PATENTS FOR INVENTIONS.

ABRIDGMENTS OF SPECIFICATIONS.

CLASS 64, HEATING.

Excepting FURNACES AND KILNS; STOVES, RANGES, AND FIREPLACES;

for which see Abridgment Classes 51, FURNACES &c.; 126, STOVES &c.

PERIOD—A.D. 1884–88.

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PUBLISHED AT THE PATENT OFFICE, 25, SOUTHAMPTON BUILDINGS,
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1897

PRICE ONE SHILLING.

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EXPLANATORY NOTE.

The contents of this Abridgment Class may be seen from its Subject-matter Index. For further information as to the classification of the subject-matter of inventions, reference should be made to the *Abridgment-Class and Index Key*, published at the Patent Office, 25, Southampton Buildings, Chancery Lane, W.C., price One Shilling, postage (parcel post) Sixpence.

It should be borne in mind that the abridgments are merely intended to serve as guides to the Specifications, which must themselves be consulted for the details of any particular invention. Printed Specifications, price Eightpence, may be purchased at the Patent Office, or ordered by post on the Patents Form C[1] (to be obtained from any Post Office), no additional charge being made for postage.

SUBJECT-MATTER INDEX.

Abridgments are printed in the chronological order of the Specifications to which they refer, and this index quotes only the year and number of each Specification.

NAME INDEX.

The names in *italics* are those of persons by whom inventions have been communicated to the applicants for Letters Patent.

HEATING.

Excepting FURNACES *or* STOVES;

for which see Abridgment Classes FURNACES &c.; STOVES &c.

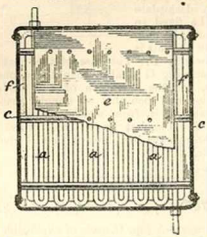
Patents have been granted in all cases, unless otherwise stated. Drawings accompany the Specification where the abridgment is illustrated and also where the words *Drawings to Specification* follow the date.

A.D. 1884.

118. Wood, T., and **Milton, G.** Jan. 1. *Drawings to Specification.*

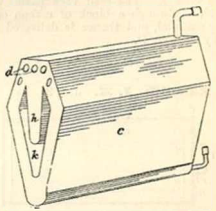
Heating water for hot-water circulation apparatus. Two metal boxes forming the front and back of the boiler are connected together by means of a number of horizontal tubes. The external tubes form the walls and base of the combustion chamber; the remaining tubes traverse that chamber, which is open at the top to admit fuel. The boxes which form the ends of the boiler are provided with inlets near the bottom and outlets near the top to connect to the circulating system. The whole is encased in brickwork &c. in such a manner as to allow a space beneath the bottom tubes, and spaces at the sides to form flues leading to some convenient uptake.

147 Brophy, M. M. Jan. 1.



Heating water.—One or more inclined gridiron or equivalent arrangements of pipes *a*, through which the heating-medium passes, are fitted in a water tank; above and parallel to each series of pipes is fixed a baffle-plate *e* made so that there are spaces *f* between its upper and lower edges and the sides of the cistern *c*. Any deposit from the circulating water will fall on the baffle-plate below or on the bottom of the cistern, and be easily removed.

156. Watson, J. Jan. 1.



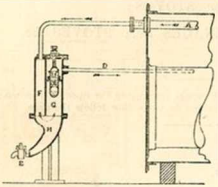
Heating water for heating conservatories &c. The boiler *c* is horizontal and is constructed with its sides rising outwards, and then turning inwards and upwards, being joined above by the crown. The hot gases from the furnace below circulate outside the boiler, and pass through the internal flue *k* and the pipes *d* before escaping to the chimney. To increase the heating-surface, a wedge-shaped water-way *h* may extend downwards into the flue *k*.

P 10364—1060—6/94 Wt 5973 D & S.

455. Clark, A. M., [*Offrion, O.*]. Jan. 2.
Drawings to Specification.

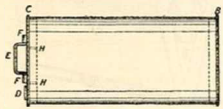
Heating air.—Air is heated in an oven combined with a coffee roaster, and employed for warming rooms &c.

481. Bowers, M. J. A. Jan. 3.



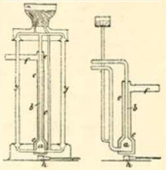
Heating water.—Relates to apparatus for purifying and softening water for boiler-feed, laundry, and other purposes, in which the water is first heated to precipitate certain dissolved salts. The invention is described as applied to steam boilers. The feedwater, in some cases mixed with soda or lime, passes through a pipe A in the steam space of a boiler, and is thus heated, its mineral impurities being rendered insoluble. After traversing this pipe it is led to a settling and filtering vessel, passing down one side F into a chamber H, so arranged as to facilitate the deposit and removal of the impurities by means of the blow-off cock E. The feed then passes up the other side G through a block of carbon or other filtering-material, and thence is delivered to the boiler by the pipe D.

505. Radcliffe, J. H. Jan. 3.



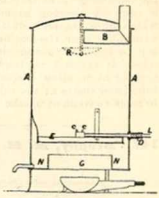
Footwarmers.—The body is formed of tinned iron, and the two ends B and C of tinned malleable cast iron. On the top end C are cast two projections F, F with holes, into which the ends of the strong wire handle E are forced. D is a screwed hole with a plug for filling purposes. Cross-webs H, H form air chambers to allow for expansion. Cast-iron ends are similarly applied to other vessels for other purposes.

519. Petrie, J. Jan. 3.



Heating buildings; heating water.—Relates to hot-water circulation apparatus, and to hot-water chamber-heaters or radiators. The vessel *a*, in which water is heated by a gas or oil burner *h*, is connected above and below, by pipes, as shown in the right-hand Figure, to any hot-water apparatus for heating rooms or buildings, or to a system of pipes *y* surrounding the vessel *a* and with or without a perforated enveloping casing, as shown in the left-hand Figure. The vessel *a* and the upper connecting pipe *b* are surrounded by a casing *e* inside which the products of combustion circulate before escaping through the pipe *f* to a chimney or flue. The water is supplied to the system from a cistern above, and when heated passes through the apparatus, heating the air in the rooms or buildings before returning to the vessel *a*.

809. Fletcher, T. Jan. 5.

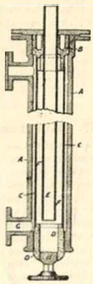


Heating water.—The water is brought into actual contact with the products of combustion from a gas burner placed underneath the apparatus. The water flows through a pipe L, within which may be a strainer D, and issues at C inside the casing A in a jet or jets. A dash-plate R may be fixed to the top of the casing, and below the jets is a shallow tray E. The base of the chamber A has an opening G smaller than the diameter of the tray, for the admission of the products of combustion, and such that an annular space N is formed around it, from which the hot water is drawn off. The hot gases pass upwards and escape through the bent flue or pipe B above the dash-plate.

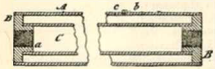
995. Jensen, P., [*Keidel, J.*]. Jan. 8.

Steam traps.—A pipe C, made of expansible metal, is secured at its lower end to a plug D screwed into the lower end of the vessel A. Its upper end seats

against a plug B. An inner pipe E which leads from the vessel to be drained passes steam-tight through the upper plug, and terminates near the bottom of the apparatus. As the condensed water collects in the annular space F, the pipe C contracts and leaves its seat B, allowing the water to be blown out by the branch G. The steam, on coming in contact with the expansion pipe C, causes it to lengthen and seat itself again, closing the outlet. A screw-plug H is provided by which any sediment can be removed.



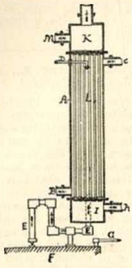
999. Lake, W. R., [*Walsh, M. J.*]. Jan. 8.



Footwarmers.—A footwarmer or similar vessel consists of an outer metal tube A with heads B to which is secured an inner metal tube C (either to projections *a*, or in holes in the heads) by welding. The tube C holds the heating-agent (steam, air, or water), and the space between A and C is filled (through the hole *b* with its screw-plug *c*) with heat-retentive material such as sodium acetate.

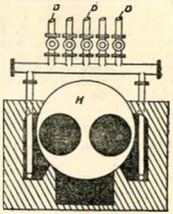
1052. Collins, W. Jan. 9.

Heating water.—Waste steam from an engine or other apparatus is utilized to heat water in a vessel similar to a surface condenser, consisting of a cylindrical casing A provided with an inlet B and an outlet C for the exhaust steam, and also an injector nozzle D for the water. The exhaust in meeting with the water is condensed, falls to the bottom of the chamber, and is removed by a pipe E to a well F. From this well it passes as required by a pipe G to a pump, by which it is forced through the pipe *h* into a cap I on the end of the casing A. A similar cap K on the upper end is in communication with the first-named by pipes L passing through the casing A. Through these pipes the water passes, becoming heated by the exhaust steam surrounding them.

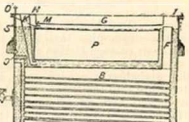


1062. Morris, T. Jan. 9.

Heating buildings &c.; heating air.—Air is heated by being forced by means of a fan or steam jet through pipes, lined with fireclay and placed over a fire or in the flues of a boiler H or other heating-arrangement, and is then passed through a system or systems of pipes D in the structure. After passing through the room or rooms of the building, the warm air is directed back to the flues of the boiler or other heating-arrangement.



1179. Loch, J. H. Jan. 10.

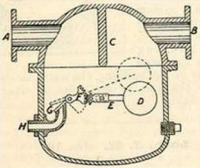


Heating water.—A water tank A is made with a double casing between which the water circulates, a series of wide flat tubes B connecting the front and back water spaces. The heat is supplied by a gas or oil burner E, the heated gases passing up between the tubes B, through the flue F, and either out through H by passing along under G, or through I by raising a damper. The water is fed in to G, and trickles through the holes M upon the plate L, where it meets the hot gases coming from F to H. The funnel K is provided to fill the tank when only a small quantity of water is required, and the valve O shuts off the top of the tank from the bottom, so that only the water in the lower part shall be heated. S is a warning pipe to prevent the water from going down F, and P an oven within which food may be warmed.

1269. Southby, E. R. Jan. 11.

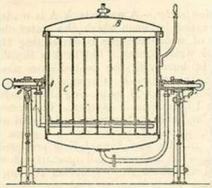
Heating air; thermostats.—Air is heated for drying purposes by passing it over heated steam pipes or flues or through a fire. In the latter case, or if high-pressure steam is used, a regulating-apparatus is employed. The exit from the blower is divided into two separate pipes, one carrying the air to the fire &c., and the other external to the fire, thus producing a hot and a cold current which are caused to mix before entering the drying-chamber. Valves regulate the amount of air passing through each pipe, and thus any desired temperature can be obtained. The valves may be actuated by hand, or automatically by the expansion of a metal bar.

1402. Dove, L. Jan. 14.



Steam traps.—Two branches A and B are connected to the steam pipe that is to be drained. The steam in its passage strikes against a plate C formed across the upper part of the vessel, by which the mechanically-carried water is retained. The water drops into the lower part of the vessel, where it collects and, on attaining the required level, lifts the balls D on the end of the lever E. The other end of this lever is formed with teeth which gear with a quadrant F, by which the hinged valve G is lifted, allowing the water to escape by the pipe H.

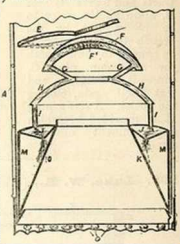
1426. Lake, W. R., [*Ancelin, A.*]. Jan. 14.



Footwarmers, apparatus for heating. A heating boiler or vessel A, with tight-fitting movable lid B, is mounted on hollow trunnions O, O^1, or fixed horizontally or vertically. The footwarmers are placed in a movable casing in the boiler divided into compartments C. Steam is sent through the compartments after passing a pressure-regulating chamber, and the condensed water flows back to the steam generator. The boiler may be heated by a fire, or by means of a steam coil.

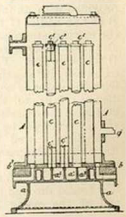
1627. Righton, W. J. Jan. 17.

Heating water.—Relates to apparatus heated by gas, oil, or spirit burners, in which the water circulates upwards through the spiral divisions in an annular space A between two cylinders, whence it is conducted down the covered helical channel E, inside the cylinders, to the chamber F, connected by pipes G to the space H, and having an internal division plate F^1 with a perforated central portion. The water flows from the chamber H through the pipes I into a hollow ring J, with perforations below, which forms the cover for the space into which the water descends, between the cylinder M and the conical casing K, situated over the burners O. If desired, several such spaces may be used, having chambers similar to the chamber F placed in the centre of each chimney. Water is supplied to the annular space below through a water cock which is so situated above the tap regulating the gas &c. supply that the latter cannot be turned on unless the water cock has been previously opened. The burners O are lighted by means of a gas jet &c. at the end of a branch pipe, connected so as to turn with the main tap.



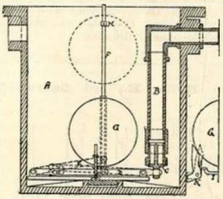
1700. Sterne, L., and **Wainwright, C. D.** Jan. 18. *Amended.*

Heating water by steam. Relates to apparatus for heating and purifying water. The water to be purified enters at *g* the vessel A, which stands on a base *a* divided into chambers by the partition a^2, one of them being in communication with *b* and the other with b^1. In A are a number of tubes *c* closed at the top by caps c^2 and divided by diaphragms c^1 fixed on the partition a^2 and extending almost the whole height of the pipes. Exhaust steam



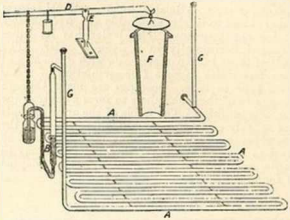
enters at *b*, traverses the pipes, and escapes at b^1, having in its passage heated the water in A and caused it to deposit some of its impurities. The water is pumped out of A by hand, thence to a second chamber containing an inner drum full of live steam, traversed by a number of pipes open at both ends to an outer chamber containing the impure water, which is thus further heated, and a further proportion of its impurities deposited. From this second chamber the water passes to a filtering-chamber consisting of a vessel with a perforated diaphragm at each end, the space between being filled with sawdust or other suitable material. A number of rings are placed round the inside of the filter to prevent the water from passing between the sides of the chamber and the filtering-medium. From this chamber the water is taken to tanks and used as required.

1921. Rotton, W. Jan. 22.



Steam traps.—The accumulation of the water raises a float and so opens a valve by which it is discharged. The pipe or vessel to be drained communicates with a chamber A in which the water of condensation collects. This chamber, which may be of any suitable dimensions and form, has extending to its lower part a discharge pipe B terminating in a seat for the valve C. This valve is opened and closed by the motion of the short end of a lever D. At the other end of this lever is a slot in which works a pin in a second lever E pivoted at one end and attached to a vertical rod F at the other. On this rod is a float G which is free to rise until it strikes a collar H on the rod, after which any increase in the depth of water causes the float to lift the rod and through the levers to open the valve and so discharge the water. On the end of the vertical rod, as shown in the Figure, is a pawl I which, when the rod is raised, takes into one of the notches on a bell crank K which is kept in position by a spiral spring. The rod is by this means held when raised, and the valve therefore remains open until the float in falling, as the depth of water decreases, pushes the bell crank aside, releasing the rod and closing the valve.

2021. Muir, W. Jan. 24.



Thermostats.—The Figure shows a heat-regulator applicable to incubators for hatching eggs by artificial heat, and to halls, stoves, and greenhouses where it is required to maintain a uniform temperature. Within the egg-chamber of the incubator is arranged a continuous coil A of tubing filled with liquid. One end of the coil communicates with a siphon tube B containing mercury and dipping into a bottle of mercury suspended from one end of a beam D balanced upon a knife-edge E. At the other end of the balance-beam a damper or valve-plate is suspended over the ventilating or air flue F, and there is a second damper placed over the heat flue and attached to the chain holding the mercury bottle. Thus, if the heat within the egg-chamber becomes too great, more mercury is forced from the siphon tube into the mercury bottle, which thereupon pulls down its end of the balance beam, causing the damper to close more tightly the heat flue, and raising the damper from the air flue by which more air is admitted. The outlet and inlet pipes G in connection with the continuous coil are provided with screw caps having an inner elastic cushion by which the said pipes are hermetically sealed.

2104. Blamires, T. H., and **Bailey, W. H.** Jan. 25. *Drawings to Specification.*

Digesters for cooking, treating bones, &c. The vessel in which are placed the articles to be cooked &c. is enclosed within an outer vessel. Steam for heating is admitted to the space between the vessels. The lid is secured vapour-tight by a screw working in a bar which may be hinged so that the bar and lid may be moved out of the way when filling or emptying the inner vessel. In order to facilitate pouring out, the vessel may be placed on trunnions. When the cooking is effected cold water may be passed through the outer chamber in order to cool the inner vessel and contents. The apparatus may be used in conjunction with "Bailey's steam "kettle," or warm-water producer and steam oven combined.

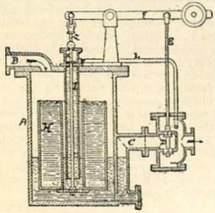
2164. Rose, F. D. Jan. 26.

Heating water.—Relates to a sectional steam boiler stated to be also applicable as a water-heater or heating-apparatus. The boiler has its tubes arranged horizontally in a definite order. The ends of these tubes communicate with drum-shaped chambers which cause a free circulation of water from tube to tube. Openings are made through the centre of these chambers to form a central flue for internal firing. The whole of the arrangements are suitably enclosed. Openings are formed in the chambers to permit of cleaning the tubes. When used as a water-heater variations in detail may be made, and cross circulating tubes may be adopted if found desirable.

2276. Gill, J. Jan. 28.

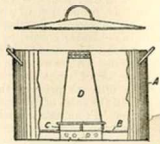
Non-conducting coverings.—Hot-water pipes and cylinders are protected from cold or frost by covering them with strips of brown paper in varying thicknesses or folds.

2318. Auld, J. Jan. 29.



Steam traps.—The vessel A is in communication by a pipe B with the steam pipe or other fitting to be drained. An outlet C for the condensed water is provided at the lower part of the vessel, controlled by an equilibrium valve D which is secured on the end of a rod E jointed on one end of a weighted lever F. On the other end of the lever is jointed a similar rod G, which passes through the cover of the condensed-water receiver, and has attached to its lower end an open-topped vessel H. On the lower side of the cover of the receiver is a pipe I which is maintained full of water by the steam pressure. This column of water acts as a seal preventing the escape of steam, and any water which passes into the box K is conveyed away by a small pipe L. The water first fills the vessel H, after which it overflows and collects in the bottom of the receiver A. The float is by this means lifted and the discharge valve opened, upon which the water escapes, allowing the float to sink, and thus close the discharge valve. In modifications, the valve D is worked directly by the vessel H, the outlet being in a continuation of the pipe I, or the vessel H is formed as a closed air-float situated directly above the valve D.

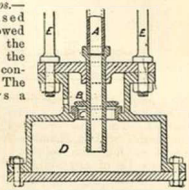
2414. Harmens, A. Jan. 30.



Boiling-pans for washing purposes. A is a vessel having a false bottom B, through which passes a perforated cylinder C provided with a cover. D is a tube passing up the side of the vessel and opening at its lower end into the space beneath the false bottom B. In this space is placed water which, when boiled, rises up the tube D, and is projected on to the clothes placed upon B, and soaks through them, carrying with it the dirt contained in them. It is then reheated, and the operation becomes continuous.

2422. Hyde, H., and **Eastwood, W.** Jan. 31.

Steam traps.—The condensed water is allowed to escape by the contraction of the metal pipe containing it. The Figure shows a



section in which A is a pipe of some readily-expansible metal attached at its upper end to the vessel to be drained, and at its lower screwed into the hollow stem of the valve B. The seat C of this valve is formed in the upper part of the casing D, into which the water escapes through the pipe A; this casing is secured to a cross-bar on the upper end of the pipe by two tie-bolts E, E, and is provided above the valve with an overflow or outlet pipe. By this arrangement there is a much larger area for the escape of water than in those in which the end of the pipe forms the valve, and moreover, owing to the pipe being always free at the end, it is less liable to become obstructed by deposits of any kind.

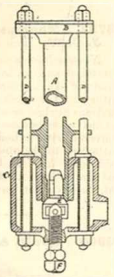
2613. Armstrong, J. Feb. 2. *Drawings to Specification.*

Steam traps.—In a locomotive blast-apparatus, in which a reservoir for exhaust steam surrounds the

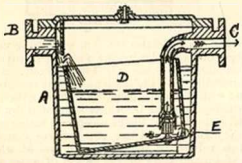
steam cylinders, automatic arrangements are provided for the discharge of condensation water from the reservoir, consisting of a valve opening inwards by a spring, and kept closed by steam pressure, or a ball valve allowing the escape of the water when it has risen to a certain level.

2652. Atkinson, T. Feb. 4.

Steam traps.—A tube A, carrying at one end a flange B by which the apparatus is secured to the pipe or vessel to be drained, is held in the cylindrical box C, attached to the flange by the bolts D, and is adapted to form a seat for the valve E, which can be adjusted in height by the screw F, so that when the tube is filled with steam the seat on the end expands by the heat and is thus fixed hard on the valve. When water lodges in the pipe, however, it necessarily contracts and draws away from the valve, allowing the water to escape.



2827. Picking, G. G., and **Hopkins, W.** Feb. 6.

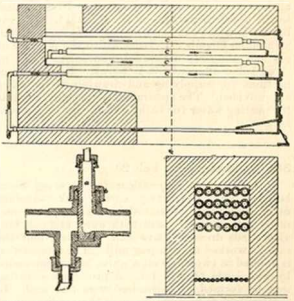


Steam traps.—An outer casing A of any convenient form is provided with an inlet B connected by a pipe to the steam pipe to be drained, and an outlet C, extending to within a short distance of the bottom, and in some cases formed with a valve seat, as shown. An inner vessel D of similar shape to the outer is supported on trunnions E in bearings formed in the outer vessel, and carries a valve which closes the end of the pipe C. When water collects in the bottom of the outer casing, the inner, owing to its buoyancy, rises and closes the outlet, until the water has risen to such a height as to flow over the edge into the inner vessel. This inner vessel then sinks, uncovering the end of the outlet pipe and allowing the contents to be blown out by the steam pressure, after which it again rises and closes the outlet, preventing the escape of steam.

2920. Lorrain, J. G. Feb. 7.

Thermostats for automatically controlling electrically-actuated ventilators. A thermostatic band may be used, consisting of strips or bars of different metals soldered together and placed near the highest point of the space to be ventilated. One end of the band is fixed, while through the other end passes a screw contact-piece, connected with one pole of the battery. As the air becomes foul and hot, it heats the band, which then curves in the direction of the metal having the least co-efficient of expansion, until the contact-piece touches another contact-piece connected with the remaining pole of the battery. The circuit thus completed calls into action the electromotor which drives the fan or propeller, or opens the ventilating-valve. Other forms of thermal contact-maker may be used, *e.g.*, an ordinary thermometer with a platinum wire above the mercury, so arranged that when a certain temperature is reached the mercury, touching the wire, completes the circuit. By regulating the distance through which the bending or expansion has to take place, the apparatus can be adjusted to act at any desired temperature.

3133. Jackson, J. Feb. 12.

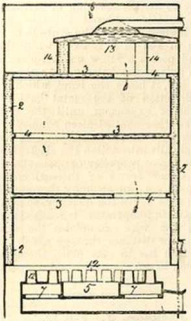


Heating buildings &c.; heating water.—Relates to a hot-water &c. circulating system. A series of pipes C are placed in a furnace, so that the water circulates through each pipe. The pipes are arranged to form one or several circulating systems. There is also a four-way cock, with a hollow plug *a*, held in position by the nut *b*, used for filling the pipes by pumping water into them.

3585. Shrewsbury, G. Feb. 19.

Heating water by gas burners. The apparatus consists of two cylindrical casings, forming an annular water space 2, provided with several

hollow cross diaphragms 3, through which the water can circulate. Openings 4 are made in these diaphragms, alternately at opposite sides, through which pass the heated gases from a gas burner



underneath. Before escaping, the gases impinge against a smaller hollow diaphragm 13 connected to the upper diaphragm by the tubes 14. The gas burner 5, which can be swung aside, is formed with an annular chamber 7, from which the mixture of gas and air escapes through concentric series of short tubes 12, where it is burnt. Suitable connections for supplying and drawing off the water are provided. The apparatus is specially suitable for heating water for baths and for heating greenhouses.

3660. Buser, J. Feb. 20.

Non-conducting compositions for covering steam boilers &c. Refractory earth, cork, sawdust, dung, and flour are mixed in the dry state and made into a thick paste with water and coal tar; afterwards dressed goat's hair is added, and the mass is worked up in a pug-mill. The composition is applied in two coats on a warm boiler, succeeded by two coats of coal tar. A protective covering may be formed of galvanized wire and lead. In vertical boilers hooping succeeds the application of each coat.

3725. Crapper, G. Feb. 21. *Drawings to Specification.*

Heating buildings.—An air-heating chamber is fitted in the flue at the back of a kitchen range or other fireplace, and connected with the open air and by pipes with other apartments into which a stream of pure warm air is thus delivered.

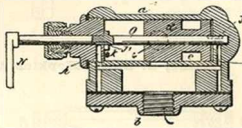
3766. Hazard, H. H. Feb. 22. *Drawings to Specification.*

Heating water.—Relates primarily to methods of condensing the products of combustion from gas and oil stoves and lamps, but an arrangement is described and illustrated in which the condensation is effected in a coiled pipe in a water cistern, so as to utilize the heat of the gases for heating water for baths and analogous purposes.

3792. Thompson, W. L., and **Stanley, J. C. W.** Feb. 22.

Non-conducting coverings.—Sheets of porous material, such as hair felt, silicate cotton, asbestos, and the like, are corrugated and placed one over the other to the thickness required, with the corrugations at right or other angles. On the inner side strips of asbestos are secured by riveting, and covered with adhesive material, and the lagging so attached to the objects to be covered. The outer side may have a plate of tinned iron or a sheet of tinfoil paper. The metal coating is perforated at various points to detect leakage.

3960. Boult, A. J., [*Davis, I. B.*]. Feb. 26.



Steam traps.—Relates to an equalizing-valve consisting of a cylinder having a piston *d* provided with an annular recess *e*. This cylinder is in communication with the condensed water receptacle by *c* and with the discharge pipe *b*. Passing through the cylinder is a rod O, which is rotated by the rise and fall of a float in the receptacle acting on a lever N. In this rod are two grooves *j* and j^1 acting as valves for the passages *h* and h^1, which admit steam and allow of the escape of water and exhaust steam from their respective ends of the cylinder by valves not shown. When the float rises, steam is admitted to the back end of the cylinder, driving forward the piston and allowing the condensed water to escape by the annular recess in the piston. The float then falls, rotating O and admitting steam to the forward end of the cylinder, thus forcing the piston to the back end, closing the communication from the reservoir to the discharge pipe.

4049. Dick, F. W., and **Fleming, J.** Feb. 28. *Drawings to Specification.*

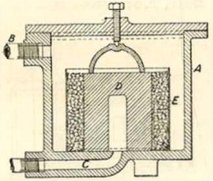
Steam traps; thermostats.—The object is to give an automatic exit to the condensed water in steam

pipes, and also to supply baths or other vessels with water at an approximately equal temperature. To effect this a column of water or other liquid, quite filling a closed tube, acts through a diaphragm upon a valve which gives exit to the condensed water of steam pipes and ingress to hot water when used for baths &c. The expansion of this column of water closes the valve, thus preventing the exit of steam in the one case, and further admission of hot water in the other. When either an accumulation of condensed steam or the falling of the temperature of the bath occurs, the column contracts, opening the valve, and giving free egress to the condensed water or ingress to hot water for the bath. In controlling the supply to a bath, the apparatus may act to regulate the cold water supply.

4190. Duncan, J. March 1. *Drawings to Specification.*

Heating air.—Relates to a kiln for drying oats. The air for drying the oats is heated by passing it over a furnace or through pipes placed in a furnace or in a body of steam such as a steam boiler, or a receptacle filled with exhaust steam from an engine; or it may be passed over or through a coil of steam pipes.

4423. Johnstone, J. F. March 5.

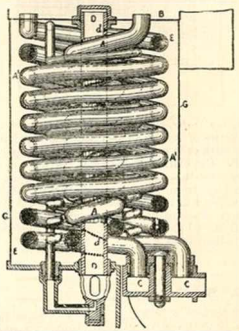


Steam traps.—This trap consists of a block of hard carbon placed over a suitable opening, which, while allowing the water of condensation to percolate through it, effectually prevents the passage of steam. One form of apparatus is shown, in which A is a closed vessel in communication with the receptacle to be drained by means of a pipe B, and provided with an outlet C for the water. On the bottom of this vessel a block of carbon D is held in position by a cap and screw through the cover. It is formed with a central recess placed over the outlet C, and is encircled by a gauze cylinder E, the intervening space being filled with granulated carbon to prevent the formation of any film on the block's surface which might render it impermeable.

4466. Hearington, A. H. March 6.

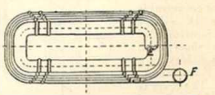
Heating water.—The water to be heated circulates through coiled tubes, where it is exposed to the heat of one or more tubular or coiled gas burners. In a casing G are inner and outer concentrically-coiled tubes A, A^1, connected at their upper ends with the reservoir B, and at their lower ends with the common outlet C. The gas

FIG. 1.



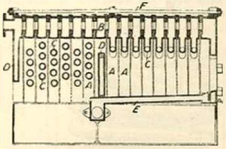
traverses a coiled pipe between the two water coils where it is heated before entering the burner D, which consists of a tube with a helical series of perforations *d*. The apparatus may be made with a group of coiled tubes, each surrounding a straight tubular burner; or it may consist of a coiled tube with contiguous convolutions surrounding a number of upright tubes, minute orifices being formed for the jets of gas between the turns of the coil. Again, the gas pipe may have two coils communicating at the top, an outer one enclosing two water coils, and an inner one between these two water coils, the inner coil being perforated to form the burner; or the inner gas coil may alternate with the coils of a water pipe round a central straight water tube. In these two last modifications the gas is heated in traversing the outer coiled pipe before entering the burner.

4523. Wheelwright, H. March 7.



Heating water.—Relates to a circulating boiler for heating purposes. The Figure shows a plan view. The boiler is made of a number of tubes jointed together and forming a pyramidal coil; the water enters the coil at F and leaves through E; the fire is inside the coil, and the hot gases circulate round the pipes as they rise.

4657. Witherspoon, J. March 10.

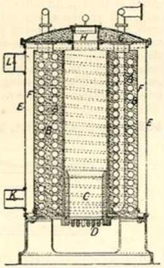


Heating water.—Relates to boilers constructed of a series of saddle-shaped sections A communicating with each other at top and bottom by openings B. Circulation of water is further provided for by cross-tubes C. Deep water spaces are cast alternately from the top and bottom of some sections, such as D, to deflect the hot gases. A stream of water continually runs through the hollow firebars E, the whole apparatus being held together by longitudinal stays F.

4792. Southwell, A. March 12.

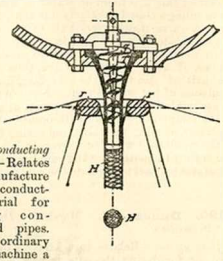
Non-conducting compositions for covering boilers, pipes, ice-safes, &c. Washed sea-mud, ground chalk, horse-droppings, and washed sand, in about equal quantities, are mixed well together. About one-fourth part of cow hair and one-sixteenth part of liquid glue, with small quantities of white lead, and naphtha are added, and the whole is kept plastic for application by a trowel.

4902. Lake, W. R., [*Fouque, L.*]. March 14.



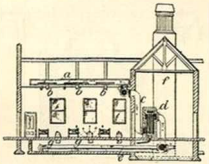
Heating vapours or gases.—A superheater for steam is stated to be applicable for other vapours or gases. A metallic tube A is coiled in an annular cylindrical vertical sand-bath B, and is heated by the central furnace C having a movable grate D. The whole is surrounded by a sheet iron casing E leaving a space F around the bath. The cover G is made hollow and filled with sand, an opening H being provided for the introduction of fuel. The furnace gases rise to the top and pass down the annular space F to the flue K. An auxiliary flue L is provided to assist combustion when the fire is first lighted.

5223. Bolze, H. March 20.



Non conducting coverings.—Relates to the manufacture of a non-conducting material for enveloping conduits and pipes. In an ordinary braiding-machine a hose is plaited on a split ring *r*, through the centre of which passes a funnel-shaped pipe T enclosing a rotating screw S, which serves as a feed to fill the hose as it is made with a suitable non-conducting material, *e.g.*, kieselguhr.

5277. Dale, T. H. March 22.

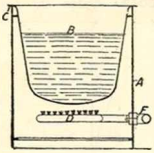


Heating buildings &c.—Relates to a system of ventilating, disinfecting, and heating hospitals &c. Foul air is drawn off to main pipes *a* in the ceiling, by means of branch pipes *b* opening to the ward or room, and passes by a flue *c* to an extractor *d*. Here the noxious germs in the air are destroyed by contact of the latter with metal tubes through which hot air from any gas heater or furnace passes. A gas regulator maintains the temperature at a uniform point. The heated and purified air from the extractor is conducted by a pipe *e* below the floor to the end of the ward and back again to an outlet shaft *f*. Fresh air, admitted by suitable inlets to an air chamber or passage *g* surrounding the heated pipe *e*, becomes warmed and escapes to the room through branch pipes and gratings.

5341. Halmshaw, D. March 24.

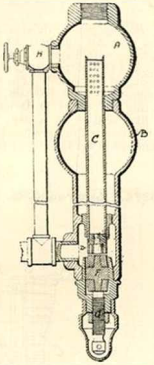
Boiling-pans.—The flange C of the pan rests upon a metal casing A, leaving the whole external surface of

the boiler exposed to the heated gases from the burner D. The pan has a lid with a large sheet-metal stopped pipe rising therefrom, which serves to condense the escaping steam.



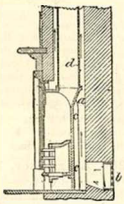
5391. Thompson, W. P., [*McCracken, G. B.*]. March 25.

Steam traps. The condensed water is collected in the chamber A, which is secured in the top of a casing B, and has fixed in its lower side the upper end of an expansion tube C, as shown. In the bottom of this tube is formed a double-seated valve D, which beds on a seat of soft metal placed in a reversible holder F, adjustable by means of the screw G. A pipe H is provided for blowing through.



5594. Grundy, J. March 28.

Heating air.—Relates to a fireplace fitted with air-heating and ventilating arrangements. A chamber *a* is made behind the grate, through which air passes from the inlet *b*, past the gills *c* cast on the back of the grate, around the smoke-pipe *d*, and through a gridiron ventilator in the chimney breast into the room. A plate is fitted in the chimney round the smoke-pipe to prevent the hot air from going up the chimney instead of through the ventilator.

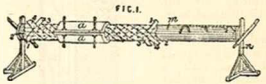


5725. Haddan, H. J., [*Gervais, B.*]. March 31. *Drawings to Specification.*

Boiling-pans; heating water for brewing. The boiling water for the mash tun is prepared in a "boiler" of enamelled cast iron suspended by means of hinges in a furnace and provided with a lid of the same material which can be lifted by a counterweight.

5942. Kosztovits, O. I. April 4.

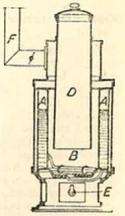
FIG. 1.



Non-conducting coverings for steam boilers and cylinders. The Figure illustrates the manufacture of a tube, but the invention is applicable to non-conducting coverings. Thin layers of wood are glued together, with the grain of adjacent layers crossed, upon a suitable model. The hollow pattern *m* may be made in parts easily separable, and is supported in uprights *n*. The layers of veneer 1, 2, 3, 4 are glued together on the surface of the pattern, and the two parts of the former *a*, which can be heated, are bolted together to press the strips of veneer against the model *m* so that they will retain the shape required. The pattern may be covered with calico, sheet metal, &c., on which the veneers are glued, and the article manufactured may be covered with calico, paper, sheet metal, or other material.

5943. Pifre, A. April 4.

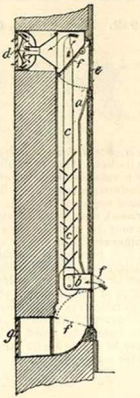
Heating water.—Relates to an improved form of steam generator, stated to be applicable as a circulating boiler for heating buildings, as well as for supplying steam for heating and cooking purposes, heating air, &c. The annular chamber A forms the water and steam space, and contains the central fire B supported by a grate C which is formed of a serpentine coiled tube, the ends of which open into the boiler at different levels, thus promoting the circulation of water. The fire is supplied by means of the removable tapering cylinder D, which has a sufficient length to hold a large quantity of fuel. Air may be supplied by a forced draught entering the ashpit by the pipe E the products of combustion passing away by the flue F.



6004. Burns, D. April 5.

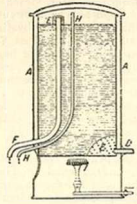
Non-conducting coverings.—Fibrous material such as flax waste, fireclay or other non-combustible, and spent tanner's bark, are ground together with water to the consistency of mortar. The proportions vary according to the heat of the surface and the like, and, where the strain on the composition is small, an adhesive substance may be substituted for all or part of the fibrous material.

6011. Connell, G. April 5.



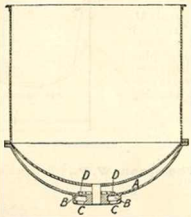
Heating air for ventilating and heating buildings. A chamber *a* is made in the wall of the house, and fitted with a combustion chamber *b* and gilled flue *c*. The flame in the combustion chamber causes a current of air to pass from the apartments through the flue *c* and grating *d* into the atmosphere as indicated by the arrows. The air in the chamber *a* is warmed by the contact with the gilled flue and consequently rises, entering the rooms through *e*; fresh air enters through *g* to take its place, and thus a continuous current is set up. The currents of air are controlled by dampers *f*, *f*, *f*.

6040. Fletcher, T. April 7.



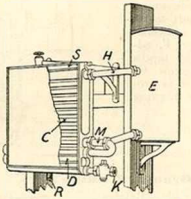
Heating water by gas burners. An air-jacketed vessel A, in which the water is heated, is provided with two pipes F and H, which extend downwards from near the top and pass out at the side as shown. The upper end of the pipe F is bent so as to form a siphon. The water, supplied by means of a pipe D at the bottom, rises until it reaches the upper bend of the pipe F, the air escaping meanwhile through the pipe H. Water is then discharged through F as long as the admission at D is kept up. The water is heated by means of a gas burner I. The inlet at D may be protected by a strainer E.

6047. Aplin, H. April 7.



Boiling-pans.—Relates to boiling-coppers used for wort &c. and heated by steam. The jacket A is fitted with a steam belt or chamber B situated around the bottom of the vessel upon the exterior casing of the jacket. The steam is admitted at the orifices C, C into the chamber B, and passes through a ring of orifices D, D into the jacket, where it strikes first on the centre. The highest degree of ebullition is thus produced at the centre, and this diminishes the liability of the contents to overflow.

6374. Lawrence, G. April 15.

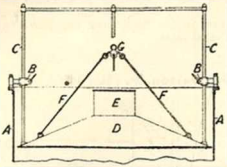


Heating liquids.—The water or other liquid to be warmed flows from the trough S over the corrugated surfaces C and out at R, while hot water from the tank E is forced to circulate between the corrugated surfaces through H and back to E by means of a jet of steam inserted in a pipe M. D are tubes through which steam may be forced by placing the jet in K.

6728. Alexander, E. P., [*Galland, J. N.*]. April 23. *Drawings to Specification.*

Heating air.—The products of combustion from a furnace pass into a chamber filled with bricks &c., which forms a heat accumulator. The gases then pass into a mixing-chamber into which the air enters through a regulator.

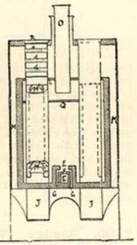
6733. Aplin, H. April 23.



Boiling-pans.—The object is to allow of a rapid ebullition without fear of the liquid boiling over. A is a copper such as is used for boiling wort in brewing. At its top are fixed two guides B in which slide the vertical rods C, which can be clamped at any desired height. The lower ends of the rods are connected to the conical dome or cover D having a throat E. The liquid boils up through the throat, and runs down the surface into the copper. F, F are links connected to an eye G for facilitating the raising or lowering of the cover.

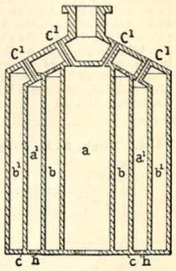
6859. Fichet, P. A. April 26.

Heating air. — Relates to apparatus for drying and heating granular materials, and comprises the utilization of the heat of such materials, after they have been subjected to a gradually-increasing temperature, to warm air which is then employed in other parts of the apparatus. The materials to be treated enter through gratings R, and pass downwards inside a series of hollow vertical columns situated on each side of the fireplace E extending the entire length of the apparatus and having a fuel chamber E¹ provided with orifices or burners F. The upper part of each column is provided with inverted troughs *d*, below which is a number of overlapping annular plates or truncated cones *h* fixed at a suitable distance apart and forming a vertical central passage H¹. Each column below the fireplace divides into two separate chambers J with a passage between through which air enters, absorbing heat from the dried products and passing partly through channels G to the fireplace, and partly through passages M and through the inverted troughs *d* to the space surrounding the chimney O. The gases from the fire, ascending outside the columns, are deflected by the horizontal plate Q, and descending enter and pass up the central passage H¹, escaping through the opening L to the chimney.

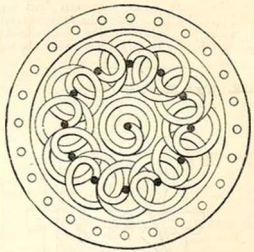


6981. Clark, A. M., [*Newton, E. D.*]. April 29.

Heating liquids. —Relates to apparatus for heating mineral waters, alcoholic spirits, wines, &c. The bottles containing the liquid consist of one or more annular chambers *b*, *b*¹ separated by spaces *a*, *a*¹ with apertures C¹ passing through the shoulder of the bottle, and open below, or have apertures *h* in the base. They are placed in a double chamber with some non-conducting material between the walls and provided with a tightly-fitting cover, a thermometer, an outlet pipe, and a pipe with a stop-cock, to supply hot water from a tank supported on a level with the top of the chamber and heated by means of a lamp or otherwise.



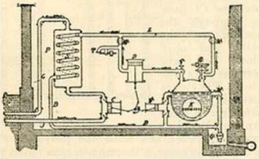
7200. Kirkaldy, J. May 3.



Heating liquids. — A series of helical worm tubes pass longitudinally through a cylinder preferably placed vertically, and connect chambers above and below. The apparatus is described as a condenser, but it is stated to be applicable also as a heater. The coils are arranged in one or more circles, their ends being secured in tube-plates at top and bottom, and are alternately right and left handed spirals, so that the coils of one may enter the spaces between the coils of the next. Steam enters the upper chamber and passes downwards through the tubes; the condensed water is withdrawn from the lower chamber. Condensing-water is pumped through the cylinder,

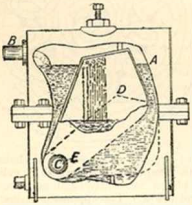
entering at the bottom, circulating round the outsides of the tubes, and leaving at the top. The admission pipe passes up the centre of the cylinder to near the top, where its end is closed. The water enters the cylinder through holes in this pipe near the bottom, the object of the prolongation being to produce a cooling effect on the water in the upper part of the cylinder. The Figure shows a plan of the apparatus with the top tube-plate removed. Reference is made to Specification No. 1816, A.D. 1883.

7484. Reck, A. B. May 9.



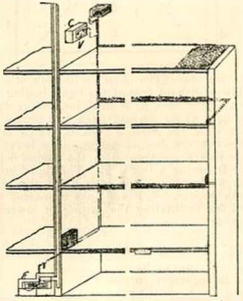
Heating buildings; heating water.—Exhaust steam from the engine D is passed through the coils S in the tank P containing water which may be caused to circulate by means of the pump C and pipes G and J through coils fixed in casings with register valves for the purpose of heating buildings. By keeping these valves closed and the tank and coils filled with water, the waste heat may be stored up and utilized when the engine is stopped. Steam may be admitted to the coils S direct from the boiler K, if necessary, by means of the tube L.

7522. Pye, R. May 10.



Steam traps.—A is a closed vessel communicating with the steam pipe or other vessel from which the condensed water is to be removed by means of a pipe B. The outlet consists of a close-ended pipe C on which turns the hollow float D. In the pipe and socket E on the float are longitudinal slots as shown, which, when the float sinks by becoming filled with water through the apertures near its top, register with one another and allow the water in the trap to escape. The buoyancy of the float then causes it to rise and close the outlet until sufficient water has collected to reach the apertures in the float, when the above operation again takes place.

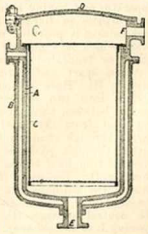
7723. Dalton, P. May 14.



Heating buildings &c.; heating by water circulation.—Relates to hot-water apparatus for heating buildings or for other purposes. The pipes are intended to sustain a high internal pressure and are jointed by forcing the coned end of one tube into the flattened end of the other by means of sockets with right and left handed screws. A small portion of the system is contained in a furnace F, the other being disposed variously as may be required. The whole is maintained full of water and provided with a relief valve V contained in a filling-cistern C.

7900. Gedge, W. E., [*Glaser, F. C.*]. May 19.

Boiling-pans or digesters for bleaching, washing, and dyeing fibrous materials under pressure or vacuum. The boiler A, fitted with an air-tight cover D, is provided in the interior with a ledge on which rests the light movable receptacle C, having a perforated bottom on which rests the material under treatment. Between the boiler



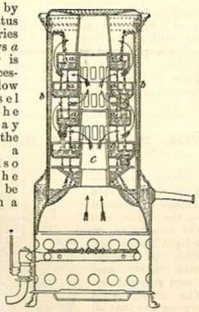
and this receptacle a tight packing is placed on the ledge; the boiler is surrounded by an outer shell B, and is heated by steam in the space enclosed. The liquids employed are passed in at E and out at F, or the reverse.

7946. Talbot, H. May 20. *Drawings to Specification.*

Heating buildings.—Ventilating-flues, formed in the walls of buildings by means of specially-constructed bricks, are employed to conduct heated air to the various rooms, the air being previously passed through heating-chambers in connection with the kitchen fireplace or other fireplace in the building.

7956. Osgerby, J. May 20.

Heating water by gas. The apparatus consists of a series of movable trays *a* to which water is supplied in succession by overflow from a vessel above, or the uppermost tray may receive the overflow from a jacket *b*, also movable. The burner *c* may be fitted loosely in a



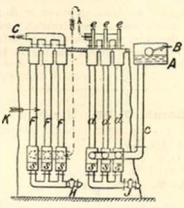
socket underneath, or made with a joint and swivel, or may be fixed; the heat passes round the trays and also up the central stem formed of sockets attached to the trays. The whole may be enclosed in a movable cylindrical case.

8001. Sykes, T. May 21.

Heating water.—Two series of pipes are placed in the flue of a steam-boiler or other furnace, so as to be heated by the waste gases. The first series *d*, situated furthest from the furnace, are supplied with water by the pipe *c* from the cistern A with a regulator valve B, and are open to the atmosphere at *e* to allow the escape of carbonic acid. From these pipes the water is pumped into a second series F which are closed, and where it is still further heated, depositing its impurities from solution or suspension into the boxes *s*, which are cleared by means of the blow-off cocks H, J. The pipes may be provided with scrapers if necessary.

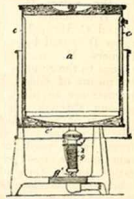
(*For Drawing see next column.*)

8001.



8035. Maxim, H. S. May 21.

Thermostats; boiling-pans; digesters; heating water.—Relates to means for automatically controlling the temperature during cooking, heating, digesting, or similar operations. The substance to be heated is placed in a vessel *a*, which may or may not be surrounded by a casing *c* containing water. Heat is supplied from a gas burner underneath consisting of a



double-coned perforated cap *j* fixed to the top of a spindle and sliding on a tube *g* with air-holes g^1 at its base. The other end of the spindle which acts as a valve is provided with a perforated piston working in the tube *g* below the air-holes. As the temperature rises, the pressure in the casing or vessel, as the case may be, will bulge out its side or base c^1 and depress the spindle against the action of a spring *k* on the tube, and thus diminish or cut off the supply of gas. When used for heating water, the products of combustion pass up through tubes in the water space, and the pressure of a volatile fluid in a chamber above the burner will depress its base and the gas supply will be diminished as before. The burner may consist of a tube with a series of perforations, the spindle &c. for regulating the gas supply being situated at another part of the tube.

8081. Leoni, S. May 22. *Drawings to Specification.*

Non-conducting coverings.—Consists in lining the wood jackets used to surround gas cooking-ovens and the like with slagwool or other non-conducting material, held in place by a wire gauze netting.

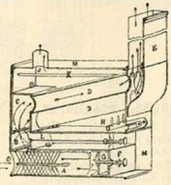
8125. Smeaton, J. G. May 23. *Drawings to Specification.*

Heating buildings. — Relates to a system of warming, cooling, and ventilating buildings, in

which a special air-heating stove, with means for filtering, moistening, disinfecting, cooling, or warming the air, delivers the air into a single series of conduction pipes leading to the various parts of the building.

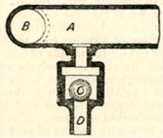
8174. Lamb, J. M. May 26.

Heating air in ventilation. By the apertures O, in the casing M fixed in the wall, air is admitted to the tubes A containing removable filter brushes, and passes by the valves G and L to chambers B and C, through tubes D heated by burners H, and thence to the room by means of slides, brackets, pillars, &c. The burners are supplied with air by means of tubes passing through the back of the casing, the products of combustion escaping by the flue J. The apparatus may be square or cylindrical in form; when used for heating only, the cold-air tubes may be closed by a separate plate. A modification, in the form of a "cylindrical air-heating "bracket," is described and illustrated in the Specification, and the apparatus may also be made in pillar form.



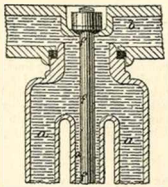
8309. Lancaster, H., and **Tonge, R. F. C.** May 28.

Steam traps.—Relates to an improvement on the trap described in Specification No. 3663, A.D. 1882, in which the water entered a cistern by a hollow lever and ball which, when containing steam, owing to its buoyancy rises and closes the inlet valve by means of a quick-threaded screw. In the Figure, A is a section of the hollow arm and B the entrance for the condensed water. On the arm is placed a small chamber containing a ball valve C which, when the arm is horizontal as shown, closes a pipe D, but when inclined this ball leaves its seat and allows the ready escape of any air coming with the condensed water, which by its collection in the float might tend prematurely to raise it and close the valve.



8395. Cannon, W. G. May 29.

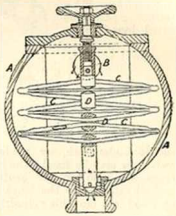
Heating buildings &c., hot-water coils or radiators for. The main part of the coil consists of multiple pipes *a* cast together, with or without a cross water-way, and united at their ends to form one pipe. These necks or ends, which fit into sockets on another pipe *b*, are provided with a flange or



shoulder for forming a joint. The whole arrangement is kept in position by rods *f* which pass down the centre pipe and through the socket tubes *b*, and are provided at their ends with nuts and washers. One end of the rod may be screwed into a boss on the socket tube, or the nuts may fit into recesses into that tube.

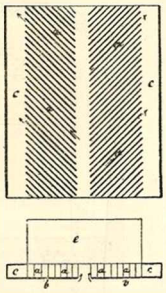
8736. Kuhlmann, A. H., [*Kuhlmann, W.*]. June 9.

Steam traps.—The escape valve is opened and closed by the contraction and elongation of a light framework when in contact with water and steam respectively. The casing A is arranged so that all water of condensation drains into it through the inlet B. In the upper part there is a large opening closed by a cover, through which the expanding framework is introduced. This consists of several lozenge-shaped frames C, C connected to one another by thimbles D, D. Each frame is composed of bars or tubes of some expansible metal, with a horizontal diagonal of some less expansible metal, so that when the frames become heated the greater amount of expansion in the side bars causes the vertical diagonals to become longer, and places the valve E on its seat. In a similar manner any contraction of the side bars caused by their contact with water shortens the vertical diagonals of the frames and opens the valve, allowing the water to be discharged.



8778. Johnson, J. H., [*Körting, E.*]. June 10.

Heating air. — The object is to increase the efficiency of apparatus for heating air by conducting air over the heating-surface through inclined or horizontal channels *a*, formed by parallel division plates placed near together and contained between the heating-surface *e* and another plate *b* surrounding it on one or more sides. The channels are open at both ends, and when horizontal the air is conducted by them over the heating-surface to collecting-chambers *c*, but when the channels are inclined these collecting-chambers are not necessary.



8935. Singleton, T. June 13. *Drawings to Specification.*

Boiling-pans for boiling size for yarns are made of glass and set in suitable framework. When several pans are used they are connected together by a tube or tubes so that the size can pass from one to the other and be boiled in each successively. This arrangement may also be adopted for metal pans.

9018. Toope, C. June 16.

Non-conducting coverings. — Pipeclay, sodium silicate, and silicate-cotton or asbestos fibre, or a mixture of the two, are worked up together in a pug-mill to a plastic mass, moulded, and baked. A coating of asbestos sheeting or asbestos paper is used to render the surface smooth, and may be applied to the plastic mass in the mould, or to the moulded block, in which case a cement consisting of pipeclay and sodium silicate is used.

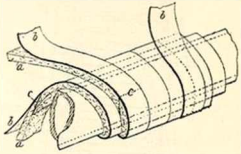
9063. Wilding, S. P., [*Wirth & Co.* acting for *Grunzweig & Hartmann*]. June 17.

Non-conducting coverings. — Loosened asbestos fibre is mixed by the use of any suitable liquid with finely-ground fossil meal together with a small proportion of clay and soluble glass, and granulated cork added. The composition is quickly dried and disintegrated, and is mixed with water before application. Any very smooth surface to be coated with it should be first of all roughened.

9067. Goodell, H. C. June 17. *Drawings to Specification.*

Non-conducting compositions.—The hollow walls of refrigerating-chambers are filled with lampblack or lampblack mixed with powdered mica or similar material.

9070. Bourdon, J. June 17.



Non-conducting coverings.—Consists in wrapping round any object to be covered with a layer of cork a continuous ribbon formed of strips *a* of cork covered, on one or both sides, with a fabric *b*, cemented to it by a solution of india-rubber or caoutchouc. The raw cork is shaped into strips of the required size with bevelled ends *c*, which are then cemented together, and the fabric applied. The ribbon may be made of two or more layers of cork with fabric interposed, and is applicable to the covering of pipes &c. for steam, water, air, hot gases, &c., of cooking-utensils, and also of electric apparatus.

9238. Lake, W. R., [*Scholte, J. T.*]. June 20.

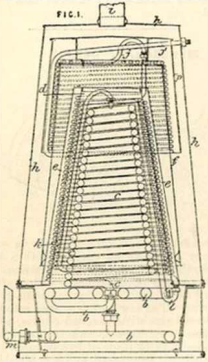
Footwarmers heated by sodium acetate. The ends of the vessel are corrugated as at *a* to render them flexible and prevent damage from careless handling, and strengthening-rings are fitted as at *c*, *d*. A cock or valve, operated by hand, is provided for allowing of the escape of air when the acetate is boiled, and a spring inlet valve is also provided for admitting air when required, for the purpose of crystallizing the acetate and causing the heat to be given out. In a modification, the vessel consists of a strong copper tube closed by end plates, in one of which is an air valve, the acetate being introduced through a short projecting tube closed by a screw tap.

9321. Jardin, L. June 23.

Heating water.—A number of pipes *b* in the form of a grate communicate with a double coil of pipes *c*, *l* within a double casing *d*, *e*, between the

walls of which a third coil k is placed. Over the casing e another casing f supports a fourth coil of pipes j enclosed by a cover p. The whole is surrounded by a casing h. Cold water enters by the

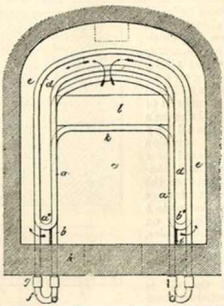
FIG. 1.



pipe j^1, and passing through the coils in succession escapes at m. The products of combustion, from any suitable source, pass in the opposite direction upwards through the inner chamber, downwards between its walls, and upwards over the fourth coil of pipes, and escape by the chimney i. The several coils are connected together by means of screw unions, and the whole may be readily taken to pieces. The arrangement shown is adapted for heating by gas; other fuel, however, may be used. Air or other gas which may be circulated in pipes may be heated in a similar manner.

9726. Hanna, J. A., and **Shillington, T. F.** July 3.

Heating water.—In a circulating boiler, wrought-iron pipes a, b are bent and arranged so as to form the walls between the furnace c and the flue d, and the flues d and e. They may be connected by means of the bends f and sockets g outside the furnace to form two or more series according to the number of circulating systems required. The inner portions of the series b cross the back of the furnace a little in front of the inner portions of the series a, forming a passage to the flue d for the furnace gases, which take the direction of the arrows to the flue e and thence to a chimney, plates i preventing the entrance of furnace gases to the flue d at the front of the furnace. The pipes and flues may be disposed variously, and the uppermost and lowermost of the series of pipes may be bent so as to form the roof and grate of the furnace respectively, and a bridge k across the



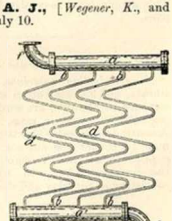
furnace may be formed of the three lowest pipes in the series.

9865. Wormald, C. F. July 7.

Non-conducting coverings.—Non-conducting compositions are held in position about boilers, steam pipes, &c. by means of sheet lead applied either in wide sheets or in strips.

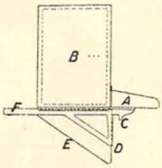
10,012. Boult, A. J., [*Wegener, K.,* and *Passburg, H.*]. July 10.

Heating water, surface apparatus for. Relates to cases in which water, heated by the products of combustion of a furnace, is used in heating or evaporating apparatus such as is employed in sugar factories and dye-houses. Cold water enters a pipe a^1 by the elbow e, and becomes heated by passing through a system of coiled tubes d to a pipe a, whence it passes out through the elbow f. The tubes d are made of thin metal, and are arranged in the flue of the furnace or in the smoke-stack. Between the exit f and the inlet e is inserted a vessel which serves to regulate the pressure in the system of pipes.



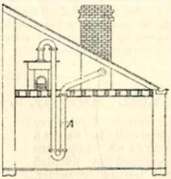
10,114. Hirst, H. July 14.

Heating water for washing. The boiler B rests upon a framework C, D, F, which can be supported upon the bars of an ordinary firegrate by the parts C and D. The boiler can be moved to and fro on the guides F, and is provided with an extension A by which the contents are heated when it projects over the fire. A reflector E is provided which keeps the lower part of the boiler from contact with cold air.



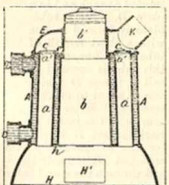
10,287. Raine, D. July 18.

Heating buildings.—The chimney or flue pipes of stoves, steam boilers, or furnaces are formed with one or more siphon-like bends, as shown in the case of a domestic fireplace, to utilize the waste heat for heating other apartments of the building in which the stove or furnace is situated.



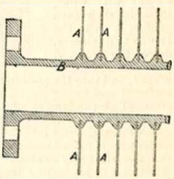
10,579. Hocking, F. July 25.

Heating water.—Relates to a circulating boiler heated by solid fuel, gas, or oil. Around a central tube *b* are arranged a series of smaller tubes *a* with contracted outlets a^1, the whole contained between tube-plates *e*, *h* surrounded by a casing A with inlet and outlet pipes D, B, and surmounted by a hood E with an outlet pipe K for the products of combustion. A water cistern placed in any convenient position is connected by a pipe with the lower part of the casing. Coke &c. is supplied by means of the hopper b^1 through the central tube *b* to the grate H. Gas or oil may be used as fuel, in which case the tube *b* also may have its outlet contracted and the cistern be placed immediately over the apparatus, the underside of the cistern being domed and provided with a pipe for the escape of the products of combustion, the condensed vapour from which is collected in a gutter arranged round the inner edge of the dome and is carried off by a pipe. The outlets of the tubes *a*, *b* may be contracted either by being made of taper form or by means of covers a^1 with a central hole *c* the diameter of which may be regulated.



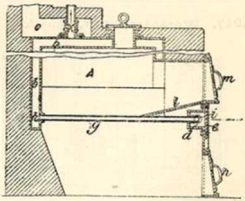
10,637. Mewburn, J. C., [*Surmont, J. de,* and *Surmont, C. de*]. July 26.

Heating buildings &c.—The gilled pipes or radiators used for heating by means of water or steam are cast upon discs A, made of some malleable metal, which enables them to be made thin and smooth, at the same time securing non-liability to breakage.



10,828. Corbett, J. July 31.

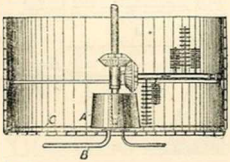
Heating water.—Relates to boilers for hot-water heating-apparatus. The combustion chamber A is surrounded by a water space *b* having an extension downwards at the back. In front is the water chamber *d*, fitted with a movable cover *e* and communicating with the water space *b* by means of the hollow firebars *g* attached at each end by means of hollow shoulder nuts *i*. The circulating water enters the boiler by a pipe attached to the chamber *d*, and leaves by the pipe *k*; *o* is the boiler flue. The doors *m*, *n* are supported as shown, and arranged to slide on bevelled baseplates.



10,861. Wise, W. L., [*Koster, T. A. de*]. Aug. 1.

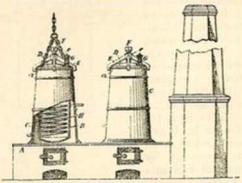
Heating liquids by gas. The water or other liquid is supplied through a pipe to the upper small box *a*, whence it issues into the tray *b* fringed with wires *c*, which cause it to drop in fine streams on to the conical surface *d*, also fringed at its inner and outer edges with wires, these in their turn guiding it on to the inverted cone *e*, down the wires *f*, over the cone *g* and wires *h*, and into the reservoir between the conical surface *l* and casing *m*. A number of gas jets are arranged at the bottom of the cone *l*, the heated products passing as indicated by the arrows through each stream of water into the flue at the top. The outlet pipe is placed near the top of the cone *l* so that the latter may be always surrounded by water. A small gas jet leading from the main burner is fixed to the outside casing to indicate the condition of the flame inside, so that soot may be prevented from forming.

10,947. Worssam, H. J. Aug. 5.



Boiling-pans for heating brewers' wort and other liquids by steam. A hollow drum A is fitted to the bottom of the "copper" or other vessel. In each end of this drum is a tube-plate for receiving the ends of a series of vertical tubes through which the liquid circulates. The drum is kept filled with steam by a pipe B, and another pipe is arranged for carrying off the condensed water. The Figure shows the apparatus as applied to a brewer's mashing-machine. C is a perforated strainer for keeping back the hops when the wort is being drawn off. For heating water without boiling it, an inverted conical cap is fitted a little above the top of the drum, and allows of an improved circulation and more uniform heating of the water.

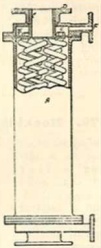
11,191. Imray, O., [*Harris, F. L.*]. Aug. 12.



Digesters.—Relates to apparatus for treating phosphatic and lime-bearing substances for use as manure, and consists of a furnace A and retort B surrounded by a shell or jacket C, and closed by a steam-tight lid D fastened down by arms E and a screw F. The substance is placed in the vessel with water or enriched liquor extracted from animal substances, and heated. The heating may be aided by passing steam through a coil H which is subsequently used for cooling the contents of the vessel by passing cold water through it. G is a steam-pressure gauge.

11,241. Kirkaldy, J. Aug. 13.

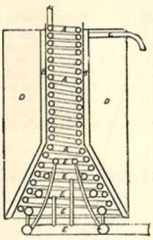
Heating liquids or gases.—Relates to surface apparatus described as adapted for heating feedwater. A cylindrical casing A contains a number of helical tubes G, alternately right and left handed; these are jointed at each end in a plate B. Each tube-plate is formed in one with a short length of tube C. The end of this tube is screwed to suit a flange D which acts as a nut to make a steam and water tight joint with the jacket E. Each jacket E is provided with an opening F for the entrance of steam or water, as may be arranged. The feedwater is passed into one jacket and through the spiral tubes to the other, becoming heated by exhaust or live steam supplied to the casing A by means of the pipe C. Or the steam may be inside the tubes and the water outside.



11,242. Kirkaldy, J. Aug. 13.

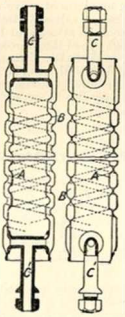
Heating water for baths &c. A series of spiral or otherwise bent tubes, heated by gas burners, are connected at one end to a supply pipe, and at

the other to an enveloping water space. The Figure shows one form of the apparatus, but several other forms are described and illustrated in the Specification. The water runs through the coiled pipe A, up through B, and out of the spout C, being heated in its passage by a series of gas burners E. D is an air jacket. The water may take the opposite course if necessary. In one of the other forms the water casing is dome-shaped with an opening above, which is surmounted by a smaller water chamber connected to the top of the coiled pipe. In other forms, several parallel water coils are vertically or horizontally disposed in a water casing, which may be cylindrical, arched, or of other form.



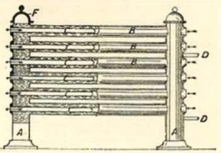
11,259. Hocking, H. Aug. 14.

Heating liquids.—Relates to surface apparatus for heating &c., such as is employed in hot-water heating-apparatus or for feed-heaters. Two spirally-grooved or corrugated tubes A and B, one having right-handed and the other left-handed spirals, are placed one within the other, the grooves forming crossing and re-crossing courses. The ends of the tubes are brought together and united in any way, suitable pipes C, C¹ being provided to supply the spiral courses with the liquid to be heated. The Figure shows two longitudinal sections made by planes at right-angles. The tubes so formed may be used singly, or in groups or nests in a suitable casing.



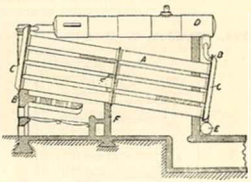
11,598. Poore, W. Aug. 25.

Heating buildings &c.—Relates to radiators in which two upright hollow columns A are connected by the large tubes B; through these tubes and columns pass the small tubes C, which are open at both ends to admit of a free current of air passing through them. The hot water is supplied



to the columns by one of the pipes D, and circulates in the pipes B around the tubes C. By the air passing through the tubes C as well as circulating round the pipes B, more heating-surface is afforded. F is a cap by removing which the interior of the column may be got at. Where long pipes are used small tubes are let in through the pipes B into the tubes C to allow the air to escape from the latter instead of traversing their whole length.

11,633. Lloyd, G. H. Aug. 26.

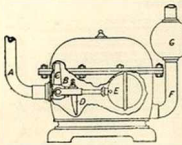


Heating water.—Relates to steam and hot-water boilers. The water tubes A are secured at each end to the tube-plates B in any convenient manner. The ends of each vertical series of tubes are covered by dished plates C, forming end chambers which communicate at their upper extremities with the steam drum D, while those at the back communicate also with the mud-drum E. In some cases annular water tubes are used through which the products of combustion pass, the smoke tubes extending through the chambers for that purpose. For boilers of small size the end covers may be dished out of one plate.

11,778. French, J., Hayes, J., and **Hodge, T. H.** Aug. 29.

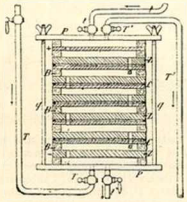
Steam traps.—The pipe A, which communicates with the steam pipe or vessel to be drained, passes into the interior of the casing and terminates in a valve chamber B with an outlet nozzle C on its upper side. The valve which closes the inlet pipe

is horizontal, and is formed on the end of a spindle which protrudes through the end of the chamber and abuts against the projection D on the lower side of the hinged float lever E. The water



escapes from the casing by means of a pipe F on which is a spherical or other enlargement G to retain part of the water when discharged. When the casing becomes full of water the float rises, which owing to the form of the projection D allows the valve to open, whereupon the water is blown out by steam pressure. The float then sinks and closes the valve, till the return of the water held by the enlargement of the discharge pipe opens it. In some cases the lever and float are made hollow, the projection being in this case so formed that it closes the valve when the float rises.

12,374. Baudet, C. Sept. 13.

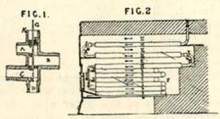


Heating by electricity.—Relates to the construction and supply of batteries, which may be used as heating-agents. Z, Z are zinc plates, and C, C are plates which may be of amalgamated copper or lead, or of any metal covered with a coating of varnish mixed with graphite or powdered carbon; or this coating may be applied to the zinc plates directly. B, B are water-tight india-rubber joints. The whole battery is held together by the plates P and the rods and nuts *q*. Liquid is supplied and drawn off by the pipes T, T'. The battery may be washed out with water by means of the pipes *t*, *t*. Several modifications are also described.

12,427. Routledge, T. Sept. 15.

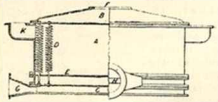
Digesters used in the manufacture of materials for paper-making, for textile purposes, in the treatment of grain, or in analogous operations where acid solutions under high pressure or temperature are employed, are constructed entirely of lead, either alone or with the addition of antimony or other suitable metal for hardening it, the necessity for a separate lining being thus obviated.

12,488. Jackson, J. Sept. 17.



Heating water.—Relates to circulating boilers of the type described in Specification No. 3133, A.D. 1884. The sides and back of the firebox F, Fig. 2, are formed of horizontal tubes connected together by tubes J and made continuous, by means of the bands K, with baffle tubes H which form the zig-zag flue E, the whole forming one continuous system. The apparatus is filled with water by means of a five-way piece, Fig. 1, having two discs or valves E fitted on the same spindle G. The pump is attached at D and the water is forced through C, and then through the circulating system to B, and is finally discharged at A. A cap is then screwed on to the end K which forces the discs E into the lower position, and the pump is detached. Caps may also be screwed on the ends A, B, C, D if necessary.

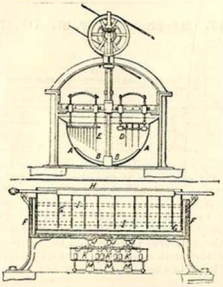
12,617. Kirkaldy, J. Sept. 19.



Heating water &c.—Relates to improvements on the coiled-tube condensers and heaters described in Specification No. 7200, A.D. 1884. The condensing-water, instead of being supplied through a central pipe, is introduced into a space included between the lower tube-plate and a perforated plate E, through which the tubes pass as shown. The holes through the plate are slightly larger than the tubes, and the water passes through the annular space around the tubes, thus coming effectually into contact with them, and flowing through all parts of the casing more uniformly. A is the casing, B and C the top and bottom caps, D the coiled tubes, and E the perforated plate

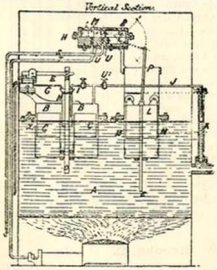
The exhaust enters at F, and the air pump is connected to G. The circulating-water enters at H and is discharged at K. The method of using the apparatus as a heater will be evident. The fluid to be heated may be passed either through the coiled tubes or through the casing.

12,720. Hodges, C. F., and **Christy, W.** Sept. 23.



Boiling-pans for lard. The lard is boiled and refined in a steam-jacketed tank A containing a set of stirrers formed of screw blades B constantly rotated by any suitable external means and provided with the stationary vertically-adjustable knives D and rakes E to effect the cutting, pulping, and melting of the lard.

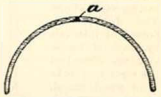
12,916. Lampard, S. Sept. 29.



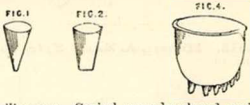
Heating water; thermostats.—A boiler A of copper &c. is fitted with a steam chest B communicating with the boiler by means of apertures *x* and fitted with an annular float C carrying a rod D which passes through the bottom of the steam chest and is connected above, by means of a lever E, to the water-supply valve; the water enters the boiler by means of a pipe G and a pipe H passing through the upper part of the steam chest and dipping below the water line. A small pressure-relief pipe I passing from the top of the steam chest is carried down the pipe H nearly to the water line; a branch J passing outside the boiler dips into the water gauge glass K. Steam generated in the steam chest raises the water in a dip vessel M, perforated near the lower end, and containing a float L connected by means of levers to the block N of a slide valve through which the gas passes from the main S to the burner supply pipe T. The ports U terminate in slanting grooves to assist the adjustment of the gas supply.

12,936. Christy, T. Sept. 29.

Heating buildings.—Relates to pipes for heating conservatories, houses, &c. by steam, water, or air. The pipes are made saddle-shaped in section to increase their heating-surface and diminish their cubic capacity. They may be of any form, either semicircular or angular. One or more tays *a* are placed in the fluid space to strengthen the pipe.



13,106. Outtrim, W., and **Wade, H.** Oct. 2.



Boiling-pans.—Conical or wedge-shaped projections, Figs. 1 and 2, are fixed to the bottoms of coppers and the like, with the bottom edges of the wedges in the direction of the draught of the fire, as shown in Fig. 4. The object is to expedite the heating of the water &c. contained in the vessel.

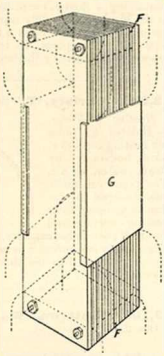
13,312. Stanford, E. C. C. Oct. 8.

Non-conducting coverings and compositions.—A solution of sodium, potassium, or ammonium silicate is employed to agglutinate charcoal or other form of carbon for application where very high temperature is to be endured, as in the uptakes and smoke-stacks of marine and other boilers. Preferably a little powdered lime, magnesia, alumina, or silica is added to the mixture,

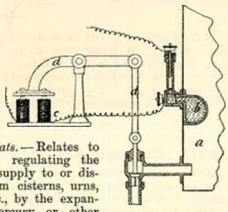
and the composition may be applied either as the sole coating or over other compositions, or, when finely ground, like paint, and colouring-matter may be mixed with it. Successive coatings of the compound may be applied, each being washed with a solution of calcium chloride. The composition may also be cast in blocks, and may be combined with felt, kieselguhr, slagwool, asbestos, wood, paper pulp, or sawdust.

13,441. Braithwaite, C. L., and **Braithwaite, I.** Oct. 11.

Heating air, gas, vapour, or other fluid for use in drying, ventilating, &c. Relates to surface apparatus consisting of two sets of narrow passages formed by bending copper or other foil in a zig-zag manner. The folds, supported at intervals by stays, if necessary, are closed at the ends by blocks F of wood, metal, or other material, and at the sides by means of guards G with openings near the ends to which tubes are attached (shown dotted) for the entrance and exit of the air &c.

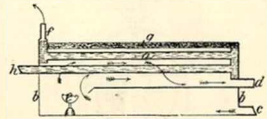


13,515. Hubert, A. E., and **Fyfe, W. W.** Oct. 13.



Thermostats.—Relates to means for regulating the hot-water supply to or discharge from cisterns, urns, kettles, &c., by the expansion of mercury or other suitable substance. Several forms of apparatus are described. In one of these the expansion of mercury in a tube is made to close the end of a branch tube through which the gas passes on its way to the burner. In the remaining cases the expansion of mercury &c. is made to operate the valve &c. directly by means of a piston, or, either directly or by means of a float, to close an electrical circuit containing an electromagnet, which, by means of suitable levers, operates the valves. The Figure shows one of these latter forms:—*b* is a mercury bulb in the cistern *a*, and *c* an electromagnet which operates the discharge or other valves by suitable levers *d*.

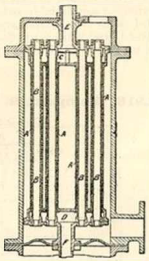
13,717. Stephenson, W. H. Oct. 17.



Heating water for hot-water supply, or for heating by hot water. A series of pipes *a* in the form of a grating are fixed in the casing *b* (with apertures *c*, *d* for the entrance and exit of air), and heated by a series of gas burners *e*. The extremities *f*, *h* are connected to a circulating system, or, if the apparatus be used only for heating water, are provided with stop-cocks. The whole is covered with a layer of slagwool *g*.

13,753. Smillie, S. Oct. 17.

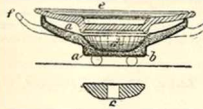
Heating gases and liquids.—Relates to apparatus for heating fluids. Two boxes C, D are connected by tubes A between their inner plates. Smaller tubes B, which may be made with a helical thread outside, are placed through these tubes and the boxes, and the whole are fitted in an outer casing, the lower end F of which is a metal diaphragm allowing expansion and contraction of the parts. The fluid to be heated passes through the annular spaces between the tubes, while steam is passed through the smaller tubes and around the outer tubes.



13,819. Brooks, E. Oct. 18.

Footwarmers; bedwarmers &c.—Relates to apparatus for heating or warming various articles, such as

beds, carriages, &c. The Figure shows the vertical sections of the stand *a*, with handles *f*, *f*, supporting an article, such as a plate *e* to be warmed, and of the heating-slab *c*. The stand is hollow and filled



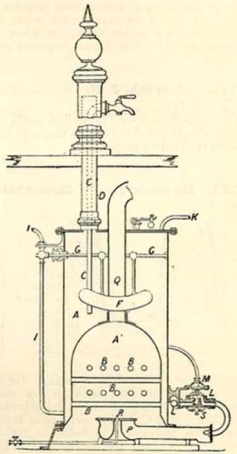
with asbestos, slagwool, or other good non-conductor of heat *b*. The heating-slab *c*, made of fireclay, soapstone, or other suitable material, is placed, when heated, on the stand, in the cavity *d*, and the article *e* to be heated is placed resting on the edge of the stand so that it does not touch the heating-slab, but closes in the space above the stand, which then prevents radiation of heat in all directions except through the plate *e*. Instead of being hollow, the stand may be merely coated inside with a non-conductor, which slightly overlaps the edge of the stand. The stand may also have a hole at the bottom for heating the slab while in position by a lamp. When it is applied to heating carriages, beds, &c., a lid covered with carpet or felt for the feet to rest upon is provided.

13,884. Williams, J. S. Oct. 20. *Drawings to Specification.*

Thermostats.—Relates to the casting of articles in airtight moulds which have been exhausted and, if desired, heated to some predetermined extent, and comprises methods of automatically regulating the temperature of the molten metal and of the mould. A thermal device, acting by the expansion of a rod by the heat of the mould or furnace, or otherwise, completes a circuit which stops the flow of hot gases to the mould, or opens a cock to admit compressed air or water behind a plunger connected to the furnace damper or liquid fuel supply &c. valves.

13,952. Jones, C. Oct. 21.

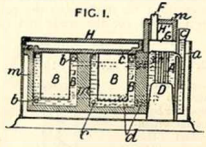
Heating water; thermostats.—Relates to apparatus for maintaining a supply of hot water or steam, or both. The boiler A is formed with a chamber A^1 at its lower part, traversed by water tubes B, the products of combustion from the burner P escaping by the pipe Q. The boiling water is forced through a pipe C dipping below the water line, and surrounded, outside the boiler, by a steam pipe D. Steam is supplied through a pipe K. The supply of water to the boiler is regulated by means of a float F attached by arms to an axle G which is connected to a cock on the supply pipe I. For regulating the gas supply to the burner, a flexible diaphragm M, in communication on one side with the boiler, is connected to the diaphragm of the gas valve L, and maintained in the raised position by means of a spring or a weighted lever; excessive pressure in the boiler closes the end of the pipe L^1, thus shutting off the gas. A small pipe S with a regulating-cock admits sufficient gas to the burner to maintain the water at the boiling



temperature, and a small jet R, supplied with gas independently, ensures the lighting of the burner P.

14,266. Lake, W. R., [*Malkiel, M.*]. Oct. 28.

FIG. 1.



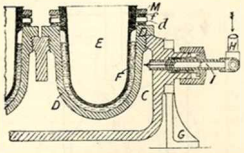
Heating water for hot-water cooking-apparatus. A boiler A with fireplace D, and with or without tubes, is connected by pipes *b* and *c*, controlled by cocks *d*, *d*, with the jackets B^1 of the cooking-chambers B; the latter are covered by a lid H, surrounded by an asbestos covering *m*, and fitted with thermometers. The gases escaping from the fireplace impinge on the plate G before passing away by the chimney F, and heat a chamber H^1.

The boiler is also connected through a cock near the bottom with an external vessel C, which supplies it with water: an open pipe *a* leading from the top of the boiler into the vessel C maintains the water in the boiler at atmospheric pressure. The boiler may be of various forms, some having cooking-chambers within them, and when higher temperatures than 100° C. are required ordinary water is replaced by a saline solution. In operation the water in the boiler is heated, the cocks *d*, *d* turned, and the water allowed to circulate in the jackets until the required temperature is attained; at this point the communication with the boiler is cut off, and the cooking completed by the heat of the water in the jackets, external radiation being prevented by the asbestos covering

14,712. Moerath, J. N. Nov. 7. *Drawings to Specification.*

Heating buildings. — The hollow shaft pieces forming the tubular skeleton of a fireproof building are used for heating purposes.

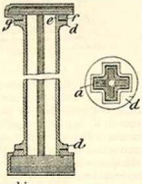
14,792. Dawson, D., and **Broadbent, H.** Nov. 10.



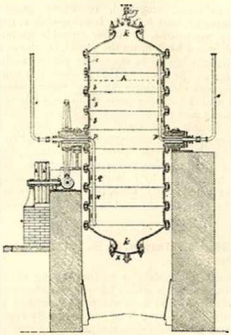
Boiling-pans.—Relates to apparatus for boiling water in small dye-pots such as are used for experimental dyeing in technical schools. A steam-tight vessel C, having metal pans D screwed or otherwise fastened into holes in its top, is mounted in journals on standards G. In each pan is put a dye-pot E, the space between the two being occupied by glycerine or other suitable liquid; the pot is fixed by its flange *d* and a ring M secured by set-screws, the india-rubber rings *f* being used to avoid breakages. Steam at a pressure of 40 to 50 lbs. per square inch enters the vessel by the pipes H and I, the latter being provided with a stuffing-box to permit of the vessel being overturned for discharging the pots. Exit pipes are provided for the waste and condensed steam.

15,042. Waters, A. Nov. 15.

Heating buildings. — Relates to hot-water pipes for heating churches, greenhouses, and other buildings. The pipes are cruciform in section, as at *a*, and are cast with circular flanges *d* and spigots *e*, which are turned to fit the faucets *f*; the joint is made with india-rubber or other suitable packing *g*.

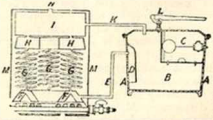


15,188. Lake, H. H., [*Flodqvist, C. W.*]. Nov. 18.



Digesters or boilers for treating wood or other fibrous materials with acids. The boiler A is made up of lids or covers *a*, *a*¹ and a number of cylindrical rings *b* with rounded flanges, each lined with a lead plate *c* which, being drawn over the flanges, serves as packing between them. Screw bolts secure the sections together. The boiler is filled and emptied through manholes *k*, *k*¹. Steam is admitted through the tubes *o*, *p*, and *q*. The boiler may be fixed in position, or may rotate horizontally or vertically.

15,306. Yates, C. D. Nov. 20.



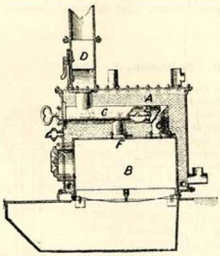
Heating water for cooking &c. Relates to hot-water and steam supply apparatus. The feed cistern A is divided into three compartments, two

of which, C and D, each communicate below with the main compartment B. In the compartment C is placed a back-pressure ball valve admitting water from the main, and the compartment D communicates, by the pipe E, with an annular chamber F connected by coils G to a chamber H surmounted by a steam drum I which communicates by the pipe K with the compartment B of the feed cistern; a safety-valve L is applied. Steam may be delivered at N, and hot water drawn off at any convenient part of the apparatus. The boiler is enclosed in a casing M, and is heated from below by means of gas, oil, or other fuel.

15,800. McDougall, I. S. Dec. 1.

Heating liquids.—Relates to a process for coating boilers and other vessels made of copper or copper alloys with lead. The vessel or part of it to be coated is treated with chloride of zinc (or its equivalent), and then immersed in molten lead, or molten lead is run over the surface, or the lead may be applied in any suitable way.

16,145. Astle, E. W. Dec. 9.



Heating water for heating churches, schools, houses, conservatories, baths, and for hot-water supply generally. The water space A entirely surrounds the firebox B, from which the flue C, passing through the water space and over the aperture F in the top of the firebox, leads to the chimney D. A damper E serves to clear out the flue, the soot passing into the firebox. The boiler is rectangular in form, and is constructed in sections, which may be either riveted or bolted together.

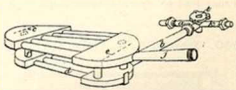
16,402. Thompson, W. P., [*Kelner, L.*]. Dec. 13. *Drawings to Specification.*

Thermostats for incubators. In the egg-chamber is placed a device consisting of a spiral coil the centre of which is fixed to a peg, while the free end moves under the influence of heat or cold between stops, producing electric contacts at given points for the purpose of extinguishing or relighting the heating-flame of the lamp employed in the incubator or of actuating an electric bell. In the case of an oil lamp, the extinguishing is effected by a device which is formed so as to leave a portion of the wick alight, the rest of the latter being thus rekindled when the device is raised from the wick. In the case of a gas lamp, the supply of gas to the burner is cut off when the temperature exceeds a certain amount, a capillary tube, supplied constantly with gas, serving to re-ignite the lamp.

16,428. McDougall, I. S., and **McDougall, J. T.** Dec. 13.

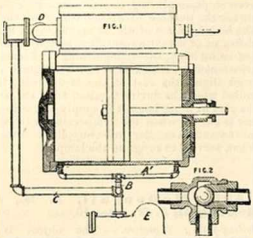
Boiling-pans; digesters. — The object is to strengthen sheets of lead used for lining boilers for chemical and other purposes. For this purpose strips or wires, interwoven or crossing each other as in wire-cloth sieving, wirework, latticework, or any equivalent, previously coated with lead if necessary, is embedded into one or both surfaces of the sheet of lead, or between two separate sheets, in any convenient manner, as by hammering, pressure between rollers, or casting. If the strengthening-material be of a soft malleable metal, such as copper, brass, zinc, or tin, it may be supported in a mould and the lead cast around it, the whole being afterwards rolled in the ordinary manner. India-rubber may also be used for this purpose. The sheets of india-rubber are placed between the layers of metal, the subsequent heat and pressure of the boiler rendering them cohesive. In other cases the india-rubber is dissolved in a suitable liquid and applied in a liquid or pasty condition. Joints are strengthened by placing over them a strip of gauze, wire netting, or the like, and then burning or melting the lead over the joint.

16,476. Cooper, C. Dec. 15.



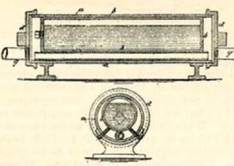
Heating water for baths, conservatories, and other places. Cold water is supplied through *a* and the three-way cock *t* into the lower chambers and heating-pipes *d*, through the vertical pipes *f* into the upper chambers and heating-pipes, and thence by *j* to the bath or other apparatus to be supplied. When sufficient cold water has entered, the cock *t* shuts *a* and opens *k* to *b*, *k* being in communication with the apparatus to be supplied, and a continuous circulation is set up. The upper chambers are provided with division plates *c*, the apparatus being heated by a gas burner placed under the pipes *d*.

16,534. Newton, H. E., [*Worthington, C. C.*]. Dec. 16.



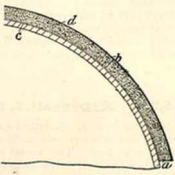
Steam traps.—Relates to the arrangement of drain valves and steam traps for the cylinders and steam pipes of steam engines. Drain pipes are provided leading from each end of the cylinder to a steam trap, and these pipes are fitted with check-valves to prevent steam entering the end of the cylinder open to exhaust, either from the other end of the cylinder or from the steam trap. Fig. 1 shows a section through one cylinder of a duplex engine fitted with such an arrangement. A^1 are pipes leading from the ends of the cylinder to pipe B, which connects them with similar pipes on the other cylinder, and into which a drain pipe C from the steam pipe D opens. E is the steam trap, which may be of any known form; that known as the "Curtis" trap is described in the Specification by way of illustration. The check-valve is placed at the junction of the pipes A^1 and B, and is shown enlarged in section at Fig. 2. The pressure in the end of the cylinder open to steam keeps the valve, which is globular or cylindrical, against the opening of the pipe leading to the other end of the cylinder, which is open to exhaust, thus leaving a free passage for the water from the end open to steam. Separate check-valves may be used in each pipe, and the various pipes may lead to separate steam traps.

16,540. Boult, A. J., [*Gold, E. E.*]. Dec. 16.



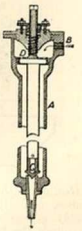
Heating buildings &c.—A sealed tube *b*, containing water or some equivalent substance, is supported in an outer tube *a* fitted with screwed caps *d*. Steam is admitted to *a* through the pipes *g* until the water is sufficiently heated, when it is turned off, the heat absorbed by the water being afterwards slowly radiated into the apartment to be warmed.

16,588. Dunn, C. J. Dec. 17.



Non conducting coverings.—Consists of lagging constructed in separate sections to permit ready removal, each section being a case holding a non-conducting composition, as shown applied to a steam boiler in sectional view, in which *a* is a suitable and sufficiently-strong frame of wood or iron, and *d* is the non-conducting composition. The inner face *c* of the lagging is formed of any suitable material, such as light sheet iron, cloth, &c., secured to the frame *a*, and the outer face *b* of sheet metal or wood is similarly secured. The various sections of lagging may be held in place by straps or by other convenient means, and adjacent sections may overlap.

16,629. Johnson, J. Dec. 18.

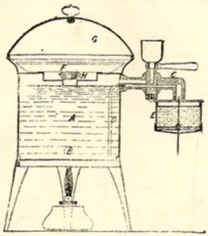


Steam traps.—A metal tube A is connected to the vessel to be drained by the branch B. At its lower end is an opening for the discharge of the condensed steam, closed by a valve C. This valve is attached to the lower end of an inner tube, of more expansible metal than that of the outer shell, the upper end of which is attached to a disc D perforated for the admission of steam, while its lower end is also perforated to allow the water of condensation to escape into the outer shell, from which it is discharged when the valve is lifted by the contraction of the inner tube owing to its contact with water. A screwed spindle at the upper end, surmounted by a hand-wheel or equivalent device, provides means of adjusting the apparatus.

16,648. Stone, A. F. Dec. 18.

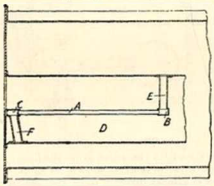
Heating water.—Relates to table apparatus for boiling water; applicable also for making coffee and heating a dish or plate of food. The water is boiled in a cylinder A by a spirit lamp. There

are two outlets, one B, ordinarily closed, and the other C, which draws off hot water from the lower part of the boiler by the tube D, this cock having always a small outlet for steam. Attached to C



is a coffee-strainer E under which the coffee-pot is placed. Above E is a chamber to hold a dish or plate of food F to be heated, covered by the lid G. The boiler is filled by a screw H.

16,691. Riley, D., and **Lee, W.** Dec. 19.



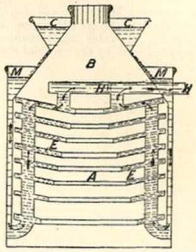
Heating water.—In boilers "for generating steam "and for warming purposes," the firebars are made hollow and their ends connected above and below the flue respectively. A shows one of the firebars, secured to water-boxes B, C which communicate above and below the flue D by the tubes E, F.

16,756. Harvey, G. A. Dec. 20.

Heating water for baths, conservatories, &c. A cylinder A, with a hood B, contains a number of shallow hollow dishes E communicating above with the outlet pipe H and below with the jacket M supplied with water from the reservoir C. The apparatus, which is portable, is heated by gas burners below, or otherwise.

(*For Drawing see next column.*)

16,756.

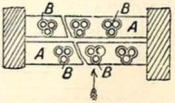


16,814. Kirkaldy, J. Dec. 22.

Heating water.—Helical coil tubes of surface condensers and heaters are formed of solid-drawn tapering tubing, either diminishing at intervals as shown in the Figure or in one continuous taper. These tubes are secured to the tube-plates by flanged ferrules A, brazed on the ends and screwed up by nuts B, having conical projections taking into countersinks in the plate. The tubes may be plain or corrugated, the ferrule being fitted to them; or corrugated tubes may have plain ends on which the ferrules are brazed. Straight tubes, either plain or corrugated, are also formed in the same way.

16,905. Lowcock, A., and **Sykes, T.** Dec. 24.

Heating water.—Water tubes of thin metal are arranged in groups as shown at B, B connecting a number of bottom boxes A, A with corresponding top boxes not shown. The groups in one section are placed opposite the space between the groups in the adjacent ones, so as to facilitate free circulation of the heated gases. The cold water enters the lower boxes by suitable connections, passes up the connecting tubes to the upper ones, and from them is fed to the boiler. Each upper and lower box is provided with one or more covers secured by bolting or in any other suitable manner to allow of cleaning. The apparatus is mainly designed for heating feedwater for steam boilers, but it is stated to be applicable generally.



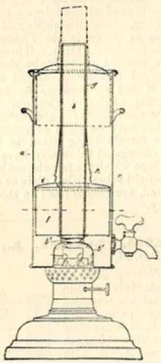
16,992. Radford, R. H., [*Martini, H.*]. Dec. 29. *Drawings to Specification.*

Heating buildings; heating air and water.—In hot-air engines, air, which is pumped by the front side of the piston through the cylinder jacket, to cool the latter, may be afterwards used for domestic or other heating purposes. A water jacket surrounding the cylinder may be connected to some apparatus in which the heat imparted to it by the cylinder may be utilized; a number of air circulating or cooling pipes pass through the jacket.

A.D. 1885.

130. Martin, A. Jan. 3.

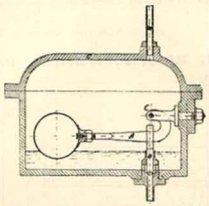
Heating water.—A vertical boiler *a* has a central flue *b* forming a chimney for the lamp beneath it. The chimney is conveniently made in two parts *b* and b^1, the part *b* being slipped over the contracted part b^2 and soldered or brazed thereto. Round the flue *b* is fitted an annular filtering-chamber *f*, having a loose cover *i* held down by springs *k* attached to the tube *g* of the chamber.



157. Brin, L. Q., and **Brin, A.** Jan. 5. *Drawings to Specification.*

Thermostats.—In a retort furnace in which carbonic oxide burned with air is used as fuel, and which is employed in a process for separating oxygen and nitrogen from air, one of the retorts acts, in the manner of a pyrometer, to raise or lower the air supply valve. This is adjusted so that just sufficient air passes in to keep the retorts at one part of the process at one temperature and at another at a higher temperature.

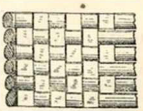
182. Hargraves, R. Jan. 6.



Steam traps.—The water when it has sufficiently accumulated lifts the valve B by the float and lever A. The lever is bent as shown, so as to bring the fulcrum C almost directly over the centre line of the discharge valve, and thus give great power to the float in lifting it against the steam pressure in the casing.

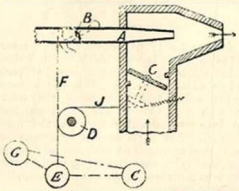
190. Johns, H. W. Jan. 6.

Non-conducting coverings.—Consists of a sheet of paper or other fabric, with rolls of fibrous material or strips of asbestos paper or sheathing attached to one or both faces. The sheet may be corrugated, and may have notched edges to hold a continuous roll of the fibrous material. The rolls may be replaced by tufts, and the sheet by a series of strips woven



with the rolls, as shown in the Figure. To the faces of the fabric, or either of them, may be fastened a sheet or sheets of asbestos or other suitable material, which may extend as flaps beyond the edge of the fabric to compact the whole. Several layers of fabric may be placed together. When a flat sheet is used, the roll or rolls may be so fastened on the surface as to form cells, which may be closed or divided by another layer of rolls. The rolls may have a strengthening-core, and the corrugated sheets may have a wire passing through the corrugations, or across their tops, to hold them in place.

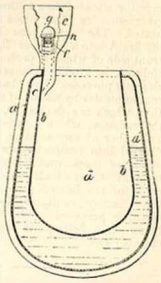
339. Lorrain, J. G. Jan. 10.



Heat-regulating appliances.—Relates to means for automatically regulating apparatus used in connection with heating, cooling, and ventilating. For this purpose electromotors are used in combination with electric generators and some form of thermal, barometric, osmotic, or gravity electric contact. These contacts may be of any known type and may be adjusted for both the upper and lower limiting conditions of the air &c. The electromotors may regulate the consumption of gaseous or solid fuel &c. by regulating its supply, by operating suitable valves, by agitating the supports (for solid fuel), by regulating the admission of air to the fuel, or by mixing therewith other substances. They may regulate the passage of the heated or cooled fluids to or from the spaces to be heated &c., or may regulate the pressure, tension, or velocity at which such fluids pass into or from spaces to be heated &c. The Figure illustrates one arrangement for carrying out the latter method, and may be taken as a type of the arrangements used in carrying out the invention. It represents an injector or ejector actuated by a steam jet A with a valve B; C is the valve in the pipe through which the fluid passes, and G the electric generator, C the contact placed in the space to be heated &c., and E the electromotor which actuates both valves by means of cords F, J. Fans or other propellers may be similarly controlled. The electromotors may regulate heating or cooling by inserting movable screens between the fuel &c. and the fluid &c. to be heated &c. The heating &c. may be regulated by regulating the electric current passing through the motor, either by varying the resistance in circuit or in any other suitable manner. The Specification also describes an arrangement for the supply of air &c. at a constant temperature, consisting of a chamber having two inlets and one outlet, one inlet being for cold, the other for warm air &c., and all having valves operated by motors controlled by contacts set, the one for temperatures below, the second for those above, and the third so as to act at the desired constant temperature only. In an apparatus for heating fluids by electricity the fluid is passed through a casing in contact with conductors heated by the passage of a current which is automatically regulated by varying the resistance in the circuit; this is done by a motor controlled by contacts as above described. In an arrangement for heating fluids by chemically-produced heat, the fluid is passed through tubes immersed in a mixture of substances which generate heat by their chemical or molecular combination, such as sulphuric acid and water. The supply of these substances is automatically regulated as above described. In another arrangement the heat produced by similar means is regulated by controlling electrically-actuated agitators or stirrers acting on the mixture. In an arrangement for heating by hot-water circulation, thermal contacts control an electromotor driving the circulating-pump; they may also control devices operating valves by which the water is diverted into a bye-pass or short-circuit pipe when the space to be heated becomes too hot.

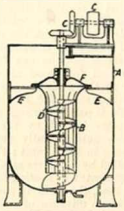
341. White, L. Jan. 10.

Heating liquids in bottles, flasks, and the like.—The Figure shows a transverse section of a hot-water pocket for heating and keeping hot feeding-bottles, travelling flasks, and other vessels. The pocket consists of a bag *a* with or without an external covering of felt or other non-conductor of heat, and an inner bag *b*, both bags being made, preferably, of india-rubber and forming a water-tight joint at the top. The space between the two bags is filled with hot boiling water through a pipe *f* fitted with a screw cap *g*, a washer *h*, and a funnel top *e*. The bottle to be heated is placed in the space *d*, which may be divided into several parts by hollow partitions.



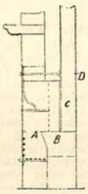
500. Welch, F. B. Jan. 14.

Boiling-pans.—During the boiling of sugar, either in vacuum or open pans, the removal of the steam is facilitated by keeping the liquid in agitation. The Figure shows the application to an open pan A in which a screw B is continually revolved by gearing C, C. The screw is enclosed in a tube D, the upper end of which is flanged and rests on brackets E, E; to the spindle above the screw is attached a disc F, having a flat surface parallel and close to the edge of the tube D. The screw is revolved in such a direction that the liquid rises in the tube D and passes out under the disc F. Instead of, or in combination with, the mechanical stirrer, air may be blown into the liquid for the same purpose.



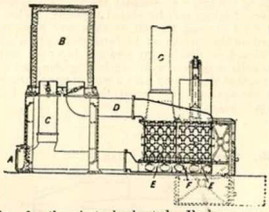
518. Pickup, T. Jan. 14.

Heating buildings.—The surplus gases from an ordinary stove or fireplace A are led away into a radiator situated in a bathroom, greenhouse, or other place to be heated. The gases pass from the fire A into a chamber B, the front side of which is perforated and may be readily removed for cleaning purposes. This chamber communicates by means of a flue C, in which is a damper D, with the radiator, which consists of a chamber of any suitable form divided into compartments by a series of horizontal partitions open at each end alternately, forming a zig-zag path for the heated gases, which pass thence to the chimney; suitable doors are provided for cleaning purposes. The flue C may terminate below in a bell-mouth opening in lieu of the chamber B.

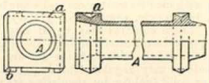


655. Dick, J. Jan. 16.

Heating air.—Relates to means for heating the air to be used for drying purposes and for re-drying the spent desiccants. The air is dried by being drawn, by means of an exhaust fan attached at A, through a chamber B, the walls of which are formed of fabric &c., treated with suitable desiccants, and passes away, either directly by the pipe C, or after passing by the pipe D through the heating-chambers E. These chambers, separated by a vertical partition F, are formed of hollow blocks having two sets of channels at right-angles to each other, one set for the passage of the products of combustion to the chimney G, and the other for the air to be heated. Each passage of one set is complete in each block, each of those in the other set being made up of two half-passages formed in adjacent blocks. When it is required to dry the walls of the chamber B, the communication with the exhaust fan is closed and air passed into the chamber through the heating-channels E. The parts of the apparatus are in duplicate, and arranged on each side of the central furnace, the drying-chambers being used alternately, *i.e.*, one is regenerated while the other supplies air for drying purposes.



685. Kosinski, S. von. Jan. 17.

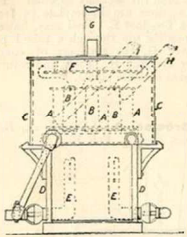


Heating air for drying, ventilating, and disinfecting. A double ventilating-fan and an air-heating apparatus are employed. The latter is similar in construction to a locomotive boiler, and consists of a firebox and smoke-box and a number of metal tubes, through which the fresh air to be heated is forced by the ventilator. The heated air is expelled through a suitable pipe into the room or against the walls to be dried &c. The ends of the heating-tubes, one of which is shown at A, are conical, so as to fit into one another for the purpose of lengthening the apparatus, and are furnished with heads or plates formed with grooves *a* and projections *b* which fit into each other to form the ends of the heating-chamber.

696. Staynes, W. H. Jan. 17.

Heating water. — The gas-heated boiler A is traversed by tubes B which may be vertical, as shown, or inclined, terminating in the sides of the boiler. It is enclosed in a casing C, supported upon a stand D, and heated by vertical burners E and a

ring burner shown above. The products of combustion pass through the boiler tubes and round a



baffle-plate F to the chimney G. H, I are flow and return pipes.

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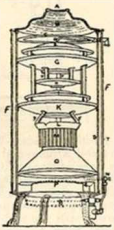
717. Hart, J. Jan. 19.

Heating water.—Relates to gas-heated apparatus. Water is admitted at the top of a double casing F by means of a perforated ring C and nozzle D, and flows down the inner surface of the chamber and over the conical plate E turned up and perforated round the lower edge, thence over the inverted cones G and H, the conical plate I, similar to the plate E, and the inverted cone K into a pan L, and, passing through a number of narrow tubes M, flows over the conical plate O and accumulates in the bottom of the casing, from which it may be withdrawn. The products of combustion from the burner P pass upwards through the cone O, between the tubes M, and over and between the other cones in succession, escaping by an aperture A in the removable cover B. The burner is lighted by means of a smaller burner fixed on a swivel arm and passing through an aperture in the casing through which the height of the flame may be inspected.



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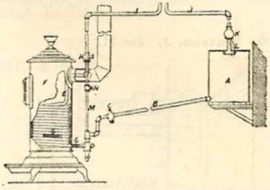
840. Lake, W. R., [*Inman, P. H.*]. Jan. 20.

Heating buildings &c.; heating water.—Water from the tank A is admitted by the pipe B, with stop-cock C, through a check valve D to the coil E between two cylinders of sheet iron and placed within the cylindrical stove F. A smaller coil G is arranged within the lower part of the coil B, and is open at both ends. The coil E communicates with a horizontal pipe H with branches I leading to radiating coils &c., furnished with drip pipes J leading to the condenser K and by the pipe L to the tank. A drip and pressure-equalizing pipe M,



having a stop-cock N, is fitted between the pipe H and the check valve D. When used as a water-heater, the water is allowed to enter the coil faster than it can be converted into steam, and the heated water is conducted away for use.

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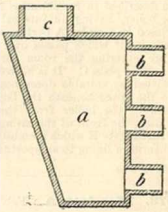
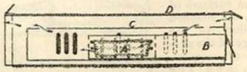
887. Furneaux, J. R. Jan. 21.

Heating air.—Fresh air is supplied to the box *a* (placed in any firegrate) through the pipes *b*, where it is heated and conveyed by the pipe *c* to other rooms requiring to be warmed. The box may be supplied with oxygen-generating apparatus and the gas produced carried away with the heated air; a steam kettle may also be added. When the apparatus is not required for supplying warm air the pipe *c* may be carried a short distance into the chimney to produce a draught.



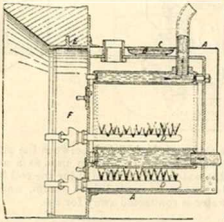
1276. Büsche, P., and **Hopkinson, J. E.** Jan. 29.



Footwarmers.—"A heated cake of carbon or "other suitable material" A is placed in a sliding drawer B enclosed in a double casing C, D. Perforations are made in the drawer, in the inner lining C, and in the ends of the outer case for the

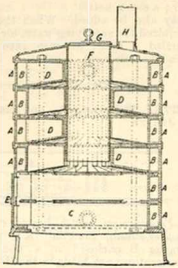
introduction of air for combustion, and for the exit of the warm air for heating. The whole is supported on a suitable stand. The outer case is covered with asbestos or other non-conducting material.

1400. Watson, J. Jan. 31.



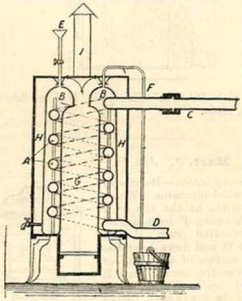
Heating water.—Relates to improvements in the application of gas fuel to boilers, for heating greenhouses &c., constructed according to the invention described in Specification No. 156, A.D. 1884. The boiler, having an internal horizontal flue, is enclosed in a casing A perforated at its lower end to admit air which passes over a pan of water B before entering the room through a removable perforated plate C. It is heated by gas burners D, admitted by suitable doors both into the flue and into the space beneath the boiler. To allow of access to the boiler from the exterior of the building, the front of the casing may be fitted with a flanged plate E which is embedded in the masonry and forms a lining to an aperture F in the wall.

1678. Marriott, A. Feb. 6.



Heating water.—A vertical cylindrical boiler is made in sections A consisting of annular chambers B, those above the fire-chamber C being provided with radial continuations D the top or bottom surfaces of which are inclined to allow of the passage of the products of combustion, and the continuations of one section being placed between those of the sections above and below. The chambers B communicate at intervals by means of apertures through which pass the bolts which bind the sections together. The two lowermost sections are incomplete in front and fitted with a fire-door E. Fuel may, however, be admitted from the top through a tube F provided with a cover G, the products of combustion escaping by the flue H. Flow and return pipes are attached at suitable points.

1851. Browne, A., [*Fromm, A., Ballo, M.,* and *Kugler, F. T.*]. Feb. 10.

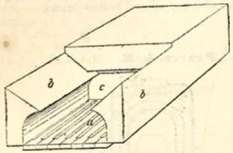


Heating liquids.—Wine or other liquid is heated in a coil A immersed in a boiler B and connected by circulating pipes C, D (which may be branched) to the casks &c. The boiler is fitted with supply and overflow pipes E, F; the products of combustion pass upwards through the central flue G, downwards through the side flue H made of a spiral form by means of a strip of metal, and escape by the chimney I. The circulating pipes C, D enter the cask together, and the latter is bent into a curve immediately before entering the heater. For heating water or other liquids which do not suffer from contact with metal at high temperatures, the boiler may be dispensed with and the single or double coil heated directly by means of a burner. If, owing to expansion, an overflow from the cask be feared, the upper bunghole may be connected to one mouth of a Woulfe's bottle, to the other mouth of which is attached a tube packed with cottonwool.

2000. Perrott, R. A. Feb. 13.

Heating water.—Relates to a circulating boiler specially applicable to the kitchen range described in Specification No. 5315, A.D. 1885. The gases from the fireplace *a* pass partly over the parts *b*, *b* to the ovens, and partly over the bridge *c* into

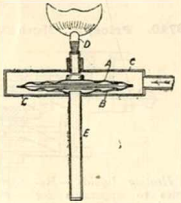
the space enclosed by the sides, top, and back of the boiler, all of which contain water spaces, and from thence under the sides to the flue. The Specification describes various modifications in the details to meet special conditions such as the



size, construction, and setting of the range. The bridge *c* and the lower parts *b*, *b* may be of fire-brick. When the character of the water is such that there will be a considerable quantity of sediment and mineral deposit, the bottom of the boiler may be located below the firebars to minimize the danger of its being injured by the flame. Preferably in all cases, the lower front edge of the top of the boiler projects downwards over the firebridge to guide the products of combustion into the chamber behind.

2455. Willway, A. B. Feb. 23.

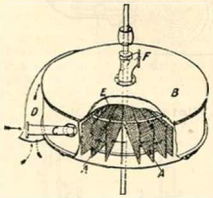
Thermostats for controlling gas stoves and water-heaters, and for regulating the temperature of ships' cabins, dwelling-rooms, glasshouses, &c. The regulating-apparatus is operated by means of the expansion or contraction of the air between two concentrically-corrugated metal discs A, B attached together at their edges, as shown. One of them is fixed to the side of the box or case C, and the other is connected, either directly or by means of levers, to a valve, ventilator, or other regulating-apparatus, (in the arrangement shown to a valve regulating the supply of gas to a burner D). The space between the discs may be extended, if desired, by means of a tube E, which may terminate in an airtight chamber. There may be an independent gas supply to the burner, sufficient to prevent the flame from being extinguished by the closing of the valve D.



2638. Walker, W. T. Feb. 26.

Heating buildings.—The space between cast-iron dados or skirtings and the wall may be utilized as channels for ventilation, or to convey heated air which may be allowed to pass into the room through adjustable openings.

2797. Best, G. March 3.

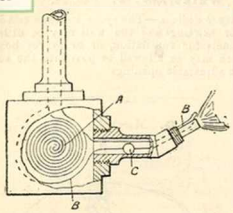


Heating air in connection with steam-engine and other condensers. A light wheel or fan, with blades A, A formed of wire gauze, revolves, preferably on a vertical axis as shown, in a casing B. The Figure shows a perspective view, with a portion of the casing broken away. The steam to be condensed is introduced to the casing by a jet C, in such a manner as to impinge on the blades, and cause them to revolve, but the wheel may be independently driven by external means. The blades in their rotation meet an opposing current of cold air introduced at D, which air mingles with the steam carried round by the blades and condenses it, and also cools the wire gauze, becoming itself heated in the process. The heated air passes through perforations in a partition plate E, into a chamber between this plate and the upper wall of the casing, and is led away by the branch pipe F to be utilized for heating or other purposes.

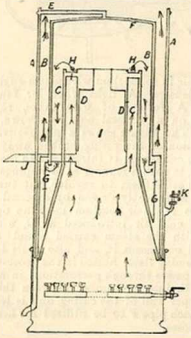
2986. Lorrain, J. G. March 6.

Heating by electricity.—Consists in volatilizing hydrocarbons or other suitable bodies for use in lighting by means of the heat evolved from an electric circuit. The vapour is generated by the resistance A, and is ignited by the shunt circuit B. The shunt B is cut out after the ignition of the vapour by a thermal contact consisting of a compound metal band C. In a modification, the current is only used to start the volatilization, which is then continued by the main or by subsidiary jets. A too rapid generation of vapour, occasioned by the overheating of the hydrocarbon, is prevented by a second thermal contact.

(*For Drawing see next page.*)



3029. Winterflood, J. March 7.

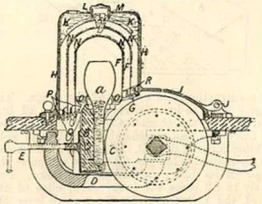


Heating water.—Four concentric annular spaces A, B, C, D are connected together so as to form a continuous water course, and also a zig-zag passage between them for the products of combustion from a burner below. A and B are connected by a pipe E, B being furnished with a hollow cover F; B and C are connected by vertical tubes G, the lower part of C being made conical as shown; and C and D are connected by means of three horizontal tubes H. The inner annular space D terminates in a chamber I, to which the discharge pipe J is attached, and may be fitted with a perforated cover to allow the escape of accumulated steam. K is the water inlet; the arrows indicate the course of the products of combustion.

3070. Garrett, J. D. March 9. *Drawings to Specification.*

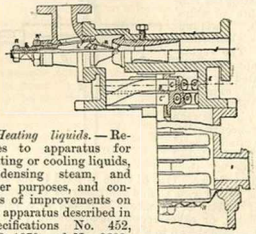
Heating air.—Fresh air entering the lower end of a ventilating-flue is heated by a helical smoke-flue passing around it, the two flues being constructed of recessed and hollow bricks.

3597. Pearce, L. H. March 20.



Heating liquids by friction. The vessel *a*, containing the liquid, is fixed in a block B and heated by the friction of a rotating-wheel C of wood &c. against the side of the vessel, the friction being regulated by a screw E which operates a movable frame D upon which the wheel is fixed.

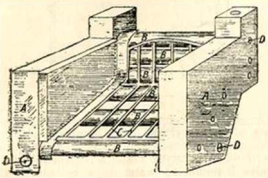
3740. Price, J. March 23.



Heating liquids.—Relates to apparatus for heating or cooling liquids, condensing steam, and other purposes, and consists of improvements on the apparatus described in Specifications No. 452, A.D. 1879, and No. 2308, A.D. 1883. The Figure shows a condenser. A number of elements, each consisting of two chambers or cells C, C¹ separated by a partition B and connected by spiral tubes D, are fitted to one another by screwing, and enclosed in a casing E. The lowest element is connected to a corrugated expansion plate H secured to the casing. The condensing-water entering from the lower inlet to the right is circulated by an ejector, in which one side

of the connection J is curved or sloping so as to give a helical direction to the issuing water, and the steam cone L is perforated so as to serve also as a valve and works in a perforated plug N carrying a bridge O to support the central spindle P. R, R¹ are lock nuts and S is a pin for securing the parts in the adjusted position. When used as a feedwater heater the uppermost chamber is connected to the feed exit passage and steam is made to circulate on the outside of the tubes D. The apparatus may be used in combination with the "Brunswick" condenser described in Specification No. 2908, A.D. 1883, and instead of using the elements in casings they may be placed in vats or tanks for heating liquids contained therein by means of hot water, steam, &c.

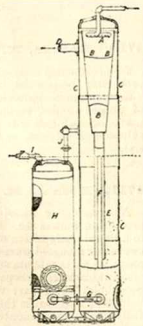
3910. Wood, T. March 27.



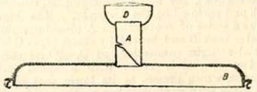
Heating water.—Relates to a boiler for kitchen ranges, circulating apparatus, and the like, consisting of two flat cast-iron boxes A, A fixed so as to form the sides of the fire space and connected together by a series of iron pipes B which form the bottom and back. A frame of iron bars or false bottom C rests upon the connecting tubes to support the fuel. Several openings closed with plugs D are provided for the purpose of cleaning out the boxes and tubes.

3979. Fairweather, W., [*Babcock, G. H., Pine, L.,* and *Babcock & Wilcox Co.*]. March 28.

Heating water.—Relates to means for heating and purifying feedwater for boilers &c. The water is forced through an annular pipe A having oblique perforations and takes a spiral course along the inner surface of a cone B enclosed in a casing C to which steam is admitted by a pipe D. The cone B is terminated by a pipe E extending to the lower part of the casing C which forms a settling-chamber in which the water accumulates and from which it passes by means of pipes F and G into a filter H provided at the upper part with an outlet pipe I leading to a boiler or to a reservoir. The steam chamber and the upper part of the filter are connected by a pipe J for the purpose of cleaning the filter, when required, by passing steam through it, and also to act as a safety pipe in case the passage through the filter becomes interrupted. Manholes, blow-off cocks, &c. are fitted at suitable points. The parts may be arranged variously; the perforated pipe A may thus be replaced by a spray box having an elastic perforated bottom secured by a central bolt, and the cone B may be dispensed with if desired.



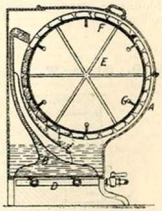
4013. Bannehr, J. March 30.



Boiling-pans, alarms for. A whistle A, or other sounding-apparatus, is fitted into the cover B to indicate when boiling occurs, a packing of soft cotton &c. being placed around the rim C to prevent escape of steam except through the whistle. If a loop handle is used the top of the whistle A may be covered by it instead of by the hollow knob D.

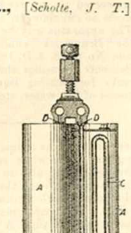
4066. Lumsden, A., and **Sternberg, J.** March 31.

Heating water in washing machines. Within the casing A of the machine is fixed a false bottom B of inverted funnel shape. The water in the casing being boiled by gas jets or other heating-apparatus D below, it rises in the conduit B, and falling on the buckets of the cylinder containing the clothes rotates it. The buckets are attached to the cylinder at their top edge only, being otherwise separated from it in order that the water within the cylinder may not cool that projected from the conduit. Above the conduit is also fixed the covering C to prevent the cooling of the water that is passing up the conduit.



4193. Lake, W. R., [*Scholte, J. T.*]. April 2.

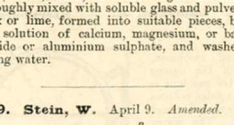
Radiators; heat-storing apparatus; steam traps; footwarmers.—"Warmers" in which heat is accumulated by melting acetate of soda, resinous matters, &c. are heated by means of steam pipes, the condensed water being removed automatically by means of a valve operated by a ball float. The float is connected to the valve by means of a hollow stem, passing through the valve, open to the air and surrounded by a deflector for preventing the discharged water from entering the stem. In a form of the apparatus for domestic use (illustrated in the Specification), the steam generator is combined with and enclosed by the "warmer." The Figure shows a series of footwarmers A placed upright in a water tank B and heated by steam pipes C with special airtight connections at D. These consist of two concentric tubes with a spiral spring between, which presses at its lower part upon a disc fitted with a stuffing-box and a packing-disc, and sliding on the inner tube. They are connected below to screwed ferrules for attachment to the apparatus.



4343. Allison, H. J., [*Sophus, Dohlmann, & Co.*]. April 8.

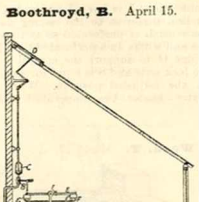
Non-conducting compositions.—Sawdust, chopped straw, cork, bark, or other light material is thoroughly mixed with soluble glass and pulverized chalk or lime, formed into suitable pieces, boiled in a solution of calcium, magnesium, or barium chloride or aluminium sulphate, and washed in boiling water.

4419. Stein, W. April 9. *Amended.*



Heating water.—A boiler *p* is fitted to the crown of the bakers' oven shown for supplying the bakehouse with hot water.

4663. Boothroyd, B. April 15.



Thermostats for opening and closing the ventilators of conservatories, glass houses, and other buildings. The expansion or contraction of air or other fluid in a suitable vessel A is made to operate a valve B admitting water to a cylinder C the piston of which is connected by suitable levers to the ventilator D. This is effected either by means of suitable bellows, an inverted vessel floating in mercury &c., a float in one limb of a U tube containing mercury &c., or (as shown) by means of a balanced lever E carrying mercury vessels F, G connected at their bases by a tube H, one of them F being closed and the other remaining open to the atmosphere. The separate vessel A may be dispensed with, the upper part of the closed vessel F being filled with ether &c.; I is a movable weight for adjustment. The valve B has two ways at right-angles to each other, one admitting water to the cylinder and the other leading to the discharge pipe.

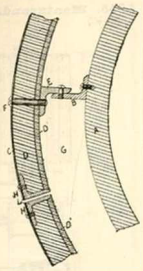
4710. Keenan, M. April 16.

Non-conducting compositions.—A composition for protecting boilers &c. is composed of 35 parts of "Keenan's non-conducting papier mâché," 25 parts of pulped swedes, turnips, or mangold wurzels, 30 parts of sulphate of magnesium, 10 parts of sulphate of calcium, and about ½ part of vegetable size.

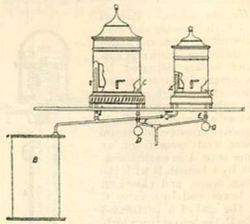
4711. Keenan, M. April 16.

Non-conducting coverings and compositions for protecting boilers &c. Hair or hair felt is soaked in a liquid composition of 50 parts pulped turnips, swedes, or mangold wurzels, 30 parts magnesium sulphate, 10 parts calcium sulphate, 2½ parts vegetable or spirit black, 2½ parts paper pulp, 2 parts oil, 2 parts Stockholm tar, ½ part vegetable size, and ½ part hair. The material is then removed, drained, carefully dried, and cemented to a thin iron or other metal plate, the opposite surface being lined with

a layer of the above composition, and, when necessary, another metal plate is placed below this layer. The metal plates may be made of any convenient shape to cover boilers, pipes, &c., and may be fastened so that an air passage remains between the covering and the object covered. The Figure shows the manner in which the covering is applied to a boiler or other curved surface. C is the metal plate to which is fastened the prepared hair felt D, and D^1 is the layer of non conducting composition; this covering is fixed to the boiler shell A by means of the bolt F and angle-irons B and E, leaving the air space G between the boiler and the covering. H, H are angle-irons to strengthen the segments into which the non conducting covering is divided.



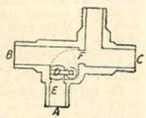
4834. Jones, C. April 18.



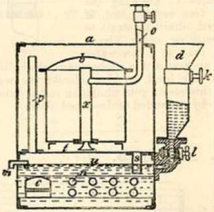
Heating water; steam traps.—Relates to the heating of vessels, such as those shown (for supplying hot water), by means of steam jackets. The pipes A supplying steam from the boiler B are made to project some distance within the jacket, as shown. The condensed water flows away by pipes C contracted at their lower ends where they dip into spherical vessels D normally filled to the overflow pipe E with condensed water.

5166. King, J. April 27.

Heating buildings &c.; heating water.—A closed system of pipes jointed by sockets with right and left handed screws are nearly filled with water, allowing about 15 per cent. for expansion, or an additional safety tube is connected to them for this purpose. A portion of the system in the form of a loop or a coil is heated in a casing lined with bricks, tiles, &c., by means of a gas burner consisting of a coiled tube with jets at intervals, or by means of an oil lamp or of a current of electricity passed between carbon electrodes, the coil being surrounded with asbestos, porous fireclay lumps, &c. The remainder of the system may be arranged variously. The tubes are filled by a pump connected by a four-way piece as shown. The pump is attached at A and the ends of the system at B and C. The valve D has two seats E, F, and either directs the water from the pump to the circulating pipes or stops the branch to the pump, according as one or other seat is used. The safety-valve consists of a pointed plug kept in position by a weighted lever; the supply valve is a simple suction valve attached to the safety-valve, both being immersed in a cistern of water. The tee-pieces, return bends, angle bends, knees, return connectors, safety tubes, valves, and caps are preferably made of malleable cast iron.

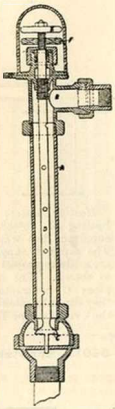


5401. Schatzky, S. May 1.



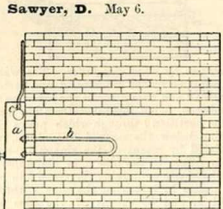
Heating by steam circulation.—The water chamber supplied by the reservoir *d* and heated by the fireplace *c* and flues *n* forms the lower part of the chamber *a*, being separated from the upper part by the partition *t* through which passes the pipe *s* dipping below the normal water level, which is regulated by means of the siphon tube *m*. The steam passes by the pipe *p* to the upper part of the chamber *a* containing the vessel *b* to be heated, and passes by means of the pipe *x* through the vessel *b*, and by means of the pipe *o* to the atmosphere, the condensed water returning by the pipe *s* to the water chamber. The pipes *p*, *x* and the fireplace *c* may be disposed variously. The tube *m* also acts as a safety-valve in case the pipe *o* becomes stopped, and is placed at the same level as the supply pipe, so that, if the cock *k* be kept closed and *l* remain open, the water in the reservoir below *k* will be supplied automatically, and the water level *u* will remain practically constant.

5508. Stubbs, J. B. May 5.



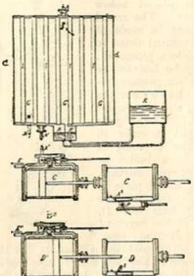
Heating water.— Relates to a high-pressure and low-water safety-valve and alarm apparatus for steam and hot-water boilers actuated by the increased temperature of steam of too high pressure. The valve is shown in section as arranged to indicate excessive pressure in a steam boiler, and consists of an outer tube A in communication by a branch B with the steam space, and closed at its lower end by a valve C on the end of a perforated tube D, the tension on which, when the valve is seated, can be regulated by the hand and lock wheels E, F. Should the pressure in the boiler exceed the predetermined amount, the increase of heat accompanying this excessive pressure causes the expansion of the tube D, which is of greater expansibility than the outer casing A, and in this manner opens the valve C, allowing the steam free escape, and, if required, admitting steam to a whistle or other alarm. When used as a low-water safety apparatus it is connected to the boiler at the lowest safe level, so that, should the water fall below this, steam gets admission to the tube, which is thereby expanded as described above.

5565. Sawyer, D. May 6.



Heating water.—One or more tanks *a* are fixed to the sides or front of a bakers' oven and connected with U tubes or coils *b* inside the oven through which the water circulates to be heated. The tank is fitted with a ball cock *c* in order that a constant supply of hot water may be kept up.

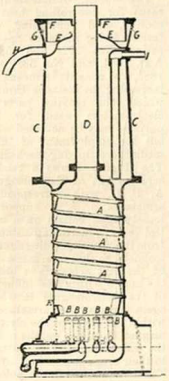
5645. Montgrand, Charles, Marquis de. May 7.



Heating air and other gases; heating buildings &c.—A certain volume of expanded air or other gas is caused to absorb the heat of compression of a quantity of compressed air; the former is then conducted to the place to be heated and the latter to the apartment to be cooled. A metallic case *a* surrounded by an insulating-envelope contains a number of vertical tubes I communicating with each other at the ends and so forming an interior chamber G. Into the tubes I air is compressed by means of the cylinder C, and thence it passes by means of the pipes A^1, A^3 to one side of the piston C^1, by which it is passed through the pipe E to the apartment intended to be cooled, the slide valve of C^1 being so adjusted that a greater quantity of air passes from C to the tubes I than passes away from the cylinder C^1, until the required amount of compression has been obtained. Similarly, air is passed to the space G by means of the cylinder D, and a larger quantity conducted away and forced into the apartment to be heated by means of the cylinder D^1, the air in each case taking the direction indicated by the arrows, viz., P, A^2, A^1, A^3, E and F, B^2, B, B^1, B^3, E^1 respectively. The bottom of the chamber *a* is provided with two receivers R, R^1 in communication with the chambers I and G respectively, and by means of valves with the reservoir K. In place of the cylinders C^1, D suitable valves may be used to indicate, the one the amount of air escaping from the tubes I, and the other the amount admitted to the compartment G. In order to regulate the length of the stroke of the piston in the cylinder D^1 the crank upon the driving-shaft is connected by means of a rod to a slotted link pivoted at its other end, the position of which may be adjusted, a slide upon the connecting-rod working in the slot as the link oscillates.

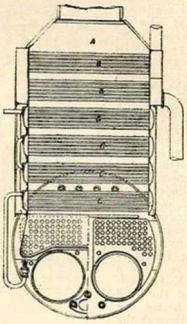
5744. Keith, J. May 9.

Heating water.—Relates to apparatus for supplying hot water or steam for baths, cooking, heating, and other purposes. Consists of a number of annular or other shaped sections A superimposed one upon another, inclined from back to front, and fitted with cross tubes. The sections communicate with each other at the angles or at other suitable points by flanged orifices, through which pass long bolts for securing the sections together. Either solid or gaseous fuel may be used. In the former case the fire-chamber is formed of the two lowermost sections; in the latter case the burner consists of a number of vertical tubes B screwed into two rings, each supplied with gas independently. The boiler may be surmounted by a water dome or by a cylinder C traversed by the flue D, and fitted near the top with a dome-shaped diaphragm E extending to within a short distance of the flue; F is the steam space surrounded by an air space G, and H the outlet pipe. The inlet pipe I may be connected, as shown, immediately below the diaphragm E and passed downwards through the water in the cylinder, or it may be connected to the lowermost section of the boiler. When used for generating steam for cooking or heating purposes, the water cylinder is replaced by a steam cylinder fitted with safety-valve, water gauge, steam pipe, and feedwater supply pipe and valve. The cylinders may be jacketed if desired, and the apparatus may be fitted with a suitable gas-regulating arrangement.

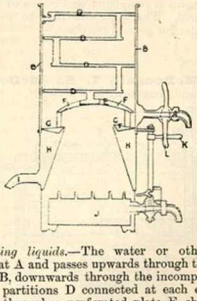


5814. Kemp, E. May 12.

Heating water.—Relates to "compound" boilers for heating water and generating steam in which a "low-temperature boiler" or feedwater-heater is arranged to be acted on by the furnace gases after they have heated the main or "high-temperature" boiler. The Figure shows the application to a marine steam boiler. Several sets of tubes B, C are arranged horizontally side by side within the uptake A. Water enters the set C most remote from the furnace and passes circuitously through several sets, being finally conveyed to the main boiler. The tubes B heat the air supply to the furnace.



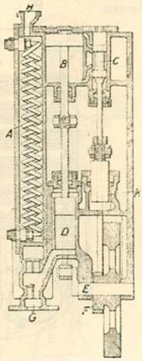
6009. Righton, W. J. May 16.



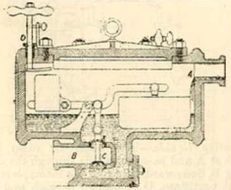
Heating liquids.—The water or other liquid enters at A and passes upwards through the double casing B, downwards through the incomplete horizontal partitions D connected at each end alternately, through a perforated plate E, chamber F, and a perforated ring G into a conical chamber H, escaping at I. Hot air &c. from the gas burner J passes upwards in a zig-zag fashion between the plates D. The lever K of the gas cock crosses the lever L of the water valve so as to ensure the flowing of the water when the gas is turned on &c. The spout I may be screwed on to either side of the casing, which may be removed, when required, for cleaning purposes. Above the spout is a small overflow outlet. Oil, spirit, or other heating-agent may be employed instead of gas.

6043. Kirkaldy, J. May 16.

Heating water.—Relates to a combined pump and condenser, which may also be used as a water-heater. A donkey-pump is mounted on the casing of a surface condenser, so that the water pumped serves as the cooling-medium. The Specification describes three modified forms, of which one is shown above in section. A is the condenser, B the steam cylinder with its valve C, and D the pump cylinder. E is the crank shaft, which is driven by a frame connecting-rod enclosing the pump cylinder. K is a feed-pump, and the feed may be heated by passing it through the condenser casing, or through one set of tubes surrounded by steam. In the remaining modifications, the donkey-engine is compound, and in one of them it is horizontal. The apparatus may be used as a water-heater for general purposes.



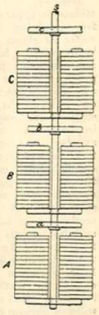
6350. McDougall, I. S., McDougall, J. T., and **Sugden, T.** May 23.



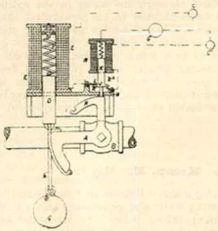
Steam traps.—A section is shown in the Figure, in which A is the inlet from the vessel to be drained, while B is the discharge pipe closed by an equilibrium valve C. This valve is lifted by a float, counterbalanced as shown, when the water has risen to a predetermined level. The valve may also be lifted from the outside to blow out any dirt &c. by means of a rod D passing through a stuffing-box as shown.

6753. Lorrain, J. G. June 3.

Thermostats.—Relates to apparatus for controlling heating, cooling, and ventilating, reference being made to Specifications Nos. 2920 and 15,464, A.D. 1884, and No. 339, A.D. 1885, and consists in means for increasing the distance through which the moving parts of electromotors used for this purpose may be actuated without the employment of intermediate multiplying-mechanism. The Figure shows a tandem arrangement of electromagnets A, B, C, with corresponding armatures *a*, *b*, *c*, supported loosely upon collars on a central rod *s* at increasing distances from their corresponding electromagnets, so that the attraction of the first armature *a* brings the next *b* within the influence of the electromagnet B, which again brings the armature *c* within the range of the electromagnet C, and so on, the rod *s* being connected to the valve &c., and the armatures brought back to their original positions by means of springs &c. The armatures and the poles of the magnets may be made of a conical form, or the magnets may be replaced by a solenoid and the armatures by short cores, or a single electromagnet may attract a number of armatures connected by links so that they may close up as they are attracted to the magnet, the last armature being connected to the valve &c. With the exception of the first, the magnets may be permanent magnets, but electromagnets are preferred.



6859. Lorrain, J. G. June 5.

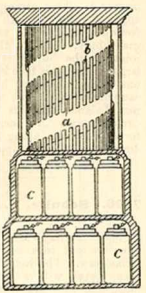


Thermostats.—Relates to further developments of the invention described in Specifications No. 15,464, A.D. 1884, and Nos. 339 and 6753, A.D. 1885, and consists of the application of a "holdback" to the valve &c. of heating, cooling, and ventilating apparatus, for the purpose of retaining it in its extreme

positions so as to reduce to a minimum the expenditure of electrical energy used for operating it. Several forms of "holdback" are described consisting of a clutch, clip, or detent actuated by a spring, lever, weight, &c., or by a permanent magnet &c. controlled by an electromagnet, solenoid, &c. called into action by an automatic contact depending for its action on the thermal condition of the fluid in the space to be heated, cooled, or ventilated, or by a non-automatic contact such as a push, key, &c. The Figure shows one of the forms described. The lever A of the valve B is attached by a cord k^1 to the core D of the solenoid E, the core being suspended by means of a spring F and carrying a counterweight G^1. The valve lever carries also a quadrant H with a notch I in which a clutch J engages when the valve is closed. This clutch is connected to the core K also suspended by a spring and provided with flanges k^1, k^2 which, in the extreme positions, make contact with the insulated springs L, M. G is a generator, and C and C^1 are automatic contacts. The parts being in the position shown, if the circuit be completed by the contact C, the current passes through G, C, E, L, k^1, and K, and the core D is lifted, operating the valve and allowing the clutch J to engage in the slot I. At the same time the circuit is broken at L, k^1, and contact made at k^2, M. The solenoid N is now in circuit with G through K, k^2, M and the contact C^1, which is not closed until the condition of the process requires B to be opened. In a modification, a solenoid, having two coils placed end to end, is provided with a long core which is drawn to the right or to the left according as the current is passed through the one coil or the other. The core is held in its extreme positions by clutches connected to an oscillating tube about half filled with mercury, by means of which the current is reversed as in the first case. In two other cases an electromagnet with reversible poles oscillates through 90° or 180° between the poles of a permanent magnet or electromagnet; other magnets may be used to retain the movable parts in the extreme positions. In another case, a pivoted armature weighted at its upper end and fitted below with a contact-finger, oscillates between the poles of two electromagnets; and in a fifth modification, the core of a solenoid is maintained in its extreme positions by friction, the core being wound with two coils connected in multiple arc.

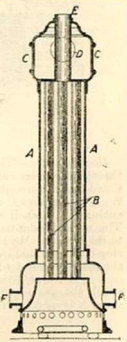
6971. Frère, N., [*Elu, A.,* and *Courcelles, E.*]. June 8.

Heating by electricity.—An electric current is passed through a series of metallic conductors of varying diameter, and carrying masses of lead or other suitable material which act as radiators. These radiators may be replaced by tubes conveying air, gases, or liquids. The Figure shows a heater consisting of a number of radiators *b* strung upon the wires *a*, conveying an electric current generated by the battery *c* or by any other suitable means. The invention may be applied to stoves for cooking or heating purposes, and for warming railway and other carriages. In the latter case the current is generated by a dynamo mounted upon the axle of the carriage.



7131. Cannon, W. G. June 11.

Heating water; heating buildings &c. — Relates to means for heating radiators such as are described in Specification No. 8395, A.D. 1884, and consists in combining a water-heater of the form shown with such radiators, so as to cause a circulation of water therein. The water-heater consists of a vertical boiler A containing longitudinal tubes B, through which the products of combustion from a gas or oil burner below pass to the smoke-box C, which communicates with the flue D. E and F are flow and return pipes connected to the radiator, the former passing through the centre of the smoke-box.



7242. Hardingham, G. G. M., [*Groucelle, J.*]. June 13.

Heating buildings &c.—In making pipes for heating purposes having discs, star-wheels, or other annular bodies attached to increase the heating-surface, the discs &c. A are made separately of wrought or cast metal and are attached to the pipe B by means of iron cement C. They are made with a boss having a conical

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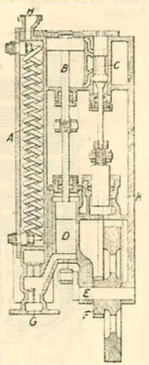

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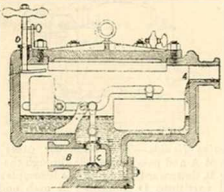

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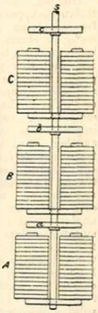

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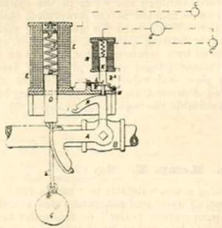

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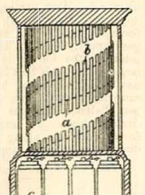

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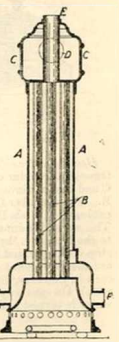
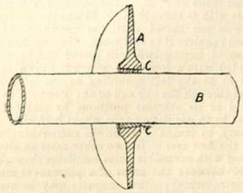


7242. Hardingham, G. G. M., [*Grouvelle, J.*]. June 13.

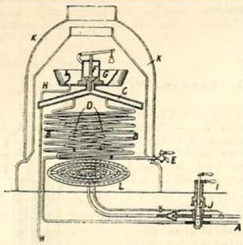
Heating buildings &c.—In making pipes for heating purposes having discs, star-wheels, or other annular bodies attached to increase the heating-surface, the discs &c. A are made separately of wrought or cast metal and are attached to the pipe B by means of iron cement C. They are made with a boss having a conical

aperture for the pipe, and the cement is rammed in with suitable caulking-tools. A suitable cement



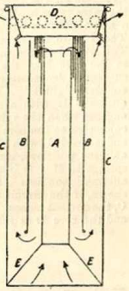
consists of 920 parts of cast-iron filings, 6 parts of crystallizable acetic acid, and 74 parts of water.

7376. Yates, C. D. June 17.



Heating water.—The water, entering at A, passes through the outer coil of pipes B into the chamber C and thence through an inner coil D to the outlet E. The chamber C is fitted with a safety-valve F enclosed in a shell G fitted with a waste pipe H. The water is admitted to the heater, and the gas to the burner L, by independent ways in the same stop-cock operated by the handle I; both passages are therefore shut off simultaneously. The stop-cock is, however, fitted with a central plug J by which the gas supply may be regulated when the water is turned full on. The heater is enclosed in a double casing K packed with asbestos &c., and open at the top for the escape of the products of combustion.

7493. Sweet, A. June 19.



Heating water. — Relates to an instantaneous water-heater. Consists of two concentric cylinders A, B enclosed in a casing C. The water is admitted to a perforated drum D divided into compartments, and passing in a shower between the cylinders collects in the conical space E beneath, from which it may be withdrawn, a small siphon being attached to prevent dripping. The arrows indicate the direction taken by the products of combustion from a gas burner below. This direction may be varied, and the inner cylinders may be dispensed with if desired. The burner is either atmospheric or luminous. The apparatus is fitted with an automatic arrangement for allowing for the variation in pressure of the gas supply. Within the gas way of the swing joint of the burner is cut a conical hole. The larger end of this hole is fitted with a long plug or nut having a central hole in which slides a rod carrying a metal disc which is weighted so as to just balance the gas pressure under ordinary circumstances. An increase in the gas pressure forces the disc along the conical hole, thereby diminishing the gas supply.

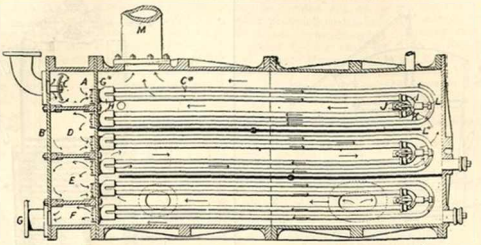
7496. Schulte, F. June 19. *Drawings to Specification.*

Non-conducting coverings.—Blocks of dried peat-moss are cut into curved slices by means of a ribbon saw. The inner surfaces of these slices are then coated with a dough prepared from fossil meal, and they are secured to the pipes, vessels, &c. to be covered, by binding-wires or iron hoops.

7634. Reddie, A. W. L., [*Gannon, T.*, and *Daudt, G. A.*]. June 23.

Heating liquids.—The apparatus described below as a surface condenser is stated to be applicable for heating fluids generally. A longitudinal vertical section of the condenser is shown. Steam or vapour enters the upper compartment A of the chamber B, is spread by the deflecting-plate C, and then enters the tubes C², by means of which it arrives at the next compartment D; by similar means it passes on to the compartments E, F and outlet G from which the products of condensation emerge. Instead of piercing the tube-plate G² for the reception of each cooling-tube, a number are grouped together and enter a socket H the outlet of which passes through and is secured to

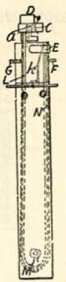
the tube-plate by a nut which compresses packing between a shoulder on the socket and the tube-plate. Two inner tubes of each group have connecting pieces I on their ends supported by a transverse bracket J which receives pins K formed on the connecting pieces. The bent portions of the outside tubes are also provided with supporting-pins L, each of which enters a socket on the connecting pieces.



Instead of the bends as described, each group of tubes may enter one common chamber. The tube chamber is intersected by diaphragms L° which give a circuitous course to the cooling-medium, which passes out at M. In a modification, two end chambers are provided arranged vertically, serving for the inlet and outlet compartments respectively. The inlet chamber lies between two portions of the outlet chamber and also between it and the sides of the casing. The bends at the ends of the tubes in this case are arranged horizontally.

7643. Groth, L. A., [*Garavagno & Co., F.*]. June 23.

Thermostats. — Relates to a gas carburetter with a separate heating-burner, the supply to which is regulated by a compound metal strip. The gas passes from the carburetter to the burners between the inlet tube and an outer concentric tube, and the heat is concentrated by a brass spherical covering surrounding the vessel but open above and below. The supply of gas to the heating-burner is regulated by the arrangement shown, the framework of which rests on a stand inside the carburetter, and which consists of two strips of steel and copper bent, the copper inside, into the U strip L, M, N, which is kept in position by the bent plate E. The arm M, N is held by the spring *k* and adjusting-screw F, and the arm M, L carries the plate D and controls the valve C, which regulates the outlet *a* to the heating-burner, complete closure of *a* being prevented by the screw G. G may be dispensed with by providing a small constant supply to the heating-burner.



7653. Meschter, J. K. June 23. *Drawings to Specification.*

Thermostats for incubators. The temperature of the incubator is automatically regulated by means of a balance, to which is attached a weight by means of a chain. When this balance is disturbed by the addition or removal of mercury from a column of mercury in consequence of an increase or diminution of temperature, the weight operates upon a cut-off valve or shield which closes over or leaves exposed a portion of the wick of the heating-lamp.

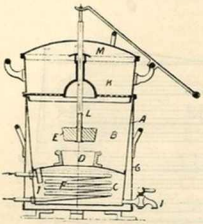
7809. Stewart, R. June 26. *Drawings to Specification.*

Non-conducting coverings for boilers, roofs and walls of buildings, &c. Silicate cotton or slagwool is placed between an outer casing of corrugated or plain sheet metal or other suitable material, and an inner casing of wire netting; these are held together by bolts and suitable washers and nuts. When the covering is to be applied to the roofs and walls of buildings, both casings may be of wire netting, and strips of wood or other material may be embedded in the slagwool, sheets of paper or other light material being placed between the slagwool and the strips. After fixing in position an external coating of plaster or cement may be applied.

7843. Malen, L., and **Deglise, E.** June 27.

Heating water.—The apparatus is described as adapted for making coffee &c., but is stated to be applicable to heating water. A receptacle A is divided into two compartments B and C by a

...ing with central opening D closed by a stopper E. A steam coil F is arranged in the lower compartment. The receptacle is contained in an outer casing G by which an air space is



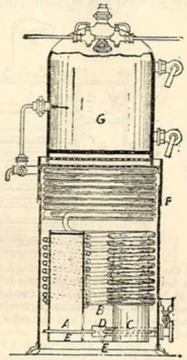
formed to serve as a non-conductor of heat. A cock I at the bottom draws off the coffee &c. A vessel K with perforated bottom is placed on the top. The water by the pressure of steam rises through a central tube L, and is spread by a flange M over the coffee.

7983. Cook, W. July 1. *Drawings to Specification.*

Thermostats for automatically controlling the temperature of bakers' ovens. The apparatus consists of an expansion tube, piston and cylinder, or equivalent device in connection with the short arm of a lever, the longer arm of which is attached to a damper in the furnace flue; and, further, of a screen or its equivalent operated by a lever capable of expansion either by the heat of the oven or of the furnace itself to regulate the supply of air to the furnace.

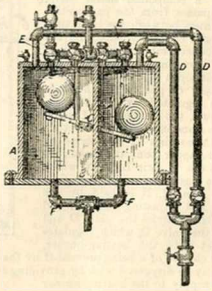
8027. Drake, T. July 2.

Heating water.—Consists, mainly, in adapting the water-heater described in Specification No. 2845, A.D. 1881, for use as a steam generator for motors. A series of three coils A, B, C surround perforated cylinders through which heated products of combustion from gaseous fuel pass. The fuel is supplied from the central chamber D to each of the cylinders by radial pipes E, perforated on their upper surfaces. Water passes through each of the coils in succession and enters a larger coil F, from which it emerges in the form of steam. The steam is collected in the reservoir G, fitted with the usual boiler mountings. The water is forced into the coils by a pump worked by the engine, to which the steam is supplied. Before the engine has started, water is forced into the coils either by the pressure in the water-supply main or by a hydraulic accumulator, upon the ram of which the steam pressure in the receiver acts in addition to the ordinary weights. The feedwater supply is taken from a vessel surrounded by an annular



chamber, through which the exhaust steam circulates.

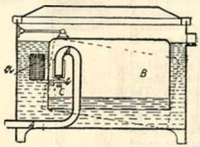
8207. Thompson, W. P., [*Erwin, J. B.*]. July 7.



Steam traps.—A vessel A is divided into two compartments by the partition B, which is Z-shaped in plan to allow the shaft C to extend into both. Each communicates with the vessel to be drained by pipes D, D, with the steam space of the boiler by pipes E, E, and with the waste pipe, or

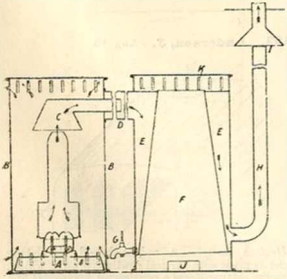
with the water space of the boiler when the water of condensation is to be used as feed, by pipes F, F, all being provided with non-return valves when required. The shaft C carries at each end a lever, on which is a float, and which is connected by rods to a valve in the steam pipe. The chambers fill alternately, raising their respective floats, and by means of the connecting-rods the steam valves, so that the water is blown into the boiler or the waste pipe as required. Suitable stop-cocks are provided on the steam and other pipes so that the apparatus can, if required, be worked by hand.

8615. Kullig, R. July 16.



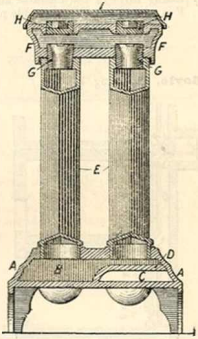
Steam traps.—Relates to an improvement on that form of apparatus known as Royle's. The steam-inlet pipe A is placed within the float B, instead of being at one side, so as to allow a lift valve C to be used in place of a slide as in the original arrangement. As shown, the float is full of steam, so that it has risen and closed the valve, but, as the steam condenses, it sinks and opens the valve to admit steam afresh.

8966. Rippingille, E. A. July 25.



Heating buildings &c.; heating air.—Relates to apparatus for heating greenhouses &c. The products of combustion from an oil stove A, B are collected by a hood C and passed through a tube D into a jacket E surrounding an air-heating chamber F. The jacket is fitted with a waste tap G, and communicates by a pipe H with the chimney, which may be divided at I, as shown, the upper portion being provided with a hood in order to lessen the effect of down-draughts. Atmospheric air is admitted to the chamber F by a flap valve J, and escapes through apertures K near the top. The casing B is also perforated near the top, and may be fitted with a suitable pan or kettle for supplying moisture to the apartment. Several variations in the arrangement of the parts are described, in one of which the air-heating chamber is placed within the stove case B.

9057. Tompkins, S. D., and **Matlock, J. N.** July 28.



Heating buildings &c.—The hollow base A of a steam or hot water radiator is divided into two compartments by means of a vertical partition B, arranged transversely between any two series of pipes, communication being made with the further compartment by means of a passage formed by a bent partition D extending from an aperture C in the partition B. Each compartment is connected with one or more series of pipes E screwed into the base. The pipes are connected to a hollow casing E by means of threaded thimbles G expanded so as to be steam-tight, access being obtained for this purpose by means of apertures afterwards closed by plugs H. The whole is covered with an ornamental plate I. Steam or hot water is admitted to one compartment of the base; the other is connected to the exit.