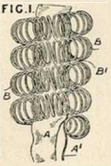
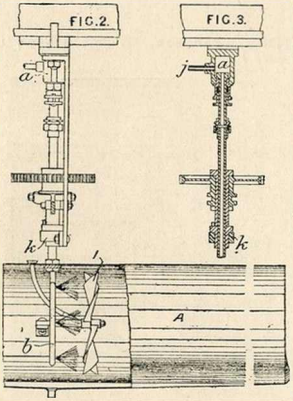
11,532. Clarkson, F. June 13.

Heating water; heating gases. — Consists of a number of plain or corrugated tubes A, round each of which is wound a coil B of fine wire, and attached by brazing or the like. The heating agent passes through the tubes A, thereby attemperating the fluid circulating around the coils B, and in modified arrangements, the heating-agent may circulate around the tubes and the coils B may be replaced by wire gauze.

FIG.1.

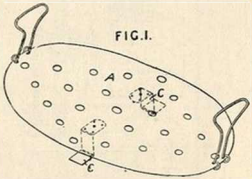


11,719. Watson, F., and Holden, A. June 17.

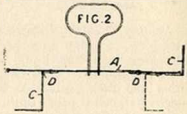


Heating air.—A method of regulating the temperature of workshops for the spinning and weaving of textile fabrics consists in providing a pivoted drum or casing A with a series of steam jets arranged on the ring *b* and supplied with steam from the hollow vertical axis *a* and steam inlet pipe *j*. The steam jets impinge on the vanes of a fan I, causing this latter to rotate and induce a current of air through the drum, whereby the atmosphere becomes heated and also laden with moisture. The drum can be set in any horizontal position by means of gearing for rotating the sleeve *k*, and by any suitable means air may be drawn from the inside or outside of the building for heating and ventilating.

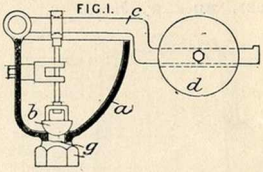
11,793. Richards, K. June 18.



Boiling pans. — A perforated plate A, for use in boilers, is fitted with plates C hinged at D so that they may be turned down for use as feet or turned up out of the way.



11,989. Beszant, B. N. June 20.



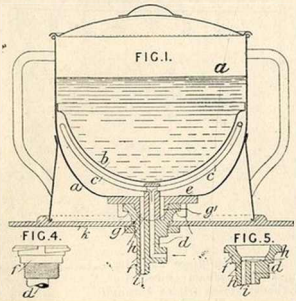
Heating water. — Relates to means for filling a kitchen boiler or hot water cylinder by hand when the ordinary feed pipe is frozen or cut off. Upon the cylinder or boiler is fixed a funnel *a* provided with an orifice *g* closed by a valve *b*, which latter is loaded by means of the lever *c* and adjustable weight *d*, so that when the valve *b* is lifted by the lever *c* water may be poured into the boiler, while at the same time the valve prevents the pressure rising above the amount fixed by the adjustable weight *d*.

12,332B. Cannot, G. A. June 25.

Non-conducting coverings.—Dried red p[illegible] in use device. into suitable forms by sawing, is submitted[illegible]y when

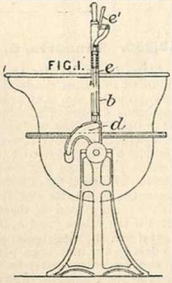
pressure, and afterwards finished and rubbed down with glass paper.

12,435. Hoffmann, E. E. June 27.



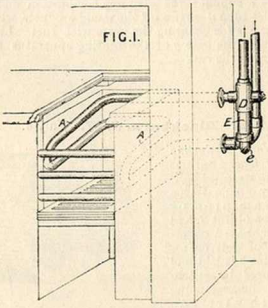
Boiling pans heated by steam. The vessel *a* jacketed below the false bottom *b* is provided with a fitting *e*, by which it may be connected to a steam supply pipe, the parts being secured by a bayonet joint. The part *e* has a central boring and also side borings *g*, *g*[1] adapted to make connection with a groove *h* in the piece *f* which is secured to the plate or hearth *k*. Steam is supplied through the pipe *d* and is spread by the pipes *c*, *c*. The water condensed flows away through the pipe *i*. The parts *e* and *f* are secured together by the hooks passing down suitable slots, the apparatus being then partially rotated.

12,352. Brierley, W. June 26.



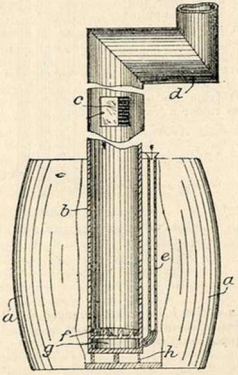
Boiling pans.—In order to tip and hold a pan in any required position, the trunnion handle *b* of the pan carries a spring actuated detent *e* engaging with a fixed quadrant *d* and operated by the bell crank lever *e*[1].

12,454. Bushell, A. M. June 27.



Water, purifying.—Attached to a water heating coil A, such as is used for kitchen ranges and the like, is a tee piece D, so that when the hot water flows outwards it strikes the vertical sides and is thereby caused to deposit its sediment, which latter is drawn off from the collecting pipe E through the plug *e*.

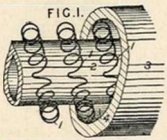
12,784. Haworth, T., and **Helme, W.** July 2.



Boiling pans, for cattle food, water, and the like,

consist of a cask *a*, in which is placed a tubular heater *b*, heated by fuel on the grate-bars *f*. A tube *e* supplies the air for combustion and an outlet tube *d* carries off the waste products, while a door *c* is for charging the grate with fuel. Legs *h* prevent the base *g* of the heating apparatus from burning the cask.

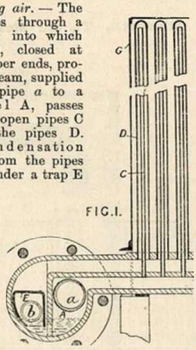
12,909. Blackburn, J. W. July 4.



Non conducting coverings.—Springs 1 are wrapped helically round the steam pipe or other object 2, and over these a covering of felt or asbestos 3 is laid and secured by stitching or wrapping with wire. An air-space 4 is thus formed round the pipe 2, which adds to the efficiency of the covering, and also prevents this latter from being charred by heat.

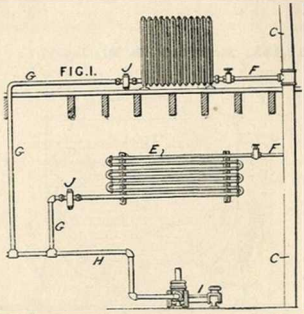
13,012. Higginbottom, J. July 5.

Heating air. — The air passes through a casing G into which pipes D, closed at their upper ends, project. Steam, supplied from a pipe *a* to a channel A, passes through open pipes C within the pipes D. The condensation water from the pipes passes under a trap E

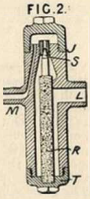


to an outlet *b* in a box arranged as illustrated. Instead of steam, hot water may be passed through the pipes in either direction.

13,319. Pickels, W. D. July 10.



Heating buildings and structures by steam circulation. Exhaust steam passes through the pipes C and F to the various heaters E, and the return pipes G lead into a pipe H, which is in connection with an exhaust pump I. The partial vacuum formed prevents short-circuiting in the system and air from accumulating in the heaters E.

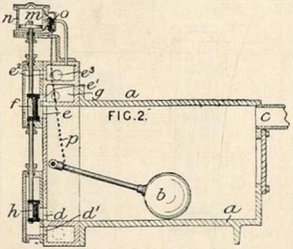


Thermostats J are fitted to the outlets of the heaters. Air &c. can be drawn freely through the nipples L and M and discharged at I. Should steam pass through L, the plate R will expand, so that the spindle S closes the passage and no steam can pass to the return system.

13,350. Saunders, S. July 11.

Steam trap.—Relates to steam traps of the type intended to return condensed water to the boiler, but applicable also as an ordinary steam trap. The apparatus consists of a casing *a* with an inlet *c* and an outlet d^1 for the condensed water, while a pair of distributing valves *f*, *h*, worked from a small steam cylinder *n* above, serve to control the openings of the various ports. As the condensed water gradually fills the casing *a* it lifts the float valve *b*, which latter raises the slide valve *o* of the steam cylinder by a link *p*; the piston *m* therefore rises and carries with it the valves *f* and *h*, thereby uncovering the port *d* and allowing boiler steam from the pipe e^3 to pass by the now open ports e^2, *e* into the cavity use *a* and force the water back into the boiler. device. soon as the condensed water has been forcedly when

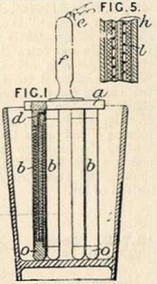
of the casing a, the float drops and the valves are returned to their former positions, and any vapour collecting in the trap escapes by the ports e, e^1 to the outlet pipe g. A diaphragm operated by steam



pressure, or by springs, may replace the steam cylinder, and the apparatus may be used in conjunction with an ordinary steam trap, which latter controls the admission of water into the one described above.

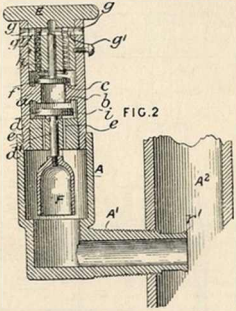
13,444. March, O. July 12.

Heating liquids.—Relates to an electric heating apparatus for liquids contained in a suitable receptacle, the form described being suitable for insertion into a tumbler. A number of metal tubes b are screwed on plugs d on a head a, the lower ends having water tight plugs o. Each tube contains a resistance consisting of a central wire h. Fig. 5, surrounded by asbestos, round which is coiled a wire l connected at its lower end with the wire h and insulated from the tube by asbestos. The resistances are joined in circuit with a suitable source of electricity through wires e passing through a handle f. On completing the circuit the tubes are heated, imparting heat to the liquid. The tubes may project upwardly from the head, the handle being made longer and the wire connections sealed up.



13,577. Lake, H. H., [*Sawyer, S.*]. July 15.

Heating buildings &c.—A valve is described which allows the escape of air when steam is turned on to radiators and other heating apparatus, and which prevents the escape of steam or water and permits the entrance of air when steam is cut off. The stem A^1 is screwed some distance into the

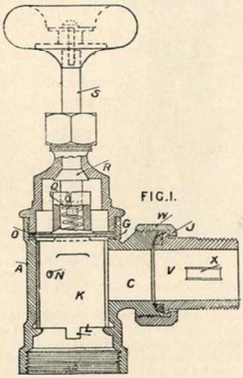


radiator pipe A^2, and has a projecting ring r^1 at its inner end to reduce the amount of water of condensation forced into it. The body of the valve is screwed into the pipe A, and has, near the middle of its length, an annular rib a having valve seats b and c, respectively, on its two faces. Into the lower end of the said body is screwed a block perforated at e, e to allow the passage of air and bored in the centre for the valve stem d^1 which carries a float F at its lower end. Projections i, i on the upper face of the block support the valve d in the position shown. When steam is turned on, the air is blown through the passages e, e, lifts the spring loaded valve f, and passes up the annular passage h in the cap E, and out through the passages g^1 and g. By rotating the cap E, the passages g^1, g^1 can be placed out of line with those g, g. When the steam in the radiator has reached the desired pressure, the valve d is forced against the valve seat b and further escape is impossible. Should water accumulate to any great extent, it lifts the float F and closes the valve d. By varying the diameter of the valve d, the pressure at which it closes is also varied.

13,598. King, J. July 16.

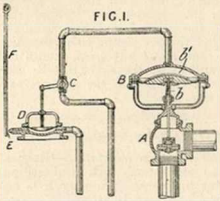
Heating by steam circulation.—Relates to plug cocks and connections used for heating apparatus and other purposes. The plug K is hollow and cylindrical, and may be slotted so as to render it resilient. It is closed at the top by a plate O and actuated by a pin on the spindle S engaging with a slot. A spring Q keeps the plate O in engagement with a seat G in the casing A. Various means for attaching the spindle to the valve are shown, such as a laterally projecting pin on the spindle engaging with a notch in the plug. The spindle may also be screwed to the plug or to the arms projecting therefrom. L is a stop to limit the motion of the

plug and N a small hole to equalize the pressure in the inlet and outlet to admit steam for warming the parts of the apparatus with which the valve is employed, or the like. The spindle S has a

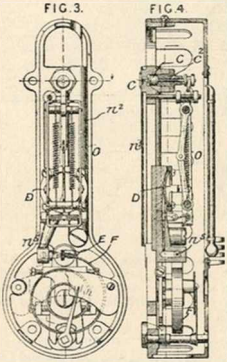


bevelled collar R engaging with a similarly shaped recess in the casing for packing. A tapered connection V is secured to the branch C by an inner nut W, and is held by a tool engaging with internal lugs X while coupling up. White metal or other packing J can be applied either to the branch C or to the connection V.

13,620. Jones, H. S., [*Johnson, W. S.*]. July 16.

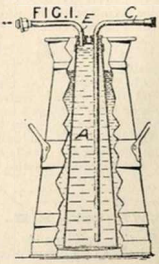


Heating buildings; thermostats.—Relates to apparatus for distributing and regulating fluid for heating dwelling houses and the like by the use of air or other fluid under pressure for actuating the main controlling valves. The apparatus is shown in diagrammatic form by Fig. 1, and the thermostatic device employed is shown in detail by Figs. 3 and 4. In the positions shown, compressed air is escaping from the secondary "motor" D by the port E, thereby opening the valve C and admitting compressed air above the diaphragm of the "motor" B, causing this latter to close the regulating and distributing valve A. As soon as the



temperature rises above the normal, the coiled strip F, Figs. 3 and 4, closes the orifice n^3 of the secondary "motor" D and allows compressed air, supplied independently by the passages n^2, n^3, to accumulate and force the piston of D outwards, thereby pressing outwards the toggle joint o to shift the valve C from the waste port c^2 against the supply port or passage c. The expansion chamber of the primary "motor" is thus cut off from its supply pipe, and the spring b lifts the diaphragm b^1 and opens the valve A to allow air for heating the rooms to pass. In modified arrangements, a slightly different form of thermostat is shown, and steam or other fluid may be used instead of air.

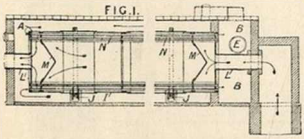
13,749. Long, E. July 18.



Heating milk.—A vessel A, with inlet and outlet pipes C, E for circulation, is placed in the milk to be cooled or heated. The pipes are arranged for attachment to the vessel, and to the pipes of similar vessels.

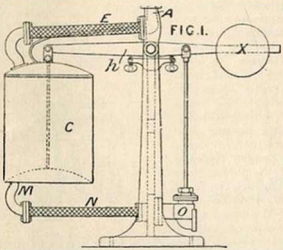
in use
device.
y when

13,871. Smithson, S. July 20.



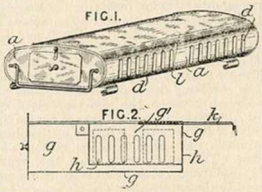
Heating air and other gases.—The products of combustion from a steam boiler furnace or the like are led away into a cylinder I supported upon rollers J and slowly rotated. The products of combustion enter by the tube L, and are deflected by the dished plate M so as to pass between tubes N into the main body of the cylinder, finally escaping past a similar baffle-plate to the flue L¹ leading into the chimney. The cold air to be heated is admitted to the chamber A at the right hand end, and after circulating round the outside of the cylinder I it enters the tubes N and escapes into the chamber B in a highly-heated condition, being led away by the flue E to be used in furnaces and the like. In order to remove soot and other deposits on the air tubes, a quantity of slag is placed on the rotating cylinder.

13,951. Boult, A. J., [*Musnicki, A.*]. July 22.



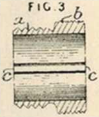
Steam traps.—To one arm of a beam *h* is attached a vessel C balanced by a counterpoise X, and connected to the steam pipe A above by a flexible pipe E, while an outlet pipe M, N below is controlled by a plunger valve *o*, operated by the beam *h*. When a predetermined quantity of water has collected in the vessel C, the latter sinks and lifts the valve to allow it to escape. In modified arrangements, the vessel C allows circulation of steam through it, and a piston valve is used instead [illegible] inger valve, while the knife-edge of the [illegible] s supported in an acute angled fork.

14,027. Boult, A. J., [*Deutsche Gluhstoffgesellschaft mit beschränkter Haftung*]. July 23.



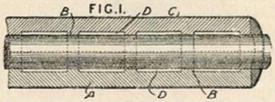
Footwarmers.—Fig. 1 shows the outer casing and Fig. 2 a horizontal section through the inner casing. The outer casing *a* has perforations *d*, and carries a woven fabric *l* to act as an insulator or heat moderator. The inner casing *g* carries a perforated frame g^1 provided with openings *h* and a sliding door *k*. The frame g^1 is charged with incandescent charcoal blocks.

14,070. Kinnell, C. P. July 23.



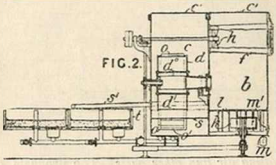
Heating buildings; heating water.—A nipple for connecting radiator sections, hot water boilers, and the like is formed with a coarse thread *a* and a fine thread *b* upon cylinders of different diameters, both threads being of the same hand, so that when the nipple is screwed into place by means of the internal projections *c*, the two parts will be brought together with considerable force, owing to the differential action of the screws.

14,392. Ibotson, H. P. July 29.



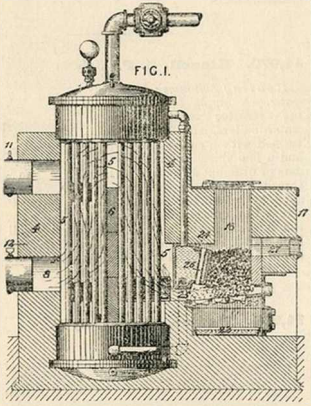
Non-conducting coverings for pipes, boilers, and the like are formed with inwardly projecting ribs B and intermediate air spaces D, while the two halves of the covering are secured by an outer wrapping C of canvas. The ribs B may be annular as shown, or arranged helically or longitudinally, and, when the pipes are socket jointed, the recesses D are made sufficiently deep to enclose the sockets.

14,456. Chubb, H. R. July 30.



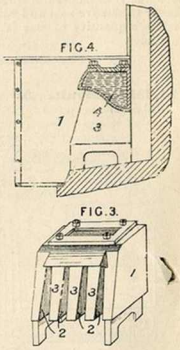
Heating liquids or gases.—Relates to an apparatus for, among other things, purifying and heating air, and cooling or heating liquids. The apparatus is shown in transverse section in Fig. 2, and is described as an air purifier. It comprises two chambers *b*, *c*, closed with liquid or sand luted covers c^1. The air is first forced into *b*, and then passes into the revolving drum *d*, which contains filtering material, between the two perforated cylinders d^2, d^3, and has water sprayed on to it or poured over it by buckets o^1 on the endless band *o*, which raises the water from the bottom of the chamber. The solid matter from the drum is caught in a trough *s* and conveyed by a pipe s^1 to settling tanks and filters *t*, whence the water is returned to the apparatus. The air is forced through the outlet pipe *f* by means of a fan *h*. Solids and liquids entering the chamber *b* may be separated by the centrifugal fan *k*, the solids being caught by radiating plates *l* as they are thrown out; the liquids are drained off by a trapped pipe *m*, and the solids removed through doors m^1. The bearings of the fan shaft are water jacketed to keep them cool.

14,465. Powell, E. July 30.



Heating water &c.—Fig. 1 shows the invention as applied to a low-pressure steam generator, but it is equally applicable to heating-water boilers. The furnace is placed in a lateral extension of the setting, the products passing under a fire-bridge 24 into the chamber 5, which latter is divided by a wall 6 to cause the said products to pass up and down among the tubes. The fire-bridge is preferably a hollow metal casting connected, as shown, to the upper and lower portions of the boiler, and is traversed by smoke-tubes 26 or by a rectangular flue.

14,833. Rowland, T. Aug. 6.

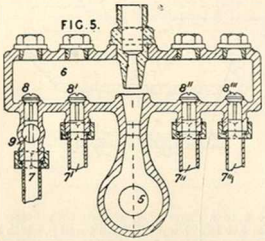


Heating water.—Boilers for use in connection with kitchen grates, open grates, and the like are of box-like form with perforations 2 extending from front to back, said perforations being separated by water chambers 3 in such a manner as to resemble, when seen in front elevation, the teeth of a comb. The boiler so arranged has a large heating surface, and in order to prevent clogging of the perforations with fuel, the front part 1 of the shell of the main water chamber is curved and extended forward to form a kind of canopy, while the lower side 4 is curved to an S shape for the same purpose.

15,050. Brooke, R. G. Aug. 9.

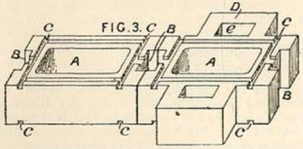
Steam traps for draining steam pipes, valves, chambers, and the like. Fig. 5 shows the general construction. A number of suction pipes 7, 7^{I}, 7^{II}, 7^{III}, have non-return valves which are normally closed by the pressure of steam in the chamber 8. Each pipe has or may have a cock 9. A device. the valve 5 is opened, an ejector action ily when

the valves open, and water from the suction pipes is delivered through the ejector. In some cases,



a number of ejectors may be placed in one casing in connection with a common steam supply chamber.

15,231. Buck, W. Aug. 13.



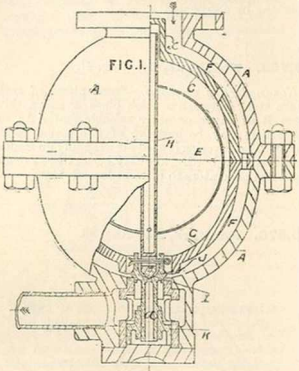
Heating buildings. — Flues A for conducting warm air from chambers in chimney breasts to other rooms of the building are constructed of perforated or tubular bricks.

15,265. Badger, J. R., and **Badger, W** Aug. 14.

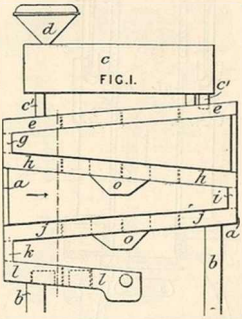
Steam traps.—An annular casing A, C admits condensed steam by the inlet x in the space F from whence it passes by apertures into the interior of the chamber C. As the water level rises the float E is buoyed up and lifts the conical valve I, thereby allowing steam and condensed water to escape through a central aperture a below a sliding piston valve K, which latter now pushes up and opens the valve J to permit the escape of condensed water by the outlet pipe m. In a modified arrangement, the top of the hollow float stem H is provided with a piston valve to cut off steam from the casing C when water is being discharged.

(*For Drawing see next column.*)

15,265.



15,743. Hart, B. Aug. 21.

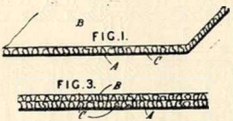


Heating water and other liquids for baths, washing, making tea and coffee, and for other domestic purposes. The liquid to be heated is supplied to a reservoir c by a funnel d, and passes successively to the inclined pans e, h, j, l by means of channels c^1, g, i, k. Deflecting plates, shown in dotted lines, may be fitted to each pan. The whole casing a is supported on legs b. Heat may be applied to each pan, or a central hole may extend through each to

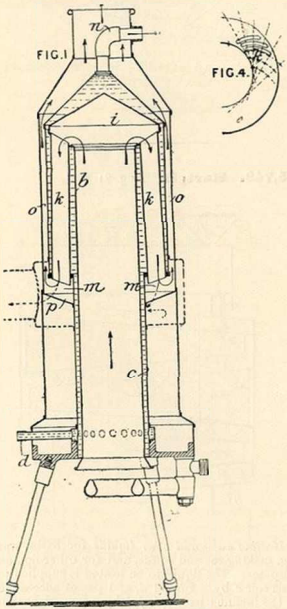
permit the flame of a common burner to pass up, cones *o* being fitted to deflect a part of the flame to each pan. The liquid may enter at the bottom of the apparatus if desired, and the bottoms of the pans may be corrugated.

15,753. Thiebaut, C. Aug. 21.

Non-conducting coverings.—Small pieces of cork C are stuck between a thick piece A and a thin piece B of paper or other suitable material; or the article may be built up of two layers, as in Fig. 3. The covering is used for wrapping up fragile bodies, such as bottles, and may be applied to steam pipes and generators to prevent loss of heat.



15,876. Junkers, H. Aug. 23.



Heating water.—Fig. 1 is a vertical section of a geyser in which a gas flame is used, but liquid fuel may be employed. The hot gases pass up the tube *b* to a chamber *i*, whence they descend by tubes *k*, *k* to a chamber *m* with a well *p*, which latter receives the water of condensation from the gases traversing the said tubes *k*, *k*. From the chamber *m* the gases pass away by a pipe, shown by dotted lines, or upwards through an annular space *o* to a chimney. The water is supplied by a pipe *d* to the water-chamber *c* and flows away through a pipe *n*. The tubes *k* may be of ordinary circular section, of oval section, or of the section shown in Fig. 4, in which both walls of each tube are cylindrical and are described from the same centre.

16,052. Cummer, F. D. Aug. 27. *Drawings to Specification.*

Heating air for drying purposes. Within a furnace structure containing a drying cylinder, a series of pipes, heated by exhaust steam, is arranged in such a way that incoming air passes over the steam pipes on its way to the drying apparatus.

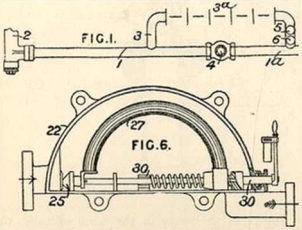
16,058. Michell, H. C. Aug. 27. [Date claimed under SEC. 103 of PATENTS &c. ACT, 1883, March 29th.]

Non-conducting coverings.—Relates to the manufacture of flake mica for boiler coverings and the like. Refuse mica is passed between a pair of corrugated rollers, and afterwards heated to separate the laminæ and render their edges quite open. The laminæ are then subjected to a strong blast to separate the mica into flakes, and when sufficient of the flakes are produced these are fed between a pair of finely corrugated rollers. The mica flakes thus prepared are utilized for non-conducting coverings. In modified arrangements, the heating and corrugating by the final set of rollers are dispensed with.

16,152. Brooke, R. G. Aug. 28.

Heating by liquid circulation.—The whole or a part of the hot water delivered by a pump or

injector is passed through one or more heating apparatus, the amount passing being controlled automatically or by hand. Fig. 1 shows diagrammatically the arrangement. The injector 2 delivers into a pipe 1, from which a branch-pipe 3 leads



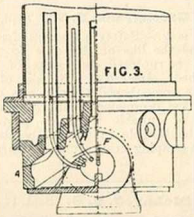
the whole, or a part, of the water into the heating apparatus 3^a, from which it passes to the pipe 1^a through a valve 5 regulated by hand or, automatically, by a thermostat. The pipes 1 and 1^a communicate through a loaded valve, which opens to allow the water to pass when very little or none is being sent through the heating apparatus. Several such heating apparatus may be supplied by the pipe 1, in which case a non-return valve 6 is fitted in each branch system. Fig. 6 shows an arrangement of controlling the passage through each heating apparatus automatically. The water passes through a casing 22, the entrance to which is controlled by a valve 25, the position of which is governed by a bent tube 27 containing some volatile liquid. One end of the said tube is held against a cam surface on the end of the spindle 30, so that by rotating the latter the apparatus can be adjusted.

16,381. Bannister, M. C. Sept. 2.

Non-conducting coverings.—Relates to a method of cleansing the husks or ears of cereals, such as rice and oats, when used as heat non-conducting material, and consists in subjecting the material to steam, hot-air, or a solution of alum and water, the material being afterwards dried. The treatment is intended to prevent fermentation by removing impurities adhering to the husks or contained therein.

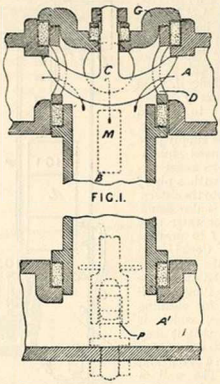
16,445. Atkinson, J. Sept. 3.

Heating water; heating air &c.—Relates primarily to feed-water heaters of the kind described in Specification No. 2458, A.D. 1877, but the improved apparatus may be used as a condenser or for heating any kind of fluid. The object is to enable heaters of this kind to withstand the higher pressures now employed. The tube plate A is stepped or arched, whereby pockets are formed for the collection of sediment, and the water branch, blow-out branch, and cleaning out openings are enabled



to be formed in the lower casing or head instead of in the shell as hitherto. The tube plate is strengthened by ribs F transverse to the arch, and the small circulating tubes H may be attached to these ribs, thus avoiding the sharp bends formerly necessary.

16,681. Messenger, T. G. Sept. 6.



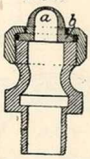
Heating buildings.—Relates to means for securing pipes in boilers used for heating buildings, and also to a mode of constructing the boiler itself. The pipe B is passed through two holes in the

part A of the boiler, and through a single one within part A^1. It is held in place by a ring D and a cover G which may be made in one, and the cover is secured by a bolt C. The parts A and A^1 may be held together by a tie rod engaging with a hook P and the pipes may be removed by lugs M. A modification is shown in which the ring D is acted on by set screws passing through arms on a bolt corresponding to C.

16,707. Greengrass, F. W. Sept. 6.

Heating water.—Safety apparatus for boilers, heaters, and the like of the class in which a diaphragm is ruptured on excess of pressure being reached. Instead of a flat disc of uniform thickness, a dome-shaped thimble *a* is employed of a thickness decreasing towards the crown. A flange *b*, of suitable width, is provided for securing the thimble in place. By attaching a whistle the escaping steam sounds an alarm.

FIG.2.

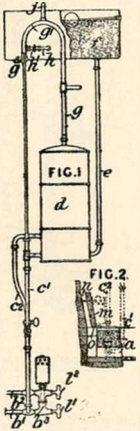


17,148. McLay, J. C. S. Sept. 14.

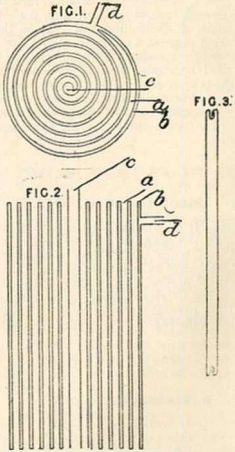
Non-conducting coverings.—Easily removable coverings for pipes are made in the form of tubes of asbestos, papier-mâché or paper chemically treated, so that it is rendered incombustible. These tubes are made of somewhat larger diameter than the pipes to which they are to be applied and are divided longitudinally. To the concave surfaces of these half pipes are affixed half-rings of similar materials, the inner diameter of the rings being equal to the outer diameter of the pipes. An air-space is thus provided between the pipes and their coverings. The half-tubes are secured by staples or bands. The divisions between are covered by strips of asbestos or other paper and the ends filled up with asbestos pulp.

17,294. Ederington, W. S. Sept. 17.

Heating water for domestic purposes. The pipes b^1, b^2, leading from the boiler *a*, are connected by a short branch b^3 and pipes c^1, c^2 connect to the water cylinder *d*. Cold water from *f* passes through *e* to *d*, and then by c^1 to the boiler. The house supply pipe *g* is arranged siphon-like at g^1 to assist circulation with a pipe *j* leading into the cistern. A pipe *h* is also fitted, so that hot water may pass into *f* to prevent freezing. Cocks h^1 and g^2 regulate the flow and circulation of the system. Plugs l^1, l^2 are fitted for cleaning the boiler, which is fitted, so that it may be readily removed for examination and repairs. The wall *m* of the flue *n* is mounted on a bridge *o* clear of the top of the boiler, and only a few bricks have to be removed for disconnecting purposes.



17,370. Green, F. Sept. 18.



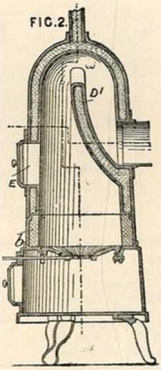
Heating water and other liquids.—A very broad tube *a* of rectangular cross section is formed into

spiral, and heated in any convenient manner, so that water or other liquid entering by the inlet *d*, circulates within the convolutions of the tubes, and escapes in a heated condition by the outlet *c*. The method of forming the seams of the tube by overlapping the edges is shown by Fig. 3.

17,421. Lake, H. H., [*Magee, F. A.*]. Sept. 18.

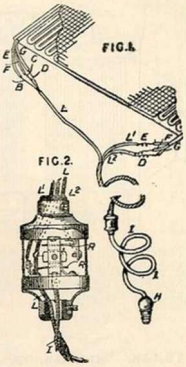
Heating water.—A vertical section of a boiler is shown in which the outlet for the furnace gases is at the side, and which is provided with a water chamber D^1 forming a baffle, which is subject itself to great heat, and directs the hot gases on to the front and top of the firebox. This baffle may, in some cases, be solid. The lower part of the firebox is, preferably, lined with brick at *b*.

FIG. 2.



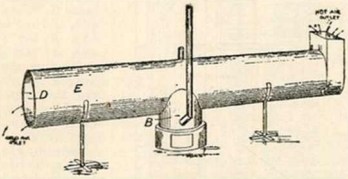
17,495. Feeny, V. I., [*H. W. Johns Manufacturing Co.*]. Sept. 19.

Heating by electricity.—Relates to means for regulating the amount of heat by using two or more conductors, one or more of which can be put into the circuit by means of a switch. The invention is shown as applied to a flexible heater with three wires B, C, D, Fig. 1, each enclosed in a wrapper E, F, G of asbestos &c. The wires at one end of the heater are formed into a cable L, and at the other end are connected, as shown, to two strands L^1, L^2. The wires are connected through a switch, shown in Fig. 2, with a cable I having a contact plug H. The strand L passes through the switch, the strand L^1 is connected with a contact R, and the strand L^2 with a contact R^1. When the contact plug is in the position shown, the circuit is broken; by turning the plug into the proper position, the circuit may be completed through one or more of the conductors.



17,565. Hansom, R. Sept. 20.

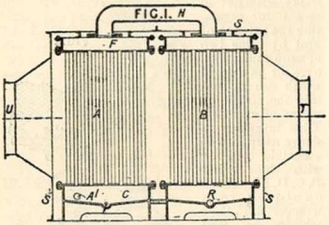
Heating buildings.—A boiler B circulates hot water in the annular space between the concentric tubes D, E, and thereby heats the air circulating within the inner tube. The apparatus may be used for heating and ventilating buildings, and the air is moistened during the heating operation by a layer of water in the tube D.



17,651. Davidson, S. C. Sept. 21.

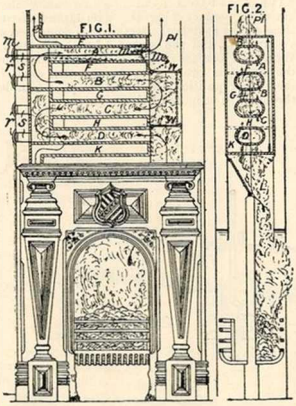
Heating air.—Live or exhaust steam is led into the lower steam chest C by the pipe A^1 and flows up through the tubes A to the upper steam chest F, from whence it passes by the pipe H into a similar group of tubes B, finally escaping by the exhaust pipe R. The air to be heated enters the

casing S by the inlet T, and after circulating around the pipe systems A, B and their corresponding steam chests, it escapes by the outlet U in a highly



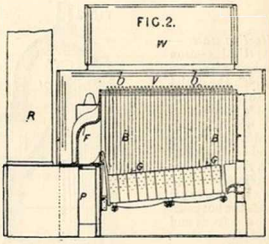
heated condition. The arrangement of pipes, as described, allows each set to expand independently and freely without in any way detrimentally affecting the jointing.

18,148. Shillito, T. R., [*Phillips, G.*]. Sept. 28.

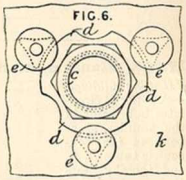


Heating air.—The hot gases from the fire pass through flues D, C, B, A to the chimney P', or they may pass directly into the chimney if the dampers W, W are turned by means of the handle and rod *m*. Air entering from outside or from near the floor passes round the flues and through passages K, H, G, F, E to the outlet *e*', and is conveyed to the rooms where it may be required. The apertures S, which have covers *r*, allow of the cleaning of the flues when necessary. The Figures show two fireplaces back to back, a damper L permitting either or both to be used.

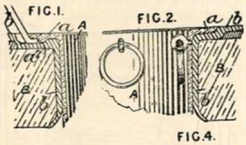
18,167. Davidson, S. C. Sept. 28.



Heating air.—Relates to stoves for supplying large volumes of heated air. The sides and roof of the furnace are formed of metal ribs B having "gills" *b* on their outer sides, and protected in the firebox by inclined perforated firebrick plates G. Parallel with, and on both sides of the furnace, are arranged air heating chambers opening above into the chamber V and hot air supply duct W, and traversed by a series of tubes or flues through which the hot gases from the furnace pass. The gases are deflected by the back plate F, and pass through an upper series of tubes to smoke chambers in front, returning by a lower series to the chamber P and chimney R. Air inlets are formed in the base of the air heating chamber, and the casing which encloses the stove. Suitable doors are provided to allow of easy access to the tubes &c. Figs. 6 and 8 illustrate the expansion fittings of the tubes or flues M into the walls *k* of the air heating chambers. Lugs *d* on the caps or covers *c* engage under catches *e*, and can be released therefrom by partly turning the cocks, which can then be removed for the purpose of renewing the tubes &c.

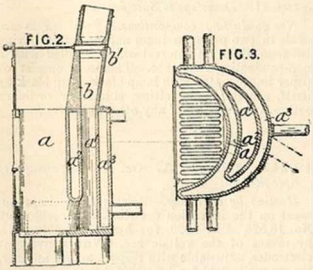


18,464. Wood, J. Oct. 3.



Boiling-pans.—Relates to means for providing ready access to the flues. A lining *b* is inserted between the pan A and the setting B. A bead a^2 in the flange *a* fits into a recess in *b*. Figs. 2 and 4 show modifications. The pan may be lifted by levers, ring-bolts, brackets, or the like.

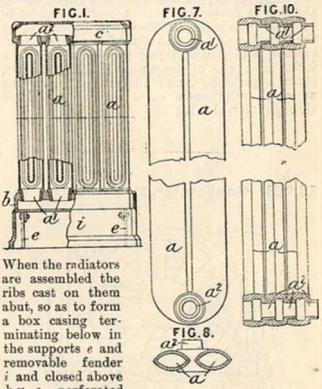
18,568. Funnell, W. Oct. 4.



Heating water, boilers for. A vertical boiler *a* is so shaped as to form the back of an ordinary grate, there being a flue or passage a^1 for the hot products of combustion to pass into the uptake *b*, thereby heating the water circulating in the water chambers a^2, a^3. The hot water is led off into the pipe system in any convenient manner, and a damper b^1 in the flue *b* regulates the draught. In a modified arrangement there may be three or more water-chambers and additional flues or flue boxes.

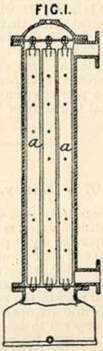
18,625. Wagstaff, J. G. Oct. 5.

Heating buildings, radiators for. The hollow sections *a*, Fig. 1, are formed with taper spigot ends a^1, a^2, which are forced into corresponding holes in the end boxes *b*, *c* by hydraulic or other pressure so as to form a fluid tight joint by metallic contact between the two taper faces.



When the radiators are assembled the ribs cast on them abut, so as to form a box casing terminating below in the supports *e* and removable fender *i* and closed above by a perforated casing, while air is admitted below through an inlet pipe, and, after circulating within the casing, passes out into the room or compartment in a heated condition. In a second arrangement, Figs. 7, 8, and 10, the spigots a^1, a^2 of the sections are formed on the sides and the joints are made in the same way, while the sections are formed in two parts *a* connected at the ends.

18,722. Paul, A. W. Oct. 7.

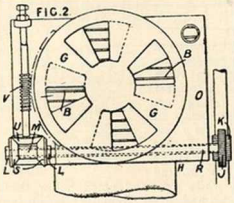


Heating water, air, or other fluid.—Relates to surface condensers and like apparatus for heating or cooling water, air, or other fluids. The invention consists in the use of narrow channels composed preferably of flattened tubes through which the fluid treated is caused to flow. The flattened tube may be strengthened with rivets if desired. Fig. 1 shows one form of apparatus, in which *a*, *a* are the tubes in question. In another form illustrated in the Specification, the tubes are coiled.

18,727. Thwaite, B. H. Oct. 7. *Drawings to Specification.*

Heating gases; heating by liquid circulation.—Consists in means for heating steam, in order to prevent loss through radiation or otherwise, by the circulation of heated glycerine or other non-volatile liquid. The liquid may be applied in a jacket in the case of steam pipes, engine cylinders, steam superheaters, and like steam containing vessels; or in some cases may be circulated through internal tubes.

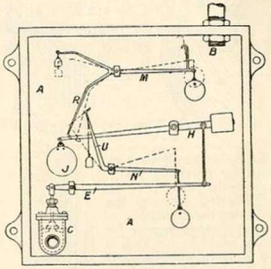
18,908. Lanchester, F. W. Oct. 9.



Thermostats.—Gas and oil engine cylinders are cooled by a current of air through their jackets and the cooling is controlled by a thermostatic arrangement comprising a tube R in the air outlet pipe which is constantly rotated by screw gear J, K, from the engine and carries two loose bevel wheels S and two fixed washers L. Inside the tube is a rod H with a co-efficient of expansion different from that of the tube; this is fixed to the tube at the end J and at the other end is attached through slots in the tube to a sleeve M outside the tube and between the wheels S. A difference of temperature causes one of the wheels to be pressed against its washer L and to rotate a wheel U and screw V for operating the valve G.

19,075. Easby, J. Oct. 11.

Steam traps.—A casing A, with an inlet B for condensed water, is provided with an outlet valve C operated by a pair of counterbalanced levers E, H and float J, while a pair of auxiliary levers U, N and R, M serve to lock the lever H in its highest and lowest positions respectively. As water rises in the casing A it brings the toe lever U, N into its operative position, and later causes the finger R to release the lever H, thus allowing this latter to tilt and be held by the lever U, N, thereby permitting the condensed water to escape by the valve C. As the water level falls the lever U, N drops out of engagement, the lever H is



again locked by the lever R, M and the action commences anew.

19,084. Barraclough, A., and **Clark, A.** Oct. 11. *Drawings to Specification.*

Non-conducting compositions.—Metal pipes are made in two parts, an inner and an outer, having between them an interval which is filled with a non-conducting substance. This may consist of paper impregnated with lamp black, lamp black by itself, asbestos, hair felting, silicate or ordinary cotton, vulcanite, or of any other substance.

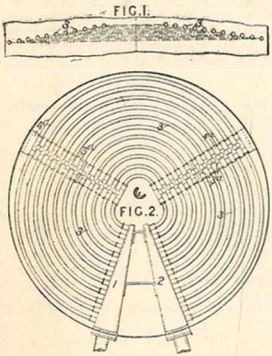
19,442. Hirsch, A. Oct. 16. *Drawings to Specification.*

Heating by electricity.—Relates to an improvement on the invention described in Specification No. 18,523, A.D. 1890, for heating, welding, &c. by means of the voltaic arc. With convergent electrodes, adjustable with respect to one another, the magnetic field for deflecting the arc is dispensed with. Various forms of apparatus are described and illustrated in the Specification.

19,463. Tyacke, F. H., and **Brownlow, R. S.** Oct. 16.

Heating liquids. An apparatus for heating, softening, and purifying water and other liquids consists of two steam chambers or boxes 1, 2, connected by bent pipes 3 arranged in three lengths and joined by nipples or connections 3^a and 4^a. The fluid to be heated or cooled flows through the pipes, and the active heating or cooling agent circulates around these latter or *vice versâ.* In a modified arrangement, the pipes are bent into a U-form and radiate from a pair of hollow boxes arranged one above the other. The apparatus

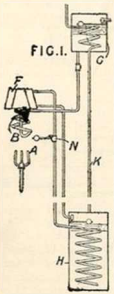
described may be applied to water purifying and softening apparatus of the type described in Specification No. 9814, A.D. 1894, and is preferably arranged below the vertical water mixing tube.



The steam chambers or boxes of the heating coils are carried by the containing vessel, while the spindle carrying the screw-like mixing blade is fitted with brushes or scrapers for cleaning the tubes.

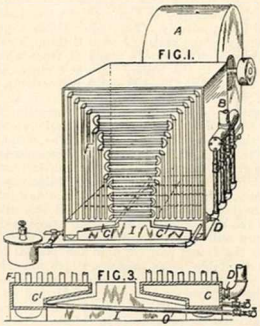
19,695. Robinson, H. M. Oct. 19.

Heating water.—The waste heat from any illuminating burner A is utilized for heating water by providing above it a coil or other boiler B in connection with a supply cistern C and a hot-water tank H. The boiler is fitted with a steam chamber F, whence a pipe fitted with a safety valve N is led down into the hot tank, wherefrom any steam remaining uncondensed escapes by a pipe K rising above the supply tank.



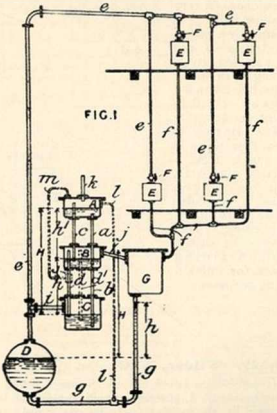
19,849. Curtis, W. H. Oct. 22.

Heating air.—Relates to apparatus for heating buildings, drying lumber, and the like by hot-air circulation. The apparatus comprises a series of pipes F secured to the hollow steam chests c, c^1, so that steam entering by the inlet pipe D is caused to circulate through the pipes F and heat the air



flowing through the casing B from the fan A. The inner pipes F are convoluted so that they are all of approximately the same length, and suitable pipes I, O are provided to drain away the condensation water.

19,871. Obrebowicz, C. Oct. 22.



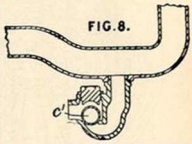
Heating by steam circulation.—Relates to regulating heating apparatus by keeping the difference

of pressure between the steam and water connections of the boiler constant. Three vessels A, B, and C, which contain water at varying levels, have pipes *a* and *b* giving connection at their lower parts, and pipes *c* and *d* connect the waterless spaces in A and B with the normal water level in B and C respectively. The boiler D has a pipe *e* for supplying the heating bodies E through valves F. Pipes *f* drain into a vessel G, from which a pipe *g* leads to the boiler. Overflow pipes *i* and *j* and *l* are fitted to C and B and A respectively, and an air pipe *k* is fitted through the cover of A. An air suction device J is fitted in connection with pipes *m* and *d*, and an additional pipe d^1 extending somewhat lower than *d* is fitted. The distance *h* between the water levels in B and C represents the difference of pressure between D and G. Assuming C filled to the pipe *i*, if the boiler pressure increases, water will rise in *b* and *d* and flow into B till the bottom of *c* is covered, and this will be when the boiler pressure is equal to *h*. Should the pressure still increase, water rises in *a* and *c* and covers the lower part of A to the normal level. With a suitable boiler pressure, which must, however, be greater than *h*, the difference of pressure remains constant or is quickly readjusted by the apparatus, assuming the pressure h^1 in G remains constant and the pressure H in D falls. The levels in A and B sink, water running by *a* and *b* into C, the under side of the pipe *c* is uncovered and the excess of steam and vapour in G escape through *j*, B, and *k* to the air, till the difference of pressure *h* is re-established, after which the water rises and closes *c*. The boiler pressure may also increase, or variations may occur in the pressure h^1, but in all cases the apparatus in a similar way to that described, readjusts the pressure *h*.

19,966. Davies, E., and Metcalfe, J. Oct. 23.

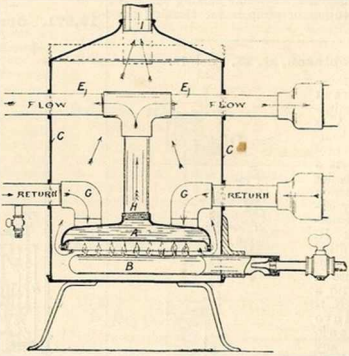
Steam traps.—To remove the water of condensation, say, from pipes conveying exhaust steam to locomotive injectors, traps such as shown are fitted at the bends where the water accumulates. When the head of water is sufficient, the valve c^1 is lifted and the water escapes.

FIG. 8.



20,182. Cooper, J. Oct. 26

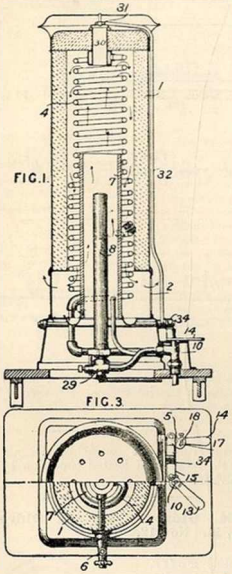
Heating by water circulation.—A very shallow boiler A is heated by a gas or oil burner B and is enclosed by a casing C, in which the hot air and gases circulate before escaping by the chimney I. The flow pipes E branch from a vertical pipe H, and the return pipes G re enter independently. The casing C may have a flat dished top containing water for humidifying purposes.



20,327. Wilder, M. G. Oct. 29.

Geysers.—An inverted cup casing 1, lined with refractory material, rests upon a slotted ring 2 and contains a coil 4, through which the liquid to be heated travels upwards from the inlet valve 5 and escapes by the outlet 6. The gas supply to the burner 8 is controlled by a valve 10, and the supply enters between the casing 7 and burner 8, while this latter burner is placed so high that direct heat from the flame is imparted to the lower part of the coil, the hot air and gases first pla

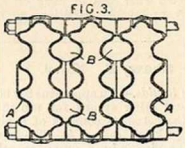
upon the upper part of the coil and finally escaping to the outlet 12 between the lower spirals. The handles 13 and 14 of the gas and liquid valves are connected by slotted links 15 so that they are



both turned on together, but a pin of the handle 14 moves in a slot 17 of the lever 18 so as to permit some amount of independent regulation of the liquid supply. To prevent accumulations of gas within the casing 1, a valve 31 therein is kept open when the valves 5 and 10 are shut, this opening being effected by a cam surface 34 on the lever 15 pressing upwards the link 32. To further regulate the gas supply, a slotted disc valve 29 is interposed between the gas valve 10 and burner 8 and its opening regulated by a thermostat in connection with the hot water supply.

20,730. Steven, T., Steven, A. W., and McDowall, Steven & Co. Nov. 2.

Heating buildings, radiators for. Each section A is spirally fluted, as shown at B in sectional plan, so that air entering from below circulates therein and becomes heated before passing into the room or apartment. Each section is connected to its neighbours by screw threaded nipples taking into screw-threaded tubes cast in the



radiator sections. The outer surfaces of the sections are formed with mouldings to impart a highly ornate character to the completed radiators

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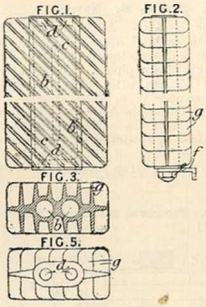
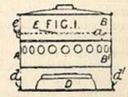
20,751. Rowell, H. Nov. 2.



Heating buildings, radiators for. Relates to a form of radiator which can be used in either a horizontal or vertical position. Each radiator section has two chambers *b* of circular cross section communicating at the ends *c* and furnished with a pair of orifices *d* at each end for the inlet and outlet of heating fluid. The section has inclined gills or ribs *g* to increase the heating surface and is carried by supports or brackets *f*, being secured to these latter by the plugs *e* used for stopping up the orifices *d* not in use.

21,027. Roberts, P. Nov. 7.

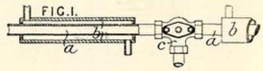
Boiling pans.—Relates to improvements upon utensils such as workmen's cans &c. Fig. 1 shows one form. The vessel A is divided by the plate *a* into two compartments B, B¹, the former to contain the articles to be



heated and the latter to receive a lamp D. The lamp is secured by catches or clips d, d^1. The vessel A may be further divided by a plate E, the space below containing water, which may be renewed through an opening at e. The vessel B may be provided with a spout and a handle, and may be fitted with lugs to hang on a support or on a velocipede. The vessel may be internally divided by removable partitions so that several articles may be cooked simultaneously.

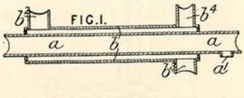
21,245. Shaw, E. Nov. 9.

Heating liquids.—An apparatus for boiling sugar, glucose, and other syrups for use in the manufacture of sweetmeats consists of a pipe a heated by steam-jacketed casings b. The syrup is forced through the pipe a by a pump or other suitable device, and is heated by steam circulating in the casings b. The syrup is drawn off by any one of three-way cocks c, and the steam supply to the jackets is independently varied to suit the heating requirements.

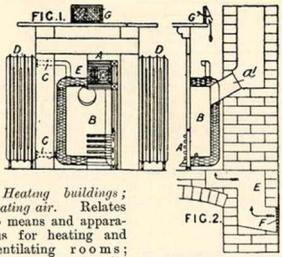


21,254. Shaw, E. Nov. 9.

Heating liquids. — An apparatus for boiling sugar, glucose, and other syrups for use in the manufacture of sweetmeats consists of a casing b heated by a steam pipe a. The syrup enters by an inlet b^2, and after circulating within the casing b escapes in a heated condition from the outlet b^3. The steam from the syrup escapes by the pipe b^4 and the condensed steam from the steam pipe a by an outlet a^1. The outer casing b may be heated independently by a steam jacket, and in one form of the apparatus the outlet pipe b^3 forms the inlet pipe of a second heating chamber, and the syrup passes successively through three such casings.



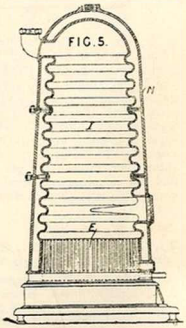
21,316. Rogers, H. J., and **Fearon, H. S.** Nov. 11.



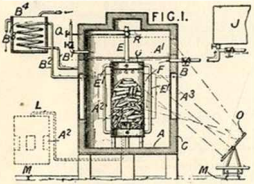
Heating buildings; heating air. Relates to means and apparatus for heating and ventilating rooms; conservatories, public buildings, and the like. A stove or fireplace A is made as a hollow casing B, this latter being connected to radiators D by piping C, so that the products of combustion from the firegrate heat the water contained in the casing, and thereby cause an active circulation in the hot water system before they escape by the outlet flue a^1. The building is ventilated by a shaft E, which allows air to enter from outside through a grating F and circulate around the casing B, the air finally enters the room in a heated condition by way of the valve G.

21,464. Oldroyd, E., and **Oldroyd & Co., E.** Nov. 12.

Heating water, vertical boilers for. The firebox I is circumferentially corrugated for the greater portion of its height, while at its lower extremity vertical corrugations E are provided. The circumferential corrugations decrease in diameter as they approach the crown of the boiler. The shell N of the boiler may be formed in any desired number of sections suitably connected.



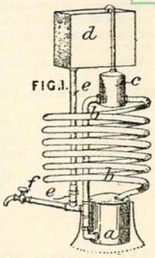
21,468. Calver, W. Nov. 12.



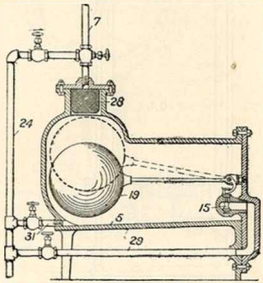
Heat, utilizing solar.—Relates to apparatus for manufacturing gases, as hydrogen and oxygen from water, wherein the rays of the sun are utilized. A heating chamber A is formed of non-conducting material C, and provided with a series of double glass or like windows A^3. The spaces A^2 between these double windows are connected together by tubes B passing through the non-conducting material. Cold water is caused to circulate through these tubes and spaces by tubes B^1, B^2, and a coil B^3 laid in a tank B^4, through which a constant stream of cold water passes. The chamber A is divided into two compartments by a diaphragm A^1, the upper of which acts as a boiler and delivers steam through a tube E to the lower compartment. The latter contains a vessel or retort F containing comminuted or scrap iron, and having top and bottom compartments G connected by tubes E^1. The upper compartment receives the steam from above, and the lower receives it from the tubes E^1 and allows it to ascend into the mass of iron. Surrounding the chamber concentrically is a tramway M, on which a series of reflectors O is carried, so as to reflect the sun's rays through the windows on to the retort and raise it to a red heat. The steam is thereby decomposed, hydrogen being evolved and collected in the vessel J, while oxygen is absorbed, and is afterwards liberated after stopping the supply of steam to the apparatus by turning the valve R by the hand wheel Q, either by heat alone or by carbonic oxide or carbonic acid. The process is then repeated. Instead of the boiler shown any other boiler may be used, as the external boiler shown in dotted lines. This is heated by solar rays in the same way as the chamber A, and is connected thereto by the tube L. Any other desired gas or gases may be produced by this apparatus, the material employed in the retort being varied as required. Instead of using steam, water may be passed directly on to the material, and formed into steam in contact with the material.

21,649. Hulse, J. Nov. 14.

Heating water; heating buildings.—The essential parts of a portable heater are shown by Fig. 1, in which *a* is the boiler connected to a coil of piping *b* furnished with an air chamber *c*. Water is supplied to the system by means of a tank *d* and pipe *e*, while hot water can be drawn off by means of the pipe *f*. A suitable casing surrounds the apparatus, having suitable openings and slides for the accommodation of the oil or gas burner, kettles, and the like, there being also handles for lifting and transferring the apparatus from place to place.



22,022. Brainerd, G. S. Nov. 19.



Steam traps.—A casing, with a sloping base 5, has an inlet 7 for the condensed steam, which latter passes through a strainer 28 before entering the trap. As water accumulates, the ball 19 rises and lifts the valve 15 from its seating, thereby permitting the water to escape by the outlet 29. Any sediment collecting in the trap is removed by a pipe 31, and a bye-pass 24 is provided to permit water to escape without passing through the trap so that this latter may be removed for repairs.

22,023. Newton, P. A., [*Wellington, A. B.*]. Nov. 19. *Drawings to Specification.*

Thermostats.—A wooden rod is used to carry the fulcrum of the lever which is to operate a valve or other contrivance. The short arm of the lever is attached to a pipe, through which passes the fluid,

whose variations of temperature are to control the position of the lever. This portion of the fluid pipe is made of expansible metal.

22,344. Jara, A. F. Nov. 22. *Drawings to Specification.*

Heating liquids by water circulation.—Heating milk for preserving is carried out in a cylindrical vessel containing alternating coils of tubes, through which hot water and milk are passed. The milk containing tubes consist of small tubes, several of which are wound together to form a coil

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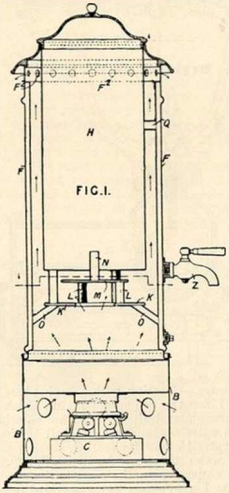
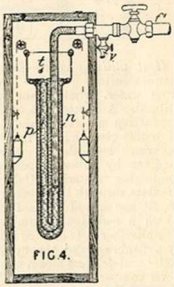
22,710. Darby, W., Darby I., and **Punchard, J. H.** Nov. 27.



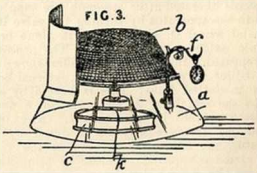
Heating water; heating buildings.—An apparatus for heating water for baths, hot water systems for buildings, green houses, and the like, consists of a water jacketed casing F with an inner water receptacle H connected to the shallow water holders M, K, and to the casing by suitable connecting pipes L, N, O, Q. This apparatus is detachably fixed upon perforated casing B of a portable stove provided with oil burners C of the type described in Specification No. 2274, A.D. 1895, and the products of combustion therefrom circulate around the water holders K, M, and H and connecting pipes L, N, O, Q, thereby heating the water contained therein before escaping by the outlet orifices F^2. The cold water is fed into the holder H in any suitable manner, and is drawn off by the tap Z, and in modified arrangement the jacketed casing is dispensed with.

22,739. Clay, H. Nov. 28.

Heating water.—A safety device for use in connection with domestic hot water supply is shown in Fig. 4. The pipe f^1 communicates with one of the water circulating pipes, and when pressure rises in the boiler mercury and water are expelled from the U-tube p into the counterbalanced receiver n, which sinks and exposes the end of the tube p for the discharge of steam &c. When the expelled water has drained off by the aperture t, the receiver n rises and the U-tube is again filled with mercury, a cock v being opened to discharge water &c. if necessary. The tubes and receiver may be of glass, and the height of the mercury in the latter may be used as a gauge of the boiler pressure.



22,959. Bromhead, S. S. Nov. 30.

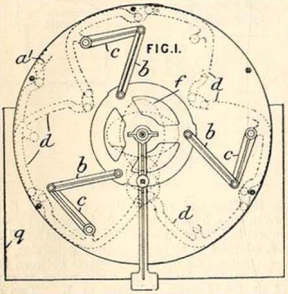


Heating water; foot-warmers; bedwarmers.—An appliance for warming beds, carriages, water for toilet purposes and the like consists of a lamp or burner c within a perforated casing a, upon which a kettle or other water holder may be placed, the whole being covered by a wire gauze casing b. The contrivance may be placed in a carriage or bed for warming purposes, and in this later case air is supplied to the burner by a flexible tube upon the nozzle (not shown).

22,996. Mills, J. Dec. 2.

Bedwarmers and airers.—An earthenware body A is formed on a potter's wheel in the ordinary way, and is provided with a screw stopper B, projecting knob G, and wooden handle E, this latter being secured by a key F; other materials than earthenware may be used for the different parts of the bedwarmer.

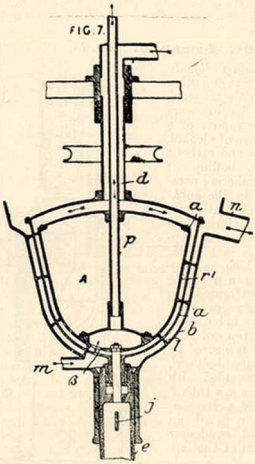
23,114. Bathgate, J. Dec. 3.



Boiling pans, containing clothes-washing machines. The articles are washed in a rotating drum consisting of two sides a^1 united by bolts and between which a series of movable pressers *d* are placed. The pressers *d* are linked together, as shown, and are operated to move in and out by means of the levers *b*, *c* connected with alternate pressers and driven from the rotary disc *f*, which is mounted on a loose sleeve on the driving shaft and geared with it by means of eccentric and elliptical gearing so that the disc *f* is driven alternately faster and slower than the drum. The whole rotates in the tank, boiler, or copper *q*. The clothes are introduced through a door in one of the pressers.

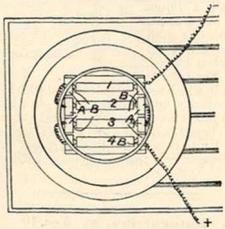
23,163. Rack, A. B. Dec. 3.

Heating liquids and gases.—An apparatus for heating liquids and gases and especially suitable for Pasteurising milk is shown in sectional elevation by Fig. 7. The liquid or gas to be treated enters the fixed casing *b* through an aperture *m* and after circulating between the spiral ribs *l* escapes by the outlet *n*. The active fluid, which may be steam, hot water, or the like, enters by the inlet pipe *d* and passes down between the sides r^1 and *a* of the rotating drum A, thereby heating the fluid passing upwards between the casings *a* and *b*, while the active fluid escapes by an aperture B into an outlet pipe *p*. In order to prevent



the outer casing from rotation a cottar *j* secures it to the pedestal *e*, while on the removal of the cottar the casing *b* is free to slide down the pedestal, leaving the rotating casing exposed ready for cleaning and repairs.

23,354. Le Roy, F. Dec. 5.

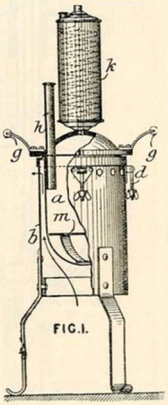


Heating by electricity.—Consists in the use of silicon blocks raised to a high temperature by the

passage of the current. In the form of heater shown in the Figure as applied to an electric stove, the silicon blocks 1, 2, 3, 4, which are exposed to the air, are held at their ends by platinum cones B supported on carbons A connected with the leads.

23,504. Leman, J. Dec. 7.

Heating liquids.—Catgut and other materials are sterilized by exposure to the vapour of a mixture of alcohol, water, and carbolic acid, boiling at atmospheric pressure, in the apparatus illustrated. The materials are placed on a support *m* in a boiler *a*, which is supported in a casing *b*, perforated to discharge products of combustion. The top of the boiler is secured by clamping bolts *d*, and provided with handles *g*, a tube *h* to hold a thermometer, and an upright condenser *k*, open at the top.

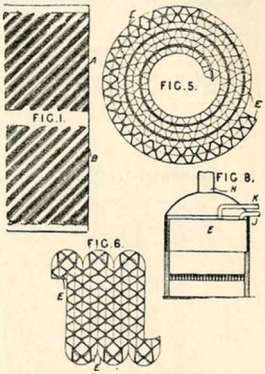


23,584. Oehlmann, E. H. C. Dec. 9.

Boiling pans.—The vessels are jacketed, and in the space between the inner and outer walls a liquid capable of being evaporated, or a solid capable of giving off vapour when heated, is placed. Fig. 1 shows one form, in which a safety valve fitted with a fusible plug *e* is attached to the outer wall. In a modified form, the jacket is connected by tubes to an annular or other shaped vessel adapted to be placed over a lamp or lamp chimney. For purposes such as chemical operations the vessel may be formed of glass.

23,664. Ljungström, F. Dec. 10.

Heating water and other liquids; heating air and other gases.—Surface apparatus for heating liquids and gases generally, consists of a series of corrugated, fluted, or ribbed metal chambers, formed by placing or folding together plates A, B, Fig. 1, until they are in contact, and then securing the



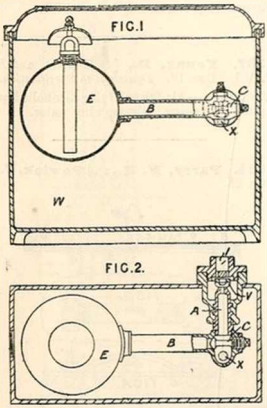
edges together and rolling them into coils E, as shown in Figs. 5 and 6, or by placing several small chambers in juxtaposition. Fig. 8 shows a coil E, Fig. 6, adapted to serve as a steam generator, the furnace gases passing up the spaces between the chamber to the chimney H, while water is supplied at J and steam delivered at K. Two or more such coils may be wound concentrically. The chambers may also be made by flattening a helically coiled tube, or by ribbed metal plates, and the contour of the corrugations may be of various shapes.

23,794. Butterworth, J., and **Tonge, R. F. C.** Dec. 12.

Steam traps.—A casing W is provided with an inlet I for water of condensation, the opening of which latter is regulated by a valve V carried by a hollow pipe A having a quick-threaded screw upon its outer surface. A float E carried by a hollow extension B is attached to the screwed pipe A, and as water flows into the casing, part of it escapes by an outlet X, while the remainder fills the ball E, causing it to drop and keep open the inlet. When steam begins to pass over, the water is driven out of the float E, and this latter then rises and shuts the valve V. A second valve *c* is adjustably fixed in the pipe A to regulate the water flowing into the ball, and the valve V is annular with a corresponding seating.

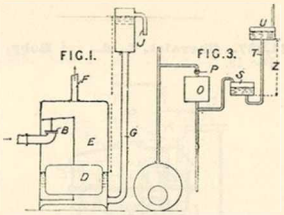
(*For Drawings see next page*)

23,794.



23,946. Lindemann, O. Dec. 13.

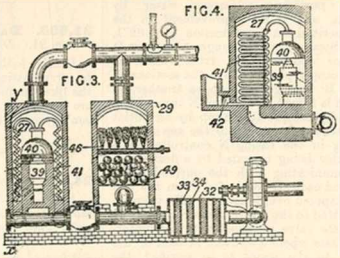
Heating by steam circulation; hermostats.—A method of maintaining a fixed counter-pressure in steam heating-coils and preventing the ingress of air, consists in joining up the coil O, Fig. 3, to a vessel S, which latter is connected to a similar closed vessel U by means of the siphon pipe T, so that when steam is admitted to the coil O by the valve P it is subject to the pressure of the water



column Z. The steam inlet valves are provided with grooved discs on their undersides, and when the valve is fully open just enough steam is supplied to displace all the air from the coils and to replace the volume of the steam condensed. The automatic regulation of steam is effected by means of a chamber E, Fig. 2, containing a float D connected by linkwork to the inlet valve B, so that the steam pressure is balanced by the water column in G, whereby a constant pressure is obtained; the steam escapes by an outlet F, and a waste pipe J prevents any increase in the height of the water column. Slightly modified arrangements are described and illustrated.

24,292. Deininger, A. Dec. 18.

Heating air for drying malt. Fig. 3 shows in vertical section apparatus for purifying, moistening, and heating air, and Fig. 4 is a section on the line *x–y*, Fig. 3. The heating-apparatus comprises a furnace 39 with a dome 40 through which the furnace gases pass into two serpentine tubes 41, and thence into flues 42. The apparatus is contained in a chamber 27, through which the air to be heated ascends.

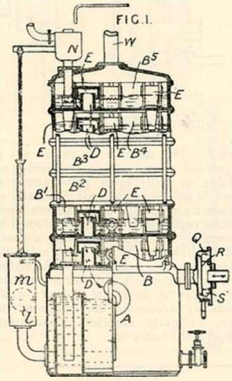


24,322. McLay, J. C. S. Dec. 19.

Non conducting coverings. — Asbestos, papier mâché, or millboard, which may have previously been rendered incombustible, is used as a non conducting covering for steam pipes, refrigerating-vessels, and the like. The covering has a number of air spaces formed by punching

holes therein and covering with asbestos, or the like, and distance-pieces are attached upon the inside to prevent the covering from coming into actual contact with the pipe or vessel to be protected; the air spaces thus formed act as an additional protection.

24,337. Chevalet, L. A., and **Boby, W.** Dec. 19.

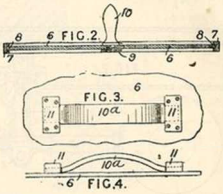


Heating water.—Relates to an apparatus for heating and purifying calcareous water by exhaust steam, and is an improvement on the apparatus described in Specification No. 8271, A.D. 1889. Steam passes through a scourer Q into a tank or vessel A, and from thence is conducted by capped pipes D into the sections B, B^1, B^2, B^3, B^4, B^5 arranged one above another, so that the steam is forced by the caps E through the water and finally escapes at the top by an outlet pipe W. Water is admitted into the top section by an opening in the casing N controlled by a valve, the latter being operated by a float *l* in a casing *m* communicating with the purified water reservoir A, and each section is fed from the one above it by a tapered overflow pipe. The pressure of steam admitted to the apparatus is regulated by a weighted plate valve provided with a counter-balance. In cases where a solution of soda or the like is added to the water to be purified, the boiler feed-pump carries a small auxiliary pump of any well known form, which takes soda solution from a tank and delivers it into the water as it flows to the heater, and a float in the store tank indicates to the attendant the strength of the solution. The scourer Q has a diaphragm R with its edges turned in at S to more effectually catch the greasy water of condensation from exhaust steam, and in modified arrangements two or more horizontal diaphragms may be provided.

24,387. Young, D., [*Bullock, C.,* and *Reed, C. M.*]. Dec. 19. *Drawings to Specification.*

Heating air.—Air for purifying alcoholic liquors is heated by passing it through hot water.

24,564. Parry, W. H., and **Powick, J. H.** Dec. 23.



Boiling-pans.—A lid or cover for boiling-pans and the like has a wood centre 6 let into grooves 8 of a bent wood hoop 7 while a cross ledge 9 stiffens the centre and carries the handle 10. In modified arrangements, the centre is of enamelled iron plate, corrugated to increase its strength and furnished with a handle as described above, or with a flat handle 10^a, Figs. 3 and 4, detachably secured in the bridge-pieces 11.

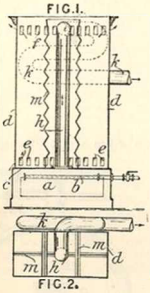
24,600. Dargue, J. A., and **Griffiths, E.** Dec. 24. *Drawings to Specification.*

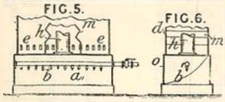
Heating buildings.—In cases where it is required to carry heating-pipes past a fireplace, window, or the like, the fenders, window sills, and other parts are formed as hollow pipes or chambers for the conveyance of the heating-fluid.

24,611. Rotter, F. Dec. 23.

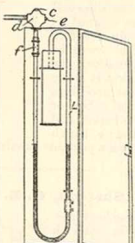
Heating buildings; heating air. Relates to stoves for heating air or heating buildings and using solid, liquid, or gaseous fuel. The Specification describes the invention with reference to a gas-heated stove *d* provided with a burner *b*, the hot products of combustion from which ascend by the flue *h*, *k* and thereby heat the cold air flowing into the casing *d* through the openings *e* and escaping in a heated condition by the outlets *f*. The corrugated plates *m* are intended to increase the heating-surface and, in some forms of the invention, the burners, Figs. 5 and 6, are directed

downwards and hot air is allowed to escape by an opening *o* near the floor.



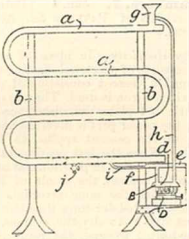


24,622. Mackintosh, C. Dec. 23.



Heating water.—The invention is applied to low pressure boilers and water-heaters and consists of a U-shaped glass tube L open at both ends and connected by a flexible tube *f* to a fitting *d* communicating with the boiler. The tube L is charged with mercury through a plug *c*, so that, if the pressure exceeds a certain limit, the steam blows out the mercury and escapes. The fitting *f* can be cleaned on removing a plug *e*. The apparatus may also act as a pressure gauge.

24,855. Foster, A. Dec. 28.



Heating buildings; heating water.—A portable apparatus for heating buildings and the like consists of a coil of piping *a* closed at both ends and connected by pipes *i*, *h* to a boiler B, consisting of two shallow water-containers *d*, *e* connected by a pipe *f*. The apparatus is filled with water at the funnel *g*, and the boiler is heated by any convenient lamp or burner D. The whole apparatus is supported upon stands *b*, and hot water may be drawn off from a tap *j*.

24,863. Macpherson, A. Dec. 28.

Heating air.—The radiating-surface of the fire-brick lining in flues for heating air is increased by flutings or corrugations.

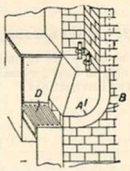
A.D. 1896.

306. Chambers, J. Jan. 4. [Date claimed under Sec. 103 of Patents &c. Act, 1883, Nov. 8, 1895.]

Heating by electricity.—In place of embedding the resistance wires of electrical heating-apparatus in hard enamel, a cement consisting of plaster of Paris and oxide of iron is used. Thus, in constructing an electric hot plate, the dish-shaped portion constituting the upper part is inverted, and a series of coatings of the cement applied to the inside with a brush. When the last coating has set the resistance wire is placed in position and completely covered with the cement, the whole of the casing being filled up with the same material. The hot plate is then subjected for some time to a temperature of about 200° F. to dry the cement, which is then further heated to expel the remaining moisture by passing the normal current through the resistance wire. The exposed surface of the cement may be coated with a mixture of pitch and paraffin, or the casing may be soldered up and a protecting-tube placed about the leading wires when the plate is to be used immersed in water. The process is applicable to electric frying-pans, kettles, radiators, sad-irons, &c. to be used as to the simple form of hot plate.

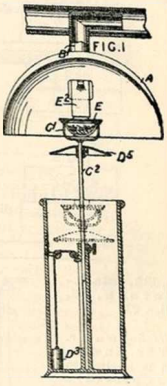
337. Fisher, R. P. Jan. 6.

Heating water.—Boilers for hot-water supply are fitted in the back of an ordinary grate, and are formed with a curved back A^1 corresponding to the flue wall B, so that the products of combustion escape direct into the firegrate D.



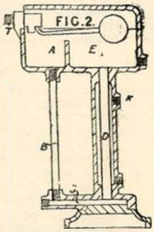
373. Cinnamon, J. Jan. 6.

Heating buildings.—An apparatus for heating animal houses in zoological gardens, hothouses for growing tropical plants, aviaries, and the like, comprises a grate or fire-basket C^1, supported by a sliding rod C^2 and balanced by a weight D^1. The fire-basket is closed in above by a radiating-cover E having a central lid for feeding in fuel to the fire-basket, and a short pipe E^2 for conducting the smoke into a flue B^1. A canopy or hood A reflects the heat rays downwards, and a reflector D^5 below the fire basket directs any heat that may radiate from the sides and bottom upward to the main reflector A. In modified arrangements, the fire-basket is slung from the hood by a chain or cable, or the fire-basket and hood are both carried on a portable tubular stand.

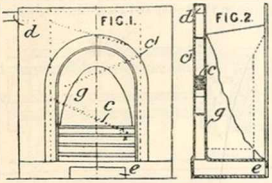


424. Sherwin, G. B. Jan. 7.

Heating liquids.—Tubes in which liquids are to be heated are spirally corrugated and are surrounded by steam. In apparatus with tubes or coils a ball valve regulates the water supply. In the Figure T is the water supply valve; the cold water runs from the compartment A to E through the pipes B, D, of which the latter is steam-jacketed.



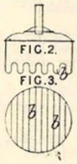
470. Hannah, J. D., and **Peele, W. C. C.** Jan. 7.



Heating air.—A chamber *g* is formed at the back of a stove or furnace, which may be that of a steam generator, and baffle plates *c*, *c*¹ ensure the proper heating of the air before reaching the outlet pipe *d* which conveys it to the required places. The cold air entering the flues at *e* may be brought from outside the room.

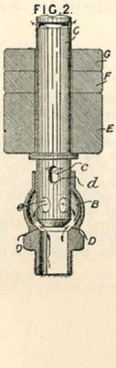
703. Bates, O. B. Jan. 10.

Boiling-pans.—The bottoms of utensils for boiling and for analogous purposes are made with deep hollow flutes, webs, channels, or projections of any suitable shape to increase the heating capabilities. Figs. 2 and 3 show a kettle, the bottom of which is made with a series of parallel flutes or projections *b*.

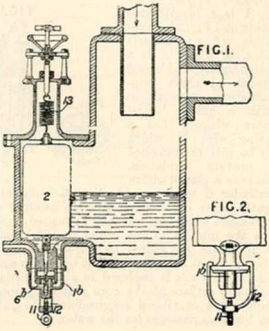


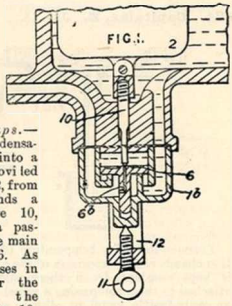
804. Gourlay, J. Jan. 11.

Heating water, safety-valves for boilers for. A tubular lift valve C rests on a seat D in a bulb B till the steam pressure raises it and thereby opens a passage for its escape through the bulb and the perforations *e* of the valve. A pin and slot *c*, *d* limit the lift of the valve.



848. Thornycroft, J. I., and **Thornycroft, J. E.** Jan. 13.





Steam traps.—Water of condensation is led into a casing provided with a float 2, from which depends a spindle valve 10, controlling a passage 6b in the main outlet valve 6. As the water rises in the chamber the float lifts the spindle valve 10, thereby opening a passage for the water which will have collected above the main valve 6 and relieving the pressure. The valve 6 accordingly opens and allows the condensation water to drain away until the float descends sufficiently to close the valve, when the action commences anew. The float is partly supported by a spring 13, and in a modified arrangement a separate casing is provided for it communicating with the main casing by pipes. The valve casing 1b, Fig. 2, is detachably supported by a hanging stirrup 12 and pinching-screw 11 for facilitating cleaning and repairs

830. Ewart, G., and Vaughan-Sherrin, J. Jan. 13.

Heating liquids.—Fig. 1 is a longitudinal section and Fig. 2 a cross-section of an electric heater, in which A is a longitudinally-ribbed cylinder of some non-conducting material in which is cut a helical groove wherein lies a heating-wire B which may be gilt or nickelled to prevent oxidation. This core is placed within a cylinder C of non-conducting material and of slightly larger diameter, so that an annular space is provided which the water to be heated traverses from the inlet D to the outlet E. The ends of the apparatus are closed by non-conducting discs F, G, the joints being made tight by elastic washers H, I. The whole is enclosed in a metal casing K. The outer surface of the core may be grooved in various ways or ribbed longitudinally to provide long tortuous passages for the water.

FIG.1.

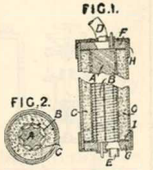


FIG.2.

884. Capitaine, E. Jan. 13.

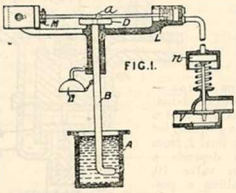


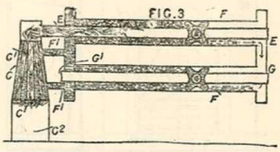
FIG.1.

Thermostats.—The temperature of the combustion chambers and vaporizers of gas and oil engines is kept constant by a thermostatic apparatus attached to them comprising a vessel A, containing an easily-fusible metal or alloy in which a rod B rotates or oscillates. The rod is driven by a belt on the disc D and carries a crank-pin *a*, from which a valve M is operated directly, or a valve V through the piston *n*, and air or liquid pump L. The valves L and M admit cooling-fluid to the cylinder and vaporizer jackets. When the temperature is low, the metal in H tends to congeal, and retards or stops the motion of the bar; the belt then slips on the disc D and the cooling-fluid valves L, M remain closed. R is an alarm bell.

927. Reilly, S. Jan. 14.

Heating buildings.—A heating-apparatus, shown in the accompanying illustration in sectional elevation, consists of a conical boiler C, fitted with internal flue tubes for conveying the hot products of combustion from the grate C^2 through the body of water in the boiler and then discharging it into

FIG.3



a smoke-box C^1, from whence it is conveyed through the hot-water pipes F by an internal flue E. The hot-water pipe system is connected to the boiler by the flow and return pipes F^1, and the air of the room or building can freely circulate in the open ended pipe G^1, G, thereby becoming heated. The pipes are corrugated as shown in cross-section and dampers are provided at suitable points in the flues.

1043. Pitt, S., [*Compagnie Internationale des Procédés Adolphe Seigle*]. Jan. 15. *Drawings to Specification.*

Thermostats.—A pyrometer fixed at one end is surrounded by boiler steam. The free end acts on a lever and controls the supply of fuel to a sprayer.

1113. Barbe, J. Jan. 16. *Drawings to Specification.*

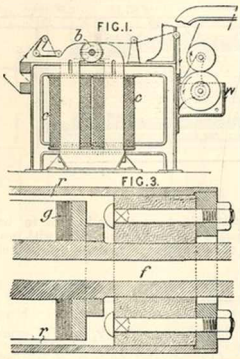
Heating by steam circulation.—In order that air may not enter steam apparatus through leaky joints when the pressure within is low, thereby tending to increase the size of the leaks, a vacuum valve is provided in the system.

1189. Carter, F. S. Jan. 17.

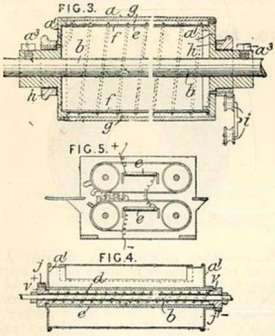
Heating by electricity.—The cylinder *b*, of copper or other material, for singeing fabrics or for annealing and tempering metals, is heated electrically by rotation between the poles of an electromagnet C. Within the cylinder, on the shaft *f*, Fig. 3, are mounted insulated iron or steel discs *g* forming a laminated core. The shaft is hollow to permit of the circulation of water to keep the bearings cool, and the space *r* may be packed with asbestos &c. The fabric is passed through a water trough W to quench burning fibres, which may be replaced by an oil &c. trough when treating metals.

(*For Drawings see next page.*)

1189.



1461. Hacking, R., and **Bennett, J.** Jan. 21.

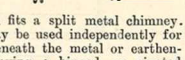


Heating by electricity.—Relates to means for electrically heating the rollers or cylinders used for roasting coffee, ironing, calendering, goffering, and the like. One form of cylinder is shown in section in Fig. 3, and consists of an inner tube *e* over which is wrapped a layer of asbestos cloth to receive the heating-coil *f*, and the latter is covered by plaster of Paris or asbestos cement *g*. The ironing, calendering, or goffering roller *a* is supported upon the insulating-layer *g* and is provided with end bosses a^1, a^3 keyed to the shaft *b* by set screws a^2, and the wire *f* is connected up to the slip rings *h*, which latter contact with rollers or brushes *i* of the electric supply leads. In a modified arrangement, Fig. 5, a crimping or goffering machine is heated by fixed tubes *e* provided with heating-coils. An arrangement for coffee roasting and the like is shown, Fig. 4, in which *b* is a spindle carrying an insulated electric heating-coil *d* protected by an outer tube *e*. Slip rings *r* and brushes *j* are provided for connecting the heating coil with the source of electric supply, and a casing *a* for receiving the granular material is fixed to the shaft.

1587. Hocquet, M. Jan. 22.

Non-conducting compositions.—Powdered cork is treated with borax solution, dried, and added to a mixture of sheet gelatin, Dutch glue, glycerine, crystallized sugar, and smaller quantities of ammonia and sulphur, with tannin and bichromate of potash dissolved in water. The whole mixture is kneaded, dried, and powdered, and the powder is compressed in heated moulds or otherwise to the required forms. In a somewhat simpler process, the cork is mixed with a solution containing gelatine, glycerine, tannin, and bichromate of potash, and optionally dry carbonate of lime and resin.

1620. Robertson, G. Jan. 23.



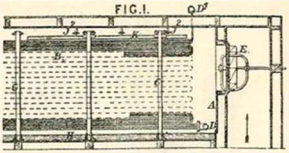
Heating water.—An oil lamp, for which may be substituted an atmospheric gas burner, is provided with a glass globe having a flange upon which fits a split metal chimney. The lamp, which may be used independently for lighting, is placed beneath the metal or earthenware chamber B having a hinged or pivoted cover b^4. Flues b^3, proceeding from this chamber, pass through boilers, water-heaters, or sterilizing-chambers, such as c^8, c^9, which may be single or jacketed as shown, and the products of combustion are finally discharged either into the room or to a chimney. The lamps and fittings may be secured to a wall or floor by brackets or standards. A hot-water circulating cistern may be used in connection with a boiler through which the flue b^3 passes.

1914. Lightfoot, T. B. Jan. 27.

Heating air.—Relates to apparatus for cooling air and for producing dry warm air. The air to be cooled is passed over pipes in which volatile liquid is evaporated and over which brine is circulated to assist cooling and to prevent rime. The pipes B are arranged on supports C, in zig-zag or otherwise, as walls in a chamber A, and are

connected with the volatile liquid main D and gas exhaust main D^1. Brine is circulated by a pump being lifted from the tank H and distributed over the pipe walls by pipes J^2 and troughs K with serrated edges. Vertical plates may be arranged between the pipes and similarly supplied with brine to increase the cooling-surface. Air is circulated by a propeller E. The air thus cooled and deprived of its moisture may be passed through a second chamber containing pipes heated by steam &c. in order to give a supply of warm dry air for thawing meat or other purposes.

FIG.1.



1960. Shaw, E. Jan. 28. *Drawings to Specification.*

Heating liquids; boiling-pans.—Relates to means for regulating the temperature in pans for boiling sugar and other syrups. The steam heating-coils for both jacket and pan are provided with pressure reducing valves of any well known type, which are capable of adjustment so that the temperature of the pan may be regulated.

2008. Fish, J. A. Jan. 28.

FIG.2.

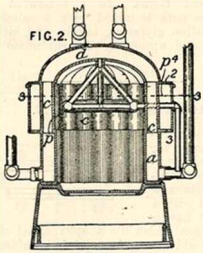
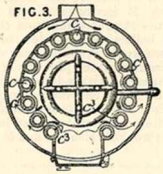


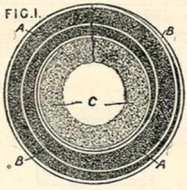
FIG.3.



Heating water.—A vertical section of a boiler is shown in Fig. 2, and a sectional plan on the line 3, 3, Fig. 2, in Fig. 3. From the annular cylindrical base *a*, a series of vertical tubes *c* rise to the dome *d*. These tubes are connected laterally by flanges c^1, except at the front. Between these tubes c^3 at the front, the combustion products pass to the external surfaces of the tubes and pass round to the flue opening behind through the casing 2, 3. The course of the gases is shown by arrows in Fig. 3. The under-surface of the dome may be ribbed. To increase the efficiency of the boiler, the water ring *p* is suspended by water tubes from the dome. The ring is connected with the chamber *a* by the pipe p^1.

2170. Morley, S. E. Jan. 30.

FIG.1.

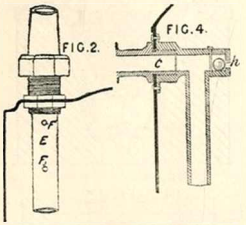


Non-conducting coverings.—A covering A of asbestos or the like is mounted upon a suitable backing B, and around the inner periphery of the segments A a flexible covering of silicate of cotton, asbestos, or the like is attached by silica-soda paste, wire, or other means. This covering, when applied to pipes or other bodies, adapts itself and beds against the whole surface, and the thickness of the covering is maintained irrespective of joints or other irregularities.

2192. Woosey, W. J. Jan. 30.

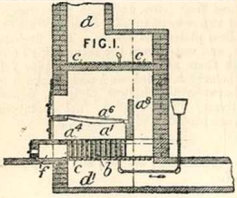
Heating buildings; heating water.—A means for preventing the siphoning off of water in

the boilers and circulating cylinders of hot-water heating-systems consists in perforating the cold-water supply pipe E, Fig. 2, at points F near the top of the boiler or cylinder, so that if the

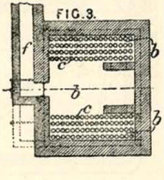


water falls below the level of these perforations air enters the pipe E and the siphon action is stopped. In a modified arrangement, Fig. 4, the ball valve *h* under normal conditions rests on its seat, and should water be drawn from the boiler or cylinder through the supply pipe C the water level falls and the valve is opened by the inrush of water to admit air to the pipe as before.

2339. Langfield, J., and **Kenworthy, G. H.** Feb. 1.

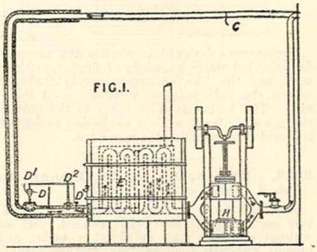


Heating air.—Relates to means for heating air in a furnace using coal, gas, or other suitable fuel. The air to be heated is led by a flue d^1 into a series of vertical tubes *c* placed at the sides of the furnace and extending from the chamber d^1 to the chamber *d*. The heated air escapes by an outlet flue *d*. The hot gases from the firegrate a^6 are led away by a flue a^8



into the bottom of a chamber *b*, and circulate among the tubes *c* from back to front, thereby heating the air in the tubes and the bottom of the ashpit a^4, whereby the air for primary combustion is heated. The products finally escape by the flue *f*. A propeller or suction fan may be used to accelerate the passage of air through the tubes. The casings of the furnace may be of metal or brickwork.

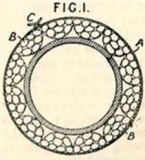
2349. Hislop, G. R. Feb. 1.



Heating gases.—Relates to internally heating ironing-rollers, hand-irons, &c. by means of steam or heated gases supplied from overhead pipes by flexible metallic tubing. The Figure shows the main portion of the apparatus. The steam &c. is circulated by means of a pump H and passes through the heater E along the asbestos-covered overhead pipe C, and after going through the ironing-appliances returns along a parallel overhead pipe which lies close to the pipe C. The temperature is regulated by means of the rising and falling of the mercury in the regulator D, which moves a float D^1 and actuates the lever D^2 to turn the cock D^3 controlling the admission of gas to the heater E. The volume of steam &c. passing is controlled by a regulating-valve connected to the throttle valve of the engine, turbine, &c. which drives the pump H.

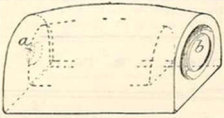
2363. Ibotson, H. P., and **Giles, G. W.** Feb. 1.

Non conducting coverings.—Upon a canvas backing A a number of loose ropes B, composed of asbestos, are fixed by a solution of silicate of soda, and the covering so formed is wrapped round the steam pipe or other article and secured thereto



by lacing C or other convenient means. In a modified arrangement, cork dust, infusorial earth, or the like is mixed with agglutinating material and moulded into bars of triangular or trapezoidal section, for use in place of the asbestos rope.

2481. Phillips, C. Feb. 4.



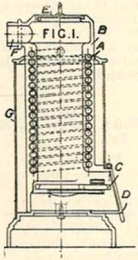
Footwarmers designed to obviate the necessity for using hot water are made of fireclay, earthenware, and the like, of approximately D-shaped section, the walls being of relatively great thickness. The hollow interior opens to the outside through an orifice *a*, while a projection or knob *b* is provided for handling the apparatus.

2528. Zinzen, A., and **Beckmann, O.** Feb. 4. *Drawings to Specification.*

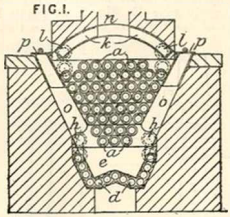
Non-conducting compositions.—Consists of a mixture made of lime, ashes, and cement, with or without chemicals such as alum or borax, and organic materials such as hair, feathers, wood-shavings, &c., the whole being mixed in suitable proportions, and formed into sheets or slabs. The inner surfaces of the sheets have ribs or projections of various forms, so that when wrapped round a pipe or other object an air space is left in order to prevent radiation and diminish the area of contact. A backing of jute, linen, wire, or the like may be provided to hold the composition together.

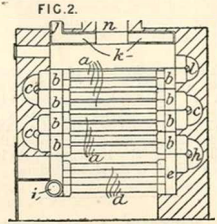
2625. Waugh, J., [*Bolze, H.*]. Feb. 5.

Heating water; heating gases.—An apparatus for heating water, and superheating steam and gaseous fluids comprises a coil of pipe A embedded in a protective cast-iron covering B and provided with a fire-grate C, fuel aperture, and a flue F. The fluid to be heated circulates in the piping A, and is heated by the hot products of combustion from the grate C. Radiation is prevented by a mantle G and an asbestos covering, and in a modified arrangement the coil is heated by placing the apparatus in a flue and allowing the hot gases to circulate in and around the covering B



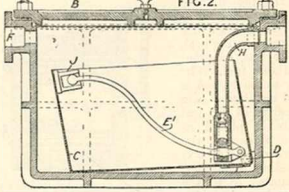
2828. Dilworth, W., and **Carr, E.** Feb. 7.





Heating water, boilers for. The water tubes *a* are fastened to the hollow end plates *b*, of which there are four pairs, and each plate receives the ends of two rows of tubes. Siphons *c* also connect the hollow plates *b* as shown. The firebars *d* are hollow, and water from the return pipe *i* circulates through them and joins the flow pipe *j* leading from the arch *k*. Siphons *h* and *l* make a connection between the hollow plates *e*, *b* and *b*, *k* respectively. The sloping fuel chambers *o*, *o*, Fig. 1, are provided with doors *p*, *p*.

2860. Picking, G. G., and **Hopkins, W.** Feb. 7.

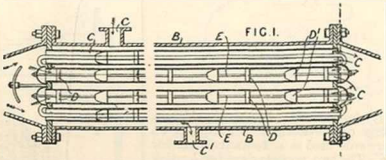


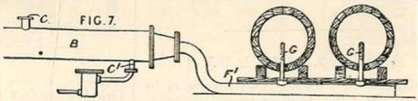
Steam traps.—A steam trap, which may be used for returning the water of condensation back to

the boiler, consists of an outer casing B enclosing a dish-shaped float C, the latter being pivoted at D and controlling the end of the valve lever E¹ by an enclosing guide J. When the water has risen a sufficient height in the casing it overflows into the float C and causes it to sink, thereby depressing and opening the valve F. The steam pressure in the casing now expels the water through the outlet pipe H and relieves the float, which latter therefore rises and closes the outlet; the action then commences anew.

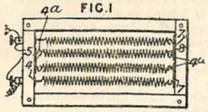
2902. Gillies, J. Feb. 8.

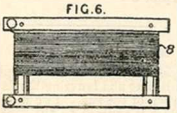
Heating air.—In seasoning or curing casks by heated air, the cold air is pumped or forced through tubes C, Fig. 1, fitted with a steam cylinder B having steam inlets and outlets *c*, *c*¹ respectively, Figs. 1 and 7. Threaded on rods E within the tubes C are serrated rings or cones D, D¹ to impede the movement of the air and cause it to impinge on the sides of the tubes to be heated thereby. In lieu of the rings &c. helically-wound wire or other obstructions may be employed.





3141. Boustead, J. M. Feb. 11.

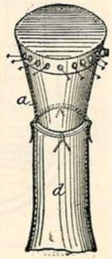




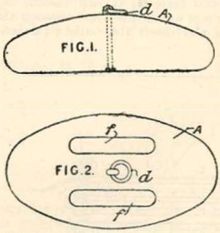
Heating air; heating by electricity.—Air for drying tea and the like is heated by resistance coils of iron or other metals, which may be coated with porcelain or other insulating-materials. The heater shown in Fig. 1 consists of a frame of slate or other insulating-material. The coils 8 are secured to hooks 4 and 4ᵃ. The former pass through the frame and are secured by terminals 5 to which the leads are connected; the others are attached to metal plates 7 secured to the frame. The latter may, if desired, be of metal, in which case the hooks and plates 7 are insulated from A. Another form of heater is shown in Fig. 6 in which the wire 8 is wound on a frame of insulating-material.

3179. Heggie, J., and **Buckley, M.** Feb. 12.

Heating buildings.—Consists in an appliance for use in connection with lamps and stoves for the purpose of retaining, collecting, and utilizing the heated products of combustion for warming rooms, or for cooking, or for conveyance to a hot-air radiator. The appliance or bonnet *a*, which may be utilized as a support for cooking-utensils, is placed above the lamp &c. flame or chimney *d*; and an outlet *e* may be provided for attachment to a hot-air radiator.



3540. Deidesheimer, A. Feb. 17.

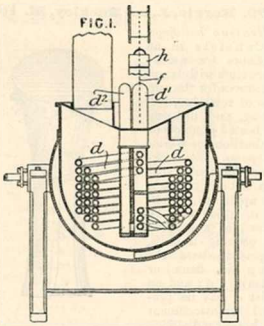


Bedwarmers; footwarmers; heating liquids.—A mass of pottery or porcelain A is heated in an oven and afterwards used as a footwarmer or for warming beds. The two pockets *f* are for heating milk bottles, and for convenience of handling a ring *d* is provided.

3575. Boult, A. J., [*Judell, M. W.*]. Feb. 17.

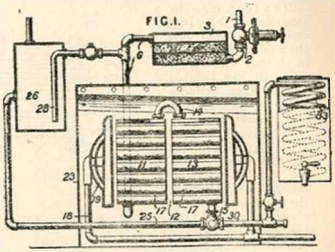
Heating liquids; footwarmers.—Glycerine or its allied products, either alone or mixed with water, is used as a heating-agent instead of water in foot warmers and the like, and also for heating other liquids.

3613. Shaw, E. Feb. 18.



Boiling-pans.— A jacketed pan for boiling sugar and the like is pivoted on trunnions in the usual manner and furnished with a set of auxiliary steam coils *d* attached to the cover *e*, through which latter the inlet and outlet pipes d^1, d^2 are passed. The auxiliary coil and cover are raised by a chain *f* and counterweight *h*, and in the present arrangement the pipes d^1, d^2 are pivoted to a wall bracket so that the coil swings round a centre.

3679. Prunty, J. E. Feb. 18.

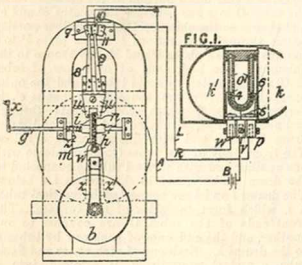


Heating water.—The water is supplied by a pipe 1 through a reducing-valve 2 to a filter 3 and passes thence by a pipe 6 to a geyser. This consists of two chambers 11 and 13, each consisting of a wide though shallow zig-zag or corrugated passage. The water enters at the lower part of the left-hand chamber and passes to the upper end of the right-hand one by a bend 14, and is drawn off by a valve 15 to either of the pipes 25 and 30. The water is heated in passing through the geyser by burners 19, each being supplied by pipes 18 and having several jets. The hot gases pass through flues 17 to a central passage 12, and the heating-apparatus is enclosed in a casing 23. The water can be led either to a cooling-coil 33 or to a tank 26, to which water can be admitted direct from the filter by a pipe 28.

4611. Wenck, C. Feb. 29.

Thermostats.—The invention consists of an apparatus for raising and lowering blinds &c. controlled by the action of the sun. Two air chambers *k*, k^1, one of which is exposed to the sun's rays and the other is jacketed are connected by a U-tube o^1, containing mercury, in which are fixed three contacts 4, 5, 6 connected to binding-screws *w*, *v*, *p* which are connected by wires L, R, A to terminals 7, 10, 11 over which moves a pivoted forked switch 8, 9, *u*. A battery B is placed in the wire A. The arms 8, 9 are connected to the commutator brushes Z, Z'. The armature *b* of a magneto machine is geared to a spindle W on which the blind roller is fixed. A worm *h* on the spindle W gears with a pinion *r* loose on the shaft *g* on which is a fixed disc *i* pressed by a spring i^2 against the pinion *r*

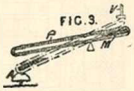
Projections *m*, *n* shift the forks 8, 9 when the shaft *g* is rotated. Starting from the position shown if the air in *k* expands, contact is made at 4 and broken at 6 and the current flows and the



armature rotates till the fork 8, 9 is shifted to 10, 11, when the battery circuit is broken. When the air in *k* contracts, contact is made at 6 and broken at 4 and the current flows and the armature rotates in the opposite direction till the fork 8, 9 is shifted back to 7, 10, when the battery circuit is again broken. The shaft *g* may be turned by the handle *x*.

4681. Pfleiderer, P. March 2.

Thermostats.—A temperature alarm and heat-controlling device for baking-ovens and the like comprises a closed tube P balanced on a knife-edge and containing a fusible metal or alloy M which, when melted, runs down the tube and overbalances it thereby operating an alarm A and heating valve or damper V. This form of controlling-device may be applied to drying-chambers and refrigerators, the tube then containing cocoa-butter, water, or the like.



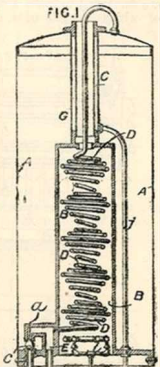
Heating water; heating buildings.—Cooling-water used for abstracting heat from the closed steam heating-coils used in baking-ovens and the like may afterwards be used in radiators for heating buildings.

4762. Clark, R. March 3. *Drawings to Specification.*

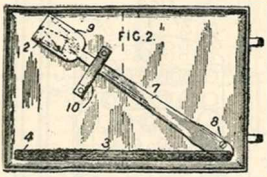
Thermostats for incubators. The temperature is regulated by means of a damper on the lamp chimney operated by levers actuated by a rod resting on a capsule in the egg drawer.

4826. Coe, J. S. March 3.

Heating water.—A vertical cylinder A has a central chamber B containing a coil D, which latter is of varying diameter, so that the hot gases from a burner *l* circulate freely around it before escaping by the chimney C. When water is drawn off from the outlet pipe F, the spherical valve *c* is lifted and closes the opening *a*, because of the rush of water entering by the pipe *d* to replace the water drawn off. In consequence of this action the hot water is drawn from the top of the tank, and passes through the coil D before escaping. When no water is being drawn off, there is a free circulation through the casing E, the coil D, and cylinder A. The flue G is jacketed by a pipe C, and has an outlet *j* for condensation water, while in a modified apparatus the inlet *d* is on the opposite side to the valve *c*, which latter is carried by a cage to prevent it falling away from its seating.



4843. Harland, A. P., Wright, F. M., and Usina, D. A. March 3.

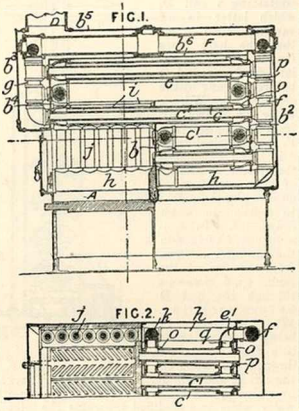


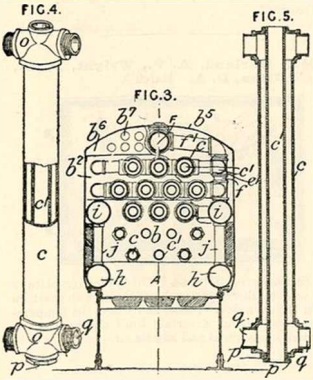
Thermostats for ovens. The indicating-plate 9 of an oven thermometer shows through an aperture 2 in the oven door or side, and when the temperature rises beyond a certain limit the aperture is partially uncovered and admits air.

4846. Plenty, J. March 3.

Heating liquids.—Fig. 1 is a vertical longitudinal section, Fig. 2 a half sectional plan, and Fig. 3 a

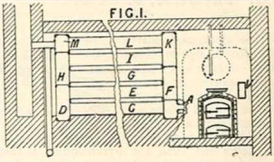
cross-section of a boiler in which each water-tube is traversed by a flame-tube. The lower tubes C^1 are shortened to make a fireplace A, the back wall of which consists of a diaphragm in which the





forward ends of the said tubes are supported. The back ends of all the tubes are supported in a diaphragm b^3 between which and the top of the setting is left a passage for the furnace gases. A portion of the latter passes through the tubes C^1, and a portion over the diaphragm b and under b^2, to the rear flue between the plate b^3 and the casing. From this rear flue a portion of the gases traverses the tubes C to a flue between the plates b^3 and b^4, and thence to the chimney D, and another portion passes through perforations b^7 in the plate b^2 to a top flue between plates b^5 and b^6, and thence to the chimney. The back ends of each row of tubes C, C^1 are connected by short tubes q and the outer ones of each row are coupled, by bends c^1, to vertical tubes f, which communicate through inclined tubes f^1, with a central steam-and-water drum F above, and with side drums h, h below. The front ends of the tubes C communicate with one another and with vertical tubes g connected to the drum F above, and to side drums i, i below. The drums i and h are connected by vertical tubes j, j, which form the sides of the furnace. The front ends of the tubes C^1 are coupled to one another, and the end ones of each row by tubes k to the drums h. Each end of each water and flame tube, c and c^1 respectively, is screwed into a coupling-piece o, Figs. 4 and 5, which has branches to receive the connecting-pipes q. A bush p may be screwed on one end of the inner tube and into the coupling, the said bush having a flange p^1 between which and the coupling the tube sheet or diaphragm forming the flue wall is secured.

4965. Arbury, A. March 5.

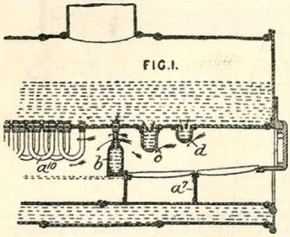


Heating air for Turkish and hot-air baths. Combustion products, from the usual boiler or heat generator, are led by an inlet A into the lowest tube C of a series C, E, G, I, and L placed one above another and connected by end boxes F, K, D, H, M arranged to cause the gases to flow through all the tubes before escaping into the outlet flue. Air enters by a door V and circulates around the metal tubes, escaping to the baths &c. in a highly-heated condition.

5127. Christmas, C. March 7.

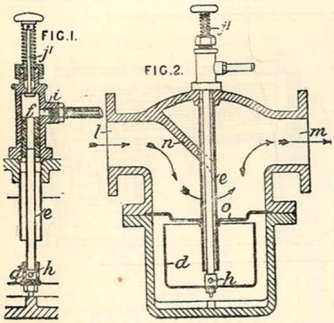
Heating water.—In place of the ordinary firebrick bridge or arch at the back of a boiler furnace, a water chamber, connected to the boiler by tubes and suspended thereby, is employed. In addition, other water baffles and arches are used. Fig. 1

shows the application of the invention to a Cornish boiler, where the water bridge is shown at *b*, baffles at *c*, *d*, and water circulation &c. tubes at a^{10}. The



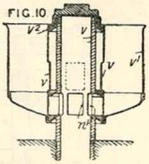
ashpit is shown as divided into two spaces by the partition a^7. The Specification also describes and illustrates the application of the invention to marine and egg-ended boilers.

5214. Jackson, A. E., and **Jackson, J. P.** March 9.



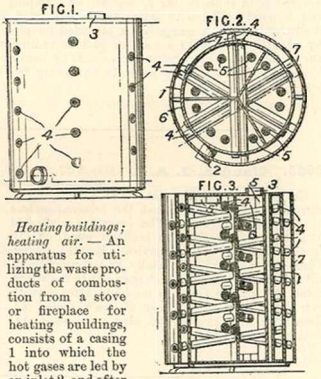
Steam traps.—A combined steam trap and separator is shown in sectional elevation in Fig. 2, in which steam entering by an inlet *l* impinges against an inclined plate *n*, and is caused to deposit its water, which latter drops into a hollow float *d*, while the steam escapes by an outlet *m*. As soon as sufficient water has collected, the float drops and pulls down a hollow piston *f*, Fig. 1, thereby uncovering an orifice *i* for the escape of water by the inlets *h* and pipe *e*. When the water has escaped from the latter float, this latter rises and closes the outlet, while a plunger *j* may be pressed down to open the outlet by hand.

5431. Lillie, S. M. March 10.



Steam traps for discharging water of condensation from the heating-chambers of evaporators without allowing the escape of steam or other vapour. Fig. 10 is a vertical section showing the exit pipe V with ports n^1 therein. Surrounding this tube is a balanced cup V^1 having a tubular sleeve V^2, in which are openings *v*, which only coincide with the openings n^1 when sufficient water has collected in the cup V^1 to depress it to the required extent.

5566. Fox, J. B. March 12.

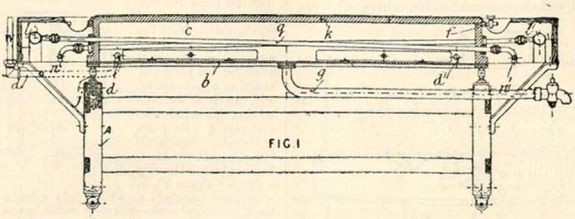


Heating buildings; heating air.—An apparatus for utilizing the waste products of combustion from a stove or fireplace for heating buildings, consists of a casing 1 into which the hot gases are led by an inlet 2, and after circulating in the chamber escape by an outlet 3. Air, entering the lower ends of the inclined tubes 4 and the vertical tubes 5, escapes in a heated condition from the outlet ends into the room or compartment. The casing is divided into three parts by radial wings 6 so that the hot gases first ascend one compartment, then descend a second, and finally ascend and escape by the third. A jacket 7 may surround the casing and in that case the tubes 4 project right through.

5594. Thompson, W. P., [*Tillibiller, E.*]. March 12. *Drawings to Specification.*

Hot-water bottles.—Bed pans &c. are made with a hollow rim, handle, and walls, which are filled up with hot water &c.

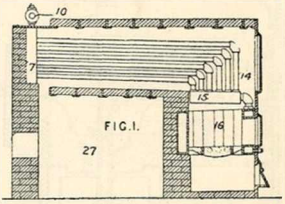
5599. Erlwein, C. L. March 11.



Heating by steam circulation.—A steam-heated table, on which glass is levelled and warmed during silvering, is constructed as illustrated in vertical section. A cast-iron box k is closed by a wrought-iron plate b, and supported by levelling-screws j on a stand A. The top of the box is planed and covered with india rubber c, secured by clamping strips and screws on the sides of the box. The box is partly filled with water from perforated pipes d, d^1, which extend across it, the air being discharged at f. A gauge W is provided on pipe d. The box is warmed to any desired temperature by admitting steam to a number of longitudinal pipes q from pipes l, l^1, at both ends of the box, the condensed water being drawn off by connecting-pipes n, n^1. Stirrers movable across the box by hand-rods are used to assist in equalizing the temperature of all parts of the box. A discharge pipe g is provided.

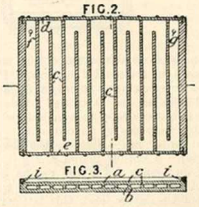
5965. Claudon, J. A. I. March 17.

Heating water, boilers for. The furnace 16 is surrounded by a water-jacket, the internal surface of which is corrugated. The jacket is connected by nipples and bends with inclined manifolds 15 from which a series of vertical pipes 14 spring. These pipes turn horizontally and communicate with vertical headers 7 which open out to the steam dome 10. The combustion products after passing over the tubes escape by way of the chamber 27. Return pipes are provided as also cast-iron doors, cleaning-plugs, &c.

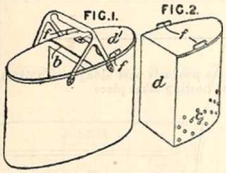


6727. Collier, J. L. March 27.

Heating by steam or water circulation.—Relates to a hollow plate through which a cooling or heating fluid may be passed for cooling or heating substances placed upon it. The top and bottom surfaces a, b are separated by partitions c arranged alternately as shown, preferably they are formed in one piece. The open ends are closed by end plates d, e. At f and g are openings for the introduction and withdrawal of the heating or cooling agent. Suitable rims i may be formed on or secured to the plate.



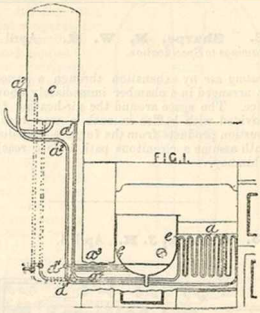
7106. Llewellyn, T., and Llewellyn, D. April 1.



Boiling-pans are made with a division *b* or divisions to form two or more compartments into which receptacles *d* are fitted. The receptacles are provided with perforations for draining and with handles *f*. They may be provided with lids d^1 and strainers.

7188. Marcroft, J., and Heap, C. April 2.

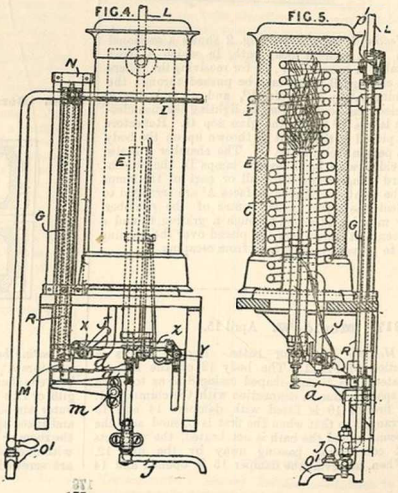
Heating water.—Relates to means for supplying hot water to slaughterhouses, baths, restaurants, wash-houses, and the like. The invention is described with reference to a wash boiler *e* connected to a hot-water coil *a* embedded in the fireclay back of a firegrate of the form described in Specification No. 4548, A.D. 1895; this coil also communicates with a cylinder or reservoir *c* by suitable pipes a^1, a^2, a^3, a^4, the



connections being controlled by three-way cocks *d*, d^1.

7376. Wilder, M. G. April 7.

Heating water, geysers for. A circulating water-heater shown in elevation in Figs. 4 and 5, consists of a coil C heated by a Bunsen burner E and connected by pipes L, I, to a hot-water tank (not shown), and by pipes I, J to a thermostatic device. A pilot burner is provided for lighting the main burner. The heating effect of the gas burner causes a constant circulation of hot water through the tank and a hollow casing G, which latter surrounds a hollow zinc rod M bearing against a stationary support N above and below controlling the position of a gas supply valve *d* by an intermediate lever *a*. Hot water is drawn off at the tank temperature through a tap O, and the reduction of pressure in the pipe R causes a valve *p* to close and prevents water in the coil from passing directly away. If boiling hot water is required it may be drawn off directly from the coil through a tap *j*. In order to increase the effect of the burner independently of the thermostat, the opening of the valve *j* causes a cam *m* to engage with

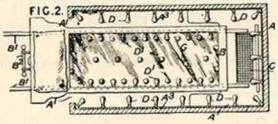


the gas supply valve and open the latter to its full extent. A valve Y in the gas supply pipe and a valve X in the circulating pipe J are connected by a link z, so that the heater may be thrown out of action at will.

7613. Sharpe, N. W. H. April 10.
Drawings to Specification.

Heating air by exhaustion through a series of tubes arranged in a chamber immediately above a furnace. The space around the air-heating tubes is provided with baffles in such a way that the combustion products from the furnace immediately beneath assume a circuitous path before reaching the chimney.

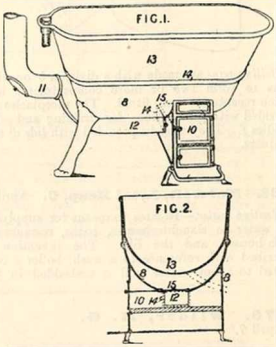
7893. Kellogg, J. H. April 4.



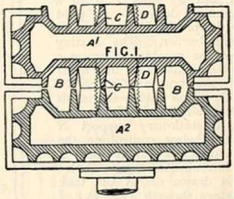
Heating by electricity.—Fig. 2 shows a sectional plan of a radiant heat bath, in which a fixed chamber A has rails B^1, B^1 for receiving the rollers of a carriage B which may be pushed through the opening A^1 by a handle B^2, and when inside A an electrical contact is made, lighting the incandescent lamps D^1 below the glass top G. Reflectors are placed so that light is thrown up on the body of a person reclining on G. The chamber A is also provided with incandescent lamps D, the switchboard being arranged for all or part of the lamps to be lighted. Mirror surfaces A^3 are arranged to reflect the light to the centre of the chamber. Air may be admitted through a grating C, and a screen, not shown, may be placed over the opening A^1 to prevent radiant heat from escaping.

7917. Mould, W. April 15.

Heating water for baths. Fig. 2 shows a section of Fig. 1. The body 13 of the bath is seated in a trough-shaped casing 8 so as to leave a space or flue in connection with the chimney 11. A firebox 10 is fitted with dampers 14 and 15 arranged so that when the first is opened and the second closed the bath is not heated, the products of combustion passing away by the flue 12. When, however, the damper 15 is opened and 14 closed, the products pass along the bottom of the bath and heating takes place.



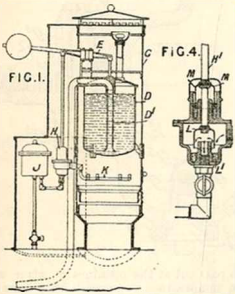
7974. Berry, G. L. April 15.



Heating buildings, radiators for. Two or more radiators A^1, A^2 are coupled together so as to form between them enclosed spaces B, into which project gills or ribs C; these spaces communicate with the outer air, so that such air rises through the spaces and takes up heat from the gills C before entering the room or apartment. The sections communicate with one another by openings D into which nipples are screwed having right and left handed screw

threads, the arrangement permitting each section to expand freely without putting any strain on the joints.

8502. Livesey, F., and **Sugg, W. T.** April 22.



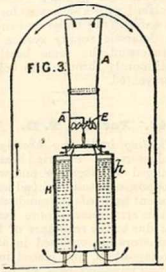
Heating water.—Relates to an apparatus for preventing the freezing of the seal water of the lifts of telescopic gas holders. Within a casing C, mounted on the lower lift, is arranged a boiler D the interior of which is connected by a siphon pipe D¹ with the seal cup. This boiler is heated by a burner K supplied with gas through a regulator J and cut-off valve H, which is periodically ignited and extinguished in the following manner :—The boiler is suspended from one end of a counter-weighted beam E in connection with the valve H, so that when the boiler is filled the valve is opened and gas passes to the burners, where it is ignited by a pilot jet ; when the water boils it is discharged by steam pressure through the siphon pipe D¹ into the seal cup, the boiler rises, and the gas is cut off. On the cooling of the boiler a vacuum is created, cold water re-enters it through the siphon tube, the boiler descends, and the gas is once more turned on. Fig. 4 shows a suitable form of cut-off valve consisting of a bell L carried by a rod H¹ and dipping into an annular mercury seal L¹. Instead of a stuffing-box a second bell M and mercury seal are employed.

8535. Rosenthal, J. H. April 23. *Drawings to Specification.*

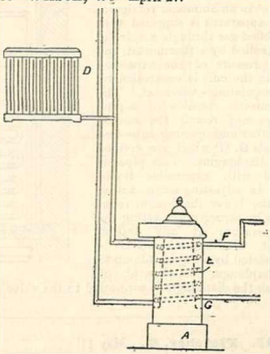
Heating air for supplying through suitable trunks to a steam-boiler furnace. The heater is of the tubular type and arranged beyond the boiler in the path of the waste furnace gases. Air is forced through the tubes of the heater by a fan while the waste gases play about their exteriors.

8711. Bennett, A. R. April 25.

Heat, utilizing solar; non-conducting coverings, testing. Relates to apparatus operated by solar or artificial heat and applied to various purposes. One form of motor, which may be used as radiometer or a sunshine-recorder, is shown in sectional elevation in Fig. 3, in which E is a fan pivoted in a tube A covered by a glass shade. The rays of the sun cause a circulation of air in the directions shown by arrows and the air current thus produced works the fan, the rotations of which latter may be taken as a comparative measure of the radiant heat. In order to effect a continuous rotation a fluid heat storing apparatus H, *h* is provided, which assists the circulation of air during the nighttime. In a modified form, the apparatus may be used for measuring the conducting powers of various bodies such as non-conducting coverings, the latter being wrapped round the tube A. When a heated body is suspended in the tube, the effect in causing rotation may be ascertained with different coverings, or the different conducting power of wires may be ascertained by using these latter as the suspension for the body N.



8806. Wilson, W. April 27.



Heating water; heating buildings.—Relates to improvements in apparatus of the type described

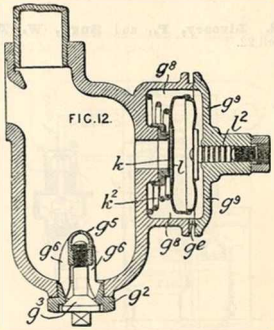
in Specification No. 5724, A.D. 1893. A boiler A of an ordinary type is used for circulating hot water in the radiator system D, and is also furnished with a separate closed coil E heated by the water in the boiler and supplying hot water to the domestic supply system F, G. With this arrangement the same heating-water circulates continuously through the boiler and incrustation is prevented.

9047. Farrall, T. D. April 29.

Heating buildings; heating by electricity.—The conductors in electric heating apparatus are arranged near together, and so that the current is in opposite directions in adjacent conductors, or in adjacent parts of one conductor. It is stated that by this arrangement more heat is produced than that due to the resistance of the conductors. The conductors are enclosed in asbestos paper, cloth, or composition, and placed in airtight cases. For heating buildings, cars, &c. by radiation these cases are exhausted of air, and thick asbestos coverings are used on the conductors to contain a store of heat. The heaters are applicable also to ovens, coffee-pots, and other cooking-utensils.

9225. Gresham, J., and **Gresham, H. E.** May 1.

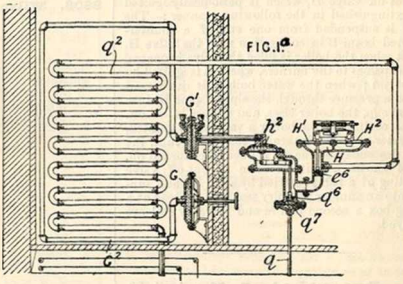
Steam traps.—The apparatus is for use on railway trains which are heated by steam. A thermo drum l is carried by its stem l^2 in the plate g^9 hinged at the side to the casing g^5. The drum normally rests on the valve seating k against the action of the spring k^2. When the temperature falls the contraction of the drum allows condensed



steam to pass out at the openings g^6, after which a rise in temperature re-expands the drum and cuts off the escape. The conical valve g^3 screws into the cap g^5 carried by arms g^6 from the seating g^2, and is employed when removing sediment from the trap.

9573. Boult, A. J., [*Knox, G. F.,* and *Sharpneck, E. L.*]. May 5.

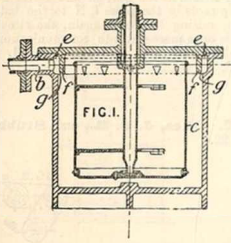
Thermostats.—The evaporator coil q^2 in an ammonia refrigerating-apparatus is supplied with liquefied gas through a valve q^6 controlled by a thermostat, and the pressure of the expanded gas in the coil is controlled by a regulating valve e^6. The thermostat consists of a pipe G^2 passing round the cooled chamber and opening into two vessels G, G^1 which are divided by diaphragms. This pipe is filled with expansible liquid and an adjusting screw acting on the lower diaphragm regulates its capacity for setting the temperature at any desired point. The upper vessel G^1 is connected by a liquid column to a diaphragm chamber h^2, of which the diaphragm is connected to the valve q^6.



9997. Fletcher, G. May 11.

Steam traps.—Relates to improvements in steam traps of the kind where a float is employed in connection with the water discharge. To prevent the float c from being forced to one side by the

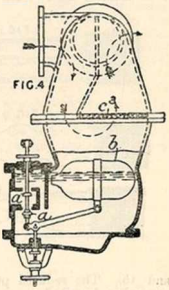
inrushing steam and water the inlet pipe *b* discharges into an annular recess *e*, the baffle *f* of



which leaves an opening *g* into the box round the whole extent of the recess *e*.

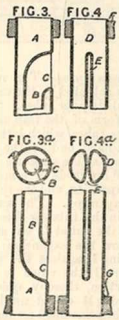
10,312. Smith, R. B. May 14.

Steam traps.—Relates primarily to float apparatus for automatically regulating the feedwater supply of steam generators, but capable by slight modification of being applied as a steam trap. Fig. 4 illustrates the application as a steam trap. The steam impinges against a dash-plate c^3, and the outlet of the separated water is controlled by the float *b* and equilibrium valve *a*.



10,338. Ortmans, V. C. J. May 14.

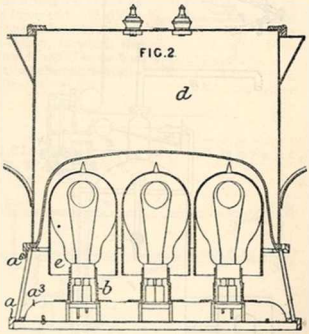
Heating liquids.—A form of tube or element for use in apparatus for heating liquids is shown in Figs. 3 and 3^a, and is described with reference to an evaporating-apparatus. The outer tube A encloses a concentric tube B, which latter has outlet openings C in the sides of the main tube to afford means of ingress or egress for the liquid to be treated, while the active agent circulates in the main tube A. In a modified arrangement, Figs. 4 and 4^a, the main tube splits up into two parts E and the active agent circulates within these.



The tubes are arranged between the tube-plates F, G, in any convenient manner.

10,803. Davies, E. May 19.

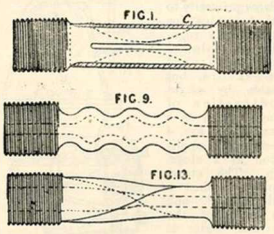
Heating liquids.—Heating is effected by electric incandescent lamps, on which coverings *e* of gauze or perforated sheet metal are placed, within a cavity in the vessel *d* to be heated. In the arrangement illustrated in section, six lamps are placed around a single one, in ordinary holders *b*, on a base of wood a^3 and metal *a*, which also carries a ring a^6 to support the vessel *d*. A smaller vessel may be arranged similarly on a single lamp. The use of lamps worn out for lighting purposes is mentioned. The coverings *e* are stated to prevent overheating of the lamps.



10,860. Preston, R. T., and **Holden, J.** May 19.

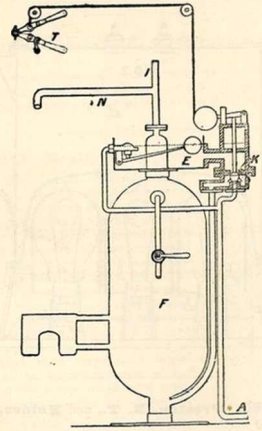
Heating water, boilers for. Stays, such as are described in Specification No. 15,547, A.D. 1894, as having recesses and slots, are provided, for example, as shown in Fig. 1, with a covering or sleeve C of rubber, elastic material, or sheet metal. Instead of making the stays with recesses &c., they may be constructed in the portions between the stayed

surfaces of an undulating or extended form and either solid or hollow such as shown in Figs. 9



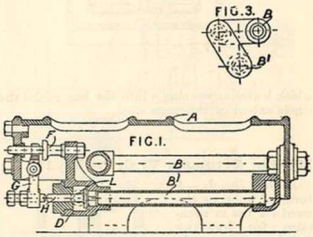
and 13. The reduced portions are preferably covered as described.

10,978. Paton, J. May 21.



Heating water for baths &c. Relates to means for avoiding injury by frost to pipes in hot-water supply systems to baths &c. A circulating cistern F is placed in the neighbourhood of the stove or range, and is supplied with water from the ball-cistern E. The hot-water supply pipes I, N are therefore normally empty. When, however, the lever T is depressed the valve K rises and the water service pipe A is put into communication with the circulating-cistern at the bottom and forces the hot water upwards in the pipes I, N to the bathroom &c. On raising the lever again, the circulating-cistern is once more put into communication with the ball-cistern only, and the pipes I, N are emptied.

11,110. Okes, J. C. R., and **Stubbs, A.** May 22.



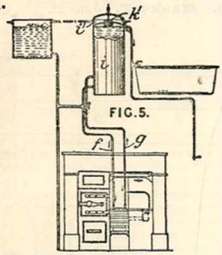
Steam traps.—The invention relates to steam traps actuated by the expansion and contraction of metal strips or tubes. Fig. 1 is a cross-section of one form of the trap, and Fig. 3 an end elevation of the tubes, which latter are rigidly fixed at the right-hand end to the casing A and are free to expand at the opposite end. The alternate tubes B, B^1 are made of a metal with a high coefficient of expansion, and the third tube has a low coefficient of expansion. The water of condensation collecting in the tubes is free to escape past a valve H into the outlet L, but as soon as steam commences to flow the expansion of the tubes advances the seating D against the valve, and by a lug F and lever G the valve is advanced in the opposite direction, thereby quickly closing the valve and keeping it closed until the tubes become cooled. Slightly-modified arrangements are described and illustrated.

11,111. Boddy, C. May 22.

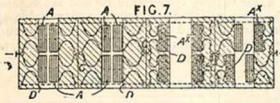
Heating water.— A circulating-cistern *i* which supplies a bath &c. is heated by water circulating in the pipes *f*, *g* and in a tubular or cylindrical boiler, which is prevented from over heating by its immersion in a low pressure boiler. A conical perforated valve *k*^{1} opens if the pressure in the circulating-cistern rises, and the steam, water, &c. escape into the chamber *i*^{1}. The cistern may be cased with wood or plaster to protect it from cold.

(*For Drawing see next page.*)

11,111.

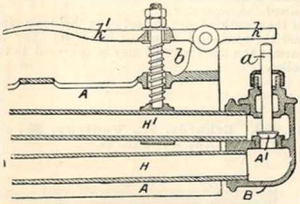


11,907. Hardingham, G. G. M. June 1.



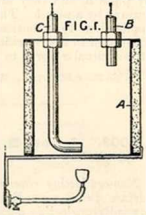
Footwarmers. — A plan of the apparatus for one carriage is shown. Tubular radiators in permanent communication at C with a source of steam, hot-air, or hot-water supply are arranged to be pushed beneath the seats D as at A× to warm the carriage or to be drawn out as at A to act as foot warmers. The radiators are carried on rollers and are regulated by cocks C.

12,131. Goold, W. T. June 3.



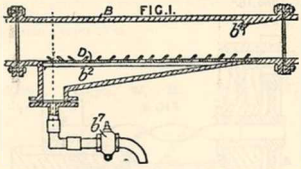
Steam traps.—Relates to improvements in steam traps of the kind described in Specification No. 21,571, A.D. 1894. In the present arrangement there are two expansible tubes H, H¹, of different metals fixed at one end to the casing A and fitting into a valve casing B at the other. Condensed water collecting in the tube H is forced by the steam pressure past the valve A¹ into the outlet pipe H¹ until the circulation of steam in the pipes expands the latter and the casing itself moves upwards, causing the valve stem *a* to press against the finger k^1 of the pivoted lever *k* and thereby close the valve. The upward movement of the pipes H, H¹, by aid of the spring *b*, also presses down the finger k^1 of the lever *k* to close the valve; this arrangement permits the use of short expansible tubes.

12,430. Arter, A. June 6.



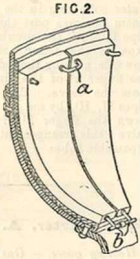
Heating gases. — Gas for illuminating and other purposes is heated and dried before being consumed by passing it through a vessel A heated by one or more gas jets and provided with an inlet pipe B and outlet pipe C, the latter of which may be coiled at its lower end. Modified forms of apparatus are described, in which the pipes B and C enter the heating-chamber horizontally.

12,615. Durant, W., and **Durant, T. W. B.** June 9.



Steam traps.—Relates to the extracting or separating of water from steam in steam pipes. A length of piping B with a well or cavity b^2 is inserted in the steam pipe as seen in section in Fig. 1. The cavity is covered by a grating or perforated plate D, of which various modified forms are illustrated in the Specification. The steam entering is directed downwards on to the plate by the slope b^4. A draining pipe and tap b^7 are provided.

12,910. Kellner, C. June 11.

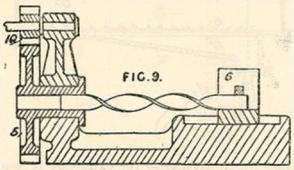


Digesters; heating liquids.—Relates to steam-heated digesters, cellulose boilers, and like boiling-apparatus, and consists in applying the heat of the steam to the liquid by means of shallow chambers forming, when placed in position, a partial or complete internal lining to the boiler &c. The Figure shows the application to the basin-shaped base of a vertical boiler. The heating chambers are connected together by pipes *a*, and they are drained by a pipe *b*. The application to a horizontal cylindrical boiler is illustrated in the Specification, the chambers being of semicircular form to fit the lower half of the boiler.

13,008. Jones, E. June 12. *Drawings to Specification.*

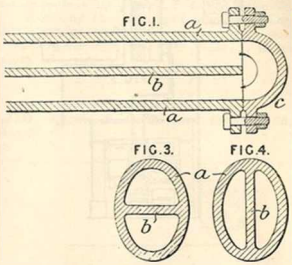
Non-conducting coverings.—The pipe or other surface to be covered is encircled by rings with inwardly-projecting pieces, and the space between the sheet-iron cover and the pipe is packed with slagwool or other suitable material.

13,282. Platts, H. C., and **Lowther, T.** June 16.



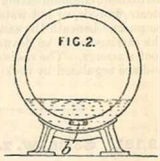
Heating buildings.—Relates to tubes used for heating. Metal tubes, either drawn flat or flattened by passing them between rolls, are twisted in the machine shown in Fig. 9. One end is held in a block 6 which is capable of sliding so as to accommodate itself to the difference in length arising from the twisting. The opposite end is held in the hub of a wheel 5 which is turned by a pinion 10.

13,748. Manks, F. June 22.



Heating buildings.—The flow and return pipes of hot-water heating systems are formed as one pipe *a* with a separating-diaphragm *b*, and suitable end caps *c* are provided to give free water circulation. Any suitable sections of pipe may be used, and examples are shown in Figs. 3 and 4.

13,860. Wilmot, J. F. June 23.

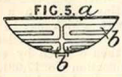


Heating water.—Relates to the heating of rotary machines for washing linen and other fabrics such as those known as "American washing machines." The liquid is heated by means of a pipe or coil *b* through which steam or hot water is passed. A separator of the usual kind may be used upon the steam pipe, and the condensed steam or hot water after its passage through the coil *b* may be conveyed to the boiler.

13,993. Erhardt, H., Ventzky, H., and **Chrometzka, W.** June 24.

Heating buildings.—Flues or spaces *e* are provided between the slabs *a* of walls and floors for heating purposes.

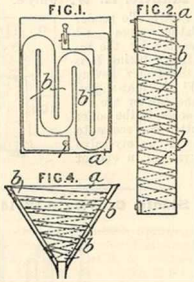
14,015. Dymond, G. C., [*Chemisch Elektrische Fabrik "Prometheus" Gesellschaft mit Beschrankter Haftung*]. June 24.



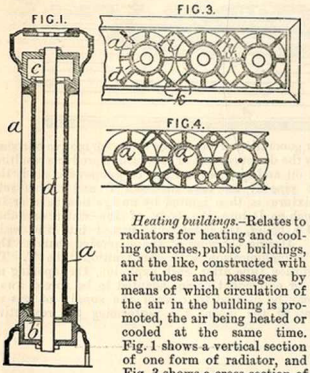
Heating gases and liquids.—Relates to electric heating devices for liquids and gases, and consists of resistance layers *b* of precious metals formed on insulating-bodies *a*, such as plates, tubes, funnels, dishes, and the like, in the manner of ceramic precious metal decorations, so that the mass of the insulation body can receive in the form of heat almost all the electrical energy conveyed to it by the resistance layers. The resistance strips are protected by asbestos casings *c*, varnish, or the like, and the fluid is heated by circulating in and around the heating appliance.

(*For* Figs. 1, 2, & 4 *see next column.*)

14,015.

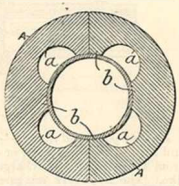


14,605. Morris, G. July 2.



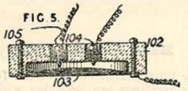
Heating buildings.—Relates to radiators for heating and cooling churches, public buildings, and the like, constructed with air tubes and passages by means of which circulation of the air in the building is promoted, the air being heated or cooled at the same time. Fig. 1 shows a vertical section of one form of radiator, and Fig 3 shows a cross-section of the same. The heating or cooling medium passes through the outer tubes *a* which connect the troughs or chambers *b* and *c*, while air circulates through the inner tubes *d* and through passages *l* formed by certain of the ribs *h*, *k*. Fig. 4 shows a cross-section of a modified form, in which the inner tubes *d* are dispensed with, and air tubes are formed in the ribs. The arrangement of these air tubes and passages may be varied.

14,721. Smith, J. W., and **Hannay, C.** July 3.



Non-conducting coverings and compositions.—A mixture is made of a natural diatomaceous earth called "carib silicate" with asbestos fibre and an adhesive substance such as rice or flour sweepings, and the material is moulded into fluted sections for covering steam pipes, boilers, refrigerating-chambers, and the like. As an illustration, a steam pipe *b* is shown provided with a covering A made in halves and fluted at *a* to retain a layer of air.

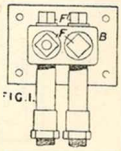
14,996. Heys, W. E., [*Frost, J. W.*]. July 7.



Thermostats for fire-alarm systems are each provided with double contacts, to prevent a danger signal being given by the accidental closing of a single contact. An insulating-base 102 has secured to it an expansible diaphragm 103, which, under the action of heat, makes contact first with the screw 105, then with the second one 104. If one contact only is made, a warning signal is sent.

15,123. Mantle, A. W. July 8.

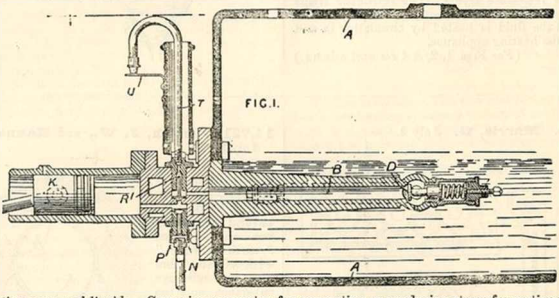
Heating water.—To render the circulating pipes and boiler accessible for the removal of fur, a fitting B is bolted to the boiler having plugs F, F¹ at right-angles, of which the former are removed for access to the boiler and the latter for access to the tubes. A safety-valve may be arranged in one of the plugs.



15,326. Crompton, R. E. B., and **Fox, E. J.** July 10.

Heating by electricity.—Radiators for cooking and other purposes are constructed by placing resisting-wires on a non-conducting infusible support, which may be a layer previously applied to a metal or enamelled metal plate. The wires are then covered by enamelling, as described in Specification No. 17,091, A.D. 1892. The infusible support or layer is made from a paste consisting of alumina or china clay, or of equal parts of oxide of iron and lava, mixed with silicate of soda solution; this is dried and may be fired.

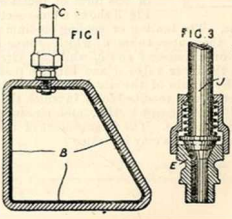
15,535. Siddle, C. W., and **Field, R.** July 14.



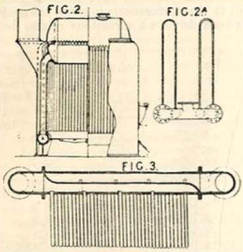
Heating gases and liquids.—Comprises apparatus for generating or producing steam for motive purposes and for heating water, air, or other liquids or gases by the direct contact of combustion products resulting from the explosion of charges such as of vaporized oil and air, gas and air, or gunpowder and the like. The explosive mixture is drawn through the pipe N and the air-holes P and driven into the explosion chamber B by the pump K. The mixture is then ignited by an ignition tube or by electricity, and discharged through suitable valves such as D into the body of the water or other medium to be heated. Instead of, as in the case of a boiler, the gases being passed into the main body of water, they may enter with the feedwater. During charging of the explosive chamber the valve R¹ is held against its seating so as to prevent communication with the ignition tube T. To ensure the escape of combustion products in the ignition tube after each explosion, the opening at the upper end of the tube is closed by a spring U or equivalent device adapted to be forced away at every explosion. A safety-valve on the boiler may be devised to control the supply of gas or oil. The details of construction and arrangement of the means for performing the respective functions may be variously modified.

15,545. Barraclough, A. July 14.

Heating water.—Hot-water boilers for domestic and other purposes are provided with an inner shell B of copper or other non-rusting metal inserted before the ends are riveted in. The circulating-pipes are fitted with safety unions as shown in Fig. 3, the pipe J being lifted off its seating E if the pressure exceeds a certain limit, and allowing of the escape of steam &c.



15,721. Watkinson, W. H. July 16.



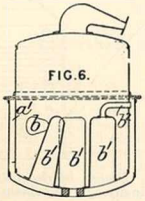
Heating air.—The object is to reduce the amount of tube surface in boilers, superheaters, air-heaters, condensers, feedwater-heaters, and other tubular vessels used for heating and cooling fluids. The invention consists in placing the tubes of the structure in close proximity in such a way that the gases to be heated or cooled shall be subdivided into very thin sheets, sufficient flue area being obtained by suitably proportioning the number and diameter of the tubes. Several modifications are described in the Specification and illustrated by drawings attached thereto. Of these Fig. 2 represents a water-tube boiler, Fig. 2A a steam superheater, and Fig. 3 another form of superheater.

16,525. Selberg, E. July 25.

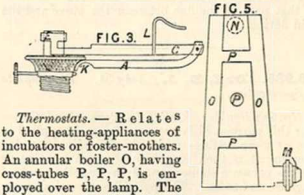
Non-conducting compositions.—Two parts of vegetable fibre, one part of cork, and one part of earthy material are mixed together, and salts or acids are added in small quantities in order to make the material more porous. The composition is moulded into bricks or blocks, or used as a porous mortar, or for covering boilers, steam pipes, &c.

16,774. Martin, E., and **Stapley, A.** July 29.

Boiling pans. — The heating-efficiency is increased by pockets b, b^1 disposed so as to directly heat the central portions of the apparatus. The pockets are of any convenient shape, and may be strengthened by stays, which may be hollow tubes b^2 for conveying the products of combustion to a jacket a^1.



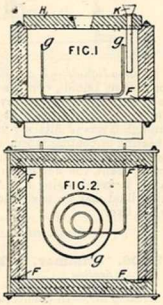
16,791. Chafer, W. T. July 29.



Thermostats. — Relates to the heating-appliances of incubators or foster-mothers. An annular boiler O, having cross-tubes P, P, P, is employed over the lamp. The boiler is fitted with inlet and outlet pipes at M and N which communicate with the tank in the incubator or foster-mother. An extension arm A is fixed at K to the lamp burner, and a rod C, which carries a tube E fitting loosely round the burner, is pivoted to the arm A. A hook L attached to the rod C is connected to a thermostat by means of which the tube E is raised or lowered to increase or diminish the size of the flame, and thus regulate the temperature.

16,877. Bray, D. July 30.

Boiling-pans for acids, alkalies, and other corrosive liquids are made as shown in vertical section in Fig. 1 and horizontal section in Fig. 2 of slabs of stones unaffected by such liquids. Between the stones is placed a packing consisting of solid rubber pieces F and the whole are bound together by iron bands and bolts. The cover H, which is also of stone, has holes in it in which may be fixed a still head and a supply funnel K. The steam coil g serves to heat the liquid.



16,959. Underhill, S. W. July 30. *Drawings to Specification.*

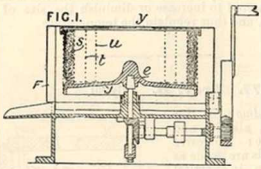
Heat-storing apparatus.—An apparatus for storing or accumulating heat, from the waste gases in the flues of stoves, furnaces, and the like, consists of a number of transverse bars arranged as a grid or network in the pipe, and furnished with a suitable

scraper for removing soot. The hot gases pass between the bars, and the heat is stored therein or in that part of the flue between the stove and the said device.

16,985. Duff, E. J. July 31. *Drawings to Specification.*

Heating liquids; heating by steam circulation.—For this purpose high-pressure steam is applied to one or more engines and only partially expanded therein; it is then passed to the steam mains or lower-pressure boiler supplying another set of engines, and so on. The partially-exhausted steam may, in place of being used in the engine, be employed for boiling and heating liquids and the like.

17,057. Classey, L. Aug. 1.



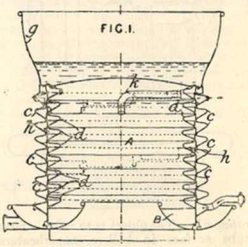
Heating liquids.—A centrifugal strainer, modified for heating liquids, consists of a drum J mounted on a vertical shaft *l* and revolved by hand gearing. The liquid is poured in at the centre *y* and flows through layers of filtering-media *s*, *t*, *u*, and around a heating or cooling worm coiled inside the drum before escaping by an outlet A. In another arrangement, the heating or cooling fluid circulates in the jacketed casing F. Any suitable attemperating fluid may be used, such as air, water, steam, or the like.

17,106. Cummer, F. D. Aug. 1. *Drawings to Specification.*

Heating air.—In connection with a furnace and its accessory chambers and details, an air-heater is provided. It is preferably of tubular form and made up of corrugated plates placed ridge to ridge. The air to be heated may be directed so as to assume a zig-zag course through the passages.

17,328. Jönsson, J. L. Aug. 5.

Heating liquids.—Relates to means for heating water and other liquids such as milk. A corrugated cylinder A is built up of rings *c*, *d* which communicate at intervals through perforations *h* and are provided with internal partitions adjacent to the perforations to cause the cooling or heating agent to take a circuitous course between

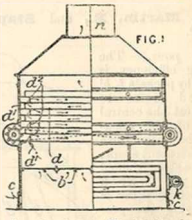


the inlet h^1 and outlet *k*. A trough *g* with a perforated bottom directs the milk or other liquid over the internal and external surfaces of the cylinder and a trough B collects the treated liquid.

17,637. Hutchinson, G., Lawson, T. H., and **Lawson, A. J.** Aug. 10.

Non-conducting compositions.—A paste is made by mixing pugged clay or cement with paper or wood pulp and this mixture is ground in a suitable mill. Shredded bark is added to the mixture at intervals, and also sufficient water to bring the whole to a plastic consistency. Suitable proportions for the composition may consist of 27 per cent. of clay, 40 per cent. of pulp, and 33 per cent. of bark. The composition is applied as a mortar or paste to the boiler steam-pipe or chamber to be protected.

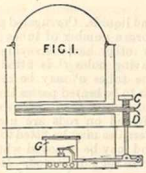
17,702. Stevenson, H., [*Stevenson, J. S.*]. Aug. 10.



Heating by electricity.—Electricity is employed in drying tea to obtain the requisite heat, which is

produced by passing the current through a high resistance, or by an electric arc, or an electric furnace. The Figure shows a form of drying-apparatus, in which the electrical heaters consist of radiator plates *b* mounted on metallic supports of perforated metal upon which are embedded, in insulating-material, wires of high resistance connected with a generator of electricity. The electrical circuits are arranged in parallel, and one or more of them may be cut out by the regulating-switch *k* and the heat generated reduced accordingly. Air enters through openings regulated by dampers *c*, and is heated in passing the radiators, and then passes over or through the tea or other produce on the trays *d* and escapes by the chimney *n*, in which an exhausting-fan may be placed. In the arrangement shown, the trays are provided with openings *d* and d^2, alternately on the right and left of the tray, whereby the current of air passes over the tea; perforated trays may, however, be used, in which case the air passes through the tea. The invention may also be applied to a rotary drier.

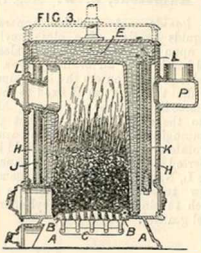
18,186. Sweet, A. Aug. 11.



Thermostats for regulating the supply of gas to burners for heating kettles, glue pots, and other vessels containing water. In the Figure the invention is shown applied to a glue pot. A suitable combination strip C, D — *e.g.* brass and iron—is fixed in a tube in the water space, its outer end being free to move and actuate a cone valve to controlling the gas supply. As applied to a kettle which must be kept boiling, the thermostat is heated by the steam issuing from the spout. In an apparatus for supplying hot water, the thermostat is at the bottom of the vessel, so as to be cooled by cold water coming in near it, the hot water being drawn off at the top. In this case a disc valve is used, having a small hole for a bye-pass.

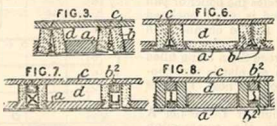
18,256. Naylor, S., and Marshall, L. Aug. 18.

Heating buildings; heating water, boilers for. Relates to a boiler for use in connection with hot-water or steam heating-apparatus, and consists of an annular water chamber E supported on a conical base A. The grate has rocking firebars B operated by a link C so as to break up the fire and cause the ashes to fall in the pit, while the hot gases from the furnace circulate within the annular space L and jacket H before escaping to the outlet flue P. To render the boiler more efficient, there are a number of depending water-tubes J furnished with diaphragm plates K, which latter cause a circulation of the water in the direction marked by arrows. When the



apparatus is used for generating low-pressure steam, the boiler is extended as indicated by dotted lines.

18,295. Kleine, J. F. Aug. 18.



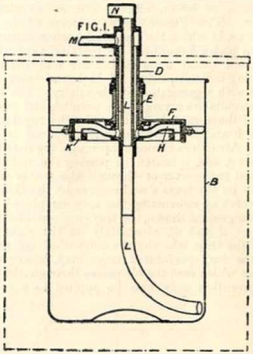
Heating buildings. Hollow floors are constructed of iron joists, blocks *a*, *b*, and flooring plates *c* united by cement. The hollow spaces *d* are connected by apertures in the blocks *b*, and serve for heating-flues.

18,315. Sibley, J. Aug. 18.

Boiling-pans. — An apparatus for promoting the circulation of water in washing-coppers consists of a hollow perforated ring A provided with nozzles B. The ring is placed in a central position in the copper or boiler, and the hot water, entering by the perforations C, streams out through the nozzles B, thereby causing a constant up and down flow.

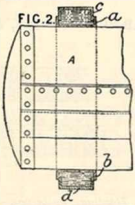
18,377. Ramstedt, C. W. Aug. 19.

Heating liquids. — A portable apparatus for heating liquids consists of a closed cylinder B supported upon a fixed pipe D by a sleeve E, F, having ball bearings of an ordinary type. Steam or fluid under pressure enters the inlet pipe M, and passes to radial turbine arms H fixed to the pipe D and set immediately over a ring of blades K attached to the sleeve E, F, so that the fluid streams impinging on these blades causes the casing to rotate and attemperate the fluid in which it is immersed. The waste fluid escapes by an outlet pipe L, N, and in modified arrangements the parallel-flow turbine above described is replaced by a Scotch turbine driving the cylinder B by a bevel wheel gearing.

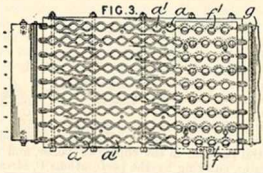


18,418. Foenges, E. C. W. Aug. 19.

Boiling-pans and boilers, settings for. A divided channel-iron ring *a*, *b* encircles the boiler or pan A, and is itself enclosed by a second channel-iron ring *c*, *d*, the space between them being filled with an elastic non-conductor of heat, such as silicious marl. The expansion of the boiler A causes the compression of the substance within the annulus, and the masonry is thereby protected.

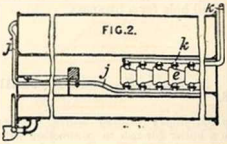


18,893. Cummer, F. D. Aug. 26.



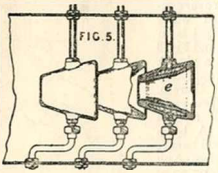
Heating gases and liquids.—Apparatus is described for heating air, and may be applied for heating gases and liquids. Corrugated plates *a* are arranged so as to form a number of tubes a^1 through which hot gases or other heat-conveying agents pass. A plate *f* having holes f^1 is fitted so that the top ends of the tubes a^1 may be more or less covered. The air to be heated passes through the sinuous passages formed between the rows of plates, and louvres *g* pivoted on rods are used to control the supply. Ferrules may be fitted to the bottoms of the tubes, and may be removed when choked with soot and a fresh set substituted. In a modification, the plates *a* are arranged so as to form continuous channels instead of separate tubes.

19,016. Makin, E. Aug. 28.



Heating water, boilers for. For increasing the heating-surface of steam generators and boilers for domestic and other purposes, for feedwater-heating and for superheating steam, a series of conical or equivalently-shaped water-jacketed vessels *e* are placed in the paths of the furnace gases. Fig. 2 shows an arrangement of vessels

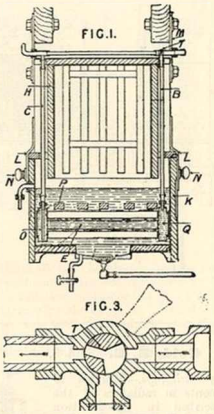
within the flue of a Lancashire boiler. In this case, the arrangement acts as a superheater. Fig. 5 shows the construction of the vessels. The invention may be applied to all classes of furnaces and



boilers, several applications being illustrated in the drawings accompanying the Specification.

19,080. Davies, J. G. Aug. 29.

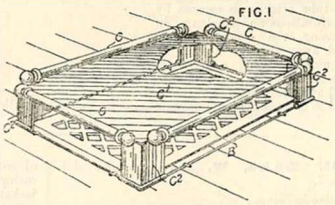
Heating liquids.—Fig. 3 shows a three-way cock T for regulating the supply of cooled or heated liquid. Fig. 1 shows the apparatus for cooling or heating malt liquids by passing a regulated quantity through the cock T and pipe B to the cylinders E in a bath heated from below or cooled by ice placed over the false bottom P in the top casing H. These cylinders open into the end chambers O, Q by nozzles with screw caps, and the chambers have



screwed covers. The lower part K is hung from the upper by straps L and screws N.

19,231. Hanson, S. P. Aug. 31.

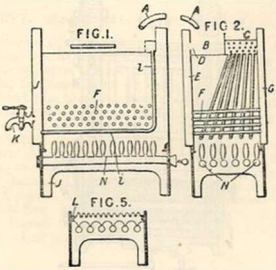
Heating buildings.—A device for directing the hot air supplied to a room through a floor register B consists of a deflecting-plate C^1 supported by corner pillars C^2 and rails C. The sides are shown open to permit of air passing into the room, and in modified arrangements one or more of these openings are closed to guide the air current in the required path.



19,366. Robertson, T. Sept. 2.

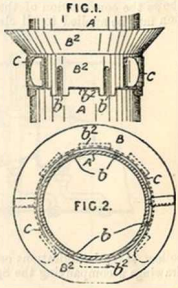
Heating water, geysers for. The apparatus is shown in longitudinal section in Fig. 1, and in transverse section in Fig. 2. Cold water from a pipe A enters the receptacle B and passes by a slot D into the chamber E, and by the cross-tubes F into a similar chamber G. The water now rises into a receptacle C, from whence it flows by pipes *i* to the outlet tap K; the hot air and gases from the burners N play round the pipes F, *i* and heat the water therein before escaping. The water-container merely rests upon the frame J, and may be lifted off and replaced by a perforated cover L,

Fig. 5, when it is desired to use the gas-heater for cooking purposes.



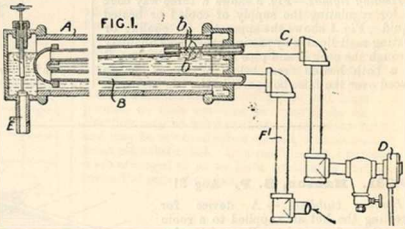
19,447. Wright, H. T. Sept. 2.

Heating water, surface apparatus for. Appliance for spreading water in a thin film over condenser and other pipes. Fig. 1 is an elevation, and Fig. 2 a plan, of a pipe A with the appliance attached thereto. It is in two parts B, B² held against the pipe A by a spring C and having distance pieces *b* on their interior, so as to leave a passage for water between it and the pipe. The turned up parts *b*² serve to support the spring C.



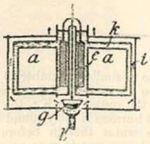
19,497. Gold, E. E. Sept. 3.

Heating buildings.—Relates to improvements in radiators of the type described in Specification No. 19,695, A.D. 1893. A cylindrical casing A, usually nearly filled with condensed water, is fitted with a U-shaped steam pipe B having an inlet F¹ and an outlet C connected to the U-pipe by a loosely-fitting perforated pipe *b*. The entering steam, circulating in the U-tube, afterwards escapes by the perforations and condenses in the casing, the overplus being drained away through a trap D. For quickly heating a building, the condensed water may be drained away through a pipe E and the radiator filled with steam. When several radiators are arranged parallel to one another they are connected by a common outlet pipe for draining away condensation water.



19,764. Lake, W. R., [*Schwabe, A.*]. Sept. 7.

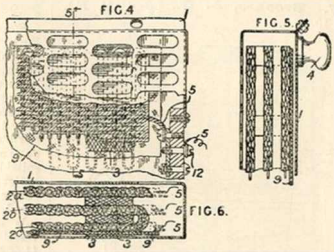
Heating buildings; thermostats.—An apparatus for regulating and maintaining a uniform temperature in warehouses and the like is shown in sectional elevation in the Figure, in which *a* is the chamber to be heated surrounded by a water jacket *k* and contained within a casing *i*. The hot products of combustion from a gas flame *l* circulate in the casing *i* to maintain the temperature of the water jacket, and as soon as the specific gravity of the water decreases, owing to an undue increase of temperature, the float *c* sinks, and the ball-shaped float *g* partially closes the gas inlet until the temperature becomes normal, when the float and valve rise to increase the heating effect.



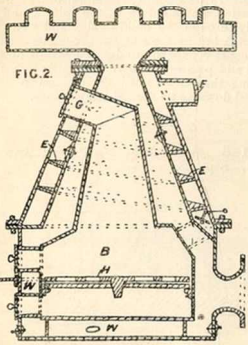
19,818. Meek, J. E., and **H. W. Johns Manufacturing Co.** Sept 8.

Heating buildings; heating by electricity.—An electric heater for buildings and the like consists

of a woven fabric of asbestos or other incombustible material in the woof thread of which electric conductors 5 are embedded. The fabric is folded into layers 2^a, 2^b, 2^c, with millboard or asbestos 3 between, and is provided with a similar backing 9; the whole is stiffened by size or other suitable material. The electric circuit is divided at suitable points, and the terminals are connected at the base 11 in series or multiple arc, while to protect the heater a perforated metal cover 1 is provided having knobs 4 to raise it from the floor.



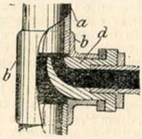
19,887. Kingston, J. S. Sept. 7.



Heating water, boilers for. Furnace gases from the firebox B of the design shown ascend in a helical path round the conical boiler by the flue E which terminates in the outlet F. Fuel is fed to the magazine by the shoot G. Suitable doors and openings are provided where necessary. The grate H rotates round a central pin. The water-space W also extends below the ashpit.

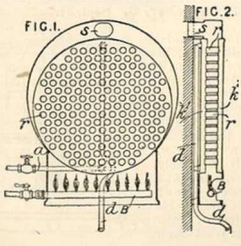
19,939. Stokes, J. T. Sept. 9.

Heating buildings; heating by water or other liquid circulation.—Nozzles *d* (one only shown) are screwed into T pieces *b* in the main pipe *a* so as to face away from each other. Water is forced in at one nozzle and leaves the system at the other, and the nozzles acting as injectors increase the circulation. To vary the flow the nozzles are screwed in or out, being held by lock nuts.

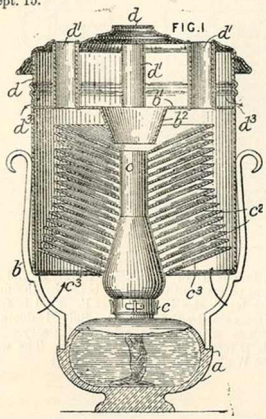


20,260. Junk, J. G. A. Sept. 14.

Heating water.—Two vertical chambers k^1, k^2 are connected by a number of pipes *r*, so that the cold water entering by the pipe *a* is exposed to a large heating-surface, while the small space between the tubes does not allow explosive gas to accumulate. The hot gases from the burner B circulate around the water-tubes *r*, thereby heating the water, and are afterwards led away by the flue S, while the hot water is drawn off by the pipe *d*. In modified arrangements, two heaters are connected together in one casing and the flue tubes may be replaced by water pockets.



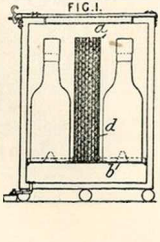
20,347. Brookes, A. G., [*Beal, M. F.*]. Sept. 15.



Heating buildings; heating air.—An air-heating apparatus for warming rooms and the like comprises an oil lamp *a* having any suitable form of burner enclosed by a metal chimney *c* provided with inverted conical grills c^2, which latter are perforated with holes c^3, so that air entering the casing *d* from below circulates around the grills and afterwards escapes by the outlet tubes d^1 in a heated condition. The hot products of combustion from the lamp escape from the casing by the cone b^2, drum b^1, and apertures d^3; the casing *d* is supported by a frame *b* resting, upon the oil reservoir. In a modified arrangement, a gas flame directly heats the flanged edges of a number of perforated grills arranged in a casing, so that air can enter and, after becoming heated by circulating around the grills, can escape by suitable outlets.

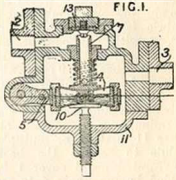
20,869. Fischer, C. Sept. 21.

Heating liquids, especially wine, in bottles. A vessel *a* with double walls is provided with a perforated false bottom *b* on which stand the bottles and a tube *d*. This is preferably of corrugated and perforated sheet metal and holds a source of heat. A cover is attached.

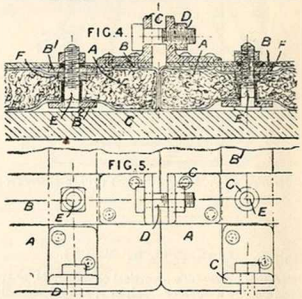


20,952. Bradshaw, A. Sept 22.

Steam traps.—Relates to that class of steam traps operated by the expansion and contraction of a volatile liquid contained within a flexible capsule. A casing 11, with suitable inlet and outlet passages 2, 3, respectively, is fitted with a capsule or expansion vessel 4 of the type described in Specification No. 11,632, A.D. 1887. The capsule is supported from below by a screw 10 and pivoted to a link 5, so that some amount of adjustment is possible, and it directly operates a hollow valve 7 bearing against a seating 13 of woodite, vulcanite, or the like. In operation, water enters by the inlet 2 and passes freely through the hollow valve and away by the outlet 3, but as soon as steam commences to flow, the capsule expands under the action of the hot fluid and presses the valve against its seat, thereby closing the outlet until the expansible fluid has cooled down to its normal temperature.



21,125. Snowdon, W. F., and **Snowdon, S.** Sept. 23.



Non-conducting coverings.—The invention relates to means for securing mattresses, pads, or slabs A of non-conducting material upon steam boilers and the like C by longitudinal and transverse straps B, B¹, B². The straps are connected by screwed bolts D passing through angle-irons riveted upon their ends, and also by transverse bolts E with squared necks. The pads are preferably quilted and may be consolidated to any desirable extent by nuts F, while any pad may be removed without disturbing the others.

21,617. Heys, W. E., [*Chedville, D.*]. Sept. 30.

Heating by electricity.—Resisting wire B is wound on a sheet A of asbestos cardboard, and en closed between two cards and in an envelope to exclude moisture. Other materials may be used. The ends of the wire are connected to eyelets C. Such heaters may be used in hot presses for finishing fabrics, in vehicles, as dish warmers, and for other purposes.

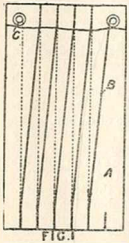
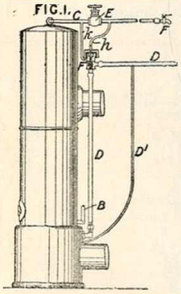
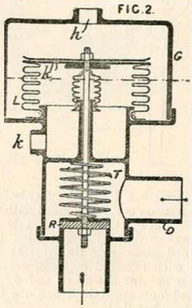


FIG. 1

21,689. Braithwaite, C. L., and **O'Brien, E.** Sept. 30



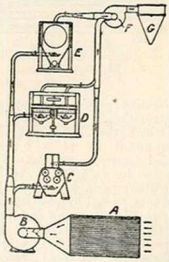
Heating water.—Automatic means for cutting off the gas supply so long as no water is being drawn off from the heater, and for turning on the gas when the hot-water tap is opened. Water is supplied at B and drawn off at C. Gas is supplied by the pipe D through the automatic valve F, and a pilot light is maintained by the gas passing through D'. An automatic check valve E is placed in the hot-water service pipe C, and is balanced to open against any desired pressure so as to maintain a slight difference of pressure between the two sides, from which pipes *k*, *h* pass to the governing-valve F. Fig. 2 shows a section of this valve, the difference of pressure of the water in the pipes *k*, *h* causing the extension of the corrugated rubber casing L and lifting the gas-supply valve R. A small opening k^1 allows equilibrium of pressure to be reached when the flow of water in the pipe C ceases, and



the gas-supply valve then closes under the action of the spring T. In a modified form of the valve, the casing L is inverted and is secured to the inside of the cover G.

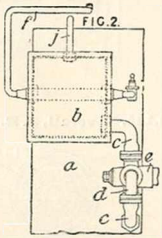
21,859. Leetham, S., and **Simon, H.** Oct. 2.

Heating air.—Flour-milling machinery is provided with a regulated supply of heated or dry air constantly renewed. The Figure shows a heating-apparatus A and fan B connected with the roller mill C, rotary sieves D, and centrifugal reel E. The exhaust is taken off by a fan F to a dust collector G. One of the fans may be dispensed with Heated air may also be led into conveyers, elevators, and spouts.



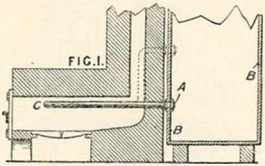
described in which the table is provided with electromagnets and an ordinary iron is used. Permanent magnets may be employed in place of electromagnets.

23,408. Robinson, H. M. Oct. 21.



Heating water.—Improvements on the invention described in Specification No. 19,695, A.D. 1895, where water in a reservoir *a* is heated by a coiled steam pipe *f*. Measured quantities of this heated water can be drawn off from a measuring side chamber *b* which is connected with the reservoir by a pipe *c* having a discharge bib *d* and cock *e*. The measuring-chamber and reservoir are also connected by a top pipe *j*. In order that the contents of the measuring-chamber may be kept hot, the steam pipe passes through it before entering the reservoir. The safety-valve is put in a loop of the steam pipe on the other side of the reservoir.

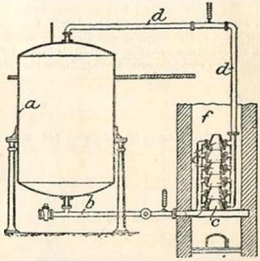
23,417. Henly, T. L. Oct. 21.



Heating liquids in tanks containing flax and like fibrous-producing substances. The tank B is furnished with a number of tubes A, closed at their outer ends and projecting into a furnace C. The liquid in the tanks circulates in the tubes, and is heated thereby and, in order to facilitate flow, the tubes may be divided by a central longitudinal partition. A slightly-modified arrangement is described and illustrated.

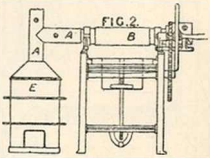
23,635. Makin, E. Oct. 24.

Heating liquids.—For rapidly heating and circulating the liquor a kier *a* for dyeing, bleaching, &c. is connected at the bottom by a pipe *b* and at the top by a pipe *d* with a series of hollow conical vessels *c*. These vessels overlap each other without touching, and are formed with a



central passage so as to be freely exposed to the hot gases of the furnaces *f*.

24,093. Cudlipp, T. Oct. 29.

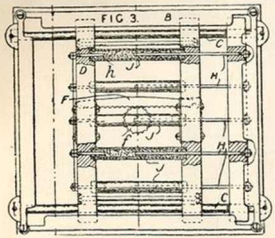


Heating by air circulation.—Ironing, drying, and other machines are heated by hot air obtained from the flue pipe of an ordinary drying or heating stove. Any suitable connections may be employed, and a fan or blower may be used to improve the draught. The Figure shows a stove E connected by a pipe A with the roller B.

24,594. Cummings, G. K. Nov. 3.

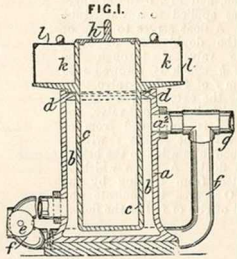
Heating by electricity.—Resistances for this purpose consist of tubes J of any suitable form, containing resisting-material, such as granular or powdered 50 to 90 per cent. graphite, or a liquid or semi-liquid, and fixed and movable conductors *h*, H, connected so that the effective resistance of all the tubes may be varied simultaneously, no part being cut out of circuit. Otherwise resistance rods making contact with mercury or brushes may be used. In the arrangement illustrated, long conducting-rods H are fixed in an open frame B, and project into the tubes J, which are carried in a frame D movable along guides C by a rack F, pinion *f*, and hand-wheel. The short rods *h* are fixed in the tubes; these are connected electrically

in any desired order. Metal tubes enamelled inside are preferred, and they may have irregular exteriors.



24,656. Bickerton, H. N. Nov. 4.

Heating liquids. — An apparatus for heating liquids and the like by the exhaust gases from a gas engine consists of a metal casing *a* fitted with a receptacle or container *c* for holding liquid. The hot gases are led past a two-way valve *e* into the annular space *b* and, after circulating therein, escape



by an outlet a^2, *g*. The container is luted at *d* and provided with a lid *h*, and the hot gases may be diverted by the valve through a branch pipe *f* when not required.

24,708. Jones, J. D. Nov. 4.

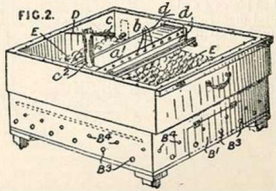
Non-conducting compositions. — Relates to non-conducting coverings of the kind described in Specification No. 19,799, A.D. 1893. A mixture is made of 25 per cent. of mica, 55 per cent. of asbestos, and 20 per cent. of clay. The composition thus prepared is rendered plastic by the addition of water and applied in the ordinary way.

24,787. Thompson, W. P., [*Dürr, G.*]. Nov. 5. *Drawings to Specification.*

Heating gases.—The steam, air, or other gas for use in a motor is first passed into a superheater, which during the superheating is closed both to the pressure generator and to the engine. When the desired pressure is obtained the gas is liberated for use in the motor. In the case of high-speed engines several superheaters are employed.

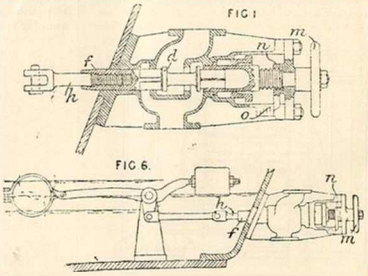
24,961. Duckering, S. Nov. 7.

Thermostats are constructed with a metal box C partially filled with ether and used to actuate a lever D connected by a link to a flap valve (not shown) in the cover of an incubator, thereby regulating the temperature of the egg drawer.



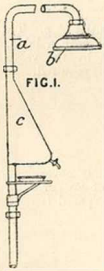
25,075. Paxton, J. F. Nov. 9.

Heating water. — Fig. 1 shows water-supply valves and controlling mechanism in sectional elevation, and Fig. 6 the arrangement as applied to a water-tube boiler. A float serves to open or close the double-beat or other suitable valve *d* through the spindle *h* which is screwed into the stem *f* of the feed-valve. On rotating the external wheel *m* and along with it the feed-valve, the spindle *h* is protruded from or taken into the socket *f* with a consequent alteration in the height of the float. A nut *n* which is prevented from turning by the guide O serves to indicate the amount of rise or fall of the float.



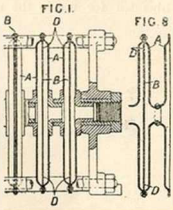
25,490. Koop, A. A. O., and **Klentze, J. F.** Nov. 12.

Heating water for baths. A vessel *c*, formed in the course of the supply pipe *a* to the rose *b*, is heated by a spirit lamp &c. before turning on the shower.

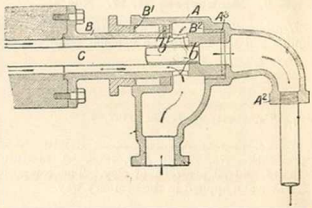


25,643. Smith, M. H. Nov. 14.

Heating buildings, radiators for. The hot liquid is circulated through hollow gills built up of dished plates A and central diaphragms B perforated near the edge at D. The parts may be riveted, brazed, or otherwise secured together and may be held in a frame.



25,654. Milne, S. Nov. 14.



Heating apparatus. — Relates to means for admitting steam or other fluid into, and removing water from, drying cylinders, rollers, and other revolving articles. The steam is admitted at A^1 and passes into the cylinder through the ports *b* and hollow stem B, while the condensed water, collected by suitable scoops &c., escapes by the central pipe C and outlet A^2. The end of the stem B fits closely against the lining A^3 in the prepared part of the casing A, and the steam chamber B^2 is separated from the gland B^1 by a ring b^1, secured on the stem by a screw. In the case of rolls of small diameter the steam is admitted by the central tube and the water escapes by the ports *b*.

25,898. Bayley, A. J. Nov. 17.

Steam traps.—Relates to steam traps in which the expansion of a fluid is used for controlling the outlet orifice. A chamber B, containing an expansible fluid f^1, is provided with a thin corrugated plate C to which a valve K is fixed. Condensation water, entering the casing E by an inlet I, exerts a cooling effect upon the expansible fluid, thereby

relieving the pressure upon the plate C and allowing the valve to open. The condensation water is expelled under pressure through the pipe J, but as soon as steam commences to enter the casing the

FIG. 1.

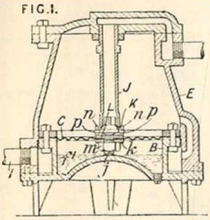
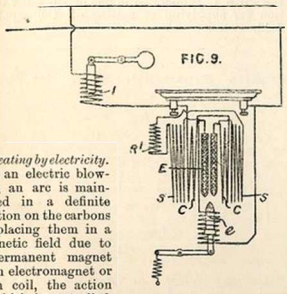


FIG. 2.

fluid f^1 exerts a pressure upon the plate C and closes the valve. The valve holder consists of a disc L, Fig. 2, having a screw-threaded shank j extending through the diaphragm C to receive a washer k and lock nut m, the upper face of the disc being provided with hook arms n with which lugs p of the valve engage.

25,903. British Thomson-Houston Co., [*Thomson, E.*]. Nov. 17.

FIG. 9.



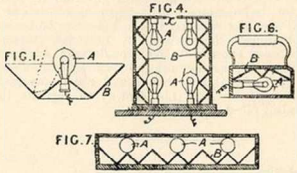
Heating by electricity.—In an electric blowpipe, an arc is maintained in a definite position on the carbons by placing them in a magnetic field due to a permanent magnet or an electromagnet or main coil, the action of which is controlled by opposing coils. In the diagram, the carbons are shown in a plane at right-angles to their proper position. The main coils C may be excited by the main current passing through the carbons E, as indicated, or by a current controlled by the main current. The opposing coils S may be in a highly resisting or reactive circuit R^1, forming a shunt across the carbons; a too energetic action of the main deflecting-coils C, causing an increased difference of potential between the carbons, would then be opposed by the action of the increased current through the shunt circuit S, R^1. Continuous or alternating currents may be used, and the invention is applicable where three parallel carbons are connected with three conductors carrying three-phase currents. The three carbons are arranged triangularly in plan, and three pairs of series and shunt coils are also placed triangularly.

25,968. Embleton, D. Nov. 18. *Drawings to Specification.*

Heating air supplied to stamps for dry crushing ores. Oil and air are injected into a chamber which is traversed by a series of air pipes, connecting chambers below and above the heating-chamber. The former is in communication with the atmosphere, and the latter with the suction pipe of the blower by which the air is driven into the mortar.

26,249. Dowsing, H. J. Nov. 20.

FIG. 4. FIG. 6. FIG. 1. FIG. 7.



Heating by electricity.—An electric heating-device, such as a glow lamp A or the like, is provided with a reflector B of projecting, conical, pyramidal, or wedge-shaped form to reflect the heat rays away from the lamp globe and prevent overheating this latter. An aperture in the reflector around the lamp admits air for cooling the globe, or the reflector may be perforated with minute holes for the same purpose. The device is shown applied to a toaster or grill, Fig. 4, with two opposite sets of lamps separated by a space x. Fig. 6 shows a flat-iron provided with a heater and reflector, and a similar arrangement is used as a hot-plate, Fig. 7.

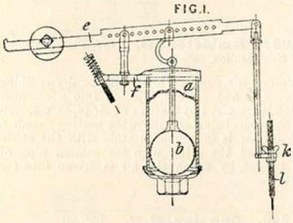
26,267. Crompton, R. E. B., and **Fox, E. J.** Nov. 20.

Heating by electricity.—In attaching resisting-wires to metal plates by enamel, a layer of porcelain or other very infusible insulating-material is interposed between the wire and metal plate, to prevent contacts between them during subsequent

heating. The metal plate is first coated with enamel, and the porcelain applied to it in powder, or sheets, or hexagonal or other pieces. The Provisional Specification states that the wire may be previously laced through holes or otherwise secured on porcelain sheets. The invention is applicable to heating and cooking apparatus of the kind described in Specifications No. 6072, A.D. 1891, and No. 17,091, A.D. 1892.

26,429. Hough, J. Nov. 23.

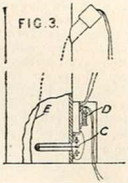
FIG. 1.



Thermostats.—An automatic governor or regulator for hot-water heating-apparatus consists of a cylinder *a* connected to the hot-water boiler and containing a float *b*. When the temperature of the water exceeds the required degree it begins to rise and carries the float and its attached linkwork *e*, *j*, *k* with it, and the screwed rod *l* operates a valve or damper (not shown) to regulate the heating effect.

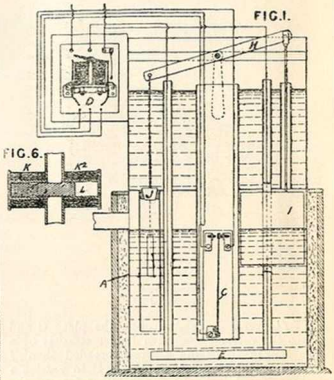
26,625. Edmunds, H. Nov. 24.

FIG. 3.



Thermostats; heating water.—Relates to means for controlling the supply of heating or cooling fluid, and for regulating the temperature of fluids and the like. The invention is shown applied to a water-heating apparatus in which A, Fig. 1, is a water container, C a thermostatic strip, and D an automatic electric switch. Current is supplied to a thermic wire contained in a casing E, and, should the temperature of the water rise above the normal, the thermostat C moves over and completes a circuit through the switch, which now interrupts the current until the normal temperature is regained and the circuit is remade by the automatic control. Water is supplied to the tank A by depressing a valve J suspended from the hand-lever H, and thereby affording a passage for the water in the upper tank; at the same time a float I is depressed and forces the hot water out by a pipe *a*. In another arrangement, Fig. 3, for preventing the freezing of

FIG. 1.



stand-pipes and the like, a thermic wire E therein is traversed by a current regulated by a thermostatic bar C and switch D. A similar arrangement is applied to heaters for soldering-irons. A means for regulating the supply of heating or cooling fluids consists of a bobbin with coils K, K², Fig. 6, connected to a thermostatic bar and switch whereby the valve L is operated in one or the other direction for supplying or cutting off the supply of fluid.

26,659. Rippingille, H. V. Nov. 24.

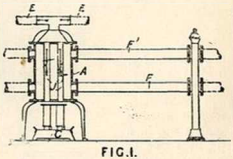
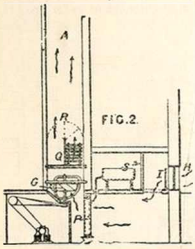


FIG. 1.

Heating buildings.—An apparatus, which may be used for heating buildings, comprises a boiler A heated by an oil stove C, the hot gases of combustion from which ascend by the flues J to an outlet pipe E. The hot water in the boiler circulates in the flow and return pipes F, F¹ of the pipe system, thereby heating the room or building.

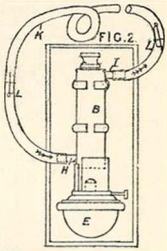
26,795. Stott, J. Nov. 26.



Heating buildings.—Relates to a method of ventilating theatres, churches, and the like, in which the air may be heated, cooled, or otherwise treated. Fig. 2 shows in section the arrangements by which air is admitted into the building. Entering by an inlet H near the ground, the air passes through a radiator I consisting of pipes heated by hot water or steam, then through an endless rotating screen P (as described in Specification No. 5086, A.D. 1894), which may be moistened with scent, then through the air-propeller G (driven by an electromotor), then through a second heater Q into the shaft A which leads to a receptacle over the ceiling. From this receptacle the air is discharged through a number of openings into the room or space to be ventilated. The foul air is drawn off through doors or hit-and-miss ventilators placed near the floor, and connected to uptake shafts leading up to the roof of the building.

26,880. Brown, A. C., and **Neilson, G. R.** Nov. 26.

Bed-warmers.—A cylinder B, heated by a lamp E, has an outlet I and inlet H connected by an india-rubber pipe K, so that hot water circulates in the direction indicated by arrows. The cylinder and lamp are attached to any convenient part of the bedstead or couch, and the flexible tube is secured to the bedclothes by safety-pins L.

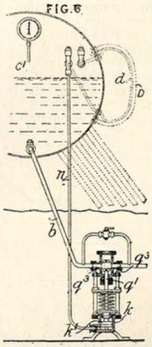


26,940. Jack, W. C. Nov. 27.

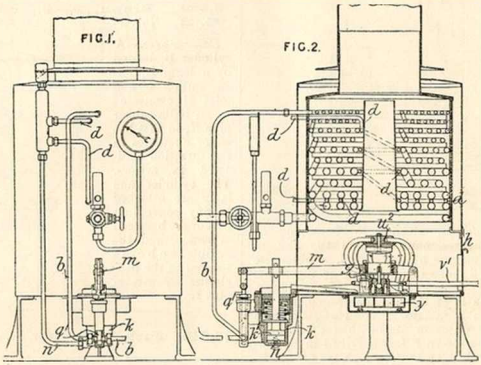
Non-conducting coverings.—A material for coating pipes and the like is obtained from certain flat shells, "Perna Ephippium," which have their thin internal layers readily detachable as lamellæ. These flakes are bruised into small fragments and thoroughly incorporated with about 8 per cent. of starch. The mixture so formed is kept dry for use, and is applied as a paste

27,204. Smith, J. Nov. 30.

Thermostats.—Relates to means in connection with steam boilers for maintaining approximately constant the quantity of water, and for regulating the heat supplied, by adjusting the outlets from the vapour burners which heat the boilers. Fig. 1 shows an external elevation of a coiled water-tube boiler with the regulating-mechanism attached thereto, Fig. 2 a central vertical section of the same, and Fig. 6 an adaptation of the invention to a special form of water-tube boiler. An independent tubular circuit d in close contact with the coils of the generator is filled with liquid which, by its receipt or loss of heat through a corresponding variation in the generator, causes a movement of the spring-pressed piston k^1 within the cylinder k, to which, by a junction at n, the contents of the coil have access. On an ascent of the piston, the valve-rod q^1 is raised and also the vapour burner valve g. By this means feedwater can pass the valve q^1 and enter into the boiler circuit by the pipe b, while the outlet from the vapour burner is diminished. In a modification, the valve of the vapour burner and the piston k^1 are upon the same rod, which in this case is vertical. The rod m in Fig. 2 may, by its movements, be made to operate a damper controlling the air supply to a boiler furnace. As applied to the water-tube boiler shown in Fig. 6, the regulator tube d is brazed to a tube D which extends from the side of the steam and water drum C^1. By this means heat is rapidly



communicated from the tube D to the regulator tube. The junctions of the latter are the same as in the foregoing, viz., controlling the position of the piston k^1, and consequently the opening or closing of the boiler feed passage q^3. By adjusting the load on the piston k^1 the normal water level in the boiler



can be varied. Circulation may be allowed for through the regulating-tube. In the case of a Cornish or Lancashire boiler, substantially the same U-shaped tube is fitted into one of the side flues. The same may be arranged in combination with the furnace crown or other part of a boiler liable to be overheated, and arrangements made for sounding an alarm.

27,625. Deissler, R. Dec. 4.

Heating by chemical action.—Relates to a method of heating metals by the ignition of a mixture of certain specified metals with oxygen, halogen, and sulphur compounds, and is applicable to welding, forging, soldering, riveting, and like processes. For example, rivets may be heated by a mixture composed of finely-divided aluminium and ferric oxide, and the ignition may be started by a piece of magnesium ribbon or by a special fuze of a similar composition to the igniting mass. The ignition temperature may be modified by using inert bodies such as fluor-spar, cryolite, sand, and gypsum in the mixture, and for heating large pieces of metal a special crucible may be employed, consisting of a framework of wire netting covered with magnesia.

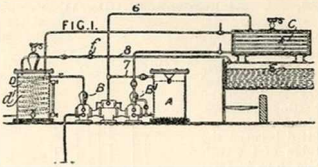
27,626. Deissler, R. Dec. 4.

Heating by chemical action.—Relates to a means for heating metals by chemical action, and is applicable to welding, soldering, and riveting operations. For example, a mixture may be formed of carbide of calcium with gypsum, sand, and either magnesium or aluminium, and the metallic objects to be heated are embedded in this mixture, which is then ignited by a blowpipe flame or a suitable fuze, as, for example, magnesium ribbon, or a mixture of carbide of calcium with peroxide of barium. A special crucible may be used for the heatings consisting of a framework of wire netting covered with magnesia.

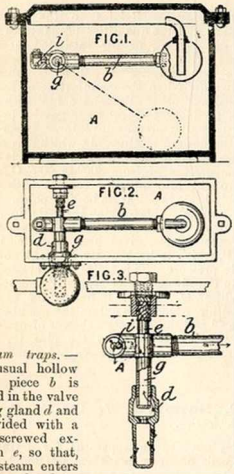
27,989. Ashley, F. M. Dec. 8.

Heating liquids. — Relates to apparatus for sterilizing water, milk, and other liquids. The liquid is circulated through a heater in which it is raised to a temperature above the boiling point, a sufficient pressure being maintained to prevent boiling. The Figure shows one form of apparatus for the purpose. From the storage tank A the milk or other liquid is forced by a pump B^1 through a coil C heated by steam from a boiler E; from this it is conducted to a cooling-tank D containing a coil d^1 through which cold water is circulated by a pump B. Steam is supplied to the

pump engine by a pipe 6 and to the upper part of the tank A by a branch 7; it is also supplied to the upper part of the tank D by a pipe 8 containing a reducing-valve *f*. Two somewhat modified forms of apparatus are also described. In one of these, the milk is forced from the storage tank into a second tank supplied with heated air under pressure, thence through a heating-coil contained in a hot-water bath, and thence through a third tank, supplied with heated air, direct to the bottling-apparatus. The other form of apparatus is similar to the last, but heated air is supplied to the storage tank, and the milk, after being sterilized, is passed through a cooler.

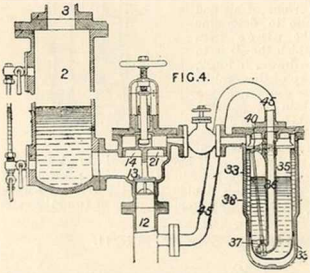


28,138. Halsall, T. H., and **Hampton, J. C.** Dec. 9



Steam traps.—The usual hollow elbow piece *b* is pivoted in the valve seating gland *d* and is provided with a solid screwed extension *e*, so that, when steam enters and lifts the float, the hollow valve *g* is pressed against its seating and closes the inlet. To prevent incoming air lifting the float, there is a ball valve *i* to allow of its escape into the casing A. In a modified arrangement, when the float is in its lowest position, a projection on the casing pushes open a spring-loaded valve.

28,162. Reed, J. W. Dec. 9.

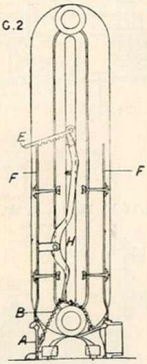


Steam traps.—A sectional elevation of the apparatus is shown in Fig. 4, in which 2 is a condensed water receiver, connected to a pipe system or the like by an inlet 3. As water rises in the receiver it leaks past the piston valve 14 through an orifice 21, and flows into a float chamber 33 and finally escapes over the edge of the float 35, causing the latter to sink and pull a valve 37 away from its seating by aid of the bell-crank lever 40 and link 38. A passage is now afforded to the condensed water by the pipes 36, 45 into the outlet pipe 12 below the main exhaust valve 13, and at the same time a reduction of pressure ensues above the piston 14 owing to the water not being able to leak through the orifice 21 fast enough. The main differential valve 13, 14 therefore rises and opens a direct passage into the exhaust pipe until the water falls below the piston valve 14, and water ceases to flow into the float chamber; the float consequently rises and the action commences anew. In a modified arrangement, a float in the receiver 2 operates a valve within the stem of the differential piston valve, and the float chamber is dispensed with.

28,330. Richardson, W. Dec. 11.

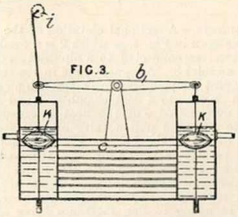
Heating air.—Relates to an improved construction of hot-air or steam radiators adapted for ventilating and heating purposes. Metal plates F are fitted between the tubes of the radiator so as to form shafts or passages for the air to rise between the tubes and to be heated in its passage. Valves A are fitted on the inlets to control the current of air and also to determine the place from which the air is to be drawn. In Fig. 2, two of these valves are connected by a chain B, so that when one is closed the other is open. The chain is actuated by a lever H having a toothed rack E at the top to fix the lever in any required position. By means of this double valve the radiator may be made to draw air from the room or from the outer air.

FIG. 2



28,359. Sykora, F. Dec. 11.

FIG. 3.

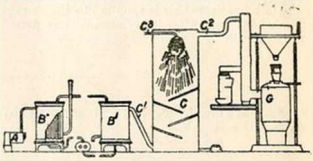


Heating fluids.—A device for increasing the efficiency of heating-apparatus consists in providing means for keeping the working fluid or the fluid under treatment, or both, in a continual state of oscillation. This may be accomplished in various ways by the motion of a piston in a cylinder, or by multiple-way cocks, oscillating fans, floats, and the like. In one form of the apparatus, Fig. 3, the fluid under treatment circulates inside the tubes *c* and the working fluid outside. The oscillations are caused by floats K suspended from a pivoted beam *b* and vibrated by a crank and connecting-rod device *i*. Several modified arrangements are described and illustrated.

28,475. Blundell, G. H. Dec. 12. *Drawings to Specification.*

Thermostats.—An ordinary thermostatic capsule is employed in connection with a system of levers and dampers for regulating the temperature of incubators.

28,588. Mond, L. Dec. 14.



Heating gases. — Relates to the economical production in large quantities of mixtures of air and water vapour, or air saturated or nearly saturated with water vapour, at temperatures between 80° and 90° C. This is more particularly required in the manufacture of ammonia from coal and other nitrogenous fuel with simultaneous production of producer gas by processes patented by the present inventor. In order to obtain the desired mixture, air, which may already contain a certain amount of water vapour, is heated to a temperature of from 300° to 500° C., and is then brought into intimate contact with water, preferably heated to near its boiling point. Fig. 1 shows a method of performing the invention. The gas engine A, or other more or less distant source of hot waste gases, gives heat to water in the heater B, which is kept under constant and considerable pressure. This water is circulated by a pump to the air and water heater B^1 situated near the producer G. In this is heated the partially-saturated air, which then enters the chamber C by the pipe C^1 and there meets a shower of preferably heated water introduced by the pipe C^3. The heated and saturated air passes out through the pipe C^2.

28,599. Sutton, G. W. Dec. 14. *Drawings to Specification.*

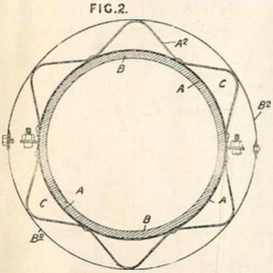
Heating air.—In an apparatus for drying tea, heating coils of steam pipes are situated beneath each tea-tray and heat a current of air as it passes through the apparatus.

28,718. Hennessy, T. Dec. 15. *Drawings to Specification.*

Heating buildings.—The firegrates of gas generators are made of iron tubes, and contain water which may be used in connection with a circulating system for heating the building containing the plant.

28,885. Barton, R. Dec. 16.

FIG.2.



Non-conducting coverings.—Relates to means for holding granular non-conducting material against or around a boiler, pipe, cylinder, or other article. The invention is shown applied to a pipe B, upon which latter are clamped bands A carrying corrugated strips or distance-pieces A² for supporting a cover B². The non-conducting material is filled into the space *c*, the ends being closed by plugs to prevent the escape of material. The bands A are lined internally with asbestos to prevent conduction, and, in a modified arrangement, the corrugated strips A² are riveted to the interior of the bands A.

29,017. McMeekin, J. Dec. 18.

FIG.I.

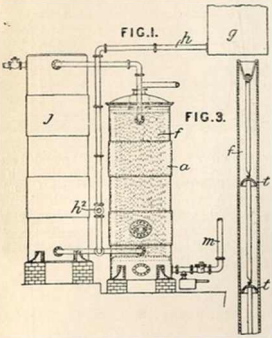
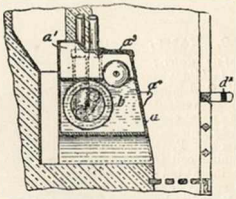


FIG.3.

Heating water.—An apparatus for heating water for paper-making, brewing, and steam-boiler supply consists of a vertical cylinder *a* provided with a series of tubes or pipes *f* through which exhaust or live steam is circulated. Water from a tank *g* is led into the boiler by pipes *h*, *h*² and, after being heated by the steam pipes, is drawn off into the hot-water tank *j* ready for use. The steam and condensed water from the cylinder *a* escape by an outlet pipe *m*, and, in order to promote the heating efficiency of the tubes *f*, these are furnished with suspended baffle-plates *t*, to spray the steam and condensed water against the sides.

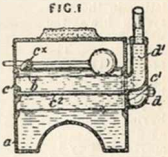
29,039. Boddy, C. Dec. 18.

FIG 2



Heating water.—Relates to that class of circulating boiler for domestic and other purposes in which a high-pressure boiler is placed inside an open or low-pressure one. The outer boiler *a* may be supplied with water by hand through the opening a^3, or may be provided with a ball tap and cock c^x. Projections a^4 on the boiler *a* serve in connection with the drop bar d^x as a rest for the pans. Vent holes a^1 are provided at the back for the escape of steam, as described in Specification No. 11,111, A.D. 1896. The high-pressure boiler *b* may be formed of a flanged tube held by a bolt c^2 between plugs *c*, c^1, of which the latter is formed with inlet and outlet pipes *d*, d^1. The inner sides of the plugs *c*, c^1 may be fitted with copper to prevent corrosion. The high-pressure boiler may be arranged in an inclined or vertical position and the circulating pipes may be extended into it. It may be cast in one with the low-pressure boiler, which may be of any suitable form.

FIG.I

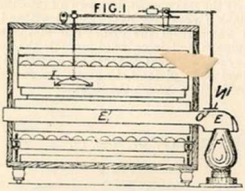


29,552. Paterson, A. F. Dec. 23.

Thermostats for incubators. The temperature is regulated by means of a damper N^1 on a hole O in the flue E of the lamp F. The damper N^1 is operated by the levers shown, actuated by a metal capsule I containing air.

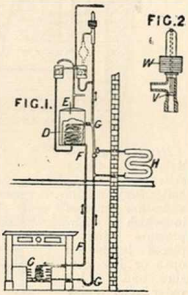
(*For Drawing see next page.*)

29,552.



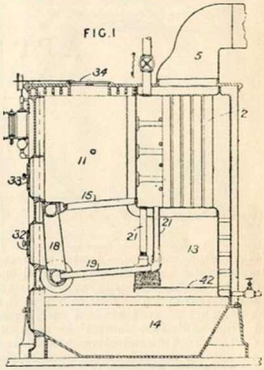
29,759. Yates, A. Dec. 28.

Heating water; heating buildings.—A coil C heated in any convenient manner is connected by flow and return pipes F, G to a similar coil D placed in a hot-water supply cistern E, whereby the hot fluid circulating in the pipe system heats the water contained in the cistern. The pressure in the pipes is controlled by a safety-valve V loaded directly by ring weights W, and a room or apartment may be heated by allowing the hot fluid to circulate through a radiator H.



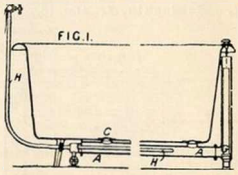
29,942. Lake, H. H., [*Parkhurst, E. B.*]. Dec. 29.

Heating water, boilers for. The firebox 11 having a dry crown and front is provided with a double grate formed of water-circulating firebars 15, 19 and with doors 32, 33. By means of lateral chambers 18 circulation is carried on through the firebars and the body of the boiler. Air is supplied through the disc damper 34. The furnace gases escape between the vertical branches 21 to the combustion chamber 13, from which the vertical smoke-tubes 2 rise to the uptake 5. A removable plate 42 prevents the direct access of air from the ashpit 14 to the combustion chamber. In a modification, the crown and front of the firebox are



water-jacketed. In some cases the fuel opening in the furnace crown is so arranged as to require no cover.

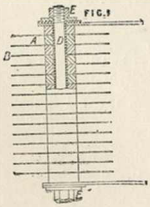
30,073. Shanks, J. Dec. 31.



Heating water for baths. An open-ended steam pipe H enters a tube A fixed below the bath and communicating therewith by apertures C and D. The pipe A also communicates with the usual outlet G. When steam is admitted it mingles with the water and sets up circulating currents. In a modification, the pipe H is enclosed by a concentric tube with closed ends.

APPENDIX.

A.D. 1893.

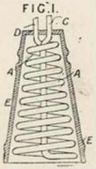


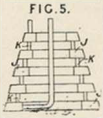
23,331. Cuttriss, S. W. Dec. 5.

Heating by electricity.—A heater consists of blocks A of carbon, or a mixture of carbon with clay, asbestos, mica, or other material, separated by thin metal plates of larger area, and held together adjustably by a bolt D.

A.D. 1895.

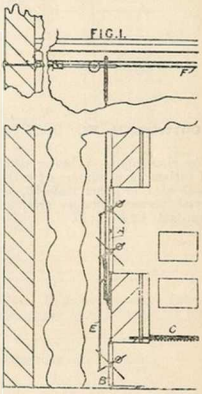
444. Hill, J. Jan. 8.





Heating water.—Portable apparatus for heating water consists of a tapering or conical coiled metal tube A surrounded by a hood or cover E of metal, fireclay, asbestos, &c., which can be lifted off if required. The cold water is admitted at C, and the hot water is drawn off at D. Several coiled tubes, one inside the other, may be used. The water-heater may be made up of conical sections J connected together by tubes K.

A.D. 1896.



29,546. King, H. J. H. Dec. 23.

Thermostats.—Relates to means for automatically regulating the temperatures of malt and hop kilns, ovens, stoves, and buildings, and furnaces for the same, and consists of improvements cn the arrangements described in Specifications No. 5274, A.D. 1879, and No. 13,006, A.D. 1885. To prevent waste of fuel a double system of ventilators is employed, both ventilators being operated by the expansion of brass or other metallic rods F placed below the kiln floor. One ventilator A is placed above the grate C, and another B in front of the ashpit or on the furnace door. These ventilators are so connected by the rod E that, when the required temperature is reached, the top one opens and the lower one closes, and *vice versâ*. In the case of public buildings, the top ventilator is placed in the roof, while the bottom ventilator is placed in the ashpit to check the fire, and the expansion rods are placed near the ceiling.

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