2-bromo-1-aminoanthraquinone gives bluish-violet shades; with 2-bromo-1-

amino-4-hydroxyaminoanthraquinone blue-green, grey after chlorination; from 3-bromopyrazolanthrone and 1:4-diaminoanthraquinone, green-grey, bordeaux after chlorination.

C. HOLLINS.

Manufacture of [red] vat dyes [of the pyrazolanthrone series]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,703, 9.8.28).—4-Chloro-1:8-naphthalimide or an *N*-derivative is condensed with pyrazolanthrone and the product is fused with alcoholic alkali at 115–120° to give a red vat dye. Very pure shades result from *N*-alkyl derivatives or on subsequent alkylation.

C. HOLLINS.

Production of indanthrone bodies [halogenation of diarylaminoindanthrones for green vat dyes]. R. J. LOVELUCK, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 321,192, 30.4.28).—4:4'-Dianilinoindanthrones, prepared from 2-halogeno-1-amino-4-anilino- (or -toluidino)-anthraquinones, are dichlorinated or dibrominated in nitrobenzene to give fast green vat dyes. C. HOLLINS.

Dyes and dyeing. [Separation of leuco-esters of vat dyes from metal and pyridine.] R. S. BARNES, J. E. G. HARRIS, B. WYLAM, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 321,462, 11.8.28).—Decomposition of the sulphuric ester of leuco-vat dyes during isolation is prevented by first removing all copper, *e.g.*, by heating with caustic alkali and filtering, before distilling off the pyridine in steam.

C. HOLLINS.

Production of *N*-dihydro-1:1':2:2'-anthraquinoneazine fast to chlorine. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 320,397, 11.7. and 12.11.28, and 25.3.29).—Impure indanthrones, *e.g.*, indanthrene-blue RS or its methyl or sulphonic derivatives, are treated at 30–70° with manganese dioxide and sulphuric acid; unsulphonated indanthrones may further be treated with a mild sulphonating agent in presence

of boric acid. High yields of chlorine-fast product are claimed.

C. HOLLINS.

Azo dyes and their application [to wool and viscose silk]. BRIT. DYE STUFFS CORP., LTD., and R. BRIGHTMAN (B.P. 321,483, 21.8.28. Addn. to B.P. 294,284; B., 1928, 704).—In the dyes obtainable according to the prior patent the nitro-group is reduced, the resulting aminoazo dye being then diazotised and coupled with an aromatic amine or phenol or a sulphonic or carboxylic derivative of such. The final product must contain as end-component at least one 2:8-aminonaphtholsulphonic acid or an *N*-substituted derivative thereof.

C. HOLLINS.

Manufacture of azo dyes [for cotton]. SOC. CHEM. IND. IN BASLE (B.P. 299,791, 31.10.28. Switz., 31.10.27).—An arylamine containing no hydroxyl groups is diazotised and coupled through two non-hydroxylated middle components (α -naphthylamine or Cleve acid) with *J*-acid in acid, neutral, or alkaline medium to give grey to green-grey direct dyes. Suitable first components are aniline, β -naphthylamine-4:8-disulphonic acid, metanilic acid, Cleve acid.

C. HOLLINS.

Manufacture of [azo] dyes [containing chromium]. SOC. CHEM. IND. IN BASLE (B.P. 289,094, 23.4.28. Switz., 23.4.27).—Blue dyes with affinity for cotton are obtained by coupling diazotised 5-nitro-*o*-aminophenol with *N*-aryl-*J*-acids in alkaline solution, and chroming the product.

C. HOLLINS.

Manufacture of [azo] dyes containing chromium. SOC. CHEM. IND. IN BASLE (B.P. 295,594, 13.8.28. Switz., 13.8.27).—Chromable azo dyes are heated with sodium sulphide solution and chromium hydroxide, preferably with the addition of sulphite-cellulose liquor, glycerin, sucrose, etc. and caustic alkali. Nitro-groups are reduced at the same time to amino-, azo, or azoxy-groups. The products dye silk, wool, cotton, and viscose silk or may be used for colouring varnishes.

C. HOLLINS.

Manufacture of developing dyes. I. G. FARBENIND. A.-G. (B.P. 303,026, 24.12.28. Ger., 24.12.27).—Secondary disazo dyes of the type: first component \rightarrow non-phenolic middle component \rightarrow benzenoid *p*-coupling amine, or similar trisazo dyes containing a second non-phenolic middle component, are *m*- or *p*-nitrobenzoylated and the nitro-group is reduced to give direct dyes which may be diazotised and developed on the fibre for browns. Examples are: *G*-acid \rightarrow Cleve acid \rightarrow *m*-toluidine; β -naphthylamine-4:8-disulphonic acid \rightarrow *m*-toluidine \rightarrow 2:5-dimethoxyaniline; aniline-2:5-disulphonic acid \rightarrow Cleve acid \rightarrow α -naphthylamine \rightarrow *m*-toluidine.

C. HOLLINS.

Manufacture of dyes [in dry, finely-divided form]. S. W. DUCKWORTH, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 320,359, 9.7.28).—Dyes, especially vat dyes and insoluble dyes for acetate silk, obtained by drying aqueous pastes with or without dispersing agents, are finely ground, *e.g.*, in a ball mill, with ether, chloroform, or other low-boiling liquid. The product is a readily dispersible powder.

C. HOLLINS.

Production of body colours. "KOLLOIDCHEMIE" STUDIENGES. M.B.H., J. B. CARPZOW, M. MARCH, R. LENZ-MANN, and H. SANDERS (B.P. 319,808, 30.5.28).—A mud

containing 20–60% of colloidal “unsaturated” silicon compounds (*i.e.*, compounds in which the silicon and oxygen are in the ratio $x:2x-1$) is treated with organic or inorganic dyes (which may also be formed *in situ*) in presence of metal salts capable of reacting with the mud to form silicates; the water is then removed. The mud may be activated by preliminary keeping in absence of air, if desired with addition of anaerobic bacteria and suitable nutrients. Examples are magenta, Turnbull's blue, ferric oxide (from the blue by calcination in presence of ammonia), and aniline-blue.

C. HOLLINS.

Manufacture of vat dyes. H. T. BUCHERER, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,745,004, 28.1.30. Appl., 24.2.27. Ger., 29.5.25).—See B.P. 252,745; B., 1927, 838.

Halogenated pyranthrones (B.P. 321,161). **Benzanthrones** (B.P. 305,536).—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Straw. II. Production of furfuraldehyde from oat husks and oat straw. O. ROUTALA and O. KUULA.

III. Action of enzymes on the hemicelluloses.

O. ROUTALA and H. SOINI (Suomen Kem., 1929, 2, 124–135, 135–146).—II. Hydrolysis of oat husks containing 29.33% of pentosans by means of zinc chloride gave 4.21% of furfuraldehyde, whilst with aluminium chloride the yield was 6.76%. Heating with 3.57% sulphuric acid solution at 145° and under 4 atm. for 7 hrs. gave 6.34%, whereas 9.30% resulted from treatment under similar conditions with a 3.3% phosphoric acid solution for 15 hrs. About 4% of the weight of the original material was present in the residue after hydrolysis as sugars fermentable with yeast. From oat straw containing 26.67% of pentosans a 9.57% yield of furfuraldehyde was obtained by the phosphoric acid treatment.

III. Straw treated so as to liberate its hemicelluloses is not fermented by malt extract, and the waste liquor from the production of sulphite-cellulose from the straw is not fermented by yeast. Straw, cotton, and pine-wood yield the same triacetates and cellobioses. A 40% zinc chloride solution dissolved 76.81% of a straw containing 19.4% of lignin in 24 hrs.

R. CUTHILL.

Brittle straw in rye. J. FRATEUR (Natuurwetensch. Tijds., 1930, 12, 2–5).—The second crop from a crossing of Petkus and Eecloo rye gave 133 plants, of which two were very brittle. The grain from these was sown, and the proportion of brittle plants increased rapidly. Examination revealed no histological basis for the brittleness, but chemical investigation showed a very low proportion of crude cellulose (27.7–29.8%, against 57.4–60% for normal straw), and a very high proportion of extractable matter (64.7–66.8%, against 33.2–35.8% for normal straw), which contained abnormally high proportions of pentosans.

S. I. LEVY.

Carbonisation of wool. W. KEGEL (Leipziger Monatsschr. Textil-Ind., 1929, 44, 219; Chem. Zentr., 1929, ii, 953).—A discussion.

A. A. ELDRIDGE.

Bamboo. II. Pulp-making from the bamboo “Mōso-chiku.” Y. UYEDA (J. Cellulose Inst., Tokyo,

1930, 6, 3–5; cf. B., 1928, 477).—The yields and composition of the pulps obtained in the digestion of bamboo by the soda, the sulphite, and the bisulphite processes are compared. In the soda process the pulp obtained contained a high proportion (22.81% *av.*) of pentosan, whereas by the other methods both lignin and pentosan contents were largely removed. The yields of pulp by the three methods are 54.7, 48, and 52%, respectively.

F. R. ENNOS.

Change of viscosity during ripening, and the spinning of viscose. G. KITA, S. IWASAKI, and S. MASUDA (J. Cellulose Inst., Tokyo, 1930, 6, 19–26).—Viscose prepared with soda of more than 18% concentration and with carbon disulphide equivalent to about 50% of the cellulose undergoes the usual changes of viscosity during ripening, and there is no improvement in the threads so produced compared with those obtained from normal viscose.

F. R. ENNOS.

Cellulose acetate. I. Acetylation of cotton cellulose. Y. KAMI, M. INUBUSHI, and K. KITAZAWA (J. Cellulose Inst., Tokyo, 1930, 6, 11–18).—Viscosity determinations on the esterified cellulose indicate that the minimum quantities (by wt.) of reagents required for complete acetylation are acetic anhydride 3 pts., acetic acid 3 pts., and sulphuric acid 0.2 pt. for 1 pt. of cotton wadding, and 2.5, 2.5, and 0.2 pt., respectively, for 1 pt. of linters pulp.

F. R. ENNOS.

Apparatus for concentration of sulphite-[cellulose] waste liquors. ANON. (Chem.-Ztg., 1930, 54, 99).—An evaporator for concentrating the waste liquors of the paper industry without foaming or the formation of hard crusts comprises a boiler with heating system consisting of a number of concentric rings each of which is built of two cylindrical, metal shells with upper and lower strengthening rings welded on to form a chamber through which the heating steam is passed. The liquor to be evaporated circulates rapidly through the annular spaces between the heating rings. The heating surface of a 7-ring boiler is 120 m.². All the auxiliary apparatus is arranged below the boiler so that the evaporating surfaces can be readily reached for cleaning, which is effected by means of a mechanically operated metal brush. A basket-shaped chamber above the heating rings is provided with a rotating beating device which serves to break up any foam that forms. Data are given for the capacity and power consumption of four sizes of this type of evaporator.

A. R. POWELL.

Theory of rosin sizing of paper. H. ROSCHIER (Suomen Kem., 1929, 2, 48–54).—The author's conclusions (B., 1928, 851) have been questioned by Öman, who considers the fibres always absorb aluminium ions and that the sizing is effected by free resin independent of the acidity, aluminium hydroxide being detrimental to the sizing rather than improving it. Experiments are described which confirm the author's previous results, and which show that aluminium resinate, aluminium hydroxide, and free resin are of great importance in sizing (although free resin and the aluminium ions in the fibres cannot themselves bring about sizing), whilst aluminium ions are of little or no importance. Thus lime-free, ashless filter-paper fibres take up almost no

aluminium ions from alum solution, but the fibres can nevertheless be satisfactorily sized. Benzene extracts 82% of the rosin used for a drawing-paper made at p_H 4.8, the extract containing 81% of aluminium resinate, i.e., the aluminium and resin are chemically combined.

S. K. TWEEDY.

Oxidation of alkali-cellulose by ageing and its importance in the manufacture of artificial silk.

G. KITA and I. SAKURADA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1929, 12, 1—20).—See B., 1929, 749.

See also A., Feb., 205, **Action of aromatic diazo-compounds on lignin and cellulose** (KÜSTER and DAUR).

PATENTS.

[Centrifugal apparatus for] treating flotalant materials [degumming of silk]. J. J. McKEON, Assr. to TOLHURST MACHINE WORKS, INC. (U.S.P. 1,739,162, 10.12.29. Appl., 27.2.26).—The material (raw silk) to be cleaned by alternate solvent extraction and centrifuging is treated in bulk in a free condition and remains in one detachable centrifugal basket during all stages of the process.

B. M. VENABLES.

Improvement of (A) artificial fibrous material, (B) artificial fibres or fabrics. L. LILIENTFELD (B.P. 323,731—2, 2.7.28).—(A) Regenerated cellulose silks show a reduced tendency to crease, improved elasticity and extensibility, a softer feel, and a lustre more closely resembling that of natural silk, without any deleterious effect on their strength, if they are treated, preferably in an unstretched condition, with alkaline reagents such as caustic alkali solutions (5—74% calc. as NaOH), organic bases, or alkali sulphide solutions containing more than 15% $Na_2S \cdot 9H_2O$ at temperatures between 25° and 150°. The duration of the treatment may be 1 min. for caustic alkali solution or 5 min. for alkali sulphide solution. This process may be applied to mixed fabrics containing, e.g., cotton and cellulose silks, and is particularly suitable for the treatment of Lilientfeld silk. The results of 43 experiments on materials so treated are tabulated. (B) The effects produced by the above process are also obtainable at the ordinary temperature (15—25°) with caustic alkali solutions containing more than 30% of caustic alkali (calc. as NaOH).

D. J. NORMAN.

Preparation of cellulose masses [from straw etc.]. CELLULOSE ET PAPIERS (SOC. DE RECHERCHES ET D'APPLICATIONS) (F.P. 569,492, 26.10.22).—Straw or other raw fibrous material is rapidly and uniformly digested with a caustic alkaline liquor in a digester provided with an inner, open, cylindrical vessel; the material is circulated upwards by, e.g., a helical stirrer or pump in the inner cylinder and then downwards through the outer space.

A. J. HALL.

Manufacture of fine viscose filaments. VEREIN. GLANZSTOFF-FABR. A.-G. (G.P. 458,790, 9.8.19).—In the manufacture of viscose silk in which strongly acid (sulphuric acid) spinning baths are used, also a viscose solution having a degree of ripeness suitable to the acidity of the bath, and spinning jets of the usual dimensions, an addition is made to the bath of products obtained by hydrolysing cellulosic materials by means of mineral acids.

A. J. HALL.

Coagulation or precipitation of viscose. L. LILIENTFELD (B.P. 323,747, 2.7.28).—For this purpose warm or hot caustic alkali solution or alkali sulphide solution is used either alone or in conjunction with other suitable agents. Thus a viscose solution containing 6.5% of cellulose and 8% of caustic soda is filmed on glass and then immersed in 18% caustic soda solution at 104° for 6—10 min. Fourteen other examples are given.

D. J. NORMAN.

Manufacture of cellulose esters. KODAK, LTD., Assees. of H. T. CLARKE, C. J. MALM, and R. L. STINCHFIELD (B.P. 287,880, 27.3.28. U.S., 28.3.27).—Mixed esters of cellulose are obtained by treating cellulose with an organic monocarboxylic acid and a lower aliphatic acid anhydride, both the acid and the anhydride entering into the reaction. A solvent (chloroacetic acid) and an esterification catalyst (zinc chloride, perchlorates, etc.) are desirable. For mixed esters insoluble in benzene the ratio of higher to lower acyl groups should be within certain limits; in each C_{24} cellulose molecule the number of acyl groups above C_8 should be between 0.3 and 4.0, whilst the acyl groups C_1 to C_5 should exceed 8 but be less than 11.6. The most useful film-forming esters are those containing 9 acetyl groups and about 3 stearyl and/or palmityl groups. A method for determining the proportion of acyl groups is detailed.

C. HOLLINS.

Manufacture of mixed esters of cellulose. KODAK, LTD., Assees. of H. T. CLARKE and C. J. MALM (B.P. 290,571, 4.5.28. U.S., 14.5.27. Addn. to B.P. 287,880; preceding abstract).—In the process of the prior patent the higher acid is first treated with the lower (acetic) anhydride, the lower acid is distilled off, a solvent (chloroacetic acid) is added, and cellulose is esterified with the resulting mixture in presence of a catalyst (magnesium perchlorate).

C. HOLLINS.

Manufacture and treatment of cellulose derivatives. H. DREYFUS (B.P. 320,842, 18.4.28).—Cellulose is acylated with chloro- or bromo-acetic anhydrides. The halogen may subsequently be replaced by hydroxyl, amino-, alkylamino-, or other groups. Mixed esters may also be made.

C. HOLLINS.

Sizing of paper. L. F. DOBLER (F.P. 569,363, 19.10.22).—The paper is sized and passed through rollers heated at 100—175° so that the resinous constituents melt and the size is distributed homogeneously through the material.

L. A. COLES.

Manufacture of transparent paper resistant to fat and moisture. RÉALISATION DES BREVETS FRANÇ. AMOUROUX & Co., Assees. of F. C. WICKEL (F.P. 631,645, 16.11.26. Ger., 14.8.26).—Highly calendered sulphite-cellulose paper is coated on both sides with a fluid, resinous, formaldehyde condensation product and passed between rollers at 120—150°.

A. J. HALL.

Manufacture of cellulose esters. KODAK, LTD., Assees. of H. T. CLARKE and C. J. MALM (B.P. 289,853, 1.5.28. U.S., 4.5.27).—See U.S.P. 1,690,620; B., 1929, 203.

Manufacture of foils, films, ribbons, etc. from viscose and similar cellulose solutions. E. CZAPEK and R. WEINGAND (U.S.P. 1,745,247, 28.1.30. Appl., 1.9.27. Ger., 13.9.26).—See B.P. 277,309; B., 1928, 810.

Stencil sheet for use in duplicating. A. DE WAELE, Assr. to D. GESTETNER, LTD. (U.S.P. 1,744,755, 28.1.30. Appl., 6.7.27. U.K., 8.7.26).—See B.P. 298,705; B., 1929, 14.

Production of compound yarns or threads. O. RASCH (B.P. 314,521, 30.5.9. Ger., 30.6.28).

[Spreader device for] manufacture of very smooth, varnished, flexible fabric. G. A. LANGVERTE & CIE. (B.P. 309,866, 15.4.29. Fr., 16.4.28).

Production of thin films or strips from solutions of cellulose or its derivatives [by extrusion]. H. HAMPEL (B.P. 324,648, 28.8.28).

Decorated [toilet] articles and their manufacture. (Sir) G. C. MARKS. From DU PONT VISCOLOID CO. (B.P. 323,473, 29.9.28).

Method of paper drying and apparatus therefor. H. A. GILL. From J. O. ROSS ENGINEERING CORP. (B.P. 324,745, 20.11.28).

[Multi-layer] sheet or strip material for packing, covering, decoration, etc. WOLFF & CO. KOMM.-GES. AUF AKT., E. CZAPEK, and R. WEINGAND (B.P. 324,326, 19.10.28).

Artificial masses etc. (B.P. 321,258).—See XIII. **Feeding-stuff** (F.P. 623,663).—See XIX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

PATENTS.

Improving the [wetting-out] action of treatment liquids in the textile industry. H. T. BÖHME A.-G. (B.P. 297,383, 20.8.28. Ger., 20.9.27).—The wetting-out properties of aromatic sulphonic acids substituted in the nucleus by groups having three or more carbon atoms are preserved in highly concentrated alkaline solutions, such as those used in mercerising, by adding thereto a phenol or similar substance. In an example a mixture of sulphonated ricinoleic acid, tricresol, and dipropyl-naphthalenesulphonic acid is used. A. J. HALL.

Preparation of effect threads. CHEM. FABR. VORM. SANDOZ (B.P. 323,500, 323,515, and 323,548, 24.7.28. Addns. to B.P. 280,493; B., 1928, 812).—(A) The process of the earlier patent may be satisfactorily carried out at temperatures above 25°, and hence in a shorter time, if the activity of the acetylating bath is reduced by using either a smaller quantity of the catalyst or a less active one. Thus, bleached cotton yarn (100 pts.) is treated for $\frac{1}{2}$ — $\frac{3}{4}$ hr. at 80° with a bath containing zinc chloride (30 pts.), acetic anhydride (250 pts.), and glacial acetic acid (720 pts.). (B) Greater economy and a product of softer feel are obtained if the above process is carried out with the theoretical quantity of acetic anhydride or only a slight excess thereof. (C) The cellulose is treated first with one or more of the constituents of the acetylating mixture and later with the remaining constituents. D. J. NORMAN.

Treatment of textile fabrics. BRIT. CELANESE, LTD., and R. S. FELGATE (B.P. 323,210, 20.9.28).—In the production of effects on fabrics composed of or containing cellulose acetate, the fabric is first embossed and the effect material is then applied to the upraised portions by a roller or similar device. This process is parti-

cularly applicable for the production of local saponification effects and subsequent cross-dyeings. Suitable apparatus is described. D. J. NORMAN.

Treatment of artificial silk threads and filaments. J. BRANDWOOD (B.P. 323,216, 26.6.28).—The tendency of artificial silk, when dyed in the form of, e.g., cheeses or while wound on perforated spools, to show unevenness, and with parti-coloured dyeing a ragged edge, may be obviated by first treating the silk with a paraffin wax emulsion which is not in itself soluble in the dye liquor. The emulsion is preferably introduced into the centre of a perforated spool and forced through the thread mass, and, at the same time, between the individual filaments of the thread, by centrifugal action. D. J. NORMAN.

Bleaching fibres with ozone. E. CRESPI and M. P. OTTO (F.P. 622,646, 2.2.26).—Raw textile fibres are treated for 7 hrs. at 3 atm. pressure in a closed vessel with a 6% solution of caustic soda containing 1% of Turkey-red oil, then washed, soured with dilute hydrochloric or oxalic acid, again washed, and then bleached while moist in a chamber with air containing 4.5–9.0 g. of ozone per m.³ A. J. HALL.

Bleaching of straw. R. FALANDRIN (F.P. 618,007, 22.6.26).—Straw is treated with a mixture containing sulphur dioxide and an acid salt, such as an acid sulphate or oxalate. A. J. HALL.

Dyeing with anthraquinone vat dyes. CHEM. WORKS, FORMERLY SANDOZ (B.P. 300,662, 17.11.28. Ger., 18.11.27).—Dye liquors used in dyeing printed reserve fabrics with anthraquinone vat dyes by the glucose-caustic soda process are stabilised by addition to the vat of phenols or naphthols to which 2–10% of hydrogenated aromatic substances (cyclohexanols, methyl-cyclohexanols, hydrogenated naphthols or naphthalene) has been added. The decomposition and re-oxidation of the dye liquors is thereby prevented, and leuco-compounds set free in the liquors remain in solution or in a finely-dispersed form. A. J. HALL.

Dyeing of cellulose acetate silk. GILLET ET FILS (F.P. 570,264, 17.11.22).—The silk is successively treated for a long time with cold potassium permanganate solution, washed, treated with sodium bisulphite solution, treated with hydrochloric acid until the brown colour disappears, and dyed with basic dyes. L. A. COLES.

Production of special [cross-dyeing] effects on mixed fabrics of cotton and acetate silk. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 320,027, 30.4.28).—The cotton in the mixed fabric is dyed with a sulphide dye (preferably vatted with hyposulphite instead of sulphide) in presence of a borate, hydrogen carbonate, or other weak-acid salt of an alkali metal (sodium if sodium sulphide is used). The acetate silk in the fabric remains uncoloured and may afterwards be dyed, if desired, with acetate silk dyes. C. HOLLINS.

Dyeing and printing [over-printing with soluble esters of leuco-vat dyes]. J. MORTON, J. I. M. JONES, and STANDFAST DYERS & PRINTERS, LTD. (B.P. 321,191, 26.4. and 10.12.28).—Cloth is printed with a soluble

leuco-ester together with an oxidant which does not affect the leuco-ester but is a resist against an ordinary vat dye used in the subsequent over-printing or padding. The leuco-ester and oxidant may be applied to yarn which is then woven with untreated yarn, and the whole over-printed or padded. A suitable oxidant is sodium *m*-nitrobenzenesulphonate.

C. HOLLINS.

Printing of fabric with pigment dyes. SOC. ALTHER & GUEX, and W. HUGENTOBLE (F.P. 570,093, 2.11.22).—A printing paste is used consisting of the pigment dye, cadmium-yellow, and linseed oil diluted with turpentine or glycerin.

A. J. HALL.

Improvement of vegetable textile materials. L. LILIENFELD (B.P. 323,174—5, 2.7.28).—(A) The materials are mercerised by means of an alkali sulphide solution containing not less than 25% of alkali sulphide (calc. as $\text{Na}_2\text{S}\cdot 9\text{H}_2\text{O}$) at a high or moderately raised temperature. Cotton yarn treated for 5 min. in crystalline sodium sulphide solution of 100% concentration at 115° showed an increase in strength of 66% in the dry state and 59% in the wet state as against 16.5% and 17.3%, respectively, for the same yarn mercerised with 22.5% caustic soda solution. (B) Mercerisation is effected by concentrated solutions of caustic alkalis (20—74%) at temperatures well above 100°, *e.g.*, 120—150°; thus cotton yarn mercerised in a stretched condition with a 50% caustic soda solution at 140° for 5 min. showed increases in strength in the dry and wet states of 68% and 42.5%, respectively, as against 48% and 26.6%, respectively, for the same yarn mercerised with 50% caustic soda solution at 100°. Further, the lustre obtained at the higher temperature is superior to that at 100°.

D. J. NORMAN.

Treatment of fabrics or yarns composed of natural celluloses. Treatment of mixed fabrics or yarns composed of natural celluloses and wool or natural silk. Treatment of fabrics containing artificial silk. W. MARSHALL (B.P. 323,345—6 and 323,307, [A, B] 12.12.28, [C] 7.11.28).—(A) The handle and lustre of materials made from natural celluloses are improved and the risk of damage is minimised if, after mercerisation or other treatment with alkali solution, the material is washed in an aqueous solution containing one or more of the following protective agents: sodium or potassium chloride, sulphate, nitrate, chlorate, sodium thiosulphate, sucrose, glycerin, and glucose. A solution containing 8% or more of common salt is suitable at a temperature between 15° and 104°, preferably 43°. The use of such protective agents prevents damage to (B) animal fibres and (C) regenerated cellulose silk fibres when mixed fabrics are treated with caustic alkali solutions, and in the latter case promotes level dyeing of the cellulose silk fibres. In the case of fabrics containing animal fibres the washing should be conducted at a low temperature.

D. J. NORMAN.

Proofing of woollen or other cloth. F. D. TOYNE, and HUNT & WINTERBOTHAM, LTD. (B.P. 323,250, 30.8.28).—The cloth is impregnated with rape, linseed, or similar oil containing a relatively small quantity of lead and/or manganese, colophony and/or turpentine, and also, if desired, a cobalt compound known as

“linnælite.” When dry the treated fabric is resilient, substantially impermeable to water, oil, or similar liquids, and is particularly suitable for printers’ blankets.

D. J. NORMAN.

Treatment [waterproofing] of materials made of or containing cellulose esters or ethers. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 323,501, 31.7.28).—Insoluble metal soaps may be introduced into such cellulose materials by treating the latter simultaneously or successively with a swelling agent and a soluble metal salt, *e.g.*, chloride, sulphate, or thiocyanate of tin, aluminium, iron, or chromium. Alternatively, the salt solution, if sufficiently concentrated, may itself act as a swelling agent. Suitable swelling agents include aqueous solutions of acetic acid, lactic acid, alcohol, acetone, diacetin, phenol, urethanes, guanidine, etc. The treated material, with or without rinsing, is subsequently treated with solutions of soluble soaps or of the fatty acids themselves. In certain circumstances either the soluble soap or the metal salt may be dissolved in the spinning liquor. The resulting products have a subdued lustre and show improved resistance to water.

D. J. NORMAN.

Sizing of fibrous materials. TEINTURERIE DE LA RIZE (F.P. 618,284, 1.7.26).—The fibrous materials are impregnated with the sizing mixture in a closed vessel *in vacuo*, excess of the mixture is run off, and the fibrous material exposed to a current of warm ozonised air.

A. J. HALL.

Treatment of felts made from animal hairs. H. HAAKH and H. SUBAL (U.S.P. 1,745,417, 4.2.30. Appl., 7.6.27. Ger., 13.8.26).—See B.P. 275,939; B., 1928, 48.

Liquid centrifuging apparatus, more especially for washing machines. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 317,310, 5.4.29. Ger., 13.8.28).

Water-soluble condensation products (B.P. 321,190). **Wetting-out etc. agents** (B.P. 289,841).—See III. **Xanthene dyes** (B.P. 320,345). **Dyes and dyeing** (B.P. 321,462). **Azo dyes** (B.P. 321,483).—See IV. **Coloured varnishes** (B.P. 293,358).—See XIII.

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

Thermal production of phosphoric acid and high-percentage phosphates. E. V. BRITZKE and N. E. PESTOV (Trans. Sci. Inst. Fertilisers, Moscow, 1929, No. 59, 5—160).—Laboratory yields of 90—99% were obtained from phosphates of low phosphorus content. Data concerning the production of phosphine and iron phosphide are recorded. By using lime, alumina, and silica, an aluminous cement was also obtained, but the higher temperature decreased the yield of phosphorus. Lime from the towers was converted into phosphate to a 50% P_2O_5 content. The precipitation of phosphorus pentoxide by the Cottrell apparatus, the theory of the separation of phosphoric acid from gases, and the deposition of fumes of phosphoric acid on the surface of lime or crude phosphate were examined. With lime a phosphate containing 58% P_2O_5 (water-soluble),

and with crude phosphate (15.6% P_2O_5) one containing 36% P_2O_5 (available) was obtained.

CHEMICAL ABSTRACTS.

Catalytic reduction of carbon monoxide. KODAMA.—See VII. **Changes in superphosphate during storage.** SHOJI and SUZUKI.—See XVI. **Determination of thallium in mouse poisons.** LEPPER.—See XXIII.

See also A., Feb., 151, **Adsorption of nitrogen peroxide by colloidal silicic acid** (SAPOSHNIKOV and others). 156, **Preparation of concentrated silicic acid sols** (CHALIZEV). 176, **Hydrates of bleaching powder** (NEUMANN and HAEBLER). **Phosphorescent compounds** (VERNITZ). **Yellow luminous phosphorescence** (VANINO and SCHMID). 183, **Electroanalysis of copper** (GUZMÁN and RANCAÑO). 262, **Iodides, bromides, and iodide-oxidases in marine algæ** (KYLIN).

PATENTS.

Apparatus for producing sulphuric acid. MANSFELD A.-G. F. BERGBAU U. HÜTTENBETRIEB, H. KREBS, and R. BORCHERS (B.P. 304,688, 11.1.29. Ger., 24.1.28).—In the manufacture of sulphuric acid of d 1.61 or over, by the nitric oxide process, the reaction vessels, comprising chambers, towers, and gas-reaction vessels, are constructed of cast iron, wrought iron, steel, mild steel, cast steel, or certain iron alloys. Provided that the concentration of the acid does not fall below d 1.61 there is considerably less action on the plant than when lead is used in the construction. W. J. WRIGHT.

Manufacture of hydrogen and phosphoric acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,122, 20.10.28).—Hydrogen and phosphoric acid are obtained continuously and in the pure state by treating phosphorus with water or water vapour at 300–400° and at pressures up to 500 atm. The gaseous and liquid reaction products are removed and subjected separately or together to another pressure treatment, with addition of water or water vapour if desired. W. J. WRIGHT.

(A, B) **Oxidation of phosphorus in presence of steam.** (c) **Condensation of phosphoric acid.** COMP. NAT. MAT. COL. ET MANUF. DE PROD. CHIM. DU NORD RÉUNIES (ETABL. KUHLMANN) (F.P. 635,432, 2.6.27, 635,501, 3.6.27, and 635,765, 10.6.27).—(A) Phosphorus is converted into phosphoric acid by steam in the presence of a silicide of copper, of copper and nickel, or of copper, iron, and nickel. (B) Finely-powdered copper or nickel phosphide on a granular carrier is used as catalyst. (c) Phosphoric acid is recovered from the gases by absorption in hot dilute phosphoric acid, which is thereby brought up to the desired concentration. The remaining acid in the gases is removed by filtration.

A. R. POWELL.

Boiler for alkaline solutions. H. FRISCHER (G.P. 458,372, 17.5.25).—The boiler comprises a cast-iron pan with a wrought-iron cover. A. R. POWELL.

Production of barium hydroxide, alkali hydroxide or carbonate, and hydrochloric acid from barium sulphate [silica, and alkali chloride]. SOC. FRANÇ. DE SUCRATERIES (BREVET ET PROC. DEGUIDE) (F.P. 633,368, 26.4.27).—Barium sulphate is

heated with silica at 1500° or above and the polybasic silicate so obtained is ground and leached with water to extract barium hydroxide (cf. Swiss P. 122,352; B., 1929, 516). The gases evolved in the furnace treatment are converted into sulphuric acid in lead chambers or contact plant and the acid is used for the manufacture of hydrochloric acid and alkali sulphate from alkali chloride. Finally the alkali sulphate is dissolved in water and the solution treated with the barium hydroxide solution previously obtained to regenerate barium sulphate and yield alkali hydroxide. A. R. POWELL.

Caustic magnesia from impure magnesite and rocks containing it. STEIRISCHE MAGNESIT-IND. A.-G. (Aust.P. 109,012, 18.5.22).—The rock is burnt at such a temperature that only the magnesium carbonate is converted into oxide, the calcium carbonate and magnesium silicate remaining undecomposed. The product is then agitated in scouring cylinders, whereby the magnesia falls to a fine powder which is separated from the unchanged rock by screening. A. R. POWELL.

Preparation of hydrazine from ammonia by electrical discharge. I. G. FARBENIND. A.-G. (G.P. 454,699, 20.3.26).—A rapid stream of dry ammonia is passed through an ozonising apparatus operated with an alternating current of 500 periods at 10,000 volts, the issuing gases are condensed, and the liquid is subjected to fractional distillation to remove ammonia. Alternatively, the walls of the apparatus may be kept moistened with an aliphatic hydrocarbon oil, e.g., paraffin oil, which absorbs the hydrazine. A. R. POWELL.

Manufacture of hydrogen peroxide in concentrated solution. M. BODENSTEIN (G.P. 458,189, 25.12.26, and 458,190, 13.4.24).—(A) Barium peroxide is treated with sufficient phosphoric acid to form the soluble primary barium phosphate and the solution is then treated with hydrofluoric acid and barium peroxide alternately until a thick suspension of barium fluoride is obtained. After removing the insoluble barium fluoride by filtration, the clear liquor is treated with barium peroxide until it ceases to dissolve, then with barium carbonate to precipitate completely all the phosphoric acid and leave a concentrated solution of hydrogen peroxide. The barium fluoride precipitate is converted into nitrate by digestion with calcium nitrate and the nitrate is recovered and converted into peroxide by roasting. The calcium fluoride obtained is heated with sulphuric acid to regenerate hydrofluoric acid for further use. (B) Arsenic acid is used instead of phosphoric acid, and hydrofluosilicic or hydrofluoboric acid in place of hydrofluoric acid. Alternatively the barium may be precipitated by introducing gaseous hydrogen fluoride, silicon tetrafluoride, or boron trifluoride into the phosphate solution. The residual hydrogen peroxide is purified by fractional distillation *in vacuo*. A. R. POWELL.

Preparation of a stable hydrogen peroxide solution containing formaldehyde. A. RITTERS-HOFER (G.P. 458,889, 10.8.27).—Formalin containing added potassium hydroxyquinolinesulphonate or other quinoline derivative is mixed with 30% hydrogen peroxide. A. R. POWELL.

Manufacture of sodium fluoride or bifluoride. STICKSTOFFWERKE GES.M.B.H., and E. HENE (G.P. 458,526, 28.10.26).—A concentrated brine is treated with ammonium hydrogen fluoride and the precipitate is washed with a solution of the precipitant, the wash-liquors being returned to the process for further use as a precipitant. The sodium hydrogen fluoride so obtained is free from chloride. A. R. POWELL.

Extraction of alkali iodide from water containing iodine. N. V. MIJNBOW EN HANDELMAATSCHAPPIJ "SOEMBER ASSIN" (Dutch P. 17,807, 27.9.26).—The iodine is concentrated by adsorption with starch and subsequently extracted with alkali bisulphite or bicarbonate. A. R. POWELL.

Electrolytic production of hypochlorite solutions. F. CHEVRIER (F.P. 635,654, 21.12.26).—A high-tension anode is used in an acid electrolyte so that a large amount of ozone is generated in the anode compartment of the cell. A. R. POWELL.

Preparation of anhydrous chlorides of aluminium, iron, etc. VER. F. CHEM. U. METALLURG. PRODUKTION (G.P. 455,266, 9.3.24).—A mixture of hydrogen with a large excess of chlorine is passed over a hot mixture of the metal oxide and carbon whereby, owing to the heat of reaction of the hydrogen and chlorine, the metal chloride formed sublimes out of the reaction chamber. The gases from the condensation vessel are treated for the recovery of pure hydrochloric acid. A. R. POWELL.

Thermochemical treatment of bauxite with sulphuric acid. F. TRAWINSKI (F.P. 633,199, 4.4.27).—A thick suspension of finely-divided bauxite in water is added to concentrated sulphuric acid, the heat of dilution of which is thereby utilised in effecting the reaction. A. R. POWELL.

Preparation of an aluminium magnesium silicate (artificial mica). STUDIEN-GES. F. WIRTS. U. IND. M.B.H. (G.P. 458,475, 19.5.25).—A fused mass of magnesium chloride, quartz, alumina, feldspar, and calcium fluoride is subjected to electrolysis. A. R. POWELL.

Preparation of crystallised iron, copper, zinc, and nickel sulphates [from pickling liquors]. G. AGDE (G.P. 458,191, 23.12.26. Addn. to G.P. 431,581; B., 1926, 914).—The solution is cooled nearly to 0°, whereby the greater part of the ferrous sulphate crystallises out and the solution becomes correspondingly enriched in acid. The mother-liquor may be suitably diluted and used for further pickling in order to concentrate the sulphates of the other metals, which are subsequently recovered by the process claimed in the prior patent. A. R. POWELL.

Contact material for catalytic cracking and like operations. COMP. INTERNAT. POUR LA FABR. DES ESSENCES ET PÉTROLES (B.P. 324,541, 11.2.29. Fr., 10.11.28).—The material, which is preferably worked up into small annular units, comprises activated aluminium silicate, not more than 30% of an argillaceous binder, and, e.g., about 3% of free alumina. L. A. COLES.

Hydrogen producer for intermittent working of contact chambers. P. GROSSMANN (G.P. 458,187,

9.7.26).—The contact chambers are long, narrow, and high rectangular flues provided with discharge openings in the narrow sides and heating flues along the long sides between each pair of chambers, the flues being divided by vertical walls into several compartments the heat of which can be separately controlled. Numerous horizontal floors of gas-permeable material covered with a thin layer of catalyst are evenly disposed through the contact chambers. A. R. POWELL.

Separate recovery of sulphur dioxide and hydrochloric acid from gases. RHENANIA-KUNHEIM VER. CHEM. FABR. A.-G. (F.P. 635,339, 31.5.27. Ger., 31.5.26).—The gas current is washed with water on the countercurrent system to obtain a final concentrated solution of hydrochloric acid and a gas with a high content of sulphur dioxide free from chlorine. A. R. POWELL.

Separation of ammonia from gases and mixtures of gases containing it. G. F. UHDE (U.S.P. 1,745,730, 4.2.30. Appl., 13.6.27. Ger., 15.6.26).—See B.P. 272,929; B., 1928, 482.

Manufacture of solutions of salts of alkali metal and aluminium. H. BRENEK, ASSR. to RHENANIA VER. CHEM. FABR. A.-G. (U.S.P. 1,745,734, 4.2.30. Appl., 3.7.24. Ger., 10.7.23).—See B.P. 218,998; B., 1925, 803.

Preparation of cyanamides of the alkaline-earth metals and magnesium. N. CARO, A. R. FRANK, H. H. FRANCK, and H. HELMANN (U.S.P. 1,745,350, 4.2.30. Appl., 19.10.27. Ger., 28.10.26).—See B.P. 279,812; B., 1929, 53.

Manufacture of zeolites. S. DAHL-RODE, ASSR. to COCHRANE CORP. (U.S.P. 1,745,337, 28.1.30. Appl., 23.12.24).—See B.P. 245,092; B., 1927, 382.

Conducting thermal reactions (F.P. 569,342). Chlorine water (Dutch P. 17,747).—See I. Metals for metal carbonyls (B.P. 324,382).—See X. Treatment of bones (F.P. 634,361).—See XV. Fertilisers (Swiss P. 124,358 and F.P. 635,523). Seed-pickling material (G.P. 454,570).—See XVI.

VIII.—GLASS; CERAMICS.

Dependence of the solubility in water of the soluble substances of clays and ceramics on the temperature of calcination. P. P. BUDNIKOV (Ukrain. Chem. J., 1929, 4, [Tech.], 205—213).—The materials examined were Tschasov-Jarski and Nikolaevski clays, Cetlitski kaolin, porcelain from the Baranovski factory, dinas from the Krasogorovski factory, and earthenware from the Budjanski factory, these being extracted with water after being heated at various temperatures, and the electrical conductivity of the solutions measured. With Tschasov-Jarski clay, heating at 900° corresponds with the maximum formation of water-soluble products. With Nikolaevski clay the maximum solubility is obtained by heating at 750°, and with both this and the preceding clay the solubility is increased by boiling the material in water after calcination. Somewhat different results are obtained with the other materials. The varying behaviour is ascribed to chemical reactions between the components during the heating.

T. H. POPE.

Properties of various alumina-clay mixtures under various firing conditions. H. SALMANG and F. GOETH (Sprechsaal, 1929, 62, 503—506, 521—523, 539—543; Chem. Zentr., 1929, ii, 1728).—The behaviour of various mixtures of alumina and clay, when fired under load at 1410°, 1500°, or 1650°, was examined. In ordinary firing the porosity increases with increasing alumina content. Diminution of porosity on firing under load is least when the composition approaches that of mullite, the same composition corresponding with maximum stability. The softening point could be raised to 1630°. Scorification depended only on porosity. In kaolin-alumina mixtures the highest softening point was shown at the composition of sillimanite.

A. A. ELDRIDGE.

See also A., Feb., 150, **Solubility of quartz and clay in feldspar** (PARMELEE and AMBERG). 156, **Reddening of glass containing gold and its birefringence** (TAMMANN and SCHRADER). 162, **Ceramics of refractories: system zirconia-beryllia** (RUFF and others). **Systems** $\text{BaO-Al}_2\text{O}_3\text{-SiO}_2$, $\text{ZnO-Al}_2\text{O}_3\text{-SiO}_2$, $\text{KNaO-feldspar eutectic}$, and $\text{CaO-MgO-Al}_2\text{O}_3\text{-SiO}_2$ eutectic (ZIMMER and NEFF). **Influence of alumina and silica on** $(\text{K}_2\text{O-Na}_2\text{O-Al}_2\text{O}_3\text{-SiO}_2)$ eutectic (BUTTERWORTH and KATES). 183, **Determination of alumina in aluminosilicates** (KRASNOVSKI). 186, **Hygroscopic properties of glass** (SHISKAKOV).

PATENTS.

Substances transparent to ultra-violet light. CORNING GLASS WORKS, Assees. of H. P. HOOD (B.P. 298,908, 15.10.28. U.S., 15.10.27).—Samples of commercial ultra-violet light transmitting window-glass artificially "solarised" by exposure to radiation from a quartz-mercury arc were restored to their original ultra-violet transmission values by heating at 550° for 15 min., or at 400° for 1 hr.

M. PARKIN.

Decoration of enamelled ceramic and metalised articles. "SFINX" SPOJENÉ SMALTOVNÝ A TOVARNÝ NA KOVOVÉ ZBOŽÍ, AKC. SPOL. (F.P. 634,669, 19.5.27. Czechoslov., 8.6.26).—The articles, after drying but before firing, are sprayed with aqueous solutions of suitable salts to produce the desired colours on firing.

A. R. POWELL.

Fusing metal particles into glazes and ceramic products. W. DÄLLENBACH (Swiss P. 124,309, 15.9.26).—The metal particles are first thinly coated with chromium or an alloy containing it.

L. A. COLES.

Fusible ceramic product for moulding. R. MOHR and H. BECKER, SEN. (G.P. 458,509, 27.11.26).—Fusible silicates, e.g., phonolite, are fused with calcium fluoride and, if necessary, aluminium, alkali, or alkaline-earth compounds, or minerals containing them. Colouring materials such as metal oxides or substances which promote crystallisation, e.g., loam or kaolin, may also be added.

A. R. POWELL.

Reactive packing for metallurgical refractories. C. S. HOLLANDER and E. L. HELWIG (U.S.P. 1,741,128, 24.12.29. Appl., 6.2.29).—To prevent escape of a charge, owing to refractory failure, from a crucible furnace, where such escape is liable to cause serious damage, e.g., to coils in electric induction furnaces, the

crucible is surrounded by a packing consisting of a mixture capable of reacting with the escaping charge to form a viscous mass at the prevailing temperature. E.g., for a clay-graphite retort containing zinc, the packing consists of 4 pts. of finely-ground silica and 1 pt. of sodium phosphate.

M. PARKIN.

Metallic deposits [on glass] (B.P. 324,363).—See X.

IX.—BUILDING MATERIALS.

Cements and moulding masses and their use in electrotechnics. W. NAGEL and J. GRÜSS (Wiss. Veröff. Siemens-Konz., 1929, 8, [2], 174—186).—The change in weight and the percentage alteration in volume during storage for 3 months have been determined for numerous magnesium oxychloride cements made from chemically-prepared magnesia and from burnt magnesite. The latter, in general, gave the most satisfactory cements, the best ratio of $\text{MgO} : \text{MgCl}_2$ being 2—10:1. Above or below this ratio there is a tendency for the cement to swell and become distorted or porous. The ageing process is somewhat retarded by the addition of inert fillers, but ceases sooner, and the fillers prevent any segregation of the constituents taking place. Zinc oxychloride cements with a composition approximating to $5\text{ZnO}.\text{ZnCl}_2$ are remarkably free from volume changes after a slight contraction during the first 5 days. The most resistant of the magnesium oxychloride cements to atmospheric disintegration is that with the composition $4\text{MgO}.\text{MgCl}_2$ containing a suitable filler.

A. R. POWELL.

Manufacture of anhydrite cement. P. P. BUDNIKOV (J. Appl. Chem. Russia, 1929, 2, 389—393).—The best catalyst is a mixture of sodium hydrogen sulphate and copper sulphate. Anhydrite cement can be regenerated without further addition of catalysts. Lime reduces the strength. Variations in the strength with time are probably due to the formation of an unstable complex hydrate.

CHEMICAL ABSTRACTS.

Influence of magnesia, ferric oxide, and soda on the temperature of liquid formation in certain Portland cement mixtures. W. C. HANSEN (Bur. Stand. J. Res., 1930, 4, 55—72).—The influence of ferric oxide, magnesia, and soda on the temperature at which melting starts when they are added separately or together to mixtures of lime, alumina, and silica has been determined. Mixtures of lime, alumina, and silica approximating to the composition of Portland cement start to melt at 1455°. When ferric oxide is added the temperature of liquid formation is reduced to 1340°; with magnesia, to 1375°; with soda, to 1430°; with ferric oxide and magnesia, to 1300°; and with all three compounds, to 1280°. The following compounds were identified in the clinkers: $3\text{CaO}.\text{SiO}_2$, $2\text{CaO}.\text{SiO}_2$, $3\text{CaO}.\text{Al}_2\text{O}_3.\text{MgO}$, and $4\text{CaO}.\text{Al}_2\text{O}_3.\text{Fe}_2\text{O}_3$.

C. J. SMITHELLS.

Mixed Portland cements. V. S. NAGAI (J. Soc. Chem. Ind., Japan, 1929, 32, 373—374 B).—Results of studies of physical properties of mortars prepared from a new mixed Portland cement "Neo-solidit" are described.

F. J. WILKINS.

See also A., Feb., 161, **Dehydration of calcium sulphate** (YAMANE).

PATENTS.

Heat-insulating material. A. C. D. BOULANGER (F.P. 636,263, 20.6.27).—The material comprises the ash of burnt coal-dust, which is applied in admixture with sodium silicate solution or is vitrified and cut, *e.g.*, into rings for covering pipes for conveying superheated steam.

L. A. COLES.

Intimate admixture of materials [e.g., the constituents of Portland cement]. WICKING'SCHE PORTLAND CEMENT- U. WASSERKALKWERKE (G.P. 458,637, 4.6.25).—The coarsely mixed material is passed repeatedly through a compressed-air or suction conveyor which returns it to the container.

L. A. COLES.

Production of building material. E. A. LUNDIN, Assee. of E. W. TILLBERG (Swed.P. 60,338, 23.12.24).—The dust and smaller particles separated from broken-up brick waste are ground finely and mixed with lime and/or Portland cement and then with the coarser particles of the brick, and the mixture, moulded into blocks, is treated with steam under pressure.

L. A. COLES.

Production of artificial marble. V. MOLINARI (F.P. 636,140, 8.10.26).—Moulded blocks of gypsum or alabaster, after a rapid drying, are dipped successively into solutions containing alum, potassium sulphite, and, *e.g.*, zinc, iron, or copper sulphate, and are then polished.

L. A. COLES.

Wood preserving and disinfecting, and seed-grain immunising. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 321,396, 1.6.28).—An aromatic mercuri-compound is applied, for the preservation and disinfection of wood or for the immunisation of seed, either in intimate mixture with an inert filter (talcum, kieselguhr), or in aqueous solution or suspension. Suitable compounds are phenyl, tolyl, or naphthyl mercuriacetate, mercurated nitrobenzene, anisole, or ethyl *p*-aminobenzoate, and toluene-*p*-sulphonyl or salicylsulphonyl derivatives of aniline mercuriacetate. Arsenical compounds may be added.

C. HOLLINS.

Drying or treating wood and other materials. H. C. BABEL (B.P. 324,333, 18.10.28).—See U.S.P. 1,687,822; B., 1929, 56.

[Mixing] treatment of concrete. CLINTON MOTORS CORP. (B.P. 308,207, 25.2.29. U.S., 19.3.28).

Apparatus for manufacturing bituminous compounds. A. H. TYLER (B.P. 324,424, 2.11.28).

Dehydration (B.P. 323,740).—See I. Emulsions of tars etc. (F.P. 633,687).—See II.

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

Eutectic cast iron. B. OSANN (Giesserei, 1929, 16, 565—567; Chem. Zentr., 1929, ii, 1736).—The eutectic point can be determined by slowly cooling and expressing the fluid portion immediately before solidification. The expressed material is then analysed. The formation of the eutectic is considered theoretically.

A. A. ELDRIDGE.

Superheating of cast iron. P. BARDENHEUER and K. L. ZEYEN (Giesserei, 1929, 16, 733—746; Chem. Zentr., 1929, ii, 1736—1737).—For iron containing not

less than 3.2% C, superheating on fusion increases the strength; with lower carbon content increase of superheating is accompanied by diminished resistance to bending (and, if little phosphorus and sulphur are present, also to drawing). Alloys containing boron, chromium, etc. are insensitive to heating. A. A. ELDRIDGE.

Works' supervision in the manufacture and working of special steels and in carrying out the necessary tests. R. HOHAGE (Stahl u. Eisen, 1930, 50, 93—97).—The selection of the raw materials, the melting and casting processes, and the methods used in further working of special steels are briefly described, together with methods of testing the quality of the metal at various stages of the work and precautions to be taken to ensure that satisfactory properties are obtained.

A. R. POWELL.

Effect of cold-drawing on the magnetic properties of a carbon steel. W. S. MESSKIN (Arch. Eisenhüttenw., 1929—1930, 3, 417—425; Stahl u. Eisen, 1930, 50, 105—106).—The remanence of a plain carbon steel with 0.78% C decreases considerably with light rolling, but increases again with heavier rolling; the maximum permeability changes similarly, but with a greater reduction than 30% it decreases again. The coercivity increases steadily during rolling to about double its original value when the thickness has been reduced 80.8%; on subsequently annealing, the coercivity decreases with rise of temperature rapidly to 450° and then somewhat more slowly. Maximum remanence is obtained after annealing at 600°; this value is greater than that measured before rolling. Cold-deformation of steel has a similar effect on the magnetic properties to that of quenching; *e.g.*, on annealing the quenched steel at 450° a secondary maximum of coercivity is obtained similar to that produced by annealing heavily cold-rolled steel at the same temperature. In a molybdenum steel with 0.96% C and 2.18% Mo, the same but less well-defined phenomena were observed.

A. R. POWELL.

Quenched steels. K. TAMARU (Sci. Rep. Tôhoku Imp. Univ., 1929, 18, 473—490).—Magnetic observations of the A0 transformation of a 0.95% C steel showed that its magnitude varies with the form of the cementite particles, being greatest with pearlitic cementite and least with the globular form. Tempering a quenched high-carbon steel (1.69% C) results in the transformation of α - into β -martensite at 110°, of the retained austenite through α - into β -martensite at 240°, and finally of β -martensite into ferrite and cementite at 260°. The maximum in the magnetisation curve at 300—350° corresponds with the complete separation of cementite from martensite in a finely-divided and almost colloidal state; at a slightly higher temperature coagulation of the cementite occurs and the magnetisation curve falls. A similar fall in specimens very slowly heated at 110° is attributed to the same cause. The rate at which specimens etch in a 5% alcoholic solution diminishes during the transformation of α - into β -martensite. The density of pure iron, extrapolated from a series of curves showing the density of steels of varying carbon content after different heat-treatments, is 7.882, to which point all the curves converge. Similarly, the density of pure

γ -iron, extrapolated from curves for austenitic steels, is 8.10, and decreases linearly by 0.06 for every 0.5% C and by 0.017 for every 2% Mn present. The change of length of quenched steel during tempering and the electrical resistance at 20° of austenitic steels containing 2–20% Mn have been measured. A. R. POWELL.

Nature of martensite crystals. K. HONDA (Sci. Rep. Tôhoku Imp. Univ., 1929, 18, 504–516).—A review of recent work and a discussion of some of the modern theories dealing with the nature of martensite. Matsushita's theory with some slight modifications (cf. Tamaru, preceding abstract) is considered to be more in accord with the facts than that of Hanemann and Schröder (Arch. Eisenhüttenw., 1928–29, 2, 763).

A. R. POWELL.

Steel ingots. W. H. HATFIELD (Proc. South Wales Inst. Eng., 1930, 45, 523–562).—A recapitulation of the practice of casting steel ingots, including methods for diminishing heterogeneity and segregation.

C. A. KING.

Density of some iron alloys in the liquid state. C. BENEDICKS (Compt. rend., 1930, 190, 114–116. Cf. B., 1924, 1014, and Berlin, B., 1927, 487).—The method is that previously used. Densities have been determined at various temperatures up to 1700° and the results are expressed by (i) sp. vol.-temperature curves for alloys with carbon, nickel, and silicon; (ii) a sp. gr.-composition curve for iron-carbon alloys: this shows a discontinuity at 4.4% C, corresponding with that in the liquidus; (iii) sp. vol.-composition curves for alloys with aluminium, carbon, chromium, molybdenum, nickel, phosphorus, silicon, and tungsten at 1600°, and for iron-nickel alloys also at 1500° and 1550°, at which temperatures these alloys, in general, show specific volumes in excess of those deduced from the additive law, the maximum excess corresponding to the composition Fe₂Ni, i.e., approximately that of Invar. Alloys containing 26–40% Ni show negative dilatation, with apparently a maximum sp. vol. at about 1600°.

C. A. SILBERRAD.

Abnormal rusting. F. WILBORN (Farben-Ztg., 1930, 35, 945).—Wolff's observations (B., 1929, 988) on the dissolution of iron by paint films, the iron plate remaining bright, are confirmed in the case of a nitro-cellulose lacquer and a Spanish red oxide-boiled oil paint. In the latter case blisters, which were formed after immersion of the test panel, were broken and the metal surface was examined. Photomicrographs show that the iron is practically free from corrosion and that rust is imbedded in the paint film. S. S. WOOLF.

Water-works' corrosion problems. I. D. VAN GIESEN (J. Amer. Water Works' Assoc., 1930, 22, 36–48).—Open, steel equalising tanks are subject to severe corrosive conditions as the top layer of water rarely changes, there being but a single bottom connexion. The effect is worst on the inside portion facing south, as this receives the full heat of the sun besides being alternately wet and dry. The corrosion may be reduced by covering the tank and by the use of a suitable paint, but a water-emulsified asphalt paint is not recommended owing to the effect of heat on the air particles entrained therein unless emulsified

under vacuum. Cases of corrosion in cast-iron mains are shown to be due to the crystallisation of combined carbon into the form of graphite in the presence of a highly ionised soil. Mutual corrosion (of dissimilar metals) may be prevented by using the same metal throughout, or, if this be impossible, by coating the pipes with asphaltum compound for several feet in both directions from the point of metal change. The difference in corrodibility between cast iron and wrought iron is emphasised. C. JEPSON.

Effect on the recrystallisation of copper of a second metal which forms a limited series of solid solutions and induces age-hardening. O. DAHL (Wiss. Veröff. Siemens-Konz., 1929, 8, [2], 157–173).—The recrystallisation temperature of cold-rolled copper (70% deformation) is increased by about 100° by the addition of 0.05–0.1% of zinc, aluminium, phosphorus, silicon, tin, magnesium, or beryllium. Addition of larger quantities of these elements within the limit of solid solubility does not further affect the temperature at which recrystallisation begins, but it raises the final temperature to which it is necessary to heat the metal to obtain complete recrystallisation. The rate of reduction of hardness at the minimum recrystallisation temperature is greater for the four first-named alloying constituents than for the other three. In the case of copper with 2% Mg, 3% Si, or 2% Be, the softening due to removal of work-hardness at 350° is more than counterbalanced by age-hardening effects.

A. R. POWELL.

Effect of recrystallisation on the technical behaviour of lead. F. BRENTHEL (Z. Metallk., 1930, 22, 23–25).—Chemical analysis of lead is not sufficient to determine whether the metal is suitable for use in chemical plant as the crystalline structure has far more influence on the behaviour of lead towards acids than has its composition. Thus lead refined by the Parkes process recrystallises rapidly at 180°, and its structure then consists of large, regularly oriented crystals; sulphuric acid attacks this lead very vigorously at 160–240°, the attack proceeding inwards along the grain-boundaries so that the metal soon disintegrates. Lead refined by the Pattinson process, however, always contains small quantities of copper, and its structure remains stable, homogeneous, and finely crystalline at 180°; attack on this lead by sulphuric acid does not commence until 300°, and disintegration does not occur until well above this temperature. Pattinson lead is also very resistant to failure by fatigue, whereas Parkes lead soon recrystallises when subjected to constant vibration, and intercrystalline fracture then rapidly ensues.

A. R. POWELL.

Influence of temperature on the impact strength and hardness of aluminium alloys. W. SCHWINNING and F. FISCHER (Z. Metallk., 1930, 22, 1–7).—The hardness of 99.5% aluminium and of 98/99% aluminium falls with increasing temperature from –80° to 200° in a smooth curve from 50 and 45 to 25 and 20, respectively, for 1-mm. sheet, whereas that of lantal falls from 105 at –80° to 99 at 40°, 80 at 130°, and 55 at 200°. At the ordinary temperature aluminium regains its original hardness after heating, whereas the hardness of

lateral slowly falls with increase of the temperature at which it has been heated. The actual hardness figures vary somewhat with the thickness of the sheet. The impact strength of bars with a 45° rounded notch decreases between -40° and 0°, then increases with further rise of temperature for scleron, and falls very slightly for constructal and lateral, but more rapidly for duralumin. These results are compared graphically with those obtained for a 56% Cu brass and a 0.51% C steel. The angle to which lateral can be bent round a rod without breaking increases in a smooth curve with the temperature, and is the greater the higher is the ratio of the rod diameter to the thickness of the sheet. The effect of ageing at the ordinary temperature on the bending and impact tests is not very marked in the case of lateral.

A. R. POWELL.

Commercial chromium-plating. R. SCHNEIDERWIND (Dept. Eng. Res., Univ. Michigan, Circ. Series No. 3, 1930, 60 pp.).—Technical information necessary for the design and operation of commercial chromium-plating baths is given, and the process of deposition of chromium from chromic acid baths is discussed. Equipment is considered under the headings of motor generators, rheostats, tanks, fume-exhausting apparatus, temperature-control devices, racks, contacts, and anodes. The effects of variations in plating conditions and solutions are discussed in detail. Notes on throwing power, stripping, inspection, defects, and costs are also included.

C. J. SMITHELLS.

Throwing powder in chromium-plating. H. L. FARBER and W. BLUM (Bur. Stand. J. Res., 1930, 4, 27—53).—It is shown on general principles that there is little hope of radically improving the throwing power of chromic acid baths used in chromium plating. The conditions giving the best throwing power have been investigated, and the following are recommended: (a) a high temperature, such as 55°; (b) a high current density, such as 35 amp./dm.²; (c) a low concentration of chromic acid, such as 150—250 g./litre; (d) a low sulphate content, such as CrO₃/SO₄ = 200. These conditions require about 6 volts, and for lower voltages a more concentrated solution should be used with lower temperature and current density.

C. J. SMITHELLS.

Electrodeposition of nickel. I. Effect of p_H and of various buffering agents; the presence of oxygen in the deposits. J. B. O'SULLIVAN (Trans. Faraday Soc., 1930, 26, 89—93).—Nickel deposited by electrolysis from buffered nickel sulphate solutions becomes smoother and finer-grained as the p_H of the solution is increased. This cannot be explained by assuming that the simultaneous evolution of hydrogen prevents the growth of large crystals (Kohlschütter, B., 1924, 300), or that the metal is initially deposited in an unstable form which rapidly changes into a more stable modification (Glasstone, A., 1927, 24), but may be accounted for by the simultaneous deposition of colloidal nickel hydroxide or basic salt (cf. Kohlschütter and Schacht, A., 1913, ii, 287). This view receives support from the observation that the deposit contains a small amount of oxygen.

R. CUTHILL.

Electrolytic deposits on aluminium and its alloys. BALLAY (Compt. rend., 1930, 190, 305—308).—

The mechanical or chemical etching of the surface of aluminium or its alloys, which is necessary to bring about the satisfactory adherence of an electrolytic deposit, results in difficulties when the plated surface has to be polished. A process is described for nickel-plating the aluminium, thus forming a surface on which other metals may then be readily deposited. The surface is prepared by dipping the aluminium or its alloy in a hydrochloric acid solution of ferric chloride at the b.p. or nearly so. A slight deposit of iron is thus obtained, and, on subsequently plating with nickel in a hot bath at a high current density, a strongly adherent deposit can be rapidly prepared. Iron solutions suitable for all alloys are comprised within the following limits: Fe, 6—22 g./litre; HCl, 0.10—0.70 g.-mol./litre.

M. S. BURR.

Making the cuprous oxide film on the surface of copper [plates]. Its efficiency of rectification [of electric currents]. Y. KATO and T. MURAKAMI (J. Soc. Chem. Ind., Japan, 1929, 32, 339—340 B).—By heating the plates at 800—1026° in air, they acquire a film of cupric oxide which subsequently becomes reduced by the metal in contact therewith to cuprous oxide. The rectifying elements thus obtained have a ratio of the electrical resistance in one direction to that in another of at least 300 : 1.

F. J. WILKINS.

Recovery of austenitic steels. A. MICHEL and P. BÉNAZET (Rev. Mét., 1929, 26, 455—463).—See B., 1929, 358.

Boiler plugs. FREEMAN and others.—See I.

See also A., Feb., 147, **System cadmium-antimony** (HALLA and ADLER). **System chromium-carbon** (KRAICZEK and SAUERWALD). **Silver-zinc alloys** (PETRENKO and PETRENKO). 148, **Platinum-iridium alloys** (NEMILOV). **Rhodium-bismuth alloys** (RODE). **Palladium- and gold-antimony alloys** (GRIGORIEV). **Iron-beryllium and -boron alloys** (WEVER). **System iron-manganese** (SCHMIDT). **Nickel-copper alloys at low temperature** (KRUPKOWSKI and DE HAAS). 149, **Silver-copper alloys** (WEINBAUM). 161, **System copper-zinc** (RUER and KREMERS). **System copper-oxygen** (VOGEL and POCHER). 176, **Pure powdered mercury** (KRAUSS and MÄHLMANN). 177, **Extraction of rare earths from gadolinite** (PEARCE and HARRIS). 183, **Spectroscopic analysis of manganese ores** (PIÑA DE RUBIES and DORRONSORO). **Determination of tungsten** (DOTREPPE).

PATENTS.

Preparation of slimes derived from wet washing of [blast-furnace] gas for sintering. A. J. BOYNTON, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,738,940, 10.12.29. Appl., 27.10.27).—The sludge obtained by the wet washing of the gases from the iron blast furnace is filtered and the cake dried without crushing. The dry mass is then broken through a ½-in. screen and sintered directly after addition of about 14% of moisture, which causes the mass to swell to a maximum volume.

A. R. POWELL.

Roasting of zinc blende. BALZ-ERZÖSTUNG Ges. M.B.H. (B.P. 309,476, 11.10.28. Austr., 11.4.28. Addn. to B.P. 303,055; B., 1929, 923).—In a multiple-hearth

furnace with hollow hearths alternately fixed and movable, a pipe is provided for withdrawing gases from the lower hearths and returning them to upper hearths or to the bottom of the kiln at a velocity sufficient to penetrate into the ore layers. Means are provided for introducing fresh air into the pipe system if required.

A. R. POWELL.

Melting furnace for readily fusible metals [e.g., zinc]. W. BUSS (G.P. 458,351, 4.11.25).—The furnace comprises a collecting hearth, heated with gas or oil burners, above which is a melting vessel provided with separately heated overflow tubes leading to the hearth and totally enclosed so that the metal in them does not come into direct contact with the heating gases.

A. R. POWELL.

Furnace [for treatment of scrap metal etc.]. F. MENNE, Assr. to H. F. HOEVEL (U.S.P. 1,739,250, 10.12.29. Appl., 7.6.28. Ger., 24.6.27).—An elongated furnace is described in which billets or boxes of material are placed across the hearth and progressed in steps. When stationary, the billets rest on outer rails composed of water-cooled tubes; when to be moved the inner rails rise, lift the billets, move them forward, and then fall and recede without the billets. B. M. VENABLES.

Annealing of wire- or band-rings of iron or another metal by inductive heating. R. ARPI and G. J. M. DAHLQUIST (B.P. 323,835, 24.10.28).—The rings are welded together in parallel or in series, and mounted to form one or more secondary coils in a transformer, which is so arranged that the primary is outside a cylindrical furnace chamber, and the portions of the core adapted for the mounting of the rings are in the shape of water-cooled, heat-insulated rods inside the furnace chamber. [Stat. ref.]

A. R. POWELL.

Manufacture of steel. T. F. BAILY (U.S.P. 1,739,278, 10.12.29. Appl., 11.3.26).—Iron and steel scrap is fed together with pig iron into the upper end of an inclined, rotating, cylindrical furnace fired by an oil burner arranged in an opening in the axis of the furnace at the lower or discharge end. This end of the furnace is lined with basic brick, whilst the central portion has an acid lining, and the upper portion a lining of wear-resisting metal. The charge is preheated by the waste gases in the throat of the furnace, melted in the acid-lined zone, and partially refined in the basic-lined zone under an oxidising flux which removes the phosphorus. The metal is then discharged into an electric furnace for the finishing processes.

A. R. POWELL.

Making ductile high-silicon steel sheets. L. R. CURRY, Assr. to ALLEGHENY STEEL CO. (U.S.P. 1,739,126, 10.12.29. Appl., 27.7.27).—Silicon steel containing more than 4% Si may be rolled readily into thin sheets if it is annealed at the rolling temperature for 1–4 hrs. prior to rolling.

A. R. POWELL.

Reconditioning of steel cutting-tools. HASSENFORDERER & CIE. (F.P. 634,370, 14.5.27).—Tools which have become unusable owing to overheating are hardened by immersion in a fused mixture of talc, fish-liver oil, colophony, borax, soot, sodium chloride, bone ash, and leather ashes.

A. R. POWELL.

Determination of the sharpness, cutting power,

and permanence of the cutting edge of blades, tools, etc. K. HONDA (G.P. 458,052, 25.12.26. Jap., 20.1.26).—The loaded tool is drawn backwards and forwards with a regular motion over a pile of thin sheets of paper or fabric. The number of sheets cut is a measure of the cutting power, and the number of movements required to reduce the cutting power to half its original value is a measure of the permanence of the edge. (Cf. B., 1927, 782.)

A. R. POWELL.

Metallic element [single-crystal iron rod]. L. W. MCKEEHAN, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 1,738,307, 3.12.29. Appl., 11.4.27).—A polycrystalline iron rod is passed slowly through an electrically heated tube furnace at 1400°, and is cooled rapidly to 200° at the exit end by means of steel rollers and by a current of cold hydrogen which is passed through the furnace in the opposite direction to the travel of the rod. In this way a very small portion of the rod is subjected at one time to a temperature of about 900°, at which grain growth of α -iron is rapid. The rate of travel of the rod is so adjusted that, as every portion passes through the zone at 900°, the crystals grow to such an extent that a single crystal occupies the whole cross-sectional area; this crystal then grows along the whole length of the rod. The optimum rate appears to be about 200 cm./hr. Single-crystal iron has a high permeability and a small hysteresis loop.

A. R. POWELL.

Production of finely-divided metallic materials. J. H. WHITE, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 1,739,052, 10.12.29. Appl., 31.1.29).—The material, e.g., iron or nickel-iron alloy, is melted together with a small quantity of the sulphide of one of its constituents, so as to obtain on casting a brittle ingot which may readily be reduced to fine powder. The process is especially suitable for preparing magnetic materials for dust cores.

A. R. POWELL.

Production of [metallic] materials in finely-divided form [for magnetic dust cores]. J. E. HARRIS, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 1,739,068, 10.12.29. Appl., 31.1.29).—The material, e.g., iron or an iron-nickel alloy, is melted with a small quantity of iron oxide or sulphide to render it brittle, then granulated in water, dried, and ground to a powder.

A. R. POWELL.

Corrosion-resistant ferrous alloy. J. T. HAY (B.P. 323,845, 30.10.28).—The alloy consists of iron with 0.4–0.5% Cu, 0.05–0.1% Mo, up to 0.05% C, 0.1–0.15% Mn, and less than 0.005% Si, 0.005% P, and 0.04% S. [Stat. ref.]

A. R. POWELL.

Treatment of [tin] ores. D. H. MCINTOSH, Assr. to G. L. OLDRIGHT (U.S.P. 1,737,888, 3.12.29. Appl., 24.12.26).—Tin ores containing pyrites and other sulphides are heated first at 800–850° for about 3 hrs. and then at 1000° for at least 1 hr., both operations being conducted in a reducing atmosphere. The product is leached with sulphuric acid with or without the addition of ferric sulphate. When the ferrous sulphide has all dissolved, the residue is roasted in an oxidising atmosphere and the copper and lead are extracted by a brine leach, leaving a residue of almost pure cassiterite.

A. R. POWELL.

Production of zinc. R. LEPSON (U.S.P. 1,738,910, 10.12.29. Appl., 24.6.27).—Zinc is recovered from lead blast-furnace slag by melting the slag with 10% of its weight of coke in a continuously operating electric furnace of the submerged-arc type, whereby zinc and lead are volatilised and a silicon-iron alloy is obtained below a lime-ferrous silicate slag. The gases are withdrawn at 1100° or above, through a short tuyère situated just above the surface of the bath, into a large, rectangular, iron cooling chamber provided with numerous vertical, water-cooled pipes suspended from the roof. The gas stream is thus cooled rapidly to 300°, and the zinc is thereby deposited as a very fine powder on the outer surfaces of the cooling tubes, from which it is periodically detached by the aid of reciprocating plungers working loosely on the tubes. This fine zinc dust is especially suitable for use in the purification of electrolytic zinc liquors, for effecting precipitation of other metals from their solutions, and as a reducing agent in chemical operations. A. R. POWELL.

Concentration of [tin] ores. Flotation of cassiterite. (A, B) R. S. HANDY and (A) R. R. BEARD, Assrs. to PATINO MINES & ENTERPRISES CONSOL., INC. (U.S.P. 1,737,716—7, 3.12.29. Appl., [A] 13.9.28, [B] 13.11.28. Bolivia, [B] 5.12.27).—(A) The finely-powdered ore is agitated with 8 lb. of sodium silicate per ton and 28 times its weight of water. After sufficient settling, the supernatant colloidal suspension is removed and the crystalline residue subjected to flotation with pine oil in an acid circuit to remove sulphides. Tin is recovered from the tailings by flotation with 1 lb. of oleic acid and 0.2 lb. of cresol per ton. (B) Finely-ground tin ore is subjected to flotation in an alkaline circuit containing sodium carbonate, sodium silicate, and copper sulphate, using oleic acid or a soluble oleate, with or without an oil, as flotation agent. The concentrate contains the cassiterite and pyrites, the latter being subsequently removed by flotation in an acid circuit. A. R. POWELL.

Bearing [copper-tin-lead] alloy. H. M. WILLIAMS, Assr. to GEN. MOTORS RES. CORP. (U.S.P. 1,738,163, 3.12.29. Appl., 11.4.27).—The constituents of the alloy in a finely-powdered form are thoroughly incorporated in a mechanical mixer, the mixture is formed into the desired shape by a pressure of 75,000 lb./in.², and the shapes are heated in an inert atmosphere for 3 hrs. at 775°, whereby the volatile constituents are removed, leaving a porous bearing which absorbs a high proportion of lubricant. Suitable mixtures comprise (a) copper 90, tin 8, lead 10, phosphor-tin 2, graphite 6, and salicylic acid 2—4 pts.; (b) copper 68, lead 25, graphite 5, and phosphor-tin 2%, with or without salicylic acid; or (c) copper 80, lead 10, graphite 8, and tin 10 pts., with 0.5 pt. each of phosphor-tin and ammonium chloride. The phosphor-tin prevents segregation of the lead during heating. A. R. POWELL.

[Aluminium] alloys. P. BERTHELEMY and H. DE MONTLY (F.P. 634,751, 20.5.27).—A homogeneous alloy of cadmium with aluminium is obtained if magnesium is added at the same time. The alloys are claimed to be resistant to corrosion by sea-water, Sorel cement, and thiosulphate. A. R. POWELL.

Acoustic castings of aluminium or its alloys. VEREIN. ALUMINIUM-WERKE A.-G. (G.P. 458,312, 19.10.24).—The acoustic properties of aluminium alloy bells, gongs, etc. are improved by quenching or slow cooling from a high temperature, followed by ageing at the ordinary temperature when magnesium is the alloying constituents, or at higher temperatures according to the nature of the alloy. A. R. POWELL.

Preparation of alkali metals and alkaline-earth metals. S. G. S. DICKER. From N. V. PHILIPS' GLOEI-LAMPENFABR. (B.P. 323,718, 3.8.28).—A suitable non-volatile, non-hygroscopic compound of the alkali or alkaline-earth metal is heated in a vacuum or an inert gas with finely-powdered titanium, zirconium, or hafnium, whereby the alkali or alkaline-earth metal is liberated. The process is especially applicable to the production of small quantities of caesium or barium inside vacuum tubes or radio valves to act as getters; e.g., a small pellet or rod of caesium sulphate, bisulphate, or dichromate with 4—20 times its weight of zirconium is heated at 300—500°, when an energetic reaction takes place with the liberation of 50—97% of the caesium. A. R. POWELL.

Production of calcium. W. KROLL (G.P. 458,493, 5.2.26).—An alloy of lead and calcium, obtained by heating lead with calcium carbide or with mixtures which produce calcium carbide, is made the anode in a bath of molten calcium salts. A. R. POWELL.

Purification of molten metals. R. WALTER (F.P. 634,436, 14.5.27. Ger., 18.5.26).—The molten metal is stirred under a flux comprising a mixture of alkali carbonate or chloride with 1—38% of calcium fluoride. Metals so treated are claimed to be free from gas inclusions and internal stress. A. R. POWELL.

Manufacture of [metals for production of] metal carbonyls. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 324,382, 27.9.28).—Metal oxides are reduced by heating above 500° in the presence of hydrogen, carbon monoxide, hydrocarbons, etc., and, to prevent sintering, the metals, as soon as reduction is complete, are cooled rapidly in a non-carburising atmosphere preferably consisting of or containing hydrogen. L. A. COLES.

Manufacture of metallic deposits from metal carbonyls. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 324,363, 12.10.28).—The carbonyl is introduced at low pressure into a vessel in which the article to be coated, e.g., a glass plate, is maintained at a temperature above that of decomposition of the carbonyl while the walls of the vessel are kept cold by water-cooling. To ensure better adherence the article to be coated may first be washed with a solution of potassium hydroxide or other cleansing agent. If the deposit is made on a soluble substance, e.g., a large crystal of sylvine, a thin transparent film of the metal is obtained by subsequent dissolution of this substance. The process is particularly adapted for the production of plane iron mirrors on glass and for the preparation of thin iron foil. A. R. POWELL.

Electrolytic process and apparatus [for silver-plating]. LANGBEIN-PFANHAUSER-WERKE A.-G. (G.P.

455,506, 5.11.26).—In order to obtain a thicker deposit of silver on the parts of plated articles which are most subject to wear, a large flat disc of metal, preferably silver, is placed in the solution facing the anode and the back of the disc is connected with a much smaller silver disc by means of a metal conductor rod, the back of both discs and the connecting rod being insulated from the solution, so that the current passing through the electrolyte to the larger disc is concentrated in the smaller disc, which faces the part of the cathode to be plated more thickly, and hence a higher current density is applied to this part while a lower current density is applied to the neighbouring parts. A. R. POWELL.

Protection of metal parts in electrolytic baths. ULLSTEIN A.-G. (G.P. 458,284, 28.9.27).—The metal parts which are not to be plated, *e.g.*, heating coils, are made anodic to the cathode by means of an opposed *E.M.F.* just equal to the direct *E.M.F.* between the cathode and the part to be protected. A. R. POWELL.

Ceramic vessel for chromium-plating baths. Electroplating with chromium. CHROM-IND. M. WOMMER (F.P. 635,699 and 635,700, 9.6.27. Ger., [A] 9.6.26, [B] 7.12.26).—(A) The plating bath is provided with a hollow rim with perforations just above the surface of the liquid in the bath so that by coupling the rim with a suction tube dangerous vapour and spray may be removed from the surface of the bath. (B) Inorganic colloids, *e.g.*, silica or sodium silicate, are added to the usual chromium-plating bath. Bright, adherent deposits are thus obtained at current densities (up to 15 amp./dm.²) higher than usual.

A. R. POWELL.

Protective coatings of chromium. ELEKTRO-CHROM-GES.M.B.H. (G.P. 458,632, 9.8.24).—The metal is first electroplated with cadmium, zinc, or lead, then with chromium. The intermediate layer protects the metal from penetration of corrosive media through imperfections in the chromium plate. A. R. POWELL.

Production of compact chromium deposits from molten electrolytes. H. SCHMIDT (G.P. 458,494, 1.9.26).—The bath consists of a chromium compound dissolved in a molten compound of an alkaline-earth metal, aluminium, magnesium, zinc, or manganese, together with an alkali borate.

A. R. POWELL.

Electroplating on aluminium and its alloys. E. P. M. GAT and E. M. L. CARRIÈRE (F.P. 635,002, 25.5.27).—The cleaned metal is plated first with a thin layer of iron in a ferrous sulphate bath, then with nickel or other suitable metal in the usual plating bath.

A. R. POWELL.

Electrolytic deposition of alloys. B. LEECH and F. HAMMOND (B.P. 323,765, 4.7.28).—Pulverulent iron-nickel alloys may be produced electrolytically on a nickel cathode by electrolysis of a slightly acid chloride solution of the two metals, using a composite anode composed of nickel, iron, and graphite in such proportions that the nickel content of the solution remains constant while the iron content gradually increases. A nickel-iron alloy containing 78.7% Ni is always produced from a bath in which the nickel-iron ratio is 2—5:5—16. This alloy behaves as a single metal

when used as anode in an electrolytic cell, and hence may be deposited on other metals in a smooth coating which is highly resistant to corrosion. From sulphate solutions of tin and copper similar alloys containing 80% or 85.72% Sn may be produced in powder form by suitable adjustment of the conditions.

A. R. POWELL.

Direct production of steel or steel alloys from titaniferous ores and iron sands. F. A. DE SILVA and C. G. CARLISLE (U.S.P. 1,745,360, 4.2.30. Appl., 30.7.27. U.K., 18.5.27).—See B.P. 290,442; B., 1928, 527.

Purification of metals. F. WEVER, Assr. to KAISER-WILHELM INSTITUT F. EISENFORSCHUNG (U.S.P. 1,745,464, 4.2.30. Appl., 18.1.27. Ger., 27.1.26).—See B.P. 265,213; B., 1928, 489.

Jacketed metal drums. F. KRUPP A.-G. (B.P. 310,531, 22.4.29. Ger., 28.4.28).

Thermal reactions (F.P. 569,342).—See I. **Treatment of pickling liquors** (G.P. 458,191).—See VII. **Decoration of metallised articles** (F.P. 634,669). **Packing for metallurgical refractories** (U.S.P. 1,741,128).—See VIII. **Separation of materials** (B.P. 312,684).—See XI.

XI.—ELECTROTECHNICS.

High-voltage phenomena in insulating oil. T. NISHI and K. OHTSUKA (Bull. Inst. Phys. Chem. Res., Tokyo, 1929, 8, 999—1013).—The charge on the surface of glass plates immersed in four qualities of transformer oil has been studied.

R. A. MORTON.

Cements and moulding masses. NAGEL and GRÜSS.—See IX. **Chromium-plating.** SCHNEIDEWIND; FARBER and BLUM. **Electrodeposition of nickel.** O'SULLIVAN. **Electrodeposits on aluminium and its alloys.** BALLAY. **Copper plates for rectifying.** KATO and MURAKAMI.—See X.

See also A., Feb., 141, **Magnetic nickel-manganese alloys** (KAYA and KUSSMANN). 183, **Electro-analysis of copper** (GUZMÁN and RANCAÑO).

PATENTS.

[Electromagnetic] separation or sorting of solid materials. F. KRUPP GRUSONWERK A.-G. (B.P. 312,684, 23.4.29. Ger., 31.5.28).—A number of devices making use of the differing electrical conductivity, dielectric constant, permeability, or other quality of a constituent of a mixture are described. The thermionic valves, discharge tubes, or other primary relays actuated by the very feeble currents produced as the materials to be sorted (*e.g.*, raw mining products) are brought piece by piece within the range of influence of the electric or electromagnetic fields are arranged in unstable "tipping" connexion.

B. M. VENABLES.

Electrical purification of gases. ELEKTR. GAS-REINIGUNGS-GES.M.B.H., and H. ROHMANN (G.P. 458,876, 14.10.22).—All the spark-discharge electrodes in the apparatus are operated with the same voltage, but by varying the thickness of the wires, the sharpness of the points, and the temperature of the electrodes the intensity of the discharge is increased from the front of the apparatus to the back to correspond with the decreasing

concentration of the dust in the gases as they pass through the precipitating chamber. A. R. POWELL.

Electrode for electrical purification of gases. H. ZSCHOCKE (G.P. 458,948, 10.5.24).—The electrode consists of a central wire provided with a series of small cylindrical or conical conducting bodies regularly disposed along it. These bodies protect the wire from corrosion, from damage by arcing, and from becoming coated with impurities, and act as discharge points for the high-tension current, not by point action, but by reason of the well-known corona effect. A. R. POWELL.

Inductor furnace. E. F. NORTHRUP, ASST. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,744,983, 28.1.30. Appl., 2.8.28).—See B.P. 316,659; B., 1930, 245.

Electroplating apparatus. J. G. NEWBY and C. B. JERRED (U.S.P. 1,744,792, 28.1.30. Appl., 20.9.27. U.K., 9.10.26).—See B.P. 279,616; B., 1928, 22.

X-Ray installations. N. V. PHILIPS' GLOEILAMPEN-FABR. (B.P. 309,997, 8.4.29. Holl., 19.4.28).

[Gas-filled, multi-filament] electric incandescence lamps. GEN. ELECTRIC CO., LTD., and J. P. BOWEN (B.P. 324,390, 25.10.28).

[Vent for] electric accumulators. CHLORIDE ELECTRICAL STORAGE CO., LTD. (B.P. 324,533, 5.2.29).

Conducting chemical reactions (G.P. 458,756).—See I. Hypochlorite solutions (F.P. 635,654). Artificial mica (G.P. 458,475).—See VII. Packing for metallurgical refractories (U.S.P. 1,741,128).—See VIII. Annealing iron rings (B.P. 323,835). Finely-divided metallic materials (U.S.P. 1,739,052 and 1,739,068). Alkali or alkaline-earth metals (B.P. 323,718). Calcium (G.P. 458,493). Silver-plating (G.P. 455,506). Electrolytic baths (G.P. 458,284). Chromium-plating (F.P. 635,699 and 635,700; G.P. 458,632 and 458,494). Plating on aluminium (F.P. 635,002). Deposition of alloys (B.P. 323,765).—See X.

XII.—FATS; OILS; WAXES.

Laurel fat (*Oleum lauri*). A. HEIDUSCHKA and J. MÜLLER (Arch. Pharm., 1930, 268, 114—128).—An investigation has been made of the fatty acids contained in laurel fat. The following constants of the commercial fat are new or differ considerably from the recorded figures: $[\alpha]_D^{20} + 6.6^\circ$, acid value 15.3, ester value 190.7, acetyl values 19.7 (apparent) and 11.4 (true), volatile acids 0.034%, water 0.94%, ash 0.03%. After removal of essential oil (1.1%) by steam-distillation, the fat was hydrolysed with alcoholic potassium hydroxide, acidified, and chlorophyllins were separated by treatment with bicarbonate solution. The fatty acids had $d_{15}^{15} 0.9075$, m.p. 25—26°, setting point 20—18°, butyrolactometric index 44.4 at 25°, $n_D 1.4496$, $[\alpha]_D^{20} + 3.23^\circ$, neutralisation value 225.2, mol. wt. 249.2, iodine value 66.36. The mixture was esterified with alcohol and sulphuric acid and the ethyl esters were fractionally distilled under 2 mm. pressure. No fatty acids lower than lauric acid were present. The laurate was readily separated and was followed by a mixture of palmitate, oleate, and linoleates. The last-named was analysed by the lead salt-ether method, and α -linoleic acid was

determined by the bromide method. The composition of the fatty acids deduced from this was: lauric acid 30.2, palmitic 11.1, oleic 39.8, α -linoleic 11.0, and β -linoleic acid 7.9%. It was shown definitely that myristic acid was absent, and no more than a trace, if any, of stearic acid was present. R. K. CALLOW.

Action of silent discharge on oils, fats, and fatty acids. II. Effects of gaseous media. I. Y. IWAMOTO (J. Soc. Chem. Ind., Japan, 1929, 32, 259—260 B).—Oleic, linoleic, and linolenic acids when exposed to a silent discharge of 10,000 volts in gaseous media are attacked the more severely the smaller is the mol. wt. of the gaseous medium. Hydrogenation and polymerisation occur rapidly in hydrogen, slowly in nitrogen, and not at all in sulphur dioxide and carbon monoxide. As compared with the reaction in hydrogen, the rate of polymerisation in nitrogen is much greater than that of hydrogenation in this gas. S. K. TWEEDY.

Combined determination of water and fat in organic material. H. BULL (Tidsskr. Kjemi Berg., 1930, 10, 5—7).—The material (10 g.) is weighed out into a flask fitted with a graduated side tube, and boiled under reflux with 50 c.c. of trichloroethylene, the flask being inclined so that the expelled water collects in the graduated side tube. After reading off the volume of water in this, the solvent remaining in the tube is returned to the flask by cautiously inclining the latter, and an aliquot portion of the liquid is withdrawn by a pipette. The extract is evaporated in a weighed flask over a flame and the last traces of solvent are removed by evacuating the flask while heating it at 100°, admitting air, and then re-evacuating; after $\frac{1}{2}$ hr. the flask and extracted fat are weighed. If the material under examination is a powder the extract must be filtered before withdrawing the sample; this is preferably accomplished by inserting a thimble made from filter paper into the liquid in the flask, and pipetting off the clear liquid from its interior. A correction must be applied to the quantity of fat obtained, due to the increase in volume of the solution caused by the dissolved fat; for this purpose tabulated figures are given.

H. F. HARWOOD.

Comparison of the Hanus and Kaufmann methods for determination of iodine value. S. JUSCHKE-WITSCH (Chem. Umschau, 1929, 36, 385—386).—The Kaufmann method was found to give excellently concordant results, was convenient and rapid in use, and was cheaper than the Hanus method; the reagent also had good keeping properties. E. LEWKOWITSCH.

Density of fats, fatty acids, and mineral oils. K. K. JÄRVINEN (Suomen Kem., 1929, 2, 111—115).—Values of d for various fats, fatty acids, and mineral oils at 20—100° are recorded. For the liquids, d diminishes by about 0.007 for a rise in temperature of 10°.

R. CUTHILL.

Soya-bean oil extraction. I. M. MASHINO (J. Soc. Chem. Ind., Japan, 1929, 32, 256 B).—The residue after the extraction of soya-bean oil with an azeotropic mixture of hydrocarbons and lower alcohols is suitable for the raw material of foodstuffs. After extraction at 40—50° with a mixture of gasoline and methyl alcohol,

the azeotropic mixture separates into two layers: the upper, gasoline, layer contains soya-bean oil; the alcohol layer contains carbohydrates, phosphatides, colouring matter, and other impurities. The lowering of the separation temperature increased the concentration of the oil in the upper layer, which process is also aided by the water content of the soya bean.

C. C. N. VASS.

Chaulmoogra oil from the seeds of *Hydnocarpus heterophylla*. D. R. KOOLHAAS (Rec. trav. chim., 1930, 49, 109—111).—Extraction of the dry kernels with light petroleum gives a yellow oil, d_4^{27} 0.952, n_D^{27} 1.4679, $[\alpha]_D^{27}$ +43.1°, acid value 0.86, iodine value 73.3, saponif. value 194. Hydrolysis of the oil with alcoholic potassium hydroxide, purification of the potassium salts, esterification of the free acids, and subsequent fractional distillation and further hydrolysis affords hydnocarpic and chaulmoogric acids, m.p. 59° and 68°, respectively.

H. BURTON.

Oil from the seeds of *Butea frondosa*, Roxb. M. C. T. KATTI and B. L. MANJUNATH (J. Indian Chem. Soc., 1929, 6, 839—845).—The oil, obtained in 18% yield by extracting the crushed seeds with light petroleum, has d_4^{25} 0.8983, n_D^{25} 1.4650, f.p. 15°, saponif. value 178, iodine value 67.2, acetyl value 23.6, acid value 18.1, Hehner value 88.6, and Reichert-Meissl value 0.5. Hydrolysis of the oil with alcoholic potassium hydroxide solution, separation of the saturated (36%) and unsaturated (64%) acids by Twitchell's method (A., 1921, ii, 662), and subsequent purification through the methyl esters show the presence of oleic, linoleic, palmitic, lignoceric, and higher saturated acids. Sitosterol is present in the unsaponifiable matter (2.3%) of the oil.

H. BURTON.

Negative catalysts of the hardening of fatty oils. VIII. S. UENO and T. YUKIMORI (J. Soc. Chem. Ind., Japan, 1929, 32, 318—321 B).—Catalysis of the hardening of fatty (sardine) oils by nickel is retarded by the presence of minute quantities of nitric acid and ammonia; nitrogen, ethylene, methane, and carbon dioxide have no effect.

C. W. GIBBY.

Narcotic action of anaesthetics towards reducing catalysts [for the hydrogenation of fatty oils]. S. UENO (J. Soc. Chem. Ind., Japan, 1929, 32, 321—323 B).—The catalytic activity of platinum and nickel in the hydrogenation of sardine oils is reduced by treatment with anaesthetics.

C. W. GIBBY.

Determination of tung oil in stand oils. H. WOLFF, G. ZEIDLER, and J. RAKINOWICZ (Farben-Ztg., 1930, 35, 896—897).—The coagulation of the tung oil content of stand oils by iodine (McIlhiney, Marcusson) and by zinc chloride (Scheiber) does not afford a method of determining the tung oil. The chief sources of error are the frequent failure of the oil to coagulate, and the fact that linseed oil yields insoluble fractions under the stipulated conditions. No reliable method is at present available, but the determination of the refractive index (n_D^{40}) of the fatty acids isolated from the stand oil is considered to give more trustworthy figures than the coagulation method, the tung oil content being expressed by $(n - 1.4714)/0.162$. High results are given by thin

oils and bodied mixed oils, whilst thick and blended stand oils tend to give low results.

S. S. WOOLF.

Manufacture of higher alcohols and soaps from waxes. I. Odourless soap and wax alcohol from sperm-head oil. M. HIROSE (J. Soc. Chem. Ind., Japan, 1929, 32, 253—254 B).—The oil is saponified with sodium hydroxide at above 150°; addition of a small quantity of wax alcohol aids the reaction. The greater part of the wax alcohol is removed by distillation of the soap at 200° under 13 mm. The wax alcohol, which forms about 22% of the oil, consists chiefly of oleyl and cetyl alcohols. The residue is a hard, greyish-yellow, odourless soap, which contains no free alkali and dissolves almost clearly in warm water; its lathering power is good at low temperatures, but unsatisfactory at 40°.

C. C. N. VASS.

Insecticide soaps. VAN DER MEULEN and VAN LEEUWEN.—See XVI.

See also A., Feb., 259, Constituents of *Illicium religiosum* (CHEN).

PATENTS.

Manufacture of soap. G. LAPORTE (F.P. 577,923, 18.2.24).—Boiling coconut oil (60 kg.) is run slowly into a solution of 5—7 kg. of sodium hydroxide and 5 kg. of sodium carbonate in 45 kg. of water, the mixture is heated to the b.p., and 5 kg. of powdered colophony and a solution of 5 kg. of sodium chloride in 25 kg. of water are added; after boiling for 20 min. the product is run into moulds.

L. A. COLES.

Water-soluble hydrocarbon soaps. R. VIDAL (F.P. 634,983, 23.9.26).—Fats, oils, or fatty acids are saponified with alkali hydroxides and alkali hypochlorites or aldehydes; e.g., 10 kg. of oleic acid and 10 kg. of vaseline oil are made into a paste with 10 kg. of sodium hypochlorite solution (d 1.16) and 3 kg. of sodium hydroxide solution (d 1.33), whereby a semi-solid soap is obtained. The hypochlorite may be replaced by 1—1.5 kg. of 50% acetaldehyde solution; after 24 hrs. the soap formed will dissolve in water without separation of oily particles.

A. R. POWELL.

Refining of fatty oils. E. E. AYRES, JUN., and L. H. CLARK, Assrs. to SHARPLES SPECIALTY Co. (U.S.P. 1,737,402, 26.11.29. Appl., 15.7.22).—The fatty oils are heated to 60—80° and agitated with small amounts (1—5%) of water or dilute (e.g., 2%) solutions of starch, salt, or acid, whereby the impurities dissolved in the oil are "hydrated" and precipitated in the form of an insoluble sludge which is easily removed by settling or centrifuging. The addition of excess water, which is indicated by the appearance of free water globules in the sludge, should be avoided.

E. LEWKOWITSCH.

Treatment of talloel [tall oil]. W. SCHULTZE (U.S.P. 1,736,802, 26.11.29. Appl., 30.9.27. Ger., 11.10.26).—Tall oil is treated by such esterifying agents (e.g., alcohol and concentrated sulphuric acid) that the liquid fatty acids only are esterified; the resin acids therefrom are removed by adding aqueous caustic soda lye and extracting the esters with a solvent (benzene). The fatty esters may be purified from unsaponifiable matter by distillation and the fatty acids recovered

by saponification; the resin acids are recovered by acidification and extraction of the soap solution.

E. LEWKOWITSCH.

Apparatus for purifying oils and fats *in vacuo* by means of steam or the like. W. GENSECKE (U.S.P. 1,746,078, 4.2.30. Appl., 26.8.24. Ger., 18.9.23).—See B.P. 222,093; B., 1925, 556.

Wetting-out etc. agents (B.P. 289,841).—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Colour testing [of pigments]. C. D. O. WINSLADE (J. Oil & Colour Chem. Assoc., 1930, 13, 3–7).—Mainly a discussion of the testing of the colour of pigments in full strength and on reduction. The comparison of "self colours" is best done at brushing consistency, as stiff pastes may show colour variations with slight differences in fluidity. This is particularly marked in the case of Turkey-red oxides. In connexion with the use of white pigments, other than zinc oxide, for reduction of coloured pigments, it is pointed out that different tones are obtained with zinc oxide, titanium white, lithopone, and white lead, there being a trend from blue to yellow in the order indicated. The harmful influence of excessive water-soluble salts is stressed. S. S. WOOLF.

Amorphous and crystalline resins and varnishes. D. VORLÄNDER (Z. angew. Chem., 1930, 43, 13–16).—With reference to the behaviour of numerous complex organic compounds of known constitution which behave under certain conditions as resins or varnishes, it is shown that the factor which determines whether the substance solidifies in the crystalline or amorphous state is the arrangement and nature of the groups in the molecule. Any dissymmetry in this arrangement, such as the presence of side-chains, *m*- and *o*-substitution, or an uneven number of side-chains, tends to render more difficult the assumption of a crystalline state on solidification. The formation of varnishes by polymerisation and oxidation appears to be due to a decrease in the symmetry of the molecule which permits permanent supercooling or hardening of the amorphous mass. A. R. POWELL.

Hydrocarbons and a high-tension discharge. BECKER.—See II.

See also A., Feb., 215, **Resins: preparation of pure α - and β -amyrin** (HORMANN).

PATENTS.

Manufacture of coloured varnishes. SOC. CHEM. IND. IN BASLE (B.P. 293,358, 4.7.28. Ger., 4.7.27).—Pre-chromed or pre-coppered azo dyes derived from *o*-aminophenols are incorporated in varnishes or lacquers having a basis of cellulose nitrate or phenol-aldehyde products. C. HOLLINS.

Nitrocellulose composition [for artificial leather]. J. C. EMHARDT, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,737,364, 26.11.29. Appl., 21.9.26).—A homogeneous nitrocellulose composition suitable for use on leather coatings and free from solvent softeners contains as softeners for the nitrocellulose a blown vegetable oil, *e.g.*, castor, cottonseed, rapeseed oil, and a non-volatile mineral oil (2–5% of the total

mineral and vegetable oil content). The mineral oil prevents the stickiness normally induced by the vegetable oil. S. S. WOOLF.

Manufacture of artificial masses, lacquers, and solutions containing both cellulose esters and rubber. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,258, 27.8. and 21.12.28).—Unsaturated aliphatic esters, especially ethyl crotonate, are used as ingredients in lacquers of low viscosity containing cellulose nitrate or acetate and rubber. A spraying lacquer is produced, *e.g.*, by mixing ethyl α -crotonate (70 pts.), butyl cinnamate (5 pts.), methyl oleate (12 pts.), cellulose nitrate (10 pts.), and rubber (3 pts.). C. HOLLINS.

Manufacture of condensation products of cyanamide and formaldehyde. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 319,822, 28.6.28).—Cyanamide, especially an aqueous extract of "nitrolin," is condensed with formaldehyde either (a) in neutral or alkaline solution or (b) at higher temperatures in presence of dilute acid. Two different products result. C. HOLLINS.

Old rubber [lacquer] (B.P. 323,526).—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Causes of deterioration of ebonite when exposed to light and air. D. M. WEBSTER and B. D. PORRITT (India-rubber J., 1930, 79, 239–243; cf. B., 1929, 828).—The surface film of ebonite, containing no free sulphur, develops distinct traces of sulphurous and sulphuric acids after exposure to light in a damp atmosphere for 4 weeks, the acids resulting apparently from oxidation of hydrogen sulphide which arises from decomposition of the rubber-sulphur compound in the ebonite. The rate of evolution of hydrogen sulphide from ebonite heated in hydrogen is rapid at first, but rapidly decreases, finally becoming practically uniform over a long period. After being heated, the ebonite is reddish in colour and less saturated than the original material; it is also more soluble in acetone or carbon disulphide. No appreciable proportion of free sulphur or volatile organic compounds appears to arise from ebonite below 250°. The bearing of the results on the electrical deterioration of ebonite is discussed. D. F. TWISS.

PATENTS.

Production of tubes from aqueous dispersions of rubber. DUNLOP RUBBER CO., LTD., G. W. TROBRIDGE, and E. A. MURPHY (B.P. 323,519, 6.7.28 and 30.11.28).—A predetermined quantity of concentrated compounded latex calculated to give the desired thickness of wall is introduced into a horizontally mounted cylindrical mould, *e.g.*, a rotatable tube, of the necessary internal diameter. The aqueous mixture is compacted under the influence of centrifugal force while being subjected to the action of setting and/or coagulation. During the process the tube may be heated and a current of hot air passed over the surface of the dispersion, which also may contain chemical agents capable of facilitating its coagulation by heat. D. F. TWISS.

Manufacture of vulcanised rubber. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 323,580, 18.10.28).—

Before vulcanisation there are added to crude rubber, or compounded rubber (which may contain natural and/or artificial rubber), resinous or asphaltic oxidation products of organic compounds of high mol. wt. or resinous or asphaltic conversion derivatives of these oxidation products. The mechanical properties, after vulcanisation, are thereby enhanced. D. F. TWISS.

Antioxidant or age-resister [for rubber]. GOOD-YEAR TIRE & RUBBER Co., Assees. of A. M. CLIFFORD (B.P. 302,144, 27.8.28. U.S., 10.12.27).— α - or β -Naphthylamides of formic and other acids are applied as antioxidants in rubber mixes. Examples are form- α - and - β -naphthylamides, β -naphthylacet- β -naphthylamide, β -2-naphthylaminocroton- β -naphthylamide, form- β -2-naphthylaminoethylamide, and the product from ethyl acetoacetate and α -naphthylamine.

C. HOLLINS.

Refining of old rubber of all kinds and its application. H. E. POTTS. From H. PLAUSON (B.P. 323,526, 6.9.28).—Old rubber is treated with a volatile solvent, preferably a saturated organic compound, under pressure and with agitation at 160–180°; small amounts of an organic anhydride or superoxide or an alkaline-earth peroxide or superoxide being also added; benzoyl peroxide, acetic anhydride, and phthalic anhydride are mentioned. Fibrous or powdery fillers may be removed from the resulting solution by filtration or other means. The solution obtained may be used as such, or as an impregnating material for paper, leather, etc., or as a lacquer. D. F. TWISS.

Manufacture of [highly porous] rubber substance. H. BECKMANN (U.S.P. 1,745,657, 4.2.30. Appl., 1.7.25. Ger., 22.8.24).—See B.P. 238,870; B., 1927, 81.

Manufacture of [thermoplastic] rubber composition. H. GRAY, Assr. to B. F. GOODRICH Co. (U.S.P. 1,745,926, 4.2.30. Appl., 2.11.25).—See B.P. 260,637; B., 1927, 610.

Artificial masses (B.P. 321,258).—See XIII.

XV.—LEATHER; GLUE.

Action of alkali solutions on leather. M. BORDULIN (Trans. State Inst. Appl. Chem., Moscow, 1928, No. 10, 72–74).—Treatment of leather with alkali causes appreciable loss in weight, affecting first the non-nitrogenous portion; chrome-tanned leather is resistant, but "plant-tanned" leather was especially affected.

CHEMICAL ABSTRACTS.

Determination of water in glue. O. GERNGROSS (Kunstdünger- u. Leim-Ind., 1929, 26, 195–196; Chem. Zentr., 1929, ii, 1758).—Portions (10–50 g.) of glue are dissolved in 2.5 pts. of water, cooled to 30–35°, and a portion of the solution is dried in an aluminium vessel to constant weight. A. A. ELDRIDGE.

See also A., Feb., 258, **Influence of alcohol treatment on extraction of tannin from vegetables** (MICHEL-DURAND).

PATENTS.

Treatment of bones. GÉLATINES HASSELT & VILVORDE (F.P. 634,361, 13.5.27. Belg., 12.8.26).—The bones are treated with dilute phosphoric acid to remove calcium phosphate, which is subsequently recovered as

the mono- or di-hydrogen phosphate by addition of lime. The residual ossein or gelatin from the extraction process is colourless and free from arsenic. The phosphoric acid is regenerated from part of the extract by addition of sulphuric acid sufficient to remove the lime.

A. R. POWELL.

Plastic material. L. LEDERMANN, R. KOCH, and G. KÜPKER (F.P. 629,886, 26.2.27).—A mixture of animal and vegetable glue with glue obtained by the saponification of resin, together, if desired, with emulsions of celluloid, resin, etc. in a non-aqueous solvent, e.g., amyl acetate, is poured on to plates, dried, and hardened by treatment with solutions of formaldehyde, hexamethylenetetramine, or aluminium or chromium salts. L. A. COLES.

Treatment of leather-impregnating material. E. D. VAN TASSEL, JUN., Assr. to VAN TASSEL SOLE & LEATHER CORP. (U.S.P. 1,745,591, 4.2.30. Appl., 12.6.26).—See B.P. 293,062; B., 1928, 682.

Production of solid glue and gelatin in drop- or lens-shape. C. GREINER (U.S.P. 1,744,884, 28.1.30. Appl., 17.1.28. Ger., 28.3.27).—See B.P. 287,866; B., 1929, 30.

Method and apparatus [knife] for separating skin from flesh or depilating skins. M. MASSIN (B.P. 301,032, 21.11.28. Fr., 23.11.27).

Dehydration (B.P. 323,740).—See I. **Synthetic tanning agents** (B.P. 321,190).—See III. **Artificial leather** (U.S.P. 1,737,364).—See XIII.

XVI.—AGRICULTURE.

Physical chemistry of cultivated soils. R. A. HERZNER (Z. Pflanz. Düng., 1930, 15A, 342–361).—The nature of the electrical double layer surrounding soil particles is discussed. The adsorption potential of a number of soils, examined by means of the special apparatus described, varied between 6.0×10^{-3} and 0.4×10^{-3} volt. The charge carried by soil particles is dependent on the physical structure of the soil and on the composition and concentration of the aqueous solution in equilibrium with it. Measurements of the adsorption potential of soils afford indirect means of determining their nutrient requirements. Particles of medium and heavy soils of low nutrient content carry but small charges, those of light soils vary considerably.

A. G. POLLARD.

Soils. VI. Displaceable acid radicals. VII. Evolution of clay. J. CLARENS and S. NIKOLITCH (Bull. Soc. chim., 1930, [iv], 47, 104–109, 109–113; cf. B., 1929, 950).—VI. A graphical method is described for representing the displaceable acids and bases in soils.

VII. A possible mechanism for the transformation of felspar into clay is discussed. C. W. GIBBY.

Absorbing complex of soil. K. N. TARANOV (Ukrain. Chem. J., 1929, 4, [Tech.], 179–204).—The absorptive capacity of soil (black soil-clay) may be quickly and accurately determined by means of 0.2N-hydrochloric acid. Treatment with neutral salts of univalent ions (sodium, ammonium, and potassium chlorides and sodium acetate), although serving to remove particles of about 1 micron or less in diam.,

does not deprive the soil of absorptive power. Further separation of such particles in an alkaline medium (0.1N-sodium hydroxide) gives a further quantity of organic and mineral substances, but the residual soil still retains absorptive capacity. The impossibility of displacing completely the absorbing hydrogen ions by univalent ions, even in an alkaline medium, is also demonstrated by treating soil which has been subjected to electro dialysis.

T. H. POPE.

Base exchange and acidity [in soils]. P. VAGELER and J. WOLTERS DORF (Z. Pflanz. Düng., 1930, 15A, 329—342).—The mathematical basis of a number of methods for examining base exchange in soils is critically discussed and formulæ are developed for expressing the course of this phenomenon. The importance is emphasised of ascertaining well-defined limiting values for the exchange of bases, and of including these in any mathematical expression of results. Properties of free ions, notably their hydration, are not necessarily the same as those of ions adsorbed by soils.

A. G. POLLARD.

Determination of soil acidity. D. L. ASKINASI and J. S. JARUSOV (Trans. Sci. Inst. Fertilisers, Moscow, 1927, No. 48, 5—36).—The value of the absorption capacity and acidity of soils depends on the reaction of the reagent used for extraction; the highest capacity is obtained by using free alkali. The "increased" capacity for base exchange is determined as follows. The soil is placed in a funnel free from carbon dioxide and air free from carbon dioxide is admitted; the soil is then treated with 0.1N-barium hydroxide and the excess removed by washing with boiling barium chloride solution, the barium chloride being washed out with water. Hydrogen carbonate in the wash-waters is determined by titration. The sum of the barium remaining in the soil and that calculated from the hydrogen carbonate titration, when expressed in terms of calcium, gives the value of the increased capacity. The different results for the capacity obtained by the use of calcium acetate, barium chloride, etc. represent the value of the active fraction of the absorbing complex of soils. For the determination of the hydrolytic acidity the soil was treated with N-sodium chloride in presence of an excess of calcium carbonate, the total calcium in the filtrate being determined. Treatment of a soil with weak acids decreases its absorptive capacity, which may be restored by treatment with sodium acetate. Liming increases the absorption capacity of, and therefore improves, podsol soils.

CHEMICAL ABSTRACTS.

Simple electrode apparatus for measuring the hydrogen-ion concentration of soils. The quinhydrone-calomel electrode. W. SELKE (Z. Pflanz. Düng., 1930, 15A, 362—368).—The apparatus described enables the user to combine speed of equilibrium with accuracy. Diffusion potential is minimised.

A. G. POLLARD.

Pipette method of mechanical analysis of soils based on improved dispersion procedure. L. B. OLMSTEAD, L. T. ALEXANDER, and H. E. MIDDLETON (U.S. Dept. Agric., Tech. Bull. 170, 1930, 23 pp.).—The soil sample is prepared by treatment with hydrogen peroxide, but the usual hydrochloric acid treatment is omitted as being superfluous and in some cases undesir-

able. Special treatment is prescribed for soils rich in manganese dioxide, involving destruction of the latter with acetic acid. Soluble salts are removed by washing and filtration with Pasteur-Chamberland filters. Dilute sodium oxalate solution is used as dispersing medium. Sand fractions are removed by a 300-mesh sieve and the fine silt, clay, and colloid fractions determined by the pipette method.

A. G. POLLARD.

Field test for available phosphorus in soils. R. H. BRAY (Illinois Agric. Exp. Sta. Bull., 1929, No. 337, 591—602).—The reagent is prepared by dissolving ammonium molybdate (100 g.) in water (850 c.c.), filtering, cooling, and adding slowly, with stirring, a cold mixture of 36% hydrochloric acid (1700 c.c.) and water (700 c.c.); for use, 120 c.c. are diluted to 1 litre. The soil (1 pt.) is shaken with the solution (3 pts.) and, after settling, the solution is gently stirred with a tin or solder rod, the intensity of the blue or green colour produced varying with the quantity of available phosphoric acid present.

CHEMICAL ABSTRACTS.

Biological oxidation of sulphur. II. Effect on the microflora of activated sludge. C. V. R. AYYAR and R. V. NORRIS. **III. Sulphur-oxidising organism from activated sludge.** C. V. R. AYYAR (J. Indian Inst. Sci., 1929, 12A, 275—277, 278—294; cf. B., 1928, 938).—II. As a result of the continued aeration of suspensions of sulphur in activated sludge the p_H value decreased from 7.2 to 2.1 in one month. The faecal, putrefactive, and chromogenic types of bacteria quickly disappeared, moulds persisted longer, but in the last stage (p_H 2.1) sulphur-oxidising organisms were almost the only survivors, and were therefore easy to isolate in pure culture.

III. The sulphur-oxidising organism isolated as described above proved on examination to be a new species having a higher S:C ratio than Joffe's and being capable of oxidising elemental sulphur to sulphuric acid without accumulating sulphur either within or without the cell. It can withstand p_H 6.6 and utilises carbohydrates to some extent, oxidising more sulphur in their presence. Certain inorganic salts, notably sodium silicate, have a stimulating action.

C. JEPSON.

Composting barnyard manure with sulphur and rock phosphate. W. G. FRIEDEMANN (Georgia Agric. Exp. Sta. Bull., 1929, No. 154).—Greater loss of nitrogen occurred in untreated compost than in compost containing sulphur.

CHEMICAL ABSTRACTS.

Fertilising value of sewage sludge. G. S. FRAPS (Proc. XI Texas Water Works' School, 1929, 150—152).—In Imhoff tank sludge extensive decomposition has taken place, only resistant material remaining; sludge from the activated-sludge processes is, however, easily decomposed by soil bacteria. Comparative values (8—10% H_2O) are: N 0.88—2.99, 3.6—5.5; P_2O_5 0.47—2.48, 2.41—2.68; K_2O 0.2—1.44, —, respectively.

CHEMICAL ABSTRACTS.

Movement of fertiliser salts in the soil. O. F. JENSEN (J. Amer. Soc. Agron., 1929, 21, 1113).—Downward movement of phosphorus was indicated.

CHEMICAL ABSTRACTS.

Change in the water-soluble phosphoric acid content of superphosphate during heap storage. I. T. SHOJI and E. SUZUKI (J. Soc. Chem. Ind., Japan, 1929, 32, 272—274 B).—Increase in the water-soluble phosphoric acid content of stored superphosphates prepared from Christmas phosphate is hindered when the superphosphate is kept at a fairly high temperature (60°). For this reason such superphosphate which is stored in heaps does not attain a sufficiently high soluble phosphate content in summer.

S. K. TWEEDY.

Effects of seed treatment on the germination and subsequent growth of wheat. D. C. SMITH and E. N. BRESSMAN (J. Agric. Res., 1930, 40, 25—36).—Ammonium thiocyanate proved decidedly toxic as a seed dressing; it reduced germination, growth of wheat sprouts, and the length of the roots of Kanred and White Winter wheat. Ethyl bromide was slightly toxic to root and sprout growth of White Winter wheat, and reduced germination particularly of this variety. Germinating wheat grains withstood 12 days at -12°, but this treatment did not break the dormant vegetative period of winter-wheat plants subsequently produced. Alternate freezing and thawing was more detrimental than continuous freezing.

E. HOLMES.

Crop experiments with "Kalkammonsalpeter." E. BLANCK and F. KLÄNDER (J. Landw., 1930, 77, 337—340).—In pot trials with oats, "Kalkammonsalpeter" (a mixture of ammonium nitrate and calcium carbonate) proved slightly inferior to sodium nitrate but better than ammonium sulphate or calcium cyanamide.

A. G. POLLARD.

Phosphate nutrition of cultivated plants. M. K. DOMONTOVICH (Trans. Sci. Inst. Fertilisers, Moscow, 1928, No. 52, 3—37).—Within the limits of physiologically balanced solution the p_H has no influence on the absorption of phosphorus by oats or buckwheat. Oats, maize, buckwheat, mustard, and peas showed no striking differences in the power to exhaust the phosphorus supply from a solution. The influence of the period of vegetation on the utilisation of soluble and insoluble phosphates by plants was also investigated. With decrease in the size of particles raw phosphates become available in culture solutions.

CHEMICAL ABSTRACTS.

Influence on plant growth of the addition to sand of clays of varying composition. E. BLANCK and E. F. VON OLDERSHAUSEN (J. Landw., 1930, 77, 331—336).—Pot experiments are described in which oats were grown in mixtures of sand and a number of clays. Higher yields were obtained with mixtures having p_H 4.5 approx. than with the more nearly neutral samples.

A. G. POLLARD.

Apparatus for watering pot cultures and determining the absolute water consumption. K. MEYER (J. Landw., 1930, 77, 327—330).—A portable apparatus is described whereby water is added to culture vessels till the latter attain a predetermined gross weight. The volume of water added is measured by a special apparatus.

A. G. POLLARD.

Effects of leaching with cold water on the foliage of fruit trees. I. Course of leaching of dry

matter, ash, and potash from leaves of apple, pear, plum, black currant, and gooseberry. T. WALLACE (J. Pomology, 1930, 8, 44—60).—The leaves, subjected to leaching for 4 successive days at ordinary temperatures, lost considerable proportions of potash, ash, and dry matter, the proportions leached being in the order named. The ratios of % potash/% ash, and % ash/% dry matter leached varied for different classes and varieties of fruit. Apple and gooseberry leaves leached readily, plum leaves showed great variations. Summation curves suggest that the same groups of materials were leached throughout the 4-day periods.

E. HOLMES.

Manuring of fruit trees. III. Effects of deficiencies of potassium, calcium, and magnesium, respectively, on the contents of these elements, and of phosphorus in the shoot and trunk regions of apple trees. T. WALLACE (J. Pomology, 1930, 8, 23—43; cf. B., 1927, 55).—From an examination of the effects on apple trees, Stirling Castle variety, grown in quartz sand with added nutrients, it is concluded that omission of potassium resulted in increased shoot growth, leaf scorch, and defoliation of shoots, of calcium in slightly increased shoot growth, relatively large leaves, and breakdown of leaf-tissue in patches, whilst omission of magnesium reduced shoot growth particularly after two seasons. Large reductions of potash and magnesia, but not of lime, in the ash of the trees was caused by lack of these bases. Omission of potash and lime gave a higher percentage of dry matter and a low percentage of ash, whilst omission of magnesia had the reverse effect. The effects on phosphoric acid in the plant were not striking.

E. HOLMES.

Decomposition and effect of straw and peat litter-stall manure in soils. P. NIEMEYER (Landw. Versuchs-stat., 1929, 108, 305—348).—Comparison is made of the chemical changes occurring during the decomposition of manure made with straw and peat litter in soils of different types. Changes in the "total carbonaceous matter" are more rapid in straw manure than in peat, the difference being most marked in clay soils. Decomposition of pentosans follows similar lines, and in the case of peat is incomplete after 1 year. The decomposition of lignins is slower, and occurs at similar rates with both manures. With the progressive decomposition of cellulose and pentosans the soil humus becomes increasingly rich in lignins. Decreases in total nitrogen soon after the application of manure were greater from the straw than from the peat. After cropping, all added nitrogen from both materials was utilised. Changes in the easily-soluble nitrogen were similar, the proportion in peat manure being higher than in straw initially, but lower after cropping. The nitrate content of soils receiving peat manure was generally higher than with straw. No differences were observed in the citric-soluble phosphate in the two cases. Straw originally contained more easily-soluble potash than peat, but losses by leaching and chemical change in the treated soils were greater in the case of straw. Crop yields were generally higher from peat manure plots. This is attributed to the higher proportion of nitrogen available and to the more uniform

rate of decomposition of the peat manure during the growth period of the plant. Both field trials and Neubauer tests show that the proportional utilisation of nutrients is greater from peat manure than from straw.

A. G. POLLARD.

Compatibilities of insecticides. I. Fluosilicates and cryolite with arsenates. R. H. CARTER (J. Econ. Entomol., 1929, 22, 814—818).—Mixtures of lead arsenate with sodium, potassium, barium, or calcium fluosilicate in water do not show excessive amounts of soluble arsenic; calcium, manganese, magnesium, aluminium, and barium arsenates are largely decomposed in presence of fluosilicate. Cryolite inhibits the formation of soluble arsenic.

CHEMICAL ABSTRACTS.

Use of acidulated mercuric chloride in disinfecting potato tubers for the control of *Rhizoctonia*.

J. G. LEACH, H. W. JOHNSON, and H. E. PARSONS (Phytopathol., 1929, 19, 713—724).—Treatment with mercuric chloride solution (0.2%) containing 1 vol.-% of hydrochloric acid is rapid (5 min.), and as satisfactory as that with soap in mercuric chloride solution (2 hrs.) or hot formaldehyde.

CHEMICAL ABSTRACTS.

Insecticidal properties of soaps against the Japanese beetle. P. A. VAN DER MEULEN and E. R. VAN LEEUWEN (J. Econ. Entomol., 1929, 22, 812—814).—The insecticidal efficiencies for *Popillia japonica* of the sodium and potassium soaps of the fatty acids of various oils are recorded.

CHEMICAL ABSTRACTS.

Sulphide-sulphur content as a basis for diluting lime-sulphur for spraying. G. M. LIST (Colorado Agric. Exp. Sta. Bull., 1929, No. 352, 14 pp.).—The insecticidal value of lime-sulphur is attributed largely to the ability of the calcium polysulphides to take up large quantities of oxygen. Determinations of the effective concentration of sulphide-sulphur for various pests are recorded.

CHEMICAL ABSTRACTS.

Arsenical injuries [to foliage] and correctives. J. M. GINSBURG (New Jersey Agric. Exp. Sta. Bull., 1929, No. 468, 1—16).—Zinc oxide, when added to arsenical sprays, eliminated soluble arsenic, but was itself toxic to peach and apple foliage; alumina, aluminium palmitate, calcium silicate, stannic oxide, charcoal, and powdered skim-milk did not reduce the injury. Ferric oxide or excess of lime slightly injured peach foliage; the former improves adherence.

CHEMICAL ABSTRACTS.

Injury of peach trees with *p*-dichlorobenzene. O. I. SNAPP and H. S. SWINGLE (J. Econ. Entomol., 1929, 22, 782—785).—Injury was caused in high temperatures. *p*-Dichlorobenzene dissolved in gasoline did not control the peach borer.

CHEMICAL ABSTRACTS.

Simultaneous determination of arsenic and copper, especially in insecticides. F. WESSEL (Chem.-Ztg., 1930, 54, 97—98).—The substance is dissolved in dilute hydrochloric acid and an aliquot part of the solution containing 0.03—0.04 g. of arsenic as arsenic acid is filtered off, treated with 1 c.c. of 10% calcium chloride solution and 8—10 c.c. of 10% ammonia in excess of that required for neutralisation, and thoroughly stirred until the precipitate becomes crystalline. After 10—12 hrs. the solution is filtered

the precipitate washed with a dilute ammoniacal solution of calcium chloride until colourless, and then dissolved in 5 c.c. of 10% hydrochloric acid, and the arsenic determined iodometrically. The ammoniacal filtrate is boiled to expel ammonia, concentrated if necessary, acidified with dilute sulphuric acid, and the copper determined iodometrically. If the arsenic in the original substance is all present as arsenious oxide the copper may be determined directly in the usual manner and the arsenic by titration with iodine in the presence of sodium hydrogencarbonate. If the copper is present as cuprous salt and the arsenic as trioxide, the substance is heated with sulphuric acid and hydrogen peroxide and the analysis finished by the first of the above methods.

A. R. POWELL.

See also A., Feb., 185, **Immersion filter for phosphorus, calcium, and crude-fibre determinations** (SIMON). 258, **Rôle of enzyme action in seed germination** (STEPHEN). 262. **Nitrates and ammonium salts as sources of nitrogen for plants at constant p_H** (PIRSCHLE). **Relative importance of sulphur and phosphorus in plant nutrition** (BERTRAND and SILBERSTEIN). **Action of calcium and magnesium ions on seeded peas** (BOLELOUCKY). **Assimilation of phosphoric acid by barley** (TUEVA).

PATENTS.

Fertiliser. CHEM. FABR. DR. HEPPES & Co., G.M.B.H., J. B. CARPZOW, and J. HEPPES (Swiss P. 124,143, 31.10.25. Ger., 31.10.24).—The use is claimed of mixtures of inorganic or organic vegetable nutrients with slime deposited from streams etc. and containing dead animal or vegetable material.

L. A. COLES.

Fertiliser. ELEKTRIZITÄTSWERK LONZA (GAMPEL U. BASEL), and E. LÜSCHER (Swiss P. 124,358, 18.12.26).—Unwashed filter residues obtained in the production of ammonium sulphate by treating gypsum with ammonia and carbon dioxide are treated with an equivalent weight of nitric acid of such concentration that a practically dry mixture of calcium nitrate, ammonium nitrate, and a little calcium sulphate is obtained.

L. A. COLES.

[Phosphatic] fertiliser. G. TRUFFAUT (F.P. 635,523, 3.6.27).—Crude phosphate rock is digested with aqueous phosphoric acid and finely-ground silica, the acid used being sufficient to decompose the carbonates and fluorides present and to convert 80% of the calcium phosphate into CaHPO_4 and 20% into $\text{Ca}(\text{H}_2\text{PO}_4)_2$. Limestone is then added until all the fluorine is precipitated and the solution filtered and evaporated for the recovery of the dissolved phosphates.

A. R. POWELL.

Fertiliser containing potassium compounds. B. T. G. V. H. O. MELLERBORG (Swed. P. 60,306, 5.7.24).—Mixtures of potassium ores with quick-lime and sufficient water to slake the lime are sealed up in autoclaves; the temperature and pressure generated render the potash water-soluble.

L. A. COLES.

Dry seed pickling material. CHEM. FABR. L. MEYER (G.P. 454,570, 27.11.23).—Pickling materials containing a fungicide and an acid or material capable of hydrolysis to furnish an acid, such as various mixtures of copper carbonate and anhydrous copper sulphate,

calcium arsenite, mercurous sulphate, copper acetate-arsenite, or arsenious acid, are claimed. E. HOLMES.

Method of pickling seed. BAYERISCHE STICKSTOFFWERKE A.-G. (G.P. 457,995, 2.9.24).—A 1:1 mixture of seeds treated with different pickling materials, and immediately dried, is claimed to give increased germination and plants less susceptible to deleterious external conditions. E. HOLMES.

Increasing the germination of seed. I. G. FARBENIND. A.-G. (G.P. 456,556, 16.12.19. Cf. U.S.P. 1,565,237; B., 1926, 559).—It is claimed that seeds of barley and wheat may be disinfected, and germination increased, by treatment for $\frac{1}{2}$ hr. with solutions containing 0.25–0.5% of various specified aryl derivatives of arsenious acid, or with similar materials combined with copper sulphate, mercuric chloride, and mercury chlorophenols. E. HOLMES.

Insecticides etc. I. G. FARBENIND. A.-G., Assees. of A. STEINDORFF and O. WEICKERT (G.P. 453,357, 19.3.22).—Insecticides containing copper compounds, sulphonic acids of high mol. wt. (e.g., sulphonated naphthol pitch, coal-tar pitch), waxes such as coumarone wax, colophony, and fillers such as lime or slaked lime are claimed. E. HOLMES.

Preparation of stable water-soluble insecticides etc. I. G. FARBENIND. A.-G., Assees. of K. MARX and K. BRODERSEN (G.P. 456,019, 22.12.22. Addn. to G.P. 430,712; B., 1926, 893).—Water-soluble insecticides stable in air are prepared by incorporating with organic acids of high mol. wt., obtained by the oxidation of brown coal etc., alkali polysulphides with aluminium hydroxide or aluminates, and arsenicals. E. HOLMES.

Materials with fungicidal and insecticidal properties. J. D. RIEDEL A.-G. (G.P. 453,193, 11.10.24).—Soap emulsions of the acetyl, benzoyl, and crotonaldehyde derivatives of hydrogenated naphthalene are stated to be better insecticides etc. than is hydrogenated naphthalene itself. E. HOLMES.

Material for combating plant pests. CHEM. FABR. DR. REIS G.M.B.H. (G.P. 454,899, 19.8.21).—A solution of *p*-dichlorobenzene in pyridine, emulsified with soft soap, is claimed to be effective against plant lice, red spiders, and caterpillars without damaging the plant or interfering with the flavour of vegetables or fruits. E. HOLMES.

Extermination of soil and other plant pests. E. DINKELMANN (Swiss P. 124,486, 16.2.27).—Soil disinfectants containing nicotine, ferrous sulphate, ammonium sulphate, or sodium nitrate, with quicklime or calcium salts are claimed to be useful when applied with liquid manure or water. E. HOLMES.

Sulphur preparations as plant disinfectants. I. G. FARBENIND. A.-G., Assees. of M. MÜLLER-CUNRADI and M. SCHMIKING (G.P. 454,933, 21.12.23).—Finely-powdered sulphur or ammonium polysulphide solutions with humic acid or its salts are claimed as good spray materials. In an example, brown coal rich in humus is treated with ammonia, the mixture filtered, and the filtrate evaporated to dryness. The finely-powdered residue is mixed with 3 pts. of sulphur. E. HOLMES.

Preservation of [fresh] flowers and plants. LABORATORIUM MIGOHLA INH. K. KIEF (G.P. 455,528, 1.3.24).—The flowers etc. are treated with solutions containing 50% of alcohol, 45% of water, and 5% of boric or salicylic acid. E. HOLMES.

Production of liquid insecticide containing the effective ingredient of *Derris* species. T. OHORI and K. NAKAZAWA, Assts. to ZAIDAN HOJIN RIKAGAKU KENKYUJO (U.S.P. 1,745,907, 4.2.30. Appl., 10.2.28. Jap., 18.2.27).—See B.P. 285,797; B., 1929, 106.

Mixing mill (U.S.P. 1,739,149).—See I. **Seed-grain immunising** (B.P. 321,396).—See IX.

XVII.—SUGARS; STARCHES; GUMS.

How much non-sugar from the water used for diffusion passes into the juice [in beet-sugar factories]? V. STANĚK and J. VONDRÁK (Z. Zuckerind. Czechoslov., 1929, 54, 117–121).—The water supplies of some beet-sugar factories are liable, at times, to contain abnormal amounts of dissolved solids. To ascertain what proportion of the dissolved solids in the water passes into the juice the authors carried out comparative diffusion experiments with a laboratory battery, using distilled water alone and distilled water containing 0.1 and 0.5% of sodium chloride and urea. From the amounts of these substances found in the diffusion juices it is concluded that about one third of the dissolved matter in the water passes into the juice. If this is not removed by carbonatation it must lower the purity of the final juice and increase the amount of molasses obtained. The extra molasses due to 0.1% of mineral salts or 0.1% of organic non-sugar in the original water may amount to 0.25% of the weight of beets in the former case or 0.12% in the latter.

J. H. LANE.

Baryta-alumina clarification of cane-sugar products. J. H. HALDANE and N. DEERR (Facts about Sugar, 1929, 24, 928).—The following results were obtained for mixed juice, syrup, and waste molasses, respectively: direct polarisation with dry lead acetate (Horne) 13.31, 46.46, 34.18; double polarisation (Steuerwald) 13.49, 47.11, 35.93; direct polarisation with clarification by baryta and alumina, volume corrected, 13.24, 46.19, 32.83; double polarisation by inversion with sulphuric acid and clarification with baryta and aluminium sulphate (Coates and Shen) 13.40, 46.84, 35.18. CHEMICAL ABSTRACTS.

Clarification of sugar solutions for analysis. M. I. NAKHMANOVICH and S. L. BERMAN (Monograph, 184 pp.).—A review and bibliography. CHEMICAL ABSTRACTS.

Capacity of crystallisation of green syrups treated with activated carbon, sulphur dioxide, and carbon dioxide. I. I. DOKHLENKO and G. A. SOKOLOV (Zhur. Sakh. Prom., 1929, 3, 20–34).—The velocity of crystallisation of green syrups treated with lime and carbon dioxide or sulphur dioxide (6%, calc. on sugar) is much greater than when norit (2%, calc. on sugar) is used. Norit effects greater removal of ash, but the decrease in surface tension is greater when norit is used. CHEMICAL ABSTRACTS.

Determination of the starch content in potatoes. SPROCKHOFF (Z. Spiritusind., 1930, 53, 35).—Unless the determination of starch in potatoes by the chemical method is based on a sample weighing at least 5 kg., *i.e.*, the weight used for the sp.-gr. method, comparable results from the two methods are not obtained, since individual potatoes from the same lot may show variations in the starch content amounting to 3.7%. In addition, the starch is not evenly distributed through the potato, and the starch content at the hilum end may exceed that at the top end by 1% or more. If possible, a correction should be made for the gas content of the potatoes when the starch is determined by the sp.-gr. method.

C. RANKEN.

Glycerin by fermentation. TOMODA.—See XVIII.
Swelling of dried beet slices. MACH and HERRMANN.—See XIX.

See also A., Feb., 195, **Precipitation of sugars etc. as copper-barium hydroxide complexes** (FLEURY and AMBERT). 259, **Galactose from sea-weed "Tengusa"** (UYEDA).

PATENT.

Production of dextrose and laevulose from grape juice. SOC. DES ETABL. BARBET (Addn. 32,642, 17.4.26, to F.P. 615,942; B., 1927, 856).—The crystals of dextrose obtained by evaporation are separated from the syrup by centrifuging and are then washed with a concentrated dextrose solution. The mother-liquor is evaporated to obtain a second crop of impure dextrose crystals and a mother-liquor (*d* 1.4) which is decolorised with animal charcoal and allowed to crystallise to obtain pure white laevulose.

A. R. POWELL.

XVIII.—FERMENTATION INDUSTRIES.

Substances toxic to the Downy mildew of the hop. W. NEWTON and C. YARWOOD (J. Inst. Brew., 1930, 36, 67—68).—Sap bled from the cut tips of hop plants was toxic to the zoöspores of the Downy mildew, whereas that bled from cut basal stems was almost non-toxic. Sap which was obtained by pressure from ground hop and other plant material, such as nettles and bind-weed, was only slightly toxic. The antiseptic principle associated with the hop resins was probably responsible for the toxicity of the sap. Commercial pine resin dissolved in methyl alcohol and potassium hydroxide was more toxic than copper sulphate, and may be used as a control measure against the attacks of the Downy mildew.

C. RANKEN.

Prolonged fermentation of wort. STAIGER and GLAUBITZ (Z. Spiritusind., 1930, 53, 36).—A wort prepared from rye was seeded with yeast, and the content of alcohol, acid, and diastase as well as the amount of carbon dioxide evolved and the condition of the yeast were determined after periods of 24, 48, 72, 96, and 120 hrs. At the end of 72 hrs. the optimal production of alcohol was obtained, the amount of acid was normal, carbon dioxide had ceased to be evolved, and the quantity of diastase, although diminished, was sufficient. The appearance of the yeast was considered as normal, although there were 50% of cells present which were weakened or dead owing to the increasing alcohol content

and diminished quantity of nutrients. At the end of 96 hrs. the dead cells had increased to 60% and the diastase had completely disappeared, whilst at 120 hrs. almost all the cells had been destroyed, the acidity was higher, and the alcohol content had diminished slightly.

C. RANKEN.

Influence of aeration during fermentation on yeast condition and beer quality. F. WINDISCH (Woch. Brau., 1930, 47, 33—39, 45—51).—Parallel fermentations of 8-litre portions of wort, of which one set was aerated daily by stirring, showed distinctly higher rates of fermentation in the aerated sets. The yeast harvested from these deteriorated in quality throughout the fermentation, as shown by its appearance and its fermentative and reproductive powers. The observations were made on two bottom-fermentation yeasts. The increased rate of fermentation was due to the stimulating effect of aeration on reproduction, since it did not occur when high pitching rates were used, either with fresh yeast or with sediments to which fresh wort was added. Aeration after cell increase had reached its maximum, *i.e.*, on the 5th and 6th days of fermentation, also had no effect on the final attenuation. A series of three successive brewery fermentations, of which one set was aerated by pumping on the first three days, showed a slight increase of fermentation rate on the first two occasions, but again the yeast deteriorated progressively and in the third fermentation proved less vigorous than the unaerated yeast, in spite of the stimulating action on reproduction of the wort aeration. The beers from the third unaerated fermentation gave a clean normal sediment, that from the corresponding aerated wort being larger, looser, and of unsound smell, and containing hardly any normal yeast cells. On the basis of the results the practice of aerating to stimulate fermentation is criticised.

F. E. DAY.

Determination of the fat content of yeast. R. OTTO and A. HALTER (Chem.-Ztg., 1930, 54, 98—99).—The sample is dried at 105° and, after fine grinding, 5 g. are dissolved in 10 c.c. of hydrochloric acid (*d* 1.19) and 10 c.c. of water with gentle warming. The brown syrupy solution is boiled gently for 5 min., filter pulp is added, and the solution diluted with 25—30 times its volume of cold water and filtered. The filter is washed free from acid with cold water, dried, and the fat extracted in the Soxhlet apparatus in the usual way. Direct extraction of the yeast with ether gives low results.

A. R. POWELL.

Production of glycerin by fermentation. VII. Velocity of fermentation in presence of sulphite.

VIII. Formation of β -butylene glycol and acetic acid during glycerin fermentation in presence of sulphite. Y. TOMODA (J. Soc. Chem. Ind., Japan, 1929, 32, 229—230 B, 230—231 B).—VII. The velocity of fermentation in a synthetic medium is seriously affected by the sulphite concentration, but in molasses solution the effect is less marked. On the assumption that 3 mols. of sulphite combine with 1 mol. of zymase, producing 1 mol. of inactive zymase-sulphite complex, and that the velocity of fermentation depends solely on the uncombined active zymase, the relation between the velocity of fermentation and the concentration of the sulphite is expressed by $V_a = Bn/(1 + Ds^3)$ for the synthetic

medium, and by $V_m = B^1 \log(1+n) - \log(1+Ds^3)$ for molasses solution, where V_a or V_m represents the velocity of fermentation, n the initial number of yeast cells per unit of volume, s the initial concentration of sulphite, and B , B^1 , and D are constants. These equations are in agreement with the experimental results. The dissociation constant of the arbitrary zymase-sulphite complex, calculated from the relative velocities of fermentation, is 7.6×10^{-3} , which is similar to the value 4.6×10^{-3} obtained by Kerp (A., 1904, i, 713) for the acetone-bisulphite compound. In most cases the maximum concentration of sodium bisulphite tolerated by the fermentation is about 0.2%, and if the inhibiting action of sulphite is ascribed to the effect of bisulphite ions, the maximum allowable concentrations of sulphite calculated for different values of p_H of the medium are in good agreement with the experimental results (cf. A., 1928, 365, 923).

VIII. During the glycerin fermentation of sugar in presence of a relatively small proportion of sulphite and a large proportion of sugar, the formation of β -butylene glycol occurs after the exhaustion of the free sulphite in the medium, probably owing to dissociation of the acetaldehyde-bisulphite compound and subsequent condensation and reduction of the resulting acetaldehyde. A considerable amount of acetic acid is formed at the same time. The formation of glycerin after exhaustion of the free sulphite is to be attributed mainly to the induction of Neuberg's third form of fermentation and, to a less extent, to the regeneration of the aldehyde-fixing power of the sulphite consequent on the transformation of the dissociated acetaldehyde into β -butylene glycol. Formation of acetylmethylcarbinol during the glycerol fermentation of sugar is not observed, although in normal alcohol fermentation traces of both acetylmethylcarbinol and β -butylene glycol are formed, the amount of the latter being much less than in the glycerin fermentation (cf. A., 1928, 365, 923).

T. H. POPE.

Hop-drying investigations, their aims, and results already attained. A. H. BURGESS (J. Inst. Brew., 1930, 36, 57—59).—A *résumé* of work already abstracted (cf. B., 1928, 461; 1929, 533). C. RANKEN.

Brewing research and large-scale experiments. H. L. HIND (J. Inst. Brew., 1930, 36, 51—57).

Cause of odour of beer etc. SCHMALFUSS and BARTHMEYER.—See XIX.

See also A., Feb., 250, Fermenting power of yeasts of first group of *Saccharomyces* (TRAUTWEIN and WASSERMANN). Acceleration of alcoholic fermentation of sucrose (OWEN and DENSON). Fermentation of sucrose in presence of sulphite (POLAK).

PATENTS.

Manufacture of sparkling wine and similar non-alcoholic sparkling drinks. A. CHAUSSEPIED (F.P. 623,984, 2.11.26).—Fermented liquors made in closed containers are subjected to distillation in a vacuum and the alcohol and carbon dioxide are condensed separately, the latter being returned to the residual liquor in the still.

A. R. POWELL.

Wine vinegar. F. NOLDIN (F.P. 625,752, 6.12.26).—The mass to be fermented is agitated with compressed air in presence of filling materials. A. R. POWELL.

Production of bacterial enzyme preparations. A. BODIN and J. EFFRONT (U.S.P. 1,744,742, 28.1.30. Appl., 28.6.23. Fr., 3.7.22).—See B.P. 221,860; B., 1924, 959.

XIX.—FOODS.

Gas storage of fruit. II. F. KIDD and C. WEST (J. Pomology, 1930, 8, 67—77. Cf. B., 1927, 425).—Commercial storage life of fruit is defined as the interval between dates of storage and of the development of 10% wastage in store. Wastage of apples at 1° was found to be entirely due to low-temperature breakdown in green, unripe fruit, and at 5° and 10° to fungal rotting. The optimum conditions for storing Bramley's Seedling apples were determined as 5° in an atmosphere of 10—15% of carbon dioxide and 10% of oxygen, and gave 50% greater life than storage under conditions of temperature control only. Further tests indicate that the loss of carbohydrates was approx. 1.3 times as fast in air as in an atmosphere with 10% of oxygen, and approx. 1.45 times as fast in the absence of carbon dioxide as with 10% of this gas. Loss of acid does not appear to be affected markedly by reduction in oxygen or increase in carbon dioxide up to 9%.

E. HOLMES.

Storage of pears in artificial atmospheres. S. A. TROUT (J. Pomology, 1930, 8, 78—91).—At moderate temperatures the storage life of pears may be extended as much as 50% by exclusion of oxygen, provided the storage atmosphere contains less than 10% of carbon dioxide. This treatment prevents the appearance of scald in susceptible varieties, and, by excluding oxygen, stops normal respiratory oxidations which produce acetaldehyde. The mechanism of core breakdown is discussed. (Cf. preceding abstract.) E. HOLMES.

Swelling capacity of dried [beet] slices and the effects of over-heating. F. MACH and R. HERRMANN (Landw. Versuchs-stat., 1929, 108, 349—370).—Processes for determining the "swelling coefficient" are described, and the effect of overheating at various temperatures on this value is obtained. In general, the swelling capacity decreases markedly when drying is carried out at 150° and upwards. Examination of the nutrient value of overheated slices showed the soluble protein content to diminish sharply at 150—300°. There is a corresponding increase in crude fibre and a decrease in "soluble" crude fibre within this temperature range. A. G. POLLARD.

Ensilaging of green fodder rich in protein with special reference to the hydrochloric acid process. K. VOLBEHR (Landw. Versuchs-stat., 1929, 108, 115—146).—Laboratory examination is described of the chemical and microbiological changes occurring in the Fingerling hydrochloric acid process for the preservation of green fodder. To inhibit unwanted enzyme and bacterial action the initial reaction of the mixture should not exceed p_H 2. The limiting value for the production of good silage is p_H 4.0. Butyric fermentation becomes active at p_H 5.0. Protein losses increase directly with

the storage period, with the proportion of protein in the original material, and inversely with the amount of hydrochloric acid used. The total nitrogen content of the product is not greatly affected by the conditions of storage. The use of 5% sodium chloride as a preservative yields excellent silage with similar protein loss to that of the hydrochloric acid method.

A. G. POLLARD.

Sensitiveness of test animals to French beans.

A. VAN RAALTE (Chem. Weekblad, 1930, 27, 37).—Tins of French beans of which complaints had been received were found sterile and free from poisons by chemical examination. Rats and mice fed on these beans alone died within a few days, and the same result was obtained with fresh beans bottled in the laboratory.

S. I. LEVY.

Diacetyl as the constituent causing the odour of provisions and other materials.

H. SCHMALFUSS and H. BARTHMEYER (Biochem. Z., 1929, 216, 330—335).—The cause of the odour of tobacco smoke, butter, burnt coffee, beer, and honey is shown to be diacetyl, by isolation as the nickel glyoxime. Diacetyl was not obtained from tea, black bread, or bonbons.

P. W. CLUTTERBUCK.

Disposal of creamery wastes. C. E. SLAUGHTER (Mich. State Coll. Eng. Exp. Sta. Bull., 1928, No. 18, 27 pp.).—High acidity inhibits reduction of wastes. The acidity increases as the oxygen consumed is reduced. Septic action is facilitated by addition of lime to p_H 7.6. Chemical precipitation with ferrous sulphate, followed by addition of lime and then by secondary storage or oxidation on a sand-filter, is recommended.

CHEMICAL ABSTRACTS.

Determination of water and fat. BULL. Soya-bean oil extraction. MASHINO.—See XII.

See also A., Feb., 160, **Formation of pectin jellies by sugar** (SPENCER). 260, **Proteins of *Cajanus indicus*** (SUNDARAM and others).

PATENTS.

Production of butter. J. SIEDEL (B.P. 323,546, 6.10.28).—Butter is prepared from rich cream (at least 45% of fat) at 2–10° by sweeping or spreading it in a thin film over a suitable surface until the structure becomes granular with the formation of butter.

E. B. HUGHES.

Production of feeding-stuff. O. MARTENS (G.P. 459,172, 2.12.25).—Dairy residues, e.g., whey-albumin, lactose molasses, enriched with lactic acid and mixed with albuminous vegetable material, e.g., soya beans, are dried, worked up to a paste with water and feeding-stuff rich in carbohydrates, and the products are fermented with yeast.

L. A. COLES.

Production of feeding-stuff from cellulose. M. A. J. L. F. GIRAULT (F.P. 623,663, 25.10.26).—The cellulose in straw, sawdust, etc. is saccharified by mixing the material with sulphuric acid and heating the mixture, e.g., with steam, and the acid is neutralised by stirring with calcium carbonate. The product is used direct or after admixture with meal, molasses, etc. for the production of fodder.

L. A. COLES.

Conditioning and drying machines for wheat and other cereals. H. SIMON, LTD., and C. RAEBURN (B.P. 324,258, 13.2.29).

[Consumable] liquor cooling apparatus. T. ALLEN (B.P. 324,730, 8.11.28).

Dehydration (B.P. 323,740).—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Methyl alcohol content in tobacco. II. J. O. GABEL and L. G. SCHMUKLOVSKA (Ukrain. Chem. J., 1929, 4, [Tech.], 241—248; cf. A., 1929, 1347).—The percentage of methyl alcohol in dry tobacco varies from 0.464 to 0.905 for cigarette, from 0.228 to 0.401 for cigar, from 0.074 to 0.158 for dark Bakun, and from 0.549 to 0.703 for light Bakun-Verkievsky tobaccos. Maxorka tobaccos vary widely in this respect; two varieties from the Zhabki-Romensky region gave 0.660 and 0.661%, and two from the Xmelev-Romensky region 0.090%; for other Maxorka tobaccos the mean percentage was 0.328. The determination of the methyl alcohol forms a valuable means of following the course of, and indicating the completion of, the fermentation of tobacco, and renders it unnecessary to determine the pectic acid. The proportion of methyl alcohol should not exceed 3.2% of the proportion of pectic acid present.

T. H. POPE.

Haziness of final chloroformic extractions in alkaloidal assaying. G. E. ÉWE (J. Amer. Pharm. Assoc., 1930, 19, 23—28).—The cloudiness of the final extracts obtained in the chloroform extraction of aqueous solutions of alkaloids containing ammonia and ammonium sulphate is due to an almost colloidal suspension of a trace of the aqueous liquid. The effect of the ammonium sulphate thus introduced into the alkaloid is practically negligible under the ordinary conditions of analysis, but in the presence of a great excess of the aqueous liquid lower results may be obtained due to liberation of ammonia by the alkaloid during the evaporation. Methods for clarifying the final extracts are described.

E. H. SHARPLES.

Therapeutic activity of neoarsphenamine. A. E. JURIST and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1930, 19, 35—40).—A commercial sample of neoarsphenamine is described. Compared with arsphenamine, it is less toxic and as uniform in its activity towards trypanosomes and only slightly less active. It also had a therapeutic index at least twice that of two other commercial products. In neoarsphenamine there is no relationship between either the toxicity and therapeutic efficiency or the solubility and biological properties. The chemical composition is not closely related to the solubility of the material, and the chemical factor is not the major controlling one in determining the trypanocidal activity.

E. H. SHARPLES.

Preparation of ethereal oils. A. W. K. DE JONG (Chem. Weekblad, 1930, 27, 82—87).—An account is given of the nature, occurrence, and extraction of ethereal oils in general, with a *résumé* of the possible mechanisms of syntheses in the plant.

S. I. LEVY.

Δ^8 -Decenaldehyde, the principal constituent of essential oil of *Achasma Walang Val*. P. VAN ROMBURGH (Proc. K. Akad. Wetensch. Amsterdam, 1929, 32, 1352—1354).—The oil was taken from the leaves, petioles, and rhizomes of *Achasma Walang Val*. It consists mainly of an aldehyde (Δ^8 -decenaldehyde). By repeated fractional distillation *in vacuo* a principal fraction was obtained as a colourless liquid, b.p. 104°/13 mm., 229—231°/760 mm. This showed typical aldehydic properties, and was unsaturated. It was oxidised by alkaline potassium permanganate, yielding *n*-octoic acid. The aldehyde was oxidised by passing oxygen through it until absorption had practically ceased; an unsaturated acid, $C_{10}H_{18}O_2$, of which the structure is still being investigated, was formed. A. J. MEE.

Cause of odour of tobacco etc. SCHMALFUSS and BARTHMEYER.—See XIX.

See also A., Feb., 192, Easily decomposed organic compounds of bismuth (PICON). 216, Rotenone, from *Derris* root (TAKEI and KOIDE). 217, Optically active pericarveol (SCHMIDT). 222, New antimalarials (BALDWIN). 223, Product from pyrimidine (CHARONNAT and DELABY). Synthesis of 1-phenyl-2-methyl-3:4-cyclotrimethylene-5-pyrazolone (MANNICH). 224, New antimalarials (CHATTERJEE; BARGER and ROBINSON; ROBINSON). 227, Determination of nicotine (CHATTAWAY and PARKES). Alkaloids of *Anabasis aphylla* (ORÉKHOFF). Alkaloids of *Fritillaria verticillata* (FUKUDA). Yohimba alkaloids (HAHN and SCHUCH). 228—9, *Aconitum* alkaloids (MAJIMA and MORIO; MORIO). 229, Brucine (WAGENAAR; THOMS and GONEIN). *Strychnos* alkaloids (CORTESE). 230, Compounds of tryptamine type (GIBSON and LEVIN). 233, Nucleic acid-protein compounds (HAMMARSTEN and others). 255, Hormone of the anterior pituitary lobe (ZONDEK and ASCHHEIM).

PATENTS.

Manufacture of thymol and menthol. SCHERING-KAHLBAUM A.-G. (B.P. 301,087, 23.11.28. Ger., 24.11.27).— α -Hydroxythymol is dehydrated and hydrogenated to thymol in one operation by heating at 120—180° with hydrogen in a closed vessel in presence of a nickel catalyst and kieselguhr etc. *r*-Menthol may also be obtained.

C. HOLLINS.

Manufacture of the *m*-aminobenzoyl derivative [ester] of dimethylaminopentanol [β -dimethylaminomethyl- β -hydroxybutane; local anaesthetics]. SOC. DES USINES CHIM. RHÔNE-POULENC, ASSEES. of ÉTABL. POULENC FRÈRES, E. FOURNEAU, and J. TRÉFOUEL (B.P. 301,845, 6.12.28. Fr., 6.12.27).— β -Dimethylaminomethyl-*n*- β -butyl alcohol is esterified with *m*-nitrobenzoyl chloride in benzene at 50° and the product is reduced with stannous chloride and hydrochloric acid. The hydrochloride, m.p. 189°, has high anaesthetic power.

C. HOLLINS.

Manufacture of phenylcarboxylic acid compounds [carboxyphenylaminoquinolines]. A. CARPMAEL. From I. G. FARBERIND. A.-G. (B.P. 321,738, 21.8.28).—A 2(or 4)-amino-4(or -2)-alkylquinoline is heated with an aminobenzoic acid or ester to give

therapeutically valuable compounds. 2-*o*-, *m*-, and *p*-Carboxyphenylamino-4-methylquinolines, m.p. 305—307°, 255—265°, and 203°, respectively, and 4-*p*-carboxyphenylaminoquinoline, m.p. 327—328° [ethyl ester hydrochloride, m.p. 267° (decomp.)], are described.

C. HOLLINS.

Preparation of compounds of CC-disubstituted barbituric acids and 4-dialkylamino-1-phenyl-2:3-dimethyl-5-pyrazolones [pyrimidone]. CHEM. WORKS, FORMERLY SANDOZ (B.P. 301,727, 6.11.28. Switz., 3.12.27).—The salt-like compounds of 5:5-disubstituted barbituric acids and pyrimidone are obtained in purer condition by combining salts of the two ingredients in a saturated aqueous solution of pyrimidone as medium.

C. HOLLINS.

Manufacture of difficultly soluble salts of organic bases and alkaloids. I. G. FARBERIND. A.-G. (B.P. 295,656, 15.8.28. Ger., 16.8.27).—Non-hygroscopic salts of alkaloids (quinine, strychnine) and of the bases described in B.P. 267,169 (B., 1927, 379), 274,058 (B., 1929, 264), and 286,087 (B., 1928, 347) are prepared by adding to a solution of the hydrochloride the sodium salt of a methylenedisalicylic acid, methylenebis-2:3-hydroxynaphthoic acid, or similar acid of the type $R \cdot CH_2 \cdot R'$ in which at least one of the aromatic residues *R* and *R'* carries one or more carboxylic or sulphonic groups.

C. HOLLINS.

Synthesising and transmuting antirachitic substances and the like, and the products thereof. C. M. RICHTER (B.P. 296,053, 10.8.28. U.S., 24.8.27).—Ultra-violet rays of about 3022 Å. and longer wavelength (*i.e.*, capable of passing through glass) are able to convert vitamin-*A*, contained in its preparations, into vitamin-*D* in about 40 hrs.

C. HOLLINS.

Manufacture of physiologically active substances from the anterior lobes of the hypophysis. I. G. FARBERIND. A.-G. (B.P. 291,018, 23.5.28. Ger., 23.5.27).—By extracting anterior lobe of the hypophysis separately in an organic solvent (acetone) and water (*pH* 2.5—9) there are obtained (a) an oestrus-retarding substance and (b) an oestrus-promoting substance; both are unstable above 60°.

C. HOLLINS.

Manufacture of hormones. I. G. FARBERIND. A.-G. (B.P. 295,680 and Addn. B.P. 323,474, 27.6.28. Ger., [A], 17.8.27, [B] 26.4.28).—The hormone of the anterior lobe of the hypophysis is obtained from the urine of pregnant women or other human or animal fluids, which may be concentrated and/or purified or freed from the ovarian hormone by previous extraction with ether, or by precipitation with a water-soluble organic liquid. The ovarian hormone can be recovered from the ether extract, and the crude precipitate obtained above is purified by fractional precipitation of its aqueous solution with (A) acetone, alcohol, etc., or (B) with either an equal quantity of alcohol and repeating the precipitation if necessary, or, when the initial precipitation of the crude material is carried out with acetone, with a quantity of alcohol equal to about 80% of the water added, the filtrate being worked up as in (A).

E. H. SHARPLES.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Metallic silver in undeveloped photographic layers. I. F. WEIGERT and F. LÜHR (Z. wiss. Phot., 1930, 27, 312—337; cf. B., 1928, 212, 348).—Further evidence is obtained for the existence of free metallic silver in undeveloped photographic emulsions. The last traces of silver thiosulphate can be removed from the plate by treating it a second time with the fixing solution after an intermediate washing with water. Any silver left after this treatment can be dissolved by means of persulphate solution, and is therefore not present as silver sulphide. The rôle of this free metallic silver in photographic phenomena is discussed.

O. J. WALKER.

Destruction and intensification of the image by development in bright light. LÜPPO-CRAMER (Z. wiss. Phot., 1930, 27, 305—311; cf. B., 1928, 693).—Curves are given which show the strong bleaching action of red light on plates which have been previously exposed and then desensitised. The weakening of the latent image is not due to the action of the desensitiser (Pina-cryptol Green), and is strongest in the weakly exposed portions. This effect is opposite in nature and probably related to the Sterry effect.

O. J. WALKER.

See also A., Feb., 174, **Law of blackening of photographic plates** (SEITZ and HARIG). **Photochemical oxidation and reduction** (STEIGMANN). **Photographic photometry** (VALENKOV).

PATENTS.

Production of light-sensitive layers by means of diazo compounds. KALLE & Co. A.-G. (B.P. 296,725, 25.8.28. Ger., 6.9.27).—For the sensitive layer a mixture of two or more diazo compounds which are not converted into phenols by alkalis (*e.g.*, diazotised *o*-aminophenols) is used; preferably these are chosen so that one of them is not completely decomposed during the exposure to light. Examples are diazo compounds of *o*-amino-5-diethylaminophenol and 4-chloro-*o*-aminophenol-6-sulphonic acid (developed with ammonia for brown); dianisidine and 3-amino-5-sulphosalicylic acid (reddish brown); 3:3':6:6'-tetramethoxybenzidine and *o*-amino-5-diethylaminophenol (brown); *o*-amino-5-diethylaminophenol, 4-chloro-*o*-aminophenol-6-sulphonic acid, and 3-amino-5-sulphosalicylic acid (yellowish brown).

C. HOLLINS.

Preparation of light-sensitive layers by means of ferric salts. G. KÖGEL (B.P. 302,282, 7.12.28. Ger., 13.12.27).—A ferric salt, *e.g.*, ferric ammonium citrate, is applied to paper (etc.) together with a ketone capable of forming a coloured ferrous compound. After drying, exposure to light under a negative produces at once a coloured positive which is washed with water and may be mordanted. Suitable ketones are isonitroso-acetylacetone, nitroso- β -naphthol, β -naphthaquinone-4-sulphonic acid.

C. HOLLINS.

Development of positive diazo[*-type*] prints. F. VAN DER GRINTEN (B.P. 295,993, 11.8.28. Holl.,

22.8.27).—The exposed print is passed between rollers the lower of which is partly immersed in an alkaline developing solution and thus deposits a thin film of solution upon the print. The alkali used is preferably sodium or potassium carbonate, with the addition of phosphates or citrates as buffer salts. C. HOLLINS.

Photographic sensitised [metal] discs. D. A. MCCOWAN (B.P. 302,348, 20.11.28. Can., 15.12.27).

Transparencies [with stereoscopic effect]. J. MCCREATH (B.P. 324,691, 2.10.28).

XXII.—EXPLOSIVES; MATCHES.

Decomposition of nitrocelluloses by volatile solvents. J. P. LEHALLEUR (Ann. Acad. Brasil. Sci., 1929, 1, 149—150).—Nitrocellulose explosives prepared with a volatile solvent show after ageing some 600 times as rapid an emission of nitrous vapours as explosives prepared without such solvents. H. F. GILLBE.

PATENTS.

Smokeless powders. IMPERIAL CHEM. INDUSTRIES, LTD., and O. W. STICKLAND (B.P. 324,044, 5.9.28).—In smokeless powders, made without volatile solvents, the nitrocellulose consists wholly or mainly of the insoluble variety, containing 13.2% N or more (preferably above 13.45% N). The higher viscosity of this insoluble guncotton is partly reduced by using an increased amount of gelatiniser, and this enables the paste to be pressed at lower temperatures and pressures. The finished powder is free from brittleness. W. J. WRIGHT.

Blasting cartridges and appliances. D. HODGE (B.P. 324,617, 18.9.27).

XXIII.—SANITATION; WATER PURIFICATION.

Chlorination of sewage and effluents. F. W. MOHLMAN, E. HURWITZ, and C. C. RUCHHOFF (Proc. XI. Texas Water Works' School, 1929, 135—142).—The effect of chlorination on the biological oxygen demand was studied (Chicago). Ammonia-, but not organic, nitrogen is reduced by chlorination, but this reduction did not account for the effect of chlorination in reducing biological oxygen demand, which is not attributed to the oxidising action of chlorine. Thus chlorination cannot supplant the biological process, but may increase the efficiency of overloaded plant.

CHEMICAL ABSTRACTS.

Thermophilic digestion of sewage solids. I. Preliminary. W. RUDOLFS and H. HEUKELEKIAN (Ind. Eng. Chem., 1930, 22, 96—99).—If sewage solids which have been previously inoculated with ripe digested sludge are anaerobically digested at 45—55°, the time required for complete digestion is reduced to about one half that necessary at the low-temperature optimum point (28°). The yield of gas is increased from 650 to 870 c.c. per g. of fresh organic matter, whilst the average composition remains the same (CH₄ 70%, CO₂ 22%). The increased yield of gas, together with the smaller capacity of tank required, may render it an economic

proposition to carry out the digestion of sewage solids at the higher temperature. C. JEPSON.

Effect of iron compounds on digestion, sedimentation, and [sewage] sludge conditioning. W. RUDOLFS (Proc. N.J. Sewage Works' Assoc., 1929, Mar.).—When ferrous sulphate (26 g. per litre of fresh solids) was added to a seeded mixture, the reduction of volatile matter was greater during the first part of the digestion but smaller than the control after 35 days, whilst after 60 days the results were identical. Hence the rate of gas production was accelerated by several days. CHEMICAL ABSTRACTS.

Effect of alkaline substances on sewage-sludge digestion. A. J. FISCHER, W. RUDOLFS, and P. J. A. ZELLER (N.J. Agric. Exp. Sta. Bull., 1929, No. 424).—Small quantities of lime accelerated digestion, but excess after neutralisation of initial acidity caused retardation. With sodium nitrate the digestion was more rapid and complete. Dolomite and calcium carbonate were also used. CHEMICAL ABSTRACTS.

Collection and utilisation of [sewage-sludge] gases. A. J. FISCHER (Proc. XI Texas Water Works' School, 1929, 148—150).—Average domestic sewage should, if thoroughly digested, produce 530 c.c. of gas per g. of dry solid; the controlling factors are discussed. The gas contains approx. CH_4 70, CO_2 25, N 5%, and has a heating value of approx. 700 B.Th.U. per cub. ft. CHEMICAL ABSTRACTS.

Significance of hydrogen sulphide in partly treated sewage. E. WHEDBEE (Proc. XI Texas Water Works' School, 1929, 142—144).—Of the bacteria present in raw sewage, 9% reduce sulphur compounds. Oxidation of the hydrogen sulphide so produced to sulphur and finally to sulphuric acid causes disintegration of concrete sewers. CHEMICAL ABSTRACTS.

Gravimetric determination of thallium in mouse poisons. W. LEPPER (Z. anal. Chem., 1930, 79, 321—324).—The method previously given (B., 1926, 390) has been modified as follows. The material (5 g.) is boiled with nitric and sulphuric acids until the organic matter is destroyed, any thallic salt formed is reduced with sulphurous acid, and after expulsion of the excess of the latter the solution is neutralised with ammonia. Acetic acid (5 c.c.) is then added and the thallium precipitated in an aliquot portion of the solution by the addition of potassium iodide and weighed as thallous iodide. The above method requires less time than the chromate process previously recommended, and also yields slightly higher figures for the thallium content of the material analysed. H. F. HARWOOD.

Trends in municipal zeolite water-softening. W. J. HUGHES and H. B. CRANE (J. Amer. Water Works' Assoc., 1930, 22, 68—81).—Clear waters, free from iron and with temporary hardness only, can be softened either by a lime-soda or zeolite treatment according to the relative cost of reagents and the size of plant required etc. A similar water with additional permanent hardness is most efficiently dealt with by a

combination of lime and zeolite treatment. If the water is turbid, filtration before softening with zeolite is essential, and if lime is used during the pre-softening process, the water must be stabilised with carbon dioxide to prevent incrustation of the zeolite grains. Zeolite softening plant is more efficient and economical if it is constructed as a rectangular, reinforced concrete tank instead of like a circular pressure-filter. By this means larger and deeper tanks are available as they can be constructed on the site and the increased depth permits longer periods to elapse between regenerations. A rectangular under-drainage system is more efficient than a circular one, and therefore better distribution through the bed of both water and brine (for regeneration) is obtained. If the direction of flow be upward there is no packing together of the material; the small amount of frictional energy required to keep the material in suspension is constant, and so a regular rate of flow through the bed can be maintained. C. JEPSON.

Uses of aeration in water purification. M. PIRNIE (J. New England Water Works' Assoc., 1929, 43, 395—398).—In order to be non-corrosive, waters having bicarbonate alkalinities of less than 100 p.p.m. should not contain more than 2 p.p.m. of free carbon dioxide, resulting in a p_{H} value of 8.1—8.3. Carbon dioxide, in excess of this amount, present in spring or well water or in the effluent from sand filters may be removed by fine-spray aeration and the residual gas may be neutralised by lime or caustic soda as desired. Fine-spray aeration is also a valuable aid to flocculation, resulting in considerable economy in the use of alum and soda. Operating results of three American plants are given. C. JEPSON.

Sewage effluent standards. V. M. EHLERS (Proc. XI Texas Water Works' School, 1929, 171—173).

Gas mask. KATZ AND GRICE.—See II. **Water-works' corrosion problems.** VAN GIESEN.—See X. **Sulphur-oxidation of activated sludge.** AYYAR and NORRIS; AYYAR. **Sewage sludge as fertiliser.** FRAPS.—See XVI.

PATENTS.

Volumetric-displacement apparatus suitable for controlling the supply of gas for chlorinating water or similar purposes. B. BRAMWELL (U.S.P. 1,746,186, 4.2.30. Appl., 15.12.27. U.K., 16.3.27).—See B.P. 277,869; B., 1927, 894.

Apparatus for use in carrying out exchange reactions [particularly for water-softening]. E. B. HIGGINS, ASSR. to UNITED WATER SOFTENERS, LTD. (U.S.P. 1,745,421, 4.2.30. Appl., 27.11.26. U.K., 1.10.24).—See B.P. 248,414; B., 1926, 422.

Forming plastic explosives into strings, e.g., for manufacture of dynamite cartridges. (Sir) G. C. MARKS. From FINSKA FORCIT-DYNAMIT AKTIEBOLAGET (B.P. 324,440, 10.11.28).

Carbonisation of oil, fat, etc. (U.S.P. 1,738,202).—See II.