

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. 1889-92.



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By DARLING & SON, LTD., 1-3, GREAT ST. THOMAS APOSTLE, E.C.
PUBLISHED AT THE PATENT OFFICE, 25, SOUTHAMPTON BUILDINGS,
CHANCERY LANE, LONDON, W.C.

1898.

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PATENT FOR THE METHOD

ARRANGEMENTS OF REPRODUCTION

OF ARTS AND CRAFTS

BY THE UNITED STATES DEPARTMENT OF COMMERCE

AND PATENT OFFICE

IN RESPONSE TO A REQUEST OF THE HOUSE OF REPRESENTATIVES

Pub. No. 111, 1889, 92



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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 1s., postage 5d.

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 8d., may be purchased at the Patent Office, or ordered by post on the Patents Form C¹ (to be obtained from any Post Office), no additional charge being made for postage.

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ERRATUM

In abridgment No. 16,452, A.D. 1889, page 23, for "*Heating liquids*" read "*Heating gases
and liquids.*"

HEATING.

Excepting FURNACES or STOVES;

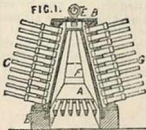
for which see Abridgment Classes FURNACES &c.; STOVES &c.

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. 1889.

46. Roberts, W. S. de L., and Mollison, J. S. Jan. 1.

Thermostats.—In a thermo-electric battery, the elements C are fixed in a frame of non-conducting and refractory material with their ends projecting into a hot-air chamber B, heated by a furnace A, with flue F. A

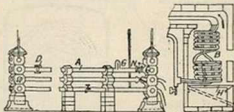


"pyro-safety valve," consisting of two metals differently expanded by heat, is attached to the upper portion of the hot-air chamber B. When the temperature reaches a predetermined limit, shown by the gauge, the expanded metal lifts a valve and allows the heated air to escape.

110. Holder, J. Jan. 3.

Heating buildings; heating water.—Relates to hot-water apparatus for heating conservatories &c. Earthenware pipes A, with expansion joints D, are used for the hot-water circulation. The pipes are provided with a thermometer, valves, cocks for

drawing water for watering purposes, and a device to signal when the water boils. The boiler B is



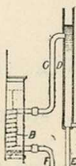
of double coil form, as shown, and has a removable grate H.

487. Rees, D., Mills, W., and Turner, J. H. Jan. 10. *Drawings to Specification.*

Heating buildings; heating air.—An oven for baking bread, biscuits, &c. is heated by a separate stove, and is provided with a pipe for ventilating or regulating the heat of the same. This pipe may be employed for conveying hot air to various parts of the building for warming purposes. From a boiler with which the stove is fitted hot-water pipes extend to any portion of the building.

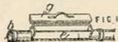
502. Perkins, L. Jan. 10.

Heating buildings.—Relates to a modification of the Perkins' system of heating by hot water whereby the coil and furnace B may be placed above the heat-distributing pipes. The coil is of ordinary form and has its upper end prolonged upwards C to an expansion chamber D, from which the water circulates through the flow and return pipes E, F back to the furnace. In case the distributing-pipes are far below the furnace, the flow pipe surrounds the return pipe partly to heat the incoming water in order to aid circulation.



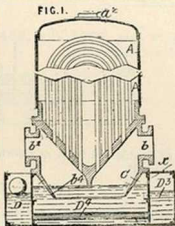
1228. Hulme, W., and Hulme, J. Jan. 23

Heating buildings.—Openings are made in the tops of hot-water pipes *b*, used for heating greenhouses &c., and are surrounded by walls *e*. A cover *g*, which may be provided with a grid valve, controls the escape of moisture into the air.

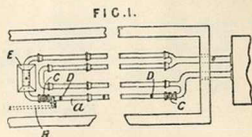


1322. Wright, J. Jan. 24.

Heating water.—The apparatus employed is an improved form of the 'Berryman' heater. The water enters at the lower part of the casing A, and leaves at the top *a*². Steam enters at *b*, and any of it remaining uncondensed escapes at *b*¹, while the water of condensation collects in the space C, which is provided with a conical flange *b*¹, and flows through openings *x* into the chamber D². From the lower part of D² the water is drawn off by a pump and supplied to the heater. Any additional water required is supplied to a chamber D under the control of a ball cock, and passes by a pipe D¹, or under a diaphragm to the other chamber D³, which may be carried round the back of the space C. Any oil or light impurities collecting in D³ pass through a siphon into a chamber into which the mud cock from the heater also delivers, and which can be blown off as required.



1465. Poat, J. Jan. 26.



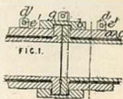
Heating buildings.—Relates to a system of heating greenhouses and the like by hot water. Regulating-valves C are placed at each end of one branch *a* of the hot-water return pipe, and cold water is introduced between them by a pipe and cock B under suitable pressure. A cock is also placed in the pipe leading to the expansion cistern E. By suitably manipulating these cocks hot, cold, or tepid water can be drawn from the pipe *a* by the cocks D, or the temperature of the whole system of pipes can be controlled by the admission of cold water.

1569. Rivač, K. Jan. 29. *Drawings to Specification.*

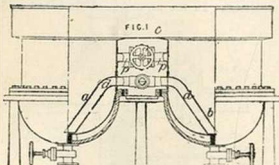
Heating buildings; heating air.—Consists mainly in utilizing the heat escaping with the products of combustion from stoves and the like by employing it to heat secondary stoves or radiators, which may be variously disposed throughout a building. The secondary stove may be traversed by pipes for heating air. It may be arranged in the floor or ceiling, and heat the air passing into the room, and thus assist ventilation. It may also be placed in a chimney, which is converted into an air-heating chamber, or contains air-heating pipes. The products of combustion may also be led from a chimney through pipes exposed to the room.

1670. Wood, W. O. Jan. 30.

Non-conducting coverings for steam pipes &c. Wood strips *a* are held over a layer *c* of hair, felting, asbestos, slag, wood, &c. by the straps *d* and bolts *e*¹. The felting &c. is laced, wound, or otherwise secured on the pipe &c., and the wood strips *a* are hollowed out to fit the pipe between the flanges. The flanges are similarly protected by wood *b* outside a layer *g* of flannel &c. The wood strips *b* are also secured by a strap.

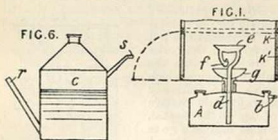


1942. **Cave, G. G., and Howell, J. H.**
Feb. 4



Boiling-pans.—Relates to means for circulating and aerating wort while boiling or heating the same. Two forms of apparatus are described. In that shown in the Figure, the wort is contained in two steam-jacketed coppers *a, b* connected at their upper part by a continuous curb or pan *c* so that the liquid in one pan, being more strongly heated than that in the other, overflows by the pan *c* into the other, and from the latter back through the pipe *d* into the former. The pipe *p* replaces the pan *c* in the case when the liquid does not rise to the level of the pan. In another form, one of the coppers is replaced by a vat or other vessel of copper or other suitable material, which may or may not be steam-jacketed.

2287. **Strauss, E.** Feb. 8.

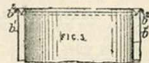


Heating water.—Relates to heating-apparatus for trams and other vehicles or structures, the invention being stated, in the Provisional Specification, to be applicable for heating water for shaving, baths, &c. Liquid fuel or oil gas may be used. Fig. 1 shows one form of apparatus suitable for burning petroleum or the like. The oil reservoir *A* is provided with an elastic cover and communicates at *b* with some air-compressing apparatus, such as a pump actuated by the axle of the vehicle. The liquid rises in the pipe *d*, fills a cup-shaped vessel *e*, and descends to the burner *f*, the pipe *d* being preferably heated at latter by spirit contained in a cup *g*. The burner is enclosed in a double-walled casing *K, K'* from which the products of combustion are led by pipes which heat by radiation the floor or other part of the vehicle.

A constant pressure in the pipe *d* may be maintained by elevating the reservoir *A*. Fig. 6 shows apparatus for generating oil gas for supplying the burners. A current of air is constantly forced through the pipe *r*, and passing through benzene or similar liquid in the vessel *C*, with which it becomes impregnated, it is led through the pipe *s* to the burner. According to the Provisional Specification, the annular casing *K, K'*, Fig. 1, may be made to contain water to be heated for use in shaving &c.; and the apparatus may be used for heating a bath by arranging it in a heating-chamber at one end thereof, from which flues pass through the water.

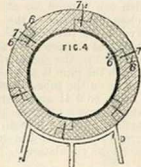
2488. **Blakely, W.** Feb. 12.

Boiling-pans.—To increase the heating-surface of domestic water-heating vessels the bottoms and sides are fluted, and they are surrounded by a casing *b'* to prevent loss of heat by radiation. The top rim *b''* may be grooved, as shown, to catch overflow.



2918. **Gilman, C. C.** Feb. 19.

Non conducting coverings for steam boilers. The covering is composed of sections consisting of terra-cotta lumber or porous burned material formed into solid or hollow blocks of any required shape. The blocks may be formed with overlapping projections

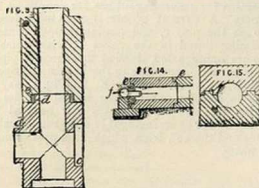


6 fastened together by nails 7 as shown; or they may be tongued and grooved, the depth of the grooves being greater than the length of the tongues, to form air spaces; or they may be built into the form of an arch over the top of the boiler after it has been set in position. The blocks on the underside of the boiler may be held in position by supports *D*.

2942. **Hall, J.** Feb. 19.

Heating buildings.—The floor of a hothouse or other building is constructed of hollow blocks or pipes which are fitted together with spigot-and-faucet joints so as to form a series of heating-flues. A block for connecting flues at right-angles is shown in Fig. 9. The spigots *d* are embedded in cement *e* in the sockets *c*. Fig. 14 shows a section of the floor with the pipe *f* for supplying the flues with hot air or the like. The blocks may be

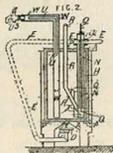
formed of halves cemented together as shown in Fig. 15.



2950. Lake, H. H., [Barnstead, R. P., Spalding, R. H., and Bullard, J. C.]. Feb. 19.

Heating water; thermostats.—Water is heated in the boiler A by a gas burner D, or by a gasoline, naphtha, or other burner. The gas supply through the pipe E is regulated by a thermostatic device. A tube H is divided by a central partition N, and partly filled with mercury, which can expand so as to close the passage of the gas round the partition N.

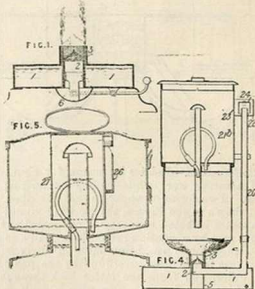
A bye-pass *a* is provided, and a plunger Q to adjust the height of the mercury. The cold water enters through the pipe R and is caused, by a shield T, to impinge on the tube H which contains the mercury, so as to cool it and open the gas passage. Hot water is drawn off through the cock U, which is attached to the pipes U, W; the internal pipe permits the exit of the top or hottest water, and also allows circulation.



3119. Wynne, F. Feb. 21.

Heating liquids.—Relates to spirit lamps for heating and boiling liquids, and with means for automatically reducing the flame and blowing a whistle when the heated liquid boils. The lamp, Fig. 1, consists of a reservoir 1 with two concentric tubes 2 and 3 between which is inserted a wick composed of fine wire gauze, either alone or surrounded by a cotton wick. When a valve 6 is opened, air passes up through the tube 2 and maintains a small flame at the top, which, by heating the interior of the wick, increases the size of the main flame. The air supply to the tube 2 may also be regulated by a tubular handle with perforations. When used in connection with an apparatus for making infusions, such as that described in Specification No. 14,893, A.D. 1888, the air supply to the inner flame is automatically cut off when the liquid boils by the device shown in Fig. 4. The upper end of the air-supply pipe 20 is contained in a receptacle 22, and is covered by

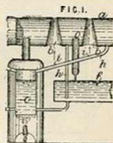
a cap 24. When the liquid rises sufficiently in the upper vessel 21, a portion flows through the opening 23 into the receptacle 22 and forms a liquid seal. In the arrangement described in the



Provisional Specification, the flame is automatically extinguished when the liquid boils, by directing steam upon it or into the air tube. The boiling of the liquid is indicated by a whistle 26, Fig. 5, attached to the side of the inverted bell 27, within which a slight pressure is produced sufficient to blow the whistle.

3150. Groom, J. A. Feb. 22.

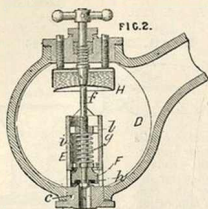
Heating buildings; heating air.—Products of combustion and steam from the boiler *c* and steam from the boiler *c* are passed into the tube *a* through which pass the Galloway tubes *b* for the passage of air to be heated. Steam escapes from holes *i* in the pipes *h* to moisten the air. Condensed water passes to the feed-tanks *f* by the pipes *h*. Waste gases are carried off by the flue *o*.



3436. Gold, E. E. Feb. 25.

Steam traps.—Relates to apparatus for removing the water of condensation in steam heating systems applied to railway cars, buildings, &c. A section of a trap as fitted to the coupling of a railway-car heating-pipe is shown. A valve seat *c* is screwed into the lower part of the coupling *D*, and is provided with a cylindrical extension *i* slotted at the bottom. The valve *F* has a ring of soft metal *h*, and is guided by a nut *l* on the screwed stem *f*. A spiral spring *g* tends to open the valve, which is normally held shut by the steam pressure, and by

an expansion vessel H, which is capable of adjustment. When water collects in the coupling, the pressure is reduced and the temperature is lowered, so that the spring is allowed to lift the valve and



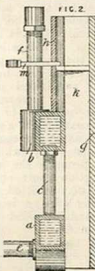
discharge the water. An arrangement for closing the valve by hand is shown, but the trap may be used without this, or without the expansion chamber H. Means for opening the valve by hand may also be provided to allow the apparatus to be blown off, and it may have a depending stem on which is a disc against which the issuing steam acts to assist in closing the valve.

3591. Blandy, A. A. Feb. 28.

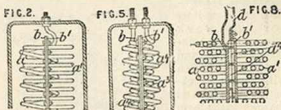
Non-conducting compositions.—Relates to compositions applicable for use as substitutes for leather &c., and as non-conductors of heat and electricity. They consist of mixtures of bitumen, asphalt, bituminous tars, mineral pitch, oils, &c., melted together in various proportions. The following is an example:—Val de Travers asphalt, 10 parts; colophony or black resin, 1 part; gypsum or plaster of Paris, 1 part; mineral pitch, 2 parts; gutta-percha, 2 parts; and antimony sulphide, $\frac{1}{2}$ part.

3727. Cannon, W. G. March 2.

Heating water.—Consists in constructing a stove or fireplace boiler of two chambers *a* and *b*, provided with inlet and outlet pipes *e* and *f*, and connected together by a series of vertical tubes *c*. Behind the boiler is an iron plate *g* forming, with a second plate *h* above the chamber *b*, a flue *k*, which is provided with a damper *m*.



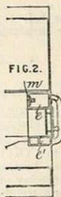
3753. Row, O. M. March 4.



Heating liquids and gases.—Relates to tubular apparatus for facilitating the transfer of heat for condensing steam or other vapours and for heating or cooling fluids. Tubes are fixed and arranged in tube-plates so that, when the latter are screwed together, one or more coils or worms, or zig-zag passages, are formed. The Figures show sectional views of three arrangements as above described, but several of these may be joined together for use at the same time. In Fig. 2 two tube-plates *b*, *b'* are shown, each with tubes *a*, *a'* which form a continuous coil when the plates are screwed together. In the form shown in Fig. 5, each plate is provided with two sets of tubes which, when joined together form separate coils *a'* and *a''*. In the form shown in Fig. 8, there are three sets of tubes, and passages *d'* are arranged between the tube-plates communicating with the tubes *a*, *a'* and arranged so that the fluid entering at *d* is caused to follow a zig-zag or serpentine course to the outlet.

3910. Seaman, C. J., and Roberts, H. March 6.

Heating water.—The feed for boilers is passed into the lower portion *e'* of the door frame, which, in this case, forms the dead-plate. After traversing the front of the compartment and returning by the rear, the feed enters the upper portion *e*, from which it passes direct to the boiler or to the door frame of the neighbouring furnace. The cross section of the upper chamber may be as shown or of other convenient shape, while, in addition, an expansion joint *n* may be fitted to its rear face.

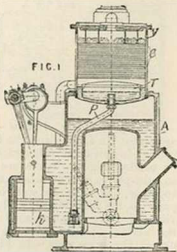


4175. Murjahn, E. March 9.

Non-conducting compositions.—Greenstone, diabase, actinolite, and similar varieties of hornblende are ground to a powder, washed, and dried. The powder thus obtained can be used as a lagging-material.

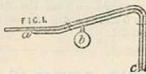
4237. Schmidt, W. March 11.

Steam traps.—Relates to motors for light work driven by a mixture of steam and air, or air charged with aqueous vapour. The air is charged with steam or aqueous vapour in a chamber *y*, the excess of water being returned to the boiler through a trap consisting of a chamber float *T*, which, on becoming filled with surrounding water, descends and thereby opens ports in the pipe *P*.



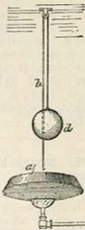
4281. Pochin, E. A. N. March 12.

Heating water, portable apparatus for. The coiled end *a* of the tube shown is inserted in a fire, or otherwise suitably heated, the open ends *c* are placed in a vessel of water, and the tube is filled with water by means of the rubber ball *b*, which is squeezed to expel air. Water circulates in the tube and is heated.



4726. Gilson, R. A. March 18.

Heating buildings; heating liquids.—Relates to smut-catchers for gas burners, and to their utilization for heating purposes. The fireclay or other refractory ismut-catcher *a* is placed immediately above the gas flame but not in contact therewith, so that it serves to warm the surrounding atmosphere or the room and to ensure the more perfect combustion of the gas. The interceptor *a* is preferably suspended by a wire *b* and counterbalance weight *d*, to allow of its being raised to a greater distance from the flame when not required for heating purposes. It is

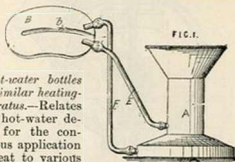


stated in the Provisional Specification that the interceptor may be so constructed that water or other liquids may be heated or converted into steam for medicinal or other purposes.

5177. Small, D. M. March 26.

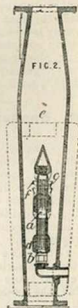
Hot-water bottles and similar heating apparatus.—Relates to a hot-water device for the continuous application of heat to various parts of the body.

A chamber formed by two slightly-concave plates *B*, preferably of metal, is provided with a partition *b* and is connected with a water-heater *A*, preferably of the form shown, by means of two pipes *E, F*. The apparatus being filled with water and the vessel *A* heated by a lamp or gas burner, a circulation of the water takes place round the partition *b*.



5326. Shillington, T. F., and Hanna, J. A. March 28.

Heating liquids.—A steam jet nozzle of special construction is fixed within a circulating-pipe. The nozzle is constructed in such a way as to prevent the noise usually produced by the contact of steam with cold water. The steam pipe *a*, pierced with a series of holes *b*, is enveloped by folds of gauze or perforated sheet metal *c* around which the short ring *d* is placed. By this means the steam is compelled to traverse the gauze or perforated metal and become minutely subdivided before escaping. To increase the heating power, two or more similar coatings may be arranged along the length of the steam pipe, while to further promote the circulating action short annular jackets *f* may be fitted. The circulating pipe *e* is bulged above the steam nozzle, and provided with a lateral door for inspection &c.

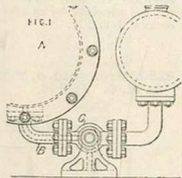


5500. **Watson, W.** March 30.*Steam traps.*—

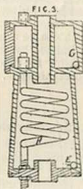
The discharge of the collected water is controlled by the partial rotation of a cock operated by the weight of the condensed steam.

The water is collected in a closed tank A carried at the end of the counterbalanced arm B to which the shell c of the plug cock is secured.

As soon as sufficient water has collected from the steam entering at one end of the cock, the water overbalances the arm and ejects the contents of the tank through another passage. In a modification, the tank-arm is secured to the plug of the cock, while the casing is fixed.

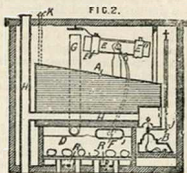
5516. **Sherwin, G. E.** April 1.*Heating liquids.*—

In one arrangement cold water or other fluid is passed through the coil H around which live steam circulates, the hot water &c. being withdrawn from the chamber C. Condensed steam drains away from the steam space through a suitable aperture E, controlled by a cock, or otherwise. If desired, steam may traverse the coil, and the water &c. the central chamber. In another arrangement, water or steam enters one chamber formed in the apparatus and passes through the coil or central space to another similar chamber from which it is withdrawn. Suitable joints are provided for securing the coils in place.

5606. **Delve, T. H.** April 2.*Thermostats for incubators.*

The temperature is regulated by automatically adjusting the height of the flame of the lamp B, and by ventilating the egg-drawer. The height of the flame is adjusted by a lever J which is connected to a float in a small open cistern, not shown in the Figure, connected to the closed water reservoir A. The height of the flame is thus adjusted by means of the expansion or contraction of the water in the heating-apparatus. The egg-drawer D is ventilated by a pipe G over which is a damper operated by a balance valve E. The valve E contains two

chambers E', E'' connected by pipes and partially filled with a convenient liquid. The chamber E'' is open to the air. The chamber E' is closed but is connected by a flexible tube to a cylinder F in



the egg-drawer. As the temperature in the egg-drawer varies the air in the cylinder F expands or contracts; this causes a flow of liquid between the chambers E', E'', thus overbalancing the valve E and operating the damper.

5862. **Deards, S.** April 5.*Heating water;**heating buildings.*—

The heating-chamber a, which is placed over an oil or gas burner b in such a way that the combustion products pass through it, is enclosed by water jackets, from which heat is radiated for warming conservatories and the like, or for heating the supply for baths or other purposes. Tortuous flues are formed in the internal chamber by baffles f, while the heated air and gases may or may not pass over the surface of the water contained in the jacket. The walls of the outer chamber are preferably formed with corrugations or gills. The arrangements of the gas outlets and the water jackets may be varied.

5919. **Lea, W. S., and Lynam, H. M.**

April 6.

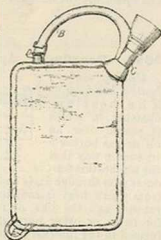
Non-conducting compositions.—Relates to a fire-resisting cement for lining furnaces, kilns, ovens, crucibles, &c., applicable also as a non-conducting covering for steam boilers, cylinders, and pipes, and for use in the manufacture of bricks, and gas and other retorts, muffle kilns, crucibles, and apparatus for use in chemical operations. The cement is formed of disintegrated granite or granitic rock, blast-furnace slag, basic steel slag, or other compound silicates, such as glass, earthenware, &c., hydrated silicates of alumina and magnesia, such as clay, kaolin, steatite, &c., silica, such as sand, loam, and silicious ochre, phosphate of lime, carbonate of

lime, caustic potash, chloride, sulphate, silicate and carbonate of soda, manganese oxide, refractory oxides, and borax. The granite is disintegrated by the action of hydrochloric and nitric acid fumes in a kiln at a high temperature, and the steatite and slag are similarly treated, the latter being first calcined, ground, and washed to remove sulphur. The disintegrated material is then reduced by grinding, the sand, loam, phosphate and carbonate of lime, caustic potash or borax, and manganese oxide being added; this mixture is afterwards further reduced with the addition of chloride and silicate of soda or potash, either in the dry state or as a solution. Linseed or other oil may also be added. For storing, the mixture is preferably kiln-dried before the addition of the chloride and silicate of soda, caustic potash, phosphate and carbonate of lime, borax, and manganese oxide, these being added immediately before use. The Provisional Specification mentions the use of felspar, argillaceous marl, carbonate and sulphate of barium, and cement.

6017. Burbridge, J. April 8.

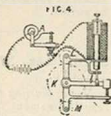
Hot-water bottles.

—The filler and valve C of rubber water bottles are placed outside of, and attached to, the handle B. An air-escape valve D may be provided in any suitable position, and also a loop E for tilting &c.



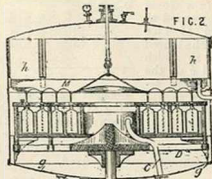
6027. Hamilton, W. J. L. April 8.

Thermostats.—Consist in a regulating or controlling apparatus, in which the small force furnished by a sensitive agent is employed to liberate a force of greater magnitude for effecting the regulating operations. The source of power may be a fluid under pressure, or an electric current; and as examples of the sensitive agent may be mentioned centrifugal governors, electric apparatus, thermometers or floats. Among the principal applications the regulation of the temperature of bearings is described. The bearing is furnished with a jacket, having a cock for admitting cold water, and a tap for admitting lubricant, both controlled by a device sensitive to heat operating through an electric relay or solenoid apparatus. The controlling device, in the



example illustrated, is a metal strip thermometer A, which by its movements makes the necessary electrical contacts. The solenoid operates a toothed wheel K by an arm I, and thus the two cocks at L and M.

6280. Gronwald, J. F. H., and Oehlmann, E. H. C. April 12.

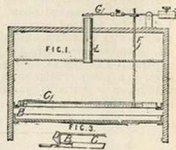


Heating liquids.—Relates to apparatus for heating milk for preserving purposes. The milk is heated by and in the presence of steam in a covered jacketed pan, bottles into which it is to be filled being placed on a table D in the lower part of a receptacle provided with an upper part h, which can be raised or lowered as required. Steam is admitted by the pipe C, and the hot milk is run off from the pan into a reservoir M and thence into the bottles.

6292. Durnford, J. April 12.

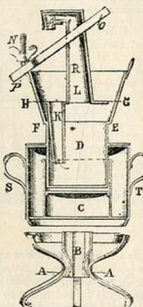
Thermostats.—

The arrangement, specially designed to regulate automatically the temperature in incubators, is also applicable to conservatories, bed-rooms, and other confined spaces where heated air is required to be excluded and cold air admitted, or *vice versa*. The expansion of a zinc tongue B, shown on a larger scale in Fig. 3, operates the lever C which is supported upon its fulcrum at D. The movement of the long arm is then transmitted in a convenient manner to produce the required result. As shown in Fig. 1, in connection with an incubator, the movement is transmitted by the vertical rod F to the balanced lever G. Other suitable means may, however, be employed.

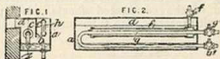


6318. Seathing, R. W. April 13.*Heating liquids.*

—Relates to an apparatus for boiling milk, and consists of a tripod A carrying a spirit lamp B, above which is placed a stand S, T, and a perforated iron plate C to cut off the direct flame of the lamp from the vessel above. The milk is placed in a vessel D having a widening top part, and flanges F, E on which the cover H, G is caused to fit tightly by means of the cross-bar O, P held down by a staple at one side and a thumb-screw N at the other. The lid is provided with two tubes, one K projecting downwards, and the other L projecting upwards, the latter being doubly bent at the top as shown. When in use



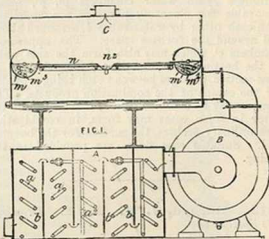
the milk is raised to boiling point, and then boiled for twenty minutes, during which time the froth &c. passes up the tube L and falls down through K again into the vessel D, thereby causing a circulation of the liquid.

6698. Howorth, J. B., and Howorth, F. C. April 20.

Heating air for ventilation. A casing *a*, partially covered and divided by a partition *b*, is provided with inlets *d* and fixed against the wall of the building, room, &c. to be ventilated. The compartment *c* is fitted with a steam pipe *g*, which is surrounded by a finely-perforated water pipe *f* to produce spray for moistening the air. The compartment *e*, which is open at the top, is fitted with a heating-pipe or coil *h*. In a modification, the moistening-chamber is fitted with a perforated pipe having two inlet pipes for steam and water, respectively. The pipes *f* and *g* may be arranged inside rooms over a suitable trough.

6699. Howorth, J. B., and Howorth, F. C. April 20.

Heating air for ventilation. Air for ventilation is moistened and heated or cooled in separate chambers, the moistening-apparatus C being placed at a higher level than the heating-apparatus A, and the air is drawn through the latter and forced through the former by a specially-constructed fan B. By this arrangement the apparatus continues to work slowly when the fan is stopped, by which means mills &c. may be kept warm and moist at night. The heating-apparatus consists of a casing fitted with partitions *b* to form a zig-zag channel, in which are arranged steam or hot-water coils *a* connected by unions *a* and vertical pipes *a'*. The heating-apparatus may be dispensed with, the air being heated during its passage through the jacketed fan.

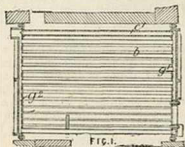
**7141. Grundy, J.** April 29. *Drawings to Specification.*

Heating air.—Air is passed over and along the exterior of heating-surfaces consisting of a series of pipes or flues. Two tiers of horizontal pipes may be employed, while conduits passing up between the pipes may be fed with cold air, which is thus warmed and may be subsequently mixed with the hot air passing through the pipes. Special arrangements of the flues &c. are illustrated in the Specification.

7241. Wilson, J. May 1. *Drawings to Specification.*

Heating buildings &c.—Relates to constructions, in corrugated or other sheet metal, of buildings, walls, warehouses, sheds, fortifications, batteries, theatres, partitions, balconies, doors, ceilings, floors, columns, and other structures. Two or more corrugated sheets are arranged with the ridges touching one another, or opposite to one another, so as to form a series of tubular spaces, and these spaces may be used for cooling by liquid or air, heating by liquid, steam, or air, ventilating, &c. Instead of the corrugated sheets, plain parallel sheets with intermediate tubes may be used.

7254. Harrison, T. W. May 1.



Heating water.—Relates to tubular boilers for heating and circulating water through the pipes of warming apparatus in greenhouses and other buildings. End water chambers g^1, g^2 , easily removable for cleansing purposes, are connected with each other by water-tubes b , arranged above and around the furnace space. The uppermost chambers c^1 , which may also form the side walls of the heating-space, are of a flattened form in cross-section, passages between each being provided for the escape of the combustion products. The furnace may be enclosed by water-tubes, while the latter in some cases may form, in combination with ordinary firebars, the surface for the burning fuel. Suitable soot doors are provided in the setting.

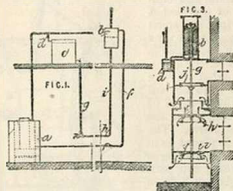
7313. Oldroyd, J. W. May 2. *Drawings to Specification.*

Heating buildings.—Consists in casting or otherwise manufacturing pipes with transverse, longitudinal, or helical corrugations, to increase the strength or surface.

7316. Pass, E. de, [Korting Bros.]. May 2.

Heating buildings; thermostats.—Low-pressure steam is admitted from the boiler a , Fig. 1, to steam-heated "stoves" c through taps d which

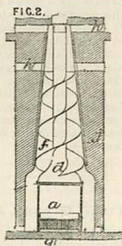
control the pressure. The "stoves" c are connected by pipes g, i to a cistern b containing water, which fills them to a height depending on the pressure therein. The overflow f from the cistern



leads to the boiler. For regulating the pressure in the boiler steam is admitted from it to a chamber d , Fig. 3, from which, when the pressure is excessive, mercury is forced into a second chamber b containing a float connected to the damper which controls the air supply. In the form shown, air is admitted to the asphalt through a double-beat valve h, i . After this valve has shut off the air supply, the spindle g can move further and open a second valve j to admit air to the flue in order to cool it and lessen the draught. A blow-off pipe may be arranged on the boiler, and a connection made to a second chamber communicating with the float, so that the water is introduced to hold the damper closed in case water has blown off.

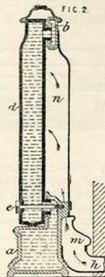
7515. Lelièvre, S. May 4.

Heating buildings; heating air.—Relates to arrangements for heating apartments by passing air for distribution through a chamber j surrounding the hot-air stove a and flue d . Air is admitted by the pipe g and supplied to the various apartments by apertures h . The air admitted to the apartments serves at the same time to produce a draught for the fireplace, so that by this system a constant renewal of interior air is obtained. The heating-chamber f may be of any form, and may be provided with baffles or helical partitions.



7684. Cannon, W. G. May 8.

Heating buildings; heating air.—Relates to improvements in the heating-coils or radiators described in Specification No. 8395, A.D. 1884, and to their adaptation to ventilating purposes. The water or steam chambers *d* are formed with closed ends, their connections to the upper and lower water boxes *b, a* respectively being made by lateral necks with or without packing. For securing the lower ends bolts *e* are employed, suitable means being applied for the same purpose to the upper ends of the chambers. In a modification, two rows of chambers are employed, each row being arranged on opposite sides of the upward extension from the lower box. In each case convenient plugs, taps, vents, and the like are provided. For ventilation, air is passed in from the outside by the passage *h* and chamber *m* to the casing *n*, which is formed upon the heating-chambers *d*, the air being allowed to escape to the apartment through the spaces between the chambers. In some cases the arrangements may be combined with the apparatus described in Specification No. 7131, A.D. 1885, by the addition of the boiler as therein described.

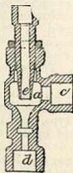


7986. Marston, W. H. May 14. *Drawings to Specification.*

Hand-warmers.—The handle of an umbrella or walking-stick is made hollow to contain hot water, for use as a hand-warmer.

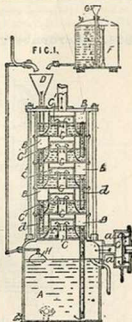
8329. Bradford, T. May 20.

Heating water by steam jets. Cold water entering the vessel *a* by the aperture *c* meets a steam jet issuing from the nozzle *e*, and escapes in a heated condition by the outlet *d*. The apparatus, although particularly designed for use in public baths and steam laundries, may be employed in other places where steam is available.



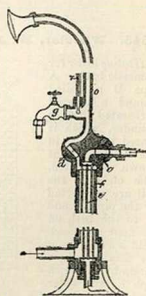
8271. Chevalet, L. A. May 18.

Heating water.—Apparatus for heating, by means of live or exhaust steam, water for feeding steam boilers and for other purposes, consists of a series of superimposed annular water chambers *B*, to the upper of which water, with or without a chemical, is supplied, such water overflowing by downtubes *d* to the chamber immediately beneath and so on until the tank *A* is reached. During this descent steam, from which oil, grease, &c. has been removed by the baffle-plate *a*, ascends the central passages *c* and traverses the water in each chamber, the steam being compelled to travel in such a course by caps *c'*. The heated and purified water is removed from the tank *A* by a suitable orifice above the sediment there deposited. The float arrangement *H* is employed to control the supply to the funnel *D*. In a modification, the apparatus is arranged horizontally, the respective portions being correspondingly and suitably varied.



8380. Schaffstaedt, H. May 20.

Heating water for shower baths. The water passes up a pipe *f*, down the centre of which steam is passed through a pipe *e*, and thence by a cock *d* to the arm and rose *o*. The steam supply is regulated by a cock *c* and the steam passes off at the bottom of the apparatus. A thermometer and drawing-cock *g* are fixed to *o*.



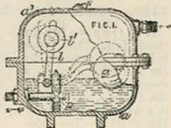
8455. Grundy, J. May 21.



Heating air.—Air for warming buildings is heated in underground chambers traversed by flues *h* leading from a stove as shown. To deflect the heated air the baffle *L* is employed, and lateral air shafts return the air from the building to the heating-chambers.

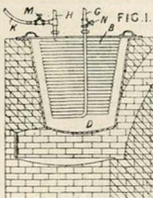
8561. Conlong, J. May 23.

Steam traps.—The steam and water chamber is formed of two halves *a, a'* suitably secured to each other. The water-escape valve, fitted within the casing *p*, is of the double-beat type, and is actuated by the flotation of the counterbalanced ball *g*, or a tile substituted therefor. The counterbalancing arm *l* with weight *l'* is arranged in such a way as to effect instantaneous movements of the discharge valve. An air relief valve *f* is also fitted in the crown of the steam and water chamber.



8645. Wheeler, W. J. May 24.

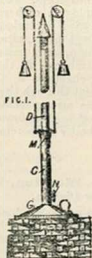
Heating water for domestic baths. A pipe *B* is coiled around a tapered perforated hollow cylinder, which is placed in water in the copper *D*, as shown, and heated. The ends of the coil are connected by the pipes *G* and *H* to the bath on the floor overhead. Cold water from the service pipe enters by a branch pipe *K*, and after passing through the coil rises to the bath. When the bath is sufficiently full the cock *M* is closed, and if the water is not hot enough it is allowed to circulate until it is,



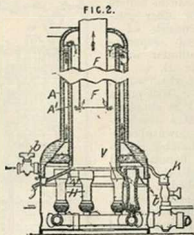
when the cock *N* is closed. The bath is discharged by disconnecting the pipe *K* and leading it to a sink.

8767. Le Fevre, C. May 27.

Boiling pans.—Relates to a steam vent for low-pressure boilers, coppers, and the like. A pipe *C* is attached to the movable lid *G*, so as to form a steam vent; it slides over or inside a tube *D* which communicates with the outer air. The lid and pipe *D* are counterbalanced. A joint is made at *M* and a damper is placed at *N*. The flange of the tube *D* may be extended to form the lid *G*. In a modification, the tube *C* is bent at right-angles and the lid slides horizontally.



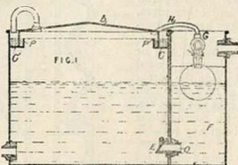
8864. Werdenberg, E. May 28.



Heating water for baths &c. Two or more concentric tubes *A, A'* in communication above and below, are arranged above a series of atmospheric burners *H* in such a manner that the combustion products, impinging upon the conical surface of the external water annulus, ascend the space between the water casings, and after descending the inner space reach the internal flue *F*, as indicated by the arrows. Water entering by the lower cock *b* is drawn off at the upper end. Drip pipes *V, z* and

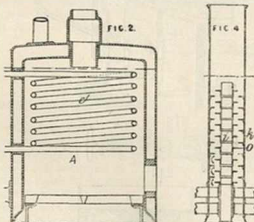
the gutter *t* are employed for removing the water of condensation. A jet, issuing from the pipe *K*, is used for igniting purposes. Air holes are provided in the lower portion of the gas-burning chamber.

8909. Crompton, J. May 29.



Heating water.—Relates to apparatus for supplying water to boilers for baths &c. The hot-water cistern, which is connected with the boiler by flow and return pipes, is provided with an inverted dished cover *B* resting in an annular water lute *C* the inner side *P* of which terminates at a lower level than the outer side, so that overflow water will fall back into the cistern. Cold water is supplied by a ball-cock *G* to a second cistern *F* connected with the first by a pipe *O* provided with a valve *E*. The lute *C* is supplied with water by a pipe *H* from the ball-cock *G*.

9567. Jones, W., [trading as Jones & Attwood]. June 8

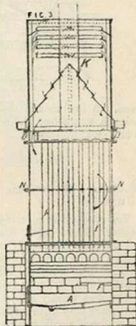


Heating buildings; heating water; heating air.—In churches, public halls, and the like, a combination of high and low pressure systems of hot-water pipes is provided, of which the low-pressure system is employed to heat the lower stratum of air, and the high-pressure system to heat the upper

or higher stratum of air. The upper series of heating-pipes are conveniently carried by cornices, the pipes in some cases traversing the roof ventilators. By this means cold down-draughts are prevented. The compound high and low pressure boiler, Fig. 2, is conveniently constructed by locating within the firebox *A* of an ordinary vertical low-pressure circulating boiler the independent water coil *c*. In connection with or independently of the above systems, the internal ventilating removable trunk *t*, Fig. 4, may be employed. For heating the incoming air the close-ended vertical water pipe *i* is provided, to the surface of which baffles *o* are secured, similar baffles in some cases being fitted to the interior of the air pipe.

9788. Sinclair, D. S., [Lyndall, J. E.]. June 14.

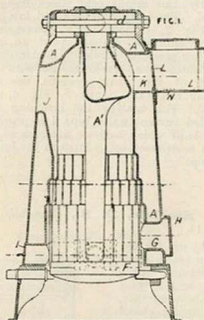
Heating air for use in drying tea or similar substances. The tea &c. is dried in trays *K*, one above another, in a chamber supplied with heated air from a furnace below. The fire-gases pass from the firebox *A* through flues *F* into side chambers, where they are mixed together, and pass thence through the tubes *I* to the chimney, the air for drying purposes taking the direction indicated by the arrows over the tubes *I*, through apertures near one end of the baffle-plate *N*, and through a passage on one side of the smoke-box *D* to the drying-chamber. The ends of the tube *I* are protected by a setting of firebrick. Suitable dampers and cleaning-doors are provided.



9898. Keith, J. June 17.

Heating water.—Relates to a boiler composed of two semi-cylindrical hollow sections *A* and a central bifurcated tubular section *A'*. The parts are connected together by flanged and beaded joints, and are drawn together by bolts *d*. The annular part may be ribbed and stepped inside to allow fuel to fall regularly &c. Flow and return pipes with cleaning-doors are provided, and also a feeding-door *J*, cleaning-doors *I*, grate *F*, &c. A swinging damper *L* in the flue allows air to be drawn through the opening *N* to control the draught. In a modification, the tube *A'* is replaced

by an extension of the water casing A, or the tube A' can be adapted to an annular boiler cast in one

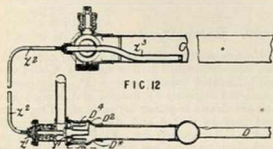


piece. A firebrick G is secured in an orifice in the casing A by a cover H, and a second brick is attached to the cleaning-door I.

10,022. Norman, T., and Coates, E. June 19.

Non-conducting coverings and compositions.—Scrap leather, mixed with washed and bleached stalks and roots of rushes, is converted into a pulp, and treated with animal size and a small quantity of alum. The composition is then passed into a "stuff-chest," whence it is taken and moulded into sheets, and finally subjected to hydraulic pressure. The pulp may also be laid upon a fabric and used for washers, roofing, covering steam pipes, &c.

10,359. Maxim, H. S. June 25.

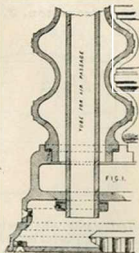


Thermostats for controlling the fuel valve of liquid-fuel fittings for steam-generator furnaces. The thermostat is situated in the steam drum C,

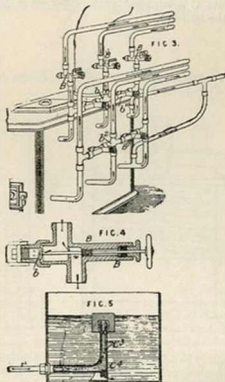
and consists of a closed tube Z' containing a suitable liquid and communicating by a pipe Z² with a diaphragm chamber Z¹.

10,445. Richardson, W. June 27.

Heating buildings; heating air.—Radiator pipes, bottoms, and tops, and other pipes, &c. for heating purposes are corrugated. When two or more pipes are placed side by side the corrugations are arranged to fit into one another, and the corrugations may be of any suitable form for this purpose. The ends of the radiator may be drawn together, so as to make a tight joint with the tubes, by means of bolts or tubes screwed at the ends and carrying nuts. In the latter case these tubes act as a warm-air inlet.



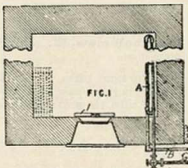
10,457. Ritchie, R. M. June 27.



Heating buildings; heating water.—Relates to the high-pressure or "Perkins" system in which two

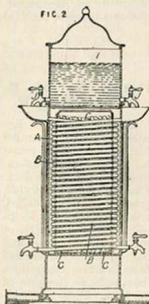
or more coils of close pipe are ranged in the heating-furnace. The invention consists in the arrangements and fittings whereby the circulating-coils may be joined up in series, in parallel, or left independently of each other. In addition, a safety-valve is also described. Fig. 3 shows a perspective view of the junctions of a three-coil system with a furnace of a usual construction, the direction of the water currents being shown by arrows. The coils are coupled up to each other by pipes b^1, b^2, b^3 , in which are placed the double-faced valves, Fig. 4, with their corresponding seatings and casings B, by means of which the paths of the circulating currents are determined. The safety-valve arrangement is shown in Fig. 5. As the contents of the heating-coils expand the weighted valve c^1 permits of the discharge of a portion, the contrary, with the aid of the valve c^2 and without the admission of air, taking place on a cooling of the contents.

steam. The steam and hot water may be used for any purpose.



10,506. Neale, M. T. June 28.

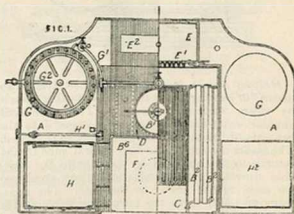
Heating liquids.—Relates to apparatus for cooling or warming beer or other liquids. The liquids are passed through a coil B in a felt-covered cylinder A, the ice or other cooling-medium being contained in a cage C. The cistern I contains either water for cleansing purposes, or a drink which may be drawn off directly by the cocks J. For warming or mulling liquids, the cooling-medium is replaced by water heated by a spirit lamp or a gas jet.



10,959. Thoms, W. A. July 8.

Heating-apparatus; heating water.—Relates to arrangements for equalizing the temperature of baking-ovens and other heating-chambers. Coils of pipes are arranged in the parts of the oven which are liable to become excessively heated, and through these pipes water is passed when required to carry away the excess of heat. The Figure shows a baker's oven in one side of which is arranged a coil of pipes A connected by pipes B, C with cold and hot water tanks. By allowing a very small quantity of water to pass through the coil, steam may be generated and employed for filling the oven when bread of a certain class is being baked. In this case a sliding door I is fitted within the ordinary oven door for retaining the

10,971. Cook, H. T. July 8.



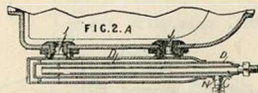
Heating water; boiling-pans.—Relates to cooking-apparatus. The Figure shows a half-sectional plan of the apparatus. A marine boiler is mounted upon a bed-plate A, which carries also various cooking and like vessels. C is the internal furnace, and B^1 the return tubes. A casing D surrounds the boiler, which is fitted with a steam dome B^1 , a safety-valve, pressure and water gauges, &c., and also with movable firebars mounted so as to allow for expansion. An iron chimney into which a blast pipe opens increases the draught, and additional flues with a flap damper are also provided for this purpose. The front of the furnace case D is removable, and the furnace door is placed therein. The cooking-arrangements are as follows:—The products of combustion pass when desired through a hit-and-miss valve E^1 into a chamber E, at the top of which is an opening E^2 through which articles are introduced for toasting or grilling. H are steam chests with steam-tight doors and drain pipes H^1 leading to a hot-well. F is an oven which is heated by the products of combustion passing through the flues B^2 after their return through the tubes B^1 and firebox. G, G are steam kettles with outer metal casing and inner lining which are heated by steam pipes G^2 ; the overflow water and condensed steam are led to the hot-well. Steam is supplied to the kettles and steam chests by pipes H^1, G^1 leading from the dome B^1 . The water in

the hot-well is returned to the boiler by a steam pump or injector.

10,978. Bartholomew, W. July 8. *Drawings to Specification.*

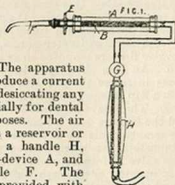
Heating water for spray baths. The heated gases from a number of burners pass up a tube, around which, in another tube, the water passes on its way to the bath.

11,193. Reilly, J. July 11.



Heating water; heating buildings.—Relates to means for heating water in baths and other vessels by steam surface apparatus. The cylindrical annular water-heater opens by passages J to the contents of the bath A, or other vessel to be heated. The steam is admitted to the central pipe C, and returns to the outlet N by the annulus D. Suitable sleeves, ferrules, and packing are employed for securing the heater to the bath. The apparatus may also serve the purpose of warming the bathroom.

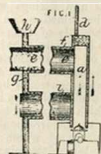
11,200. Rowney, T. July 12.



Heating air.—The apparatus is intended to produce a current of heated air for desiccating any object, and especially for dental and surgical purposes. The air is conveyed from a reservoir or bellows through a handle H, valve G, heating-device A, and adjustable nozzle F. The handle may be provided with air spaces and other non-conductors of heat; the valve G is placed so as to be readily operated by finger and thumb. The heating-chamber A contains a mass of material B, which has previously been heated; this material may consist of compressed carbon and iron wire or other suitable substance which will retain heat. The nozzle F is fitted with a shield E. In a modification, the handle is placed between the nozzle and heating-device.

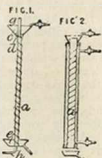
11,232. Phillips, J. O. C. July 12.

Heating water for heating buildings. Relates to arrangements for heating churches, houses, schools, greenhouses, and other places. In the system shown the internal flame chamber *a* is surrounded by a water-jacket, from which extend the horizontal circulating annular water tubes *f*, *i*, reuniting in the end-chamber *g*. The pipe *d* is provided for the escape of steam, and the funnel *h* for filling the apparatus with water. The combustion products from the gas or oil burner pass away through the upper tube *e*. In place of the heating-chamber *a*, a hinged Bunsen or equivalent burner may be fitted to the mouth of the lower tube. Or coal or other fuel may be used. In a modification, the horizontal tubes are increased in number, arrangements being provided by means of which the combustion products traverse each tube in succession.



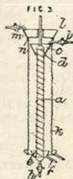
11,350. Garton, R. C., Garton, C. H., and Lawrence, W. July 15.

Heating liquids.—Relates to tubular apparatus for facilitating the transfer of heat for evaporating, heating, and cooling. The tubes are fluted, grooved, or channelled, either spirally, longitudinally, or laterally, or are spirally twisted, and the liquid to be treated flows in a film either down the inside or outside of the tube, while the heating-agent passes along the other side of the tube. The tubes may be arranged singly or in sets. Fig. 1 shows a tube *a* arranged so that the liquid to be treated is supplied to the trough *c*, and flows through an annular groove *d* down the outside of tube, and the concentrated liquid is collected in the trough *e*. The heating-agent is collected to the interior of the tube *a* through the pipe *g*, and any condensed water &c. is run off through the pipe *h*. Fig. 2 shows a jacketed tube, down the interior of which the liquid flows, while the heating-agent passes into the jacket and around the tube. The tube *a* in Fig. 1 may be surrounded by another tube, down the outside of which the liquid flows, and is evaporated by the vapours given off from the liquid flowing down the inner tube.



11,351. Garton, R. C., Garton, C. H., and Lawrence, W. July 15.

Heating liquids.—Relates to the crystallization of solutions of salts (whether acid, alkaline, or neutral), or of crystallizable acids, and consists in causing the somewhat concentrated solutions to flow in thin films down the inside or outside of vertical or nearly-vertical tubes which are fluted, grooved, or channelled, either spirally, longitudinally, or laterally, or are spirally twisted, steam or other medium for heating the solutions being on the reverse side of such tubes. The solutions are afterwards received in a vessel in which they are allowed to rest, whereby crystals rapidly form. Steam or other heating-agent is passed through the twisted tube *a*, while the solution is passed through *b* to the feed-trough *c*, and thence through the annular opening *d* to the outside of the tube, down which it flows to the receiving-vessel *e*, from which the mother liquor may be removed through *f*. A second feed-pipe *m*, trough *h*, annular space *n*, and tube *k* are provided for utilizing the heat of the vapour given off from the first tube. This outer tube is, however, not always employed. The solution may pass down the tube on the inside instead of the outside, in which case the latter is provided with a steam jacket. Several of these apparatuses may be used in a set.



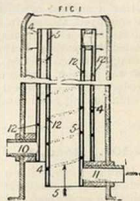
grooved or channelled, and the liquid under treatment may flow down the inside or outside surfaces of the tubes. Fig. 1 shows a section of a still with the tubes *a* arranged for the liquid to flow down their inside surface. The steam for heating is supplied by the pipe *g*. The liquid enters by the pipe *b*, and passes through the feed slits *k* at the top of the tube, and the concentrated liquid flows away by the pipe *f*. Fig. 7 shows a few tubes *a* arranged so that the liquid which is supplied to the trough *c* flows through annular openings *d* down the outside of the steam-heated tubes. Fig. 11 shows a sheaf of tubes partly twisted so as to obtain a spiral surface down which the liquid flows. The tubes may be used in apparatus for treating acids, alkalies, ammoniacal liquors, dyes, saccharine liquids and syrups, salts, and fresh or salt water.

11,661. Huelser, C. [*Mestern, H.*] July 22.
Drawings to Specification.

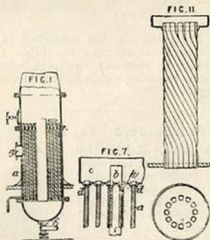
Heating air.—In a thermo-electric battery, the positive electrodes are cooled by enclosing them in a casing to which cold air is admitted by a regulating device. The air, which is, in consequence, heated, may be utilized for any suitable purpose.

11,808. Shanks, J., Burnside, R., and McCorkindale, A. July 25.

Heating water for baths &c. The apparatus, which may be heated by exhaust steam or hot gases, consists of one or more annular thin metal water cylinders 4, 5, over the exterior of which the heating-medium passes. The water enters by the lower aperture 10, and after passing direct or in a helical course through the cylinders, escapes by the opposite opening 11. The helical passages may be formed by wire 12, or by ribs embossed or otherwise formed on the inner or outer shells of each cylinder. In the case where gas is employed, the lower portion of the apparatus is expanded so as to take in the gas-burner ring.



11,352. Garton, R. C., Garton, C. H., and Lawrence, W. July 15.



Heating liquids.—Relates to arrangements of tubular apparatus for facilitating the transfer of heat for distilling, evaporating, concentrating, condensing, and for heating or cooling. The tubes are spirally twisted or spirally or longitudinally

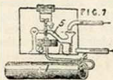
11,883. Trivick, S. July 26. *Drawings to Specification.*

Heating liquids; heating air.—Relates to a wet method of extracting precious metals from their

ores, in connection with which the waste heat of a roasting-furnace is utilized to heat water by means of pipes embedded in sand above the furnace flue, the water being used to heat the leaching-solution employed, by means of pipes in the reservoir for such solution. An air-heating chamber is also mounted over the furnace flue, the air from which is used to dry the precipitates obtained.

12,043. Monier, J. F. L. July 29.

Thermostats for use in gas-carburetted apparatus. The annular space between two thin concentric brass tubes 1 is connected by a tube 2 to a bellows 3, which consists of thin ribbed metal similar to an aneroid barometer. The whole system is filled with alcohol, and is placed in the carburetted-liquid in proximity to a lever 5 which is operated by its expansion or contraction to close or open the end of the steam inlet tube. A screw 8 acts to regulate the movement.

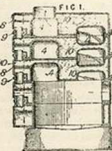


12,102. Lake, H. H., [Robinson, H. S.]. July 30. *Drawings to Specification.*

Heating air.—The waste heat derived from the exhaust steam in condensing-engines is employed. The method is to pass a current of air through a heater of suitable construction in contact with the condensing or circulating water leaving the engine. Either a surface or direct-contact apparatus may be employed, the air in the latter case becoming moistened. The air may be afterwards further heated by passing between a number of pipes through which a portion of the exhaust flows on its way to the condenser. The current of air produced by the flywheel and belt may be utilized, a suitable casing and conduit being provided.

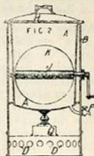
12,105. Bond, J. July 30.

Heating water.—The sections of a sectional boiler are so formed and built together as to form a spiral flue 4 surrounded by the waterway 10. The products of combustion pass as shown by arrows. A side extension on each section is formed with an inclined partition 8, and is connected to the next extension by screwed nipples 9 &c., thus giving a spiral path for the water. The lower sections which surround the firepot are similarly formed and connected. The boiler has inlet openings at the lower part and outlet openings at the top.



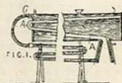
12,276. Brown, M. Aug. 2.

Boiling-pans.—Relates to washing-coppers. The copper A is supported in a cylindrical casing B perforated at the bottom D as shown, and is heated by a lamp Q. Beaters K are mounted on a spindle J operated by a handle for washing the clothes. A lid H and draw-off cock P are provided.



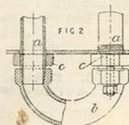
12,333. Kerry, E. Aug. 3.

Heating buildings; heating water.—Relates to hot-water apparatus for heating greenhouses and other buildings. The products of combustion from a gas or oil burner, or other source of heat, are led by the funnel-shaped extension and flues A through the boiler. Connection is made between the end of the boiler at C and the funnel A through a circulating system of pipes.



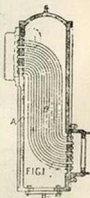
12,491. Edwards, E., [Schmitz, R. von]. Aug. 7.

Heating water.—The tubes a of boilers and heating apparatus have taper spigots projecting through the plate to which they are secured by nuts c. The nuts have lugs by which they are bolted to a bend b provided with taper sockets to fit the tube spigots. The tubes are thus connected in pairs. Another method of securing the tubes to the plate consists in reducing the pipe ends, the reduced parts receiving collars formed in two parts hinged together.



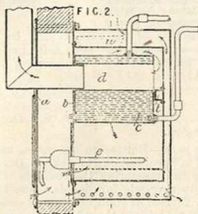
12,512. Kirkaldy, J. Aug. 7.

Heating water.—Relates to apparatus for heating feedwater for steam boilers and for other purposes, and consists in disposing within the cylindrical chamber A the series of parallel tubes B which are secured at their ends to flat tube-plates as shown. The tubes may be held in place by nuts or be secured by expanding. The ends of the cylinders are enclosed by covers, that upon the lower end being taken off for the removal of the



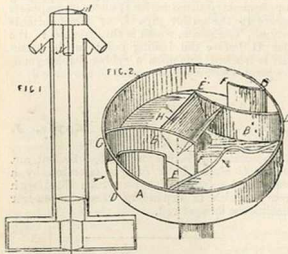
sludge &c. which collects when the water to be heated passes round the tubes. Live or exhaust steam is employed as the heating-medium, the steam circulating within or exteriorly to the tubes. In place of tubes with bends at each end tubes with bends at one end only may be fitted. Suitable hollow covers are employed to enclose the tube ends.

12,655. **Watson, J.** Aug. 10.



Heating water and air.—Relates to apparatus of the kind described in Specification No. 1400, A.D. 1885. A pear-shaped internally-flued boiler *c* is carried within the perforated double casing *a, b*, the latter of which contains the atmospheric or other suitable burner *e* such as that described in Specification No. 12,467, A.D. 1888. To prevent the direct passage of the heated gas to the flue *d*, the baffle *t* is provided. Suitable cleaning-doors &c. are also fitted. Air used for warming purposes is heated during its passage between the casing *a, b*. For moistening the air the water trough *a* may be provided.

12,827. **Rigby, S.** Aug. 14.

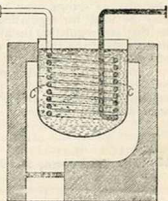


Boiling-pans.—Relates to apparatus for use in washing. In the lower casing are two apertures *C, D*, continuous with which are deflecting-plates *B*

arranged to make the opening *E, F* less than *C, D*. Below the entrance to the vertical tube is a guide-plate *H*. The vertical tube is closed by a cap *I*, and provided with nozzles *J* for distributing the boiling liquid over the clothes.

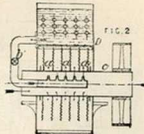
12,885. **Miller, M.** Aug. 15.

Heating air.—The air is passed through a coil *C* immersed in an externally heated bath of oil, tar, or analogous liquid of high vaporizing-point; or lead, tin, zinc, or analogous metal of low specific heat and comparative low liquefying point.



13,212. **Reichling, R.** Aug. 21.

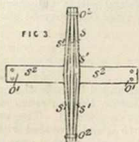
Heating liquids.—Evaporating apparatus, applicable for cooling or heating liquids, has a movable evaporating-body, to the entire surface of which air or gas has constant access. The Figure shows a cross-section of a vapour condenser. The evaporating-body is formed of a series of corrugated discs *a*, mounted vertically, as shown, or horizontally, on a hollow and perforated axle *c*. The condensing-water which is to be cooled passes from the condenser *D* through a pipe *b*, into a tube situated within the axle *c*, and escapes radially through openings so arranged that each jet supplies the space between two adjacent discs. The air or other gas enters the axle from the ends, and escapes through perforations, as shown by the arrows, so as to come in contact with the discs. There is an additional air-opening in the casing of the apparatus. In another form, the condenser is situated beneath the evaporator, and the condensing-water is forced up by any suitable means. In a third form, the evaporating-body consists of an endless travelling band, which may be smooth or provided with ribs or plates.



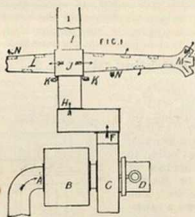
13,761. Wach, J. Aug. 31.

Thermostats.—The T-shaped bars s^1, s^2, s^3, s^4 are secured at the ends o^1, o^2 to a plain bar s between them, and at the ends o^1, o^2 to a pair of bent flat bars, one on each side of the wings s^1, s^2 . The bar s is formed of a metal having a higher coefficient of expansion than the others, so that the effect of heat is to draw in the points o^1, o^1 , to an extent diminished by the expansion of the wings s^1, s^2 . The motion of the ends o^1, o^1 increases the flexure of the sides bars. A number of elements, as shown, may be combined, and they may be used for regulating the temperature in heating and regulating installations, being inserted in the rods of the valves for controlling the supply of heated air.

Steam traps.—A thermostat in a chamber in connection with the steam pipes is coupled to a valve at the bottom thereof, and is adjusted by a screw and hand-wheel.



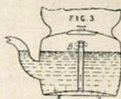
13,872. Parsons, P. Sept. 3.



Heating air.—Relates to apparatus for ventilating and heating or cooling and moistening air in factories. The air is drawn from the outside of the building by a fan C driven by an engine D, through the pipe A and chamber B, where it is heated by steam in the winter and cooled by water in the summer. It passes from the fan through vertical zig-zag passages in a chamber F, H, having water spray jets and steam or air jets for distributing the spray at the bottom of each passage; the air passes thence through the system of pipes I, J, L, and, escaping by the openings M, N, is distributed equally throughout the room. The openings N are provided with baffle-plates; K, K are valves.

13,988. Brown, A. J. P., and Coombe, F. W. Sept. 5.

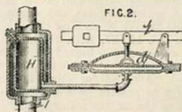
Heating liquids; boiling-pans.—To promote circulation in kettles and other utensils for heating or boiling liquids, one or more vertical tubes B are attached to a perforated false bottom A, which may be fixed or removable. The top of the tube B may be open or provided with a cap and side perforations. Suitable means are used for securing the false bottom A.



14,052. Parish, J. Sept. 6. Drawings to Specification.

Boiling-pans.—Relates to apparatus, such as is described in Specification No. 6821, A.D. 1887, for indicating and measuring the contents of boiling-pans or other vessels for liquids. Small circular windows, formed of transparent eyes encased in a metal cup, are let into the sides of the vessel.

14,289. Powers, W. P. Sept. 10.



Thermostats.—The air supply to furnaces of hot-water boilers is automatically regulated by putting the water in the main boiler under a pressure greater than that of the atmosphere, and supplying a supplementary steam boiler H under atmospheric pressure in the outlet pipe I, or other suitable position. The steam, which is thus formed in the boiler H before the boiling point in the main boiler is reached, acts upon a rubber diaphragm d, and operates a damper connected to the lever J.

14,324. Ellis, J. W., and Mayes, J. Sept. 11. Drawings to Specification.

Thermostats for incubators heated by hot air. The flue is closed by a damper operated by a thermostat consisting of a bent tube filled with mercury, which in expanding raises a plunger operating the damper rod.

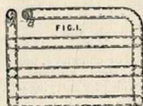
14,649. Lake, W. R., [Lee, C. T.]. Sept. 17. Drawings to Specification.

Non-conducting coverings.—Comminuted mica is used as a covering for steam pipes &c. The mica

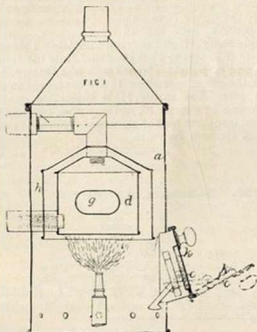
is used in the form of flakes or scales without admixture of other substances, and is contained in a suitable casing.

14,693. Ely, L. D. Sept. 18.

Heating water for baths &c. A coil of pipe connected at A and B to the hot and cold water cisterns is inserted into an existing stove or fireplace, or itself forms the fireplace.



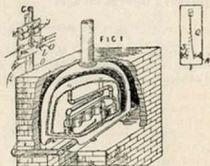
14,807. Spencer, J. T. Sept. 19.



Heating water.—The boiler *d*, shown as of the circulating type, is surrounded by the close-topped casing *h* in order that, by enveloping the boiler in a heated jacket, the consumption of fuel may be reduced to a minimum. A suitable outer casing *a* surrounds the whole. To increase the heating-surface, the transverse smoke-tube *g* is provided in the water space. In combination with the door *c*, a reflector *k* may be fitted, whereby on opening the door the heating-jet may be inspected.

Boiling-pans.—A similar arrangement of jacket casing may be applied to an open boiler or copper.

15,042 Imray, O., [Ware, E. R.]. Sept. 24.

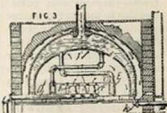


Thermostats for controlling the gaseous fuel supply to furnaces. The supply of gas is controlled by a plug-cock operated electrically by means of a thermostat of any usual construction, such as a flexible tongue composed of platinum and rubber. The plug of the cock is turned by an armature *H* supported between certain electromagnetic coils *J, K* mounted on a base-plate secured to the supply pipe *C, D*. Conducting-wires pass from the flexible tongue *Q* and a pair of terminals *R, S*, between which it vibrates, to terminals *k, l* on the plate supporting the coils, and to a battery; from the latter also a wire passes to the supply pipe. The shank of the plug-cock carries a switch *P*, and the coils are so connected up with the switch and the terminals that the plug is turned in one direction or the other by the armature according as the flexible tongue is in contact with one or other of the terminals between which it vibrates.

15,043. Imray, O., [Ware, E. R.]. Sept. 24.

Heating water.—

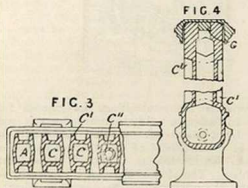
Relates to a gas-heated boiler in the form of a dome furnished with an internal domical combustion chamber. The boiler is set so as to be surrounded by a domical heating-chamber



from which the outlet *k* for the combustion products is lower than the seat of ignition. The burners are surrounded by water spaces *E, F*, suitably connected with the boiler by pipes *c* whereby an efficient circulation is maintained. The gaseous fuel is introduced by the pipe *D*, which at its inner end has a series of small branches leading to the several burners. These each consist of two plates, the upper corrugated and having a number of slits through which the gas draws along with it air entering by perforations in the bottom of the chamber. The several burners and the whole group are surrounded by water spaces *E, F* connected with

the boiler by pipes *c'*. The combustion products pass away by a flue *k* situated at a low enough point to prevent a through draught.

15,237. Boulton, A. J., [*Mignot-Delstanche, Representative of Compagnie Générale de Chauffage et Ventilation Société Anonyme*]. Sept. 27.



Heating buildings.—Radiators for heating are cast in a single piece with the aid of tubular perforated core-bars *c'*. The tubes *c* of the radiator are winged at *c'*. Openings *G*, which can be closed by plugs, are made in the top, bottom, or sides for the withdrawal of the cores and core-bars, or the core-bars may be left in as strengtheners. An outlet at the bottom and an air escape are provided. When hot water is used it is directed to the top of the radiator through the first pipe *A*; when steam is used it is admitted through pipes of small diameter, so as to expand largely when it gets into the radiator.

15,639. English, W. P. Oct. 5.

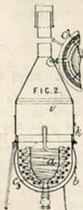
Heating liquids and gases.

—Relates to means for warming rooms and buildings by water, liquids, or gases, heated by gas burners or other sources of light. As shown, each gas burner is provided with a hollow water carrying shade *B*, which is connected up by suitable circulating-pipes to the hollow rings *C*, *F*, and the tubular water-stand *H* in the room above. In place of water, steam or air may be employed. Various modifications of the arrangement may be made to adapt it to existing circumstances. If desired, hot water may be supplied by the apparatus for various purposes.



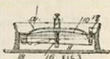
15,689. Noblett, L. Oct. 7.

Boiling-pans for the manufacture of sweetmeats are constructed so as to withstand a steam pressure of at least 80 lbs. per square inch to obtain the necessary degree of heat. The pan or boiler *a* is heated by means of a steam jacket *b* or a removable steam coil *c*, or both may be employed. A hood or chimney *i*, provided with sight windows *k*, is provided for carrying off the fumes.

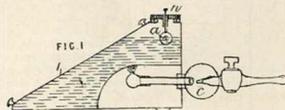


15,800. Cortland, H. Oct. 8.

Thermostats.—A hard rubber dished diaphragm 10 by expansion under heat becomes more concave and allows the spring 11 to come into contact with the adjustable screw 17, and thereby complete an electric circuit. The spring 11 is insulated from the casing *a*, 18, and is connected to one pole of a battery &c., while the casing and screw 17 are connected to the other pole. The spring 11 is adjustable on the diaphragm by a screw 16, and may work frictionally over an insulated part of the screw 17, so as to make contact above or below it.



15,880. Robinson, B. Oct. 9.

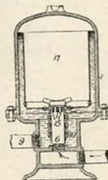


Footwarmers for use in offices &c. Consists of a metallic vessel, with a sloping face *I*, containing water, the height of which is indicated by a float *a*, *n*. The water is heated by gas jets, the supply for which may be obtained through a flexible tube attached to a cock *c*.

16,204. Thoens, B. Oct. 15.

Steam traps.—The casing 1 contains the float 17, to which is attached the internally-grooved sleeve 10 which slides on the tube 6. Openings 15 are cut in the top of the tube 6 for the exit of water, which takes place when the float 17 is caused to sink by the overflow of water into it. The inlet

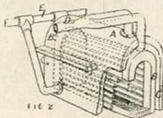
is shown at 9. The sleeve 10 fits the tube 6 loosely so that water can leak off.



16,333. Le Poidevin, F. Oct. 16.

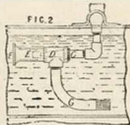
Heating water ; heating buildings.—

Relates to the boilers of water-circulation apparatus used for heating conservatories, halls, and other buildings or compartments. An inner sectional boiler, formed of end headers B, B' and water-tubes, is enclosed by the saddle boiler A, the flue space c being formed between them. The boilers externally open into the common outflow pipe D, while branches of the return pipe E separately return the water to each boiler. Combustion products from the fuel within the inner boiler pass out from the flue c, travel to the front, as indicated by the arrows, and return to the uptake over the external surface of the boiler.

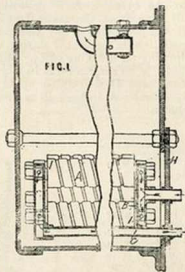


16,450. Cutler, S. Oct. 18.

Heating liquids.—Relates to apparatus for heating and circulating water or other liquids in tanks, stills, the cups of gas holders, or purifier lutes. Steam is supplied by the pipe C to induction apparatus suspended in the liquid to be heated and circulated. As the steam escapes from the nozzles D, E, F, the liquid at the lower portion of the vessel is drawn up through the pipe G and discharged at a higher level. When the apparatus is used for heating liquids in tanks or other similar vessels, it may be found advantageous to substitute a close-ended laterally-perforated extremity for the bell-mouthed or flattened nozzle illustrated.



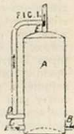
16,452. Hocking, F. Oct. 18.



Heating liquids.—Relates to improvements in or connected with surface apparatus for heating or evaporating, cooling, and condensing. In one arrangement of a water heater or boiler, the heating-surfaces consist of a plurality of helical tubes or chambers A. Steam, if used as the heating-medium, is passed into end chambers B in communication with the annular tubes, and returned from the other end chambers by the pipe c. To secure the heating-tubes in position, cap-nuts are screwed over nipples I which traverse the end chambers, the whole being removed, when necessary, through an aperture closed by the plate H. The tubes may also be of other shapes and formed with variously-partitioned courses. In a modification, the heating-chambers are vertically arranged within a similar vessel, one set of chambers being formed of helically-partitioned annular tubes and the other set of plain coiled tubes. The end chambers for the reception of the steam, both before and after its passage through the tubes, consist of external rings, suitably secured to the shell and penetrated by nipples such as I. In another modification, an end distributing-chamber is provided for each nipple, the sets of chambers being in communication with each other by peripheral passages.

16,640. Horrocks, J. Oct. 22.

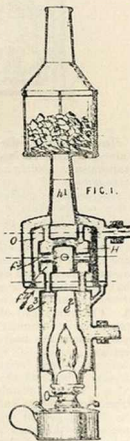
Heating water.—Relates to "kitchen range and other" boilers for heating water" and cylinders used in connection therewith. In order to prevent noises when drawing water, the supply is taken direct from the boiler instead of from the feeding-tank or cylinder. For this purpose the draw-off



pipe E is connected directly to the pipe D, which is in communication with the boiler. The cold supply to the cylinder A is shown at B, and the supply pipe from the latter to the boiler is shown at C. In addition, by this arrangement, water circulation is facilitated during the periods that no drawing-off is taking place. Among other modifications is an arrangement in which the hot-water return pipe D is coupled up to the upper end of the cylinder A instead of to the discharge pipe, as shown.

16,741. Hoyes, G. Oct. 23.

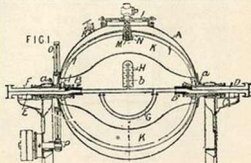
Heating water for use in warming plant-growing frames, conservatories, halls, rooms, and the like. The chamber *e*¹, containing a suitable heating medium, is surrounded by the lower water-jacket *e*² to which the upper water-chambers *f*², H are suitably connected. The combustion products pass through radial flues *f*² to the annular space O, and mix with air supplied thereto, finally emerging by the uptake *h*¹. When desired, the combustion products may escape to the apartment in which the boiler is situated, after having been purified by traversing, along with air, a mass of filtering-material, such as charcoal.



16,863. Hobson, A. H. Oct. 25.

Heating apparatus.—Relates to apparatus for use in extracting the soluble constituents of bones, hides, roots, &c., and generally for treating materials by steam and heat &c. The apparatus consists in a vessel A mounted by means of hollow trunnions a upon a stationary tube B, and slowly rotated by gearing O, P. The tube B is provided with two entrance pipes D, C for steam. The former D is connected with meridional heating-pipes I arranged along agitating-paddles K and opening into the discharge pipe F. The latter C supplies a perforated pipe G bent down into the lower part of the vessel for supplying steam to the material to be treated, and for acting as an agitator. The pipe E leading to a stop-cock is

provided with a hood containing baffle-plates to prevent particles of material from being carried away on blowing-off steam. The manhole door L is fitted with a draw-off cock, the entrance to



which is protected by a perforated cone M surrounded at a distance by an openwork cage N. The apparatus may be applied with air instead of steam, stop-cocks being provided near the trunnions to allow the air to blow-off.

16,904. Stanley, R. Oct. 26.

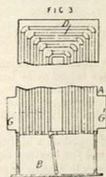
Heating water.—For cleaning boiler flues, a cartridge of gunpowder or other explosive substance or liquid, with fuze attached, is exploded in the chimney or flue.

16,963. Pemberton, F. B., and Angell, A. Oct. 26.

Non-conducting coverings and compositions for steam pipes, steam boilers, and other articles or structures. The primary coating, which is applied to the surface of the structure, is composed of clay, water, soot, and sawdust. The secondary or main coating is made up of charred cork, plaster of Paris, powdered clay, water, wool, and hair or other organic fibre. In applying the covering, a series of lumps of the first coating are applied to a dried foundation of the same material, and the spaces are filled in with the secondary composition.

17,267. Mower, G. A. Oct. 31.

Heating air.—The waste gases or heated products of combustion from a gas engine, or the heated water from the cooling-jacket of the engine cylinder, is admitted to one compartment of the chamber B and passed to the second compartment by way of the tubes D. The air to be heated enters the casing A at the lower end G, and after traversing



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ABRIDGMENT CLASS HEATING.

the exterior of the tubes escapes from the chamber G'. The air thus heated is used for warming and drying purposes.

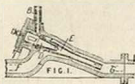
17,456. **Shepherd, C. W.** Nov. 4.



Hot water bottles; footwarmers.—Relates to bottles, cases, or flasks, for imparting heat to any particular part of the body, whether used as foot-warmers, muff-warmers, carriage and chair seats and backs, or as heaters or heat-retainers for poultices, plasters, sponges, or other medicated absorbents, the flasks &c. being additionally applicable for carrying heated potable liquids. The bottle, case, or flask A, shown in one of the shapes that may be taken, is made of suitable material and enveloped in vulcanized india-rubber or other suitable soft covering and stoppered in the usual way. Staples, rings, &c. are provided for attachment to the body. For heating poultices and the like, recesses are formed on the bottles.

17,717. **Ward, H.** Nov. 7.

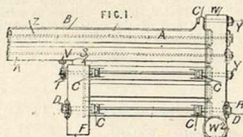
Heating water; heating buildings.—Water is heated and circulated for heating buildings &c. by means of the injector shown. Steam is admitted by the pipe B, and issues through the cone D, where it induces a current of water through the combining-tube E, from the pipe F to the outlet G. The working parts can be removed from the casing by the cover I. Suitable check valves and an overflow pipe from the reservoir are provided.



17,920. **White, L., and Baker, W. Y.,**
[trading as Thames Bank Iron Co.] Nov. 11.

Heating water.—Relates to a cast-iron tubular boiler for heating greenhouses, conservatories, and other buildings by hot-water pipes or coils. The end castings W are attached to the pipes by short bolts Y passing through lugs C. Bolts Z passing along the axis of some of the pipes may also be used; a rubber washer R is placed under the iron washer at each end, these fitting in recessed bosses D. Webs B may be formed on one or both sides of the pipes A and on both sides of the pipes

forming the firebars, in which case they are horizontal and serve to increase the draught. The central casting F is connected by a spigot-and-socket joint S to one of the pipes A, which carries

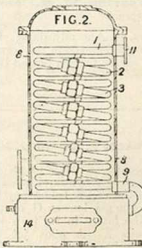


a hinged bolt T fitting between lugs V on F. Openings W' for the water return are formed on both sides of the front casting. In case a pipe has to be removed, a cross-bar and blind flange with rubber washer are used to cover the opening in the castings; a special form of pipe is also used for repairs, to obviate the necessity of taking the boiler to pieces when it is required to renew one. The pipe has a fixed collar at one end and a sliding collar driven home by a curved wedge at the other.

18,190. **Bennett, F.** Nov. 14.

Non-conducting coverings.—Relates to apparatus for maintaining the heat of water and food. A metal or earthenware vessel which contains heated water stands upon a non-conducting mat of wadding &c., and is covered by a non-conducting cover like a tea-pot cosy. When used for food a small receptacle containing the same is suspended within the water vessel, so as to be nearly covered by the hot water.

18,324. **Bengough, W. W.** Nov. 16.

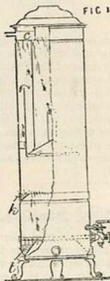


Heating water.—Relates to steam surface apparatus for heating, evaporating, and condensing,

applicable as a feedwater-heater, a distiller, or condenser. For condensing purposes, one or more double tubular volutes 1, 2, 3, &c., preferably of solid-drawn copper, are arranged within a suitable vessel 8, through which the cooling-water, or water to be heated, passes. Steam is admitted to the upper end of the coils at 11, while the water of condensation runs off at the lower end 9.

18,441. Righton, W. J. Nov. 19.

Heating water.—Water supplied to the upper chamber *c* discharges itself through numerous perforations and trickles down the surfaces of concentric cylinders arranged above a series of gas burners at the lower end of the apparatus. The water is caught in the annular cistern *k*, from which it overflows to the reservoir *t*. The direction of the gases from the burners is indicated by the arrows. The water thus heated may be used for baths or other similar purposes. The gas supply may be automatically turned on and off by the water supply. The incoming cold water acts to raise a valve which is connected to a gas valve in a manner similar to that described in Specification No. 18,682, A.D. 1888.



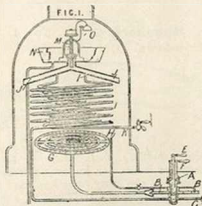
18,703. Wearing, W. H. Nov. 22. *Drawings to Specification.*

Footcarriers.—An adjustable foot-rest for vehicles and boats is made in the form of a hollow box in which can be fitted a heated block of metal, or other heater.

18,803. Yates, C. D. Nov. 23.

Heating liquids.—Relates to an instantaneous heater for water or other liquids. The water &c. is supplied to the coiled tubular system *I*, which, located above the gas burner *G*, opens out to the chamber *J*, the latter in its turn supplying the descending coils *K*. A pilot jet issuing from the pipe *H* re-lights the burners. The plug-cock *A* is provided with two passages corresponding with the gas and water supply pipes *B, C* respectively. For independently regulating the gas the

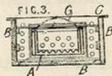
internal plug *E* is provided. The safety-valve *M* is fitted to the water chamber *J*, the escaping water &c. passing away from the trough *N* by



suitable waste pipes. The gong *O* may be provided for announcing the movement of the safety-valve.

19,026. Lake, H. H., [*Desouches, C.*] Nov. 26.

Footcarriers for heating vehicles. Consists of a perforated metal box *A* surrounded by a wooden or other non-conducting casing *B* closed at its upper end by a plate *C* which fits into an opening made in the floor of the vehicle, the casing *B* being below the floor. The box *A* is fitted with a perforated drawer, in which is placed burning charcoal of a special kind. Perforations are made in those sides of the casing *B* which are placed longitudinally to the vehicle, the transverse sides not being perforated in order to prevent a waste of heat by the air current due to the motion of the vehicle. The top plate *C* is supported by a curved stay *G*.



19,098. Zimmermann, F. O. C., and Behrend, E. G. Nov. 27. *Drawings to Specification.*

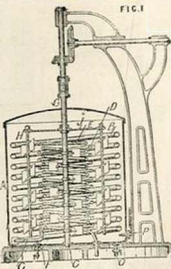
Solar heat, utilizing.—Relates to a method of and apparatus for utilizing the natural heat of the earth and sun which is stored up in water and in air for the production of motive-power and for refrigeration. For this purpose vapours or soluble gases, possessing at the ordinary temperature considerable tensions, are employed in an engine of ordinary construction in combination with heating, absorbing, and generating apparatus, for enabling the gas or vapour to be used in a closed cycle. Gases or vapours mentioned as suitable are ammonia, carbonic acid, methylic ether, and sulphurous acid, but the calculations and description

mainly have reference to the first two. Heat is imparted to the vapour in a tubular "counter-current" apparatus, through which water or air at the ordinary temperature is made to pass.

19,281. Edwards, E., [*Seidensticker, A.*], Nov. 30.

Heating liquids.

—Relates to a method and means for preserving milk for sterilization or pasteurization, the process including three steps, viz., heating, cooling, and filling into cans. In the heating process, the milk is charged into a boiler A, provided with an outer heating-coil B, and two inner smaller heating-coils D, E, the steam for heating passing through B, D, and E in a succession by means of connecting-pieces C. Condensed water and waste steam escape through F and E. The boiler has two sets of agitating-blades, one carried directly on the vertical revolving shaft G, and the other on vertical rods H carried by arms J from the shaft. Before using the boiler it is steamed out. The milk is kept at a regular temperature, as shown on the thermometer P.



19,732. Stevenson, A. Dec. 7. *Drawings to Specification.*

Heating air.—Relates to a machine for separating dust, bran, and the like from middlings. The air supplied to the fan is first heated, dried, and filtered. A suitable arrangement consists of a drying-chamber with heating-pipes to which the air is admitted through a filtering-cloth.

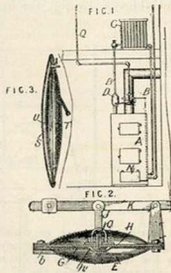
19,804. Allison, H. J., [*Colorado and New York Heating, Cooling, and Power Co.*], Dec. 10.

Heating by liquid circulation.—Relates to a liquid for use as the circulating-medium in pipe heating systems. Any of the higher alcohols is mixed with an ester or acetone of the same in proportions giving the compound a high specific heat, a high boiling point, and rendering it non-solidifiable under ordinary low temperatures.

19,873. Powers, W. P. Dec. 10.

Thermostats; heating water.

—Relates to means for regulating or controlling the temperatures in buildings. The thermostat, Fig. 3, consists of a vaporizing chamber S, separated by a flexible metallic diaphragm U from a chamber T, containing air or other fluid, which is displaced by the flexure of the diaphragm consequent upon the volatilization of the contents of the chamber S. The diaphragm is normally under an outward pressure due to a spring or other means whereby the point of vaporization is lowered. In a modification, the chamber S is formed with two corrugated sides. The thermostat is placed in the room the temperature of which is to be regulated, and its air chamber T is connected by a pipe Q with the damper-actuating device E, Figs. 1 and 2. This consists of a pair of diaphragms G, H with a space *h* between, into which the pipe Q connects. These diaphragms are smaller than that of the thermostat, so that there is a correspondingly-increased motion imparted by the rod J to the lever K which is connected to the damper N. Dished plates are secured around the edges of the diaphragm, the former constituting with the diaphragm G a chamber connected by the pipe *b* with a steam generator in the pipe B supplying the radiators C. The generator consists of an enlargement D of the pipe enclosing a drum containing water, into which the pipe *b* is screwed. The steam generated by the circulating-water acts upon the diaphragm independently and regulates the action according to the temperature of the water leaving the boiler A. In a low-pressure heating system, the pipe *b* may be connected direct to the boiler A. The lever K may be connected to a window, fanlight, or ventilator.



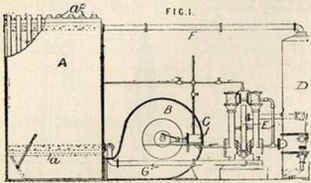
19,906. Lonsdale, W. H. Dec. 11.

Non-conducting compositions.—A cement for covering boilers, steam pipes, or vessels containing steam or hot water is formed by mixing together ground cork, paper pulp, charcoal, clay, fireclay, cowhair or other animal hair, flax, soot, and water.

19,962. Wright, J. Dec. 11.

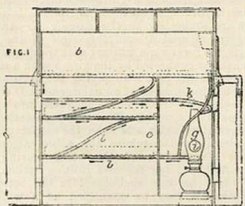
Heating air.—Relates to apparatus for supplying heated or cooled air to buildings or like uses.

The chamber A is provided with a number of tubes extending from its false bottom *a* up and through its top, through which the air to



be heated or cooled, or which is to be the cooling-medium, is forced by any suitable means, as by the fan B driven by steam engines C. Water is circulated through the chamber A around the tubes *a'* by means of a steam pump E and pipes F and G. It may be heated in the heater D, to which the exhaust steam from the engines C, E may be led. The pipes F, G proceed across the chamber A, and are provided with nozzles between each row of tubes. The tubes may be expanded in the tube-plate, or may be packed by a rubber ring fitting in a recess in the top plate.

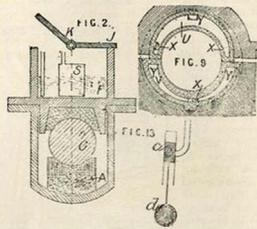
20,011. Phillips, J. O. C. Dec. 12.



Heating water; heating buildings &c.—Relates to hot-water apparatus for promoting the propagation and germination of plants, cuttings, and seeds in boxes or forcing-frames, greenhouses, &c., and for other like horticultural purposes; also applicable as an incubator. The Figure shows the arrangement with the doors of the lower chamber open. An annular boiler *g*, containing a small quantity of water, is constructed of the shape and dimensions of an ordinary or gas lamp chimney and provided with glazed sight-holes *i*. The boiler is heated by an oil or other lamp. To the upper and lower portions of the boiler respectively the flow and return pipes *k*, *l* are secured, such pipes traversing the lower chamber *e*

and the base of the upper glass-covered propagating-chamber *b*. The disposition and arrangement of the pipes may be suitably modified. Convenient ledges are provided for the support of the propagating-pans. In a simpler form of apparatus the lower chamber is omitted, the upper chamber being supported above the heating-medium.

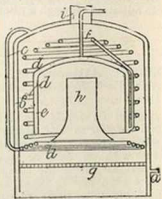
20,037. Walton, W. Dec. 13.



Thermostats.—In cooling railway axle-boxes the chamber F is supplied with water dropping from a tap. A supply valve is also provided which is opened by the pressure of steam in the vessel S when the bearing becomes over-heated. In the case of bearings for shafts of steam engines &c., the liquid is applied in chambers in the brasses or between the brasses and the bearing block and cover. Fig. 9 shows an arrangement with spaces U and V within the brasses. Liquid is supplied through X, X, and vapour passes off at Y, Y. In the case of the bearing for the crank-pin end of a connecting-rod the motion of the crank through the air will be sufficient to dissipate the vapour. A ball valve for maintaining the level of the liquid in the chambers is shown in Fig. 13. When the float *d* falls the piston *c* is moved down and a supply of water is delivered through it.

20,040. Siegner, C. R. Dec. 13.

Heating water.—The annular casing *b* encloses another annular casing *e*, and is connected to it by the pipe *c* and coil *d*. The grate *g* is surmounted by the funnel *h*; *i* is the chimney. The water enters the apparatus at *a*, and escapes at *f*.



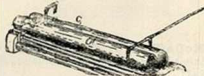
20,126. Garland, H. Dec. 14. *Drawings to Specification.*

Thermostats for incubators. A thermometer, or a coil containing ether and mercury, as the temperature rises completes an electric circuit through an electromagnet, the armature of which is fixed on one end of a lever, to the opposite end of which is attached a damper, which when opened allows the hot air to escape without entering the incubator.

20,510. Shapland, R. A. Dec. 20. *Drawings to Specification.*

Heating air for drying wood, wool, &c. The air is heated by passing it through pipes contained in a drum to which steam is supplied, or through a jacket round a semi-portable or other boiler and chimney, or through a rectangular casing containing steam pipes.

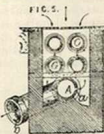
20,661. Foat, J. Dec. 23.



Heating water for warming greenhouses &c. The waste heat from steam-boiler and other furnaces is passed through the tubular system C, C' before escaping by the flues, such system containing the circulating water. In addition, longitudinal water-tubes may be arranged in the interior of the tubes C, C'; or such heating-tubes may be fitted to boilers of all sorts which themselves may be employed for distinct purposes.

20,691. Little, R. Dec. 24.

Heating buildings.—Relates to means for supplying and distributing warm air to buildings. The air-distributing pipe A, which may be of metal or earthenware, and is shown in connection with a series of heating-pipes C, is formed with lateral distributing-apertures a, each of which, to prevent the lodgment of dust, is vertically cut away at its lower portion. The pipe



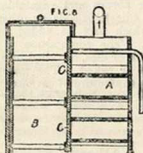
receives its supply at various points from branches passing through the exterior walls.

20,719. Hänisch, G. E. Dec. 24.

Heating liquids.

—Relates to towers for use in boiling, precipitating, evaporating, and treating liquids with gases. To facilitate the discharge and cleansing of such towers, they are divided into two vertical parts, one of which A serving for the boiling &c.

operations is separated from the other part B serving as a passage of access by a partition C formed of planks, plates, or doors which are fitted together almost or quite hermetically and are provided at intervals with fixed supports so as to render necessary only the removal of a few planks &c. to obtain access to any particular part of the tower. To facilitate the removal of precipitates, the inclined planes &c. in the precipitating-tower are arranged parallel to each other and at such a distance apart to allow of the insertion of a board to receive the precipitate which is scraped. The tower is stated to be applicable among other purposes to the boiling of lyes.



20,730. Morris, R., and Wood, J. Dec. 24.

Drawings to Specification.

Heating air for drying. Minerals, brewers' grains, &c. are dried in a long cylinder heated by a furnace below and a suitable arrangement of flues, or by a hot-water or steam jacket. Hot air may be admitted at the delivery end of the cylinder, the air being heated by means of a jacket partly surrounding the same.

A.D. 1890.

795. Stone, R. Jan. 15.

Non-conducting compositions.—Peat, sawdust, and other fibrous and vegetable materials are mixed with silicate of soda or other silicious compounds, to which may be added glue, resin, cement, or lime. The composition is run or pressed into moulds or dies, or rolled into sheets, slabs, &c., and dried or baked. The material is applicable for the manufacture of various articles, and for coating steam pipes, boilers, and canvas, &c.

825. Albert, W. Jan. 16. *Drawings to Specification.*

Heating air for drying yarns, fibres, &c. Woollen and cotton fibres, yarns, and other textile materials are dried by forcing hot air through thin layers of the material held between perforated surfaces. Fans are used for forcing air through the apparatus, near the discharge end of which is placed a tubular air-heating apparatus to which steam may be admitted and which is fitted with a drain pipe.

926. Nesbit, D. M. Jan. 18.

Heating buildings.—Radiators for heating public buildings, hotels, dwellinghouses, &c., constructed of various dimensions and of suitable designs, are made up of a series of vertical or otherwise arranged steam, air, water, or similar chambers A, A'. The lower portions of such chambers are constructed with a transverse diaphragm B, through which passes the bolt C holding together the various sections. The heating-medium is admitted to the space at one side of the diaphragm, and after traversing along such space passes to the other by way of the vertical passages. The upper chambers may be similarly formed and held together. In some cases the upper ends, when not in communication with each other, are formed with interlocking tappets. The Specification describes how a series of the radiators may be nested together in various ways.

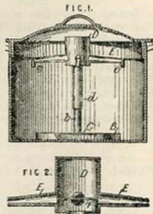


955. Pfaff, H. Jan. 18. *Drawings to Specification.*

Thermostats for incubators. The temperature is controlled by means of a compound metal coil, the end of which is attached to a rod which operates a counterpoised damper regulating the admission of heated air to the incubator.

1183. McCaffrey, J. T. June 25, A.D. 1889, [date claimed under Sec. 103 of Patents &c. Act, A.D. 1885].

Boiling pans.—Relates to means for circulating liquids in washing boilers. A suction chamber B is used, formed with a perforated top C, and carrying an ascending tube *b* upon which fits a tube *d* leading to a steam chamber D, provided with radiating taper arms E ending in openings *e* directed downwards. Within the steam chamber is fixed a diaphragm F, at the level of the middle of the arms E, to deflect the ascending liquid into the latter.

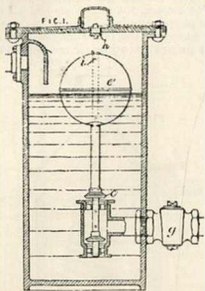


1465. Butterworth, J. Jan. 28.

Steam traps.—The double-beat equilibrium valve *c* is actuated by the rise of the float *e*. The float spindle is provided with holes *i* to equalize the pressure within and without the float. The cock *g* is fitted for accumulating condensed water in the trap prior to blowing through. In some cases a rod passing through a stuffing-box in the casing is used for lifting the valve. The cover is supplied with an air valve *h* from the casing of which a pipe leads to the discharge main. When the air valve is unnecessary, the float with its valves may be fitted direct to the main discharge pipe of any steam apparatus.

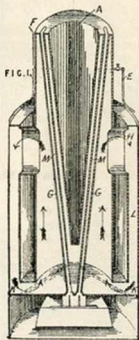
(For Drawing see next page.)

1465.

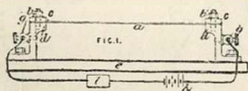


1781. Thorburn, T. Feb. 3.

Heating water; heating buildings &c.—Relates to water-heaters and radiators adapted for offices, lobbies, greenhouses, &c. The apparatus is shown as heated by oil burners. It consists of an outer annular water chamber L opening by channels H to the interior cylinder G which, rising above the outer chamber, carries the conical radiating-surface A and the flue tubes M. The water-overflow and air-discharge pipe are respectively shown at E and F. When heated by gas, additional tubes K, shown in dotted lines, are provided.



1894. Robinson, A. E., and Wheatley, W. H. Feb. 4.



Heating by electricity.—Metal articles to be

enamelled are heated by means of an electric current, so that the temperature may be regulated. The plate or other article *a* is clamped by nuts *b* and plates *c* between brackets *d* connected through terminals *g* to any suitable electric generator *h*, preferably of the alternating type. An electric current regulator *l* is inserted in the circuit.

1930. Rosher, C. H. Feb. 5.

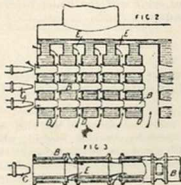


Heating water for swimming baths. The water from the bath enters an annular chamber *y*, which communicates with an inner tube *z*, into which steam is blown through a nozzle *x* to heat and circulate the water. In a modification, a steam-jet heater of the non-forcing type is employed, or the apparatus shown in the Figure may be placed in connection with two branches.

2016. Marsh, E. Feb. 7.

Heating buildings.—Atmospheric air is conducted through a pipe contained within a stove in the basement of the building. The air thus heated passes onwards through a continuation of the pipe as it traverses the main chimney flue and escapes into the apartments requiring heating.

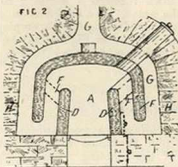
2055. Mills, B. J. E., [Seigle-Goujon, A.]. Feb. 7.



Heating liquids and gases.—Liquid and gaseous bodies are heated in chambers surrounding a series of Bunsen burners burning gas, vapour, or pulverulent material. Fig. 2 shows the arrangement as applied to a steam generator. Combustible gases from the injector nozzles *C* enter corresponding

chambers B, which in succession penetrate the depending water spaces D of the boiler. Air, as shown by the arrows, is drawn in at the open mouths of each chamber B. The gases, as they leave the heating-passages, may be further utilized in the boiler or in the separate apparatus. Grooves, wings, or gills may be provided for increasing the heating-surface. Fig. 3 shows another arrangement for vaporizing liquids. Around each heating-chamber B an annular space is constructed, through which the liquid is conducted in a serpentine manner. The chambers are joined up by open washers E through which the air supply passes. The washers are also formed with passages affording communication between the annular sections. The serpentine channels in the heating-chambers may be packed with iron or other metal turnings, borings, or shavings.

2189. Kendall, C. Feb. 11.

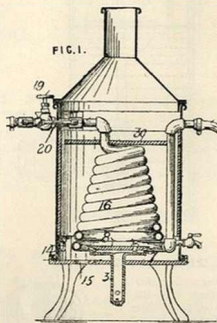


Heating water for heating horticultural and other buildings and open spaces. The annular water chamber D, enclosing the furnace A, is surrounded and covered in by a bell-shaped water vessel, the two spaces being connected by water-tubes F. The combustion products are conducted from the central space to the outer annular chamber G, which is formed by the setting H, and led over the whole of the interior surface of the boiler before escaping by the chimney.

2278. Western Coil and Pipe Cleansing Co., Applegarth, R. W., and Moore, E. D. Feb. 12.

Heating water.—Relates to a coiled water-tube boiler for steaming, washing, flushing, and cooling the pipes of apparatus for drawing-off beverages. Steam is instantaneously generated in the heated coil 16, and passed to the tubes of the drawing-off apparatus. A larger quantity of water is then heated and similarly passed on, while, finally, the heating-medium being extinguished, cold water emerges from the coil for cooling purposes. For admitting the smaller quantity of water the bypass 20 is employed, the cock 19 controlling the larger inlet. The coil may be duplicated, in which case the outer coil serves for superheating the

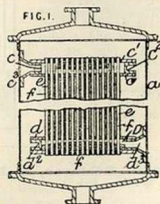
steam. The Bunsen gas burner 3 may be employed for heating, the mixed air and gas escaping from peripheral openings between the discs 7 and 8. The casing of the boiler may be suitably protected by linings &c., while air apertures 14, 15 are



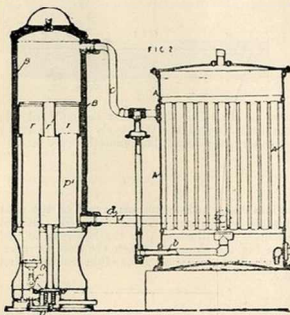
also provided in the casing. Suitable baffling-surfaces 30 are also fitted. In addition a steam-separating chamber, provided with a safety-valve, pressure gauge, and water gauge glass, may be fitted.

2502. Renshaw, W. R. Feb. 15.

Heating liquids and gases.—Relates to tubular apparatus for heating, cooling, and condensing fluids. The cooling or heating medium is contained in the casing *a* and tubes *f*, while the fluid under treatment passes from the box C through the spaces between the tubes *e*, *f* to the box D. These boxes are formed by the tube-plates *c*, *c'*, *d*, and rings *e'*, *d'*, which latter are each formed at one part into pipes leading to the opening *e'*, *d'* respectively. The flanges of these pipes are bolted to the case and support the boxes, but in a modified form the tube-plates are rigidly attached to the sides of the casing, passages being provided through them for the heating or cooling medium.



2559. Maxim, H. S., and Sedgwick, G. S.
Feb. 17.

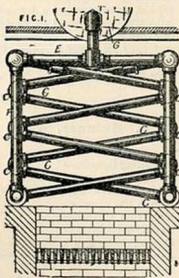


Heating water.—A boiler B for heating the hydrocarbon vaporizer A of gas-carburetted apparatus has two vertical flues *p* connected at the top by a cylindrical chamber *r* through which pass one or more tubes *r*¹. It is heated by a burner *o* the gas supply to which is regulated by a valve *g* operated by a diaphragm *f*¹ in communication with the interior of the boiler.

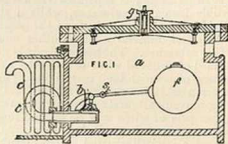
2872. Newton, J. M. Feb. 22.

Heating water.—Relates to apparatus for heating water or generating steam for heating the interior of buildings and structures, and for other purposes.

A three sided tubular framework E, F encloses sets of zig zag tubes C the upper and lower members of which open into the tubular framework. The ends of the pipes composing the zig-zag sets are connected by the angle-piecesc. The whole is suitably mounted above the furnace. When employed for generating steam, the steam chamber G is provided.

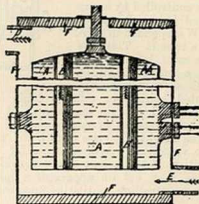


3063. Clark, W. A. Feb. 26.



Steam traps.—Relates to that class of trap in which the water-discharge valve is operated by a float. The condensed water accumulates in the chamber *a*, and discharges the air from the trap through the valve *g*. When the float is sufficiently raised the slide valve *b* opens the outlet to the cooling-coil *c*. The entry of steam, in combination with metal bands, closes the air valve. To reduce friction and balance the slide valve the latter works upon a grooved seating. To withstand the high pressure the float *f* may be filled with cork, saw-dust, or other suitable light material. The float arm is constructed with the adjustable joints *s*.

3120. Radcliffe, R. H. Feb. 27.

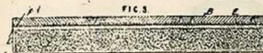


Heating air for heating and ventilating houses &c. The heat radiated from circulating-cylinders commonly employed for supplying hot water for domestic and other purposes is used to heat incoming atmospheric air. For this purpose the cylinder A is fitted with the air tube B and the surrounding casing F. Cold air entering by the pipe E traverses the surfaces of the water cylinder and escapes in a heated condition from the outlet D.

3169. Carpenter, C. E. Aug. 6, A.D. 1889,
[date claimed under Sec. 103 of Patents &c. Act,
A.D. 1883].

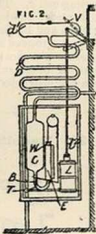
Heating by electricity.—The apparatus, one form of which is shown, is designed for use in heating

stoves, laundry machinery, heating-rollers, flat irons, and similar utensils. The surface plate B which is to be heated is separated from the heating-body E by a sheet F of some electrical non-combustible insulating-substance, while a similar sheet divides the heating-body from the packing G of asbestos felt, mineral wool, or other non-heat conducting substance. The heating-body is preferably formed of reflexed wires of refractory metal. The heating-plates with their corresponding heaters may be arranged in independent sections, the wires also being conveniently arranged in various manners. In addition sets of wires may be secured to sheets or caris, whereby resistances depending upon the amount of available current may be employed. In the case of electrically-heated rollers, brush connections are provided for the supply to the rotating portions, while with other apparatus convenient spring or other easily-detachable connections are fitted.



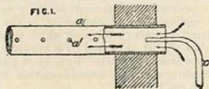
3179. Crowe, G. W., and Massam, W. K.
Feb. 28.

Thermostats.—For maintaining a constant temperature within a room, hall, conservatory, &c., the ventilator V, window, or other device for controlling the air supply is adjusted by the action of a rod P extending from the piston of a cylinder L. A three-way cock T, regulating the supply of water or other fluid to the latter, is controlled by levers connected by cords with a weight W suspended in mercury in a tube E. This tube communicates by a U tube B with a bulb C, coil D, and bulb d' containing air, methylated spirits, or other volatile or easily-expandible fluid. As the temperature of the room varies the expansion or contraction of the fluid causes the weight W to rise or fall, and so to control the ventilator. Arrangements for adjusting the position of the weight W are provided. The apparatus may act on apparatus employed for driving or controlling ventilating-apparatus.



various shapes and dimensions as may be the most suitable for the purpose contemplated. Several examples are illustrated in the Specification; of these Fig. 3 is shown, in which the wool is represented at b, the iron sheet at a, and the securing-wires at c.

3265. Ormerod, B., Davies, J. F., and Haythornthwaite, W. March 1.



Heating air.—Relates to means for ventilating and regulating the temperature and humidity of the air in spinning and weaving factories and other buildings, and comprises means for heating the incoming air by jets of steam, water, or air. A pipe a, communicating by openings a' or branches with the room &c. to be ventilated, is provided at one end with a pipe or pipes c supplied with steam, water, or air under pressure, for inducing a current of air through the pipe, and for heating or moistening it as required.

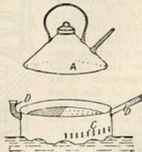
3224. Muller, L. d'E. Feb. 28.



Non-conducting coverings.—Consists in forming heat-resisting and non-conducting coatings or laggings by securing slag-wool, mineral cotton, or scoria wool in pads, tufts, or packets upon thin iron sheets suitably galvanized, varnished, or rendered unoxidizable. For securing the wool, metal wires passing through perforations in the plates are preferably employed, the plates being of

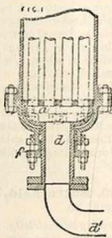
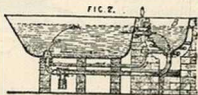
3279. Skinner, W. H. March 1.

Heating liquids.—A block tin kettle with concave bottom A fits upon an iron fuel chamber having perforations C in the sides and a handle and chimney as shown.

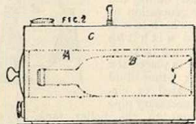


3292. **Schneider, A.** March 1.

Heating liquids.—Relates to tubular apparatus for heating feedwater and other liquids, and consists in providing means for allowing expansion and contraction of the tube-plate &c. to take place readily. The tube-plate *a* is carried by the bell-mouthed induction or eduction pipe *d*, leakage from the heating-chamber being prevented by the stuffing box *f*. To prevent straining the pipe *d'*, a sliding joint, or a bend such as shown, may be provided in its length.

3746. **Hall, W. J.** March 10.

Heating liquids; boiling-pans.—For heating or boiling fluids for cooking, washing, bathing, and general purposes, an ordinary domestic copper B with an external heating-coil is employed. They are arranged in such a way that a free circulation is maintained through the entire apparatus. When the boiler is used in the treatment of manufactured fibres, textile fabric, and the like, overflow pipes for the removal of scum &c. are fitted. Valves, cocks, plugs, and usual mountings are provided.

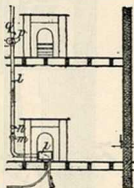
3976. **Herries, F. S.** March 13.

Heating liquids.—Relates to apparatus for heating wine in bottles. The bottle of wine B is placed

in a hollow space A, of which several may be provided, in a vessel C. The vessel is then filled up with a suitable heating-medium.

4056. **Tracy, J.** March 15.

Heating buildings; heating air.—Relates to arrangements for warming buildings, rooms, &c. by hot air. For this purpose a chamber *i* is provided at the back of the ordinary domestic heating or cooking stove or fireplace, and supplied with air from the external atmosphere or from rooms &c. to be ventilated. The air thus heated is passed through suitable conduits *l* to the various apartments, the flow being controlled and regulated by convenient valves *m, n, p, q*.

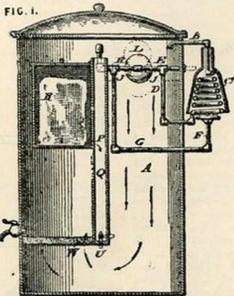
4191. **Farrall, T. D.** March 18.

Heating by electricity.—Consists in means and apparatus for electrically generating heat, steam, and light, and embodies the combinations of dynamo-electric machines, storage batteries, or other supplying-arrangements, electric heating-cartridges, steam engines and generators, lighting-apparatus, and details connected therewith. Fig. 2 shows the construction of the heaters. Conductors A, of various configurations and resistances, are embedded in suitably-enclosed non-conducting media, such as asbestos, soapstone, or powdered glass, and, by the passage of electrical currents, raised to the desired temperature. For heating tubular boilers, of the locomotive type for instance, the electric heaters are disposed along the smoke-tubes, while in other types the heaters are arranged in positions in which they may act with the greatest efficiency.

4251. **Simpson, G.** March 18.

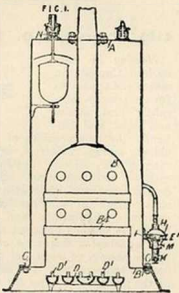
Heating water.—Relates to apparatus for purifying water by heating it. The heating-apparatus consists of a coil C supplied with water by a pipe D, gas being supplied to the burner F by a pipe G. The water and gas taps E and H are both operated

by a float L attached to the plug spindle J. The heated water is introduced through a pipe B into a tank A in which it is cooled and filtered.



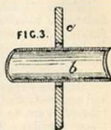
4320. Jones, C. J. March 19.

Heating water.—Relates to improvements in gas-heated boilers used for maintaining a supply of boiling water under light pressure. Specification No. 13,952, A.D. 1884, is referred to. The vertical exterior shell A of the boiler is secured to the inner heating-chamber B by the flanges B¹, C. The chamber B is provided with the cross water-tubes B², the lowest of which occurs some distance above the base of the boiler. Feedwater is automatically supplied through the rise and fall of the float valve N. The boiler is heated by rings of gas burners D¹. The valve I which controls the supply to the burners D¹ is operated by the boiler pressure acting upon the surface of a diaphragm H, which acts conjointly with the second diaphragm E¹. Water escaping through the first diaphragm is allowed to pass away before leaking through the second diaphragm. The pressure at which the valve opens is regulated by the coiled spring K. To prevent extinction of the gas flame, a small bye-pass controlled by a screw M is provided.



4643. Masterman, C. E. March 25.

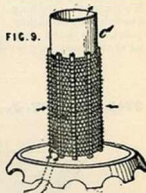
Heating water.—A tubular surface heater is provided with a series of transverse diaphragms c through perforations in which the tubes b pass. To produce a more efficient distribution over the tubes and to allow the condensing-medium to traverse the chamber, the perforations in the diaphragms are formed larger in diameter than the tubes.



4660. Butterfield, H. R., and Mitchell, W. March 25.

Heating by electricity.

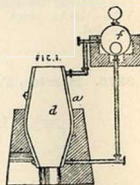
—Coils of wire are raised to the desired temperature by the passage of electricity, the coils being disposed in a manner most convenient for effecting the required purpose. The coils may be bare or covered with insulating substances, in the former case care being taken to prevent short-circuiting. For heating and warming rooms, halls, and similar chambers, the resistance wires are mounted upon a framework surmounted by a flue C, Fig. 9, the whole being surrounded by a perforated casing not shown. For boiling and similar operations the coils are arranged within a rectangular casing upon which is placed the article to be treated or the utensil to be heated.



4741. Gibbs, W. A. March 26.

Heating liquids.

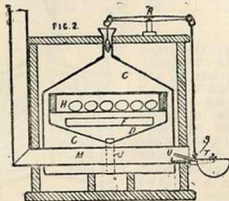
—The objects of the invention are to utilize the heat employed in the burning of cement and other mineral substances for heating and circulating water and other fluids, and for the generation of steam. The kiln a is formed with the hollow lining jacket d, in which is placed the water or other fluid to be heated or circulated, necessary pipe connections to the boiler, tank, or equivalent vessel f being also employed. In modifications, the jacket is formed of a coiled pipe or of upper and lower rings united by a concentric row of vertical pipes.



4781. Schmitz, J. March 27. *Drawings to Specification.*

Thermostats for regulating the supply of air to be mixed with furnace gases. Relates to the extraction of useful products from the waste gases of steam-boiler and other furnaces, and to the subsequent utilization of such gases. In order that the gases may be safely employed for heating and drying purposes, a supply of air is automatically admitted to the chambers through which they are travelling. By this means all danger of ignition of soot or dust is thereby obviated. The air supply is regulated by the expansion of the gases, due to their high temperature, acting upon a piston to which the air-supply damper is connected.

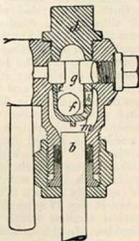
4857. Cashmore, C. March 28.



Thermostats for regulating the temperature of incubators. A float placed in the water in the neck of the tank C operates a lever R which, by a link S, raises or lowers the lamp U pivoted at T, so that the flame is caused to play more or less directly upon the top of the flue M.

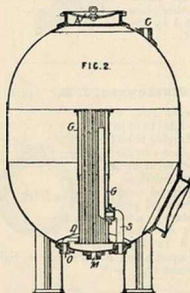
4924. Dewrance, J., and Wall, G. H. March 29.

Heating water.—In gauge glass fittings for steam and other boilers, automatic valves are provided for cutting off, on a fracture of the glass, the inconvenient rush of steam. A ball valve *f* is carried in a chamber *e* in such a way as normally to leave open the aperture *h* leading to the glass *b*. When the glass breaks the ball is driven against the opening. For restoring equilibrium &c., the bye-pass *m* is provided in the valve cage.



The latter, if desired, may be formed in one piece with the top cap *d*, the ball being introduced between the bars *g*. Reference is made to Specification No. 14,952, A.D. 1888.

4976. Hawksley, G. W. March 31.



Digesters.—The material to be boiled &c. is introduced into the closed cylindrical boiler by the manhole A, water or other liquid being passed in by the aperture C. The contents of the boiler are heated by steam within the tubular chamber G through the tubes of which the liquid within the boiler circulates. Steam is introduced by the pipe S, while the condensed water escapes at O. A mud hole M is also provided beneath the perforated disc D.

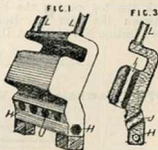
5453. Ackroyd, W., Ackroyd, T. H., and Willoughby, J. April 10. *Drawings to Specification. Amended.*

Heating air.—Relates to means for utilizing the heat of steam-boiler, annealing-pan, destructor, or other furnaces, by forcing air through pipes located in a suitable position, such heated air being employed in furnaces to prevent smoke, for use in drying operations, for warming buildings, steam-boats, and machinery, for evaporating, or for other suitable purposes where heat is required without the direct action of fire.

5572. Millington, W. J. April 12.

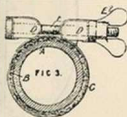
Heating water.—A circulating boiler of an irregular shape, as shown in perspective in Fig. 1

and in section in Fig. 3, has tubes I, J of various shapes passing through it for the products of combustion. Water is supplied at the pipes H, H, and is carried away to a heating-coil, radiator, or other place required by the pipes L, L.



5580. Mathewson, J. E. April 12.

Non conducting coverings.—Relates to clips for securing lagging to boilers, shown, however, as applied for securing hose pipes to nozzles. The hose is slipped over the end of the rigid pipe and held in place by a band C the ends of which are secured to blocks D threaded upon a bolt E. The clip is tightened by the wing-nut F.



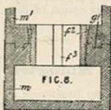
5623. Nelson, D. April 14.

Hot-water bottles.—A screw neck for india-rubber bottles is formed by covering a metal mandrel, formed as shown, with successive layers of hard and soft india-rubber. The mandrel is then inserted into the neck of the bottle, calico is lapped around it, and the rubber is vulcanized in the usual way, after which the mandrel and calico are removed. The screw neck can be made separately and applied to any india-rubber bottle. The Provisional Specification describes also a method of forming the body of the bottle from calico and felt, coated with india-rubber cement.

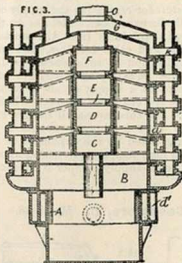


b733. Imray, O., [Hogan Engineering Co.] April 15.

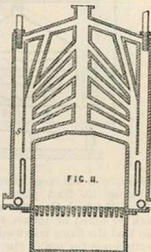
Heating water.—In hot-water boilers constructed of superposed layers of hollow sections arranged around and above the fire, circulation is carried through



distinct passages, arrangements being also provided for preventing the colder streams from mingling



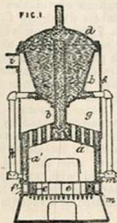
with the hotter water. The invention may be also applied to boilers of the type described in Specification No. 5734, A.D. 1890. Water entering the outer compartment d' , Fig. 3, of the annular firebox A leaves the inner compartment and the upper adjacent ring to enter by suitable passages the superposed hollow sections C, D, E, and F, the water ascending



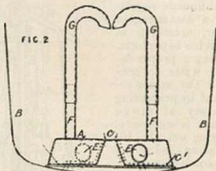
by way of the central hollow bosses. The water descends from the uppermost sections G through the external hollow ears k , which are protected from the heat of the furnace gases. The sections are provided with lengthened apertures for allowing the combustion products to ascend from the firebox to the flue O. The water-passage coupling for connecting the sections A, B, C is shown in Fig. 8. The lug m^1 fits into the packed groove g^1 of the lug m , and is secured by the screwed ferrule f^2 and the split collar f^1 . The ears or pockets k , Fig. 3, being open to the downward passages secure, when required, a direct descending circulation from each section. To prevent the heated fluid within a section from flowing into the pockets, the latter are provided with deflectors which, in the Figures, are formed by the walls of the water-legs a , but in other cases are specially fitted. The trapped circulation is shown in Fig. 11 as applied to a boiler made up of vertical sections which are connected by lateral thimbles. In this case the deflectors s depend in front of the transverse water-passages and thus trap the hot water.

5734. Imray, O., [*Hogan Engineering Co.*].
April 15.

Heating water.—The object is to provide for a free internal circulation in boilers connected with hot-water radiators and to facilitate the renewal of the firebrick lining. The boiler consists of a reservoir section *d* connected with the water chamber *a* by the inner water-circulating tube *b*, and by external pipes *k*. The firebox section is formed of the annular jacket *a'* and the hollow perforated crown-plate *a*. The gases pass away from the smoke chamber *g*, enclosed in the casing *f*, by the flue *i*. In a modification, the central tube *b* is dispensed with, while in another arrangement a gas space is formed round the lower portion of the central tube but within the upper water section. The lining bricks *e* are carried between the upper and lower plates *m, m'*, the latter of which are connected by transverse ribs. The bricks are removed through the circumferential space formed by taking away the outer casing *f'*.



copper is heated. Steam is produced in the space *D*, and drives the hot water up the tubes *F* and *G*, by which it is distributed over the materials under

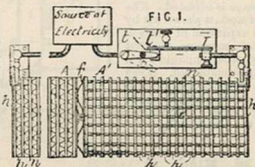
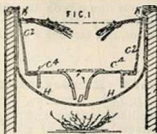


treatment. A modification is described in which a double conical pan supplies the hot water to a central vertical discharge pipe.

6032. Dewey, M. W. April 21.

5917. Mackie, S. A. April 18.

Boiling-pans for use in washing and similar operations. Relates to means for promoting circulation of the liquids in the pans. In the form shown, an internal suitably supported casing *c'* is provided with a bottom portion *c'* having the descending funnel *D*. The heated liquid passes from below the false bottom *c'*, ascends the annular space *H*, and discharges under pressure from the peripheral apertures *K*. Modifications may be made in the arrangement of the casing *c'* and space *H*.



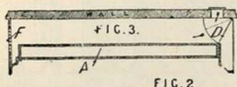
Heating by electricity.—The heating-devices take the form of floor mats which may extend partially or entirely over the apartment or vehicle to be heated. Several arrangements are described and illustrated in the Specification, of which one is shown in Fig. 1. The heat developing and radiating conductors *h* are secured to and protected by slats of wood *n* or other non-conducting material. The mat *A* is of rigid construction, while the mat *A'* is capable of being rolled up. In other arrangements, the conductors may be bedded upon tiles to prevent danger of ignition. An upper protective covering of asbestos may be employed, or a metallic mat may be combined with one of fibre. In another form, a corrugated or fluted plate of metal, containing wooden slats in the corrugations, is provided. A suitable thermal cut-out is used with the heater, but that preferably employed is shown at *T*. It consists of two strips *t, t'* of similar or different metals, a mica or similar strip being interposed in the former case. On an undue increase of temperature the warping of the strips severs the electric connection. The mats are secured to each other and to the main wires by suitable connections, such as clamps or springs. An arrangement of the latter is shown at *f*, a dovetail contact with projecting pins securing an efficient connection.

6006. Scillitoe, E. April 21.

Boiling-pans for use in washing. Relates to circulating-apparatus to be placed in laundry coppers, and consists in a chamber *A* to be placed at the bottom of the copper *B*, and provided with perforated plates *c, c'* below, with supply holes *E*, and with tubes *F*, on which are mounted movable curved discharge tubes *G*. In operation the materials are packed over the chamber *A* and the

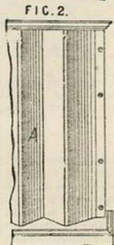
as carriage footwarmers, are made with a casing of asbestos cloth, lined or stuffed with silicate cotton or similar incombustible material, with or without a core of pumicestone or other heat-retaining material.

9504. Phillips, J. F. June 19.



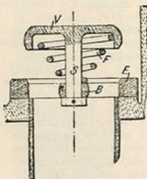
Heating buildings ;

heating air.—Steam or hot-water radiators consist of one or more sets of undulating, corrugated, or indented vertical chambers A, arranged in a desirable manner and formed without horizontal base channels or tubes. Air is admitted from the exterior by way of the opening D, provided with a suitable regulating-flap, and, being heated by contact with the radiator, escapes into the room through perforations F in the ornamental cornice.



9682. Bauer, J. June 21.

Heating water.—Relates to check valves for stopping burst tubes, applicable to all cases in which water is heated in tubular boilers. V is a mushroom valve the spindle S of which is supported in a ring B, and is kept away from its seating E at the mouth of the tube under ordinary circumstances by a spring F. If the tube bursts, the valve closes by the rush of fluid.

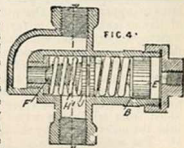


9708. Davies, C. H. June 23.

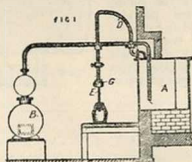
Non-conducting coverings.—Pipes used to convey steam or compressed air to engines in a special system for ventilating tunnels and stations of underground railways, the shafts and levels of mines and collieries, drains, and other places, are clothed with brown paper, felt, &c., well pitched, and enclosed in buried wooden troughs.

9841. Phillipson, J., and Rushforth, J. June 25.

Steam traps.—Relates to improvements in that class of drain and relief valves for the cylinders and steam pipes of engines in which the valve is automatically closed by the steam pressure when the engine is started, and is opened by the pressure of a spring when the engine is stopped. The invention consists in two improvements:—(1) The pressure of the spring H¹ is regulated by means of an adjustable collar J on the shank of the valve F. (2) In order to make the piston E on which the steam acts in closing the valve perfectly tight, it is provided with a seating B, against which it closes like a valve. The piston may be made capable of a slight movement relatively to the valve F, as in Fig. 4, for the purpose of ensuring tight closure against the seat.



9867. Hilde, W. H. June 25. [Complete Specification but no Letters Patent.]



Heating air for use in glass manufacture. In order to avoid the cooling effects of cold air, hollow glass ware is blown with air previously heated. Fig. 1 shows one arrangement of apparatus. The air is forced by a compressor B through a heater A, which may also serve as a reservoir or may consist of a number of tubes, and thence through the pipe D to the blowpipe E.

9956. Kennedy, R. June 27.

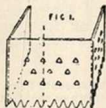
Heating by electricity.—The heat generated in the cores and magnetic conductors of electromagnets by the passage of alternating currents through the enveloping coils is used for heating smoothing-irons, kettles, water for various



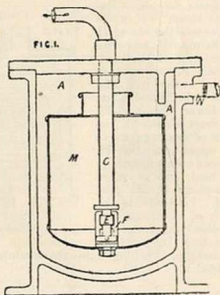
purposes, soldering-irons, &c. Fig. 1 shows a smoothing-iron F in the process of heating, S representing the coil, and the arrows the magnetic flow. In the case of non-magnetic substances, conductors are introduced into the body of the structure or the liquid in the process of heating. In some cases the cores of the electromagnets form the liquid-heating chambers.

10,021. Jepson, A. June 28.

Heating water; boiling-pans.
— Cast-iron ovens, boilers, coppers, and other similar castings which are to be exposed to the action of fire are cast with a central perforated core of wrought, sheet, or plate metal. Fig. 1 shows a core round which metal is cast to form an ordinary oven.



10,055. Blackmore, F. E. June 28.



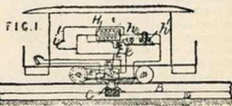
Steam traps.—The condensed steam enters the chamber A by the pipe N, and continues to fill it until the hollow float M is raised and the escape opening in the fixed discharge pipe C covered by the ring valve E, the valve being operated through the frame F. When the chamber is nearly full the water overflows into the float until the latter sinks. The water, on account of the uncovering of the escape aperture by the valve E, is discharged by the pressure of the steam. An air-escape valve may be fitted in the cover.

10,116. Pemberton, F. E. June 30.
Amended.

Non-conducting compositions particularly applicable to steam boilers, pipes, tanks, &c., for preventing loss of heat, and to vessels or pipes for their

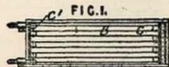
protection from the effects of frost. The composition is made up of the following ingredients in varying proportions, viz., peat, moss litter, charcoal, sheep's wool, fireclay, plaster of Paris, Manila fibre, alum, boiled linseed oil, and water. If some of the materials specified are not available, closely-analogous substances may be employed. Before covering the articles with this composition a "scratch coat mixture," consisting of equal quantities of the above described mixture and fireclay, is first applied.

10,122. Dewey, M. W. Jan. 27, [date claimed under Sec. 103 of Patents &c. Act, A.D. 1883].



Heating by electricity.—Relates to electric heating-apparatus for the vehicles of the railway system described in Specification No. 6492, A.D. 1890, and for other systems with direct or alternating currents. Any suitable heater H is supplied from the main conductor, and may or may not be in series with the motor. Fig. 1 shows the system above referred to, with a counter electromotive force device C for directing the current from the conductor B through the motor E and the heater H. A shunt I around the heater contains resistances and a switch *i*. The current through the heater is regulated by the solenoid and armature *h, h'*. In the case of alternating currents, as here used, the armature is repelled and, by means of the lever *e*, throws resistances into the circuit. The heater and regulator may be applied to series and other systems. In some cases the heater is supplied with currents from a transformer to which the current flows from the regulating-device described above.

10,124. Dewey, M. W. Dec. 13, A.D. 1889, [date claimed under Sec. 103 of Patents &c. Act, A.D. 1883].

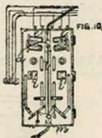


Heating by electricity.—The heaters, adapted for currents of large volume, are particularly applicable for use in waste spaces, such as under the seats of cars and other vehicles. A series of metal plates B, perforated or not, are supported within a perforated casing, shown in elevation, on suitable insulating-blocks C, C', one block C' being fixed and the other, for taking up the expansion and contraction of the plates, being movable. At one end of the heater a switch, pivoted at the end, is employed with a spring to hold it, when required,

in its open position. An automatic break on an undue elevation of temperature is afforded by the withdrawal of the loose blocks C from a spring contact.

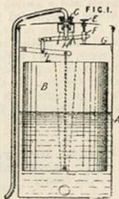
10,238. Thompson, W. P., [Lion, A.]. July 2.

Thermostats for incubators. The incubator is heated by gas, coal, or liquid fuel. The heating is automatically controlled by electric switching and relay devices modified to suit the gas and liquid fuel heaters, while, when solid fuel is employed, an electromagnet is used to open a tap or valve admitting cold water to flow into the hot-water pipes or tubes passing through the hot-water pipes. Fig. 10 shows a diagram of the switching-devices, in which e, e' are electromagnets having an armature a extended by the pendulous lever l , which throws the pivoted crescent-shaped piece of metal m to one side or the other. The axis of the piece m may be extended to control the supply tap; in the Figure, i, i' are the relays for throwing the whole of the battery into circuit.



10,261. Gorrings, C. R. July 2.

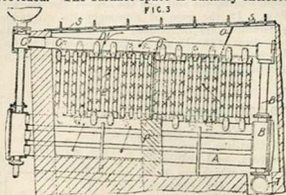
Heating water.—Relates to means for feeding water to boilers. A feed-tank A freely connected with the boiler contains a float B the fall of which opens a supply valve C. The valve is linked to the middle of a lever H one end of which rests in a loop F between a screw E and a spring G, while the other end is linked to a lever L, itself linked to the float B. The screw E adjusts the pressure at which the valve will close.



10,643. Asbury, F. H. July 9.

Heating water.—The arrangement described as forming a steam generator is also applicable as a water-heater for warming buildings. A series of sinuous water-tubes E connect the horizontal chambers A, arranged on each of the furnaces, with upper water-boxes D¹ which in their turn open out to lateral horizontal drums C, the latter with the chambers below being also in communication by end headers C¹, B and descending pipes B². The sinuous tubes E are connected up to each other by suitable U-couplings. The setting-chamber T is provided at the rear of the furnace, while at the

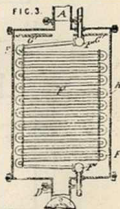
front upper end the transverse steam drum is provided. The furnace space is suitably enclosed



by masonry fitted with the usual doors &c. The crown or roof S is made in easily-detachable lined sections. Suitable baffles O, P are also provided.

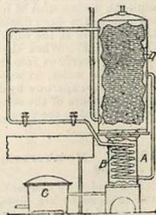
10,645. Asbury, F. H. July 9.

Heating liquids.—Exhaust steam or waste heat enters the casing H by the pipe D, traverses the exterior of the heating-coils F, and escapes by the outlet A. The liquid to be heated enters the lower chamber F¹, and travels through the series of heating-coils to the upper chamber F². To more evenly distribute the heat, two or more baffle-plates G are provided. To facilitate the supply of chemicals &c., for dissolving scale and preventing incrustation, a stand-pipe opening into the chamber F¹ is provided.



10,851. Matthews, W., Yates, J., and Yates, W. July 12.

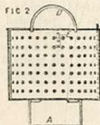
Heating water.—The water to be heated is contained within the coil B, which is in communication with the cylinder D in the ordinary way. The coil is heated by the steam within the chamber A, the water of condensation being removed by the steam trap C or allowed to return to the boiler by



gravity. In a modification, the steam traverses the coil while the water circulates outside.

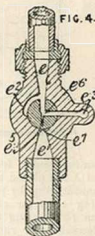
10,913. Pratt, H. J. July 12.

Boiling pans.—Provision is made by means of a perforated container for supporting articles to be treated within culinary boilers, coppers, pots, pans, and the like. The arrangement is specially applicable for steaming or boiling vegetables. The container may be supported upon the folding feet A or hung by hooks E. Handles D may be also provided. The container may be made in halves, hinged or secured together by pins.

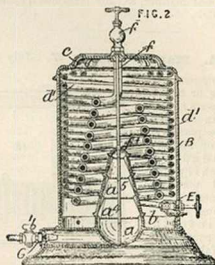


10,949. Cook, S. G. B., [Ward, R. G.] July 14.

Heating water.—Relates to heating apparatus for cleaning pipes by steam and water. A vessel B contains two coils of tube d^1 and f^1 , through the former of which the water descends, and is warmed on its way; it then passes through a tap E into the second coil f^1 , which it enters in the form of a jet, and is there converted into steam. The steam leaves the coil f^1 through a tap f , and passes through the pipe to be cleaned. The tap E is then turned so as to admit a full flow of water, first hot and then cold, into the pipe to be cleaned so as to wash it out. The gas burner for heating consists of a chamber a , into which gas is admitted through a tap I, and air, which mixes with the gas, enters through a revolving perforated plate G. The chamber a is surmounted by a series of covers a^1, a^2 , &c., which are serrated at their junctions to allow the gas to escape, and turned up at the edges to form deflectors for the flame. The chamber B has air inlets and outlets at b and c , the orifices being covered by sliding plates to regulate the opening. The cock E is shown separately in Fig. 4. In the position shown the water passes from the inlet e through the taper orifice e^1 in the plug e^2 to the outlet e^3 . When desired, the water can also be drained from the inlet into a passage e^4 connected to a pet cock, and by turning the plug the outlet e^1 can also be so connected. The channel e^5 in the shell allows a



more copious flow from the inlet to the outlet when the plug is turned into a suitable position.



10,962. Vasson, R. G. de, and Societé Dite La Suberine. July 14. Drawings to Specification.

Non-conducting compositions.—Rasped cork is mixed in a dry state with burnt sulphate of lime and sesquioxide of iron or other colouring-matter, and the mixture is incorporated with dextrin or glue in either a dry or dissolved state. Into the mixture may be introduced ashes, puzzolana, or cements, and also fireproofing-substances such as soluble silicates, ammonium phosphate, or sodium tungstate. For building materials adapted for humid places, the cork is metallized by an oxychloride, such as oxychloride of zinc, or magnesia or magnesium chloride. To adapt the composition for various uses any of the following materials may be introduced, viz.:—India-rubber, gutta-percha, animal or vegetable fibres, cements, or lime milk to which zinc silicates, zinc chloride, potassium silicate, or sodium silicate has been added. The metallized cork compositions are suitable for non-conducting coatings for steam boilers, steam pipes, and distilling, drying, and heating apparatus.

11,027. Hanmore, H. M. July 15.

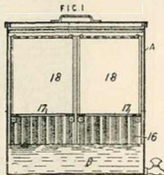
Non-conducting coverings and compositions for pipes, boilers, &c. The composition is made up of fossil-meal, carbonate of magnesia, and animal, vegetable, or mineral fibre. The covering is preferably formed of moulded sections A, which have their extremities a^1 alternately outwardly bevelled and undercut, whereby interlocking joints are provided and the



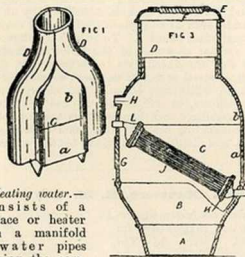
liability of the escape of heat at the junctions diminished. The covering may be secured in any convenient manner, as, for instance, by means of straps C.

11,044. **Martinot, M. L. W.** July 15.

Boiling-pans for washing or bleaching apparatus. The pan or vessel A, to be placed on a fire or stove, is provided with vertically-corrugated partitions and inner walls 16 extending downwards into the water space B, and with a false bottom 17. The linen and other domestic articles to be cleaned are sorted into boxes 18 constructed with perforated bottoms and provided with handles for facilitating their removal from the compartments of the vessel A. In operation, the boiling liquid rises round the sides of the vessel A and overflows into the boxes 18, and thus circulates through the linen. Steam also comes into contact with the linen from beneath and assists in loosening the dirt.



11,064. **Lake, H. H.,** [Bottsford, R.]. July 15.

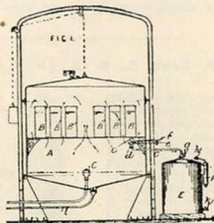


Heating water.—Consists of a furnace or heater with a manifold of water pipes crossing the combustion chamber.

Fig. 3 shows a vertical transverse section of the whole, and Fig. 1 an external perspective view of the upper portion. The heater is made up of superposed sections, namely (1) a grate section A circular in form, (2) a firepot section B presenting in plan a rectangular centre with semicircular bays at the ends, (3) a rectangular combustion chamber C in two parts a, b, and (4) a

A-shaped magazine section D which fits over the combustion chamber and rests on the semicircular bays of the firepot B. The two parts of the magazine section are kept together by a top E with a feed-aperture covered by a lid F. The fuel finds its way laterally through the bays to the firegrate. The combustion chamber is provided with a door G and smoke exit H. The manifold consists of straight tubes connecting heads K provided with funnel-shaped caps L connected to inlet and outlet pipes. The ends of the tubes are tinned and expanded into threaded holes in the heads, after which a filling of lead is run round the projecting lips.

11,554. **Redfern, G. F.,** [Gronwald, J. F. H., Oehlmann, E. H. C., and Neuhaus, G. H.]. July 23.



Heating liquids for sterilizing purposes. In the vessel A are placed three annular vessels B, B', B'', communicating by passages with one another, for holding milk or other liquid to be sterilized. Steam for heating the vessels enters at C, while condensed water runs off through l. In connection with the vessel B is a short tube c, provided with a three-way cock d, operated by a rod e, and connected to tubes f and c. The latter leads to a receiving-vessel E for the sterilized liquid provided with an air filter F and valves g, h, and k. While the milk &c. is being heated, or before, the vessel E and air filter F is sterilized by passing steam through f and valves d, g, and h. When heated sufficiently, the milk &c. is withdrawn into the vessel E without exposure to the air. Instead of annular heating-vessels, other arrangements may be made, and the communication between the vessels may be made outside the main vessel instead of inside.

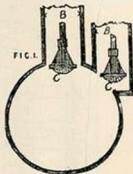
11,560. **Schaaf, A.** July 23. *Drawings to Specification.*

Heating air for use in drying stoves or furnaces for bricks, ceramic articles, and the like. The

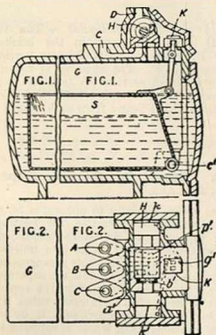
air-heaters consist in one case of a series of pipes through which steam, water, or other agent is travelling, while in another case the air is heated by passing over the exterior surface of an annular furnace or kiln.

11,752. Welch, W. July 28.

Heating buildings.—Gas burners, preferably of the kind described in Specification No. 5293, A.D. 1890, are fixed in boxes in the walls, ceilings, floors, and chimneys of buildings. Fig. 1 shows the application of the invention for ventilating sewers.



11,779. Picking, G. G., and Hopkins, W. July 28.



Heating water.—Relates to feedwater-supplying apparatus stated to be applicable for steam or other boilers. Water is automatically supplied from a chamber which is alternately placed in communication with the boiler and the source of supply. Fig. 1 shows a sectional elevation of one arrangement, and Fig. 2 a plan. The opening and closing of the passages to the water supply and the boiler is regulated by the steam-actuated slide

valve H. In the position shown, steam, which has constant access to the valve casing by the inlet D, is passing into the interior of the float chamber G through the ports a^1 , b^1 , while water, overflowing into the hinged cistern float S, is escaping to the boiler through the trunnion c^1 . On the float rising by the escape of water therefrom, the auxiliary slide valve K is simultaneously operated. In consequence of this the puff-port g^1 is uncovered, steam passed to the end k of the main slide H, and the exhaust from the end k^1 put in communication with the exhaust cavity of the auxiliary valve, and, by the passages open for it, with the main exhaust outlet B. The main valve having then moved to the other end of the casing, the water-supply pipe C is placed in communication by a cavity in the valve and the port a^1 with the float chamber, while the steam communication with the boiler is cut off. This continues until another stroke is effected by the rising of the float. Other suitable methods may be employed for actuating the auxiliary valve. When the feed-chamber is below the level of the boiler, the water is forced from the chamber by the steam pressure to a vessel at a higher level from which the air and exhaust steam is received by the inlet A, and so on to the main exhaust B. When the pressure in the higher vessel becomes the same as that in the boiler through the reversal of the main slide, and the consequent opening of the port p^1 , the water descends to the boiler by gravity. The same result may be obtained by interchanging the position of the two vessels. The arrangement above described is specially applicable for marine purposes in supplying the boilers with the water of condensation.

11,870. Redfern, G. F., [Oehlmann, E. H. C.]. July 29.

Heating water.—Relates to apparatus for heating water for baths by spraying the water in the paths of heated gases. The sprayer A to which the water is supplied is made up of series of a perforated concentric rings secured together by a central rod and screw d . The perforations, although preferably divergent, may be otherwise arranged. The water as it passes out is heated by the products of combustion from gas burners below, the heated water passing away through the funnel-shaped chamber E. Moreover the gases capable of absorption from the burners are taken up by the issuing water.

