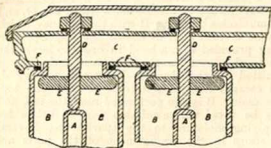
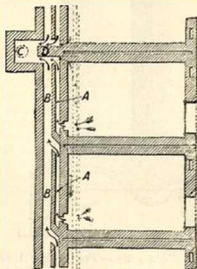


9223. Leeds, L. W. July 31.



Heating buildings &c.—Reference is made to Specification No. 511, A.D. 1883. The radiator tubes are fitted with one or more internal divisions A so as to form two or more pipes B with common inlets and outlets. They are secured to the end chambers C, either directly by screwing, or by means of bolts D passing through the chamber and held by nuts E; F is asbestos or other suitable packing.

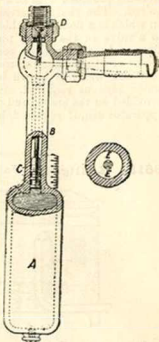
9262. Boyle, R. Aug. 1



Heating buildings.—Relates to arranging the heating and ventilating passages of prisons &c. so as to prevent the transmission of sound from one cell to another. For this purpose, each cell is made to communicate by an independent passage A with a parallel passage B leading to an upcast shaft C provided at the top with a ventilator and at the bottom with gas flames &c.; D is a baffle wall. Passages may be similarly arranged for the admission of atmospheric or heated air. In existing buildings where it is inconvenient to make the passages in the walls, they may be made inside the cell by special conduits having double casings packed with some bad conductor of sound.

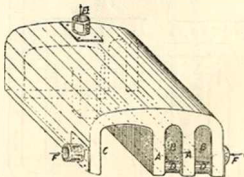
9453. Justice, P. M., [Holmes, J. E.] Aug. 8.

Thermostats.—Fire-extinguishing gases or liquids, such as water, carbonic-acid gas, carbonic oxide, sulphuretted hydrogen, and ammonia, are compressed into receivers having soldered joints with asbestos packing. The flow of the liquids and gases is regulated by a thermostatic governor, which consists of a bulb or receiver A containing mercury, and having a neck B in which is fitted a piston C the rod of which actuates the inlet gas valve D. The piston-rod is grooved at E, E to allow the gas to pass. The apparatus may be fitted in elevator shafts in buildings or in rooms,



and an alarm whistle may be placed in the discharge pipe. For refrigerating purposes the apparatus may be fitted on railway carriages, or may be used in arrangements for cooling hospitals or rooms, or for cooling burial cases; or for controlling hot-water or steam heaters for buildings and railway carriages. The governor may be placed in safes with the pipes in the casing to protect them from fire or burglars. Petroleum, alcohol, or other liquids may be used instead of mercury in the governor.

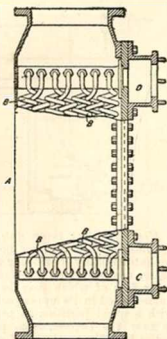
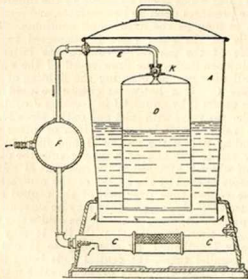
9492. Anderson, J. Aug. 10.



Heating water.—A saddle-shaped circulating boiler is made with vertical continuations A which, with the setting, form a continuous horizontal flue B from the fire-chamber C. Pipes D, D connect the water spaces A, to assist circulation; E, F are flow and return pipes.

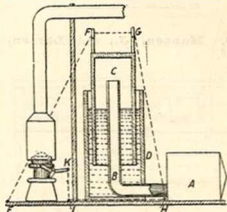
9852. Kirkaldy, J. Aug. 19.

Heating liquids.—The apparatus is particularly adapted for heating feedwater in the smoke-box of a locomotive, but may be used for heating for other purposes. It consists of a casing A through which the exhaust steam passes, heating during its passage the helical tubes B, B, which pass from both sides of the lower tubes (one of which only is shown), to the upper ones, one of which also is shown. The lower row communicates at one end with a chamber C, to which the feed is supplied by a pump or injector, through a dirt arrester, and the upper with the chamber D, from which the feed is led to the boiler by a pipe not shown.

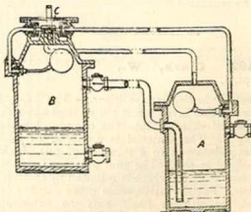

9971. Royle, J. J. Aug. 22.


Heating water; thermostats.—Relates to means for automatically controlling the gas supply to the burners of gas-heated apparatus for boiling water. Within the boiler A is fixed a bell D in which steam accumulates, and is passed by a pipe E to a chamber F where it is mixed with the gas, and the mixture passed to the burner C; K is a valve to prevent the passage of gas to the boiler. The bell

may be dispensed with, if desired, and in the case of a boiler for generating steam under pressure, the chamber F is fitted with a weighted escape valve. The bell may be made to float, and connected by a rod to a valve in the gas-supply pipe, which is made to pass through the upper part of the boiler.

10,049. Gedge, W. E., [Perry, H. F.]
Aug. 25.


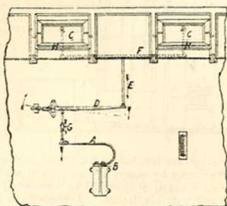
Thermostats for incubators &c. The air chamber A communicates by means of the pipe B with the interior of a vessel C inverted in a vessel D containing any suitable liquid. A cord fixed at E and passing over guide-pulleys F, G, H, and I is attached to a lever K which regulates the flame. The rising and falling of the vessel C, due to the expansion and contraction of the air in A, controls the flame of the burner.

10,148. Royle, J. J. Aug. 27.


Steam traps combined with boiler-feeding apparatus, for steam heating-systems. The trap A is situated at the lowest part of the system and is connected by the pipes shown with a receiver B. This is fixed at a higher level than the boiler so that it can feed it by gravity. It is provided with a valve-chest C containing a slide valve to which

are connected two pistons, behind which are pipes opening to the vessels A and B respectively. As the water collects in A, it raises the float shown and opens a valve covering the pipe leading to the right-hand piston aforesaid. This upsets the equilibrium of the valve, which is therefore moved to the right, and steam is turned on to force the water out of the trap into the receiver. When this becomes full a float valve within it is operated, and the slide valve is once more in equilibrium.

10,479. Hansen, J., and Larsen, F.
Sept. 4.

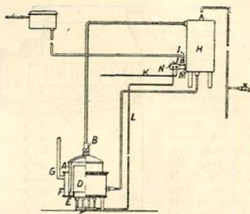


Thermostats for regulating ventilation. A compound bar A, made up of two dissimilar metals such as brass and steel, is fixed at one end B and connected at the other to the ventilators C by means of a system of levers G, D, E, F, H. The rod G is made in two parts connected by a socket with right and left handed screws, by means of which the amount of opening of the ventilators may be regulated.

10,492. Clark, W., [Fagnet, E. E.]
Sept. 4.

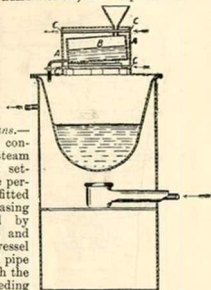
Non-conducting compositions.—The essential feature of this invention is the method of solidifying the oil entering into the compound without boiling it. The material is produced by adding certain substances to a mixture of oils of which linseed oil is one. The first substance added is carbonate of lime, which is followed by chloride of sulphur. For the latter, some other sulphur compound, or sulphur itself, may be substituted. These having been mixed till a firm paste has been obtained, pulverized substances, such as sawdust, eggshells, and gutta-percha, are added and the whole is ground by rollers to form a coating for boilers &c.

10,555. Foullis, W. Sept. 7.



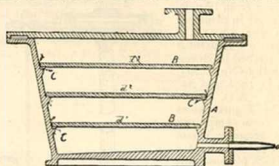
Heating water; thermostats.—Relates to means for heating the water for hot-water supply, and for automatically controlling the gas supply. The heater consists of an annular water space A the inner face of which may be corrugated. It is dome-shaped in its upper part, which is furnished with a spiral partition to prevent the water, fed in near the bottom, from passing direct to the outlet B. The products of combustion from the burners C pass upwards through a central tube D, downwards between it and the inner water casing, and through openings at E upwards between the outer water casing and a casing F to the chimney G. The water may be drawn directly from taps or valves connected directly with the heater A, or an intermediate hot-water cistern may be used. In the former case, to the inlet of the heater is fixed a lift valve which opens by reason of the difference of the pressures upon its two surfaces, and remains open so long as the drawing-off continues. The spindle of the water valve is connected to the spindle of the gas valve, causing the latter to remain open during the drawing-off of the water, a small pilot gas jet ensuring the lighting of the burners C. If a hot-water cistern be used the water enters it by an inlet I in a casing J containing the gas valve with inlet and outlet pipes K, L. This valve is attached to an iron or other rod extending within the cistern H and fixed by its other end to one end of a copper tube the other end of which is attached to the casing at M. It is therefore opened by the excess of the contraction of the copper tube over that of the central rod. In some cases the copper tube may be surrounded by a perforated casing to retain the cold water for a longer time in contact with it; it may be virtually lengthened by attaching to it one or more parallel tubes, the central rods being connected by means of levers; or the gas valve may be screwed on its spindle so that its range of motion may be adjusted by means of an index traversing a dial on the end cover N. In a modification of the latter, the copper tube operates the valve by means of a lever, the range of motion of which may be regulated by a screw.

10,593. Hainsworth, B. Sept. 8.



Boiling-pans.—In order to condense the steam arising from set-pans, over the perforated lid is fitted a dome or casing A, traversed by air tubes C, and containing a vessel B or a coiled pipe through which the water for feeding the pan passes.

steam is delivered by a branch in the cover, and passes from chamber to chamber, past the edges of the discs, and through semicircular grooves C, C, in the upper surface of the ledges, or lower surface of the discs. From the lower chamber the



water escapes by a pipe ending in a nozzle the opening of which can be adjusted to suit the amount of water to be discharged. The discs are preferably of a more expansible material than the casing, so that, in the event of steam of higher pressure reaching the apparatus, their expansion contracts the steamway past their edges. They may also, with advantage, be of a material which floats in water, so that should water collect faster than it is being discharged, the disc forming the roof of the chamber in which it collects is lifted, and thus a greater pressure of steam brought to bear on the water's surface, by which it is expelled. In place of discs, balls of caoutchouc or similar elastic material may be employed, in which case each ball is made slightly larger in diameter than the ledge above it, so that the latter acts as a stop, when the ball is lifted by an excess of water collecting in any one of the chambers.

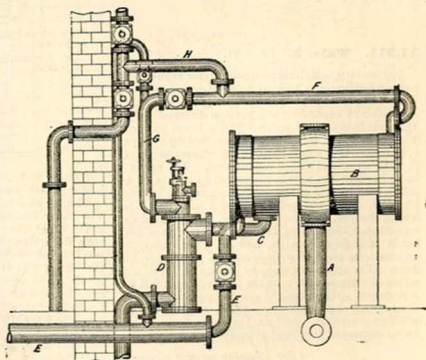
10,630. Imray, O., [Richard, C.]. Sept. 8.

Steam traps.—Any steam entering this trap is condensed by passing through small passages, connecting a series of chambers, the bottom one of which has a discharge pipe, with a nozzle which is regulated to deliver a quantity of water equal to the condensation constantly taking place. One form is shown in section in the Figure, in which A is a vessel of metal or glass, with a number of ledges round the interior supporting-discs B, B, which divide it into a series of chambers. The

10,694. McNab, A.

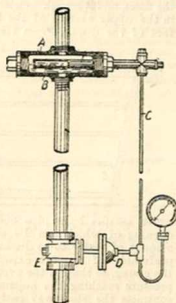
Sept. 9.

Heating water.—Relates to condensers for steam engines, in which the circulating water forms a hot-water supply for use in bleaching, dyeing, or washing operations. The exhaust steam from the engine is passed through the pipe A into the small surface condenser B. The condensation is completed by the steam passing through the pipe C to the jet or ejector condenser D. Cold circulation water is supplied to the surface condenser through the pipe E, and after being heated passes into the pipe F, part being led as hot-water supply through H. The remainder, after being mixed with cold water in the pipe G, enters the jet condenser and completely condenses the steam from B.



11,907. **Murrie, J.** Sept. 15.

Steam traps.—Relates to apparatus for separating vapours from liquids, similar in principle to the thermometric apparatus described in Specifications No. 15,947, A.D. 1884, and No. 303, A.D. 1885. The Figure shows a form employed to separate steam from water, for which purpose this method is particularly applicable. The water from the vessel to be drained collects in a chamber A in which is a tube B containing some highly-expandable liquid, which communicates by means of the pipe C with a chamber D closed by a diaphragm, the motion of which operates the cock E on the discharge pipe from the vessel A. Thus, when a certain amount of water has been received into the vessel A, the liquid in the tube contracts, and in so doing opens the discharge cock to allow the water to escape. The greater surface of the tube now exposed to steam in the vessel A causes expansion of the liquid, and therefore closure of the discharge cock, which remains in this position until the predetermined quantity of water has again collected.

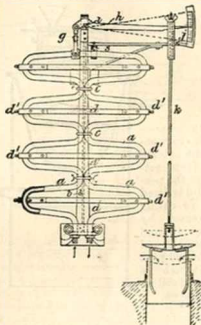


11,211. **Walz, A.** Sept. 21.

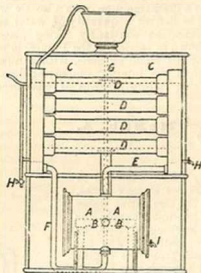
Thermostats.—Relates to apparatus for regulating and indicating the temperature of steam, water, &c. The steam &c. is passed through a bent tube *a*, capable of expanding in a vertical direction only, the ends being firmly secured to the lower part of the frame *b*, the inner bends connected by clamps *c*, and the outer bends secured by transverse stays *d*, with set-screws *d'* for adjustment. The uppermost bend of the pipe is connected by means of a link *g* to a lever *h* pivoted at *i*, carrying an index-finger *j*, and connected to a rod *k* attached to a valve, damper, or other regulator. When used as an ordinary thermostat, the coil and the frame are made of different metals, and the frame may, in any case, be covered with some bad conductor of heat. The apparatus may, by means of levers or of an electric circuit, be made to operate signals at a distance. When used in connection with water-heating apparatus, the uppermost bend is fitted with an air valve *s*, and in the case of air or gas being employed this bend is perforated.

(For Drawing see next column.)

11,211.

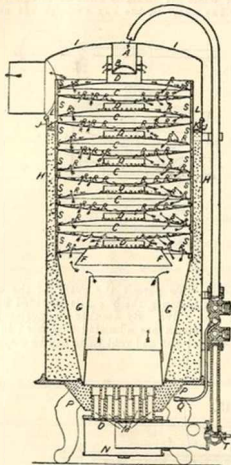


11,411. **Sephton, J.** Sept. 25.



Heating water.—Consists of a boiler or water-heater which may be connected to a circulating system, or used independently as a warming-stove. The boiler A is formed of two cylinders, one within the other, the annular water space being fitted with deflecting-plates, which cause the water to traverse both ends of the boiler before arriving at the outlet. It is perforated below in order to admit a gas or other burner B into the inner cylinder, and above to allow of the escape of the products of combustion. These, instead of passing direct to the chimney, may be passed into a box C containing a coil of pipes D connected to the boiler by pipes E, F. G is the feed pipe, and H, I are waste pipes.

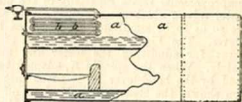
11,437. Hearson, C. E. Sept. 25.



Heating water.—Relates to geysers or apparatus for heating flowing water. The water enters the apparatus at the top by a pipe A with strainer B, and flows in succession over a number of trays C, each (with the exception of the lowest one) formed of a pair of curved perforated plates, with their concave sides facing each other. Each of the perforations R is provided with a raised rim to prevent the water passing through; the uppermost plate of each tray is fitted with a perforated cup D to receive the water from the tray above, and is perforated round its periphery for the passage of the water to the plate below; and each tray is surrounded with a deep flange S to support the superposed trays. The lowermost tray E of the series is formed of a single plate similar to the uppermost of each pair. F is a guard to direct the water into the conical part G, from whence it is withdrawn. The apparatus is enclosed in an outer casing H, packed with some bad conductor of heat, and is covered with a lid I, provided with a flange J, which takes into a channel K normally filled with water; L, L are perforations to allow the surplus water to escape into the apparatus. It is heated by a gas burner, consisting of a number of tubes M with asbestos nozzles, communicating with a mixing-chamber N, and provided below with a diaphragm O of wire gauze, which may, if desired,

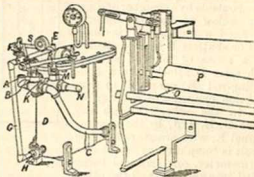
be placed within the tubes; P is a screen of perforated metal, and T is a pin valve for regulating the gas supply. The upwardly-directed arrows indicate the passage of the products of combustion, and the downwardly-directed arrows that of the flowing water. In order to prevent the gas cock from being opened until the water is turned on, and to prevent the water cock from being closed before the gas cock, the two cocks are formed in the same casting or placed side by side, and the plugs of each is secured a disc having a portion cut away, the discs being so near each other that they can be turned only in the required order. Q is a pilot jet, connected with a cock, placed between the water and gas cocks.

11,507. Stubbs, J. S., and Stubbs, S. H. Sept. 28.



Heating water for baths, laundries, hot-water supply, &c. The water is passed through a coil of pipes b within a steam boiler a, and thence into a receiver mounted in front of the boiler and communicating also with the cold-water supply, and fitted with a thermometer. From the receiver the water is withdrawn for use.

11,864. Hitchon, A. Oct. 6.



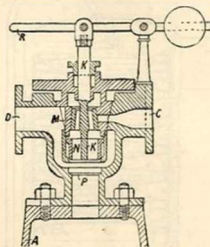
Boiling-pans for boiling size under steam pressure. The size is forced through a pipe A, valve B of special construction, and pipe C to the size-boiling box D. The steam pipe E has a loaded valve F and communicates by a pipe G and tap H with the box D. The discharge pipe K has a weighted discharge valve M from which extends the pipe N into the size-box O. The float roller P is connected by a lever and links with the lever R of the valve B. The action is as follows:—The valve F being adjusted and the tap H opened, steam passes to the box D until the pressure in the latter opens the discharge valve M,

whereon size is discharged to the box O, the inlet of cold size being controlled by the float roller P. A finger on the cross-shaft of the valve B comes in contact with a projection on the lever S of the valve F for the purpose of lifting the said lever at intervals by the action of the float, to prevent the valve from getting fast. A four-way tap for diverting the flow of size is employed in connection with the pipes A and K, box D, and a pipe for drawing off size for inspection.

12,080. West, H. J. Oct. 10.

Heating liquids.—Relates to valve apparatus, applicable for heating water or other liquids by steam, by which steam and water &c. are admitted, either together or alternately, into a water box or tube, from which they pass through a nozzle. The improvements relate especially to the steam and water valves, which are arranged on the same spindle so as to be simultaneously operated by a hand-lever. The Figure shows a section of the apparatus for admitting the water and steam alternately. When the spindle K, adapted to be operated by the hand-lever E, is lifted into the position shown, the steam valve M shuts off the steam which enters through the opening C, and the water valve N being lifted from its seating P, access to the water box A is given to the water which

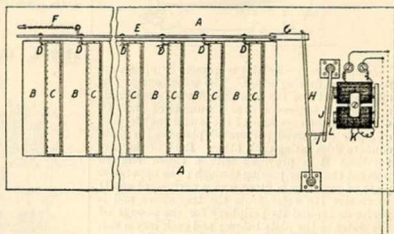
enters through the opening D. On depressing the spindle the reverse process occurs, *i.e.*, the water is shut off while the steam is allowed to enter, thus forcing the water in the box through the nozzle



referred to. To permit the entry of the water in the first instance, the box A is provided with a special vent valve. By another arrangement the water and steam are admitted together; in this case the water box and vent valve can be dispensed with.

12,193. Thompson, W. P., [Tucker, C. A.]. Oct. 13.

Thermostats for regulating the temperature of the air in rooms, halls, churches, &c. In a frame A, fitted into a part of a window or other suitable opening, and protected outside by a chamber of glass open below to the atmosphere, are fixed a number of inclined slats or shutters B between which are a series of pivoted slats C with arms D attached to a connecting-rod E operated in one direction by means of a spring F, and in the other, through the levers G, H, I, J, by the electromagnet K, with armature L. The circuit is completed by means of a thermometer, one terminal being sealed into the bulb and the other

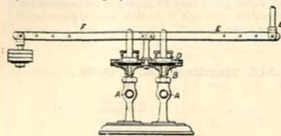


into the stem at the point to which the mercury rises at the desired constant temperature. A series of such thermometers may be arranged on a suitable stand, any one being, by means of a suitable switch, placed in circuit, according to the standard of temperature desired. In order to preserve the mercury of the thermometers, they may, instead of forming part of the principal circuit, be included in a relay circuit, an electromagnet in which, by the attraction of its armature, completes the main circuit.

12,398. Kelly, R. R., and Akester, W. H. Oct. 17.

Thermostats for incubators or fostermothers. Two strips of metal having different ratios of expansion are associated in such a manner as to make contact between a battery and an electromagnetic device, causing a door or shutter in the box to open, or actuating a cover or damper over the outlet of the flue, when any predetermined degree of heat is reached.

12,716. Brough, R. Oct. 23.



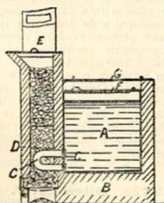
Thermostats.—Relates to apparatus for working ventilators, regulating the temperature of ships' holds, warehouses, hay ricks, &c., actuating alarms, and opening and closing valves, fire-doors, or the like. The expansion of any suitable liquid or gas contained in the tube A actuates, through the medium of a cup-leather or of an elastic diaphragm B, a piston D connected by means of levers E to the ventilators, valves, or other regulating-apparatus, or by electrical means to fire-alarms &c. A similar arrangement provided with a weighted lever F acts as a safety-valve or regulator. A pressure gauge may be attached to the tube A and graduated so as to indicate temperatures as well as pressures.

12,780. Mewburn, J. C., [Martiny et Cie., J. L.]. Oct. 24.

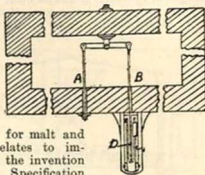
Non-conducting coverings.—Non-conducting substances or mixtures are inserted into supple sheaths of fibrous or other suitable substances, which are then wound spirally round the objects to be protected and secured at the ends. The sheaths are preferably made of cotton plaited as in lamp-wicks, and may be filled either during or after their manufacture.

12,923. Henly, T. L. Oct. 27.

Heating liquids for flax-steeping purposes. The tank A in which the flax is steeped is set in a suitable framework B, and is heated by the circulation of the liquor through one or more curved pipes C, part being within the fire portion of a slow-combustion stove D.



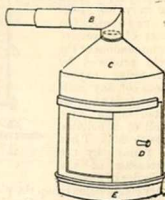
13,006. King, H. J. H. Oct. 29.



Thermostats for malt and hop kilns. Relates to improvement on the invention described in Specification No. 5274, A.D. 1879. A metallic rod A, or rods A, B connected by a lever, are fixed at one end to the wall of the kiln, and at the other to mechanism D for actuating a ventilator. The ventilator is mounted on knife edges to make it turn more easily, and is fitted with a locking-arrangement, consisting of two pawls acting on a sector, to prevent the wind from moving it. Instead of actuating the ventilator directly by levers, the expansible rod may direct a stream of water into a trough on the end of the lever of the ventilator when it is desired to open it. Or the ventilator may be actuated by a ring composed of metals of different expansibility, or the expansion of a liquid may act on a "Bourdon" gauge or a piston.

13,094. Barton, W. W. Oct. 30.

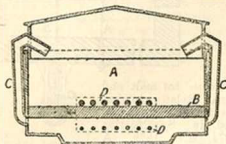
Boiling-pans or open-topped boilers for washing, brewing, and cooking. A cover or top is made to fit on the top of the boiler to carry off the steam. The steam may be passed into a chimney or condensed by a worm immersed in water. The bottom edge of the cover E fits into the boiler. D is a sliding door in the side of the cover for giving access to the boiler. C is a conical top to the cover, on the top of which is fitted a bent pipe capable of turning in any direction on the cover. The escaping steam passes through the pipe B.



13,225. Dannmeyer, M. F. D. C. Nov. 3.

Boiling-pans.—Relates to apparatus for washing clothes. Above the bottom of the boiler A a non-conducting diaphragm B is fixed. Tubes C, C convey hot water from the lower part of the boiler, and project it upon the clothes contained in the

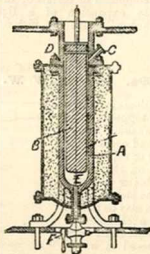
upper compartment, water from the latter passing through the apertures D and an outer channel into the lower part of the lower compartment. Guides may be placed about the lower apertures D to direct



the water downward and prevent it from disturbing the upward current, and valves may be placed over the lower apertures to prevent reverse currents. The tubes C, C may be inside or outside of the boiler.

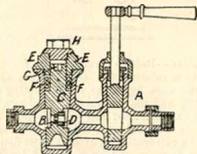
13,466. Solvay, E. Nov. 6.

Heating air and other gases. — Relates to apparatus for compressing and exhausting air or other gas for producing and maintaining very high or very low temperatures. The heat of successive compressions or the cold produced by successive expansions of any suitable gas is accumulated upon the wall of a suitable vessel A. This is formed by the extension of the cylinder of an ordinary compression pump the piston B of which is also lengthened as shown. For high temperatures the walls of the chamber are lined with, and the piston B is formed of, suitable refractory material, the former being also encased with non-conducting material. The inlet valve C and the outlet valve situated about D are separated from the heated walls by a packing of wire gauze &c. The materials to be heated &c. are placed within the space E or in an adjoining reservoir communicating with it and are withdrawn by means of a stop-cock F or by removing the lower part of the sheath. For cooling purposes the operation is reversed, the gas entering the apparatus compressed and leaving it expanded, heat being continually abstracted. This invention is especially applicable for the fusion of metals &c., and for the liquefaction of gases. If a



gas, not readily condensable, such as hydrogen, be used, other gases may be liquefied by causing them to circulate through a hollow casing surrounding the chamber.

13,516. Hardingham, G. G. M., [Gronelle, P. J.], Nov. 7.

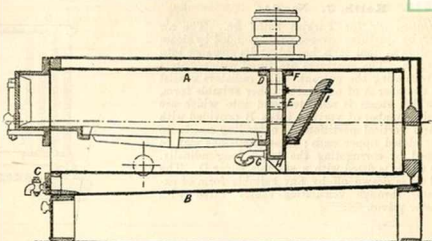


Heating buildings &c.—Relates to systems of steam supply for heating purposes, and consists in means for regulating the supply of steam to the heaters in the various places or apartments to be heated. This is effected by means of a regulator or gauge cast in one piece with or simply attached to an ordinary stop-cock A, and by varying the pressure of the steam supply. The gauge consists of a removable washer B, the diameter of the central aperture of which is carefully determined; and it is secured in position in the plug C by means of a screwed socket D. The plug has side recesses in addition to the through-way shown, and is secured by means of a screwed cap E and spiral spring F, and, by means of a slit G, it may be rotated through one or two right-angles, the first, when the side recesses come in use, in order to clear the pipes from obstructions and for rapidly raising the temperature &c. when starting the apparatus, and the second in order to clear away obstructions from the gauge itself; it is also provided with a protecting-nipple H. The places to be heated are fitted with heaters or radiators of various types supplied with steam by branch pipes fitted with gauges of suitable size; the return pipes are fitted with spring valves having spherical seatings, and terminate in a receiver for condensed water. The boiler is supplied with a pressure gauge and also with an additional scale indicating the variations in the steam pressure rendered necessary by variations in atmospheric conditions indicated by a suitably-placed thermometer. Should the boiler be used for purposes other than heating, an expansion chamber is placed on the supply pipe and a pressure gauge and the special scale are fitted in connection with it. The variations in steam pressure are effected by manipulation of the boiler, mixing with the steam a suitable quantity of air, or by other means.

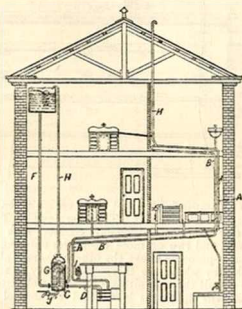
13,725. Silvester, F. Nov. 11.

Heating water for hot-water heating apparatus &c. The annular boiler A is made of a slightly-conical form and with a channel in the lower part of the outer shell B leading to a door C in front for clearing

out. It is divided and supported by one or more hollow bridges D traversed by flue tubes E and connected to the water space of the boiler at several points either by means of flanges F or by bent pipes G; H is a door for communicating with the space behind the bridge, and I is a baffle-plate to retard the escape of the products of combustion. If desired, a simple perforated plate may be used.



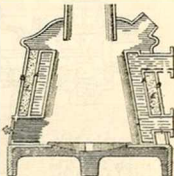
13,757. **Hollingsdrake, C. H., and Stanfield, W. H.** Nov. 11.



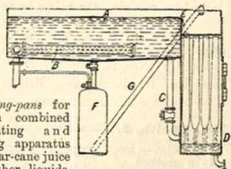
Heating buildings.—Relates to hot-water apparatus for supplying baths &c. with hot water and for warming rooms. The hot water is drawn, by means of branch pipes, from the flow pipe A of the boiler, which may be situated behind the kitchen fire, the return pipe B opening into the hot-water cistern C, which is connected to the boiler by means of a pipe D. The hot-water cistern is supplied from a cistern E by means of a pipe F, which enters near the bottom, passes upwards through the cistern, and terminates in a cap G perforated on its under surface. H is an air pipe, I is a safety-valve, and J is a waste tap.

13,777. **Blezard, T.** Nov. 12.

Heating water.—In circulating-boilers the body of the boiler A is surrounded by a casing B, and the intervening space is filled with some non-conducting material E.



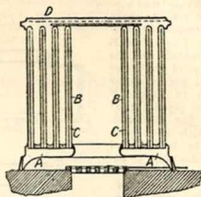
13,792. **Ewing, A. C., [Shields, T.]** Nov. 12.



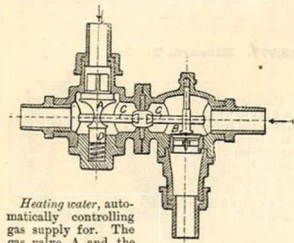
Boiling-pans for use in combined eliminating and filtering apparatus for sugar-cane juice and other liquids. The liquid is placed in the open pan A and heated by the steam coil B. When in a state of ebullition the lower portion is drawn off by the pipe C to the bottom of the filtering-chamber D, while the upper portion, with the scum &c., flows over the partition E and runs through the filter. The last portion may be run into a separate closed vessel F and then forced to the top of the filter through the pipe G by steam pressure.

13,918. Keith, J. Nov. 14.

Heating air for Turkish baths &c. The air enters by apertures covered or surrounded by steam radiators so that it is heated at its entrance into the room. The apertures are fitted with registers for regulating the current. The radiators consist of a chamber A of annular or other suitable form, to which steam is admitted and into which are fitted a number of vertical tubes B provided with central vertical partitions C extending nearly to their closed upper ends; these partitions may be formed by corrugating the tubes longitudinally. The whole is fitted with a suitable cover D. The foul air is drawn off by any suitable form of exhauster through ventilating-shafts fitted with register valves.



13,957. Fletcher, T. Nov. 16.

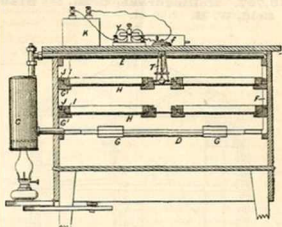


Heating water, automatically controlling gas supply for. The gas valve A and the water valve B are connected together, being carried at the extremities of a lever C passing through and turning about a flexible diaphragm separating the two chambers containing the valves. A spring D or its equivalent is used for retaining the valves in the closed position.

13,998. Allison, H. J., [Bassini, C., and Heyden, A.]. Nov. 17.

Thermostats for incubators. Relates to an

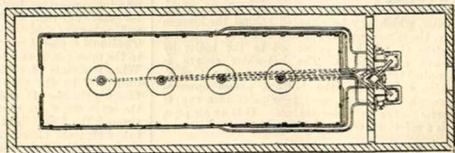
electrical device for maintaining constant temperatures in the incubator. At T is a circuit-closing thermometer in connection with a battery K. On the top of the incubator box is an electromagnet Y provided with a pivoted armature which



opens a damper for the hot air to escape when the battery circuit is closed. The thermometer T has one electrode in permanent contact with the mercury, and two or more electrodes entering the mercury space one above the other; there is also a switch γ by which the thermometer may be set to make circuit through either of the said electrodes, so that the apparatus is enabled to control the damper at two or more temperature points.

14,235. Keith, J. Nov. 20.

Heating water. — Relates to a method of heating and circulating the water in swimming-baths and ponds. In the case of large baths, the hot water is supplied through inlets in the sides, extending round in a single line near to the bottom and placed closer together at the deep end of the bath.

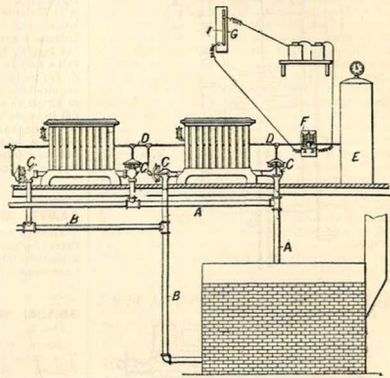


The inlets are arranged in sections which are supplied independently from the boiler. The water outlets, which are arranged in a middle longitudinal line in the bottom of the bath, return the water to the boiler. Each outlet is provided with a grating, and is surrounded by an annular depression to intercept dirt &c. The boiler is provided with a vertical pipe rising to a point above the water level of the bath, which acts as an overflow pipe in the event of the supply cocks being closed. In the case of small baths the inlets are fixed in one end and the outlets in the other.

14,746. Johnson, W. S. Dec. 1.

Heating buildings; thermostats.

—Relates to a system of temperature regulation for steam, hot-air, or other heating-apparatus, the steam or hot-air generator being placed in the basement of the building to be heated, and being connected by circulating-pipes with coils or radiators as shown. The valves of the apparatus, normally kept open by means of springs, are closed by means of fluid under pressure controlled by a valve operated by an electromagnet in a circuit which is made and broken by means of a suitable thermostat. A, B are the supply and return pipes fitted with valves C. In these valves the opposite end of the valve rod carries a spring diaphragm or piston forming one side of a chamber to which fluid (such as air, water, &c.) under pressure may be admitted by pipes D from a reservoir E, all the valves opening in the direction of the steam &c. supply. The valve F controlling the supply of compressed fluid is a piston valve, normally closed by means of a spring, and is opened by means of an electromagnet governed by a thermostat G.



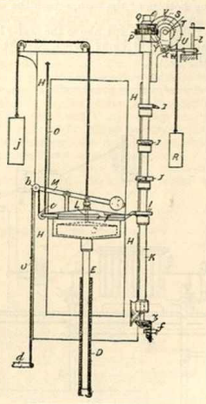
14,771. Kocherthaler, S. Dec. 1.

Thermostats for regulating the temperature of rooms, drying-apparatus for malt, &c. By the expansion of a suitable volatile liquid mercury is forced along the tube D connected by means of a flexible or telescopic tube E with a vessel F containing a float, itself connected by means of levers L, M and the cord O to the lever *d* of a valve or other regulating-apparatus; the pulleys *b*, *c* are carried by the lever M and the vessel F respectively. The vessel F travels in vertical guides H, and is kept in the adjusted position by means of stops I on the shaft K; *j* is a counterbalance weight. If a periodical increase of temperature is required, as in the drying of malt, the following arrangement is provided:—The stops I are fixed upon the shaft K at intervals corresponding to the variations in temperature required, and the shaft is rotated periodically so as to remove one stop from engagement with the chamber and bring the next into

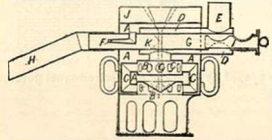
position to engage with it when raised into the required position by the weight *j*. To do this, the shaft K carries a toothed wheel P carrying a pawl *e* which engages with a ratchet-wheel Q keyed to the shaft. The wheel P gears with a worm S on the axis T, which also carries an eccentric V and a disc U, and is driven by means of a spring or a drum and weighted cord R. Upon the disc U is a projection W normally in engagement with a lug X upon a bent lever Y held in the raised position by a lug on the lever *l*. When a variation in the temperature is required the supporting-lever *l* is moved away by the hand of a clock, and the re-adjustment takes place, the bent lever Y and the supporting-lever *l* being brought back to their original positions by the action of the eccentric V on the vertical arm of the bent lever Y. Bevel-wheels Z and a crank on the horizontal shaft *f* are provided for turning the shaft K by hand for re-setting.

(For Drawing see next page.)

14,771.

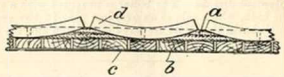


14,912. Lake, W. R., [Thursfield, W. E.].
Dec. 4.



Heating air.—The Figure shows a vertical section of a portable steam-generating and air-heating apparatus for vapour and Turkish baths. The boiler A, which is heated preferably by a spirit lamp, is made with two disc-shaped chambers B, B', which communicate with each other by radial and vertical tubes C, C, C. The products of combustion escape from the upper chamber B through an annular space D to the chimney E. The generated steam escapes by a nozzle F into the heated tube G, along which it induces a current of air which escapes with the steam by the tube H into the bath. The end of the tube G is fitted with a tubular plug I for regulating the admission of air and heated products of combustion to the nozzle. An open vessel J at the top of the apparatus communicates with the boiler by a tube shown in dotted lines at K; if the ebullition becomes too violent, the water escapes into this vessel and is cooled down. The tube K also serves to fill and empty the apparatus.

14,964. Eddington, S., and Steevenson, J. E., [trading as Eddington & Steevenson].
Dec. 5.



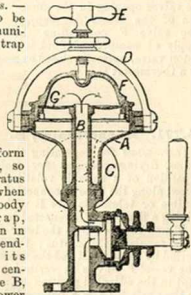
Non-conducting coverings.—Relates to boiler lagging or cleading, consisting of a sheet-metal shell with distance-blocks and with or without transverse batters and layers of felt or like materials. The batters *b* are placed at such intervals as to allow the lagging to be bent round the boiler, and the felt *a* may be dispensed with. The distance-blocks *d*, for maintaining the sheet-metal shell *c* at the required distance from the boiler, may be segmental in shape as shown and project through openings cut in the felt *a*. The batters *b* may be dispensed with, and the felt cemented to the shell *c*, additional blocks *d* being employed to compensate for the batters. The various sections of lagging may be secured by metal hoops as usual.

14,977. Henderson, C. J. Dec. 7.

Heating buildings.—Air from a ventilating-fan driven by the domestic water supply is passed over a heated surface to warm as well as to ventilate the apartments.

15,126. Gedge, W. E., [Granjon, J. B.].
Dec. 9.

Steam traps.—The vessel to be drained communicates with the trap



through some form of valve box, so that the apparatus can be cleaned when required. The body A of the trap, which is shown in section, has extending towards its upper part a central inlet pipe B, and at its lower part a discharge branch C. On its upper part is held, by a bow D and screw E, a cap F to the periphery of which is secured a metallic diaphragm G. This has a hole cut in its centre the edge of which rests on a shoulder on the inlet pipe and thus divides the casing into two portions. When water accumulates

on the diaphragm it contracts, leaving the shoulder and thus opening a passage by which the water escapes to the discharge branch at the bottom of the vessel. After the water has been removed, the steam which replaces it causes the diaphragm to expand and close the opening to the lower part of the casing until a sufficient quantity of water again collects.

15,261. Haworth, W., and Copeland, J. Dec. 12. *Drawings to Specification.*

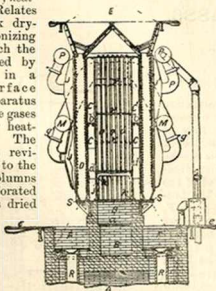
Heating air for drying tea. The air is passed through iron pipes heated on the outside by products of combustion from an ordinary firegrate. The flue from the firegrate passes upwards in an inclined direction to the top of the chamber in which the iron pipes are contained. The hot products pass downwards round the outside of the pipes, and out at an opening which communicates with a chimney. The hot air is delivered to a special drying-chamber.

15,588. Browne, M. P. Dec. 18. *Drawings to Specification.*

Hot-water bottles.—Relates to apparatus for administering enemas or other injections, which may be used also as a hot-water bottle. The water or other liquid to be injected passes through a tube from a flexible vessel which is pressed by a spring or weight. This vessel may be used as a hot-water bottle by unscrewing the tubes and substituting a plug or stopper.

15,828. Lillie, S. M. Dec. 23.

Heating air; heating liquids.—Relates to boneblack drying and carbonizing kilns, in which the black is dried by air heated in a special surface heating apparatus and the waste gases are used for heating liquids. The black to be revived is fed to the retorts in columns between perforated walls, and is dried

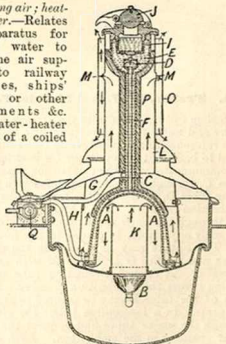


on its way first by a cross current of hot air which has been heated in the surface heater, and afterward lower down by merely warm air drawn from around the kilns. A is the furnace which heats the retort R. The products of combustion pass

into the flue B, which is divided by a perforated plate a for the purpose of equalizing the flow, and then up the tubes o, o of the surface heater into a horizontal flue passing along the hopper E. The sloping walls of this flue can be turned back on hinges to give access to the tubes. Down the centres of the tubes hang rods threaded with spiked rings of heat-radiating material, such as cast iron or earthenware. The surface heater is divided by partial horizontal partitions e into zig-zag passages, the lowest of which communicates by an opening k with a vertical chamber separated from the heater by the partition j, removed to show the tubes. The warm air from round the furnace comes through the floor e, by pipes d at the back, into the spaces c, and passes through the lower half of the black in D into the hoods J', and thence by the mains M into the heater above the top partition r. Having traversed the zig-zags of the heater it reaches the vertical chamber in front and passes by side apertures into the spaces c'. From these it goes through the black in the upper half of D into the hoods J' and mains P. These two mains join in front. The furnace gases in the hopper flue are either allowed to mix with the heated air or are directed into the juncture of the mains P. This is effected by a flap which closes either the pipe to the juncture of the mains or the top of the chamber in front of the heater. Dampers g' in the tubes connecting the hoods J with the mains M regulate the proportion of air and furnace gases. The hot air and gases are further utilized for heating water or syrup before reaching a chimney stack or other exhaust. The heated vapours from the retorts are similarly treated.

16,015. Foulis, W. Dec. 30.

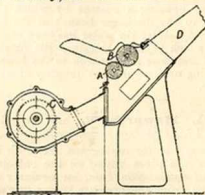
Heating air; heating water.—Relates to apparatus for heating water to heat the air supplied to railway vehicles, ships' cabins, or other apartments &c. The water-heater consists of a coiled



pipe or of an annular dome-shaped vessel A supported over a lamp B, which may be also used for

lighting. The water space communicates at the top with a tube C fitted at its upper end with a valve D, which opens into the chamber E, forming the upper part of the annular chamber F to which the flow pipe G is attached; H is the return pipe. To increase the effect of the water in opening the valve D, within the tube C may be fitted a jet pointing upwards. The chamber E may be fitted with a perforated box I closed by a hinged lid J. The products of combustion pass upwards through the cylinder or chimney K, and then, as indicated by the arrows, over both the interior and the exterior of the heater, and passing upwards through the surrounding casing L escape through apertures M into an outer casing O open to the atmosphere. The upper part of the heater and of the casing F may be covered with non-conducting material P. The pipes G, H are fitted with a special hinge joint Q, so that the heater may be turned aside to give access to the interior of the lamp for cleaning, lighting, &c. The heater is connected to suitable apparatus for heating the air admitted to the apartment to be warmed. In the Specification two forms are described in which the air is made to pass along one or both sides of an annular water space. In the case of a railway carriage the air-heating apparatus is partially let into the floor below the seats.

16,091. Lamy, E. Dec. 31.

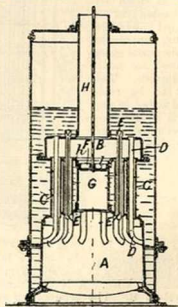


Heating buildings.—Relates to heating factories in connection with arrangements for treating raw cotton. The cotton is fed, by hand or otherwise, between the rollers A, B covered with leather, and is carried, by means of a current of hot air drawn by the blower C from the boiler or engine houses, along the tube D and deposited where required. The operation effects the cleaning, opening, drying, and mixing of cotton, removes the surplus heat from the boiler and engine houses, and utilizes it for heating purposes in the factory.

A.D. 1886.

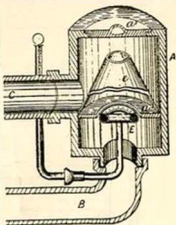
194. Fraser, W. J., and Morris, F. S. Jan. 5.

Heating water.—Relates to the arrangement and construction of fire and water tubes in multitubular boilers, which are shown with reference to a vertical steam boiler although they may be fitted to boilers of various types for heating water. The firebox A communicates with the combustion chamber B by the smoke tubes C, through the outer ring of which pass the water-circulating tubes D, connecting the firebox sides with the roof of the combustion chamber. The "Field" tubes E pass into the firebox through the inner rings of smoke tubes. A baffle-plate F, vertically adjustable, is placed in the flue G below the uptake H. The uptake may be placed at the side of the boiler, in which case the flue G is dispensed with and its place occupied by water. A central circulating tube would then be fitted passing across the combustion chamber. If desired, the lower ends of the tubes D may be secured to the firebox sides below the grate. In a locomotive boiler the circulating tubes pass through the smoke tubes and connect the firebox sides with a water chamber in the smoke-box. Each circulating tube may be bent into a U-shape with the ends connected to the firebox sides or the water chamber in the smoke-box.

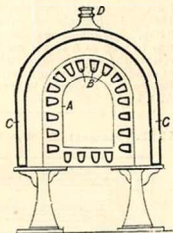


201. Hellyer, R. W. Jan. 5.*Heating air.*—

Relates to apparatus for consuming sewer gas and foul air, stated to be applicable for warming and ventilating purposes. A cylindrical chamber A of metal, terracotta, &c. is built in the side of a gully and connected with the drain by a pipe B and with the atmosphere by a pipe C. An annular diaphragm *a* encircles an atmospheric gas burner E which is surmounted by a conical cover *e*. The chamber A is fitted with a cover *a'*, in the centre of which a glass disc is fitted to facilitate inspection. The sewer gas enters by the pipe B and, after being subjected to the action of heat, passes to the atmosphere by the pipe C.

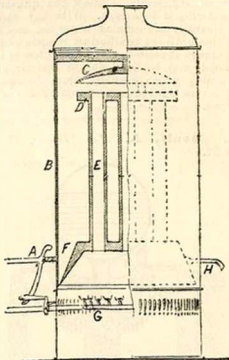
**394. Stanley, J., and Todd, I.** Jan. 9.*Heating water.*—

Relates to circulating boilers for heating conservatories, public buildings, &c. The Figure shows a transverse section of the boiler. The end boxes A are connected by water tubes B, preferably V-shaped, the lowermost forming the firebars, and the whole may be surrounded by a saddle-shaped water jacket C connected to the highest and lowest parts of the boiler by suitable tubes; D is the flow pipe.

**655. Goggin, J. B.** Jan. 15.

Heating water; heating buildings.—Relates to water-heaters for baths, also applicable as radiators for heating buildings. The water enters at A and passes upwards through the annular casing B into the chambers C, D, and downwards through the annular tubes E to a conical or pyramidal chamber F provided with an outlet H; G is a gas burner. The levers of the gas and water cocks are so

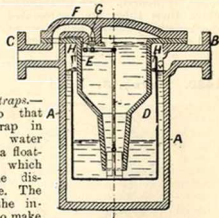
adjusted that the lever of the water cock is operated when the gas is turned on. If the direction of the water current be reversed, the casing B becomes



hot and the apparatus may be used for heating purposes.

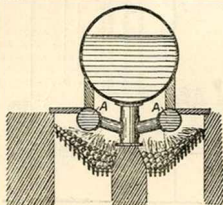
989. Johnson, J. Y., [Körting Bros.].
Jan. 22.*Steam traps.*—

Relates to that class of trap in which the water flows into a floating cup which controls the discharge valve. The object of the invention is to make the trap a constant discharge one, and this is attained by allowing the water to enter the cup through lateral openings in place of over the top as usual. A vertical section of one is shown. A is the outer casing provided with an inlet branch B by which it is connected to the vessel to be drained, and with a delivery branch C. D is the cup which surrounds the tubular piece E, through which the water is discharged by steam pressure, and which is secured by a flange between the casing and its cover F. A passage in the cover leading to the discharge branch is closed by a valve G controlled by the



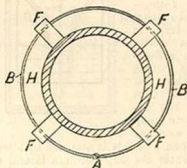
cup D into which the water gets admission through the openings H, H. By this arrangement the cup D takes up a position such that the valve G shall be opened sufficiently to allow the quantity of water entering it to escape. With any variation of the quantity of incoming water the cup alters its position until the equilibrium is again restored. The openings, if desired, may be at different levels, and shields may be fixed on the interior of the outer casing which partially close the openings in the event of the cup becoming too deeply immersed.

1001. **Boult, A. J.**, [Heiser, G. A.].
Jan. 22.



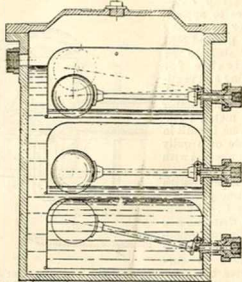
Heating water.—The firebrick partitions, which, in some classes of smoke-consuming furnaces, separate the charging-boxes from the fireboxes, are dispensed with and water tubes substituted for them. These tubes may be connected to the boiler, if desired. One arrangement is shown in which these tubes are represented at A. In another arrangement, a pair of water chambers are used connected by tubes transverse to the boiler.

1420. **Payne, J.** Feb. 1.



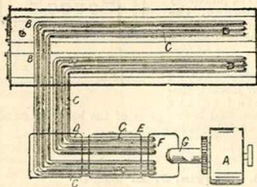
Non-conducting coverings.—A casing of sheet metal B is placed around the pipes, boilers, &c., and joined by a lap seam joint A or an ordinary flange joint. The several lengths of casing overlap each other at one end to make joint. Wooden blocks F, F are inserted between the object and casing to keep the latter in position, and the space between the two is then filled with any suitable non-conducting material H.

1653. **Royle, J. J.** Feb. 4.



Steam traps.—When a steam trap is used to return the water of condensation from various sources to the boiler, difficulty arises owing to the non-uniformity of pressure in the said various supplies of water. In order to obviate this difficulty the return trap is fitted with a drip box such as is shown in section in the Figure, in which a separate trap arrangement is fitted to each supply pipe. These traps are preferably of the form described in Specification No. 6231, A.D. 1882, and commonly known as "Royle's Syphonia 'trap,'" but others may be used. The drip box may be used as a simple multiple steam trap to remove the water from a number of vessels, as well as an adjunct to a return trap as described above. Reference is made also to Specification No. 10,148, A.D. 1885.

1711. **Hewett, R. W.** Feb. 5.

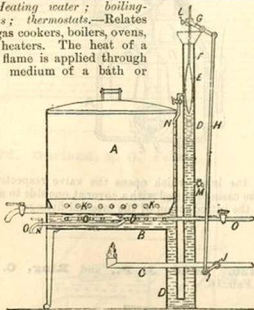


Heating buildings; heating water.—Relates to draught-inducing appliances for furnaces &c. serving also to heat feedwater for boilers; a similar arrangement may be applied to apparatus for heating buildings. The arrangement is shown in the Figure as applied to a steam boiler of the Lancashire type. By means of an exhausting-fan A the furnace gases are withdrawn from the ends of

the flues B, through the pipes C which pass through the water space in the boiler and through tanks D, E. The pipes open into the tank F above the surface of the water contained therein, and deposit the sediment from the gases before they are withdrawn through the pipe G. The water heated in the tank D may be used to supply the boiler.

1782. Kirby, H. T. Feb. 6.

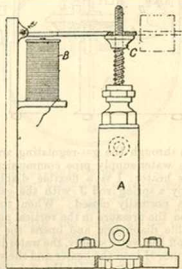
Heating water; boiling-pans; thermostats.—Relates to gas cookers, boilers, ovens, or heaters. The heat of a gas flame is applied through the medium of a bath or



circulating body of liquid to which a temperature-regulating apparatus is attached. A number of methods are indicated for carrying the invention into effect. One method is shown in the Figure. The vessel A is warmed by the liquid in the vessel B heated by a gas burner C, and communicating with a bent tube D containing a float E having a graduated stem F, and connected by levers G, H, and I with the valve J of the gas burner; L is a set-screw for adjustment. Instead of the float E a piston, plunger, diaphragm, pressure gauge, or other device for transmitting the effect of the expansion of the liquid by heat, may be employed; or the rise and fall of the liquid in the tube D may itself control the gas supply by means of an open-ended pipe. When a plunger is employed, it may itself form the gas valve. The liquid in the vessel B may communicate with pipes K or be made to circulate through a coil or sheaf of pipes to increase the heating-surface. The gas burner may be pivoted, provided with a counterbalance weight, and connected by means of a link with the lever I; the distance of the burner from the bottom of the vessel will thus be adjustable to the size of the flame. By making the short limb of the tube D sufficiently long, the water in the longer limb remains cool and no heat is wasted by exposure; and by increasing the length of the longer limb, the vessel A may be heated to a higher temperature owing to the increased pressure, and the apparatus may be used for generating

steam for motive power or other purposes. M is a stop-cock for regulating the height of the liquid in D, and N is a tube provided with a stop-cock for allowing the escape of air. The surface of the liquid in D may be covered with oil or other suitable liquid, to prevent evaporation; O is a coiled pipe through which water or other liquid to be warmed may be passed. The liquid heating-medium may circulate through a tubular or other boiler, preferably constructed to expose a thin stratum of the liquid to the action of the gas flame, and through a chamber or conduit containing, or enclosed by, pipes, passages, or receptacles for the liquid to be heated.

1894. Brewster, J. W. Feb. 9.

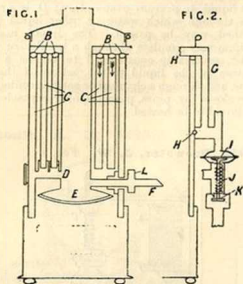


Thermostats.—The spring valve within the casing A, through which the heating or cooling medium passes, is closed by means of an electromagnet B, the circuit of which is completed at the desired temperature by the expansion of the mercury in a thermometer having one of the terminals sealed in its bulb and the other in its stem. The apparatus may be made to act at different temperatures by inserting wires at several points in the stem of the instrument and connecting them to insulating binding-screws to which the terminals may be attached; C is an adjusting-screw. When the valve and its connections require considerable force to move them, the electric current may be made to withdraw a suitable catch and the valve may be operated by means of clockwork driven by a weight or spring. The catch may consist of two semi-circular cam-grooves, connected at the ends, in a disc upon a rotating axis connected to the valve by a crank and link, a pin being held in its normal position in the slot at one of the extremities of a diameter, by means of a weighted lever operated by the electromagnet.

2075. Sweet, A. Feb. 12.

Heating water.—The water entering at the upper part of the vessel shown in Fig. 1 passes through

perforated rings B and in a shower through the concentric annular spaces C, having flue spaces between, communicating by a pipe D with the central space E and the flow pipe F. Fig. 2 shows

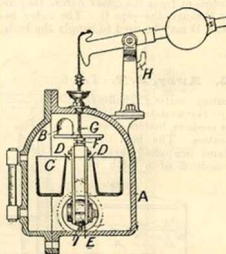


a section through the gas-regulating arrangement. G is the water-supply pipe communicating at H with the heater; I is a flexible diaphragm connected by a spring rod J with the gas valve K, which is normally closed. When the water is turned on, the pressure in the vertical pipe G bends the flexible diaphragm and opens the valve. On turning off the water supply, the water in G escapes by an orifice H into the heater and the valve closes. The amount of water passing through the apparatus is indicated by a gauge attached to the outer casing and showing the height of the water in the heater, the gauge being graduated in terms of the amount of water (determined by experiment) which flows through the apparatus at different pressures. A thermometer is inserted in a branch tube L on the flow pipe.

2180. Watson, C., and Gaukroger, A.
Feb. 15.

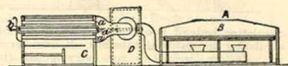
Steam traps.—The water of condensation from the vessel to be drained is delivered at an opening B, and is discharged through an equilibrium valve (not shown), which is opened by the rising of the annular cup-shaped float C, attached by a pair of links D, D to the end of the lever E, on which the valve spindle rests. The float is balanced by a lever pivoted on a standard on the exterior of the casing and carrying an adjustable weight; it is secured by a clamping-nut F to a wire or light rod G which passes through an opening in the dome-shaped top, surrounded by a cup which may contain a liquid seal; a stuffing-box is in this way dispensed with. The upper end of the wire or rod is connected by a union piece to a flat steel ribbon secured to the end of the counterbalance lever, which is of the form shown, so that the direction

of the supporting-rod is not changed by the rise and fall of the float and lever. Stops H, I are provided to limit the travel of the weighted arm, and



of the lever which opens the valve respectively. The casing is fitted with a cover at one side to allow of the introduction of the internal fittings.

2226. Land, J. P., and Ring, C. P.
Feb. 16.

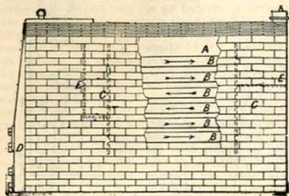


Heating air for use in carbonizing fibres. The wool, after being saturated with hydrochloric acid, is spread on the gauze cover A of a chamber B; pure hot air is then forced through the mass by a fan. The air is heated by being drawn through a series of tubes a, a, a in the upper chamber of a furnace C, and is further heated by contact with coils of pipes, arranged in a chamber D, and also in the chamber B, containing steam superheated by passage through a drum b in the furnace.

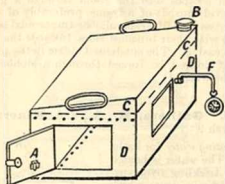
2381. Widdows, S. Feb. 18.

Heating air.—Relates to apparatus for heating churches &c. by hot air. The air is heated in a brick chamber A traversed by fine pipes B fixed between the tube-plates C. The pipes may convey the products of combustion from a stove D at one end of the apparatus or from any existing fireplace, or the waste heat from the furnace of a hot-water heating-apparatus may be used. Suitable division plates E are fitted within the chamber, to cause the furnace gases to take a zig-zag course as indicated by the arrows, and doors are provided at the back

and side for cleaning purposes. The heated air may be carried to any part of a building to be heated.



2476. **Garland, S. C.** Feb. 20.



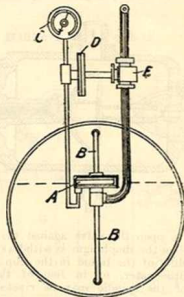
Footwarmers; bed-warmers; heating water.—

Relates to a vessel for heating water for toilet and other purposes, which may also be used as a foot-warmer for vehicles, or as a bed-airer, night-light, or watch stand. The shallow water chamber C, heated by a small oil lamp put within the air chamber D, is fitted with a feeder screw B, having a steam escape valve. The lamp may be placed in a socket behind the small door A. When used as a night-light a small pane of horn or glass may be put in one side, near which a hook F is fitted for suspending a watch. The water may be heated by means of an electric current when that is available.

2520. **Thomson, J.** Feb. 20.

Thermostats.—The apparatus consists essentially of an expansion chamber in which is placed some fluid such as ether; a connecting-tube leads from the expansion chamber to a pressure gauge, which may be graduated for various purposes, and a branch tube leads to a diaphragm which is made to actuate regulating-valves. The Figure shows an arrangement for indicating and regulating the water level in a steam boiler, but an analogous arrangement may be used for controlling the flow

of heated fluids through a pipe, and for regulating and indicating the temperature of hot chambers, ovens, &c. The expansion chamber A is placed in an enlarged portion of the tube B, which leads



into the boiler at both its upper and lower ends, the enlarged part being at or near the normal water level. Should the level fall, the expansion chamber becomes surrounded by steam which is at a higher temperature than the water in the lower part of the boiler. A consequent increase of pressure will take place in the chamber A which will be communicated to the pressure gauge C (graduated for levels), and to the diaphragm D which operates a valve E controlling the feedwater supply. The pressure may be indicated on a separate gauge connected by a tube passing into the boiler below the level of the water. The diaphragm E may also sound an alarm, control an overflow valve, or operate a safety-valve.

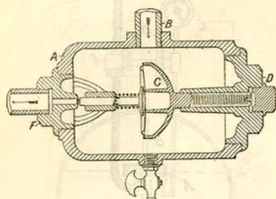
2758. **Bale, J. E.** Feb. 25. *Drawings to Specification.*

Thermostats for controlling louvre ventilators. The rod for operating the latter is connected to a pivoted lever carrying a vessel containing water, or other suitable liquid, into which dips another vessel partially filled with similar liquid. The expansion or contraction of the air within the latter vessel regulates the weight of liquid tending to close the louvres.

2926. **Justice, P. M.,** [Curtis, N.]. March 1.

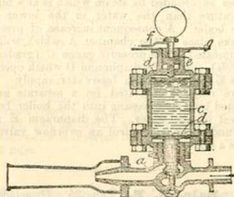
Steam traps.—A section of the trap is shown, in which A is a casing communicating through a pipe B with the apparatus to be drained. In it is a vessel C containing alcohol or equivalent liquid, one end of which is closed by a flexible diaphragm,

and which can be adjusted in position by a screw passing into the cover D. The discharge orifice is controlled by a valve on the end of the spindle E, which is guided in a boss on the cover F and rests against the flexible diaphragm. A spiral spring is



employed to open the valve against the internal pressure when the diaphragm is withdrawn, owing to the cooling of the liquid in the cup C, from contact with water, or in lieu of this spring the end of the spindle may be riveted to the diaphragm.

2969. Hochuli, F., [Fischer, P.]. March 2.

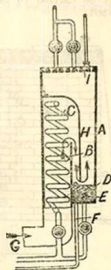


Thermostats.—Relates to temperature-regulating apparatus for baths, heating-chambers, &c., whether heated by steam, hot air, hot water, or the combustion of gas. The cylinder *c*, containing mercury or other suitable fluid, is fitted at the ends with flexible diaphragms *d, d*, the upper one of which is adjustable by means of a screw plug *e* carrying an index-finger *f* which traverses a dial *g* indicating temperatures. The lower flexible diaphragm is connected to the valve *a* in the pipe through which the heating-medium passes. In a modification, only one flexible diaphragm is used. The diaphragm is pressed upon by an adjustable plug which can slide in the cylinder containing the expansible fluid, the cylinder resting upon a piston supported by the valve.

3134. Howorth, J. March 5.

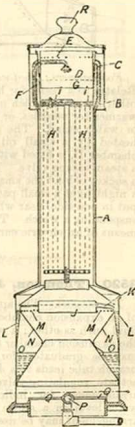
Heating air for heating buildings. A chamber A is partially divided by a partition B into two compartments. One of these contains a coil of steam pipes C, and the other is supplied with water D, which may be heated or cooled by means of steam or cold-water pipes E; F is an overflow pipe. Atmospheric air is forced into or admitted by the pipe G, which may contain some air-filtering material, and taking the direction of the arrows is heated by the steam coil C, deflected by a pendulous partition H towards the surface of the water D, and escapes into the room through a grid I.

This grid consists of a frame, preferably of wood, with cross-bars of triangular or trapezoidal section placed with their broadest sides towards the inside of the casing. The condensed steam in the pipes E may, if desired, be forced through a siphon tube into the water D.



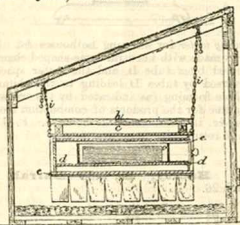
3316. Galliers, H. A., and Klaerr, F. March 9.

Heating water for baths &c. The water is heated while trickling over surfaces of wire gauze which is heated by exposure to the products of combustion from gas burners. It is admitted at the lower part of the water jacket A and passes upwards by the pipe B into the jacket C of the chamber D, and thence by the apertures E into this chamber, which also receives the water from the jacket A directly by means of a pipe F. The chamber D is provided with a wire-gauze partition G by which the water is distributed over the ends of a concentric series of wire-gauze cylinders H, the upper ends of which are held between wedge-shaped rings I between which the water escapes through fine apertures, and trickles over the surfaces of the cylinders. The water from the central cylinders drips



into a chamber J communicating by channels K with the space L which receives the drippings from the outer cylinders directly. It passes thence by perforations M and over the surface of the plate N into the chamber O, where it accumulates or is drawn off. This chamber may be continued downwards so as to form a complete water jacket for the firebox. A pilot gas burner is connected to the common spindle of the gas and water cocks, and is provided with a separate tap, so that the water and gas are turned on simultaneously when the pilot light is swung within the casing. The gas burner consists of a central pipe P fitted with others Q at right-angles, which may be perforated on their upper surfaces or be fitted with short vertical tubes provided with gas burners. The products of combustion escape by an aperture in the cover R.

3398. Tyler, A. J. March 10.



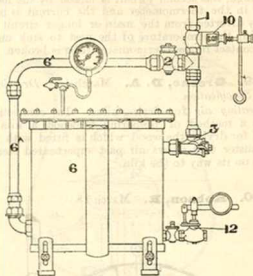
Heating garden frames &c.; footwarmers.—Relates to an apparatus for heating incubators, fostermothers, garden frames, footwarmers, and the like. The Figure shows the invention in its application to a fostermother. The casing c, which may be made of iron or earthenware, is provided with a false bottom d, and has at one end an opening through which the drawer e containing a heated hydrogenated charcoal brick o is inserted. A rotary valve is used to regulate the admission of air to the interior of the heater. The bottom of the heater is surrounded by a woollen cloth f for conveying heat to the chicks by direct contact. The sides are protected by wire gauze, and the top is covered in by the board h. The whole is suspended from the roof of the fostermother by chains i, which allow of the height being regulated. The heater may be enclosed in a water chamber.

3436. Hillier, W. H. March 11. *Drawings to Specification. Amended.*

Thermostats for incubators. The thermostat for controlling the admission of hot air consists of a valve hung on the end of a lever which is balanced on a knife-edge and to which is attached a glass or other curved tube. One end of the tube is sealed, and at this end it contains a small quantity of ether;

the remainder of the tube contains mercury. An excessive temperature causes evaporation of the ether and a consequent displacement of the mercury and a disturbance of the balance of the lever, whereby the valve becomes closed.

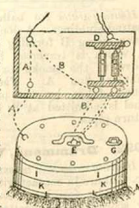
3532. Hibbert, J. March 12.



Boiling-pans.—Relates to means for controlling the flow of size to and from the boiling-pans of machines for sizing yarns. The raw size is fed by a pipe 1 and passes direct to the boiling-pan 6 by way of the pipe 6^A when the top 2 is opened and the three-way tap 3 closed. If the raw size is to be fed direct to the size trough the tap 2 is closed and 3 opened. The boiled size passes to the size trough through the tap 3, when allowed to do so by a suitably-placed dead-weight relief valve, the tap 2 being also open to supply the boiling-pan. The steam for boiling the size enters at 12. At 10 is the ordinary screw valve operated from the float in the size box.

3670. Neumann, H. March 16.

Thermostats for incubators. The incubator is warmed by the heat obtained from an electric current. The platinum wires which are heated by the passage of the current are embedded in the layer of feathers M. In the centre of the cover is an ordinary mercury thermometer E into which two platinum wires are fused, so that when the temperature of the nest rises above the required temperature electric contact is made by the expanding mercury between

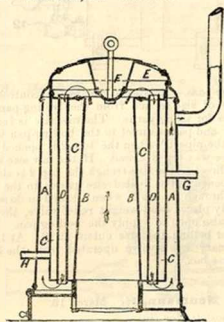


these two wires. C, C is an electromagnet which acts as an indicator to show when the current is passing through the wires of the coils C, C. There are two circuits, the one A by which the current passes through the platinum wires and heats the nest, and the second B which is shorter and which contains the thermometer A and the electromagnet C, C. As soon as the temperature in the nest is too high, this second circuit is closed by the mercury in the thermometer and the current is partially diverted from the main or longer circuit A, causing the temperature of the nest to sink until the contact in the thermometer tube is broken.

3899. Greene, D. A. March 16. *Drawings to Specification.*

Heating air for drying-kilns. In connection with a method of preparing firewood, a kiln is used for drying the wood, which is fitted with an exhauster that draws air past superheated steam coils on its way to the kiln.

3800. Robson, R. March 18.

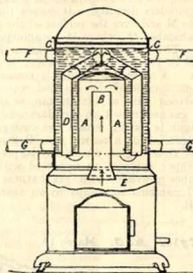


Heating water for baths, digesters, &c., or for heating buildings. A double casing A contains an inner casing B forming the annular water space C, which is traversed by flue tubes D, open above to the smoke-box E, and below to the annular flue A. The arrows indicate the course taken by the products of combustion. Fuel is admitted at F; G and H are flow and return pipes.

3992. Drummond, W. A. March 22.

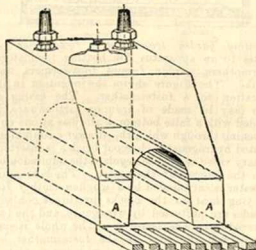
Heating water.—The surfaces of heating-vessels &c. that are in contact with the fire are increased in area by forming protuberances upon them or by scoring or corrugating them. In the case of flues, rods are introduced which may extend from side to side.

4142. Toope, C. March 24.



Heating water for warming hothouses &c. The boiler is made with a central dome-shaped chamber A pierced by a tube B, and the water space C is traversed by tubes D leading to the chimney; the whole forming (as indicated by the arrows) a zig-zag flue for the products of combustion from a burner &c. in the channel E beneath. F, G are flow and return pipes.

4268. Hadley, E., and Darrah, C. March 26.

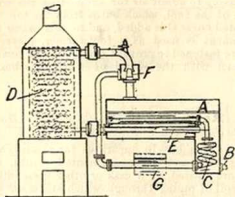


Heating water for baths &c. The water space of the boiler, situated behind the fireplace, is extended downwards at the sides, as shown at A, in lieu of the usual brick setting.

4406. Schmidt, W. March 29.

Heating water.—Relates to the combination of a tubular heating-apparatus or boiler with an ordinary boiler serving as a reservoir for feedwater. The feedwater is first heated in the water and

steam reservoir to deprive it of incrustating substances and then cooled to enable it to be injected into the tubular generator by means of a steam

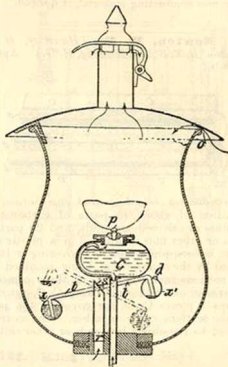


jet. The feed enters the reservoir A by the pipe B, and by contact with the coil C becomes heated and deposits its impurities. The water in the reservoir is heated by steam which is generated in the coil D, and escapes from the pipe E. The coil generator D is supplied with water from the reservoir A by means of an injector F which draws the water through the coil C and cooling-chamber G. If desired, the reservoir and tubular generator may be heated by the same furnace. In a modification, a portion of the steam from the coil generator gives up its heat to the reservoir by passing it through a pipe contained in the reservoir, the condensed steam being received in a separate vessel. The other portion of the steam passes round the outside of a coil, which is in communication with the water in the reservoir. The steam in the reservoir is used to force the water into the coil generator, and so long as there is a free passage through the supply pipe, the coil generator always contains water, whatever may be the pressure in the reservoir. By this means the coil is prevented from being overheated. In order to get rid of the air in the entering feedwater, the air is collected before entering the reservoir in the upper portion of a vessel placed above the water level.

4582. Barlow, W. A., [*Jahnke, J. F. W. A.*]. April 1.

Thermostats for regulating admission of air to maintain an even temperature in the air-carbureting apparatus of a railway-carriage roof or other lamp. If the temperature in the interior of the lamp increases beyond a certain point, more vapour is generated in the chamber C than can be properly consumed by the burner. In order to keep the atmosphere at a nearly constant temperature, a tube r , which is normally closed at its upper extremity by a valve x , is provided. Two vessels x, x' are carried at the extremities of a tubular rod t which is affixed to and operates the valve x . The vessel x is partially filled with liquid, and when the temperature increases the air in this vessel expands and forces a portion of the liquid over into x' , the interior of which communicates by the aperture d with the external air. The vessels then take the position indicated by the dotted lines and

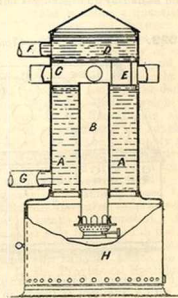
the valve opens to admit cool air to the interior of the bowl. When the temperature of the lamp has been lowered, the contraction of the air in x forces



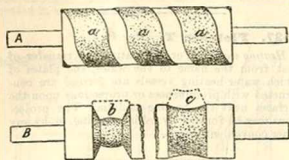
the liquid in the vessel x' back to the vessel x and closes the valve. Several modifications are described in which the valve is operated by the expansion and contraction of a liquid which may be contained in a vessel having a flexible side, or may actuate a float attached to the valve lever. When the lamp is adapted for the roofs of railway carriages, the air supplied by the tubes r, r is controlled by the expansion and contraction of a metal hood.

4694. Toope, C. April 3.

Heating water for warming conservatories, garden frames, and the like. Consists of a circulating boiler in which the water space A is traversed by a central flue B leading to a smoke-box C surmounted by an additional water space D connected with a pipe E; F and G are flow and return pipes. The boiler is heated by an oil or gas lamp placed in the chamber H beneath, the chimney



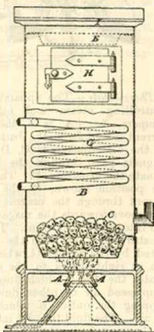
emery. The portion *b* of the roller B is for grinding the inner surface and edges, and the portion *c* the outer surface and edges of the pieces of peat.



For pipes of small diameter the pieces of turf are bored and placed upon the pipes before they are fastened together.

5841. Leeds, L. W. April 29.

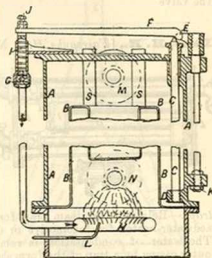
Heating water.—The gas burners A are placed in an open space beneath an arch C of asbestos or other refractory material, preferably perforated and placed in or near the base of a chamber B closed at its sides and top. This chamber may be made of iron and capped with fire-brick I upon or under which an oven H may be placed, and within it may be situated a coil of pipe G containing water, which may be used for heating other rooms.



5886. Humphrys, J. April 30.

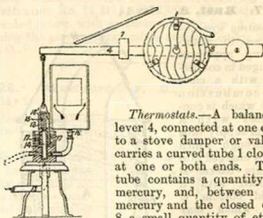
Heating water; thermostats.—Relates especially to means for regulating the supply of gas to the burner of a water-heating boiler for domestic and other purposes. The heater consists of an outer casing A and an inner casing B, made of any suitable form to present an efficient heating-surface, these being connected together by tubular stays S, which serve also to carry off the products of combustion. It contains a rod or tube C of zinc, copper, &c., secured at its lower end D to the casing, and bearing at its upper end upon a lever F pivoted at E, and connected to the valve G, supplying gas to the burner H. This valve is provided

with a shank I, made gas-tight by a series of grooves, and the amount of its motion is regulated by means of a screw J, and also by adjusting the



position of the fulcrum E by means of a screw K. L is a pilot gas jet; M and N are connections for flow and return pipes.

6126. King, H. J. H. May 6.

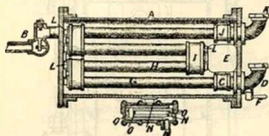


Thermostats.—A balanced lever 4, connected at one end to a stove damper or valve, carries a curved tube 1 closed at one or both ends. This tube contains a quantity of mercury, and, between the mercury and the closed end 8, a small quantity of ether or other volatile liquid, the

expansion and ebullition of which disturbs the equilibrium of the lever and controls the damper or valve; 7 is an adjustable sliding weight for regulating the temperature. The Figure shows the invention applied to regulating the supply of gas to the burner 16; 13 is the gas-supply pipe, the upper part of which is closed by the valve 15 connected to the regulator and carried by a float 18, the space above the liquid 17 communicating with the burner by means of an annular space 14; a small groove is left in the valve to prevent the burner from being totally extinguished. In a modification, the ether only is enclosed in the tube of a Bourdon pressure gauge, the movable end of which is connected by suitable means to the pivoted lever 4. In the Provisional Specification is described also a regulator consisting of an

inverted and balanced floating cylinder containing a quantity of volatile fluid. The rise and fall of the vessel, due to the expansion &c. of the fluid, operates the valve.

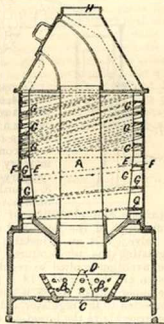
6271. Lake, H. H., [Fairbanks, H.]. May 8.



Steam traps.—Relates to a steam trap for use with a feedwater-heater for locomotive or other boilers. The water of condensation is removed from the outer casing by a trap of the form shown. The outlet M is covered by a slide valve until the connection of the series of bars N, N, connected by rocking beams O, O, opens it and allows the water to escape. On contact with steam again the bars expand and close the valve, preventing the escape of steam.

6517. Rust, A. May 14.

Heating water.—Relates to water-heating apparatus arranged in connection with a close slow-combustion stove which is constructed with a central supply tube A through which fuel is charged into the fire-basket B provided with a grated bottom C upon which may be placed a cone D for the purpose of distributing the fuel in an outward direction as it descends. The supply tube is surrounded by a casing E, which may either be filled with sand or other suitable non-conducting material, or may be partially filled with water and employed as a steam boiler. Outside this is another concentric casing F, and between them are fixed a series of spiral ribs G which form spiral flues, preferably three in number, through which the products of combustion escape into the flue at H. Hot-water pipes in connection with a

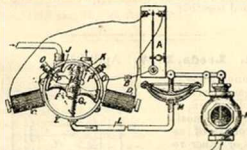


circulating system may be substituted for the ribs. The whole stove may be surrounded by an outer air casing with openings above and below.

6527. Fletcher, T. May 15.

Heating water.—For facilitating the transfer of heat from the flame to the water, the plates of which water-heating vessels are formed are constructed with prominences or projections upon the surfaces next the heating-medium. The projections may be formed by rolling, casting, or by any other convenient means.

6669. Johnson, W. S. May 18.



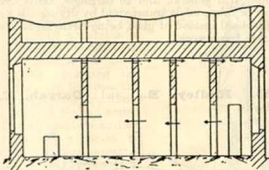
Thermostats.—The apparatus may be used for controlling steam and other valves, furnace dampers, &c. A is a thermostat by which a current is sent from the battery B through either of the electromagnets C, D. The poles of the magnets pass through the brass casing E and actuate the armature F. The apparatus being in the position shown, if the thermostat send a current through the magnet C, the armature will then move towards the magnet C, and in so doing will interrupt the current. The movement of the armature into line with the magnet will be completed by the spring G, which is attached to an arm at right-angles to the armature. This arm rotates the disc I, which uncovers an inlet J for compressed air or other fluid, at the same time stopping the outlet K which communicates with the air. The fluid thus let into the casing E passes by the pipe L to the vessel M, in which it acts upon a diaphragm closing the valve N. If the thermostat moves so as to send a current through the magnet D, the inlet J is closed, and the outlet K opened, thereby allowing the fluid passing the valve N to push its way through. The currents are interrupted by the springs O leaving the contact-points P; sparking is thus prevented at the thermostat.

6804. Hitchins, R. W. May 20.

Non-conducting compositions.—Relates to a compound applicable for ordinary plastering, covering boilers, lining safes, &c. The plaster is formed by mixing together about equal quantities of slag-wood and plaster of Paris or any cement, by means of a machine which consists of a pair of discs studded

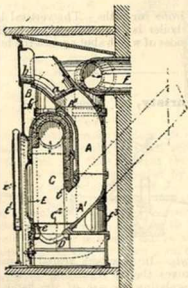
with pins and revolving in opposite directions. Beneath the machine is placed a sieve which allows the material which has been sufficiently reduced to pass through. The slag-wool may be previously treated in a carding-engine.

6858. **Boult, A. J.**, [Montenegro, A.]. Feb. 21.



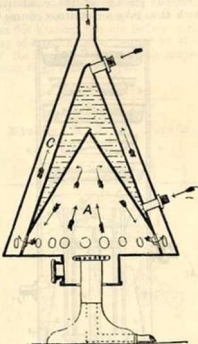
Heating buildings.—A single stove is made to warm a series of rooms which communicate with one another, by making suitable openings in the walls near the ceiling, or through the ceiling itself, so as to allow the air to circulate through the rooms, as indicated by the arrows.

6930. **Heim, H.** May 22.



Heating water; heating buildings.—Relates to stoves such as are provided with a feeding-tube A and combustion chamber C which open into each other immediately above the grate D. The combustion chamber may be lined with water pipes or a water casing which may be in connection with a water-heating system. The products of combustion, instead of being led away direct to the chimney, may be conducted to auxiliary heaters situated in other apartments.

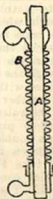
7002. **Sephton, J.** May 25.



Heating water for domestic and other purposes. Relates to improvements in apparatus described in Specification No. 11,411, A.D. 1885. The boiler is provided below with an enclosed chamber A containing the gas burners, and is surrounded by the flue C.

7023. **Mewburn, J. C.**, [Dietze, J.]. May 25.

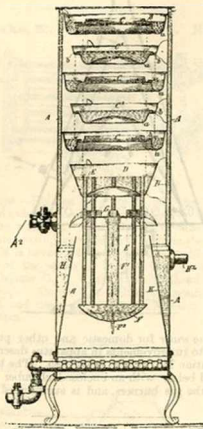
Heating liquids, surface apparatus for. The liquid to be heated is caused to flow over the outer surface of an apparatus composed of a number of elements each formed of two concentric tubes A, B, one or both of which may be corrugated, while the heating-liquid is passed upwards between the tubes.



7149. **Sugg, W. T.** May 27.

Heating liquids.—In gas-heated apparatus or geysers for heating water and other liquids, the water, admitted at A, passes upwards through the annular chamber A and overflows into the uppermost of the trays C, C'. These trays have diameters respectively equal to and less than the

diameter of the inner wall of the chamber A, and the trays C are annular troughs having a central aperture for the passage of the combustion products, which thus take a circuitous course through



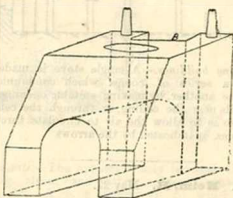
the apparatus. The section of the trays is such that in each of them a reservoir *a* is formed, which overflows into a trough *b* having a perforated bottom through which the water flows in fine streams to the trays beneath. From the lowermost tray of the series the water runs into a vessel *D*, and thence through the pipes *E*, which project upwards through the bottom, to the hemispherical vessel *F* provided with a central flow pipe *F'* connected with a number of spouts or a shallow tray *G* which directs the water into a reservoir *H* provided with an overflow pipe *H'*. The chamber *F* is provided with a double-pointed plug *F''*, the inner end of which directs the current of heated water up the central tube *F'*, the lower end forming a point from which condensed water may drip clear of the burners. The trays *C*, *C'*, and also the combined parts *D*, *E*, *F*, *F'*, *G*, may be removed for cleaning or repairs. In the Provisional Specification is described a modification in which the water does not come into contact with the products of combustion.

7163. March, T. C. May 28.

Non-conducting coverings.—Consists in the application to various structures of a layer of water as a transparent protection against heat or cold. The

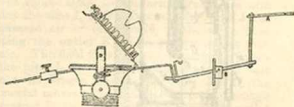
water may be contained between two sheets of glass in a frame, or, in cases where it is horizontal, it may be open above, the glass frame serving merely as a shallow tank. Such frames may be hinged or mounted to slide on rollers &c. The structures may be protected from snow or frost by stiff covers of wattled straw or the like. The frames may be used for roofs, skylights, &c., and may also be applied to greenhouses and plant shelters, to buildings in general, and to carriages, boats, &c. Paper or fabric made transparent by drying-oils &c. may be used instead of glass, being strengthened by suitable framework.

7265. Hadley, E., and Darrah, C. May 31.



Heating water for baths. The vertical back flue of a bath boiler is formed by a recess *B* in the boiler, the sides of which abut against the brickwork setting.

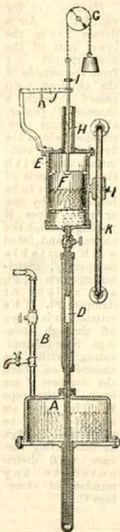
7347. Christy, T. June 1.



Thermostats.—In chambers heated by means of gas or oil stoves, the tap regulating the gas supply, or a slide regulating the size of the flame, is connected by means of levers to a thermostatic band. The Figure shows the invention as applied to an oil stove. *A* is the thermostatic band, *B* and *C* are levers, *D* is the slide, and *E* is a counterbalance weight. The levers may also be operated by means of an electric current, the circuit of which is made and broken by means of the thermostatic band.

7707. **Lake, H. H.**, [*Bigelow, H. M.*].
 June 8.

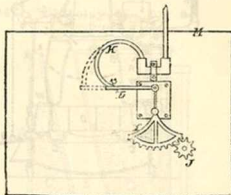
Thermostats.—Relates to apparatus controlled by variations of fluid pressure and applicable for various regulating purposes, among which is mentioned the operation of the valves of steam, hot-water, and hot-air heating and drying apparatus. The apparatus is described as applied to steam boilers, for automatically operating the damper. In this case the working of the apparatus is effected by the action of steam upon the surface of mercury, a portion of which is forced upwards into a chamber containing a float connected to the damper through any suitable mechanism. One arrangement of the apparatus is shown in the Figure. Steam enters the reservoir A by the pipe B, forcing the mercury up the telescopic tube D into the chamber E, containing the float F, which by its movement operates the pulley G connected to the damper. By making the chambers A and E of different sectional areas, a small lowering of the level in the lower chamber will effect a large alteration of that in the upper chamber. The upper surface of the float is made to close the opening H of the chamber E when the float has arrived at its extreme position, and thus prevent the escape of mercury. The float can be loaded by means of weights I or by the weighted lever J. By means of the telescopic arrangement of the stem D, the height of the column of mercury, corresponding to the predetermined pressure of steam to be arrived at before the damper is closed, can be adjusted by sliding the chamber E up or down upon the vertical support K, to which it is fixed by a set-screw I. By causing the tube D to pass below the bottom of the reservoir A, the passage of steam or air into the mercury tube is prevented. The float can be arrested in any position by closing the cock, so that the mercury is prevented from falling when the pressure is removed in the lower vessel. Modified arrangements of the apparatus are described. In one of these the mercury column and float chamber are formed by a large tube dipping below the surface of the mercury in the pressure chamber.



7733. **Drake, T.** June 9. *Drawings to Specification.*

Heating air.—Relates to the manufacture of lighting-gas by carburetted air, and comprises apparatus for heating the air before carburetted, consisting of a coil of pipe heated by the exhaust steam of the engine driving the air-propelling fan, or by steam from other sources.

8389. **Biscow, H. S. T.** June 25.

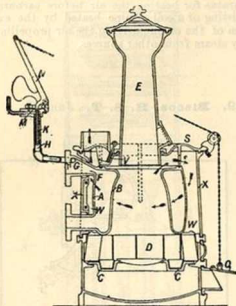


Thermostats.—Consists in automatically regulating dampers in connection with the flues of stoves, ranges, and furnaces by utilizing the expansion and contraction of water or mercury receiving heat from the fire. According to one method a flexible tube K is connected at one end with a hot-water chamber, placed preferably in the boiler when present, and at the other by means of a lever L to a circular rack I gearing with a pinion J attached to the damper. The expansion of the water causes the tube K to bend outwards as shown in dotted lines, and the motion being communicated to the rack and pinion partially closes the damper. Another method consists in employing a cylinder containing mercury upon the surface of which is a float connected to a lever which in turn is connected to the circular rack I.

8667. **Blezard, J., and Blezard, N.**
 July 2.

Heating water; thermostats.—The boiler is formed of inner and outer shells B, A surrounded by a casing X. To resist fracture the shells may be made barrel-shaped and with curved or rounded corners. They may be made together or separate; in the latter case they are connected by means of metal rings and set-screws. The sides of the fire-box D slope outwards towards the bottom, and the firebars are supported by a plate C in which are channels to receive firebricks &c. The fire space communicates either with the chimney directly by means of the damper V, or with an annular flue W

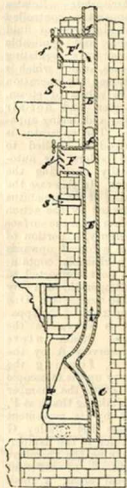
leading to the chimney as indicated by the arrows. The case X, cover S, and fuel stack E are connected by luted joints so as to be readily detachable for cleaning &c. The flow pipe F is made of



increased width at the part where it joins the boiler, in order to promote circulation. Upon any convenient part of the hot-water system is placed a chamber G with an air and steam pipe H passing from its upper part and a curtain to prevent the air and steam from passing further through the apparatus. Within the pipe H may be placed a vessel K containing mercury or other suitable liquid, the expansion of which operates a flexible diaphragm M which is connected by a weighted lever N and chain to the damper O of the boiler.

9822. **Dement, M. H.**, [*Le Vin, G. W.*]. July 6.

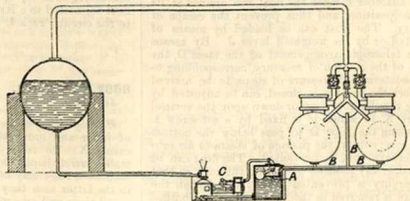
Heating air for ventilation. Air is drawn from the lower part of the compartment or from the outside of the building and passed through a chamber C, preferably of cast iron, situated behind the fireplace and communicating with the upper parts of the chambers to be heated &c. by one or more pipes E passing through the chimney and fitted with suitable dampers *f*, distributing-ports F, F', and valves or dampers *f*'. The vitiated air is drawn off through openings S communicating with the chimney, or, when the dampers *f* are open, by the pipe E. The outer air may, if desired, be passed first through an air-heating furnace, and distributed to any number of chambers C.



9131. **Newton, H. E.**, [*Worthington, C. C.*]. July 13.

Steam traps. —

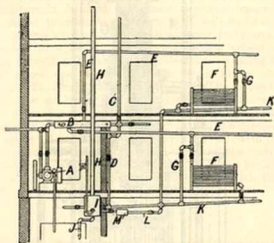
The arrangement is shown in the Figure, in which A is a closed tank which receives the water from the steam engine receiver jackets &c. through the pipes B, B. Its upper part is filled with steam at boiler pressure, and from it is supplied a pump C which returns the water to the boiler, the supply being regulated by a ball cock or valve as shown.



9199. Haacke, A. July 15.

Non-conducting coverings and compositions for boilers. Hoops are fastened around the boiler at suitable intervals, but are kept at a certain distance from the same by means of packing-pieces of asbestos, millboard, &c.; small plates are fastened to these hoops by screws, and the space between this sheath and the boiler is filled with infusorial earth (kieselg uhr) mixed with small quantities of cork fibre, and glutinous matter such as flour, starch, &c.

9642. Pitt, S., [King, J. T.]. July 26.



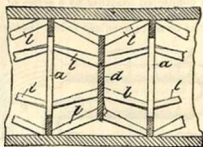
Heating buildings.—The Figure shows a vertical section of a building fitted with the apparatus. Exhaust steam from the engine A is expanded into a vessel B fitted with an exhaust pipe C, a drip pipe D, and with pipes E for supplying the heating-coils or radiators F; G, G are bye-passages, controlled by stop-cocks, for the steam when it is not required to pass through the heaters. All the drip pipes open into a jet condenser I communicating with the atmosphere by means of a pipe H and where, owing to the increased temperature, the impurities in the water partially separate, the heated water passing by a pipe J to the hot-well from which the feed for the boiler is supplied. The drip pipes K leading from the radiators are fitted with branch pipes L containing steam traps M through which the condensed steam &c. is made to pass when live steam is used in the apparatus. All the pipes are fitted with stop-cocks at suitable points.

9733. Meeze, A. G. July 28.

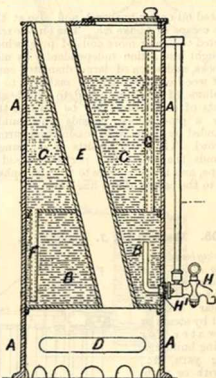
Heating liquids or gases.—The tubes of boilers or other apparatus for heating fluids are fitted with a series of "deflectors," of which a number of modifications are described, but consisting generally of annular plates *a*, *a* and discs *d* held together by lugs *l*, or of two perforated plates, the perforations in one plate being opposite the intervening spaces in the other.

(For Drawing see next column.)

9733.



10,041. Whiteley, W. Aug. 5.

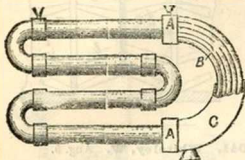


Heating liquids.—The chamber A is divided by a horizontal partition into two compartments B, C, communicating by means of a tube F, which extends nearly to the bottom of the lower compartment, and traversed by the flue E; G is an air tube passing upwards from the lower compartment, and D is a "Bunsen burner." Water is supplied to the upper compartment, which serves as a feed chamber to the lower one, the latter being provided with a tap H having a gauge attached. The tap is provided with a flange by which it is secured to the flanged tube H' fixed in the boiler.

10,069. Pitt, E. C. Aug. 6.

Heating buildings &c.; heating water.—Relates to apparatus for warming or heating the interiors of greenhouses and conservatories, and for

analogous purposes. The boiler consists of two boxes A connected together by a series of pipes B bent into a semicircle and encased in a jacket C having one or more openings below (beneath which

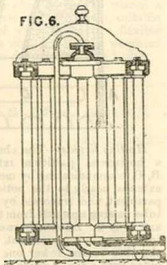


are placed oil or gas burners) and also at the top for the escape of smoke &c. The end boxes A are connected to one or more coils of pipe, which may be brought into action independently by means of stop-cocks, and when of large diameter contain a core of wood or other suitable material, to reduce the volume of water required to fill them. The products of combustion may be led into the open air by a pipe which, outside the building, is surrounded by a perforated casing and surmounted by a cowl. The cowl consists of a casing which surrounds the closed and perforated end of the flue pipe, and is open above to the atmosphere, and below to the casing of the flue pipe.

10,205. **Bertrand, J.** Aug. 10.

Heating buildings; heating air.—The apparatus consists of fixed or rotating "tubular drums" heated by steam or hot water for warming buildings, drying yarn, &c., and with or without means for causing a circulation of air through them. The Figure shows a fixed apparatus for warming buildings. Each drum consists of two hollow annular crowns connected together by tubes as shown. In the rotary form of the apparatus the annular crowns, which are toothed, are connected by hollow arms to hollow axles, one of which serves for the admission of steam, and the other for the escape of condensed water. Each drum is also surrounded by a cylindrical jacket of wire gauze or other suitable material. It is driven by means of a pinion, and may be provided with internal revolving fans to promote evaporation; or a current

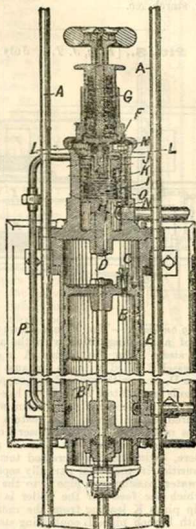
FIG. 6.



apparatus the annular crowns, which are toothed, are connected by hollow arms to hollow axles, one of which serves for the admission of steam, and the other for the escape of condensed water. Each drum is also surrounded by a cylindrical jacket of wire gauze or other suitable material. It is driven by means of a pinion, and may be provided with internal revolving fans to promote evaporation; or a current

of air is forced through the drum by other suitable means. In case it is desired that the material to be dried should not come in contact with metallic surfaces, the drum is surrounded with a frame of wood supported and rotating concentrically upon the end frames.

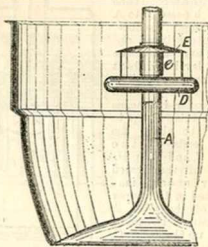
10,283. **Justice, F. M.,** [Curtis, N.].
Aug. 11.



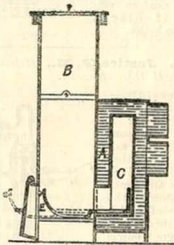
Thermostats.—Excessive steam pressure in a steam boiler is made to automatically close, or partially so, a weighted damper in the furnace chimney which opens as soon as the pressure is relieved. The damper is full open in its normal position, and is kept in that condition by a weighted lever secured to its axis. This lever is attached by chains to a yoke uniting the rods A, A, to which motion is imparted by steam, acting at the desired period upon the hollow piston B within the cylinder B'. An adjustable port C is formed in this piston and a passage D in the cylinder cover E, the latter being enclosed at the top by a flexible metallic diaphragm F, pressed upon by the spring-weighted mushroom piece G. A piston valve H

within the cover E closes the passage D, being kept in place by the spring I. A valve J fitting upon a seating at K is kept up against, and compelled to follow the movements of, the diaphragm F by means of a spring L. This valve J closes the exhaust passage from the space above the piston H, which latter works loosely within the cylinder cover or is provided with a pin-hole through which steam from the lower side can obtain admission to the upper side. The space N and the space M, by means of the passage O, are in full communication with the boiler. P is an exhaust pipe which communicates with the lower end of the cylinder B'. The action of the apparatus is as follows, the chimney damper being supposed fully open and the piston B at the upper end of the cylinder and the chambers M, N filled with steam.—On an increase of steam pressure the diaphragm F will be lifted, the spring above it having been previously compressed to withstand the normal steam pressure. The valve J will therefore be raised by the spring L and allow the steam from the space above the piston H to escape to the exhaust pipe. The piston H will now no longer be balanced, and therefore will lift from its seat and admit live steam above the piston B. The latter then descends, and the damper is operated. If desired, the cylinder B' with its piston may be located near the flue and the valve mechanism at a more remote part near the boiler, a suitable pipe connecting the port C with the cylinder E.

10,376.



10,470. Killick, G. E. Aug. 16.



10,353. Podger, H. Aug. 12. Drawings to Specification.

Heating air for laundry drying-rooms or the like. The air is forced by means of a fan through the hollow firebars of a steam-boiler or other furnace, or through additional tubes communicating with the hollow firebridge of a steam boiler, or through a series of gratings of pipes within a stove. This stove may be surmounted by a chamber traversed by flue tubes, through which the air may be passed either independently or after traversing the pipes.

10,376. Hamper, D. W., and Howell, J. H. Aug. 13.

Boiling-pans.—Relates to brewers' coppers and like vessels. The vessel is traversed by one or more inclined or vertical tubes, communicating below with the fire space and above with the flue. In the case shown, the tube A is arranged vertically, and is fitted with a sliding collar e carrying a dome-shaped plate E, supported by a float D, consisting of a tubular ring of metal or other material. The plate E tends to prevent boiling over.

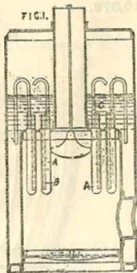
(For Drawing see next column.)

Heating water.—Relates to boilers for heating greenhouses, dwellinghouses, &c. by means of hot water. The fireplace is fed continuously with fuel from a hopper B above, and communicates with a flue C, surrounded by the water space A of the boiler. The grate E is made to slide in and out, as shown in dotted lines, to facilitate cleaning.

10,494. Gamgee, J. Aug. 16.

Heating liquids.—The invention is described with reference to steam generators and kettles, but is applicable also to other apparatus for boiling liquids. Tubes A, A, closed at each end, are fitted so as to project into the firebox of a steam boiler as shown in Fig. 1, or set in the bottom of a kettle as shown in Fig. 2. Each of these tubes is fitted with a tube B, which extends from the top

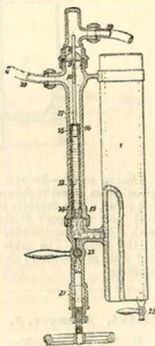
to near the bottom, and with a second tube C which passes into A for a short distance, and is continued upwards to or above the water level and bent down as shown. The tubes A become filled with water, by means of the tubes B, up to a little above the lower ends of the tubes C, and the pressure of the heated air or steam imprisoned in the upper ends of the tubes A maintains a stream of water up the tubes C, thus causing an active circulation in the boiler or vessel. The tubes need not be arranged to project into the fire, as they will act, though not so efficiently, if placed inside the boiler.



10,826. Justice, P. M., [Holmes, J. E., and Covert, H. C.]. Aug. 24.

Thermostats.—

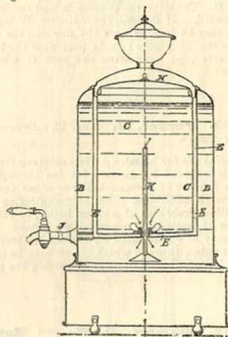
The expansion or contraction of a suitable liquid contained in the annular or other shaped vessel 1 operates an expandible piston 12, the rod 17 of which passes through a diaphragm 9 and is provided with a groove 18 of gradually increasing sectional area for the passage of the gas from the inlet 19 to the outlet 20; 10 is a strainer. The piston is formed of india-rubber or other suitable material, and has coils of wire or cord embedded in its walls to prevent lateral expansion. It is secured below to a conical seat 13 by a hollow conical plug 14, the other end being sealed by a conical plug 15, and wedge ring 16. Suitable stopcocks 23 and 25 and a piston 21 are provided for adjustment. The apparatus may be applied for refrigerating and fire-extinguishing.



10,891. Finlayson, W., [Martin, R. H.]. Aug. 26. *Drawings to Specification.*

Non-conducting coverings.—Asbestos is passed through a carding-machine and the fleece formed is deposited in even layers upon an apron or table, or coiled upon a rotating cylinder, until a sufficient thickness is obtained. A small quantity of water or solution of silicate of soda is added at any convenient stage. The piled sheets are pressed, according to the density required, by means of a roller or other suitable apparatus. Hair, wool, mineral wool, or other fibre, and clay, chalk, or infusorial earth may be added to the asbestos fibre. The layers, coiled upon a cylinder, may be cut longitudinally and used for applying to pipes &c. The outer fleece may be saturated with size to form a hard exterior, and the sheets coated on either side with paper or other material, which may be arranged to form a flap or cover over the joints.

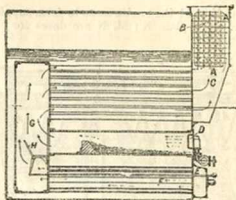
10,978. Royle, J. J., and Brown, J. Aug. 28.



Heating liquids.—Milk or other liquid to be heated is placed in the space E between the annular vessel B and an inner vessel C, the two vessels communicating by means of a tube K. Hot water or ice is introduced into the inner vessel by removing the cover H; J is a tap for removing the heated or cooled liquid. The outer vessel may be heated by means of a lamp if desired. The annular vessel B may be replaced by a simple casing, and the apparatus during use covered with some non-conducting material. In a modification, a single vessel only is used having a deeply-corrugated transverse partition near the top, which serves as a support for the liquid.

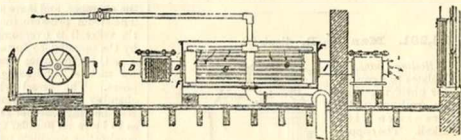
10,983. **Montgomerie, H.** Aug. 28.

Heating air.—The waste heat from the products of combustion in a steam boiler is utilized to heat air for saloons &c. Atmospheric air is mechanically forced through a series of chambers A and connecting-tubes B, which are situated in the smoke-box C directly in the paths of the escaping furnace gases.



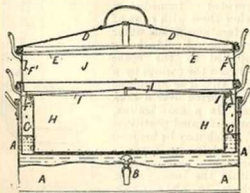
11,583. **Jolliffe, C. H.** Sept. 11.

Heating air for ventilation. The air is forced by the blower B through pipes G connected by end boxes so as to form a zig-zag course for the air, and immersed in a tank or other suitable vessel F containing heating-agents. The supply and exit pipes A, D of the blower, and also the delivery pipe I and the outlet apertures or windows of the apartment, are provided with screens of wirework and cotton or woollen wadding &c. The invention is specially intended for the fermenting-rooms of breweries and the like.



11,848. **Hancock, F. A. L., and Hancock, C. L.** Sept. 17.

vessel A. The inner vessel C may receive another vessel H open at the top or provided with a lid I, as shown. Two vessels only may be used, the outer one A to contain the water and the inner one C to contain the substance to be cooked. The inner vessel C may be perforated around the top part so that the steam alone can enter, or it may be perforated so that the water can also enter.

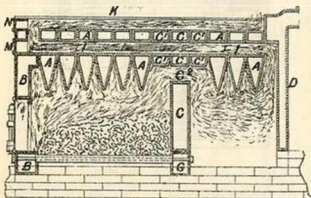


Digesters.—Relates to combined apparatus for cooking by boiling, steaming, or heating by means of hot water. Inside the vessel A, which contains water and is provided with the cock B to regulate the height of the same, is placed the perforated vessel C. Above the latter is a steamer J covered with the lid D, which is provided with a rim E to convey the water of condensation to the pipes F, F' fitted to the steamer J, or to the pipes F, F' fitted to the vessel C, which return it to the

11,850. **Turtle, J.** Sept. 17.

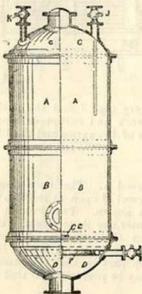
Heating water.—Relates to a boiler made up of a number of transverse vertical sections A held together between the end sections B, D by longitudinal bolts. The sections are composed of hollow side pieces connected by two hollow water passages so as to form a return flue I for the products of combustion, and are made wedge-shaped on the inner side to increase the heating-surface. The firebars are hollow and pass from the bottom of the front section B to a water chamber G, into which the return pipe opens. In large boilers the section at the back of the fire is made so as to form a furnace bridge C, the wedge-shaped portions of the two adjacent sections C', C' being incomplete as shown. The products of combustion may, if desired, be led over the top of the boiler, the sections being for this purpose made higher at the

sides than at the centre so as to form supports for a covering-plate K; M, N are doors for cleaning purposes.



12,291. Manbré, E. Sept. 28.

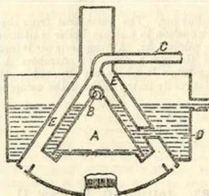
Boiling - pans. — Relates to a copper for purifying wort by boiling under pressure with alkali. The copper is formed of two parts A and B bolted together with hemispherical ends C and D. The top is fitted with a wort supply pipe J, an air cock K, a pressure gauge, and a manhole; the bottom contains a steam coil P and a removable perforated false bottom E secured by a cross-bar G.



12,384. Gilmore, J., Gilmore, J. F., and Clark, W. R. Sept. 29.

Heating buildings. — The steam generator described below is covered by a dome to act as a radiator. Provision is made for giving exit to the condensed steam. An open conical chamber A is placed with its large end downwards in any vessel

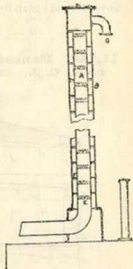
in which steam is to be generated. Its upper end is provided with a loaded valve B. As the steam is formed in the chamber A its gradually increasing pressure will partially drive out the water from



the chamber, and leave a thin film to be acted upon. The steam pressure increases until the weight of the valve B is overcome, when the steam escapes by the opening so formed and passes away by the pipe C to the place where it is required, whether for motive, condensing, cooking, or heating purposes. The vessel which contains the conical chamber may be permanently combined with a feed-heating chamber D arranged in such a manner as to leave an annular space E through which the combustion products may rise.

12,395. Hill, T. Sept. 30.

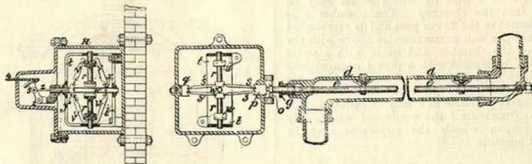
Heating liquids. — Heated air or steam is forced through the inner of two concentric tubes or casings A, B, which carries a number of perforated rings F and is provided immediately below these with rows of perforations E, the water or other liquid being supplied to the space between the casings by a pipe G. The apparatus is supported over a tank &c. In a modification, the perforated partitions F, which may be inclined alternately in opposite directions, are placed within the inner casing, which, in this case, receives the supply of liquid, the air or steam being admitted to the space between the casings.



12,574. Mills, E. C. Oct. 4.

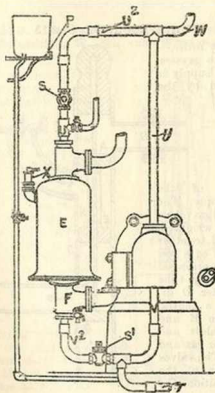
Thermostats for regulating draught in heating-apparatus and other furnaces. Within a straight portion *d* of the return pipe of the system is fitted a rod *e* of copper or other suitable material, rigidly fixed at one end and sliding at the other in a stuffing-box *g*, and pressing against a lever *o* which operates a sliding block *p* connected through multiplying-mechanism to a lever *5*, which operates the weighted damper &c. through a chain 4. Of the multiplying-mechanism two sections at right-angles to each other are shown.

The sliding block *p* operates through the struts *s*, *s* and *s*¹, *s*¹ the rods *r* moving in vertical guides *t*. These rods carry suitable blocks *u* to which are attached tension-rods *v*, *v* and *v*¹, *v*¹ connected by links *x* and *y* respectively to a tube *w* by which the fulcrum of the lever 5 is carried, and to a central sliding-rod *z*



connected to the lever 5, the fulcrum 2 and rod *z* moving in opposite directions on change of temperature. In cases in which there is more than one return pipe, the pipe *d* may be a special short length of pipe connected by circulating pipes to the lower part of the boiler.

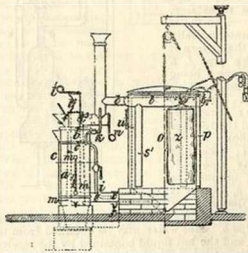
12,640. Sutcliffe, H. Oct. 5.



Heating water.—The exhaust gases from a gas engine are passed through the pipe *F* into and around a double-walled dome-shaped chamber contained in the casing *E*; water circulates in the space formed by the walls of the chamber, which is connected to the water jacket of the engine by pipes *V*, *V*² and *U*, *U*² and with the place where the hot water is to be used by pipes *W* and *T*. The communication between the heater and the circulating

pipes and water jacket may be cut off by cocks *S*, *S*¹. A safety-valve *X* and water-supply cistern *P* are provided.

12,698. Thursfield, W. E. Oct. 5.

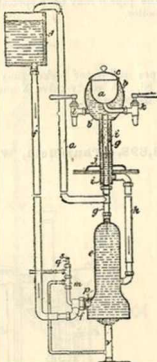


Heating-apparatus.—Relates to apparatus chiefly designed for disinfecting or purifying clothes by moist heat, but also applicable for heating articles generally up to 150° C. by using a mixture of steam and products of combustion or hot air, or both. The apparatus consists of an annular boiler *a* with an inner flue *m* traversed by a tube *l* through which the air and products of combustion are forced, together or separately, by the steam jet *i* into the heating-chamber *o*. The tube *l* communicates with the atmosphere at *b* and with the flue or chimney at *c*, the two sets of apertures being opened and closed alternately by a valve *i*; *n* is a

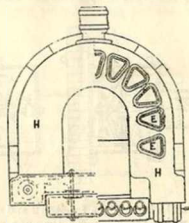
valve for closing entirely the entrance to the chimney. The boiler is fed by an open reservoir which communicates with it by a side tube *c*; it is heated by any suitable means; *f* is a hopper for fuel, and *k* is a pipe by which steam may be injected into the chimney. The chamber *o* is funnel-shaped in the lower part and is surrounded by a jacket *p* which communicates above with the interior of the chamber, and below with a series of tubes *s* connected with a pipe *t* opening into the chimney. The chamber is closed by a double cover *r*, to the lower plate of which hooks for hanging sacks as shown at *z* may be fastened; *e* is a tap for drawing off the condensed water. By mounting upon wheels the apparatus may be rendered portable.

12,733. Kerfoot, J. Oct. 6.

Heating liquids; thermostats.—Relates to a jacketed apparatus or muller through which circulates hot water for heating wine, beer, or solid food. The receiver *a* is provided with a lid *c* and surrounded by a jacket *b* which is connected to the boiler *e* by means of the pipes *i*, *g*, and *h*. The boiler is fed automatically from the cistern *d* by the pipe *f*, a safety pipe *a* being connected to the pipe *g*. The hot water circulates around the receiver *a* as shown by the arrows; ascending by the pipe *g* it passes around the vessel *b*, and as it cools descends by the outer pipe *i* and enters the boiler *e* through the pipe *h*. Hot water may be obtained from the cock *l*, and the hot liquid contained by the receiver from the cock *k*. The boiler *e* is heated by means of a gas burner *v*, the supply of gas to which is regulated by means of the arrangement *s*, *g*, *m*, *p*. The horizontal part *p* of the pipe *m* contains mercury or other liquid and is surrounded by the water in the boiler *e*; as the temperature of the water increases the mercury expands and seals the end of the gas-supply tube inside the tube *m*, thus cutting off the supply of gas. For cooling purposes ice is placed in the receiver *a*. The apparatus may be secured to an ordinary counter by means of the flange *j*.



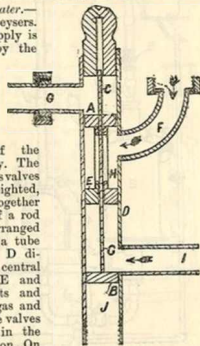
12,914. Whitehead, W., and Emley, A. Oct. 11.



Heating water for hot-water heating-apparatus for horticultural and public buildings &c. Consists of a saddle boiler formed of one or more rows of V-shaped tubes *E* joined to horse-shoe-shaped ends *H*; either solid or hollow firebricks may be used.

13,064. Winterflood, J. Oct. 13.

Heating water.—Relates to geysers. The gas supply is controlled by the

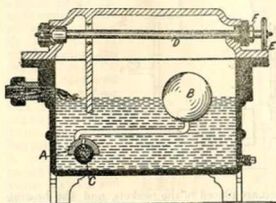


pressure of the water supply. The water and gas valves *A*, *B* are weighted, connected together by means of a rod *C*, and arranged to slide in a tube or cylinder *D* divided by a central diaphragm *E* and having inlets and outlets for gas and water. The valves are shown in the closed position. On admitting water at *F* the valves rise, the water escaping at *G* to the water-heater, and the gas passing along the pipes *I* and *J* to the burner; *H* is a sleeve of india-rubber for making the piston-rod water-tight.

13,203. Fye, R. Oct. 16.

Steam traps.—The discharge valve consists of a ported saddle piece which is moved over a port in

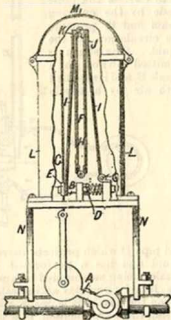
the discharge pipe by a float, and the air valve is fitted with means for adjusting it from the outside. The saddle valve A is connected by a rod to a float B so that when the trap is full a port in the



valve coincides with a port in the outlet pipe C and the trap is emptied. The air-valve stem D is carried to the outside and is fitted with an adjusting-wheel E and lock-nut F.

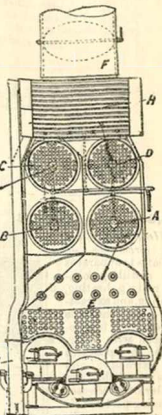
13,332. Browne, W. G., Kelly, J., Hemphill, W. A., and Westmoreland, T. P. Oct. 19.

Thermostats for water-supply pipes. The object is to cut off the water in the supply pipe before the temperature falls sufficiently low to freeze the water. The weighted arm A of the valve is held in the raised (open) position by means of a spring bolt B taking into a loop or aperture in the bar C, and provided with a nut D for adjustment. Upon the bolt is a sliding collar E connected to one end of a thermostatic band F hinged to the frame at G. This band consists of four compound bars of brass and steel, or two other suitable metals. The two inner bars H are hinged together at both ends, and the two outer bars I are brazed to these at J and K. When the temperature falls sufficiently low the bending of the band disengages the bar C from the spring bolt and the valve is closed by the weighted lever. The whole is enclosed in a casing L having a hinged cover M, and fixed on a support N attached to the pipe.



13,417. Kemp, E. Oct. 21.

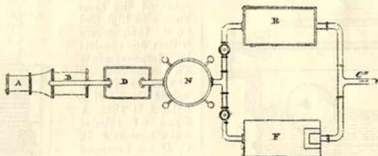
Heating water.—Relates to a apparatus of the class known as high and low temperature boilers, and consists in improvements and modifications of that described in Specification No. 5814, A.D. 1885. A series of tubular water-heaters A, B, C, D are arranged above the main boiler E in such a fashion as to cause the furnace gases to pass successively through each before entering the uptake F. The paths of the gases are indicated by dotted lines. The water is forced into the heaters in a direction contrary to that of the escaping furnace gases. A loaded valve may be placed in the pipe connecting the water-heaters with the main boiler, so as to keep up a pressure in the former and prevent the generation of steam in them by increasing the boiling point of the water which they contain. The air for the furnaces may be supplied by means of a fan at G, which forces the air through a tubular heater H placed in the uptake. In some cases a fan may be arranged in the uptake itself to act as a draught-inducer. When this is the case the uptake is divided into two vertical chambers, one of which contains the fan. A flap valve is hinged to the upper edge of the partition, and is so arranged that it may close the outlet from one or other of the chambers, and consequently put the fan in or out of action. The Specification describes and illustrates the arrangements modified to suit various conditions. Steam jets issuing from nozzles I may be used to clean the tubes.



13,555. Horrocks, J. Oct. 23.

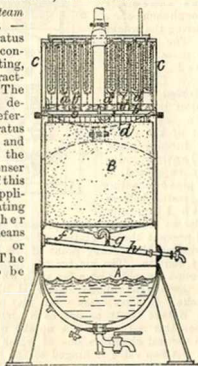
Heating buildings.—Relates to a system of ventilating or warming buildings by means of compressed air. The air is forced by an engine A and pump B through a tank D into a weighted telescopic holder N sealed by means of water; it is passed thence as required through a heater F or a cooler R to the distributing-pipes C¹¹, which are

perforated with cylindrical or tapering holes and covered with felt or other suitable material, to break up the issuing streams of air. The heater consists of a furnace in which is a chamber traversed by flue tubes.



13,861. Bernhardt, I. Oct. 28.

Heating by steam &c. circulation. — Relates to apparatus for distilling, condensing, heating, cooling, and extracting operations. The invention is described with reference to apparatus for extracting, and it is stated that the cooler or condenser forming part of this apparatus is applicable for heating solid or other materials by means of hot gases or vapours. The materials to be

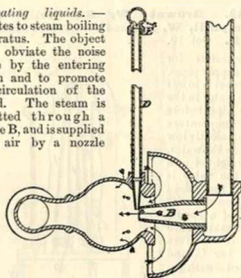


submitted to the extracting operation are contained in a vessel B, which may have a perforated bottom so that the materials may be acted upon by the vapours from a pan or boiler A beneath; or the said vapours may be excluded by a drip vessel f and conducted directly to the condenser C, which may be supported in the position shown or connected to the rest of the apparatus by suitable pipes. The condenser consists of a series of plain or corrugated pockets a, having longitudinal drip wires a¹, and arranged in concentric circles or otherwise with intermediate solid or hollow partitions b, which may have a fixed or removable base b, forming a series of compartments in which the vapours condense fractionally. Various forms and arrangements of the pockets and partitions are illustrated in the Specification. When the apparatus is applied for heating purposes, the materials to be

heated are placed in the pockets, and the heating gases or vapours are caused to circulate between them.

14,196. Picking, G. G., and Hopkins, W. Nov. 4.

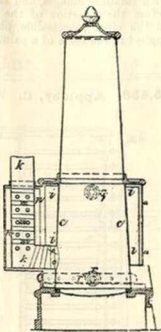
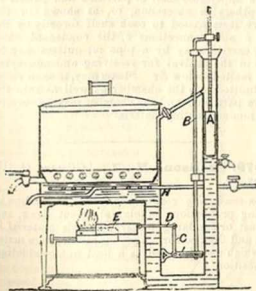
Heating liquids. — Relates to steam boiling apparatus. The object is to obviate the noise made by the entering steam and to promote the circulation of the liquid. The steam is admitted through a nozzle B, and is supplied with air by a nozzle



and pipe D which projects above the surface of the liquid and has a perforated extremity E, the nozzles being surrounded by a casing through which the liquid circulates as indicated by the arrows. When the nozzle B is made with more than one outlet, these are enclosed in a perforated chamber connected to the air pipe D; and if the vacuum caused by the condensation of the steam is insufficient to draw in the necessary quantity of air, the air pipe D is connected with the steam supply pipe and fitted with an air valve through which air is drawn and carried into the apparatus by the entering steam.

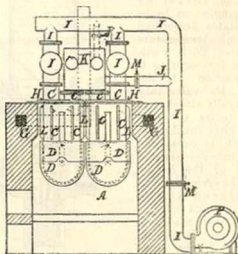
14,245. Stuttle, W. Nov. 5.

Heating water, circulating boilers for. The boiler consists of an upright casing *a* with an inner casing *c*, the lower part of which forms the fireplace and the upper is continued to form a hopper for fuel. The water space between the casings has projecting into it from the inner casing a number of radial plates *i*, and is traversed by the flue *k* which opens near the bottom of the fireplace, and may also have radial plates *n* and be traversed by water tubes *m*; *o* are water tubes across the front of the flue to prevent the entrance of fuel. *q* is the flow and *r* the return connection, which is forked before it communicates with the boiler, the fork extending three parts round the boiler and communicating with it by a number of small tubes.

**14,331. Kirby, H. T.** Nov. 6.

Heating water; boiling-pans; thermostats.—Relates to the application of the invention described in Specification No. 1782, A.D. 1886, to apparatus

in which oil lamps are used. The float *A* is connected by the levers *B*, *C*, and *D* with the sliding shutter or extinguisher *E*. The invention may be applied for heating boiling-pans for cooking, and for other purposes, as indicated in the previous Specification, and for warming fern cases, incubators, fostermothers, &c.

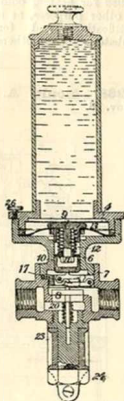
15,268. Boulton, A. J., [Carvalho, S. N.].
Nov. 23.

Heating gases or vapours for distribution and use in various mechanical arts. The gas or vapour is forced by a fan *P* through tubes *C* suspended by flanges *H* in a furnace *A* which may be heated by its own fire or by the combustion products from other furnaces. The tubes are U-shaped, and arranged in sets in the furnace. They are provided with external longitudinal ribs or wings *L*, and the bend is fitted with internal ribs or is filled with wire coils for increasing the heating-surfaces. The outer surfaces of the bends are protected from the direct action of the fire by guards *D*, which may be in several parts and are attached by bolts or other suitable means; plates are arranged to prevent the entrance of soot, ashes, &c. into the spaces between the guards and the retorts. The furnace is provided with side flues *G* which pass through the reservoir *K* for receiving the heated gases, to which the distributing-pipes are attached. For moderating the temperature of the heated gases or vapours the delivery pipe *I* is connected by means of pipes *J* with the reservoir *K* and with the distributing-pipes so that a mixture of cold and heated gas may be drawn off as required. All the pipes are provided with suitable dampers *M*.

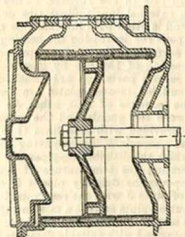
15,292. Westinghouse, G., and Moore,
F. Nov. 23.

Thermostats.—A vessel containing alcohol, benzene, or other suitable liquid is closed at one end by a flexible diaphragm *f* against which presses an

abutment connected by levers 17 to a valve 8 normally kept open by a spring 20. The abutment is in two pieces 9, 10, kept apart by a spring 12, and adjustable by means of a nut 11; 13 is a second flexible diaphragm to prevent leakage from the casing 6. The casing 6, with the valve chamber, is attached to the vessel by screwing, so as to be adjustable according to the temperature required; 26 is a set-screw for securing it in position. If desired, the valve may be rigidly attached to the centre of the flexible diaphragm, which is caused to bend into a constricted part of the casing, and the spring 12 may be placed at the opposite end of the vessel, between a flexible diaphragm and the casing. The whole is supported on a bracket 23, and secured by a nut 24.



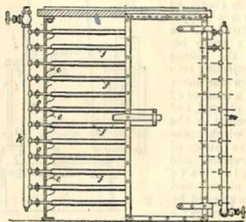
15,390. Joy, D. Nov. 25.



Non conducting coverings for steam engine cylinders and pistons. The internal surfaces of the cylinder and the faces of the piston are covered with a layer of non-conducting material, such as a mixture of asbestos and cement, which is provided on the wearing surfaces, and also on the other surfaces if desired, with a liner or facing of thin metal. The non-conducting material is applied to

the outer surface of the liner, which is provided with retaining-flanges, and is allowed to get hard before the insertion of the liner in the cylinder. In the more inaccessible places the material is applied in the form of a paint.

15,456. Appleby, C. Nov. 26.



Heating by steam circulation.—Relates to chambers or closets for melting tallow or other ingredients used in the manufacture of candles, refining oils, such as mineral oils and scale from shales, cooking, and other purposes. The chamber is made of wood, having an open front provided with hinge doors, and containing a number of loose hollow metal shelves *f* supported in a slightly-inclined position upon brackets *e* at the sides and heated by steam. Steam is admitted to the uppermost shelf or partition and passed to the others in succession, or, as shown in the Figure, it is passed to each shelf directly by the pipe *k* and connections *o*, the condensed water being carried away by a pipe *m*; gutters may be made in the shelves for receiving and conveying away melted tallow &c. Steam may, in some cases, be admitted into the chamber as well as into the hollow partitions, and the chamber may be covered with non-conducting material.

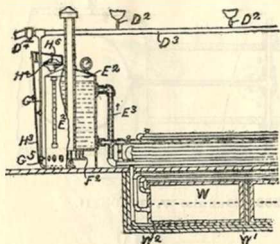
15,579. Allison, H. J., [Gilman, C. C.].
Nov. 30.

Non-conducting compositions.—A composition in varying proportions of clay, short-cut straw, and sawdust or similar granular vegetable material is dried and fired to form a porous earthenware material which may be used as a heat non-conducting composition.

15,663. Plass, R. H. Nov. 30.

Heating water.—Relates to a system of lighting and heating trains, ships, &c. in which air gas is

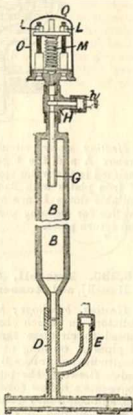
produced as required. The heating-arrangement comprises a boiler E^2 with a central flue, and a series of tubes E^3 . The boiler is heated by a Bunsen burner F^2 which is connected by a pipe G^4



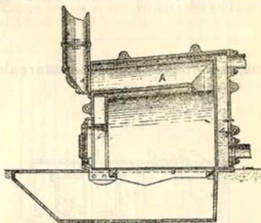
to the supply pipe D^3 . The quantity of air-gas supplied to the burner F^2 is automatically controlled by a cock G^5 , which is operated through the levers H^3 , H^4 by the steam governor H^4 .

15,759. Ridder, R. P. de, and Bennett, W. Dec. 2.

Heating buildings.—In small-bore hot-water heating-apparatus provision is made to allow for the escape of air or steam that may collect or be generated in the pipes, should the pressure exceed a certain amount. The expansion tube B is united to the system by a T-piece D having a branch E by which the system is filled. At the upper end it is contracted abruptly into a narrow tube G which projects downwards into it and is connected by a junction H , provided with a pet cock or cap h , with the safety-valve. This consists of a conical or other suitable valve which is pressed upon its seat by weights or by a spring M regulated by the screwed nuts L . It is enclosed in a casing O the bottom of which is perforated.

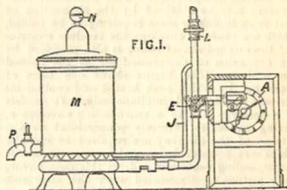


15,861. Simpson, H. C., and Astle, E. W. Dec. 4.



Heating water.—A saddle boiler for heating purposes and hot-water supply is made higher at the back than at the front, and with terminal water ends and return flues A which pass through the water space. It is made in two parts, each forming an independent boiler, which are bolted together along the centre line of the complete boiler.

15,920. Holmes, W., and Holmes, J. Dec. 6.



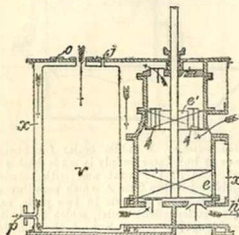
Heating water.—A clock A turns on a gas cock E at a pre-arranged time, a small jet from the pipe J lighting the gas passed through a burner under the boiler M . A few minutes later the water boils, and the steam escaping past the whistle N makes a continuous alarm which is stopped by turning out the gas by the cock L . The boiler is provided with a tap P for withdrawing hot water.

15,926. Dickinson, M. Dec. 6. *Drawings to Specification.*

Steam traps.—A receiver is fixed below the steam pipe of an engine as near the engine stop valve as possible, and into this the suspended

water passes and is returned through a non-return valve to the boiler. The water of condensation from the cylinder jacket and stop valve may also be passed into this receiver.

16,029. Montegrand, Charles, Marquis de. Dec. 7.

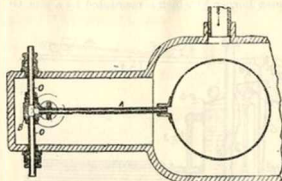


Heating air. A current of heated air is obtained by the compression of air which has been previously rarefied and brought nearly to the normal temperature. This additional temperature may be obtained by the abstraction of heat from liquids or gases requiring to be cooled, which are made to envelope the receiver containing the rarefied air. Cooling is also produced by the expansion of compressed air at the normal temperature. The Figure shows one form of apparatus, by which both heated and cooling air currents are obtained simultaneously. It consists of a receiver *v* with a surrounding envelope *x*, having capacities inversely proportional to the tension of the air they are required to contain. These are connected to double-acting pumps of corresponding capacities and, in this case, having their pistons *e, e'* mounted upon the same rod. Air is drawn through the receiver by the lower pump and forced through the envelope by the upper one, the heated and cooling currents escaping at *h'* and *p* respectively. The arrows indicate the directions of the air currents; *o* and *j* are apertures for the insertion of pressure gauges.

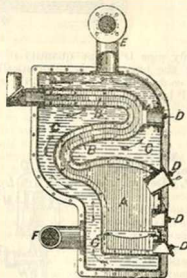
16,080. Galloway, J. H., and Galloway, J. W. Dec. 8.

Steam traps.—In traps in which the outlet valves are operated by floats, the latter are put into communication with the external atmosphere to prevent bursting or collapse. The method of doing this is shown. The float is mounted on the tubular arm *A*, which is connected by a T-piece *B*

to the open tubes *C, C*, which pass through stuffing-boxes in the sides of the casing and serve as the trunnions on which the float oscillates.



16,263. Dennis, W. R. Dec. 11.

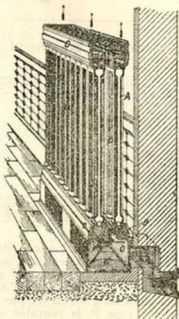


Heating water, circulating boilers for. The firebox *A* and the zig-zag flue *B* are entirely enclosed in the water space *C*. The boiler is made of iron plates with flanges *C* for bolting together. Suitable doors *D* are fitted to the firebox and to the flue for cleaning purposes &c.; *E, F* are flow and return pipes.

16,280. Russell, J., [trading as Rosser & Russell], and Rosser, J. S. Dec. 11.

Heating buildings; heating air.—Relates to radiators in which hot water, steam, &c. is caused to circulate through two parallel series of pipes *A* opening at the top and bottom into longitudinal chambers *B* which communicate at the ends. Between the pipes is a space *D* opening above into a hollow cornice *C* having a perforated top, and below into a chamber *E* having openings at the front and back which communicate respectively with the apartment and with the atmosphere,

and are provided with valves F, G, hinged at the bottom and connected together by a rod so that when the one is fully open the other is closed. Atmospheric air, or the air of the apartment, enters



the chamber E, and, passing between the pipes, escapes at the top of the apparatus. The pipes A are of approximately octagonal section, with circular ends and re-entering panels at the front and back, and are fitted between upright bars having grooves which receive longitudinal ribs on the pipes, preventing the escape of air at the sides of the apparatus.

16,355. Huxley, A. Dec. 14.

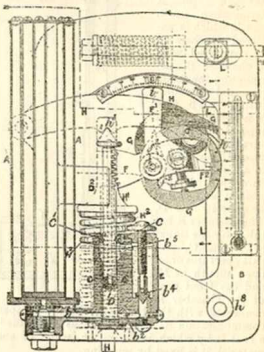
Heating buildings &c.—Relates to hot-water apparatus for conservatories and other places. The hot-water pipe is traversed by the flue pipe I, and the annular water space is divided by ribs 4 into flow and return portions which communicate at the extreme end of the pipe.



16,414. Popplewell, W. W., [Trueb, J.]
Dec. 14.

Thermostats for steam, air, or hot-water heating systems. A vessel A, preferably formed of a series of tubes closed at the top and open below to the hollow base, is filled with a suitable fluid and communicates by a passage b^2 with a cylinder c fitted with a piston D, the rod of which is provided

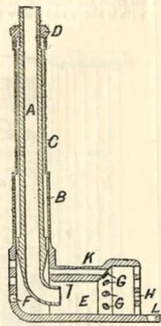
with rack teeth which gear with the teeth on the pivoted segment F. The cylinder c is filled with oil from the adjacent vessel E, which communicates with it above and below by passages b^3 and b^4 , and



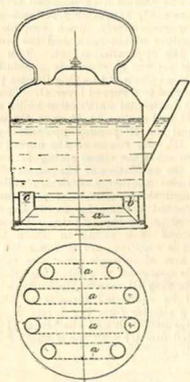
is fitted with a stop valve b^4 . The segment F forms one arm of a three-armed lever, the other two arms F^1 , F^2 forming index-fingers for indicating respectively, upon suitable scales, the temperature of the room and the temperature at which the apparatus is set. This three-armed lever is pivoted at j^3 and is attached by an adjustable set-screw f^2 to a ring G^1 also pivoted at j^2 and secured to a curved lever G. This lever rests upon a horizontal antifriction roller carried by a lever H and resting at h^3 upon the upper end of a vertical rod H^1 pressed upwards by the spiral spring H^2 . By means of the curved lever G the pressure upon the spiral spring is kept constant during the oscillation of the piston. The lever H carries also another antifriction roller h which bears against a vertical lever L pivoted at h^4 and attached at the other end to a spring lever M connected to the supply valve. The supply valve is arranged in a casing to which the heating-medium is supplied, and is connected by a link to one arm of an angle lever, the other arm of which is connected to a balancing-valve. In some cases the ring G^1 may be dispensed with and the lever G be connected directly to the lever L, and in a simpler form the levers G and L are also dispensed with and the levers H and M are connected directly with the segment F and arm F^1 respectively.

16,525. Bond, F. W. Dec. 16.

Heating liquids.—Steam is injected into the water or other liquid through a pipe A terminating in a nozzle which is enclosed in a chamber E connected with a chamber B surrounding the steam pipe and communicating with the atmosphere by a pipe C which may surround the steam pipe and terminates in a series of apertures which are opened and closed by a screw cap D. The chamber E has inlets for the liquid at F and G, and exit apertures or an open mouth at H, and the front part of the chamber is connected with the back part by an independent communication K. The apparatus is provided with a foot L by which, in tanks &c. made of suitable material, it is fixed by screwing.



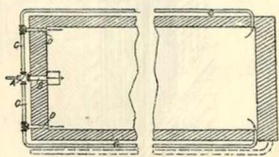
16,698. Darrah, C. Dec. 20.



Heating liquids.—Kettles and other vessels for

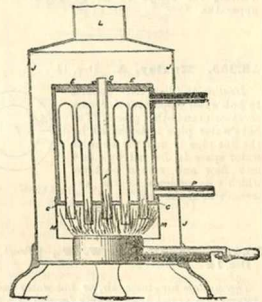
heating liquids are provided with tubes *a* which are fixed in under the bottom; the tubes at one end *b* are fixed in the base and at the other *c* pass a short distance into the vessel to produce a circulation. The sides of the vessel are extended below the tubes and are perforated for the passage of hot gases.

16,760. Rosher, C. H. Dec. 21.



Heating water for swimming baths &c. Relates to a method of heating, circulating, and filtering the water of swimming baths, and other large bodies of water. The Figure shows a horizontal section. A circulating steam-jet pump A, fixed in the delivery pipe B, is provided with lateral return pipes such as C, each of which communicates with the opposite end of the bath by a branch pipe D through which, if required, the return may wholly or partially pass.

16,821. Willway, A. B. Dec. 22.



Heating water.—Relates to gas-heated boilers for baths, heating buildings, &c. Through the bottom of the boiler pass a number of tubes open at the

lower ends which project to equal or varying distances below the bottom plate C and may be protected by a curtain M. These tubes may be expanded at their upper ends, and one of them passes through the boiler and holds the top plate E in position by means of a nut G, and serves also as a flue tube. They may be cast in one piece with the bottom plate, or they may be formed of screw-threaded piping screwed to the bottom plate or secured thereto by nuts and closed at the upper ends by screwed cups. The outside of the boiler may be provided with gills, and the whole is enclosed in a casing J connected at L with the chimney; N and P are flow and return pipes.

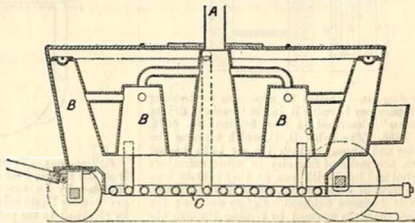
A.D. 1887.

267. Gamble, J. H. Jan. 7. *Drawings to Specification.*

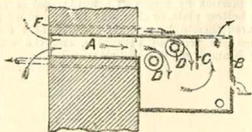
Heating water for baths. A cistern is placed in a hot-air flue in a system for heating and ventilating buildings.

385. Martin, J. W. Jan. 10.

Heating water.—Relates to a snow-melting wagon adapted to serve as a hot-water boiler. The wagon body, preferably constructed of iron, is provided with a furnace communicating with a chimney or chimneys A and suitably-situated internal flues B. The furnaces may advantageously be in the form of tubes C, through which the water circulates. The wagon is mounted on wheels so as to be as near the ground as possible in order to melt the snow in the immediate proximity. Movable covers are fitted to the wagon so that when they are closed the wagon body forms a hot-water boiler. In use, the snow is shovelled into it and the resulting hot water is distributed over the surrounding snow through cocks and hose furnished for the purpose. The wagon may be used as a sloop cart, if desired.

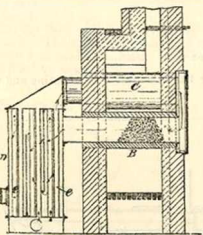


470. Matthews, W., and Yates, J. Jan. 12.



Heating air for ventilation. The air is admitted to the room through apertures A, and passes through the chamber B in which is a deflecting partition C. For heating and moistening the air, the inlet tubes are surrounded by a casing F into or through which steam may be passed, and the chamber B contains a coiled or other arrangement of perforated pipes D through which the steam is forced. Suitable taps are provided for draining the apparatus.

501. Ewens, P. Jan. 12.



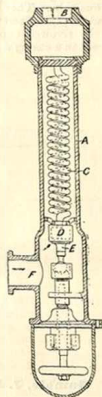
Heating air.—Relates to apparatus for treating air preparatory to using it in the "cool air drying process" described in Specification No. 4546, A.D. 1882. The tubes B, C, which traverse the furnace and through which the air to be heated passes, are made of fine clay or other refractory material and lined with iron, or they contain iron in the form of wire or scrap, which may be replaced when it becomes oxidized. Before entering the furnace the air is warmed by passing through the tubes e which traverse a chamber D, and around which the heated air circulates on its way to the drying-chamber.

686. Boulouse, J. Jan. 15.

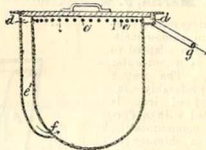
Thermostats.—Relates to self-acting valves for heating-apparatus, which are opened and closed automatically, according to the temperature of the air passing through them, by means of a thermostatic

592. Stubbs, J. E., and Thornton, J. E. Jan. 14.

Steam traps.—Coiled rods or tubes are used to operate the valves by their expansion and contraction. In the form shown the water from the vessel to be drained enters the chamber A at B and, collecting in the coil C, cools and contracts it, thereby drawing away the box D from the valve E, which is adjustable by the means shown. After the discharge of the water the steam in the coil again expands it and closes the valve. In place of being in the coil the water may be in the vessel surrounding it.

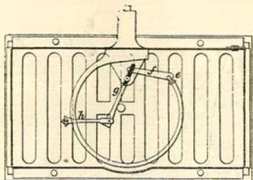


677. Arnold, A., and Webb, W. H. Jan. 15.



Boiling-pans.—To prevent loss and inconvenience from the boiling over of the liquid, the pan is surrounded by an annular trough d in which the overflowing liquid collects and from which it may be returned to the pan through apertures e in the lower part of the trough, or by a pipe g opening into the lower part of the pan, or it may be conducted into a separate receptacle by a pipe g.

arrangement. The movable part of a rotating or sliding gridiron valve is connected by levers *h, g, f* to the end *e* of a curved band fixed at the other end, and formed of two metals having different

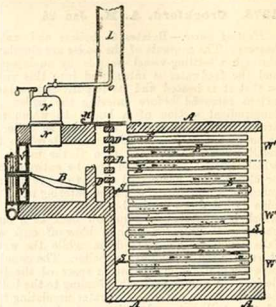


coefficients of expansion, or of a tube filled with a suitable fluid. The valve may be held partly open by means of a stop until a certain temperature is reached, when it is removed by the thermostat.

833. Day, St. J. V., [Swan, P. S.]. Jan. 19.

Heating air.—The air to be heated passes upwards in a zig-zag manner through a chamber *A* of firebrick or other suitable material, in which are a number of plain or flanged tubes *E* which are traversed, also in a zig-zag manner, by the hot gases from a furnace *B*, hinged flaps or dampers *S* diverting the gases from one set of tubes to another, as shown by the arrows. Between the furnace and the chamber *A* is a protecting grating *D* of fireclay &c. Doors *W*, which are provided for obtaining access to the tubes *E* for cleaning purposes, are also lined with fireclay slabs. The hot gases pass

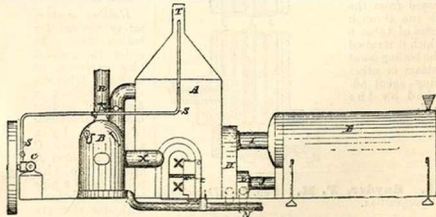
from the tubes *E* by side flues to the chimney *L*, which may also communicate directly with the furnace by means of a damper *M*. The draught is produced by a fan or blower or by a jet *O* of steam



obtained from any suitable source, a small boiler *N* for this purpose being shown fitted in the upper part of the furnace. After the hot air has been used for the purposes for which it is required it is passed through the hollow fire-door *V* to the spaces both above and below the firegrate. The air-heating apparatus may be combined with a steam boiler of the locomotive or other type, for the purpose of utilizing the waste heat thereof. The smoke-box of the boiler communicates with the chimney either directly or through the flue tubes of the air-heating apparatus.

840. Day, St. J. V., [Swan, P. S.]. Jan. 19.

Heating air for drying grain, tea, and the like. The object is to utilize the waste heat of the apparatus. The drier *E* is supplied by a pipe *I* with hot air driven by a blower through a tubular air-heating apparatus *A* such as is described in Specification No. 833, A.D. 1887. The exhaust steam from the engine *C*, used for driving the blower, may be

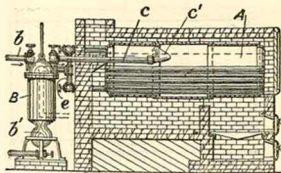


passed by the pipe *S* into one or both of the chimneys *R, T* of the steam boiler and air-heating apparatus respectively, to increase the draught therein; the waste furnace gases from the boiler *B* may be passed by the pipe *X* through the air-heating apparatus and there utilized; and the hot air after passing through

the drier is conducted by the pipes J, L, and N to the furnaces of both the steam boiler and air-heating apparatus. These furnaces may be supplied by the pipe H with hot air direct from the air-heating apparatus.

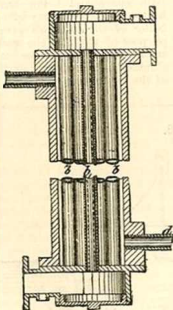
1273. Crockford, A. H. Jan. 26.

Heating water.—Relates to boilers and water-heaters. The contents of the boiler are circulated through a settling-vessel outside by an injector, and the feedwater is introduced into this vessel so that it is heated and its impurities to a large extent removed before entering the boiler. A longitudinal section of a boiler to which this arrangement is applied is shown. The boiler A is connected at the working water level to the settling-chamber B by a pipe C the mouth of which is flared as at C' and may be entirely open or closed by a perforated plate to prevent large pieces of scum, grease, &c. from entering it. This pipe is led down to the bottom of the vessel B, which is connected by a narrow neck to a mud chamber B' provided with a blow-off cock as shown. In this vessel the solid matter settles and falls down into the mud drum, while the water rises to the upper part, from which a pipe e leads it back to the bottom of the boiler. The circulation is maintained by an injector nozzle in the delivery pipe supplied from the steam space of the boiler, but a nozzle may be fitted to the suction also if desired. A pipe b, preferably leading to the bottom of the vessel B, delivers the feedwater so that it is heated and mingles with the water circulating from the boiler, and is delivered with it along the bottom of the shell. Any deposit on the bottom of the boiler is thus washed off and stirred up, and is conveyed by the pipe C to the settling-chamber and deposit drum.



1516. Adlam, W., and Faulkner, F. Jan. 31.

Heating liquids.
—Relates to the treatment of brewers' wort, and comprises surface apparatus for heating it. The wort is passed from the mash tun through a series of tubes b in which it is raised to the boiling point by steam or other heating-agent admitted by the pipe d.



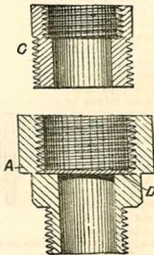
1569. Snyder, F. H. Feb. 1. Drawings to Specification.

Non-conducting coverings and compositions.—The carbon from gas retorts is finely powdered, and the finer particles are separated from the coarser by levigation with water, or by an air blast. The fine powder is then made coherent with tar,

asphalt, resin, or india-rubber, and serves generally as a non-conductor of heat. With subsequent moulding and firing it is made into linings for safes &c., coatings for steam boilers, pipes or cylinders, hot-air furnaces, hot-blast pipes, &c. A more porous material is produced by adding saw-dust. Sometimes other non-conductors of heat, such as slagwool and asbestos, are mixed with the powdered carbon.

1577. Foord, J., and Paddon, W. W. Feb. 1.

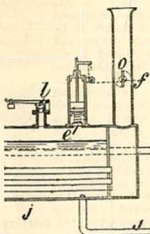
Heating water, safety devices for boilers for. In order to prevent the explosion of bath and other domestic boilers, a disc D of lead or other suitable metal is secured by a screwed cap C within a socket A attached to the boiler, or to a pipe in connection therewith, the strength of the disc being so regulated with regard to that of the boiler that explosion of the



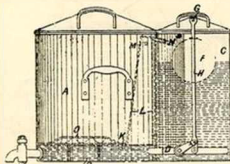
latter is prevented. To the cap C may be attached a hollow ball having a perforation in the side, from which the hot water or steam may be led away by a pipe.

1683. **Lynam, P. J.** Feb. 2.

Thermostats for hot-air engines. Relates to engines in which the air is heated by means of oil or other liquid which boils at a convenient temperature. The oil &c., which is heated in the apparatus shown, is circulated through special air &c. heating apparatus. The temperature and pressure in the oil heater is kept constant by a valve *e*, which is raised when the required pressure is reached and closes a damper *f* in the chimney.



1698. **Goodison, E.** Feb. 3.

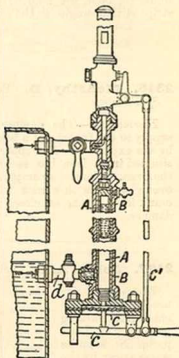


Boiling-pans.—Relates to washing-apparatus for domestic purposes. Clothes or other articles to be washed are placed on a tray K contained in a vessel A connected with a reservoir C by a pipe D provided with a valve, the latter being controlled by a ball F connected to it by a rod H and lever G. The tray K is connected with the upper part of the reservoir by a tube L having perforations M near the top. The space beneath the tray having been filled with washing-liquor and a sufficient quantity placed in the reservoir to just close the valve in D, the apparatus is placed on a fire; when the liquor beneath the tray boils it is forced to the top of the pipe L and issues in jets through the perforations therein; after percolating through the clothes &c., it passes beneath a shield O and

through an opening P back to the underside of the tray. A portion of the boiling liquor passes into the reservoir C, which results in the raising of the float F, the opening of the valve E, and the passage of fresh liquor to the vessel A.

1770. **Murrie, J.** Feb. 4.

Thermostats.—Relates to an improvement on the inventions described in Specifications No. 303, A.D. 1885, and No. 2520, A.D. 1886, and consists of means for indicating and regulating the temperature, pressure, and liquid level in steam boilers and other closed vessels. A vessel A closed at its upper end and containing water or other fluid is enclosed in a casing B connected with the waterspace of the boiler &c. by a tube *d* at the lowest water level. The lower end of the tube A is open, and the liquid in it communicates,



either directly as shown, or through a coiled or other pipe, with a diaphragm C. The chamber B is filled with water so long as the level in the boiler is above the tube *d*, but when it falls below this, steam will displace the water in B and will cause the water in A to boil and the diaphragm C to be moved outwards by the extra pressure produced in A. The diaphragm carries a stud which actuates levers *c*, *c'*, which may sound a steam whistle or other alarm as shown, or may open a safety-valve, or may cause the contents of a water reservoir on the top of the boiler &c. to be emptied into the latter, thus forming an automatic feed regulator. In order to keep the temperature of the diaphragm as low as possible, a long coiled pipe may be interposed between it and the bottom of the vessel A, and to this pipe may be connected a gauge graduated to show pressures and the corresponding temperatures. In a modification, the diaphragm C is dispensed with, and the expansion of the vessel A itself, or of equivalent pieces of metal, is used to actuate the levers *c* and *c'*.

1811. Thompson, W. P., [*Smead, I. D.*].
Feb. 4. *Drawings to Specification. Amended.*

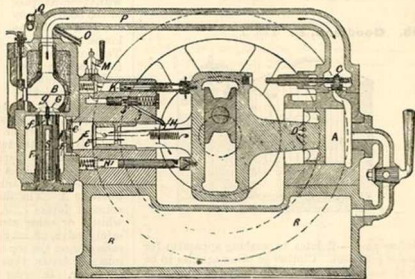
Heating buildings.—Relates to a system of heating and ventilating schools and other buildings. Atmospheric air, warmed to a moderate degree only by a special furnace having large heating-surfaces, is admitted in large volumes to the rooms through apertures near the floors, the foul air being carried off through other apertures near the floors. In order to provide a free passage under the floor, the flooring boards are nailed to strips at right-angles to the joists.

2345. McCarthy, D. Feb. 15. *Drawings to Specification.*

Thermostats.—The damper controlling the air supply to the furnace of a baker's oven is operated by the expansion of a copper rod or coil which is situated in an iron box secured to the inside of the oven. The rod operates a pinion outside the oven gearing with a rack which, through a bell-crank lever, opens or closes the throttle valve or damper.

2477. Jones, A. S. Feb. 17.

Thermostats for hot-air or furnace gas engines burning petroleum. The pump N¹ supplies water spray by the pipe O to the furnace B when its temperature is too high; this is brought about by the expansion of the pipe P, tending to close the air inlet Q to the pump. The expansion of P also closes the petroleum supply to the pump E for supplying the furnace.



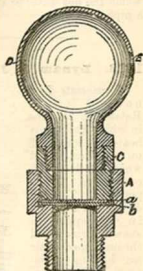
2500. Richard, C. Feb. 17.

Steam traps.—The trap is of the type described in Specification No. 10,630, A.D. 1885. In the present instance, the steam is trapped between the edges of a number of superposed discs and the walls of the containing conical casing. Between each pair of discs is a space into which the steam expands, so that the pressure is very small at the open outlet pipe. A vertical section of one is shown in which the discs A, A are formed integral with the spindle B, and are of metal of greater expansibility than the conical casing C. A screw D is provided by which the area of the annular passages can be adjusted, and by which the discs can be lifted to allow the trap to be cleaned.

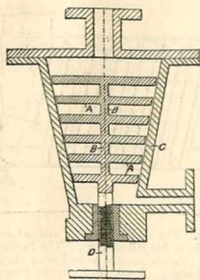
(For Drawing see next page.)

2431. Foord, J., and Paddon, W. W. Feb. 16.

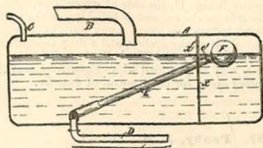
Heating water, safety - apparatus for boilers for. A plate of mica, or a plate a of metal protected by a plate b of mica or other suitable material, is secured in a socket A by means of a screwed cap C and is attached to the boiler or to one of the pipes connected with it, the strength of the plate being so adjusted with regard to that of the boiler that the bursting of the latter is prevented. A hollow ball D is screwed to the cap C, from which the escaping steam or hot water is led away through an aperture E, and which also prevents tampering with the plate.



2500.



2625. Little, R. R., and Hall, J. Feb. 19.

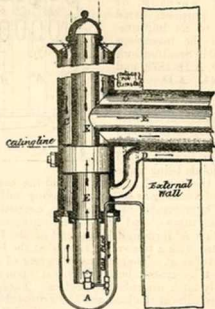


Heating water.—Relates to feed-water-heaters for steam generators or other purposes. In order that the water may be drawn from a constant distance below the surface, notwithstanding variations in the water level, the end of the outlet pipe is hinged and is carried by a float at its free extremity. A common arrangement is shown in the Figure, in which A is the vessel in which the feed is heated by steam delivered by the pipe B, C is the inlet pipe, and D the outlet. The latter has a length E hinged to it which carries a float F, by means of which the perforations e' on its lower side are maintained at a constant depth below the surface. Guides x, x' are provided to prevent the lateral movement of E. In several modifications shown and described, means are provided for adjusting the distance of the perforations from the surface.

2813. Hellyer, R. W. Feb. 23.

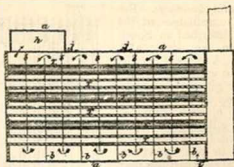
Heating air.—Relates to ventilating, warming, and illuminating apparatus for buildings, rooms, or offices. The products of combustion from the gas or other burner A, which is enclosed in a glass

bowl as shown, are conveyed to the outer air by means of a pipe E which is fitted at its outlet with a cowl and is surrounded by an inlet pipe C admitting warm air to the apartment. The burner



is supplied with atmospheric air by a branch from the pipe C or by an independent pipe D which is provided with a door which may be opened for carrying off the vitiated air of the apartment.

2870. Eaton, J. A., [Shaw, S. H.]. Feb. 24.



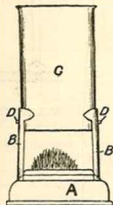
Heating air for drying tea leaf, berries, &c. The air is drawn through one or more chambers a which are traversed by flue tubes T connected with a furnace, and are provided with a number of partitions b , incomplete at each end alternately, causing the air to take a zig-zag course. It is admitted by an aperture i at the end furthest from the furnace, and is drawn through a chamber h near the other end, with which the supply pipes communicate. Other inlets j may be provided, and the whole may be covered with non-conducting material.

are arranged on a common level, a separate apparatus being used for each floor of a building. The well E neutralizes the effect of that portion of the pipe D which is within the well, so that the length of the column of water does not vary during the consumption of the oil, the water level in D being maintained constant by a ball cock M.

3119. Atkins, W. March 1.

Heating water.—

The spirit lamp A is fitted with two vertical spring guides B which support a vessel C for heating water, in such a manner that the latter may be slid up and down so as to vary its distance from the flame. The guides C have vertical slots which receive pins D attached to the lower part of the water vessel. The spring action is obtained



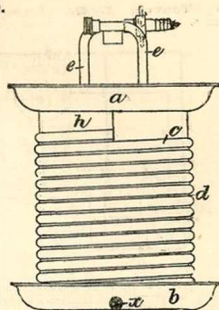
by means of a stretcher placed inside the lamp body A, which presses apart the lower ends of the guides B. When the water vessel is pressed down to its lowest position it acts as an extinguisher. A modification is described, suitable for shaving purposes, which has a soap or lather box in the base, and a receptacle for spirit which fits into and screws to the cover of the water vessel when the apparatus is not in use. In another modification, for workmen's use or for picnics, the water vessel A is enlarged and provided with a spout, turn-down handle, and a removable lid.

3169. Watson, L. March 1.

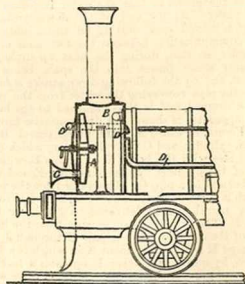
Heating liquids.—Relates to apparatus for warming or scalding milk and other dairy produce. Consists of a helical coil *c* of metallic or other tubing with a coil of wire *d* permanently secured between the convolutions of the tubing. The coil stands upon a flange in the receiving-vessel *b* and supports a distributing-vessel *a* upon a similar flange *h*. Inlet and outlet pipes *e, e* for the steam, air, or gas heating-medium, are attached to the end of the coil *c*. The milk, after treatment, is removed from the lower vessel *b* through the outlet *x*. The coil may be made in sections which can be readily bolted or clipped together. The coil may be removed from the apparatus described above, and utilized for the same purpose by immersing it in a vessel filled with the milk to be treated.

(For Drawing see next column.)

3169.

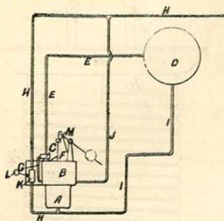


3183. Langfield, J., and Martland, R. L.
March 2.



Heating air for use in heating railway carriages. A chamber A in the smoke-box B of a locomotive is supplied with atmospheric air through the funnel C, and is connected by flexible or telescopic pipes D with a perforated chamber in each carriage or compartment, suitable valves being provided to regulate the supply of heated air. To increase the air current, or keep it up when the engine is at rest, steam from the boiler is supplied in the form of a jet in the pipes. The steam also prevents the air from becoming too dry.

3539. **Tongue, J. G.**, [*Creamer, H*].
March 8.

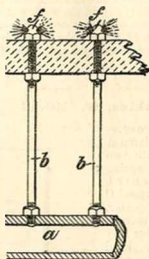


Steam traps.—The water of condensation flows into a pump barrel arranged tandem-wise below a steam cylinder, and, in so doing, raises the plunger and piston, which are on a common rod and are balanced by a weight on a lever, the end of which is connected by a chain or steel band to the piston-rod head. When the up-stroke is completed a valve is moved admitting steam to the cylinder above the piston so that the water is forced into the boiler. At the end of the down-stroke the valve is moved back, cutting off steam and opening communication between the two ends of the cylinder, so that, during the next up-stroke, the exhaust steam passes into the space below the piston, and by the following down-stroke is forced into the pipe conveying the water from the vessel to be drained, and is thus returned to the boiler. The apparatus is shown in a diagrammatic form in the Figure, in which A is the pump barrel, B the steam cylinder, and C the valve casing which communicates with the boiler D by a pipe E, with the top of the cylinder by the connection F, and with the bottom by a pipe G. The water from the vessel which is to be drained flows along a pipe H to the pump barrel, and is delivered to the boiler by a pipe I. The exhaust steam escapes from the lower end of the cylinder into the pipe H through J. In the pipe H is an enlargement K in which is a float which, by means of a lever L, operates a locking-device to prevent the movement of the valve when an insufficient quantity of water is supplied. The valve is operated by a pin on the piston crosshead M which moves in a slot in a vertical bar which, at the end of each stroke, it moves through a distance sufficient to throw over a weighted lever which moves the valve.

3623. **Pickup, J., Pickup, E., and Pickup, J.** March 10.

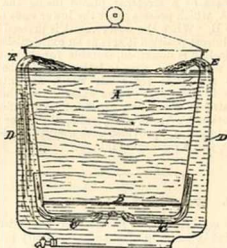
Boiling-pans.—Relate; to tape and slasher sizing-machines, and to other apparatus in which boiling is effected by steam injection. Steam is injected into the box or vessel containing the size to be

boiled through nozzles *f* provided with radiating steam-jet holes and screwed, as shown, to the ends



of pipes *b* communicating with steam pipes *a* around the vessel.

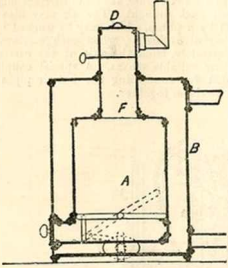
3800. **Brougham, F. J.**, [*Desjardins, E.*].
March 12.



Boiling-pans.—Relates to apparatus for washing clothes and other fabrics, which is constructed in such a manner that ebullition does not take place in the chamber A containing the materials, but in an outer vessel D, whence the water is projected by nozzles E into the inner chamber. By means of the perforated bottom B and the return passages C continuous circulation of the liquid is maintained. In modified forms for larger sizes the relative size of the outer chamber is reduced and the return passages are provided with valves.

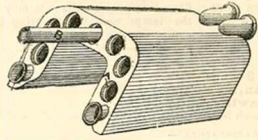
3841. **Cumming, J., Fennell, F. N., and Fennell, G. F.** March 14.

insertion of a thermometer. The bed is covered by a glass frame *u*. Planks *r* are placed outside the cement sides to prevent escape of heat.



Heating liquids.—Water for baths &c. and for warming buildings is heated by a circulating boiler consisting of an inner firebox *A* surrounded by a water casing *B*, provided, if necessary, with a non-conducting covering. The furnace is fed with fuel at *D* through the flue *F*, and the firegrate is pivoted to facilitate cleaning. Suitable taps and doors are fitted to the outer casing. Liquids, such as those used in the warming-pans of railway carriages, are heated in reservoirs by a portion of the circulating system.

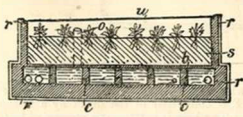
4197. **Milne, W. L.** March 21.



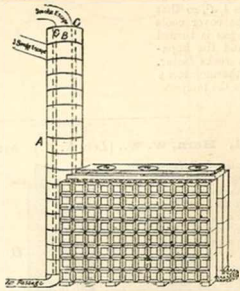
Heating water for hot-water circulating apparatus. In saddle and like boilers the water space is traversed by a number of flue tubes *B* which are supported by the end plates, the latter being recessed as shown at *A*, so that the tubes may be caulked or otherwise secured and, if necessary, replaced without removing or altering the position of the boiler. The fire-gases are caused by check-plates to pass preferably first through the side tubes and then back through the tubes in the crown of the boiler to the front and thence to the chimney.

4183. **Siem, J.** March 19.

4327. **Henderson, C. J.** March 23.



Heating garden frames &c.—Relates to means for heating hot-beds for horticultural purposes, applicable also for heating forcing-houses for plants. The heating-apparatus consists of a water reservoir placed underneath the hot-bed, and heated by pipes from a circulating boiler placed below the level of the reservoir. The reservoir is made of cement, and the cover *b* upon which the soil *s* rests is supported on cement columns *c*; it is divided into two compartments by a transverse partition, and contains an arrangement of pipes to ensure the uniform distribution of heat over the surface of the bed. The reservoir is filled by a side pipe (not shown), the air escaping through rising pipes *o* which reach above the surface of the soil, and also serve for the



Heating air.—Chimneys inside buildings are built of blocks *A*, having a passage *B* for smoke and other passages *C* for air to be heated.

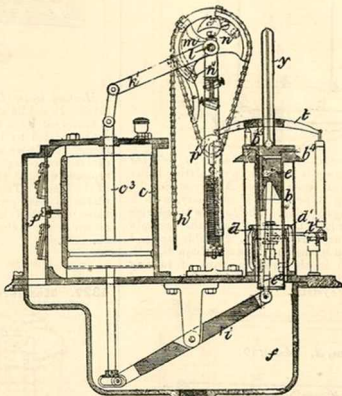
4354. Heginbottom, J. March 23. *Drawings to Specification.*

Heating air; heating buildings.—Relates to heating buildings, railway carriages, &c. (the invention being mainly described with reference to railway carriages), by the circulation of hot air through a closed system of pipes. A portion of the system is heated by any suitable means, as by a gas stove. The air supply to the jets may be drawn from the lamps used for lighting the

carriages; in some cases this hot air will be sufficient to heat the pipes without any further supply of gas. A pipe is taken from the inside of the coil to a point higher than the carriage lamps, to prevent back draught. The air may also be circulated by a pump, which may be worked by a separate small engine or, when each carriage is heated separately, from the axle of the carriage, or by other suitable means. A special coupling is provided for connecting the hot-air pipes of different carriages together.

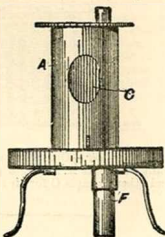
4784. Sheridan, H. B., and Rawlings, E. March 30.

Thermostats.—Relates to apparatus for carburetting air with volatile hydrocarbon, to be stored and burnt as gas. The apparatus consists of a retort *b*, which is heated by the two burners *d, d'*. The valve supplying the burner *d'* is governed by the variation of temperature of the cover *b'* through the agency of the levers *t, t'*, so that as the cover cools more gas is turned on and the apparatus works faster. The thermometer *y* shows the temperature.



4951. Horn, W. W., [*Lots, K. W.*]. April 2.

Heating buildings; heating liquids.—Relates to radiators or drums placed on stove pipes in upper rooms &c. for heating the room or for heating water &c. The products of combustion are passed through an oval drum *A* traversed by an open oval pipe *C* above which is a plate projecting from one side of the drum. The

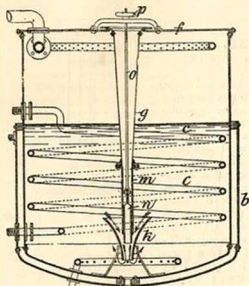


top, which may be removable, is flat, and the flue pipe *F* is connected to the drum by a telescopic joint. The base is in two parts connected by turn-bushings; the lower part, having the feet attached, may be dispensed with if desired.

4976. Wilson, J. V. April 4.

Boiling-pans for lubricating-oils &c. The pan is provided with a cover *f*, to the centre of which is fixed a conical tube *g* having a nozzle formed of a cast-iron tube *m* provided with a telescopic extension *n* which is adjusted by means of the screwed rod *o* and hand-wheel *p*, and is surrounded by a cone *k*. Air &c. is drawn or forced through the tube *g*, and, when the nozzle is raised as shown, causes the circulation of the liquid through the

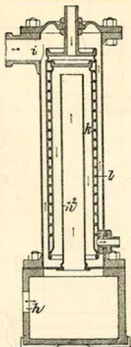
cone, as indicated by the arrows. The pan is heated by means of a steam jacket *b*, and may



contain a coiled pipe *c* through which cold water may be passed in case the contents become overheated.

5417. Hocking, F. April 14.

Heating liquids or gases.—Relates to apparatus for condensing steam, particularly that made from salt water for obtaining fresh water, the apparatus being also applicable for heating fluids. A number of arrangements are described, some of which are made up of a number of elements. A complete apparatus containing only a single element is shown in the Figure. Steam &c. passes through an annular chamber *k* divided by horizontal partitions *l*, which are incomplete alternately on each side of a longitudinal division, the condensing-water entering the casing at *h* and, passing up a central tube *h'* and along both side of the annular chamber, escaping at *i*. The condensing-water may act upon the outside surface only of the chamber *k*, and the apparatus may be provided with a central filter, or a group of elements such as that formed by the chamber *k*

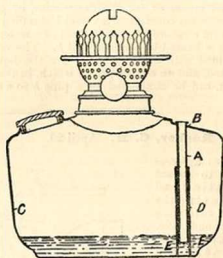


be arranged around a filter, the condensed water &c. escaping in these cases at the upper part of the apparatus. The steam &c., instead of travelling in a zig-zag course in planes at right-angles to the axis of the apparatus, may be caused to travel parallel to the axis. In a modification, the chamber *k* is flat, and a number of such chambers are arranged radially in a condensing-chamber. The baffle-plates project from each side alternately, and may be provided with arms which further lengthen the course to be traversed. Or the steam &c. may be passed through a flat annular chamber enclosed in a casing, and provided with radial baffle-plates carrying arms as in the former case.

5532. Edwards, E., [Jeger, J.] April 15.

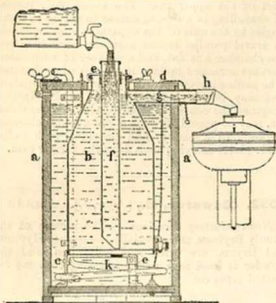
Non-conducting coverings.—The mosses of the family Bryineæ, and especially the species Hypnum and Bryina, are dried and pulverized, and the powder is used as a non-conducting covering for heated pipes &c.

5675. Anderson, T. April 19.



Heating water.—Relates to means for indicating the liquid level in lamps, boilers, &c., and consists in the use of an indicator which projects through an aperture in the top of the containing-vessel. In the Figure, the indicator *A* is formed by a hollow tube closed at its lower end, and projecting through an aperture *B* in the reservoir *C*. This indicator slides in a tube *D* which is attached to the bottom of the reservoir, and which is perforated at *E* to allow the liquid to enter beneath the indicator. The apparatus may take the form of a float with a tubular indicator sliding upon a rod fixed beneath the aperture through which the liquid is poured into the vessel.

5708. Qvistgaard, J. F. O. April 19.

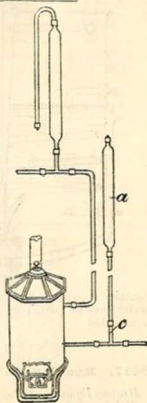


Heating liquids.—Relates to apparatus specially adapted for heating milk, either prior to the separation of cream or for the destruction of germs. The apparatus consists of a vessel *b* standing upon a platform *c* secured to the bottom of a water bath *a* which is heated by a steam coil *k*. The vessel *b* is provided with an inlet pipe *f* for the liquid to be heated, and an outlet pipe *g* which, in the case of milk, can be connected by a pipe *h* to a cream

separator *i*. The water bath *a* is provided with a removable lid *d* secured by thumb-screws. Thermometers are placed in the vessels *a* and *b*.

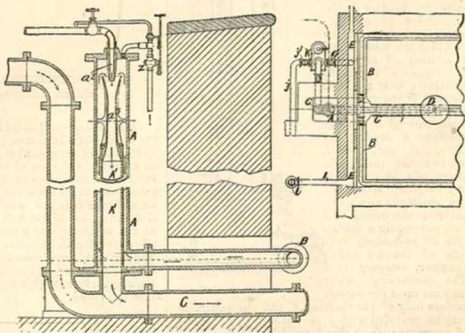
5738. King, J. April 20.

Heating buildings.
—To any part of a hot-water circulating system is connected "compensator" and fill pipe consisting of a cylindrical or other reservoir *a* closed by a screw cap and connected to the system by a T-piece *c*, the parts being joined by sockets having right and left handed screws. The sockets are tightened by means of a spanner having jaws of unequal length, the longer jaw being provided with a removable tooth.



5773. Rosher, C. H. April 20.

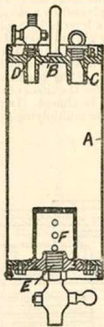
Heating water.—Relates to means for heating and circulating the water of swimming baths, ponds, &c. by a steam jet apparatus, and comprises improvements on the invention described in Specification No. 16,760, A.D. 1886. Steam is directed by the nozzle *a*² into the receiving-cone *a*³ fixed in the mouth of an inner pipe *A*¹ connected with the delivery pipe *C*, *A* being the return pipe; *Z* is a steam ejector to assist the starting of the apparatus when the bath is only partially filled.



Modifications, adapted for use in small baths, are described, in which the return pipe is dispensed with. The apparatus may in this case stand in the bath itself, or be situated in a recess communicating therewith. The delivery pipe C is laid in a channel in the floor of the bath, and terminates in nozzles fitted with spreaders D, which consists of two circular plates suitably coned on their adjacent surfaces, causing the water to be discharged in a thin film over the bottom of the bath; the return pipes B are perforated within the bath and situated round it either in a channel covered by a grating or otherwise. When it is not required to heat the water a circulating-apparatus K receives the surface water from the overflow E and forces it into the delivery pipe C; or, if it be desired to filter and aerate the water, it is circulated through suitable apparatus by means of the connections I, i, j, and j', the stop-cock g being closed. The whole of the apparatus is situated in a side chamber, which communicates with the tank by an opening in the lower part of the wall.

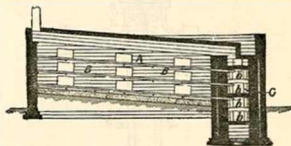
5777. Tellier, C. April 20.

Heating liquids.—Relates to a method of heating natural and artificial mineral waters and beverages such as beer, cider, &c., to sterilize them, while keeping them in an aerated condition, and to means for filtering them as they are withdrawn for consumption, and for allowing salts and gases to be added to improve their digestive qualities. The operation takes place in a number of hermetically-sealed vessels, which are placed in a bath and raised to a temperature sufficiently high to destroy any morbid germs present. The Figure shows a section of one form of these vessels. The metal casing A is provided with a top B having two apertures C and D, the first closed by a screw plug, and the second fitted with a tap. The vessel is filled through the aperture C, the tap D being open to allow the air to escape. To prevent overfilling, which would result in the bursting of the vessel, the openings C and D project internally to entrap a cushion of air in the crown of the vessel. The outlet E is surrounded by a perforated cylinder F, in which some filtering-medium may be placed. A cotton filter may also be screwed on to the top B to prevent the access of impure air. Glass or porcelain bottles may be adapted to serve in place of the vessels A, by having a metal cap with a



filter and tap screwed over a metal collar placed round the neck. When the water is wanted in small quantities, a number of these vessels are placed in a special bath of some saline solution, with a high boiling point. When the water is required in larger quantities, the vessels are placed in a large closed vessel provided with a manhole to which steam under pressure is admitted.

5793. King, J. April 21.



Heating liquids.—Relates to apparatus for use in the roasting, drying, &c. of farina, dextrin, manures, foodstuffs, &c.; for heating, concentrating, and distilling liquids; and for heating disinfectors for hospitals and water for baths and other purposes. The apparatus consists of one or more chambers A heated by hermetically-sealed tubes B, containing water, oil, or other suitable liquid, having one end projecting into the furnace C. The tubes are arranged in rows, one above another, and each row is heated by a separate fire, the furnace being for this purpose divided by a series of fireclay partitions b, which are incomplete at each end alternately, forming a zig-zag flue for the lower fires. The fuel is burnt on the slabs forming the partitions, and the zig-zag arrangement causes the smoke to be consumed. The ashes are raked on to the bottom shelf, where they serve to heat the air supplied for combustion. The smoke flue is carried along the top of the chamber A to the end, to utilize the heat of the gases as far as possible. Both the furnace and chamber are provided with suitable doors. The material to be treated is supported directly upon the tubes, or in trays, tanks, or other suitable vessels placed thereon. For heating water for baths &c., the tubes are carried along the sides or bottom of the bath &c.

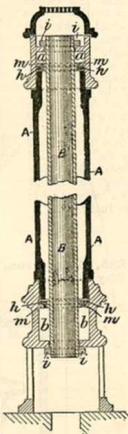
5822. Breeden, J. April 21.

Heating water.—Relates to a valve for regulating the flow of gas and water to bath heaters &c. The water valve q may be either above or below the gas valve r, but in either case both are connected together by the stem t, so that, when water is introduced at a, and the valve q lifted, the valve r is lifted simultaneously. A spring u keeps the valves closed when the water is turned off, and a screwed part s of the connecting-stem serves to adjust the valves to their seats. When the water is above the gas valve, a tube p is provided for

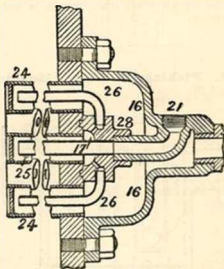
purified it is pumped along with the contents of the boiler through the filter. The settling-chamber A is divided by a layer of filtering-material d' held between a pair of perforated plates d, d' , and has a spherical deposit vessel a^2 into which the solid matter falls, and from which it is blown off at intervals. A pipe a leads the water from the boiler to the bottom of the vessel A, the said pipe being arranged to draw from the surface and from the bottom, and the pipe a' at the surface being fitted with a rose a^1 . From the top of the vessel a pipe a^2 leads the water, after passing through the filter, back to the boiler, as shown at a^1 ; or it is returned by a pipe a^3 which passes over the furnace and enters the boiler in front. By conveying the water over the fire it is heated, and the power required to drive the circulating-pump C, which may be arranged either to draw or to force through the filter, is lessened; in some cases the pump may be altogether dispensed with. In addition to, or in place of, the stratum of filtering-material a^2 , the pipe a' is fitted with a perforated nozzle a^4 containing filtering-material; and in the cover of the settling-chamber is a hole a^5 with a removable lid through which any substance calculated to assist the deposit of impurities in the water may be introduced. The feedwater may be led into the pipe a at a^6 , or it may be delivered into the bottom of the vessel A by a pipe e , where it mixes with, and is heated by, the water from the boiler. A pipe f is provided by which a tank may be supplied with purified water for general use. The apparatus may be fitted to a locomotive, in which case a horizontal pump is preferably employed driven from the valve rod or other convenient moving part.

5971. Heaps, T. April 25.

Heating buildings; heating air.—Relates to a radiator formed of a number of hot-water or steam pipes A, of oval or hexagonal section, traversed by central pipes B through which atmospheric air may be admitted to the room, or through which the air of the room may be circulated. In securing the pipes to the end boxes a, b , the ends of the pipes are made slightly taper and are forced in, being secured by nuts i on the screwed ends of the inner tube, or by ordinary bolts passing through it; h is an elastic washer. Instead of the tube ends being made taper, they may be provided with shoulders which take against the flanges m , suitable water-tight packing being placed between.



condensing-tubes are employed, these are divided into sets of gradually-decreasing numbers. In other cases the outlets of the tubes are also partially stopped. The Figure shows one of the



forms described. The steam is admitted to the casing 16 and passes to the ends of the stopped tubes 24, returning by the inner concentric tubes 26, and passing through some narrow apertures in the block 28 traverses in like manner the central tube 25 and escapes at 21. The tubes 24, 25 are surrounded by the liquid to be heated or evaporated.

6007. Weir, J., and Weir, G. April 25.

Heating liquids.—Relates to means for ensuring a continuous current through tubular apparatus for heating or cooling and preventing the accumulation of air therein. In steam-engine condensers &c. in which a large number of small

6039. Haddan, R., [Vaillant-Dubus, C.] April 25.

Heating air.—The walls of steam generators or other heaters are formed of hollow tubular blocks B so as to form passages for air, the blocks being joined together by means of short tubes the ends of which take into sockets in the blocks. The passages are preferably longitudinal, the front ends