BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

OCT. 9 and 16, 1931.*

I.—GENERAL; PLANT; MACHINERY.

Acid-resisting materials for chemical and building industries. P. N. GREGORIEV and I. I. SILVESTROVICH (J. Appl. Chem., Russia, 1930, 3, 1155—1158).—Na_2SiF_6 is recommended as a binder for materials containing silicates. CHEMICAL ABSTRACTS.

High-pressure boiler plants [at Mannheim]. MARGUERRE (Engineering, 1931, 132, 267—271).—In boilers working at 1422 lb./sq. in. pressure, failures occurred owing to tubes in which the circulation of H_2O was doubtful, being exposed to too high a temp. Traces of O_2 in the feed water hastened the failure. The trouble was overcome by increasing the section of the down tubes in order to withdraw the tubes with doubtful circulation into zones of cooler gas, by making alterations in the drums, so that the tubes acted as either downtakers or risers and by adding Na_2SO_3 to the feed water to reduce the O_2 content to 0·01 p.p.m., and Na_3PO_4 to give a soda alkalinity of 100 p.p.m. In the first section of the superheater, of mild steel, the steam is heated to 400°; in the second section, of 3% Ni steel or, later, Cr–Mo steel, to 470°. H_2O thermostatically controlled is injected into the latter section at max. loads. When starting up, H_2O is circulated through the superheater and boiler until 427—711 lb./sq. in. pressure is reached, the circulation is then stopped, and the H_2O blown from the superheater. A const.-pressure steam accumulator is in operation. Feed pumps, valves, and pipe joints suitable for high-pressure plant are described. D. K. MOORE.

Volumetric determination of sulphate [in boiler feed-water]. D. NORTHALL-LAURIE (Analyst, 1931, 56, 526—527).—The SO_4'' may be determined approx. by shaking with a suspension of $BaCO_3$, filtering, and titrating the increase in alkalinity. T. MCLACHLAN.

Efficiency of the Eirich rapid mixer. L. ZAKARIAS (Chem.-Ztg., 1931, 55, 597).—The Eirich rapid mixer (B., 1930, 931) was found to require only 5—10 min. to render a mixture of polysaccharide paste and soda perfectly homogeneous, against 1 hr. for a kneading machine of the usual type. C. IRWIN.

Extraction apparatus for rubber, cellulose, fats, etc. W. H. STEVENS (Analyst, 1931, 56, 528—529).—A modification of the apparatus of Beadle and Stevens (A., 1913, ii, 444) is described, in which a small, wide-necked, conical flask is fitted with an internal, removable, spiral condenser supporting the extraction thimble, thereby enabling the extract to be weighed in its original container. T. MCLACHLAN.

Filtration and electro-ultrafiltration. K. SILBEREISEN (Woch. Brau., 1931, 48, 381—385).—A short bibliography and summary of laboratory methods. F. E. DAY.

Moisture content of saturated gases and the quantities of water which separate on cooling such gases. F. HURDELBRINK (Gas- u. Wasserfach, 1931, 74, 685—686).—The vol., moisture content, and heat content of a saturated gas are tabulated as functions of the temp. over the range —10° to 80° in steps of 10°, in such a manner as to facilitate the calculation of the quantity of H_2O or heat given up on cooling a gas over any temp. interval. A. B. MANNING.

High-pressure compressors.—See VII. **Porcelain grinding balls etc.**—See VIII. **Microturbidimeter. Tensile-testing machine.**—See XIV.

See also A., Sept., 1026, **Calibrating low-temp. and Beckmann thermometers. Thermostats.**

PATENTS.

Counterflow furnace. V. A. HAIN, Assr. to G. J. HAGAN Co. (U.S.P. 1,792,423, 10.2.31. Appl., 16.4.28).—In an elongated furnace in which the incoming goods are preheated by the outgoing goods moving in an opposite direction on a parallel track, the transfer of heat is aided by transverse circulation of the atm. produced by fans and guided by a horizontal partition between the rows of articles. B. M. VENABLES.

Reversing regenerative furnaces. A. V. KEMP (B.P. 354,399, 26.11.30).—Two streams of air and one of gas are admitted at different angles and levels to a mixing chamber, whence the mixture passes to the furnace under an adjustable arch which is raised when the furnace is reversed to afford a larger passage for products of combustion. B. M. VENABLES.

Retort. W. F. RIEGER, Assr. to STOKER MATIC CORP. (U.S.P. 1,790,840, 3.2.31. Appl., 13.8.28).—A retort for a boiler furnace is provided with a fuel compartment which is surrounded by air under forced draught and, again round the upper part, by a water-cooled passage. The air enters the fuel sideways. B. M. VENABLES.

Dryer. J. B. and J. J. BERRIGAN, Assrs. to PRESS & DRIER Co. (U.S.P. 1,792,064, 10.2.31. Appl., 14.6.29. Cf. U.S.P. 1,770,727; B., 1931, 278).—Material, *e.g.*, thickened sewage, is passed through narrow spaces between highly-heated plates by means of pump pistons to which are attached blades extending into the spaces. B. M. VENABLES.

Heat exchangers for heating air and water by furnace gases from steam generators. D. ADAMSON & Co., LTD., and G. KERFOOT (B.P. 353,087,

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

25.4.30).—The heat exchanger consists of several parallel passages with tubes inside alternate ones. Hot gas flows through the passages containing the tubes, thereby heating the water flowing both through the tube and the passage walls, and these heat the air flowing through the adjacent passages. D. K. Moore.

Heat-transferring apparatus, particularly applicable to heating air. A. E. White. From Doherty Res. Co. (B.P. 351,950, 1.3.30).—The apparatus is suitable for heating a fluid under pressure, *e.g.*, compressed air, by means of another fluid such as exhaust gases from an engine. The tubes for the fluid under pressure are coiled so that the turns lie alternately in two parallel planes with the openings of the loops in one plane opposite the tubes of the loops in the other plane. Groups of tubes are placed in recesses formed in a mass of refractory material and forming the passages for the outer fluid. B. M. Venables.

Fire-extinguishing material. D. J. Block, Assr. to Du-Gas Fire Extinguisher Corp. (U.S.P. 1,793,420, 17.2.31. Appl., 22.9.28).—The material comprises a mixture of 97% of NaHCO$_3$, 1·5% of Mg stearate, 1% of MgCO$_3$, and 0·5% of Ca$_3$P$_2$O$_8$. The addition of these salts to the NaHCO$_3$ prevents caking under humid conditions. A. R. Powell.

Absorbent for refrigerants [ammonia]. R. M. Buffington, Assr. to Frigidaire Corp. (U.S.P. 1,792,628, 17.2.31. Appl., 27.6.29).—The absorbent comprises anhyd. SrCl$_2$ mixed with 5% of NH$_4$NO$_3$. A. R. Powell.

Crusher. E. H. Frickey (U.S.P. 1,791,669, 10.2.31. Appl., 5.10.28).—In a crusher of the single-roll or hammer type, adapted to treat clayey or sticky material, with the fixed (adjustable) breaker plate comparatively short, a tangential continuation is formed by a plate conveyor or feeder running downwards, and in the other direction adjoining the crusher plate are grid bars arranged on a circle. B. M. Venables.

Crushing machinery. H. F. Campbell, Assr. to Pennsylvania Crusher Co. (U.S.P. 1,791,712, 10.2.31. Appl., 17.1.30).—A hammer crusher is adapted to treat clayey or sticky material by the provision of one or more scraper bars reciprocating over the breaker plate; the bars are carried by chains at their ends and the chains are continued as racks which are reciprocated by pinions. B. M. Venables.

Cone crusher. E. B. Symons, Assr. to Nordberg Manufg. Co. (U.S.P. 1,791,584, 10.2.31. Appl., 9.12.29). —A method of excluding dust from the spherical bearing of a conical gyratory crusher by means of an air current and wiping members is described. B. M. Venables.

Crushing apparatus. N. D. Levin, Assr. to Jeffrey Manufg. Co. (U.S.P. 1,787,828, 6.1.31. Appl., 1.6.27).—A form of disintegrator in which rigid hammers are supported between discs is described. B. M. Venables.

Crushing machinery. G. W. Borton, Assr. to Pennsylvania Crusher Co. (U.S.P. 1,789,539, 20.1.31. Appl., 12.12.29).—The breaking surface of a hammer crusher is provided with scraping blades to prevent accumulation of pasty material. B. M. Venables.

Hammer for hammer mills. C. E. Spitzer (U.S.P. 1,791,007, 3.2.31. Appl., 13.9.28).—The hammers comprise flat pieces of metal with grooves on the edges which are inclined in opposite directions on opposite edges. B. M. Venables.

Mill for grinding and mixing ores, colours, chemicals, cements, etc. T. Breakell (B.P. 353,042, 5.4.30).—The mill consists of a mortar with rotating mullers, each muller also rotating about its vertical axis. D. K. Moore.

Mixing machine. W. F. Dehuff, Assr. to Glen Mixer Co. (U.S.P. 1,792,363, 10.2.31. Appl., 11.12.28). —A form of joint enabling a beater to be quickly attached to its shaft is described. B. M. Venables.

Mixing of substances. J. G. Jackson (B.P. 353,958, 7.5.30).—Fluid or semi-fluid substances are delivered in concentric streams by separate helical conveyors and are further mixed between rotating discs or cones. B. M. Venables.

Mixing machines for rubber and such like mixes. C. F. Schnuck and F. H. Banbury (B.P. 354,585, 9.9.30. U.S., 23.5.30).—The charging ram of a mixer is provided with a sloping upper face and with pipes for cooling agent for the purpose described in B.P. 352,803 (B., 1931, 867). B. M. Venables.

Vertical batch mixer. A. Schuchardt (U.S.P. 1,791,169, 3.2.31. Appl., 22.11.28).—A mixing machine for dry powders comprises a cylindrical vessel having a lower part tapering to a discharge neck. An axial worm is rotated in a direction to lift the material and when mixing makes a close fit in the neck; for discharge, the whole worm is raised clear of the neck. B. M. Venables.

Devices for blending, mixing, agitating, and aerating liquids and kindred uses. W. H. Carter-Lee (B.P. 354,403, 13.5.30).—The apparatus comprises a perforated, hand-operated piston working in a cylinder which is provided with a quickly detachable end; the latter is deeply grooved and the piston shaped to suit so as to eliminate dead material at the end of the stroke. B. M. Venables.

Centrifugal dust separator. T. Fröhlich A.-G. (B.P. 354,608, 1.10.30. Ger., 1.10.29).—The inlet of a cyclone separator is divided either vertically or horizontally into several passages the walls of which all terminate on the separator casing at the same radius from the outlet tube. Means such as a flap shutter are provided to cut off some of the passages at times of reduced load so as to maintain the velocity of the air. B. M. Venables.

[Centrifugal] separator. P. B. Shee, Assr. to Sears, Roebuck & Co. (U.S.P. 1,791,250, 3.2.31. Appl., 5.4.30).—A method of securing the bowl and other parts on the driving element is described. B. M. Venables.

Driving mechanism of centrifuges. Aktieb. Separator (B.P. 354,613, 10.10.30. Swed., 12.10.29).—A system of driving through clutches avoiding belt slip is described: the worm-wheel (which drives a worm on the separator shaft) forms the female part of a friction clutch for use when accelerating, and in the driving pulley is embodied a ratchet clutch which permits the centrifuge to overrun should the source of power slow up. B. M. Venables.

Continuous separation of granular and pulverulent material. J. C. Pearson and F. A. Hitchcock (U.S.P. 1,791,426, 3.2.31. Appl., 8.9.28).—The material is fed in at one end of the lower part of a casing of which the upper part leads to a bag filter or other means of collecting dust. The lower part of the casing is V-shaped and the material is stirred up by air jets in or near the point of the V, the coarse material being gradually worked to an outlet at the end remote from the feed. A preferred arrangement comprises an air pipe with downwardly directed jets which is reciprocated through a distance greater than the pitch of a corrugated strip of metal which is laid in the bottom of the V. B. M. Venables.

Apparatus for separating solids from liquids by filtration. J. T. Shimmin (U.S.P. 1,791,251, 3.2.31. Appl., 14.9.25. Renewed 20.10.30).—The apparatus comprises a sectional drum rotating in a bath of prefilt; the filter medium is on the interior of the drum and the filtering pressure (preferably a vac.) is applied only to sections that have been drowned some time so that first some sand may settle on the filter by gravity alone. The cake is detached by pulsating fluid pressure and removed by a conveyor in the upper part of the drum. B. M. Venables.

Feeding of wet material. African Explosives & Industries, Ltd., and M. S. Salomon (B.P. 354,022, 3.7.30. S. Afr., 16.7.29).—Apparatus suitable for wet material that does not flow freely comprises a rotating pan upon the bottom of which the material is spread in a layer of adjustable thickness by means of a rake, a small portion of the layer being discharged every revolution by the automatic opening of a trap door in the bottom. B. M. Venables.

Processing plant [for canned goods etc.]. Carrier Eng. Co., Ltd., and W. S. Yarrow (B.P. 354,123, 23.10.30. Addn. to B.P. 342,722; B., 1931, 422).—A conveyor with outstanding prongs is used to effect the longitudinal transfer of the cans; the conveyor as well as the drum is within the fluid-tight casing, and the locks for entry and exit are embodied in the conveyor sprockets. B. M. Venables.

Evaporator. O. H. Wurster (U.S.P. 1,791,296, 3.2.31. Appl., 28.5.27).—The return pipe from the vapour separator enters the calandria at an angle of about 45° to avoid settling out of crystals, and a deflector is provided to guide the latter to the salt vessels below. Its use for the treatment of crude glycerin is specially mentioned. B. M. Venables.

Evaporating apparatus. A. W. Baumann (U.S.P. 1,791,262, 3.2.31. Appl., 27.12.27).—A method of distributing steam evenly among several concentric coils each comprising a complete circle is described. B. M. Venables.

Apparatus for evaporating and concentrating liquids. M. J. Kermer (U.S.P. 1,791,317, 3.2.31. Appl., 10.12.25).—The liquid is spread in a thin layer upon the interior of a conical bowl which is rotated at centrifugal speed in exterior contact with steam supplied through slit-like apertures in a radial direction. B. M. Venables.

Refrigerating processes and apparatus for separation of vapours from gases in solid form. M. Fränkl (B.P. 353,014, 14.4.30. Ger., 16.4.29).—Flue gas at 5—15 atm. (gauge) pressure is cooled to $<100°$ in one of a pair of regenerators filled with strips of metal, and previously cooled by exhaust gas, and water vapour is deposited. It is then expanded, doing external work, and the CO_2 is solidified. The expanded gas is filtered from CO_2 snow and passed through the second regenerator in the reverse direction, cooling it and vaporising the previously deposited H_2O. Every 3—5 min. the operation of the regenerators is reversed. The process is applicable to other mixtures of gases. D. K. Moore.

Air-filtering apparatus. F. C. Smith (B.P. 348,447, 2.7.30).—Within a single casing are arranged a motor-driven fan, inlet and outlet conduits, and a filtering medium comprising cellulose wadding between the conduits. B. M. Venables.

Tubular filters for gases. E. W. Straus-Scharina (B.P. 349,331, 12.6.30. Ger., 12.6.29).—The filter bags of a group are constructed in lengths which progressively increase away from the outlet and, if desired, also from the inlet, whereby better distribution and freer exit of the gas is obtained. B. M. Venables.

Tubular filters for gases. Maschinenfabr. Beth A.-G. (B.P. 348,424, 7.6.30. Ger., 7.6.29. Addn. to B.P. 281,994; B., 1928, 353).—Cross-connexions and valves are provided so that one auxiliary filter at a time may be cleaned by countercurrent of air, and the air from it passed through the other auxiliary filter. B. M. Venables.

Centrifugal apparatus for separation and collection of dust from gases. Visco Eng. Co., Ltd., and F. C. Smith (B.P. 348,124, 8.11.29).—The apparatus comprises a volute-shaped passage, in which the dust is separated by centrifugal force, followed, if desired, by a filter. The volute first contracts in cross-section and then expands, and its outer wall is formed with louvre-like openings. B. M. Venables.

Filtering of air and other gases. Hall & Kay, Ltd., S. Hall, and P. Kay (B.P. 352,960, 14.1.30).—The filter medium consists of wood or papers coated with viscous oil or bird lime. [Stat. ref.] D. K. Moore.

Revivifying spent absorbent materials. (a, b) R. C. Palmer and (a) J. L. Burda (U.S.P. 1,794,538—9, 3.3.31. Appl., [a] 25.11.29, [b] 2.1.30).—(a) H_2O is removed from fuller's earth by heating the material with petroleum naphtha at 130—150° under pressure, then releasing the pressure so that part of the naphtha and all the H_2O are vaporised. (b) Fuller's earth that has been used as a filter for rosin is washed with a mixture of petroleum naphtha and $COMe_2$, EtOH, MeOH, EtOAc, BzOH, furfuryl alcohol, furfuraldehyde, or other org. solvent, which is at least partly miscible with the naphtha and with H_2O. A. R. Powell.

Absorbent for gas filters particularly for breathing purposes. G. K. E. H. Stampe, Assr. to

O. H. Dräger (U.S.P. 1,792,939, 17.2.31. Appl., 6.9.29. Ger., 29.9.28).—An absorbent filter for NH_3 and H_2S comprises activated charcoal impregnated with 20% of $Pb(NO_3)_2$ and, after drying, mixed with 40% of Cu_2Cl_2. A. R. Powell.

Apparatus for measuring the temperature of gases [hotter than their surroundings]. R. E. Wilson (U.S.P. 1,791,020, 3.2.31. Appl., 5.5.22).—A thermometer is shielded from loss of heat by radiation to cold flue walls by a device composed of thin, polished, sheet metal, which is non-tarnishing, preferably has a low coeff. of radiation, and two concentric walls, the outer one exposed on both sides to the stream of gas and the inner forming a pocket for the bulb or thermocouple. If the thermocouple is suitable, the inner bulb may also be opened to the flow of gas, in which case a separate shield is provided to prevent radiation endways. B. M. Venables.

Material adapted to bearings. C. F. Noftzger (U.S.P. 1,791,834, 10.2.31. Appl., 14.2.27).—A closely folded schist consisting of small scales of sericite containing about 95% of earthy oxides is found at Buckeye, Ariz. Claim is made for the use of this (or similar) material for bearings in the proportion of 60—80% of the schist to 40—20% of binding materials, the latter consisting preferably of an infusible and insol. condensation product of PhOH and CH_2O. B. M. Venables.

Method and apparatus for determining viscosity. S. T. Rodgers (U.S.P. 1,790,948, 3.2.31. Appl., 12.4.26).—The time taken by a buoyant body to rise through a column of the liquid under test is determined. The buoyant body is constructed of, or contains, magnetic material, and is held in the lower starting position by a magnet. B. M. Venables.

Spectroscopes with dispersion prism. C. Zeiss (B.P. 354,659, 1.12.30. Ger., 17.12.29).—The instrument is arranged to give an image of a wave-length scale adjacent to or overlapping the dispersed image of the slit. B. M. Venables.

Atomisers, vaporisers, liquid fuel burners, etc. A. Magowan (B.P. 354,304, 3.3.30).

Absorption refrigeration. J. C. Bertsch (B.P. 354,868, 22.5.30).

Refrigeration apparatus. Silica Gel Corp., Assees. of E. B. Miller (B.P. 354,720, 10.3.30. U.S., 14.3.29).

Reversible refrigerating apparatus employing a solid absorbent or an adsorbent. J. O. Boving (B.P. 354,726, 12.5.30).

[Automatic control valves for] straining or filtering devices for gas. H. J. Yates, M. Howlett & Co., Ltd., and J. Dolphin (B.P. 354,079, 4.9.30).

[Portable] apparatus for demonstrating the sound-absorbing properties of various materials. C. F. Burgess Laboratories, Inc., Assees. of C. F. Burgess (B.P. 354,431, 24.5.30. U.S., 19.6.29).

Vacuum distillation.—See II. **S from gases.**—See VII. **Furnaces for enamel ware.**—See VIII. **Light-metal pistons.**—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Constitution of coal and its classification. A. Eccles and A. McCulloch (Fuel, 1931, **10**, 308—319; cf. B., 1931, 426).—The quantities of HCl evolved when a number of coals of varying rank were treated with Cl_2 under standard experimental conditions have been determined. When these quantities, referred to pure coal, are plotted against % C in the coal a diagram is obtained similar to that on which Seyler has based his method of classifying coals, and in which % H is plotted against % C. The coal ulmins are regarded as consisting of a benzenoid nucleus around which are spaced peripheral groups of a straight-chain character; these groups react with Cl_2 with the evolution of HCl, the quantity of the latter produced being a measure of the number and size of such groups. A certain correlation has been observed between the quantity of HCl evolved and the volatile matter content of the original coal, determined at 925°. The correlation between the HCl evolved and the volatile matter content of the chlorinated coal, determined at 525°, was less marked. A. B. Manning.

Ball structure in Indian coals. K. L. Bhola and M. A. Majeed (Fuel, 1931, **10**, 330—331).—The mode of occurrence of ball coals in Indian seams leads to the conclusion that they are due to jointing which has been caused by a peculiar effect of pressure and friction. A. B. Manning.

Behaviour of solid fuels during oxidation. IV. Influence of increasing the oxygen temperature on the ignition and combustion characteristics of and the rate of heat loss from solid fuels. B. Moore (Fuel, 1931, **10**, 293—296; cf. B., 1931, 659).—In studying the oxidation of fuels by the method previously described a rise in the O_2 temp. was found to increase the rate of combustion and heat evolution during the pre-ignition period, but did not raise the mean or max. temp. attained by the combustion. With a higher O_2 temp. the rate of combustion of cokes decreased soon after ignition and remained practically uniform for a relatively long period. Neither the rate of heat loss from the fuel during combustion nor the combustible capacity was greatly affected by raising the O_2 temp. above the ignition temp. A. B. Manning.

Tar firing of retorts. W. E. Young (Gas J., 1931, **195**, 431).—The tar is led by gravity from a storage tank through a filter and fed into the producer, partly filled (75%) with bricks by an adapted "Buffalo" steam injector (nozzle reduced to $\frac{1}{16}$ in. diam. and the Venturi tube increased to $\frac{3}{8}$ in. diam.). 100 gals. of tar fire seven retorts for 24 hr. and save 1 ton of coke. The quantity of air admitted with the tar may be regulated by analysis of the flue gases. A. H. Edwards.

Porosity of lump coke. W. T. K. Braunholtz and G. Tiplady (Fuel, 1931, **10**, 328—329).—The coke is dried and weighed in air (W). The accessible pores are then filled with H_2O and the saturated coke is re-weighed under H_2O (W_w) and again, after drainage of the superficial H_2O, in air (W_a). The apparent sp. gr. is given by $W/(W_a—W_w)$, and the apparent porosity by $100(W_a—W)/(W_a—W_w)$. The coke may be saturated either by immersing it in H_2O and repeatedly evacuating and releasing the pressure in the vessel, or by boiling the coke in H_2O and allowing this to cool with the coke completely submerged. The second method is no less accurate than the first and is easier to manipulate. Either is preferable to the paraffin wax method in that the coke after drying remains uncontaminated. A. B. Manning.

Influence of dry and wet cleaning on coke properties and on gas and by-product yields. A. C. Fieldner (U.S. Bur. Mines Rep. Invest. 3114, 1931; Fuel, 1931, **10**, 320—327).—As a result of tests with two Pittsburgh coals and an Alabama coal it was found that (*a*) within the moisture limits of the coals tested (4·2% max.) there was no difference in the effects of dry or wet cleaning, respectively, on the coke, gas, or by-products, (*b*) the coke from the cleaned coal was only slightly superior in resistance to breakage to that from the uncleaned coal, (*c*) the yields of gas, tar, and light oil, and the heating value of the gas, were greater from the cleaned coal than from the uncleaned, even after allowing for the difference in ash and moisture content, and (*d*) the yields of $(NH_4)_2SO_4$ in the laboratory SiO_2-tube tests, but not in the Fe-retort tests, were slightly higher from the washed coal. It is believed that the SiO_2-tube results are more indicative of the results to be expected in practice because of the known catalytic effect of hot Fe on the decomp. of NH_3. A high % of mineral matter in the coal appears to promote cracking of the tar. A. B. Manning.

Nature and properties of certain hydrocarbons in coal gas and their effect on meter leathers. R. S. Andrews (Gas J., 1931, **193**, 158—159, 212—213; Gas World, 1931, **95**, 130—132).—Of 1000 meters examined after prolonged use, only 42% had good leather diaphragms; 29% of the others were rotted, 12% were dry, and 12% had resin deposited on them. The oil in the leather dressing scrubs the light oil from the gas, becoming less viscous and draining from the leather. This is left quite dry, and is susceptible to the rotting effect of the moisture in the gas. The resins are formed by the polymerisation of the unsaturated hydrocarbons, accelerated by O_2 and other substances. Meter troubles are accentuated by vertical-retort gas and carburetted water-gas because of their higher light oil and unsaturated hydrocarbon content. A. Key.

Electrical formation of hydrocarbons from water-gas. F. Fischer and K. Peters (Brennstoff-Chem., 1931, **12**, 268—273).—The apparatus consisted of a discharge tube, a condenser immersed in liquid air or other cooling agent, and a Hg-vapour pump, connected in series so that the reaction gas could be circulated continuously through them. Fresh gas was supplied through a valve at a rate sufficient to maintain a const. pressure, *e.g.*, 10 mm., in the apparatus. From the reaction products, corresponding in composition to the "electrical equilibrium" set up in the discharge tube, the condensible constituents were continuously separated. A relatively light electrical discharge was used. From mixtures of CO and H_2, using liquid air as the cooling agent, CO_2, H_2O, and various hydrocarbons were formed, in which C_2H_2 and C_2H_6 predominated. If the products were condensed at somewhat higher temps. they contained only higher hydrocarbons. The intermediate formation of CH_4 was observed. Traces of CH_2O and MeOH were formed, and if the original gas contained N_2 it was converted almost completely into NH_3 and HCN. A. B. Manning.

Sp.-gr. basis for determining the heating value of refinery gas. F. W. Isles (Chem. Met. Eng., 1931, 38, 475—476).—The calorific val. of refinery gas may be derived from the equation: B.Th.U./cu. ft. = (1555 × sp gr.) + 112, where sp. gr. (air = 1) is that of the H_2S- and air-free gas. D. K. Moore.

Detonation, spark-plug position, and engine speed. R. O. King and H. Moss (Engineering, 1931, **132**, 177—180).—Experiments have been carried out on an engine fitted with 4 spark plugs so that the direction of flame travel in the cylinder head could be either to or from the hot (exhaust) side to the cooler (inlet) side or towards the centre of combustion space. The petrols used were a commercial aviation spirit (*A*) containing 57, 35, and 8%, respectively, of paraffins, naphthenes, and aromatics, and (*B*) a straight-run Borneo spirit capable of being used at a higher compression ratio than *A*, and blends made from these petrols. With the flame movement towards the exhaust valves the highest useful compression ratio (H.U.C.R.) was 0·23—0·3 lower at all engine speeds with petrol *A* alone or mixed with benzol or "ethyl fluid." Increased engine speed gives a higher H.U.C.R., the increased turbulence more than counterbalancing the effect of higher engine temp., whilst the time for org. peroxides to form is also reduced. Increase in engine temp. due to an induction temp. of 50° reduces the effect due to increased engine speed, especially in the case of benzol mixtures. The relationships between detonation and engine speed are of interest with supercharged engines where the induction temp. may reach 50°. Fuels enriched with benzol for these engines may lose the beneficial effect on detonation if the flame movement is towards the exhaust valves. Fuels improved by ethyl fluid are not adversely affected by increase in induction temp. or engine speed. Increased engine speed was found not to affect so favourably an increase in H.U.C.R. with petrol *B* as with petrol *A*. The increase in H.U.C.R. with speed is found to be greatest with paraffins; with pure naphthene (*cyclo*hexane) it is negative. T. A. Smith.

Ignition of firedamp.—See XXII.

See also A., Sept., 1015, **Explosibility of C_2H_2 mixtures. Direct oxidation of hydrocarbons by air.** 1017, **Catalysts for production of H_2 from water-gas.** 1027, **Determining sp. gr. of semi-solids.** 1030, **Natural Italian gases.** 1035, **Cracking of olefines.** 1083, **Carcinogenic potency of mineral oils.**

Patents.

Firing of gas and like retorts. S. R. Illingworth, and Illingworth Carbonization Co., Ltd. (B.P. 350,960, 11.3.30).—The heating gases are passed through the flues of a series of retorts in succession, the required gas temp. being maintained by boosting the gases, *e.g.*, by burning additional fuel and adding the products of combustion to them, or by passing them through tubes in a

heating chamber, after their passage through each retort. If necessary, the gases after boosting may be reduced in vol. of flow at a predetermined stage in the series by passing them through two or more retorts in parallel. The method of heating is particularly suitable for retorts for the low-temp. carbonisation of coal, such as those described in B.P. 244,505 (B., 1926, 146).
A. B. Manning.

Carbonisation of fuel. J. Weiss (B.P. 350,920, 10.1.30).—The fuel, preferably bituminous coal, is carbonised in the form of briquettes in an apparatus comprising a battery of carbonising chambers having heating flues in their walls and connexions whereby the heating gases may be passed around any desired chamber or group of chambers, while simultaneously distillation gases and/or steam may be circulated through the chambers. Each chamber can be independently charged and discharged. The flow of the heating gases is so directed that the carbonisation is carried out in stages, *e.g.*, a preheating stage to about 350°, a tar-evolving stage, 350—500°, a gas-evolving stage, 500—600° or above, and a cooling stage, the battery of chambers at any given moment being divided into sets each containing material at one of these successive stages.
A. B. Manning.

Production of coke from carbonaceous fuels. G. Hilger (B.P. 353,139, 16.5.30).—Inferior fuel is mixed with well-coking fuel dust in a perforated Fe receptacle which may have a central, vertical, perforated shaft, or spikes may be put through the mass horizontally; the whole is then compressed. When spikes are used these are now removed and the receptacle is placed in a retort. The channels made by the spikes and the central shaft carry away the gas produced. When the receptacle with the central shaft is used the charge may be compressed during carbonisation, the ram forming a hood to carry away the gas. The coke is removed in the receptacle.
D. K. Moore.

Decomposition of gaseous hydrocarbons to obtain hydrogen and a high-grade carbon black. Soc. d'Etudes et Réalisation dite "Ereal" (B.P. 353,100, 29.4.30. Belg., 30.4.29).—Gaseous hydrocarbons, *e.g.*, coke-oven gases substantially deprived of their H_2, are forced under pressure and/or suction through an incandescent fuel mass maintained at 1000—1200° in a chamber, so that the separated C is carried away with the gaseous products outside the chamber. The thickness of the fuel mass should be 1—2 m., and is so adjusted as to give an emergence temp. of the converted products from the fuel mass not above 600—700°.
H. S. Garlick.

Production of combustible gas. A. C. Becker and W. Bertelsmann (B.P. 353,034, 19.2.30. Addn. to B.P. 335,228; B., 1931, 10).—The gas is mixed with other gases prior to the removal of the poisonous gas, so that the purified gas has the same properties as regards sp. gr., heating val., and speed of ignition as the original gas.
D. K. Moore.

Treatment of tars [for roads]. Thermal Industrial & Chem. (T.I.C.) Res. Co., Ltd., and C. O. Condrup (B.P. 351,023, 19.3.30).—Coal tars are distilled in two separate operations so as to produce (1) a dehydrated and lightly "topped" tar, and (2) a heavy residue tar or pitch, and these products are blended in proportions giving a mixture complying with the British Standard Specifications and having other desirable characteristics, in particular a relatively high content of oils evaporable about 200° to ensure quick drying.
A. B. Manning.

Operation of oil stills. B. Broido, Assr. to Superheater Co. (U.S.P. 1,794,439, 3.3.31. Appl., 31.5.23).—The oil is forced through a coil in one section in contact with the hottest furnace gas, and then through a coil in the other section countercurrent to the gas. The heating of the cold oil with the hottest gas rapidly reduces the viscosity, decreases the power required to pump the oil through the still, and reduces the deposition of C. A valve enables the gas produced in the first section to by-pass the second.
D. K. Moore.

Cracking of oil. R. C. Osterstrom and C. R. Wagner (B.P. 353,230, 8.7.30).—Oil is vaporised, and the vapours are dried without cracking by passage through a superheating zone comprising tubes of relatively great cross-section as compared with those used in the vaporising and cracking zones. The dried vapours are rapidly passed in a series of parallel streams of restricted cross-sectional area through a highly heated zone to raise them quickly to above 538°, and are then merged in a single stream continuously moving at a lower velocity, sufficient heat being supplied to maintain it at the cracking temp. for a desired length of time.
H. S. Garlick.

[Cracking] treatment of hydrocarbons. L. Kirschbraun, Assr. to Universal Oil Products Co. (U.S.P. 1,791,566, 10.2.31. Appl., 1.9.20).—The proper degree of cracking may be effected and deposition of C in the heating tubes prevented by thermostatically controlling to ±1° the temp. of the oil as it flows from the tubes into an enlarged vapour chamber.
D. K. Moore.

Cracking of hydrocarbons. E. C. Herthel, Assr. to Sinclair Refining Co. (U.S.P. 1,789,072, 13.1.31. Appl., 4.1.28).—The vapours from a pressure-cracking still are passed to a fractionating column in the lower portion of which they are brought in contact with raw cracking stock, which is thus preheated. In the upper portion of the column the vapours are treated with lighter refluxing material, which is almost completely vaporised in the column. The unvaporised portion and preheated raw stock are returned to the pressure still.
T. A. Smith.

Conversion [cracking] of petroleum oils. Petroleum Conversion Corp. (B.P. 354,496, 25.6.30. U.S., 12.11.29).—Petroleum oil vapours superheated to 480° are heated to 510—540° by mixing with hot gas, whereby cracking takes place. The deposition of C in the superheater is prevented by the high velocity of the vapours.
D. K. Moore.

Cracking of hydrocarbon oils. A. E. White. From Texas Co. (B.P. 353,276, 12.4.30).—Hydrocarbon oil is passed through a pressure-cracking still and expanded into a still operating under reduced pressure. The evolved vapours are passed to a fractionating tower, from which an overhead distillate is taken constituting the gasoline fraction. A heavy condensate is withdrawn from the bottom of the tower and utilised as a cycle charging stock for further cracking. A middle fraction is withdrawn from an intermediate portion of the tower and may be used to dilute the heavy still residue for use as fuel oil. H. S. Garlick.

Production of gasoline. D. G. Brandt, Assr. to Doherty Res. Co. (U.S.P. 1,791,113, 3.2.31. Appl., 25.2.26).—Vapours from a cracking unit are passed through a series of three condensing zones (*A*—*C*) under approx. 50 lb./sq. in. pressure, and temps. of approx. 127° in *A*, 70° in *B*, and atm. in *C*. The condensates from zones *A* and *B* are introduced into the upper and lower portions respectively of a mixing and stabilising tower in which is maintained a mixed condensate having a mean b.p. above that of the condensate obtained in *C*, which is introduced into the mid-portion of the tower. Any uncondensed vapours are passed into contact with the condensate from *A*.

H. S. Garlick.

Distillation of [hydrocarbon] oil. J. E. Bell, Assr. to Sinclair Refining Co. (U.S.P. 1,795,070, 3.3.31. Appl., 1.11.24).—Oil and the vapours formed from it during preheating by the vapours from the fractionating column are introduced into the column at such points that they are in equilibrium with the reflux and vapour, respectively, at the points of entry. Light oil, which may be the condensate from the preheater, is introduced at the top of the column to assist in controlling the reflux. D. K. Moore.

Distillation [of hydrocarbon oils]. R. D. Hunneman, F. M. Rogers, and R. E. Wilson, Assrs. to Standard Oil Co. (U.S.P. 1,791,209, 3.2.31. Appl., 1.4.25).—Oil is heated to 350—400°, intimately mixed with steam in the proportions of 2—10 lb. per gal. of distillate produced, and passed through an unheated conduit, where thermal equilibrium is established, at a velocity sufficient to prevent separation. It is then discharged into the vapour space of an enlarged chamber, where prompt separation of the vapours and unvaporised liquid is effected, the vapours being retained in the chamber for 1 sec. or less, an abs. pressure of 25—75 mm. being maintained throughout. H. S. Garlick.

Distillation of hydrocarbon oils. G. Cash, Assr. to Standard Oil Co. (U.S.P. 1,788,982, 13.1.31. Appl., 30.12.26).—Oil is heated in a coil and expanded into a drum from which vapours are removed, preferably under vac. The unvolatilised oil from the drum is pumped to the top of a fractionating column in which a further amount of oil is volatilised by means of steam. The vapours and steam from the column are added to the oil stream in the heating coil before this oil enters the expansion chamber. The method is suitable for lubricating oil stocks. T. A. Smith.

Distilling hydrocarbons. E. Piron (U.S.P. 1,794,542, 3.3.31. Appl., 20.1.27).—Hydrocarbons are fed on to hot blocks forming a chain moved by sprocket wheels. Immediate carbonisation occurs and a further quantity is fed on to the coke and is carbonised also, thereby preventing undue cracking of the volatile products. On the under part of the travel the coke is scraped off and the blocks are heated.

D. K. Moore.

Use of entrainment separators in vacuum distillation [of petroleum oils]. A. C. Spencer, Assr. to Standard Oil Development Co. (U.S.P. 1,791,940, 10.2.31. Appl., 1.10.26).—The separator consists of a cylindrical vessel with a frusto-conical wire screen near the bottom. The incoming gas and liquid are carried by a central vertical pipe down on to the screen. A pipe from the bottom carries away the liquid, and one from near the top the gas. D. K. Moore.

Refining of oil [" sour " gasoline]. A. P. Bjerregaard (U.S.P. 1,791,521, 10.2.31. Appl., 26.8.25).—Motor spirit may be rendered non-reactive to the Na plumbite test and darkening and deposition of gum on exposure to light prevented by adding 0·1% by vol. of MeOH and then treating with an alkali or alkaline-earth hydroxide. D. K. Moore.

Refining of hydrocarbon oils. Richfield Oil Co. of California (B.P. 353,055, 15.4.30. U.S., 8.5.29).—Crude gasoline vapours enter a scrubbing tower, and rise countercurrent to a stream of an aq. (50—80%) solution of a salt (or salts) of one or more of the metals Zn, Cd, and Hg; preferably a solution of a Zn salt containing 0·5—3% of $Zn(OH)_2$ is used. Both aq. solution and vapours are maintained at 200—260°, and vapours leaving the upper end of the tower pass to a suitable condenser. To prevent concentration, H_2O or steam is continuously introduced into the tower.

H. S. Garlick.

Refining of hydrocarbons. Sinclair Refining Co., Assees of (a) F. A. Apgar, (b) E. C. Herthel (U.S.P. 1,795,067 and 1,795,124, 3.3.31. Appl., 14.9.28).—(a) Cracked hydrocarbon vapours are scrubbed from tar by the oil to be cracked, partly condensed, and passed through an adsorptive catalyst, *e.g.*, fuller's earth, in which the unsaturated hydrocarbons are polymerised. At the same time part of the condensate is passed through the catalyst to wash out the polymerides and prolong its life. The liquid and vapour mixture is passed into a fractionating column the vapours from which are condensed to motor spirit, whilst the condensate is used to scrub the cracked vapours. (b) Vapours containing 50—75% of motor-spirit vapour are partly condensed and passed, without separation of the liquid, through the catalyst. D. K. Moore.

Treating of [hydrocarbon] oils. J. C. Black (B.P. 353,148, 20.5.30).—Hydrocarbon oil is heated by waste gases to distil off a portion and form a condensate, a quantity of which is then cracked in a heated coil, while a further quantity of the condensate is cooled to considerably below the cracking temp. and is introduced into the cracking coil in the region of the hottest point, in which the rate of cracking is unduly rapid, and is itself cracked thereby. The heated products from the cracking coil are directed into a reaction chamber and a further portion of the condensate is introduced into the final passes near the end of the coil in order to prevent excessive decomp. of the treated oil and deposition of C in such portions of the coil and in the transfer line leading to the reaction chamber, and also to control the temp. in the reaction chamber. Vapours from the reaction chamber pass to an evaporator wherein gasoline and a condensate are formed, the latter being returned together with the condensate produced in the pretreatment to the cracking stage. H. S. Garlick.

Treatment of petroleum. W. F. Bleecker (U.S.P. 1,794,668, 3.3.31. Appl., 1.5.28).—In a divided cell under 10 lb. per sq. in. pressure brine or dil. H_2SO_4 is electrolysed and oil is forced continuously over the liquid in the anode chamber. The corrosive compounds, *e.g.*, H_2S, are oxidised by the nascent Cl or O. D. K. Moore.

Purification of petroleum oils. K. T. Steik, Assr. to Standard Oil Development Co. (U.S.P. 1,791,941, 10.2.31. Appl., 30.8.28).—Petroleum oils may be more effectively purified by treatment with a liquid mixture of SO_2 and SO_3 at —10° than with H_2SO_4 or oleum. D. K. Moore.

Treatment of [removal of wax from] petroleum oils. H. B. Setzler and M. C. McDonald, Assrs. to Nat. Refining Co. (U.S.P. 1,791,329, 3.2.31. Appl., 27.10.21).—Petroleum oils are cooled to 0—5° and agitated while continually chilling with conc. H_2SO_4 to ppt. sludge and amorphous wax; the oil and semi-solid constituents are then separated. H. S. Garlick.

Preparation of [lower] mercaptans [from petroleum naphtha etc.]. G. L. Wendt, Assr. to Standard Oil Co. (U.S.P. 1,791,179, 3.2.31. Appl., 12.11.25).—A solution of lower mercaptans is prepared by washing petroleum naphtha with aq. NaOH, adding thereto a solution of a Ca compound, *e.g.*, $Ca(SH)_2$ derived from the washing of hydrocarbon gases with a CaO suspension, and separating the ppt. H. S. Garlick.

Absorption of gas and/or vapour in oil. Standard Oil Development Co., Assees. of H. J. Nichols, jun., and P. E. Kuhl (B.P. 353,079, 23.4.30. U.S., 2.5.29).—In a customary absorption system, automatically operating controlling means are provided, whereby the flow of gas and/or vapours to the absorption vessel regulates the flow of oil thereto, and also the flow of oil from the separating means regulates the flow of charged oil and steam thereto. H. S. Garlick.

Production of high-quality lubricating oils. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,441, 28.5.30).—When paraffin wax is cracked at 440—500° in the presence of a dehydrogenating catalyst, *e.g.*, Cu, a liquid with I val. above 200 is obtained. The liquid is condensed at up to 150°, with or without the addition of cyclic hydrocarbons, *e.g.*, $C_{10}H_8$ or *cyclo*hexane, in the presence of $AlCl_3$ to yield lubricating oils. D. K. Moore.

Production of refined lubricating oils from heavy hydrocarbon oils by treatment with hydrogen at high temperatures and pressures. Standard Oil Development Co., Assees. of P. L. Young (B.P. 354,478, 18.6.30. U.S., 22.7.29).—Heavy oils are maintained at 370—460° in H_2 at 200 atm. pressure in the presence or absence of a catalyst, *e.g.*, oxides of Cr and Mo alone or mixed with oxides or salts of metals of groups VI and VIII. Light oils distill over. The remainder is passed through a pressure-reduction valve, when part vaporises, to fractionating columns. The vapours are condensed and the unvaporised liquid, with the catalyst in suspension, is returned to the pressure vessel. The process is continuous. D. K. Moore.

(A) Gelatinisation or solidification of mineral oils. (B) Lubricants. W. W. Triggs. From M. Morgan (B.P. 351,041—2, 18.3.30).—(A) 6—9% of a salt of a soap-forming fatty acid is added to a mineral oil and the mixture is heated to 177° or above. When the spume has subsided the mass is stirred and allowed to cool. The product forms a lubricant varying from a jelly-like to a soap-like consistency with the proportion of metal soap used. Other solid lubricants such as graphite may be added if desired. (B) A solidified or thickened lubricant which will flow when a certain desired temp. is exceeded, or when subjected to friction, is obtained by mixing a lubricant produced as described in (A) with another solidified vegetable oil lubricant, or with a castor oil lubricant prepared as in B.P. 349,684 (B., 1931, 728). [Stat. refs.] A. B. Manning.

Lubricant oil. F. W. Sullivan, jun., Assr. to Standard Oil Co. (U.S.P. 1,789,026, 13.1.31. Appl., 12.11.26).—The pour point of viscous lubricating oils is lowered by the addition of the Zn or Mg salt of the acids obtained by oxidising paraffin wax; 50 g. of the salt are added per litre of oil. T. A. Smith.

Lubricant. G. D. Peters & Co., Ltd. From J. A. Burton (B.P. 353,295, 26.8.30).—A rust remover and penetrating lubricant for leaf springs etc. consists of a light petroleum lubricating oil, *e.g.*, spindle oil, dispersed graphite, one or more chlorinated hydrocarbons, *e.g.*, CCl_4 or PhCl, and a hydrocarbon oil, *e.g.*, kerosene. D. K. Moore.

Reclamation of [lubricating] oils. L. D. Grisbaum, Assr. to Railway Service & Supply Corp. (U.S.P. 1,791,474, 3.2.31. Appl., 12.12.25).—Emulsified and contaminated journal box lubricating oil is mixed with aq. NaOH sufficiently conc. to break the emulsion, and heated under pressure. The oil is then washed by projecting H_2O on to its surface, separated from contaminations, and passed through a supply of H_2O. H. S. Garlick.

[Anti-knock] fuels for internal-combustion engines. L. Rosenstein (B.P. 349,475, 18.11.29).—Organo-metallic cyanides, cyanates, thiocyanates, etc. (*e.g.*, Pr^{β}, Et, and amyl ferrocyanides and corresponding Co, Tl, Pb, Ni, Os, Mo, Cr, U, V, and W compounds), also org.-base metallocyanides (*e.g.*, aniline ferrocyanide), org. selenocyanates (*e.g.*, Ph selenocyanate), and tellurocyanates, are used as antidetonants. Solvents must usually be added to the fuel to dissolve the agent. [Stat. ref.] C. Hollins.

Operating [discharging] coke-oven plant. A. I. Davies, H. J. Thurlow, and Imperial Chem. Industries, Ltd. (B.P. 354,317, 7.5.30).

Machines for screening or grading of coke, coal, etc. B. W. Broadhead (B.P. 354,709, 8.4.30).

Liquid seal for gas offtakes of carbonising retorts or chambers. Gas Chambers & Coke Ovens, Ltd., and N. J. Bowater (B.P. 354,621, 21.10.30).

Oil burners. Gilbert & Barker Manufg. Co. (B.P. 355,117, 31.10.30. U.S., 18.11.29).

Liquid-fuel burners. G. E. W. Dawson (B.P. 354,333, 10.2., 17.10., and 6.11.30).

Reduction of phenols.—See III. **Treatment of fibres. Coated sheets.**—See V. **Dyeing of acetate silk. Treatment of textiles.**—See VI. **Materials for roads etc.**—See IX. **Pickling of Fe and steel. Concentrating ores. Cr-plated surfaces.**—See X. **Mineral oil-sol. castor oil.**—See XII. **Coatings. Polish.**—See XIII. **Meat cure.**—See XIX.

III.—ORGANIC INTERMEDIATES.

Manufacture of nitroamines. H. Blum, and Soc. Alsacienne de Prod. Chim. (Sealed Note No. 2622, 20.6.25. Bull. Soc. Ind. Mulhouse, 1931, **97**, 379—380). Report by M. Battegay (*Ibid.*, 380—381).—Hydrolysis of nitroarylsulphonamides for the production of nitroamines (cf. G.P. 157,859, 164,130, 163,516, and 166,600) is effected with $ClSO_3H$ instead of H_2SO_4; *p*-toluenesulphonyl chloride is thereby formed as a by-product and is recoverable. Battegay draws attention to a similar suggestion of Schuloff and others (A., 1929, 1056). A. J. Hall.

Hydrocarbons from water-gas.—See II. **Fatty acids.**—See XII. **EtOH.**—See XVIII.

See also A., Sept., 1017, **Hydrogenation catalyst.** 1034, **Formic acid from hydrolysis of cellulose acetate.** 1041, **Org. solvents.** 1042, **Prep. of glycine.** 1047, **Prep. of methylene sulphate.** 1048, **Prep. of β-orcinol.** 1058, **$C_{14}H_{10}$ derivatives.** 1062, **Aminodisulphonates of anthraquinone.** 1063, **Benzanthaquinones.** 1064, **Reduction products of naphthacenequinone. *lin*-Benzanthraquinone series.** 1079, **Determination of citrates, salicylates, and benzoates.**

Patents.

Manufacture of acetaldehyde from acetylene. I. G. Farbenind. A.-G. (B.P. 349,022, 15.2.30. Ger., 15.2.29).—High-percentage C_2H_2 is passed at 0·8—1·5 atm. into the acid Hg solution above 85° in absence of org. solvent. C. Hollins.

Production of *as*-dichloroethylene. A. L. Mond. From I. G. Farbenind. A.-G. (B.P. 349,872, 17.9.30).—ααα- or ααβ-Trichloroethane is stirred with excess of milk of lime and slowly heated to 70—80°. The yield of αβ-dichloroethylene on distillation is 90%. C. Hollins.

Manufacture of vinyl chloride [from ethylene dichloride]. I. G. Farbenind. A.-G. (B.P. 349,263, 1.5.30. Ger., 1.5.29).—MeOH is used as solvent for the NaOH. C. Hollins.

Production of 1 : 1 : 2-trichloroethane. I. G. Farbenind. A.-G. (B.P. 349,097, 21.2.30. Ger., 11.3.29).—The prep. of vinyl chloride and its conversion into ααβ-trichloroethylene are effected without isolation of the former by treating the mixed gases from C_2H_2 and HCl with the calc. amount of Cl_2 or slightly more. Waste gases are returned to the vinyl chloride producer. C. Hollins.

Preparation of ketones [from aliphatic acids]. Soc. des Brevets Etrangers Lefranc & Cie. (B.P. 346,822, 16.1.30. Fr., 24.1.29).—CaO or $Ca(OH)_2$ is added to Ca salts of aliphatic acids above C_2, together with sand, whereby the decomp. temp. is lowered to about 300°. C. Hollins.

Manufacture of polymerisation products of diolefines. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 347,802, 28.2.30).—The polymerisation of butadiene etc. by Na etc. proceeds smoothly in presence of up to 1% of org. halogen compounds, *e.g.*, ethylene dichloride, vinyl chloride, CH_2PhCl, 1 : 2-dibromo*cyclo*hexane, 3-chloroquinaldine, 1-chloro- or *o*-bromonaphthalene, 3-chloro-2-hydroxyindane. C. Hollins.

Manufacture of substituted phenolcarboxylic [salicylic] acids. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 346,938, 12.3. and 25.11.30).—2 : 5-Dichlorophenol is carboxylated with KOH and CO_2 at 140—150°/40 atm. to give 3 : 6-dichlorosalicylic acid, m.p. 187°; 4-chloro-*o*-cresotic acid, m.p. 155°, from 4-chloro-*o*-cresol, and 4-chloro-*m*-2-cresotic acid, m.p. 174°, from 4-chloro-*m*-cresol, are similarly prepared. C. Hollins.

Manufacture of mixed fatty aromatic ketones. Schering-Kahlbaum A.-G. (B.P. 347,543, 4.7.30. Ger., 9.7.29).—An aromatic dicarboxylic acid or anhydride is passed with an aliphatic acid in vapour form over ThO_2, MnO, FeO, Al_2O_3, $CaCO_3$, or other oxide or carbonate of alkaline-earth, rare-earth, or heavy metals. Phthalic anhydride and AcOH over MnO at 350—400° give acetophenone and $COMe_2$. C. Hollins.

Manufacture of water-soluble [non-resinous] condensation products derived from formaldehyde with aliphatic aldehydes and/or ketones. I. G. Farbenind. A.-G. (B.P. 349,556, 28.2.30. Ger., 2.3.29).—The products are heated in vac. below resinifying temp. to give colourless, transparent, viscous products useful as substitutes for glycerin, as textile finishing agents, and as dyeing or printing assistants. C. Hollins.

Manufacture of ethers from alcohols. H. D. Elkington. From N. V. Bataafsche Petroleum Maats. (B.P. 350,010, 5.3.30. Addn. to B.P. 332,756; B., 1930, 981).—In the process of the prior patent, $FeCl_2$, $CuSO_4$, $SnCl_2$, $MnCl_2$, $AlCl_3$, potash and chrome alums, and $Cr_2(SO_4)_3$ are used as catalysts at 200—300°. The last three are most effective in the prep. of Bu_2O. C. Hollins.

[Manufacture of] wetting, penetrating, foaming, and dispersing agents. H. T. Böhme A.-G. (B.P. 350,080, 350,432, and 350,595, [A] 20.3.30. Ger., 27.4.29, [B] 4.3.30. Ger., 6.3.29. Addn. to B.P. 318,610; B., 1931, 290, and [C] 18.3.30. Ger., 20.3.29).—(A) Org. bases, especially pyridine bases, are condensed with a sulphonated aliphatic alcohol above C_5; *e.g.*, lauryl or stearyl alcohol is sulphonated with $ClSO_3H$ and treated with pyridine or pyridine bases. (B) Sulphonated lauryl or myristyl alcohol is much more effective than are the other sulphonated alcohols used in the process of the parent patent. (C) Alkyl or *cyclo*alkyl esters of polynuclear sulphoaromatic carboxylic acids are added to liquid or plastic compositions such as dye powders, preparations for foam-dyeing, fur-dyeing, cosmetics, etc. C. Hollins.

Reduction of phenols. F. Uhde (B.P. 349,575, 25.2.30. Ger., 6.3.29. Addn. to B.P. 339,317; B., 1931, 190).—Phenols are heated with H_2O and spongy Fe in a closed vessel to about 400°/200 atm. Pure PhOH gives a lubricant, b.p. above 360°, with much gaseous hydrocarbon, the formation of which is prevented by admixture of tar oils, *e.g.*, creosote oils from brown coal. C. Hollins.

Manufacture of compounds [resins etc.] from indene and phenols. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,934, 28.2.30. Addn. to B.P. 297,075; B., 1928, 845).—In the process of the prior patent, other inorg. acids or salts, *e.g.*, H_2SO_4, are used in place of halogen acids. Indene is thus condensed with resorcinol, PhOH, and 1 : 7-dihydroxynaphthalene. C. Hollins.

Manufacture of derivatives of *m*-hydroxydiphenylamine. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 349,677, 12.3.30).—2-Amino-*p*-cresol is condensed with an arylamine, free from NO_2, SO_3H, and CO_2H groups, in presence of HCl. Products from aniline (b.p. 255°/20 mm.), *p*-toluidine, and *p*-chloroaniline are described. C. Hollins.

Production of tetrazoles. Knoll A.-G. Chem. Fabr. (B.P. 349,682, 14.3.30. Ger., 14.3.29).—Imino-ethers, especially cyclic imino-ethers, are treated with hydrazoic acid or its salts in absence of catalysts. Examples are 4 : 5-pentamethylenetetrazole from $[CH_2]_5<\genfrac{}{}{0pt}{}{N}{\ddot{C}\cdot OMe}$, and 5-phenyltetrazole, m.p. 215° (decomp.), from benzimino-ethyl ether. C. Hollins.

Production of esters [of sulphonated carboxylic. acids. Wetting agents]. H. T. Böhme A.-G. (B.P. 350,425, 5.2.30. Ger., 6.2.29).—Aralkyl or aryl esters of aliphatic carboxylic acids above C_8, or alkyl, aralkyl, or aryl esters of non-hydroxylated cyclic carboxylic acids, are sulphonated in presence of a lower fatty acid or anhydride or chloride, and/or with oleum, $ClSO_3H$, or $BrSO_3H$. In the process of B.P. 315,832 (B., 1930, 1058) oleum etc. is used in the case of alkyl esters of aliphatic carboxylic acids above C_8. Acetylsulphuric acid may also be employed. Examples of starting materials are: Bu^{α} or Bu^{β} and methyl*cyclo*hexyl ricinoleates, benzyl oleate, Pr^{β} β-naphthoate, and Bu^{α} hydroxystearate. Sulphonation may precede esterification. C. Hollins.

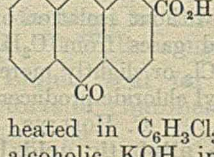
Manufacture of 3′-amino-6′-halogenbenzyl-*o*-benzoic [6-halogeno-3-aminodiphenylmethane-2′-, carboxylic] acids and substitution products and derivatives thereof. Newport Co. (B.P. 347,171, 16.12.29. U.S., 2.1.29. Addn. to B.P. 314,804; B. 1931, 290).—A 3-amino- or 3-acylaminodiphenylmethane-2′-carboxylic acid, carrying, if desired, Me, MeO, EtO, halogen, CO_2H, SO_3H, or other substituent in position 4, is chlorinated or brominated in the 6-position by halogenation, preferably in a solvent (AcOH). The following diphenylmethane-2′-carboxylic acids are described: 6-bromo-3-amino-4-methoxy- (m.p. 189—190°; Ac derivative, m.p. 228—229°), 4 : 6-dichloro-3-amino- (m.p. 164—165°; Ac derivative, m.p. 246—247°), 6-chloro-3-amino-4-methoxy- (m.p. 190°; Ac derivative, m.p. 226°; phthaloyl derivative), 6-chloro-3-acetamido-4-ethoxy- (m.p. 219—220°), 6-bromo-3-amino-4-methyl- (m.p. 193—194°; Ac derivative, m.p. 246°), 6-chloro-3-amino-4-methyl- (m.p. 196—197°; Ac derivative, m.p. 256°; *p*-toluenesulphonyl and Bz derivatives). C. Hollins.

Manufacture of 1-amino-4-halogen- [4-halogeno-1-amino]-9-anthrones and substitution products and derivatives thereof. Newport Co. (B.P. 347,195, 16.12.29. U.S., 2.1.29. Addn. to B.P. 340,519; B., 1931, 336).—The acylated products of B.P. 347,171 (preceding) are cyclised to anthrones, and, if desired, oxidised to anthraquinones. 4-Chloro-1-acetamido-2-methoxy-9-anthrone (m.p. 170°) and -anthraquinone (m.p. 242—243°), the 4-bromo-compounds (m.p. 153—154° and 205—206°, respectively), 4-bromo-1-acetamido-2-methyl-9-anthrone [m.p. 171° (decomp.)] and -anthraquinone (m.p. 212—123°), the 4-chloro-compounds (m.p. 175° and 203—204°, respectively), and 2 : 4-dichloro-1-acetamido-9-anthrone (m.p. 208°), are described. C. Hollins.

Manufacture of *o*-aminocarboxylic esters of the anthraquinone series. I. G. Farbenind. A.-G. (B.P. 349,795, 13.6.30. Ger., 14.6.29. Addn. to B.P. 267,164 and 314,028; B., 1928, 361; 1930, 809).—Anthraquinone-1 : 2-*iso*oxazoles react with aliphatic or aromatic alcohols in absence of alkali to give 1-aminoanthraquinone-2-carboxylic esters. The Me (m.p. 227—228°), and CH_2Ph (m.p. 182°) esters, and amyl 5 : 8-dichloro-1-aminoanthraquinone-2-carboxylate, m.p. 124° (from 3 : 6-dichloro-2-*p*-toluoylbenzoic acid, m.p. 162°, cyclised to 5 : 8-dichloro-2-methylanthraquinone, m.p. 244°, nitrated to the 1-NO_2-compound, m.p. 242°, and thence converted by oleum into the *iso*oxazole), are described. C. Hollins.

Manufacture of 1-hydroxy- and 1-alkoxy-anthraquinone-3-carboxylic acids and derivatives thereof. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,635, 4.2.30).—2-Alkoxybenzophenone-2′ : 4-dicarboxylic acids are cyclised in H_2SO_4 or oleum, preferably in presence of H_3BO_3; the alkoxyl group is frequently lost during cyclisation. The prep. of 1-hydroxy- (m.p. 282—284°), 4-chloro-1-hydroxy- (m.p. 198—199°), 1 : 4-dihydroxy- (m.p. 249—250°; from the 5-chloro- or 5-hydroxy-dicarboxylic acid), and 4-hydroxy-1-methoxy- (m.p. 215—216°) -anthraquinone-3-carboxylic acids is described. C. Hollins.

Manufacture of conversion products of 1 : 2-anthraquinonethioglycollic-carboxylic acid [2-carboxyanthraquinone-1-thioglycollic acid]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,080, 20.2.30).—2-Carboxyanthraquinone-1-thioglycollic acid, heated with Ac_2O etc., gives a mixture of thienanthrone-3-carboxylic acid (annexed formula), m.p. above 300°, and the *O*-acetate, m.p. 248°, of 6 : 7-phthaloylthioindoxyl, separable by means of NaOH or a solvent such as PhMe or PhCl. Shorter reaction produces the intermediate thienanthrone-1 : 3-dicarboxylic acid, which loses the 1-CO_2H group when heated in $C_6H_3Cl_3$. The *O*-acetate is converted by alcoholic KOH into 6 : 7-phthaloylthioindoxyl. The formation of the thioindoxyl or its acetate is favoured by the addition of alkali, metal oxide, or a weak acid



salt, or by using an alkali salt of the thioglycollic acid. In the absence of Ac_2O the aq. alkali salt yields mainly the thienanthrone-3-carboxylic acid, or, in higher concentrations, the 1 : 3-dicarboxylic acid (dichloride, m.p. 206—212°). C. Hollins.

Lower mercaptans.—See II. **Catalysts for org. reactions.**—See VII.

IV.—DYESTUFFS.

[Manufacture of] yellow and reddish-brown direct dyes. Soc. Chem. Ind. in Basle (Sealed Note No. 1051, 7.9.98. Bull. Soc. Ind. Mulhouse, 1931, 97, 375—376). Report by M. Battegay (*Ibid.*, 377—378).—Direct dyes fast to light, Cl_2, air, and acids are obtained by condensation in the presence of NaOH of certain monoazo compounds resulting from coupling diazotised sulphanilic acid, α-$C_{10}H_7{\cdot}NH_2$, or m-$C_6H_4(NH_2)_2$ with p-nitrotoluenesulphonic acid or its oxidation products such as dinitrobenzyl- and dinitrostilbene-disulphonic acids. Suitable monoazo compounds may also be obtained by coupling diazotised metanilic, toluidinesulphonic, β-naphthylaminesulphonic, and aminobenzoic acids with α-$C_{10}H_7{\cdot}NH_2$. Condensation of m-nitroaniline with dinitrostilbenedisulphonic acid yields a dye fast to Cl_2 and having the shade of Chloramine Yellow. Battegay reports that the manufacture of the last-named dye is described in G.P. 101,760, and that dyes obtained by condensation of dinitrostilbene- and dinitrobenzyl-disulphonic acids with monoazo dyes are described in G.P. 204,212. A. J. Hall.

See also A., Sept., 1041, **Solvent action in dyeing.** 1046, **Diphenyl derivatives.** 1052, **$C_{10}H_8$-green.** 1056, **4 : 4′-Dihydroxydiphenyl-3 : 3′-dialdehyde and its derivatives.** 1066, **Colouring matter of paprika. Vegetable dyes.** 1075, **Condensed thiazine- and thiazole-thionaphthen derivatives.** 1092, **Colouring matter of *Penicilliopsis*. Citromycetin and citrinin.**

Patents.

Manufacture of metalliferous dyes. Soc. Chem. Ind. in Basle (B.P. 349,304, 26.5.30. Switz., 25.5.29).—An azo dye of the type o-aminophenol or o-aminobenzoic acid → N-substituted J-acid is treated in alkali with a metal compound and a nitrosating agent in either order. Examples are: 5-nitro-o-aminophenol → phenyl-J-acid, chromed and nitrosated (steel-blue on cotton, viscose, wool, or silk), or nitrosated (blue-violet by after-coppering); 4-nitro-o-aminophenol-6-sulphonic acid → di-J-acid, chromed and nitrosated (grey-blue); o-aminophenol-4-sulphonamide → di-J-acid, coppered and nitrosated (red-violet). C. Hollins.

Manufacture of wool dyes [of the anthraquinone series]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,126, 19.2.30).—4-Halogeno-1-aminoanthraquinone-2-sulphonic acids are condensed with aromatic diamine-monosulphonic acids, having at least 1 primary NH_2 group, in aq. solution in presence of Na_2CO_3 etc. and a Cu catalyst. C. Hollins.

Manufacture of [acid] dyes of the anthraquinone series. I. G. Farbenind. A.-G. (B.P. 349,325, 6.6.30. Ger., 7.6.29).—Amino or alkylamino-dianthraquinonyl amines are sulphonated with oleum in presence of H_3BO_3 and a Hg catalyst, *e.g.*, at 120—150°, to give acid wool dyes more sol. than those of B.P. 201,575 (B., 1924, 861). C. Hollins.

Manufacture of fast vat dyes [of the benz- and thien-anthrone series]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,036, 19.2. and 30.4.30).—Cyclic di- or poly-ketones having at least 1 free NH_2 group are condensed with a benz- or thien-anthrone-carboxyl chloride, preferably in a diluent (PhCl, $C_6H_4Cl_2$, $PhNO_2$) in absence of acid-binding agents. Examples are: thienanthrone-3-carboxyl derivatives of 1-aminoanthraquinone (yellow vat dye), 1-amino-4- and -5-benzamidoanthraquinone (orange, golden-yellow), aminoanthanthrone (red-brown), aminopyranthrone (brown), aminodibenzanthrone (green, not becoming black with Cl_2), 5-amino-1 : 1′-dianthraquinonylamine (green), aminodibenzpyrenequinone (yellow-brown); thienanthrone-4-carboxylic derivative of 1-aminoanthraquinone (yellow); thienanthrone-5-carboxylic derivative of the carbazole from 5-amino-4′-benzamido-1 : 1′-dianthraquinonylamine (brown); thienanthrone-1 : 3-dicarboxylic derivatives of 1-amino-5-benzamidoanthraquinone; benzanthrone-4-carboxylic derivatives of 1-amino-5-benzamidoanthraquinone (yellow), 1 : 5-diaminoanthraquinone (green-yellow), 4 : 4′-diamino-1 : 1′-dianthraquinonylamine, carbazolised (olive), aminodibenzpyrenequinone (brown-yellow), and aminopyranthrone (yellow-brown); benzanthrone-3-carboxylic derivative of 1-amino-5-benzamidoanthraquinone (yellow). Thienanthrone-4-carboxylic acid (chloride, m.p. 256°) is obtained from 1-aminoanthraquinone-3-carboxylic acid by way of the 1-thioglycollic acid (cf. B.P. 349,080; B., 1931, 918). C. Hollins.

[Manufacture of vat] dyes [of the dibenzanthrone series]. R. S. Barnes, R. F. Thomson, J. Thomas, and Scottish Dyes, Ltd. (B.P. 350,030, 1.3.30).—Dibenzanthrone or its halogenated derivatives is treated with $K_2Cr_2O_7$ or other strong oxidant in presence of HNO_3 to give grey to black vat dyes. C. Hollins.

Manufacture of high-molecular pyridino-compounds [vat dyes]. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 349,059, 15.11.29).—Polycylic amines are converted by Skraup reaction into quinolines, which may, if desired, be further condensed, halogenated, or nitrated. Examples are quinolines from: 9-aminobenzanthrone (isomeric products, m.p. 250° and above 300°, respectively, green-yellow on acetate silk; violet-blue vat dye by alkaline fusion); 11-aminobenzanthrone (alkaline fusion, navy-blue vat dye); amino-*allo-ms*-naphthadianthrone (m.p. 350—352°, red; hexachlorinated, red-orange; dibrominated, orange; tetrabrominated, blue-red; oxidised to the anthanthrone, orange); diamino-compound (blue-red); aminopyranthrone (m.p. above 300°, blue-red; dibrominated, bordeaux; nitrated, blue-grey changing to brown with Cl_2); diaminoanthanthrone (yellow, golden-orange when purified from H_2SO_4; chlorinated, brilliant red-orange); amino-1 : 2 : 6 : 7-dibenzpyrene-3 : 8-quinone (orange-yellow: brominated, orange-yellow); diamino-compound (brown-yellow); 2 : 3-dichloro-7-amino-8 : 9-phthaloylacridone (weak violet); aminoanthanthrone (golden-orange ; dibrominated, orange-yellow ; nitrated) ; bromoamino-compound (orange). C. Hollins.

Manufacture of [indigoid] vat dyes. I. G. Farbenind. A.-G. (B.P. 349,361, 16.7.30. Ger., 16.7.29).—A 1-hydroxy-4-alkoxy-9-anthrone (cf. B.P. 340,639 ; B., 1931, 336), which may contain substituents in positions 5—8, is condensed with isatin α-anil (etc). Examples are products from 1-hydroxy-4-methoxy-9-anthrone, m.p. 156—157° (green-blue), the 4-ethoxy-compound, m.p. 145—146° (green-blue), and 5 : 8-dichloro-1-hydroxy-4-methoxy-9-anthrone (green). C. Hollins.

Manufacture of black [tetrakis]azo dyes. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,600, 24.2.30).—A 1 : 8-aminonaphthol-4-mono- or -4 : 6- or -3 : 6-di-sulphonic acid is coupled with 2 mols. of a diazotised nitro- or acylamino-arylamine carrying substituents suitable for coppering (OH, CO_2H, or OR *ortho* to either N), the NO_2 is reduced or the NHAc hydrolysed, and the tetrazotised product is coupled with 2 mols. of resorcinol, *m*-phenylenediamine, *m*-aminophenol, or derivatives of these. The dyes are coppered on the fibre. Examples are : 5-nitro-*o*-anisidine → (acid) 1 : 8 : 4 : 6-aminonaphtholdisulphonic acid (alk.) ← 5-nitro-*o*-anisidine, reduced, → 2 mols. of *m*-aminophenol or *m*-phenylenediamine ; 6-nitrocresidine similarly, with resorcinol as end-component ; *p*-nitroaniline → (acid) 1 : 8 : 4 : 6-acid (alk.) ← 5-nitro-*o*-anisidine, reduced → 2 mols. of *m*-phenylenediamine ; *p*-aminoacetanilide → (acid) H-acid (alk.) ← 6-nitrocresidine, hydrolysed, reduced, → 2 mols. of resorcinol ; 5-aminoacet-*o*-anisidide → (acid) 1 : 8 : 4 : 6-acid (alk.) ← *p*-aminoacetanilide or 4-chloro-5-aminoacet-*o*-anisidide, hydrolysed, → 2 mols. of *m*-phenylenediamine ; 5-aminoacet-*o*-anisidide → (acid) S-acid (alk.) ← 5-aminoacet-*o*-anisidide, hydrolysed, → 2 mols. of resorcinol ; *p*-nitroaniline → (neutral) 1 : 8 : 4 : 6-acid (alk.) ← 5-nitro-*o*-aminophenol or 5-nitroanthranilic acid, reduced, → 2 mols. of *m*-phenylenediamine. C. Hollins.

Wetting etc. agents.—See III.

V.—FIBRES ; TEXTILES ; CELLULOSE ; PAPER.

Swelling of cellulose and its affinity relations with aqueous solutions. IV. Preferential absorption of barium hydroxide. V. Absorption of copper from dilute cuprammonium hydroxide, both characteristic properties of cellulose and an indication of previous mercerisation or other swelling treatment. Catalytic method for microdetermination of copper. S. M. Neale (J. Text. Inst., 1931, 22, T 349—356, T 357—364 ; cf. B., 1931, 835).—IV. The absorption of $Ba(OH)_2$ affords similar information about the state of activation of cellulose to that given by the absorption of NaOH (*loc. cit.*). The " baryta absorption ratio" relative to the amount of $Ba(OH)_2$ absorbed by plain scoured cotton from a solution of the same end concentration at the same temp. is almost indistinguishable from the NaOH absorption ratio for samples of cotton of widely different pretreatment, and, like the latter, is independent of the reagent concentration. These facts increase the significance of the alkali absorption ratios as measures of the relative amount of accessible salt-forming OH rendered available when cellulose is swollen, washed, and dried. Whilst the ratio may be used as a check on the regularity of a standard mercerised product, it cannot be relied on as a direct measure of any quality of textile value.

V. [With T. Brownsett and F. D. Farrow.] The absorption of Cu from dil. cuprammonium hydroxide (too dil. to swell cellulose appreciably), either in the presence or absence of NaOH, is dependent on the pretreatment of the cellulose in much the same way as are the NaOH and $Ba(OH)_2$ absorptions, but though the approx. identity of the Cu, NaOH, and $Ba(OH)_2$ absorption ratios is a noteworthy fact, it does not form a basis for any satisfactory speculations. The method used for determining Cu is a development of that employed by Baines (B., 1929, 1050) and depends on the fact that the reaction between $Na_2S_2O_3$ and H_2O_2 is accelerated by the presence of traces of Cu. B. P. Ridge.

Extraction apparatus for cellulose.—See I. **Saccharification of cellulose.**—See XVII.

See also A., Sept., 1041, **Acetylation of cellulose.** 1081, **S in South African wools.**

Patents.

Retting of fibres. Rohm & Haas Co., Assees. of C. S. Hollander and P. H. D. Plaine (B.P. 353,868, 28.3.30. U.S., 17.5.29).—The raw material, *e.g.*, flax, flax straw, jute, etc., is boiled for 1—4 hr. with 10—25 times its wt. of an alkaline liquor containing, *e.g.*, 5—10% (on the wt. of fibre) each of NaOH, soap, and a buffer (Na_2SO_4), and is then washed and treated for 24—48 hr. at, *e.g.*, 30° in an enzyme bath prepared from fungi of the *Aspergillus*, *Penicillium*, *Mucor*, or *Rhizopus* groups or bacteria of the *subtilis-mesentericus*, *carotovorus*, or like groups. The best results are obtained when the bath is maintained at p_H 7, and an activator is present, *e.g.*, 1% of Na_2SO_4 on the wt. of fibre. PhMe may be added to inhibit bacterial growth. D. J. Norman.

Manufacture of material from difficultly-tractable animal fibres. H. M. Pike (B.P. 353,429, 15.4.30).—The tendency for the fibres to become displaced and form free ends in yarns and fabrics made from fibres such as horsehair, mohair, goat hair, and the lower grades of wool, is obviated by coating or impregnating such materials with a cellulose composition which contains preferably a cellulose ester (*e.g.*, cellulose acetate) and a plasticiser. A suitable composition consists of EtOH 20 pts., C_6H_6 24 pts., $COMe_2$ 45 pts., cellulose acetate 5 pts, glyceryl triacetate, 5·2 pts., and Ph_3PO_4 0·8 pt. A. J. Hall.

Treatment of vegetable fibres. L. Mellersh-Jackson. From Twitchell Process Co. (B.P. 354,303, 3.3.30).—The addition of 0·1—2·0% of mineral oil sulphonates (" mahogany " sulphonates) to the alkali solution used in boiling out textile fibres considerably reduces the boiling time so that satisfactory results may be obtained by a continuous process working at atm. pressure. D. J. Norman.

Drying of bodies, particularly breadths or strips of fibrous material impregnated or coated with a solution of synthetic resin in spirit [and recovery

of the volatile solvent therefrom]. R., M., and E. Schröder, S., R., and S. Levis (Jaroslaw's Erste Glimmerwaren-Fabr. in Berlin) (B.P. 354,099, 17.9.30. Ger., 19.9.29).—The material passes successively through 2 or more drying chambers, the bulk of the solvent being removed and recovered in the first chamber. The drying medium, *e.g.*, air (optionally heated), is repeatedly circulated through the first chamber by means of an external pump until a relatively high concentration of solvent vapour is present. At this point some of the solvent-laden air is continuously drawn from the system for solvent recovery, and replaced by an equal quantity of fresh air or air which has been circulating in the second dryer. D. J. Norman.

Producing at the cooking of cellulose and especially of sulphite-cellulose a waste liquor containing a high percentage of organic matter. G. Haglund, Assr. to Patentaktieb. Gröndal–Ramén (U.S.P. 1,791,476, 3.2.31. Appl., 1.3.30. Swed., 10.4.29).—The chips are first impregnated under pressure with fresh liquor and then cooked in a mixture of fresh and waste liquors. D. J. Norman.

Production of artificial filaments, threads, ribbons, etc. by dry-spinning processes. H. Dreyfus (B.P. 353,956, 6.5.30. Addn. to B.P. 312,203; B., 1929, 594).—In the manufacture of filaments of low denier and high extensibility by the process of the prior patent, improved results are obtained if the ratio of non-solvent liquid to high-boiling solvent is between 3 : 1 and 1 : 3 (preferably between 2 : 1 and 1 : 2) by wt. The total quantity of non-solvent liquid in the solvent mixture should preferably be $<$ 12%, *e.g.*, about 6—8% by wt. A suitable solvent mixture contains, by wt., 80—84 pts. of $COMe_2$, 9—7 pts. of H_2O, and 11—9 pts. of diacetone alcohol, Et phthalate, or the like. D. J. Norman.

Luminous [artificial silk] filament. H. A. Gardner (U.S.P. 1,791,199, 3.2.31. Appl., 29.12.27).—About 5% of a base material, *e.g.*, TiO_2, which has been treated with a small quantity of a radioactive or phosphorescent substance, *e.g.*, $RaBr_2$, CaS, BaS, or chlorophene, is added to the spinning solution. D. J. Norman.

Manufacture of cellulose derivatives. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 353,930, 23.4.30).—Cellulose derivatives of the type described in B.P. 264,261 and 268,505 (B., 1927, 552, 473), which whilst retaining their fibrous structure show a pronounced affinity for acid azo dyes, are obtained by treating the xanthated and mildly oxidised fibre with an aliphatic diamine, *e.g.*, piperazine, ethylenediamine, diethylethylenediamine, etc. Alternatively, the xanthated fibre may be treated with reagents which induce linking of the cellulose xanthate mols. either directly or through an intermediate group, *e.g.*, S_2Cl_2, $COCl_2$, $CSCl_2$, AcCl, chlorocarbonic esters, or the like, the cellulose xanthate derivative thus obtained being in turn treated with an aliphatic diamine. D. J. Norman.

Solution of cellulose derivatives. J. G. Davidson, Assr. to Carbide & Carbon Chemicals Corp. (U.S.P. 1,791,301, 3.2.31. Appl., 19.5.26. Renewed 12.8.29).—Compounds of the type $C_nH_{2n}(R)\cdot OR'$, where n is >1, R′ is an alkyl or aryl group, and R an acid group, *e.g.*, glycol monoethyl ether acetate, $OEt\cdot CH_2\cdot CH_2\cdot OAc$, b.p. 153°, are suitable solvents for use in the manufacture of cellulose ester compositions. D. J. Norman.

Manufacture of cellulose esters. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 353,978, 20.5.30).—Cellulosic material, *e.g.*, cotton, regenerated cellulose, or partly esterified or etherified cellulose, is esterified without loss of fibrous structure or degradation of the cellulose mol. by impregnating the material with KOAc or other K salt of a weak acid, drying, and heating with an org. acid anhydride, optionally with addition of esterification accelerators, *e.g.*, a *tert.* organic base, or inert diluents, but without addition of acid catalysts. Thus when viscose silk is immersed for 1 hr. in 60% aq. KOAc, centrifuged, dried at about 70°, and boiled for about 1 hr. with a 4 : 1 (by vol.) C_6H_6–Ac_2O mixture the products contain 1—2 Ac groups per mol. of $C_6H_{10}O_5$, show the dyeing properties of acetate silk, are insol. in org. solvents, have a high wet strength, and may be obtained either as matte woolly fibres or as highly lustrous smooth fibres. Pattern effects are obtained on fabrics by printing with KOAc–gum mixtures and heating the dried material at 100° for about ½ hr. with a 20% PhMe solution of Ac_2O. D. J. Norman.

Manufacture of [cellulose ester or ether] artificial threads, filaments, and the like. Courtaulds, Ltd., and C. Diamond (B.P. 353,597, 26.5.30).—In spinning by the downward dry-spinning process, the whole of the evaporative atm. is introduced into the spinning cell in the neighbourhood and on one side of the extrusion nozzle and is then withdrawn from the cell on the opposite side of the nozzle wholly at the level of the nozzle, or partly at the level and partly below the level of the nozzle; the whole of the evaporative atm. is thus drawn across the extrusive nozzle. A. J. Hall.

Fibre-liberating process [for woods of high resin content]. G. A. Richter and M. O. Schur, Assrs. to Brown Co. (U.S.P. 1,790,838, 3.2.31. Appl., 27.6.27).—A soft pulp of good quality is obtained by the alkaline digestion of, *e.g.*, jack pine if 0·3—0·4% of soap is added to the digestion liquor to disperse the difficultly saponifiable resins. Other dispersing agents, *e.g.*, Na_3PO_4, $Na_2B_4O_7$, talc, colloidal clay, may also be added. D. J. Norman.

Washing of pulp. O. Mantius (U.S.P. 1,790,714, 3.2.31. Appl., 6.4.28).—The pulp is pressed to remove as much liquor as possible and is then intimately mixed in a shredder with a small quantity of washing liquor which in turn is removed by pressure. This cycle of operations is repeated any desired number of times. Suitable apparatus for continuous countercurrent washing along these lines is described. D. J. Norman.

Manufacture of pulp web of high absorptivity. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,790,839, 3.2.31. Appl., 1.6.28).—Up to 12% of mechanically gelatinised cellulose is mixed with unbeaten or but lightly beaten long-fibred pulp, preferably of high α-cellulose content, and the resulting sheet is dried without application of pressure. The addition of gelatinised cellulose gives increased bursting, breaking, and tearing strength without substantially reducing the absorbency of the product. D. J. Norman.

Felted cellulose fibre product. G. L. Schwartz, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,791,248, 3.2.31. Appl., 22.9.28).—A preformed fibrous sheet, *e.g.*, made from kraft pulp and preferably unsized, is run through a bath of 8—15% NaOH sol. at $<5°$, *e.g.*, a 10—11% NaOH solution at —5° (time of treatment 1—30 sec.), squeezed, and rapidly heated by blowing steam at more than 10 lb. pressure on to the sheet while held under pressure against a rotating drum by a wire cloth. The sheet is then preferably passed through a 15—18% NaOH solution at 80—104° (time of treatment 2—20 sec.), after which it is washed and dried in the usual way. The resulting paper is flexible and shows a considerably increased tearing and tensile strength, whilst the tensile strength in the wet state is raised from 2% to about 20% of the dry strength. D. J. Norman.

Manufacture of pulp board. H. L. Becher (B.P. 354,001, 13.6.30. U.S., 13.7.29).—Beaten pulp, *e.g.*, ground wood, chemical pulp, straw, etc., optionally in admixture with binders, *e.g.*, pitch, asphalt, or gilsonite, is run into a mould, pressed, and heated, first without substantial pressure during the removal of interstitial H_2O (viz., to an air-dry condition), and then under heavy pressure during the removal of colloidally retained moisture (bone-dry). The pressure is then released without cooling the platens. D. J. Norman.

Manufacture of plastic articles [paste-board packing material] from artificial wood pulp. K Kürschner (B.P. 348,791, 24.3.30. Ger., 4.2.30. Addn. to B.P. 347,807; B., 1931, 671).—Long-fibre cellulosic material, *e.g.*, wood pulp, after or during a preliminary or final moulding process forming part of treatment ordinarily used in the manufacture of paper, is impregnated with a dissolved compound of cellulose which is subsequently transformed into hydrocellulose either immediately after the impregnation or after the completion of the moulding process. F. R. Ennos.

Coated material in sheets. Durastic Bituminous Products, Ltd., and W. B. Thompson (B.P. 353,910, 29.4.30).—Fibrous material (preferably 40% hair and 60% jute) is impregnated at 93° with a mixture of pitch and tar (10% of tar) and coated on one side with a substance which will adhere to metal or other surfaces on application of heat, *e.g.*, bitumen, pitch, resins, etc. D. J. Norman.

Regeneration of sulphides.—See VII. **Plastic materials. Fibrous compositions.**—See XIII. **Leather for spinning-rollers.**—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Use of glucose in printing dyes by reduction methods. A. Scheunert and N. Vosnessenski (Sealed Note No. 1993, 22.4.10. Bull. Soc. Ind. Mulhouse, 1931, **97**, 378). Report by M. Battegay (*Ibid.*, 379).—The method described previously in Note 1990 (B., 1920, 745 a) for producing vat discharges on an indigo ground may be used for obtaining vat effects on a white ground. A satisfactory printing paste contains glucose 300 pts., Indanthrene Blue paste 250 pts., and thickening 450 pts. Battegay reports favourably on the process. A. J. Hall.

Simultaneous weighting with production of clear shades on a deep ground colour of wool fabrics. Amos & Cie., and E. Koechlin (Sealed Note No. 2773, 12.12.29. Bull. Soc. Ind. Mulhouse, 1931, **97**, 372—373). Report by J. Niederhauser and E. Duhem (*Ibid.*, 373—374).—The loss of wt. experienced in milling (felting) wool materials is counterbalanced (sometimes an increase of wt. is obtained) by treatment for ½ hr. at 90° in a bath containing clipped rabbit fur and 0·5% H_2SO_4; the wool simultaneously acquires from the fur a clear grey shade not otherwise obtainable except by previous scouring. Niederhauser and Duhem refer to previous similar processes in which wool is used, but in an alkaline bath and for the purpose of weighting only. A. J. Hall.

Washing of piece goods [stained with river water]. O. Metzger and L. M. Granderye (Sealed Note No. 2225, 24.2.13. Bull. Soc. Ind. Mulhouse, 1931, **97**, 371). Report by M. Bader (*Ibid.*, 372).—Fabrics stained pink, salmon, and cream by washing with impure river water could not be satisfactorily "cleared" by chlorination while passing over Cu cylinders, but they responded to treatment with a solution containing 10—20 g. of $NaHSO_3$ per litre; this solution had no deleterious action on the cylinders. Bader confirms the novelty of the process. A. J. Hall.

Swelling of cellulose.—See V.

See also A., Sept., 1041, **Solvent action in dyeing etc.**

Patents.

Bleaching [with peroxides] of textile materials of vegetable origin. H. O. Kauffmann, and Elektrochem. Werke München A.-G. (B.P. 352,690, 18.6.30).—Vegetable fibres are bleached by subjection to a pressure boil with an alkali followed by an open boil with H_2O_2, the latter treatment being preferably effected in an Fe or other vessel coated as described in B.P. 350,726 (B., 1931, 801). A. J. Hall.

Dyeing of acetate silk. L. Mellersh-Jackson. From Twitchell Process Co. (B.P. 354,326, 3.2.30).—The mineral oil ("mahogany") sulphonates obtained in the refining of mineral oils with oleum or SO_3 (cf. B.P. 127,159; B., 1919, 493 a) are used after purification as dispersing agents for cellulose acetate dyes. Both types of "mahogany" sulphonates may be used, viz., those recovered from the acid sludge, and, more particularly, from the oil layer. Dispersion of these sulphonates in H_2O is facilitated by the addition of small quantities of low-viscosity mineral oils, aromatic, hydrogenated, or chlorinated solvents. [Stat. ref.] D. J. Norman.

Application of disazo dyes to the dyeing of regenerated cellulose in even shades. Imperial Chem. Industries, Ltd., and R. Brightman (B.P. 349,960, 3.2.30).—2-Nitro- or 2 : 2′-dinitro-benzidine is tetrazotised and coupled with 2 mols. of 1 : 5 : 7-aminonaphtholsulphonic acid or an *N*-substituted derivative, or with 1 mol. of such acid and 1 mol. of a phenol, naphthol, or pyrazolone, or sulphonic or carboxylic derivatives of

these; *e.g.*, 2-nitrobenzidine → salicylic acid and 1 : 5 : 7-acid gives a level violet-brown on viscose silk.
C. Hollins.

Production of colorations or coloured effects on cellulose derivative materials. Brit. Celanese, Ltd. (B.P. 349,683, 15.3.30. U.S., 15.3.29).—Volatile colouring matters are applied as vapour, *e.g.*, in steam, or by means of transfers, or are locally removed by volatilisation. Suitable dyes are: *p*-nitroaniline → *p*-xylidine (orange); 4-chloro-2-nitro-4′-methyldiphenylamine (golden-yellow); 5-nitro-*o*-anisidine → dimethyl- or diethyl-aniline (red). C. Hollins.

Dyeing and printing of fibrous materials of cellulose esters. Durand & Huguenin A.-G. (B.P. 352,808, 15.9.30. Ger., 14.9.29).—Cellulose acetate etc. is coloured by means of the leuco-compounds of gallocyanine dyes, since these have a greater affinity for the artificial silk than when in the fully oxidised form.
A. J. Hall.

Finishing of [viscose] artificial silk spun on bobbins. Verein. Glanzstoff-Fabr. A.-G. (B.P. 353,747, 3.9.30. Ger., 3.9.29).—The freshly-spun silk is washed, desulphurised, bleached, and otherwise purified on the bobbins, and the bobbin lap is then removed in a moist condition, dried on any suitable support, but while free to shrink in length, and then unwound. A. J. Hall.

Mercerisation of cotton fabrics. A. Nitsche (B.P. 354,312, 5.5.30. Switz., 5.3.30).—The liquor (*e.g.*, of *d* 1·091—1·116) obtained by the countercurrent washing of mercerised fabric is cooled in a heat exchanger and used for impregnating (also on the countercurrent principle) fabric prior to mercerisation. When the fabric to be mercerised is initially wet, the diluted liquor (*e.g.*, of *d* 1·045—1·059) is filtered and returned to the washing system, but when the fabric is dry the liquor is filtered and discharged to the lye recuperating tanks. Suitable apparatus is described.
D. J. Norman.

Waterproofing of textile materials and the like. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,443, 29.5.30).—Yarns, leather, paper, etc. are waterproofed by superficially impregnating them with salts of multivalent metals with H_2O-sol. acid sulphuric esters of aliphatic, *cyclo*aliphatic, or mixed aliphatic–aromatic compounds which contain at least 10 C atoms and at least one ethylenic linking or OH group, or both, or at least one group (CHO, CO, Cl, etc.) which is readily converted into a double linking or OH group, or with metal salts of true sulphonic acids of saturated or unsaturated aliphatic or *cyclo*aliphatic compounds containing at least C_{10} in the mol. Suitable compounds include sulphopalmitic acid, cetyl hydrogen sulphate, and palmitbutylanilidesulphonic acid. *E.g.*, acetate silk is impregnated at 40—50° with a 0·5% solution of Na sulphopalmitate, squeezed, and transferred to a bath of $Al(OAc)_3$ (*d* 1·014). After removing the excess of liquor the fabric is finally dried. D. J. Norman.

Effecting the shrinking of woollen fabrics. Tomlinsons (Rochdale), Ltd., and J. N. Tomlinson (B.P. 354,540, 31.7.30).—A continuous process is described, the material being first wetted and then passed in festoons successively through drying, cooling, and conditioning chambers. D. J. Norman.

Conditioning of wool or the like. A. H. Gill (U.S.P. 1,791,057, 3.2.31. Appl., 31.7.25).—1—2% of a mono-, di-, or poly-hydric phenol (*e.g.*, quinol) is added to emulsions of oils containing unsaturated constituents, as used for lubricating wool materials preparatory to spinning and related operations, since such compounds prevent atm. oxidation and spontaneous combustion. A. J. Hall.

Preparations for use in the treatment of textile materials with aqueous liquids. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,300, 6.2.30).—The H_2O-sol. acid phosphoric esters of saturated or unsaturated, simple or substituted aliphatic alcohols (C_8 or higher) or salts of these, *e.g.*, the Na or triethanolamine salt of cetyl hydrogen phosphate or of the acid phosphoric esters prepared from the unsaturated alcohols resulting from the destructive oxidation of paraffin wax by means of air, are used in quantities of about 2—6% on the wt. of fibre for dressing fabrics of all kinds, for scouring and washing wool, as levelling agents in dyeing, or in the production of emulsions for oiling textiles. D. J. Norman.

Treatment of materials containing organic derivatives of cellulose [to increase their scroop]. Brit. Celanese, Ltd. (B.P. 354,200, 2.5.30. U.S., 14.5.29).—The material, *e.g.*, taffeta, is treated with a solution or suspension of a Na, K, NH_4, Ba, or Ca salt of tartaric, citric, oxalic, or other polybasic aliphatic acid, optionally in admixture with oil emulsions, and after removing the excess the material is dried in a stretched condition without washing. D. J. Norman.

Treatment of textile yarns or threads [on spools and yard beams] with fluids. W. H. Francke (B.P. 354,437, 27.5.30. Ger., 27.5.29).

Products from CH_2O and aldehydes etc. Wetting etc. agents.—See III. **Cellulose esters.**—See V. **Degreasing of solvents.**—See XII.

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

Manufacture of nitric acid by oxidation of ammonia. G. B. Taylor, T. H. Chilton, and S. L. Handforth (Ind. Eng. Chem., 1931, **23**, 860—865).—The low-pressure plant erected by Du Pont Co. at their Repauno Works (N.J.) comprised five converters with cylindrical, Pt-gauze catalysts and had a capacity of 25 tons HNO_3 per day. Subsequently a high-pressure plant of 8 units with a total capacity of 80 tons HNO_3 per day was constructed. An illustrated description is given. Cost of power is higher in the high-pressure than in the atm. process, but initial cost is about half, and there is an increase of 8—10% in acid concentration for a yield of 90% or above, when the pressure is 7·8 atm. Loss of Pt–Rh gauzes is about half that of the Pt gauzes. W. J. Wright.

High-pressure compressors for the ammonia synthesis. Schneider (Brennstoff-Chem., 1931, **12**, 273—276).—Details are given of the compressors built by the Demag for the Ruhrchemie A.-G. Each compresses 6000 cu. m. (referred to atm. pressure) of mixed gas from 10 atm. to 900 atm. pressure per hr.

A. B. Manning.

Producing dry salt [ammonium sulphate] by heat of reaction. G. Fauser (Chem. Met. Eng., 1931, 38, 456—457).—Gaseous NH_3 is introduced into the bottom, and a spray of 65·5% H_2SO_4 into the top, of a reaction chamber. The heat of reaction evaporates the H_2O and dry $(NH_4)_2SO_4$ is removed by a conveyor. The outlet gas from the chamber passes up a tower down which the H_2SO_4 flows and NH_3 is absorbed. Control is effected by condensing a little of the exit gas from the chamber; the condensate should contain not less than 12—15% NH_3.

D. K. Moore.

Removing acidic gases by reaction with organic bases. R. R. Bottoms (Chem. Met. Eng., 1931, 38, 465—467).—Natural gas containing 15% CO_2, 8% He, and 77% N_2 is scrubbed with 50% aq. diethanolamine at 40° and the CO_2 content is reduced to 0·01%. The aq. diethanolamine carbonate and bicarbonate is heated to boiling in a reactivating column and kettle, whereby CO_2 is driven off, and, after cooling, the solution is re-used. The heat of absorption is 650 B.Th.U. per lb. of CO_2 absorbed. Triethanolamine may also be used. Both ethanolamines may be used in a similar way to absorb H_2S.

D. K. Moore.

Acid-resisting materials.—See I. **Andalusite as refractory.**—See VIII. **Determining "free cyanide" in plating solutions.**—See X.

See also A., Sept., 1013, **Electrolysis of NaCl and KCl solutions.** 1017, **Catalysts for production of H_2 from water-gas.** 1020, **Prep. of Hg_2I_2 and of salts of Ce group rare earths.** 1021, **Prep. of monosilicic acid. Mo-blue.** 1022, **Prep. of polyhalides. Working up I residues.** 1043, **Org. Au compounds. Mg org. halides.**

Patents.

Production of hydrocyanic acid. Imperial Chem. Industries, Ltd., T. S. Wheeler, H. A. T. Mills, W. B. Fletcher, and J. McAulay (B.P. 353,407, 21.2.30. Addn. to B.P. 335,947; B., 1930, 1150).—The interaction between gaseous hydrocarbons and NH_3 is carried out at 1150° or above in presence of N_2, in addition to or instead of H_2, so as to avoid deposition of C.

W. J. Wright.

Ammonia-soda process. Union Chim. Belge Soc. Anon. (B.P. 354,313, 5.5.30. Belg., 7.5.29).—NH_4Cl is recovered from the mother-liquors from the manufacture of $NaHCO_3$ by saturating the solution with NH_3 and CO_2. The filtrate from the NH_4Cl is heated to eliminate excess of NH_3 and CO_2, to prevent contamination of the next batch of $NaHCO_3$ with NH_4HCO_3.

A. R. Powell.

Purifying the nitrogen-hydrogen mixture in the synthesis of ammonia. L. C. Jones, Assr. to Chem. Eng. Corp. (U.S.P. 1,794,903, 3.3.31. Appl., 2.4.27).—The gas mixture, after compression, is treated with CO_2 in amount not exceeding 50% of the NH_3 present, whereby $(NH_4)_2CO_3$ is formed, condensation of which removes moisture and suspended matter from the gases before they pass over the catalyst. A. R. Powell.

Production of potash [potassium carbonate] and soda. Chemieverfahren Ges.m.b.H. (B.P. 354,451, 4.6.30. Ger., 13.7.29).—The NH_3-soda mother-liquor obtained in the process is treated with $SrSO_4$ (or $BaSO_4$), $SrCO_3$ is removed, and the mother-liquor is treated with sylvinite and NH_3, yielding a residue of glaserite and KCl which, after removal, is treated with cold H_2O to yield K_2SO_4 and NaCl solution; the solution, after admixture with the previous liquor, is worked up to Na_2CO_3 by the NH_3-soda process, and the K_2SO_4 is treated with the $SrCO_3$ to yield K_2CO_3 solution and $SrSO_4$ for re-use in the process. L. A. Coles.

Manufacture of hydrogen peroxide. H. E. G. Rowley. From J. D. Riedel-E. de Haën A.-G. (B.P. 354,520, 12.7.30).—A solution containing 20% of $(NH_4)_2S_2O_8$ and 10% of H_2SO_4 is atomised by superheated steam at 220° at the point at which it enters the lower end of a distillation column maintained under pressure (40 mm.). The vapours pass through the column, which is packed with refractory material and steam-heated, and thence into a receiver in which the H_2O_2 is collected under reduced pressure.

A. R. Powell.

Manufacture of sodium nitrate. A. Mentzel (B.P. 353,733, 22.8.30. Ger., 31.8.29. Addn. to B.P. 347,426; B., 1931, 630).—The NaOH obtained in the prior process is subjected to further treatment with C and N_2 at high temps. and then to oxidation, so as to produce $NaNO_3$, the liberated NH_3 being returned to the NH_3-soda process and recovered as NH_4Cl. Any N oxides formed are treated with NaOH so as to give a further amount of $NaNO_3$. W. J. Wright.

Regeneration of sulphides of the alkali or alkaline-earth metals. Courtaulds, Ltd., and H. J. Hegan (B.P. 354,607, 27.9.30).—Na_2S solutions etc. which have been used, *e.g.*, for extracting S from artificial silk, are submitted to electrolytic reduction in the cathode compartment of a diaphragm cell.

L. A. Coles.

Precipitation of metals [lead, zinc, etc.] from solutions as sulphides. N. C. Christensen (U.S.P. 1,793,906, 24.2.31. Appl., 3.5.26).—Pb, Zn, Fe, and Mn may be precipitated consecutively from brine or other leaching liquors by saturating the solution with H_2S and fractionally adding further quantities of H_2S together with almost sufficient powdered $CaCO_3$ to neutralise the acid formed in the reaction. The PbS first formed is purified from ZnS by agitating it with a further quantity of the original solution, the ZnS is freed from co-precipitated FeS by stirring it with a quantity of the solution from which Pb has been removed, and so on.

A. R. Powell.

Industrial treatment of leucite, or of aluminous potassic and sodic silicates, or of natural and artificial alums, for the purpose of obtaining pure alumina, compounds of potassium, or sodium and silica. G. Gallo (B.P. 354,255, 1.5.30).—Solutions of alums containing an excess of Na_2SO_4 or K_2SO_4, which may be prepared by the decomp. of leucite etc. with H_2SO_4 and subsequent removal of SiO_2, are electrolysed, *e.g.*, in a group of cells having two compartments separated by porous diaphragms and so operated that the

anodic and cathodic solutions circulate in opposite directions; the spent anode solution is used for the treatment of fresh material, and the cathode solution, which contains $NaAlO_2$ or $KAlO_2$, is treated, after filtration, with CO_2 to yield $Al(OH)_3$ and Na_2CO_3 or K_2CO_3.
L. A. Coles.

Production of metallic cyanates. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,604, 25.9.30).—Solutions of NH_4CNO in monohydric aliphatic alcohols or in liquid NH_3 are treated with oxides or hydroxides of the alkali or alkaline-earth metals. A. R. Powell.

Flotation concentration of phosphate-bearing material. W. Trotter and E. W. Wilkinson, Assrs. to Minerals Separation North American Corp. (U.S.P. 1,795,100, 3.3.31. Appl., 24.1.28).—After desliming, the ore pulp is agitated with an oleate soap and petroleum oil, whereby the phosphate minerals float as a froth relatively free from silicate gangue.
A. R. Powell.

Manufacture of colloidal metallic [lead] phosphate. F. E. Bischoff, Assr. to H. J. Ullmann (U.S.P. 1,794,510, 3.3.31. Appl., 23.8.27).—A 5% solution of $PbCl_2$ in a 4% gelatin solution at 95° is treated drop by drop with the theoretical quantity of a dil. solution of Na_3PO_4 until the p_H of the mixture reaches 7·4. The resulting colloidal solution of $Pb_3P_2O_8$ is used in the form of a 0·4% solution of Pb for intravenous injection for the treatment of malignant tumours, being without toxic action on the blood. A. R. Powell.

Catalytic preparations [platinised magnesium sulphate] and their applications. Imperial Chem. Industries, Ltd., From E. I. Du Pont de Nemours & Co. (B.P. 354,500, 27.6.30).—$MgSO_4,7H_2O$ is heated with 1% $Fe_2(SO_4)_3$, $Th(SO_4)_2$, or $Ce_2(SO_4)_3$ until a dry granular mass is obtained. This is broken up into pellets and platinised with the equivalent of 0·3% Pt as H_2PtCl_6. The catalyst has a high conversion activity in the oxidation of SO_2 to SO_3 and a longer life than the usual catalysts. A. R. Powell.

Manufacture of catalytic masses and their employment in organic reactions. Brit. Celanese, Ltd., H. F. Oxley, W. H. Groombridge, and E. B. Thomas (B.P. 354,351, 2.5.30).—Catalytically active elements are precipitated as oxides, hydroxides, or carbonates in the form of a highly gelatinous mass which is washed free from sol. salts and ground in a paint mill to give a thick viscous paste. This is extruded into rods or pressed into tablets which are allowed to dry in a current of cold dry air, whereby they become very hard. $ZnCO_3$, from $Zn(NO_3)_2$ and Na_2CO_3, prepared as above, is an active catalyst for the production of oxygenated org. compounds from CO and H_2, and a mixture of 2 mols. of $ZnCO_3$ with 1 mol of $MgCO_3$ is suitable for the production of ketones from aliphatic alcohols.
A. R. Powell.

Supplying artificially-ionised oxygen for ventilation etc. F. E. Hartman, Assr. to F. H. and W. R. Montgomery (U.S.P. 1,793,799, 24.2.31. Appl., 2.8.26).—Air containing ionised O and O_3, the former largely predominating, is obtained by subjecting air to an electronic discharge from a valve tube, the glass wall of which serves as a dielectric, so as to induce a unidirectional corona discharge on or about the valve tube. The potential employed is sufficient to continue the electronic discharge into the free air beyond the field of the corona discharge. A. R. Powell.

Recovery of sulphur from sulphide minerals. Patentaktiebolaget Gröndal-Ramén, and N. E. Lenander (B.P. 352,477, 5.4.30).—Cupriferous pyrite is smelted with coke in a blast furnace under such conditions as to produce a rich Cu matte and flue gases practically free from O_2. The gases pass through a dust-settling chamber, then through an electrostatic purifier, and finally at 350—400° through a catalyst chamber containing partly dehydrated bauxite, whereby the SO_2 reacts with the COS, CS_2, and H_2S present to form H_2O, CO_2, and S. The remaining SO_2 is removed by addition of CO and passage of the mixture through a second, similar, catalyst chamber. S is recovered by cooling the gases to 120—150° in a condenser, preferably in the form of a water-tube boiler to utilise the heat. Removal of the last traces of S is effected in a second electrostatic apparatus. A. R. Powell.

Collection of sulphur [from gases containing it]. D. Tyrer, and Imperial Chem. Industries, Ltd. (B.P. 354,207, 3.5.30).—The gases, after subjection, if necessary, to a preliminary electrostatic cleaning at a temp. above the b.p. of S, are submitted to electrostatic treatment at 115—150° to cause precipitation of the particles of liquid S. L. A. Coles.

Liquefaction of chlorine. Krebs & Co. G.m.b.H. (B.P. 353,704, 29.7.30. Ger., 14.12.29).—A compressed mixture of Cl_2 and other gases is cooled in a condenser so as to deposit part of the Cl_2 in a liquid state, the remainder of the mixture being cooled and liquefied in a second condenser by part of the Cl_2 so obtained, after releasing it from pressure. The cold gases from the second condenser are led to the inlet of the compressor to produce a circulation of Cl_2, and after mixing with the other gases serve to cool the compressor.
W. J. Wright.

Simultaneous production of phosphorus, or phosphoric acid, and alumina. I. G. Farbenind. A.-G. (B.P. 353,749, 4.9.30. Ger., 4.9.29).—A mixture of Al phosphate, heavy-metal sulphide ore, and a reducing agent is fused in an electrically-heated furnace at 1600—1700°, the Al_2O_3–Al_2S_3 melt being removed and worked up to produce Al_2O_3. W. J. Wright.

Fire-extinguishing material. Absorbent for refrigerants. Gases in solid form. Absorbent for gas filters.—See I. **H_2 and C black.**—See II. **Fertilisers.**—See VII. **Gases by electrolysis.**—See XI. **Zn white.**—See XIII. **Rendering insol. phosphates available.**—See XVI.

VIII.—GLASS; CERAMICS.

Modern methods in the production of porcelain grinding balls and lining blocks. R. L. Cawood (Ind. Eng. Chem., 1931, **23**, 865—867).—An automatic method employed by the Patterson Refractories Company is described. The clay is ground with H_2O, sieved, and treated in a filter press, the 40-lb. press cakes being sent to a tunnel dryer. For porcelain balls, the clay is allowed to age for several weeks. It is then transferred to a pug mill, the extruded rolls being fed to a ball-spinning machine from which the balls are ejected by air under slight pressure and conveyed to a humidity dryer, where they remain for 48 hr. In making lining blocks, the clay from the tunnel dryer is crushed to $\frac{3}{4}$-in. mesh, moistened with H_2O, and allowed to soak for several days. It is then ground to 20-mesh and pressed under vac. in a block-forming machine. The blocks are dried for 18 hr. in a humidity dryer. Both the porcelain balls and the lining blocks are fired in kilns of the intermittent type, the saggers being made from a mixture of clay and grog. W. J. Wright.

Possibility of andalusite as a refractory. F. H. Riddle (Trans. Amer. Electrochem. Soc., 1931, **59**, 225—240).—When natural Al silicates are fired at a sufficiently high temp., cryst. mullite, $3Al_2O_3,2SiO_2$, separates from the excess of Al_2O_3 or SiO_2. Andalusite, Al_2O_3,SiO_2, when fired with a min. amount of a plastic aluminous bond and a suitable amount of corundum, yields a refractory which continues to improve when maintained at high temps. The occurrence of andalusite, cyanite, and similar minerals is examined and the properties of the resulting refractories are discussed. H. J. T. Ellingham.

Methods of testing refractory materials. I. Chemical analysis. L. Belladen and C. F. Becchi (Annali Chim. Appl., 1931, **21**, 307—323).—To decompose the material it is powdered and 1 g. fused in a Ni crucible with NaOH or KOH for 10 min. with raw or 20—30 min. with baked products. The cooled mass is softened with H_2O in a porcelain dish on the water-bath and dissolved with HCl. SiO_2 is determined as usual by double evaporation, but the silicious residue is heated on the water-bath for 6 hr. The treatment with H_2SO_4 and HF is necessary because part of the Ti becomes insol. while heating the SiO_2. In order to determine Al, Ti, and Fe, the Ti residue is fused with $KHSO_4$, the melt dissolved in dil. H_2SO_4 is added to the filtrate from the SiO_2, and the bulk made up to 250 c.c. To 100 c.c. are added 3 g. of NH_4NO_3, the solution is brought to the b.p., and aq. NH_3 added in slight excess. The ppt. is collected, washed for $1\frac{1}{2}$ hr. with neutral NH_4NO_3 (methyl-red), and strongly ignited for 20 min. On another 100 c.c. portion the Fe is determined by the Zimmermann–Reinhardt method. On the remaining 50 c.c. Ti is determined colorimetrically by Weller's method. The Al is obtained by difference. Ca and Mg are determined in the filtrate from the hydroxides. O. F. Lubatti.

Electrical strength of porcelain.—See XI.

See also A., Sept., 1010, **System Fe_2O_3–SiO_2.** 1011, **System K_2O–CaO–SiO_2.** 1023, **Determining H_2O and CO_2 in silicates.**

Patents.

Manufacture of glass yarn. O. Gossler (B.P. 354,763, 10.5.30).—The glass is melted in a crucible constructed of a non-corrosive, heat-resistant alloy of Fe with, *e.g.*, Cr, Ni, W, Mo, or mixtures of these, and serving as an electrical heating resistance when connected with a low-voltage circuit. The crucible has a perforated bottom and may have perforated bridges etc. inside to act as filters and ribs etc. to increase the heating effect. L. A. Coles.

Furnaces, in particular for burning enamel ware. Naaml. Venn. Ferro Enameling Co. of Holland, Assees. of L. W. Manion (B.P. 353,976, 19.5.30. U.S., 20.5.29).—The furnace comprises a tunnel with one closed end, the goods being conveyed in an elongated U-shaped course. The combustion chamber, or series of small chambers, is (are) situated under the furnace at the closed end and is (are) separated from the goods chamber by a roof which is corrugated to give increased radiation; the gases are led away through a long flue under the incoming run of the conveyor. B. M. Venables.

Moulding sand [for cores]. R. Cross, Assr. to Silica Products Co. (U.S.P. 1,795,011, 3.3.31. Appl., 22.7.29).—A sand mixture for cores comprises 90% of SiO_2 sand, 7·5% of clay, and 2·5% of bentonite, with the addition of 1—2% of Portland cement, MgO, or ground blast-furnace slag to increase the binding power of the bentonite. A. R. Powell.

Manufacture of sheet glass. N. V. Mij. tot Beheer en Exploitatie van Octrooien (B.P. 355,134, 17.11.30. Ger., 28.11.29).

Electric furnace.—See XI.

IX.—BUILDING MATERIALS.

Preservation of wood by soluble salts. Wolman and Pflug (Z. angew. Chem., 1931, **44**, 696—698).—Previous work on chemical preservatives for wood is discussed. The advantages of a prep. containing dinitrophenol, F, As, and Cr are described: the mixture forms a non-corrosive solution stable at the b.p.; after absorption by the wood it is converted into insol. compounds, and its fungicidal power is high. H. F. Gillbe.

Acid-resisting building materials.—See I.

See also A., Sept., 1011, **System CaO–Fe_2O_3.** 1102, **Drying of a softwood.**

Patents.

Production of artificial [slate] slabs. F. Travnitschek and J. Frank (B.P. 355,056, 11.9.30).—A paste comprising cement, finely-ground slate freed from fat, long-fibre asbestos, and H_2O is pressed and cut into slabs which are then stacked, pressed, and dried. L. A. Coles.

Materials for use in the construction of roads, roofs, blocks, etc. C. M. C. Hughes and C. W. Fulton (B.P. 351,073, 9.5.30).—Tar or similar material (45—55 pts.) is mixed with "metrofelt" pitch (5—15 pts.), and the product then mixed intimately with a slurry formed from clay (15 pts.) and H_2O (22 pts.), and, if desired, slaked lime or chalk (3 pts.). A. B. Manning.

Emulsions for treatment of road surfaces and road-making materials. F. J. E. China and W. A. White (B.P. 351,242, 23.6.30).—Coal-tar emulsions are prepared by using, as emulsifier, $\frac{3}{4}$—$1\frac{1}{2}$% of soap, and as a stabilising agent an aq. extract of carragheen moss containing an amount of extractable material equiv. to 0·125—0·25% of the wt. of tar and H_2O in the emulsion. A. B. Manning.

Mixing mill.—See I. **Tar for roads.**—See II. **H_2O-resistant coatings.**—See XIII.

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

Stein-Brackelsberg rotating furnace fired with pulverised coal for melting cast iron. M. Stein (Mem. Soc. Ing. Civ. France, 1931, **84**, 454—477).—The furnace comprises a long cylinder with ends in the shape of truncated cones, the whole being lined with SiO_2 brick. Firing is started with oil, which is replaced by powdered coal when the temp. reaches 900°. Some examples of the quality of cast Fe produced from the usual charge of pig and scrap are given together with a complete thermal balance. Temps. of 1400—1500° are readily obtained without danger of burning the metal, and owing to the rotation melting is rapid and efficient mixing of the charge is obtained. Clean castings, free from porosity and quite sound, even in very thin parts, are produced owing to the fluidity of the metal at the high temp. of the furnace. Fuel consumption varies from 9·7% for grey castings to 14·3% for malleable ones. A. R. Powell.

Transformation of mixed gases in the open-hearth furnace. W. Heiligenstädt (Stahl u. Eisen, 1931, **51**, 1045—1052).—The reactions which occur in the gases of open-hearth furnaces fired with a mixture of coke-oven and blast-furnace gases may be followed quantitatively from a knowledge of the equilibria in the reactions: $CO_2 + C \rightleftharpoons 2CO$ and $CO + H_2O \rightleftharpoons CO_2 + H_2$. The equilibrium consts. in the case of an open-hearth furnace at the Burlach smelter have been determined and from them the effect of varying the moisture content of the gas feed on the separation of C and on the heat consumption of the furnace has been calc. With gases saturated with H_2O at 20° the effect is small, but with increasing moisture content the quantity of C which separates becomes progressively smaller, until, with gas saturated at 50°, C is no longer deposited. Simultaneously the heat requirements of the reaction increase so that the preheating temp. under the same conditions is reduced and the deposition of C still more retarded. The temp. relations in the recuperator are discussed with especial reference to the effect of the thickness of the walls on the heat exchange.

A. R. Powell.

Distribution of the alloying elements between steel bath and slag in the production of steel. G. Tammann and W. Oelsen (Arch. Eisenhüttenw., 1931—2, **5**, 75—80).—From a survey of the results of other workers it is shown that the distribution of Mn between the slag and the molten steel bath follows the simple law of mass action. With basic slags in which the $CaO : SiO_2$ ratio is >2, the equilibrium const. is independent of this ratio, but with the more acid slags the const. increases rapidly with the SiO_2 content, the increase being almost linear with 40—65% SiO_2. The effect of temp. on the const. is small. The Mn distribution reaches equilibrium values under basic slags only after the P reaction has reached equilibrium. A. R. Powell.

Physico-chemical principles for determining the relations between steel bath and slag. G. Tammann (Arch. Eisenhüttenw., 1931—2, **5**, 71—74).—Equations are derived, based on the electrochemical theory of the equilibria between a liquid metal mixture and a liquid electrolytic mixture (slag), by means of which it is possible to calculate the distribution of alloying elements between the metal bath and the slag layer in concentrations at which the laws applicable to dil. solutions apply. A. R. Powell.

Decarbonisation and desulphurisation of steel and pig iron by means of hydrogen. J. Ciochina (Stahl u. Eisen, 1931, **51**, 1024—1026).—Removal of C from Fe and steel by heating in H_2 starts at 700° and is rapid above 1000°, the rate of removal increasing with the C content. Desulphurisation of pig Fe in a H_2 atm. commences at about 650°, but is slow below 1100° and complete only at 1400—1450°; at 1480° the rate is much reduced from the max. Passing H_2 through molten pig Fe gives a high-quality cast Fe free from slag and oxide inclusions; under the same conditions steel is converted into Fe of Armco quality (99·75% Fe). The mechanical properties of Fe treated with H_2 are much superior to those of similar metal deoxidised in the usual way. A. R. Powell.

Field of the $\delta \rightarrow \alpha$-transformation in the iron-nickel system. H. Bennek and P. Schafmeister (Arch. Eisenhüttenw., 1931—2, **5**, 123—125).—Thermal analysis of Fe alloys with $<$ 50% Ni under retarded rates of cooling of 0·17—2° per sec. has confirmed the general shape of the liquidus and solidus curves, and of the δ- and α-fields, as found by Hanson and Freeman (B., 1923, 660 A) and by Kasé (A., 1927, 830). The peritectic horizontal, however, extends from 4 to 12% Ni at 1497°. This is at variance with Vogel's results (A., 1925, ii, 709), but the effects tend to be masked by supercooling. A. R. Powell.

Effect of the alloying elements, nickel, silicon, aluminium, and phosphorus, on the solubility of carbon in liquid and solid iron. E. Söhnchen and E. Pivovarsky (Arch. Eisenhüttenw., 1931—2, **5**, 111—121).—The solid solubility of C in Fe increases linearly with the temp. from 0·84% at 733° to 1·85% at the eutectic temp., 1152°; addition of Ni displaces this line progressively towards the Fe side, *i.e.*, Ni reduces the solid solubility of C in Fe almost linearly and depresses also the eutectoid transformation temp. Si reduces the solid solubility of C in Fe and raises the eutectoid temp. to 940° with 5·7% Si. Al has a similar effect to Si. The effects of Si and Ni are additive, at least up to 2% Si and 4% Ni. P up to 0·5% slightly reduces the solid solubility of C in Fe, but more than 0·5% P has no further action. In molten Fe the solubility of C is reduced more by addition of Al than by addition of Si up to 3%, after which Si has the more powerful depressing effect. The hardness of high-C alloys is almost halved by addition of 1% Si; further Si reduces the hardness much more slowly. The hardness curve of highly carburised Fe to which Ni is added shows two maxima at 1% and 10% Ni and flat minima at

6% and 14% Ni. Up to 1% Al halves the hardness of Fe–C alloys; further addition up to 8% has little effect, and after this the hardness rises sharply to its original value with 11% Al. A. R. Powell.

Determination of sulphur in cast iron and hæmatite. G. Zenker (Arch. Eisenhüttenw., 1931—2, 5, 101—103).—Equally good results are obtained by the $FeCl_3$–Et_2O, direct combustion, and evolution methods; the second procedure is recommended as the most rapid. A. R. Powell.

Determination of sulphur in alloy steels. C. Holthaus (Arch. Eisenhüttenw., 1931—2, 5, 95—99).—A crit. investigation of various methods of determining S in alloy steels shows that satisfactory results are obtained only by the method involving removal of $FeCl_3$ by Et_2O, and, much more rapidly, by the combustion method. The evolution method is satisfactory only when the steel has a low Ni content or is a plain Co, Cu, Al, Mn, or Cu steel; erratic results are obtained with V steels and entirely erroneous results with steels containing W, Cr, Mo, Ti, or a high Ni content. The I method is tedious and subject to numerous sources of error. A. R. Powell.

Determination of small quantities of phosphate by Pouget and Chouchak's method: determination of phosphorus in small samples of steel. S. G. Clarke (Analyst, 1931, 56, 518—525).—The method of Pouget and Chouchak (A., 1909, ii, 266), depending on the measurement of opacity caused by the formation of strychnine phosphomolybdate, is recommended. Considerable modifications are introduced, however, both as regards the prep. of the reagents and general procedure. T. McLachlan.

Use of potentiometric methods in steelworks' laboratories. II. Rapid determination of vanadium. G. Thanheiser and P. Dickens (Arch. Eisenhüttenw., 1931—2, 5, 105—110).—The steel is dissolved in 30 c.c. of 15% H_2SO_4 and 50 c.c. of H_3PO_4 (d 1·3) and the hot solution oxidised with $KMnO_4$, excess of which and any CrO_3 formed are reduced with $FeSO_4$. After dilution with 200 c.c. of 10% H_2SO_4, the cold solution is again oxidised with an excess of $KMnO_4$, 25 c.c. of 1·25% $H_2C_2O_4$ solution are added to reduce the $KMnO_4$, and, when the potential is const., the V_2O_5 is titrated potentiometrically with $FeSO_4$. Good results are obtained by the use of a comparison solution and galvanometer as indicator. A. R. Powell.

Effect of small quantities of impurities in metals. W. Fraenkel (Z. Metallk., 1931, 23, 221—224).—The effect of small quantities of impurities on the m.p., physical and mechanical properties, recrystallisation, corrosion, deoxidation, and gas content of metals is discussed with especial reference to Cu. The recrystallisation temp. of Cu is increased by 100° by 0·1% Si and by 130° by 0·1% Mg. In Cu deoxidised with P max. electrical conductivity is obtained when the metal contains 0·01% P, when sp. gr. is also a max. The tensile strength and ductility, however, rise still further with increase in P up to a total of 0·1%. A. R. Powell.

Problem of grain segregation [in alloys]. E. Scheuer (Z. Metallk., 1931, 23, 237—241).—Formulæ are derived for calculating the composition of the mixed crystals which separate from a molten alloy in relation to the proportion of the alloy which has crystallised, assuming that no diffusion occurs during solidification. From these formulæ the composition of the α-solid solution and the two stages of solidification can be calc. when the system contains a miscibility gap. The smallest possible average concentration of the α-solid solution is much below the equilibrium concentration of the system, and only in the case of eutectic alloys or alloys which solidify at const. temps. are saturated mixed crystals formed without diffusion. In the α-range in the Al–Cu and Cu–Sn systems the alloys solidify almost without diffusion; in the Al–Zn system they solidify with appreciable, and in the Cu–Zn system with almost complete, diffusion. A. R. Powell.

Effect of temperature on corrosion of zinc. G. L. Cox (Ind. Eng. Chem., 1931, 23, 902—904).—Samples were rotated in aerated, distilled H_2O at 20—100° for 15 days, the corrosion products being examined and removed, and loss in weight of the Zn determined. At 20—50° the corrosion products were gelatinous and adherent, forming a protective film; at 55—75° they were granular and non-adherent, at 95—100° dense and adherent. A graph, correlating temp. and corrosion rate, expressed as penetration in cm./year, showed slight increase in corrosion up to 50°, rapid increase with rising temp. to a max. at 65°, and then rapid decrease. The results confirm the predominating influence of the corrosion products on the corrosion, as compared with the temp. coeff. of the sp. reaction rate, the rate of transfer of O_2 through the liquid, or the O_2 solubility. W. J. Wright.

Distillation phenomena in brazing with zinc-copper alloys. W. Claus (Z. Metallk., 1931, 23, 243—244).—From Merz and Brennecke's study of the mechanism of soldering (B., 1930, 1073) it would appear that a high brazing temp. facilitates diffusion and therefore gives a sounder joint. For practical brazing purposes, however, a high temp. is unsuitable, as not only does it result in the formation of undesirable intermediate layers which may have a low tensile or impact strength, but there is danger of serious loss of Zn by distillation. An example is quoted in which droplets of Zn containing 93% Zn and 1·6% Cu were collected from an Fe pipe which had been brazed with a 53 : 47 brass. A. R. Powell.

Miscibility gap in the lead-copper and lead-copper-tin systems. S. Briesemeister (Z. Metallk., 1931, 23, 225—230).—Above 1000° Cu and Pb are miscible in all proportions; the boundary between one and two liquid phases starts from the monotectic line at 954° at 60%, extends in a smooth parabolic curve to the end of this line at 7·5% Cu, and reaches its max. at 998° with 35% Cu. Addition of Sn broadens the miscibility gap, min. solubility of Pb being reached when Cu and Sn are in the proportion of Cu_3Sn. The crit. point of the ternary system occurs at 1130—1140° with the alloy containing 35% Cu, 50% Pb, and 15% Sn. The composition of the common Pb bronzes is well outside the miscibility gap. A. R. Powell.

Effect of cold-stretching [of copper and aluminium] on the plasticity at high temperatures. E. Schmid and G. Wassermann (Z. Metallk., 1931, 23, 242—243).—At temps. above 200° hard-drawn Cu wire is much more plastic than wire that has been annealed at 600°, the elongation at 350° of hard wire being 4 times that of soft wire in 15 min. Al wires behave similarly. This behaviour is attributed to the greater mobility of the atoms in the distorted lattice at high temps. at which there is an increased tendency for them to rearrange themselves into new undistorted crystals.

A. R. Powell.

Constitution of the aluminium-rich aluminium–iron–silicon alloys. V. Fuss (Z. Metallk., 1931, 23, 231—236).—A micrographical study of numerous alloys in the Al corner of the ternary diagram has shown that FeSi does not exist in this region, which contains only the following solid phases: Al_3Fe, Al, Si, and the ternary compound $Al_6Fe_2Si_3$ which decomposes on melting into $FeAl_3$ and Si and forms no solid solution with Al. The ternary compound forms eutectics with Si and with Al–Si solid solution and a ternary eutectic (12·5% Si, 0·5% Fe, 87% Al, m.p. 510°) with both. Two other binary eutectics also occur, one rich in Si and the other between $FeAl_3$ and Si-saturated Al.

A. R. Powell.

Working up of colloidal mercury emulsions. J. Pospíšil (Chem.-Ztg., 1931, 55, 645—646).—Available methods for working up the Hg emulsions resulting from several technical operations have been examined and the yields obtained are generally low. A yield of almost 100% may be obtained by extracting the emulsion twice with light petroleum, drying the residue, and distilling under reflux for some hours, when the vapour condenses to large drops of Hg and org. matter is carbonised.

E. S. Hedges.

Electrodeposition of chromium and influence of the cathode metal. J. W. Cuthbertson (Trans. Amer. Electrochem. Soc., 1931, 59, 249—272).—The range of permissible SO_4'' concentration in Cr-plating baths operated at about 40° contracts with increasing CrO_3 concentration (especially if Fe is present), so that the CrO_3 should not exceed 3·25*M*. With higher CrO_3 concentrations the current efficiency falls but the range of permissible c.d. is not much reduced except at higher temps. With lower CrO_3 concentrations, raising the temp. increases the current efficiency and widens the range of c.d. for bright plating, but too high a temp. increases the equilibrium concentration of $Cr^{\cdots}$. The use of Fe anodes is condemned because Fe in the bath contracts the range of permissible SO_4'' concentration, increases the optimum ratio of CrO_3 to SO_4'' concentrations and the resistance of the solution, and causes accumulation of $Cr^{\cdots}$ owing to the low O overvoltage of Fe. Pb anodes and tanks lined with antimonial Pb keep down the concentration of $Cr^{\cdots}$. For plating on Fe, steel, or Ni the ratio of CrO_3 molarity to SO_4 normality should be as high as 60. Owing to the low H overvoltage of these metals, the high initial c.d. necessary to start deposition liberates much H_2 and causes internal strains, and on lowering the c.d. the structure of the deposit tends to change. Hence for deposition on Fe or steel an undercoat of a metal of moderately high H overvoltage, *e.g.*, Cu, increases the throwing power of the Cr-plating bath and gives Cr deposits more resistant to corrosion. In these respects Ni is not good as an undercoat, but it is frequently used because it leads to harder and brighter Cr deposits. The deposition of Ni undercoats on Zn and Al is described. Improved agitation and the use of specially-shaped anodes are suggested as means of increasing the throwing power of Cr-plating baths. H. J. T. Ellingham.

Thick chromium-plate. R. J. Piersol (Chem. Met. Eng., 1931, 38, 445—448).—For thick deposits Cr is plated directly on to the foundation metal. The hardness, porosity, and internal stress of the plate are influenced by the c.d., temp., concentration of CrO_3, SO_4'', and $Cr^{\cdots}$ ions, and by added ingredients, *e.g.*, Fe; these variables are interrelated. Shaped anodes are used to ensure uniform current distribution, as the rapid increase of current efficiency with c.d. tends to non-uniform deposition. There should be thermostatic control of the plating bath and continuous filtration of the plating liquid and maintenance of the concentration of CrO_3 and SO_4 ions. Pb-lined tanks and Pb anodes should be used. The article to be plated should be washed in grease solvent, *e.g.*, fish oil, and then cleaned in an electric cleaner. No fume preventive, *e.g.*, a layer of kerosene on the plating bath, should be used. A 5000-amp. motor will plate 10 sq. ft. at the rate of 0·002 in./hr. The economics of Cr-plating are given.

D. K. Moore.

Tarnishing of chromium-plated brass. W. M. Phillips (Trans. Amer. Electrochem. Soc., 1931, 59, 397—398).—Tarnishing of Cr-plated brass or Cu articles is attributed to absence or insufficient thickness of the Ni undercoat. Outdoor exposure tests show the importance of an adequate Ni-coating as a preliminary to Cr-plating on steel. H. J. T. Ellingham.

Control of acidity in low-p_H nickel-plating baths. L. C. Pan (Trans. Amer. Electrochem. Soc., 1931, 59, 295—302).—For a low-p_H bath with given concentrations of $NiSO_4$, $NiCl_2$, and H_3BO_3, control of the total acidity, determined by titration with 0·1*N* aq. NH_3, is sufficient to keep plating conditions const. A chart is provided to facilitate calculation of the amount of acid or alkali to be added to a bath in order to correct any deviation from the optimum acidity for a given bath composition.

H. J. T. Ellingham.

Further developments in low-p_H nickel deposition. W. M. Phillips (Trans. Amer. Electrochem. Soc., 1931, 59, 393—396; cf. B., 1931, 161).—Steel plated successively with Cu, Ni, and Cr was much less liable to atm. corrosion if the Ni had been deposited from low- instead of high-p_H baths. The hardness of Ni deposits is scarcely affected by the p_H, but with given p_H and c.d. it decreases with rise in temp. At a given temp. low-p_H baths can be operated at a higher c.d. (20 amp./sq. ft. at 38°) without causing peeling of the deposit. In order to avoid roughness of heavy deposits from such baths, the work must be free from adhering particles of impurities, the anodes should be enclosed in muslin bags, and the solution filtered comparatively often. The higher the $NiSO_4$ concentration, the wider is the permissible range of operating conditions for solutions of given p_H. H. J. T. Ellingham.

Preparation of pure electrolytic nickel. III. Chemical and physical properties. C. G. Fink and F. A. Rohrman (Trans. Amer. Electrochem. Soc., 1931, **59**, 399—408).—Electrolytic Ni prepared by the method previously described (A., 1930, 1382) is shown spectrographically to be free from all probable impurities (including Co and Fe) except for a trace of Cu (too small to be determined), but it contained traces of Na and B derived from the Na borate buffer used in the bath. These latter impurities can be avoided by using only NH_4 salts as buffers. The pure Ni gave a temp. coeff. of electrical resistivity of 0·00640 and had m.p. 1458°.

H. J. T. Ellingham.

Electrodeposition of silver from sulphate, nitrate, fluoborate, and fluoride solutions. E. B. Sanigar (Trans. Amer. Electrochem. Soc., 1931, **59**, 359—379).—Relatively compact deposits of Ag were obtained on a Ag surface, but, owing to simple immersion deposition, not on baser metals, from solutions of $Ag_2SO_4 + H_3BO_3$ or $Fe_2(SO_4)_3$; $AgNO_3 + H_3BO_3$; $AgBF_4$; or AgF; but all the deposits except two from $AgBF_4$ solution were more or less coarsely cryst. and tended to form trees. Also corrosion of the anode was generally poor or irregular. Even the best deposits from the $AgBF_4$ bath did not compare favourably with those from the usual argenticyanide solution for plating purposes.

H. J. T. Ellingham.

Silver-plating solutions. B. Egeberg and N. Promisel (Trans. Amer. Electrochem. Soc., 1931, **59**, 339—357).—The effects of temp., c.d., and the concentrations of Ag, cyanide, carbonate, and CS_2 on the resistivity, polarisation, throwing power, and appearance of the plate in the deposition of Ag from Na and K argenticyanide solutions are shown by a series of curves. Many difficulties with new solutions are removed by an initial addition of carbonate, which decreases the resistivity and increases the throwing power. The formation of black slime on the anodes is avoided if the anodic polarisation is kept down by increasing the cyanide or decreasing the carbonate content. Addition of CS_2 decreases cathodic polarisation, but lowers the throwing power. The max. c.d. permissible without "burning" the deposit is raised by increasing the temp., the agitation, and the CS_2 content, and by using KCN instead of NaCN. Baths prepared from KCN have a higher conductivity, tend to give deposits of better appearance, and permit a higher cathodic polarisation before burning occurs. A slightly higher cyanide content is needed to maintain a low anodic polarisation with KCN solutions, but this polarisation increases only slightly with increase of carbonate concentration. The throwing power of these plating solutions appears to be increased by decrease of temp. or Ag content, or by increase of c.d. or concentration of cyanide or carbonate.

H. J. T. Ellingham.

Change in reflecting power caused by tarnishing electrodeposited silver-cadmium alloys. L. E. Stout and W. G. Thummel (Trans. Amer. Electrochem. Soc., 1931, **59**, 303—314).—Ag–Cd has been electrodeposited under various conditions from unagitated baths prepared by mixing a bright Cd-plating solution (B., 1929, 560) with varying proportions of an argenticyanide solution. Insol. anodes were used. The ratio Ag : Cd in the deposit is approx. proportional to the corresponding ratio in the solution, but decreases with increase of c.d. in a bath of given composition. Alloys of moderate Ag content had a reflecting power approaching that of Cd (very much lower than that of Ag), but were much harder and more resistant to abrasion than was electrodeposited Cd and suffered little loss of reflecting power on immersion in a Na polysulphide solution under conditions which reduced the reflecting power of Ag to about 11% of its original value. An alloy containing about 24% Ag seems to be particularly suited for use as a reflecting surface in these respects.

H. J. T. Ellingham.

Electrodeposition of tungsten from aqueous solutions. C. G. Fink and F. L. Jones (Trans. Amer. Electrochem. Soc., 1931, **59**, 273—293).—Thin, Ag-white deposits of W can be obtained on brass by electrolysis of alkaline tungstate solutions above 60°. Baths prepared by dissolving WO_3 in NaOH solutions require an addition agent such as dextrose, apparently for regulating $[H^\cdot]$, but this is unnecessary if the WO_3 is dissolved in Na_2CO_3 solution saturated at 100°. C.ds. up to 400 amp./sq. ft. give good deposits, but the best current efficiency is attained by operation at 75—100 amp./sq. ft. The effects of WO_3 concentration and temp. on the quality of the deposit were examined. In all cases the current efficiency is very low. Pt anodes are employed since W anodes dissolve at high current efficiency and the alkalinity of the bath falls. Using Ni anodes deposits of Ni–W alloys insol. in HCl or NaOH solutions were obtained; Fe–W alloys were also prepared. The W deposits exhibit considerable resistance to corrosion if free from pits and flaws. Previous work on the electrodeposition of W is reviewed and the theory of the present method discussed. H. J. T. Ellingham.

Definition and determination of "free cyanide" in electroplating solutions. W. Blum (Trans. Amer. Electrochem. Soc., 1931, **60**, 21—26).—In view of the uncertainty as to the nature of the compounds existing in complex metallic cyanide solutions it is proposed to define the term "free cyanide" arbitrarily but unambiguously as the excess of alkali cyanide above the min. required to give a clear solution. The problem of the analytical determination of this quantity is discussed.

H. J. T. Ellingham.

See also A., Sept., 1005, **Systems Al–Ag and Cr–C.** 1016, **Transformation of white into grey tin.** 1018, **Electrolytic separation of Nb and Ta.** 1025, **Determining O in Al.** 1026, **Determining mixed Cr and Ni in solution.**

Patents.

Reduction of ores with gases. F. M. Wiberg (B.P. 352,580, 23.4.30. Swed., 6.7.29).—The hot reducing gas is passed through a series of vertical chambers containing the ore in such a way that it passes downwards through the first chamber and upwards through the second, and so on. When the reducing power of the gas is considerably lowered part is withdrawn from the system and passed to a regenerator (*e.g.*, a glowing column of coke), whilst the remainder effects a preliminary reduction of the ore in the succeeding chambers, and finally by admission of air is burned in the last chambers to preheat the ore therein. As reduction is completed, the chambers are cut out of the circuit, emptied, refilled, and passed to the end of the series. A. R. Powell.

Reducing the iron in iron oxides to its metallic form. W. W. Percy (U.S.P. 1,792,507, 17.2.31. Appl., 10.6.26).—Preheated Fe ore is fed continuously into a vertical shaft up which is passed a current of hot water-gas or producer gas. The reduced Fe sponge is withdrawn from the bottom of the shaft, and the gases from the top (comprising equal vols. of CO and CO_2) are passed downwards through a glowing mass of incandescent C from a hydrocarbon fuel contained in a bottom-blown gas regenerator, the hot gases from which are returned to the reducing chamber. A. R. Powell.

Manufacture of open-hearth steel. A. L. Feild, Assr. to Republic Steel Corp. (U.S.P. 1,794,068, 24.2.31. Appl., 29.7.26).—Steel is refined in the open-hearth furnace by maintaining on the top of the liquid metal a slag containing a const. % of FeO, determined according to the equation $dx/dt = 0{\cdot}0000757kw \times (1{\cdot}08 - 1/x)$, where dx/dt is the desired rate of C elimination, k is a const., w the % of FeO in the slag, and x the % C in the metal after time t. A. R. Powell.

Heat-treating furnace [for sheet steel]. R. S. Cochran, Assr. to Surface Combustion Co., Inc. (U.S.P. 1,792,074, 10.2.31. Appl., 3.10.28).—Steel sheets are conveyed through an elongated furnace on a hearth composed of longitudinal bars which alternately advance in a raised position and recede while lowered; the bars are deep in proportion to their width and are formed with transverse apertures through which gases pass from burners alternately on either side. To prevent the long edges of the sheets from bending, the sheets are encouraged to become corrugated transversely by forming the bars with a wavy upper surface. B. M. Venables.

Heat-treatment of iron and steel sheets. H. M. Cox and C. M. Smith, Assrs. to Republic Steel Corp. (U.S.P. 1,792,573, 17.2.31. Appl., 31.1.29).—Mild steel sheets (0·07—0·20% C) are heated at 720° for 3 min., then at 985° for 3 min., cooled rapidly to 595°, maintained at this temp. for 1 min., reheated at 750° for 4 min., and allowed to cool slowly in the furnace to 590° and then normally in the air. Sheets thus treated have the good drawing and stamping properties of normalised sheets combined with the softness of box-annealed sheets, and can be stamped or deep-drawn without wrinkling or cracking. A. R. Powell.

Production of pure iron. W. G. Clark (U.S.P. 1,792,967, 17.2.31. Appl., 22.4.29).—Air is blown through molten Fe in a Bessemer converter until 75% of the Fe is converted into oxide; the air is then replaced by He, A, or N_2, and this in turn is replaced by H_2, which rapidly reduces the oxide to pure Fe containing $<0{\cdot}002\%$ C. A. R. Powell.

Casting. [Manufacture of cast iron.] E. R. Williams, Assr. to Vulcan Mold & Iron Co. (U.S.P. 1,793,268, 17.2.31. Appl., 22.6.29).—Cast Fe having a pearlitic structure is produced by melting in a cupola a charge with a low content of C and Si with sufficient Na_2CO_3 to reduce the S content below 0·05%, casting the charge into cold moulds, and allowing the castings to cool at a normal rate. A. R. Powell.

[Iron] ingot mould. E. R. Williams, Assr. to Vulcan Mold & Iron Co. (U.S.P. 1,795,065, 3.3.31. Appl., 22.6.29).—The mould is made of cupola-cast Fe containing $<0{\cdot}05\%$ S, which is claimed to have a high resistance to cracking through sudden expansion. A. R. Powell.

Case-hardening [of iron]. J. J. Egan, Assr. to Electro Metallurg. Co. (U.S.P. 1,793,309, 17.2.31. Appl., 26.2.30).—Ferrous metals are case-hardened by heating them at 460—580° in a 4 : 6 mixture of NH_3 and NO. A. R. Powell.

Manufacture of shaped articles from metal [iron] powders. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,562, 21.8.30).—Shaped metal articles produced from powdered Fe (carbonyl method) are sintered in such a position that the direction in which max. shrinkage occurs is about vertical, so that the sintered article is free from cracks. A. R. Powell.

Apparatus for treating flexible metal bodies, cleaning iron wires, bands, etc. F. M. Dorsey, Assr. to Madsenell Corp. (U.S.P. 1,793,914, 24.2.31. Appl., 2.9.27).—The wire is anodically treated by passing it up and down through a bath of conc. H_2SO_4 over pulleys arranged alternately at the top and bottom so that the wire in its passages through the bath passes continuously between a series of cathodes. Means are provided for turning the wire to and fro about its longitudinal axis. A. R. Powell.

[Inhibitor for] pickling metals [iron]. V. Voorhees, Assr. to Standard Oil Co. (U.S.P. 1,793,146, 17.2.31. Appl., 18.1.28).—The pickling bath is made up wholly or in part from acid sludge derived from the treatment of cracked petroleum oil with H_2SO_4, the org. compounds contained therein acting as inhibitors in the pickling of ferrous metals. A. R. Powell.

Inhibitor for [steel-]pickling baths. E. C. Wright, Assr. to Nat. Tube Co. (U.S.P. 1,792,958, 17.2.31. Appl., 19.6.29).—The inhibitor is prepared by allowing H_2SO_4 to react for 24 hr. with half its vol. of coal tar (boiling range 270—350°). A. R. Powell.

Manufacture of rustless iron alloys. F. M. Becket and J. H. Critchett, Assrs. to Electro Metallurg. Co. (U.S.P. 1,793,153, 17.2.31. Appl., 20.7.27).—Fe–Cr alloys containing $>2\%$ C are blown in a side-blown converter with gases containing 50—100% O_2, whereby a temp. above 1600° is obtained at which all the impurities are oxidised and the C is reduced below 0·2% without appreciable oxidation of the Cr. A. R. Powell.

Steel capable of resisting rust and corrosion. R. Kesselring and J. Nowak (B.P. 354,177, 31.3.30. Ger., 30.3.29).—The steel is free from Si and contains 0·1—1% Cr, 0·25—0·5% Cu, 0·04—0·25% Ni, and 0·01—0·05% W, and is made by adding a ledeburitic cast-Fe alloy, containing Cr, Cu, Ni, and W, but free from graphite, to steel produced in the usual manner. A. R. Powell.

Welding electrode. J. G. Rutter, Assr. to Westinghouse Electric & Manuf. Co. (U.S.P. 1,794,983, 3.3.31. Appl., 29.6.28).—For welding ferrous metals and alloys a welding rod comprising 65—45 (58)% Fe and 35—55 (42)% Ni and having its surface Cu-plated is claimed. Owing to the low coeff. of expansion of this alloy the weld is free from internal stress and has no tendency to warp.
A. R. Powell.

Welding of steel parts. L. C. Delachaux (B.P. 352,714, 30.6.30. Fr., 27.7.29).—For welding air-quenching steel having a Brinell hardness above 220 the welding rod contains up to 5% Ni, 2% Cr, 1% Mo, and 1·5% W, together with extra C up to 0·7% and, if desired, deoxidising metals, *e.g.*, up to 1% Al, Ti, or B. The composition is so regulated that the weld has the same Brinell hardness and mechanical properties as the metal to be welded.
A. R. Powell.

Metal cement [for welding cutting-tool edges to shafts]. W. R. Chapin (U.S.P. 1,793,156—7, 17.2.31. Appl., 4.1.30).—A welding powder for joining WC and high-speed steel tips to steel shafts comprises (A) 65% of Si–Mn, 25% of fine steel filings, and 10% of $Na_2B_4O_7$, or (B) 40% of Si–Mn, 25% of powdered Cu, 25% of steel filings, and 10% of $Na_2B_4O_7$.
A. R. Powell.

Uniting iron with other alloys or elements [to form alloys without fusion]. W. H. Smith (U.S.P. 1,793,757, 24.2.31. Appl., 5.2.27).—A mixture of sponge Fe and the powder of the element to be alloyed with it is compressed into the desired form, which is then heated until the mass sinters and becomes plastic; it is then worked into the final shape by the application of pressure.
A. R. Powell.

Magnetic material. [Nickel–cobalt–iron alloy.] G. W. Elmen, Assr. to Bell Telephone Labs., Inc., (U.S.P. 1,792,483, 17.2.31. Appl., 31.5.29).—Alloys containing 10—80% Ni, 5—80% Co, 9—50% Fe, and 1—10% Cr, together with small amounts of one or more of the elements, Mo, W, Mn, V, Ti, Ta, Zr, Cu, and Si, and heat-treated to have an initial permeability above 200, are claimed.
A. R. Powell.

Concentration of cassiterite ores and the like [by flotation]. E. J. Lawrence and J. A. Daniel (B.P. 354,395, 24.7.30).—The cassiterite particles are superficially metallised by nascent H generated from Zn dust coated with Sn or from a powdered Sn–Zn alloy containing 1% Sn, and the pulp is then subjected to a flotation process.
A. R. Powell.

Selective agent for concentrating ores. R. Luckenbach (U.S.P. 1,792,544, 17.2.31. Appl., 28.11.28).—The agent claimed is a mixture of 3 pts. of candle tar, 1 pt. of petroleum, and 1 pt. of Na_2SiO_3. This is fed on to an inclined moving belt down which the ore pulp is allowed to run; the sulphides, metals, and oxidised metallic minerals adhere to the oiled belt and are scraped off when the gangue and water have been removed.
A. R. Powell.

Aluminium–copper light-metal alloys. O. Kamps (B.P. 354,202, 2.5.30).—The alloy comprises Al with 2—5% Cu, 0·2—1% Ag, 0·02—0·2% Tl, 0·2—0·8% Ni, and 0·1% Pd or V. Prior to casting, the molten alloy is treated with an Al cartridge containing $SrCl_2$.
A. R. Powell.

Production of oxidic coatings on articles made from aluminium and its alloys. R. E. Müller (B.P. 352,656, 26.5.30. Ger., 24.5.29).—In the production of protective oxide coatings on Al articles by electrolysis, minute particles of Fe_2O_3, CuO, SiO_2, or MnO_2 are incorporated into the oxide film. This may be effected by first coating the metal with a thin film of Fe, Cu, or Mn, and then subjecting it to anodic oxidation. [Stat. ref.]
A. R. Powell.

Fabrication of [nickel or cobalt] metal-coated articles. F. V. Knauss, Assr. to Madsenell Corp. (U.S.P. 1,793,936, 24.2.31. Appl., 31.1.25).—Ferrous metal articles are given a soft malleable coating of Ni in a sulphate bath containing chloride and boric acid, and the plated articles are subjected to cold-work, then passivated by anodic oxidation in a bath containing $> 85\%$ H_2SO_4, and finally again plated with Ni from a bath which yields hard wear-resisting deposits.
A. R. Powell.

Compound-coated metallic bodies and application of such coatings. Electrical Res. Products, Inc., Assees. of E. G. Sturdevant (B.P. 354,185, 29.4.30. U.S., 8.6.29).—A warm, plastic mixture containing reclaimed rubber 25%, smoked sheet rubber 20%, mineral rubber 5%, ZnO 5%, S 2%, pine tar 2%, whiting 38·5%, and oleic acid 2·5% is extruded on an electrical conductor and vulcanised.
J. S. G. Thomas.

Metal [aluminium] alloys. C. Vangrevenynge, and Soc. les Fils de V. Bidault et Cie. (B.P. 352,759, 30.7.30. Fr., 7.1.30).—Alloys of Al with 1·5—5 (3·4)% Cu, 0·25—2·5 (0·5)% Ni, 0·25—1·5 (0·5)% Cr, and 0·25—2 (0·75)% Mg are claimed. After quenching from 500° and ageing at the ordinary temp. for 8—10 days, the alloys have a tensile strength of 45 kg. per sq. mm. and an elongation of 20%.
A. R. Powell.

Production of light-metal pistons running in cylinders of harder material. F. Fehrenbach (U.S.P. 1,792,580, 17.2.31. Appl., 12.8.27).—The pistons are made by casting an alloy of Al with > 18 (*e.g.*, 20—25)% Si to which has been added 5% of finely-divided hard metal which is almost or entirely insol. in solid Al. The castings are immediately chilled, whereby the hard metal becomes distributed over the surface, thus increasing its wearing properties.
A. R. Powell.

Manufacture of tungsten carbide alloys. J. T. Terry (U.S.P. 1,792,943, 17.2.31. Appl., 22.12.28).—W powder mixed with CaO is fused in a graphite crucible in a resistance furnace, whereby a layer of WC containing no free graphite is formed below the CaC_2 slag.
A. R. Powell.

Manufacture of hard metal compositions [cobalt–tungsten carbide]. (A) F. C. Kelley, and (B) S. L. Hoyt, Assrs. to Gen. Electric Co. (U.S.P. 1,794,300 and 1,794,229, 24.2.31. Appl., [A] 7.1.28, and [B] 5.12.29).—(A) A mixture of W with 3—10% C and $< 25\%$ Co is ground intimately, moistened with $COMe_2$, and rubbed into a stiff paste with 2% of a glycerol–phthalic anhydride resin. The paste is shaped, dried, and sintered under pressure at 1375°. (B) A mixture of 97—80% WC and 3—20% Co in powder form is pressed

into bars which are sintered at 1375° and worked into the desired shape by pressure at this temp.
A. R. Powell.

Lead-purifying process. J. B. Schuettenhelm, Assr. to Bunker Hill & Sullivan Mining & Concentrating Co. (U.S.P. 1,794,647, 3.3.31. Appl., 31.3.30).—Cu and As are removed from Pb by treating the molten metal with NH_4Cl in a closed Fe pan containing a revolving paddle inside a centrally disposed cylindrical chamber through which the Pb and NH_4Cl are caused to circulate by the rotation of the paddle.
A. R. Powell.

Alloys of palladium, silver, and copper. Internat. Nickel Co., Inc., Assees. of E. M. Wise (B.P. 354,216 and 354,239, 28.1.30. U.S., 28.1.29).—(a) The alloy contains 25—98% Pd, 50—1% Cu, and $>1\%$ Ag, preferably 40—50% Pd, 14—30% Cu, and the remainder Ag. The alloys can be hardened by quenching from above 750° and tempering at 350—550°, preferably 450°. (b) An alloy of Ag with $<25\%$ Pd and 1—50% Cu deoxidised with Zn, Mn, B, Si, Mg, or Ca is claimed.
A. R. Powell.

Manufacture of chromium or its alloys. Gen. Electric Co., Ltd., and C. J. Smithells (B.P. 354,387, 10.5.30).—Cr or its alloys are melted in H_2, and this atm. is replaced by one of N_2 about 15—60 sec. before casting.
A. R. Powell.

Forming floating metal powders. J. R. Cain, Assr. to Richardson Co. (U.S.P. 1,794,585, 3.3.31. Appl., 3.5.26).—Metal powder is moistened with C_6H_6, which is evaporated by gentle heating; the powder will then float on the surface of aq. solutions. Fe powder so treated will float on $CuSO_4$ solution and the Fe will be replaced by Cu, which will also float; if this floating Cu film is made the cathode in the $CuSO_4$ solution a thin Cu foil is readily obtained.
A. R. Powell.

Continuous chromium-plating of metallic wires or strips. B. V. McBride, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 1,794,973, 3.3.31. Appl., 27.3.28).—The wire or strip is drawn continuously through a Cr-plating bath downwards between insol. anodes, horizontally along the bottom underneath an insulating diaphragm, and upwards out of the bath between a second series of insol. anodes, so that at all times when the metal is being plated it is equidistant at all parts from the anodes, but is protected from the action of the current during its passage across the bottom of the bath.
A. R. Powell.

Fractionally [chromium-]plating objects. V. L. Soderberg (U.S.P. 1,794,929, 3.3.31. Appl., 7.5.27).—The parts of the article which are not to be plated are covered with a film of nitrocellulose lacquer.
A. R. Powell.

Plating of metallic surfaces [with chromium]. E. O. Dunkley, Assr. to Standard Oil Co. of California (U.S.P. 1,793,069, 17.2.31. Appl., 23.1.28).—The interior of cylindrical oil-refining vessels is plated with Cr by means of a continuous, ring-like, electrolyte chamber, the outer wall of which is formed by the inner wall of the vessel to be plated. The chamber contains a cylindrical anode along its inner wall, and is adapted to be moved up and down the walls of the vessel; means are provided also for keeping the electrolyte at a const. level in the chamber.
A. R. Powell.

Electrodeposited [nickel] diaphragm. A. Hewitt, Assr. to Victor Talking Machine Co. (U.S.P. 1,793,483, 23.2.31. Appl., 11.5.26).—An acoustic diaphragm of thin Ni sheet is produced by the electrodeposition of Ni on a rotating cathode mould having a corrugated surface, a uniform thin layer being first formed and the deposition subsequently continued while part of the cathode is shielded.
A. R. Powell.

Electroplating zinc on (a—c) **iron or steel,** (c) **ferrous articles.** (a, b) S. H. Davis, C. O. Anderson, W. N. Smith, H. R. Hanley, with, in (c), R. J. Stengl, Assrs. to Century Zinc Co. (U.S.P. 1,795,079—1,795,081, 3.3.31. Appl., [a] 12.9.28, [b] 2.11.28, [c] 13.3.29. Renewed [b] 21.8.30).—(a) The process claimed utilises as electrolyte the purified leach liquor obtained by leaching roasted Zn ores with dil. H_2SO_4. The articles are cleaned in the usual way, given a flash coating of Zn in a feebly acid $ZnSO_4$ solution at 120 amp./sq. ft., and finally plated to the desired thickness at 60 amp./sq. ft. in a bath containing 10% H_2SO_4. In both plating operations insol. anodes are used and the electrolyte from the second operation is progressively returned to the leaching tank as its acidity increases and is replaced by electrolyte from the first plating bath, which is made up directly from the purified leach liquor. (b) The articles are first plated with a thin film of Pb which is brushed or burnished into the surface before the Zn coating is applied. (c) Three Zn coatings are given, the first at 100 amp./sq. ft. from a bath containing 2% of H_2SO_4, the second at 150 amp./sq. ft. from a solution containing 5% H_2SO_4, and the third at 100 amp./sq. ft. from the same solution.
A. R. Powell.

Mixing mill.—See I. **Moulding sand. Furnaces for enamel ware.**—See VIII. **Electric furnace. Anodes for electroplating.**—See XI.

XI.—ELECTROTECHNICS.

Söderberg electrode, oblong electrodes, and other new developments. M. Sem (Trans. Amer. Electrochem. Soc., 1931, **60**, 199—210).—The difficulties in operating Söderberg electrodes of oblong section have been largely overcome, and they have been used in ferro-alloy and other furnaces. The economic advantage of these electrodes over the ordinary cylindrical type is still doubtful. Söderberg electrodes can be fed into the furnace by raising the holder by means of a winch, or by arranging for automatic slipping of the electrode through the holder, taking advantage of the shrinkage on baking. The use of a dust shield around the upper part of the electrode also permits better temp. control in this region. At a suitable temp. the binder is melted, but baking above the holder is prevented, and the electrode material can be introduced in cold lumps and no ramming is needed. By using flexible cables encased in flexible metal hose, through which H_2O is passed to cool the cable itself and the electrode holder, a 7-fold increase in c.d. over that permissible with ordinary Cu flexible cable can be attained.
H. J. T. Ellingham.

Electrolytic phenomena in oxide-coated filaments. J. A. Becker (Trans. Amer. Electrochem. Soc., 1931, 59, 381—391).—From a crit. examination of published work it is concluded that the current through BaO coatings on metallic filaments is carried partly by electrons and partly by Ba and O ions, the proportion depending on the previous history of the coating. Preliminary results of a study of polarisation effects and the temp. variation of conductivity support this conclusion. H. J. T. Ellingham.

Electrical strength of porcelain. J. O. Kraehenbuehl and C. W. Parmelee (Trans. Amer. Electrochem. Soc., 1931, 59, 409—425).—The puncture track in a specimen of porcelain is largely a matter of chance and depends on flaws in the material. Hence a large number of samples must be tested in order to obtain a proper estimate of quality. A statistical study has been made of the results obtained with a number of samples prepared under controlled conditions. H. J. T. Ellingham.

Electro-ultrafiltration.—See I. **Hydrocarbons from water-gas.**—See II. **Determining V in steel. Plating of Cr, Ni, Ag, Ag–Cd, W. Determining " free cyanide " in plating solutions.**—See X.

See also A., Sept., 1005, **Magnetic properties of Co–Cr mixed crystals.** 1013, **Electrolysis of NaCl and KCl solutions.** 1014, **The Leclanché cell.** 1018, **Separation of Nb and Ta.** 1038, **Oxidation of sugars.**

Patents.

[Electric] induction heating. E. F. Northrup, Assr. to Ajax Electrothermic Corp. (U.S.P. 1,791,934, 10.2.31. Appl., 21.12.25).—A horizontal drum having a magnetic shell containing material to be treated and wound with an inductor surrounding substantially its whole length, connexions for sending current through different parts of the inductor either in series or in parallel, and power factor correction for the current is claimed. J. S. G. Thomas.

Electric furnaces [for heat-treatment of steel, ceramic material, etc. above 1100°]. Carborundum Co., Ltd. From Carborundum Co. (B.P. 354,172, 3.3.30).—An outer insulating casing surrounds a non-metallic refractory lining, *e.g.*, of SiC, Al_2O_3, or fireclay, forming a heating chamber and having a thermal conductivity of $>$ 0·006 c.g.s. unit and a heat capacity comparable with that of the charge. Heating resistors having positive and/or negative temp. coeffs. of resistance, *e.g.*, of SiC and/or C, are arranged in the heating chamber. J. S. G. Thomas.

Mounting means for the heating elements of electric resistance furnaces. Hevi Duty Electric Co., Assees. of E. L. Smalley (B.P. 354,928, 21.6.30. U.S., 22.6.29).—A preformed heating element of the return-bend type is self-interlocked in the apertures of the supporting pedestal. J. S. G. Thomas.

Arc-extinguishing fluids. Brit. Thomson-Houston Co., Ltd., Assees. of J. D. Hilliard (B.P. 355,145, 26.11.30. U.S., 26.11.29).—A mixture of a dry mineral oil of high dielectric strength and a detonation suppressor, *e.g.*, NH_2Ph, C_6H_6, PhMe, is claimed. J. S. G. Thomas.

Compositions having arc-resistant properties. Bakelite Corp., Assees. of F. Groff (B.P. 354,166, 29.1.30. U.S., 31.1.29).—The condensation product obtained by heating a phenol and a fatty oil, *e.g.*, tung oil, with a promoter, *e.g.*, H_3PO_4, is heated, with or without addition of a methylene-containing agent, until free phenol is eliminated, and is then mixed with a filler, *e.g.*, gelatinisable cotton flock. J. S. G. Thomas.

Production of [electrical] insulating materials. Electrical Res. Products, Inc., Assees. of A. R. Kemp (B.P. 354,380, 9.5.30. U.S., 3.2.30. Addn. to B.P. 307,966; B., 1929, 401).—Latex or crude rubber is treated at 145—150° with caustic alkali solution of concentration up to 2% under pressure (0·5—5 kg./sq. cm.). Latex, during treatment, is diluted with 0·5—3 times its vol. of H_2O and finally coagulated by addition of dil. AcOH. J. S. G. Thomas.

Electrolytic apparatus [for production of gases]. A. E. Knowles (B.P. 354,232, 5.5.30).—The asbestos sleeves, envelopes, or bags enclosing electrodes which are adjacent to the wall of the cell container are made thicker on the side adjacent to the wall than on that facing the opposite electrode. J. S. G. Thomas.

[Soluble] anodes for electroplating. Udylite Process Co., Assees. of G. Dubpernell (B.P. 354,939, 30.6.30. U.S., 13.11.29).—Relatively large balls of the metal to be deposited are supplied to a vertical steel helical cage in which the distance between adjacent turns of the helix decreases in a downward direction, and the bottom end of which is tapered and closed. J. S. G. Thomas.

Positive plates for electrical storage batteries. S. J. Williams (B.P. 354,318, 7.5.30).

[Miniature] dry-cell electric battery. Burgess Battery Co., Assees. of W. B. Schulte and J. S. Zook (B.P. 354,415, 15.5.30. U.S., 16.5.29).

Manufacture of sealed evacuated envelopes containing a liquid. [Mercury switches.] Brit. Thomson-Houston Co., Ltd., Assees. of W. R. Walker (B.P. 354,346, 29.4.30. U.S., 29.4.29).

Determining viscosity.—See I. **Treatment of petroleum.**—See II. **Regeneration of sulphides. Treatment of leucite etc. Ionised O. S from minerals and gases.**—See VII. **Glass yarn.**—See VIII. **Cleaning Fe wires etc. Welding electrode. Magnetic alloy. Oxidic coatings on Al. Ni- or Co-plated articles. Coated bodies [conductors]. Floating metal powders. Cr-plating. Ni diaphragm. Zn on Fe or steel.**—See X. **Medicinal products from yeast.**—See XVIII.

XII.—FATS; OILS; WAXES.

Cacao butter. VII. Attempts to distinguish between expressed and extracted cacao butters. H. P. Kaufmann (Chem. Umschau, 1931, 38, 241—243; cf. B., 1931, 123).—The ultra-violet absorption spectra afford no distinction between the expressed and extracted fats: both (in pentane solution) show a more or less well-marked inflexion in the absorption curve at λ 2650—2750 Å. E. Lewkowitsch.

Reichert, Polenske, and Kirschner values of rancid butters and margarines. G. D. Elsdon, R. J. Taylor, and P. Smith (Analyst, 1931, **56**, 515—518).—Mixtures of palm-kernel oil and oleomargarine, of coconut oil, palm-kernel oil, and oleomargarine, and of palm-kernel oil, butter fat, and oleomargarine give an increased Reichert val. on keeping, which corresponds with the amount of butter fat present. The Polenske val. increases slightly and, although the Kirschner val. increases, there is no obvious relationship to the constituents. Butter fat, however, when stored alone or as butter, shows these changes only to a very slight extent. The changes may be biological and caused by the presence of different organisms in various types of products. T. McLachlan.

Physico-chemical methods for determining the purity of fatty acids. E. L. Lederer (Chem. Umschau, 1931, **38**, 243—246).—The limits are discussed within which impurities are revealed by the usual chemical and physical characteristics; more accurate results are anticipated from determinations of m.p. by dilatometric methods, of the protective action on Au sols, and temp.–viscosity measurements. E. Lewkowitsch.

Analysis of sulphonated oils. I. [Report of a Committee of Leather Trades Chemists.] D. Burton and G. F. Robertshaw (J. Soc. Leather Trades' Chem., 1931, **15**, 308—328).—Methods are given for sampling and analysing sulphonated oils including determinations of H_2O, unsaponifiable matter, acidity, ash, total alkali, organically combined SO_3, neutral combined SO_4, combined and free fatty acids, free fatty acids, and NH_3. D. Woodroffe.

Erratum.—On page 551, col. 1, line 22 from bottom, for "Calcutta" read "La Plata."

Extraction apparatus for fats.—See I. **Volatile products in cottonseed meats. Oil in canned sardines.**—See XIX. ***Monarda punctata.***—See XX.

See also A., Sept., 1033, **Soya-bean lecithins.** 1034, **Separation of glycerides.** 1035, **Determination of OH in castor oil.** 1067, **Esters of capsanthin.** 1101, **Nutmeg oil. Pæony seed oil. Brazil-nut oil.**

Patents.

Degreasing apparatus. M. de W. Hirst, Assr. to L. A. Goodwin (U.S.P. 1,795,170, 3.3.31. Appl., 17.9.27).—Plant for recovery of used solvent from dry-cleaning of textiles, wool, etc., including removal of the liquid from the fabrics, is described. E. Lewkowitsch.

Preservation of soaps, fats, and fatty oils. Imperial Chem. Industries, Ltd. (B.P. 355,055, 10.9.30. U.S., 10.9.29).—Small amounts of a hydroxylated diaryl compound, in which the aryl residues are directly linked, *e.g.*, dihydroxydiphenyl, hydroxylated phenylnaphthyl, are added. E. Lewkowitsch.

Manufacture of derivatives of higher fatty acids containing nitrogen. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 355,139. 21.11.30. Addn. to B.P. 339,675; B., 1931, 355).—Halogenated derivatives of amido-compounds of higher saturated or unsaturated fatty acids, or hydroxy-fatty acids (*e.g.*, oleic acid), are treated with solutions of NH_3 in org. solvents, as in the prior patent. E. Lewkowitsch.

Manufacture of modified [mineral oil-soluble] castor oil. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,783, 9.5.30. Cf. B.P. 317,391 and 321,724; B., 1930, 826, 652).—Castor oil (alone or admixed with mineral oil) is heated, preferably in vac. or in a current of inert gas, in the presence of H_3PO_4 and/or its esters (*e.g.*, of BuOH, cresol) at 200—260° until it becomes sol. in mineral oil. Further removal of H_2O (up to 3 mol. proportions) by prolonged heating furnishes a drying oil. E. Lewkowitsch.

Production of drying oil [from pine oil]. I. W. Humphrey, Assr. to Hercules Powder Co. (U.S.P. 1,793,220, 17.2.31. Appl., 15.3.27).—A polymerised terpene product (from alcohols or hydrocarbons) is distilled so as to remove the polymerides boiling below 335° [$(C_{10}H_{16})_2$]. The residue (which may be further fractionated or blown with air) dries to a film insol. in gasoline. E. Lewkowitsch.

Treatment of fish-liver oils and application of the products thereof. Imperial Chem. Industries, Ltd., H. M. Bunbury, W. A. Sexton, and A. Stewart (B.P. 354,417, 17.5.30).—Squalene, or an oil rich in it, is treated with conc. H_2SO_4 or oleum at temps. below 60° (preferably $< 30°$) in the presence or absence of, *e.g.*, Ac_2O, salted out, and washed; the product is used as an emulsifying agent. E. Lewkowitsch.

Deresinification of waxes containing alcohols of high mol. wt. or of alcohols obtained therefrom. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,334, 3.3.30).—The waxes etc. are treated at room temp. with a mixture of two org. solvents, one of which can homogeneously dissolve waxes, *e.g.*, C_6H_6, hydrocarbons (in amount insufficient to dissolve the wax completely in the cold), whilst the other can dissolve waxes dispersely), *e.g.*, alcohols, esters. E. Lewkowitsch.

Evaporator [for glycerin].—See I. **Gelatinised oils. Lubricants.**—See II. **Treatment of textiles.**—See VI.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Philippine rosin from *Pinus insularis* (Endlicher). I. de Santos, A. P. West, and J. Fontanoza (Philippine J. Sci., 1931, **45**, 383—390).—*P. insularis*, Endl. (Benguet pine), grown in the Philippines, yields slightly more resin than do Florida pines. An average sample of the resin contains turpentine 16·34%, rosin 83·66%, and typical samples of the latter have characteristics within the following limits: *d* 1·033—1·072, softening point 55—105°, m.p. 62—119°, acid val. (aq. alkali) 148·9—165·3, sap. val. 153·0—189·9, ester val. 1·0—25·4, unsaponifiable matter 4·35—6·82%, $[\alpha]_D^{30}$ −26·95° to −64·57°. The Na salt of the rosin acids yields about 74% of abietic acid, m.p. 152—153·8°, which has $[\alpha]_D^{30}$ varying from −3° to −82·54° according to the solvent used. E. H. Sharples.

See also A., Sept., 1021, **Mo-blue.** 1081, **Blue pigment, *Haliotis*-indigo.** 1099, **Pigment of the elderberry. Anthocyanin pigments.** 1101, **Black pigments of *Sarothamnus scoparius*.**

Patents.

Manufacture of paints and the like. I. G. Farbenind. A.-G. (B.P. 353,319, 23.9.30. Ger., 23.9.29).—A monoacylalkylenediamine, an acylpolyalkylenepolyamine (*e.g.*, mono-oleyltriethylenetetramine), or an alkylation product thereof including the quaternary NH_4 bases, is incorporated with pigment and/or binding agent in the prep. of ground pigment pastes. S. S. Woolf.

Manufacture of zinc white. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 354,794, 14.5.30).—NaOH solution is added to $ZnCl_2$ lye until the liquor has p_H 12—12·8, and the ppt. is washed and dried below redness. Alternatively, the $Zn(OH)_2$ is precipitated with milk of lime and, after washing, is suspended in NaOH solution of such concentration that the liquor has p_H 12—12·8. L. A. Coles.

Reducing the oil absorption of titanium dioxide pigment. Soc. de Prod. Chim. des Terres Rares (B.P. 354,799, 17.2.30. U.S., 16.2.29).—The pigment, after calcination and wet grinding, is dried and ground. L. A. Coles.

Coating of surfaces. Brit. Thomson-Houston Co., Ltd., Assees. of R. H. Kienle and L. V. Adams (B.P. 354,544, 1.8.30. U.S., 10.8.29).—A resin that can be rendered infusible by heat-treatment is powdered and sprayed through a flame, where it is partially and superficially melted, on to the article, which is then baked to produce an even, adherent film. E. Lewkowitsch.

Coating materials. M. Deseniss and A. Nielsen (B.P. 353,311, 15.9.30).—Mixtures of chlorinated rubber and tar, pitch, asphalt, or other bituminous substances, dissolved in a suitable solvent, *e.g.*, solvent benzene, and incorporated, if desired, with fillers, *e.g.*, finely-ground asbestos, are claimed. S. S. Woolf.

Production of water-resistant coatings. L. Kirschbraun, Assr. to Flintkote Co. (U.S.P. 1,794,522, 3.3.31. Appl., 23.9.27).—The surface is coated with an aq. dispersion of bitumen etc. (suspended with clay etc.), and, after drying, a coating of an aq. slurry of hydraulic (Portland) cement, containing a small amount of bitumen, with or without, *e.g.*, $CaCl_2$ to accelerate hardening, is applied. E. Lewkowitsch.

Non-inflammable nitrocellulose lacquer. M. Thau (U.S.P. 1,793,726, 24.2.31. Appl., 21.4.25).—Sufficient CCl_4 is added to a solution of nitrocellulose in BuOAc and/or Et lactate (*i.e.*, in a liquid of high flash point and solvent power, the vapour of which has a sp. gr. not much above that of CCl_4, whilst the vapour tension of the mixed solvent(s) and CCl_4 is scarcely greater than that of CCl_4 alone). E. Lewkowitsch.

Liquid polish. A. S. Finter (B.P. 354,487, 23.6.30).—A coloured mixture of oil varnish and petroleum spirit or other light hydrocarbon is claimed. H. Royal-Dawson.

Treatment of rosin. F. W. Kressman (B.P. 354,332, 10.2.30. U.S., 11.2.29).—Rosin is batch-distilled at low temps. and pressure (at not above 260°/10 mm.) and fractionally condensed; resenes pass into the first fractions (approx. 12%), whilst the still residues are enriched in abietic acid. Volatile oils, H_2O, etc. are removed by preheating at lower temps. E. Lewkowitsch.

Manufacture of synthetic resin. E. E. Novotny, Assr. to J. S. Stokes (U.S.P. 1,793,715, 24.2.31. Appl., 31.7.26).—Xylenols are heated with furfuraldehyde at ordinary pressure at 182—193·5° and the H_2O is continuously removed from the condensed vapours by a gravity separator, the reactive ingredients being returned to the digestor. The reactive product is preferably combined with a hardening agent, *e.g.*, CH_2O. E. Lewkowitsch.

Synthetic resins from chlorinated toluol and phenol. C. Ellis, Assr. to Ellis-Foster Co. (U.S.P. 1,793,310—2, 17.2.31. Appl., [a] 23.3.23, [b] 12.5.24, [c] 23.10.24).—The dark red, syrupy, resinous material obtained by treating phenol (3 mols.) with crude benzotrichloride (1 mol.) in alcoholic solution in the presence of $AlCl_3$ or $FeCl_3$, or the resin (*X*) obtained by combining it with CH_2O (10%) may be cold-moulded (with fillers) and hardened by baking. (b) Hexamethylenetetramine is incorporated with the product *X*. (c) The material is acidified with HCl (up to 1%) before combination with CH_2O. E. Lewkowitsch.

Manufacture of (a) plastic materials, (b) materials having a basis of cellulose derivatives. H. Dreyfus (B.P. 354,860—1, 20.5.30).—(a) The finely-divided cellulose ester(s) containing little or no solvent is impregnated with a plasticiser (*e.g.*, toluenesulphonamide, alkyl phthalates) in a volatile liquid vehicle (*e.g.*, Et_2O) which is not a solvent for or sol. in the cellulose derivative, but is evaporated before the material is worked. (b) The plasticiser is applied uniformly by spraying on to the finely-divided cellulose ester (preferably itself as a spray) substantially in the absence of solvents or diluents; solid plasticisers may be used if dissolved in a highly volatile solvent which evaporates before contact with the ester. E. Lewkowitsch.

Manufacture of plastic substances. J. C. Patrick (B.P. 354,310 and 354,394, 2.5.30. U.S., [a] 3.6.29, [b] 10.6.29. Cf. B.P. 302,270; B., 1929, 826).—Hard thermoplastic materials are prepared by treating olefine (di)halides with aq. solutions of (Na) polysulphides (a) containing an at. proportion of S between 1·5 and 3·75, (b) in the presence of 1—5% of finely-divided oxides, hydroxides, or carbonates of Ca etc. EtOH may be added to increase the solubility of the halide. [(a) Stat. ref.] E. Lewkowitsch.

[Plastic] fibrous compositions. H. Wade. From Bakelite Corp. (B.P. 353,070, 17.4.30).—Mouldable compositions comprising a loose fibrous material containing fibres long enough to overlap and stiff enough to avoid knotting and tangling (either naturally stiff, *e.g.*, sisal, or a soft fibre spun or twisted into threads, cords, etc.) together with a resinoid bonding agent are claimed. The latter may be applied as a varnish with subsequent removal of solvent, or part, *e.g.*, 10%, may be applied in this manner and the remainder incorporated as dry powder. S. S. Woolf.

Treatment [increasing the elasticity] of objects from plastic masses. C. F. Boehringer & Soehne, G.m.b.H. (B.P. 354,957, 11.7.30. Ger., 18.7.29).—Objects, *e.g.*, billiard balls, prepared from masses containing cellulose derivatives and a plasticiser, *e.g.*, acetethylanilide, are treated with a solvent for the plasticiser, *e.g.*, Et_2O, C_6H_6, to remove it from the surface layer. L. A. Coles.

Manufacture of sealing wax in a more or less finely-distributed form. W. Hochgesand (B.P. 354,576, 29.8.30).—The wax drips from a sieve (or other suitable devices) into a cooling liquid (*e.g.*, H_2O), kept at a const. temp. and in which the wax is insol. H. Royal-Dawson.

Manufacture of ornamental sheets, veneers, and the like from thermoplastic materials. Celluloid Corp. (B.P. 354,834, 16.5.30. U.S., 16.5.29).

Mixing mill. Revivifying spent adsorbent. Materials for bearings.—See I. **Resins from indene and phenols.**—See III. **Solution of cellulose derivatives.**—See V. **Arc-resisting composition.**—See XI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Microturbidimeter for determination of rubber content of latex. S. D. Gehman and J. S. Ward (Ind. Eng. Chem. [Anal.], 1931, **3**, 300—304).—A modification of the microturbidimeter of Conklin (B., 1925, 571), based on the obscuring of an incandescent filament, has been applied to the rapid determination of the % rubber in *Hevea* latex. The time required is less than 5 min. and the accuracy is approx. 1% in 35% latex. The turbidity of H_2O-diluted latex obeys the turbidity–dilution law up to a proportion of 15% of rubber. D. F. Twiss.

Cause of variability in the plasticity of plantation rubber after storage. G. Martin and L. E. Elliott (Trop. Agric., 1931, **76**, 342—344).—Storage of crêpe and sheet rubber in an atm. of N_2 causes hardening which increases with rising temp. In an atm. of O_2 rubber is always softer than in N_2 at the same temp., the difference increasing with temp. Storage changes in the plasticity of rubber result from (1) spontaneous hardening such as occurs in an inert atm., and (2) softening induced by O_2. At low temps. (1) predominates, whereas (2) is greater at higher temps.; there is a crit. temp. at approx. 30°. Rubber extracted with aq. NH_3 becomes very soft in O_2 at 45° although hardened at 15°, but unextracted samples tend to harden even at 45°. Extraction with H_2O causes softening in O_2 at 45°, but to a smaller extent than that caused by NH_3 treatment. A. G. Pollard.

Scorching and other plasticity changes in rubber compounds on heating. E. O. Dieterich and J. M. Davies (Ind. Eng. Chem. [Anal.], 1931, **3**, 297—300).—The plastometer described recently (B., 1931, 351) is applied to testing samples of rubber mixtures which have been heated for various periods. The rate of development of the initial stages of vulcanisation thus revealed is a measure of the tendency to scorching and is used for estimating safe operating temps. and periods. D. F. Twiss.

Autographic machine for testing tensile properties of rubber. G. J. Albertoni (Ind. Eng. Chem. [Anal.], 1931, **3**, 236—239).—A specially designed machine of the pendulum type records the stress–strain curve of deformable material such as rubber; no calculations are required and the records can be used directly, *e.g.*, for measurement of the area under the curve. Mechanical means are also provided to correct for variation in the cross-section of the test-piece and to produce equal chart displacements for equal angular deviations of the pendulum. D. F. Twiss.

Extraction apparatus for rubber.—See I.

See also A., Sept., 1067, **Isoprene and caoutchouc.**

Patents.

Manufacture of rubber-like masses. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 349,976, 5.3.30).—Butadienes, with or without cyclic diolefines or olefines having a benzene ring in the mol., are polymerised in the presence of an unsaturated ketone, $R\cdot CO\cdot CR':CR''R'''$ (R = aryl or alkyl, and R', R'' and R''' = H or hydrocarbon radicals). Mixtures of butadiene with α-*iso*propenyl Me ketone and oleic *p*-β-diethylaminoethoxyanilide hydrochloride or Na and Mg oleates, or with styryl Me ketone and oleic *p*-β-diethylaminoethoxyanilide hydrochloride with or without α-*iso*propenyl Me ketone, give rubber-like products when heated for several days at 60°. C. Hollins.

Manufacture of india-rubber-like products. G. B. Ellis. From Soc. des Usines Chim. Rhône-Poulenc (B.P. 353,194, 19.6.30).—Polymerised vinyl derivatives are incorporated with unvulcanised indiarubber and the mixture is vulcanised. S. S. Woolf.

Vulcanisation of rubber. Imperial Chem. Industries, Ltd., H. M. Bunbury, W. J. S. Naunton, and W. A. Sexton (B.P. 350,161, 29.4.30).—2 : 4-Dinitro-1-naphthyl 2-benzthiazolyl sulphide, m.p. 144°, is a vulcanisation accelerator showing delayed action, especially in conjunction with diarylguanidines. C. Hollins.

[Preservation of] oxidisable organic compounds [*e.g.*, rubber or transformer oils]. Goodyear Tire & Rubber Co., Assees. of A. M. Clifford (B.P. 347,916, 23.5.30. U.S., 27.7.29).—See U.S.P. 1,779,390; B., 1931, 579.

Mixing of rubber.—See I. **[Rubber-]coated bodies.**—See X. **Insulating materials.**—See XI. **Coating materials.**—See XIII.

XV.—LEATHER; GLUE.

Microscopical study of the effect of follicular mange on skins, hides, and leather. F. O'Flaherty and W. Roddy (J. Amer. Leather Chem. Assoc., 1931, **26**, 394—403).—Photomicrographs of follicular mange in raw skins and leather and of damages caused by them are given. No evidence is adduced to indicate that the mange can spread to other skins in storage of raw skins. D. Woodroffe.

Use of reflected light in microscopical studies of leather. A. Küntzel (Collegium, 1931, 381—391).—Several applications of the use of such light in the study of leather are described and illustrated. D. Woodroffe.

Dung bates. H. Göller (Collegium, 1931, 334—339).—Very poor bating effects were produced on skin by fresh dog puer alone; good bating was obtained

with fresh puer and a little deliming agent. The skin had a smoother feel and was rendered more flaccid by the use of more deliming agent, but the fibres were not properly separated. The skin was rendered very flaccid and the fibres were well separated by the use of an excess of fresh puer alone, but the bating was incomplete. Even with sufficient deliming agent the bating was insufficient after the use of old fermented puer. An excess of old puer was required to effect complete bating even in presence of the necessary amount of deliming agent, which confirms general practice.
D. Woodroffe.

Causes of and remedies for faults arising during the curing [of raw hides]. W. Schindler (Collegium, 1931, 358—365).—Recent publications on this subject are summarised. D. Woodroffe.

Liming and depilation of animal skin. E. R. Theis (J. Amer. Leather Chem. Assoc., 1931, **26**, 352—388).—The time of unhairing was greatly diminished by additions of NaCN or Na_2SO_3 and increased by cane sugar or aq. NH_3, but not much affected by additions of NaOH or KOH to a lime liquor. The degree of unhairing increased as the p_H of the lime liquor was increased. Two stages of unhairing were observed in most lime liquors. The first step was expedited by additions of Sn and Fe salts to the $Ca(OH)_2$, and the hair removal was expedited by additions of $NaNO_3$, $Na_2S_2O_3$, Na_2SO_3, or NaCN. Min. time for unhairing was obtained by using M-NaCN and M-$Ca(OH)_2$. Each liquor had an optimum p_H for unhairing. Greater swelling and hydration were shown by the epidermal layer than by the corium and much greater hydration by old hair. Skin became more hydrated during the liming process. The hydration was increased by (*a*) changing the lime liquor each day, (*b*) stirring the liquors, (*c*) additions of Na_2S, NH_2Me, or NH_3, and retarded by Na_2CO_3, $NaHCO_3$, or $Ba(OH)_2$. Greater hydration and greater swelling were obtained by liming skin with $Ca(OH)_2$–Na_2S or $Ca(OH)_2$–Na_2S–NaCl than by $Ca(OH)_2$ alone. Greater hydration, but less swelling, was obtained in a mellow lime liquor than in a sharp one. 70% of the N in a lime liquor was derived from the epidermis. The N derived from the true skin decreased as the Na_2S concentration increased. The N distribution was changed as the rate of unhairing was altered. Less N was dissolved in $Ca(OH)_2$–Na_2SO_3 liquors than in $Ca(OH)_2$ alone. Photomicrographs of sections of pelt limed in different liquors are appended. D. Woodroffe.

Determination of amines in tannery lime liquors. E. K. Moore, J. H. Highberger, R. Koppenhoefer, and F. O'Flaherty (J. Amer. Leather Chem. Assoc., 1931, **26**, 341—351).—A modification of Weber and Wilson's method (B., 1918, 638 A) is described. The "total volatile alkali," *A*, is determined by distilling a measured vol. of the settled lime liquor into $0·2N$-H_2SO_4. The titrated distillate is diluted, rendered alkaline, well shaken with yellow HgO in a brown glass bottle, filtered out of contact with air through cotton, and the filtrate distilled into standard H_2SO_4; the "total volatile amines," *B*, is calc. therefrom. Then $NH_3 = A - B$. A second portion of the titrated distillate is acidified with conc. H_2SO_4, evaporated down, cooled, mixed with saturated $NaNO_3$ and glacial AcOH, left for 45 min., well shaken, the NO expelled with a current of air, and the mixture rendered alkaline is distilled into $0·1N$-H_2SO_4 and (*C*) the NMe_3 calc. therefrom. Zn and conc. HCl are added to this titrated distillate, which is then heated for 10 min., the solution decanted into a Kjeldahl flask, the Zn washed thrice with H_2O, NaOH is added, and the whole distilled into $0·1N$-H_2SO_4 and (*D*) the $NHMe_2$ and NMe_3 are calc. therefrom. Then $NHMe_2 = D - C$; and $NH_2Me = B - D$. D. Woodroffe.

Moisture in vegetable-tanned leather. R. F. Innes and J. G. M. Coste (J. Soc. Leather Trades' Chem., 1931, **15**, 302—303).—A reply to Chambard's criticism (B., 1931, 771) that moisture in leather can be determined by heating it to const. wt. D. Woodroffe.

Determination of strong acid in vegetable tanned leather. R. F. Innes (J. Soc. Leather Trades' Chem., 1931, **15**, 303—308).—Leathers can be divided into four groups according to their "difference figure" (B., 1929, 729) (D.F.) and the p_H of their aq. extract: (*A*) D.F. 0·7 or over, $p_H < 3·0$; (*B*) 0·7 or over, $> 3·0$; (*C*) $< 0·7$, $> 3·0$; (*D*) $< 0·7$, $< 3·0$. Large amounts of weak acids are present in leathers in group *D*. About 0·35% of free H_2SO_4 is present in leathers of group *B*. Strong acids are present to a harmful extent in leathers of group *A* if the p_H of the aq. extract is 2·9 or less; if 2·9—3·0 the leather is open to suspicion. Not more than 0·45% of free H_2SO_4 can be present in a leather the aq. extract from which has p_H 2·9.
D. Woodroffe.

Tannin analysis. Report of a Committee [of the French section of the Society of Leather Trades' Chemists]. P. Vignon (J. Soc. Leather Trades' Chem., 1931, **15**, 360—367).—Good results were obtained by the Riess method, but no advantage was shown over the official method. The Schmidt method required too long. The sedimentation method was too indefinite to draw any conclusions. Poor concordance was obtained by all filter-paper methods, but good concordance by the filter candle. Difficulty was experienced with dry American chestnut extract and pine-bark extract owing to their content of larger particles of insol. matter. The Darmstadt apparatus for detannisation proved inconvenient and the Freiberg–Keiguelоukis apparatus was impracticable. The Jamet apparatus was more rapid for one or two analyses. It is proposed that the filtration by the Berkefeld filter candle should be an official method, and that no modifications which do not improve the concordance obtained should be made in any official method. D. Woodroffe.

Extraction of raw tanning materials for analysis. Report of Committee—1931 [of the American Leather Chemists' Association]. W. K. Alsop (J. Amer. Leather Chem. Assoc., 1931, **26**, 403—431).—Preliminary comparative tests on the official method of the A.L.C.A. and the provisional International method of extracting tanning materials for analysis indicate that different methods will be required for different tanning materials. D. Woodroffe.

Presence of traces of heavy metals in tannin extracts. P. Vignon (J. Soc. Leather Trades' Chem., 1931, **15**, 385—387).—Tannates of heavy metals are peptised by the tannin in a tannin solution and remain in colloidal solution. Alteration in colour of the solution can be detected by the tintometer and confirmed by a tanning test. A greyish tone is imparted to leather by minute quantities of Fe which are not detected by the tintometer. Neither the colour of the extract nor of the leather tanned with it were affected by $< 0 \cdot 06\%$ Cu in a chestnut extract. D. Woodroffe.

Tanning with tara (*Cæsalpinia tinctoria*) and its production in Italy and Italian colonies. F. Vignolo-Lutati (Boll. Uff. Staz. Sperim. Ind. Pelli, 1931, 9, 297—303).—Complaints by Indian tanners that putrid fermentations occur during tanning with *Cæsalpinia* pods probably result from the use of *C. digyna* (tari) or Indian divi-divi and not of *C. tinctoria* (tara). Small-scale experiments showed that extract of tara pods (freed from seed) from Cagliari exhibits mould growth when kept for some time, but that it is not inferior to other similar extracts in this respect; no putrid fermentation was observed. The possibility of cultivating this material in Erythrea is discussed. T. H. Pope.

Formation of gases in tan liquors. H. Machon (Collegium, 1931, 392—396).—Most of the gases formed in vegetable tan liquors during tannage consist of H_2S arising from the use of sharpened CaO liquors on the pelts. The amount increases as the quantity of Na_2S used increases, and diminishes as the amount of deliming is increased. CO_2 is present in old fermenting tan liquors and much less H_2S is present in them than in fresh liquors. Gases are formed also by the decomp. of tannins with micro-organisms with the accompanying formation of insol. matter, *e.g.*, untreated quebracho extract. D. Woodroffe.

Gas-meter leathers.—See II. **Egg yolk.**—See XIX.

See also A., Sept., 1094, **Tannin-decomposing micro-organisms.**

Patents.

Manufacture of leather for coating rollers of a spinning machine. C. Nitta (B.P. 353,098, 29.4.30).—Tanned skins are drummed with rice bran and water for 1 hr., washed, dried, the grain surface is buffed and calendered, and the skin shaved to level substance. D. Woodroffe.

Wetting etc. agents.—See III. **Waterproofing of textiles.**—See VI. **Gelatin-composition container.**—See XXIII.

XVI.—AGRICULTURE.

Soils of the Nile and Gash. II. P. Vageler and F. Alten (Z. Pflanz. Düng., 1931, **21A**, 323—346; cf. B., 1931, 772).—A discussion of earlier results from the view point of soil–H_2O relationships. A. G. Pollard.

Biodynamics of alkali soils. M. I. Prikhodko and M. I. Belikova (Pochvovedenie, 1929, **24**, No. 3—4, 145—166).—On soils in the open field NaCl hindered the activity of *Azotobacter*, whilst Na_2SO_4 stimulated their multiplication, and the amount of N fixed was as great as in the controls. *Clostridium pasteurianum* developed better on the NaCl soil. Anaërobic and aërobic decomp. of cellulose were stimulated by treating the soil with NaCl. Nitrification was stimulated in the soils treated with Na_2SO_4, but not in those treated with NaCl. The alkalinity of the soils was increased by treatment with NaCl and subsequent leaching by rain water. Chemical Abstracts.

Correlation between plant communities and the reaction and microflora of the soil in S. Central Texas. M. B. Morrow (Ecology, 1931, **12**, 497—507).—The relation between plant cover and soil reaction is definite and significant to soil depths of 12 in. The relative numbers of the various groups of soil micro-organisms do not vary definitely with soil reaction, but are more closely related to moisture content and aeration. A. G. Pollard.

Coagulation of aqueous suspensions of soil with barium sulphide and calcium sulphide. B. G. Zaprometov (Pochvovedenie, 1929, **24**, No. 3—4, 37—42).—BaS, CaS, $BaCl_2$, and $CaCl_2$ are effective as coagulants for mastic; the first pair only are absorbed by the mastic. Chemical Abstracts.

Influence of calcium sulphide on percolation of water through soil. A. N. Rozanov (Pochvovedenie, 1929, **24**, No. 3—4, 34—35).—CaS is more effective as a coagulating agent than $CaSO_4,2H_2O$; it decreases the alkalinity of the soil. Chemical Abstracts.

Can a water extract serve as an index to characterise the degree of salt treatment of soils? D. I. Tarasov (Pochvovedenie, 1929, **24**, No. 3—4, 61—99).—H_2O extracts all the sol. salts; hence the chlorides and sulphates are not in an adsorbed state. Chemical Abstracts.

Rôle of peat in increasing absorption capacity and buffer properties of soils. D. V. Druzhinin (Udobr. Urozhai, 1930, **2**, 645—650).—The effect is especially important in connexion with physiologically acid fertilisers. Chemical Abstracts.

Optical method for investigation of humus. G. I. Pokrovski (Pochvovedenie, 1929, **24**, No. 1—2, 124—130).—A photometric method for the determination of humus is described. Chemical Abstracts.

Neutral salt decomposition in humus soils. W. U. Behrens (Z. Pflanz. Düng., 1931, **21A**, 363—368).—Treatment of washed peat with neutral salt solutions results in a true salt decomp., direct analytical vals. being confirmed by titration of the free acid produced. A. G. Pollard.

Lime studies. The "p_H span" as a function of the buffer power of soils, and a new manner of buffering. S. Goy [with P. Müller and O. Roos] (Z. Pflanz. Düng., 1931, **21A**, 346—363; cf. B., 1931, 897).—The difference between the p_H of soil in aq. suspension and in KCl suspension ("p_H span") is related to the buffer power of the soil. The buffer power of a soil in neutral salt suspension exceeds that in aq. suspension. The p_H span is a function of the increased area of the base-fixing zone of the soil-titration curve produced by the action of neutral salts. This neutral salt action involves a reduction of the base area of the titration curve and of the p_H, without actual loss of base. The quantity of base necessary to satisfy the p_H span may be determined electrometrically and is greater in soils containing relatively high proportions of mineral colloids. The org. colloids are less affected by neutral salts. Manuring of soils with neutral salts reduces the p_H span by lowering the p_H in H_2O. A. G. Pollard.

Determination of lime requirement by hydrolytic acidity of soil. S. S. Yarusov (Udobr. Urozhai, 1930, **2**, 638—642).—From the equation $[H^{\cdot}] = K[AcOH]/[NaOAc]$ a series of equations is deduced from the reactions which take place when a soil is treated with NaOAc for the determination of hydrolytic acidity in terms of $Ca^{\cdot\cdot}$. Chemical Abstracts.

[Determination of] lime requirement of soil. V. M. Filipenya (Udobr. Urozhai, 1930, **2**, 642—645).—The CaO requirement is calc. from the hydrolytic acidity (NaOAc method); the coeff. 2·0 is used. Chemical Abstracts.

[Determination of] replaceable sodium in soils. K. K. Gedroiz (Pochvovedenie, 1929, **24**, No. 1—2, 1—14).—The soil (10 g. if $< 0·1\%$; 100 g. if $> 0·1\%$) is mixed with $CaCO_3$ (10%) and H_2O (1 litre), and CO_2 is passed for 2—3 hr. The Na is determined in the filtrate. If sol. Na salts are present they are washed out before the soil is treated with the $CaCO_3$ and CO_2. Chemical Abstracts.

p_H determinations [of soils] in water and in potassium chloride solution and the effect of the alkaline earths, especially magnesium. H. Elleder (Z. Pflanz. Düng., 1931, **21A**, 368—378).—Differences in the p_H of soils in H_2O and in KCl suspension vary with the total ($CaCO_3 + MgCO_3$) content and probably with the ratio $CaCO_3 : MgCO_3$ which exists therein. A. G. Pollard.

Fineness of grinding of phosphates for podsolised soils. N. D. Smirov (Udobr. Urozhai, 1930, **2**, 765—769).—Certain raw phosphates of fineness up to 0·01 mm. gave effects in pot experiments of 75—100% compared with acid phosphate. Chemical Abstracts.

Influence of various nitrogenous fertilisers on the reaction of soils and on [crop] yields. K. Nehring (Z. Pflanz. Düng., 1931, **10B**, 361—370).—Changes in soil reaction following applications of N-fertilisers varied with soil type. On a relatively well-buffered soil exhibiting exchange acidity the reaction was not affected until the second application, and then altered only very slightly. With a light sandy soil a definite change in reaction was apparent in the first season. The utilisation of the various fertilisers by crops varied both with soil reaction and with the nature of the crop. On a sandy loam N was most easily assimilated from $(NH_4)_2SO_4$ by potatoes and less easily by barley and roots. A. G. Pollard.

Causes of reduced yields of tubers and of starch in potatoes produced by various potash manures. I. Technique of fertiliser trials and conclusions from these. Tomzig and H. Pernice (Z. Pflanz. Düng., 1931, **10B**, 370—395).—The use of kainite and 40% potash salts increased the yield of potato tubers, but the % starch and total starch yield declined. K Mg sulphate ("Kalimagnesia") and K_2SO_4 increased the yield of tubers and the total starch yield, with a slight reduction in % starch content. A. G. Pollard.

Effect of organic substances and especially of green manures on the nitrogen and other nutrient contents of soils. E. Mussla (Landw. Versuchs-Stat., 1931, **112**, 115—159).—The incorporation of straw, paper, or sawdust with soil resulted in a decreased nitrate content over a period of many months. Addition of peat to soil reduced its nitrate content for about 1 week, but subsequently increased it. In all cases the NH_3 and total N content of the treated soils remained unaltered, the addition of org. matter merely causing a fixation of easily-sol. N. The crop yields on treated soils were directly proportional to the nitrate contents. Green manuring with legumes increased the NH_3 content of the soil for a brief period, and the nitrate content throughout the cropping season. The added N was very largely withdrawn by the succeeding crop. Green manuring increased the root-sol. K content of the soils, but did not affect the proportion of citric-sol. P. The C of the green manure was reduced to approx. 50% within 2 months of ploughing-in, but subsequently remained practically unaltered. The conductivity of green-manured soils was closely related to their nitrate contents. A. G. Pollard.

Intensive system of grassland management. Digestibility and feeding value of (IV) artificially dried grass; (V) grass silage made in a tower, and the digestibility and comparative yield of artificially dried grass obtained from the same source; (VI) grass silage made in a stack; (VII) grass silage made in a pit. S. J. Watson (J. Agric. Sci., 1931, **21**, 414—424, 425—441, 452—457, 469—475; cf. B., 1931, 82).—IV. Artificially dried grass, fed whole or ground to sheep, had a high digestibility. The material has a narrow nutritive ratio and high digestible protein content and is superior to good hay.

V. Highly nutritive silage may be made from grass in a tower silo. Losses by drainage and fermentation are small. Silage may replace the whole of the hay ration for cows without affecting the milk yield. In comparison with artificially dried grass, silage has a slightly lower starch equivalent and digestible crude protein content and a considerably lower proportion of digestible true protein.

VI. Analyses and digestibility values for grass-stack silage are recorded. The process is suited to the conservation of surplus grass, particularly the aftermath.

VII. The digestibilities of the constituents of pit silage made from grass cut at the flowering stage were similar to those of meadow hay, but the digestibility of the protein was lower. On a dry-matter basis the silage had a greater starch equiv. than had hay. A. G. Pollard.

Insect injury of blue grass in relation to environment. L. F. Graber, C. L. Fluke, and S. T. Dexter (Ecology, 1931, **12**, 547—566).—Injury by white grubs is associated with deficient soil fertility and shortage of org. food reserves in the plants. Liberal use of fertilisers reduced the injury in nearly all cases.

A. G. Pollard.

Effect of sulphur on citrus trees. E. A. McGregor (California State Dept. Agric., Mo. Bull., 1931, **20**, 167—170).—Dusting of citrus trees with S caused some burning of the fruit but practically no injury to the foliage, only the old leaves being affected.

A. G. Pollard.

See also A., Sept., 1099, **Influence of KI, KIO_3, and KIO_4 on germination etc. of cereals.** 1101, **Utilisation of fixed N by root nodules of legumes.** 1102, **K deficiency of fruit trees.**

Patents.

Manufacture of fertilisers. Odda Smelteverk A./S., and E. Johnson (B.P. 353,763, 22.9.30. Nor., 28.9.29.)—In the process already described (B., 1931, 201), the $Ca(NO_3)_2$ may be converted into KNO_3 by means of K salts, part of this KNO_3 being added to the $Ca(NO_3)_2$ mother-liquor. The mixture is then neutralised with NH_3 and evaporated to dryness or neutralised during evaporation. Prior to addition of KNO_3, the mother-liquor may be freed from Ca by precipitation with a suitable reagent, *e.g.*, HF, H_2SO_4, or fluorides or alkali sulphates. W. J. Wright.

Production of [granulated] fertilisers. W. K. Hall, and Imperial Chem. Industries, Ltd. (B.P. 354,307, 31.3.30).—A mixture (preferably $< 1\cdot5:1$) of H_2O-insol. ballast material [*e.g.*, $CaCO_3$, $Ca_3(PO_4)_2$, $CaSO_4$] with a hot, conc. urea solution containing 2—5% H_2O (calc. on the total wt. of dry solids) is broken up at 95—115° into droplets, 0·5—3 mm. in diam., which are solidified by contact with cold gas, *e.g.*, as described in B.P. 309,299 (B., 1929, 448).

L. A. Coles.

Rendering insoluble phosphates available [as fertilisers]. H. Lehrecke (U.S.P. 1,795,173, 3.3.31. Appl., 28.1.29. Ger., 26.1.28).—Mineral phosphates are heated at 1000—1400° with powdered C, SiO_2, and, if necessary, CaO, so that for every 1 pt. of P_2O_5 in the charge there are present 0·18—0·24 pt. of C, 0·18—0·24 pt. of SiO_2, and 0·85—1·13 pt. of CaO. In this operation 25—55% of the P_2O_5 is reduced to P and volatilised, and a sintered residue of $5CaO,P_2O_5,SiO_2$ is obtained, which, after fine grinding, forms a valuable fertiliser having practically all its P_2O_5 content sol. in citric acid. A. R. Powell.

Powdered deodoriser for the acceleration of ripening of organic fertilisers. K. Yamaji (U.S.P. 1,791,918, 10.2.31. Appl., 1.8.29).—A mixture of bran with powdered cereals containing a large quantity of enzyme (*e.g.*, wheat, barley, bean) is moistened and allowed to ferment, and the product is dried, powdered, and mixed with $Ca_3(PO_4)_2$ and with germinated cereal seeds which have been dried and powdered.

L. A. Coles.

XVII.—SUGARS; STARCHES; GUMS.

Effect of scum particles in boiling up and in [sugar] thin-juice evaporation. J. Hamous (Z. Zuckerind. Czechoslov., 1931, **55**, 681—682).—When the thin-juice was filtered only twice, *i.e.*, after the second carbonatation and after boiling up, the heaters were less incrusted than when it was thrice filtered, *i.e.*, after the 1st and 2nd carbonatations and after boiling up. Further, when the usual filtration after the 2nd carbonatation was omitted, so that unfiltered juice went into the boiling-up apparatus, the bodies of the evaporator were distinctly less incrusted. (Cf. B., 1928, 765.)

J. P. Ogilvie.

Porosity of carbonatation scums. J. Dědek and E. Dostál (Z. Zuckerind. Czechoslov., 1931, **55**, 671—681).—Very varying results were obtained when determinations were made of the porosity (c.c. of air liberated from 100 g.) of carbonatation scums from Kelly, Sweetland, and Kroog filter-presses. Even the same cake was very unhomogeneous. An increase in the CaO addition in carbonatation considerably diminished the porosity value, viz., from 62·4 with 1·2% of CaO to 43 with 4·0%. J. P. Ogilvie.

Wood-sugar problem. II. Saccharification of cellulose by means of sulphuric acid with recovery of the acid. L. Leone (Annali Chim. Appl., 1931, **21**, 343—352; B., 1928, 619).—Higher yields with greater acid and fuel economy are obtained by the Ost and Wilkening method (A., 1910, i, 364) when the concentration of the acid during cold saccharification is 72% for dry cellulose or 75% for cellulose of 6% H_2O content. The hot digestion is carried out at 102—103° for 30 min. and the acid concentration is 15%. The yield of dextrose is increased by increasing the ratio acid : cellulose, but beyond a certain concentration small increases in yield require great expense of acid. The recovery of the acid by the $Ca(OAc)_2$ method followed by esterification of AcOH with EtOH by the process of the Holzverkohlungs-Industrie A.-G. (G.P. 459,604) and the British Celanese, Ltd. (B.P. 284,582; B., 1928, 223) has not given satisfactory results because it is probable that the alcoholic groups of the sugar prevent esterification. The Ca citrate process is also of limited application because secondary products of saccharification prevent the crystallisation of citric acid. A modification of G.P. 305,180 (B., 1920, 203 A), *i.e.*, precipitation as $(NH_4)_2SO_4$ in alcoholic solution, showed that recovery of the acid cannot be effected economically in this way.

O. F. Lubatti.

See also A., Sept., 1038, **Oxidation of sugars electrolytically.** 1039, **Determination of lævulose in mixed carbohydrates.** 1100, **Glucosides. Plant gums.** 1102, **Determination of mixed reducing sugars.**

XVIII.—FERMENTATION INDUSTRIES.

Research methods in brewing technology. F. Kutter (Woch. Brau., 1931, **48**, 321—323).—A discussion of the conditions requisite for analytical methods.

F. E. Day.

Analysis of hops. L. Heintz (Woch. Brau., 1931, **48**, 315—320, 325—330, 335—338, 369—373).—Hops were extracted successively with light petroleum, Et_2O, EtOH, H_2O, and 5% NaOH, and the composition of the extracts was investigated. Except that light petroleum dissolves no hard resin and but little chlorophyll,

the materials extracted by the first two solvents are similar. In addition to resins and colouring matter, both extract waxes, essential oils, fats, and fatty acids. To obtain complete extraction the samples must be ground. The fats and waxes are separated by their insolubility in EtOH, and the fatty acids by esterification with hot abs. EtOH and extraction by light petroleum from the diluted liquid after addition of sufficient alkali to neutralise the resins. These acids consist chiefly of oleic acid. It is claimed that the EtOH solution of the soft resin gives no ppt. with $Pb(OAc)_2$ after removal of the fatty acids. The EtOH and to a less degree the H_2O extracts contain substances giving some of the reactions of tannin, but no true tannin is present. The EtOH extract contains a substance which with time loses its solubility in EtOH and H_2O, and may be identical with the "amorphous matter" described by Brown (B., 1913, 442), and the H_2O extract a substance which gives rise to beer turbidity when added to wort before fermentation. Based on these experiments a titrimetric method for hop analysis is described, in which the sample is extracted successively with light petroleum and Et_2O, the evaporated extracts are heated with abs. EtOH, and an aliquot is titrated with $0{\cdot}1N$-alkali in a comparator to p_H 9·18. A further portion is extracted with Et_2O, the residue dissolved in 94% EtOH, and similarly titrated. In the first two titration portions the oleic acid is esterified and from the difference between their sum and the result of the third titration its amount is calc. (1 c.c. of $0{\cdot}1N$-alkali = 36 mg. of soft, or 27 mg. of hard, resin.)
F. E. Day.

Extract differences at mash-tun taps. G. Jakob (Woch. Brau., 1931, **48**, 330—333, 338—343, 352—355).—The conditions affecting the flow of sparge-liquor through the grains are discussed, and the importance of uniformity of sparging is emphasised. F. E. Day.

Purification of alcohol by activated charcoal. Fritzweiler and K. R. Dietrich (Z. Spiritusind., 1931, **54**, 209—210).—When 100 g. of 94·4 wt.-% raw spirit containing MeCHO 0·114 g., esters 0·1 g., fusel oil 0·01 g., and furfuraldehyde 0·1 g., is treated with 20 g. of activated charcoal for 6 hr., 0·022 g. of MeCHO, 0·021 g. of esters, and undetermined portions of the fusel oil and furfuraldehyde are absorbed. Similar results are obtained with 45 wt.-% raw spirit. Since these impurities can be removed more completely by rectification, the treatment with charcoal should follow rectification instead of preceding it. Less frequent regeneration of the charcoal would be required, and small amounts of MeCHO produced by oxidation of EtOH on the surface of the charcoal could be eliminated by a second rectification. C. Ranken.

Use of barium oxide for alcohol dehydration. B. L. Meredith and W. G. Christiansen (J. Amer. Pharm. Assoc., 1931, **20**, 653—655).—91·90% EtOH (wt./wt.) refluxed with 250 g. of ground BaO (16-mesh) for 2 hr. with mechanical agitation gave 97·5% EtOH, a yield of 98% of the total alcohol originally present. Using more BaO or distilling under diminished pressure reduced the yield (cf. B., 1929, 449).
E. H. Sharples.

Calculation of alcohol from the sp. gr. J. F. Liverseege (Analyst, 1931, **56**, 529—530).—For calculating the relationship of the different ways of stating alcoholic concentration, it may be assumed that 1 g. of abs. EtOH per 100 c.c. = 0·7940 c.c. of abs. EtOH per 100 c.c. = 0·4533 proof spirit. Any of these figures divided by the sp. gr. at 60°/60° F. will give the wt. of EtOH per 100 g. T. McLachlan.

Determination of lactic acid in wine. F. Wirthle (Chem.-Ztg., 1931, **55**, 646—647).—Modifications of the usual procedure are described. E. S. Hedges.

Barley. Determining gluten. Feeding value of dreg meal.—See XIX.

See also A., Sept., 1089, **Cryst. amylase.** 1090, **Cryst. pepsin.** 1092, **Production of mannitol from dextrose.**

Patents.

Mashing of cereal products. F. B. Dehn. From Canadian Res. Corp., Ltd. (B.P. 354,258, 2.5.30).—Malt or a mixture of malt with unmalted cereals is mashed at 37·5—56° with 2·5 times its wt. of H_2O. A portion of the liquid is withdrawn after ½—1½ hr. and mixed with the boiled and cooled remainder, and the mixture is kept at 75—80° until the conversion of starch is complete. C. Ranken.

Hydrolysed protein products and method of using the same. C. N. Frey, Assr. to Standard Brands, Inc. (U.S.P. 1,794,370, 3.3.31. Appl., 26.9.28).—A protein-containing substance, such as compressed yeast, is hydrolysed by an acid, such as H_2SO_4, and after a portion of the free acid is subsequently neutralised by $Ca(OH)_2$ and the ppt. separated the further portion is neutralised by aq. NH_3 and evaporated to dryness. Its use in making leavened bread is described.
C. Ranken.

Production of yeast without alcohol. E. Jellinek (B.P. 354,118, 20.10.30. Austr., 22.10.29).—Yeast which is propagated by the discontinuous process in an aerated solution containing sugars and nutrients is separated from the fermenting liquid, and after dilution with H_2O is strongly aerated and the separated alcoholic wort slowly added to it. C. Ranken.

Treatment of yeast and manufacture of medicinal products therefrom. P. Hall (B.P. 354,371, 8.5.30).—Dried, powdered brewers' yeast, either alone or mixed with dried milk powder, is irradiated with ultra-violet rays and mixed with substances containing Ca and P in assimilable form. C. Ranken.

Manufacture of iodised yeast. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 354,611, 6.10.30).—Yeast is grown in a carbohydrate mash to which is gradually added 5—100 g. of I per cu. m. of the mash.
C. Ranken.

Dehydration of [ethyl] alcohol. Kodak, Ltd., Assees. of D. F. Othmer (B.P. 354,553, 8.8.30. U.S., 29.8.29).—An azeotropic mixture of EtOH, H_2O, and $C_2H_4Cl_2$ is distilled and the $C_2H_4Cl_2$ layer of the distillate is returned to the still, whilst the aq. layer is freed from traces of $C_2H_4Cl_2$ by redistillation and finally rectified.
C. Ranken.

Retting of fibres.—See V. **Ripening of fertilisers.**—See XVI.

XIX.—FOODS.

Condition of barley after removal of husk by sulphuric acid. J. Grüss (Woch. Brau., 1931, **48**, 343—345).—A sample of barley, de-husked by treatment with 45% H_2SO_4 for 15 min. at 50°, gave about 98% germination. The nature of the slight damage is discussed. F. E. Day.

Occurrence and properties of wheat with slimy gluten. W. Kranz (Mühlenlab., 1931, 17—19).—" Leimkleber " wheat of poor baking qualities, from which the gluten cannot be obtained by washing the flour in the usual way, has been observed chiefly in samples from Eastern Europe and Jugoslavia. As the 1930 harvest produced much more of this wheat than that of 1929, it appears that meteorological conditions are partly responsible, although the normal bushel-wt. of much of this wheat does not support this. The poor quality is not due to admixture of germinated grain. No abnormalities except lack of elasticity of the gluten are evident. Some samples give an abnormally high yield of moist gluten when the flour is washed, the H_2O content of the gluten being high, and when the latter is kept under H_2O for some hours it breaks up. The ratio of total protein to H_2O-sol. protein is low (5·0—5·5), but normal wheat may show similar values. W. J. Boyd.

Fermentation method for rapid determination of gluten quality of wheat and wheaten flour. P. Pelshenke (Mühlenlab., 1931, 1—3).—Wheat is tested in the form of grits, flour in admixture with its own wt. of grits of 4% ash content. A 5-g. sample is made into dough with 0·25 g. of yeast and formed into a ball with smooth surface. The ball is placed in a glass vessel 6 cm. in diam. and 7 cm. high, containing 75 c.c. of H_2O, and the vessel is placed in an incubator with glass doors and kept at 31—33°. The time in min. elapsing between the moment of placing the dough in the vessel and that when the first large piece of the gas-disrupted ball touches the bottom of the vessel is taken as the test val. of the sample. Dough from bad wheat is disrupted quickly, that from good wheat slowly, the limiting test val. between good and bad being 30. Values for samples of various origins are given. W. J. Boyd.

Determination of gluten quality and flour quality. T. Ruemele (Mühlenlab., 1931, 3—5).—Of the moist gluten from 20 g. of flour, 2·5 g. are dispersed in 75 c.c. and 2·5 g. in 150 c.c. of 0·02N-lactic acid at 27°, and the viscosities at 20° are measured hourly for 5 hr. in a special viscosimeter. The smaller the difference between the viscosities of the two solutions, the better is the quality of the gluten. The quality val. X is found from the equation $X = \eta$ of the 75-c.c. solution/η of the 150-c.c. solution. For a good gluten X is 1·140—1·300 after 5 hr. The method can be applied to flour directly, using 8—10 g., but the result is comparable only with other results obtained with flour, and not with those obtained when gluten is used. W. J. Boyd.

Application of viscosity measurements to evaluation of gluten quality. T. Ruemele (Mühlenlab., 1931, 19—21).—The relation of quality and viscosity of gluten is discussed with special reference to the author's quality val. (cf. preceding abstract). W. J. Boyd.

Water-insoluble and water-soluble fractions of bread. H. Ay and P. Rzymkowski (Pharm. Zentr., 1931, **72**, 465—467).—Rye bread, dried at 105° and finely ground, was extracted with 26 times its wt. of H_2O. The insol. residue dried at 75—80° in vac. amounted to 83·6% of the dry bread and contained 6·34% of nitrogenous matter, 0·12% of ash, 1·10% of fat, 1·42% of roughage, 84·92% of starch (including 4·23% of pentose), and 6·10% of residue difficult to hydrolyse. After prolonged inversion with 25% HCl, this residue, consisting of 21·49% of nitrogenous matter, 7·29% of roughage, and 0·85% of ash, yielded 35·22% of reducing substance (calc. as dextrose), and 19·89% remaining undissolved. The aq. extract of the bread gave on evaporation to dryness a residue containing 10·72% of ash. It had an odour of caramel, brown colour, sweet taste, and was slightly hygroscopic. After removal of heat-coagulable protein, inversion for 3 hr. with 1% H_2SO_4, and removal of the latter by means of baryta, the liquid was incubated with yeast till no more CO_2 was evolved. The yeast was filtered off and the liquid evaporated to dryness in vac. The dark brown, hygroscopic residue of pleasing odour like that of bread, and sharp taste (neither acid nor saline), amounted to 46% of the H_2O-sol. extract, or 7·52% of the dry bread. It consisted of 17·99% of ash, 7·20% of nitrogenous materials, 3·95% of pentosans, and 2·95% of other reducing substances (calc. as dextrose), leaving 67·89% of material (5·11% on the dry bread), corresponding to Deininger's " other nitrogen-free extractives " (Diss., Würzburg, 1920), of which he found 5·5% in war bread. It gave the reactions of vegetable gum except that it yielded little pentose on boiling with H_2SO_4. W. J. Boyd.

Value of tapioca flour and sago-pith meal in the nutrition of swine. H. E. Woodman, A. W. M. Kitchin, and R. E. Evans (J. Agric. Sci., 1931, **21**, 526—546).—Tapioca flour forms a highly digestible foodstuff for pigs and has a favourable effect on the colour and texture of the carcase fat and the quality of the bacon. It may replace barley or maize meal in pig rations. Sago-pith meal may be substituted for barley meal up to 20% of the ration without affecting live-wt. increases. Inferior results obtained with higher proportions of the meal are probably due to its depressing influence on the digestibility of other food constituents, notably of protein. Sago-pith meal is more suitable for pigs of $>$ 100 lb. live-wt. A. G. Pollard.

Digestibility and feeding value of dreg meal. S. J. Watson (J. Agric. Sci., 1931, **21**, 410—413).—Feeding trials with sheep show that dried distillers' dregs have a food value similar to that of linseed cake. The material has high protein and oil contents and low proportions of fibre and ash. The ash is almost devoid of Ca. A. G. Pollard.

Volatile products and water-soluble proteins in cotton-seed meats as related to variations in cooking conditions. M. K. Thornton, jun., and C. R. Bailey (Ind. Eng. Chem., 1931, **23**, 833—834).—The influence of time, temp., and rate of heating have been studied in order to determine the optimum treatment prior to expression of the oil. The volatile products of the cook were condensed, scrubbed, titrated, and analysed (Kjeldahl). The sol. N in the cake was determined in an aq. extract (at 40° for 30 min.). The decomp. of pectins, as measured by the amount of volatile acids, increases with temp., with rate of rise of temp., and with duration of heating. Heating at a high temp., or prolonged treatment at a moderate temp., causes caramelisation. Loss of N, as measured by titratable bases, is increased by prolonged heating and high temp., a corresponding decrease in the H_2O-sol. N in the cake occurring simultaneously. The ideal conditions of finishing the cooking are 107·2° for not longer than 20 min. H. J. Dowden.

Determination of added water in milk. A. Schneck and A. Rustom (Milch. Zentr., 1931, **60**, 129—134, 189—196).—The content of added H_2O in milk, found from the formula (1) $X = 100(S - S_1)/(S_1 - 1)$, or (2) $X = 100(R - R_1)/R_1$, or (3) $X = 100(F - F_1)/F_1$ (where X is the H_2O added to 100 pts. of milk, S the sp. gr. of the original milk, S_1 that of the watered milk, R the % fat-free solid content of the original milk, R_1 that of the watered milk, F the fat content of the original milk, and F_1 that of the watered milk), shows variations from the true content due to the limitations of the methods in use for determining these values. If the sp. gr. be determined by pyknometer the value of X obtained from formula (1) is closer to the true value, but still low, in proportion to the fat present. In the case of skim milk the correct value is obtained. The discrepancy is due to sudden crystallisation of the fat and alteration in its sp. gr. on addition of H_2O. Crystallisation of the fat also occurs slowly in normal milk kept below 13° for some hrs. On warming such normal or watered milk to 37° the effect is reversed. The phenomenon is not affected by the degree of dispersion of the fat, nor is it dependent on alteration of the casein or on the presence of the sludge, which can be removed by the centrifuge. By applying a correction to S_1 appropriate to the fat content, or by ensuring that the fats in the watered and in the unwatered samples are both liquid before determining the sp. gr., the added H_2O can be accurately determined from formula (1). Formula (2) does not give good results owing to the difficulty of determining R and R_1 accurately. The reliability of Fleischmann's formula for determination of the solids is affected by the crystallisation of the fat. Formula (3) gives good results for full milk if F and F_1 are determined accurately by the Gottlieb–Röse method. It is not applicable to skim milk. W. J. Boyd.

Dependence of the lime content of the ash from cheese on the acidity of the milk. A. Schneck and A. Elger (Milch. Zentr., 1931, **60**, 205—209).—Three samples of whey from which cream had been removed by different methods and the acidities of which were, respectively, 5·45, 5·7, and 5·8, were made into cheese under identical conditions; the CaO contents of the ash from the cheeses were 32·8, 30·1, and 29·05%. Cheese from fresh centrifuged whey (fat 0·6%) when ashed contained 32·6% CaO. The CaO does not vary inversely as the measured acidity, but is closely related to the bacterial state produced by the time and temp. conditions prior to skimming. Milk of acidity 5·35, when de-creamed by different methods, gave wheys of acidity 5·4 and 5·5, and when made into cheese the ashes contained 24·3 and 21·89% CaO, respectively. The whey from pasteurised milk when mixed with 5% of soured milk, as in the manufacture of Edam cheese, had an acidity of 10·2, and the ash of the cheese contained 23·88% CaO. Whey from the same milk, but unpasteurised and without the addition of soured milk, gave a cheese the ash of which contained 27·33% CaO. H. J. Dowden.

Analysis of egg yolk. M. Auerbach (Collegium, 1931, 396—400).—H_2O is determined by the xylene distillation method. $CHCl_3$ should be used to extract the fat, and a correction of 0·5% deducted for H_3BO_3 in products containing it. NaCl is titrated in the aq. extract of the ash. Proteins are determined by Kjeldahling and using the factor 6·25. Sap. val., unsaponifiable matter, I val., P and N contents are used to judge its purity. H_3BO_3 is tested for. The practical value is judged from the appearance of a few g. when shaken with 200 c.c. of H_2O at 30°. D. Woodroffe.

Approximate determination of egg content in macaroni paste. A. Soldi and S. Testori (Annali Chim. Appl., 1931, 21, 338—343).—The test is based on Lifschütz' reaction for cholesterol (A., 1913, ii, 886). 10 g. of powdered material are refluxed with 50 c.c. of xylene for 3 hr. on a water-bath. The residue is collected and washed with 20 c.c. of cold xylene. The filtrate, reduced to 2—3 c.c. by distillation, is evaporated slowly until a brown oily residue is obtained, which after cooling is dissolved in 20 c.c. of $CHCl_3$. 5 c.c. of this solution are treated in a stoppered glass cylinder with 2 c.c. of Ac_2O and 10 drops of H_2SO_4 (d 1·84). After shaking and keeping for 5 min., the greenish-blue tinge is compared with the colour obtained from a paste of known egg content prepared in the laboratory. O. F. Lubatti.

Analysis of oil in canned sardines. L. Zanchi and L. Cini (Annali Chim. Appl., 1931, 21, 353—354).—The fat naturally contained in the fish diffuses into the olive oil used for filling the cans, causing an alteration of the physical and chemical consts. of the oil. The usual analytical tests are capable of giving useful information only in cases of gross adulteration. O. F. Lubatti.

Vitamins in canned foods. X. Vitamin content of some common vegetables. E. F. Kohman, W. H. Eddy, and C. Z. Gurin (Ind. Eng. Chem., 1931, **23**, 808—811; cf. B., 1930, 1089).—Carrots, celery, and lettuce are all relatively low in vitamin-C, there being little difference between the inner and outer leaves of lettuce and between green and bleached celery. The vitamin content of carrots is reduced by shredding and still further so by storage of the shredded material. Canned turnip greens are rich in vitamin-*C* and resemble spinach in this respect. The doses required to promote equal growth are 2—4 g. of greens, 10 g. of celery, 15 g. of carrots, and 25 g. of lettuce. Canned turnip greens are very rich in vitamin-*A*, 25 mg. being equiv. to 5 g. of bleached or 500 mg. of unbleached celery. Canned greens, lettuce, and celery are not rich in vitamin-*B*. H. J. Dowden.

Cacao butter. Rancid butters and margarines.—See XII. **Intensive grassland management.**—See XVI. **Treatment of milk waste.**—See XXIII.

See also A., Sept., 1033, **Soya-bean lecithins.** 1081, **Camel flesh.** 1098, **Vitamins in sour-milk preparations.**

Patents.

Treatment of baking flour. Metallges. A.-G. (B.P. 354,354, 3.5.30. Ger., 18.5.29).—Perphosphates of the alkali metals or Ca are added to flour as combined bleaching and raising agents. Up to 2½% is used and bleaching is effected by heating to 65—70°, the excess of perphosphate decomposing during baking, to assist the raising process. E. B. Hughes.

Cream process and article. Production of butter. H. D. Wendt, Assr. to Sharples Separator Co. (U.S.P. 1,791,068—9, 3.2.31. Appl., 4.2.30).—(A) Normal cream is centrifuged by means of a high-speed centrifuge to produce a plastic cream with more than 65% of butter fat. This cream is miscible with skim milk or whole milk. (B) Cream containing more than 65% of butter fat, prepared as in (A), is squeezed or kneaded to form butter. E. B. Hughes.

Meat cure and its manufacture. E. H. Wright (U.S.P. 1,792,561, 17.2.31. Appl., 9.12.27).—A product for imparting a smoked flavour to meat is prepared by destructively distilling a hard wood such as hickory. The retort is maintained at first between 38° and 71° and the gases produced are allowed to escape. The temp. is slowly raised to 482° and the resulting gases are condensed. The condensate is dehydrated in a vac. still and the product may be mixed with pickling salt, introduced into brine, or diluted and brushed over meat. E. B. Hughes.

Treatment of tea and similar leaf [with humidified air]. Controlled withering of tea leaf and similar material. J. A. Main (B.P. 354,791—2, 14.5.30).

Canned goods.—See I. **Mashing of cereal products. Hydrolysed protein products.**—See XVIII. **Edestin-calcium from whey. Vitamins.**—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of phenolphthalein in pharmaceutical mineral oil emulsions. J. A. Serrallach and R. J. Owen (J. Amer. Pharm. Assoc., 1931, **20**, 648—650).—2 c.c. of a 10% aq. mixture of the emulsion are diluted to 25 c.c. with EtOH. 0·5 c.c. of this solution is mixed with 20 c.c. of 0·01*N*-NaOH in a 25-c.c. Nessler tube and the colour is compared with that produced by a similar amount of a solution of 10 mg. of phenolphthalein in 100 c.c. of 96% EtOH. The colours are matched by suitable addition of 0·01*N*-NaOH. E. H. Sharples.

Practical stability limits of some common [ophthalmic] solutions. E. Berg (Pharm. Ztg., 1931, **76**, 959—960).—The sensibility to light and the behaviour on keeping of various solutions used in eye treatment are described. E. H. Sharples.

***Monarda punctata*, L.** A. A. Harwood (J. Amer. Pharm. Assoc., 1931, **20**, 631—637; cf. B., 1931, 273).—The following have been isolated from the EtOH extract of *M. punctata* leaves: hydrothymoquinone and a glucoside thereof, a volatile oil (89% of phenols), and a fatty oil (5·3% of drug) containing thymol, phytosterol, and glycerides of linolenic, oleic, and, possibly, palmitic acids. E. H. Sharples.

Identification and determination of dicodide, eucodal, and dilaudide. J. King (Analyst, 1931, **56**, 498—503).—The behaviour of these three drugs towards various reagents is described and certain consts. of the alkaloids and their salts are given. HIO_3 in the presence of H_2SO_4 gives a yellowish-brown colour, changed to mahogany by aq. NH_3. Wagner's reagent gives a cryst. ppt. with eucodal only. When the alkaloids occur as bases they may be titrated directly, or they may be liberated from their salts and titrated. Methods are given for their separation from morphine and its esters and from cocaine. T. McLachlan.

Guarana paste. G. Bertrand and P. de Berredo de Carneiro (Bull. Soc. chim., 1931, [iv], **49**, 1093—1096). The dry paste as prepared by natives contains about 4·8% of caffeine; the industrial paste, containing a little starch, contains about 4·2% of caffeine. No alkaloid analogous to morphine is present, the phenolic colour reaction observed by Schär and Thoms being due to tannins present. R. Brightman.

Characters of essential oils of Sicilian flora. L. Luisi (Boll. Uff. Staz. Sperim. Ess. Calabria, 1931, **6**, 110—119).—*Mentha pulegium* gave 1·5% of oil, d^{18} 0·9406, α_D +9°, *n* 1·4870, acid val. 4, sap. val. 24·14, esters (as menthyl acetate) 8·48%, ketones (Burgess method) 76·59%, solubility in 70% EtOH 1 : 2. Lavender gave 0·24% of oil, d^{15} 0·8919, α_D —4·58°, n^{18} 1·4705, acid val. 0·44, sap. val. 26·35, esters (as linalyl acetate) 9·5%, free alcohols (as linalool) 60·02% solubility in 70% EtOH 1 : 2. *Thymus capitatus* gave 0·72% of oil *d* 0·9460, α_D 0, n^{19} 1·5011, phenols 67·65%, solubility in 90% EtOH 1 : 0·8. *Myrtus communis* gave 0·156% of oil, d^{21} 0·8794, α_D +17·60°, n^{18} 1·4680, acid val. 1·02, esters (as myrtenyl acetate) 17·2%, free alcohols (as myrtenol) 20·16%, cineole 22% (by vol.), solubility in 90% EtOH 1 : 0·50. *Salvia* gave 0·22% of oil, $d^{16.5}$ 0·9123, α_D —12°, n^{18} 1·4735, acid val. 1·50, ester val. 8·70, esters (as bornyl acetate) 3·55%, total alcohols (as borneol) 15·65%, free alcohols (ditto) 12·87%, ester val. after reduction and acetylation 98·00, ketones (as $C_{10}H_{16}O$) 9·95%, cineole 25·00% (by vol.), solubility in 80% EtOH 1 : 10. *Ruta* gave 0·22% of oil, d^{26} 0·8389, α^{26} +3·20°, n^{26} 1·4302, ester

($C_{10}H_{17}$·OAc) 29·64%, solubility in 70% EtOH 1 : 3, congealing point −15°; Me *n*-heptyl ketone was isolated. T. H. POPE.

Italian lemon and orange oils and U.S.P. standards. E. BERTÉ (Annali Chim. Appl., 1931, 21, 303—307).—The reports (1926—1929) of the Laboratorio Chimico del Consiglio Prov. dell' Economia, Messina, and analyses completed during the year 1930, show the following variations. Oil of lemon: α_D^{15} +56° to +62°, d^{15} 0·856—0·859, aldehydes (as citral) 4·5—6·0 wt.-%, residue on evaporation on water-bath 2·5—3·5 wt.-%, n^{20} 1·474—1·4759; the differences between the original *n* and those of the first 5 c.c. of distillate vary between 0·0015 and 0·0025. Oil of orange: α_D^{15} +98° to +100°, d^{15} 0·8485—0·8500, residue on evaporation 1·5—2·5 wt.-%, n^{20} 1·473—1·475, solubility in 90% alcohol 1 : 8. These data taken from a very large number of genuine samples do not agree with the standards set by the U.S.P. O. F. LUBATTI.

Total alcohols [of geranium oil]. R. M. REED (Perf. Ess. Oil Rec., 1931, 22, 275).—The total alcohol content of oils containing both free alcohols and esters may be correctly calc. from the formula $(1-0\cdot00075a)\times by/(561-0\cdot42b)$, where *a*, *y*, and *b* are the same as in Cocking's formula for the determination of free alcohols (B., 1918, 166 A). Gildemeister and Hoffmann's formula is not satisfactory for such oils. E. H. SHARPLES.

Vitamins in vegetables.—See XIX.

See also A., Sept., 1023, **Determination of H_2O by distillation.** 1075, **Local anæsthetics.** 1077, **Synthesis of aporphine alkaloids.** 1078, **Derivatives of *p*-arsanilic acid.** 1079, **Colour reaction of ephedrine. Determination of citrates, salicylates, and benzoates.** 1096, **Extraction of insulin from blood.** 1098, **Isolation of the antineuritic vitamin. Vitamins in sour-milk preparations.** 1100, **Harmine from *Peganum harmala*.**

PATENTS.

Conservation of pyrethrum extract. J. GUILLISSEN, and UNION CHIM. BELGE, SOC. ANON. (B.P. 354,680, 26.1.31).—The extract is enclosed in a glass phial or other receptacle capable of being hermetically sealed in a flame and not attackable by the product. H. ROYAL-DAWSON.

Producing a colloidal solution of the edestin-calcium in a whey free from milk-albumin and milk-ferment. J. SIREK (B.P. 352,608, 5.5.30).—Part of the casein is removed from milk by $MgSO_4$ and H_3PO_4, the remainder by neutralising the acid with $MgCO_3$ and boiling. Lactalbumin and lactoglobulin are removed by boiling the filtrate with NaOH followed by addition of H_3PO_4, excess acid then being neutralised with $MgCO_3$ and filtered. The final whey is boiled with $Ca(OH)_2$, ground hempseed added (at above 57°), the solution neutralised with H_3PO_4, brought to the boil, and filtered above 57°, sugar being added to prepare a syrup. E. B. HUGHES.

Manufacture of aminoalkoxy-derivatives of arylquinolines. SOC. CHEM. IND. IN BASLE (B.P. 349,761, 16.5.30. Switz., 16.5.29).—2-, 3-, and 4-Phenylquinolines containing aminoalkoxyl groups are prepared by general methods. Examples are: 7-β-diethylaminoethoxy-2-phenylquinoline (+2HCl, m.p. 230—231°), from 7-hydroxy- or 7-β-bromoethoxy- (m.p. 112—113°) -2-phenylquinoline; 2-β-diethylaminoethoxy-3-phenylquinoline (+HCl, m.p. 150—151°), from the 2-chloro-compound, m.p. 54—55°; 2-*p*-β-diethylaminoethoxyphenylquinoline (+HCl, m.p. 209—210°), from 2-*p*-β-hydroxyphenylquinoline; 6-β-*N*-piperidylethoxy-2-phenylquinoline-4-carboxylic acid, m.p. 220—221°, from *p*-aminophenyl β-*N*-piperidylethyl ether, m.p. 66—67°, benzaldehyde, and pyruvic acid; 6-β-diethylaminoethoxy-2-phenylquinoline (+ 2HCl, m.p. 211—212°); 7-β-diethylaminoethoxy-4-phenylquinaldine (+ 2HCl, m.p. 250—251°); 7-β-di*cyclo*hexylaminoethoxy-4-phenylquinaldine, m.p. 104—105° (+ 2HCl, decomp. 110°); 2 : 4-bis-β-diethylaminoethoxy-3-phenylquinoline, b.p. 208—210°/4 mm. The prep. of β-di*cyclo*hexylaminoethyl chloride, m.p. 186°, and alcohol, b.p. 135°/2 mm., and 2 : 4-dihydroxy-3-phenylquinoline, m.p. 94°, is mentioned. C. HOLLINS.

[Production of] barbituric acid derivatives. COMP. DE BÉTHUNE (B.P. 349,455, 21.2.30. Fr., 16.1.30. Addn. to B.P. 348,140; B., 1931, 824).—The use of autoclaves is avoided by distilling off EtOH progressively and finally heating at 115°. New 5-Δ^2-*cyclo*-pentenylbarbituric acids described are the 5-*n*-propyl (m.p. 147—148°), 5-*iso*propyl (m.p. 171—172°), and 5-*n*-butyl (m.p. 145—146°) derivatives. C. HOLLINS.

Manufacture of therapeutic agents. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 349,640, 3.3.30).—Basic anæsthetics etc. of the type $Ar\cdot CO_2Y$ or Ar·CHYZ, in which Y and/or Z represent(s) an aminoalkyl group and Z may be hydrogen, are solubilised by treatment with CO_2; thus β-diethylaminoethyl *p*-aminobenzoate, precipitated from aq. solution of its hydrochloride by NaOH, is redissolved on adding CO_2. Other examples are: δ-dimethylamino-*sec.*-*iso*amyl *p*-aminobenzoate, β-*N*-piperidylethyl *p*-β-methoxyethylaminobenzoate, etc. C. HOLLINS.

Manufacture of organo-mercury compounds and preparations comprising them. JOHNSON & JOHNSON (GT. BRITAIN), LTD. From JOHNSON & JOHNSON (B.P. 349,685, 18.3.30).—*m*-Nitro-*p*-cresol is treated with $Hg(OAc)_2$ etc., in presence of alkali, if desired, to give, *e.g.*, nitroacetoxymercuri-*p*-cresol, which is then converted by hot alkali into the sol. alkali salt of 3-nitrohydroxymercuri-*p*-cresol. Addition of Na_3PO_4 or other buffer salt to the solution of the product prevents absorption of CO_2. C. HOLLINS.

Manufacture of acylaminobenzenestibinic acids. I. G. FARBENIND. A.-G. (B.P. 349,796, 13.6.30. Ger., 15.6.29).—An *o*-substituted arylamine carrying an acylamino-group in position 3, 4, or 5 is diazotised and treated with an alkali antimonite; or the corresponding arylaminestibinic acid is acylated. Examples include the prep. of 5-acetamidotoluene-*o*-stibinic acid, 2 : 5-dichloro-4-acetamidobenzene-1-stibinic acid, 4-acetamidoanisole-*o*-stibinic acid, 3-glycollamido-6-hydroxybenzene-1-stibinic acid, and 3-acetamido-4-methoxytoluene-*o*-stibinic acid. C. HOLLINS.

Preparing a remedy for cancerous tumour and product obtained thereby. T. Ishihara, and Nippon Shinyaku Kabushiki-Kaisha (B.P. 352,620, 9.5.30).—Human umbilical cord or the eggs of birds, fishes, or reptiles are boiled with H_2O and the aq. extract is purified by treatment with org. solvents.

E. H. Sharples.

Extraction of certain vitamins from materials containing the same, and increasing the potency of the extracted vitamins. B. Sure (B.P. 354,421, 20.5.30).—After removal of the org. solvent, preferably in presence of a small amount of acid, from an extract of material containing H_2O-sol. vitamins, the aq. residue is treated with glacial AcOH and $COMe_2$ to ppt. inert material. AcOH and $COMe_2$ are removed from the residue, which is then treated with activated C at suitable p_H and the vitamin is removed from the adsorbent by washing with HCl and extracting with EtOH.

E. H. Sharples.

Manufacture of substances having the character of sexual hormones. Schering-Kahlbaum A.-G. (B.P. 355,057, 11.9.30. Ger., 28.9.29).—Solutions of hormones in aq. org. liquids are extracted with non-miscible solvents in which the hormone is sol. (cf. B., 1931, 515). E. H. Sharples.

Production of hormone preparations. "Pharmagans" Pharmaceutisches Inst., L. W. Gans A.-G. (B.P. 354,184, 29.4.30. Ger., 30.4.29).—Hormones, *e.g.*, insulin, adrenaline, etc., salt-like compounds thereof, or substances containing hormones are treated with deoxycholic acid or other like acids or their derivatives in presence of solvents to give sol. addition compounds which are capable of oral administration.

E. H. Sharples.

Wetting etc. agents.—See III. **Colloidal Pb phosphate.**—See VII. **Medicinal products from yeast.**—See XVIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

See A., Sept., 1018, "**Speed" of photographic emulsions.** 1019, **Actinometer for sunlight intensity.**

Patents.

Photomechanical process of printing. E. B. Eldridge, Assr. to J. A. Haeseler (U.S.P. 1,793,070, 17.2.31. Appl., 3.9.26. U.K., 15.9.25).—A substantially grainless printing surface for collotype is produced by very weak development, giving a feeble image with the tone values in correct proportion, followed by hardening with a special CrO_3 hardener.

J. Lewkowitsch.

Manufacture of photographic pictures, especially of kinematographic film pictures. F. Büchenbacher (B.P. 354,731, 12.5.30).

XXII.—EXPLOSIVES ; MATCHES.

Ignition of firedamp by coal-mining explosives. I. Gallery experiments. H. C. Grimshaw and W. Payman (Safety in Mines Res. Brd., 1931, Paper No. 69, 1931, 45 pp.).—In tests on Heathfield natural gas in galleries of 5 and 6 ft. diam. with Samsonite No. 3 and Celmonite the range of ignition, and hence the charge limit, was determined under varying conditions. When fired by direct initiation in a gun of 46-in. bore, without stemming, $\frac{7}{8}$-, $1\frac{7}{16}$-, and 2-oz. cartridges of Samsonite No. 3 gave 20 (full gun), 14, and 10 oz., and of Celmonite 14 (full gun), 16, and 14 oz., respectively. The corresponding values with inverse initiation were 16, 12, 10, and 14 (full gun), 10, 10 oz. Reduction of the bore length to $21\frac{1}{2}$ in. decreased the charge limit of $1\frac{7}{16}$-oz. cartridges, with direct initiation, to 6 oz. for Samsonite No. 3 and 4 oz. for Celmonite. When the explosive was placed at the muzzle or suspended in the gallery a charge limit of only 2 oz. was obtained. A 2-oz. shot fired by direct initiation from the back of a 46-in. bore into a gallery of only 1 ft. diam. caused an ignition ; when a mortar of $\frac{1}{2}$ in. diam. and 6 in. long was used, $\frac{1}{2}$ oz. of explosive ignited the gas. It is possible to raise the charge limit by placing a plate in front of the gun ; this is probably due to the fact that the detonation products are caused to expand and not, as claimed by Audibert, that hot particles are arrested. In tests with stemmed shots, the difference between the results with direct and indirect initiation was accentuated, comparative figures of 28 and 16 oz. being obtained. Flame photographs of two explosives fired under various conditions definitely rule out the possibility of using such photographs to distinguish between explosives or methods of firing them. They show only luminous matter and, even so, not at a particular instant, but during the whole of its existence. Direct-flame photography is being supplemented by Schlieren photography. French and Belgian theories and Audibert's and Lemaire's views on the ignition of firedamp are discussed. The chief factors with unstemmed shots are the flame of the explosive itself, the flames sent out by the explosive (including hot luminous particles), the gaseous detonation products, and the pressure effect in the surrounding atm. The chief safeguards against ignitions are the use of the smallest possible charge and the least possible number of cartridges, the employment of direct initiation, and sufficient stemming. A preliminary test for firedamp is imperative. W. J. Wright.

Patents.

Blasting cartridges and charges. A. C. Scott and D. Hodge (B.P. 354,305—6 and 354,342, [a, b] 4.3.30, [c] 8.4.30).—In blasting cartridges containing compressed CO_2, the heating element consists of : (a) $KClO_4$ or other cryst. O-carrying substance coated with a phenol–CH_2O condensation product, the $KClO_4$ having a fineness of 200-mesh and the coated product of 30—120-mesh ; (b) a mixture of $KClO_4$, finely-divided asbestos, one or more liquid nitro-compounds, a hydrocarbon oil, and castor oil ; (c) a mixture of $KClO_4$, a liquid nitro-compound, a hydrocarbon oil, and castor oil.

W. J. Wright.

Production of smokeless powder. Wolff & Co. Komm. Ges. auf Akt., R. Weingand, and H. I. Schulz (B.P. 353,634, 13.6.30. Ger., 22.6.29).—Nitrocellulose containing not above 12·8% N is gelatinised below 0° with org. gelatinising agents that are normally solvents for nitrocellulose of lower N content, *e.g.*, MeOH. Further treatment of the product is also effected below 0°. W. J. Wright.

Gas-cartridges.—See XXIII.

XXIII.—SANITATION; WATER PURIFICATION.

Removal of "biochemical oxygen demand" by the trickling filters of Decatur, Ill. W. D. Hatfield (Sewage Works J., 1931, **3**, 175—186).—Comparison of data obtained from trickling filters treating sewage containing widely varying proportions of a starch waste indicate that the percentage reduction of biochemical O demand is more closely correlated with temp. than with any other known factor. The filter loadings varied from 2000 to 10,000 lb. per acre per day of 5-day biochemical O demand. With conc. sewage the max. load of the filters was 5000 lb. per acre, but pre-aeration, by removing the more easily oxidisable matter, enabled loads of 7500 lb. per acre to be dealt with. More recent reductions in the proportion of starch waste due to recovery at the factory and trade depression are enabling the filters to operate at a load of 2000 lb. per acre and produce excellent effluents. C. Jepson.

Effect of the dilution water on the biochemical oxygen-demand determination. H. Heukelekian and N. S. Chamberlin (Sewage Works J., 1931, **3**, 187—198).—The influence of the dilution H_2O on the biochemical O demand (B.O.D.) of tank and filter effluents was determined by a series of comparative tests using 3 stream waters and 5 artificial dilution waters. The stream waters showed much greater variation than the artificial ones; distilled H_2O was an exception, the lower results obtained in this case and in one of the stream waters being due to deficiency of salts. Generally, the B.O.D. of tank effluent with artificial diluents was similar to the stream water most deficient in salts, whilst that of the filter effluent agreed with the other two streams. The salts present in sewage tend to overshadow the effect of the salts in the various artificial dilution waters, especially if the sewage is weak and the dilution low. In determining the B.O.D. load of a stream it is advisable to use a stored sample from an unpolluted part of the same stream as a diluent, whilst for theoretical and plant studies an artificial diluent with a greater variety of ions than was present in those used in these experiments is required. C. Jepson.

Treatment of combined sanitary sewage and milk waste. E. F. Eldridge and W. E. Zimmer (Sewage Works J., 1931, **3**, 199—204).—Such a sewage is amenable to treatment if the primary sedimentation is complete within 3 hr. from the introduction of the waste into the sewer and the sludge produced is digested in a separate compartment. Stable effluents can be obtained by operating 6—7-ft. filters at a rate of 1·5 million gals. per acre per day, or 7—8-ft. filters at a 2·0 million-gal. rate. C. Jepson.

Comparison of two methods for determination of hydrogen sulphide in sewage. H. E. Johnson (Sewage Works J., 1931, **3**, 205—209).—The H_2S was determined by difference in non-aerated and fully aerated samples by the I titration and the tartar emetic coloration methods. Both methods, though accurate when applied to sulphides in distilled H_2O, were inaccurate with sewage containing over 3 p.p.m., owing to the colloidal and suspended matter. The addition of gelatin to the tartrate solution prevents flocculation of the ppt., and gives a clear amber solution which can readily be compared with the $K_2Cr_2O_7$ standards. The end-point in the I titration is indistinct with sewage, and it is better to destroy the excess I with $Na_2S_2O_3$ and titrate back with I. When determining total sulphides by this method, a blank determination in an acidified and aerated sample should be made to correct for the presence of I-absorbing substances other than H_2S. Details of a recommended procedure for carrying out both methods are given. C. Jepson.

Rapid-stage sludge digestion. A. M. Buswell and E. L. Pearson (Sewage Works J., 1931, **3**, 210—213).—A digestion tank of 2300 gal. capacity during 10 months' operation has shown that 1·25 lb. of gas are produced by the digestion of 1 lb. of org. matter. The rate of gas evolution increased suddenly after about 220 days' operation and was accompanied by an increase in alkalinity and ammoniacal N. The p_H rose steadily from 7·1 to 7·8. C. Jepson.

Bacteriology and chemistry of water purification in the Breslau waterworks. W. Wagenknecht (Gas- u. Wasserfach, 1931, **74**, 673—678).—Details of the systems of water purification used and of the methods of overcoming difficulties which have arisen from time to time are discussed. A. B. Manning.

Determination of SO_4'' in boiler water.—See I.

See also A., Sept., 1083, **Carcinogenic potency of mineral oils.**

Patents.

Regenerating the breathing air in closed rooms. H. Stelzner (B.P. 354,601, 24.9.30):—The reconditioned air is cooled and dried by passage through a multi-surface condenser. C. Jepson.

Gelatin-composition container. [Gas cartridges containing asphyxiating chemicals.] B. C. Goss, Assr. to Lake Erie Chem. Co. (U.S.P. 1,792,010, 10.2.31. Appl., 24.4.29).—The cartridges are made of or lined with a composition prepared by melting at about 77° gelatin, which has been soaked in cold H_2O, and stirring in 9—35% of glycerin, calc. on the wt. of dry gelatin; after they have been filled, the cartridges are sealed with a similar composition. L. A. Coles.

Apparatus for distilling water. Appareils et Evaporateurs Kestner (B.P. 353,346, 1.11.30. Ger., 2.8.30. Addn. to B.P. 208,503; B., 1924, 572).—Inside the separator is a vessel acting as a precipitating and decanting chamber through which the raw water and precipitants flow. D. K. Moore.

Gas masks. Deuts. Gasglühlicht-Auer-Ges.m.b.H. (B.P. 354,612, 8.10.30. Ger., 28.10.29).

Dryer [for sewage etc.]. Absorbent for gas filters.—See I. **O for ventilation.**—See VII.