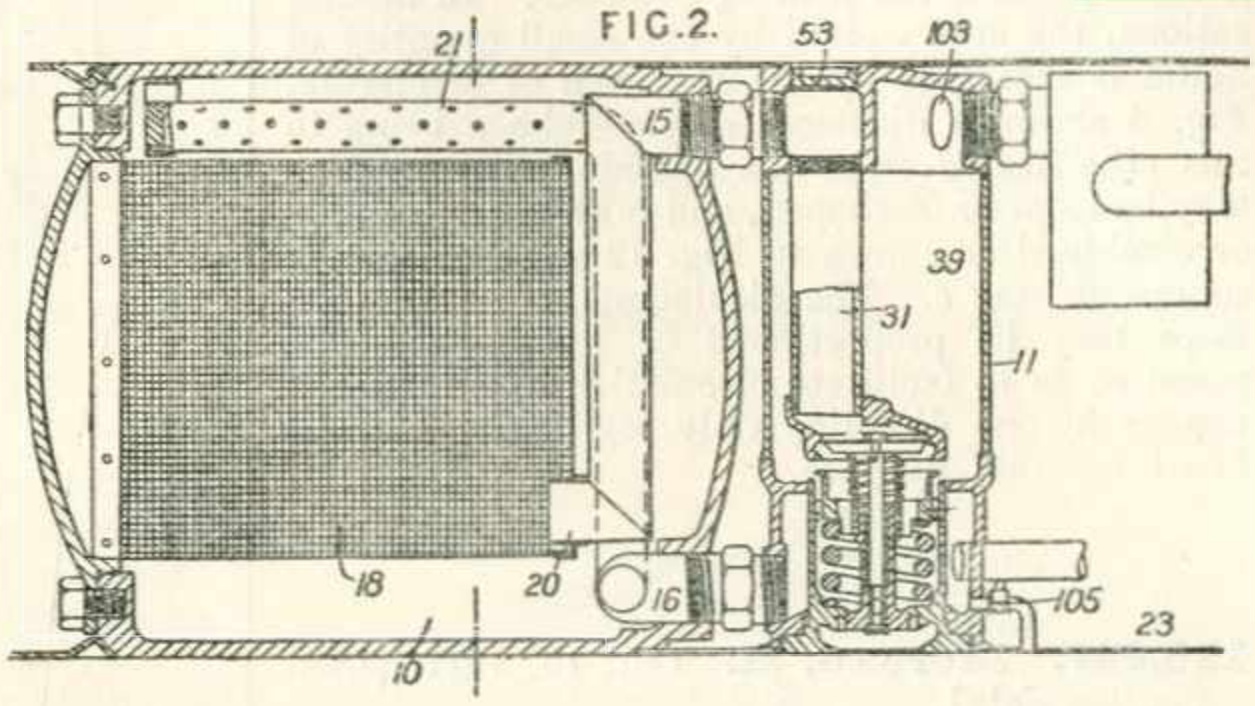
128,608. Westinghouse Machine Co., (Assignees of *Kasley, A. T.*). Aug. 11, 1916 [*Convention date*].

Steam-traps.—The Specification as open to inspection under Sect. 91 (3) (a) describes an apparatus 11 for separating liquids from motive fluids generated chemically in a generator 10 for an engine. The separator comprises a substantially cylindrical shell, into which fluid is delivered by the depending pipe 31 fitted with a controlling disk acted on by a spring, as shown, and provided with a depending stem for actuating a discharge valve. When liquid is delivered with the fluid, the controlling disk moves downwards and opens the discharge valve. This subject-matter does not appear in the Specification as accepted.

FIG. 2.



128,691. Sage & Co., F., and **Feary, N. A. T. N.** May 9, 1918.

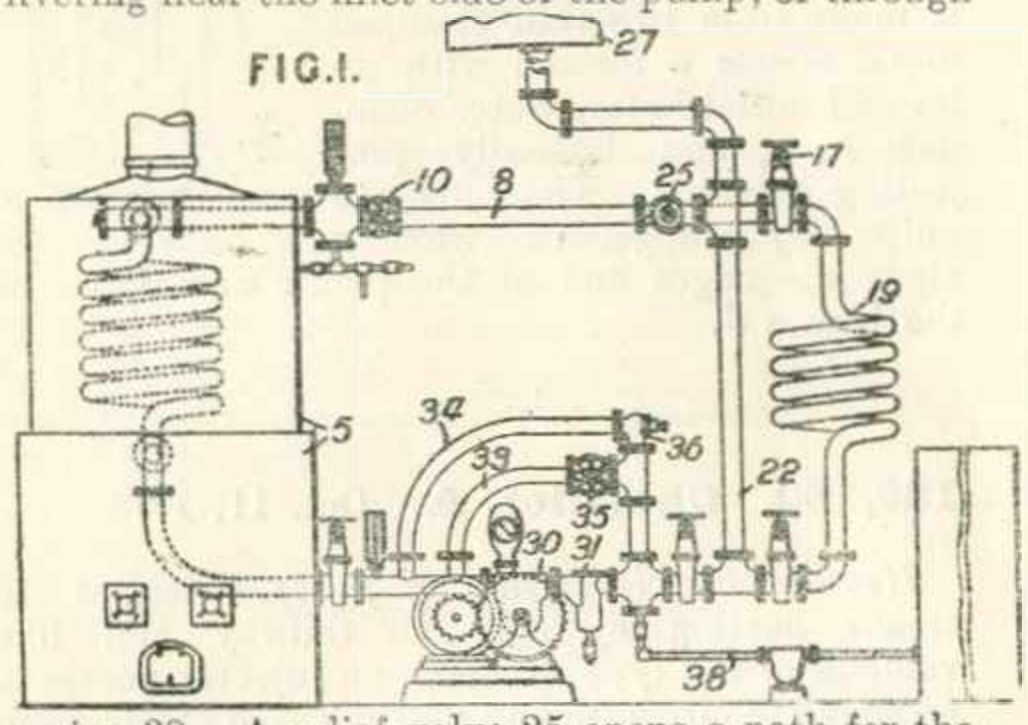
Fire-proof coverings.—A sheet fabric is made from a composition consisting essentially of cork casein and water-glass in which a wire reinforcement is embedded. The latter is preferably in an interlaced or woven form and may be inserted in the centre or on both sides of the composition, as shown in Fig. 3. The whole may be provided with a covering of paper, muslin, or the like. In an example, the composition consists of 1 oz. of casein, 3-20 oz. of borax, 7 fluid oz. of water, 1/2 oz. of water-glass, 1-10 oz. of castor oil, and 1/100—3/100 oz. of tannic acid. It may also be treated with formaldehyde which may be added to the mixture, applied as a vapour, or brushed over the inner surface of the paper when used. According to the Provisional Specification the wire reinforcement may be omitted.

FIG. 3.

128,709. Marks, E. C. R., (*Merrill Process Co.*). June 17, 1918.

Heating by cirulation of fluids. — A viscous liquid is employed as the heat conveying medium, and provision is made for short-circuiting the pump during the period of great resistance at starting the circulation from cold. The normal circuit is through a pump 30, a heater 5, a valve 10, a heat-delivery apparatus 19, a strainer 31, and back to the pump. A valve 35 permits the liquid to circulate through the branch 33 back to the inlet side of the pump at starting, and a second short-circuit branch 34, with a loaded relief valve 36, is provided to safeguard the pump during normal working. Both branches 33, 34 are curved to allow free expansion. Liquid may be supplied to the circuit through a pipe 22 from a tank 27 delivering near the inlet side of the pump, or through

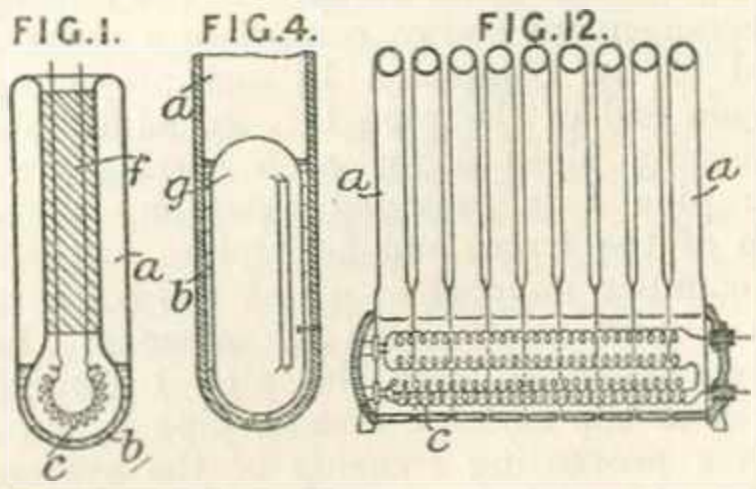
FIG. 1.



a pipe 38. A relief valve 25 opens a path for the liquid from the pipe 8 to the pipe 22 if the cock 17 is shut or out of order.

128,898. Brown, E. June 22, 1918, [*Convention date*]. *Void* [*Published under Sect. 91 of the Act*].

FIG. 1. FIG. 4. FIG. 12.



Radiators.—Heat is transmitted from small intense sources to the air of a room through the medium of a small quantity of liquid vaporized

in a closed hollow body at a pressure lower than atmospheric. Fig. 1 shows a symmetrical body *a*, the liquid *b* being heated by an electric heater *c*. A block *f* closes the heating chamber. In modifications, the area wetted by the small quantity of liquid is increased by the insertion of displacers. Fig. 4 shows a displacer *g*, the tube *a* being in this case heated from the outside. The tubes *a* may be loop- or Y-shaped, and may be used singly or combined as shown in Fig. 12 with a common source of heat *c*. The displacing bodies and the loops may be proportioned or the heaters disposed so as to facilitate circulation of disengaged vapour in one direction only, or baffles may be fitted for this purpose.

128,947. Moreau, H. Oct. 13, 1917, [*Convention date*].

FIG.2.

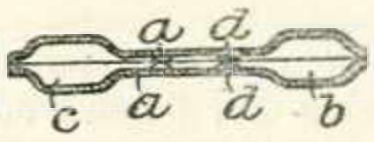
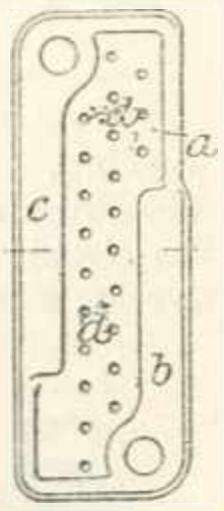


FIG.1.



Radiators. — A hollow plate which can be used in radiators is made from two thin stamped metal sheets *a* formed with inlet and outlet holes, water channels *b*, *c*, and inwardly projecting bosses *d*. The sides are united by autogenous welding along the edges and at the points of contact of the bosses *d*.

129,180. Chevillot, A. Oct. 11, 1918.

Heating by circulation of fluids.—Relates to steam heating systems for railway and like vehicles of the type in which an injector nozzle is arranged to circulate any uncondensed steam from the heaters through the system again. According to the invention, each injector nozzle 12, Fig. 3, is located in a connexion 13 leading between the steam distributing pipe 5 and a pipe 9 leading to each radiator or heater 10, Fig. 2, and the exhaust outlet pipe 11 is arranged adjacent to the nozzle 12 in such a way that the uncondensed steam is projected again into the pipe 9, while the water of condensation escapes to the atmosphere. The arrangement shown comprises a union 14 attached to the connexion 13 and projecting into the open end of the pipe 11. In addition to the distributing pipes 5 for each carriage, a main steam pipe 1 is provided extending the entire length of the train, and both pipes are mounted on a common support of which the connexion 13 forms a part. By this arrangement, heat is readily conducted from the pipe 1 through the support to the injector nozzle, pipe 5 and outlet 11, thus preventing freezing of the system, the transfer of heat being facilitated by the provision of a chamber 16 in the support 13 in free communication with the pipe 1. Reducing valves 7

FIG.2.

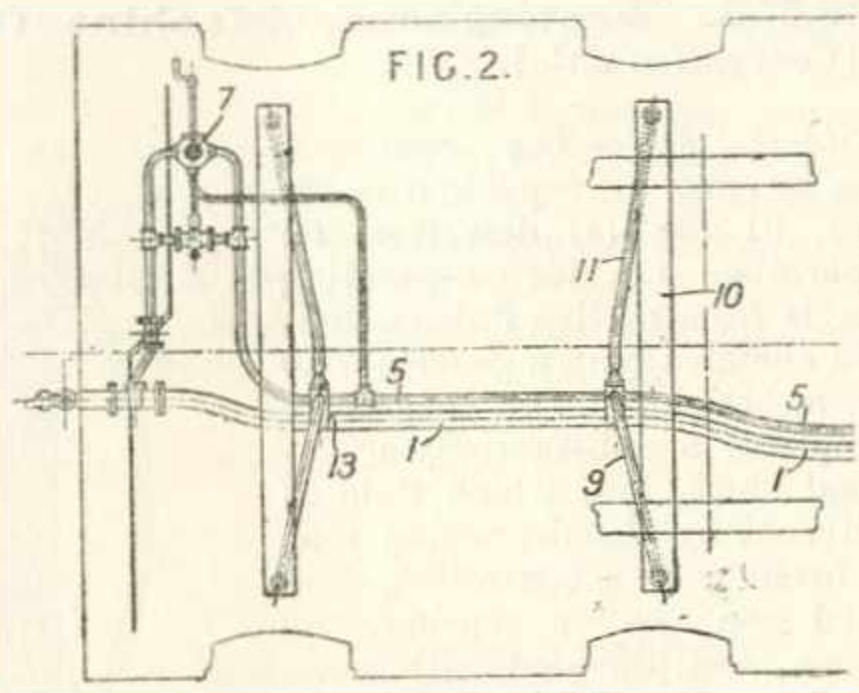
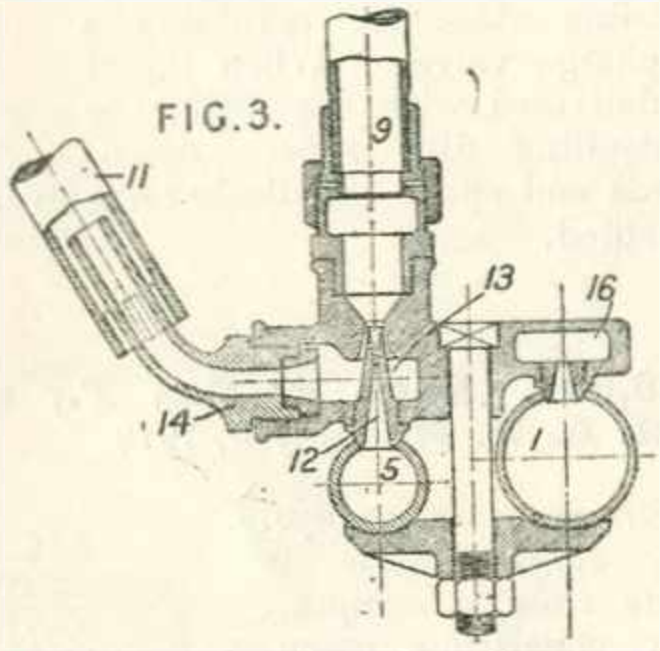


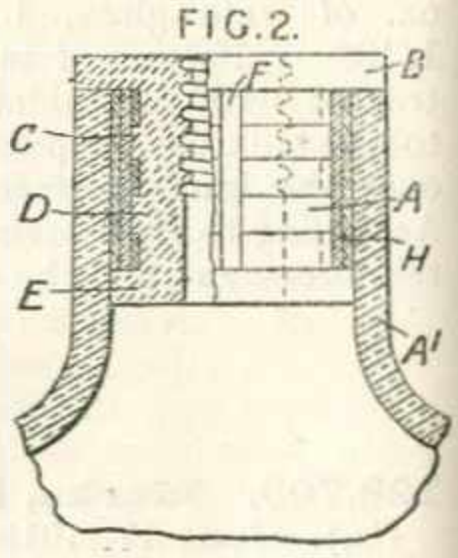
FIG.3.



may be arranged in the branches between the main steam pipe 1 and the pipes 5 so that a uniform pressure may be obtained in all the pipes 5.

129,208. Taffs, A. B. V., and **Taffs, H. F.** (*trading as* Taffs & Co., H. F.). Dec. 31, 1918.

FIG.2.



Hot-water bottles.—Relates to means for securing stoppering-devices and other fitments to rubber articles. A bush or other fitment A of porcelain, earthenware, or the like is secured to or in the neck of a rubber bottle A¹ by rubber solution applied to an unglazed portion of the bush, with or without the interposition of a thin layer of rubber between the bottle and the bush, this layer being secured to the other parts by solution on both faces. The screw-threaded bush A has an external flange B at its outer end, and circumferential ribs C, D, E and two axial grooves F on its external surface. The outside of the bush having been coated with rubber solution so as to fill the annular depressions between the ribs C, D, E, a thin rubber strip H previously treated with rubber solution is wound round the bush between the flange B and the enlarged lower end E. The outer surface of the rubber H is

afterwards painted with rubber-solution, and the bush &c. inserted in the neck of the bottle, previously painted with rubber solution, and the parts allowed to dry.

129,323. Fery, C. J. V. Oct. 23, 1916, [*Convention date*].

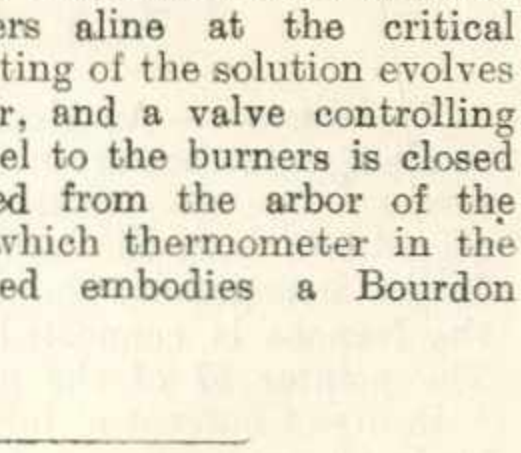
Solar and natural heat, utilizing.—The surfaces of metal reflectors for concentrating radiations are provided with a protecting layer of a varnish comprising asphaltum which protects them from atmospheric action reducing their reflecting power while not appreciably diminishing their ability to reflect heat radiations; reflectors so treated may be used for collecting the radiant energy of the sun and in pyrometric apparatus. The asphaltum may be dissolved in benzine and applied in one or more coats to reflectors consisting of a thin coat of polished silver, gold, or other metal, on a glass or other base, each coat being rendered insoluble by light action before applying the next.

129,808. British Refrigerating Co., and **Jodrey, E. W.** July 17, 1918. *Drawings to Specification.*

Thermostats.—In a combined temperature and pressure indicating gauge for use with a vessel in which gas or vapour is distilled from solution by heating, the pointers aline at the critical point beyond which heating of the solution evolves too much water vapour, and a valve controlling the supply of liquid fuel to the burners is closed by mechanism operated from the arbor of the thermometer pointer, which thermometer in the particular case described embodies a Bourdon tube.

130,045. Soc. Lorraine des Anciens Etablissements de Dietrich et Cie de Luneville. Jan. 27, 1917, [*Convention date*].

FIG. 3.



Thermostats.—A thermostat for adjusting slats A controlling the flow of air through an aircraft or other engine radiator comprises a diaphragm chamber D containing an expansible liquid or vapour, the stem G of the diaphragm F being fitted with a spring H tending to close the slats.

130,311. Wallace, J. W. July 20, 1918, [*Convention date*].

FIG. 5.

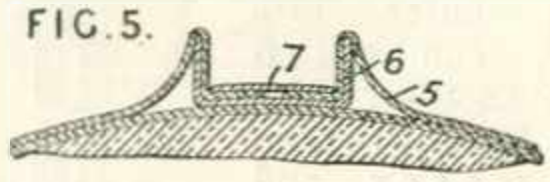
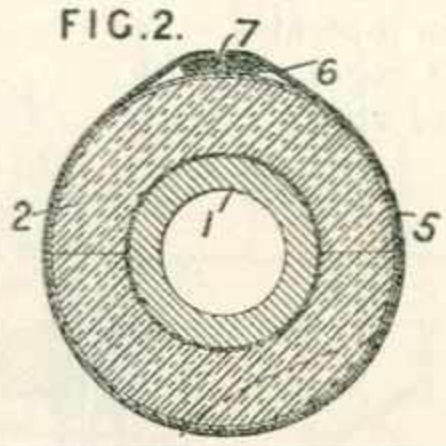


FIG. 2.



Non-conducting coverings for heat.—The edges of flexible materials 5 to be united are bent over the upturned sides of a channel section strip 6 and held by a locking plate 7. To secure the whole the upturned sides are bent over the plate 7, as shown in Fig. 2 where the fastening is applied to fixing non-conducting material 2 to the pipe 1 to be insulated.

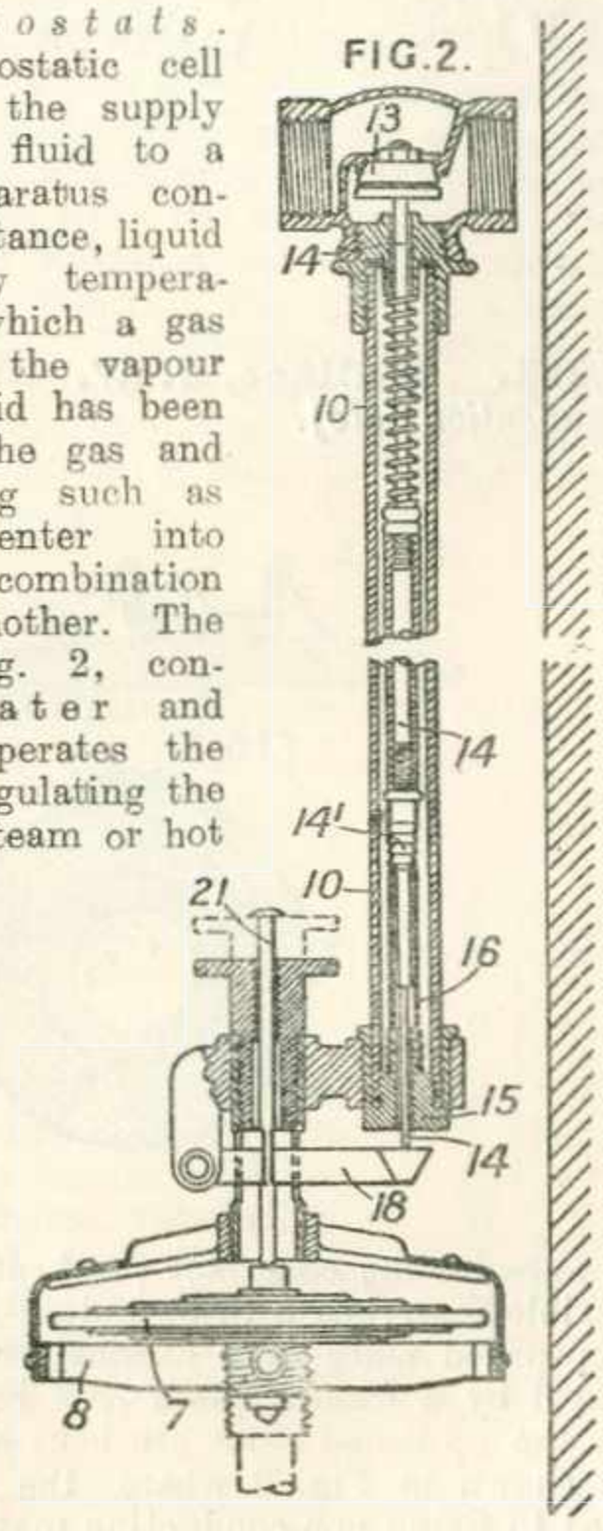
130,351. Bradley, P. R. Jan. 21, 1918.

Fire-proof coverings.—The woodwork of aircraft is covered with dope and perforated metal foil secured by an adhesive or small tacks. The foil may be finally painted and finished with waterproof varnish. Aluminium foil of .0005 to .001 in. thick is used and coated with an adhesive which is allowed to dry, and the foil is perforated with small holes to allow air to escape as it is laid. The fabric may have a coating of foil before it is applied, foil inwards, to the wing or other frame, the outer surface being afterwards doped and coated with foil. In place of an adhesive dope, orange or other shellac dissolved in methyl acetone or other solvent may be used.

130,458. Weltert, F. July 30, 1918.

Thermostats.—A thermostatic cell controlling the supply of heating fluid to a heating-apparatus contains a substance, liquid at ordinary temperatures, in which a gas other than the vapour of the liquid has been absorbed, the gas and liquid being such as not to enter into chemical combination with one another. The cell 7, Fig. 2, containing water and ammonia operates the valve 13 regulating the supply of steam or hot water to a heating-apparatus. A rod 14 connected to the valve stem has a corrugated portion 14¹ covered with a rubber tube 16 forming a yielding connexion between the rod and a stopper 15 in the lower end of a tube 10, which connects the cell framing 8 to the valve box. The middle part of the rod is tubular, and the ends fit loosely in stoppers in the ends of the tube 10. The valve may be operated independently of the cell by lifting a rod 21, which bears on the top of the cell and is connected to a lever 18 supporting the valve rod. In a steam-heated water-heater the supply of steam is controlled by two cells, one surrounded by the hot water, and the other by the condensate from the heating-pipes. A valve controlling the supply of hot water to radiators may be operated independently of the cell by a weight so connected to the valve and to a window that the valve is closed when the window is opened, the valve being again operated by the cell when the weight is lifted by closing the window.

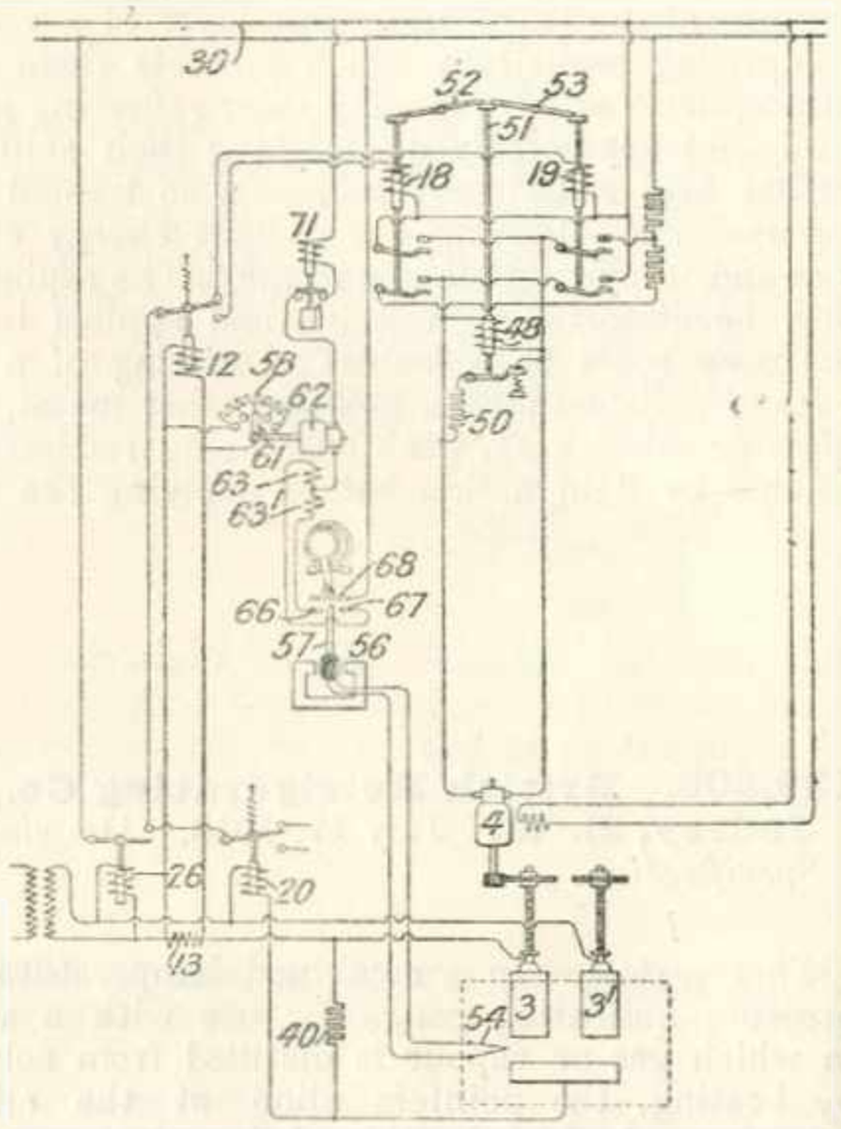
FIG. 2.



131,446. Edwards, L. A. Aug. 20, 1918.

Non-conducting coverings for heat; fire-proof coverings.—A light coarse granular substance which may be used as a heat-insulating medium is prepared from waste or other paper. The granular substance is obtained by soaking the paper in cold water for two or three days, breaking up the pulp thus formed into small pieces which are lightly rubbed or rolled into small pieces and then dried in the air or by other means. If desired, the granular substance may be coloured and it may be made water-proof and fire-proof by treating it with dilute sulphuric acid.

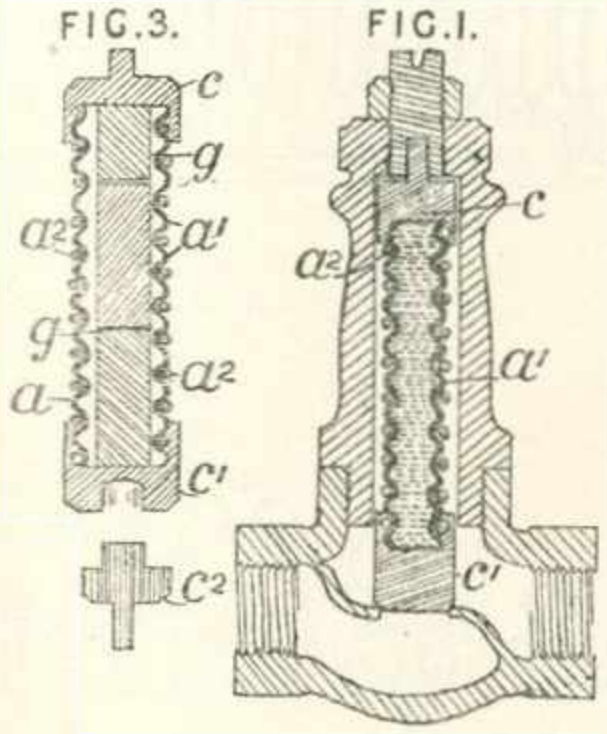
131,767. British Thomson-Houston Co., (*General Electric Co.*). Sept. 20, 1918.



Thermostats.—An electric regulator responding to changes in the current or pressure in an electric furnace is also controlled automatically in accordance with the temperature of the furnace. In the arrangement shown, a thermo-couple 54 in the furnace is connected to a galvanometer 56. The pointer 57 of the galvanometer is supplied with direct current at intervals by a reciprocating blade 68, and moves between stationary contacts 66, 67, connected to reverse field coils 63, 63¹ of a motor 62. A cut-out 71 in series with the motor is provided with a dash-pot retarding closure of the circuit again. A switch arm 61 is moved one step at a time by the motor 62, so as to cut in or out sections of a resistance 58 in shunt to the primary operating electro-magnet 12 of the regulator, which thus corresponds to increased or diminished values of the current in a transformer 13 excited by the furnace current. The electro-magnet 12 closes a circuit from auxiliary mains 30 through a relay magnet 18 or 19 to send current in either direction through a motor 4 adjusting an electrode 3. When the current to this motor is cut off, a magnet 48 connected to the armature closes another circuit

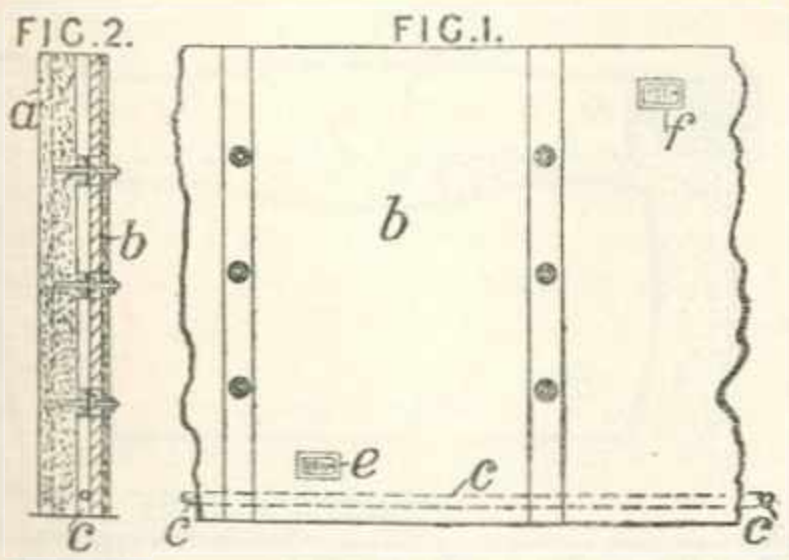
through the armature and a braking resistance 50. Interlocks 51-53 prevent closure of the supply circuit and braking circuit simultaneously. A second upper electrode 3^1 is regulated by another motor, the circuit of which is controlled by a primary electro-magnet 20 in shunt between this upper electrode and the hearth or charge.

132,631. Macintosh, J. Sept. 28, 1918.



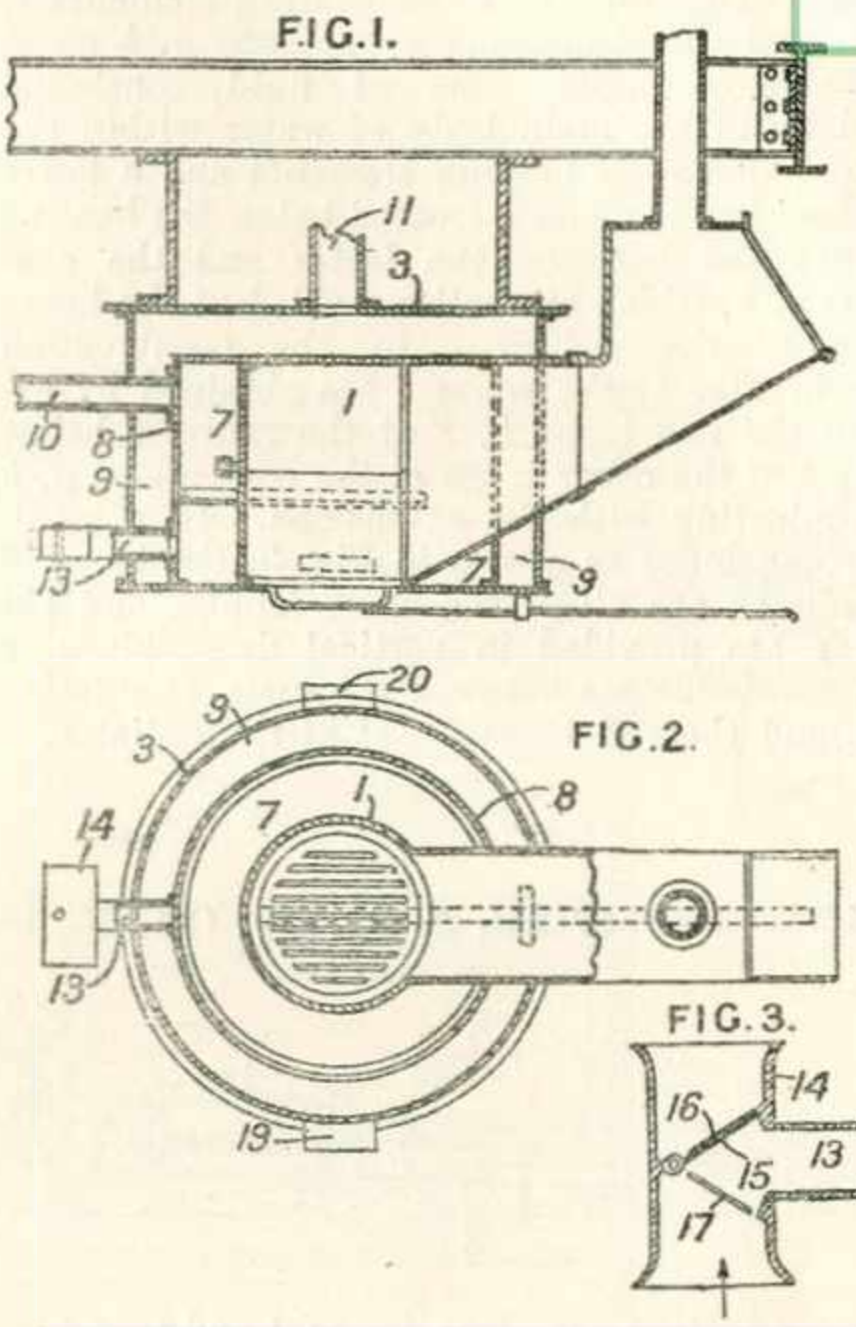
Steam-traps; thermostats.—An expansion member for a thermostat or steam-trap comprises a spirally corrugated metallic tube a^1 armoured with wire a^2 and retaining the expanding fluid by means of caps c, c^1 cast on the ends of the tube. In some cases, additional strength is given by the insertion of struts or stays g, Fig. 3. Fig. 1 shows the device fitted in a steam-trap, the cap c^1, in this instance, acting as the valve. A separate valve c^2 is shown in Fig. 3.

132,695. Kent, H. V. Jan. 2, 1919.



Radiators.—In a double-walled building, heating-pipes c for the circulating medium are disposed in the interspace, between the walls a, b or in the floors or roofs. Ventilators e, f control the admission of heated air to the rooms. Specification 130,897, [*Class* 20 (iv), Floors &c.], is referred to.

132,752. Charpentier, J. May 8, 1919.



Heating vehicles.—In an apparatus for heating railway, tramway, and like vehicles, of the kind comprising a stove 1, Figs. 1 and 2, fed from outside and surrounded by an air chamber 7, a second air chamber 9 surrounding the chamber 7 is provided, and the two chambers are independently connected by means of pipes 10, 11 to different compartments of the vehicle. The chamber 9 is located between the outer wall 8 of the chamber 7 and a cylindrical casing 3 by which the stove is connected to the framework of the vehicle. Air is introduced into the chamber 7, irrespective of the direction of the wind relative to the vehicle, through a pipe 13 having a T-head 14 which is parallel with the longitudinal axis of the vehicle and contains a hinged register 15, Fig. 3, adapted to abut against one or other of two stops 16, 17. The chamber 9 is provided with two valves 19, 20 each comprising a hinged gravity flap, one or other of which is opened automatically by the pressure of the wind.

133,209. Creasey, H. H., and **Adams, S.** Nov. 19, 1918.

Heating buildings &c.; radiators.—Relates to hot-water heating systems of the kind employing a number of radiators which can be heated either by the circulation of hot water or locally by means of gas, electric, or other heating elements, or by both methods in conjunction. With the object of preventing the local heat applied to one radiator being communicated rapidly to the other radiators

of the system, the radiators are constructed or arranged with respect to the heating elements *i*, Fig. 1, and the circulating connexions *g*, *h* so as to provide an upper zone of fluid, consisting essentially of the main body of water within the radiator, above the heating elements and a lower or cooler zone or zones *s* located below the heating elements and between the latter and the connexions *g*, *h*, which are both provided at the lower portion of the raditor. In the construction shown in Fig. 1, the zones *s* are obtained by extending the end loops *b*, *c* of the radiator below the level of the other loops *e*, the connexions *g*, *h* communicating with the extensions. In a modified arrangement as shown in Fig. 3, the loops of the radiator are all of the same length, and the zones *s* are provided in vertical drop pipes *p* which communicate between the main circulating pipe *o* and the end loops b^1, c^1 of the radiator.

FIG. 1.

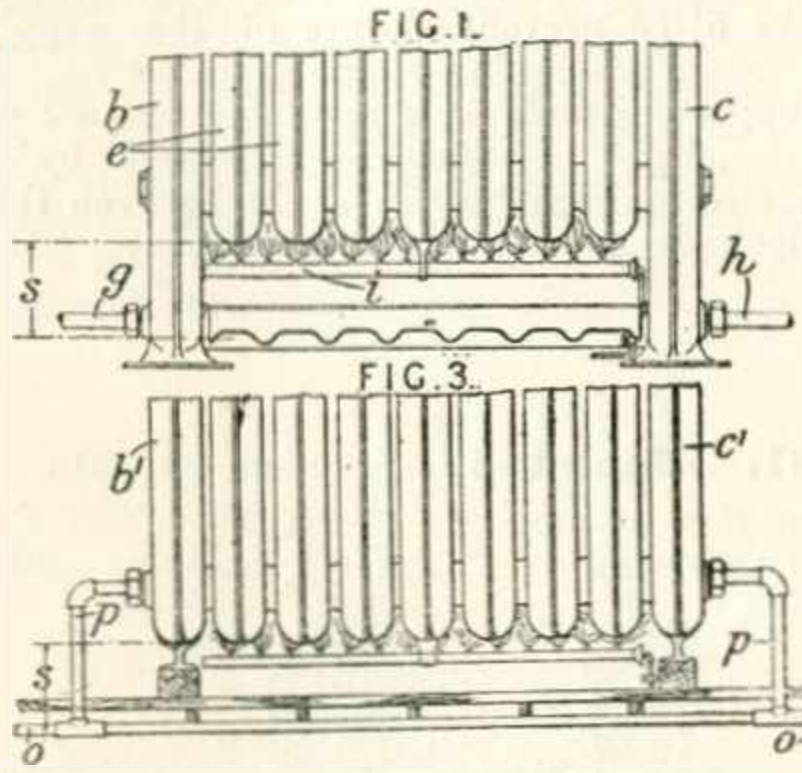
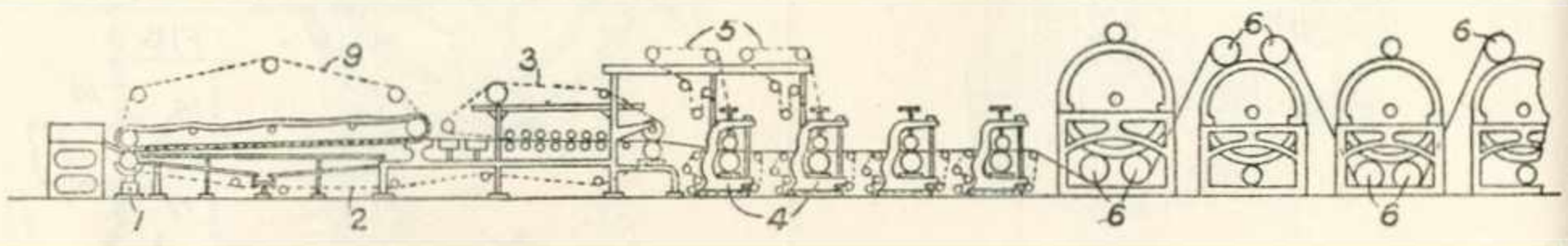


FIG. 3.

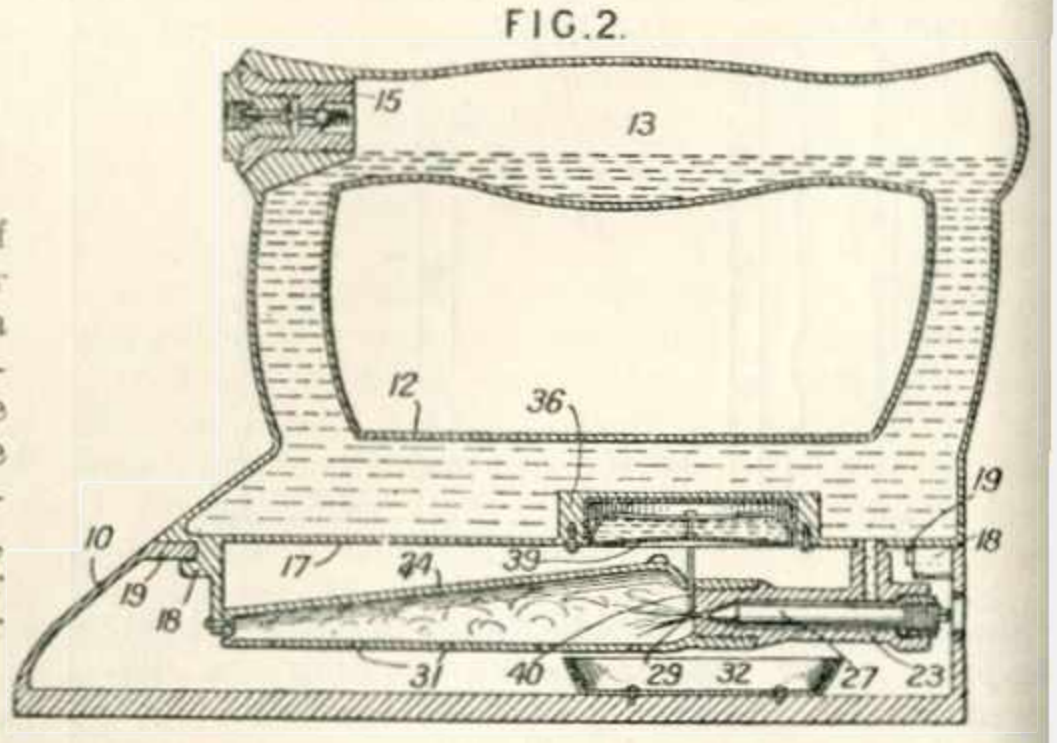
133,484. Ligterink, J. H. P. Oct. 25, 1918.



Non-conducting coverings for heat and sound.—Improvements on the invention described in Specification 12663/04, [*Class* 96, Paper &c.]. Floor coverings which may be used as substitutes for linoleum, are waterproof and bad conductors of heat and sound, and having a basis of paper are produced as follows:—The paper is produced from pulp which is suitably coloured by adding the colouring material to the pulp in the Hollander, and is made in the paper machine of the thickness and width of ordinary linoleum in rolls of continuous lengths, suitable modifications being made in the paper machine. The material is then coated on both sides with a mixture of equal parts of boiled and unboiled linseed oil, dried, and painted with linseed oil paint, and after again drying, the pattern is applied to one side in the usual manner. In the paper machine, the wire cloth 2 is longer than usual and made to slope downwards to the feed rollers 1 which are adjustable; top sieves 9, 3 are arranged above the wire cloth to prevent the flowing of the pulp thereon, the presses 4 are provided with top felts 5 and the guide rollers 6 are made larger than usual.

134,063. Tobiczyk, T. Nov. 12, 1918.

FIG. 2.



Thermostats.—Relates to spirit-heated irons of the kind wherein the handles serve as a reservoir for the spirit, the burner being provided with a thermostatic device to cut off the flame on overheating. The burner 23, depending from the plate 17 and fitted with an adjustable needle-valve 27, carries a vaporizing-chamber 24 secured forwardly to a lug 18. A housing 36 on the plate 17, fitted with liquid, forms an expansion chamber which operates a disk valve 40 to close the burner nozzle 29 upon overheating.

134,280. Stott, V. H., and **Schofield, L.** Oct. 25, 1918.

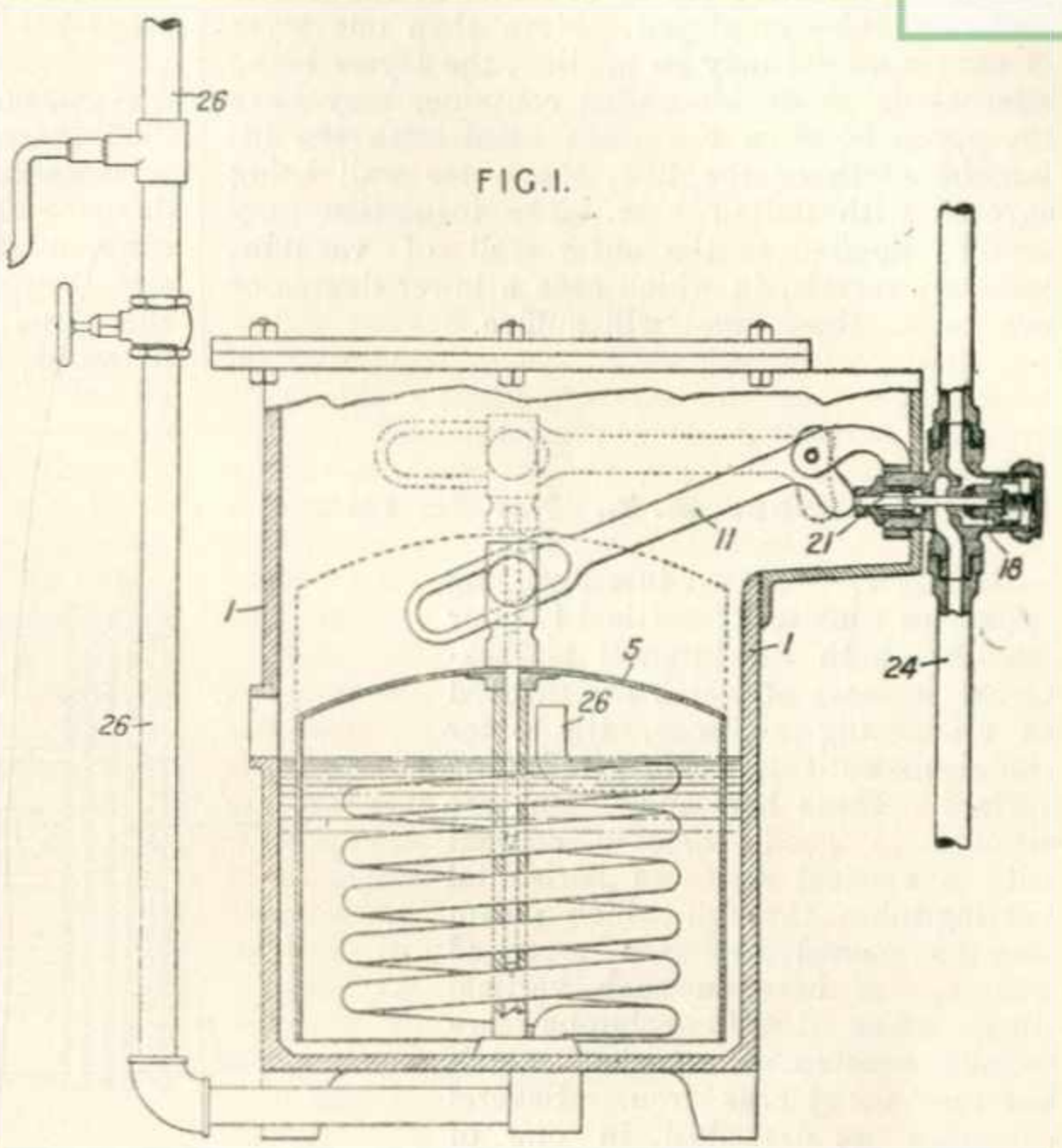


FIG. 1.

Steam-traps. — The motion of an inverted bell 5 actuated by any excess steam at the drain end 26 of a low-pressure system, controls the pressure in the system. In one example, this is done directly by causing the lever 11 to operate a spindle 21, thus admitting steam from a high-pressure line 24 behind a valve 18, which thereupon closes; or, in a modification, the control is indirect, by regulating the gas supply to a gas-fired steam-generator. In the latter case, the products of combustion may be passed around the float chamber to warm the condensation water.

134,538. Dyring, I. T. Oct. 29, 1918, [*Convention date*].

Non-conducting coverings for heat.—Two parts by weight of wood-wool or other wood shavings having long fibres are stirred into one part of weight of Mexican bitumen, Trinidad asphalt, coal-tar, wood-tar or a mixture of these binding agents. The mixture may be pressed into plates for floors, ceilings, roofs, &c. or it may be used in the soft state.

The Specification as open to inspection under Sect. 91 (3) (a) states that wood-wool alone may be compressed and that fatty substances may be added to the bituminous matter. An example of a composition suitable for making mill board or the like is given comprising 1-6 kg. wood-wool, ½-3 kg. jute or rags, $^1/_{10}$-¼ kg. resin, and $^1/_{10}$-¼ kg. glue. The wood-wool preferably comprises 75-85 per cent of the composition. This subject-matter does not appear in the Specification as accepted.

Reference has been directed by the Comptroller to Specification 102,826, [*Class* 70, India-rubber &c.].

134,622. Stott, V. H., and **Schofield, L.** Nov. 7, 1918.

Thermostats. — Heat-regulators for water-heaters, in which a float E controlling the supply of heating-medium is in a chamber A separate from the heater B, are so constructed that the heat transmission from the one body of water to the other is solely through the metallic bottom or wall of the float chamber.

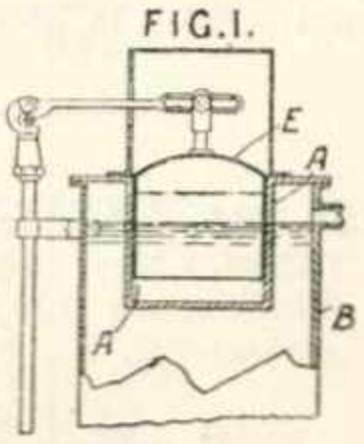


FIG. 1.

134,645. Davis, R. H. Nov. 22, 1918.

Non-conducting coverings for heat. — Glass, metal or other containers for liquids are coated with a thick layer of india-rubber vulcanized thereon, over which is applied a layer of infusorial earth, graphite, or other non-conductor. Or the rubber may be applied over the non-conductor.

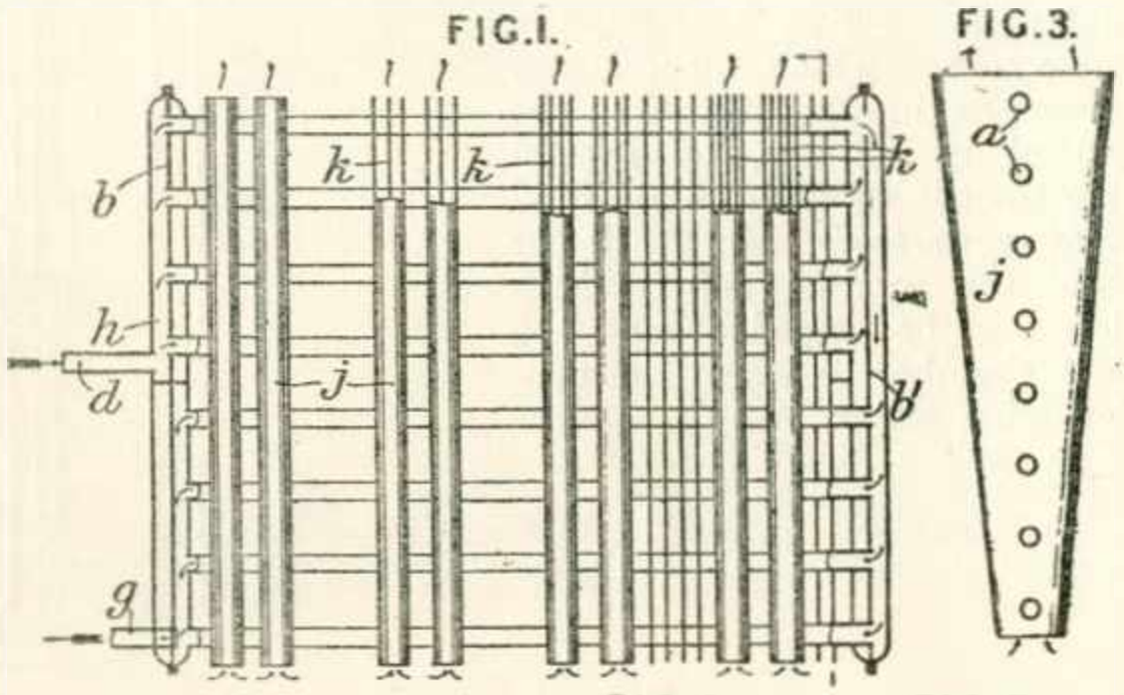
An outer protective casing of metal or the like is preferably also employed. More than one layer of each material may be applied, the layers being alternated. A double-walled container may have the space between the walls filled with the infusorial earth or the like, the outer wall being covered with india-rubber. The insulation may also be applied to the outer wall of vacuum-jacketed vessels, in which case a lower degree of evacuation than usual will suffice.

135,049. Evers, G. P., and **Gauda, M. L.** Jan. 27, 1919. *No Patent granted (Sealing fee not paid).*

Non-conducting coverings for heat.—A sheath of flexible and permeable material is filled with a mixture of asbestos and an adhesive such as dextrine for example in the proportions 90 per cent and 10 per cent. The whole is moistened and then wound round the body to be insulated, the turns being forced against one another and flattened, for example, by striking with a mallet.

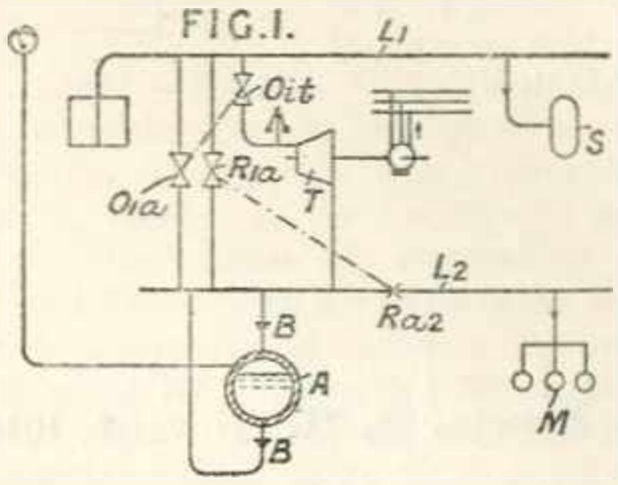
135,274. Pease, E. L. Nov. 18, 1918.

Radiators. — Heat - interchanging apparatus consists of vertical tubular members both the internal and external surfaces of which are utilized as air-heating surfaces, the outer one also constituting a heat-radiating surface. These heating-columns are secured in good metallic contact with a vertical series of horizontal heating-tubes through which steam may be passed, and are arranged with spaces between each vertical tube. The heating-columns are usually constructed of sheet-metal, but may be of cast iron. Several examples are described, in one of which a series of horizontal tubes *a*, supplied with steam &c. from a pipe *d* through a header *b* and fitted with baffles *b*, *b*[1] to ensure correct flow of heating-fluid to the outlet *g*, are provided with a number of vertical flattened tubes *j* smaller at the lower end, as shown in Fig. 3, arranged with spaces between them. The vertical tubes are in close metallic contact with the horizontal tubes and may be fitted with diaphragms *k* of various lengths, also in good contact with the horizontal

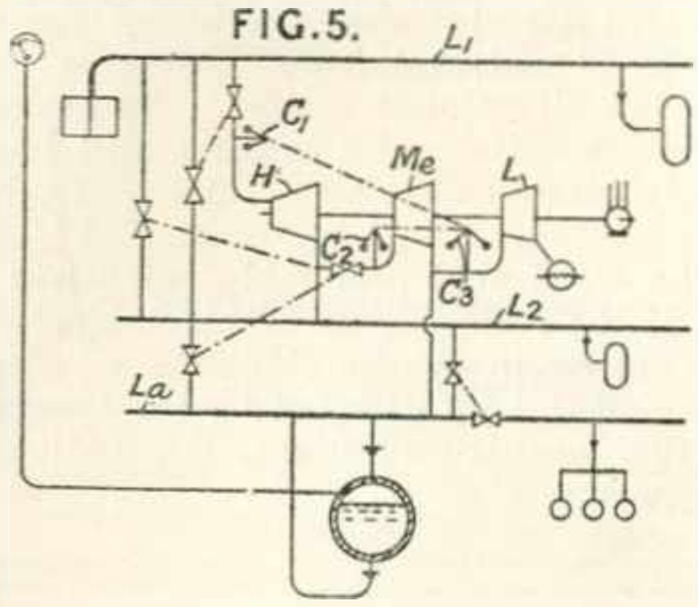


tubes *a*. In other examples, the vertical tubes are completely enclosed in a case, air being supplied at one end and exhausted at the other end. In place of vertical tubes, bent plates may be used as shown in Figs. 6 and 7. Specification 113,298, [*Class* 64 (i), Heating liquids &c.], is referred to.

135,474. Aktiebolaget Vaporackumulator. Nov. 16, 1918, [*Convention date*]. *Addition to* 129,272, [*Class* 123 (ii), Steam generators].



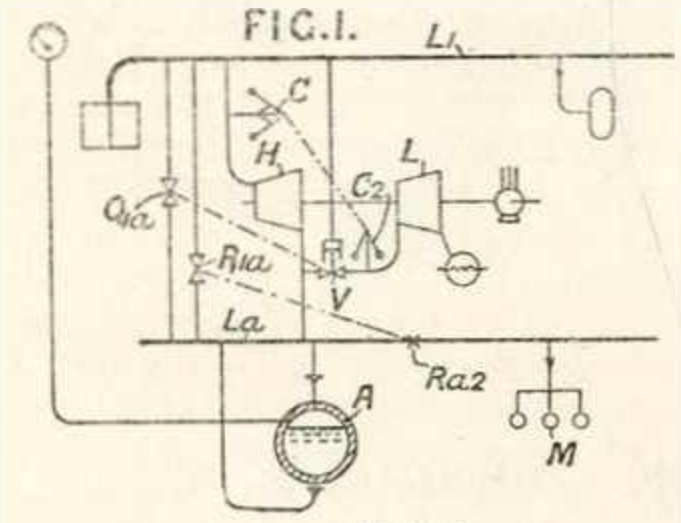
Heating systems and apparatus.—In a steam plant provided with a steam accumulator and having a flow-over valve between the main steam pipe and the accumulator, as described in the parent Specification, the surplus steam passing through the flow-over valve operates a steam engine or turbine, which exhausts into the steam pipe line containing the accumulator. Excess

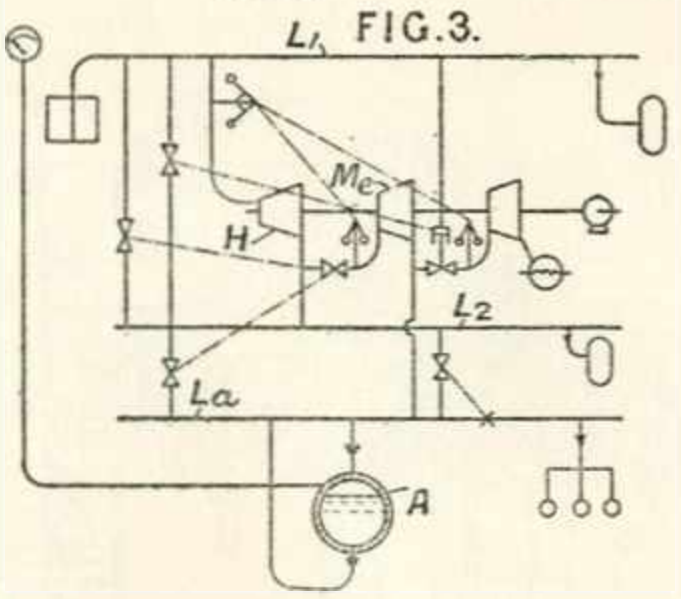


steam from the high pressure main L_1, Fig. 1, supplying a sulphite boiler S passes through a flow-over valve O_1t to a turbine T, which exhausts

into a line L_2 conveying exhaust steam from a high pressure engine to, say, a paper mill M. The accumulator A is connected in parallel to the line L_2, the connexions being fitted with non-return valves B. Steam may pass from the main directly into the line L_2 through a flow-over valve O_1a, which opens when the pressure in the main rises above that at which the valve O_1t is fully opened. A reduction valve R_1a between the steam pipes opens when the accumulator is discharged, the valve so co-operating with the reduction valve Ra_2 in the line L_2 that it commences to open when the accumulator discharge pressure falls to its lowest point. In a modification, the excess steam from the main operates a multi-stage turbine H, Me, L, Fig. 5. The exhaust from the high-pressure stage H passes into an intermediate-pressure line L_2, and the exhaust from the intermediate stage into the low pressure line L*a*. The reduction and flow-over valves between the main and the lines L_2, L*a* co-operate as described in the parent Specification. The governor C_3 on the low pressure stage operates at the normal number of revolutions, and the governors C_1, C_2 on the high and intermediate stages operate at a somewhat higher number.

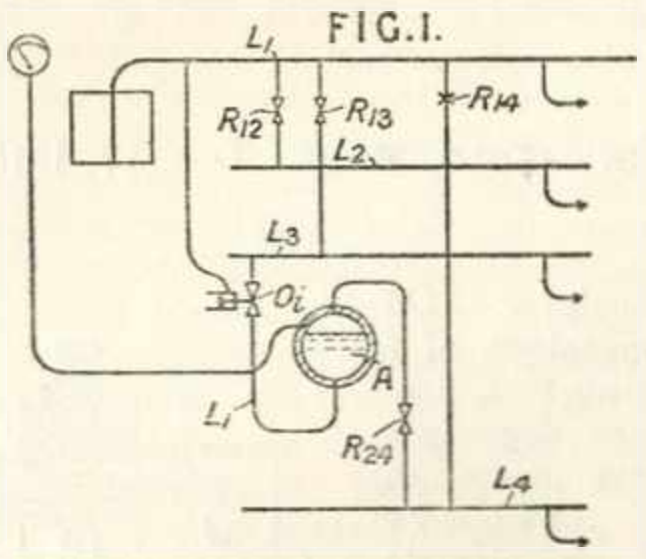
135,478. Aktiebolaget Vaporackumulator. Nov. 16, 1918, [*Convention date*].





Heating systems.—Relates to a steam plant having separate high and low pressure steam supplies, an accumulator being so connected to the supply pipes as to maintain a constant pressure in the boiler from which the high pressure supply is taken, the firing of the boiler furnace being regulated in accordance with the variations of pressure in the accumulator. Excess steam from the high-pressure pipe L_1, Fig. 1, operates a high-pressure engine H and a low pressure condensing engine L, the steam supply to the low pressure condensing engine being regulated by a valve V so controlled by the pressure in the pipe L_1 that the valve closes as the pressure rises, and opens as the pressure falls. The governor C_2 on the low pressure engine so co-operates with the governor C on the high pressure engine that it commences to regulate only when the governor C has fully cut off the steam supply from the high-pressure pipe. This regulation may be effected by a single governor through fluid operated relays. The pipe L*a* into which the high pressure engine exhausts, and to which the accumulator A is connected, is in direct communication with the high-pressure supply pipe L_1 through a flow-over valve O_1a, which opens when the pressure in the pipe L_1 rises above a certain limit. A reduction valve Ra_2 in the pipe L*a* leading to the low-pressure steam consumer M is so connected to a reduction valve R_1a between the pipes L_1 and L*a* that the valve R_1a opens only when the valve Ra_2 is fully open, that is, when the pressure in the pipe L*a* has fallen below a certain limit. In the plant shown in Fig. 3, the high pressure engine H exhausts into a pipe L_2 containing steam intermediate in pressure between that in the pipes L_1 and L*a*, the lower pressure engine M*e* exhausting into the pipe L*a*. The pipes communicate directly with one another through flow over and reduction valves co-acting as described above.

135,479. Aktiebolaget Vaporackumulator. Nov. 16, 1918, [*Convention date*].



Heating systems and apparatus.—Relates to a steam plant provided with a steam accumulator serving to receive the surplus steam from and to maintain the pressure in the various steam supplies of the system. A valve O*i* between two low pressure pipe lines L_3, L_4, to which the accumulator A is connected, is so controlled by the pressure in the high-pressure or boiler pipe line L_1 that, when the pressure in the pipe line L_1 rises, the valve is opened and the surplus steam passes into the accumulator, the valve being again closed when the pressure falls to the normal. The pipe line L_1 is in communication with the lower pressure lines through reduction valves R_{12}, R_{13},

R_{14}. If the steam consumption from, say, the line L_2 decreases, the pressure in the line rises, thus closing the valve R_{12} and consequently causing an increase of pressure in the high pressure line. This increased pressure opens the valve *Oi*, which then allows more steam to pass through the valve R_{13} into the accumulator. The reduction valves Ra_4 and R_{14} coact in the manner described in Specification 129,272. The high pressure steam may operate a three-stage turbine, the high and intermediate stages of which exhaust respectively into the pipe lines L_2, L_3.

135,638. Arneil, J. M. Dec. 7, 1918.

Radiators.—In the type of radiator in which a constant quantity of liquid is heated by heating-fluid supplied to a small tube by means of a valve, two or more such small tubes are fitted of differing lengths. The tubes are all connected to the same valve, which is constructed so that separate or joint supply of heating-fluid may be made to the tubes. The construction of the valve is shown in Fig. 2. Two tubes of different capacities 3, 4 are inserted in the bottom of a radiator 1 containing a quantity of liquid, and are connected to the rotary valve 7 through ports 10, 11. Rotation of the valve enables either or both of the tubes 3, 4 to be supplied with heating-fluid from inlet 13 and to give three gradations of heat.

FIG. 1.

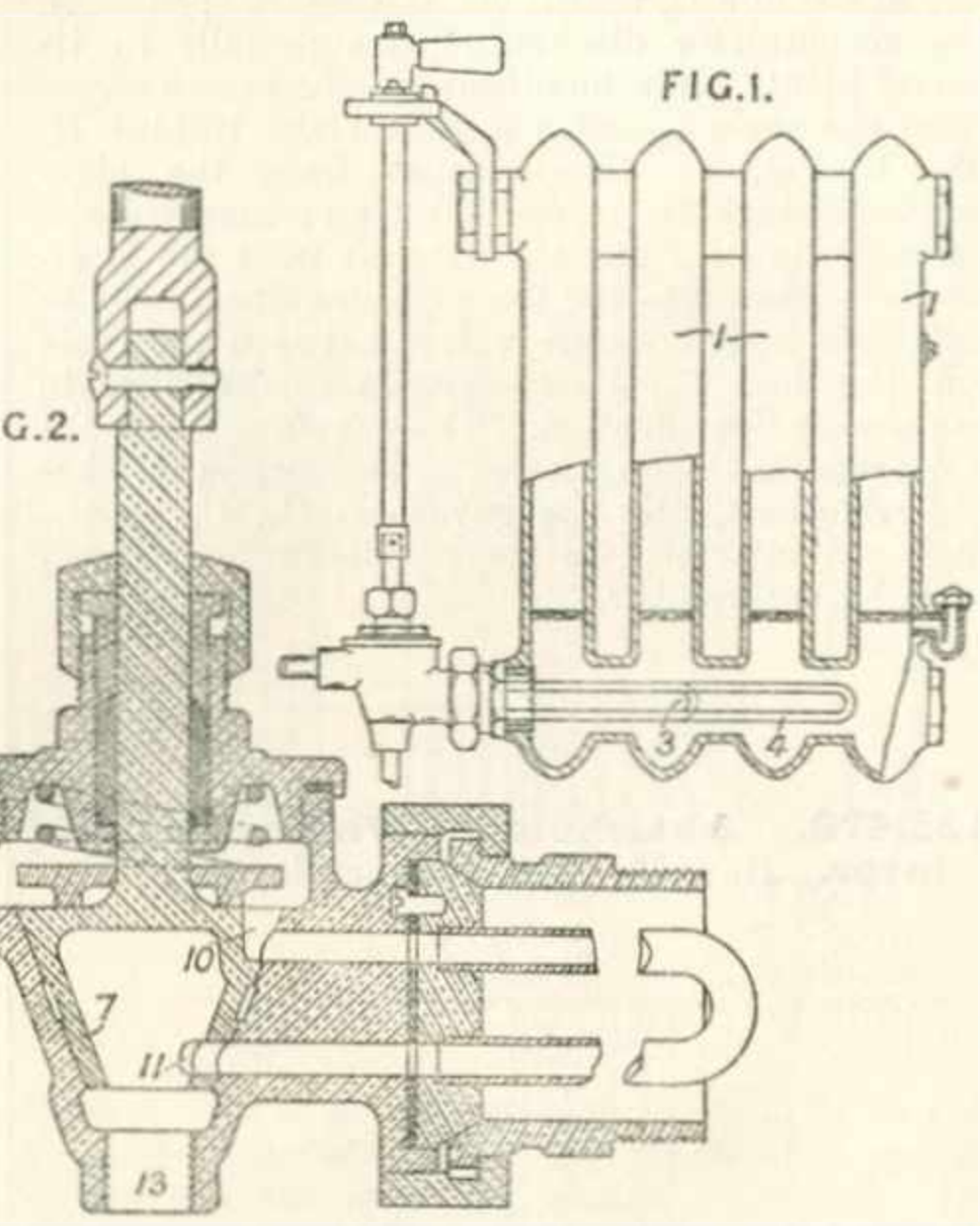
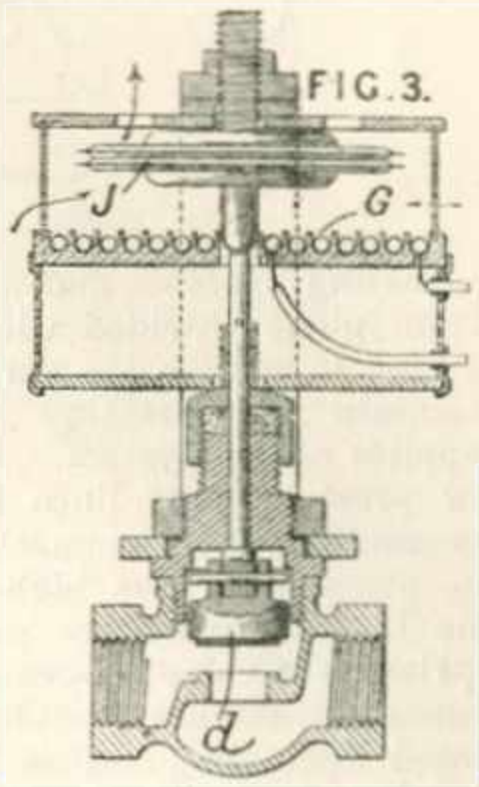


FIG. 2.

135,668. Gold, E. E. Dec. 17, 1918.

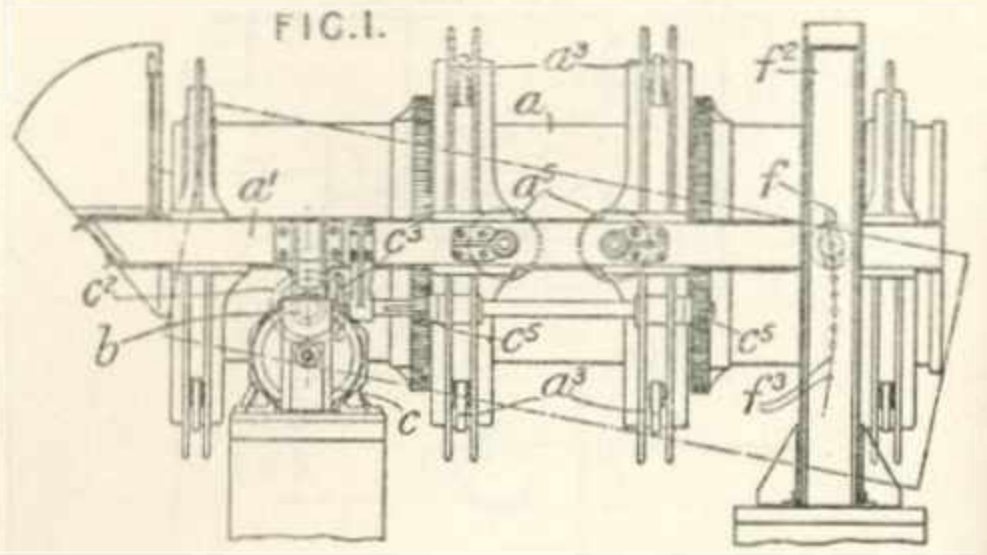
Thermostats. — On the temperature of a room rising to a predetermined degree, a thermostat closes an electric circuit whereby an electric heater G vaporizes the liquid in a capsule J, which, on expanding, closes the steam-admission valve *d* of a radiator. The heating-device is spaced apart from the capsule, so that there is a circulation of air between them serving to cool the capsule when the heater is not operating.

FIG. 3.



135,939. Blichfeldt, S. H. Dec. 4, 1918.

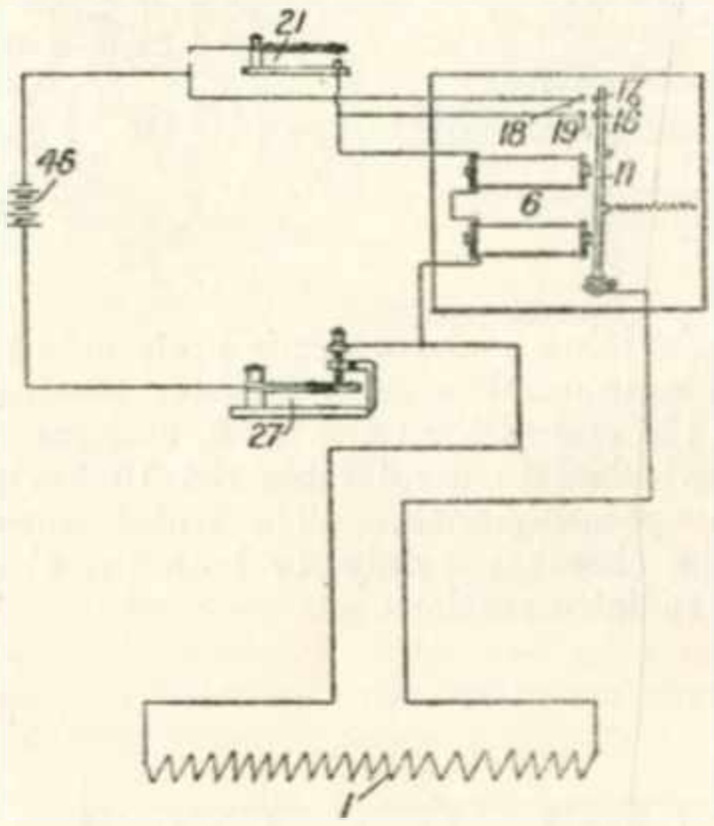
FIG. 1.



Heating-apparatus. — A rotating drum, having internal vanes &c., in which margarine or the like is heated or worked, is arranged in an inclined position so that the margarine &c. passes downwards continuously through the drum. The drum *a* carried by roller bearings a^3, a^5 on the girders a^1 is adjustable about the axis *b*, the driving-gear *c*, c^2, c^3, c^5 being arranged to act

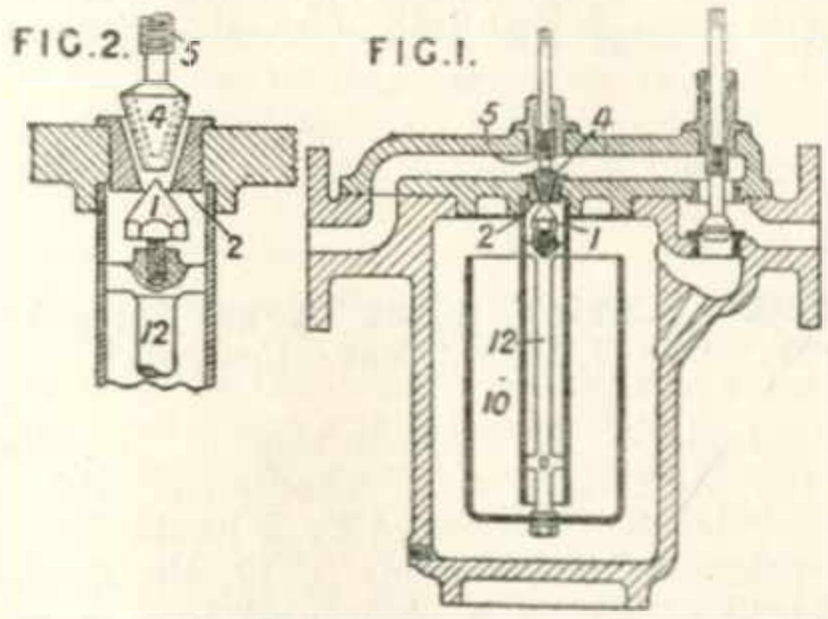
in any position of the drum. Attached to the girder a^1 at the outlet end are flanged members f which are bolted in any position to plates having a series of holes f^3 attached to the uprights f^2. The apparatus may be used in the manufacture of margarine as described in Specification 4278/13 and 17616/13 (both in *Class* 84, Milking &c.).

135,964. Browder, J. D. Dec. 11, 1918.



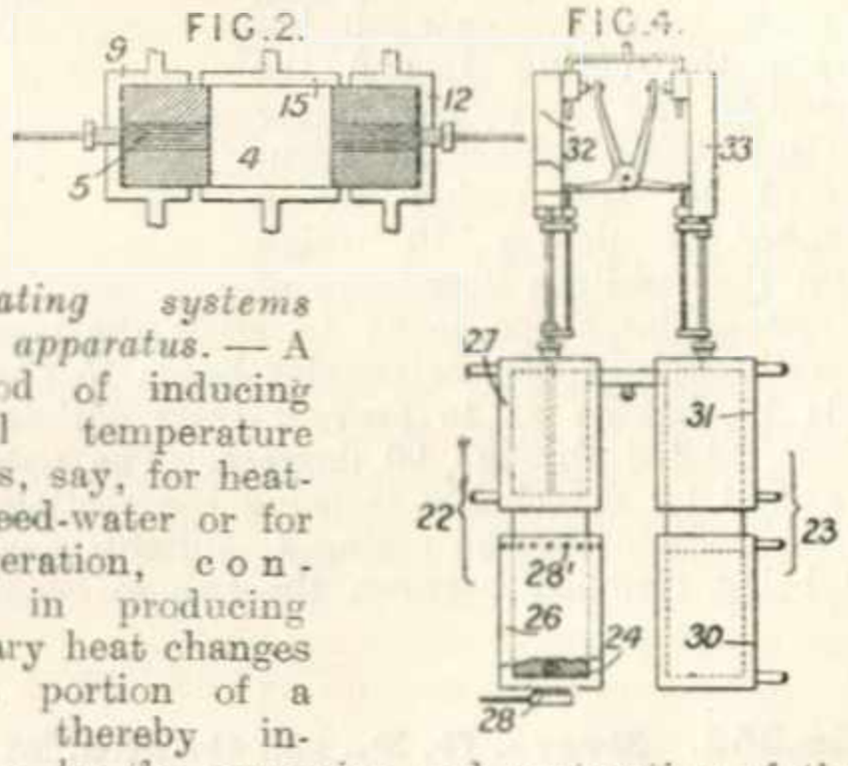
Thermostats.—Water in motor-car radiators or storage tanks is maintained between freezing and boiling points by a heating-resistance 1 controlled by a relay 6 and two thermostats 21, 27. When the temperature falls nearly to freezing-point, the thermostat 21 closes the circuit of the relay 6 through a source of supply 46 and the thermostat 27, which is normally closed. The relay 6 thereupon closes, through its armature 11 and contacts 16 - - 19, the circuit of the heating-resistance 1, at the same time short-circuiting the thermostat 21. When the temperature rises by a predetermined amount, the thermostat 27 opens both the heater and relay circuits.

136,118. Washino, U. June 25, 1919.



Steam-traps.—The stationary seat of the trap valve of a steam-trap is replaced by sliding member providing a number of seats according to the varying pressure of the steam. The trap valve 1 is mounted on a spindle 12 on the bucket 10, and engages either a fixed seat in a plug 2, as shown in Fig. 2, or a seating in the cored plug 4, as shown in Fig. 1. The plug 4 is moved into or away from the stationary plug 2 by a screwed spindle 5 operating in a gland on top of the trap cover.

136,195. Vuilleumier, R. June 4, 1918.



Heating systems and apparatus. — A method of inducing useful temperature effects, say, for heating feed-water or for refrigeration, consists in producing primary heat changes in a portion of a fluid, thereby inducing, by the expansion and contraction of the fluid, secondary heat changes in another portion of the fluid, then abstracting separately the heating and cooling effects induced by the secondary heat changes. The fluid is displaced through regenerators into and out of different temperature regions in heat-interchanging relations with the water &c. to be heated or cooled. Air in a cylinder 4, Fig. 2, having a heating-jacket 9, a cooling-jacket 15, and a refrigerating-jacket 12, is displaced by the alternate reciprocations of pistons 5, which are of a material of low conductivity, and which are centrally bored so as to leave a large number of heat-absorbing radial walls forming regenerators. A regenerator may consist of thin perforated or slotted metal plates arranged so as to form a large number of air passages. The apparatus shown in Fig. 4 comprises a high-temperature inductor 22 and a low-temperature inductor 23, the former having heating and cooling jackets 26, 27, and the latter cooling and refrigerating jackets 31, 30. The heating-jacket may be heated by gas jets 28, vent-holes 28^1 being provided for the escape of the gases. To reciprocate the inductor pistons 24, they may be connected to pistons in cylinders 32, 33, to which pressure fluid is admitted alternately. The inductor pistons may be reciprocated by the fluctuations of air pressure in the inductors. In a modification, air is displaced from cylinders having low-conductive linings through exterior heating, cooling, and refrigerating spaces by means of a reversible fan or propeller. In a further modification, high and low temperature inductors having reciprocating pistons as described above are mounted radially on a rotating shaft, the pistons moving by gravity as the shaft revolves.

136,290. Canada, S. T. Dec. 18, 1918.

Radiators.—In a radiator of the type comprising an electrically heated water chamber, quick reheating is facilitated by connecting the water-containing chamber 2 to the radiator sections 11 through openings 9 which can be opened or closed as desired by hinged flap valves 18 or like means. The insulation is effected by withdrawing the air from the space 3 between the casing 1 and the chamber 2. At its upper surface, the chamber 2 is connected to the casing by a number of sleeves 10 which form the openings 9 and are of a rectangular shape so as to allow the passage therethrough of the rectangular heads 15 of long rods 14, but so as to prevent their withdrawal when rotated through 90 degrees. The rods 14 are used for detachably securing the sections 11 of the radiator to the casing 1, suitable packing 13 being clamped between the two to ensure a water-tight joint. The water is preferably heated by a longitudinal electric heater 5 inserted through the end of the chamber 2, and the valves 18 are attached to a rotatable rod 16 having an external operating-knob. The water may fill either the chamber 2 only, or both the chamber and the radiator sections.

FIG. 1.

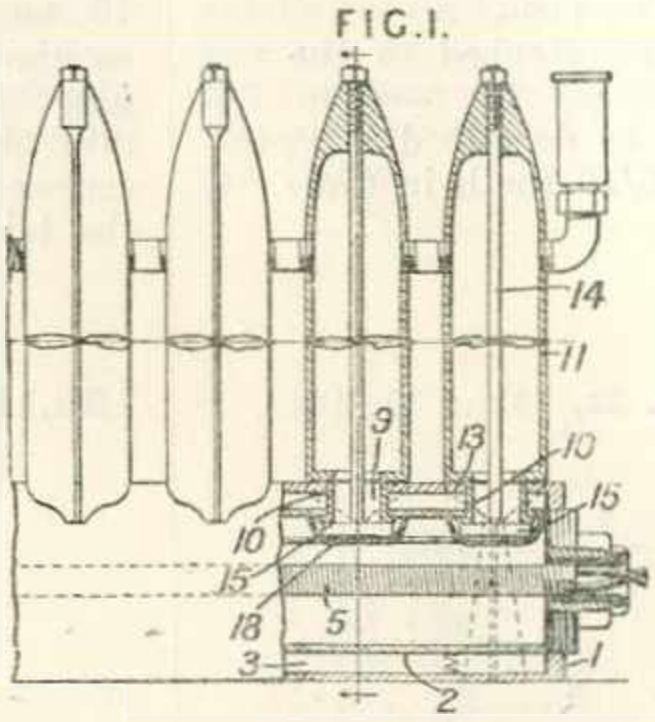
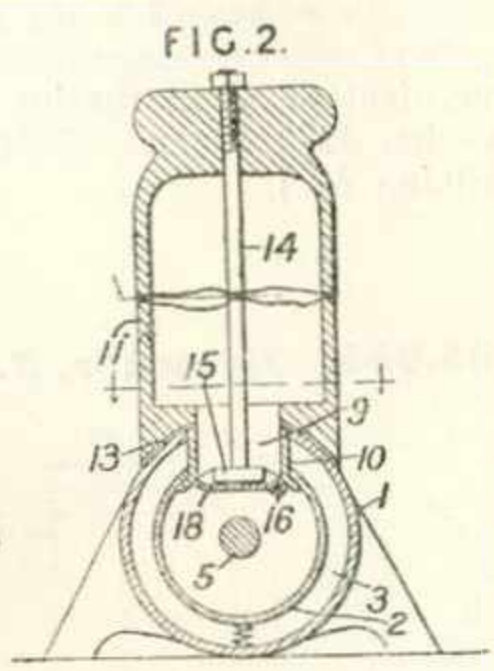


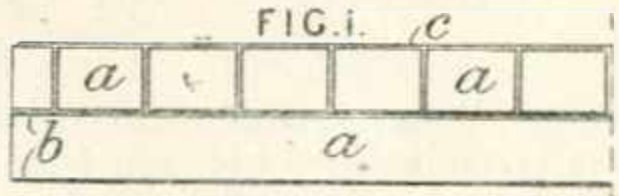
FIG. 2.



136,352. Evers, G. P., and **Gaudu, M. L.** Jan. 27, 1919. *No Patent granted (Sealing fee not paid).*

Non-conducting coverings for heat.—Each layer of a number consists of parallel tubes *a* made of insulating-material fixed to insulating-sheets *b*, the tubes of adjacent layers being relatively at an angle to give rigidity. A supplementary sheet *c* covers the topmost layer. The tubes are of any section.

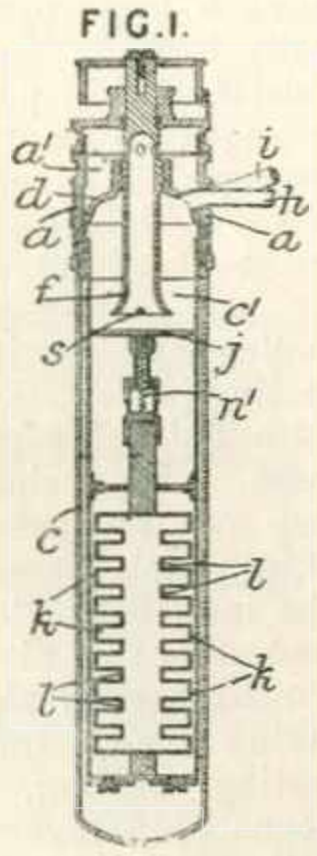
FIG. 1.



136,532. Beaudoin, L. Dec. 11, 1918, [*Convention date*].

Thermostats.—In a thermostat for controlling the supply of gas to a burner of the type comprising an envelope *c* adapted to be immersed in the liquid, paste, or gas the temperature of which is to be regulated, and containing an expansion element which is adapted to actuate a valve *j* so as to close more or less a conduit *f* traversed by the gas, the conduit *f* is carried by the bottom wall *d* of a cap *a* screwing into the envelope *c*, and communicates between spaces a^1, c^1 on either side of the wall *d*. Inlet and outlet tubes *h*, *i* for the gas communicate with the spaces c^1, a^1, and the limit of temperature may be regulated by a screw adjustment of the conduit *f* in the wall *d*. Small notches *s* are cut in the lower end of the conduit so as to allow the passage of a small quantity of gas when the valve *j* and the conduit are in contact. The expansion element preferably consists of a series of elastic casings *k* connected by tubular sections *l* and filled with an expansible liquid. The valve *j* is elastically mounted on the expansion element by means of a spring n^1, so as to prevent damage to the apparatus when the valve has been forced into contact with the conduit.

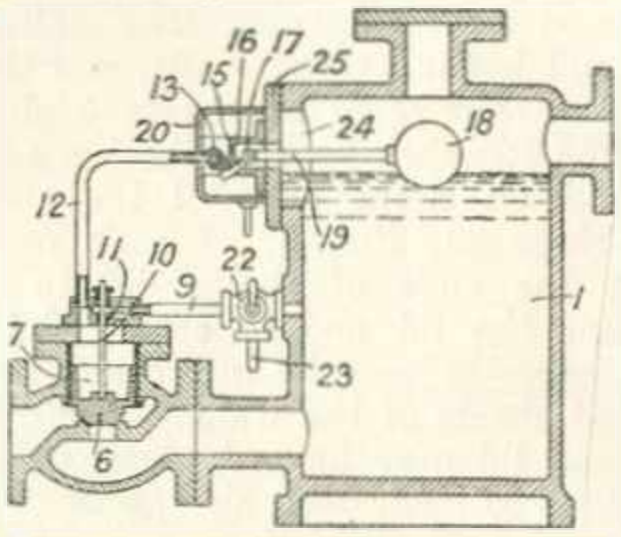
FIG. 1.



136,540. Aktiebolaget Arca Regulatorer. Dec. 7, 1918, [*Convention date*].

Steam-traps. — In a steam-trap of the float type, the drain-valve 6 is connected with a piston or the like 7 actuated by a liquid flowing under pressure in a conduit 9, 12, the outflow opening 13 of which is obstructed to a greater or less extent by a plate 15 connected with the arm 19 of the float 18, so that as the float falls or rises, the plate 15 moves towards or away

from the outflow opening 13 so as to check more or less the flow of liquid, and consequently the drain-valve 6 is closed to a greater or less extent. The conduit 9 is connected by a three-way cock 22 to the trap 1, or to an additional conduit 23, so that the liquid under pressure may consist either of the condensed water from the trap or liquid from an independent source. The float 18 and plate 15 are pivoted at 17 in a bearing 16

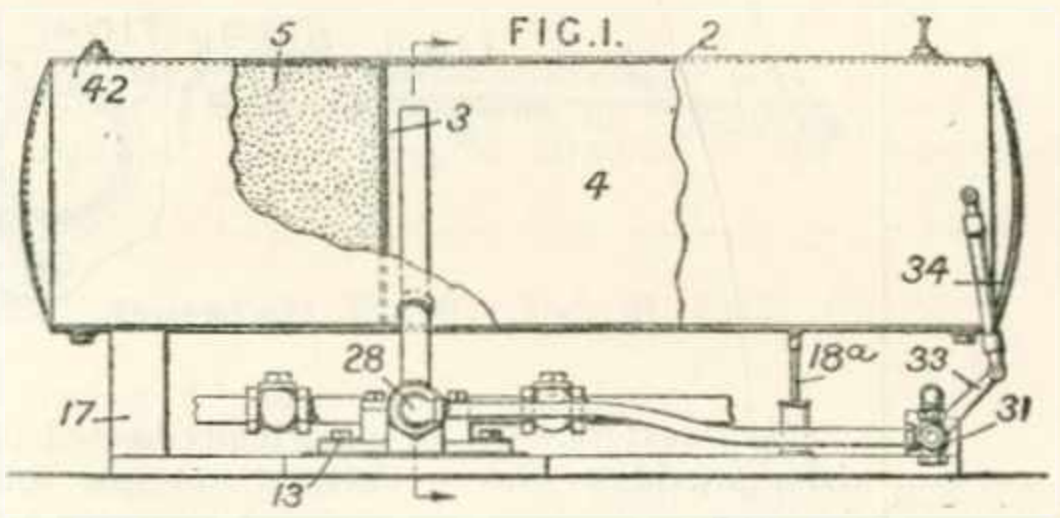


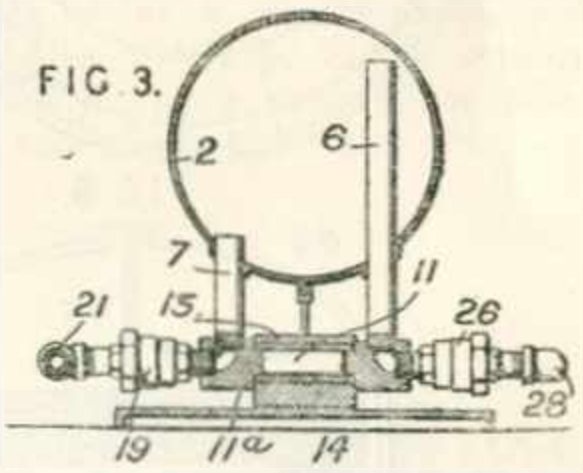
secured to a plate 25 which is arranged to cover an opening 24 in the trap, through which the float may be removed if necessary. A casing 20 also secured to the plate 25 surrounds the bearing 16 and the outflow opening 13. The communication between the conduit 9 and the upper surface of the piston 7 is by way of a restricted passage 11 located around, and maintained clean by, the reciprocating piston stem 10.

136,818. Norske Aktieselskab for Elektrokemisk Industri Norsk Industri-Hypotekbank. Dec. 16, 1918, [*Convention date*].

Non-conducting coverings for heat. — Water, with or without steam or other gases, is poured or forced into or upon molten slag so as to form a foam sufficiently liquid to be poured into moulds in which it is cooled so as to form porous bricks or insulating-material. The product may be crushed and used as a filling for walls and the like. In an example, slag is heated in an electric furnace to a temperature of 1400° C. and poured in a continuous stream into a container lined with refractory material through an inlet formed in the lower part of the container. Above this inlet, one or more tuyeres are provided, through which water is admitted, preferably under pressure, when the slag is on a level with or above the tuyeres. The water is added in a continuous stream and is intimately mixed by means of a rotary stirrer mounted in the container, the stirrer being so constructed as to prevent an accumulation of solid slag on the tuyeres. The supply of water is regulated so that the temperature of the foam will be about 1000° C. At this temperature, it is liquid and may be led through an overflow into moulds.

136,909. Farnsworth, F. C. Dec. 24, 1918.





Steam-traps. — A steam-trap of the counterbalanced-receiver type has the receiver adapted to turn on a bearing arranged between the swivelling water and steam connexions. The receiver 2, which is divided by a partition 3 to form a water-chamber 4 and a counterbalance chamber 5 adapted to be filled with sand or water through a closable aperture 42, is secured to a spindle 11 by a water inlet and outlet pipe 7 and a steam inlet and venting pipe 6 screwed to the spindle and afterwards welded to the tank. The spindle is mounted in a journal 15 provided with a lining 14 and adjustably secured to a base-plate by bolts 13 passing through elongated slots. The ends of the spindle are enlarged to form shoulders 11a and are furnished with angle passages connecting the pipes 6, 7 to swivelling connexions 26, 19 mounted on fixed pipes 28, 21. The pipe 21 is connected on the one hand through a non-return valve with the water supply, and on the other hand through a second non-return valve with the water discharge. The pipe 28 is connected alternatively to the atmosphere or a steam supply through a three-way valve 31 actuated by the tilting of the receiver acting through an arm 33 and link 34. The movements of the receiver are limited by stops 17, 18a, of which the step 18a may be fitted with a dash-pot to lessen the shock when the full receiver tilts. When used to return water to the boiler, the apparatus is situated sufficiently high above the boiler to allow the water to be delivered into the generator by gravity, a second similar apparatus being employed, if necessary, to raise the water into the upper receiver.

137,054. Thermopak Co., (Assignees of *Hicks, L.*). Sept. 18, 1916, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

FIG.1.

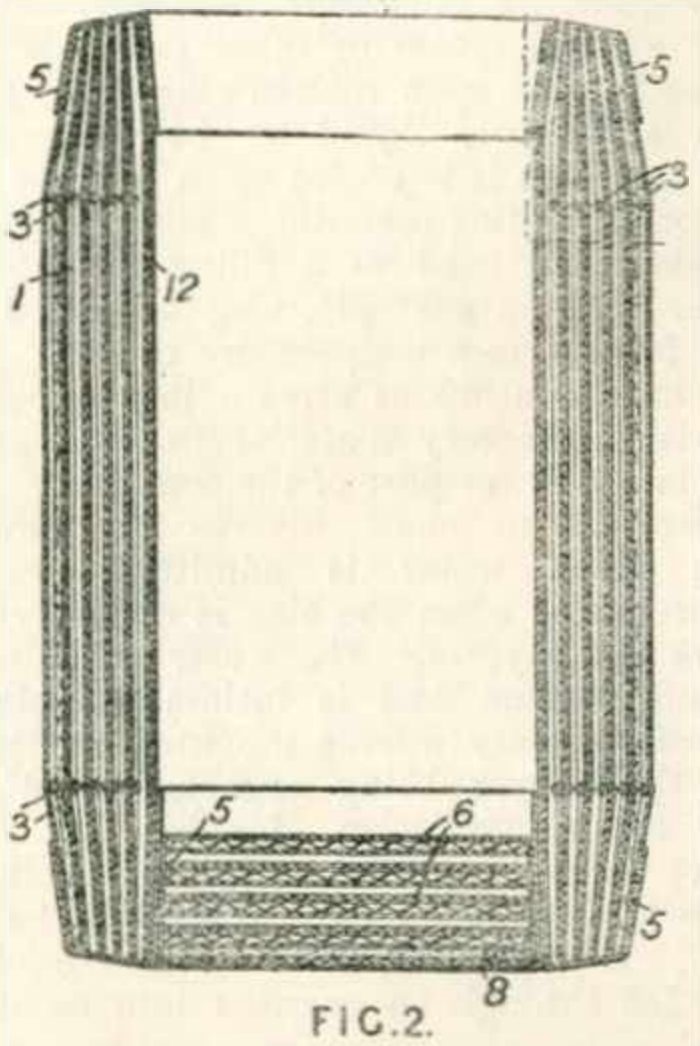


FIG.2.

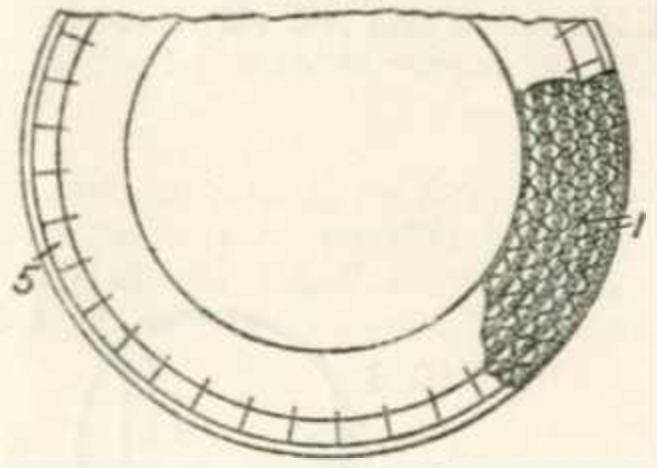
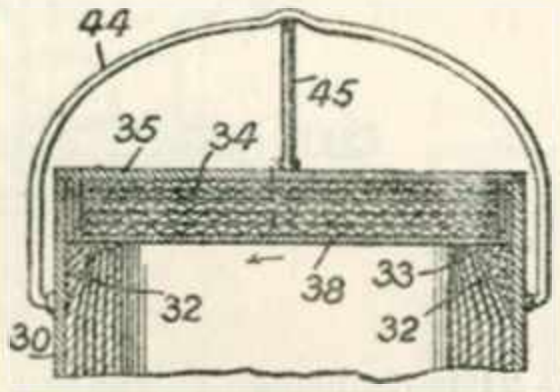


FIG.6.



Non-conducting coverings for heat.—The walls of heat-retaining vessels are formed of spaced layers or windings 1 of corrugated fibrous material, particularly corrugated paper sheets, i.e. sheets of corrugated paper secured to a plain backing, the corrugations being broken down at intervals to form dead air cells throughout the walls. The bottom 6 of the vessel is formed of superposed disks of the same material, with an interposed layer 8 of asbestos or the like, and a loose plug lid 34, Fig. 6, is similarly formed, the disks, however, being contained within telescopic members 35, 38 so that they are compressed when the lid is pressed down on its seating 33. The walls may be protected by or covered with an outer paper or other casing 30, which is provided with a spring bail handle 44 adapted to interlock with a spring bail handle 45 on the lid to hold the latter in position. The walls may be formed of a single sheet of corrugated paper wound into a spiral, the spaces between the windings being maintained by cords 3, Fig. 1, which are pressed into the material to break down the corrugations at the ends and thereby seal the air spaces. The wall is tapered at each end beyond these cords, and the ends of the sheets are covered by sheets 5 glued on, or are secured together by an adhesive adapted also to fill and close the ends of the corrugations. Packing-rings 32, Fig. 6, of cork or paper are fitted at the ends of the walls to provide a seating for the lid and to secure flat ends. A layer of asbestos may be interposed between the corrugated sheets of the walls. The disks in the bottom and lid may have depressions across the corrugations to form dead air spaces. The layers may be arranged with the corrugations face to face, or with the corrugations of one layer adjacent to the plain surface of the next layer, and the tapering ends of the walls may be compressed to close the air spaces. The inside of the container may be lined with paraffin paper 12 to render it waterproof.

137,249. Fitzgerald, A. E. July 21, 1919.

FIG.3.

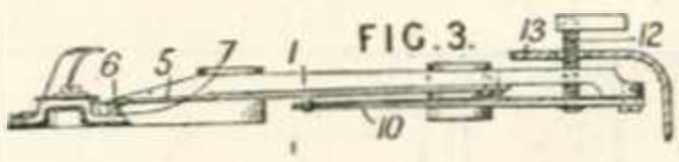
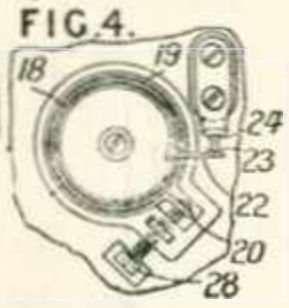


FIG.4.



Thermostats.—In an electrically-heated laundry iron provided with a thermal cut-out, the temperature at which the cut-out operates may be varied at will. In the form shown in Fig. 3, a bar 1 insulated from the iron 13 carries a bimetallic strip 10 which is adapted to raise a spring arm 5 and so separate contacts 6, 7 when the maximum temperature is reached. This point is varied by altering the normal distance of the strip from the arm 5 by means of a screw 12 extending outside the iron. In a modification, Fig. 4, a porcelain well 19 in the floor of the iron contains a copper coil 18, one end 20 of which may be adjusted by a screw 28 and the other end 22 of which carries one of a pair of contacts 23, 24.

137,352. Goldsbrough, S. L. Dec. 24, 1918.

FIG. 5.

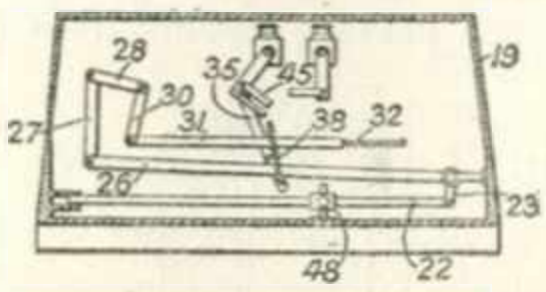
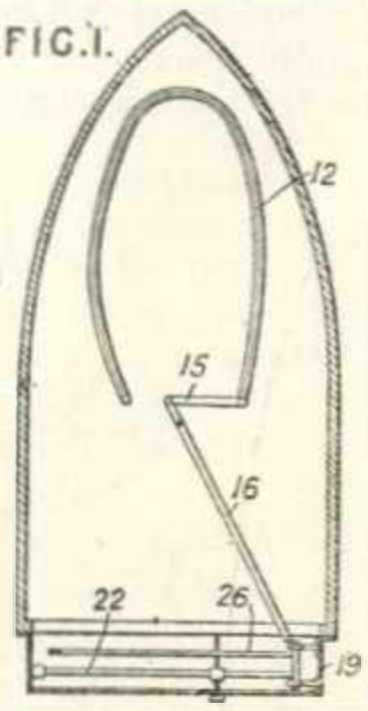


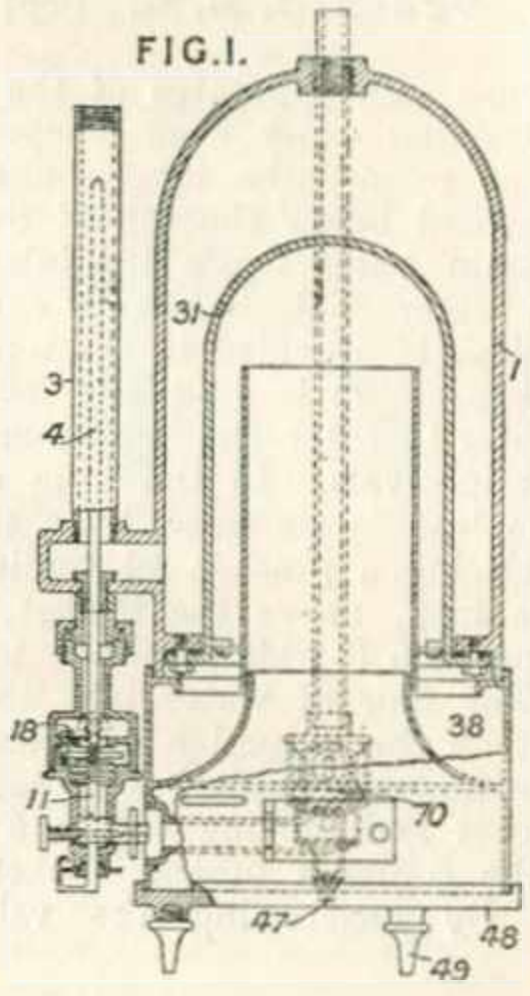
FIG. 1.



Thermostats. — The temperature of an electric flat-iron is controlled by a thermostat comprising an expansible element, such as a bimetallic strip 12, Fig. 1, adapted to engage, through the medium of a link 15 and a lever 16, an adjustable stop 48 and thereby to operate through suitable link mechanism the arm 45 of a switch having a snap action. No movement of the link mechanism or switch occurs until the stop 48 is engaged by the lever 16, the stop thus determining the temperature to which the iron may be heated. The link mechanism is arranged in a casing 19 at the rear of the iron and consists of a slidable rod 22 on which the stop 48 is adjustable, a bell-crank lever with short and long arms 23, 26, a link through which passes a pivoted lever 35 directly spring-controlled slidable rod 31 having a slot through which passes a pivoted leevr 35 directly actuating the switch arm 45. A spring 38 is connected to the lower end of the lever 35 so that a quick movement is given to the switch arm as the lever 35 passes to one side or other of its central position. The spring 32 attached to the rod 31 causes the circuit to be completed as the temperature falls, and the stop 48 preferably has a knob projecting through a slot in the casing 19 for convenience in adjustment.

137,364. O'Byrne, T. J. Jan. 4, 1919.

FIG. 1.



Thermostats.—Gas is supplied to a burner 70 of a water heater through a spring-pressed valve 18 normally operated by a thermostatic rod 4 mounted in the water inlet pipe 3. The minimum setting can be altered by a screwed spindle 11 engaging with a thread on the valve 18.

137,939. Burstall, F. W. Feb. 21, 1919.

Heat-storing apparatus. —Air is heated by the exhaust of internal combustion engines in a regenerative chamber comprising channelled blocks *d*, Fig. 3, of carbon, constructed and arranged as shown in cross section and through which passes alternately the engine exhaust and the air to be heated. The blocks are made of ground coke, coal, retort carbon, &c., mixed with pitch or other carbonaceous binding-material, which is moulded and burnt or baked in an inert atmosphere. The passage of the air and gases may be controlled by the engine by means of a double beat valve *f*, Fig. 6, which admits alternately to the regenerator *a* exhaust through the box *g* and air through the box *h*. The valve spindle *j* is connected by springs *r*

FIG. 3.

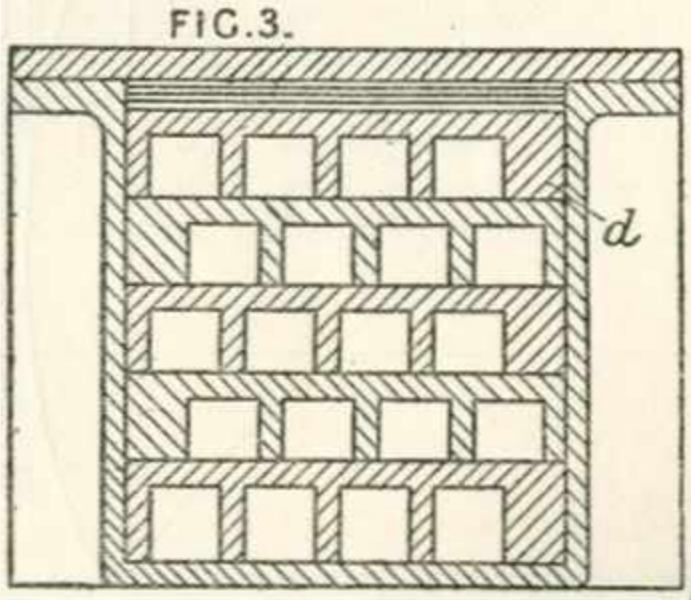
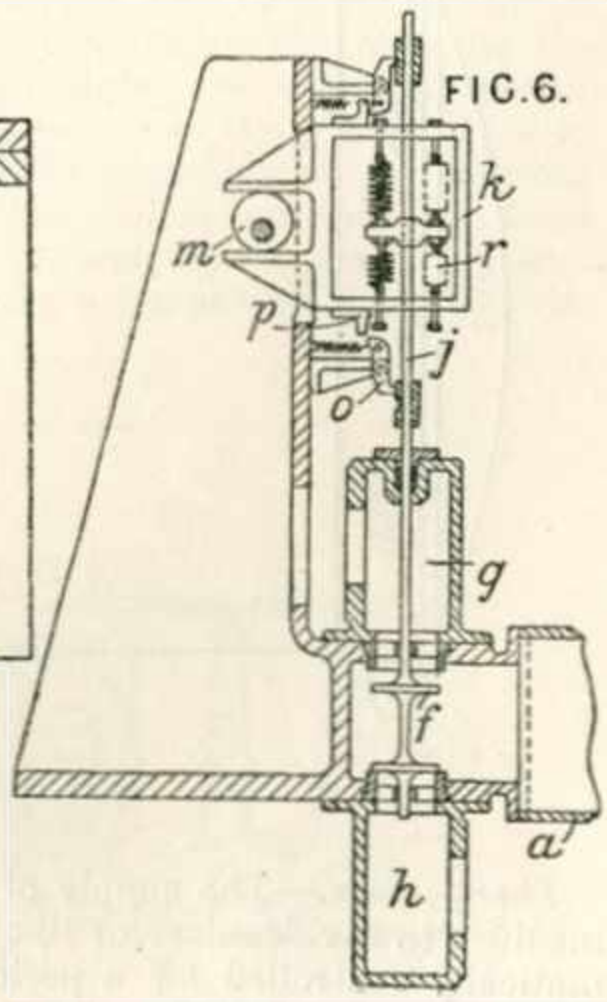


FIG. 6.

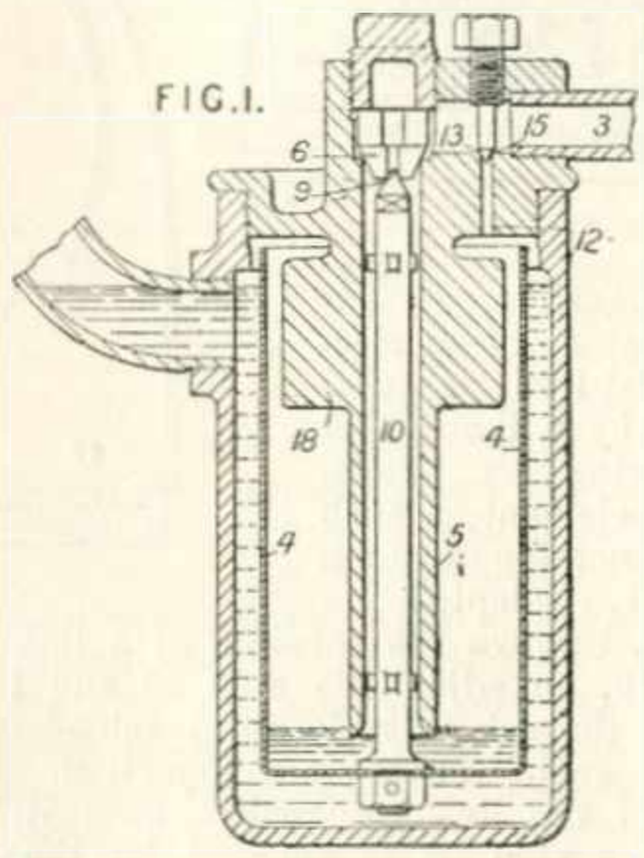


to a frame *k* which is moved up and down by a cam *m* driven by the engine. The valve is held in its extreme position by spring detents *o*, which, on withdrawal by inclined blocks *p* on the frame, allow the stretched springs *r* to move the valve. The air may be used in gas-producers, coke ovens, metallurgical furnaces, or drying-chambers, or for warming buildings.

138,292. Ogden, J. E. L. Sept. 26, 1919.

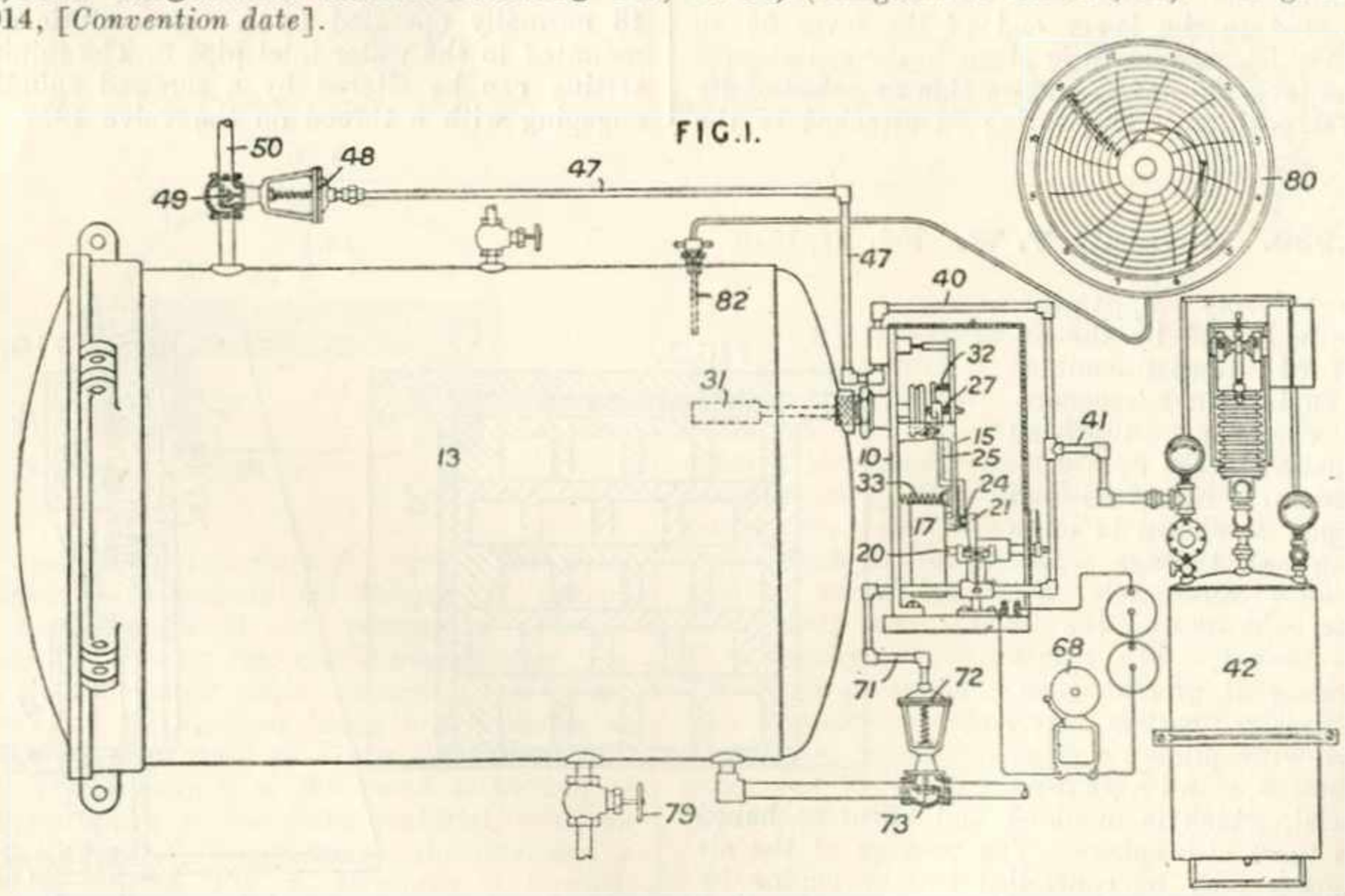
Steam-traps.—In apparatus of the bucket-float type for draining water from compressed air or gas pipes or mains, the inlet connexion of the trap is disposed below the top of the bucket so that the drain water floods the inlet connexion, forming a water seal, before it can enter the bucket; a leak is provided in the top of the trap so that the pressure is gradually reduced, allowing the water to enter the bucket and to be discharged at intervals. In the form of apparatus shown, the leak is provided by a nick 15 in a valve 13 closing a passage 12 leading from the top of the trap, above the bucket, to the discharge connexion 3 which is open to the atmosphere. The flow of water into the bucket 4, consequent on the reduction of pressure through the leak, actuates a valve 9 on a rod 10 secured to the bucket and moving within a dip pipe 5, allowing the contents of the bucket to be discharged. By unscrewing the valve 13, any obstruction will be blown away. The volume of air enclosed in the trap is diminished, and the rate of pressure reduction increased, by providing a displacement block 18 on the dip pipe. In a modification, the valve-controlled passage 12 may be replaced by an open passage leading from the top of the trap into the interior of the dip pipe, leaking taking place by a groove in the valve seat 6; the displacement block is integral with the cover of the trap, the dip pipe being screwed into it.

FIG. 1.



138,640. Tagliabue Manufacturing Co., C. J., (Assignees of *Roesch, A.*). Aug. 28, 1914, [*Convention date*].

FIG. 1.



Thermostats.—The supply of heating or cooling medium to a vulcanizer or like apparatus is automatically controlled for a period of time in such a way that the temperature is caused to vary according to any predetermined time-temperature curve, and means are provided for discontinuing

the heating or cooling at the end of the predetermined time. In the arrangement shown, the supply of steam through a pipe 50, Fig. 1, to a vulcanizer 13 is controlled by a valve 49 operated by a diaphragm 48, the air pressure on which is regulated by a double-faced valve 35, Fig. 2, in a valve body 37a located in the pipe system 47, 40, 41 communicating between the diaphragm 48 and a tank 42 for compressed air. One face 35 of the valve regulates the passage 38 from the pipe 40, while the other face 36 regulates the passage 39 opening to the atmosphere. The valve stem 34 is actuated in one direction by the air pressure, and in the opposite direction by a projection 15a on a pivoted lever 15, which at its lower end carries a clock-work mechanism in a casing 17. Mounted on the hour spindle 20 of the mechanism is a cam 21 which is shaped in accordance with the predetermined time-temperature curve and abuts against a roller 24 carried by the lower end of a lever 25 pivoted on the main-lever 15. A strong spring 32 is arranged between the upper ends of the two levers 15, 25 and a weak spring 33 between the lower end of the lever 25 and the frame 10 supporting the levers. A contact 27 carried by the lever 25 engages a capsule 29 in communication with a thermo-sensitive element 31 in the vulcanizer 13.

FIG. 2.

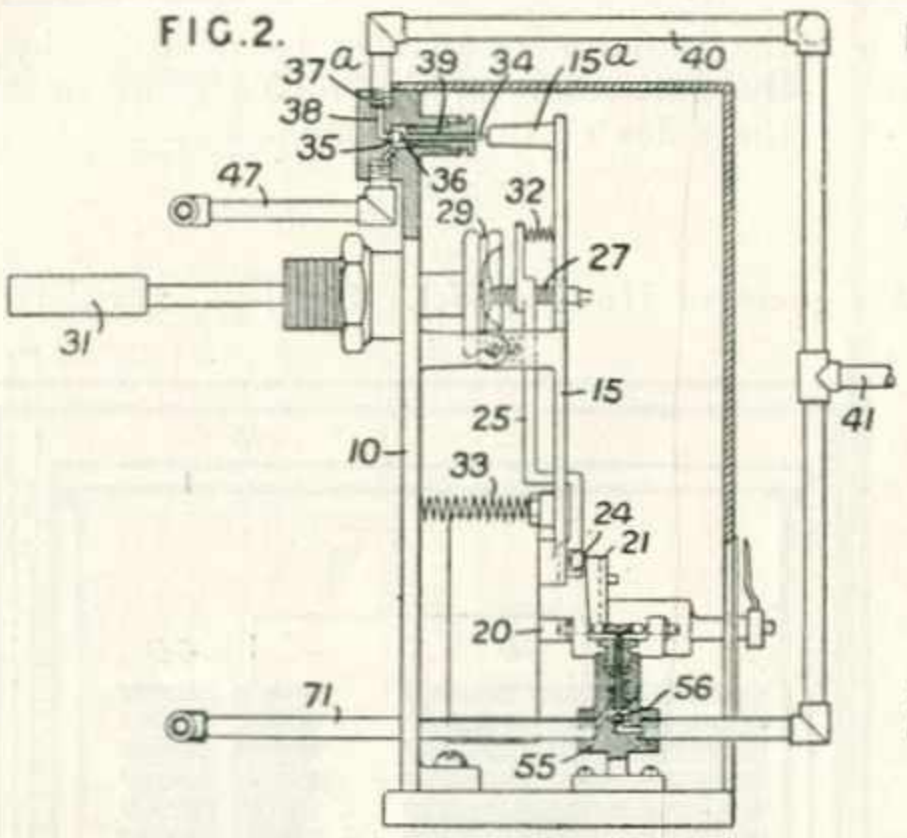
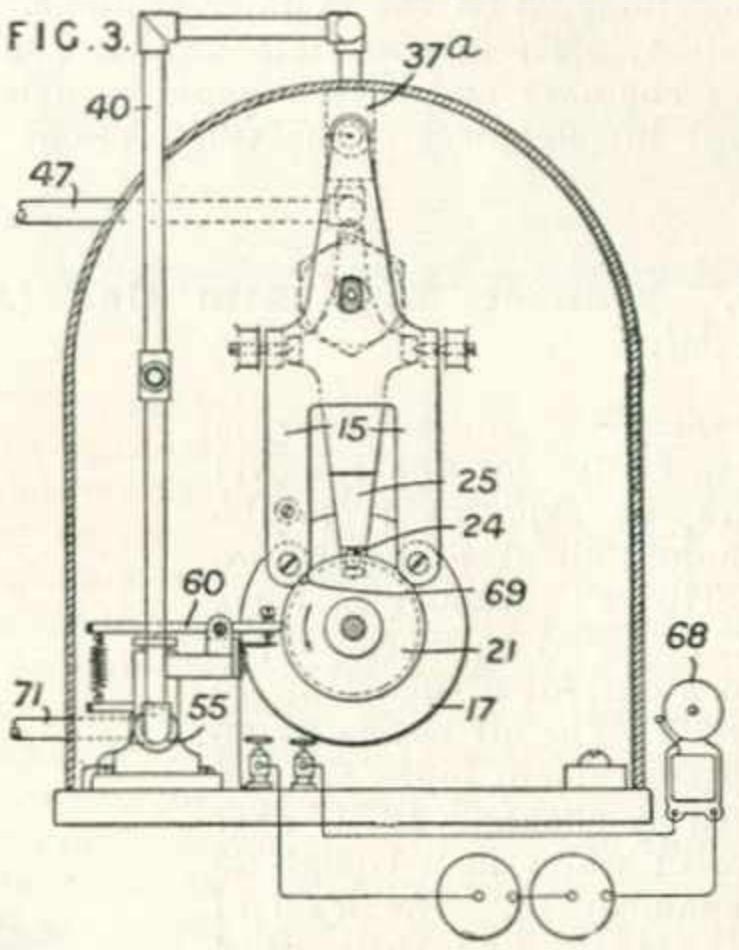


FIG. 3.

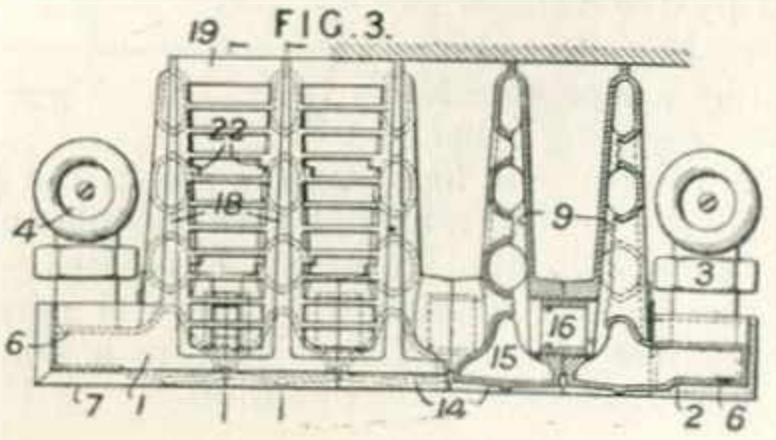


In operation, any undue rise of temperature in the vulcanizer would cause the contact 27 to be driven to the right, causing the levers 15, 25 to pivot in unison, and withdrawing the projection 15a from the valve stem 34, thus allowing compressed air to pass into the pipe 47 and partially close the valve 49, and thereby lessening the supply of steam. At the same time, the rotation of the cam 21 by clock-work continually adjusts the position of the contact 27 and thereby determines the varying temperature at which the capsule 29 engages the contact 27. At the end of the predetermined time, a stop 69, Fig. 3, carried by the cam 21 engages a pivoted lever 60, which is tilted so as to complete an electric circuit through an alarm 68 and also to permit the air pressure in the tank 42 to operate a valve 56 in a casing 55 and to pass by a pipe 71 to a diaphragm 72 controlling a valve 73 which allows a rapid escape of steam from the vulcanizer 13. Simultaneously with these operations, the roller 24 passes into a depression on the cam 21 and allows the spring 32 operating between the levers 15, 25 to move the cam 21 to the left and the projection 15a to the right, the latter movement permitting the air pressure in the pipe 40 to open the valve 35 fully and completely close the steam supply valve 49. The vulcanizer may be fitted with a drain valve 79, and with a sensitive member 82 connected with a temperature recorder 80.

138,668. Kellogg, H. D. Jan. 10, 1919.

Radiators for heating buildings are built up of a number of sections each comprising a front chamber 15 having a flat outer face 14, and one or more rearwardly tapering extensions 9 abutting against the wall of the room, the adjacent chambers 15 communicating with each other through connexions 16 so as to form a continuous longitudinal passage with a vertical front face 7, and the spaces between the wall and adjacent ex-

FIG. 3.



tensions 9 forming air channels. The end sections 1, 2 of the radiator, to which the inlet and outlet valves 3, 4 are connected, are preferably provided with longitudinal extensions 6 so as to conceal the valves 3, 4. As shown in Fig. 3, each section has only one tapering extension 9, which may be constituted by a single unbroken space or, as shown in Fig. 5, which is a section through one of the extensions, may consist of rearwardly-extending fluid spaces 10, 11, 12 connected by tubular channels 13 decreasing in cross-section rearwardly. The top of the radiator is covered by a number of grids 19 secured in position between ridges 18 on the extensions 9 by means of downwardly projecting spring fingers 22, Fig. 4, engaging projections 23 on the radiator sections. In a modification, each intermediate section has a front water chamber and several tapering extensions 9 cast in one piece. The end sections of the radiators may also be modified by omitting the extensions 6, the valved connexions entering the sides of the sections.

FIG. 4.

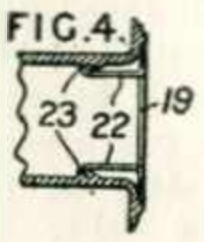
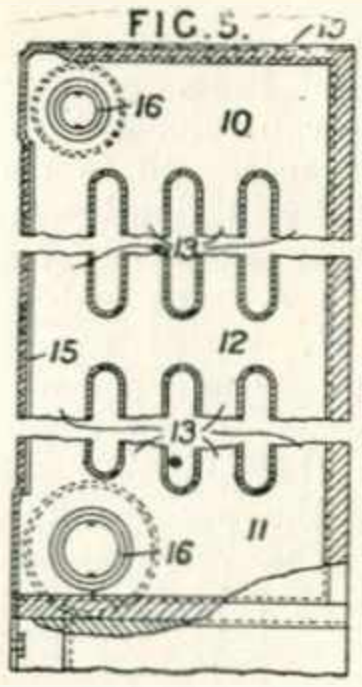


FIG. 5.



138,915. Hunter Dry Kiln Co., (Assignees of *Hunter, H.*). Sept. 25, 1915, [*Convention date*].

Thermostats. — India-rubber is treated, especially for the removal of moisture, by exposing it to the action of humid air at a temperature exceeding 110° F. Rubber in trays 40, Fig. 1, mounted on trucks 42, is exposed to a current of moist air in a chamber 16. The air enters by an inlet 11, passes steam pipes 12, and is conducted by channels 15, 17 over the surface of water in a trough 25 into the chamber 16. The level of the water in this trough is maintained constant by a float valve 28, Fig. 2, and the temperature by admitting steam through a pipe 26 having a valve 31 operated by the contraction and expansion of liquid in a vessel 35 immersed in the water. The air is maintained at a relative humidity of 20—70 per cent, and at a temperature between 110° F. and 170° F.

FIG. 1.

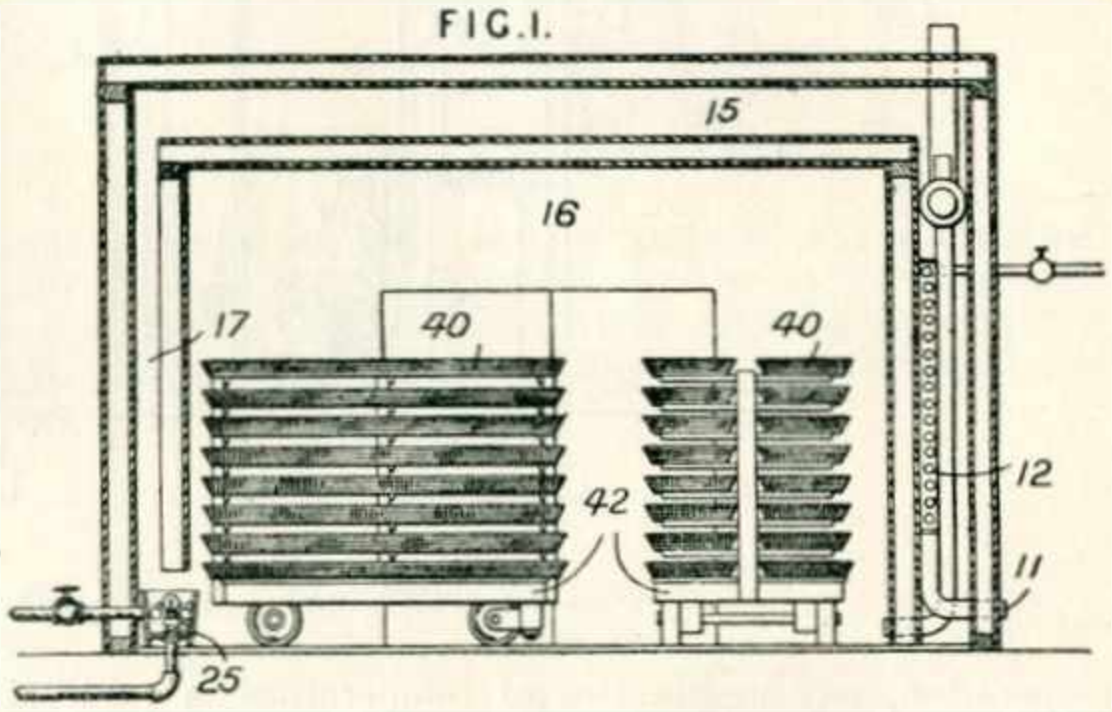
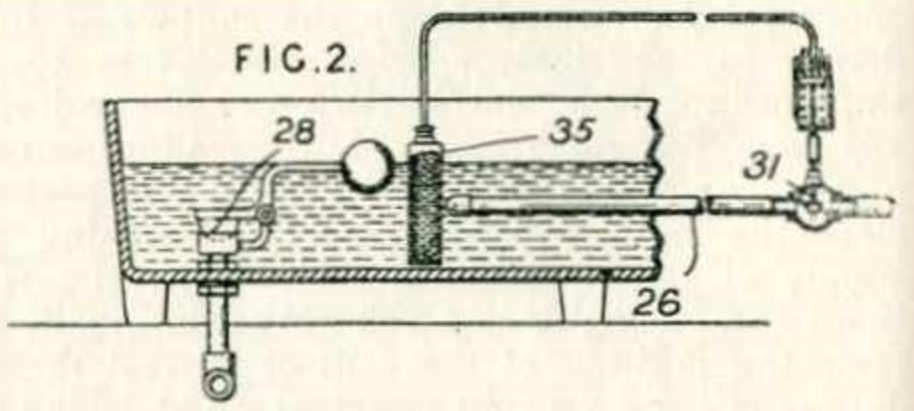


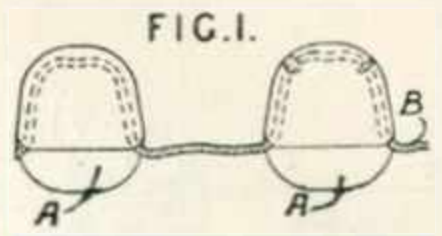
FIG. 2.



139,048. Arc & General Equipment, Ltd., (*formerly* Jandus Arc Lamp & Electric Co.), and **Jones, A. Denman-.** March 29, 1919.

Footwarmers. — In apparatus in which air, heated by the vehicle engine &c. is collected and carried by a pipe to a foot warmer, escaping thence into the vehicle, the footwarmers are in the form of muffs A of textile material with flexible tubing B through which the warm air circulates. The muffs may be large enough for several persons, or the flexible pipes may branch from a junction piece and discharge into the muff.

FIG. 1.



139,075. Ambrose, J. G., and **Mathews, C. B.** May 12, 1919.

Fire-proof coverings. — Encasing - blocks, Figs. 1 and 3, to be applied to flanged girders, columns, &c., are provided with a slot wide enough to receive the flange and with a lateral recess or recesses so that the block may be moved laterally or turned through an angle to engage the girder

FIG. 1.

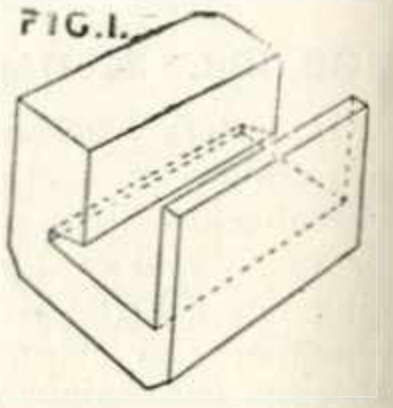
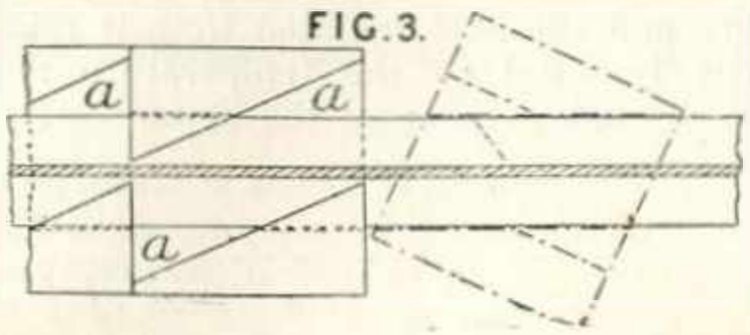


FIG. 3.



&c. The side or sides *a* of the slot are then filled in with plastic material. The blocks may be made of stone, concrete, cement, wood, or any suitable material.

139,675. Simpson, S. W. April 24, 1919.

FIG. 1.

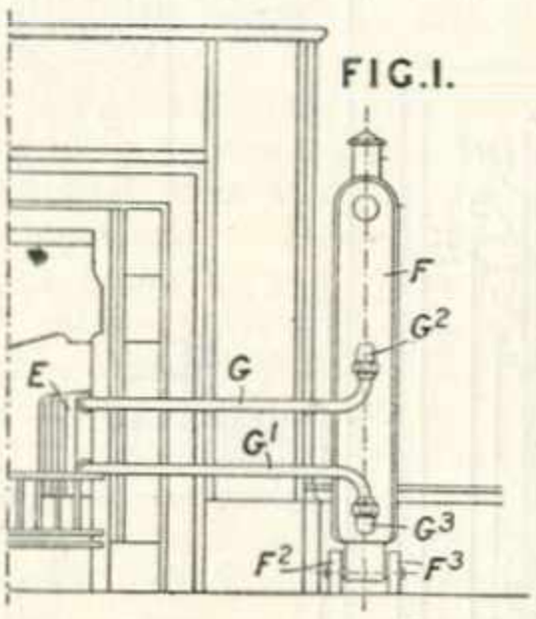
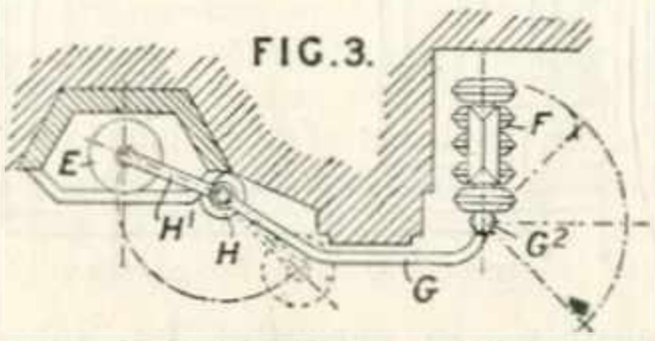
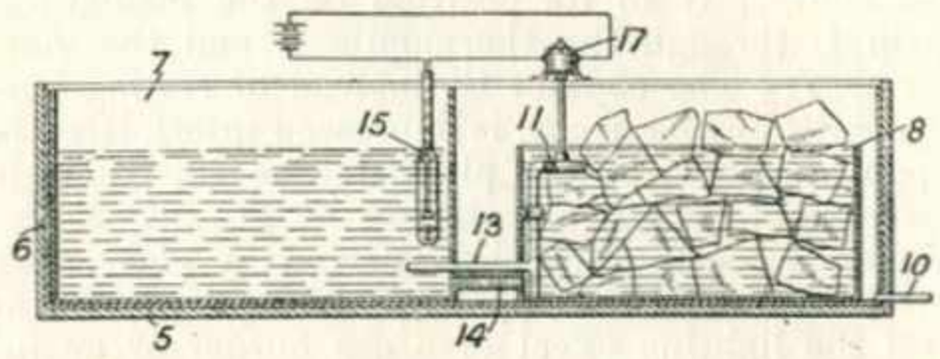


FIG. 3.



Radiators.—A device for radiating the heat of a fire comprises a boiler E connected by external flow and return pipes G, G¹ to a cast-iron radiator F, the apparatus being removable as a whole from room to room. The radiator may be mounted on wheels F², F³, Fig. 1, and the unions G², G³ allow the radiator to be set at any angle.

139,804. Ruediger, E. H. March 4, 1919, [*Convention date*].



Thermostats.—Relates to apparatus in which the temperature of a liquid in a tub or bath 7 is maintained constant by connecting the tub with an adjacent receptacle 8 containing liquid at a different temperature and by regulating the circulation between the two receptacles through the flow and return pipes 13, 14, the liquid being forced through the pipe 13 by means of a centrifugal or like pump 11 actuated by a motor 17 which is included in a circuit containing a thermostatic switch 15, so that the motor is either stationary or running according to as to whether the liquid in the bath 7 is or is not at the required temperature. According to the invention the two receptacles 7, 8 are arranged in a wooden box 5 having a metal lining 6 and a waste pipe 10 leading from a space between the box and the receptacle 8.

139,844. Newcomb, R. W. Jan. 6, 1919.

Thermostats.—In an apparatus for producing a predetermined variation or a series of variations in a physical effect, such as heat or light, means are provided for causing the physical effect to vary according to any chosen compound vector representing units of time and units of the physical effect, these means being themselves controlled by the variations occurring in the physical effect. Thus, in the case of a furnace, the temperature in a given time may be caused to undergo a series of predetermined changes, an apparatus for this purpose being shown in Figs. 1 and 2. The supply of gas to the burner 20 is regulated by a valve B controlled by two electro-magnets C, D, and the variations in temperature of the furnace, acting through a thermopile E and the moving coil of a volt-meter V, cause the position of a contact G

FIG. 1.

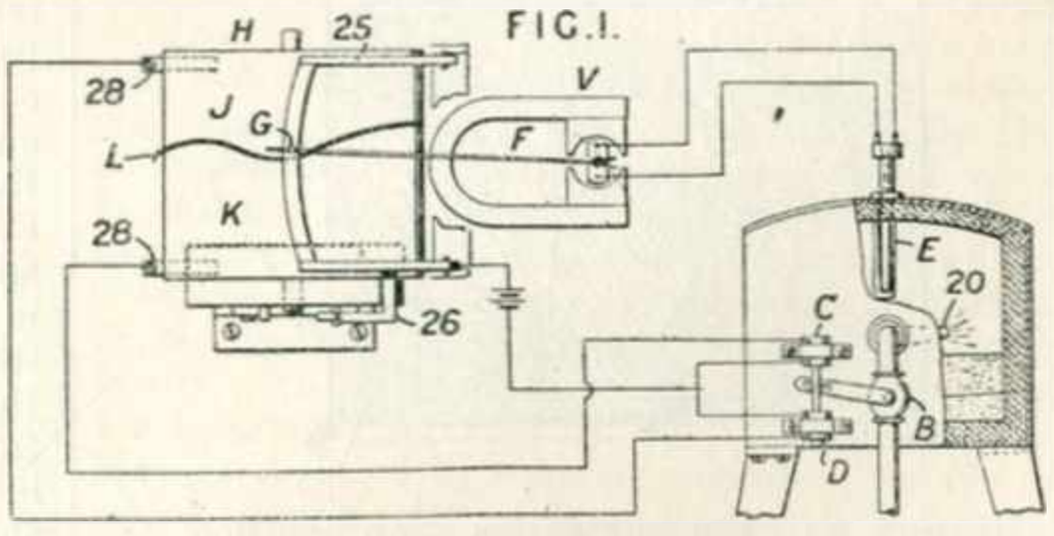
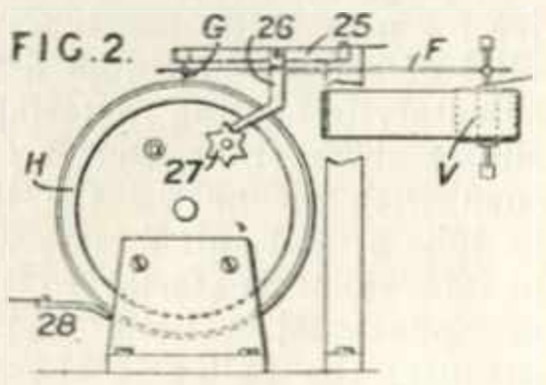


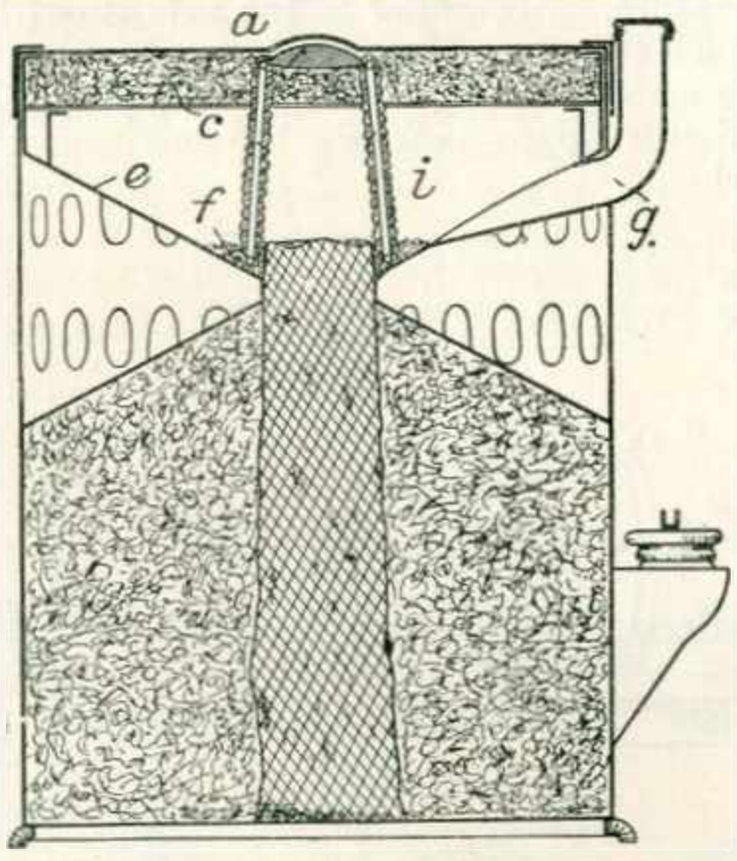
FIG. 2.



carried by a pointer F to vary in relation to a rotating drum H. The drum surface consists of two strips of conducting-material J, K separated by an insulating-strip L, the developed shape of which represents the chosen time-temperature vector. The contact G is constrained to follow the line of the insulating-strip L, and the drum is rotated at the desired speed. Should the contact G pass on to either conducting-strip J or K, an electric circuit is completed by way of a pivoted yoke 25 and terminals 28 to one or other of the two electro-magnets C, D, and the valve B is operated to increase or reduce the temperature as required, the alteration in temperature restoring the contact G to its position on the insulating-strip L through the thermopile E and the voltmeter V. The contact G, instead of resting permanently in the drum, is depressed intermittently upon the drum by the pivoted yoke 25, which is raised and lowered alternately by an arm 26 engaging a toothed wheel 27 driven by clock-work mechanism. If the apparatus is required to control the lighting effect of a gas burner or an incandescent electric lamp, the thermopile would be replaced by a selenium cell, and, in the latter case, the valve B by a switch.

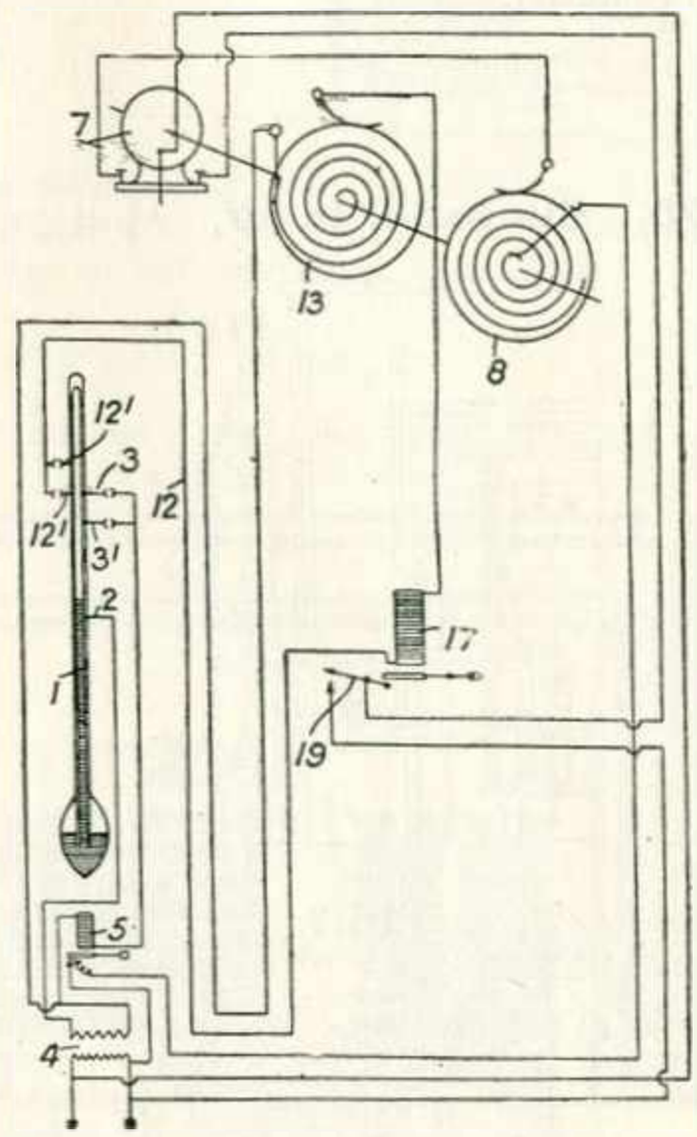
Reference has been directed by the Comptroller to Specification 138,640.

140,001. Soc. Lyonnaise des Réchauds Catalytiques, Camell, Cochet, Gritte, et Cie. April 24, 1919, [*Convention date*].



Heating by chemical action.—An ignition device for a catalytic heating-apparatus comprises a pellet of spongy platinum *a* fixed in contact with the catalytic heating material *c*, a chamber *e* containing absorbent material *f* which can be moistened with alcohol or the like inserted through the tube *g*, and an asbestos wick *i* extending from the absorbent material to the pellet. To start the apparatus, a little fuel is poured into the chamber, the pellet is thereby raised to incandescence and the heat radiated from it raises the catalytic material to the temperature required for the normal working of the apparatus.

140,103. Crida, G. March 11, 1919, [*Convention date*].



Thermostats.—In apparatus for automatically maintaining the temperature of a room between predetermined limits, the valve or the like controlling the supply of steam or other heating agent is controlled by a reversible electric motor 7, operated by two circuits opened or closed by contacts in the wall of a mercury thermometer 1. A fixed terminal 2, and alternative minimum temperature contacts 3, 3¹, and alternative maximum contacts 12, 12¹ with plug switches, are in the circuit of the low-tension coil of a transformer 4, the circuit including also a spiral switch 13 on the shaft of the motor 7, so arranged that the appropriate motor circuit is broken when the valve is fully closed. In operation, when the temperature of the room is below the desired minimum, the electro-magnet 5 is inactive and the circuit from the high-tension coil of the transformer 4 is closed through the special switch 8 on the motor shaft and the coil of the motor 7 for opening the control valve, the circuit being broken automatically by the spiral switch 8 when the valve is fully open. On the mercury reaching the minimum contrast, the circuit is broken by the electro-magnet 5. The further ascent of the column to a maximum contact energizes an electro-magnet 17 and closes the switch 19 in circuit with the coil of the motor 7 for closing the control valve.

140,104. Crida, G. March 11, 1919, [*Convention date*].

FIG.1.

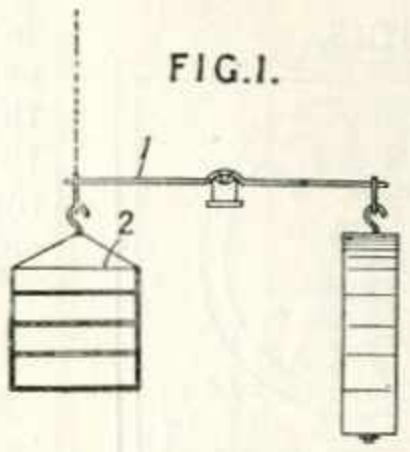
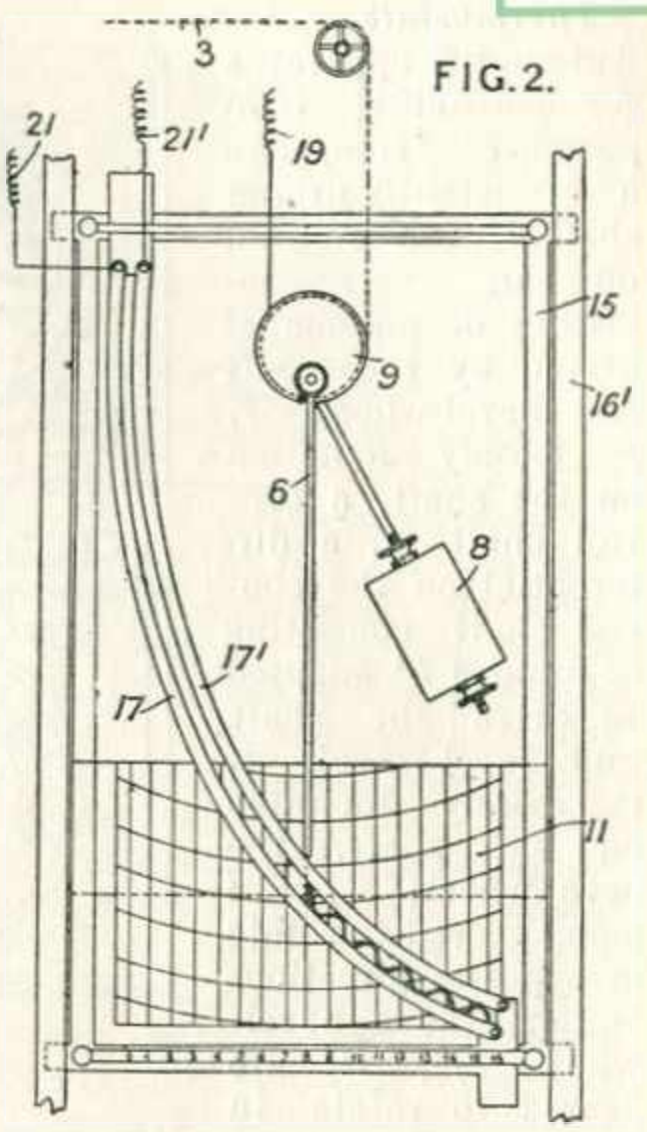


FIG.2.



Thermostats. — In apparatus for controlling the progress of a drying operation, the admission of heat is regulated automatically in accordance with the variation in loss of weight of a given amount of the material at any stage of the process from the desired loss of weight at the stage. As shown, the material is contained in a vessel 2 suspended from one arm of a balance within the drying-chamber, and a cord 3 transmits the movements of the arm to a pointer 6 through an eccentric disk 9 keyed on on the spindle of the pointer; a weight 8 connected with the pointer holds the cord taut. A style on the pointer marks a paper band 11 which is slowly unwound from a drum driven, for example, by clockwork. The drum also carries toothed wheels engaging rack bars 15 forming a frame which moves vertically in guides 16[1] and carries electric contact strips 17, 17[1] between which a pin on the pointer moves. This pin is connected by a wire 19 with the common point of the windings of a reversible electromotor; the strips 17, 17[1] are connected by wires 21, 21[1] with points connected with the forward and reverse running of the motor, which actuates the heat-controlling device, through a connexion which is broken when this device reaches either extreme position. Automatic switches may also be provided which stop the motor after a given number of revolutions in either direction have been completed. The strips 17, 17[1] are shaped, in accordance with the rate at which they travel, so that when the rate of drying is at each stage that desired, the pin on the pointer remains out of contact with the strips. When the drying is either faster or slower, the position of the pointer will be altered, bringing the pin into contact with the strip 17 or 17[1], causing the motor to move in the required direction to regulate the heating of the drying apparatus accordingly.

140,522. Paterson, R. H. Dec. 24, 1918.

FIG.2.

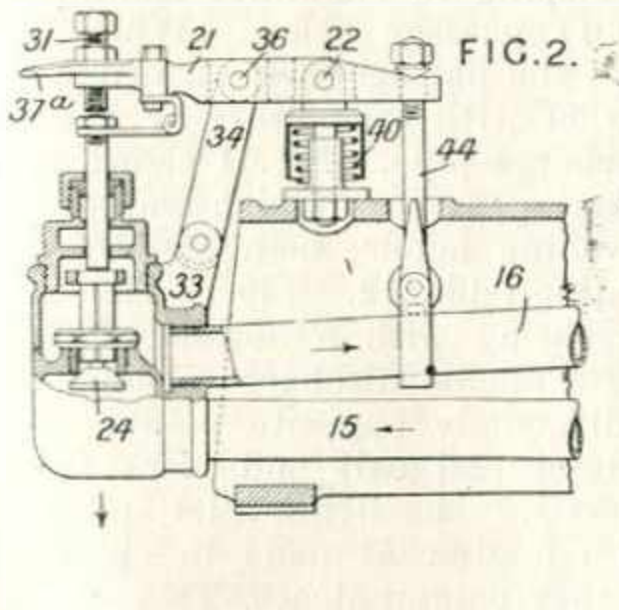
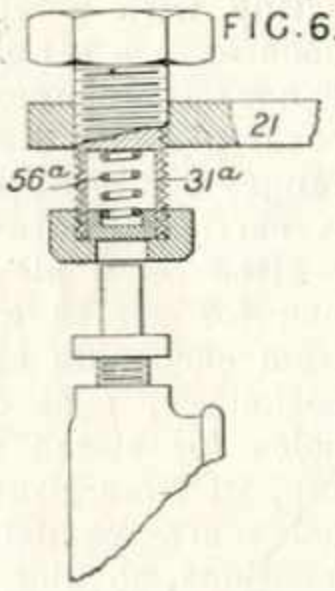


FIG.6.

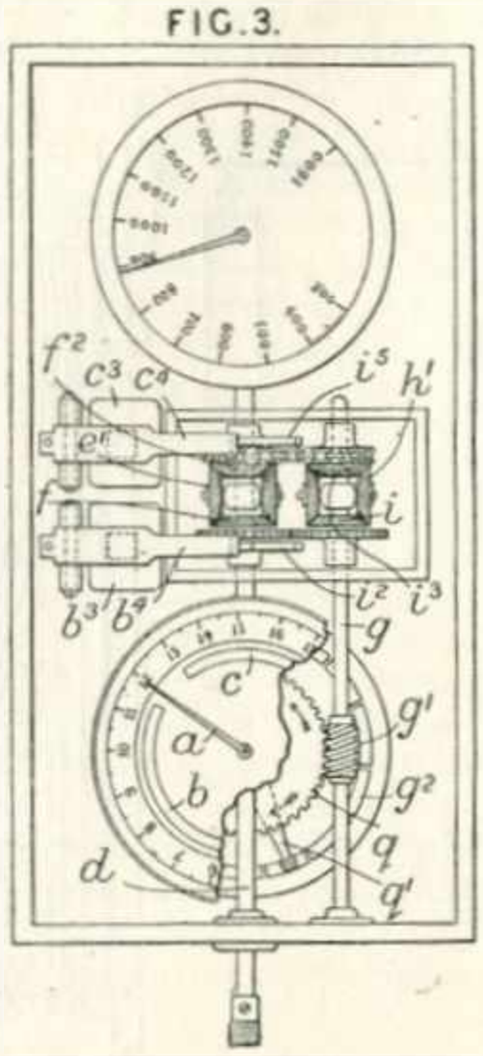


Steam-traps.—In a steam-trap of the kind in which tubes 15, 16 are arranged to contract and expand unequally to operate the valve 24 controlling the outlet for the water of condensation, the valve is arranged to open against the steam pressure and is operated by a drag-link 34 connected at 36 to the valve lever 21 and at 33 to the valve case or head or to the expansion tube or tubes in front of the fulcrum 22 of the lever. The lever 21 is resiliently mounted at its pivot 22 on a spring member 40 adjustably secured to the frame of the steam-trap, and a drag-link 44 is also connected at its rear end, as shown. By the arrangement, the degree of opening of the valve at the minimum working pressure at which the apparatus has been adjusted is maintained for lower pressures by the rear and front drag-links acting together, so that the lever 21 moves down bodily. The lever 21 is extended at 37[a] to serve for opening the valve by hand. The screw 31 may be replaced by a hollow screwed plug 31[a] in which a spring 56[a] is fitted as shown in Fig. 6. In modifications, the rear drag-link 44 is replaced by a stirrup member arranged to carry or support the resilient fulcrum of the lever 21. The device is also described as applied to the type of steam-trap described in Specification 6004/06, in which case a rear drag-link may or may not be employed. The arrangement is also described as applied to a steam-trap in which one expansion tube only is used, a thrust-link being employed in place of the second expansion tube.

140,547. Oulianine, S. July 29, 1919.

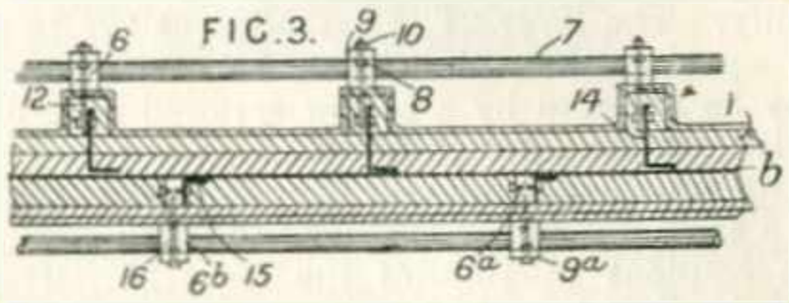
Thermostats. — Automatic apparatus for controlling temperatures comprises a constantly-driven shaft *d*, a differential on said shaft consisting of pinions e^1 driven by the shaft and bevel-wheels *f*, f^2 loosely mounted on the shaft, a control shaft *g*, a differential on the control shaft consisting of pinions h^1 adapted to drive the shaft and bevel-wheels *i*, i^3 loosely mounted on the shaft, the bevel-wheels *f*, *i* being geared to rotate in opposite directions while the bevel-wheels f^2, i^3 are geared to rotate in the same direction, and means operated by a pointer *a* and a contact or contacts *b*, *c* for stopping one pair of bevel-wheels in order to give motion to the control shaft in one or the other direction. In the arrangement shown, each bevel wheel of one differential is connected to a stop-wheel i^2 or i^5, and the stop-wheels are adapted to be arrested one at a time by the armatures b^4, c^4 of electro-magnets b^3, c^3 when the pointer engages one of the contacts *b*, *c*. In a modification, a single electro-magnet and contact are provided, and the armature carries two arms which engage one or the other stop wheel according to whether the circuit is open or closed. The pointer *a* is controlled by a thermometric device, and a wheel *q* geared to the shaft *g* cuts in or out heating units, or controls a gas-cock according to the direction of rotation of the shaft.

FIG. 3.



140,599. Davies, J., Jones, W. H., Davies, J., and **Hale, H. J.** March 29, 1919.

FIG. 3.



Non-conducting coverings.—In systems of insulating refrigerator compartments, of the type in which the insulation is held to the wall or the like by means independent of the fixings for pipe supports, such as that described in Specification 103,839, the runners 6, 6^b holding the insulation 1 in place are parallel to the stiffeners 14, 15 of the wall or bulkhead *b*. These runners or grounds are held by nuts 8 on the bolts 12, or by coach-screws 16 fixed to wooden blocks 6^a fastened to the ribs 15. Refrigerating-pipes 7 are held on the pipe-ground by cover-pieces 9, 9^a secured by nuts 10 on the bolt 12, or by separate coach-screws.

140,605. Yates, A. J. April 4, 1919

FIG. 1.

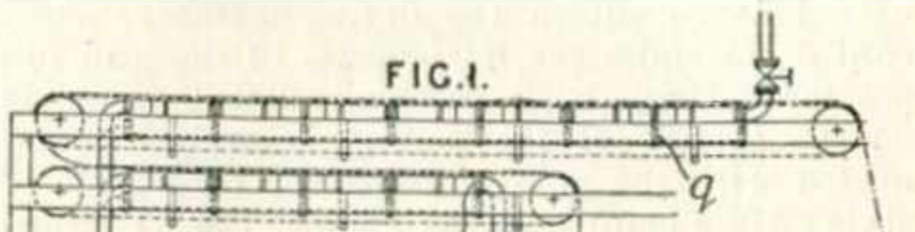
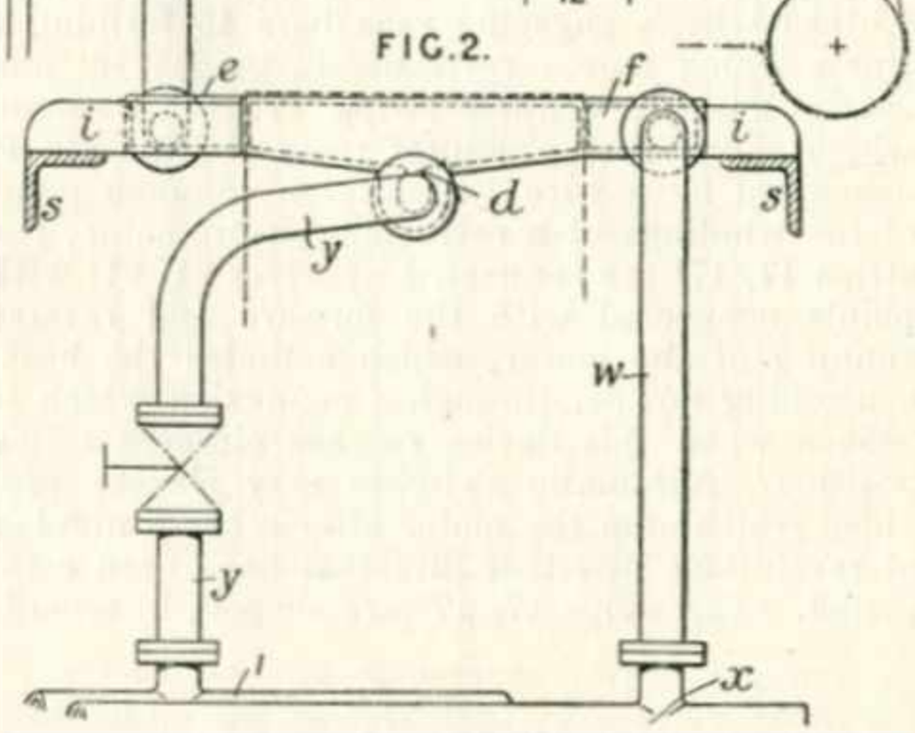


FIG. 2.



Heating-apparatus.—Steam pans used in drying wall-paper &c. are provided with steam inlet and outlet passages and means for effecting the drainage of condensation water. The pans have inclined bottoms sloping to an outlet communicating with a water passage below. When the pans form a series, the passages are formed with flanges for connexion with each other or with a cover plate or discharge pipe. Fig. 1 shows two ranges of steam-pans *q*, *r*, over which wall-paper is carried by travelling hands, being finally deposited on a pleating-table 12. Fig. 2 shows a pan formed as a casing with a bottom sloping from each side to a medial discharge channel *d*, pockets *e*, *f* at diagonally opposite points with holes for steam inlet and exit and arms *i* for support from girders *s*. The steam inlet and exit holes are formed on adjacent pans in opposite positions, so that they communicate. These holes and the ends of the water discharge passage are flanged for connexion together. The steam exit from the last pan of a series leads through pipes *w*, *x*, discharging to atmosphere or to a steam evaporator or condenser &c. collecting condensation water. The drainage channel of the last pan discharges water through a valved pipe *y* and a pipe 1 to a hot-well &c.

141,107. Codd, T. J., and **Johnson, H.** Jan. 2, 1919. *Drawings to Specification.*

Heating by circulation of fluids.—A system for heating calorifiers or the like by steam has the following features in combination; a source of steam, superheaters for the steam, calorifiers or the like with or without means for cooling the steam before its utilization in each calorifier or group of calorifiers, a condense main under a partial vacuum separated from the calorifiers and steam mains by steam traps and air valves or the like and an exhausting device for producing a partial vacuum in the condense main.

141,170. Pfenninger, H. March 13, 1919.

FIG. 2.

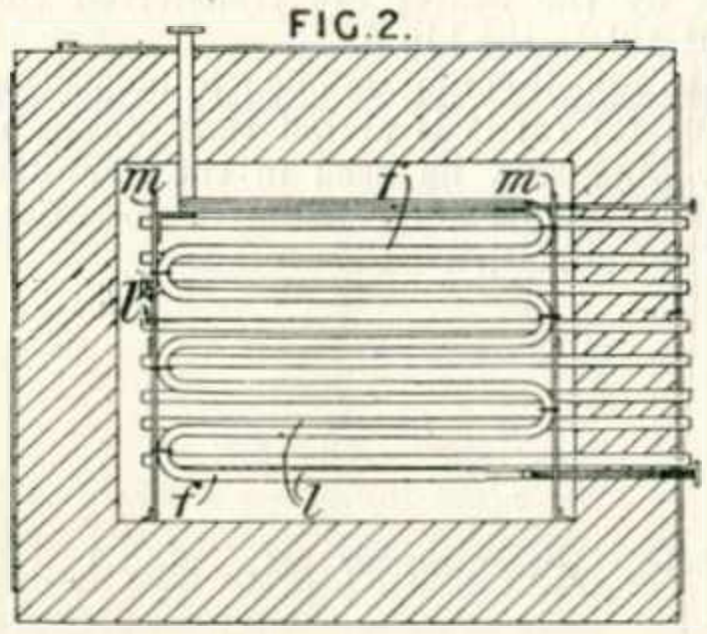
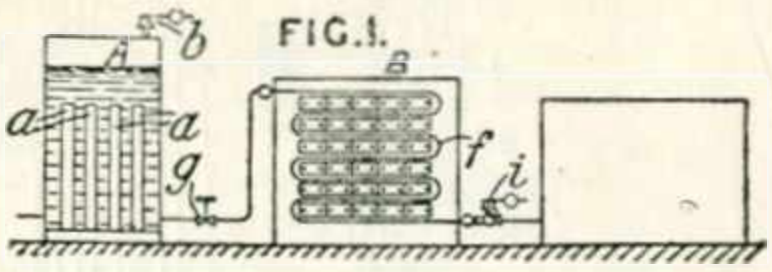


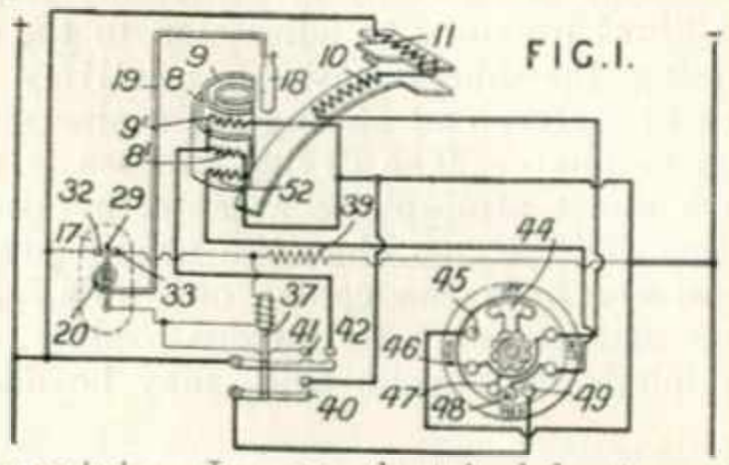
FIG. 1.



Heat-storing apparatus.—In an electric steam-generating plant, water is superheated in a vessel A, Fig. 1, and then evaporated in a heat-storing vessel B which has coiled tubes *f* or radiator-like elements, and electric heating-elements embedded in a heat storage mass. A number of steam-tubes *f* are arranged in vertical planes in the vessel B, and metal tubes *l*, Fig. 2, containing electric heaters are mounted in parallel planes in perforated walls *m*. The walls are formed in sections, the structure being built up by securing the lower sections in position, inserting the steam-coils and the lower heating-elements, and ramming in from the top the heat-storing material consisting of sand, or pieces of stone or rock, preferably steatite, with a binder such as cement, lime or gypsum, the finer material being placed around the heating-elements. The upper sections and elements are then placed in position and more material rammed in. The heat stored in the vessel B, for instance at night, may be sufficient to evaporate the water, or heat may also be applied during evaporation. Thermometers may be inserted in the vessel.

141,257. Jackson, W. J. Mellersh-, (*Cutler-Hammer Manufacturing Co.*). Jan. 21, 1919.

FIG. 1.



Thermostats.—In an electrical heat-regulating system for the metal-pots of type-casting machines &c. having independent body and spout heaters, the heat supplied to the body of the metal-pot is governed by an automatic temperature-controlled regulator, and the heat supplied to the spout is under the control of a manually-operated switch whereby three conditions of heat may be obtained. The metal in the body of the pot is heated by two heaters 8, 9, having resistance elements 8^1, 9^1. The current passing through the body-heaters is controlled by a thermostat 17, which may be of the kind described in Specification 139,111, and comprise a mercury bulb 18 connected by a tube 19 to a Bourdon spiral 20 which actuates a pivoted contact lever 29 located between fixed contacts 32, 33. When the pot is to be heated up from a cold condition, the lever 29 is against the contact 32, and a circuit is completed from the positive line through contacts 32, 29, the winding of an electro-magnetic switch 37, and resistance 39 to the negative line. The switch 37 then closes contacts 40, 41, 42, the contact 41 completing a holding circuit for the switch 37. The closing of contact 42 completes the circuit for the body-heaters 8, 9 from the positive to the negative line. When the temperature reaches a predetermined maximum, the lever 29 engages the contact 33, the winding of the magnet 37 is short-circuited, and the current through the heaters is interrupted. Specification 141,812 also is referred to.

141,322. Munroe, T. B. April 3, 1919, [*Convention date*].

Non-conducting coverings for heat; fire-proof coverings.—In the production of a heat-insulating water-proof material for use in refrigerator cars or like purposes, a mixture of wood or other cellulose fibres and a water-proofing material such as resin with a large proportion of water is felted into sheets, which are dried in a moist atmosphere at a moderate temperature to remove substantially all the water, and a number of sheets are united to form a block of the required thickness. The process is preferably carried out by introducing the mixture into a tank 1, Fig. 1, from which it passes between a rotary drum 4 covered with foraminous material 10 and an endless travelling belt 12 of foraminous material, and emerges as a continuous sheet. The proportion of water in the tank 1 is from 95 per cent to more

than 99 per cent, whilst on emerging from the tank, the proportion is from 50 to 85 per cent. The water-proofing resin is preferably deposited on the fibres previous to admission to the tank 1 by mixing the fibres with a relatively small amount of water, and adding resin size and aluminium sulphate. The drying process is carried out in a moist atmosphere at a temperature not exceeding 350° F. so that the sheets are dried progressively from the centre outwards. A fire-proofing material such as ferrous oxalate, or ferrous sulphate and oxalic acid, may be added in

FIG. 1.

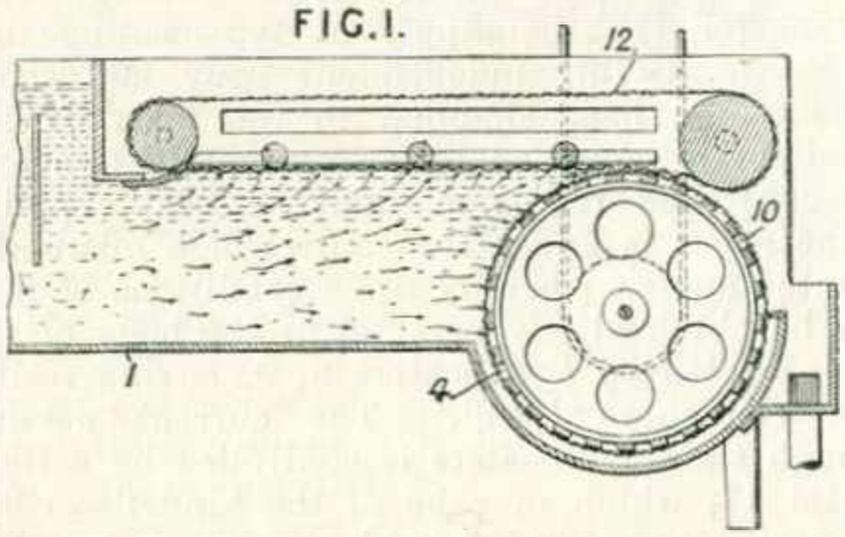
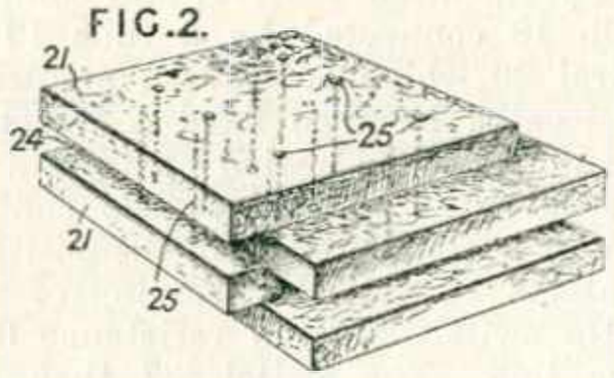
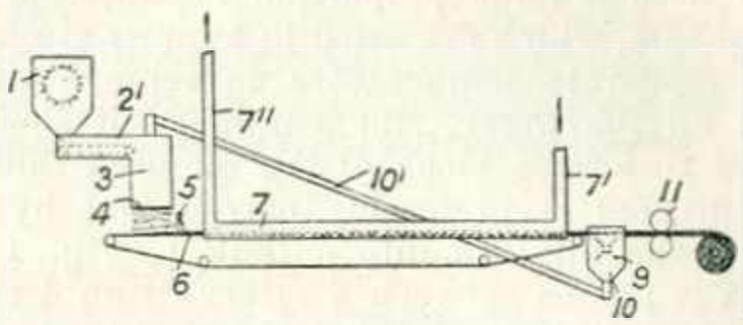


FIG. 2.



the tank 1, the ferrous oxalate decomposing during the drying process into water, carbon-di-oxide, carbon mon-oxide and iron. The sheets are cut to a suitable size and united, preferably with their edges offset to form interlocking tongues and grooves 21, 24, by means of nails 25, as shown in Fig. 2, or by wire stitching or by asphalt cement.

141,384. Burgess Laboratories, C. F., (Assignees of *Weiss, H. F.*). May 31, 1918, [*Convention date*].



Non-conducting coverings.—Woody material is shredded and the fibres are passed through a spray of adhesive and formed in air into a loose and flocculent layer. The resulting mat or fabric may be beaten to remove loose fibres, and it may be smoothed by passage between rollers. The adhesive may be a half-per-cent solution of starch so as to be absorbent, and it may contain substances to render the product antiseptic, aseptic, fire-resistant, or water-resistant. The fabric is stated to be applicable for use in making surgical dressings, cushions, upholstery, quilts, bedding, protective wrappers, heat-insulating material, &c. As shown, bleached wood pulp is shredded in a shredder 1 and falls into a conduit 2¹ from which it is delivered to a bin 3 provided with one or more screens 4 which sift the fibres on to a travelling endless conveyer 6, one or more sprayers 5 discharging adhesive on the fibres as they fall. The moistened fibres pass through a drying chamber 7 having an air inlet 7¹ and outlet 7¹¹ to a beater 9 and smoothing-rolls 11. Loose fibres detached by the beater are transferred through a conduit 10¹ to the bin 3.

In the Specification as open to inspection under Sect. 91 (3) (a) it is stated that fibrous material of any kind may be used in the manufacture of the fabric. This subject-matter does not appear in the Specification as accepted.

142,666. Porter, W. H. May 14, 1919.

4 FIG. 2.

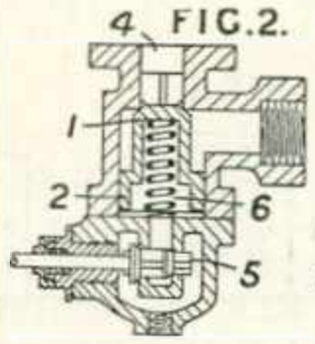
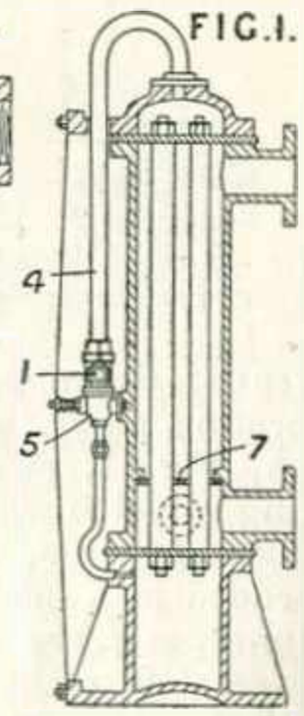


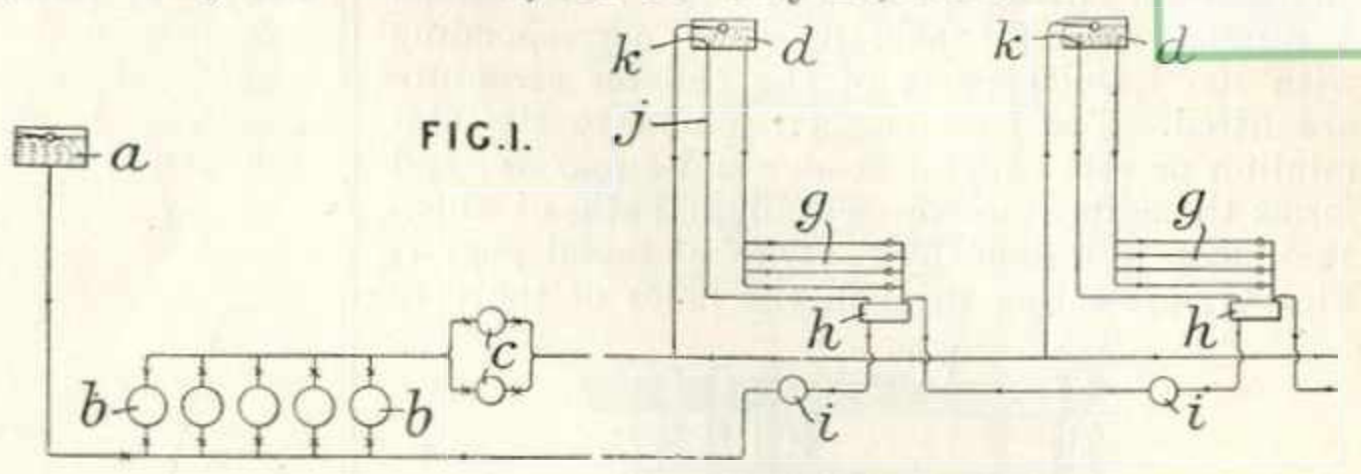
FIG. 1.



Thermostats.—The steam supply to a steam-heated water-heater is controlled by a pilot valve operated by the expansion and contraction of the casing of the heater. The supply valve 1 controlling the passage of steam to the inlet pipe 4 is held against its seat by a spring 6, and by the pressure of the steam passing behind the loosely-fitting piston end of the valve. When the pilot valve 5 is open, the steam pressure behind the supply valve is relieved, and the supply valve is opened by the inlet pressure. The incoming water is distributed over the ends of the steam tubes by a plate 7 having holes of larger diameter than the tubes.

142,677. Haden & Sons, G. N., and **Adams, H. J.** May 26, 1919.

FIG. 1.



Heating buildings.—Hot-water supply systems for buildings at a distance from the heating station comprise boilers *b* supplied from a tank *a* and delivering through pumps *c* to local storage tanks *d*; these supply heating &c. pipes *g* in the various buildings, which service pipes return the water to closed tanks *h* from which it is returned to the boilers by pumps *i*, the more distant pumps *i* returning the water through the nearer tanks *h*. Each storage tank has a thermostatically-controlled valve *k* whereby when the water in the tanks *d* falls below a given temperature, it is returned to the boilers through pipes *j* for re-heating. In a modification for hilly districts, the heating station is at a low level and the return water passes through the various tanks *h* to the boilers by gravity. The pumps *i* and tanks *h* nearer the boilers may be of increased capacity.

142,887. Cuming, A. J. Roach-. Nov. 19, 1918.

FIG. 4.

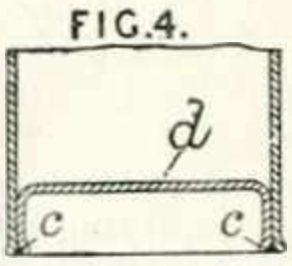
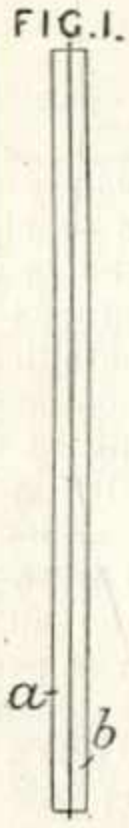


FIG. 1.



Non-conducting coverings for heat and sound.—Hollow slabs for constructional and heat-insulation purposes are formed from two layers of sheet metal rendered non-porous by coating on both surfaces with a vitreous or other enamel, the sheets being united only at the edges. The enclosed space may be evacuated, in which case a reinforcing wooden lattice is placed between the walls. In the form shown in Fig. 1, the slab is constituted from shallow metal trays *a*, *b*, which are coated on both sides with enamel, and formed with flanges *c* which are united by soldering. In a modification, only one tray may be employed, the other plate being flat, or the slab may be formed from a flattened metal tube which is coated with enamel and the ends closed by flat enamelled stampings *d*, as shown in Fig. 4. When the slabs are to be evacuated for heat-insulation and other constructional advantages, a small brass or other tube is inserted in the tray at one corner before the application of the enamel.

142,933. Smith, H. R. Melland-. Feb. 11, 1919.

FIG. 1.

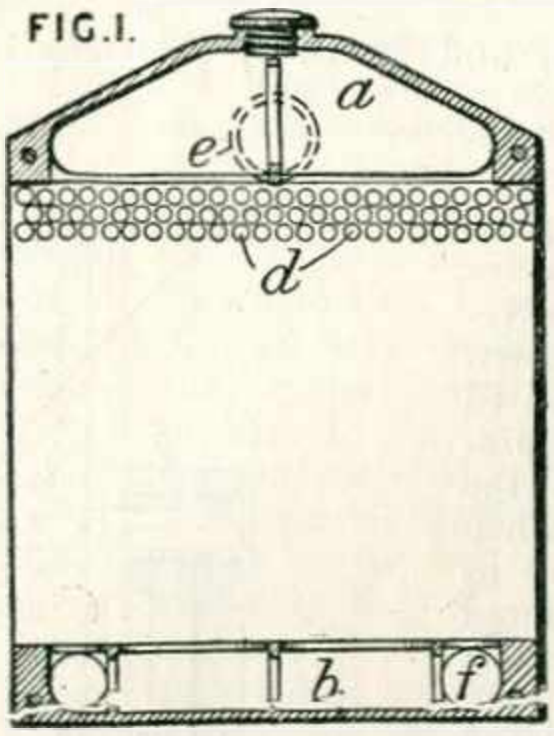


FIG. 6.

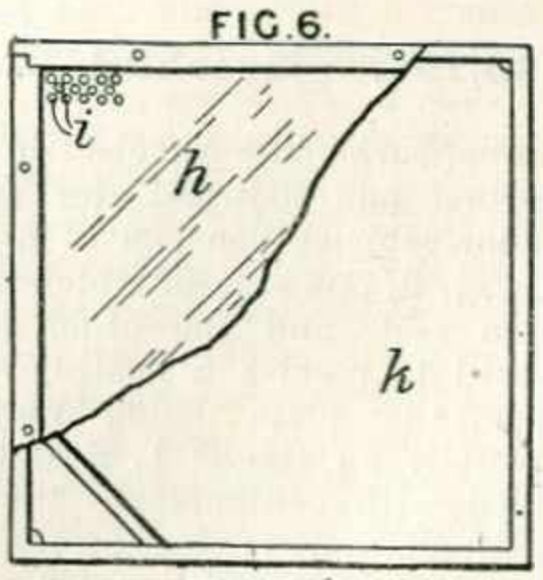
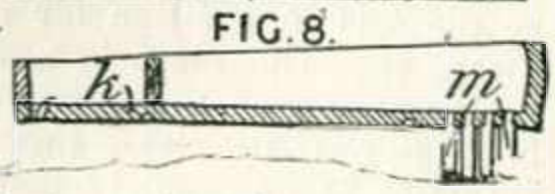
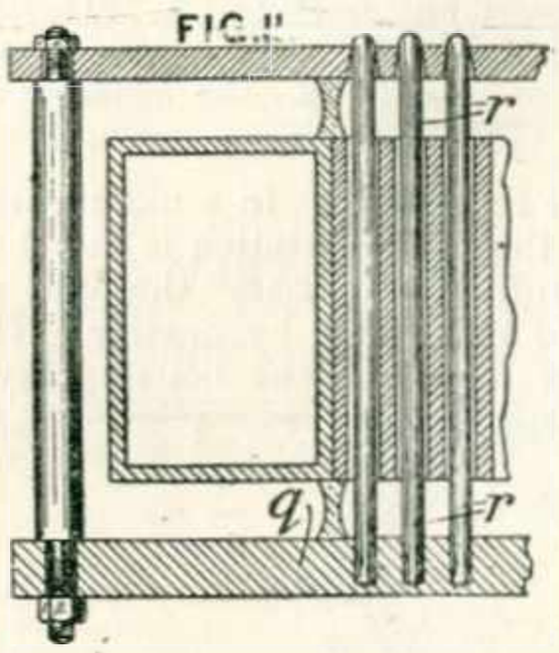


FIG. 8.



Radiators. — In heat-interchanging apparatus such as radiators for heating buildings, honeycomb radiators for motor-cars, &c., an electrolytically deposited multi-tubular cell *d*, Fig. 1, is joined integrally with the other portions of the apparatus, such as the header *a*, sump *b*, and inlet and outlet connexions *e*, *f*, so as to produce a complete radiator or radiator section. The process consists in joining the multi-tubular core of fusible metal, on which the deposit is to be made to the headers &c. by soldering or brazing so as to produce a continuous metallic joint, depositing the metal over the whole, and subsequently removing the metal of the core by melting. The core on which the deposit is to be made is preferably made by running the fusible metal in a molten condition into a mould comprising a base *h* and lid *k*, Figs. 6

and 8, each having a series of holes *i* into which a number of removable pegs *m* corresponding with the tubular parts of the cellular structure are fitted. The core is then joined to the aluminium or other metal header and sump &c. and forms the cathode in an electrolytic bath, of which the anode is formed by a series of metal pegs *r*, Fig. 11, projecting through the holes of the core

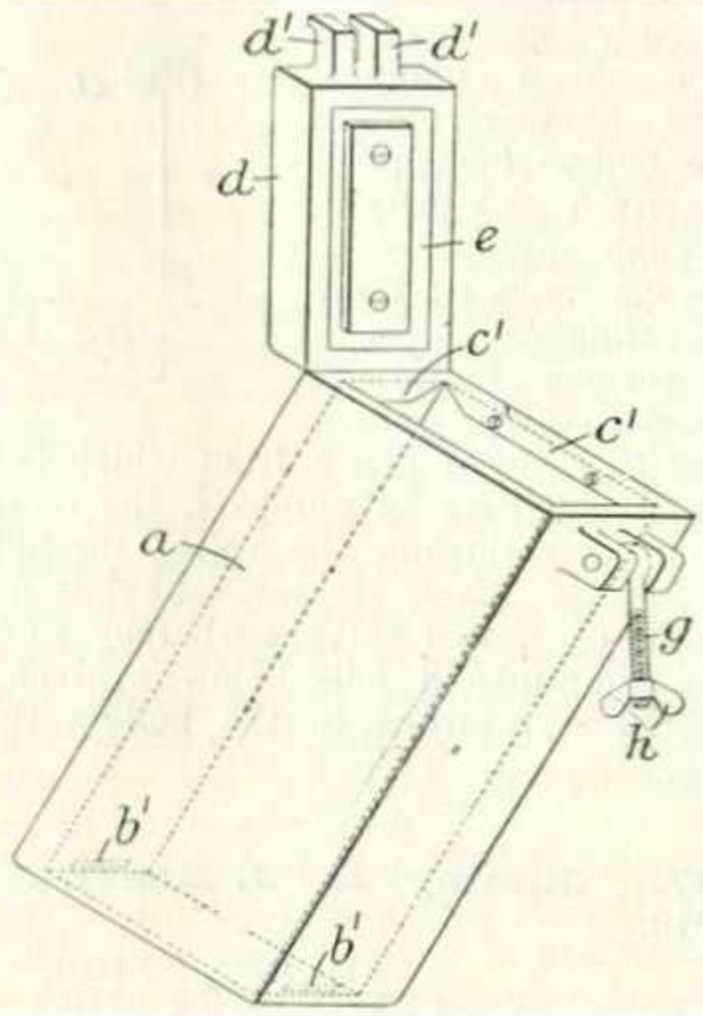


and held between conducting plates *q* of aluminium. The fusible metal core is finally removed by immersing the whole in molten metal at the correct temperature or by means of a muffle furnace. The complete radiator may consist either of a single section so produced or of several sections bolted together.

142,955. Keillar, T. W. Feb. 28, 1919.

Non-conducting coverings.—Fire-clay or silica fire-bricks are rendered less heat conducting by the provision of a cavity loosely packed with kieselguhr, which may be inserted through a hole subsequently sealed by a fire-clay plug; alternatively, the material may be introduced, with or without an envelope, into an open cavity and enclosed by a cover of fire-clay, or the brick may be moulded around an envelope containing the kieselguhr.

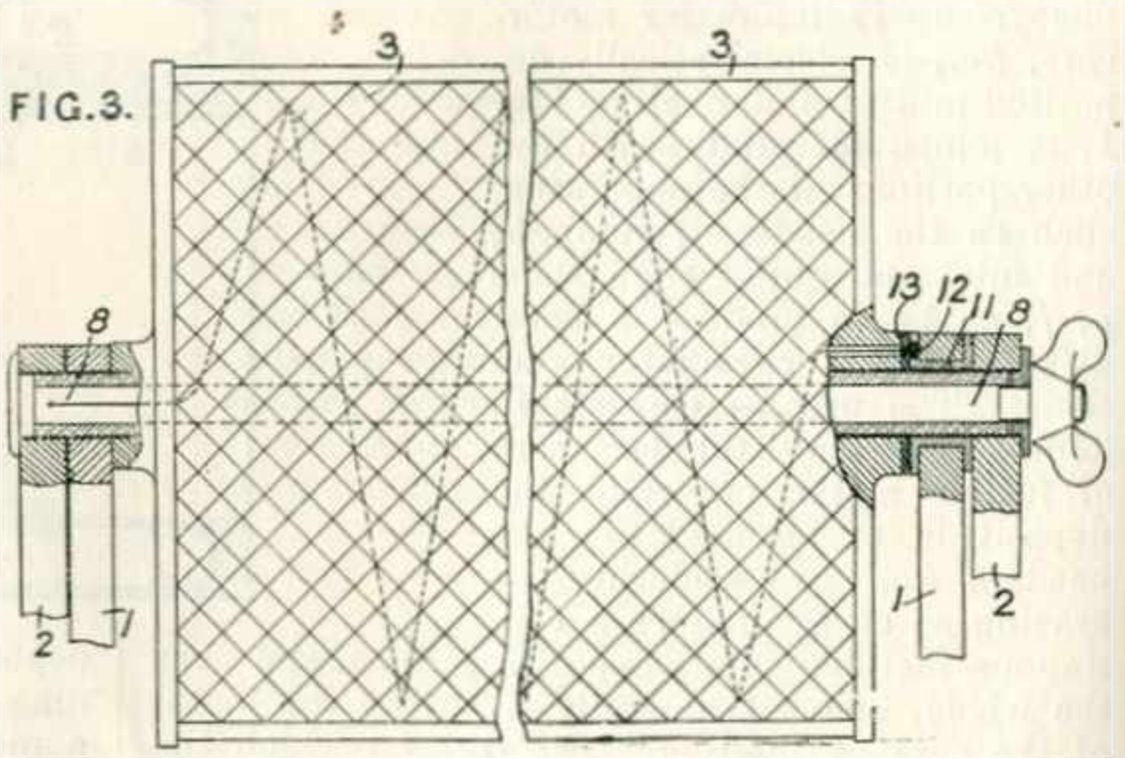
143,007. Callum, G. April 28, 1919.



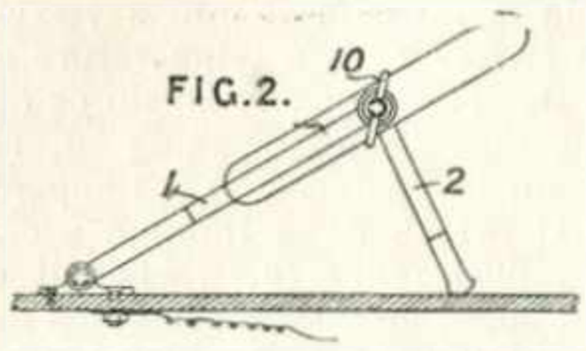
Footwarmers.—Relates to portable foot- or bed-warmers or clothes-drying devices of the kind in which the heating-medium, such as a hot brick, is introduced into a box comprising inner and outer metallic casings with an intervening packing of non-conductive material, such as asbestos. According to the invention, the outer casing *a* is fitted with a hinged lid *d* having an asbestos lining *e* and provided with lugs d^1 adapted to be engaged by a pivoted screw *g* and wing-nut *h* to retain the lid in its closed position. The outer casing *a* is preferably welded in one piece, while the inner casing is preferably riveted and is provided with a loose bottom having projections springing into slots b^1 on the sides and with an upper flange c^1 bridging the space between the two casings.

143,194. Zecchini, A., and **Panza, I.** May 13, 1919, [*Convention date*].

Footwarmers.—An electric foot-warmer and foot-rest for use in motor-vehicles consists of a plate 3, Fig. 3, one side of which serves as a rest, and the other is recessed to receive a heating-resistance, the plate being mounted pivotally on stands 1, 2 and provided with contacts so that the heating-circuit is closed only when the plate is in position for use as a warmer. The plate is mounted on a spindle 8 having at one end a clamping-nut 10. The link 1 of the stand at one end is insulated from the spindle by a sleeve 11, in which is mounted a contact 12 engaging with a contact 13 con-



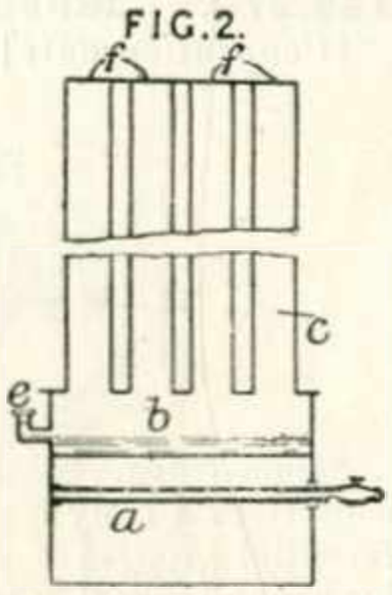
nected with the resistance. Connexion at the other end of the resistance is made through the spindle with the link 1 of the other stand. When the plate is turned for use as a rest, the contacts 12, 13 are separated to open the circuit. The



links 1 are pivoted to the floor as shown in Fig. 2, and the links 2 can be folded down to allow the plate to lie on the floor when not required. The resistance is covered with cloth or felt.

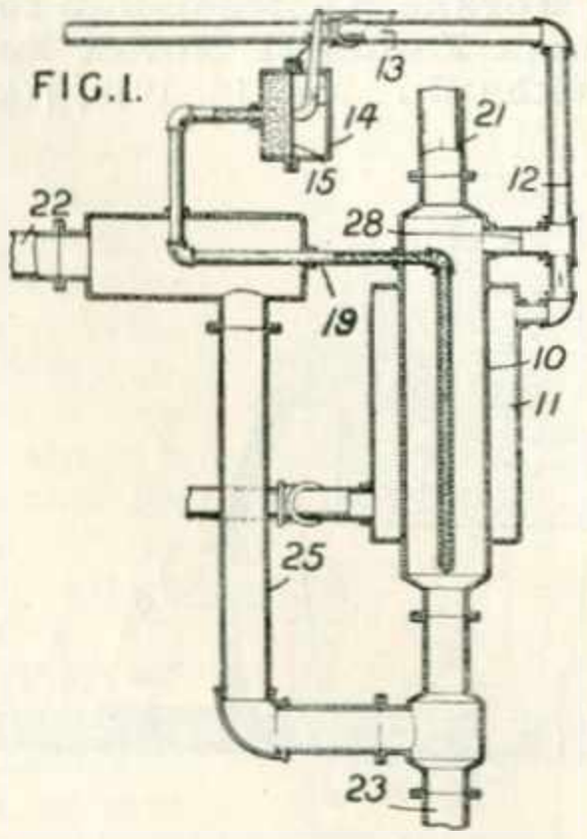
143,234. Morice, G. A. M. April 7, 1919, [*Convention date*].

Radiators. — In a steam-radiator of the type in which steam is generated in a boiler *b* under the radiator elements *c*, the elements are open to the atmosphere through openings *f* at the top, allowing the steam to be maintained at atmospheric pressure. The boiler is filled through an inlet *e* and heated by a burner *a*. The steam generated ascends the radiator elements, is condensed, and returned to the boiler.



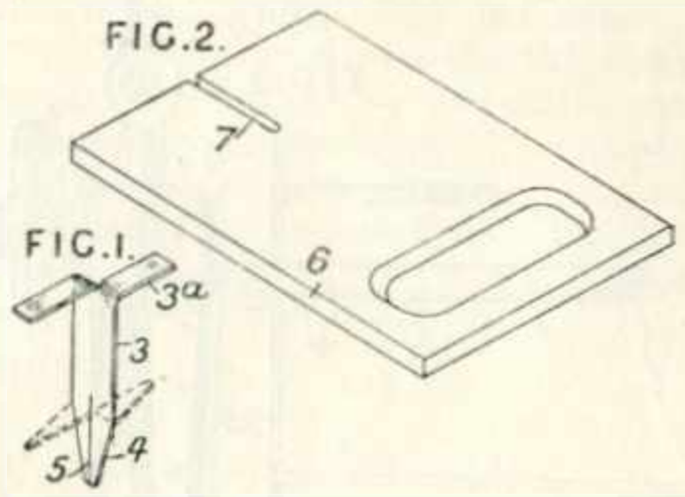
143,394. Brooks, H. May 27, 1919.

Thermostats.—A device for controlling the temperature of liquids or gases, more particularly hydrocarbon fuels for internal-combustion engines or oil-fired furnaces, comprises separate passages with a common discharge and heat-responsive devices, subject to the temperatures in the passages, which regulates the temperature in a jacket surrounding one passage. The gases or liquids to be regulated pass along conduits 21, 22 and passages 10, 25 respectively to a common discharge 23. The passage 10 has a jacket 11 for a heating or cooling medium which is supplied through the pipe 12 under the control of a valve 13 which is operated by a diaphragm thermostat 14. The heat-responsive device comprises a tube 19 containing mercury under the influence of the temperatures in both passages, the end of the mercury column acting on the diaphragm 15 of the thermostat. A valve-controlled passage 28



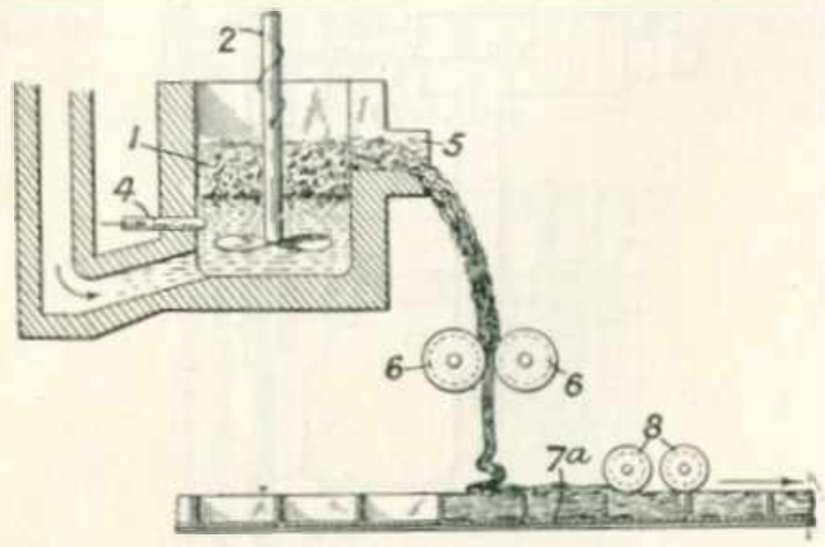
connects the pipe 12 with the chamber 10 so that direct contact of the controlling-medium with the fluid in the chamber may be obtained.

143,474. Parry, G. F., and **Anderson, Ltd., T.** Dec. 1, 1919.



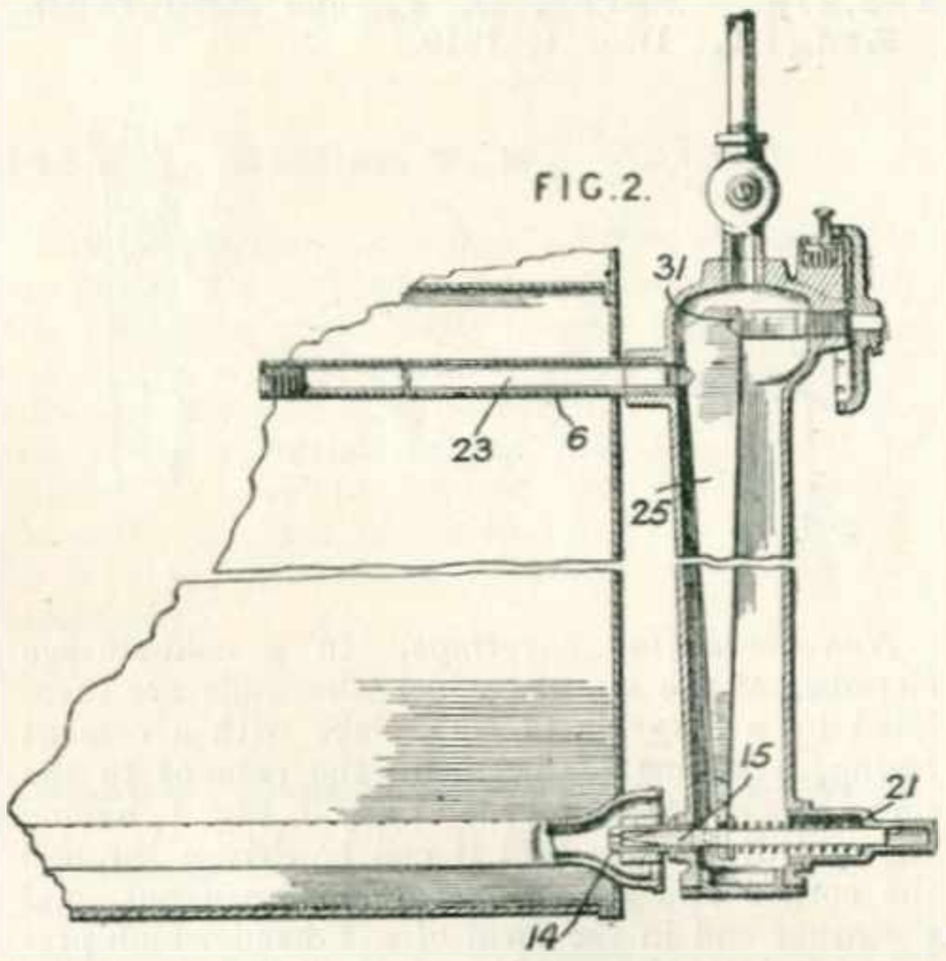
Non-conducting coverings.—In a cold-storage chamber of the kind in which the walls are insulated by a covering of cork slabs with a cement facing, a device for securing the cement to the cork slabs consists of a metal key 3, Fig. 1, having one end divided so that it can be driven through the cork 2 and the prongs 4, 5 spread out, and the other end in the form of a T-head which projects slightly above the surface of the cork 2, as shown in Fig. 4, so as to retain the cement. The T-head may be formed by dividing the end of the key and bending back the arms 3^a as shown in Fig. 1. In order to distance the heads from the surface of the cork, a spacing-block 6, Fig. 2, is employed having a slot 7 through which the shank of the key is passed when driving it into the cork 2. In the construction shown, two layers 1, 2 of cork are provided, the keys 3 being inserted in the layer 2 before connecting the two layers, and the cement being applied subsequently to the surface of the layer 2. The heads of the keys are preferably arranged in rows at equal intervals, but with the arms 3^a in different planes.

143,500. Norske Aktieselskab for Elektrokemisk Industri Norsk Industri-Hypotekbank. May 16, 1919, [*Convention date*].



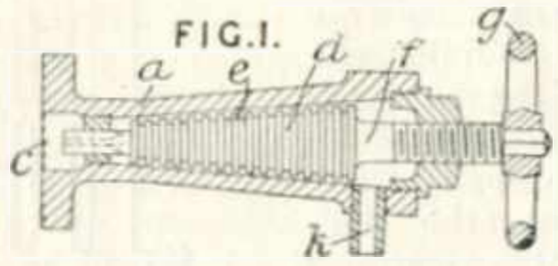
Non-conducting coverings for heat.—Molten slag is converted into foam by blowing steam or other gas through it, and this foam is rapidly cooled to a temperature at which the slag is still plastic, but the porosity becomes stable, the resulting material being moulded into bricks or the like and allowed to solidify. In an example, a slag having the composition 50 per cent silica, 15 per cent alumina, 30 per cent lime, and 5 per cent magnesia is introduced into a vessel 1 provided with a stirrer 2, at a temperature of about 1400° C. Water or water and steam or other gas is introduced through an opening 4, and, on stirring, a foam is produced at a temperature of about 1000° C. which flows through a conduit 5 on to water-cooled rollers 6, whence it emerges as a ribbon at about 800° C., which falls into cast-iron moulds on a conveyer 7^a which moves in the direction of the arrow. Rollers 8 level the surface and remove any excess of foam. The foam may be further cooled by an air or like blast between the rollers 6 and the moulds. If objectionable gases are produced during the conversion into foam, the operation should be carried out in an oxidizing atmosphere. Specification 136,818 is referred to.

143,905. American Stove Co., (Assignees of *Meacham, B. E.*). Nov. 16, 1914, [*Convention date*].



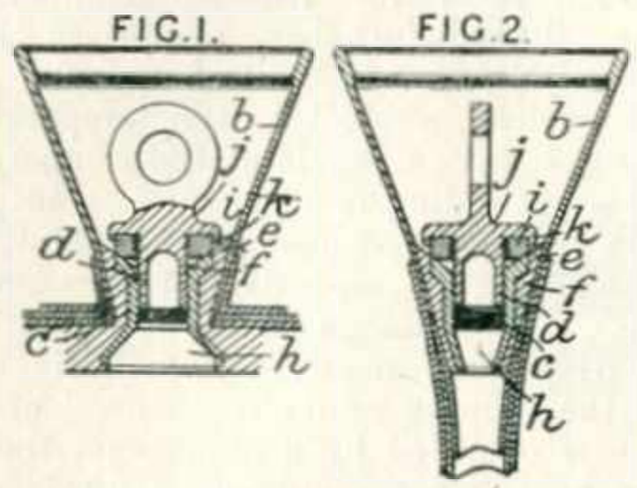
Thermostats.—For regulating the temperature of gas-heated ovens, the expansion and construction of a copper tube 6 with porcelain central rod 23 operates to close or open a grooved needle valve 15 adapted to seat in a constricted tube 14, through a lever 25 with adjustable fulcrum 31. A spring 21 tends to close the valve on the expansion of the tube 6.

144,270. Massip, G. March 15, 1919, [*Convention date*].



Steam-traps.—A device with no moving parts comprises a body *a* and member *d* having circumferential grooves *e* and a screwed rod *f* operated by a hand-wheel *g* to regulate the position of the member *d*. Wet steam enters at *c* and water is drained through the pipe *k*. In a modification, the body and member are substantially cylindrical, a needle valve on the end of the member regulating the admission of steam.

144,454. Ioco Proofing Co., and **Watt, H. D.** May 16, 1919.

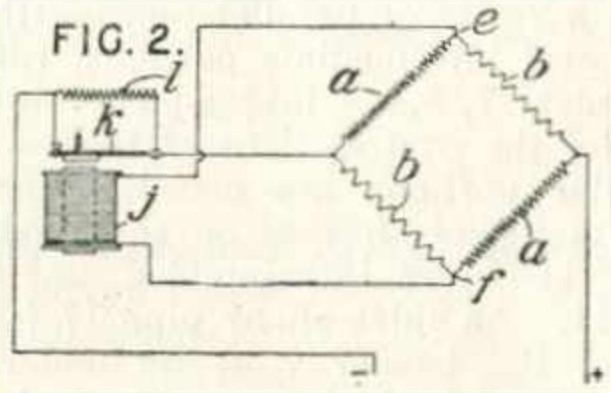


Hot-water bottles.—Relates to stoppers of the kind comprising co-operating plug and socket portions *d*, *c* adapted to be applied to hot-water

bottles &c. made of india-rubber or similar material and provided with a funnel for filling purposes. The socket *c* is provided at its upper exposed part or mouth with a flanged and tapered or conical bearing-surface *f*, which, together with a similar surface at the upper exposed part of the rubber &c. *e* surrounding the socket, prevents water from lodging in the funnel *b* after the filling operation. The socket is elongated and narrowed at its lower or inner end to prevent it from turning or becoming loose. Or the lower end of the socket may be conical, and the outer surface beneath the flange *f* may be grooved diagonally. The plug *d* has a flanged cap *j* and is screw-threaded to a point near the underside of the cap so that when the plug is screwed down to force the washer *i* against the socket flange *f*, the flange *k* of the cap bears against the rubber surrounding the socket.

144,669. Soc. Anon. des Etablissements L. Bleriot. Feb. 5, 1919, [*Convention date*].

FIG. 2.



Thermostats.—Heating-elements are arranged in two pairs to form the arms of a Wheatstone-bridge temperature-controlling device, one pair *a* being of material such as carbon, boron or constantan, having a negative or nil temperature coefficient, and the other pair *b* of material such as nickel having a positive coefficient; the difference of potential across the points *e*, *f* produced by a rise in temperature causes the winding *j* of an electro-magnet to attract an armature *k* and insert a high resistance *l* in the bridge circuit or to open the circuit. The magnet may have one or more additional windings in series or shunt with the resistance *l* to attract the armature when the potential across the points *e*, *f* falls owing to the insertion of the resistance. Variations in the reluctance of the electro-magnet may be compensated by means of the resistance *l* or a part of it. In another arrangement, the electro-magnet is replaced by a heating-coil and a thermal switch in the form of a bimetallic strip.

144,777. Frost & Co., H., and **Welch, W. H.** March 13, 1919.

FIG.1.

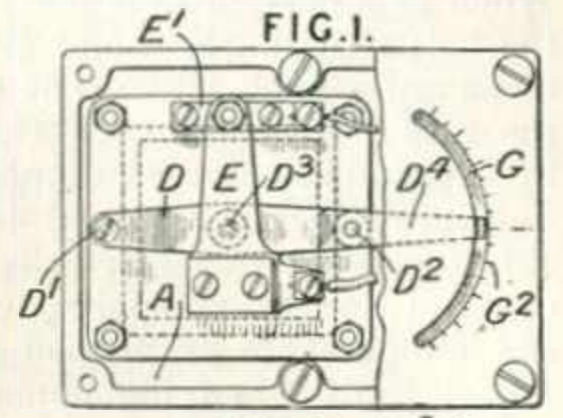
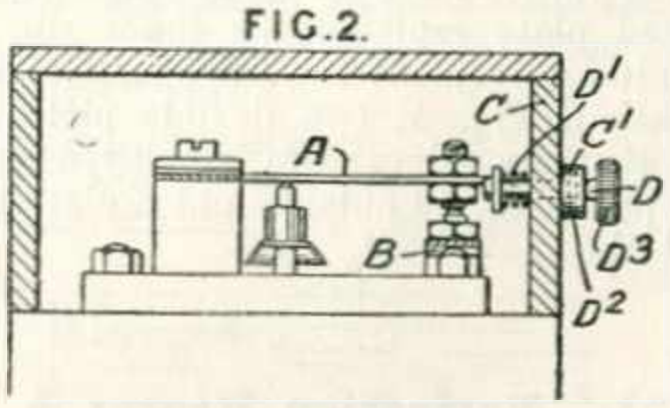


FIG.2.

Thermostats. — In a pressure-operated electric cut-out, a diaphragm or other pressure-operated member B is controlled by a bow spring D which is thrust towards the diaphragm by separately-adjustable screws D^1, D^2. The screw D^2 may be provided with an index arm D^4 which extends through a slot G in the casing and co-operates with a scale G^2. The diaphragm is held in place by a cover-plate C, which is hollowed on the lower side and serves to clamp the diaphragm to the pressure chamber A and to support the spring D. A thrust-piece B^1, extending through a hole in the cover-plate, is interposed between the diaphragm and the bow spring. A second thrust-piece D^3 on the upper face of the bow-spring bears against a resilient contact-arm E and moves this away from a fixed contact E^1 to cut out a heating or other circuit when the pressure in the chamber A exceeds a predetermined limit. The invention is particularly applicable for regulating the temperature in a portable vulcanizer by repetitive cutting-off of the current whenever a predetermined pressure is reached in the steam generator. As an additional safeguard against overheating, the contact-arm E may be bimetallic, so that it bends away from the co-operating contact when heated beyond a certain limit.

144,778. Frost & Co., H., and **Welch, W. H.** March 13, 1919.

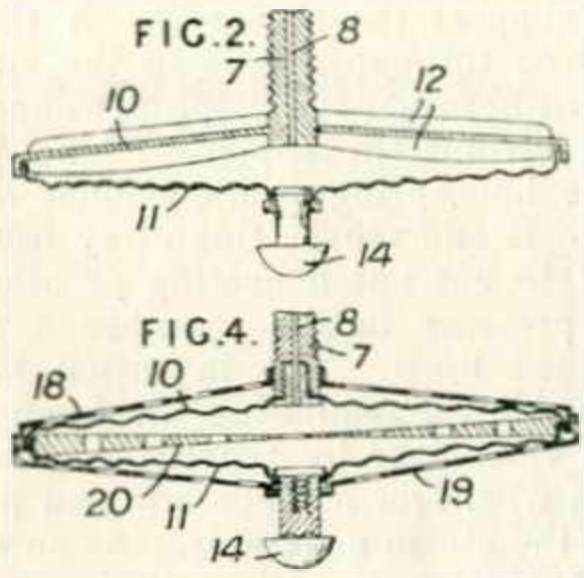
FIG.2.



Thermostats.—An electric cut-out comprising a resilient contact-arm A adapted to be moved away from a fixed contact B can be made repetitive or not at will by means of a bolt D which is slidably mounted in the walls of the casing C and can be made to bear at its inner end, under the control of a spring D^1, against the free end of the contact-arm A. When the arm A is moved away from the contact B, the bolt D slides under the

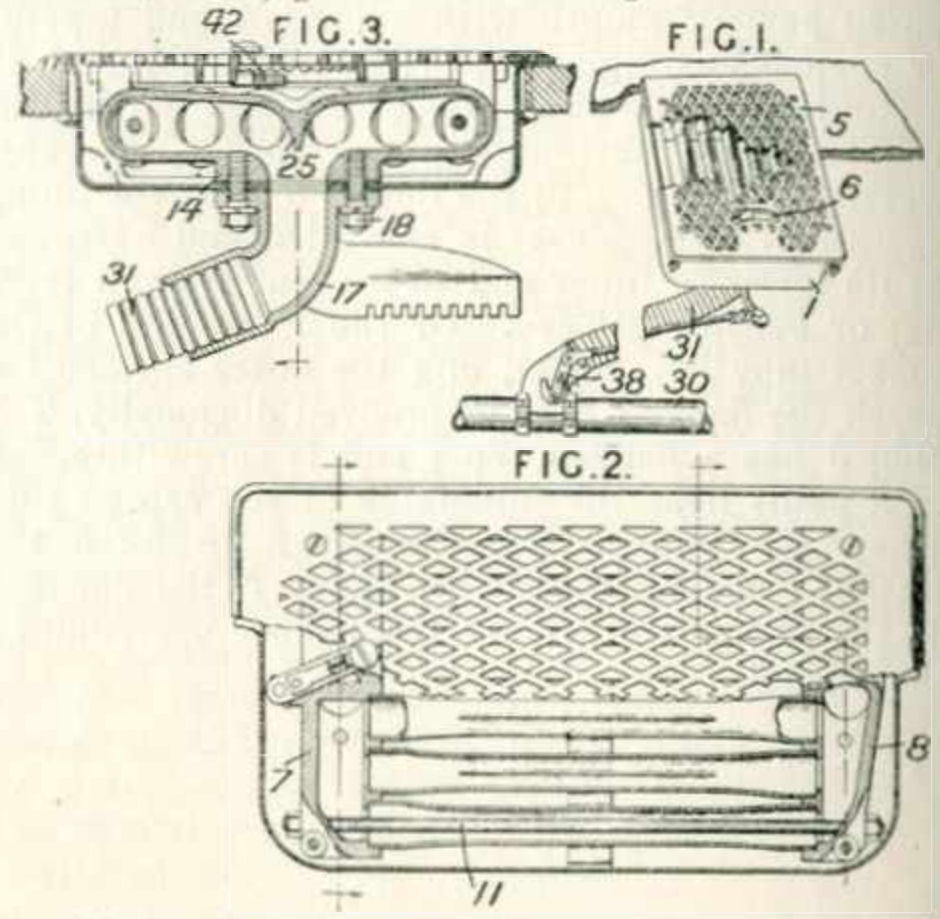
nd of the contact arm in order to prevent the circuit from closing again. The bolt carries a pin D^2 adapted to move in a slot in a boss C^1. When it is desired to make the cut-out repetitive, the bolt is withdrawn and given a partial turn by means of a knob D^3 so that the pin D^2 lies across the face of the boss C^1. The cut out is actuated by a pressure-operated diaphragm as described in Specification 144,777, and is particularly applicable for use with electrically-heated portable vulcanizers for tyre repairs, either for preventing the temperature from rising above a predetermined limit when the apparatus is in continual use, or for cutting out the heating means permanently and allowing the parts to cool down as soon as the temperature reaches the predetermined limit.

145,536. Kuhn, E., and **Ribes, P.** April 16, 1919, [*Convention date*].



Steam-traps; thermostats.—A thermostatic element for operating the discharge valve 14 of a steam trap comprises a capsule containing distilled water and water vapour as the expanding medium, air being evacuated from the capsule before sealing. In the example shown in Fig. 2, a rigid plate 10 with ribs 12 is attached at its outer edge to a flexible plate 11. A tube 7 supports the element which is charged with water and evacuated through a duct 8. In modifications, a perforated plate replaces the inner ribs to prevent undue movement inwards, and in a further modification, Fig. 4, two flexible plates 10, 11, united at their edges, are employed with perforated plates 18, 19 outside and a plate 20 inside to limit the movement.

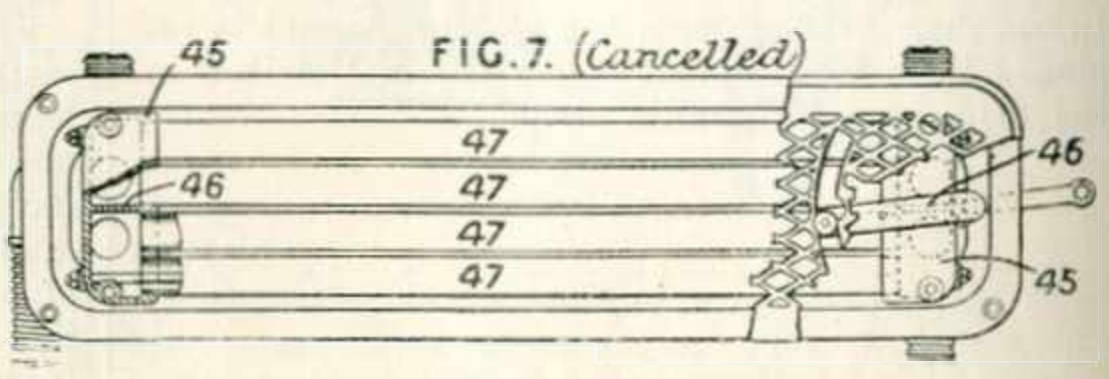
145,749. Perfection Heater & Manufacturing Co., (Assignees of *Pelton, C. S.*). Feb. 5, 1916, [*Convention date*].



Radiators.—Comprises a construction of heating radiator for motor road vehicles of the kind in which the exhaust gases from the engine are utilized as the heating medium. The radiator, which is fitted into a box 1 let into the floor of the vehicle and provided with a perforated top 5, comprises a series of parallel tubes with circular ends and oval intermediate portions, running between headers 7, 8. A bridge-piece forms a central rest for the oval sections of the tubes, while the circular portions are coned slightly to fit closely into sockets formed on the headers when the whole structure is assembled and tightened by bolts 11. An inlet elbow pipe 17 is attached midway of the header 7 at its under side by means of bolts 18 which are utilized also to connect the radiator to the box by penetrating into flanges 14. Two similar bolts connecting an outlet elbow pipe to the opposite header also function in this dual capacity. The inlet pipe 17 is connected by a flexible pipe 31 to a second elbow-pipe clamped over an orifice in the exhaust pipe 30. A butterfly valve on the pivot of the link 38 can be positioned by moving a stud in the slot 6 so as to divert more or less of the exhaust through the radiator. The stud and the link are connected by a system of links and rods which includes a spring-mounted arcuate rack setting-and-retaining mechanism associated with the under side of the lid of the box. A depending baffle 25 divides the stream of entering gases.

145,751. Perfection Heater & Manufacturing Co., (Assignees of *Pelton, C. S.*). Dec. 6, 1916, [*Convention date*].

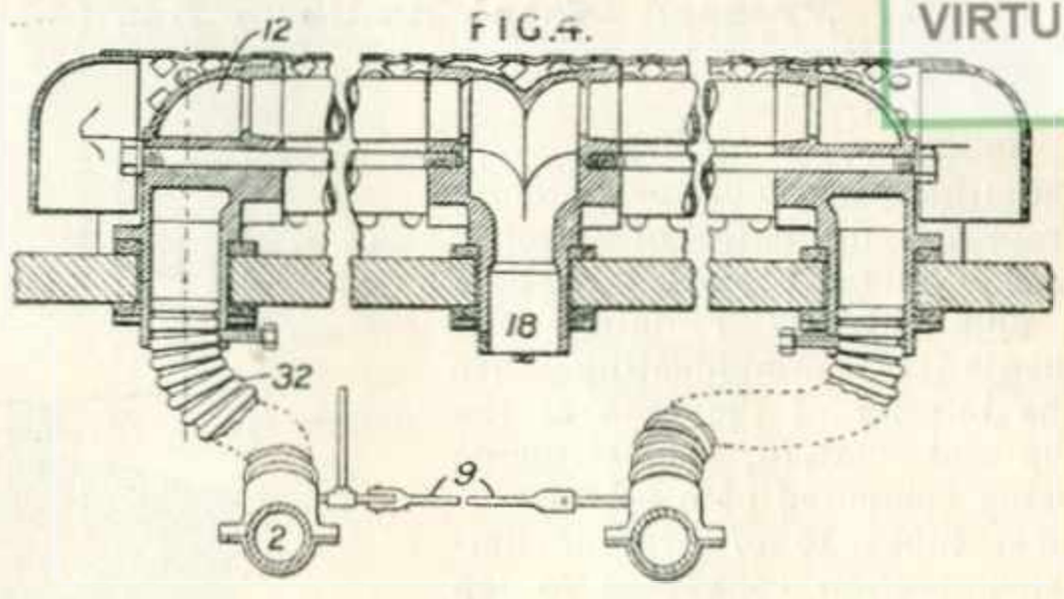
Radiators. — An exhaust gas heater for motor-vehicles consists of a plurality of similar heat-radiating portions of equal internal resistance. In the application to an engine having two exhaust pipes 2, Fig. 4,



the exhaust gases are led through valve-controlled pipes 32 to the end of the heater 12, which is provided with a central outlet 18, the two parts having equal internal resistance. The valves are simultaneously operated by linkage 9. The heater may be used with a single exhaust pipe which is connected to the central opening 18, so that the flow is in the reverse direction.

The Specification as open to inspection under Sect. 91 (3) (a) comprises also a modification in which the headers 45, Fig. 7, (*Cancelled*), are connected by tubes 47, each header having a central partition 46 and an inlet and outlet passage, so that the exhaust gases enter at one end

FIG.4.



and are discharged from the opposite end. This subject-matter does not appear in the Specification as accepted.

146,081. Goldberg, A. June 27, 1919, [*Convention date*].

Fire-proof coverings.—Inflammable materials, such as nitro-cellulose films, are protected from risk of fire by enclosing them in a container or storage tank the walls of which form a jacket filled with bi-carbonate of alkalis, such as bi-carbonate of sodium. Specification 552/74 is referred to.

According to the Specification as open to inspection under Sect. 91 (3) (a), other suitable protective substances are salts containing water of crystallization, such as copper sulphate, and magnesium chloride lye, to any of which neutral substances, such as fossil earth, may be added. The protective substances may be used as a lining or packing for the storage container. This subject-matter does not appear in the Specification as accepted.

146,129. Pressed Metal Radiator Co., (Assignees of *Sonneborn, C.*). Jan. 22, 1916, [*Convention date*].

FIG.1.

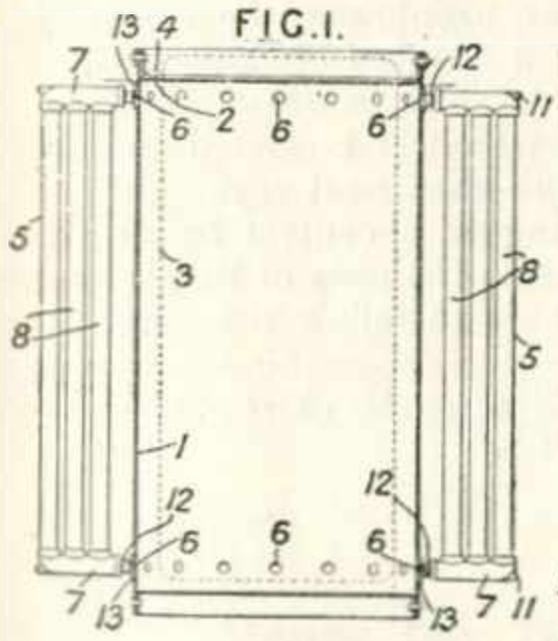


FIG.3.

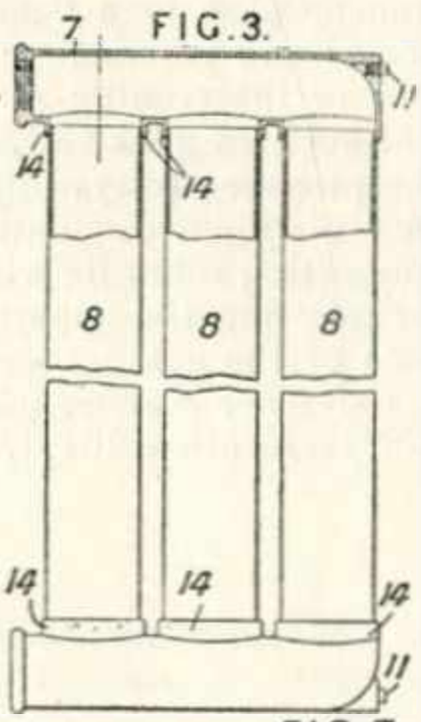
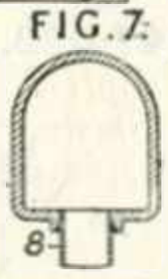


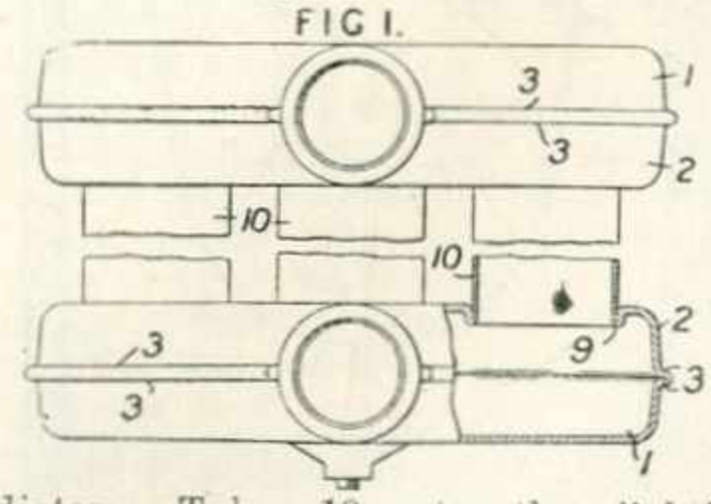
FIG.7.



Radiators.—Apparatus for cooling liquids, particularly the oil bath of electric transformers or oil used in the heat treatment of metals, comprises a tank 1 and radially arranged groups 5 of radiator tubes 8 connected to headers 7 communicating through alined openings 6 with the interior of the tank. In the case of a transformer, the oil level is maintained above the upper openings 6, and the transformer 3 is provided with projections 4 resting on projections 2 within the tank. The headers are of cast metal, preferably malleable iron, and are connected to bosses 13 on the tank by nipples 12, the joints being sealed by welding or brazing. The radiator tubes are of oval, flattened, or similar narrow section and are of wrought metal, preferably iron, and are welded or brazed in bosses 14 on the headers. The headers may be of circular section, or of the section shown in Fig. 7, the closed ends being rounded. Draining-plugs 11 may be fitted to these ends.

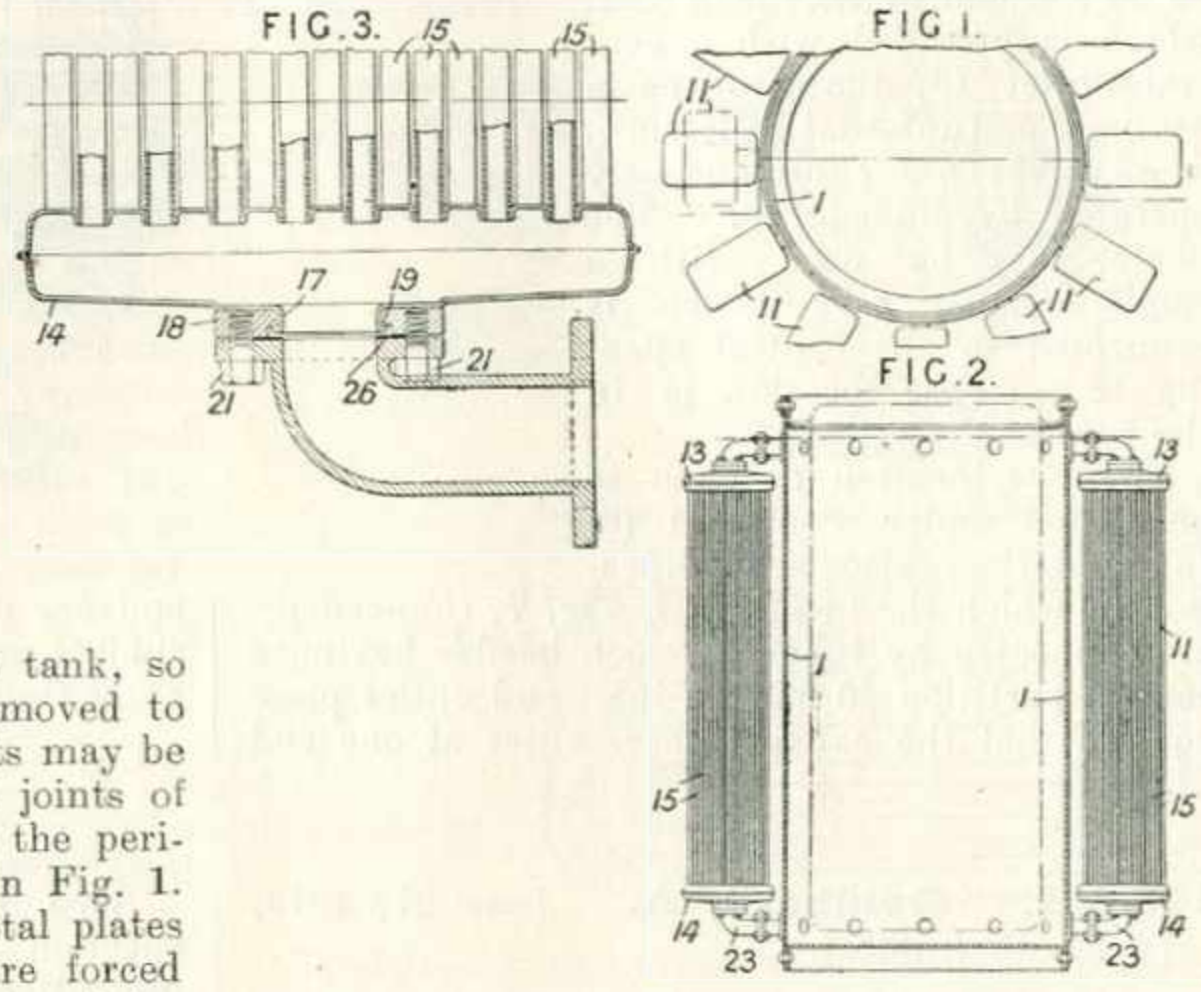
146,130. Pressed Metal Radiator Co., (Assignees of *Sonneborn, C.*). June 22, 1916, [*Convention date*].

FIG 1.



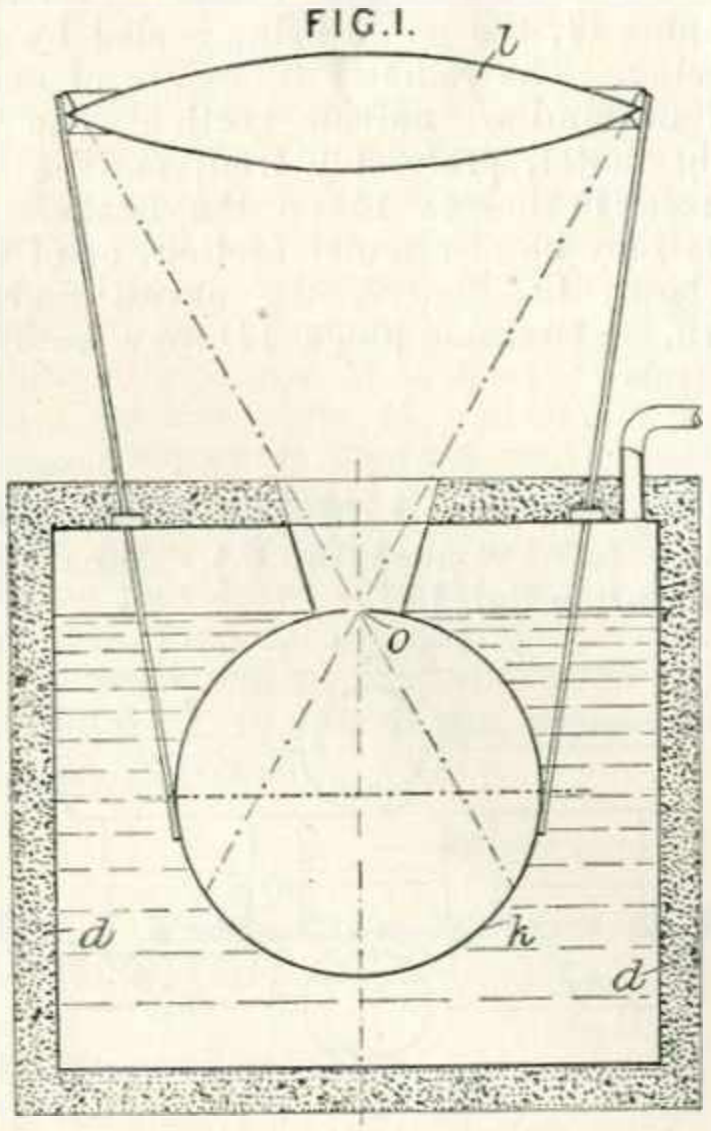
Radiators.—Tubes 10 enter the slightly-coned inturned apertures 9 in a dished thin metal header 2 and are welded together. The outer halves 1 of the headers are welded to the inner at their flanged edges 3.

146,131. Pressed Metal Radiator Co., (Assignees of *Sonneborn, C.*). Nov. 27, 1916, [*Convention date*].



Radiators. — Apparatus for radiating heat, more particularly from the oil bath of electric transformers, comprises a tank 1 and external radiating elements 11 communicating with the interior of the tank at the top and bottom, the elements being composed of a set of vertical tubes 15 of oval or flattened section connected to top and bottom headers 13, 14 of sheet metal. The headers are detachably connected by flanged joints with bends 23 connected to the tank, so that one or more elements may be removed to vary the cooling capacity. The elements may be arranged radially, or, by resetting the joints of the headers and bends, tangentially to the periphery of the tank, as shown in plan in Fig. 1. The headers are made of two sheet-metal plates welded together, and the tube ends are forced into tapered flanges pinched in the inner plates of the headers and secured by welding, as described in Specification 146,130. The outer plate of the header is punched to form a flange 17 to which is secured by welding a ring 18 having a raised rim 19 around the opening and threaded holes to receive securing-studs 21, preferably four in number, to facilitate alteration of the setting. A packing-ring 26 is fitted at the joint. Specification 146,129 also is referred to.

146,820. Marcuse, A. July 5, 1920.



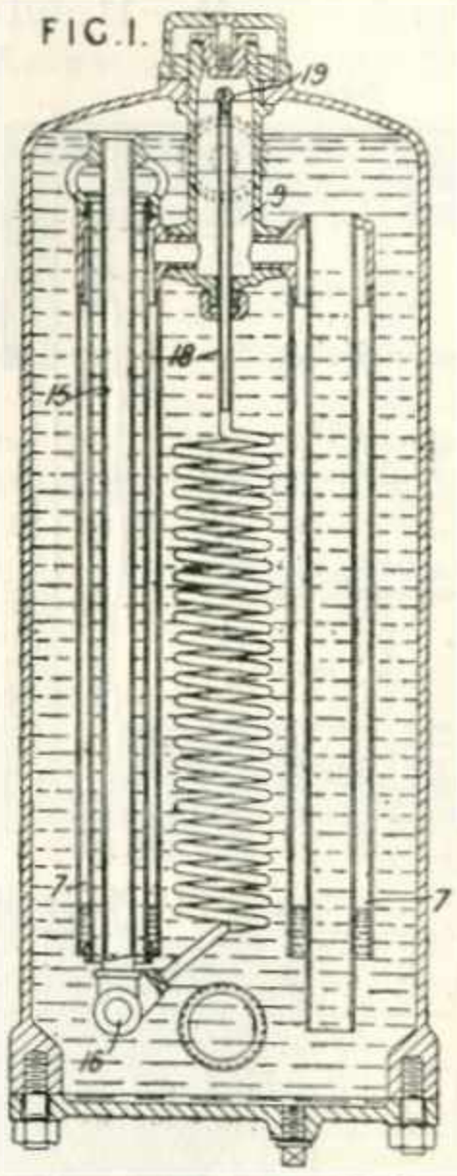
Solar heat, utilizing.—The sun's rays are concentrated by an optical system shown, for example, as a lens *l* into a receiver *k*, which is lined with an absorbent material. The focus of the system is at *o*, approximately on a level with the small aperture of the receiver. Steam may be generated in a surrounding vessel *d*, or a liquid having a high boiling point may be heated for transmission to a boiler which may be centrally placed and common to a number of heaters. The lens or intervening plate may be made of material such as rock-salt, which it is stated retards the passage of rays other than heat rays. In the case of liquid circulating to a central boiler the connecting tubes lie within the axes of the devices for allowing the apparatus to follow the apparent path of the sun.

Reference has been directed by the Comptroller to Specification 16181/01.

147,063. Schwarz, J., (Assignee of *Vereinigten Maschinenfabriken Akt.-Ges. vorm Skoda, Ruston, Bromovsky, & Ringhoffer,* (formerly *Prager Maschinenbau Akt.-Ges.*). Jan. 28, 1915, [*Convention date*].

Radiators.—In liquid filled radiators, one loop of which is used for heating by injection of steam, a by-pass tube 18, preferably provided with a nozzle 19, connects the steam inlet chamber 9 above the water level with the drain 16 so as to allow the passage of air at starting. Steam passes

FIG. 1.



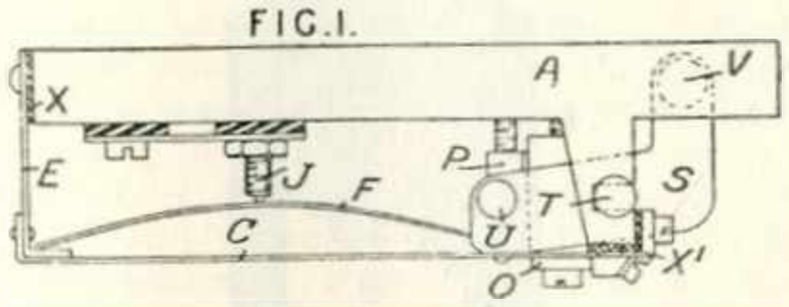
to the two annular spaces 7 which are open at their lower ends to the liquid in the radiator. The admission of steam may be thermostatically controlled. The tubes 15 conduct any overflow to the drain 16.

147,064. Schwarz, J. May 19, 1919, [*Convention date*]. *Addition to* 147,063. Drawings to *Specification*.

Radiators.—The heating effect of radiators constructed as described in the parent Specification is regulated by throttling the drain through which escapes water displaced by the injected steam or the condensation therefrom. The overflow may be measured and recorded as an indication of the amount of heating energy consumed.

147,177. Vapor Car Heating Co., (Assignees of *Geissinger, H. G.*). Jan. 19, 1918, [*Convention date*].

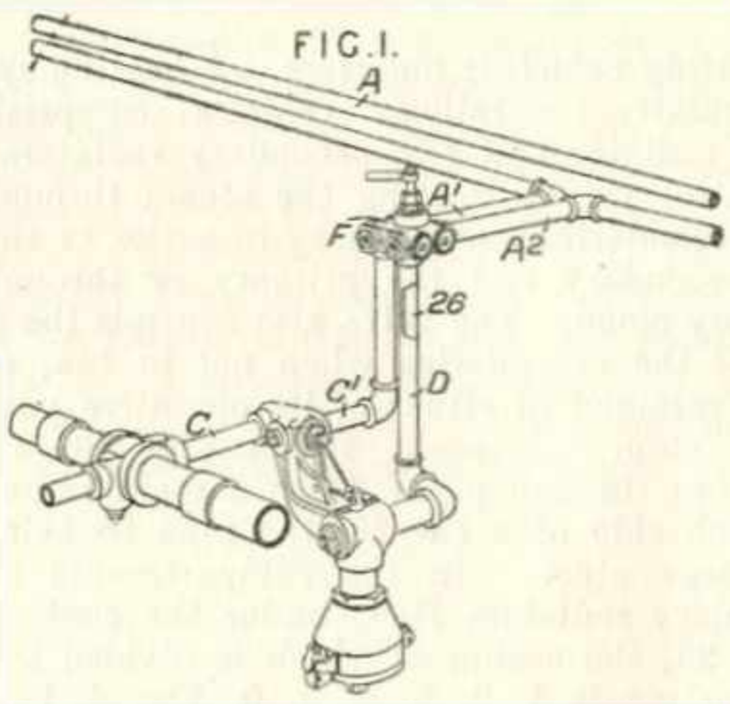
FIG. 1.



Thermostats.—In a thermostat depending upon the differential expansion of an arched and a straight strip F, C, means are provided for supporting the strips resiliently as by a spring, and for adjusting the arch F by a wedge O for curvature and by a screw-actuated block P for position relative to the contact J. The arch is mounted at both ends so as to be self-alining. Insulating blocks X, X¹ are provided to prevent conduction of heat from the base A. Double bell-cranks S pivoted at U, T and spring-pressed outwards on the pin V keep the block P bearing against the wedge O.

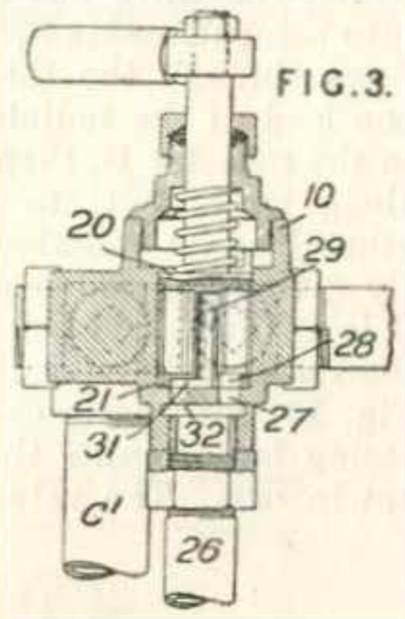
147,193. Vapor Car Heating Co., (Assignees of *Gold, E. H., and Rietz, E. W.*). Sept. 3, 1915, [*Convention date*].

FIG. 1.

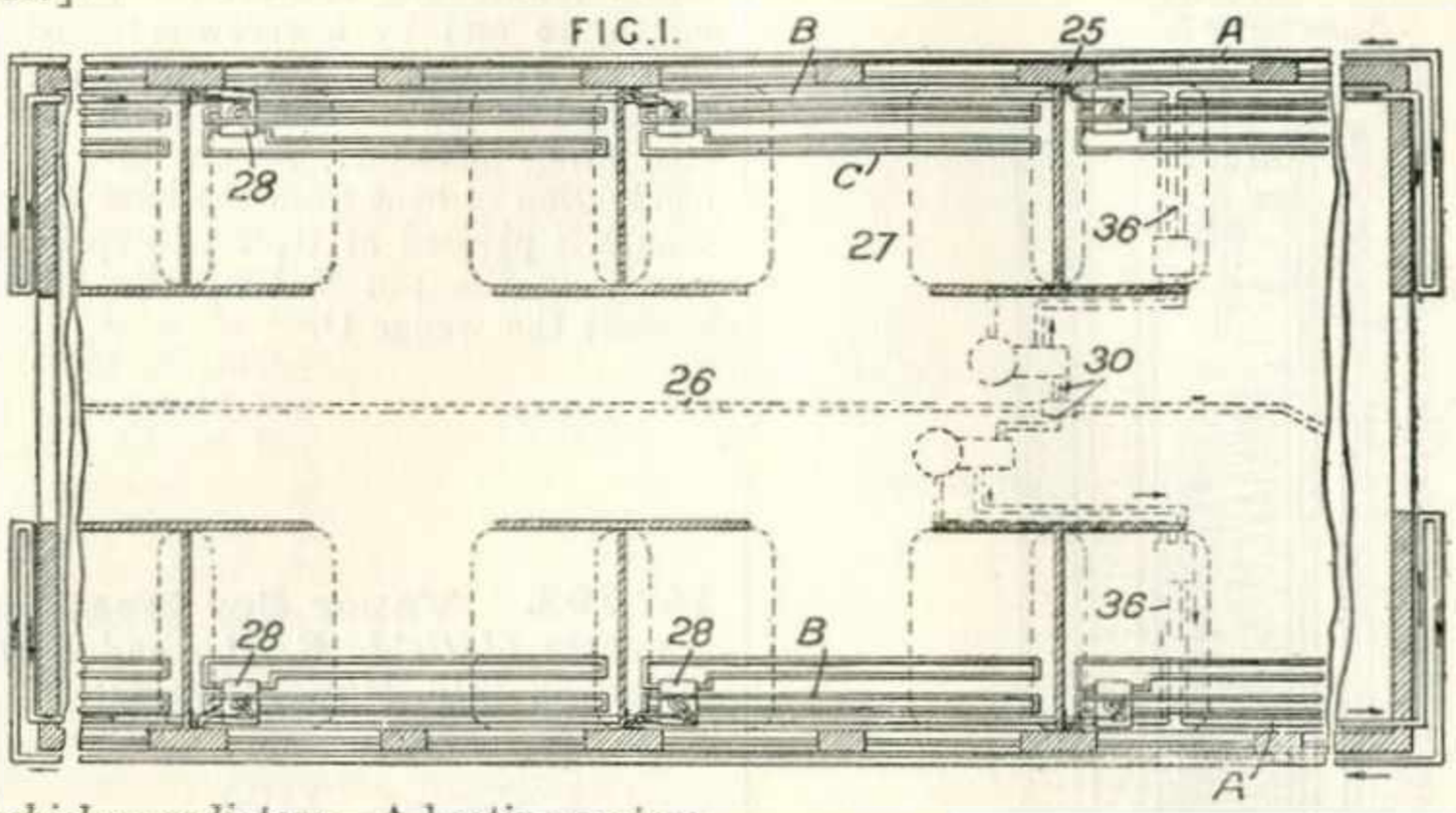


Heating vehicles; radiators.—In a radiating-element with steam inlet and outlet, the shut-off valve has a drainage-port and an air-inlet port at a higher level, the latter being provided to prevent the formation of a vacuum in the element which prevents the discharge of water of condensation. The casing 10 of the valve F, Fig. 1, is connected to the steam supply C, C¹, the steam discharge D, and inlet and outlet pipes A¹, A² of the radiator element A, and also has a drain-pipe 26. In the shut-off position, the valve body directs steam directly from C¹ to D, while the other side of the valve connects A¹ and A². At the top and bottom of the valve are integral disks 20, 21, the bottom one being ported at 28 to register with the drainage port 27 leading to the drain-pipe 26. A second port 31 leads through a passage 29 in the valve body at the top of the chamber common to the pipes A¹, A², air passing thereto from the pipe D through a port 32. When the valve is moved to the operative position, the disk is turned so that the drain and air ports are closed.

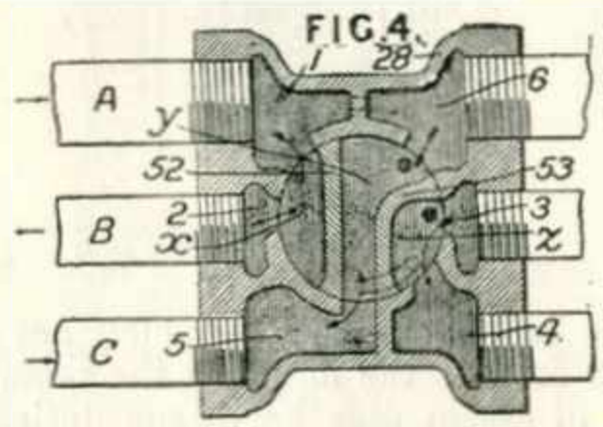
FIG. 3.

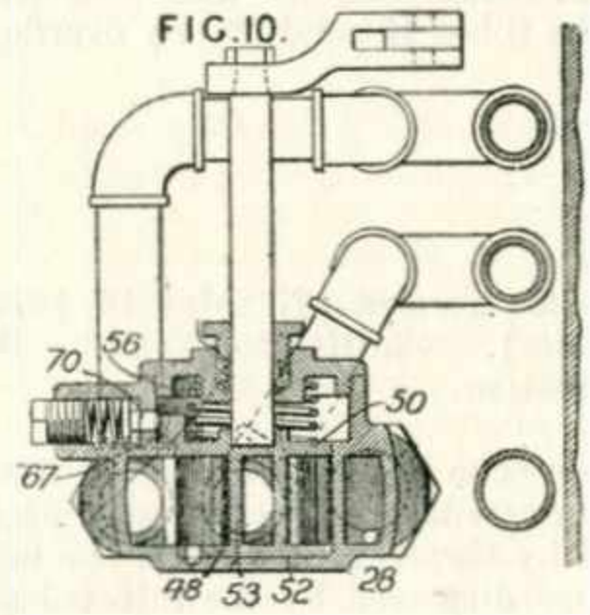


147,197. Vapor Car Heating Co., (Assignees of *Cooley, R. P.*). May 11, 1918, [*Convention date*].



Heating vehicles; radiators.—A heating-system, particularly for railway vehicles, comprising a main radiator and two secondary radiators with a control valve directing the steam through the two secondaries and primary in series or through one secondary and the primary or through the primary alone. The valve also controls the drainage of the secondaries when not in use, and is itself retained in either of its operative positions by a stop. A main steam pipe 26, Fig. 1, branches through pipes 30 to a main radiator A on each side of a car 25, the pipe 36 being the discharge pipe. In the compartments 27 are secondary radiators B, C under the control of a valve 28, the casing of which is divided into six compartments 1, 2, 3, 4, 5, 6, Fig. 4, by webs whilst the valve has two walls 52, 53 dividing it into compartments *x*, *y*, *z*. As shown, the steam flows through the three radiators in series from one lead of the radiator A, compartments 1, *x*, 2 to the radiator B, thence to compartments 3, 2, 4, along radiator C to compartments 5, *y*, 6, to other lead of radiator A and discharge pipe 36. By giving the valve a quarter-turn, the radiator C is cut out, and a further quarter also cuts out the radiator B. On the valve is a lower disk 48, Fig. 10, with ports co-operating with ports in the casing for draining the secondary radiators when not in use. The valve also has an upper disk 50





with an upstanding notched collar 67 into which moves a spring-pressed plunger 70 for locking the valve, whilst a spring 56 keeps the valve in position vertically.

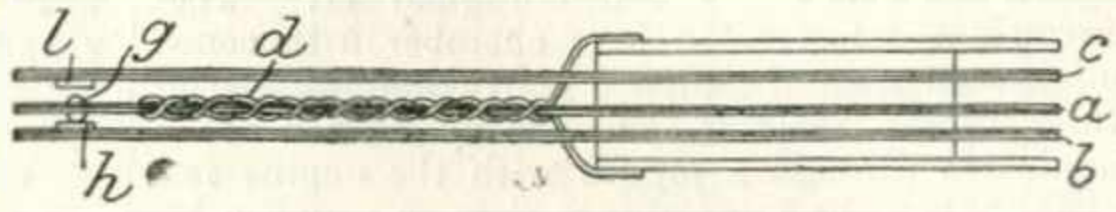
147,233. Cotton, T., (*Appleton, J. W.*). Dec. 12, 1916.

Hot-water bags and the like.—A flexible hot-water bottle or ice-bag is fitted on one side with an inwardly-extending flange 5, 6, 7, 8 for holding a compress.

Reference has been directed by the Comptroller to Specifications 17456/80 *and* 5307/97.

147,354. Relay Automatic Telephone Co., and **Bryant, G. H.** July 23, 1919.

Thermostats.—Relates to thermostatic devices of the type comprising a central bimetallic strip *a* surrounded by a heating-coil *d* and located between two outer parallel strips *b*, *c*. According to the invention in order that the three strips may remain in the same normal position relative to each other irrespective of the temperature of the atmosphere, the outer strips *b*, *c* are made of similar bimetallic material to the inner strip. Electric contacts *g*, *h*, *l* are carried by the strips for opening and closing the necessary circuits.



147,866. Columbia Graphophone Manufacturing Co., (Assignees of *Burroughs, C. F.*). Feb. 7, 1918, [*Convention date*].

FIG. 1.

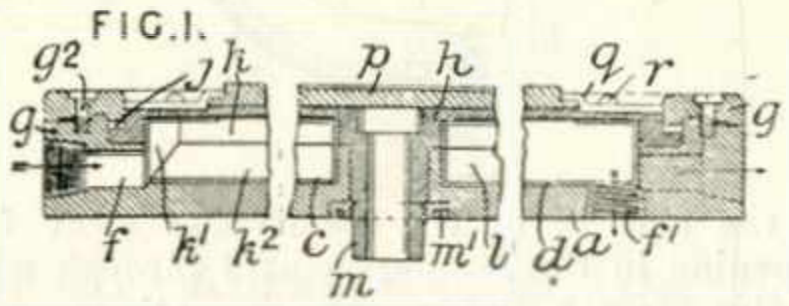


FIG. 2.

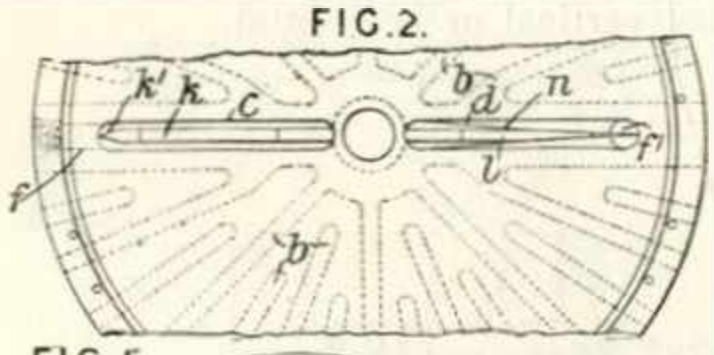
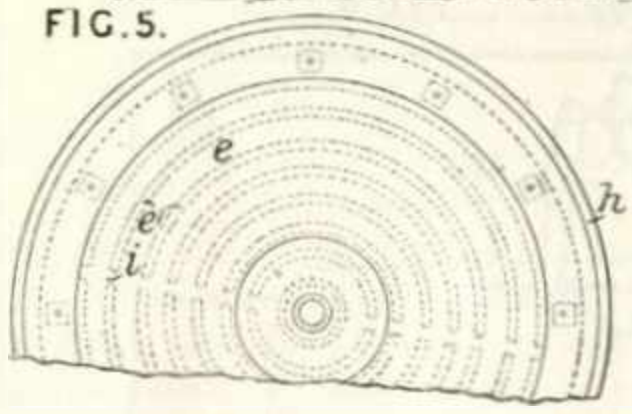
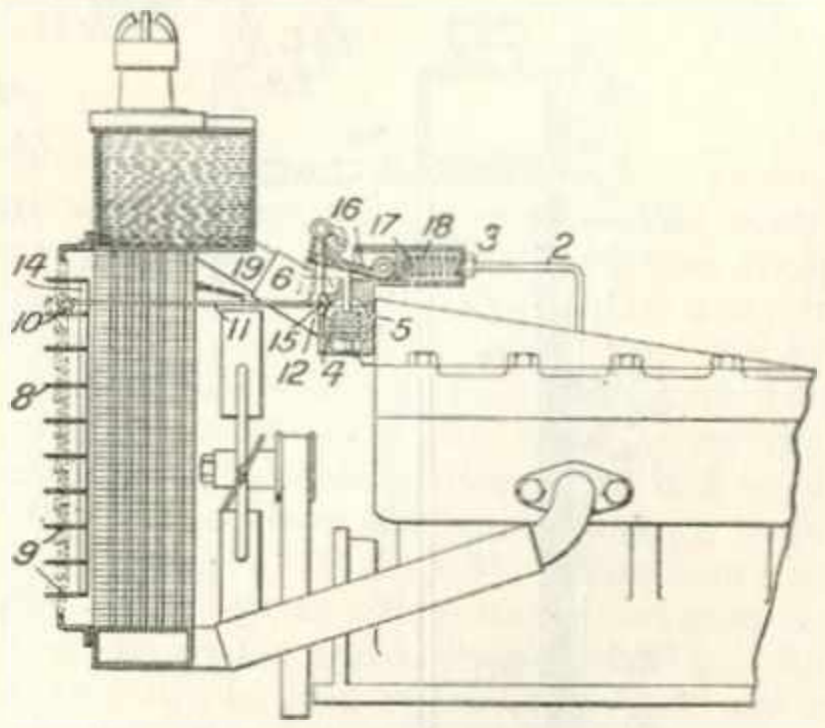


FIG. 5.



Heating systems and apparatus.—A heating or cooling plate for presses, work benches, &c. comprises a lower member *a* ribbed as at *b* on its lower surface to reduce the area of contact with the bed &c., and an upper member *h* furnished with ribs e^1 adapted to bear upon the member *a* to provide a series of concentric or parallel channels *e*, which are divided into two sets by radial partitions *k*, *l* engaging radial notches *i* in the member *h* and depending respectively into inlet and outlet pockets *c*, *d* in the member *a*. Fluid enters the pocket *c* through an inlet *f*, and is directed through the channels *e* in two directions by the partition *k*, which is formed with a tapered end k^1 and a wedge-shaped lower portion k^2. The partition *l* is formed with a wedge-shaped lower portion *n* to ensure an equal flow through the passages *e*, the fluid passing from the pocket *d* through an outlet f^1. The member *h* is secured by a ring *g* and screws g^2, packing *j* ensuring a tight joint. Additional support may be provided by a central pillar *m* secured by a nut m^1. As shown, the plate is of circular form and is adapted for heating a phonograph-record mould *p*, which is secured to the member *h* by gibs *q* and screws *r*; but the plate may be of other forms.

147,932. Schwalbenberg, P. J. May 19, 1916, [*Convention date*].



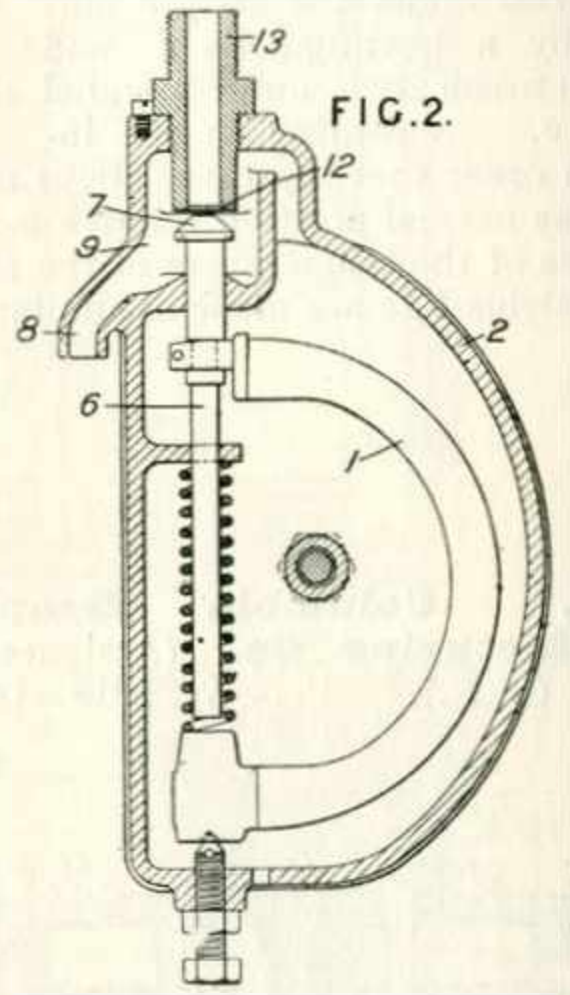
Thermostats.—The admission of cooling-air at the front of an engine radiator is controlled jointly by a thermostat in the water circuit and by a piston in a cylinder connected with the intake of the engine and subject to suction while the engine is working, so that air is admitted when the engine has been running sufficiently to warm the water to the temperature to which the thermostat is set, while the front of the radiator is closed when the temperature of the water falls or when

the engine stops. In the arrangement shown, the front of the radiator is provided with a series of slats 8 pivoted at 9 to the frame and at their rear edges to a bar 14, one of the slats having a lug 10 connected to a controlling-bar 11. The thermostat 4 is located in a chamber 5 in communication with the pipe 6 conveying the warm water to the radiator, and the cylinder 3 communicates through a pipe 2 with the engine intake. When the temperature rises, a member 16 pivoted to the piston 17 in the cylinder 3 and resting upon the stem 15 of the thermostat, is adapted to rock a bell-crank lever 12 and pull the controlling-bar 11 against the action of a spring 19 to open the slats. When the temperature falls, the member 16 drops away from the lever 12, and when the suction ceases in the cylinder 3 a spring 18 moves the piston and the member 16 to the left, as shown in dotted lines.

148,002. Westinghouse Brake Co., and **Barty, T.** April 29, 1919.

Steam-traps.—Relates to steam-traps for the heating-systems of railway vehicles or for similar purposes of the type in which the discharge valve is controlled by a thermostatic expansion element. According to the invention, in order to prevent access of the water of condensation to the thermostatic element 1, the discharge outlet 8 is located in a compartment 9 separate from the chamber 2 containing the element 1, and the valve 7 is located between the live steam pipe 13 and the discharge outlet, so that, when closed, it prevents access of steam to the chamber 2. The head of the valve 7 is preferably of a conical shape so as to direct the water of condensation

FIG. 2.



from the end 12 of the steam-pipe away from the opening in the compartment 9 through which the valve stem 6 slides. The invention may be applied to steam-traps in which the steam-pipe is either vertical or horizontal.

148,044. Evers, E. A. July 17, 1919.

FIG. 2.

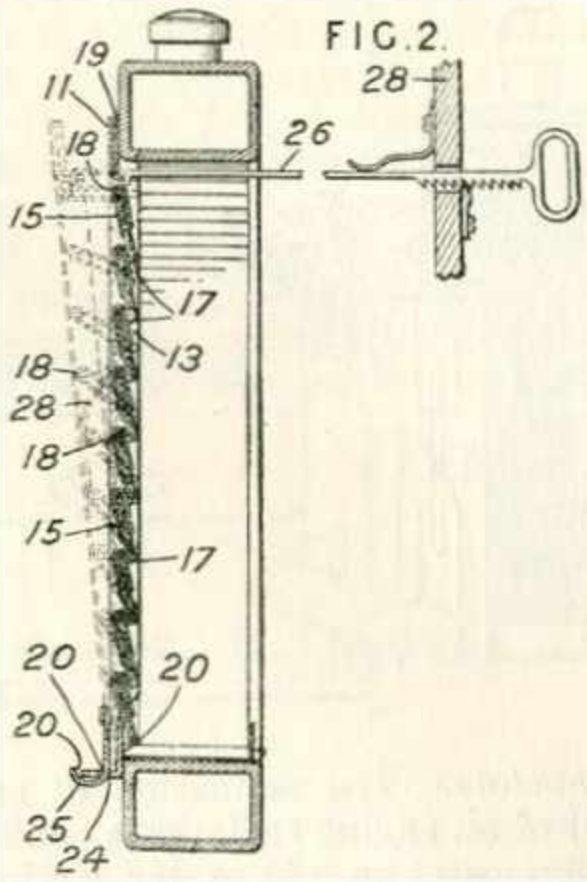
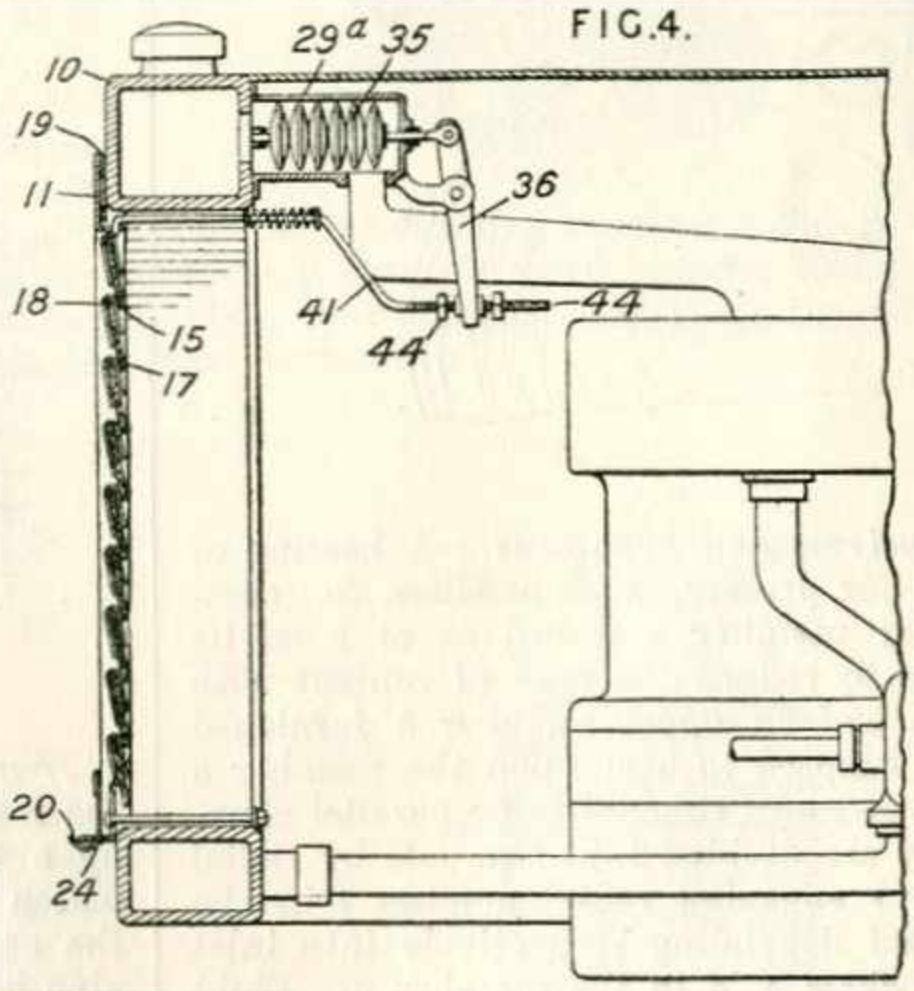


FIG. 4.



Thermostats.—To vary the temperature of the cooling-fluid in the radiator of a motor vehicle, the frame of a screen or shield arranged in front of, and relatively movable towards or away from the radiator, may be operated automatically by means of a thermostat in order to control the ex-

tent to which the air through which the vehicle &c. is passing shall be able to displace the wings or other hanging sectional members of the screen, and thus to determine the extent of radiator surface exposed to the action of the air currents. The screen comprises a frame 11 with flanges 13 to which are attached a series of rods 18 on each of which is pivotally mounted a **U**-shaped slat or damper 15 made of sheet metal and formed with a central element 17 made of felt, fibre, or other heat-insulating material. The frame is supported by means of a bracket 20 on the radiator provided with holes 24 through which pass projections 25 on the frame. The frame 11 is provided with heat insulating material 19 and springs 28 may be interposed between the frame and radiator to assist the forward movement. As shown in Fig. 4, a thermostat 29^a is placed in the circulating-fluid system and comprises thermostatic elements 35, the expansion or contraction of which controls the movement of the screen. This is effected by means of a lever 36 and bar 41; the lever 36 is bifurcated and passes between the nuts 44 which are adjustable on the screwed portion of the rod 41.

148,097. Allensby, C. R. Dec. 29, 1919.

FIG.2.

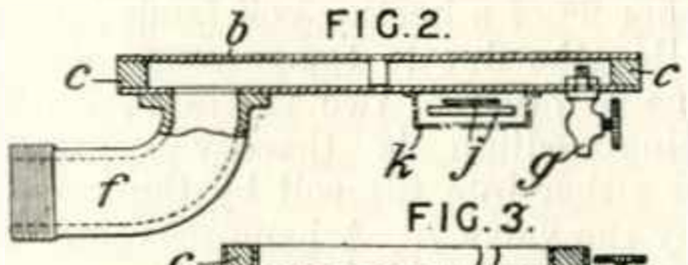
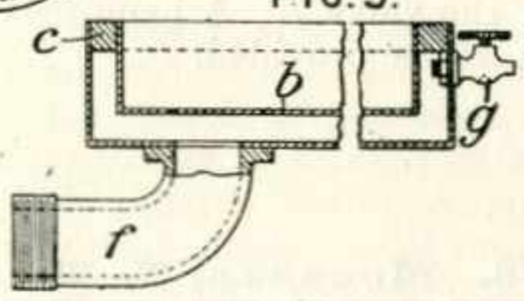


FIG.3.

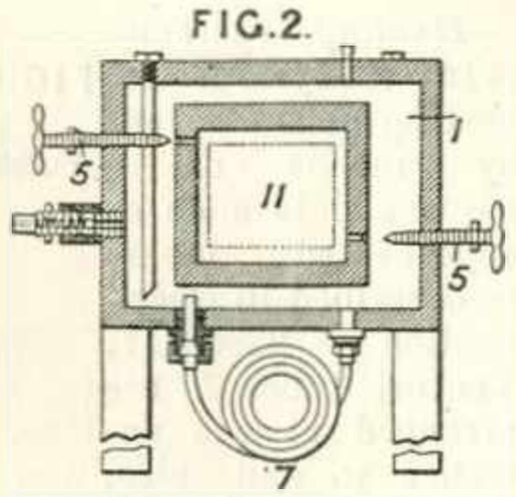


Heating-systems; radiators.—A hot-plate attachment for a steam or hot-water radiator for warming food, liquids, plates &c. comprises a hollow plate or vessel *b* communicating by means of single connexion *f* with the interior of a radiator. The vessel may be formed of two flat sheets *b* welded to distance-pieces *c* as shown in Fig. 2, or the sides may be upturned as shown in Fig. 3 to form a receptacle for food or liquids. An air-cock *g* provides for the release of the enclosed air when the steam or hot water is admitted into the hot-plate, and a cover may be provided. In addition, external heating-means, such as an electric heater *j* enclosed in a protective cover *k*, may be combined with the hot-plate.

148,171. Greuet, O. A. J. B. Feb. 11, 1919, [*Convention date*].

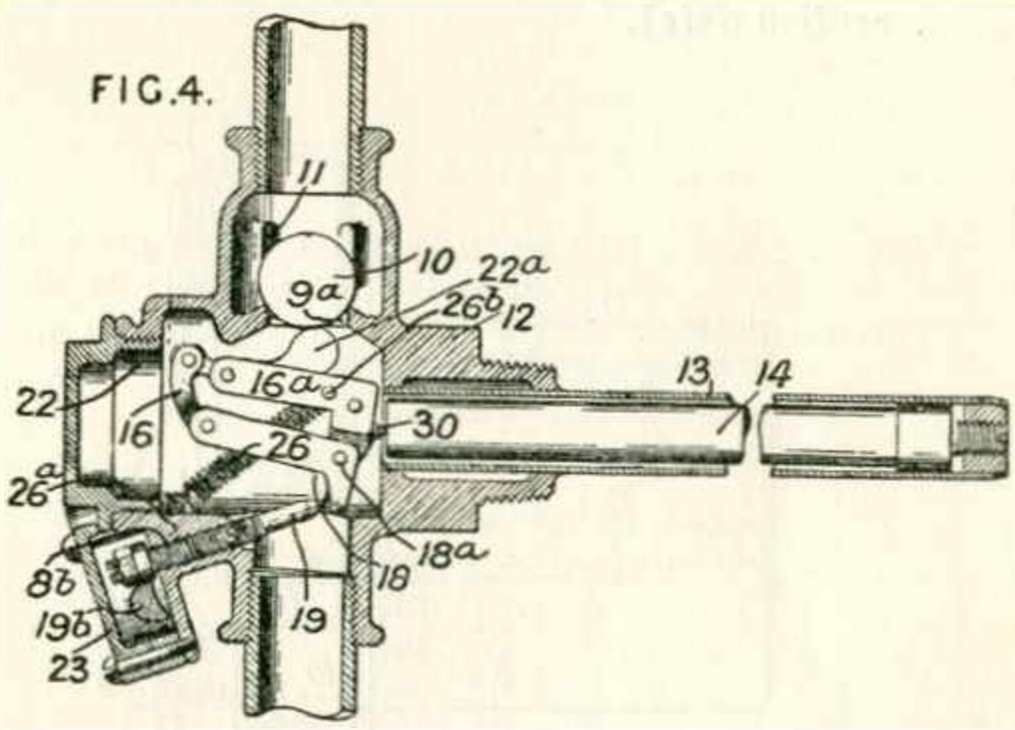
Heating-apparatus.—The outer casing 1 of a dental vulcanizer or sterilizing-oven is filled with steam from the coil 7 heated by a lamp. The inner chamber 11 can be put into communication with the outer by screw valves 5, 5, operated from the outside.

FIG.2.



148,482. Yoder, C. M. Sept. 30, 1916, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

FIG.4.

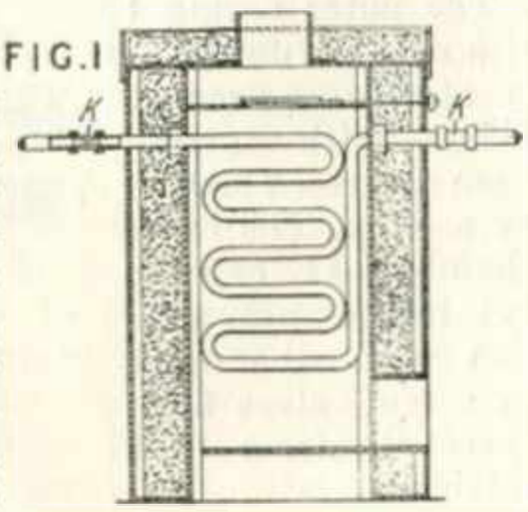


Thermostats.—A valve mechanism particularly applicable for use as a thermostat for controlling the supply of gas for heating purposes comprises a ball valve 10 adapted to be moved away from a knife-edge seat 9^a by a loaded lever 22^a pivoted to a second lever 16^a and connected by a link 16 to a third lever 18. The third lever 18 bears against an adjustable abutment 19 and is pivoted at 18^a to the lever 16^a which in turn is pivoted to the casing. The lever mechanism is also loaded by a spring 26 arranged between a hook 26^a on the casing and a cross-pin 26^b on the lever 16^a. One end of each of the levers 16^a and 18 and of the link 16 is bifurcated to receive one or other of the single parts. The abutment 19 is formed on a member screwed through a boss 8^b and provided with an indicator 19^b arranged in a case 23. The thermostat comprises a copper tube 13 secured to a boss 12 on the casing and adjustably connected at its free end to a rod of porcelain 14 which bears against a projection 30 on the lever 16^a. The ball valve is guided to and from its seat by ribs 11 formed on an enlarged part of the casing.

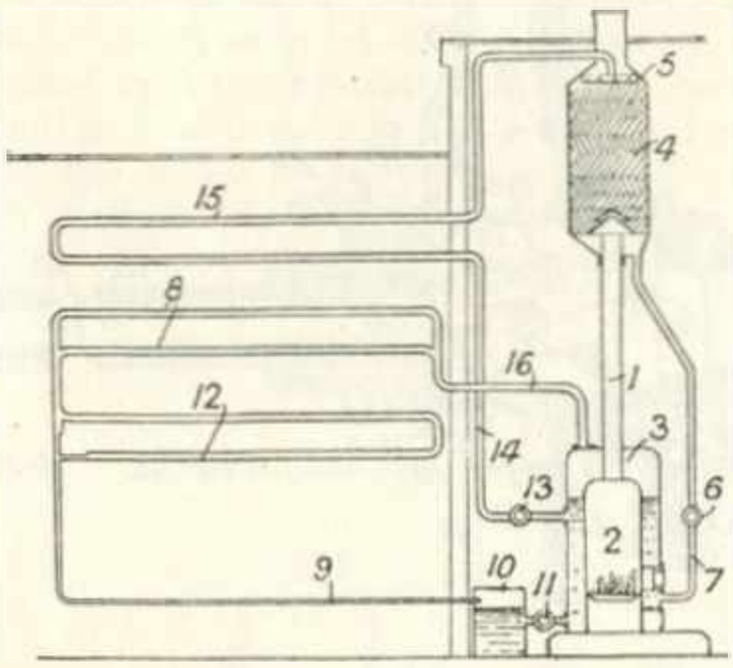
148,558. High Velocity Heating Co. July 13, 1917, [*Convention date*].

Heating - systems.—In a system for heating bakers' ovens by means of a gaseous fluid such as superheated steam as described in Specification 28963/11, Venturi tubes *k* are arranged at the entrance to and also, if desired, at the exit from the superheater coils to increase the velocity of the steam.

FIG. 1

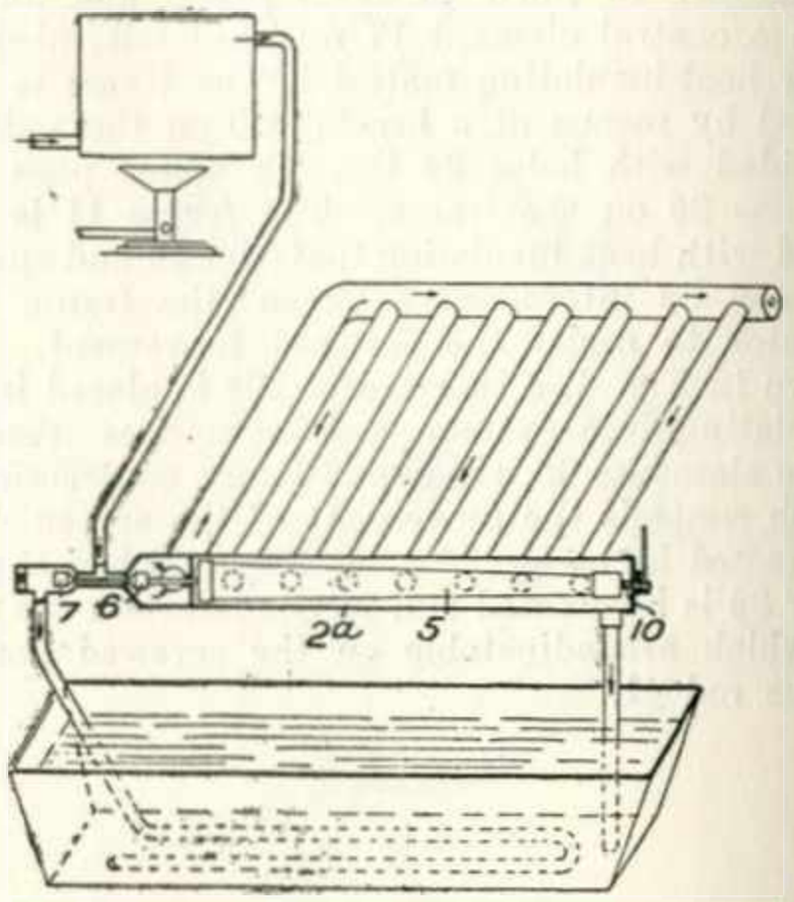


149,008. Riedel, F. Nov. 24, 1917, [*Convention date*].



Heating buildings.—In an arrangement for the supply of heat, steam, and carbonic acid to a greenhouse, carbonic acid is separated from combustion gases by alkali carbonates or other solutions which give it up again on heating, and the heating is effected to such an extent as to liberate steam with the carbonic acid so as to distribute the gas in a pipe system, the condensed water retaining any injurious impurity. The combustion gases from a stove 2 pass by a flue 1 into a packed tower 4 in which they are treated with alkali carbonate solution. The solution leaving the tower is filtered and returned by a pump 6 and pipe 7 to the boiler 3. Liquor is drawn from the upper part of that in the boiler by a pump 13 and pipe 14, and is sent through a cooling-pipe 15, which serves to heat the greenhouse, to the nozzle 5 which supplies the tower 4. The carbonic acid and steam liberated in the boiler 3 are drawn off by a pipe 16 leading to perforated pipes 8, 12 in the greenhouse. Carbonic acid with some steam escapes into the greenhouse while some of the steam condenses and retains any sulphur dioxide present. The condensate flows by a pipe 9 to a vessel 10 in which it is neutralized by caustic soda and is returned to the boiler 3 by a pump 11.

149,131. Coleman, C. J. July 31, 1919.



Thermostats.—For controlling the temperature of the liquor in domestic washing-machines, an expanding element 5 situated in the outlet part of the header 2^a of a heating-coil tends by the variation in lengths due to temperature difference, to close one or other of two valves 6, 7. The flow of heating-medium is thereby controlled and directed either into the coil by the valve 6 or to waste by the valve 7. A hand-operated screw adjustment 10 is provided.

149,168. Monahan, T. W. Nov. 29, 1919.

FIG. 1.

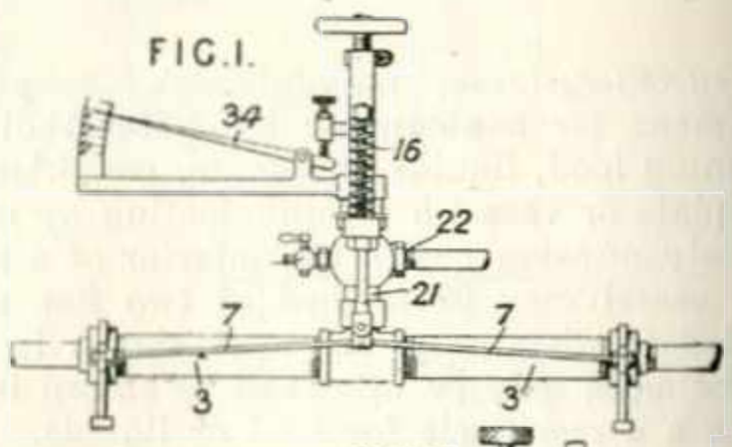
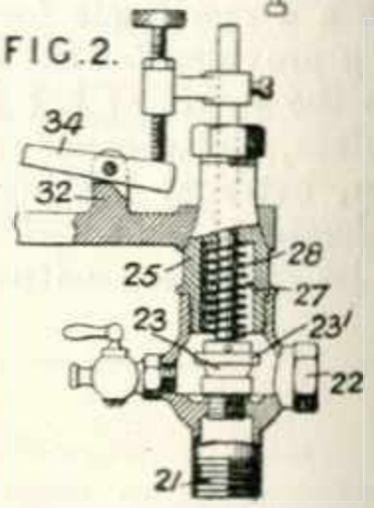


FIG. 2.



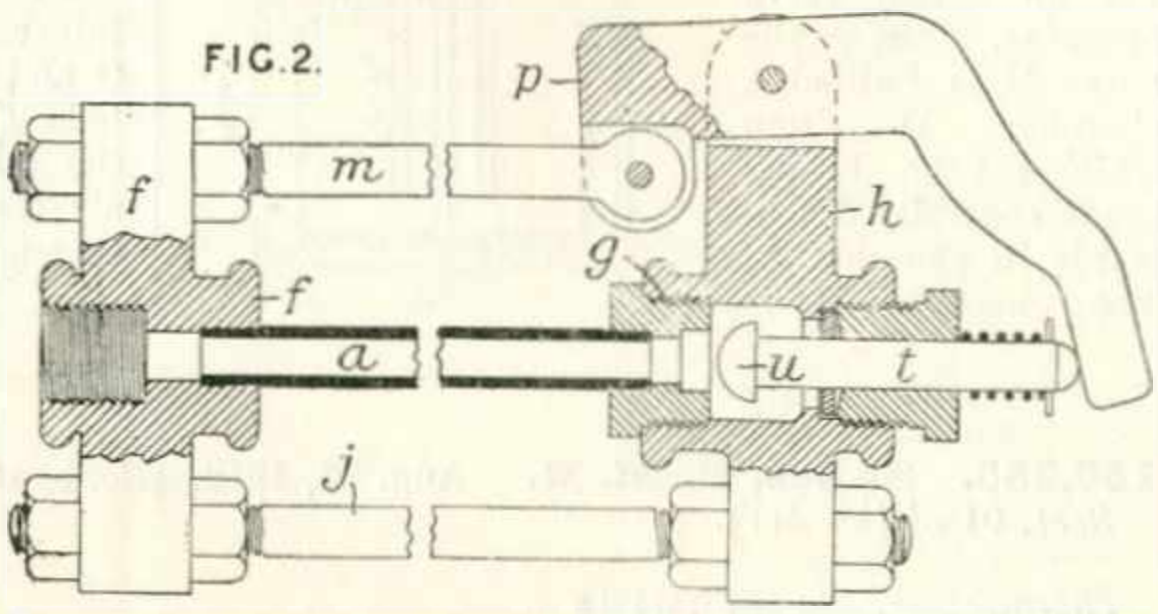
Steam-traps. — A steam-trap comprises an expanding length of tube 3 and non-expanding struts 7 kept under tension by the springs 16, which operate by their differential action on change of temperature to open a valve 23 on the passage 21, 22, an indicator rod

34 pivoted on a bracket 32 being mounted on the valve casing itself. A light spring 28 serves to retain the valve on its seat normally. When the valve is open, a flange 23 bears against the lower edge of a bonnet 25 to close the aperture 27 in the bonnet.

149,700. Cleland, J., and **Stewart, J. C.** May 30, 1917.

Steam-traps.—An expansion type steam-trap comprises a tubular expanding member *a* rigidly secured at each end to cross-members *f*, *h*, which are connected by combined tension and thrust rods *m*, *j*. The rod *m* is pivoted to the transverse member *h* and has the longer arm adapted to engage the spindle *t* of a valve *u* working in conjunction with a seat *g* removably mounted in the member *h*. The arm of the lever is inclined where it engages the spindle of the valve so that it changes the setting of the trap if the steam pressure varies.

FIG. 2.



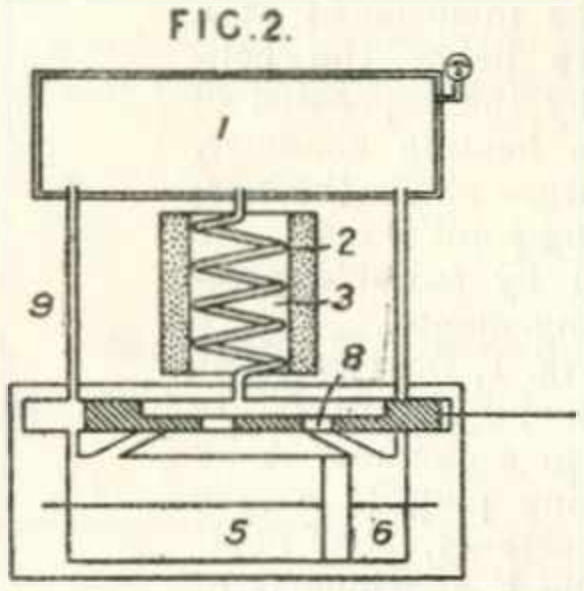
149,789. Beaton, J. A. May 26, 1919.

Non-conducting covering for heat and sound.—An insulating covering for floors, walls, bulkheads, and the like comprises a layer of agglomerated cork, covered with a metallic reinforcement to which is directly applied a facing of waterproof cement. The cork composition consists preferably of three cubic feet of cork of a quarter-inch grade, one cubic foot of cement, and one and a quarter pounds of granulated soda. A layer of this composition is covered with expanded metal or the like, and a facing composed of 5 cubic feet of granite, 4 cubic feet of cement, and a gallon of a waterproofing composition such as that described in Specification 25833/08, [*Class* 22, Cements &c.], and known as "Prufit" or "Ceresit" is applied directly to the reinforcement.

149,943. Metzger, C., and **Lütschen, E.** Aug. 9, 1919, [*Convention date*].

Natural heat, utilizing.—Air, water, or other gas or liquid under pressure, flows, at its molecular velocity, from a reservoir 1 through a pipe 2 to a motor 5, 6, or other apparatus for utilizing held by a tie-rod 16. The whole is covered by a an artificial source of heat, or from a natural source, e.g. sea water or the atmosphere, the highest temperature being next the motor. The fluid, after parting with its heat in the apparatus 5, 6, may be discharged to the atmosphere, or returned to the reservoir 1. In the arrangement shown, the fluid entering the end 6 of the cylinder at 8 forces the expanded fluid in the end 5 of the cylinder through the pipe 9 to the reservoir 1.

FIG. 2.



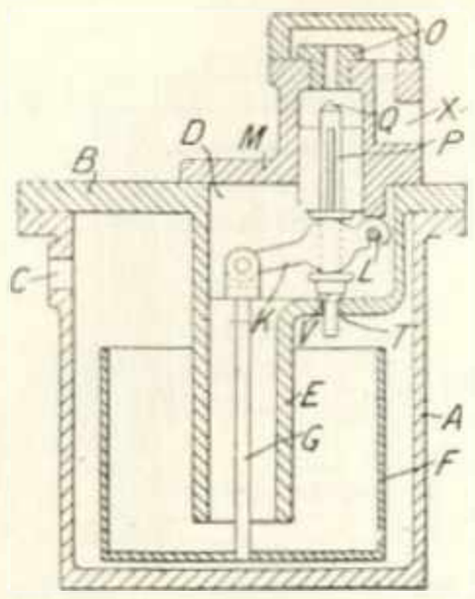
The pipe 9 is insulated to prevent absorption of atmospheric heat. Liquid ammonia or carbonic acid gas may be employed as the working fluid.

149,983. Smits, W. B. May 5, 1919, [*Convention date*]. *Drawings to Specification.*

Heating-apparatus.—In apparatus heated by electricity or otherwise the thickness of the heated parts is decreased in places where the temperature is desired to be raised above the remainder, or where the temperature is desired to be uniform and the heat input at those places is less. Examples mentioned are electric flat irons and waffle and pancake plates.

150,257. Spencer, H. W., and **Cracknell, R. J.** May 10, 1920.

Steam-traps.—In a steam-trap of the bucket type, means are provided whereby a small quantity of air escapes automatically each time the discharge valve operates. In the cover B is formed a chamber D from which a tube E extends centrally downwards in chamber A. The chamber D is



closed by a cover M in which the discharge-valve seating O is placed. The bucket F is connected to the double-ended valve spindle P through rod G and lever K. The upper end of valve spindle P has a valve Q which beds on seating O, the other end of P is reduced in diameter, and passes through an opening in casing E at T, forming a valve V which has a seating on the edge of hole T. Water enters through the inlet C and lifts the bucket F. Rod G lifts the lever K about its fulcrum L, forcing the valve Q on to its seating O and opening valve V. Air now passes through hole T to chamber D. When the bucket F falls, the valve Q is opened and valve V shut and the air trapped in D is discharged with the water through the outlet X.

150,355. Salles, P. M. R. Aug. 27, 1919, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

Thermostats. — Liquids heated by the passage of current therethrough are driven from the heating chamber when vapour is produced so so as to diminish the effective area of the electrodes and thus maintain the liquid at its boiling-point without excessive evaporation; they may similarly be maintained at a temperature below the boiling-point by the expansion of air in the heating chamber. A temperature above the normal boiling-point may be maintained by suitable pressure arrangements. In a radiator, Fig. 1, the electrodes C and a metal sheath B are supported in a chamber A by an insulating plug D having a needle-valve E, the operating handle F of which is of insulating material and carries the supply-wires, connexion being made with the electrodes when the valve is closed. Alternating current is used and the gases formed are occluded by the electrodes and recombine. Circulation between the heating chamber A and the outer limbs is controlled by a valve I. The radiator is filled through a tube at the top of the chamber A. A heater, Fig. 3, for immersion in a liquid comprises an outer closed tube J forming one electrode, closed by an insulating stopper O carrying the inner electrode K. The inner electrode has a reduced part L to which is soldered a ring N carrying a washer M. The tube J is first filled with water and the tube K is half immersed; the whole is then inverted and the tube K pushed right in. Water remains only in the space between the tube L and the tube J, the water within the inner tube leaving by an aperture R in the stopper. In a flow heater the water-supply is connected to a vessel surrounding the heating-chamber and water is drawn in variable proportion from the outer and inner chambers by a two-way valve. There may be three electrodes connected to the phases of a three-phase system, the enclosure being connected to the neutral wire. The invention is applicable to portable vulcanizers, sterilizers, steam-generators for weaving or for vapour baths, and autoclaves.

FIG. 1.

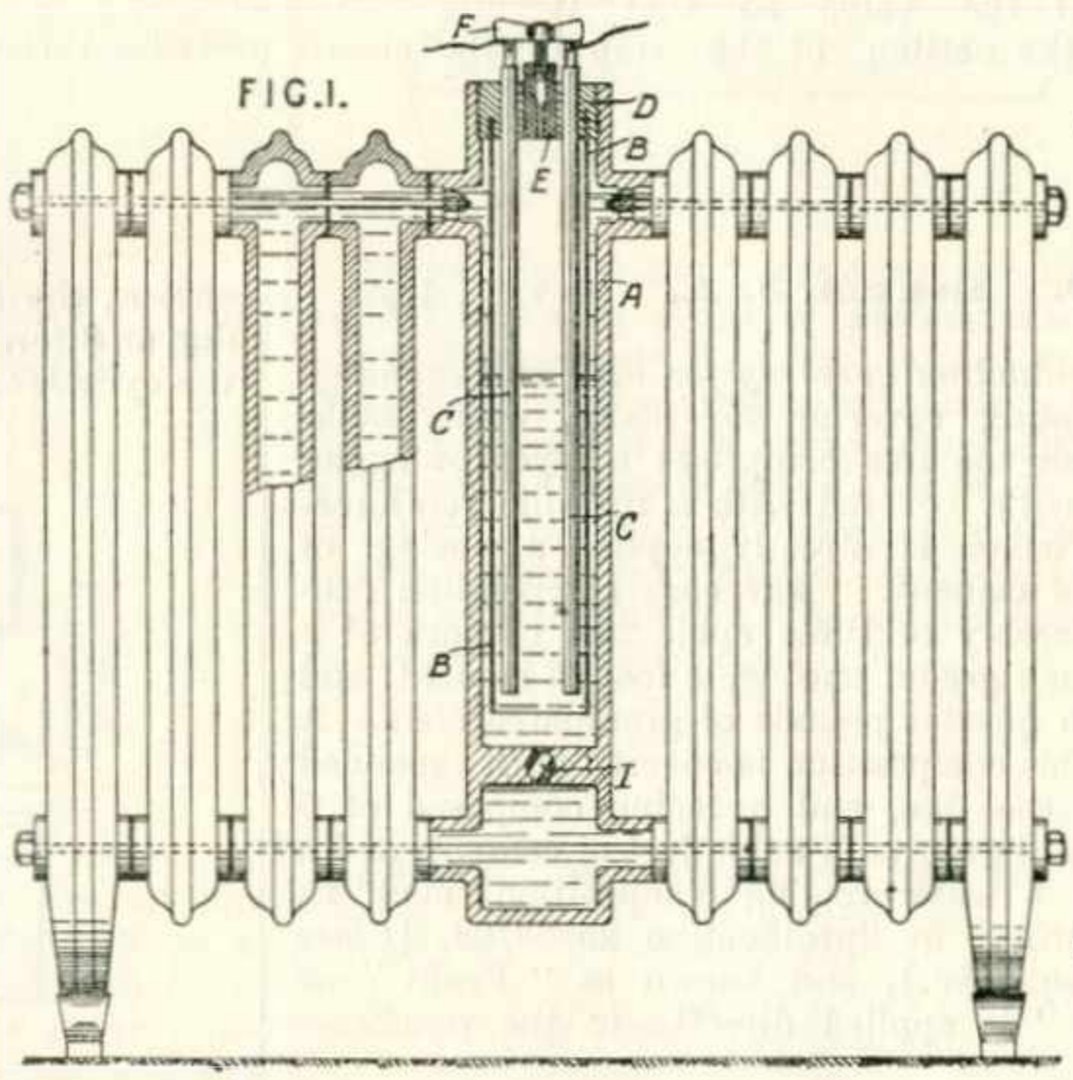
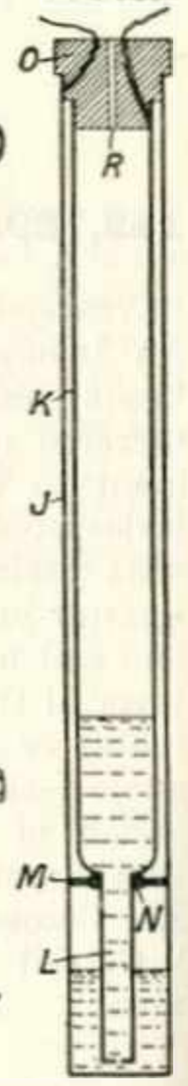


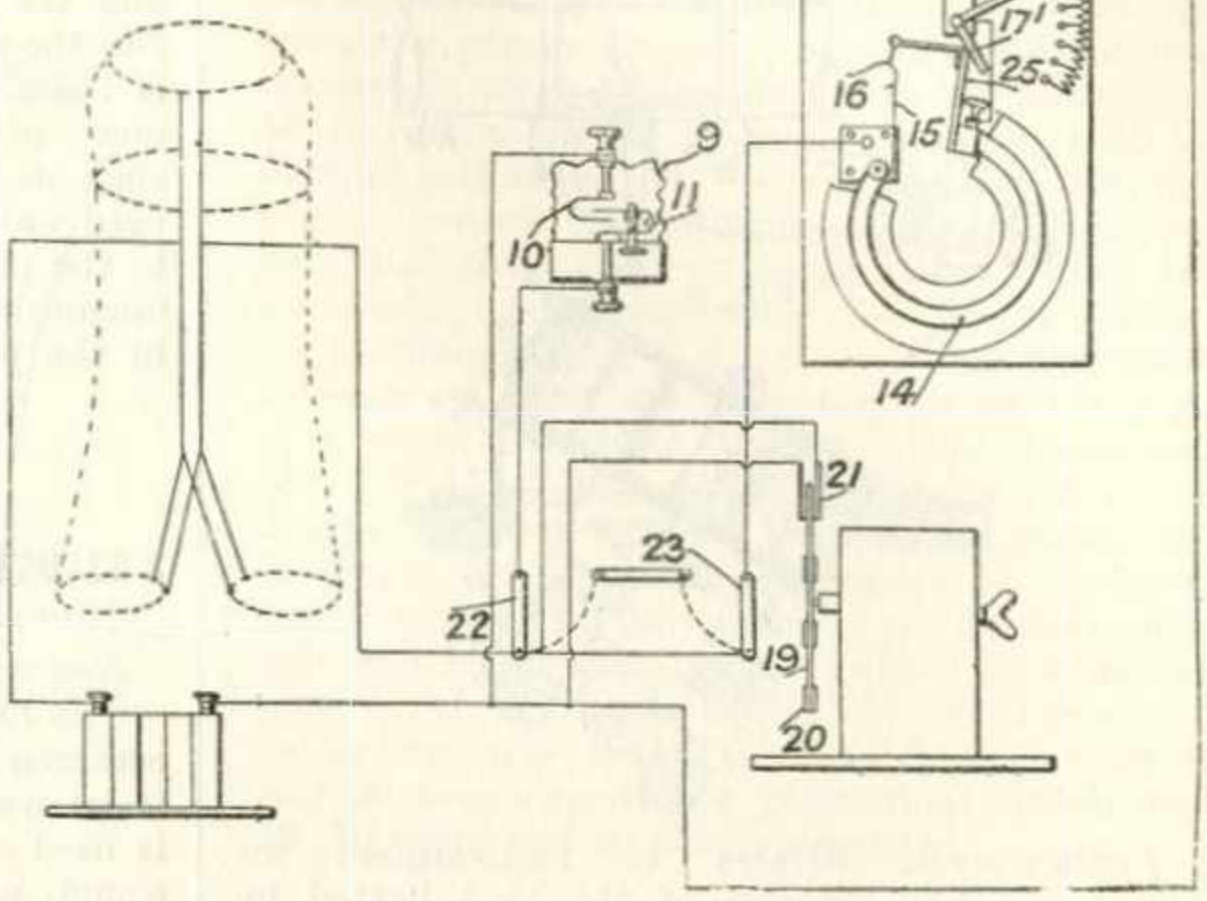
FIG. 3.



150,394. Negromanti, A.
May 27, 1919.

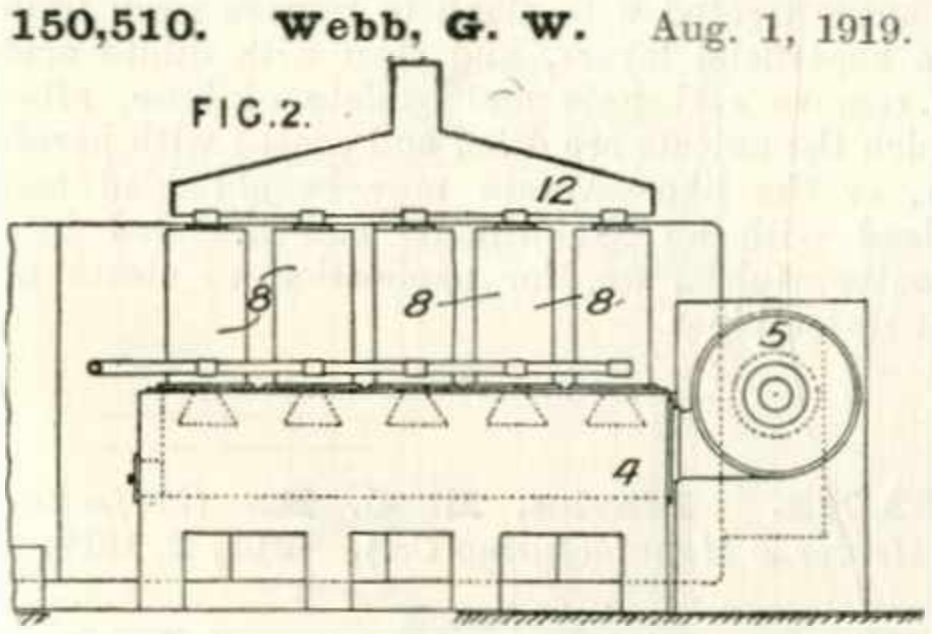
Thermostats. — A Bourdon tube 14 closes a heating-circuit through contacts 15, 16 and operates an L-shaped switch-arm 17 controlling the insertion of resistance 18 in the circuit. A pivoted link 15 slides in one arm 17¹ of the switch. The circuit may also be controlled by a switch consisting of an aneroid vacuum chamber 9 with a contact 10 which engages with a fixed contact 11 as the atmospheric pressure and temperature are reduced at a height. The switches may be connected in circuit separately, or in series or parallel by means of switches 22, 23. A clock-switch is provided.

FIG. 3.



150,510. Webb, G. W. Aug. 1, 1919.

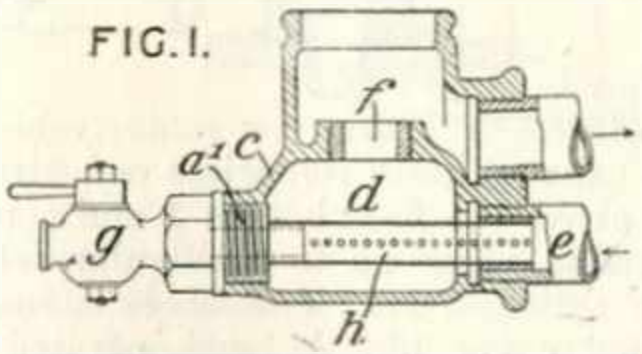
FIG. 2.



Heating systems and apparatus.—Water-heaters 8 of the geyser type, preferably constructed as described in Specification 143,086, [*Class* 64 (i), Heating liquids &c.], are heated by the gases drawn from boiler flues by a fan 5, which discharges into a channel 4 below the heaters. The waste gases from the heaters are led off by a cowl 12.

150,800. Paterson, R. H. June 5, 1919.

FIG. 1.



Steam-traps.—In expansion-tube steam-traps, a removable plug or cock is secured in a hole in the pressure side of the trap opposite the inlet expansion-tube, and carries a strainer extending across the pressure chamber into the inlet pipe. A plug a^1 is screwed into the wall c of the pressure chamber d of a steam-trap and carries a perforated tube h extending into the inlet tube e. A cock g may be fitted and the tube may be replaced or surrounded by gauze. Dirt is prevented from passing to the valve seating by the strainer, and, when accumulated therein, the strainer can be blown out or removed for cleaning.

150,879. British Thomson-Houston Co., (*General Electric Co.*). July 28, 1919.

FIG. 2.

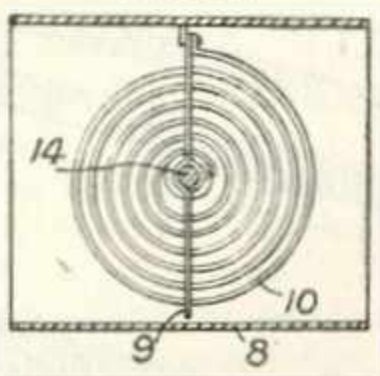
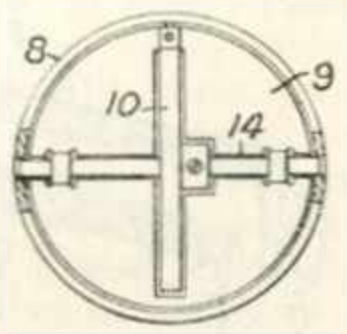


FIG. 3.



Thermostats.—The flow of water from the cylinder jacket to the radiator of an internal-combustion engine is controlled by a thermostatic valve comprising a disk 9 mounted loosely on a spindle 14 and connected to it by a coiled strip of metal 10. The valve is contained in a short length of pipe 8 within the flexible connexion.

151,310. Ashcroft, I. T. May 20, 1919.

FIG.3.

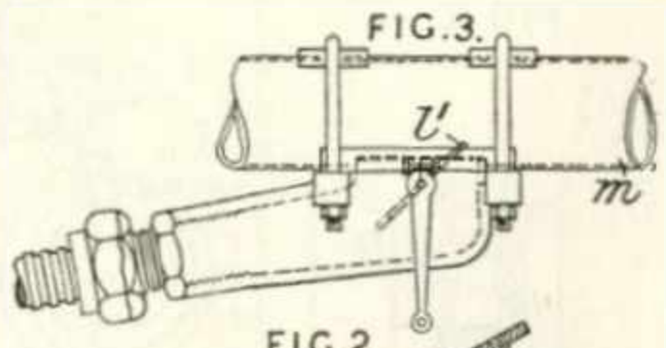
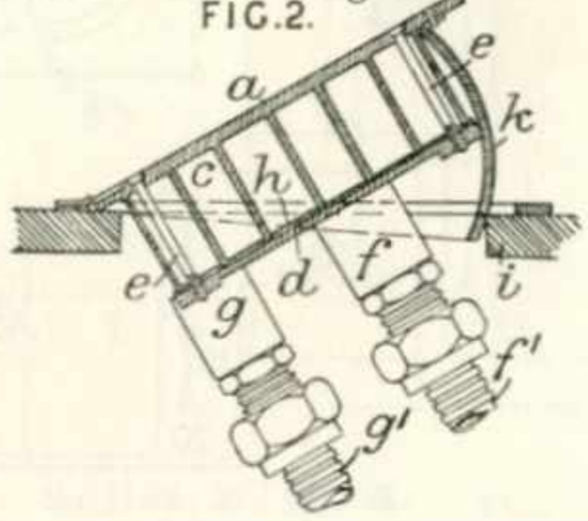


FIG.2.



Footwarmers.—Relates to footwarmers for motor and like vehicles of the kind heated by means of the engine exhaust gases. The footwarmer comprises an upper plate *a* having a depending flange *c* which forms a single continuous passage for the exhaust gases from an inlet *g* to an outlet *f*, and a cover plate *d* attached to the plate *a* by bolts *e* having an asbestos insulating sheet *h* on its inner surface into which the flange *c* is adapted to bed. The footwarmer may be hinged to the floor *i* so as to be tilted and held in an inclined position, a shield *k* being preferably attached to the front of the warmer. Flexible tubes f^1 and g^1 conduct the exhaust to and from the warmer, and a butterfly valve l^1 arranged in the exhaust pipe *m* is adapted to regulate the quantity of gases deflected for heating purposes.

151,738. Gilmour, J. D. July 3, 1919.

FIG.1.

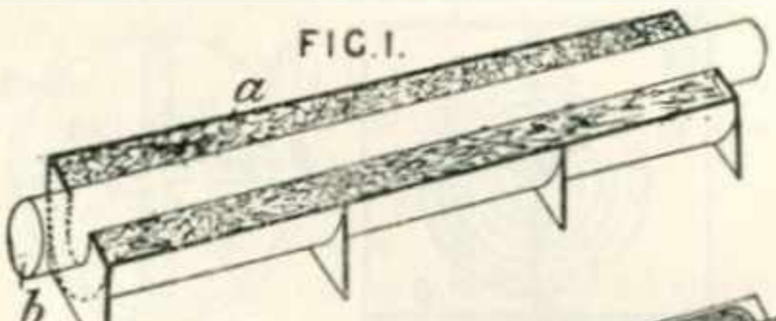
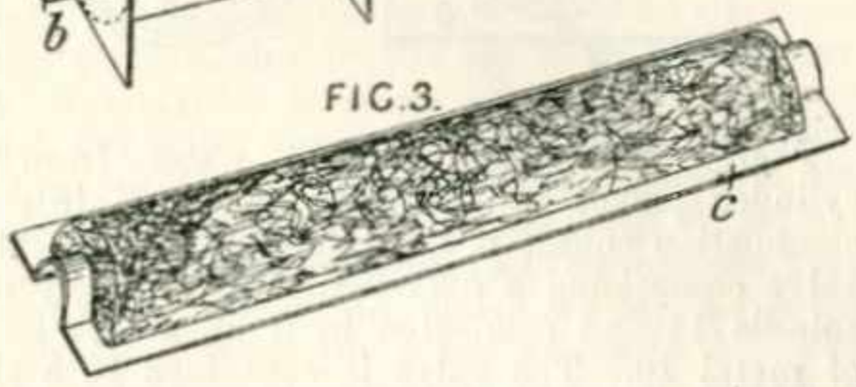


FIG.3.



Non-conducting coverings for heat.—Waste material from the manufacture of caustic soda and the hypochlorites of soda or calcium consisting chiefly of calcium carbonate is mixed with about 10 per cent of fibrous material, such as asbestos, into a stiff paste with or without an agglutinant and cast in moulds *a* with a core *b*. While still soft, a bent plate *c* replaces the core and the whole is inverted, the mould removed, and the section of insulating-covering thus formed is baked. In a modification, the main block is made of a mixture as above using organic fibre such as jute waste, and the asbestos mixture is used only as an inner lining to be applied next to the pipe or the like to be insulated. Slag wool, magnesia, or kieselguhr may also be incorporated in the paste used.

151,977. Roussan, P. E. H. Oct. 3, 1919, [*Convention date*].

Non-conducting coverings for heat and sound.—The bark of the *Melaleuca leucadendron*, a tree common in Australia and South China, where it is known by the names "niaouli, tram, tramé," is used as a non-conducting covering for heat and sound, an electric insulator, buoaynt bodies, and for all purposes for which cork is employed. The bark is cut into blocks, plates, &c. which are cleaned, treated with alkali to remove resin from the superficial layers, and then with dilute acid to remove carbonate and oxalate of lime, after which the objects are dried and coated with paraffin, or the like. Waste may be shredded and mixed with an agglutinant, and moulded into sheaths, tubes, &c. for application to steam or hot water pipes.

152,072. Marks, E. C. R., (*Perfection Heater & Manufacturing Co.*). July 2, 1919.

FIG.3.

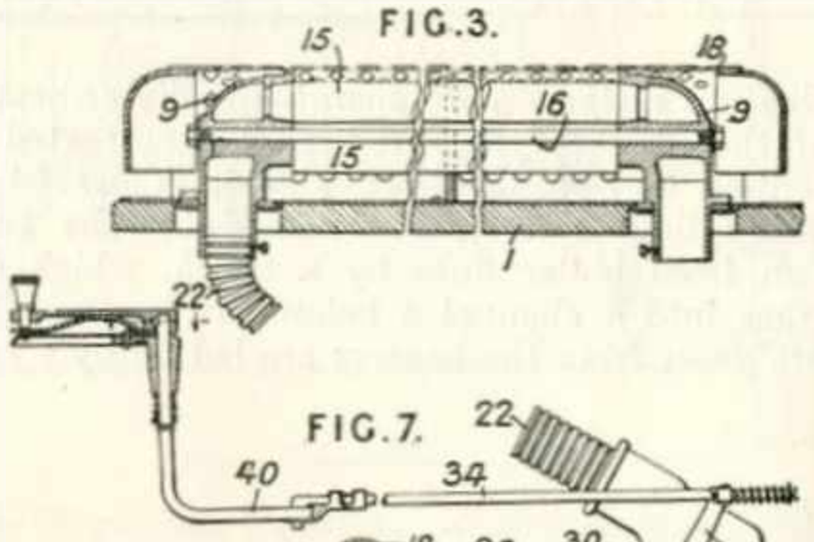
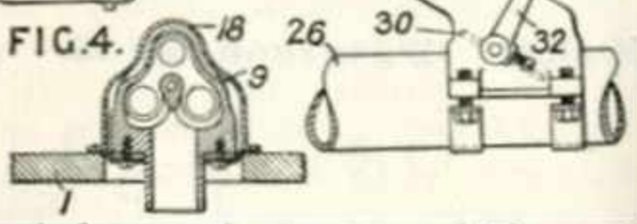


FIG.7.

FIG.4.



Radiators.—A heater for motor-vehicles utilising the exhaust gases comprises end fittings 9 projecting above the floor boards 1 and connected by coned-ended pipes 15 in triangular relation and held by a tie-rod 16. The whole is covered by a perforated cover 18. A hand-operated crank 40 which is connected to a throttle disk 30 by a rod 34 and arm 32 controls the passage of gases from the exhaust pipe 26 to the flexible connecting tube 22 and hence to the heater.

152,168. Marks, E. C. R., (*Locomotive Superheater Co.*). Aug. 22, 1919.

FIG. 1.

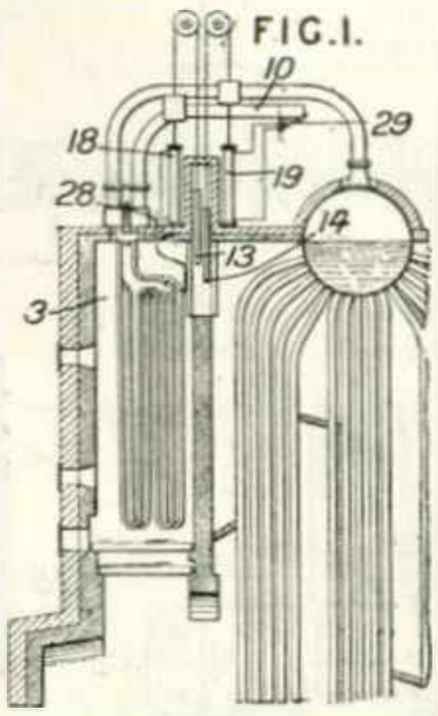


FIG. 10.

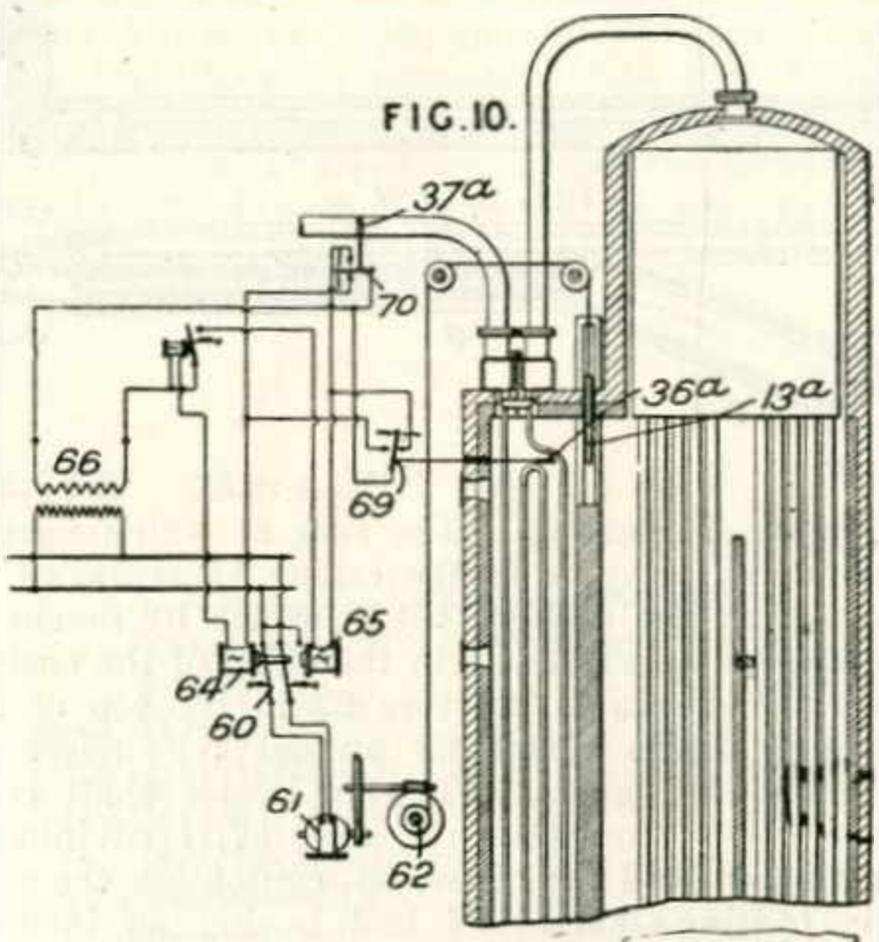
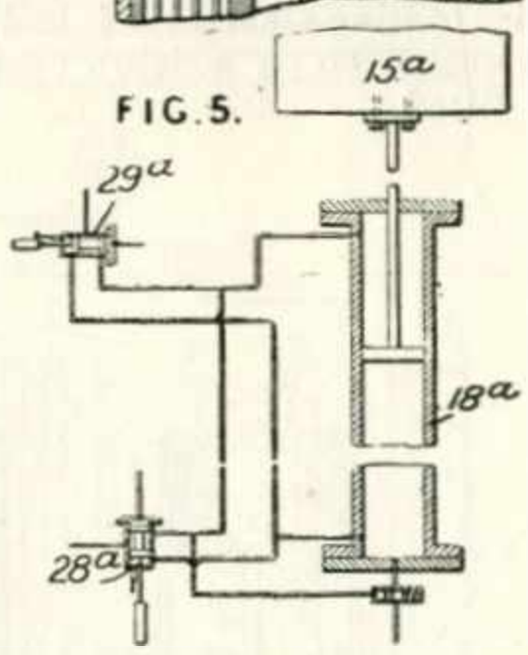


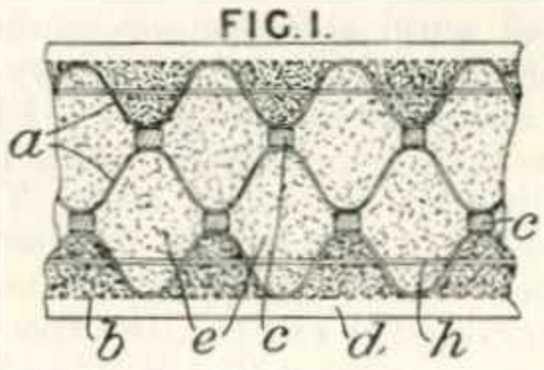
FIG. 5.



Thermostats.—The passage of hot gases through a superheater chamber is controlled by means responsive to the changes of temperature of the gases and of the superheated steam. Dampers 13, 14, Fig. 1, controlling the outlet of the hot gases from a superheater chamber 3 are operated by piston devices 18, 19 under the control of thermostats placed respectively in the path of the gases and in the superheated steam pipe 10. The thermostats operate pilot valves 28, 29 controlling the supply and discharge of pressure fluid to and from the piston devices. A single damper may be used in place of two dampers, the piston rods of the piston devices separately engaging with the damper counterweight. The pilot valves 28*a*, 29*a*, Fig. 5, control the supply and discharge of pressure fluid to and from a single piston device 18*a*, the piston rod being connected to the damper counterweight 15*a*. A rotary damper operated through a slotted lever arm may be used in place of a counterweighted damper. The thermostats 36*a*, 37*a*, Fig. 10, control the operation of the damper 13*a* electrically. The chain of the damper is wound over a pulley 62, which is rotated in one direction or the other by a reversible electric motor 61. The motor switch 60 is thrown over by electro-magnets 64, 65, which are separately included in the circuit of a transformer coil 66 according to the position of switch arms 69, 70 connected to the thermostats.

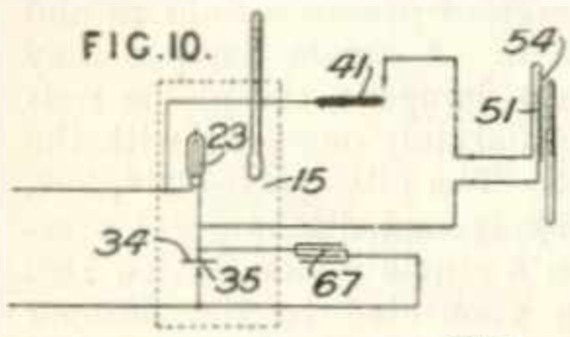
152,173. Johnston, P. L. G., Chisholm, R. R. G., and **Martin, W. A.** Aug. 26, 1919.

FIG. 1.

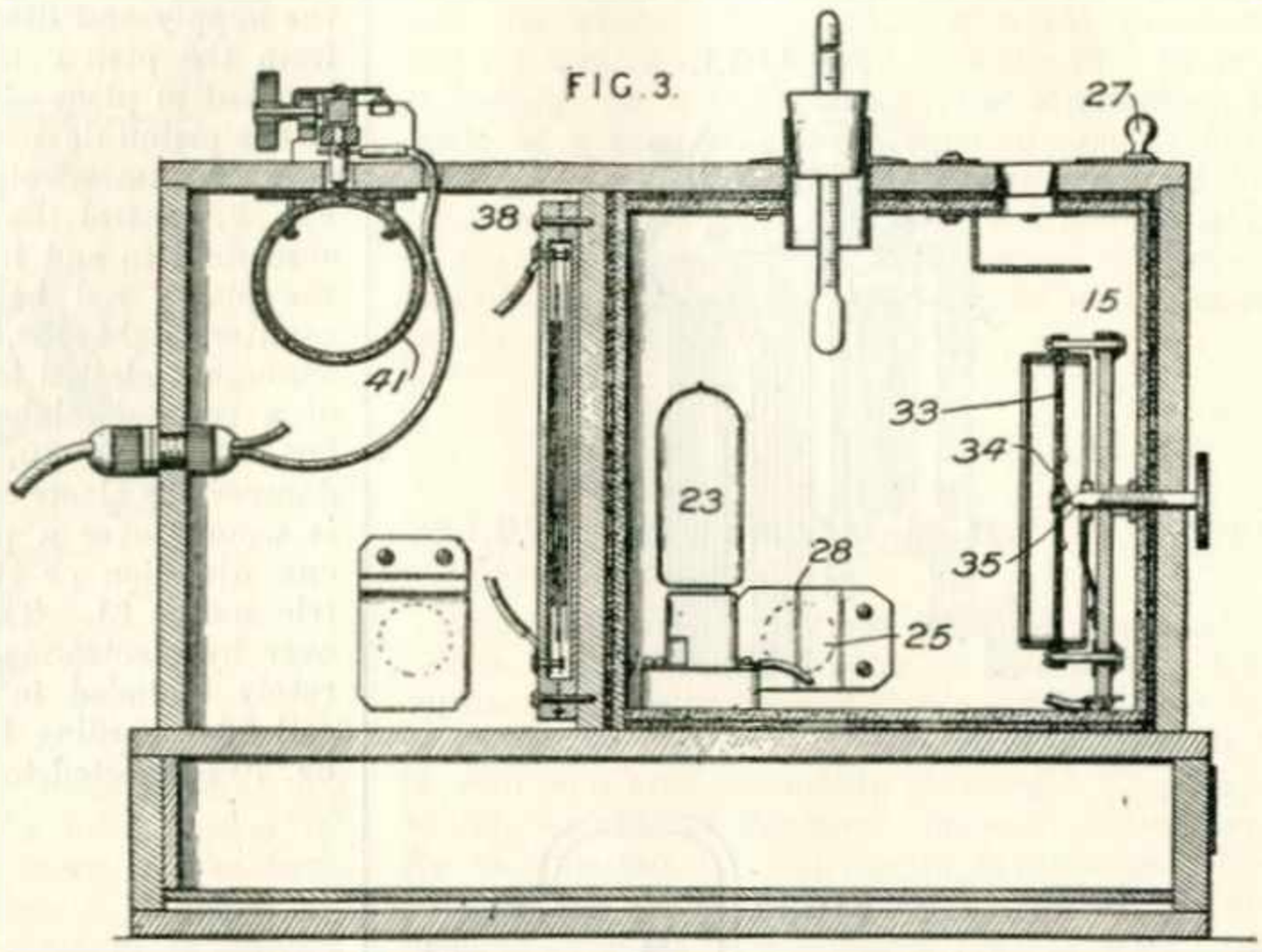


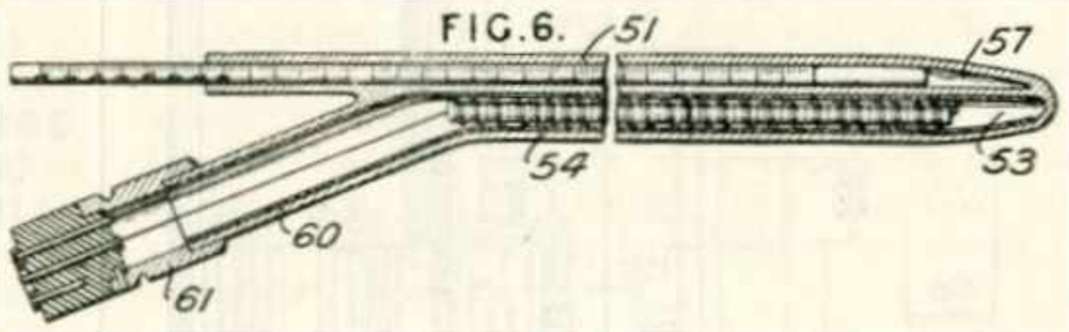
Non-conducting coverings for heat.—Heat-insulating slabs, walls, floors, and ceilings for rooms or cabins, or storage chambers in ships, consist of two or more sheets of corrugated material *a* separated by battens, chocks of wood, or other insulating material *c* to which they are nailed or screwed, the nails or screws being placed alternately on opposite sides and so that they do not make metallic contact between the sheets. The cavities are filled with cork compound or other insulating material *e*. The sheets may be formed of cement, asbestos, or metal, and the corrugations of adjacent sheets may cross. Sheets of expanded metal *b* or wire or rods may be secured to the outer and inner faces and be embedded in concrete *d*. Wires or tie rods *h* may also be added.

152,218. Lidberg, T. Nov. 10, 1919.



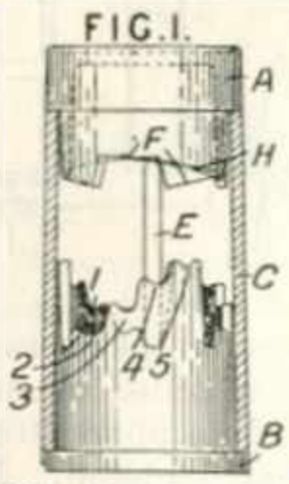
Thermostats. — The temperature of a primary area from which heat is conducted away is controlled by providing a secondary area which is heated simultaneously with the primary area and by varying the rate at which heat is conducted away from the secondary area until a desired ratio is established between the two areas, the heat supplied to both areas being controlled by a heat-responsive device in the secondary area. The invention is specially applicable in apparatus for the culture of bacteria and for surgical use. It is described with reference to an electrically-heated surgical sound or applicator 51, Fig. 6, which constitutes the primary area, an enclosed insulation-lined chamber 15, Fig. 3, containing a heating-lamp 23 and a thermal switch 33, constituting the secondary area. The switch 33 is included in a circuit with the lamp 23, the heating-element 54 of the applicator, and a rheostat 41 for varying the current, the rheostat being located in a compartment 38 adjoining the chamber 15. One of the contacts 35 of the switch is adjustable to regulate the temperature at which the circuit is broken, and a condenser 67, Figs. 3 and 10, is connected across the contacts 34, 35 to prevent sparking. The rate at which heat is conducted away from the casing 15 is varied by regulating the draught therethrough by means of adjustable apertures 25 in the sides of the casing, and an adjustable aperture 27 in the top of the casing. Baffle plates 28 protect the apertures from sudden gusts. The applicator shaft comprises two compartments, one, 57, containing a thermoter, and the other, 53, containing the electric heating-element 54 and having an inclined extension 60 on which a contact-carrying plug 61 is fitted.

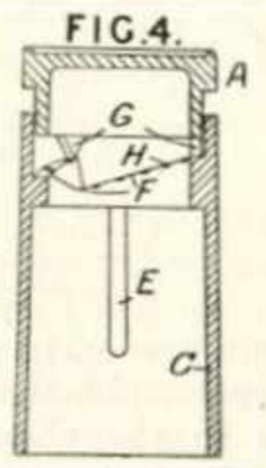




152,491. Gilbody, F. H. Sept. 12, 1919.

Radiators.—Adjustable pedestals for the support of radiators for heating buildings consist of a substantially cylindrical body C provided with three or more vertical inwardly-projecting ribs E pointed at the top. A cap A fitting in the cylinder has a similar number of inclined planes F with notches H which rest over the points of the ribs. In the form shown in Fig. 4, the cap A has projections G which fit in notches F in inclined planes on the inner surface of the body C. The extent of adjustment may be increased in either of these forms by the use of a base B provided with three or more series of rising steps 1 - - 5, Fig. 1, on which the ribs E on the body may rest.





152,696. Arno, R. Jan. 2, 1918

FIG. 3.

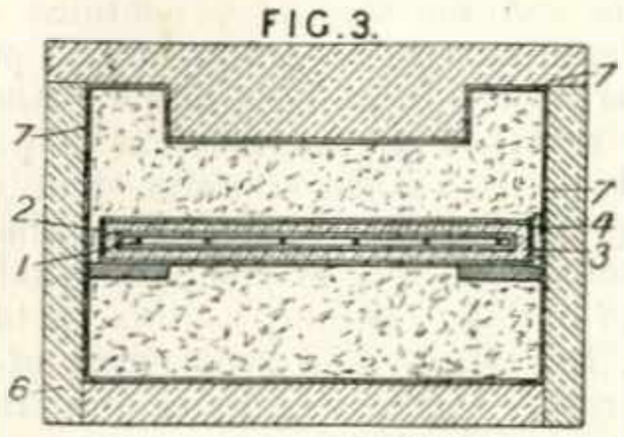
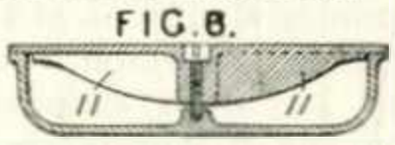


FIG. 8.



Heat-storing apparatus.—Within a metal casing 7, Fig. 3, containing a fusible substance such as sodium hydrate or acetate, aluminium, zinc, or tin-antimony alloy, is supported a metal box 4 enclosing an electric heating-resistance 1. The casing 7 may be covered with heat-insulating material 6. The whole is adjustably supported near the top of an oven, and may be used for heating utensils after removal of the top of the casing 7 and the roof of the oven. In a modification, the cover of the storage heater is provided with ribs 11, Fig. 6, immersed in the fusible material.

152,753. Merz, F. July 17, 1919.

44 FIG. 4.

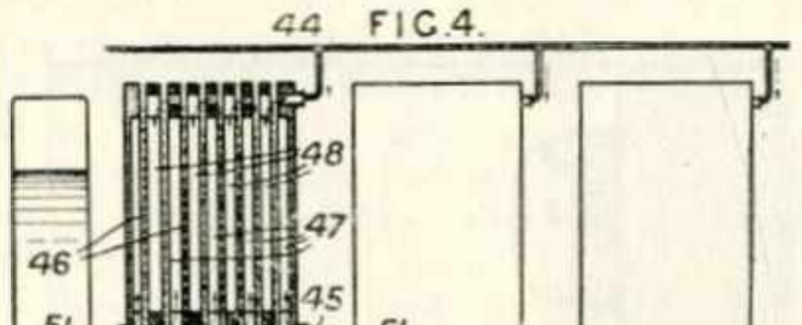
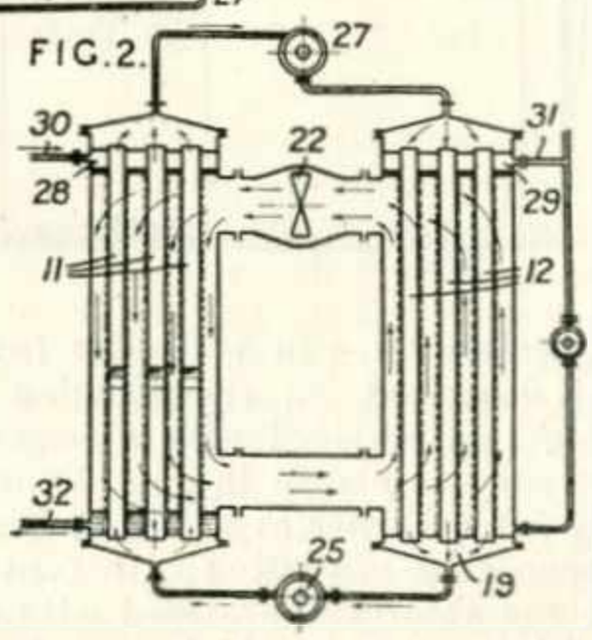


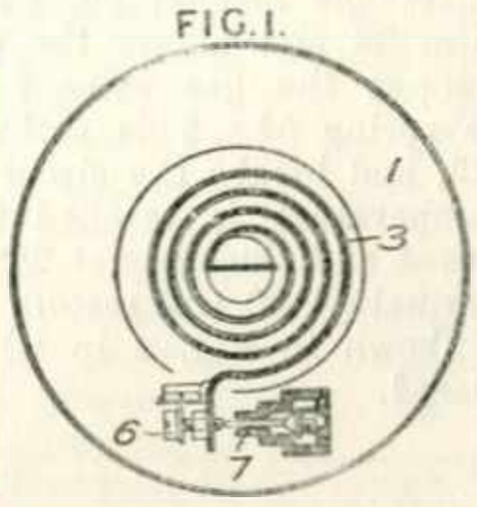
FIG. 2.



Solar and natural heat, utilizing.—Consists in utilizing the heat or pressure generated by the dilution of a concentrated solution, the said solution being then re-concentrated, e.g. by the evaporative power of air, heated by the sun or other natural source of heat, re-diluted, and so on. Fig. 2 shows one form of apparatus for utilizing the heat due to dilution. The concentrated solution is supplied by a pipe 30 to a chamber 28 and flows down the outer surfaces of the pipes 11 which contain a vaporizable liquid. The diluting-liquid is supplied by a pipe 31 to a chamber 29 and flows down the outer surfaces of the pipes 12. By means of a pump 22, air is circulated around the pipes 12 and is then moistened and passed around the pipes 11, giving up its moisture to the solution flowing down them. The solution is thus heated and the liquid in the pipes 11 is vaporized. The vapour drives the turbine 27 and is cooled and condensed while passing through the tubes 12 to the receiver 19 whence it is returned to the tubes 11 by a pump 25. The diluted solution flows by a pipe 32 to the concentrating plant. Fig. 4 shows one form of apparatus for utilizing the pressure caused by the dilution of a concentrated solution through permeable diaphragms separating it from the diluting-liquid. The solution is supplied by a pipe 41 through a non-return valve 51 to chambers 47, and the diluting liquid is supplied by a pipe 44 to chamber 48, separated from the chambers 47 by permeable diaphragms 46. Pressure is thus caused in the chambers 47, and their contents flow through the pipe 45 to a turbine 27. When the pressure falls, the valve 52 automatically cuts out the turbine and allows the diluted solution to flow through the pipe 55 direct to the concentrator. The valve 51 then allows a fresh quantity of solution to pass into the chambers 47. Sea water may be employed as the solution, and after dilution is returned to the sea, and a further quantity of sea water is then utilized.

152,883. Perlich, C. C. A. Nov. 26, 1919.

FIG. 1.



Thermostats.—Means for thermally controlling the supply of gas to gas cooking vessels comprises a coiled bi-metallic or other thermal element 3, Figs. 1, 4, and 5 mounted upon the lid 1 of the vessel and adapted to operate the gas valve either directly or through electro-magnetic means. For direct operation the gas valve is mounted directly on the lid, as 7, Fig. 1, with a screw adjustment 6 on the thermal element. In the electrical

arrangement, shown in Figs. 4 and 5, the valve is disposed in any convenient position, and the thermal element 3 is fitted with switch contacts 25, 26. In the closed position of the valve 7, the armature 30 of an electro-magnet 28 is held raised away from the valve by means of an extension 39 engaged by an apreture in an extension 37 of the armature 23 of a second electro-magnet 29. This armature 23 is pivoted at 35 and carries contact arms 40, 41 insulated one from the

FIG.4.

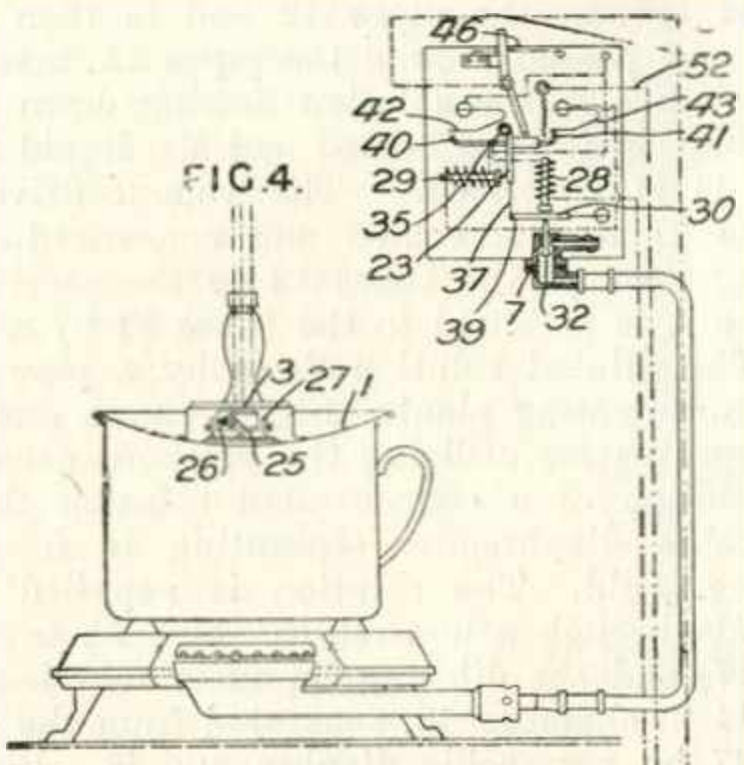
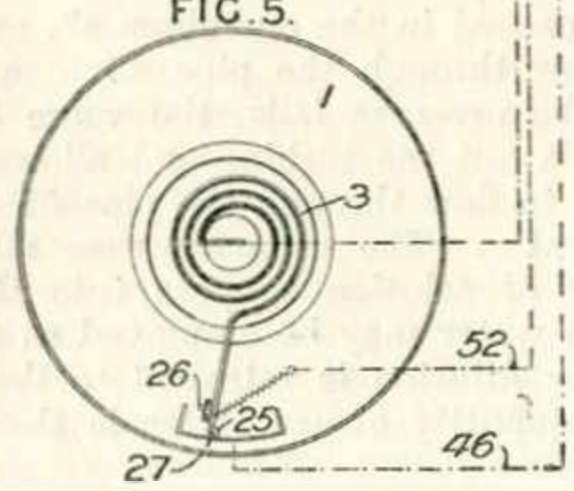


FIG.5.



other, and adapted to contact with one or other of the contact springs 42, 43. When the lowest temperature is reached, the contacts 26, 27 are closed and an electric current through the wires 46, 52 energizes the magnet 29, withdraws the catch armature 23 and allows the armature 30 to drop and open the gas valve 7 against the action of the spring 32. This action opens the contact 41, 43, and breaks the circuit. When the maximum temperature is reached the contacts 25, 27 are closed and the magnet 28 is energized to raise the armature 30 and restore the parts to the position shown in Fig. 4 in which the gas valve 7 is closed.

153,030. Boynton, C. W., and **Wig, R. J.** April 16, 1919.

Non-conducting coverings for heat.—A cellular product which is of low apparent specific gravity, a non-conductor of heat, free from laminations, and substantially impervious to water is obtained by reducing a suitable clay or shale to a uniform fine condition, and heating it in a dry plastic or slimy state under gradually increasing temperature until the mass softens and swells owing to the generation of gas from some of its constituents. A suitable clay contains silica 49 parts, alumina 21 parts, iron oxide 10 parts, carbon 2 parts, lime 4 parts, while a suitable shale contains silica 54 parts, alumina 25 parts, iron oxide 11 parts, carbon 2 parts, and negligible quantities of lime and magnesia. The clay or shale should be rich in metallic oxides, compounds of carbon, sulphur, sodium, potassium or the like, the nature and proportions of flux and gas generating ingredients being preferably such that the material softens at the same temperature as the gas is generated. Additions or subtractions may be made to ensure this. Excess of iron, lime and magnesia should be avoided. The material is ground and may be used dry, or as slurry, or it may be made into a plastic mass and moulded, in which case it is advisable to preheat the articles to drive off superfluous water. The temperature of burning varies, and may be as low as 1040° C. If the product is to be used for insulation or as an aggregate for concrete, oxidation of the surface during burning should be avoided. The product may be preformed into slabs, tiles or the like. The invention is distinguished from those in which clays, shales, slates, and the like are heated to produce porous masses.

153,213. Martin, J. Walter-. Jan. 28, 1920.

FIG.3.

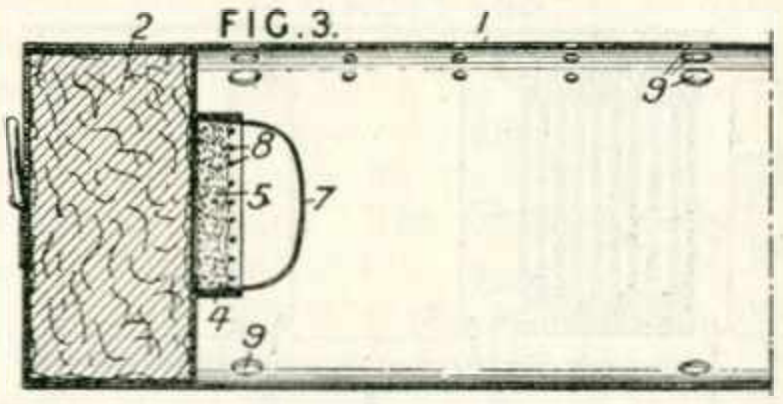
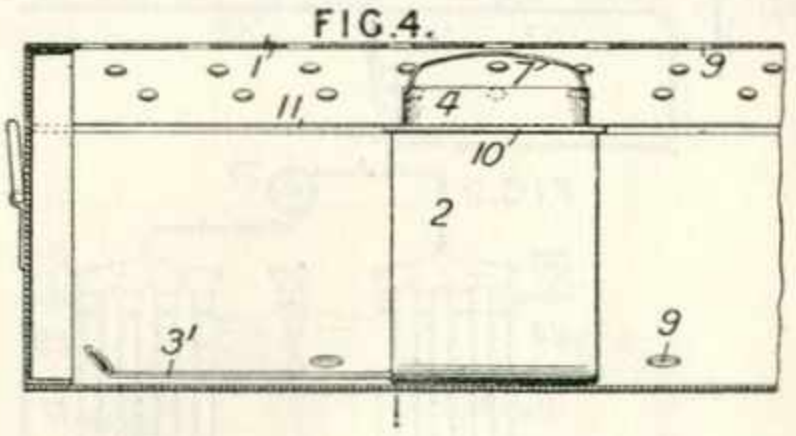


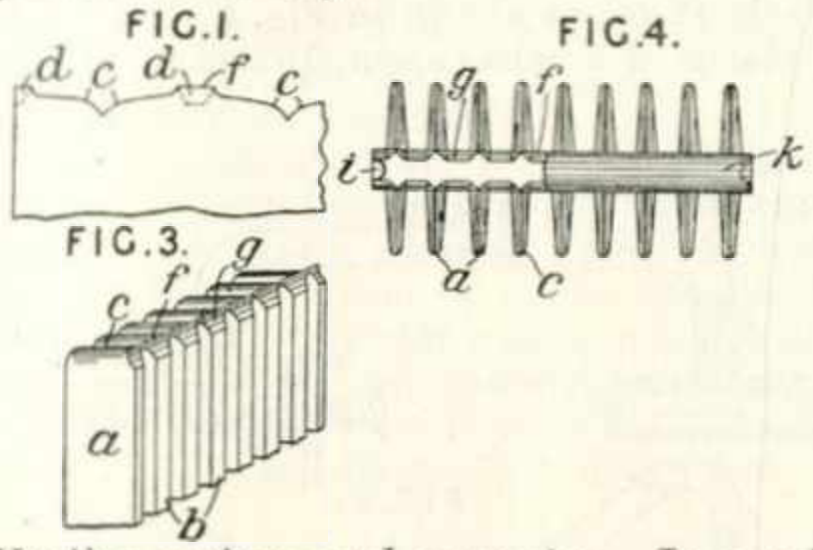
FIG.4.



Footwarmers.—In a hand or footwarmer of the kind described in Specification 105,388, the casing 1 is provided with a removable burner at each end, as shown in Fig. 3, or with an internally fitted burner as shown in Fig. 4, the burner in each case consisting of a container 2 for the gasolene absorbent provided with a flanged opening 4 into or on to which fits a basket-like holder 5 for the catalytic substance. The holder is formed of metal gauze with retaining-wires 8 for the catalytic substance, and is provided with

a handle 7. The casing 1 is provided with a number of projections 9 to allow the necessary circulation of air. In the construction shown in Fig. 3, the container 2 is shaped so as to fit the end of the casing 1; in the construction shown in Fig. 4, the container has flanges 10 sliding in grooves 11 in the casing and has a rod 3^1 attached for facilitating insertion into or removal from the casing.

153,303. Steffen, H. Nov. 1, 1919, [*Convention date*].

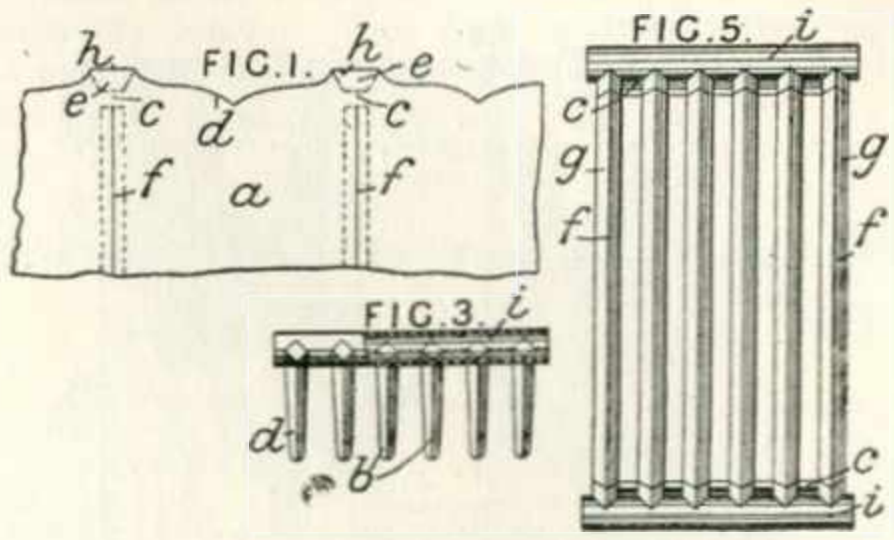


Heating systems and apparatus.—In a radiator constructed from two wrought-iron sheets stamped out and pressed to form heating-members *a* and longitudinal walls *b*, the upper and lower ends *d* of the longitudinal walls project beyond the upper and lower ends of the heating members and are bent over simultaneously with the bending over and pressing together of the latter, to form shoulder-like pipe sections *a* lying at right angles to the heating members and having their edges *f* lying in a straight line to which the semi-cylindrical pipe-channels *b* are welded. The wrought-iron sheets are similar and are stamped out to the contour shown in Fig. 1, the heating members being closed at the top and bottom by welding the edges *c*. The ends of the radiator are closed by inwardly pressed profile rods.

The Specification as open to inspection under Sect. 91 (3) (a) states that narrow rods are welded between the heating members internally and externally before assembling. This subject-matter does not appear in the Specification as accepted.

153,304. Steffen, H. Nov. 1, 1919, [*Convention date*].

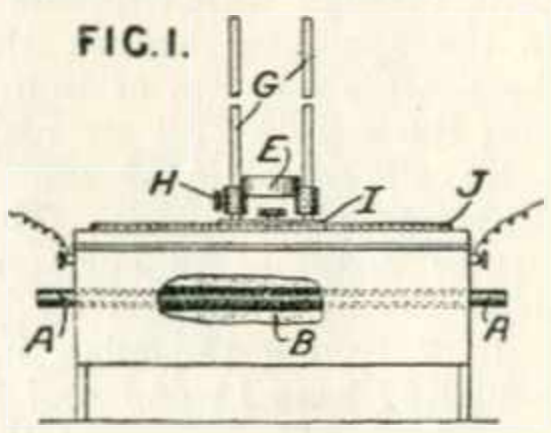
Radiators.—In a wrought-iron radiator consisting of a sheet metal plate *a*, cut out, pressed together and closed at the top and bottom by welding, the parts of the plate lying between the unilateral members *b* are slit open in a perpendicular line *f*, bent over on both sides towards the heating members and there welded to neighbouring parts so as to form the rear end of the heating members. The metal sheet *a*, of the contour shown, is provided with vertical slits *f* and is pressed to form unilateral heating members *b* connected at their upper and lower ends by the parts *c*. The edges *d* are pressed together and welded, and the edges *g* adjacent the slits *f* are bent at an angle and welded to the neighbouring edges *g* to close the rear end of the heating members. The parts *e* are bent to form a continuous pipe section and welded along the line *h* to tubular fittings *i* in the known manner.



The Specification as open to inspection under Sect. 91 (3) (a) states that the members *b* may be stiffened by pressing grooves in them. This subject-matter does not appear in the Specification as accepted.

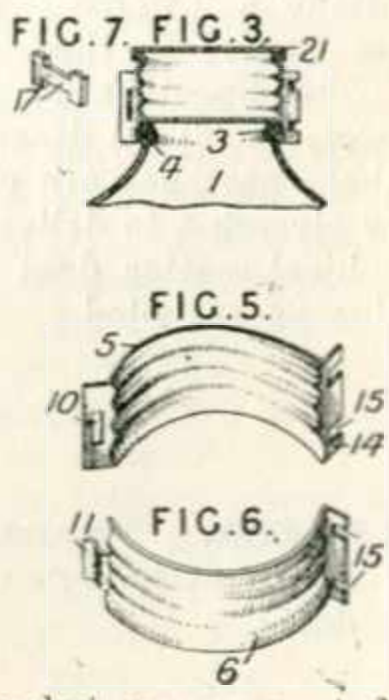
153,336. Bastian, C. O. March 25, 1919.

Thermostats. — The supply of gas or electricity to a furnace for heating steel or other magnetic material is controlled between the points of decalescence and recalescence by means of a magnetic compass E mounted adjustably and in proximity to a magnetising winding B, which, in the arrangement shown, acts also as the heating-coil for a tube A containing the charge.



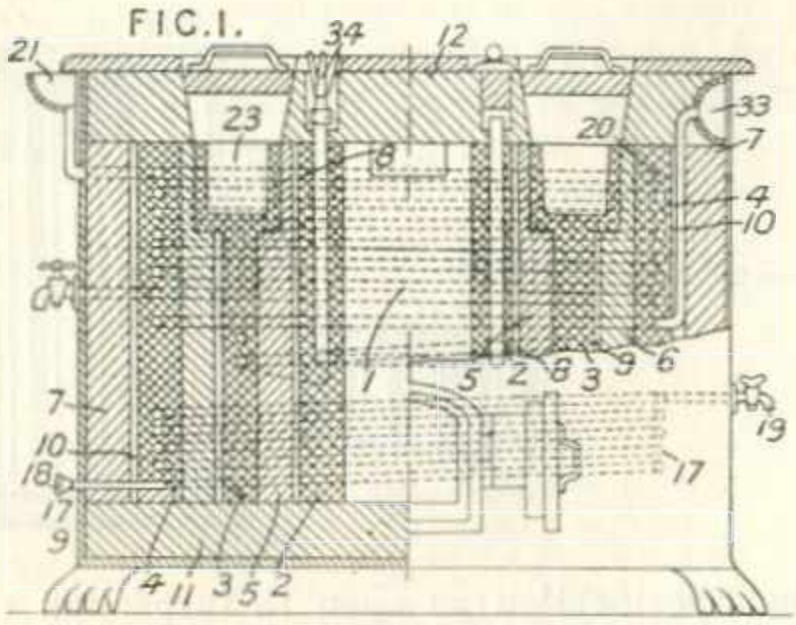
153,488. Traynor, J. C. Dec. 31, 1919.

Hot-water bags.—Relates to flexible water bottles, ice bags, and the like, and consists of a detachable fitting for a stopper. A threaded socket made in two parts 5, 6, Figs. 5 and 6, is adapted to be clamped on the neck of bottle 1, Fig. 3, and is provided with a hollow stopper 21 which screws down on to the neck 3. The neck is strengthened by an enclosed metal ring 4 over which the socket is clamped. The parts of the socket are connected at one side by a tongue 11 and eye 10 or by a hinge joint and at the opposite side by locking pieces 17, Fig. 7, which engage slots 15, Figs. 5 and 6, in flanges 14. As shown, the stopper is made hollow and is provided with top 21 seamed on to the lower part.



154,183. **Durando, G.** Nov. 20, 1919, [*Convention date*].

FIG. 1.



Heat-storing apparatus.—A resistance or arc heater is surrounded by a heat-storing body which is surrounded in turn by other heat-storing bodies separated by heat-insulating material; furnace or oven cavities are provided in the bodies or they are traversed separately or successively by conduits through which liquids or gases are passed. In the apparatus shown, the body 1 containing the heaters consists of iron cast into a graphite box; the masses 2, 3 are respectively of lead and a tin alloy fusible at 100° C. enclosed in containers to allow fusion. The bodies 2, 3 and a further body 4 are surrounded respectively by air-spaces 8, 9, 10 and by heat-insulating layers 5, 6, 7 having reflecting inner walls. A heat-insulating base 11 and roof 12 are provided. The body 2 may be formed at the top into plates for grilling, and the body 3 into ovens 23 at the top, and others, not shown, at the bottom. A water conduit 17 having an inlet 18 and tap 19 is formed in the lower part of the body 4 and a conduit 20 for heating other liquids, fed through a funnel 21, is formed in the upper part. The bodies 4, 3, 2 may be formed also with communicating passages through which air passes successively, entering at 33 and leaving as a hot blast at 34, thus giving a "flame" effect; drying chambers may be formed in these passages.

The Specification as open to inspection under Sect. 91 (3) (a) describes a modification, in which these passages are closed and contain water, oil, or glycerine to deliver heat where required. This subject-matter does not appear in the Specification as accepted.

154,604. Svenska Aktiebolaget Gasaccumulator. Dec. 3, 1919, [*Convention date*].

Thermostats.—The supply of gas, liquid fuel, or electricity for heating cooking-apparatus is adapted to be controlled by the effect of the steam generated in the heated receptacle on a thermostatic device which increases or decreases the gas &c. supply, and is applied to the edge of the receptacle so as to be affected by the steam flowing out through an opening near the edge. In the construction shown in Fig. 1, a fluid-containing casing affected by the steam communicates with a second casing 2 carrying a diaphragm 6 which, by seating on a shoulder 9 of the casing, serves as a valve to regulate the flow of gas or liquid fuel to a burner through the passages 7, 8. A spring 10 tends normally to press the valve away from its seating, and a small passage 11 allows a small quantity of gas &c. to pass to the burner when the valve is closed. The casing 1 may be attached to the side wall of the receptacle 12 or, as shown in Fig. 2, to the cover 13 by means of a balance arm 15 and a projection

FIG. 1.

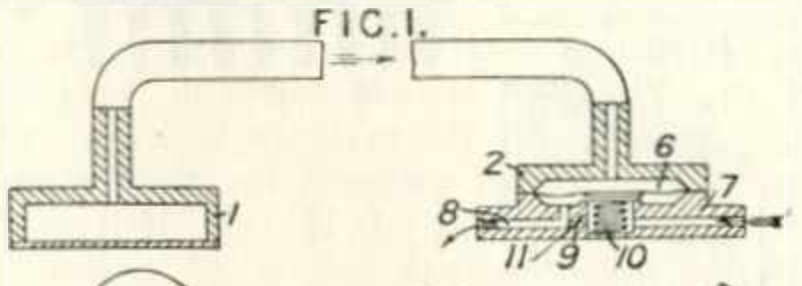


FIG. 2.

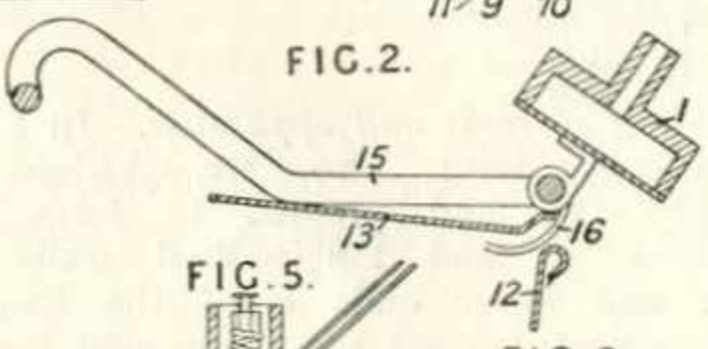


FIG. 5.

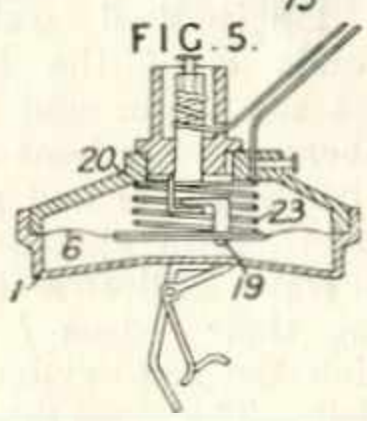


FIG. 6.

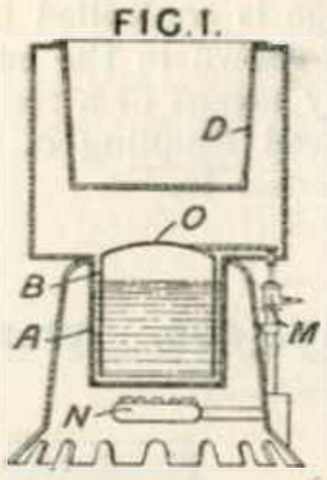
16 which passes between the receptacle and its cover, so as to allow the steam generated to be directed on to the casing 1. In a modified construction, Fig. 5, the diaphragm 6 is combined with the casing 1 for controlling an electric heating-circuit, contacts 19, 20 normally in engagement, being mounted on the diaphragm and casing respectively, and adapted to break the heating circuit when the fluid in the casing 1 expands. In order to prevent sparking, the contact pieces 19, 20 are made of soft iron, and the contact 20 forms part of an electro-magnet, whereby a magnetic force is added to that of the spring 23 for keeping the circuit closed. In a further construction, an element 26, such as a piece of wood, adapted to be deformed by the action of the moist steam, is mounted in a holder 25, and may act directly upon the gas tubing 27, or may indirectly, through the action of levers, control the supply of heating medium.

The Specification as open to inspection under Sect. 91 (3) (a) comprises also that in the first constructions described, the casing 1 may be shaped in the form of an arc conforming the shape of the side of the receptacle so that a larger surface of the casing is exposed to the action of the steam. This subject-matter does not appear in the Specification as accepted.

154,666. Stott, V. H., and **Schofield, L.** Aug. 2, 1919.

Heating systems and apparatus.—An apparatus for performing minor heating operations, the principle of which can be used in glue pots, ovens, steamers, and hot plates, comprises a gas-regulating valve M operated by the rising and falling of a bell-float B immersed in water in a vessel A heated by the burner N. The walls of the float chamber are extended above the float to act as a well for the reception of the pots D or ovens to be heated by steam escaping from beneath the float through the orifice O. A tap may be fitted for drawing off hot water and a small float controlled cistern may keep the water level constant in the chamber A. Specification 20277/14, [*Class* 64 (i), Heating liquids &c.], is referred to.

FIG.1.

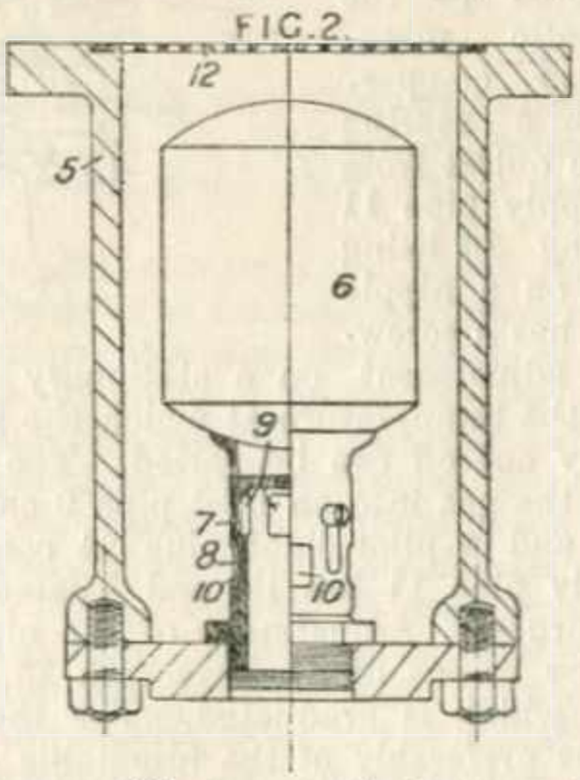


154,825. Forrester, H. J. C., (*Internationalt Isolation Co. Aktieselskabet Ikas*). March 2, 1920.

Non-conducting coverings for heat. — Non-conducting coverings for pipes or the like in the form of half-sleeves or segments are made by forming a complete tube of "Moler" (diatomaceous earth) in the manner of making ordinary drain pipes, burning the tubes, and then cutting them lengthways into two or more sections as required.

154,956. Hocking, H. July 10, 1919.

FIG.2.



Steam-traps.—Float-controlled steam-traps, applicable more particularly to heat interchanging apparatus used for heating feed-water, condensing in non-vacuum type of condensers, and for cooling fluids, comprise a cylindrical float 6 having a sleeve valve 7 provided with ports 10, which slides over the upper end of the outlet pipe 8 which is provided with ports 9. When the condensed steam reaches a predetermined level, the float 6 rises, and the ports 9, 10 register, so that the water is discharged. The float then falls and closes the valve. The heater is mounted upon the casing 5 of the steam trap, a strainer 12 being interposed between the two casings.

155,005. Malone, J. F. J. Sept. 6, 1919.

FIG.12.

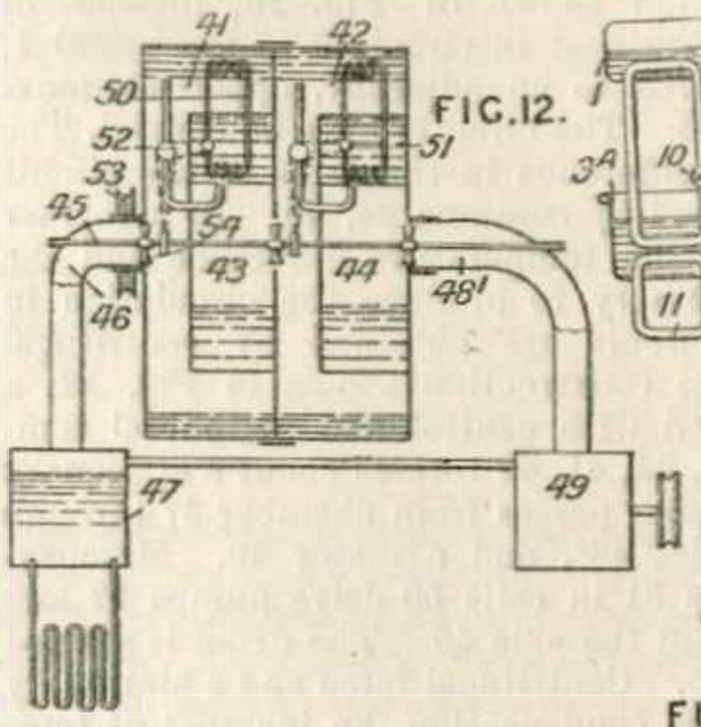


FIG.2.

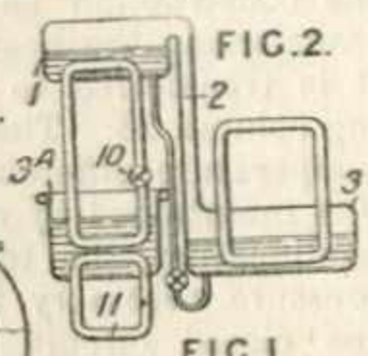


FIG.1.

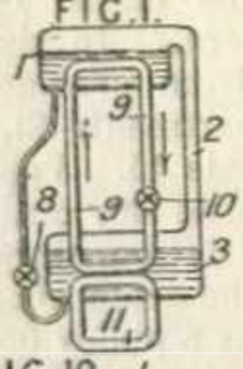
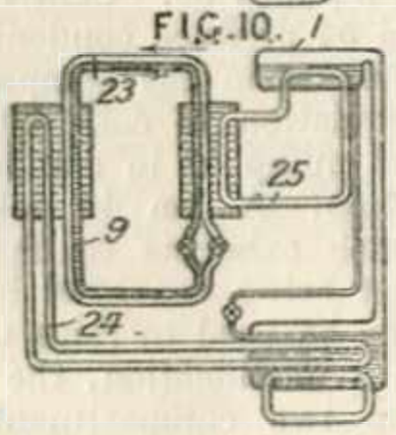


FIG.10.

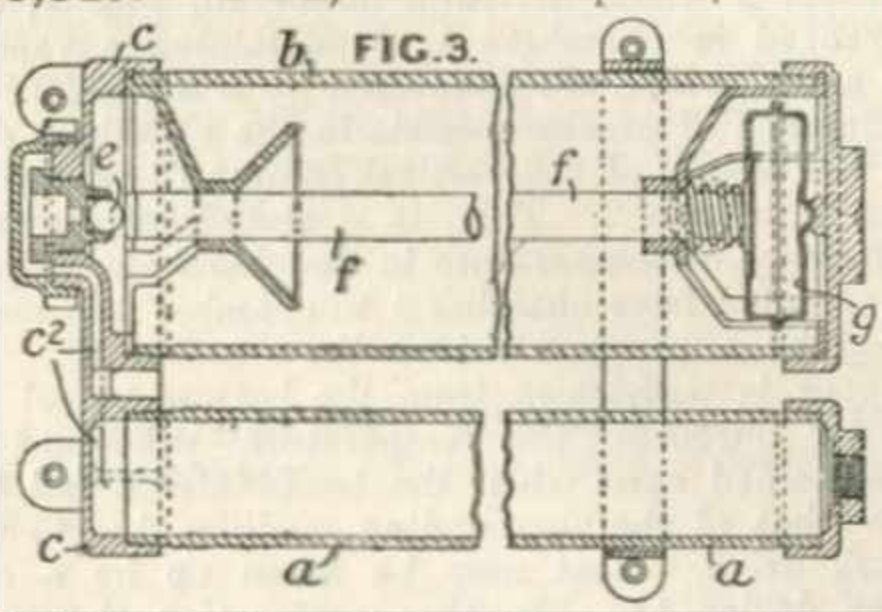


Solar and natural heat, utilizing.—Power is obtained from a moving column of liquid or a series of connected solids, the motion of which is produced by a change of density in the liquid or solids due to differences of expansion resulting from keeping different parts of the path transversed at different temperatures. Heat equivalent to the energy of a driven motor is supplied to one part of the circuit by artificial heating, or from the surrounding medium at its normal temperature, such as the normal atmosphere, or that down a mine, or the sea. The temperature of one part of the circuit may be below that of the surrounding medium. Parts of the circuit of a mercury column 9 which drives a motor 10, Fig. 1, are arranged in chambers 1, 3 containing a vapour or a gas, which are connected by a branch 2. A difference of pressure exists in the chambers due to the weight of the vertical column of vapour or gas in branch 2. This, it is stated, produces a difference of temperature in the chambers. Liquid evaporated from chamber 1 to chamber 2 is made good by a pump 8 driven by a motor 10. If vapour is withdrawn from the bottom vessel for power purposes, the temperature difference is maintained even when the temperatures fall below that of the surrounding medium due to the work drive. Heat may be taken up by a coil pipe device 11. In the construction shown in Fig. 2, the circuit connects vessel 1 and a liquid container 3A, and vessels 1, 3, are connected by a pipe 2. When the temperature is lowered by the action of the motor 10, heat is absorbed from the surrounding medium by the device 11, which

may act as a refrigerator. The vessels 3, at a higher temperature than vessels 1, 3^a, act as a heat conveyer or radiator. In a modification, the construction shown in Fig. 2, an additional motor driven by vapour from chamber 3 and exhausting into chamber 3^a is employed. In further modifications, a permanent gas is used in lieu of the liquid and vapour. Series of connected units are also described wherein the temperature range is proportional to the number of units. In the construction shown in Fig. 10, instead of transferring the heat in circuit 9 to the vessel 1, it is transferred to an adjacent, oppositely-moving column 23. The circuits may be coaxial. The temperature difference in the arms of the circuit 9 is maintained by columns 24, 25. In a further modification, the temperature difference and the pressure necessary to produce the circulation in the closed circuit are obtained by centrifugal force. In the construction shown in Fig. 12, a drum provided with central and peripheral compartments 43, 44, 41, 42 rotates about a stationary axis 45. Vapour passes from chamber 47 through inlet 46, outlet 48^1, and a motor 49. Mercury-driven motors 51 in coils 50 drive pumps 52 and the drum about the axle 45. The drum is started by a pulley 53. Centrifugal force and a stationary fan 54 produce condensation, an increase of temperature in the compartment 41, and hence the circulation in coils 50. Similarly the motor 51 and pump 52 in compartments 44, 42 are set in action. A fan 44 delivers vapour to motor 49 which exhausts to chamber 47. Instead of the heat being conveyed by a vapour to a motor, it may be used to raise the temperature of a room. In a modification, the hub of a drum is divided into two compartments containing liquids and vapour or gas, which are kept at different temperatures by a compressor. Coaxial helices surround the interior of the periphery of the drum. Water is circulated in the interior coil by a pump; and sulphurous or carbonic acid in the interior coil in the contrary direction by centrifugal force, and operates a motor which continues the drive of the drum and gives off power.

155,347. Wild, A. G. Sept. 11, 1919.

FIG. 3.



Radiators; thermostats.—Steam from the train pipe enters the high pressure element *a* of a carriage heater and passes thence through a passage c^2 in the head cover *c* to a low pressure element *b* in communication with the exhaust. The passage is controlled by a thermostat in the element *b* shown in the example as a capsule *g* operating by means of a rod *f*, a ball valve *e* seating in the head coupling *c*. Specification 19980/13 is referred to.

155,485. Wells, A. J. Feb. 24, 1920.

FIG. 9.

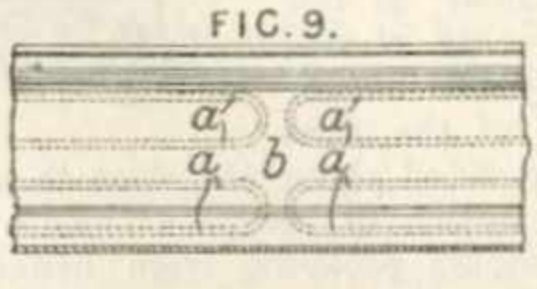
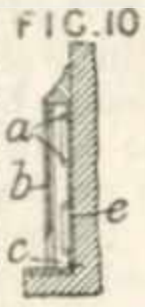


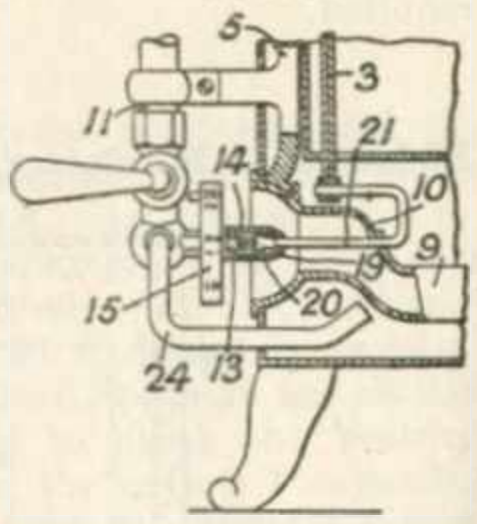
FIG. 10.



Radiators.—The heating-unit consists of a primary and secondary heating-surface separated by an air space, and may be fixed to the walls, floors or ceilings of a room. The primary heating-surface, preferably consists of bent tubes *a* supplied with live steam or other heating-medium and enclosed in a casing which may have an insulated back *e*. The removable front *b*, preferably of sheet metal, is the secondary heating-surface and is separated from the primary *a* by the air space *c*.

155,788. American Stove Co., (Assignees of *Meacham, B. E.*). July 7, 1919, [*Convention date*].

FIG. 3.



Thermostats — In a thermostat for regulating the supply of gas to an oven a valve member 20 is connected to the thermostatic member 3 and co-operates with a seating 19 on the outlet from a gas supply pipe 11 the seating 19 being arranged on a nipple 14 which has a screw-threaded adjustment on a stationary nozzle 13 whereby the temperature at which the gas supply is entirely cut off can be varied. The nipple 14 conducts the gas into an inlet pipe 9 carrying the burners, and a pilot light pipe 24 connected to the supply pipe 11 has its end located adjacent to the burners. Adjustment of the nipple 14 is effected by means of a rotary disk 15, the periphery of which is graduated. The thermostatic element is preferably of the bimetallic strip type and is connected to the valve 20 by an arm 21 passing through a bent portion 10 of the burner pipe 9, a casting 5 fixed to the oven being used to support the pipes 9, 11.

APPENDIX

The following two abridgments should be added to those appearing in the volume of this Class for the period A.D. 1909-15.

A.D. 1913

27,048. Jirotka, B. Nov. 24. *No Patent granted (Sealing fee not paid).*

Non-conducting coverings for heat and sound.—Wood pulp is pressed between hygroscopic rollers or surfaces to produce a crumbly mass; this mass is moulded under pressure, whereby more moisture is expressed, into slabs, plates, non-conducting coverings, household articles, bee-hives, bodies of violins and other musical instruments &c. and the moulded articles are dried. The drying may be effected by heating the mould, in which case it is advisable to remove the core to allow of shrinking, or by immersion in boiling oil, varnish &c. or by treatment with alcohol at ordinary temperature. To increase the elasticity, dried and powdered pulp may be added to the pressure pulp before moulding. The articles may be polished after the application of a silicate or dry pulp to the surface, and may be reinforced by cores inserted before the pulp has hardened, or by beating in metallic ornaments, the article being locally softened by liquid if necessary.

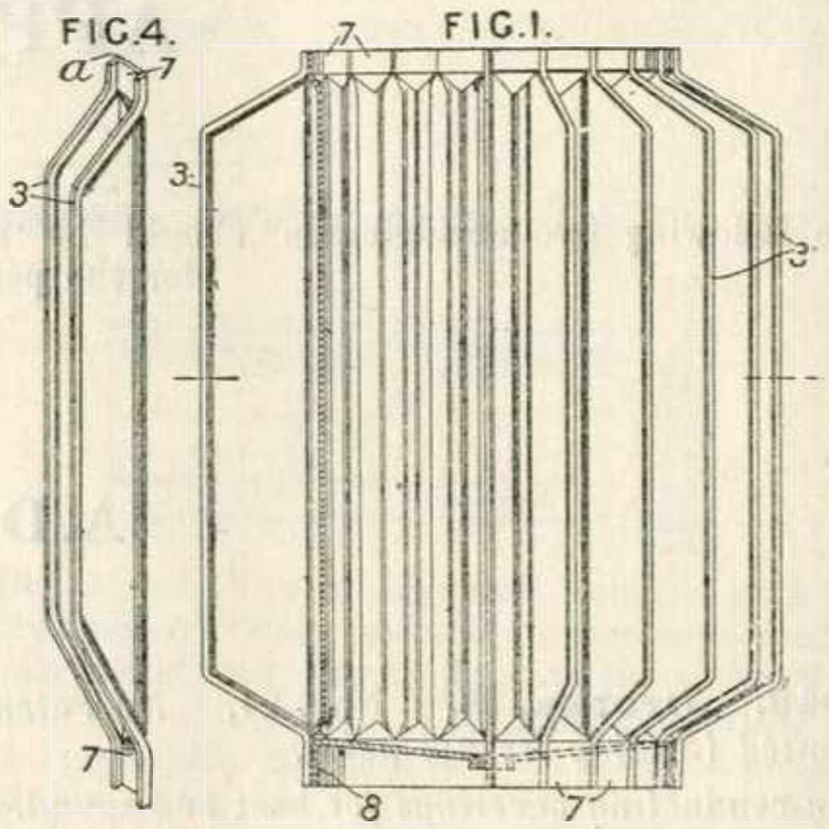
A.D. 1915

431. Soc. Anon. des Combustibles Industriels. Jan. 9, 1914, [*Convention date*]. *Void* [*Published under Sect. 91 of the Act*].

Non-conducting coverings for heat.—An electric or heat insulating material for coating or impregnating permeable supports, such as paper, cloth, &c., is made by depriving coal-tar, petroleum tar, and like products from the distillation of coal or petroleum of their more volatile constituents by distillation, and oxidizing the residue in a current of hot air until a stable plastic mass is obtained. When coal tar is used as the raw material, the heavy liquid and neutral oils are separated from the distillate and a part of these is added to the residue prior to the oxidation process. The remaining part is employed for impregnating the permeable support before this is coated with or impregnated by submersion in the insulating plastic mass. When petroleum tar or other petroleum products are employed, these are subjected to a first distillation to remove the readily volatile constituents, then to a second distillation carried to about 370° C. in the presence of an inert gas, and finally the residue is oxidized in a current of hot air. In coating or impregnating a support with the material, the support may be or may not be provided with supplementary inert absorbing-materials, such as talc, silica, or barium or calcium sulphate, and, before impregnation, is preferably deprived of any hydrated or gaseous products which might impede the penetration of the material. Successive layers of the material, in which the oxidation or distillation has been carried to different degrees, may be used in the coating or impregnating.

The following abridgment should be inserted in place in the present volume.

119,450. Sonneborn, C. Sept. 21, 1917, [*Convention date*].



Radiators.—Tanks or radiating casings especially for use with transformers are constructed by welding together the flanges 3 of **U**-shaped units *a*, bending the sheet thus formed into shape to form the side walls of the tank, welding together the terminal flanges, and securing a bottom 8 to the lower portions 7. A top may be secured to the upper portions 7.

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1924

ABRIDGMENTS OF SPECIFICATIONS

(A.)—Illustrated Abridgments classified in 146 volumes for each of nine consecutive periods, dealing completely with all Specifications published from 1855 to 1908. The price of each volume is 2*s*. per period, including inland postage. Postage to Colonies and foreign Countries extra.

List of Periods.

1855—1866.
1867—1876.
1877—1883.
1884—1888.
1889—1892.
1893—1896.
1897—1900.
1901—1904.
1905—1908.

List of Classes.

1, Acids, alkalies, oxides, and salts, Inorganic.
2, Acids and salts, Organic, and other carbon compounds, (*including* Dyes).
3, Advertising and displaying.
4, Aeronautics.
5, Agricultural appliances, Farmyard and like, (*including* the housing, feeding, and treatment of animals).
6, Agricultural appliances for the treatment of land and crops, (*including* Gardening appliances).
7, Air and gas engines.
8, Air and gases, Compressing, exhausting, moving, and otherwise treating.
9, Ammunition, torpedoes, explosives, and pyrotechnics.
10, Animal-power engines and miscellaneous motors.
11, Artists' instruments and materials.
12. Bearings and lubricating-apparatus.
13, Bells, gongs, foghorns, sirens, and whistles.
14, Beverages, (*excepting* Tea, coffee, cocoa, and like beverages).
15, Bleaching, dyeing, and washing textile materials, yarns, fabrics, and the like, (*excepting* Dyes).
16, Books, (*including* Cards and card cases and the like).
17, Boots and shoes.
18, Boxes and cases, (*excepting* Trunks, portmanteaux, hand and like travelling bags, baskets, hampers, and other wickerwork).
19, Brushing and sweeping.
20, Buildings and structures.
21, Casks and barrels.
22, Cements and like compositions.
23, Centrifugal drying, separating, and mixing machines and apparatus.
24, Chains, chain cables, shackles, and swivels.
25, Chimneys and flues, (*including* Ventilating-shaft tops).
26, Closets, urinals, baths, lavatories, and like sanitary appliances.
27, Coin-freed apparatus and the like.
28, Cooking and kitchen appliances, bread-making, and confectionery.
29, Cooling and ice-making, (*including* Refrigerators *and* Ice-storing).
30, Cutlery.
31, Cutting, punching, and perforating paper, leather, and fabrics, (*including* the general treatment of paper after its manufacture).
32, Distilling, concentrating, evaporating, and condensing liquids, (*excepting* Steam-engine condensers).
33, Drains and sewers.
34, Drying.
35, Dynamo-electric generators and motors, (*including* Frictional and influence machines, magnets, and the like).
36, Electricity, Conducting and insulating.
37, Electricity, Measuring and testing.
38, Electricity, Regulating and distributing.
39, Electric lamps and furnaces.
40, Electric telegraphs and telephones.
41, Electrolysis, (*including* Electro-deposition *and* Electro-plating).
42, Fabrics, Dressing and finishing woven and manufacturing felted, (*including* Folding, Winding, Measuring, *and* Packing).
43, Fastenings, Dress, (*including* Jewellery).
44, Fastenings, Lock, latch, bolt, and other, (*including* Safes and strong-rooms).
45, Fencing, trellis, and wire netting.
46, Filtering and otherwise purifying liquids.
47, Fire, Extinction and prevention of.
48, Fish and fishing.
49, Food preparations and food-preserving.
50, Fuel, Manufacture of.
51, Furnaces and kilns, (*including* Blowpipes and blowpipe burners; Smiths' forges and rivet hearths; *and* Smoke and fumes, Treating).
52, Furniture and upholstery.
53, Galvanic batteries.
54, Gas distribution.
55, Gas manufacture.
56, Glass.
57, Governors, Speed-regulating, for engines and machinery.
58, Grain and seeds, Treating, (*including* Flour and meal).
59, Grinding, crushing, pulverizing, and the like.
60, Grinding or abrading, and burnishing.
61, Hand tools and benches for the use of metal, wood, and stone workers.
62, Harness and saddlery.
63, Hats and other head coverings.
64, Heating, (*excepting* Furnaces and kilns; *and* Stoves, ranges, and fireplaces).
65, Hinges, hinge-joints, and door and gate furniture and accessories, (*excepting* Fastenings, Lock, latch, bolt, and other).
66, Hollow-ware, (*including* Buckets, Pans, Kettles, Saucepans, *and* Water-cans).
67, Horseshoes.
68, Hydraulic engineering.
69, Hydraulic machinery and apparatus, (*excepting* Pumps and other means for raising and forcing liquids).
70, India-rubber and gutta-percha, (*including* Plastic compositions *and* Materials of constructive utility, other than metals and stone).
71, Injectors and ejectors.
72, Iron and steel manufacture.
73, Labels, badges, coins, tokens, and tickets.
74, Lace-making, knitting, netting, braiding, and plaiting.
75, Lamps, candlesticks, gasaliers, and other illuminating-apparatus, (*excepting* Electric lamps).
76, Leather, (*including* Treatment of hides and skins).
77, Life-saving, (Marine), and swimming and bathing appliances.
78, Lifting, hauling, and loading, (*including* Lowering, Winding, and Unloading).
79, Locomotives and motor vehicles for road and rail, (*including* Portable and semi-portable engines).
80, Mechanism and mill gearing.
81, Medicine, surgery, and dentistry.
82, Metals and alloys, (*excepting* Iron and steel manufacture).
83, Metals, Cutting and working.
84, Milking, churning, and cheese-making.
85, Mining, quarrying, tunnelling, and well-sinking.
86, Mixing and agitating machines and appliances, (*excepting* Centrifugal machines and apparatus).
87, Moulding plastic and powdered substances, (*including* Bricks, building and paving blocks, and tiles, *and* Pottery).
88, Music and musical instruments.
89, Nails, rivets, bolts and nuts, screws, and like fastenings.
90, Non-metallic elements.
91, Oils, fats, lubricants, candles, and soaps.
92, Ordnance and machine guns.
93, Ornamenting.
94, Packing and baling goods.
95, Paints, colours, and varnishes.
96, Paper, pasteboard, and papier mâché.
97, Philosophical instruments, (*including* Optical, nautical, surveying, mathematical, and meteorological instruments).
98, Photography.
99, Pipes, tubes, and hose.
100, Printing, Letterpress and lithographic.
101, Printing other than letterpress or lithographic.
102, Pumps and other means for raising and forcing liquids, (*excepting* Rotary pumps).
103, Railway and tramway vehicles.
104, Railways and tramways.
105, Railway signals and communicating-apparatus.
106, Registering, indicating, measuring, and calculating, (*excepting* Signalling and indicating by signals).
107, Roads and ways.
108, Road vehicles.
109, Ropes and cords.
110, Rotary engines, pumps, blowers, exhausters, and meters.
111, Sewage, Treatment of, (*including* Manure).
112, Sewing and embroidering.

113, Ships, boats, and rafts, Div. I.
114, ——————— Div. II.
115, ——————— Div. III.
116, Shop, public-house, and warehouse fittings and accessories.
117, Sifting and separating.
118, Signalling and indicating by signals, (*excepting* Railway signals and communicating-apparatus).
119, Small-arms.
120, Spinning, (*including* the preparation of fibrous materials *and* the doubling of yarns and threads).
121, Starch, gum, size, glue, and other stiffening and adhesive materials.
122, Steam-engines, (*including* Details common to fluid-pressure engines generally).
123, Steam generators, (*excepting* Furnaces).
124, Stone, marble, and the like, Cutting and working.
125, Stoppering and bottling, (*including* Bottles, jars, and like vessels).
126, Stoves, ranges, and fireplaces.
127, Sugar.
128, Table articles and appliances.
129, Tea, coffee, cocoa, and like beverages.
130, Tobacco.
131, Toilet and hairdressing articles, and perfumery.
132, Toys, games, and exercises.
133, Trunks, portmanteaux, hand and like travelling bags, baskets, hampers, and other wickerwork.
134, Umbrellas, parasols, and walking-sticks.
135, Valves and cocks.
136, Velocipedes.
137, Ventilation.
138, Washing and cleaning clothes, domestic articles, and buildings.
139, Watches, clocks, and other timekeepers.
140, Waterproof and like fabrics.
141, Wearing-apparel.
142, Weaving and woven fabrics.
143, Weighing-apparatus.
144, Wheels for vehicles, (*excepting wheels for* Locomotives and tramway and traction engines; Railway and tramway vehicles; *and* Toys).
145, Wood and wood-working machinery.
146, Writing-instruments and stationery, and writing-accessories, (*including* Educational appliances).

(B.)—Abridgments classified in 271 volumes :—

1909—1915.
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(*In course of Publication.*)

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List of Classes.

1 (i), Chemical processes and apparatus.
1 (ii), Inorganic compounds other than metallic oxides, hydrates, oxyacids, and salts, (*including* Alkali manufacture *and* Cyanogen compounds).
1 (iii), Oxides, hydrates, oxyacids, and salts, Metallic, (*other than* Alkali manufacture *and* Cyanogen compounds).
2 (i), Acetylene.
2 (ii), Cellulose, Non-fibrous, and cellulose derivatives, (*including* Artificial filaments, sheets, and the like containing same).
2 (iii), Dyes and hydrocarbons and heterocyclic compounds and their substitution derivatives.
3 (i), Advertising and displaying apparatus, Moving and changing.
3 (ii), Advertising and displaying other than by moving and changing apparatus.
4, Aeronautics.
5 (i), Farmyard and like appliances, (*other than* Housing and feeding animals).
5 (ii), Housing and feeding animals, (*other than* Chaff and vegetable cutters).
6 (i), Cultivating implements and systems.
6 (ii), Gardening and like appliances, (*including* Miscellaneous agricultural appliances).
6 (iii), Harvesting-appliances.
7 (i), Combustion-product, compressed-air, hot-air, and vacuum engines.
7 (ii), Internal-combustion engines, Arrangement and disposition of parts of, (*including* Construction of parts peculiar to internal-combustion engines).
7 (iii), Internal-combustion engines, Carburetting-apparatus, vaporizers, and heaters for.
7 (iv), Internal-combustion engines, Igniting in.
7 (v), Internal-combustion engines, Starting, stopping, and reversing.
7 (vi), Internal-combustion engines, Valves and valve gear for, (*including* Other means and methods for regulating and controlling internal-combustion engines).
8 (i), Air and gases, Compressing, exhausting, and moving, (*including* Bellows *and* Vacuum and like dusting and cleaning apparatus).
8 (ii), Air and gases, Treating otherwise than by compressing, exhausting, and moving.
9 (i), Ammunition and ammunition receptacles.
9 (ii), Torpedoes, explosives, and pyrotechnics.
10, Animal-power engines and miscellaneous motors.
11, Artists' instruments and materials.
12 (i), Bearings and bearing-surfaces.
12 (ii), Lubricating passages, channels, reservoirs, and baths, and lubricating-cans.
12 (iii), Lubricators and lubricating bearing-surfaces, (*other than* Lubricating passages, channels, reservoirs, and baths).
13, Bells, gongs, foghorns, sirens, and whistles.
14 (i), Aerating liquids and gazogenes, seltzogenes, and siphon bottles.
14 (ii), Beverages, malt products, and organised ferments, (*other than* Aerating beverages).
15 (i), Dyeing and otherwise treating textiles, textile materials, and the like with liquids and gases, Apparatus for, (*including* Bleaching and washing, Processes and materials for).
15 (ii), Dyeing, Processes and materials for.
16, Books, mercantile forms, and the like.
17 (i), Boots and shoes, Apparatus for making and repairing.
17 (ii), Boots and shoes, Construction of.
17 (iii), Boots and shoes, Protectors and trees and other accessories for.
18, Boxes and cases.
19, Brushing and sweeping.
20 (i), Buildings and structures, Kinds or types of.
20 (ii), Buildings and structures, Miscellaneous accessories and details applicable generally to.
20 (iii), Doors and windows and their accessories.
20 (iv), Floors, roofs, walls, and ceilings.
21, Casks and barrels.
22, Cements and like compositions.
23, Centrifugal machines and apparatus, (*other than* Centrifugal fans, pumps, and reels).
24, Chains, chain cables, shackles, and swivels.
25, Chimneys and flues, (*including* Ventilating-shaft tops).
26, Closets, urinals, baths, lavatories, and like sanitary appliances.
27, Coin-freed apparatus and the like.
28 (i), Bread-making, confectionery, and cooking-appliances.
28 (ii), Kitchen and like appliances other than cooking-appliances.
29, Cooling and ice-making, (*including* Refrigerators *and* Ice-storing).
30, Cutlery.
31 (i), Cutting and severing machines for paper, leather, fabrics, and the like.
31 (ii), Punching and perforating machines and hand tools for cutting, punching, perforating, and tearing paper, leather, fabrics, and the like.
32, Distilling, concentrating, evaporating, and condensing liquids.
33, Drains and sewers.
34 (i), Drying gases, clothes, and materials in long lengths.
34 (ii), Drying systems and apparatus, (*other than* Drying gases, clothes, and materials in long lengths).
35, Dynamo-electric generators and motors, (*including* Frictional and influence machines, magnets, and the like).
36, Electricity, Conducting and insulating.
37, Electricity, Measuring and testing, (*including* Electric resistances and inductances).
38 (i), Electric couplings, and cut-outs other than electro-magnetic and thermal.
38 (ii), Electric currents, Converting and transforming other than by rotary converters and rotary transformers, and condensers.
38 (iii), Electric motor control systems and motor and like controllers.
38 (iv), Electric supply and transmission systems and apparatus not otherwise provided for.
38 (v), Electric switches and electro-magnetic and thermal cut-outs, (*other than* Motor and like controllers).

39 (i), Electric lamps, Arc and incandescent-arc, and vacuum or low-pressure apparatus for electric discharges through gases or vapours.
39 (ii), Electric lamps, Incandescent.
39 (iii), Heating by electricity, (*including* Electric furnaces and ovens).
40 (i), Electric signalling systems and apparatus, (*other than* Telegraphs *and* Telephones).
40 (ii), Phonographs, gramophones, and like sound transmitting and reproducing instruments.
40 (iii), Telegraphs, Electric.
40 (iv), Telephones and telephone systems and apparatus, Electric.
40 (v), Wireless signalling and controlling.
41, Electrolysis, (*including* Electro-deposition *and* Electro-plating).
42 (i), Fabrics, Finishing and dressing.
42 (ii), Fabrics, Treating otherwise than by finishing and dressing.
43, Fastenings, Dress, (*comprising* Buckles, Buttons, Jewellery, *and certain other fastenings specially applicable to wearing-apparel*).
44, Fastenings, Lock, latch, bolt, and other, (*including* Safes and strong-rooms).
45, Fencing, trellis, and wire-netting.
46, Filtering and otherwise purifying liquids.
47 (i), Fire-escapes and fire and temperature alarms.
47 (ii), Fire-extinguishing and fire preventing and minimizing.
48, Fish and fishing.
49, Food preparations, food-preserving, and the like.
50, Fuel Manufacture of.
51 (i), Furnaces and kilns, Combustion apparatus of, (*including* Details in connexion therewith).
51 (ii), Furnaces and kilns for applying and utilizing heat of combustion, (*other than* Combustion apparatus and details in connexion therewith).
52 (i), Furniture, Fittings and details applicable generally to, and articles of furniture not otherwise provided for.
52 (ii), Furniture for sitting and lying upon.
52 (iii), Tables, desks, and leaf turners and holders.
52 (iv), Upholstery, wall furniture, screens, and looking-glasses.
52 (v), Window, stair, and like furniture, brackets, racks, and stands, (*including* Antimacassars *and* Table and like covers).
53, Galvanic batteries.
54, Gas distribution.
55 (i), Coking, gas-producers, and retorts.
55 (ii), Gas manufacture other than gas-producers and retorts.
56, Glass.
57, Governors, Speed-regulating, for engines and machinery.
58, Grain and seeds, Treating, (*including* Flour and meal).
59, Grinding, crushing, pulverizing, and the like.
60, Grinding or abrading, and burnishing.
61 (i), Hand-tool, brush, mop, and like handles.
61 (ii), Hand tools, (*other than* Wrenches and bolt, nail, screw, and like inserting and extracting tools).
61 (iii), Wrenches and bolt, nail, screw, and like inserting and extracting tools.
62, Harness and saddlery.
63, Hats and other head coverings.
64 (i), Heating liquids and gases.
64 (ii), Heating systems and apparatus, (*other than* Heating liquids and gases *and* Surface apparatus for effecting transfer of heat).
64 (iii), Surface apparatus for effecting transfer of heat, (*other than* Apparatus in which the heat is transferred from products of combustion).
65 (i) Door and gate operating-appliances, furniture, and accessories, (*other than* Fastenings, Lock, latch, bolt, and other *and* Hinges and pivots).
65 (ii), Hinges and pivots.
66, Hollow-ware, (*including* Buckets, Pans, Kettles, Saucepans, *and* Water cans).
67, Horseshoes.
68 (i), Excavating earth and rock, booms, buoys, canals and rivers, ferries, and water supply.
68 (ii), Subaqueous buildings and structures, diving, and raising sunken ships and objects.
69 (i), Hydraulic apparatus not otherwise provided for.
69 (ii), Hydraulic presses, meters, motors, and like apparatus for use with high pressures.
69 (iii), Spray-producers and liquid-distributing sprinklers and nozzles.
70, India-rubber and gutta-percha, (*including* Plastic compositions *and* Materials of constructive utility, other than metals and stone).
71, Injectors and ejectors.
72, Iron and steel manufacture.
73, Labels, badges, coins, tokens, and tickets.
74 (i), Braid and braiding-machines, crochet-work and lace-making, and net-making machines.
74 (ii), Knitting and knitted fabrics.
75 (i), Burners and burner fittings.
75 (ii), Lamp chimneys, globes, lenses, shades, reflectors, and smut-catchers, and holders therefor.
75 (iii), Lamps for lighting and heating, Details and accessories applicable generally to, (*including* Lighting burners, pipes, cigars, and the like).
75 (iv), Lamps for lighting and heating, Kinds or types of, (*including* Lighting, Systems of).
76, Leather, (*including* Treatment of hides and skins).
77, Life-saving, (Marine), and swimming and bathing appliances.
78 (i), Conveyers and elevators for dealing continuously with articles and materials in bulk.
78 (ii), Lifting, lowering, and hauling not otherwise provided for.
78 (iii), Lifts, hoists, and jacks.
78 (iv), Loading and unloading, (*including* Transporters and cranes).
78 (v), Winding and paying-out apparatus for lifting, lowering, and hauling, (*including* Pulley-blocks and the like).
79 (i), Locomotives and tramway, traction, portable, and semi-portable engines.
79 (ii), Motor vehicles, Arrangement and disposition of driving, transmission, balance, and reversing gearing on.
79 (iii), Motor vehicles, Arrangement and disposition of parts of, not otherwise provided for, (*including* Construction of parts peculiar to motor vehicles).
79 (iv), Motor vehicles, Frames and undercarriage work of.
79 (v), Motor vehicles, Steering and controlling.
80 (i), Gearing, Belt, rope, chain, toothed, and friction, and gearing for converting and conveying rotary or reciprocating motion.
80 (ii), Gearing, Variable-speed, differential, and reversing, and for stopping and starting, and shafting and its accessories.
80 (iii), Link-work, cams and tappets, and ratchet and screw-and-nut gearing.
80 (iv), Mechanism not otherwise provided for.
81 (i), Disinfecting and deodorizing, and medical and like preparations.
81 (ii), Medical, surgical, and dental appliances.
82 (i), Metals, Extracting and refining, and alloys.
82 (ii), Washing granular, powdered, and like materials, and amalgamating, cleaning, coating, and granulating metals.
83 (i), Casting and moulding metals.
83 (ii), Metal articles and forms, Combination apparatus and processes specially designed for producing and treating.
83 (iii), Metals, Cutting.
83 (iv), Metals, Working.
84, Milking, churning, and cheese-making.
85, Mining, quarrying, tunnelling, and well-sinking.
86, Mixing and agitating machines and appliances.
87 (i), Bricks, building and paving blocks, slabs, tiles, and pottery.
87 (ii), Moulding plastic and powdered substances, (*including* Casting substances other than metals *and* Presses, Mechanical).
88 (i), Musical instruments, Automatic.
88 (ii), Music and musical instruments other than automatic.
89 (i), Bolts, studs, nuts, washers, and rivets.
89 (ii), Hooks, nails, cotters, pins, staples, wedges, and wood-screws.
89 (iii), Nailing and stapling and wire-stitching.
90, Non-metallic elements.
91, Oils, fats, lubricants, candles, and soaps.
92 (i), Ordnance and machine-gun carriages and mountings.
92 (ii), Ordnance and machine guns.
93, Ornamenting.
94 (i), Packing and wrapping-up for transit and storage, (*including* Baling).
94 (ii), Paper bags, sacks, wrappers, and the like, (*including* Making envelopes).
95, Paints, painting, and the like.
96, Paper, pasteboard, and papier mâché.
97 (i), Optical systems and apparatus.
97 (ii), Surveying, nautical, and astronomical instruments.
97 (iii), Thermometers, photometers, meteorological and mathematical instruments, and miscellaneous philosophical instruments.
98 (i), Photographic cameras and auxiliary appliances therefor.
98 (ii), Photographic processes and apparatus other than for taking photographs, (*including* Photographic plates, films, and papers).
99 (i), Pipes and tubes, Joints and couplings for, (*including* Joints for tubular framework *and the like* Wire and rod couplings and joints).

99 (ii), Pipes, tubes, and hose, (*other than* Joints and couplings for).
100 (i), Feeding and delivering webs and sheets.
100 (ii), Printing processes and apparatus, (*other than* Type setting and composing).
100 (iii), Type making, setting, and composing, (*including* Type-bar-making machines).
100 (iv), Typewriters and like machines.
102 (i), Pumps, Reciprocating, for liquids, (*including* Steam-engine air-pumps *and* Combined pumps for liquids and gases).
102 (ii), Water and other liquids, and semi-liquids, Raising and forcing otherwise than by pumps.
103 (i), Brakes and retarding-apparatus.
103 (ii), Rail and road vehicles, Details applicable generally to.
103 (iii), Railway and tramway vehicles, Accessories for.
103 (iv), Railway and tramway vehicles, Body details and kinds or types of.
103 (v), Railway and tramway vehicles, Draught, coupling, and buffing appliances for.
103 (vi), Railway and tramway vehicles, Undercarriage and underframe details of.
104 (i), Railway and tramway crossings and points and switches.
104 (ii), Railway and tramway permanent way other than crossings and points and switches, and railway and tramway systems other than electric.
104 (iii), Railways and tramways, Electric, (*including* Electric traction).
105, Railway signals and communicating-apparatus.
106 (i), Calculating, counting, and cash-registering apparatus.
106 (ii), Dynamometers, gauges, measures of length, steam-engine and like indicators, and testing-apparatus.
106 (iii), Fares and admission-fees checking, revolution and speed indicators, and odometers.
106 (iv), Indicating, recording, and registering apparatus not otherwise provided for.
106 (v), Measured quantities delivering, measures of capacity, and sampling liquids.
107, Roads and ways.
108 (i) Road vehicles, Body details and kinds or types of.
108 (ii), Road vehicles, Undercarriage details and draught appliances for.
108 (iii), Springs and vibration-dampers.
109, Ropes and cords.
110 (i), Centrifugal and screw fans and pumps.
110 (ii), Rotary engines, pumps, blowers, exhausters, and meters.
110 (iii), Turbines and reaction-wheels.
111, Sewage, Treatment of, (*including* Manure).
112, Sewing and embroidering.
113 (i), Ship and boat fittings and accessories, and pontoons and rafts.
113 (ii), Ships and boats, Kinds or types and structural details of.
114, Ships, boats, and rafts, Propelling, steering, and manœuvring.
115, Ships, boats, and rafts, Rigging, sails, and spars for, (*including* Boat raising, lowering, and disengaging gear).
116, Shop, public-house, and warehouse fittings and accessories.
117, Sifting and separating.
118 (i), Indicators and burglar and like alarms.
118 (ii), Signals, (*including* Marine signals).
119, Small-arms.
120 (i), Spinning, Preparation of fibrous materials for, (*including* Obtaining, opening, carding, and like treatment of fibres in general).
120 (ii), Spinning, twisting, and winding yarns and threads, (*including* Winding cords, wire, and the like).
120 (iii), Yarns and threads and miscellaneous spinning accessories and processes and treatment of fibres.
121, Starch, gum, size, glue, and other stiffening or adhesive materials.
122 (i), Engine and like cylinders, connecting-rods, cross-heads and guides, fly-wheels, piston-rods, and pistons.
122 (ii), Steam-engine distributing and expansion valves and valve gear and valve-actuating arrangements therefor.
122 (iii), Steam-engines, Kinds or types of, and details not otherwise provided for, (*including* Steam and other fluid-pressure hammers and presses).
122 (iv), Steam-engines, Regulating or controlling, starting, stopping, and reversing.
122 (v), Stuffing-boxes and substitutes therefor, (*including* Packing therefor).
123 (i), Liquid-level regulating, indicating, and registering, incrustation and corrosion preventing and removing, and door lids and covers for resisting fluid pressure.
123 (ii), Steam-generators.
123 (iii), Steam separators and superheaters.
124, Stone, marble, and the like, Cutting and working.
125 (i), Bottles, jars, and like vessels, (*including* Non-refillable bottles, jars, and like vessels).
125 (ii), Bottles, jars, and like vessels, Filling, opening, and closing, (*other than* Stoppers, lids, covers, and capsules).
125 (iii), Stoppers, lids, covers, and capsules, Bottle, jar, and the like.
126, Stoves, ranges, and fire-places.
127, Sugar.
128, Table articles and appliances.
129, Tea, coffee, cocoa, and like beverages.
130, Tobacco.
131, Toilet and hairdressing articles, and perfumery.
132 (i), Amusement and exercising apparatus other than games and toys.
132 (ii), Games.
132 (iii), Toys.
133, Trunks, portmanteaux, hand and like travelling bags, baskets, hampers, and other wicker-work.
134, Umbrellas, parasols, and walking-sticks.
135, Valves and cocks.
136 (i), Velocipede, cycle, and like vehicle brakes, steering-mechanism, and miscellaneous accessories.
136 (ii), Velocipede, cycle, and like vehicle driving-mechanism, (*including* Hand and foot driving-mechanism for apparatus other than vehicles).
136 (iii), Velocipedes, cycles, and like vehicles, Kinds or types and structural details of.
137, Ventilation.
138 (i), Washing and cleaning buildings and domestic articles other than clothes.
138 (ii), Washing, mangling and wringing, ironing, and starching clothes.
139, Watches, clocks, and other timekeepers.
140, Waterproof and like fabrics.
141, Wearing-apparel.
142 (i), Looms, Driving, reversing, stopping, and starting, and loom shedding-mechanism and pattern cards, chains, surfaces, and the like.
142 (ii), Looms, Kinds or types of, and details not otherwise provided for.
142 (iii), Looms, Weft supplying, inserting, beating up, cutting, doubling, and twisting in.
142 (iv), Woven fabrics and articles, and warping, leasing, balling, and beaming yarns, (*including* Pile fabrics *and* Floor coverings).
143, Weighing-apparatus.
144 (i), Wheels for vehicles, (*other than* Wheel tyres, Pneumatic and other elastic, and rims for use therewith).
144 (ii), Wheel tyres, Pneumatic and other elastic, and rims for use therewith.
145 (i), Wood, Cutting, (*other than* Sawing).
145 (ii), Wood, Working, (*including* Sawing).
146 (i), Filing papers and documents.
146 (ii), Stationery, wafers and seals, educational appliances, and ciphers and codes.
146 (iii), Writing-instruments, ink, receptacles for writing-materials, pads, and blotters.

FIFTY YEARS SUBJECT INDEX, 1861-1910.

A subject index of all complete specifications for the period 1861–1910 has now been published in 271 volumes corresponding to the new series of Illustrated Abridgment Classes (List B above). The classification is in accordance with the "Abridgment Class and Index Key," as amended up to date. To some extent the headings in the "Fifty Years Subject Index" may be regarded merely as a compilation of the corresponding headings in the abridgment volumes, and, so far as this is the case, the Index may be used with the abridgments. But, generally speaking, the headings represent an improved and extended classification of matter, and it may often be found more convenient to use the "Fifty Years Subject Index" with the specifications, as the contents of the new index headings will not always be found collected in any one Abridgment Class.

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