blast nozzle 6 and within a compartment formed in the smoke box by a diaphragm 4, a plate 3 and a cinder screen 12. The heater is inserted through the side of the smokebox and is supported by rails 26 and the frame 48 of the opening. Water, fed by a pump or injector, and in every case slightly preheated by steam to prevent condensation on the exterior of the pipes, passes to the uppermost compartment 42 of the outside header and through tubes a^5 to the inner header 44 whence it returns by tubes a^6 to the compartment 43 and to the boiler. In the example shown the tubes a^5 of the uppermost bank are traversed by close ended tubes a^7 from a header 45 fed with exhaust steam. Each header is constructed from two pressed steel plates so that when assembled stepped compartments are formed, with a plane jointing face 40, the tube plates of each compartment being vertical. The tubes are spaced most closely in the lowest bank. In use, hot gases carrying ash and dust pass under the plate 3 and, in striking the screen 12 clinker is broken up and the particles impinge on the tubes a^6, a^5 of the feed heater and have a scouring action preventing or removing incrustation. By opening a cock to the atmosphere operated from the cab, and placed in a by-pass from the pipe leading from the injector to the heater, a reversal of flow through the feed heater can be effected under boiler pressure, which will clear the heater of sediment. All pipe joints are external to the smoke box to facilitate removal of the heater when desired. The outer header may be lagged. By means of partitions in the header or further convolutions in the plates forming the headers the water may be made to pass more frequently across the stream of hot gases and in further modifications the water is heated wholly by the hot gases or simultaneously by exhaust steam and hot gases in all the tubes instead of the top bank only. For use in dismounting the heater, extensions of the rails 26 on suitable supports may be clamped to the side of the smokebox, on which the heater may rest when withdrawn for cleaning or repair. Specification 137,093, [*Class* 123 (ii), Steam generators], is referred to.

214,877. Haag, J. July 5, 1923.

FIG.4.

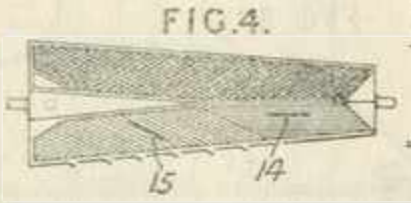
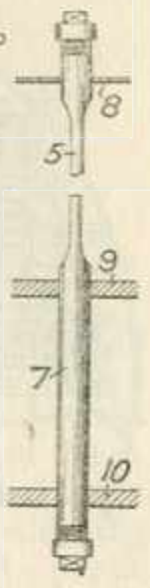


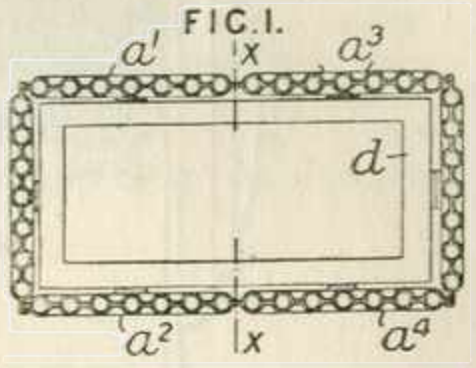
FIG.1.



Heating water.—Perkins tubes for use in heaters, and like apparatus are of circular cross section as at 7, Fig. 1, where they are heated, and at their points of contact with walls 8, 9, 10 and have flat parts 5 where heat is emitted. In the condenser shown in sectional plan in Fig. 4 for use on locomotives the flat parts are arranged longitudinally at 14 and at an angle at 15. Specifiction 197,769 is referred to.

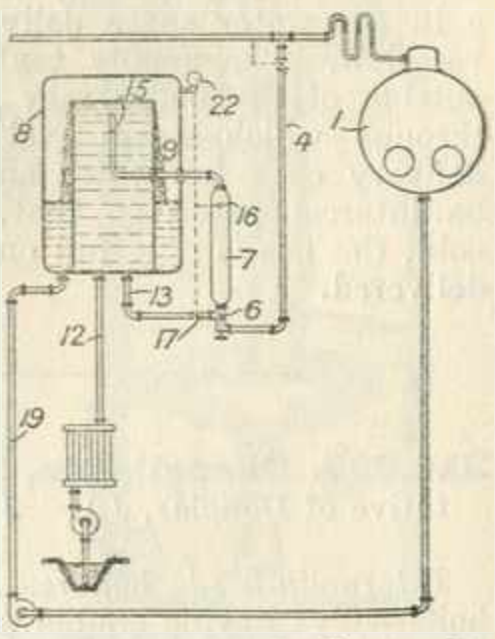
214,964. Courtot, L. April 26, 1923, [*Convention date*]. *Addition to* 14005/14.

FIG.1.



Water-tube boilers.—A water-heating stove as claimed in the parent Specification, comprising tubular panels disposed on the outer sides of the upper and lower rectangular collectors, is characterized by there being at least two of the panels a^1, a^3, and a^2, a^4 on each of the long sides of the collectors d. The collectors may also be formed in sections, that shown, for example being in two halves divided at XX, and the panels may in this case be assembled to the halves of the collectors to form two horse-shoe shaped elements which are joined to form the complete stove. There may also be more than one panel on each of the remaining sides of the collectors, one form described having two panels on each short side and three on each long side.

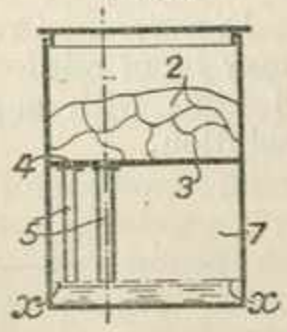
214,965. Siemens-Schuckertwerke Ges. April 27, 1923, [*Convention date*].



Feed-water, heating.—Excess steam from a uniformly fired boiler is used to heat the feed-water in a storage tank. Excess steam from a boiler 1 passes through a pipe 4 into a nozzle 6 so arranged that it draws water from the bottom of a storage tank 8 through a pipe 13 and returns it through a condensing chamber 7 and a pipe 15 to the upper part of the tank. The tank is supplied with feed-water through a pipe 12. The heated water flows over the sides of a compartment 9 in the storage tank and collects in the space between the compartment and the sides of the tank. The water is fed to the boiler through a pipe 19. The temperature and pressure in the storage tank are regulated by a thermal device 16 and a pressure-operated device 22, which operate a valve 17 in the pipe 13.

214,996. Schimonsky, H. von Schimony-. April 24, 1923, [*Convention date*].

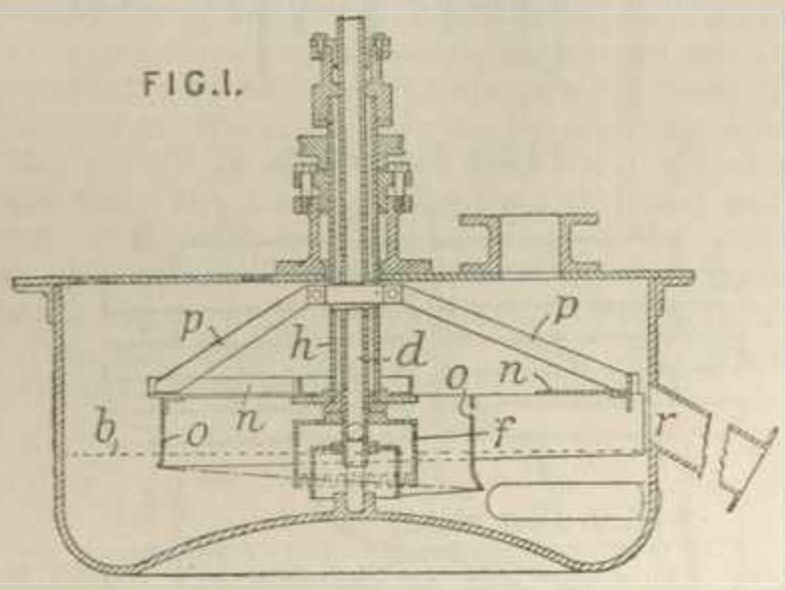
FIG.1.



Washing-boilers.—A boiler for washing linen is divided into two chambers or compartments by a partition 3, the only communication between the compartments being apertures 4 in the partition placed so that water enters below the linen 2 and at one side of the upper chamber. Conduits 5 project deeply into the lower chamber so that an air and steam space 7 is formed above the normal level *x*—*x*. In a modification the upper chamber is an horizontal drum, the conduits projecting obliquely into the lower chamber.

215,095. Thermal, Industrial, & Chemical (T.I.C.) Research Co., Ltd., and **Duckham, Sir A. M.** Feb. 2, 1923.

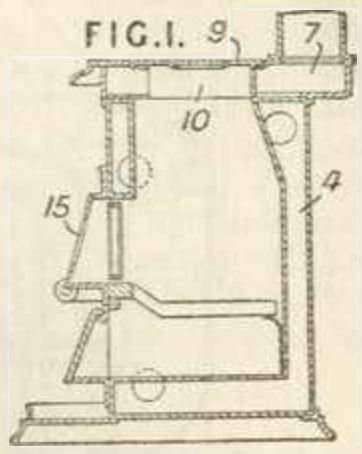
FIG.1.



Heating liquids.—In apparatus for distilling tar, oil, &c. by means of molten metal, as described in Specification 170,617, matter floating on the surface of the molten metal is removed by a spiral blade which is supported with its lower edge immersed in, or in contact with the surface of, the metal, means being provided for causing relative rotary movement between the blade and the liquid. A spiral blade *o* is supported by arms *n* and ties *p* from a hollow rotary shaft *h* which surrounds a tube *d*, through which the liquid to be distilled is supplied to a distributing hood *f*. The rotation of the blade directs matter floating on the molten lead *b* to an outlet *r* at the side. In a modification the lower edge of the spiral blade is kept in contact with the surface of the metal by a balancing spring between the interior of the hood and the bottom of the still. The metal may be agitated by arms depending from the shaft. In another modification the spiral blade is fixed and a rotary paddle gives motion to the metal.

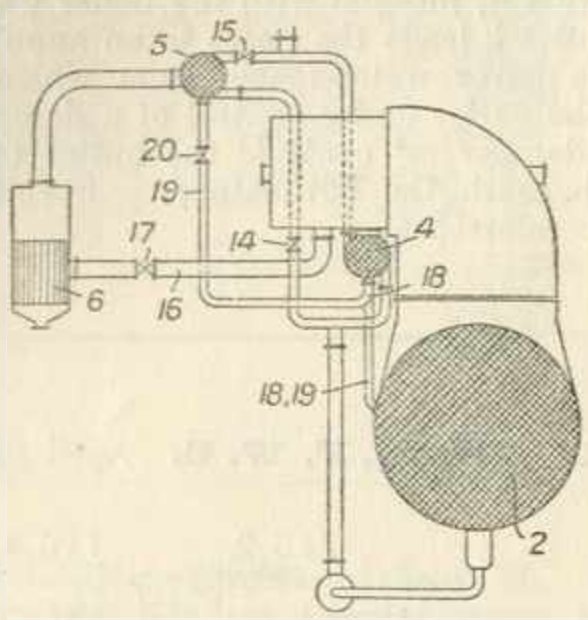
215,148. Kitchen, J., and **Balmforth & Co., Ltd., T.** March 10, 1923.

FIG.1.



Internally-fired boilers.—In a domestic boiler having a water-jacket 4 spaced from a hot-plate 9 to leave a flue 7, the baffle 10 extends down to the water-jacket and extends around substantially threequarters of its inside edge. The hot-plate may be removed and be given a half rotation so that the gases may pass directly to the flue. The boiler may be cylindrical with the upper end pressed into rectangular form and the inner walls may converge at the top. The drop-door may have mica panes 15. Specification 214,693 is referred to.

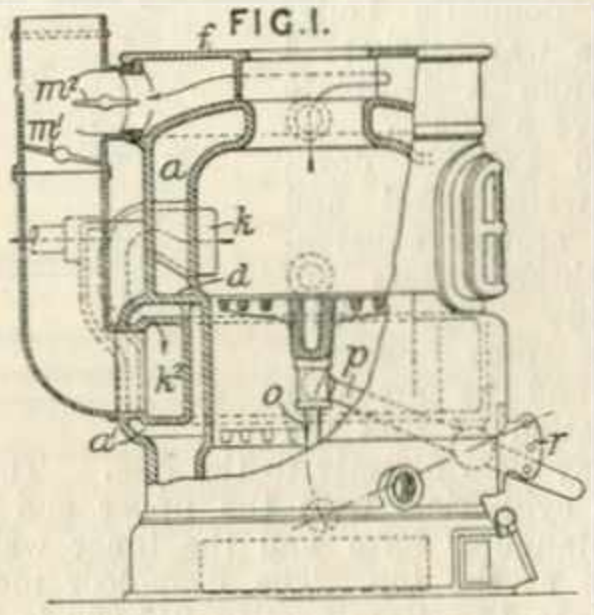
215,171. Baumann, K., and **Metropolitan-Vickers Electrical Co., Ltd.** April 11, 1923.



Feed-water, heating.—In a condensing steam turbine plant, a separate feed-water heater 5 is provided in the feed-heating system for condensing and utilizing the heat of the steam generated in the make-up water evaporator 6, and this heater is connected in parallel with a feed-water heater 4 heated from another source, for instance by steam tapped from an operative stage of a turbine. The evaporator is heated by steam taken through a pipe 16 from a higher operative stage of the turbine. The condensate from the heaters is led into the condenser 2 through pipes 18, 19. The evaporator and the heater 5 may be cut off from the system by closing valves 14, 15, 17, 20 in the water and steam pipes, the whole of the feed-water then flowing through the heater 4.

215,853. Cornelissen, L. D. J., (Representative of *Douglas, J.*). Feb. 20, 1923.

FIG. 1.



Internally-fired boilers.—In a boiler-stove of the type in which the boiler forms an annular jacket round the fire-space, the boiler is formed as a unitary structure divided horizontally into two parts by an annular partition, each of the separate water-spaces having flow and return connections. The boiler-stove shown comprises upper and lower water-spaces a, a^1 separated by the partition d, integral with the boiler walls. A lateral outlet k leads the gases to an annular flue k^2 in the lower water-space, from which they pass to the outlet under control of a damper m^1. Another damper m^2 controls the outlet of gases passing beneath the hot-plate f. Specification 214,693 is referred to.

215,921. Evans, F. W. C. April 10, 1923.

FIG. 2.

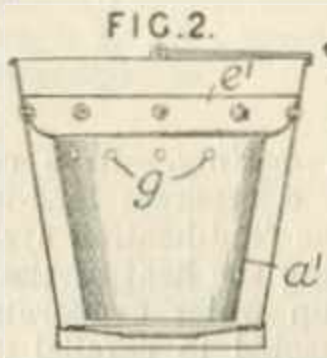
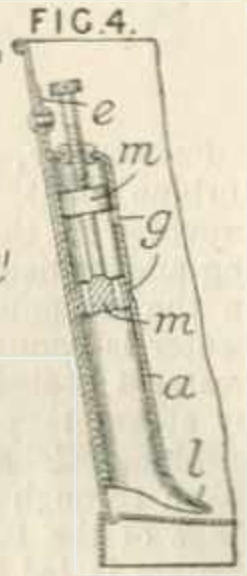


FIG. 4.



Washing-boilers.—A household bucket or its equivalent is provided with an inner wall a^1, Fig. 2, with a flanged upper end e^1 or tubular devices a, Fig. 4, with flattened upper ends e having outlets g at the top, which are arranged so as to be below the normal water level to promote circulation. The tubes a may be fitted with a two-part plunger m controlling upper and lower ports g to be used at different levels. The devices may be attached by rivets or spring clips forming extensions of the flattened ends. The lower ends may have a lip l or may extend to the bottom of the pail, inlet ports being provided.

216,109. Jouvenet, J. C. May 15, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

Digesters.—Ore is treated in an autoclave which may be of reinforced concrete at a pressure above 3 kilos with superheated steam and a suitable solution.

216,165. Heijkenskjöld, G. O. W. May 19, 1923, [*Convention date*].

FIG. 1.

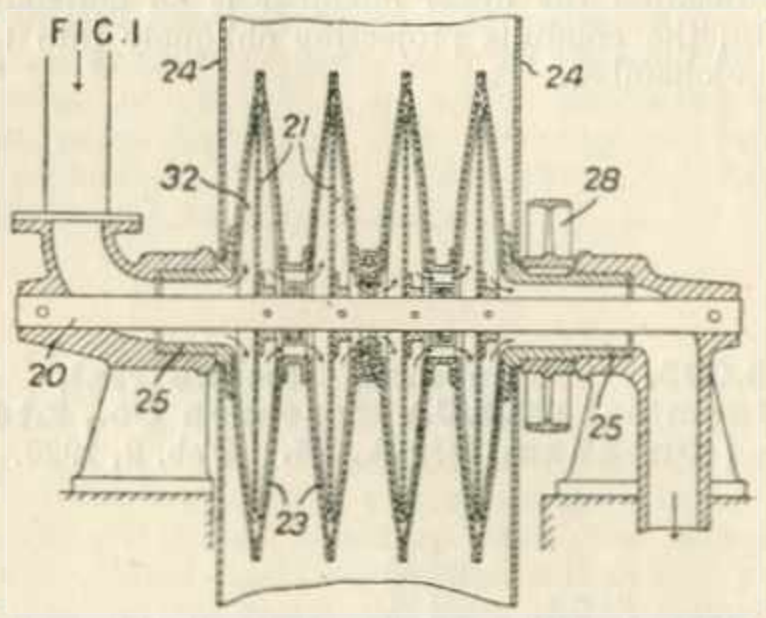


FIG. 1. *(Cancelled)*

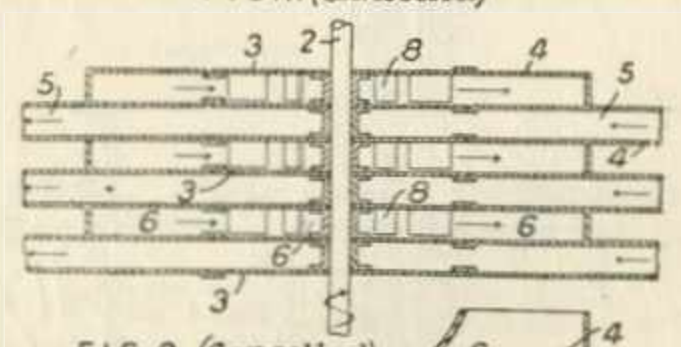


FIG. 2. *(Cancelled)*

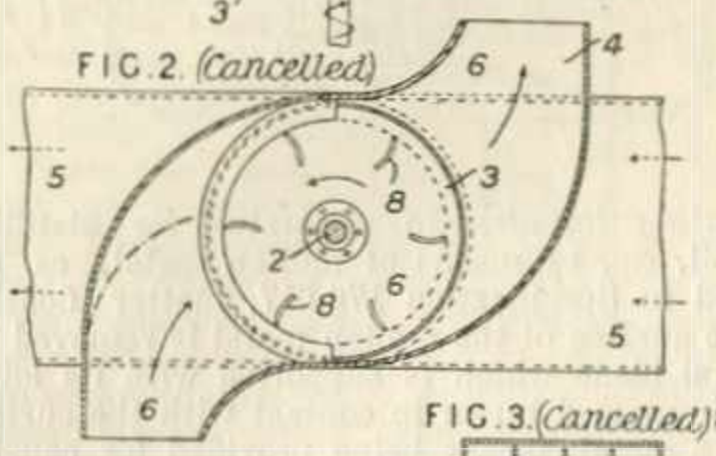
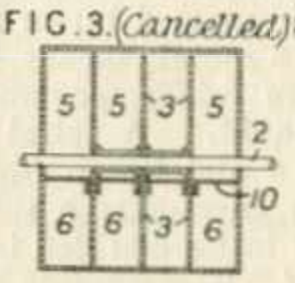


FIG. 3. *(Cancelled)*.



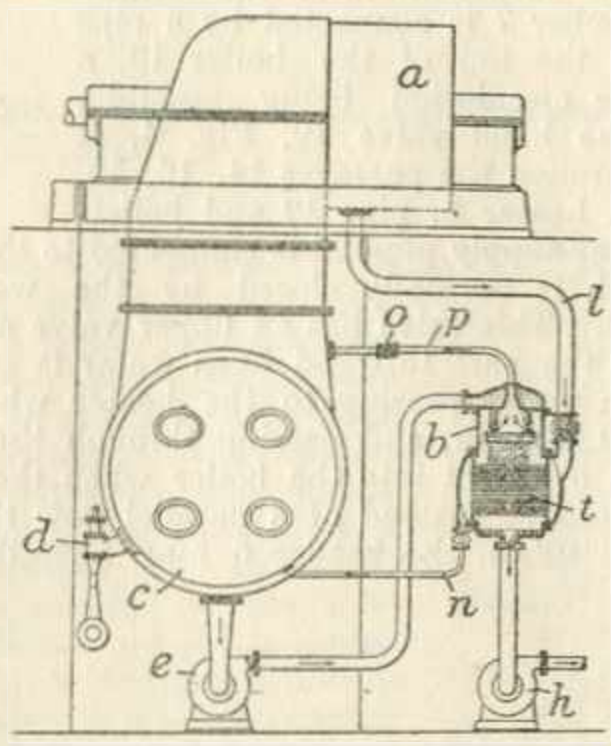
Heating air; feed-water, heating.—In apparatus for transferring heat between liquid or gaseous fluids through a rotating partition forming one of the channels for fluid, discs 21, Fig. 1, which bear radial ribs 32 for preventing fluid from following the rotation of the partitions are attached to a fixed shaft 20 and are enclosed in casings 23 which are mounted in end bearings 25 and adapted to be rotated as by a pulley 28.

One fluid, for example hot gases, passes through a conduit 24 and the other, for example, feed water is caused to flow through the casings. Provision may be made for axial adjustment of the positions of the discs. Undesired admixture to one fluid may be prevented by labyrinth packings or by a suitable adjustment of relative pressures.

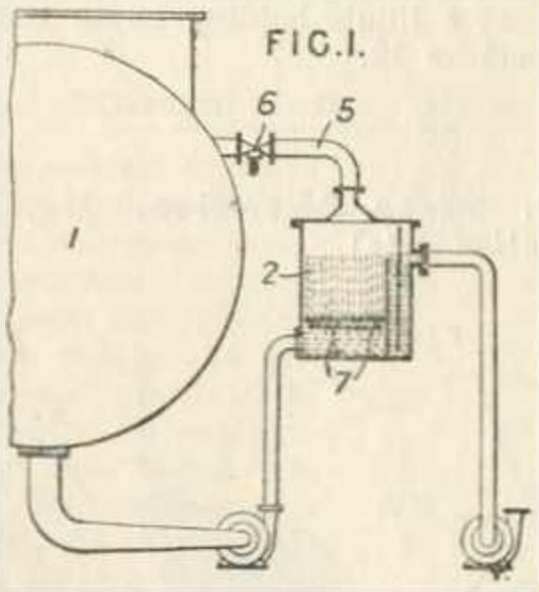
The Specification as open to inspection under Sect. 91 (3) (a) comprises also apparatus in which heat is transferred from one liquid or gaseous fluid to another through one or more discs or the like, separating the fluids, which are in motion relatively to one or both fluids. In Figs. 1 (*Cancelled*) and 2 (*Cancelled*) discs 3 attached to a rotating shaft 2 form parts of partitions 4 separating the passages 5, 6 through which pass the heating gases and air respectively. The discs may bear fan blades 8 to propel the air which may be thus preheated for use in connection with a boiler. In a modification, Fig. 3 (*Cancelled*), the fluids are separated by partitions 10 and heat is transmitted by the rotation of the discs from contact with the hot gases at 5 to the air at 6. This subject-matter does not appear in the Specification as accepted.

216,244. Fothergill, H. March 9, 1923.

Feed-water, heating.—A steam power plant comprises a steam turbine *a*, a condenser *c* into which the turbine exhausts which is provided with an air ejector *d*, de-aerating apparatus *b*, means *e* for delivering condensate from the condenser to the de-aerating apparatus, a connection *l* between the turbine and de-aerating apparatus for conveying live steam to the de-aerating apparatus, and means *h* for conveying the heated and de-aerated water to the boiler feed system. A connection *p* between the de-aerating chamber and condenser limits to a predetermined amount the quantity of aerated vapour passing from the de-aerator to the condenser by the choking effect of the nozzle or equivalent device *o*. The bled steam from the turbine may heat the feed-water direct or through a surface heater *t* in which case the condensate drains to the condenser through a pipe *n*. Specifications 138,951, 171,757, 195,783, and 196,064, [*Class* 123 (ii), Steam generators], are referred to.



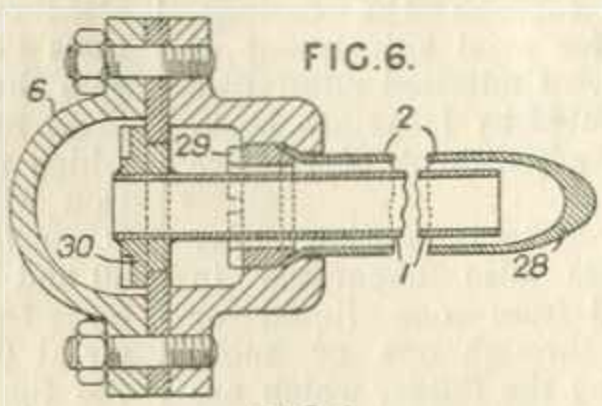
216,257. Morison, D. B. Nov. 24, 1922.

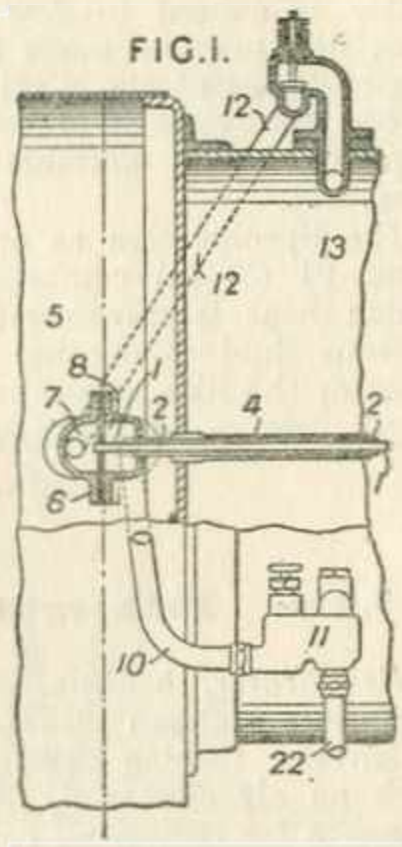


Feed-water, heating.—Relates to feed-water supply systems comprising means for the de-aeration of the feed-water, wherein de-aeration is effected by raising the water to boiling temperature by the injection of steam or other heating fluid below the surface of the water, as described in Specifications 173,301, [*Class* 46, Filtering &c.], and 199,748. A supply system according to the invention comprises a condenser, a de-aeration vessel into which the condensate is delivered continuously, means for injecting the make-up beneath the surface of the water in the vessel, and means for so regulating the resistance between the condenser and the vessel as to maintain such pressure in the vessel that the heat of the make-up is sufficient to boil the water. The de-aeration vessel 2 is maintained under reduced pressure by connecting it to the condenser 1 by a pipe 5 of predetermined cross-section or fitted with a valve 6 or its equivalent. The perforated pipes 7 through which the make-up is injected, either in the form of steam or water, are arranged as described in Specification 214,328. The hot water from evaporator coils may be used as make-up. The supply of make-up may be automatically controlled by a valve operated in accordance with the quantity of water to be treated in the de-aeration vessel. The condensate may be heated before entering the de-aeration vessel by waste steam in a surface heater.

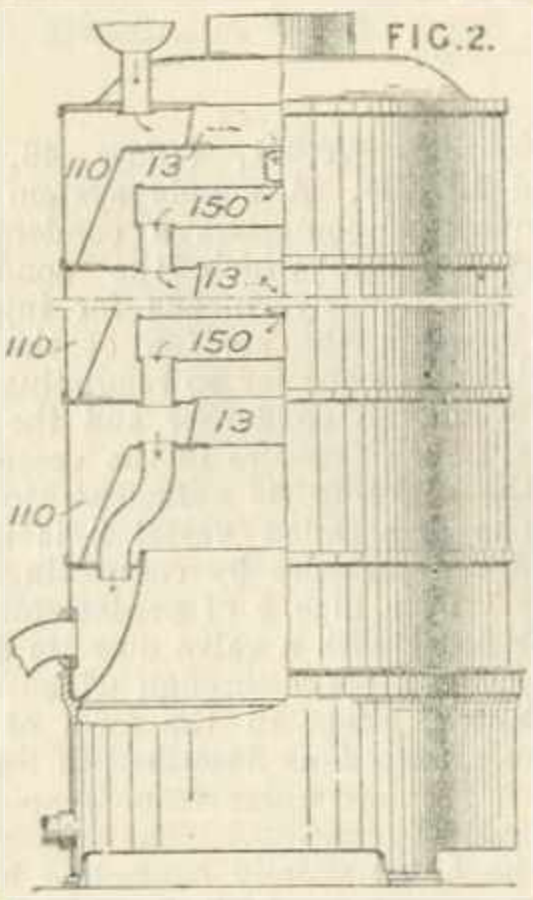
216,294. **Mills, F.** April 19, 1923.

Feed-water, heating.—In feed-water heating systems for locomotive and like boilers wherein the circulating and feed check valves are arranged so that water passes through the circulating and heating system or passes directly into the boiler, a valve remains open under its own weight when water is circulating through the concentric tube type heater, but closes and stops circulation when fresh feed water is pumped into the boiler. Field tubes 1, 2 project into the main flue tubes 4 and are connected to chambers 7, 8 in a header 6 in the smoke box 5, Fig. 1. The chamber 8 is connected by a pipe 10 with a valve box 11 and the chamber 7 is connected by a pipe 12 with the top of the boiler 13, a complete circulation being possible, when the hand valve 19, Fig. 4, is open, through the passages 14, 16, 18, pipe 10, heater 6, pipe 12 and boiler. The water supply pipe 22 is connected to the inlet 23 which is normally closed by the weighted valve 24. This valve has an upper valve adapted to close the part 15 when fresh water is pumped in, such water passing to the heater when the valve 19 is open, and passing through the valve 25, Fig. 5, direct into the boiler when the valve 19 is closed. Instead of a parallel flow through the field tubes, the header 6 may have division walls forming chambers 26, Fig. 8, with communicating openings 27 in the central diaphragm whereby the flow is in series. The rear ends 28 of the tubes 2, Fig. 6, are preferably semi-ellipsoidal. The tubes 2 are flared at the end and secured by nuts 29, and the tubes 1 have flanges 30 threaded or otherwise secured to the partition plate.



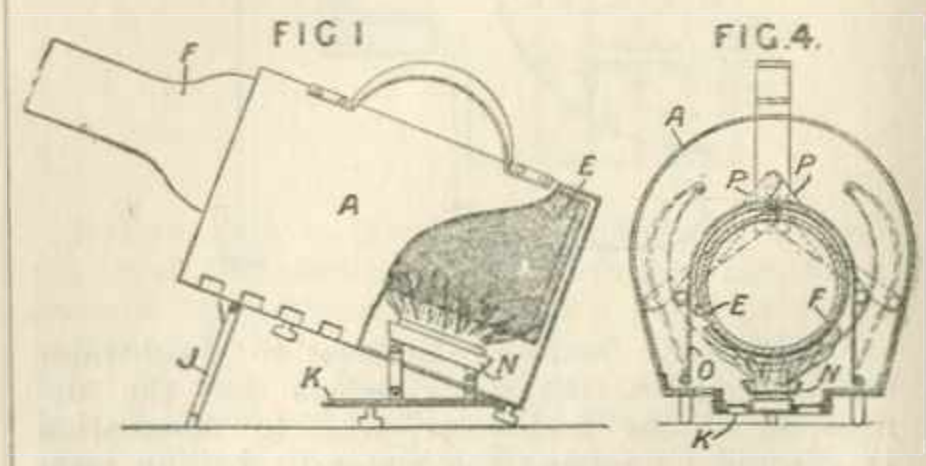


216,362. **Staniforth, H.** June 22, 1923.



Internally-fired boilers; geysers.—A liquid heater is constructed with a plurality of superposed similar separable sections, their outer walls each constituting a part of the outer wall of the heater and each section comprising an annular liquid receptacle and a baffle plate supported above the central aperture of the section. The liquid may be kept separate from the heating gases as shown or may be in contact with them, and the baffles may be liquid-holding. In the example shown separable annular sections 110 each support a liquid-holding baffle 150 above a central aperture 13.

216,510. **Meta Akt.-Ges.** May 24, 1923, [*Convention date*].



Portable liquid heaters.—A milk bottle F is enclosed in a wire netting mantle E which has

means for adjusting it closely around bottles of various sizes. In Fig. 4 the mantle is slit along the top and the edges are secured to hinged members O which can be separated for the insertions of the bottle by levers P operated from the outside. The outer casing A may be dispensed with and the members O furnished with handles for direct operation. In modifications the mantle is continuous and the slack is taken up by springs or by extending the obliquely woven wire netting. The burner N is mounted on a hinged flap K and may be parallel with or at an angle to the mantle. A hinged prop J supports the front end of the casing.

216,916. Mason, V. B. Harley-. March 9, 1923.

FIG.2.

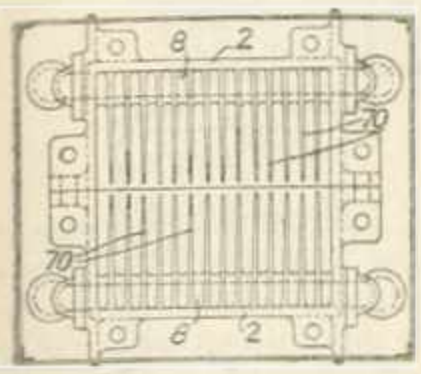


FIG.1.

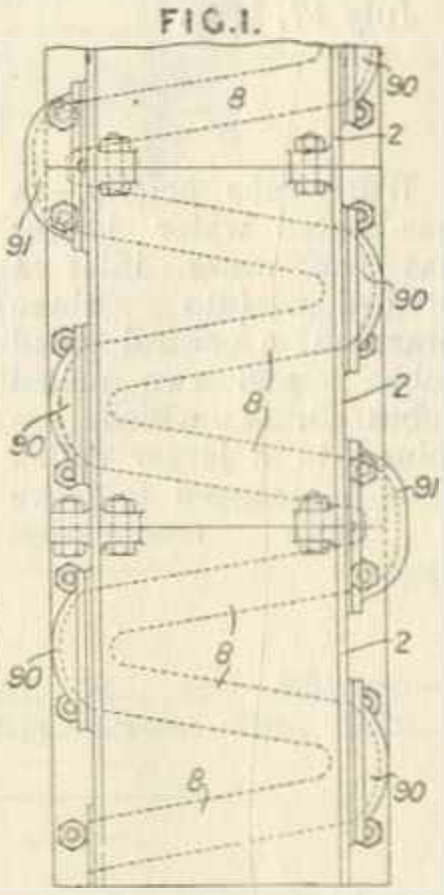
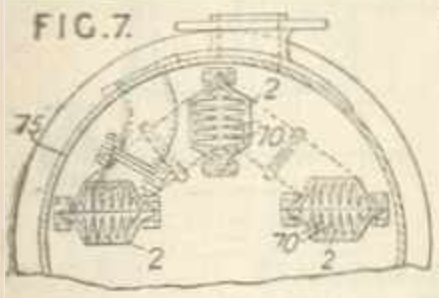


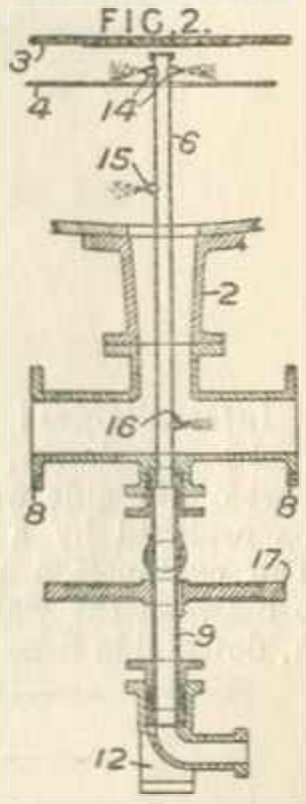
FIG.7.



Heating liquids.—A liquid heater comprises a self contained tubular structure built up of hollow elements each consisting of two channel-shaped sections 2 having plain exterior surfaces and bolted together along their channel edges to form a hollow element divided longitudinally by a series of parallel ribs 70 extending from the walls of the elements along which the heating gases pass. Each element may contain a water passage 8 passing transversely through the ribs the passages in adjacent sections being connected together at their ends as by caps 91 to form a continuous conduit in series or by tubes to form a parallel circuit. Where the passages pass to the outside in any unit, adjacent ends are connected as by caps 90. In a modification shown in Fig. 7 the units are surrounded with liquid to be heated in a casing 75.

217,130. Stewart, J., and **Brown, R. J.** Nov. 17, 1923.

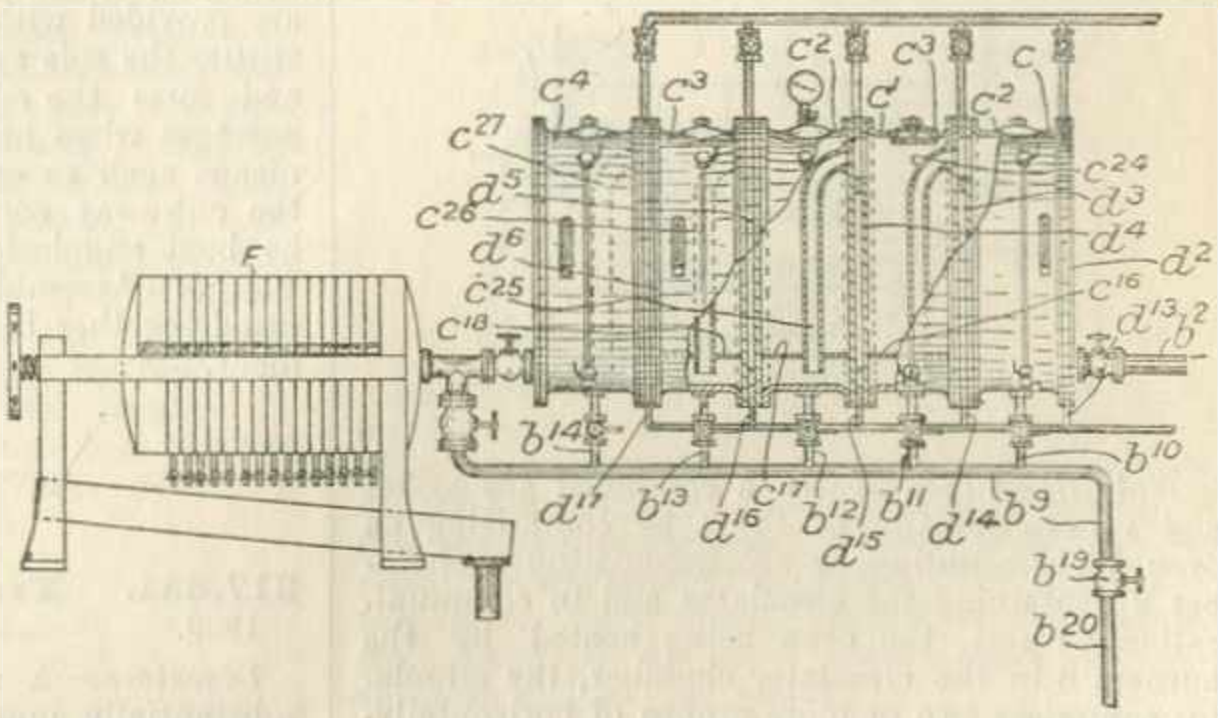
FIG.2.



Digesters. — Means for washing out a digester &c. used in paper making &c. comprise water jet nozzles carried by a rotary tube fixed permanently in the bottom of the digester. The hollow spindle 9 is supported by a fixed bracket 12 and a T-piece 8 secured to the inlet connection 2 has a hand-wheel 17 or mechanical means for rotating it and also carries a tube 6 provided with a nozzle 16 in the inlet connection, a nozzle 15 beneath the false bottom 4 and nozzles 14 beneath the perforated plate 3.

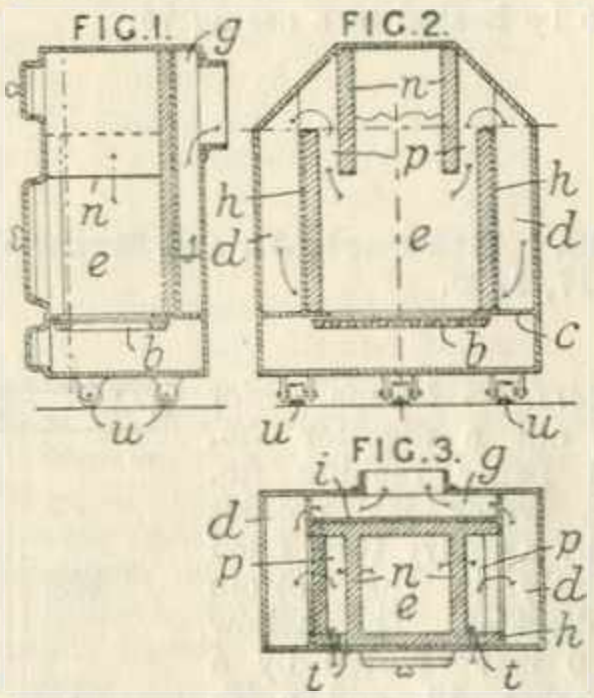
217,348. Martin, C. H. March 23, 1923.

Digesters.—Malt wort is treated with heat and pressure in a closed vessel composed of sections through which the wort flows, entering each section at the lower end and leaving it at the upper. The sections c - - c^4 of the vessel are separated by hollow partitions d^3 - - d^6 into which steam can be introduced as it can into the end wall d^2. The wort enters the section c by a pipe b^2 under pressure produced by a pump and flows from section to section by pipes c^{24} - - c^{27} arranged as shown and



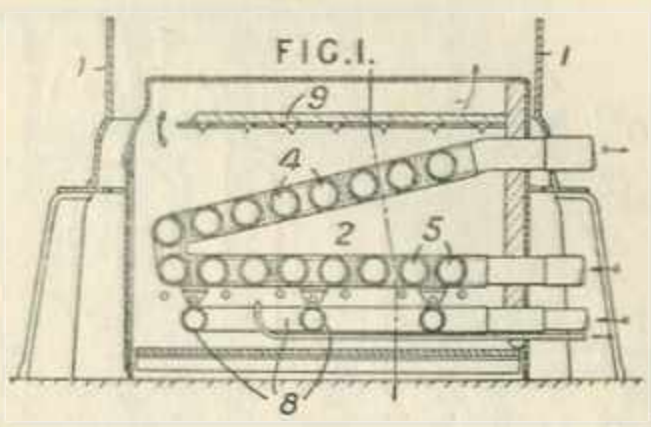
opening under strainer pipes c^{16} - c^{18}. The treated wort passes to a filter press F. Condensate from the heating-partitions escapes by pipes d^{13} - - d^{17}. Wort remaining in the vessel when a charge has been dealt with can be passed to the press F through pipes b^{10} - - b^{16} and b^{9}, and the pipe b^{9} also communicates with a drain pipe b^{20} provided with a cock b^{19}.

217,386. Bakkekilde, R. S. April 28, 1923.



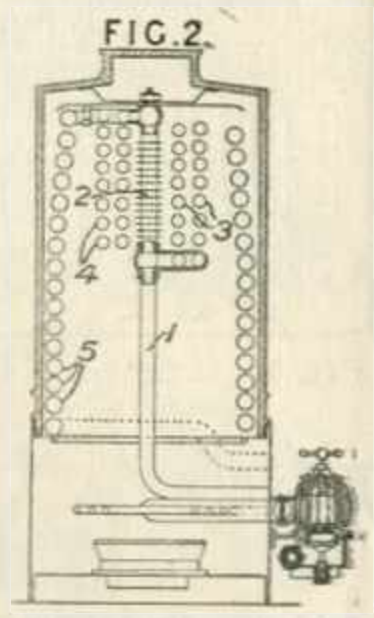
Internally-fired boilers.—In the closed solid-fuel stove shown, the fuel feed shaft *n*, the front part of the side walls *h*, and the back wall *i* may be replaced by a correspondingly formed boiler. The combustion products pass through openings *p* between the walls of the shaft *n* and the walls *h*, down side flues *d*, and thence to a back flue *g*.

217,389. Keillor, G., Smith, N. S., and **Simpson, J.** May 3, 1923.



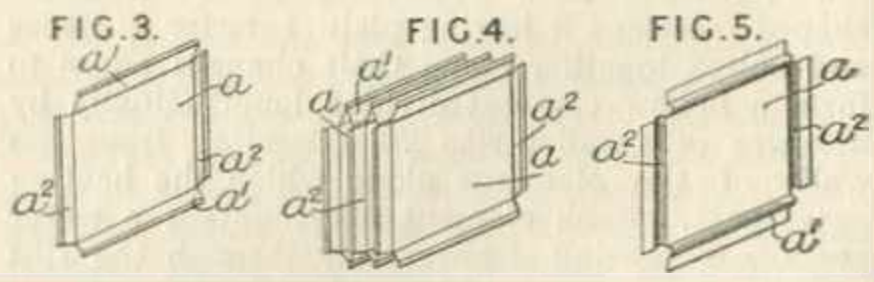
Water-tube boilers.—In a combined gas-cooker and water-circulator of the type comprising an oven 1 surmounting or accommodating a chamber 2 containing the circulator and in communication with it, the oven being heated by the burners 8 in the circulator chamber, the circulator comprises two or more groups of horizontally-disposed tubes 4, 5, connected by headers and so arranged that the entire series is traversed by the combustion products. In the arrangement shown, the upper series of tubes is inclined, and a baffle 9 is arranged between the tubes and the top of the chamber 2.

217,453. Morineau, A., and **Negrier, P.** July 17, 1923.



Water-tube boilers.—A gas-heated water heater has the water inlet 1 divided into three branches, a central gilled tube 2 and two coiled tubes 3, 4 which are joined to a larger coiled tube 5 arranged to leave a large combustion space.

217,593. Beauvais, G. M. G. de. June 13, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].



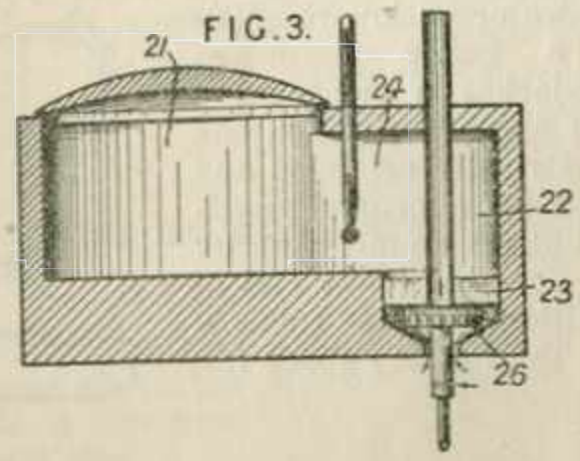
Heating air.—Plates *a* which when assembled form separate passages carrying the heat exchanging media, for example hot gases and air, are provided with bent edges a^1, a^2 which constitute the sole spacing means between the plates and form the edges of the alternate assembled passages when held together by suitable pressing means such as end frames and tie bars lying in the cut-away corners. The tongues a^1, a^2 may be bent angularly, Fig. 3, or to a curved form, Fig. 5. Assembled blocks of elements may be fitted together in any series and parallel arrangement.

217,631. Fremery, H. von. March 13, 1923.

Digesters.—A cooking-apparatus comprises a substantially unsealed container with side by

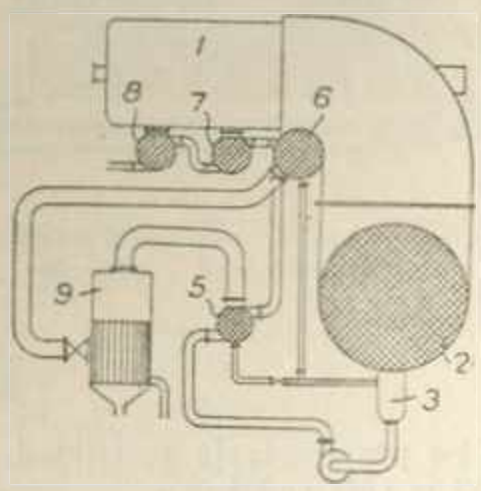
side compartments 21, 22, 24, one, 21, being adapted to contain the materials to be heated and another 22 containing a vaporizable heat transmitting medium 23. Heating means in the compartment 22 extends through the space

FIG. 3.



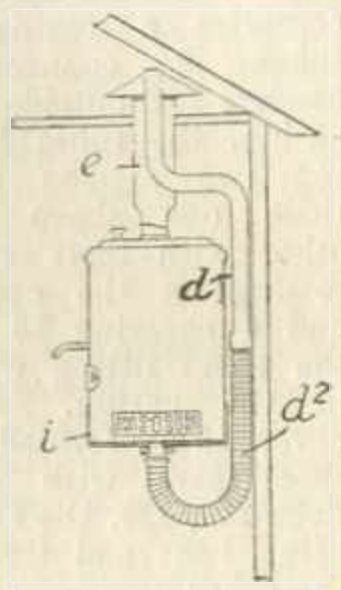
directly above the medium. In a modification the liquid-containing walls of the compartment 22 entirely surround the burner 26 shown, and in another modification an electric heater dips into the medium 23 and extends into the space above it.

217,691. Baumann, K., and **Metropolitan-Vickers Electrical Co., Ltd.** April 11, 1923.



Feed-water, heating.—In a feed-heating system of a condensing steam turbine plant, a separate feed-heater 5 is provided for condensing and utilizing the heat of the steam from the make-up water evaporator 9, and this feed-heater is connected in series on its water side with and placed before at least one feed-heater heated by steam taken from a stage of the turbine. Condensate from the condenser 2 passes in turn through the heater 5 heated by steam from the evaporator 9, and through heaters 6, 7, 8 heated by steam from stages of the turbine 1. Steam taken from the turbine for heating the water in the evaporator passes through the heater 6. Condensate from the heaters drains into the hot well 3. Specification 195,783, [*Class* 123 (ii), Steam generators], is referred to.

217,701. Feneley, C., and **Ross, J. R.** April 20, 1923.



Geysers.—In order to seal the burner compartment of a geyser, stove or similar gas-heated appliance from the room, a cap or sleeve *i* is provided, adapted to fit over the bottom of the appliance and seal the usual air inlets, an air inlet pipe *d* entering the bottom of the cap and terminating outside the room; a flue *e*, also terminating outside the room, extends from the top of the appliance, and may surround, or be surrounded by, the air inlet pipe, the outer extremities of the two pipes being in proximity. The pipe *d* is shown connected to the cap *i* by a flexible tube d^2.

217,798. Föge, H. Aug. 18, 1923.

FIG. 1.

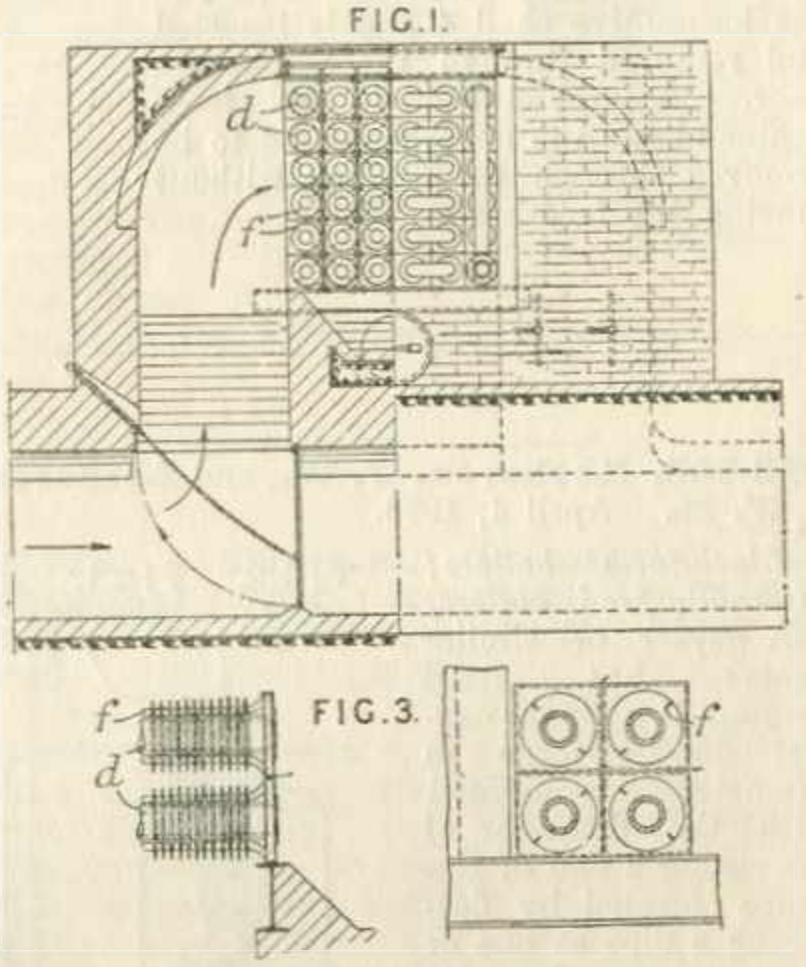


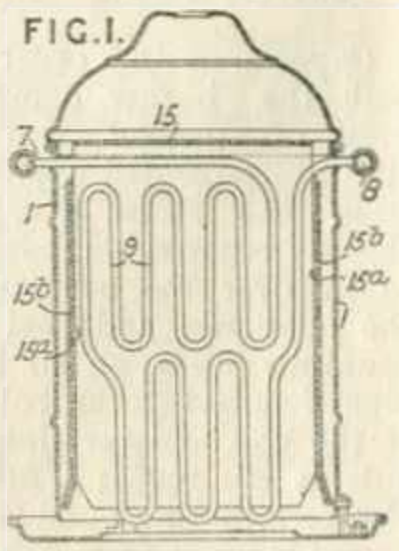
FIG. 3.

Feed-water, heating.—The gilled tubes *d* of an economizer are provided with longitudinal baffle surfaces *f* arranged diametrically opposite one another on each tube, and are assembled so that the planes containing the baffles on adjacent tubes are alternately inclined 45° to the left or the right. Rectangular flanges at the ends of the tubes fit on the usual round flanges and form the side wall of the casing.

SEUM 2. Boyle, C. July 14, 1923.

Water-tube boilers comprise a casing 1, tubes 9 connecting headers 7, 8 outside the casing, the tubes having two zig-zag portions one above the other with their ends resting on the casing and a covering 15 for the tubes fitting within the casing. The cover 15 is formed of sheet metal with side flaps 15^a, 15^b, the sheet being bent and the side flaps folded to enclose the tubes.

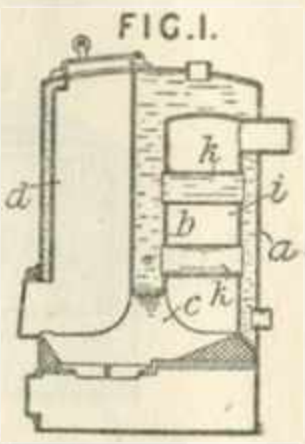
FIG. 1.



218,239. Sabel & Scheurer Ges. June 26, 1923, [*Convention date*].

Internally-fired boilers. — For hot-water or low-pressure steam a boiler comprises a water-jacket *a* enclosing a charging space *d* and fire box *i*, symmetrically arranged and separated by a central partition *b*, but communicating by a slot *c* near the lower end of the partition. Water tubes *k* traverse the heating space *i*.

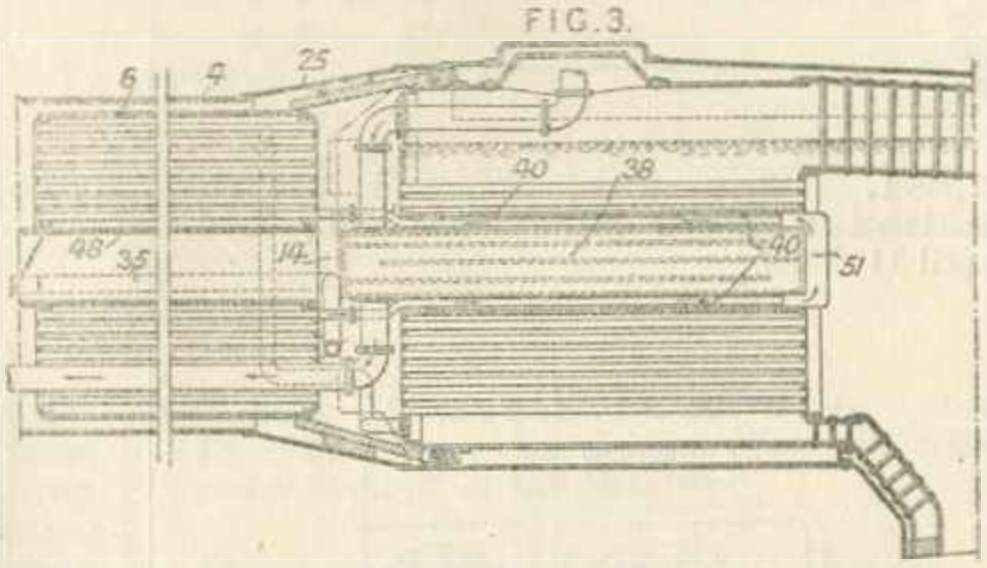
FIG. 1.



218,360. Fitzsimons, T. F. March 22, 1923.

Feed-water, heating.—The boiler, feed-heater or other unit of a locomotive or the like is so supported in an outer shell that the unit may be readily slid into and out of position within the shell. The feed-heater 6 is supported on rails in the front part of the locomotive shell 4 and is inserted and removed through the smoke-box door. A large flue 48 in the feed-heater allows the superheater 38 to be removed through the fire-box without moving the feed-heater.

FIG. 3.

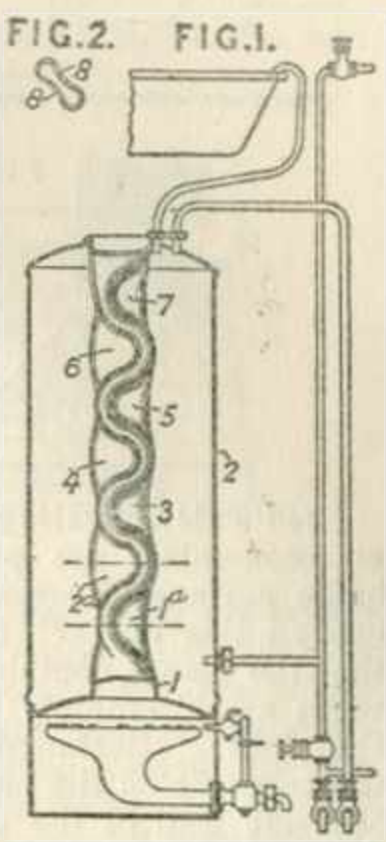


218,383. Letheren, T. W., and **Letheren, W. R.** April 4, 1923.

Block-form boilers; internally-fired boilers. —A geyser or similar heater has fixed through it a single central flue 1 large in diameter compared with the diameter of the casing 2 and of the shape formed by flattening a pipe at one or more points along its length. With two or more successive flattened parts 1^a, 2^a, 3 - - 7 these are displaced angularly to one another. The walls 8 of the flattened parts may be flat, convex or concave. The cross-section of the flattened parts may be progressively restricted. Specification 192,432 is referred to.

Reference has been directed by the Comptroller to Specification 15192/91.

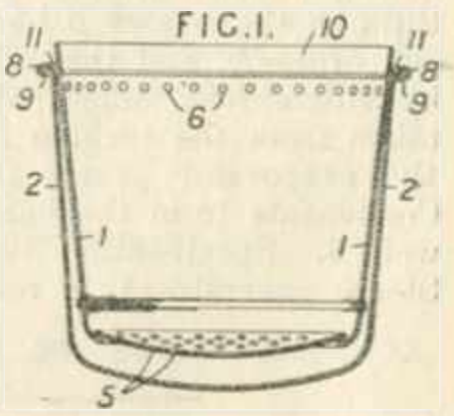
FIG. 2. FIG. 1.



218,402. Bricknell, W. H., and **Griffin, T.** April 12, 1923.

Washing-boilers.— Washing boilers having a double shell and perforations for the circulation of the water are constructed so that the inner shell is suspended by its upper flanged edge which is bent over to interlock with the flanged edge of the outer shell. An upwardly extending flange

FIG. 1.

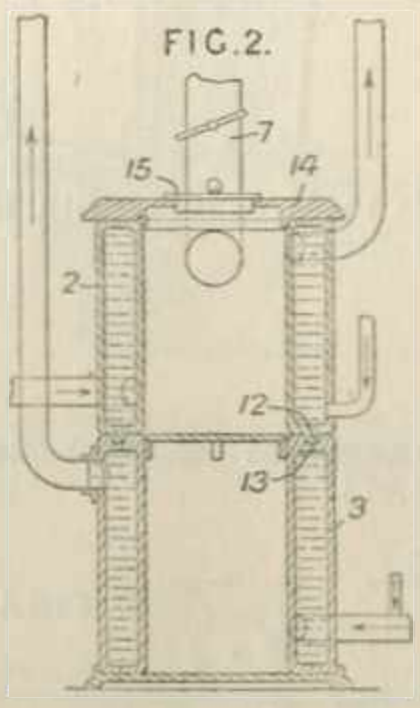


may be provided to prevent overflowing. The outer shell 2 has an upper flange 9 which is turned over to grip the flange 8 of the inner shell 1. An overflow ring 10 has its flange 11 secured in the flange 9. The inner shell has an upper row of perforations 6 whilst the bottom has perforations 5. In a modification the flange 8 rests on the flange 9 and has its outer edge turned under. The bottom of the inner shell may be made separately and be supported on legs. The shells may be stiffened by ribs or corrugations. In one form, the outer vessel has an inner channel flange, into which is sprung the downwardly turned flange of the inner vessel.

218,519. Woolnough, J. W. Aug. 20, 1923.

Annular boilers 2, 3 mounted one above the other with a common fire box and flue 7, to give separate supplies for domestic and heating purposes, are furnished at the joint with a rib 12 fitting into a groove 13 on the lower boiler with suitable jointing material. The top of the upper boiler is constituted by a removable flat plate 14 with a feeding door 15 therein and the flue 7 extends from the back of the upper boiler 2 below the plate 14.

FIG.2.



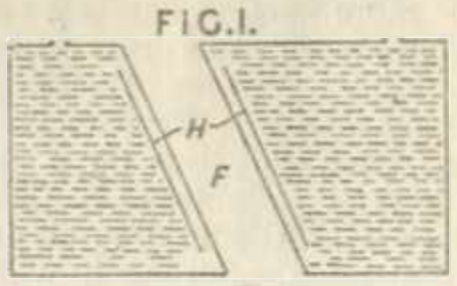
218,575. Murray, R. W., and **Murray & Co., Ltd., R. S.** Dec. 29, 1923.

FIG.1.

Boiling-pans.—A water-jacketed melting-pot for the coating substance of creams and other confectionery has heating means within the jacket and a plurality of electrical heating elements outside the jacket. Bosses 10 on the jacket 3 are supported in brackets 8 and receive the inlet and outlet connections 11 of a steam coil (not shown) within the jacket. The water inlet 4 has a screw cap 5 carrying a safety valve. The electrical heating elements 13 are secured to the bottom of the jacket by bolts 12 and in the example shown are connected to a switch 16 so that one, two or three elements may be used. The elements preferably comprise a zinc strip between mica strips with an asbestos strip lowermost.

218,590. Bailey, G. Feb. 2, 1924.

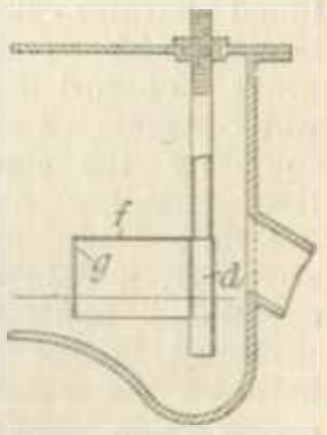
FIG.1.



Block-form boilers.—An inclined flue F through a kitchen range boiler, which which may be large enough to form the reservoir also, has surrounding but spaced from it a sleeve H in the water space to promote circulation.

218,723. Thermal, Industrial, & Chemical (T.I.C.) Research Co., Ltd., Rider, D., and **Watts, J. S.** April 7, 1923. *Addition to* 170,617.

FIG.1.

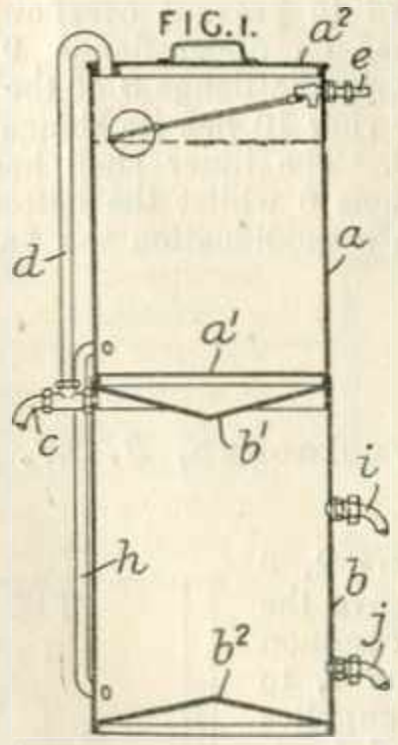


Heating liquids.—In apparatus described in the parent Specification, the liquid, such as oil, to be heated, is prevented from carrying away with it solidified metal pellets, by causing globules to " build up " near the point where the liquid enters the molten metal, so that they are forced again beneath the surface by their own weight. This is effected by fitting a guard plate or hood *f* between the distributor *d* whence the liquid emerges and the rest of the bath. A slot *g* provides for the exit of the liquid.

218,796. **Fildes, T. S.** May 16, 1923.

Heating water.—Relates to combined tanks for holding hot and cold water for domestic supply of the kind wherein the cold water tank is fitted above the hot water tank, so that an air space is formed between them and helps to prevent the hot water from warming the cold. In tanks of this type the top of the hot water tank is made concave so that the draw-off pipe may be at the side and at the uppermost part of the tank. The cold water tank *a* has a flat bottom a^1 fitting into the hot tank *b*, the top and bottom b^1, b^2 of which are made concave so that the outlet pipe *c* projects from the highest part. *d* is the vent pipe and *e* the usual ball flat inlet; *h* is a feed pipe and *i*, *j* are flow and return pipes to the boiler. In the case of direct heating of the tank *b*, the pipe *h* has a **U**-bend at its lower end to prevent water backing up it. If the tank *b* is heated by electricity, its bottom is made flat, and if by gas, the bottom is made convex, with the lowest point at the centre.

FIG. 1.



218,807. **Thermal, Industrial, & Chemical (T.I.C.) Research Co., Ltd.,** and **Rider, D.** June 4, 1923. *Addition to* 174,974.

Heating liquids.—Apparatus for use in the process described in the parent Specification is constructed with two or more parallel shafts *g* each carrying thin discs *i*, the discs on one shaft extending between the discs on the other shaft. Transverse partitions *l* between the discs on a shaft prevent material from travelling over the surface *f* of the molten metal without immersion. Scrapers, which may be carried by the partitions, are arranged more or less radially to each disc below the surface of the molten metal to remove material adhering to a disc and to feed it on to a disc on the next shaft. The apparatus shown is adapted for destructive distillation of subdivided solid materials.

FIG. 3.

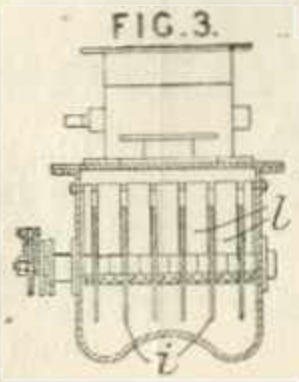
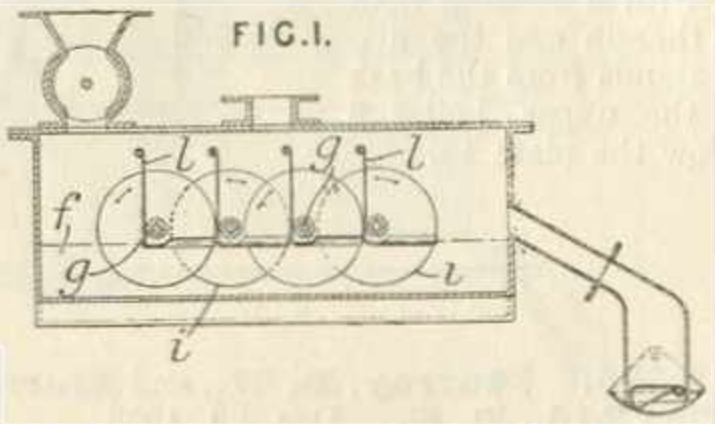


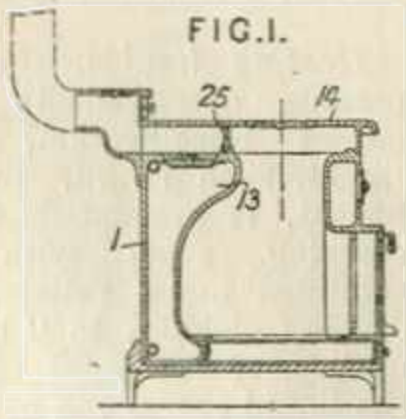
FIG. 1.



218,879. **Allin, H. P.** Sept. 4, 1923.

Internally-fired boilers.—In a combined water-heating boiler and cooking-stove comprising a water-jacket 1 surrounding the combustion chamber and a hot-plate 14 spaced above it, a damper or adjustable baffle 25 is arranged in the space between the water-jacket and hot-plate. In the construction shown the damper is pivoted on an overhanging portion 13 of the water-jacket.

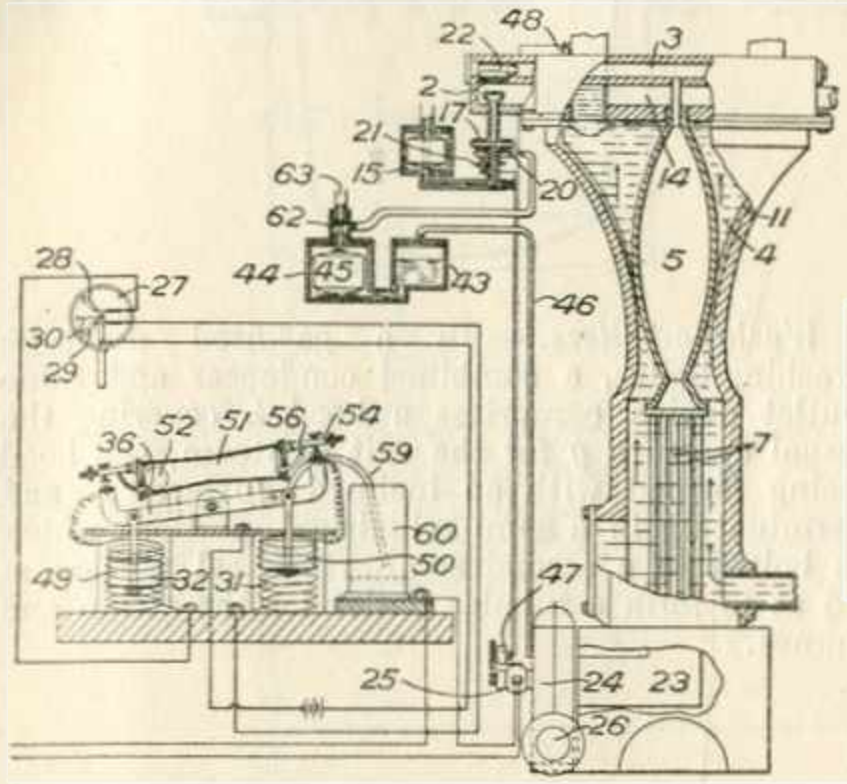
FIG. 1.



219,067. **Pattison, C. M.** April 12, 1923.

Internally-fired boilers.—The supply of liquid or gaseous fuel to a water heater is controlled automatically in accordance with the temperature of the atmosphere or water or the temperature or pressure of the steam by using a thermostat or pressure gauge to operate an electric relay and set in motion a motor driving a fan which induces a combustible mixture of air and gas into a combustion chamber where it is fired, the products being then drawn through a flue and passing through the boiler. A burner 20 vaporizes liquid fuel in the chamber 17, supplied from the chamber 15, and the vaporized fuel passes into the air conduit 14 and is drawn with air through the gauge 2 to a nozzle 22 where it is ignited by a sparking-plug 48 and burns in the combustion chamber 3. The combustion products are drawn by the fan 24 through

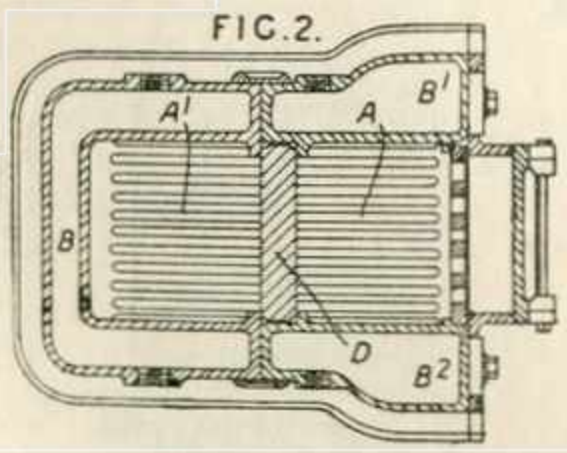
the elliptical flue 5, provided with fins 11, adapted to radiate heat to water in the boiler 4, and thence through flues 7, 23 to the fan outlet



26. In an alternative arrangement the gas may be supplied direct to the combustion chamber instead of to the burner 20.

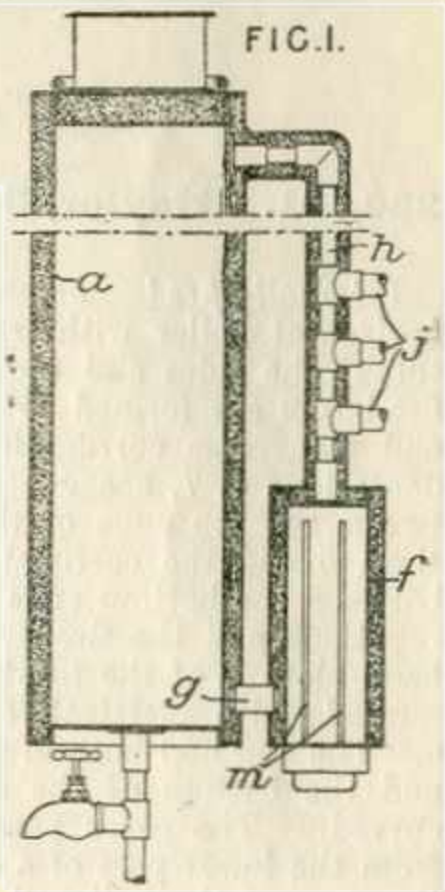
219,422. Herring, E. May 5, 1923.

Boilers.—A hot water boiler of the kind having separate water sections in which water is heated for different purposes by a common fire grate has a removable division plate or plates D to divide the fire box, which has one smoke outlet, into two parts A, A¹ to enable the rear section B to be put out of use. In the example shown the



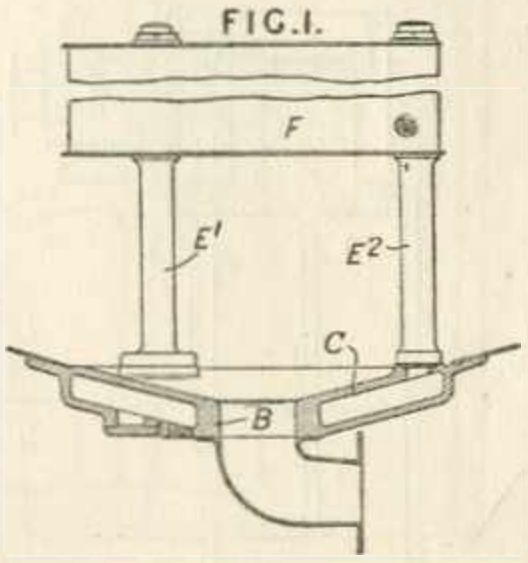
two front sections B¹, B² may be joined by piping to serve one system.

219,496. Bohle, H. July 28, 1923.



Heating water.—In a hot water system the storage tank *a*, electric boiler *f*, and the connecting pipes *h*, *g* are covered with lagging.

219,617. Worssam & Son, Ltd., G. J., and **Fox, H. S.** March 12, 1924.



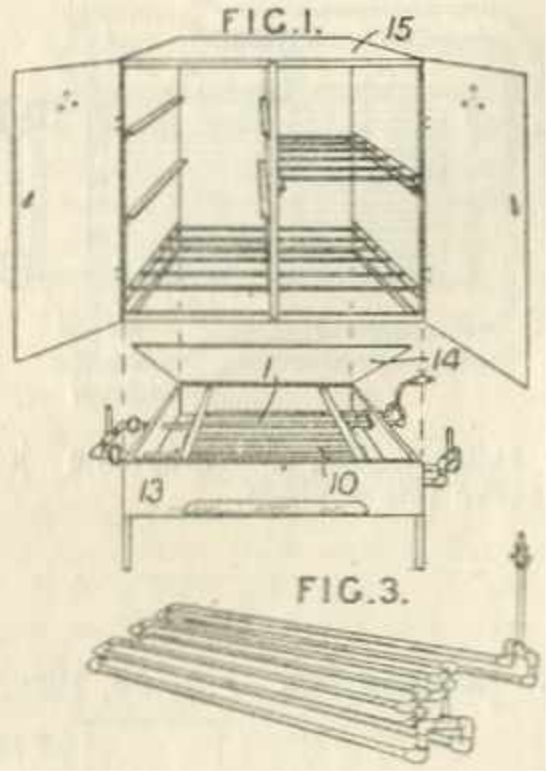
Heating liquids; boiling-pans.—To promote circulation in a vessel having the usual steam heater F, the outlet B is formed in a casting C which occupies a small part of the floor space and forms a steam jacket around the outlet. The steam passes through passages in the casting by one or more tubular columns E¹ to the heater F and thence by one or more columns E² to the jacket.

219,754. Ginger, H. May 4, 1923. *No Patent granted (Sealing fee not paid).*

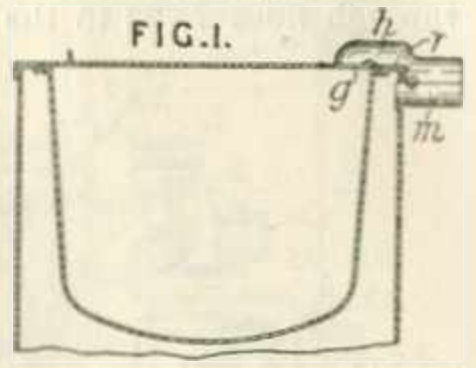
Water-tube boilers.—A casing 13 containing a burner 10 beneath the water-tubes 1 has a lid 14 which is raised when another domestic appliance to be heated, such as an open-bottomed oven 15, is placed above the casing. The preferred arrangement of water-tubes, Fig. 3, comprises two horizontal multiple **U**-tubes staggered vertically. One or more **U**-shaped gas burners may be placed parallel to and beneath the tubes.

(*For Figures see next page*).

219,754.

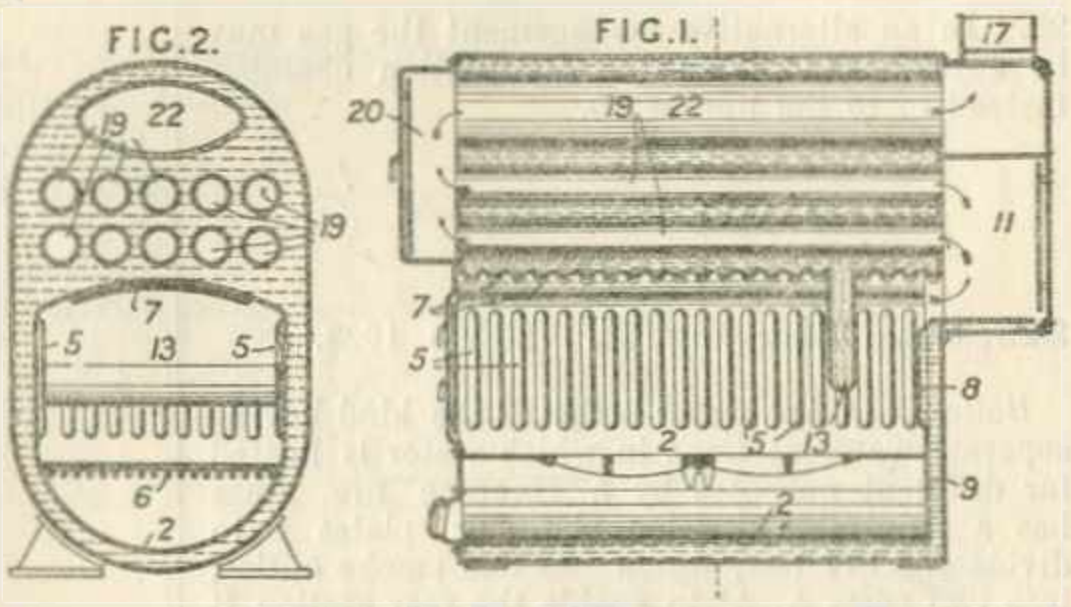


219,764. Oakley, P., Richardson, W. H., and **Allender, J. J.** May 18, 1923.



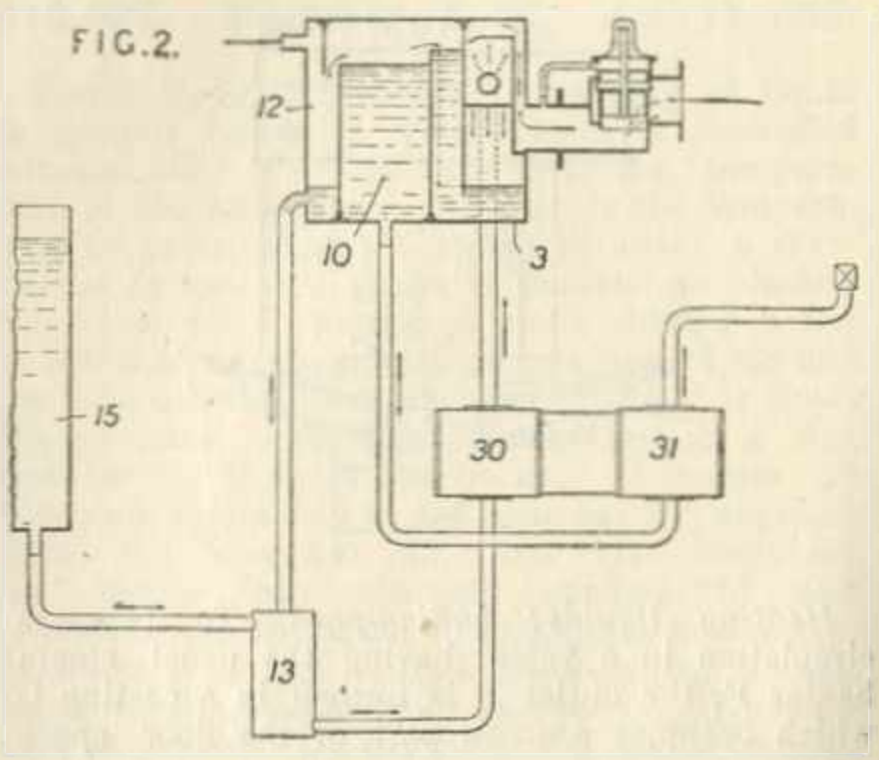
Washing-boilers. — In a gas-fired domestic washing-boiler, a combined condenser and fume outlet device comprises a hood *h* covering the usual aperture *g* for the exit of steam, the hood being formed with an inclined surface *r* and terminating in a semi-cylindrical portion which is bolted to a second semi-cylindrical portion *m* so as to form a tubular outlet for the steam and fumes.

220,101. Naylor, S. June 6, 1923.



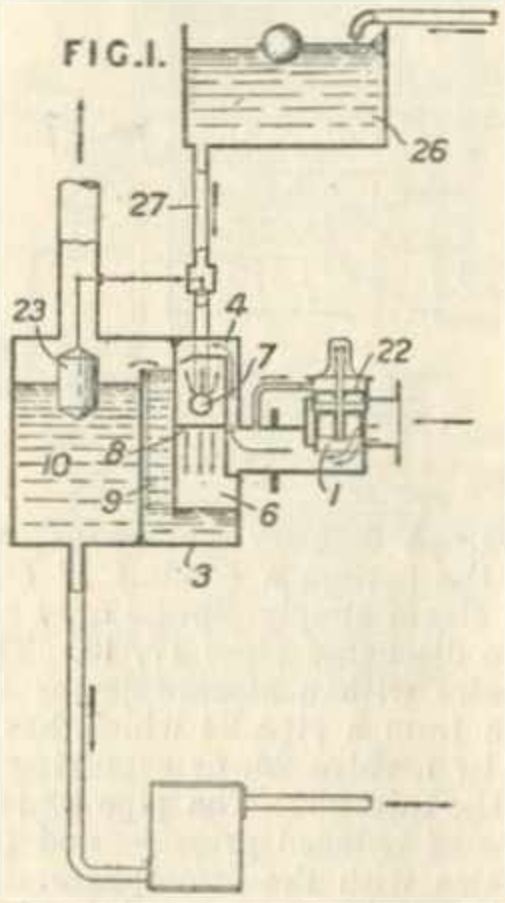
Internally-fired boilers.—In a horizontal boiler with return flue-tubes, the sides and crown of the fire-box 2 are formed with vertical and transverse corrugations or indentations 5, 7, space being left between the top ends of the corrugations 5 and the corrugations 7 and between the bottom ends of the corrugations and the firebars 6. The back plate 9 of the fire-box may be formed with vertical corrugations 8. The top and bottom of the shell and the bottom of the fire-box are curved. The gases pass forwards from the lower part of a divided smoke box 11 at the rear of the boiler through tubes 19 to front smoke-box 20, and return through an oval flue-tube 22 to the upper part of the divided smoke-box, to which the chimney 17 is attached. A water leg 13 may depend into the rear of the smoke-box. Specification 192,824 is referred to.

220,208. Fiedler, S. O. A. Nov. 29, 1923.



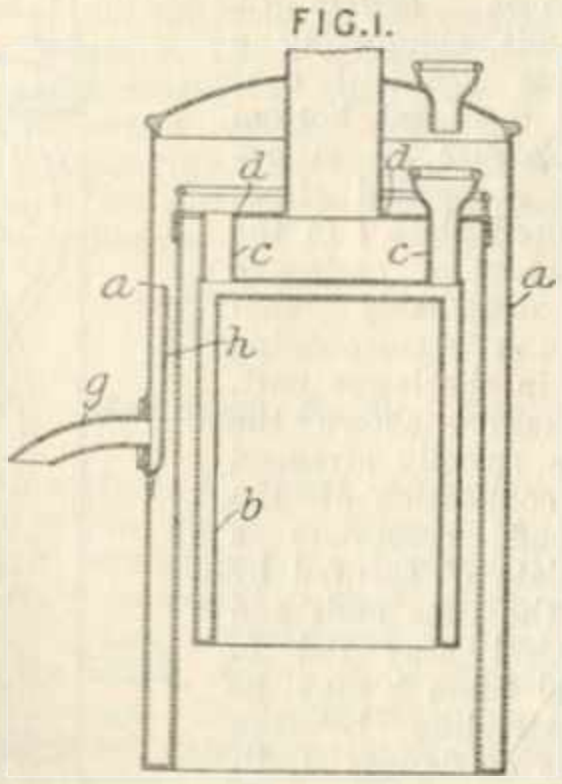
Feed-water, heating.—Feed water is heated by direct contact with steam at a constant pressure and then freed from air in a chamber open to the atmosphere. Steam is admitted through a regulating valve 1 which is controlled by the pressure within the apparatus acting on a piston 22, so that such pressure is kept constant. The heater 3 is divided into four chambers 4, 6, 9, 10, and feed water to be heated is supplied from a tank 26 to a perforated pipe 7 in the chamber 4, so that it is heated by contact with the steam. The water falls through a perforated plate 8 into the chamber 6, and is forced by the steam pressure into a chamber 9 from which it overflows into a chamber 10. The inflow of water is controlled by a valve in the pipe 27, operated by a float 23 so that the level in the chamber 10 is below the

top of the partition. The chambers 9, 10 are in communication with the air so that the gases liberated from the water may escape. A modified apparatus is described in which the feed water is supplied by a pump 30. The surplus



water then overflows from the chamber 10 through an intermediate chamber 12 to a suction vessel 13 connected to the main feed tank 15 and to the pump 30 while the chamber 10 is connected directly to the main discharge pump 31.

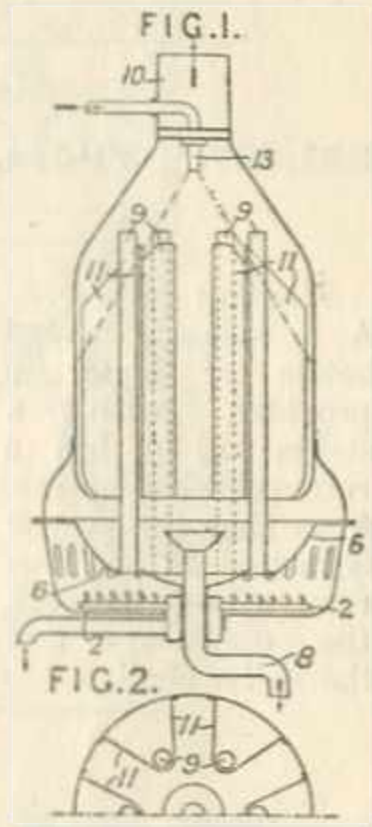
220,754. Fildes, T. R. June 16, 1923.
No Patent granted (Sealing fee not paid).



Internally-fired boilers.—Relates to water heaters of the kind in which the outer casing *a* is double-walled with a tray-like member *d* supported within, from which is suspended by pipes *c* a bell shaped heating chamber *b*. One of the pipes *c* is extended upward through the open tray *d* and is formed as a funnel to receive the incoming cold water. A pocket *h* open at the top may be fitted in the outer casing around the opening to the outlet pipe *g*.

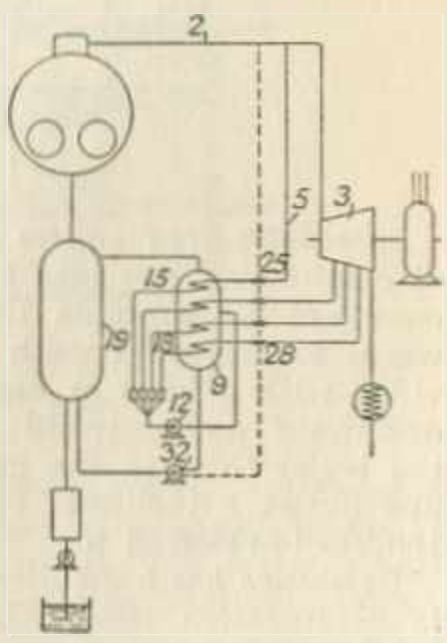
221,493. Deutsch, S. Sept. 4, 1923. [*Convention date*].

Heating liquids.—Gas-fired liquid heaters, in which the liquid is sprayed in direct contact with combustion products, are provided with conduits 9, preferably passing through the heating chamber, through which a portion of the gases are led directly from the burner 2 to the chimney 10 without contact with the sprayed liquid, to ensure a satisfactory draught. In the example shown, liquid is sprayed downward from a nozzle 13 and, falling around shields 11 about the conduits 9, is collected in a cup 6 before passing to the delivery pipe 8. Combustion products from the burner 2 pass between the cup 6 and the casing and both inside and outside the shields 11, part also passing direct to the chimney by the conduits 9. That part that flows within the shields 11 serves to heat the liquid indirectly only, through the metal of the shields.



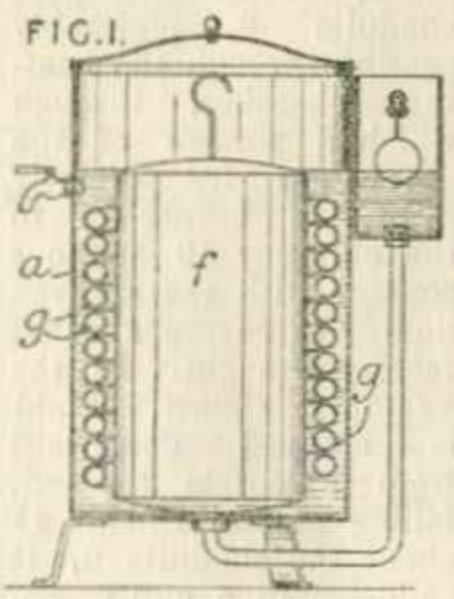
221,500. Siemens - Schuckertwerke Ges. Sept. 4, 1923, [*Convention date*]. *Void* [*Published under Sect. 91 of the Act*].

Feed-water, heating. — A feed-water heater 9 heated by steam taken from the stages of a turbine 3 serves as a hot-water storage chamber or is so connected to a separate hot-water storage chamber 19 that water withdrawn from the bottom of the chamber is heated in the heater and returned to the top of the chamber. The



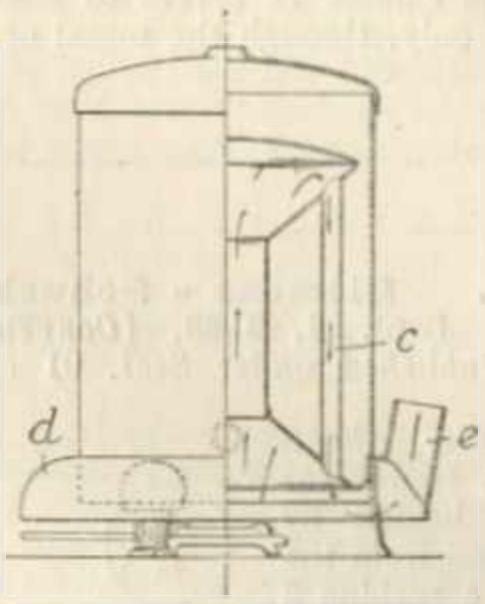
heater may be further heated by live steam taken from the steam supply pipe 2 through a pipe 5. Valves 25 - - 28 controlling the supply of steam to the heating coils 15 - - 18 in the heater are so operated by the live steam pressure that when the pressure falls, the valves close, and when the pressure rises, the valves open. The operation of a pump 32 in the bottom connection of the heater and storage chamber is so controlled by the live steam pressure that the supply of water to the heater from the chamber increases as the steam pressure rises. Water of condensation from the heating coils is supplied to the heater by a pump 12.

221,637. Fildes, T. S. Aug. 29, 1923.



Heating water.—A steam - heated kettle or boiler *a* provided with a steam coil *g* has a removable displacer *f*, so that the water is heated in the narrow space between the displacer and the boiler shell.

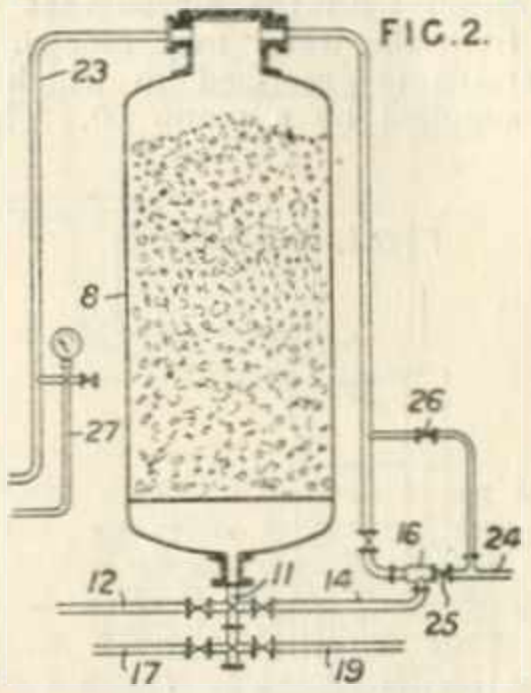
221,663. Hosler, R. Oct. 16, 1923.



Internally-fired boilers in which the products of combustion rise into a firebox and are thence conveyed for example through tubes *c*, downwards to escape, beneath the lower edge, are provided with a hood or canopy *d* which extends downward and outward from the lower end of the boiler to near the ground level and has the flue outlet *e* inclined upwardly. Specification 169,375 is referred to.

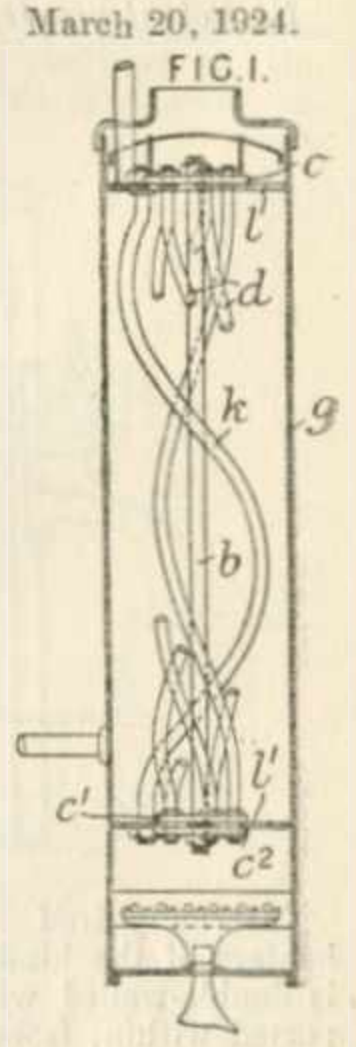
Reference has been directed by the Comptroller to Specification 10555/85.

221,702. Pansky, A. Dec. 3, 1923.



Digesters.—A digester comprises a vessel 8 having at the bottom a conduit 11 connected to water and steam supply pipes 12, 14 respectively and also to discharge pipes 17, 19. The pipe 14 communicates with a steam-injector 16 supplied with steam from a pipe 24 which has a branch, controlled by a valve 26, or supplying steam forwardly of the injector. The pipe 23 is connected to a source of reduced pressure and the pipe 27 communicates with the atmosphere. In operation the material to be treated is placed in the vessel and steam under slight pressure is admitted through the valve 26. When the material has been sufficiently steamed, cold water is admitted through the pipe 12, the source of reduced pressure is put into operation, and the valve 25 controlling the steam injector 16 is opened to cause the water to be circulated. The solution may be withdrawn and the residue then treated again.

221,744. Suttle, C. E. March 20, 1924.



Block-form boilers.—A heating unit, comprising a set of flue tubes *d* connected at top and bottom to tube plates *c*, *c*¹ is removably suspended from an apertured plate *l* in the upper part of a casing *g* and is detachably connected to a corresponding flange *l*¹ in the lower part. In the example shown the tubes are spirally arranged and the connection at the lower end comprises a second plate *c*² secured by nuts on the tube ends and on a central stay rod *b*. Additional tubes *k* may be fitted extending between the plates or flanges *l*, *l*¹.

Reference has been directed by the Comptroller to Specification 6534/08.

221,957. **Ries, F.** Sept. 21, 1923. *No Patent granted (Sealing fee not paid).*

FIG. 2.

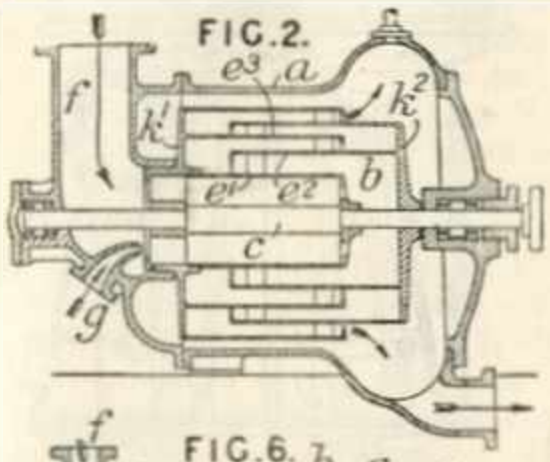
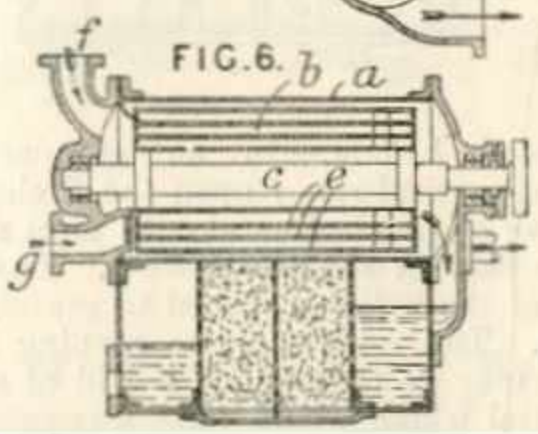


FIG. 6.



Heating water; feed-water, heating.—Apparatus for condensing steam or for cooling or heating fluids comprises a casing and a series of thin-walled open-ended vessels of substantially cylindrical form mounted on a rotating shaft and having one end opening of larger raduis than the other. Liquid admitted to the cylinders at the narrower ends is spread by centrifugal force in thin layers over the surface of the cylinders and is flung out at the wider ends, exchanging heat in passage with a fluid which may be introduced into the casing at either end. In the example shown in Fig. 2, steam enters the casing *a* at *f* and is condensed by cooling-water from the jet *g* spread alternately by the rotating cylinders e^1, e^2, e^3 . . attached to the discs k^1, k^2 fixed to the shaft *c*. In Fig. 6, which shows a pre-heater for liquids, the liquid to be heated enters at *g* into the rotor *b* comprising a single set of cylinders *e*. In a modification, a set of cylinders is arranged on each side of common steam and water inlets, while in a further example the entering fluid causes the rotation of the cylinders by striking blades formed on one end of the cylinders.

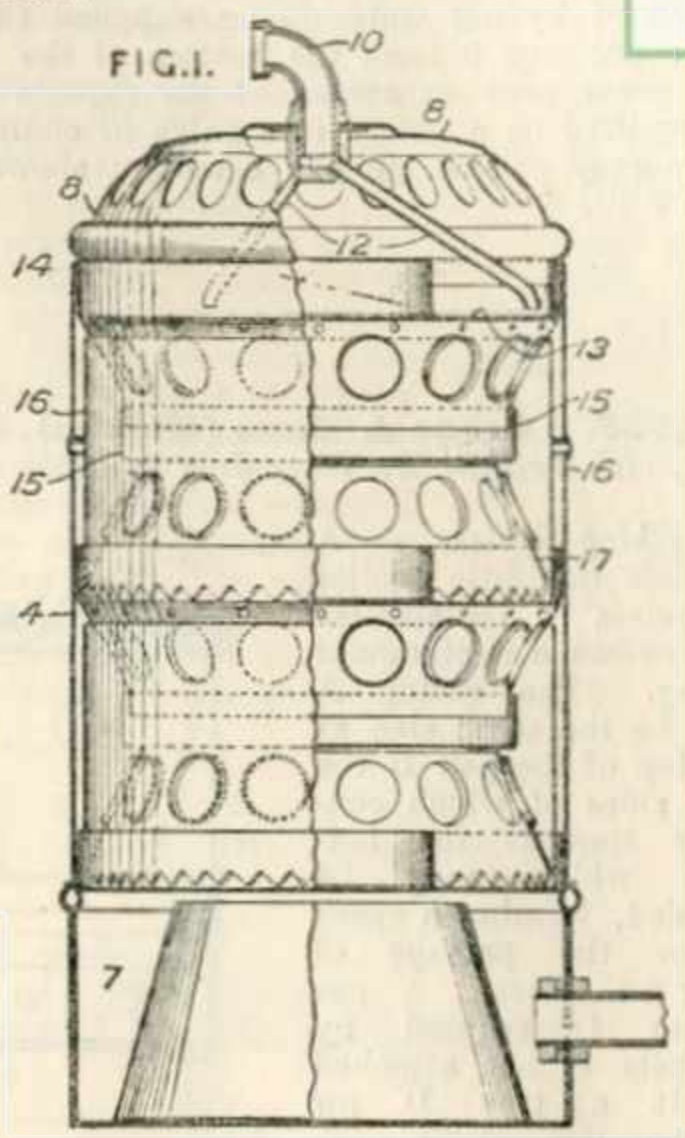
222,357. **Harbord, A. E.** Dec. 29, 1923.

Heating water.—A geyser comprises an outer casing 4 within which is mounted a series of units, each consisting of a perforated annular tray 13, two truncated conical apertured members 14, 17, and a perforated circular tray 15 between the cones, which slope alternately outward and inward. In the example two units are shown, the lower delivering water heated in passage to a collecting ring 7. Water passes to the uppermost annular tray 13 by distributing pipes 12 from an inlet 10 carried by the cover 8. Cylindrical rings 16 surround the cones at a short distance from the outer casing.

(*For Figure see next column.*)

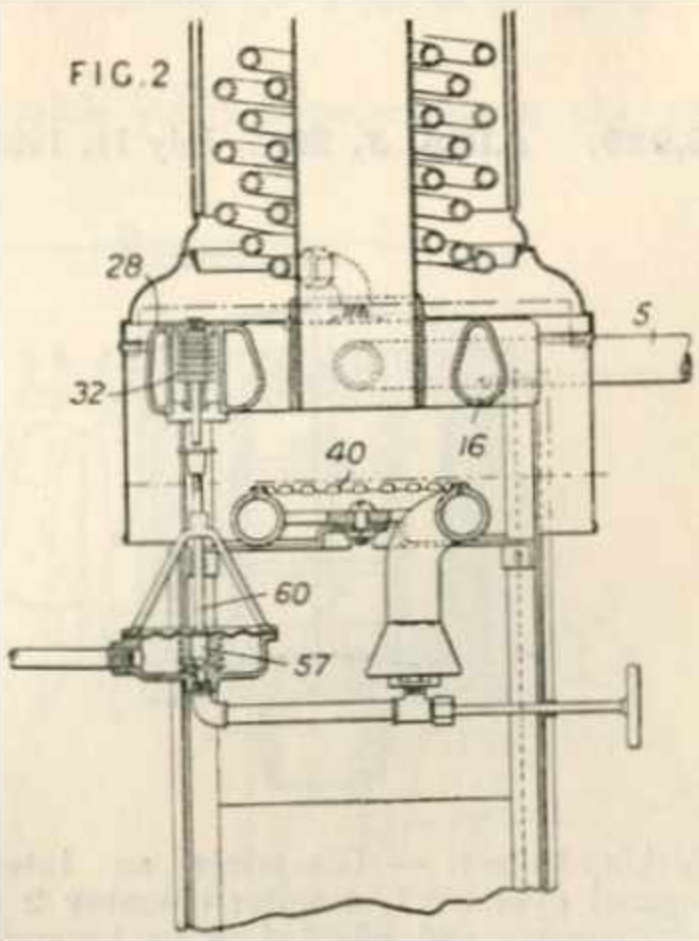
222,357.

FIG. 1.



222,498. **Cleveland Metal Products Co.,** (Assignees of *Resek, M.*). Sept. 26, 1923, [*Convention date*].

FIG. 2.



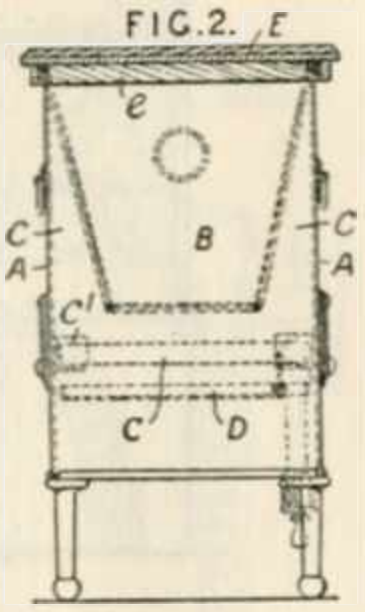
Heating water; water-tube boilers.—A thermostatic capsule 32 is housed in an extension 28 of the lower header 16 of a tubulous water heater so as to operate to cut off the heating medium as soon as the whole of the water in a connected

...ge tank is at the required temperature as evidenced by hot water being supplied through the connection 5 from the bottom of the tank. The consequent expansion of the capsule 32 is transmitted by a rod 60 to a valve 57 controlling the supply of gas, in the example shown, to burner 40.

222,938. Cross & Sons (Nelson), Ltd., J., and **Cross, T. W.** July 7, 1923.

Washing-boilers. — A portable domestic boiler comprises a rectangular pan within a rectangular casing. The casing A may be the same size as the top of the pan B the four sides of which converge towards the bottom, which may be rounded, forming a space *c* for the passage of burnt gases. A gas burner C secured by brackets c^1 has attached to it a tray D for condensation drips. A wooden top E having flanges *e* may serve as a table or as a cover for an open pan.

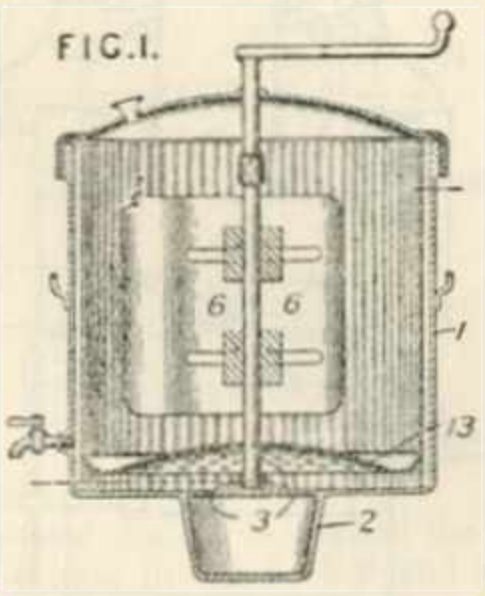
FIG.2.



Reference has been directed by the Comptroller to Specification 8593/03, [*Class* 126, Stoves &c.].

222,959. Allin, J. M. July 11, 1923.

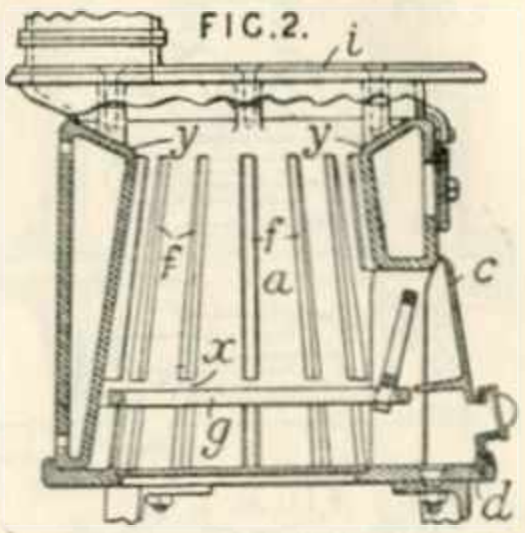
FIG.1.



Washing-boilers. — Comprises an internally corrugated cylinder 1, a water chamber 2 of reduced diameter and adapted to be lowered into a pot-hole in a kitchen range, water circulation passages 3 being arranged between the cylinder and water chamber, a four-vaned rotary stirrer 6, and a perforated sheet 13 supporting the clothes to be washed.

223,116. Bruster, O. Feb. 15, 1924.

FIG.2.



Annular boilers.—In an annular hot-water boiler *a*, vertical ribs *f* upon the firebox walls are cut away or notched as at *x* to form supports for the fire bars or shaking grate *g*. The upper surface *y* of the boiler is sloped to prevent lodgment of soot. The usual circular opening in the hot-plate *i* may be covered by a grid of expanded or like metal which would form a support for small cooking vessels.

223,223. Hanton, P. S., and **Dick, J.** Oct. 8, 1923, [*Convention date*].

FIG.1.

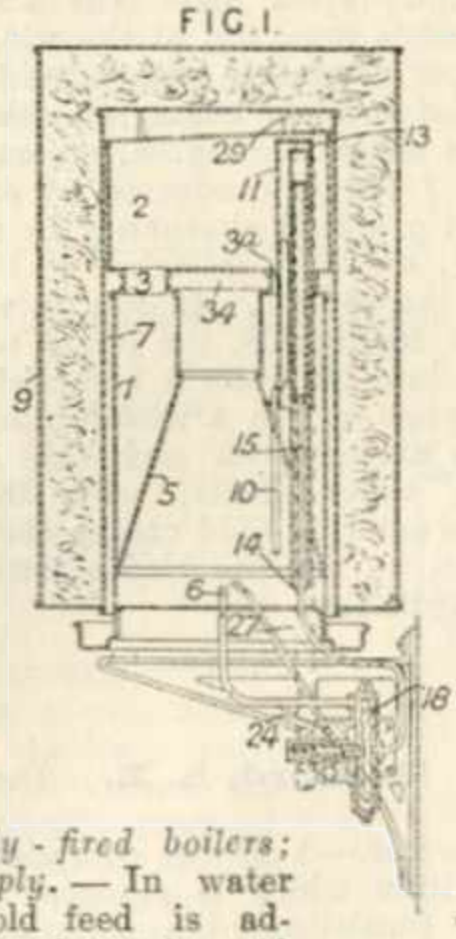
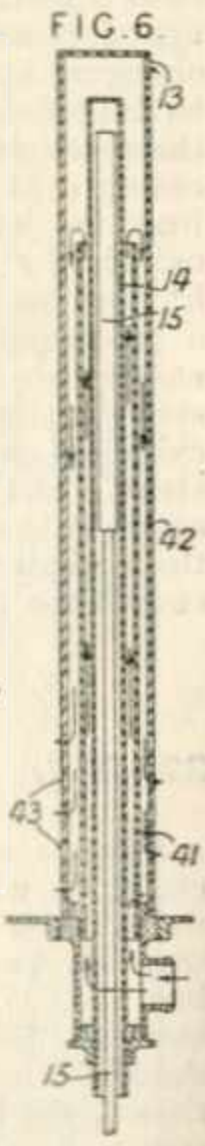


FIG.6.



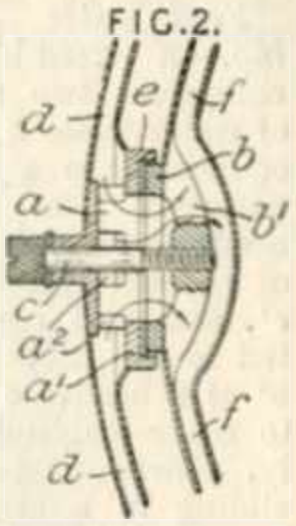
Internally-fired boilers; water supply. — In water heaters, cold feed is admitted through a pipe 10 through the wall 5 of a central coned flue to an open bottomed tube 11 which has an aperture 13 at its top end. Within this tube is a casing 14, containing the enlargement of a tube 15 filled with expansible fluid and connected to a capsule 18 controlling a spring pressed valve 24 of the gas supply to the burner 6. As shown, the heater comprises an upper non-flued portion

2 connected by short tubes 3, 3^a with a lower part 1 having a central flue 5 delivering to a space 34 separating the parts 1, 2 and communicating with an annular flue space 7 within the outer insulating casing 9. The draw-off pipe 27 extends downward through the water-space and draws from a domed extension 29 of the upper part 2. Modified arrangements of the parts 10, 11, 14 are described in which the cold feed is directed on to the top of the tube 14, the tube 11 is made oval in shape or, as shown in Fig. 6, the feed is admitted through a pipe 41 surrounding the tube 14, into an outer casing 42 with apertures 13, 43.

223,483. Barralet, J. H., and **New Geysers, Ltd.** March 3, 1924.

Geysers.—Internal and external water holding casings *d*, *f* are connected by means of a cylindrical body *a* with radial apertures a^2 and a circular seating a^1, bearing packing *e* against which bears a facing ring *b* to which the outer wall of the inner casing *f* is secured. The outer face of the body *a* is secured to the outer wall of the casing *d* and the seat a^1 is secured to the inner wall. The whole is made liquid-tight by a screw *c* engaging a thread in a boss in the centre of a bridge piece b^1 integral with the ring *b*.

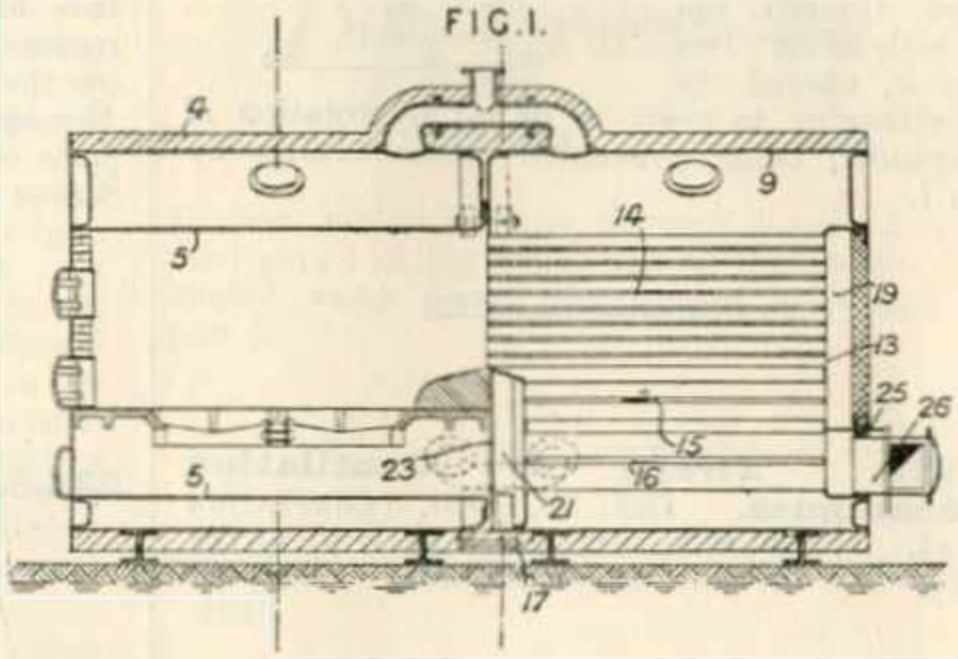
FIG. 2.



223,551. Huygen, L. B., and **Huygen, F. C.** Oct. 15, 1923, [*Convention date*].

Internally-fired boilers.—A boiler has two separate shells placed end to end, one shell 4 containing a furnace flue 5 and the other shell 9 containing smoke-tubes 14, 15, 16. The front tube plate is recessed to form a smoke-box 21 and the rear tube-plate 13 is recessed to form a smoke-box 19. The furnace gases pass through the smoke-tubes 14 to the rear smoke-box and return through smoke-tubes 15 to the front smoke-box, from which they pass through the smoke-tubes 16 to an outlet flue 26. When a damper 25 in the smoke-box 19 is opened, the gases pass from the smoke-box directly to the outlet flue. The front smoke-box has a removable front plate 23. The smoke-tubes 15, 16 are of relatively large diameter. The boiler shells are secured together by bolts 17. One shell may serve as a water heater while steam is generated in the other shell.

FIG. 1.



223,780. Zeitlin, H. Jan. 10, 1924.

Internally-fired boilers.—A raised conical bottom is provided with water-holding radial vanes *c* tapering inwards and closed at the bottom but open to the main water-space at the sides and top. Through the centre of the coned chamber depends a vaned draw-off pipe *e*, *f*, shown in Fig. 3, the top *g* fitting into a star-shaped opening in the roof of the chamber. A coned cover *l* is spaced from the raised bottom and is provided with a steam vent *p*. A removable cap *s* is fitted to the vent and, if desired, steam generated beneath the cover *l*, instead of passing under the cap into the main body of water in the boiler *a*, may be led away for any other domestic use. Flues *k* lead combustion products to beneath the boiler.

FIG. 3.

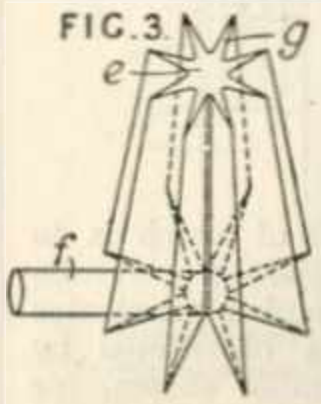
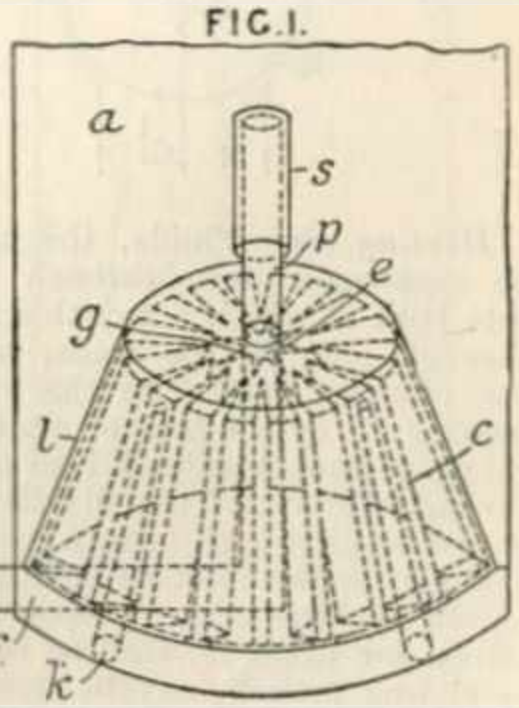
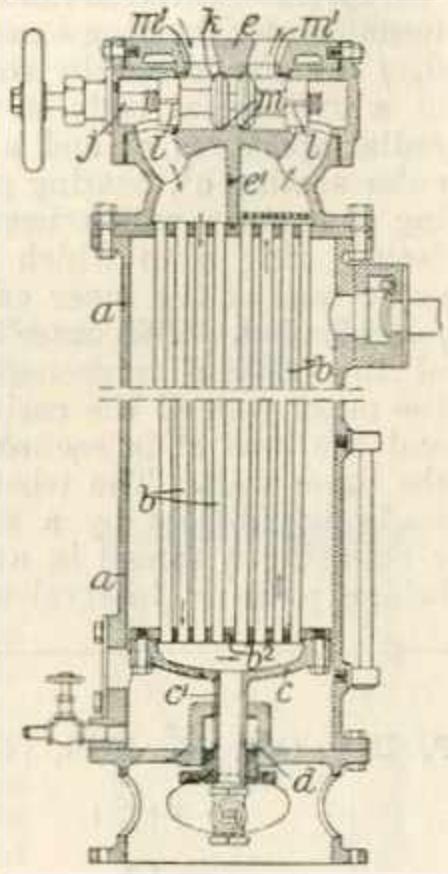


FIG. 1.

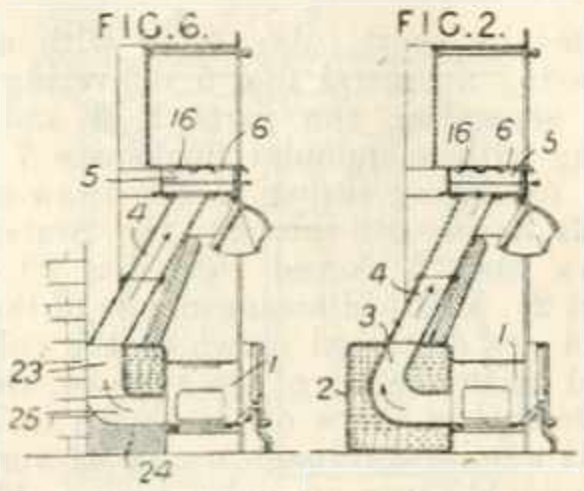


224,910. Cailliez & Lézier. Oct. 26, 1923. [*Convention date*].

Feed-water heating.—A feed-heater comprises two nests of water-tubes *b* each connected to a compartment of the header *e* on each side of the dividing plate e^1, and also connected to the tube plate b^2 of a header *c* free to move longitudinally, a drain tube c^1 sliding in a stuffing box *d*. Steam is admitted to the outer casing *a*. A valve for by-passing water from the heater comprises a spindle *j* with right and left handed threads, upon which work two valves *k*, caused to close either on to seats *m* or m^1 by rotation of the spindle, being prevented from turning by wings *l*.

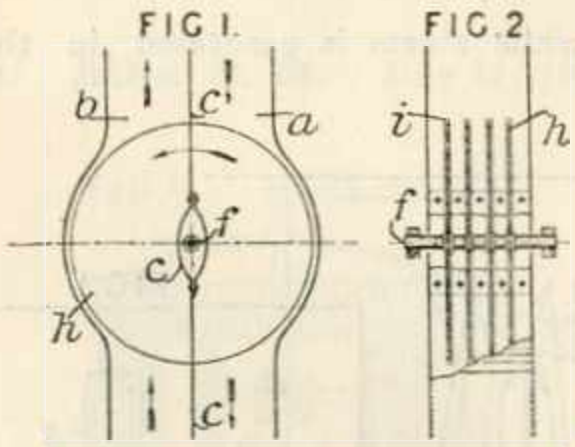


224,334. Smith, S. Sept. 13, 1923.



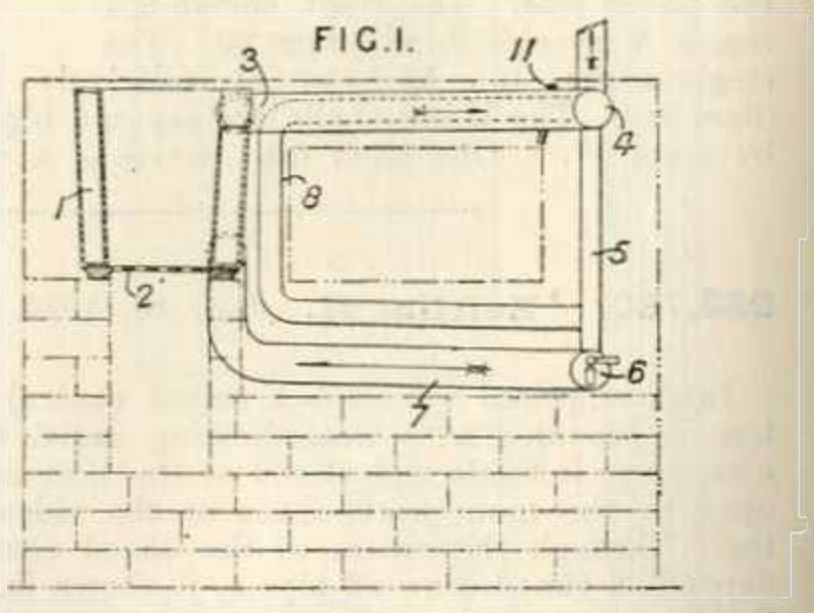
Block-form boilers.—A boiler for a combination range is provided with a flue 3 comprising horizontal and upwardly directed portions; in a modification, the boiler extends upwardly to form the grate back. In either form, the part of the boiler below the flue may be replaced by fire-brick blocks. In the form shown in Fig. 6, the boiler is provided with a recess 23 in the rear face and is supported on a block 24 having a recess 25 in the upper face, the flue being formed by the recesses. Fuel may be fed to the fire through the boiler flue by removing the hot-plate cover 16. Specification 132,674, [*Class* 126, Stoves &c.], is referred to.

224,219. Tirage et Ventilation Mécaniques. Oct. 30, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].



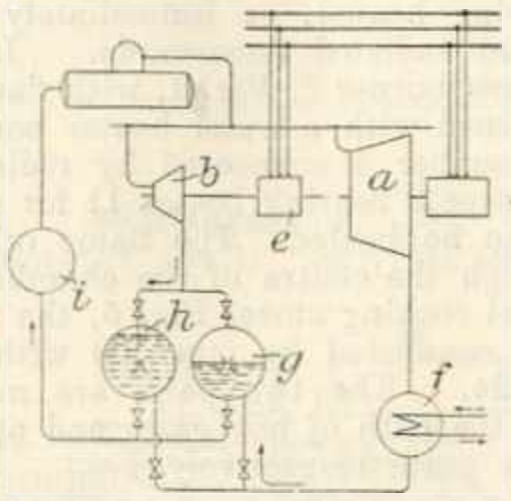
Heating air.—Fluids, the heat of which is to be exchanged, flow through adjacent conduits into both of which a movable member penetrates through slits in the walls, kept obstructed by the member itself. In the example shown, for heating air by the heat of waste gases, a series of rotating discs *h* extend into the two ducts *a*, *b* through slits *i* in the dividing wall *c* which is bowed as shown to form a covered or uncovered channel for the rotating spindle *f*, or may be cut across for the same purpose. Other moving solids, for example, endless bands, rotary cones, or sliding prisms may be used. Scrapers may be used to pack the joint at the slits and by the use of differing pressures in the conduits one fluid may be kept from any undesired admixture.

224,532. Basin, J. Nov. 5, 1923, [*Convention date*].



Boilers; annular boilers.—Particularly for use in kitchen ranges or with other ovens, a boiler 1 enclosing the movable fire grate 2, is connected by upper and lower tubes 3, 7 with collectors 4, 6 which have tubes 5, 8 extending between them encircling the oven. Flow and return pipes for external circulation of hot water are connected to the upper and lower collectors respectively. A damper 11 controls the passage of hot gases which may pass round the oven among the tubes 5, 8.

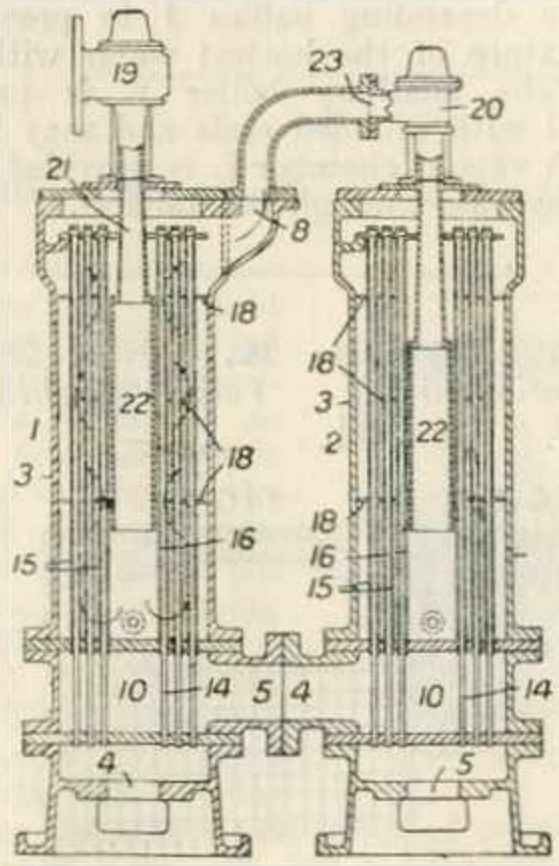
224,545. International General Electric Co., Inc., (Assignees of *Allgemeine Elektricitäts-Ges.*). Nov. 6, 1923, [*Convention date*].



Heating water; feed-water, heating.—Water, particularly boiler feed-water, is heated by collecting in a closed tank the volume required for a certain period of time and heating it up to the desired temperature by exhaust steam from an engine which works with a constantly increasing back pressure and which is loaded with say an electric machine taking the variable output of the engine. Several collecting tanks receiving the exhaust from engines may be used the tanks being used one after the other to heat the water. Water may be heated in a collecting tank only over a part of the range of the desired rise in temperature, the further heating being effected by tapped steam of constant temperature or by live steam. The water of condensation accumulating in the condenser *f* of a main engine *a* during a certain period of time is passed into collecting tanks *g*, *h* alternately, and is heated to say the temperature of the boiler steam by exhaust steam from an engine *b* operating an electric generator *e*. The heated water is taken from the tanks in turn and conducted to the boiler, a flue-gas preheater, another preheating device, or to an intermediate container *i*, from which it can be withdrawn as required.

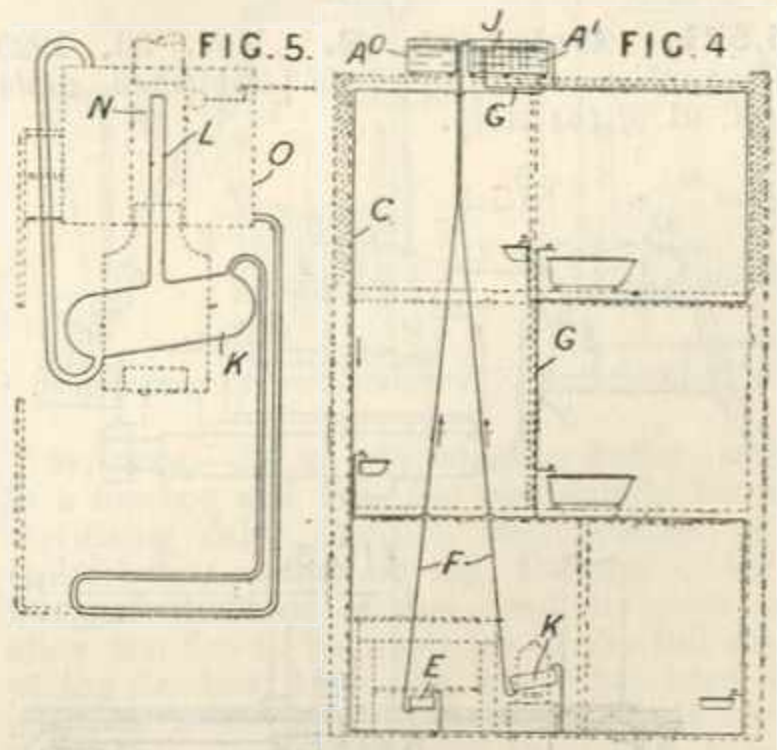
224,945. Guy, H. L., and **Metropolitan-Vickers Electrical Co., Ltd.** Aug. 17, 1923.

Feed-water, heating.—In apparatus for use in conjunction with steam condensers and comprising a steam-actuated ejector and a tubular feed-water serving to condense the ejector discharge, the feed-water heater is provided with inlet and outlet compartments for the water at one end only, and the diffuser of the ejector projects axially and centrally into the tube nest of the heater. The apparatus may comprise ejectors and heaters in stages or series. In the arrangement shown, ejectors 19, 20 have their diffusers 21 built into the tube nests 16 of feed-water heaters 1, 2, which comprise vertical casings 3 fitted with Field tubes 14, 15 and transverse baffles 18. Tubular extensions 22 are fitted to the diffusers to direct the discharged steam and air to the bottom of the tube nests. The feed-water enters the first heater through the port 4 and rises through the inner tubes 14 and descends through the outer tubes 15 to a collector



10 from which it flows through a port 5 to the inlet port 4 of the next stage of the heater. The heated water leaves the heater 2 through the port 5.

224,961. McClelland, N. E. Aug. 22, 1923.



Heating water; block-form boilers.—In a hot-water system for buildings &c. having an elevated tank A^1 supplied by or combined with a feed tank A^0, and connected with a boiler or boilers E, K by a direct riser-pipe F and parallel return circuits C, G, the riser-pipe feeds to the tank A^1 at one end, from which end the return pipe G leads through the distributing mains to join

the other return C which draws from the cold end of the cistern A^1 and leads to a point below the boiler and the lowest tapping point, both returns feeding to the upper end of the boiler or boilers through a ∩-bend. The tank A^1 may have depending baffles J to prevent undue admixture of the hottest water with cooler water. The auxiliary boiler K is preferably cylindrical with rounded ends and may be horizontal. A vapour chamber L is provided and the flue N may pass through the tank O.

225,557. Stierle, K. Nov. 28, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

FIG.5.

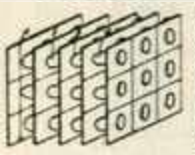
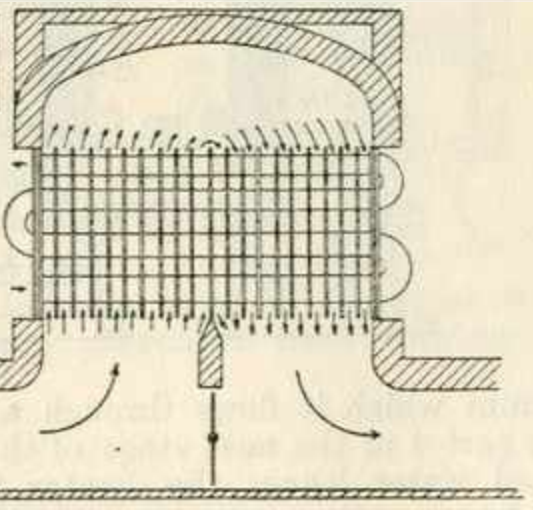


FIG.1.



Feed-water, heating.—Gills on the tubes of economisers are formed so as to form, when the heater is assembled, conducting walls for flue passages among the tubes. This may be effected by making them square and of such a size that the gills on adjacent tubes are contiguous.

225,571. Gelabert, S. Nov. 30, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].

FIG.1.

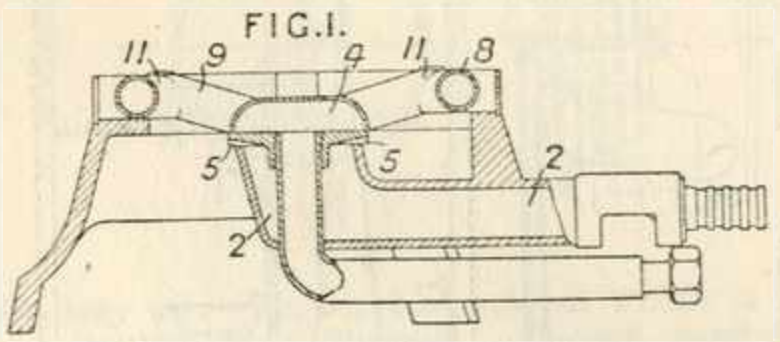
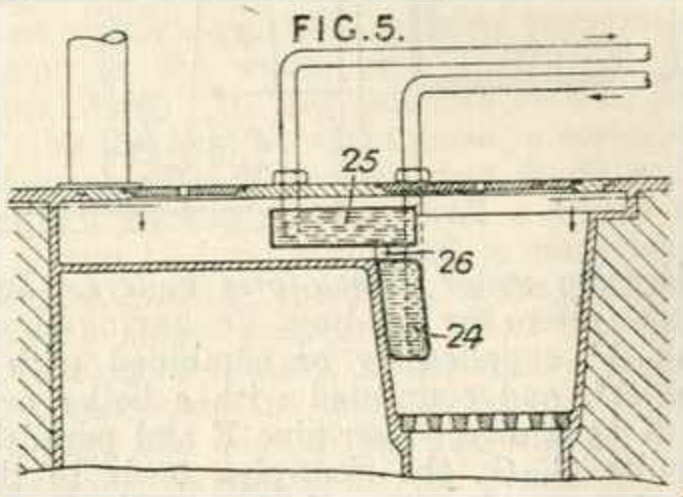
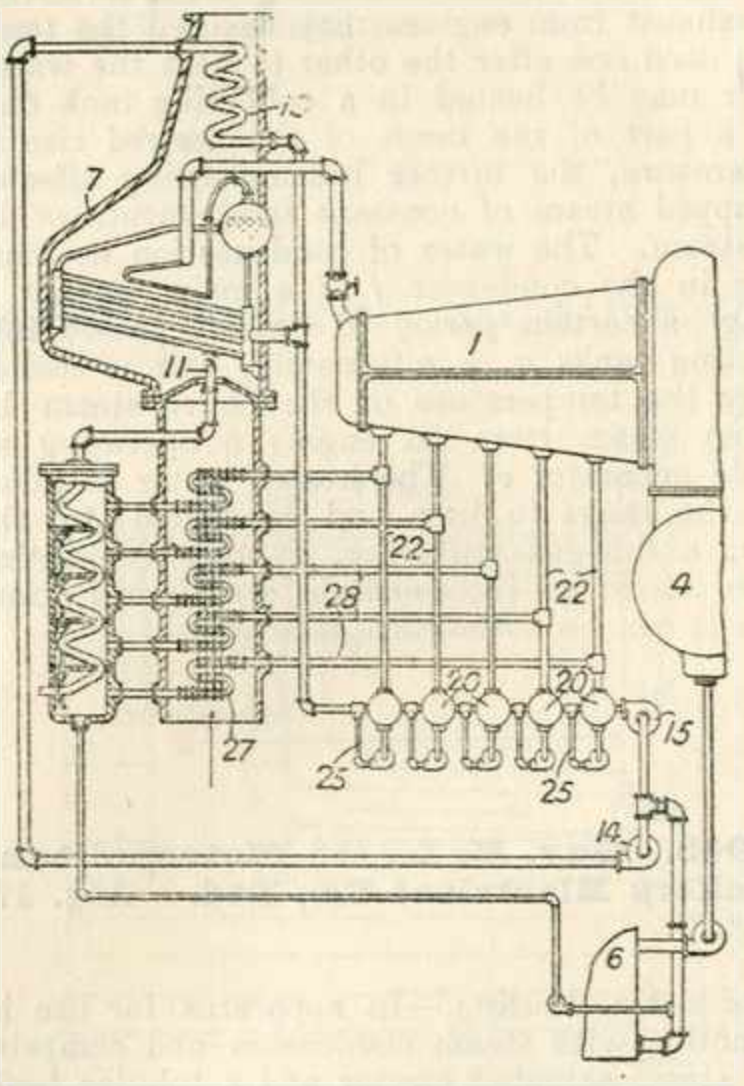


FIG.5.



Small liquid heaters; water-tube boilers; block-form boilers.—Devices for heating and circulating water comprise heaters of small capacity and of substantially flat form situated in a horizontal position and immediately in contact with the source of heat either above the region of combustion, between the region of combustion and a vessel being heated, or immediately below to utilise heat radiated downwards. In one example, a gas burner 2, Fig. 1, with flame orifices 5 is combined with a water heater comprising a central chamber 4 connected by radial pipes 9 to a ring pipe 8 bearing bosses 11 for supporting a vessel to be heated. The flame orifices may pass through the centre of the chamber 4. For a solid fuel cooking stove, Fig. 5, the flat chamber 25 is connected by pipes 26 with a vrtical chamber 24. The two parts are mounted as shown in the path of hot gases and at the back of the fire grate respectively.

225,576. British Thomson-Houston Co., Ltd., (Assignees of *Robinson, E. L.*). Dec. 1, 1923, [*Convention date*]. *Void* [*Published under Sect.* 91 *of the Act*].



Feed-water, heating.—In a steam power plant comprising a multi-stage turbine exhausting into a condenser and supplied with steam from boiler fitted with an economizer, feed is supplied to the boiler directly through the economizer and also directly through a number of heaters heated by steam taken from the stages of the turbine. Water is supplied to the boiler 7 supplying steam to a turbine 1 by a pump 14, which forces water through the economizer 13, and also by a pump 15 which forces water through heaters 20 heated by steam supplied through pipes 22 from the stages of the turbine.

The water is drawn from a reservoir 6 into which the condensate from the condenser 4 is discharged. The air and fuel supplies to the boiler burner 11 are heated by steam taken from the stages of the turbine through pipes 28 and coils 27.

225,898. Withers, J. S., (*Deutsche Evaporator-Akt.-Ges.*). July 11, 1923.

FIG.2.

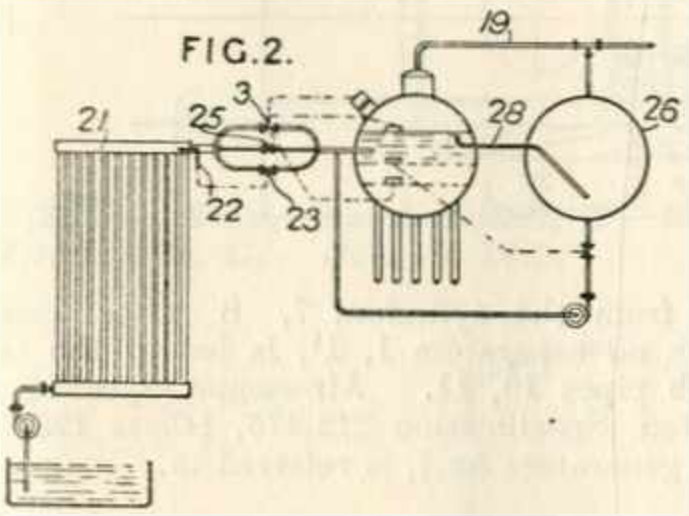
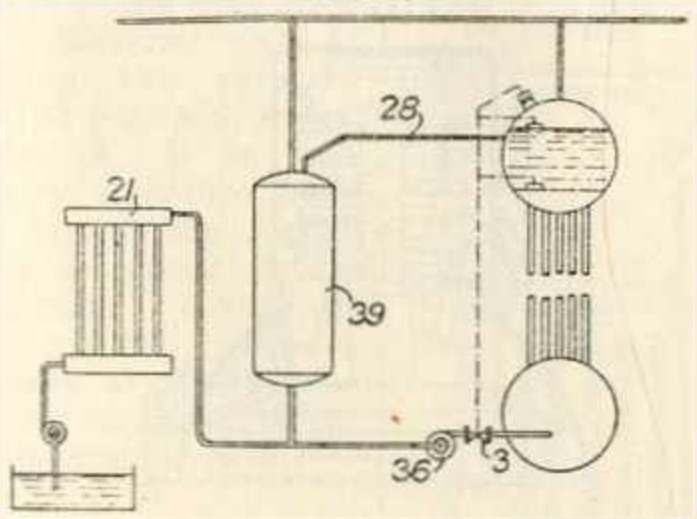


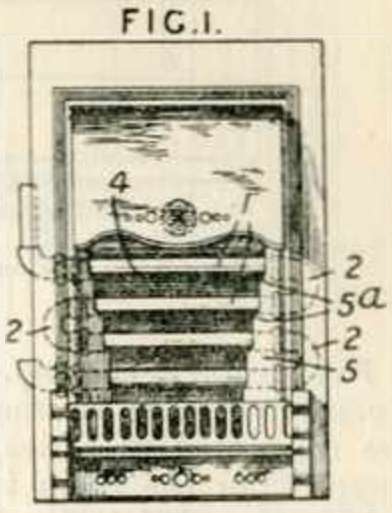
FIG.4.



Feed-water, heating.—To prevent overheating in the economizer 21, Fig. 2, when the pressure operated feed valve 3 is closed, a valve 23 in a by-pass may be so operated by a thermostatic device 22 that a flow of water is maintained between the economizer and the boiler. A permanent small flow is maintained through a valve 25. In a modification, a constant flow of water is maintained through the economizer, excess water being received when the boiler feed requirements are small by an equalizing chamber from which it is subsequently withdrawn when the boiler feed requirements are large. A thermostat increases the flow of water through the economizer when the water temperature rises and decreases it when the water temperature falls. The flow is also controlled by a float in the equalizing chamber. Water overflows from the equalizing chamber back to the feed tank. In a further modification, the equalizing chamber 39, Fig. 4, is connected to the boiler steam and water spaces and serves as a storage chamber. When the pressure operated valve 3 is fully open the feed pump 36 takes water from the lower part of the chamber 39 in addition to that supplied through the economizer 21. At the same time hot water flows from the boiler through a pipe 28 into the upper part of the chamber. When the valve 3 is closed, hot water is forced into the boiler through the pipe 28 by the water entering the lower part of the chamber.

226,590. Beard, J. Sept. 20, 1923.

FIG.1.



Water-tube boilers.—A series of straight lengths of tube 1 united at the ends by screwing into bends 2 to form a sinuous pipe is mounted in front of the fire-back 4 of an open fireplace or stove the lowermost tube being preferably further from the back than the top tube. The tubes may be supported by ledges 5^a in the side cheeks 5. The tubes are preferably of copper screwed at the ends right- and left-handed and the bends of gunmetal.

226,890. Perkins, F. A., and **Perkins, J. E. S.** Oct. 3, 1923.

FIG.1.

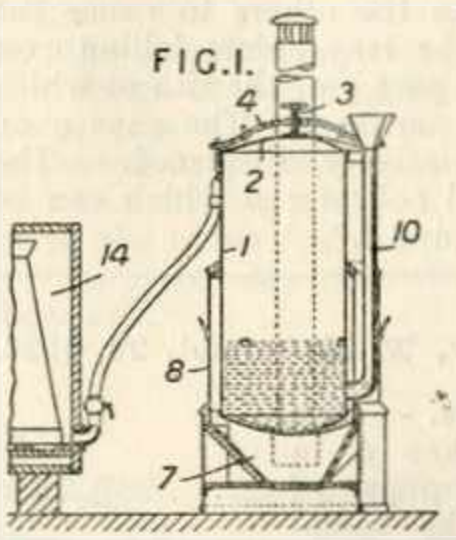
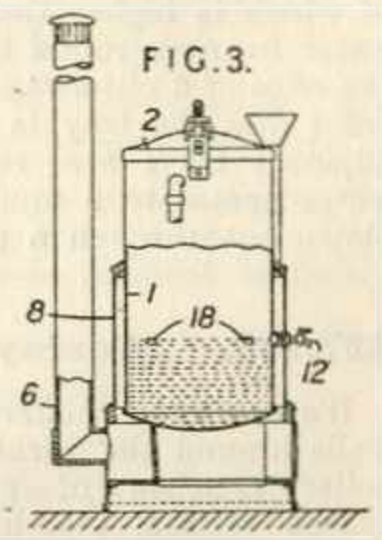


FIG.3.

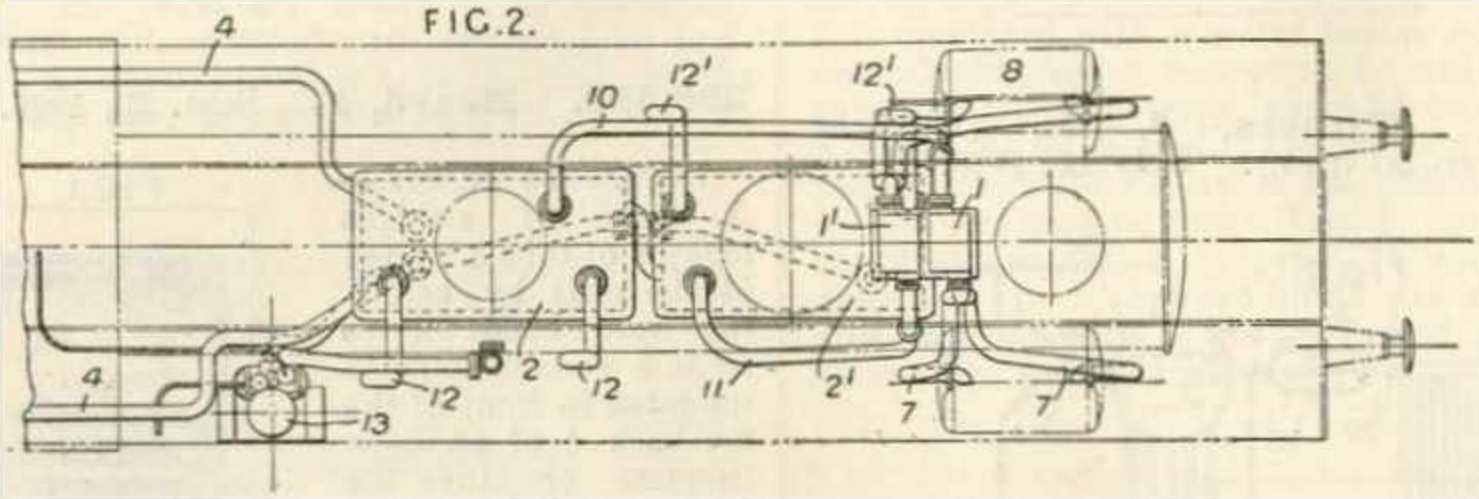


Set-pans.—In an atmospheric boiler mounted in a fire-box and intended particularly for use in sterilizing dairy utensils, the capacity of the boiler below a draw-off tap, the size of the fire-box and the kind of fuel used are such as to allow the fire to be made up to the full capacity of the fire-box, after the water has been drawn off down to the level of the draw-off tap, and the boiler left unattended until the fire is burnt out without all the remaining water being evaporated. A cylindrical boiler 1 supplying steam to a sterilizing chamber 14 is mounted on a fire-box 7 fitted with a baffle directing the hot gases through a jacket 8 around the lower part of the boiler before they escape to the chimney 6. Water is supplied through an external or internal pipe 10 extending slightly above the top

of the boiler. The hot water above the draw-off tap 12 may be used for washing purposes. Articles to be sterilized may be placed in a perforated cage or on a shelf supported on brackets 18 inside the boiler. The cover 2 is secured by a bridge-piece 4 with a central screw 3.

227,059. Sumiyama, R. July 15, 1924.

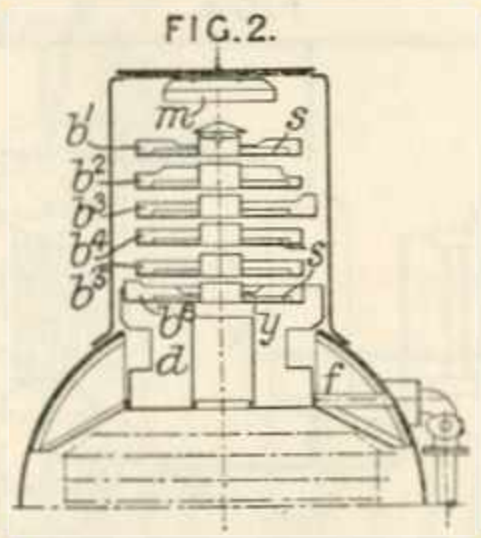
FIG. 2.



Feed-water, heating.—In a feed-heater for locomotives, two or more auxiliary tanks 2, 2^1, are connected in series, the first being supplied direct from the main tank of a pipe 4, the last being connected to the feed pumps 13. Exhaust steam from the cylinders 7, 8 after passing through oil separators 1, 1^1, is led to the tanks through pipes 10, 11. Air-escape pipes 12, 12^1 are fitted. Specification 212,475, [*Class* 123 (iii), Steam generators &c.], is referred to.

227,131. Titan-Patente Akt.-Ges., (Assignees of *Kiss, D. Ledács*). Jan. 4, 1924, [*Convention date*].

FIG. 2.



Feed-water, heating.—Water is injected under a hood *m* in a steam dome and falls over a series of superposed trays b^1 - - b^6 supported therein by brackets on the sides. Each tray has a number of compartments formed by radial baffles *s* one of which is higher than the others to cause the water to move round the tray before falling over the edge of a cut-away part *y* of the rim at which point also the tray is narrower. The gaps *y* on adjacent trays are relatively displaced. The water passes to a mud collector *d* which can be blown out through a pipe *f*.

227,156. Murray, T. E. Sept. 24, 1923.

Water - tube boilers. — The walls around the furnace of a boiler consists of groups of spaced vertical pipe-like members with welded or drawn flanges or plates which close the spaces between the members. The spaces between the members 20, Fig. 1, forming the side and end walls of a water-tube boiler are closed by plates 42. Each member may be formed by welding two channel irons together along their edges. The roof sections may also be formed of channel irons. The vertical members are connected to top and bottom horizontal headers. The front and rear groups are connected by water tubes 62. The outer surfaces of the walls are covered with

FIG. 1.

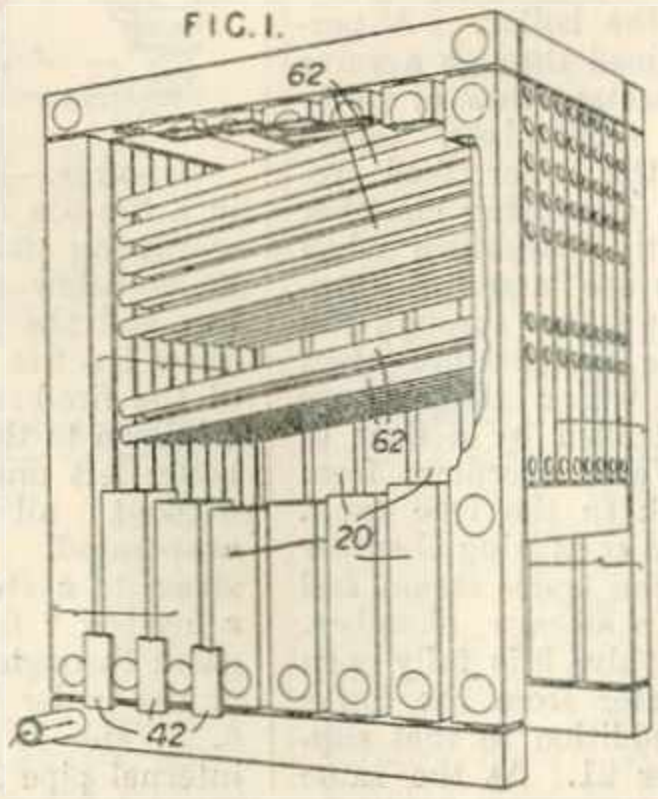
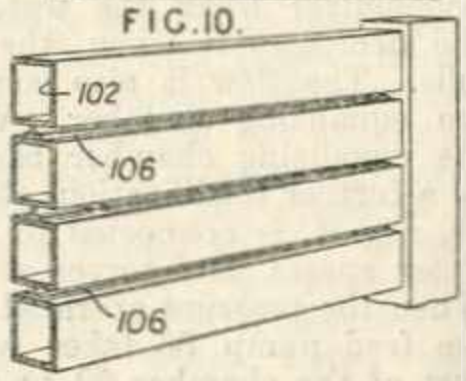


FIG. 7.

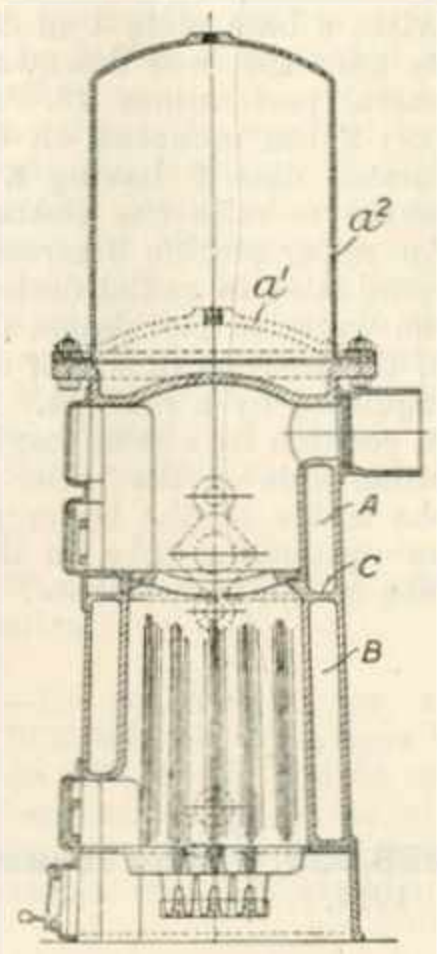
FIG. 9.

FIG. 10.



heat insulating material reinforced with woven wire. In a boiler having transverse headers connected by water-tubes, the headers are connected to the top of the front and rear walls and to the hollow roof. The walls may consist of a group of spaced pipes 86, Fig. 7, with intermediate I or T irons 90, the flanges of which are welded to the tubes. The spaces between the tubes 86^a, Fig. 9, are closed by overlapping plates 100. The boiler tubes 102, Fig. 10, are of square section and have T irons 106 welded to or drawn on them to close partly or wholly the spaces between the tubes. Groups of tubes formed in this manner may be used to form the walls.

227,206. Fox, S., Austen, F. H., and **Young, E. C.** Oct. 13, 1923.



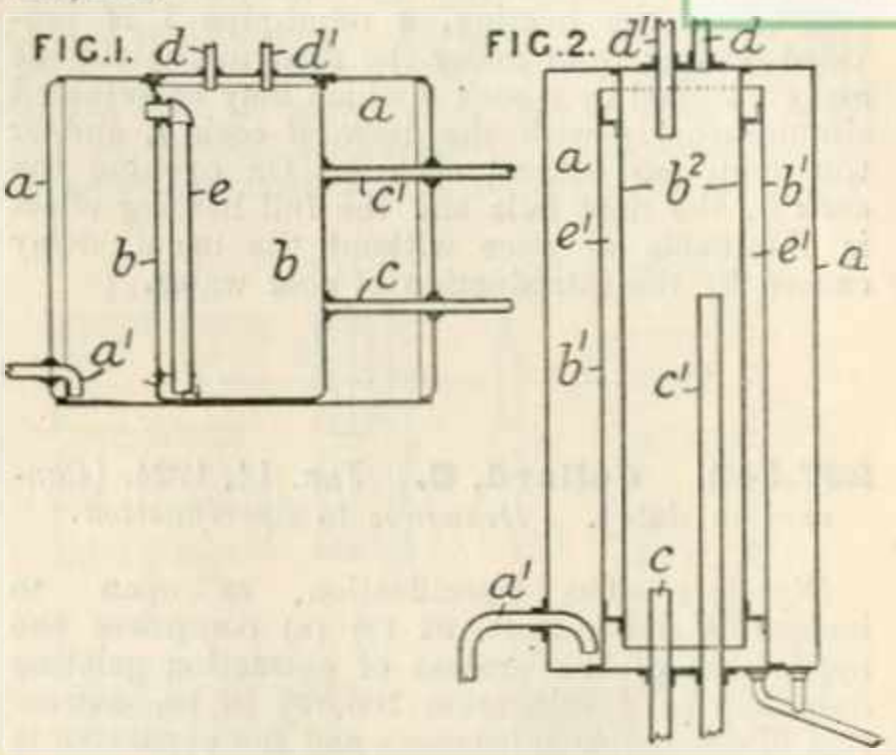
Internally-fired boilers of the type having a division plate C forming two separate superposed water spaces A, B in one unitary structure have the top of the upper space A closed by a detachable cover a^1 or provided with a cylinder a^2 which constitutes a continuation of the water space.

227,241. Edgar, D. K. Nov. 7, 1923.

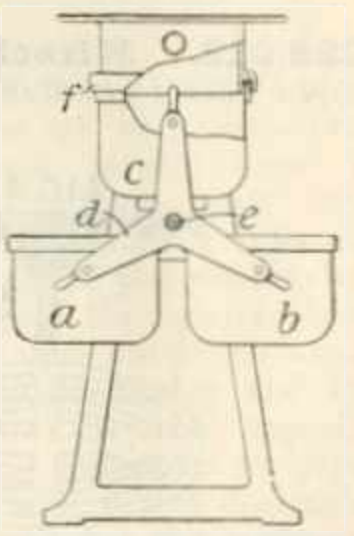
Heating water.—A storage tank *a* for hot water supply has an auxiliary tank *b* within it so that it is wholly or partly jacketed by the water in the tank *a* and heats the water by conduction. The primary flow and return pipes *c*, c^1 of the boiler and the secondary flow and return pipes *d*, d^1 of the distribution system are connected solely with the auxiliary tank. A cold water inlet a^1 opens into the lower part of the main tank and a connection *e* joins the upper part of the tank *a* with the lower part of the tank *b*. In the modification shown in Fig. 2 the inner tank is constituted by cylindrical baffle plates b^1, b^2 attached to the bottom and top of the tank respectively, forming between them a passage e^1 which replaces the connection *e*, Fig. 1.

(*For Figures see next column.*)

227,241.

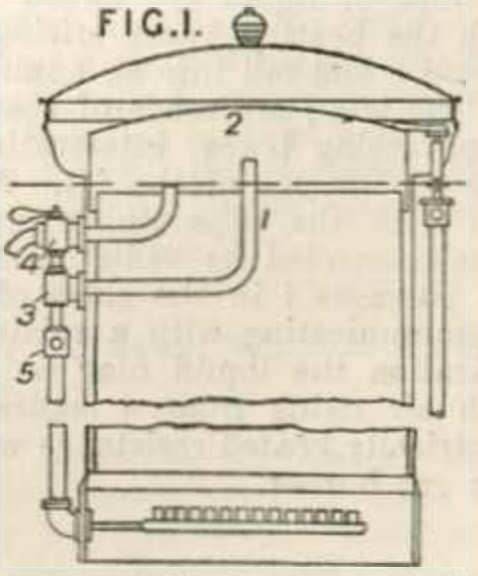


227,344. Newham, G., and **Hillary, H. B.** May 22, 1924.



Digesters; boiling-pans.—In apparatus for heating concentrating and vacuum treatment of sugar solutions in making confectionery the pans are mounted on a vertical or horizontal frame which can be rotated to bring the pans in succession below the connection to the vacuum system. As shown in the Figure, three pans *a*, *b*, *c*, are mounted in a frame *d* on a horizontal axis *e*. To produce a tight joint with the union *f* of the vacuum system, the pans or the frame are mounted in resilient or flexible bearings.

227,565. Schofield, L. Nov. 9, 1923.



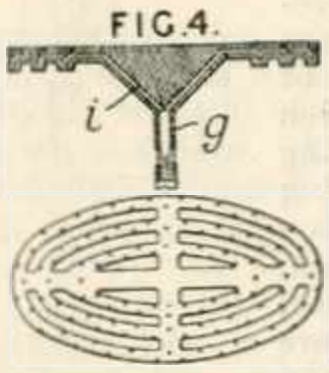
Portable heaters.—In heaters of the type employing a bell-float 2 which rises or tilts on

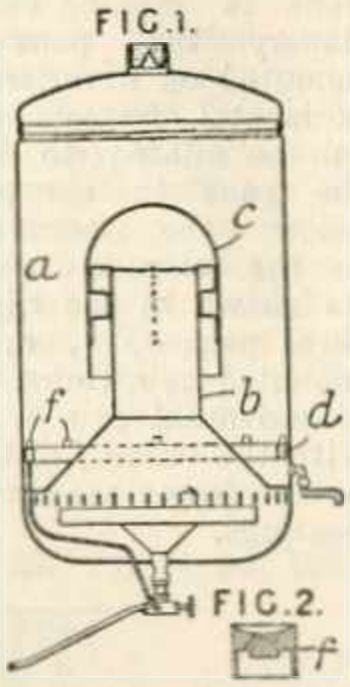
generation of steam and actuates the gas cock controlling the heating, a relief-pipe 1 is provided leading from under the float to the outside and controlled by a cock 3 which may be actuated simultaneously with the draw-off cock 4, and/or the main gas control cock 5. On opening the cock 3, the float falls and the full heating effect is obtainable at once without the usual delay caused by the introduction of cold water.

227,843. Collard, C. Jan. 14, 1924. [*Convention date*]. *Drawings to Specification.*

Digesters.—The Specification, as open to inspection under Sect. 91 (3) (a) comprises the application of the process of extracting gelatine described in Specification 166,896 to the extraction of all soluble substances and the apparatus is modified so as to be suitable for the evaporation of the solutions obtained. This subject-matter does not appear in the Specification as accepted.

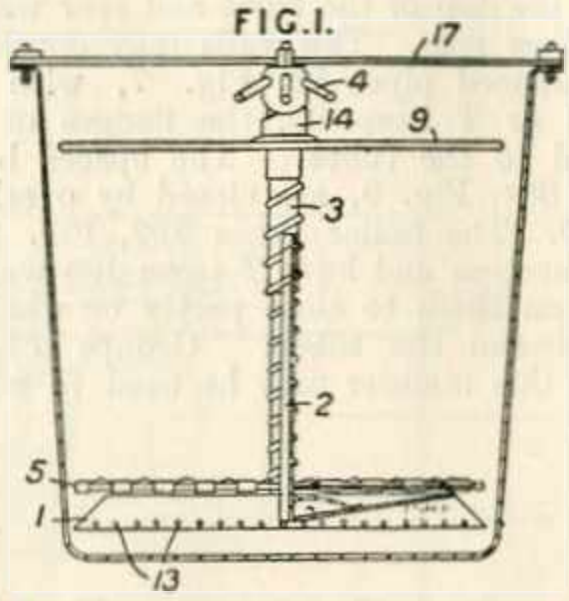
228,012. Kirschmann, L. Feb. 4, 1924. *No Patent granted (Sealing fee not paid).*





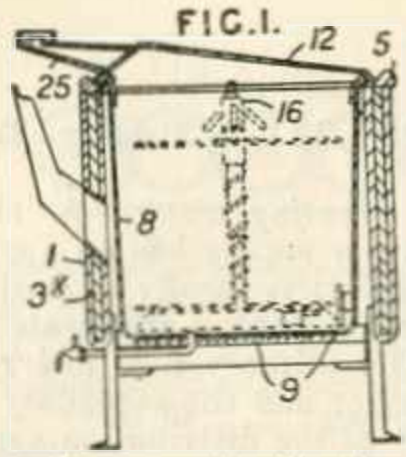
Heating liquids. — A liquid heater comprises a casing *a* having a conical partition in its lower part surmounted by a flue *b* with spaced-out hood *c*. Jets *f* for spraying liquid upwardly are fitted on a pipe *d* around the flue and below it so that drops of liquid are forced upward in contact with the heating gases arising from beneath the hood *c* and fall into an annular collecting space. The jets *f* are made of soapstone and have two converging bores intersecting at an angle at the top surface of the jet. A gas burner for use with the apparatus comprises coal burner tubes connected by radial passages with distribution passages *i* in the sides of a central cone and communicating with a mixing tube *g*. In a modification the liquid may be heated by contact with air rising from a conical arrangement of electrically heated resistance wires which replaces the gas burner.

228,031. Bowerbank, J. W. March 25, 1924.



Washing-boilers.—A water-circulating device for insertion in domestic washing boilers comprises a base plate 1 of double conical form with its apex disposed downwards and having peripheral perforations 13. A screwed central support 2 has mounted on its lower portion a perforated disc 5 having a scalloped edge which serves to raise the clothes from the base plate. An upper portion 3 screws on to the tube 2 and terminates in radial outlet tubes 4 which deliver the water in circulation on an upper wire frame 9, the position of which relative to the tube 3 is regulated by a cam 14. The device is secured in position by a cross bar 17 releasably clipped on either side of the boiler or by a sliding-bolt on the inside of the boiler adapted to engage with an upstanding tube on the edge of the top surface of the conical base.

228,032. Bowerbank, J. W. March 25, 1924.



Washing-boilers.—A construction of wash-boiler comprises the combination of a boiler 8, an outer heat-retaining casing 1, a gutter-shaped rim 5, a lid fitting the rim and provided with a conduit 25 shaped to return condensation water to the boiler which also serves for removing surplus steam if desired, and means for heating the boiler which may be of the type described in Specification 228,030, [*Class* 75 (i), Burners &c.]. The casing 1 may comprise inner and outer metal sheets separated by asbestos or the like 3*. The bottom of the boiler may be provided with studs 9 to increase the heating surface. The lid may have a glazed sight aperture 12. A circulating device 16 as described in Specification 228,031 may be used.

228,158. Baetz, H. Jan. 25, 1924, [*Convention date*].

FIG.1.

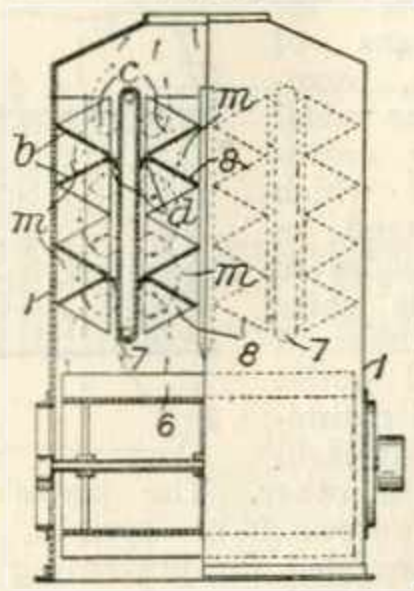
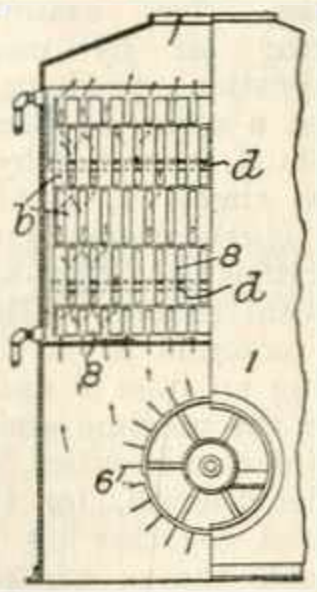


FIG.2.



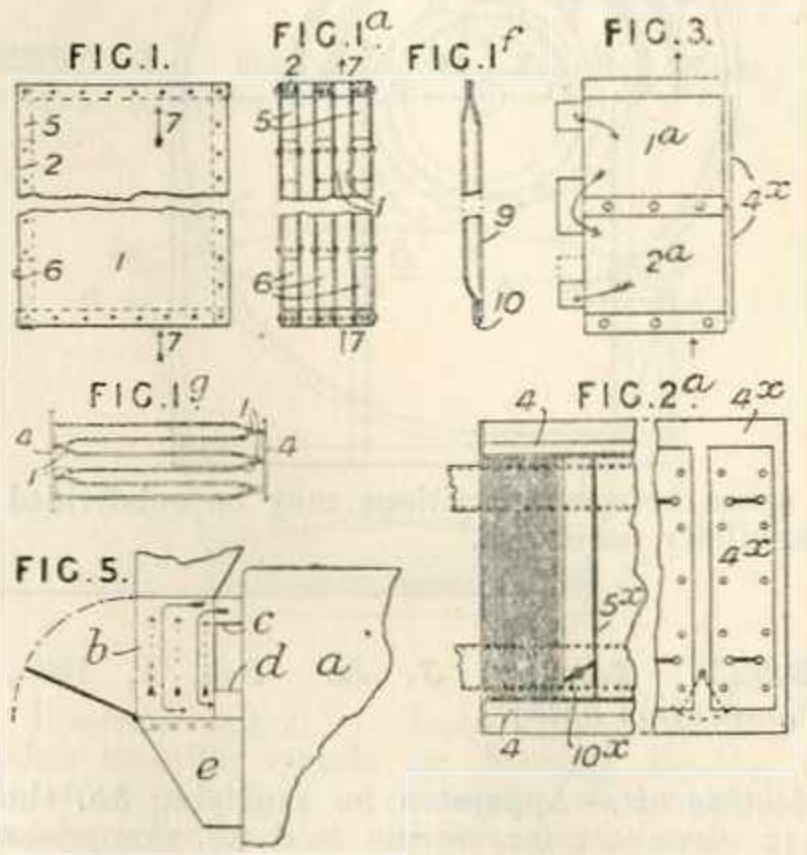
Heating air.—Air drawn into a casing by a fan 6 is divided into a plurality of jets which are caused to impinge repeatedly on the walls of a heating element 7 by baffles 8 supported by lugs *d*. Each set of baffles comprises triangular parts *c* connected alternately at the top and bottom by the closing members *b* forming chambers which are open on the side facing the element 7. Uprising air meeting the sloping tops *b* of the chambers in the lowest row is caused to strike the element 7 and passing laterally, rises to the mixing spaces *m* whence it passes to the next set of chambers where the operation is repeated. The element 7 may be heated by steam or electricity or may be directly fired as by gas.

228,217. Owen, W. H. Sept. 3, 1923. *Drawings to Specification.*

Feed-water, heating.—In a furnace the air supply for combustion is heated in two stages as described in Specification 150,065, [*Class* 51 (i), Furnaces and kilns, Combustion apparatus of]. According to one modification, a feedwater heater may be arranged between the two sections of the air heater.

228,218. Owen, W. H. Sept. 3, 1923.

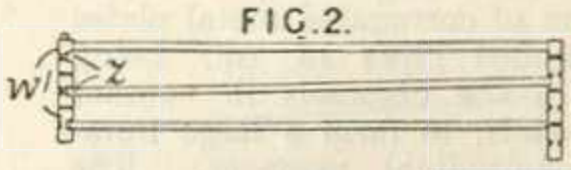
Heating air.—An apparatus for heating air, more particularly pre-heating air for combustion by utilizing the heat of waste gases, consists of metal sheets or cells arranged in groups to form elements for easy assembling in or removal from the casing of the heater. In the arrangement shown in Figs. 1 and 1[a] the plates 1 are separated by packing strips 2 and held by rivets. The hot gases pass between the cells in the direction of the arrows 7 while the air enters the cells through the space 5 and leaves by the opening 6. Guides and stiffeners may be secured in the air cells, or the sides may be indented to form rims. The ends of the plates 9, Fig. 1[f] may be welded or turned over as shown at 10. In another modification, the cells are formed of a continuous strip 1, Fig. 1[g], and are held rigidly together by a binding strip. The bundles of cells are inserted in the casing through an opening closed by the doors 4[x], Fig. 2[a]. By-pass passages 5[x] are provided with dampers 10[x] so that the gases may pass straight through the casing when desired. Ducts may be provided so that air may be taken off at various temperatures. The heating cells may be arranged in tiers 1[a], 2[a], as shown in Fig.



3 and the air passes through the two in series. In another modification the air and gases pass through the heating elements in directions at right angles to each other. When used with steam boilers of the cylindrical marine type the heater *b*, Fig. 5 is placed above the smoke box *e* so that the waste gases pass through it direct to the chimney. The inlet and outlet air ducts *c*, *d* are arranged between the heater and the boiler *a* so that the air flows in the opposite direction to the waste gases. Steam or air pipes for blowing out soot are placed where desirable. Different metals may be used for the plates in different groups in order to resist corrosion.

228,296. Jones, E. W. Nov. 23, 1923.

FIG.2.



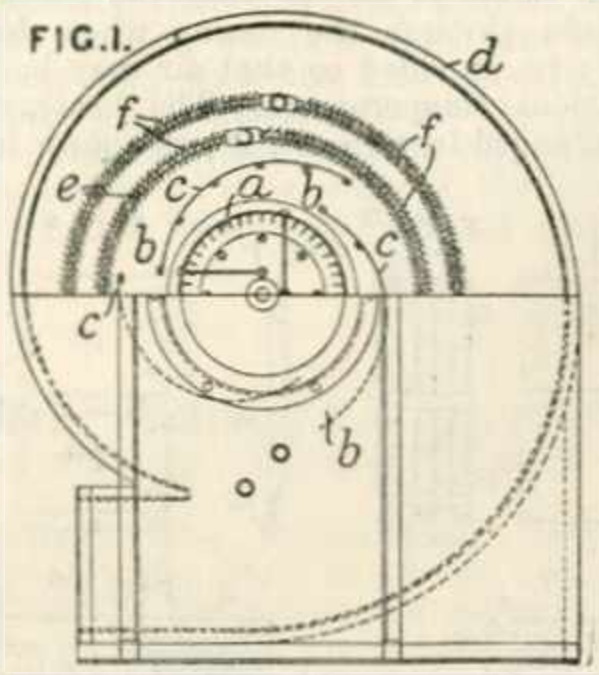
Feed-water, heating.—To assist in the replacing of tubes in the economizer the headers w^1 at one end are made **L**-shaped in cross-section, the **L**'s being arranged in pairs back to back so that spaces are left for the reception of the ends of the tubes prior to lifting them vertically into their proper position.

228,327. Yates, W., and **Yates, S.** Jan. 18, 1924.

Heating air.—The air leaving the impeller *a* of a pump passes through the volute paths formed by the partitions *c* arranged around the impeller, then through the heating device *f* which may consist of steam pipes *e* with gill plates, and then enters the volute formed by the

casing *d*. The number of partitions *b* may be increased to ensure an even heating effect and

FIG. 1.

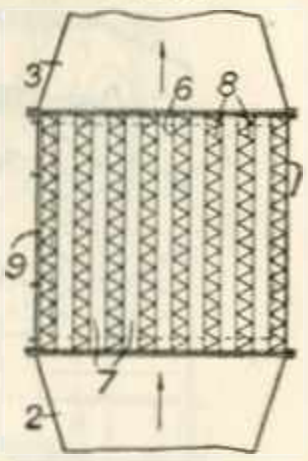


the space between partitions may be subdivided by auxiliary partitions.

228,443. Ekström, J. July 24, 1924.

Heating air. — A fluid heater, for example for heating air by means of combustion products, comprises a series of plane metal sheets 6 separated by corrugated sheets 7, 8, of which the corrugations extend in directions at right-angles in adjacent sheets. The whole are mounted in a casing 1 having an inlet 2 and outlet 3 for the medium and a similar inlet and outlet, at right angles thereto, for the other. The plates are pressed together by screws 9 or springs, and suitable means are provided for preventing the deformation of the corrugations under pressure.

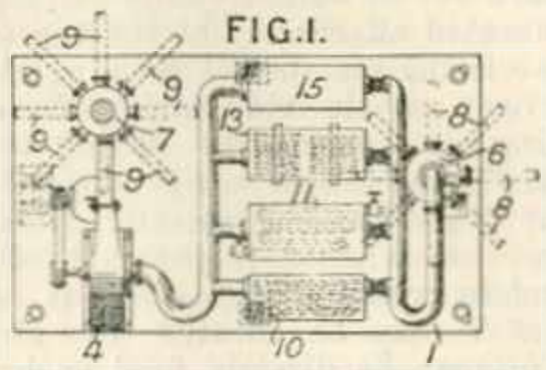
FIG. 2.



228,521. Linley, J. A. Feb. 1, 1924, [*Convention date*].

Heating air.—Apparatus for purifying &c. the air in chambers for storing food &c. comprises a portable base 1, on which are mounted intake and delivery headers 6, 7 having radiating receiving and delivery pipes 8, 9, and a number of valve-controlled treating tanks 10, 11, 13, 15 through one or other certain combinations of which the air is drawn by a fan 4. The tanks may contain heating or other means for treating the air. The base is mounted on wheels, one

FIG. 1.



or more of which may have adjustable bearings. The motor used for driving the fan may be arranged to propel the apparatus.

228,559. Forssblad, N. R. Jan. 30, 1924, [*Convention date*].

Heating air.—A heater for air for combustion comprises two separate systems of channels 3, 4, one of which is formed by the intermediate spaces between the channels of the other system, heat-conducting filling members in the form of corrugated metal plates 14, open-ended pipes 13 &c. being arranged in the channels in contact with the walls, to form a large number of longitudinal passages. The chambers are pressed together by screw devices 16. In the example shown in Figs. 1 and 2, the channels 4 for air contain tubes 13 the intermediate spaces 3, for hot waste gases, having inserts 14 of corrugated sheet metal. In the modification shown in Fig. 5, both chambers have corrugated metal fillings 14, 19 and the fluid passages are vertical. To clean the waste gas passages steam or air may be blown in from a longitudinal movable distributor 21, soot being collected in a tray 23 moved correspondingly. In a further modification each chamber may have two metal inserts corrugated diagonally and arranged so that the corrugations cross one another.

The Specification as open to inspection under Sect. 91 (3) (a) comprises also de-

FIG. 2.

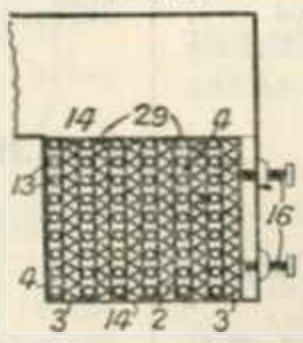


FIG. 1.

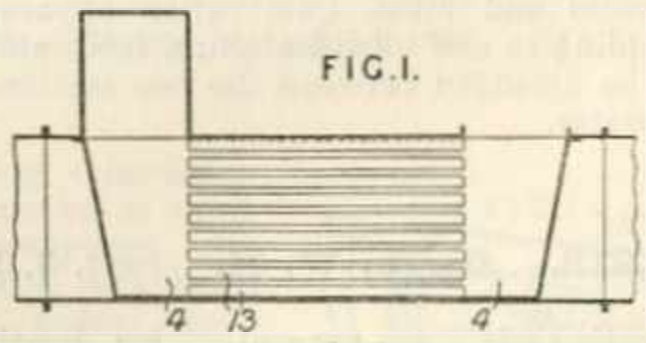
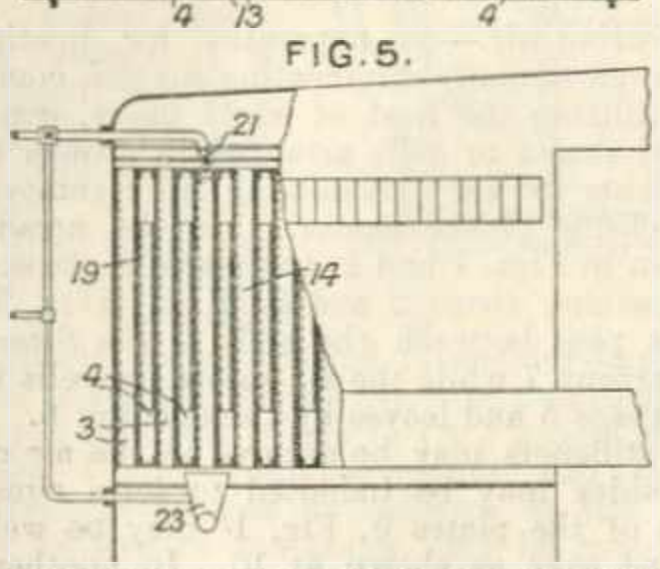


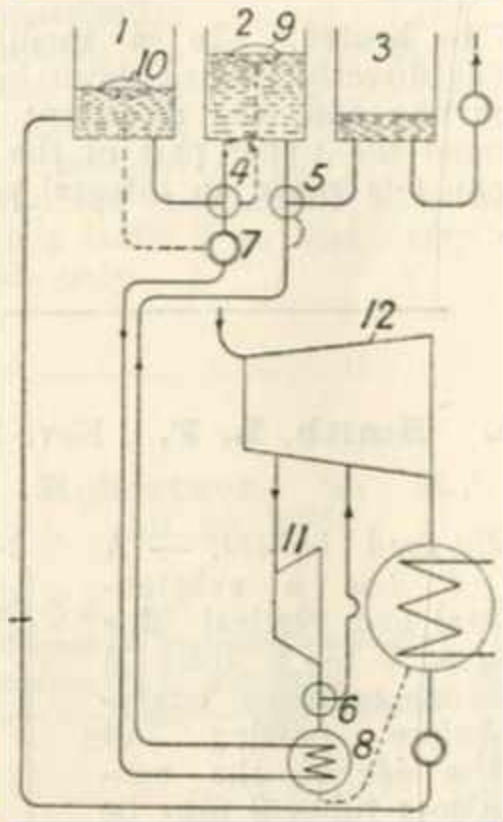
FIG. 5.



tails of construction in which the pockets for air in Figs. 1 and 2 are stated to be made from U-shaped plates 2 the flanges 29 of which overlap or they are separate flat tubes, and in a

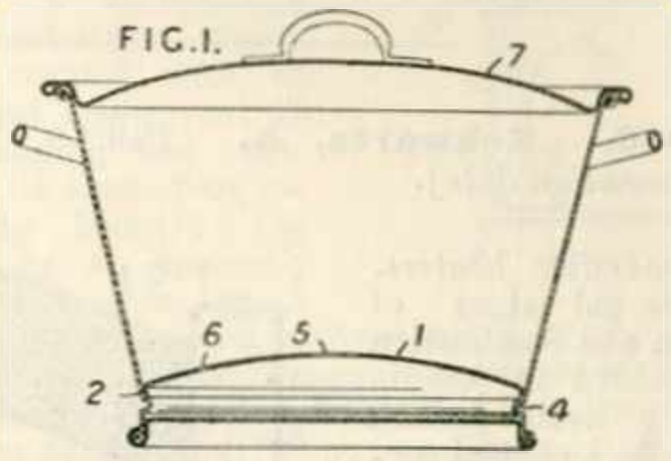
modification the air passages are themselves **U**-shaped so that the inlet and outlet are on the same side of a vertical flue in which the heater is set. This subject-matter does not appear in the Specification as accepted.

228,573. International General Electric Co., Inc. Feb. 2, 1924, [*Convention date*]. *Addition to* 224,545.



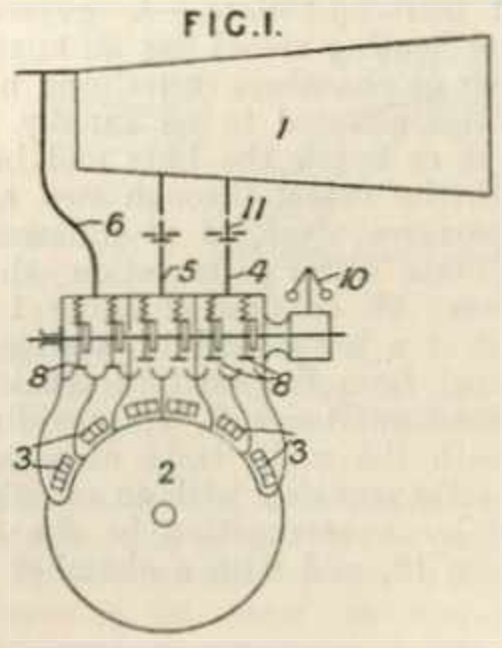
Feed-water, heating.—In apparatus for heating water according to the method described in the parent Specification, the heater is arranged outside the collector and the water of condensation is circulated by a pump or the like from the collector through the heater and back to the collector. Water from the condenser of a turbine 12 is pumped into a collector 1, from which it is withdrawn and circulated by a pump 7 through a heater 8 supplied with exhaust steam from an auxiliary turbine 11. The heated water is collected in a tank 2 and is re-circulated through the heater. When the water reaches the desired temperature, a valve 5 controlled by a regulator influenced by the water temperature or by the back pressure of the auxiliary turbine is operated to allow the heated water to flow into the boiler feed tank 3. When the tank 2 is empty, a float 9 so operates a valve 4 that the pump 7 withdraws water from the collector instead of from the tank 2. The float may also at the same time so operate a valve 6 in the exhaust pipe that the exhaust is taken back to a lower stage of the main turbine or to a condenser. As the steam pressure in the heater and the temperature of the outlet water fall, the valve 5 is so operated as to place the collector again into communication with the tank 2. A float 10 in the collector is so connected to the pump 7 that the pump is cut out when the collector is empty. When the tank is full, the float 9 reverses the valve 4 into a position to allow circulation of the water from the tank, and also so operates the valve 6 to allow the exhaust to flow into the heater again. The volume of the exhaust steam used for heating may be kept constant or not allowed to exceed a certain limit.

228,714. Rhodes, R. J., and **Holt, B.** Feb. 19, 1924.



Washing-boilers. — Enamelled galvanized or other metallic vessels for heating liquids are provided with fixed or preferably detachable false bottoms designed to prevent the contents from contacting with the actual bottom of the vessel. The Figure shows an upwardly domed or dished detachable false bottom **1**, which may be enamelled upon both surfaces, formed with perforations 5, 6, and resting by means of the depending rim 2 on a continuous or interrupted shoulder 4 formed above the bottom of a clothes-boiler. The vessel may have a domed lid 7 formed with a channelled edge adapted to engage with the upper edge of the vessel.

228,920. International General Electric Co., Inc., (Assignees of *Allgemeine Elektricitäts Ges.*). Feb. 5, 1924, [*Convention date*].



Feed-water, heating.—The automatic change-over of the connection of an auxiliary turbine

of a plurality of intermediate stages of a main turbine to another, or to live steam, is controlled by a regulator to maintain constant some factor such as speed, pressure, or temperatures. The Figure shows an auxiliary turbine 2 with connections 4, 5 to intermediate stages of a main turbine 1 and a connection 6 to the main steam supply. A speed governor 10 opens valves 8 successively whereby steam at a pressure to maintain the speed constant is supplied to nozzle groups 3. If the pressure in the connections 4 or 5 falls below the pressure in the first stage of the auxiliary turbine 2 valves 11 automatically prevent back flow. The regulator may be a back pressure regulator for the auxiliary turbine or if the exhaust is used for feed-water heating a temperature regulator. Specification 4528/12, [*Class* 110 (iii), Turbines &c.], is referred to.

The Specification as open to inspection under Sect. 91 (3) (a) comprises also an arrangement whereby the regulated steam may be taken direct without passing through the auxiliary turbine. This subject-matter does not appear in the Specification as accepted.

228,926. Schwartz, A. Feb. 9, 1924, [*Convention date*].

Submersible heaters. — External signs of ignition and combustion are avoided in a submersible heater which comprises a conical container *a* detachably held against the lower end of a casing A within which is a striker B operated by a lever K. A cartridge *b* of a suitable chemical mixture evolving heat on ignition is enclosed within the container *a* and on raising the lever K a primer E is forced downward first through a protective layer of sand *e* into the primer and mixture *c*. Gases evolved escape through the side apertures of the cap *f* and are absorbed in part in the expansion chamber H. The device is adapted for immersion, container downwards, in small quantities of liquid to be heated. In a modification the striker B is directly pushed down by a suitable handle on the end, the absorbent material is packed round the upper part of the chamber A and the cap *f* is made an integral part of the cartridge.

FIG.1.

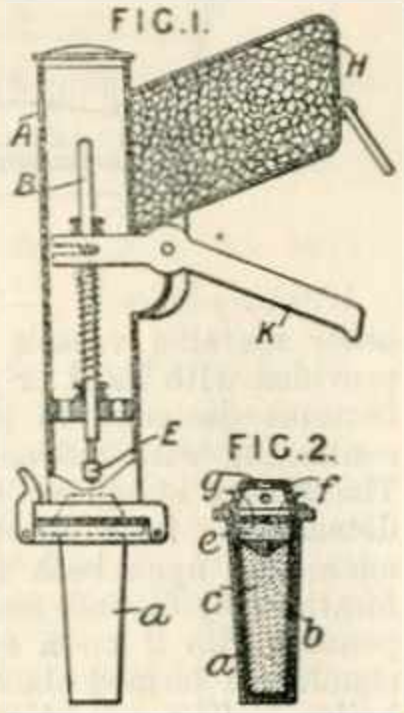
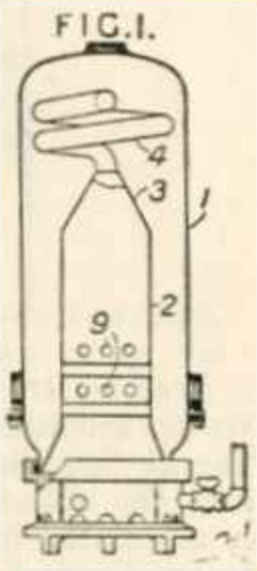


FIG.2.

229,005. Smith, L. F. Nov. 16, 1923.

Internally-fired boilers. — A container 1 has a substantially central and vertical flue 2 tapering at 3 to a duct 4 which has one or more convolutions before passing out through the side of the container. Cross tubes 9 may be provided. Specifications 5882/09, 21315/09, and 142,646 are referred to.

FIG.1.



229,081. Hill, J. N., and **Corre, A. A.** Feb. 6, 1924.

Boilers; washing-boilers.—A geyser, urn, or other water-heating vessel has an auxiliary annular chamber or chambers containing a small portion of water adapted to be rapidly heated disposed above or below the base and in communication with the vessel through two apertures or sets of apertures arranged at different levels so as to facilitate water circulation therethrough. Fig. 1 shows an annular chamber 1 formed by the base 2 of a kettle and by a ring 4 of truncated conical form disposed therebelow, two or more opposed apertures 8, 9, providing communication with the main body of water. Fig. 2 shows a kettle provided with an annular chamber 11 formed by a corrugation in the base and a closure piece 13, and with a chamber 12 in communication therewith and, by an aperture 18 in the cover plate 14, with the main body of water.

FIG.1.

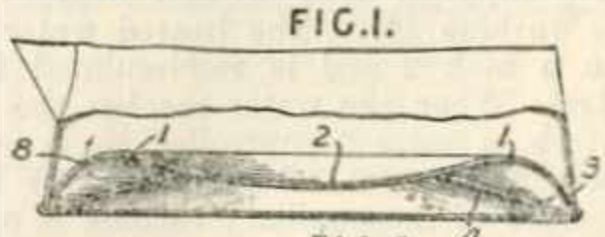
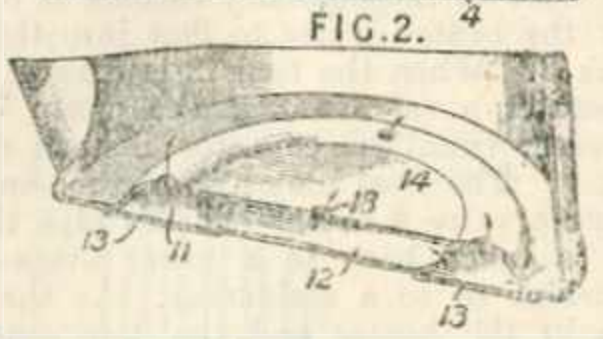


FIG.2.



229,242. Beauvais, G. M. G. de. Feb. 11, 1924, [*Convention date*].

Heating air—An air heater of the plate type comprises flat plates *a* spaced apart by members *b* placed so as to form the sides of alternate cells for air and heating medium the edges of the members *b* and of the plates *a* being fixed together by parts *c* which exert, preferably elastically, a clamping action. In the modification shown in Fig. 4 the cells for one of the heat-exchanging media are enclosed on three sides and provided with a baffle *d* so that entry and exit are on one side only.

FIG. 1. FIG. 3.

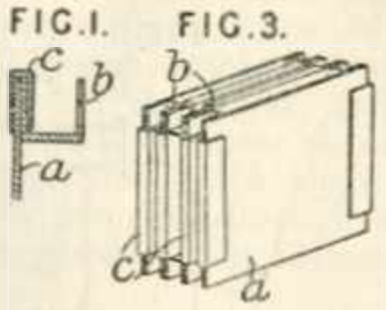
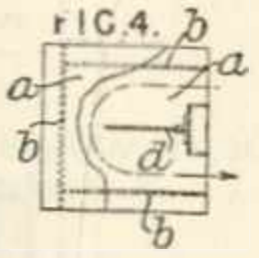


FIG. 4.



229,726. Robertson, T. E., (*Power Specialty Co.*). Oct. 22, 1923.

FIG. 4.

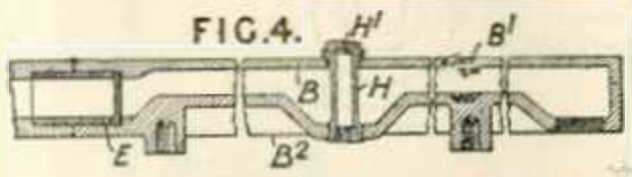


FIG. 9.

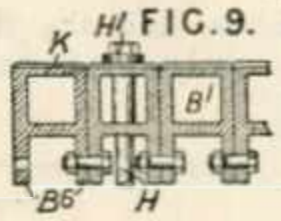
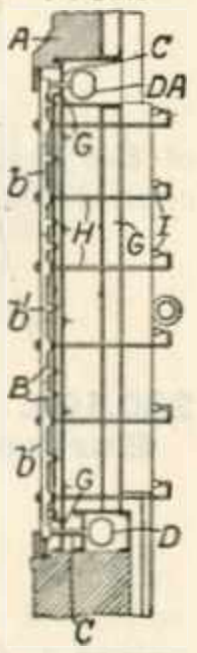


FIG. 1.

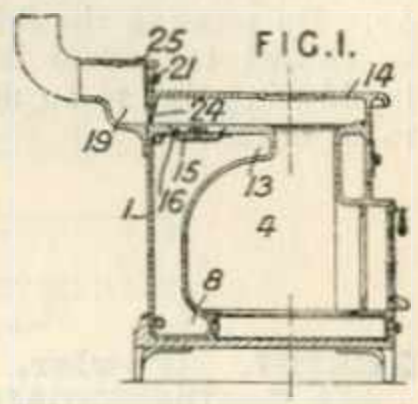


Water-tube boilers.—Apparatus for absorbing radiant heat from a furnace combustion chamber adapted to heat liquids such as oil, or vapours such as steam, or to form part of the steam generating surface of a boiler comprises an arrangement of metal pipe elements B to form a structure with a substantially smooth heat-absorbing face, with channels B^1 for the fluid in each element parallel to the face and separated therefrom by an integral metallic wall of substantially uniform thickness. Each element may comprise a plurality of sections *b*, b^1 connected end to end by means of screwed or expanded internal nipples E. The elements are supported at intervals by a metal frame-work G and are each connected by flexible tubes C to headers D, DA. Transverse slots K may be formed in the face of the element to minimize distortion under heat. Fig. 9 shows one form of element in cross section although a single longitudinal rib B^2 may be used instead of the two ribs B^6. At intervals over the area of the heat-absorbing face may be situated nozzles with radial apertures H^1 connected to a pipe system HI for cleaning the surface by a blast of superheated steam for example.

Reference has been directed by the Comptroller to Specification 26846/03, [*Class* 123, Steam generators].

229,728. Allin, H. P. Oct. 23, 1923.

FIG. 1.



Internally-fired boilers.—A boiler stove comprises a water jacket 1 surrounding the combustion chamber 4 formed with an enlarged upper part 13 overhanging the fire-space its lower part extending beneath the grate as an inwardly protruding shoe 8, a hot plate 14 spaced above the top of the water jacket with a flue-passage there-between and a flut-fitment 19 serving to provide a rearward extension of the flue passage and an auxiliary hot plate 25. An air-check 21 may be fitted in front of the auxiliary hot plate and a damper 24 in the flue-passage. The boiler may have a countersunk manhole door 15 in the top, with a cover 16 to prevent corrosion. Specifications 217,295, [*Class* 126, Stoves, &c.], and 218,879 are referred to.

229,755. Fairweather, B. Nov. 28, 1923.

FIG. 5.

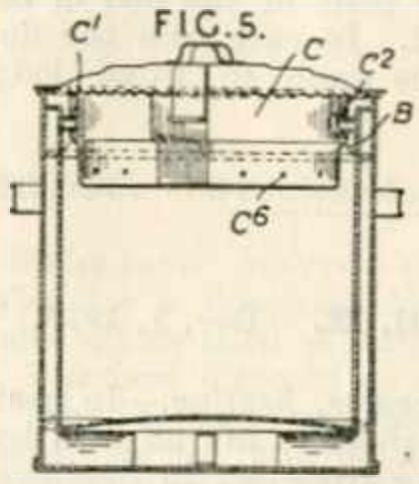


FIG. 5a.

FIG. 2.

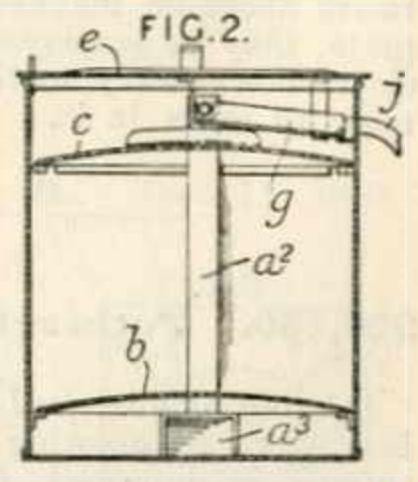
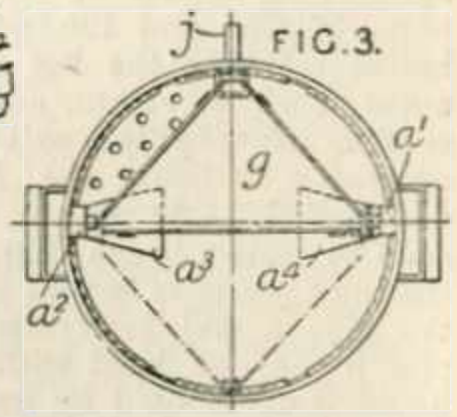


FIG. 3.



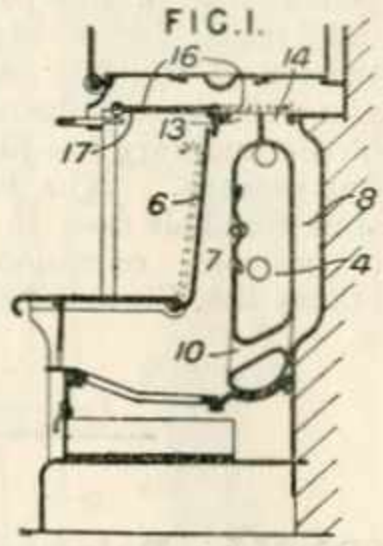
Washing-boilers.—A vessel is provided with two uptake pipes a^1, a^2, slightly to one side of a diameter with the lower ends a^4, a^3 flared to support a perforated false-bottom *b*, a perforated top *c* and means for conducting dirty water outside the receptacle. In the example shown in Figs. 2 and 3 the lid *e* bears on its under side a sloping tray *g* and when placed in one position jets of water from the nozzles at the upper ends of the pipes a^1, a^2 deliver into the tray as shown, the water

flowing out through a pipe *j*. If the lid is turned through 180° and replaced the jets are delivered over the clothes to be treated. In the modification shown in Figs. 5 and 5ª the lid bears a casing C with perforated bottom C^6 and the jets fit into recesses C^1, C^2 which are partly pockets and partly clear apertures as C^4, Fig. 5ª. Normally the jets deliver through the apertures C^4 into the perforated casing and on to the clothes &c. By rotating the lid and casing the jets may be caused to deliver into the pockets C^1, the liquid returning to an annular tray B and thence to an outlet.

229,797. Fowler, F., Malcolm, W. S., and Coalbrookdale Co., Ltd. Dec. 13, 1923.

Block-form boilers.—An upright boiler 4 at the back of an open fireplace, or of a combined open fireplace and cooking-stove is provided with flues 7, 8 at front and rear, the flues being in direct communication with the grate at their lower ends. The boiler is provided with an arched flue 10 leading to the back flue 8; alternatively, an arched flue in the bottom of the boiler, or a plain boiler raised above an inclined plate at the rear of the grate, may be employed. In each case the flue slopes downwardly to the grate to avoid lodgment of ashes in it.

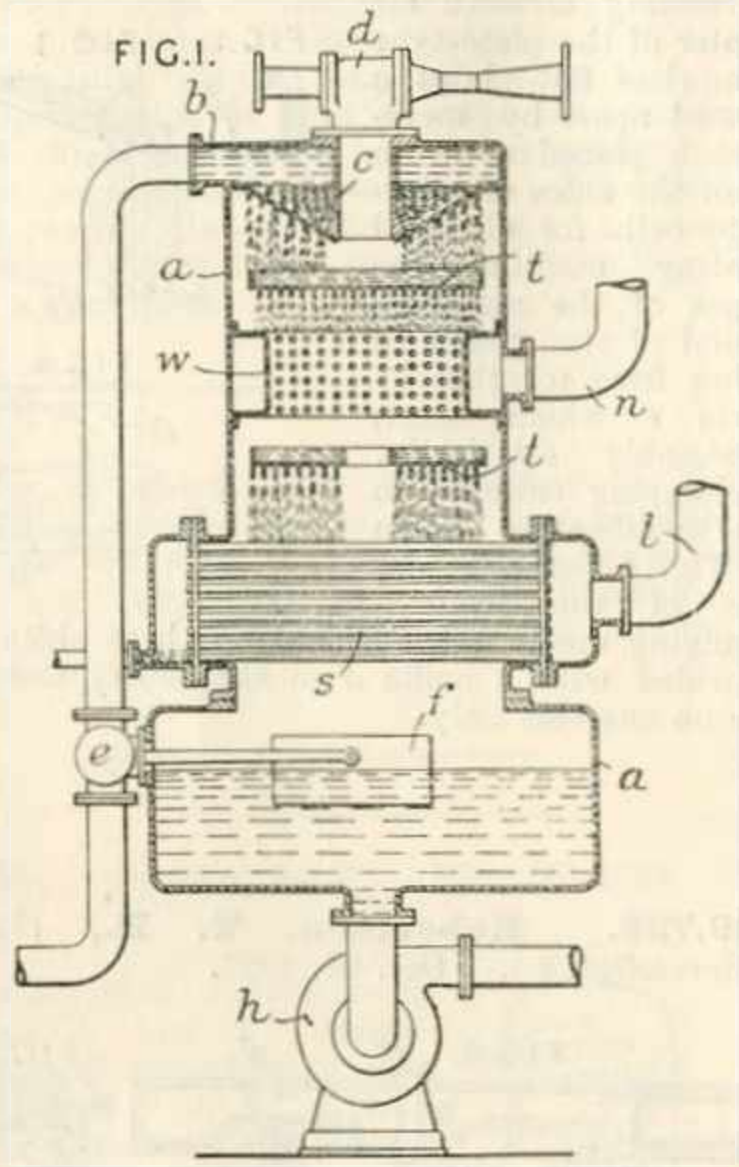
FIG. 1.



230,160. Fothergill, H. Dec. 1, 1923.

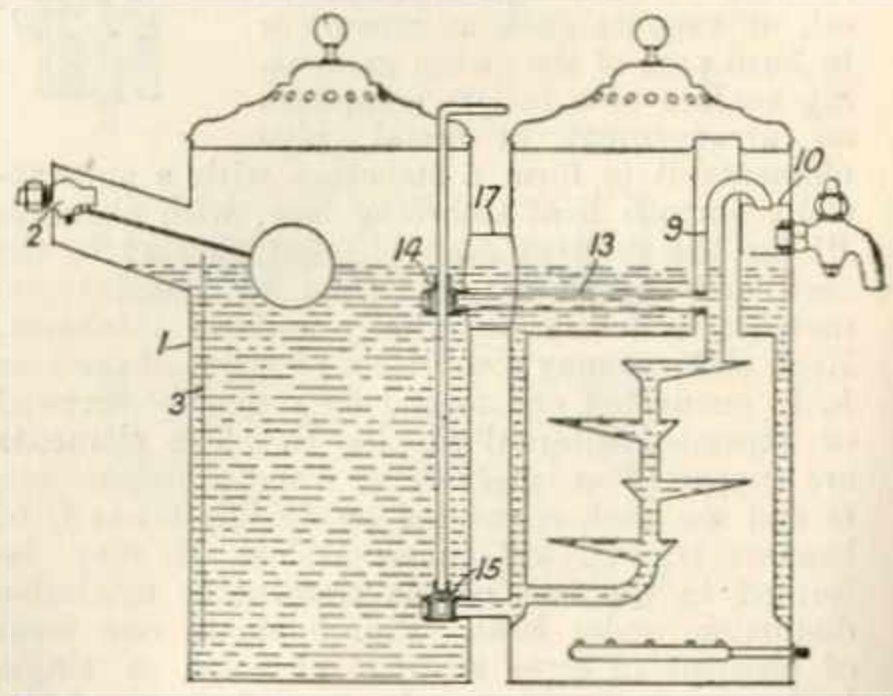
Heating liquids; feed-water, heating.—In heating liquids by allowing them to fall on to a hot surface, as described, for example, in Specifications 171,757 and 196,064, the liquid is heated, before reaching the hot surface, by a heating agent, such as steam, supplied from an external source, whereby the extent of heating surface necessary to cause the liquid to "flash" is diminished. As shown in the Figure, liquid, such as water, is fed into the chamber *a* through the inlet *b* and is heated by steam led in through the pipe *n* and perforated annular wall *w*; the pipe *n* may be fitted with a loaded valve. The liquid is distributed by trays *t* and falls on to the heated surface *s*, which comprises a tank of tubes to which steam is supplied from the pipe *l*. The liquid is withdrawn by a pump *h*, a float *f* operating the valve *e* controlling the supply of liquid to the apparatus. A modified form of apparatus is described in which the steam for preliminary heating is introduced below the surface of the treated liquid. In a further modification, steam that has passed through the tubes *s* is led through a loaded valve into the upper part

FIG. 1.



of the chamber, and the float *f* is arranged to control the supply of steam to the pump *h*.

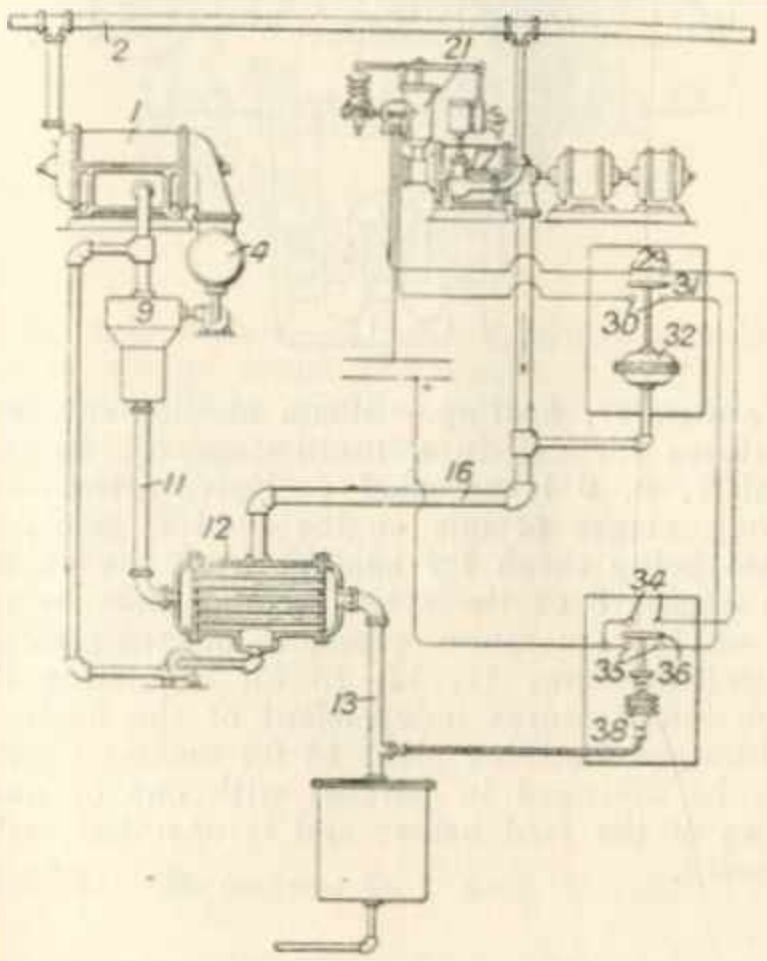
230,195. Jackson Boilers, Ltd., and Hargreaves, H. Dec. 13, 1923.



Internally-fired boilers.—A boiler fitted with an expansion pipe 9 and an expansion chamber 10, as described in Specification 16804/07, is so connected to a storage cylinder 1 that the water in the cylinder is heated by circulating through the boiler and is subsequently used as feed water

when a demand is made upon the boiler. The boiler and cylinder are connected at the bottom by a pipe fitted with a valve 15, and at the top by a sleeve 17 and by a pipe 13 opening into the expansion pipe 9 and fitted with a valve 14. When the valves 14, 15 are open, water circulates from the cylinder through the boiler, and when the valves are closed, heated water flows from the top of the cylinder through the sleeve 17 into the boiler. Cold feed supplied through a ball valve 2 is directed downwards to the bottom of the cylinder by a plate 3.

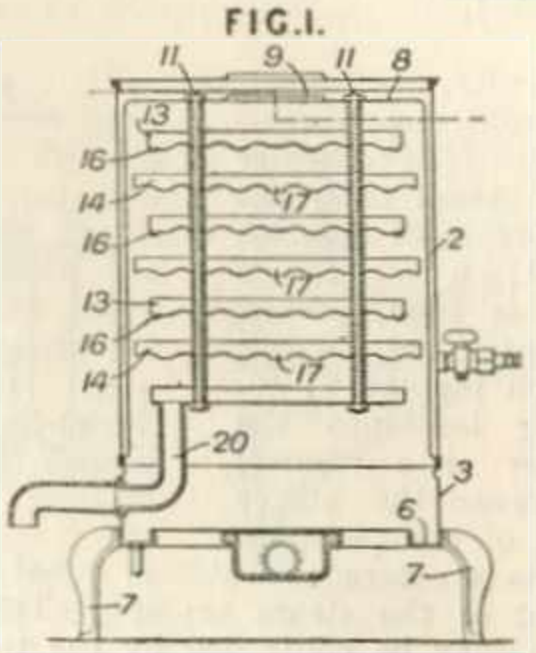
230,479. British Thomson-Houston Co., Ltd., (Assignees of *Richardson, E. L.*). March 6, 1924, [*Convention date*].



Feed-water, heating. — The supply of low-pressure steam from a source other than the main turbine, for heating feed-water in a heater 12 is controlled according to the pressure of this steam and the temperature of the water leaving the heater. In the example, the supply of steam from the main 2 to the auxiliary turbine 17 is regulated by electrically controlled valve means 21. The exhaust from this turbine passes to the heater 12 to heat condensate, from the main turbine 1 and condenser 4, which passes by way of the conduit 11 from a heater 9 supplied with steam from a low-pressure stage of the turbine 1. Electrical contacts 29, 34 and 30, 35 are connected so that each pair is in series. A pressure responsive device 32 with bridge-contact 31 is in communication with the exhaust steam pipe 16 and a thermostat 38 with bridge-contact 36 is connected to the outflow 13 from the heater 12. When both pressure of steam and temperature of water rise or fall current passes to actuate the valve device 21 to diminish or augment the supply of steam to the turbine 17 and hence to the heater 12.

230,525. Gausden, A. H. Nov. 16, 1923.

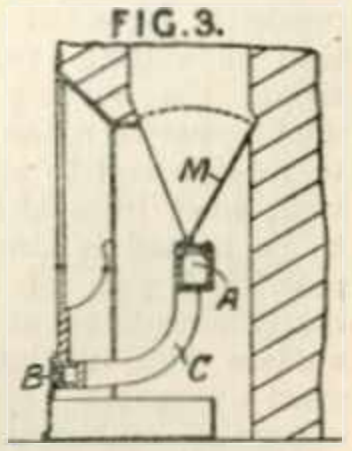
FIG.1.



Geysers.—In a geyser the water rises in an annular casing and then flows downwards over a series of trays with spiral corrugations. The annular casing 2 rests freely on a sheet metal wall 3 which is supported on a pedestal 7 having a trough 6 to collect water of condensation. The plate 8 is provided with a central aperture 9 and also with a circular series of small openings not shown. Two series of trays 13, 14 are supported by rods 11, the trays having alternate peripheral and central apertures 16, 17. The lowest tray is provided with a discharge pipe 20. A gas or liquid fuel burner is arranged in the lower part of the casing, and the hot combustion products pass around and over the trays. The trays are spirally corrugated to direct the water inwards or outwards towards the openings 16 or 17.

230,536. Stockdale, G. Dec. 11, 1923.

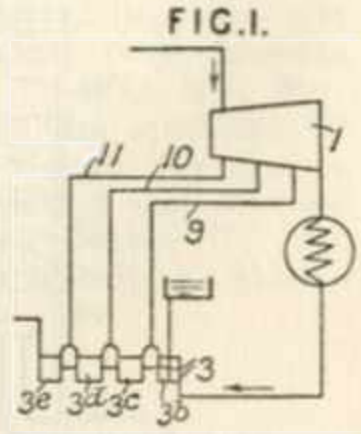
FIG.3.



Water-tube boilers. — A boiler for a domestic fire-grate, constructed of tubular members disposed so as to form a base and rear grating for the fire, is disposed in a setting in which provision is made for obtaining a reversed draught. In the example shown the fire resting on the boiler, which comprises headers A, B joined by tubes C, can burn either with a natural or reversed draught according to the position of the damper M. The boiler may be constructed either with the tubes C and upper header A in one piece joined to the header B, or each tube C may be made integral with a section of the upper and the lower header.

230,798. Josse, E., and **Seiffert & Co. Akt.-Ges., F.** March 12, 1924, [*Convention date*].

FIG. 1.



Feed-water, heating.—In a multi-stage direct-contact feed-heater utilizing steam from the various stages of a prime mover 1, a multistage pump 3 is used, preferably centrifugal, steam from each tapping 9, 10, 11 being led into the feed-water at a connection between the stages 3^b - - 3^e of the pump at which the pressure of water is equal to or less than that of the steam tapping. The quantity of steam may be controlled by the temperature of the feed.

Reference has been directed by the Comptroller to Specification 14692/06.

231,186. Chavanne, L. March 19, 1924, [*Convention date*].

FIG. 34. *(Cancelled)*

FIG. 36. *(Cancelled)*

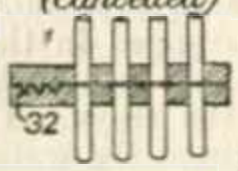
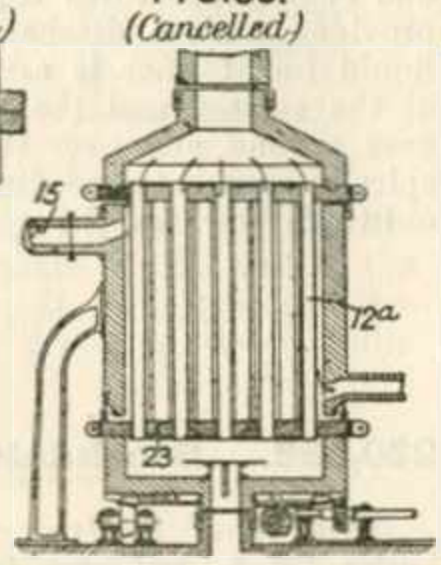


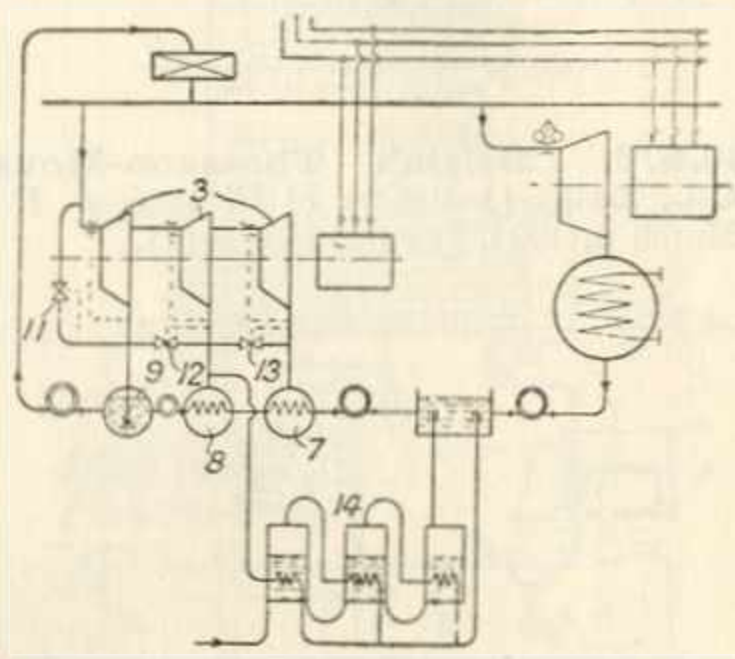
FIG. 30. *(Cancelled)*



Heating gases.—In heat-exchange apparatus of the continuous type, the two fluids (such as hot gases and air to be heated) being circulated to sweep the opposite faces of a thin separating partition, the heating fluid may be closely sandwiched between the partition and a body serving to receive and to store for radiation to the partition, heat from that fluid. Preferably the fluid to be heated is similarly treated. Owing to the restricted size of the passages the fluids are easily circulated at speeds high enough to avoid surface film insulation. A number of forms of such passages are described together with apparatus embodying them.

According to the Specification as open to public inspection under Sect. 31 (3) (a), either of the two fluids flows in the narrow passage and many additional forms of passage and forms of apparatus embodying them are described. In Fig. 30 (*Cancelled*) the nest of tubes 12^a is rotatable so as to avoid the formation of a hot zone near the inlet 15 for the hot gases. For heating air to a very high temperature sets of such nests may be arranged in series. The tubes may be soldered to the tube plates 23, Fig. 34 (*Cancelled*), and in the case of nests in series, the tube plates are jointed together by asbestos packing such as 32, Fig. 36 (*Cancelled*). This subject-matter does not appear in the Specification as accepted.

231,198. International General Electric Co., Inc., (Assignees of *Allgemeine Elektricitäts Ges.*). March 22, 1924, [*Convention date*].



Feed-water, heating.—Steam at different temperatures for use in a multi-stage feed-heating plant 7, 8, 9 is supplied exclusively from the various stages of one engine 3 of a plant, no steam being taken for heating from the others. The engine 3 or the stages thereof may be bypassed by automatic pressure or temperature controlled valves 11, 12, 13 for regulating the stage temperatures independent of the load. A multi-stage distilling plant 14 for make-up water may be arranged in parallel with one or more stages of the feed heater and is operated under pressure.

231,207. Halliday, G. June 24, 1924.

FIG. 1.

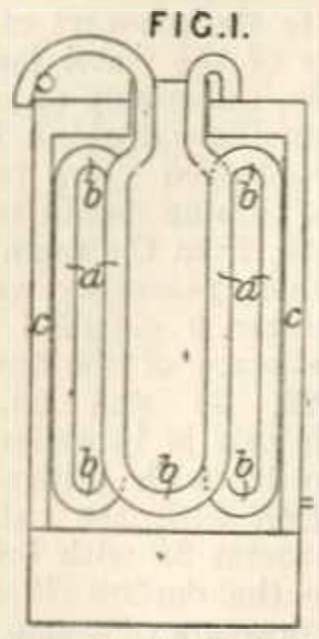
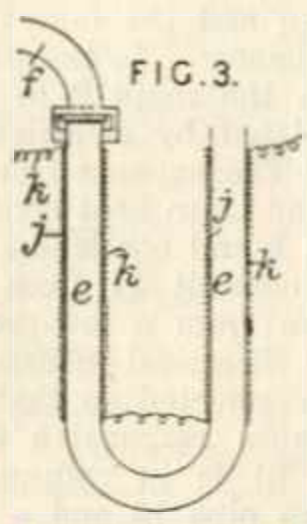


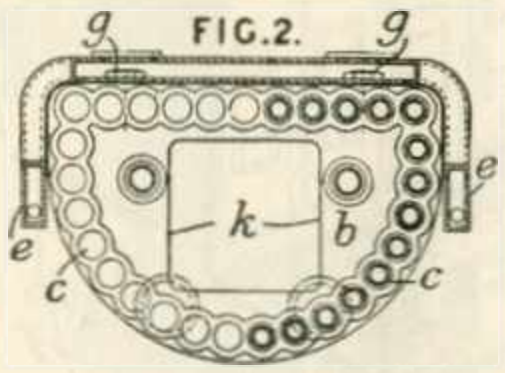
FIG. 3.



Internally-fired boilers; water-tube boilers.—A tubular unit for incorporation in water-heating apparatus for gas, liquid or solid fuel or electricity, comprises two upright tubes connected

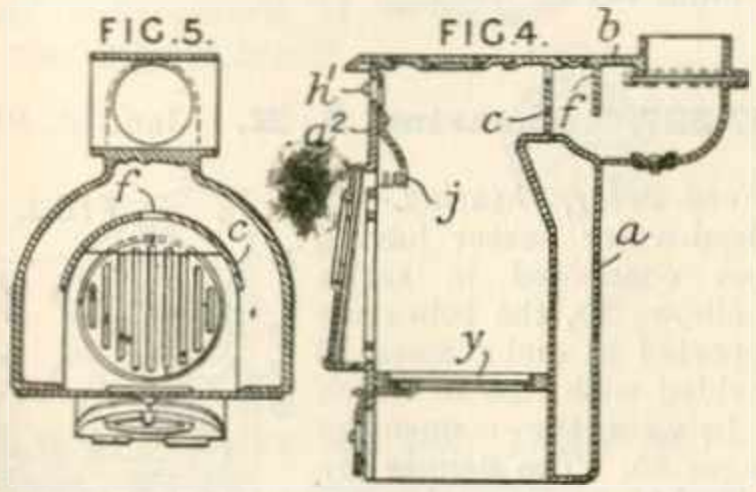
by an integral bottom bend. These units are connected to adjacent units by separate bends *b* at the top, the whole forming a heater polygonal in plan with the upright tubes *a* at the points of the polygon. This heater may be enclosed in and communicate with a water jacket *c*, Fig. 1. As adapted for heating by electricity, resistance wires *k*, Fig. 3, wound on insulating tubes *j*, are slipped over the straight tubes *e* before the upper bends *f* are connected.

231,283. West, S. R. Feb. 7, 1924.



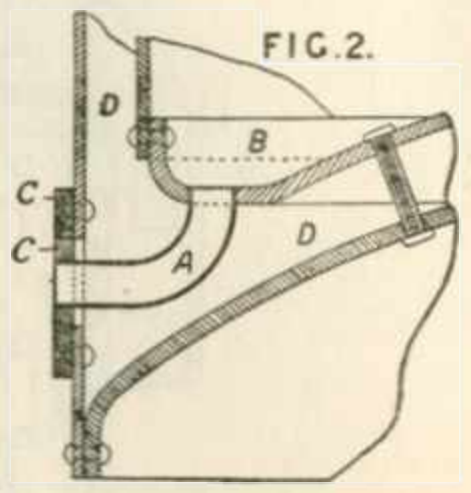
Water-tube boilers.—A nest of horizontal tubes *c* evenly spaced round the margin of a pair of flat-topped headers such as *b* so as to form a basket-like grate, are surmounted by a saddle-shaped water chamber *e* communicating with the headers by connections *g*. One header is provided with a firing door *k*, and flue openings are provided in the depending sides of the chamber *e* at the rear end of the boiler.

231,551. Bruster, O. Sept. 6, 1924.



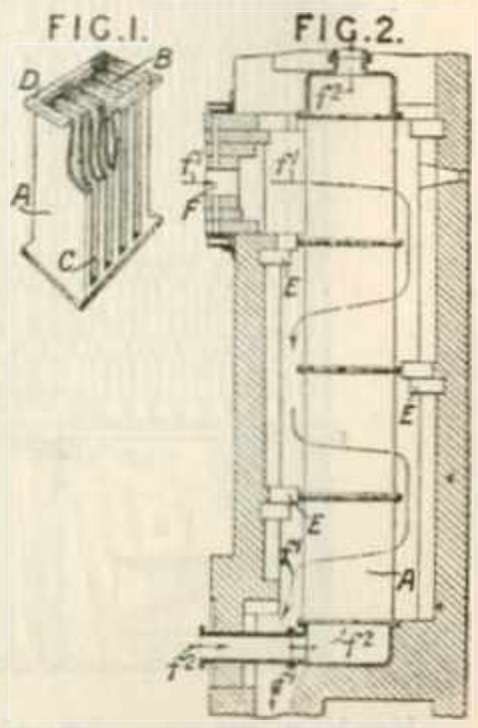
Slab-form boilers.—In a boiler of the kind comprising a fire-space within a hollow shell *a*, a hot-plate *b* above the upper end of the fire-box, and a flue formed by a plate *c* to cause the gases to circulate under the hot-plate, an opening *f* is provided at the back of the plate *c* through which part of the gases pass directly to the flue. An adjustable air-admission device h^1 is provided. A lining-plate or baffle *j*, the upper edge of which may be spaced from the front plate a^2, protects the latter from over-heating.

231,662. Anderton Bros., Ltd., and Aspden, T. A. March 26, 1924. *No Patent granted (Sealing fee not paid).*



Washing - boilers; digesters. — In a jacketed vessel, the draining pipe A is expanded into the bottom of the inner chamber B after the double walls have been fixed in place, and the hole in the jacket D, through which the pipe A has been introduced, is then closed by a plug *c* screwed into a plate C riveted or otherwise secured to the jacket. The outer end of the pipe A can then be expanded into the hole in the plug *c*, and a cock or drain pipe secured to the plate C.

231,844. Compagnie de Produits Chimiques et Electrométallurgiques Alais, Froges, et Camargue. April 1, 1924, [*Convention date*].



Heating air. — A heat-exchanger comprises an assembly of any desired number of elements each of which consists of a cellular unit A, Fig. 1, divided by parallel vertical partitions into two series of chambers, one B open at their upper and lower ends and the other C open at opposite sides. Flanges D facilitate fitting. An example of an assembly, Fig. 2, shows four superposed units with bell-like headers at top and bottom mounted in a casing adapted to cause series flow through the horizontal chambers as by baffles E. Examples of use cover, gases to be heated flowing as indicated at f^1 with waste furnace gases passing as at f^2 and gases to be heated through the vertical channels with a burner at F the products of combustion of which pass as at f^1.

232,091. Connery, W. M. July 30, 1924.

FIG. 5.

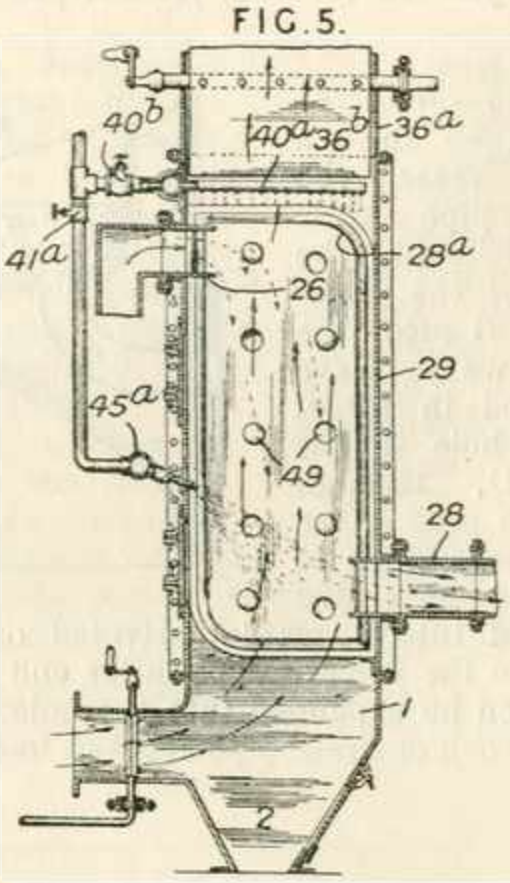
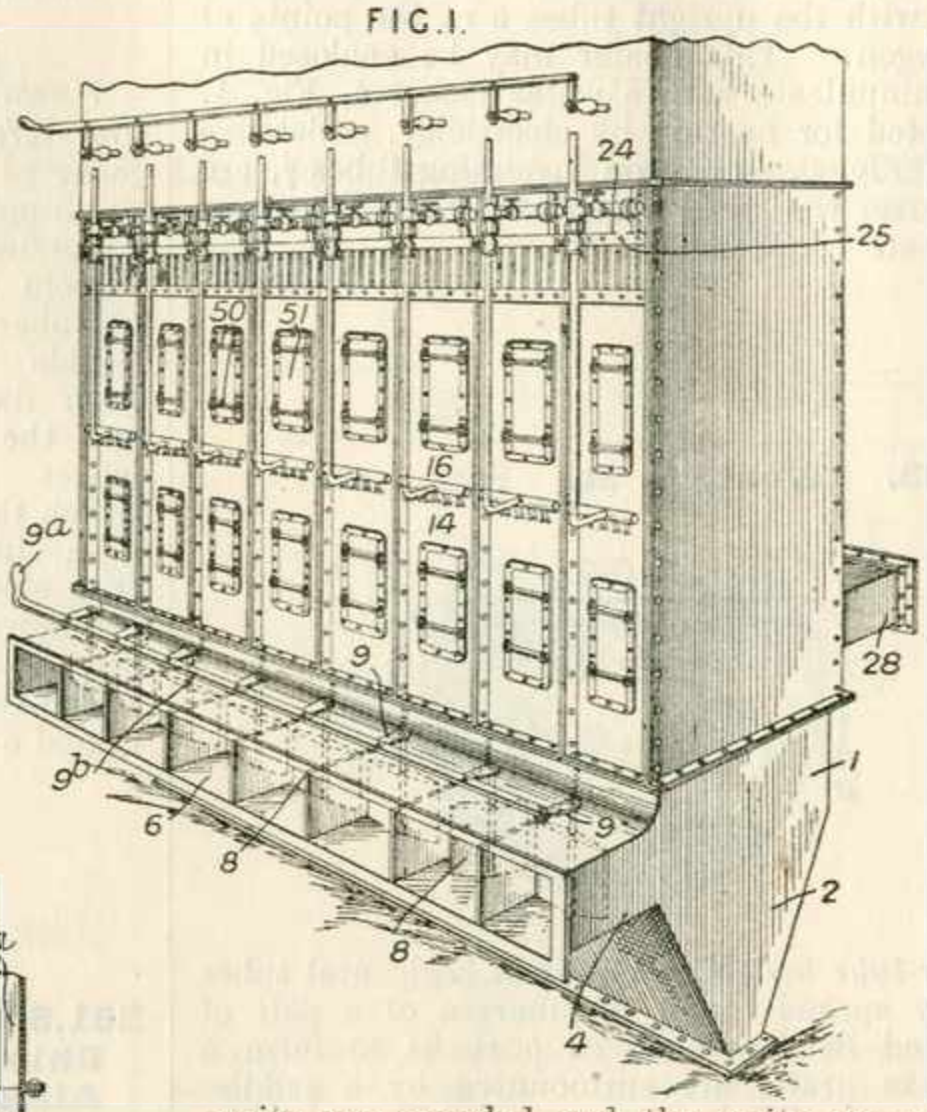
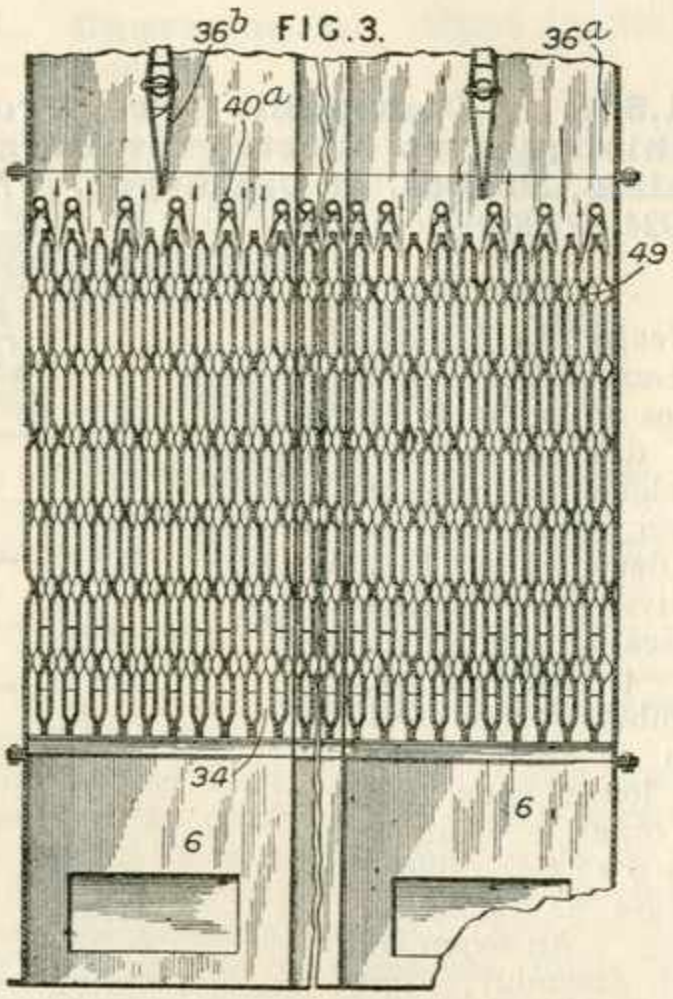


FIG. 1.



36b FIG. 3. 36a

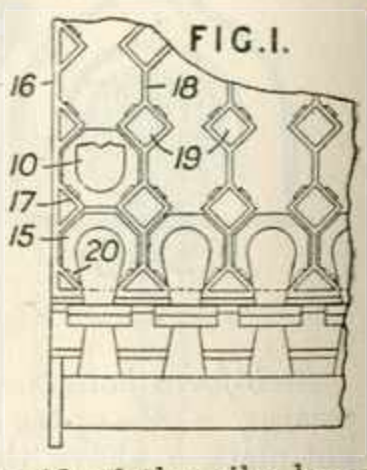


Heating air. — An air pre-heater with air passages intersecting the flue section of the furnace to give a forced air draught, has a number of sections each being composed of several units and detachably secured in position. The base part 1 of the heater includes an extension 4 with passages 6 provided with dampers 8 operated from a handle 9^a by means of a bar 9^b and arms 9. A flange at the top of the base part is bolted to the sections 14 containing the units. Each section has a front plate 16, which is cut and the cut edges 24 turned back to form an opening 25. This encloses a boxing 26, Fig. 5, through which is admitted the air to be heated; after its passage through the heater the air leaves by a boxing 28 held in a similar manner in the back plate 29. Opposite corners 28^a, Fig. 5, of the units are rounded and the units are spaced to provide vertical passages 34 which are in communication with the passages 6 and which carry the products to the stack through flues 36^a with damper 36^b. When a section is removed its damper 36^b is closed and its damper 8 is closed and disconnected from the bar 9^b. Air blast devices 40^a, 45^a are used for the removal of scale and are controlled by valves 40^b, 41^a. Buttons 49 on the walls of the units extend in each direction and engage other buttons on adjacent walls. The doors 51 on the front plates have inspection openings 50.

232,327. Spearing, A. H. Jan. 16, 1924.

Feed-water, heating.—In a feed-water heater having tubes connected in series by elbows 10, the tubes are supported in end frames 16 provided with ribs 18 which fit between the connecting flanges 15. The flanges are preferably octagonal and the spaces between them are filled by triangular projections 17 on the frame and rectangular enlargements 19 of the ribs having apertures for access to the tubes. The flanges are smaller than the space between the enlargements so that they may be lifted clear of positioning lugs 20.

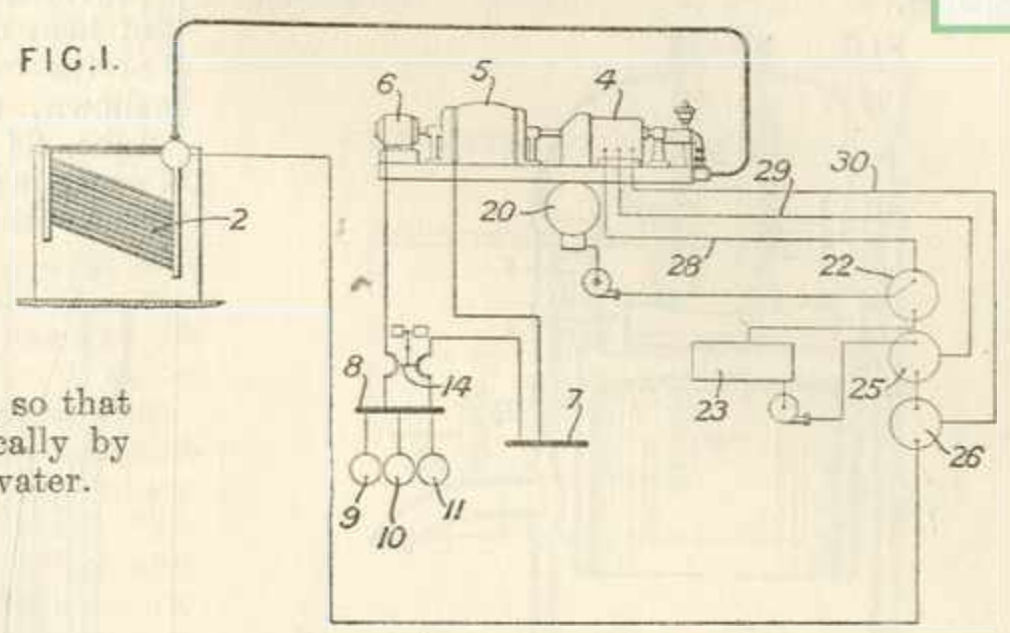
FIG. 1.



232,364. Clarke, C. W. E. Feb. 12, 1924.

Feed-water, heating.—In an electric generating plant, the exhaust steam from a turbine 4 is discharged into a condenser 20, the condensate being pumped through a feed-water heater 22 to a storage tank 23, from whence it is pumped through heaters 25, 26 to the boiler 2. Steam is supplied from the turbine by connections 28, 29, 30 to the heaters 22, 25, 26, which are closed except for suitable vents and drips, so that the flow of steam is controlled automatically by the heat absorbing capacity of the feed water.

FIG. 1.



232,406. George, Ltd., W. & J., and **Hedley, T. J.** April 10, 1924.

Annular boilers.—A water-heater comprises a tubular jacket 7 with a plurality of baffle plates or vanes 8 within the upper part of the bore, a burner 9b supported by a mounting secured to the lower end of the jacket 7, a cowl or capping 10 having an aperture in one side for directing the outlet of hot gases, and brackets 14 for securing the heater.

FIG. 2.

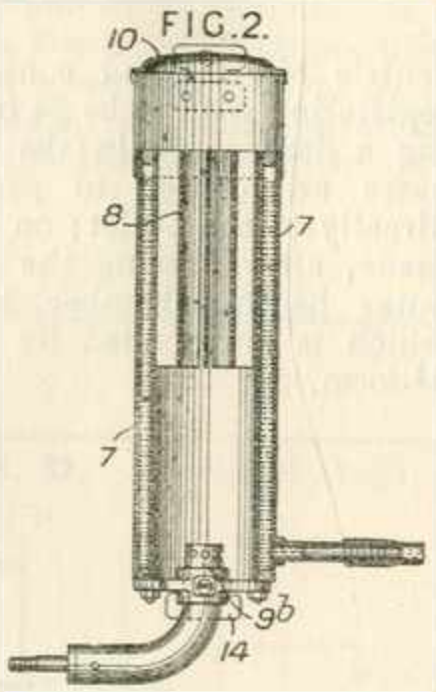
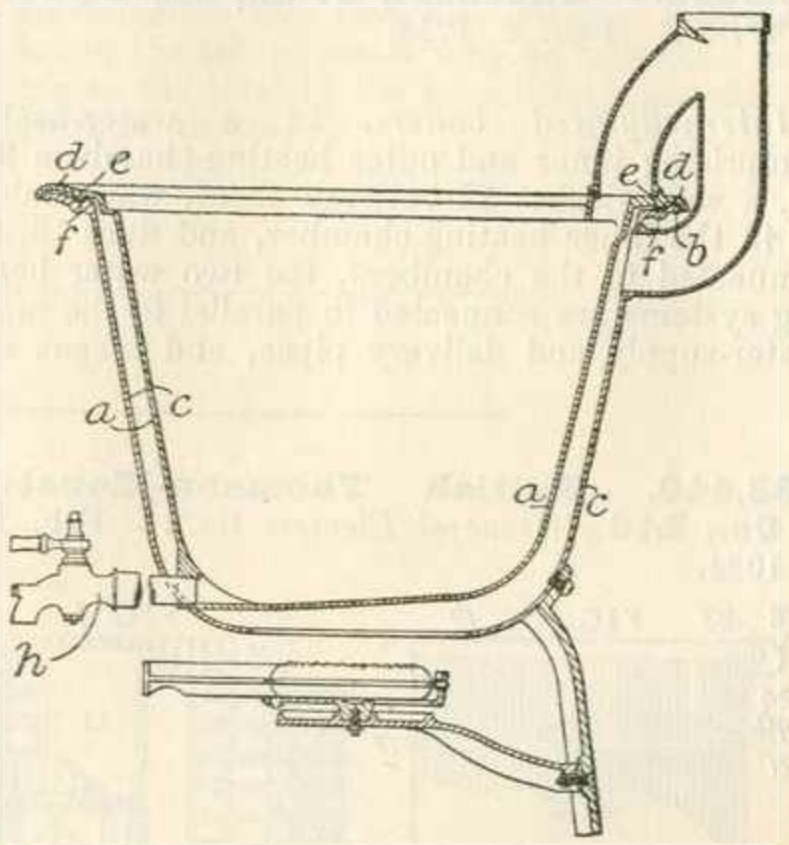


FIG. 4.

This construction is designed to prevent liquid which may boil over from entering the space between the inner and outer casings. The positions of the groove and head may be reversed and the groove may be lined with asbestos.



232,694. Sugg & Co., Ltd., W., and **Sugg, P. H.** Jan. 25, 1924.

Washing-boilers.—In gas-heated boilers of the type in which an inner pan *a* is contained within a casing *c* the inner pan being formed with an out-turned flange *d* resting upon the outer casing the products of combustion from the burners passing through the space between the pan and the casing and the pan being provided at the bottom with a draw off cock *h* which passes through the casing, the casing is formed with an out-turned flange *b* in which is located a groove *f* into which a head *e* on the inner casing enters.

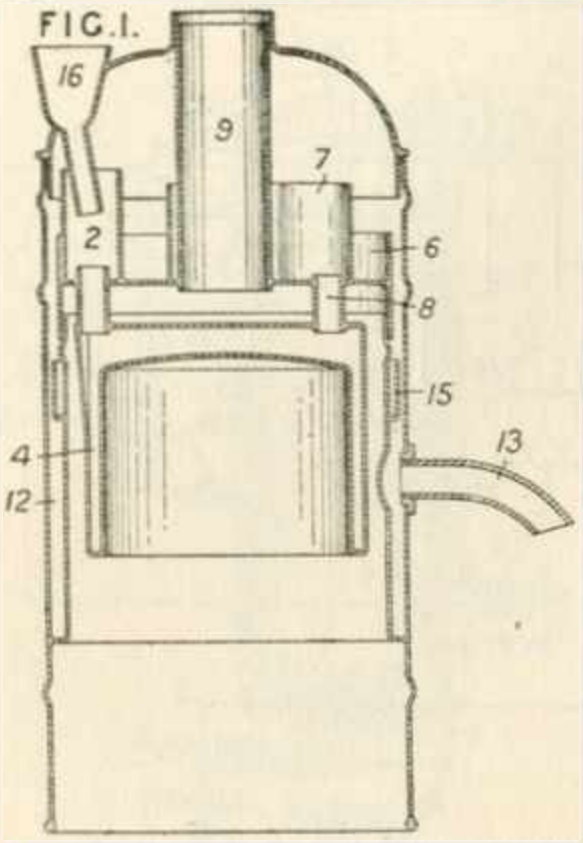
232,856. Wheeler, H. J. Sept. 15, 1924.

Internally-fired boilers.—Water flows into a heater by the funnel 16 through a cup 2 into a bell-shape chamber 4. Thence it passes through a tubular junction 8 to a trough 7, overflowing into the surrounding tray 6 and the channel 15 in the jacket 12, to the outlet 13. The tray 6 bearing the flue 9 and the parts 2, 4 and 7 can be removed as a unit from the casing.

(*For Figure see next page.*)

232,856.

FIG. I.



233,408. Daechsel, F. A., and **Powell, W. F.** Feb. 6, 1924.

Internally-fired boilers.—In a water-heater comprising inner and outer heating-chambers 20, 13, a water-jacket 12 between them, water-tubes 24 in the inner heating-chamber, and flues 15, 32 connected to the chambers, the two water heating systems are connected in parallel to the main water-supply and delivery pipes, and means are provided for controlling the action of the source of heat on one of them to vary the temperature of the outflowing water. In the construction shown, an annular header 25, from which the tubes 24 depend, is connected in parallel with the water-jacket 12 to a water supply pipe and to the outlet pipe 61. The tubes 24 are in two concentric circles, and contain baffles or webs 53 registering with webs 54 in the header. By opening a damper 34 in the flue 32 the combustion gases are caused to pass through the header directly to the outlet; on closing it, the gases are made, after passing the header, to descend the outer heating-chamber 13, the outlet 14 from which is surrounded by a baffle 64 of inverted **U**-form.

FIG. II.

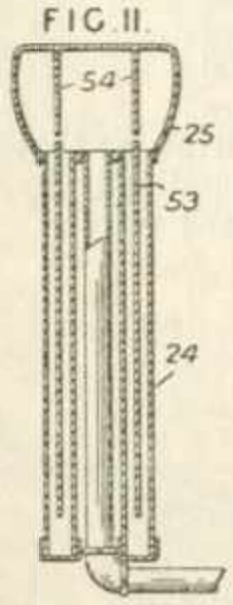
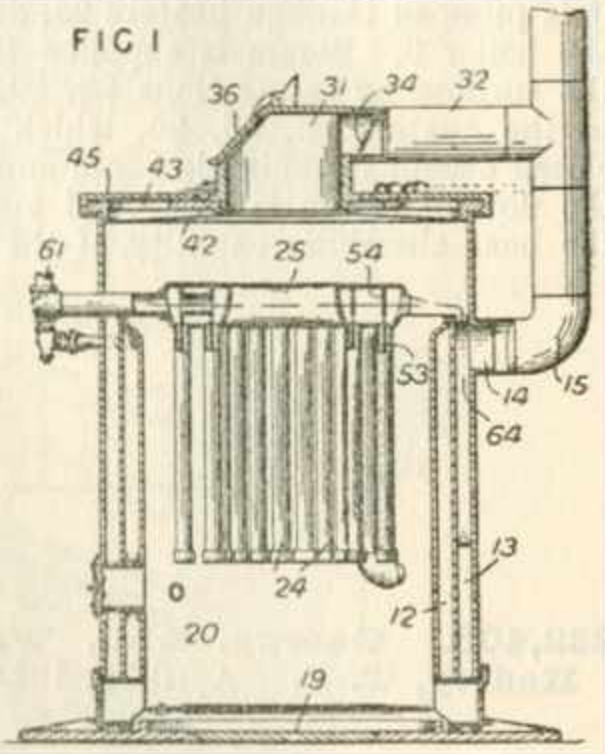


FIG. I



233,440. British Thomson-Houston Co., Ltd., (*General Electric Co.*). Feb. 12, 1924.

FIG. 5.

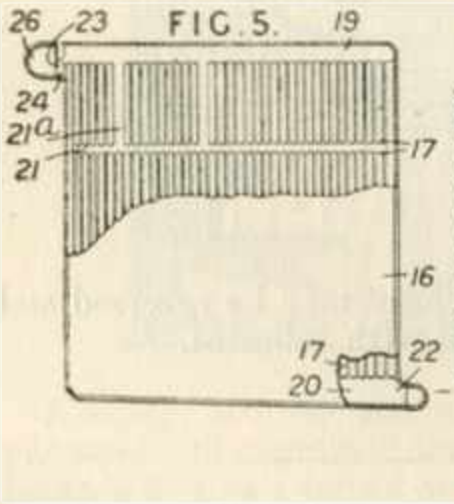


FIG. 3.

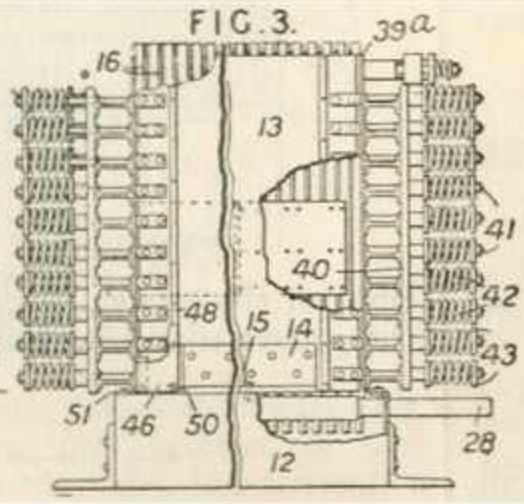
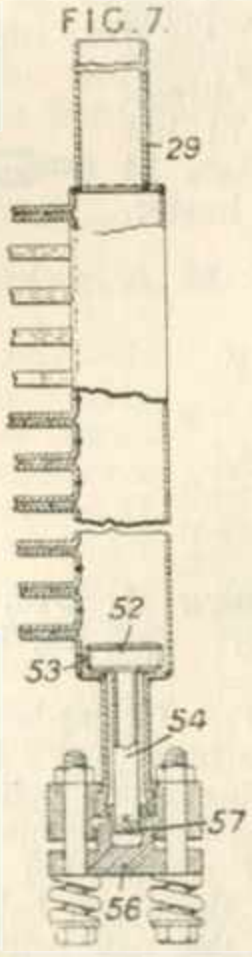


FIG. 7.

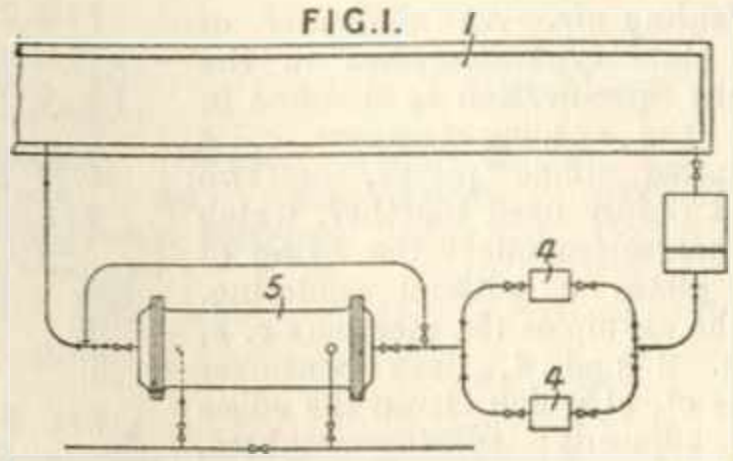


Slab-form boilers.—A liquid heater particularly adapted for heating a liquid such as mercury comprises a number of flat divided chambers connected in parallel and arranged with separators between side and end walls yielding means being provided for holding them in firm engagement with each other. The liquid chambers comprise a pair of plates 16 welded together along their edges and separated by a series of parallel spacing strips 17 preferably welded to one plate only. The strips terminate short of the top and bottom of the chamber so as to leave passages 19 and 20 communicating respectively with the outlet and inlet parts 23, 22. The strips are interrupted at 21 to form a transverse passage 21 communicating by wider channels 21^a with the passage 19. The outlet 23 is provided with a dam 24 to define the level of liquid in the chamber. The openings 22,

23 are provided with flanges adapted to be welded to those on the adjacent chambers and to the open side of trough shaped members 26 adapted to form common headers connected to the inlet and outlet pipes 28, 29. A series of chambers, separated by spacing members consisting of a series of vertical strips jointed at top and bottom by transverse strips, are arranged between side and end plates 13, 39a secured to an angle-iron base 12. The side plates are fixed to an angle-iron 14 secured by a single bolt 15 to the base so as to permit expansion without distortion and internally are provided with transverse grooves adapted to receive a series of plates to which members welded to every fourth chamber are secured. The central plate alone is bolted in place. The end plates 39a are supported by I-beams connected by vertical members 40 acted on by a series of springs 42 bearing against abutments 43 carried by rods 41 secured to the side members. To prevent leakage at the corners, plates 46 attached to angles secured to the plates 39a are held against bearing strips 48 on the side walls by bolts engaging slots 50. Thin plates 51 are also secured to the base for this purpose. To facilitate cleaning a box 52 having a side opening 53 and a screwed pipe connection 54 is mounted in the header and is held in the inoperative position by a bayonet catch 57 on a removable cover 56. On removing the cover an air hose may be attached to the pipe 54 and the box reciprocated in the header.

233,485. Bennis, A. W. March 15, 1924.

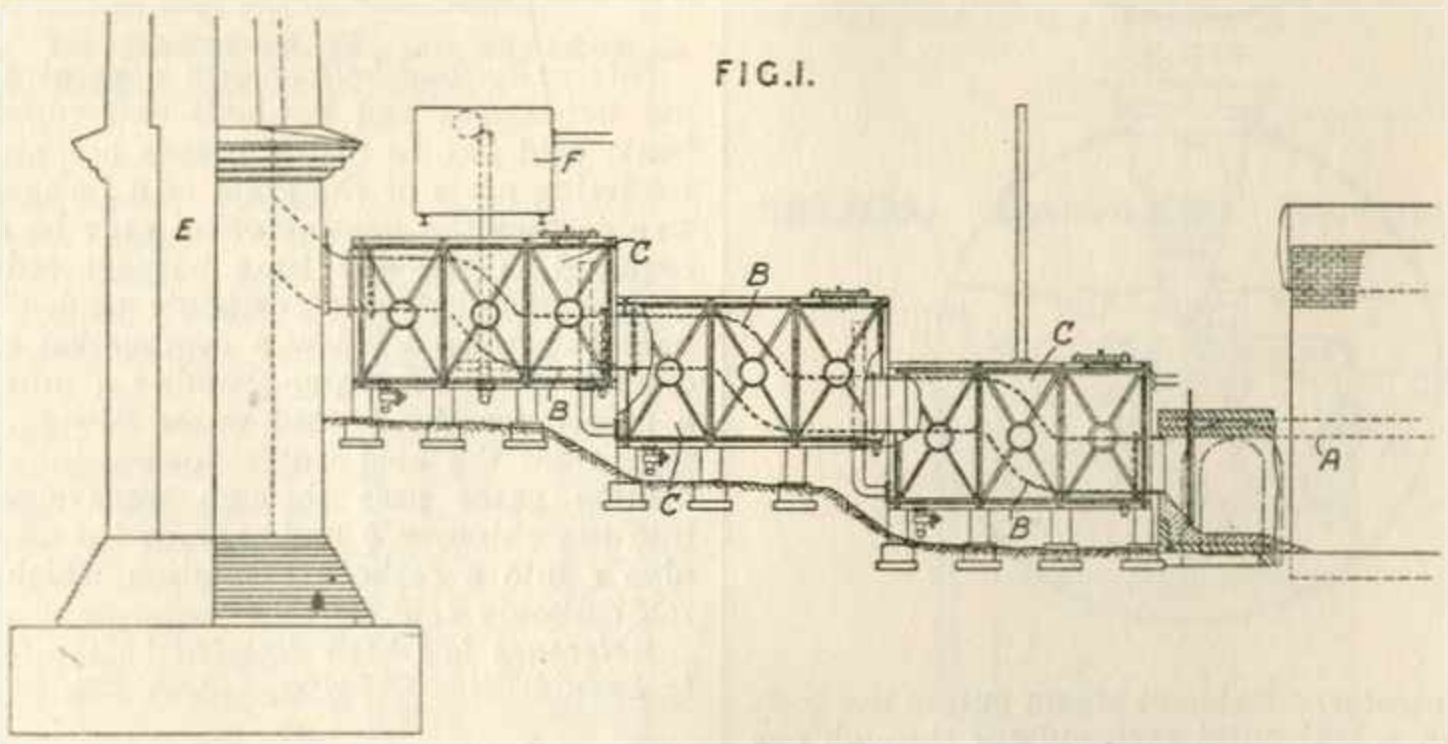
FIG.I.



Feed-water, heating.—Water in conveyer troughs 1 and like apparatus receiving hot ashes, coke, &c. for quenching, flows through a circulating system including a heat-exchanger 5 prior to its return to the conveyer trough. The heat-exchanger may take the form of radiators for heating buildings, or a heater for boiler-feed or other water. In modifications, the medium to be heated may flow through pipes arranged at the bottom or sides of the trough or through jackets surrounding the trough. Pumps 4 for circulating the trough-water may be controlled according to the level in the trough by a suitable float-operated device.

233,494. Brown, D. March 29, 1924.

FIG.I.



Feed-water, heating.—Waste gases from a steam boiler &c. A on their way to the chimney E are passed through a pipe or pipes B of ogee formation submerged in water in tanks C supplied from a cistern F.

229,647. Beauvais, G. M. G. de. June 13, 1924. *Addition to* 229,242.

Heating air.—An air-heater of the plate type described in the parent Specification is modified in that the spacing-members *c*, *e* comprise single pieces, or two parts rigidly fixed together, which in themselves effect the fixing of the plates *a* without soldering. In the examples the members *c*, *e*, Figs. 2 and 4, have bent-over parts c^1, e^1 which clamp the edges of adjacent spacing-members, while in Fig. 6 the outer part *h* effects the clamping.

FIG. 2.

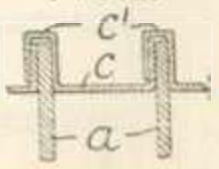


FIG. 4.

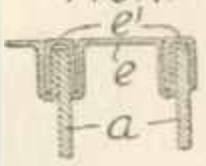
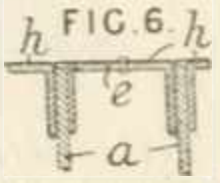


FIG. 6.



233,566. Galloways, Ltd., and **Pilling, H.** July 21, 1924.

FIG. 2.

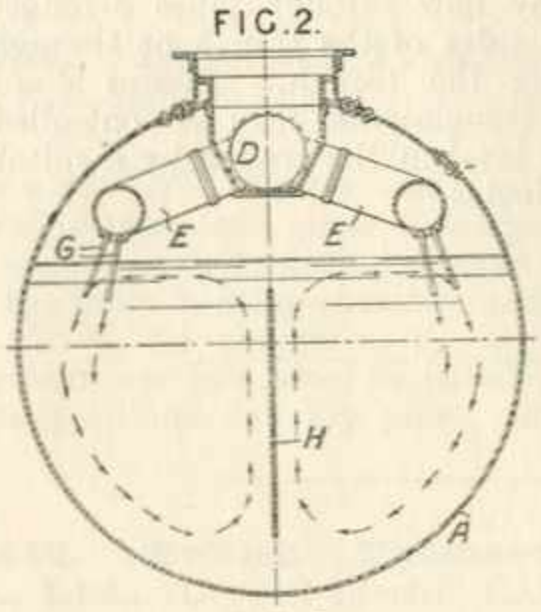
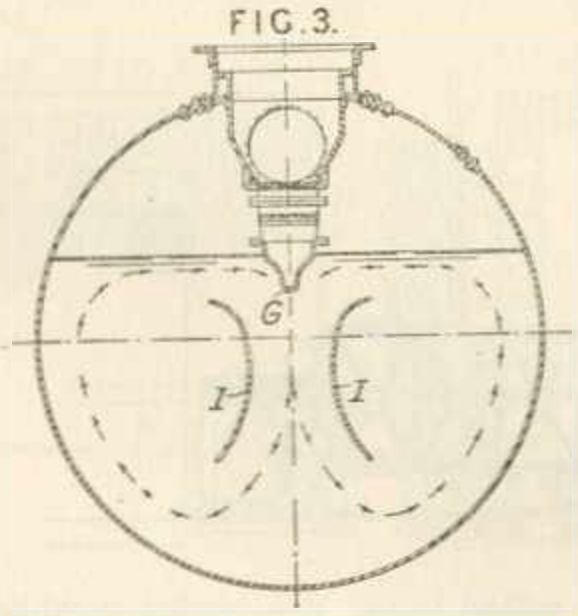
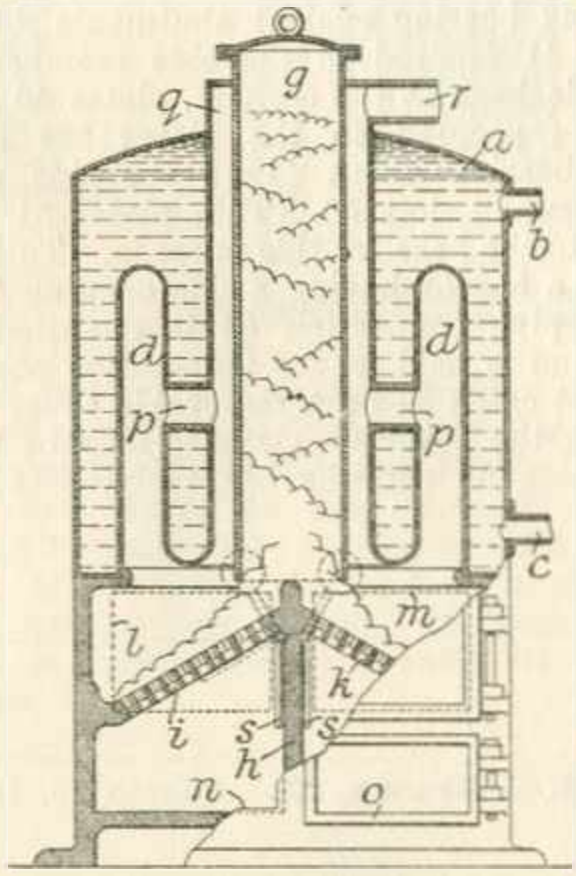


FIG. 3.



Heating water.—Exhaust steam enters the body of water in a horizontal accumulator through one or more pipes fitted within the shell, and provided with nozzles which dip into the water and which are so directed as to set up a circulatory movement of the water following the contour of the walls of the accumulator. The steam supply pipe D, Fig. 2, in the steam space of an accumulator A have two branch pipes E fitted with nozzle-pipes G so inclined as to direct the water along the walls of the accumulator shell on each side of central vertical partition H. The steam supply pipe may have only one branch, the central partition being then dispensed with. Inclined nozzle-pipes may project from the opposite sides of a single pipe arranged vertically above the central partition. The nozzles G, Fig. 3, are directed downwards to deliver steam to the water space between two longitudinal curved partitions I. Small holes may be drilled in the sides of the nozzle pipes to provide steam jets for removing the scum from the surface of the water.

233,656. Ketterer, E. May 9, 1924, [*Convention date*].



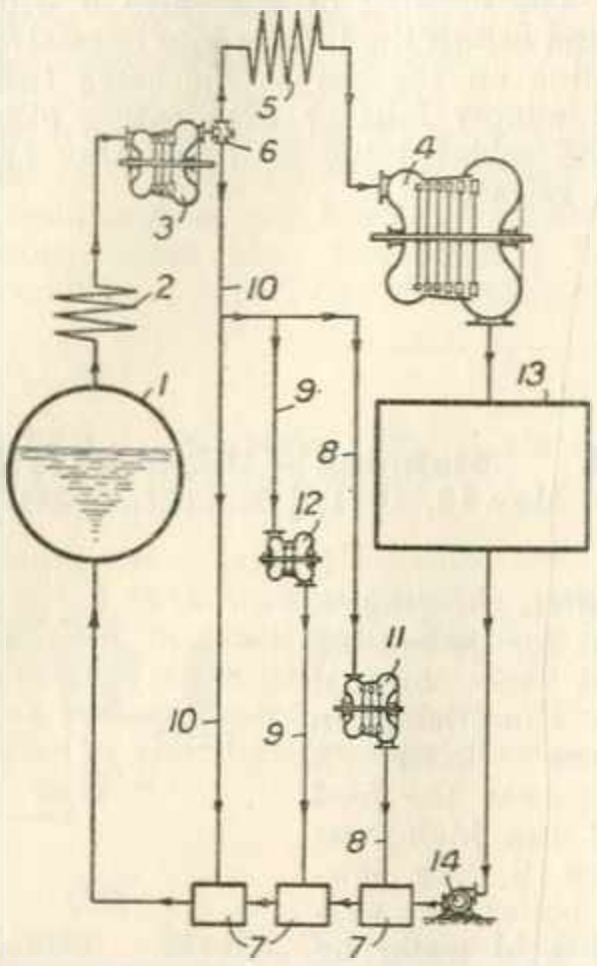
Internally-fired boilers.—In apparatus for heating hot-houses and hot-beds and supplying carbonic acid gas to plants means are provided for rendering parts of the grate of a furnace inoperative so that the heating effect may be divided as required in the day time without reducing the proportionate yield of carbonic acid. The furnace is arranged below a combustion chamber *d* extending into a water-chamber *a* provided with a pipe *b* for the heated water flowing off and a pipe *c* for the cold water flowing in. The combustion gases pass through transverse ducts *p* into the chimney *q* and may be led off through a pipe *r* into a carbonate solution which takes up the carbonic acid.

Reference has been directed by the Comptroller to Specification 9154/90, [*Class* 126, Stoves &c.].

233,686. Akt.-Ges. der Maschinenfabriken Escher, Wyss, et Cie. May 10, 1924, [*Convention date*].

Feed-water, heating.—In a steam turbine plant comprising high- and low-pressure sections 3, 4, steam is tapped at a single point 6, preferably in front of the reheater 5, and led through a number

of pipes 8, 9, 10 arranged in parallel to the several stages 7 of the feed-water heater, heat-consumers such as auxiliary turbines 11, 12 of different expansion ratios, or steam engines, or other apparatus, being interposed in the pipes 8, 9, and, if desired, also in the pipe 10. A pump 14 draws

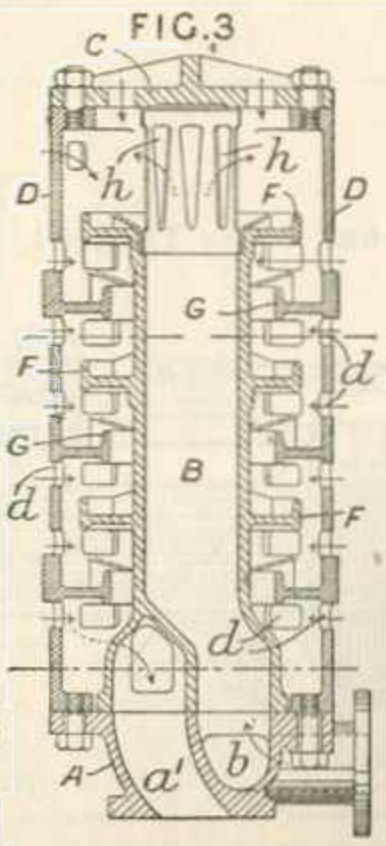


the condensate from the condenser 13 and delivers it through the feed-water heater to the boiler 1, which supplies the turbine plant through a superheater 2. The main turbine 3, 4 may be in a single casing, tapping being effected as before at one point only.

233,829. Stephenson, B., and **Holden & Brooke, Ltd.** March 20, 1924.

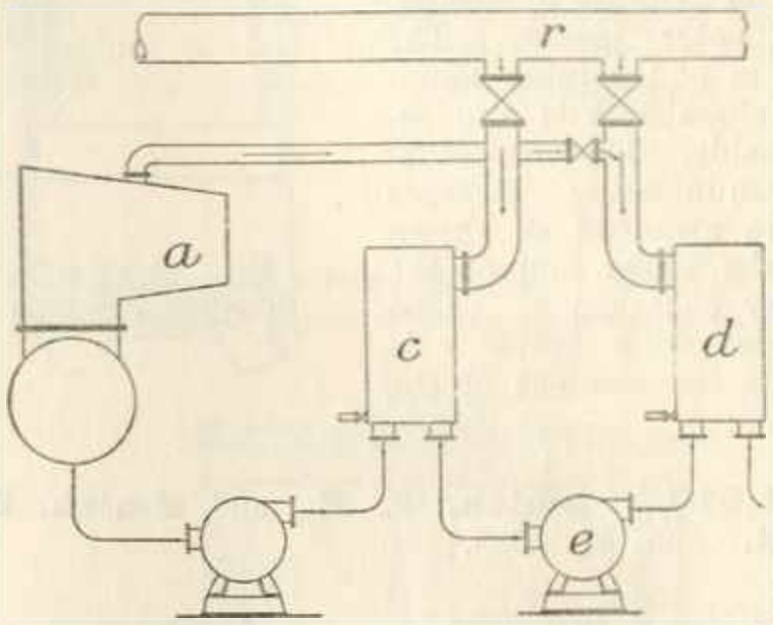
Feed-water, heating. — A feed-water heater placed in the steam space of a boiler has a central inlet tube B formed with a number of surrounding annular flanged trays F and with a number of V-shaped water outlet apertures *h* at its upper end. The tube is enclosed by a casing D formed of two longitudinal parts bolted together and having a number of annular flanged trays G projecting between the trays F. The feed-water flows downwards over the trays and is heated by contact with boiler steam admitted through apertures *d* in the casing. The casing is closed by a cover C having apertures through which air and gases escape. The

FIG.3



heated water flows through a passage *a* in the base A to a pipe leading to the bottom of the boiler.

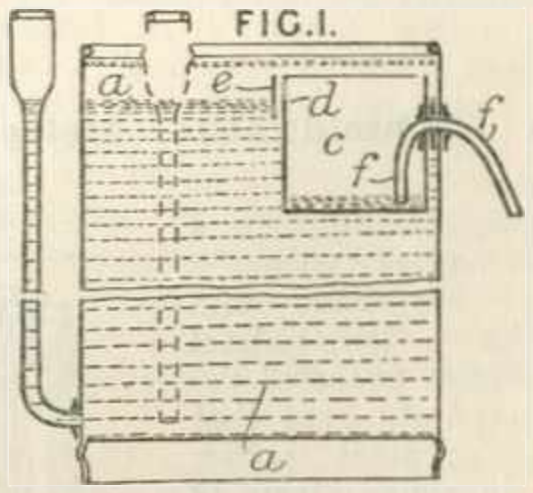
233,836. Weir, Ltd., G. & J., and **Weir of Eastwood, (William Douglas), Baron.** March 27, 1924.



Feed-water, heating.—In steam power plant including a main turbine and auxiliary motors, the two feed-water heaters *c*, *d*, or two portions of one heater, arranged in series as regards the flow of feed-water, are heated under full power conditions of running, by exhaust steam taken from the auxiliaries by the pipe *r*. Under low power conditions, the first heater *c* is heated by auxiliary exhaust steam, and steam for the heater *d* is taken from a point in the main turbine *a* where the pressure is higher than that of the auxiliary exhaust. The heaters are preferably arranged one on each side of the feed pump *e*.

233,839. Brown, W. March 29, 1924.

FIG.1.

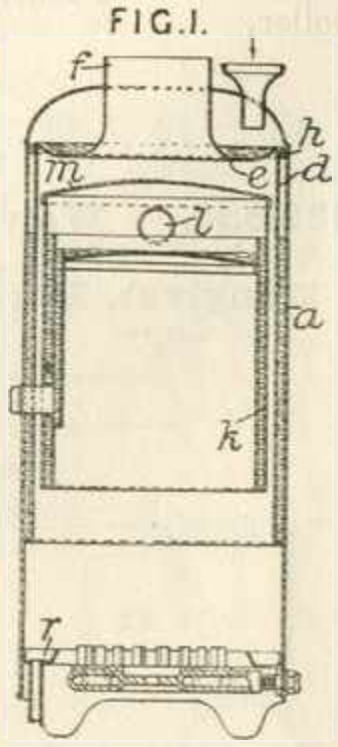


Water delivery.—A heater of the type comprising a heated container *a* from which hot water is discharged by introduction of cold water at or near the bottom, is provided with a catch-pocket *c* to which water passes through a notch *d* and from which water is discharged through a siphon *f*. The weir *d* is guarded by a belt or skimmer *e*.

234,007. Ewart, J. W. Dec. 24, 1924.

Internally-fired boilers.—In a water-heater as described in Specification 10867/07, the tray *e* is made integral with the vent pipe *f* and the outer edge *h* over which the water flows is detachably fitted to the upper edge of the cylinder *d* forming the water jacket. The top *m* of the inner annular chamber *k* is also detachable. The horizontal communicating passages *l* are arranged as shown at the upper end of the inner chamber *k*. The condensation gutter *r* is made independent of the casing *a*.

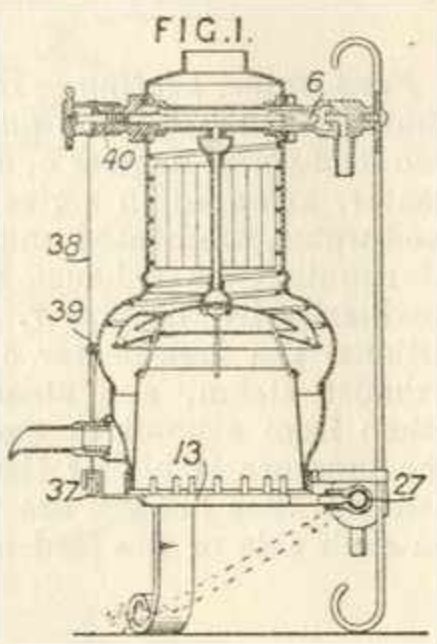
FIG. 1.



234,016. Smith, T. H., and **Smith, C. H.** Jan. 19, 1925.

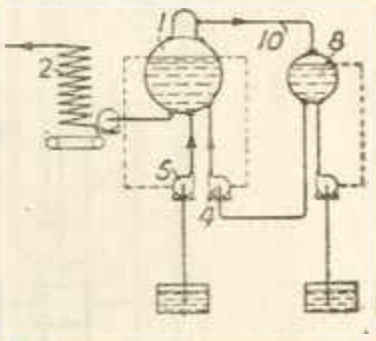
Safety arrangements.—In a water-heater, means for shutting off the gas supply automatically comprises a gas-control member tending to close the gas cock but normally prevented from so doing by a retaining device connected to a soldered lug or the like on a part of the heater liable to overheating, and also to the water supply valve. In the example the whole burner 13 is hinged upon a plug cock 27 and a wire &c. 38 passes over the pulley 37, and has its ends connected to the soldered lug 39 and to a drum 40 on the spindle of the water-valve 6. The opening of the valve 6 winds up the wire and brings the burner into operative position, turning on the gas at the same time. If the water supply fails or overheating otherwise occurs, the soldered lug 39 falls away and the burner is released.

FIG. 1.



234,096. Siemens - Schuckertwerke Ges. May 13, 1924, [*Convention date*].

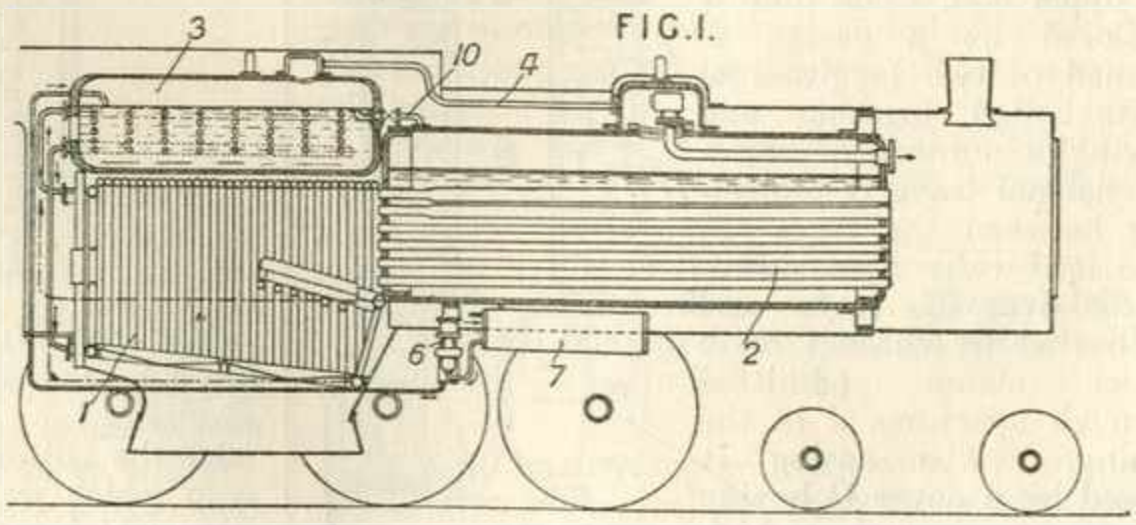
Feed-water, heating.—In a plant for generating steam at the critical pressure, comprising a low-pressure boiler 1 serving to heat the feed supply of the high-pressure boiler 2, the low-pressure boiler is supplied with cold water by an additional pump 5 which is brought into operation when a certain temperature or pressure is exceeded in the low-pressure boiler. The usual feed pump 4 is operated in accordance with the water level in the low-pressure boiler. The additional feed pump may be automatically operated in accordance with the temperature or pressure in the low-pressure boiler. Excess water passes from the low-pressure boiler through a pipe 10 into a storage vessel 8.



234,119. Schmidt'sche Heissdampf- Ges. May 14, 1924, [*Convention date*].

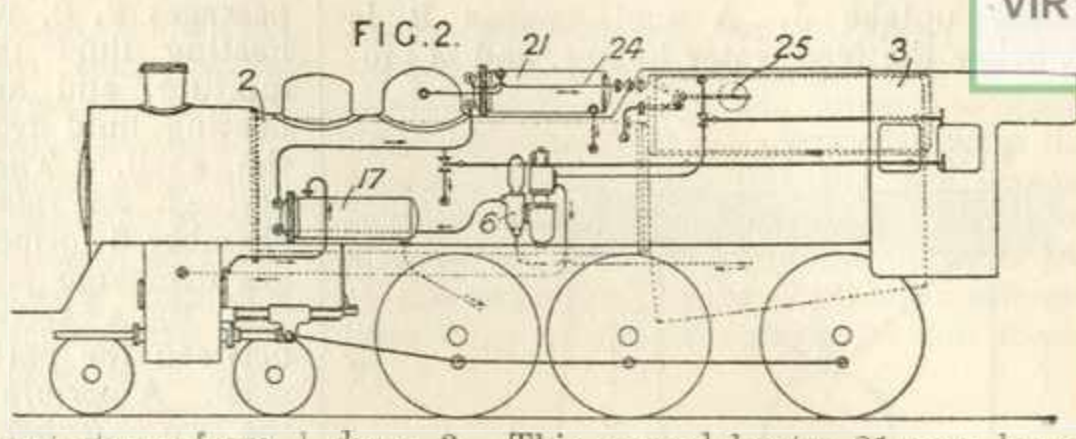
Feed-water, heating.—In a locomotive boiler with a water-tube fire-box and smoke-tube longitudinal boiler, the water space of the fire-box is separate from that of the longitudinal boiler. In Fig. 1, in which steam of one pressure only is generated, the water tubes 1 of the fire-box are used for the generation of steam. A pipe 4 connects the steam spaces of the drum and longitudinal boiler 2, and excess feed-water overflows through a

FIG. 1.



pipe 10 into the boiler 2. Feed-water heated by engine exhaust in a heater 7 is forced by a pump 6 into the steam space of the drum 3. In the form shown in Fig. 2, the pressure in the drum 3 is higher than that in the boiler 2. The feed water from the pump 6 is heated first in a heater 17 to about 100° C. by exhaust steam from the main engines and then in a heater 21 by low-pressure steam from the boiler 2 before being delivered by a pipe 24 to the steam space of the drum 3. This second heater 21 may be replaced by pipes or coils arranged in the low-pressure boiler and preferably in its steam space.

FIG. 2.

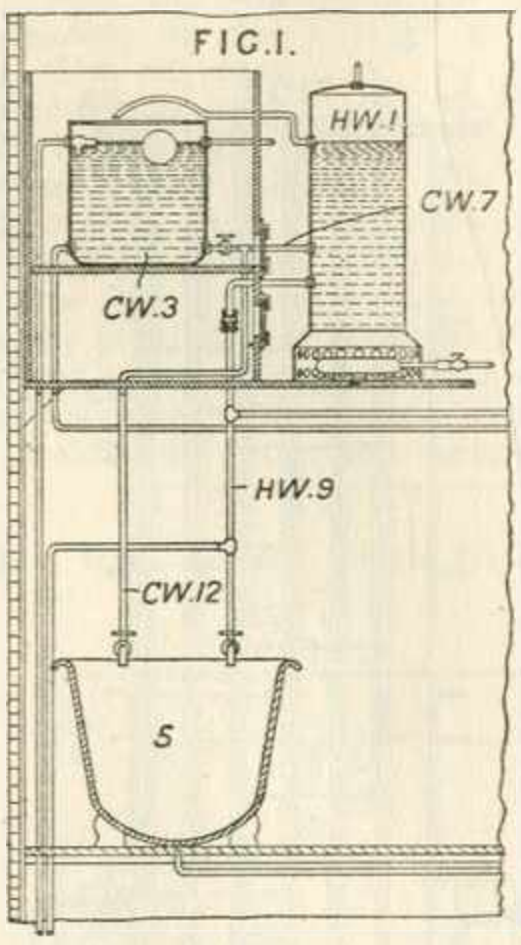


234,148. Lulofs, W. Dec. 19, 1923.
Drawings to Specification.

Feed-water, heating.—Feed-water for steam generators in a turbine plant is passed through two heaters in succession. The first is heated by the exhaust from the low-pressure turbine and the second is heated by steam taken from the exhaust of the high-pressure turbine.

234,289. Neild, J. June 10, 1924.

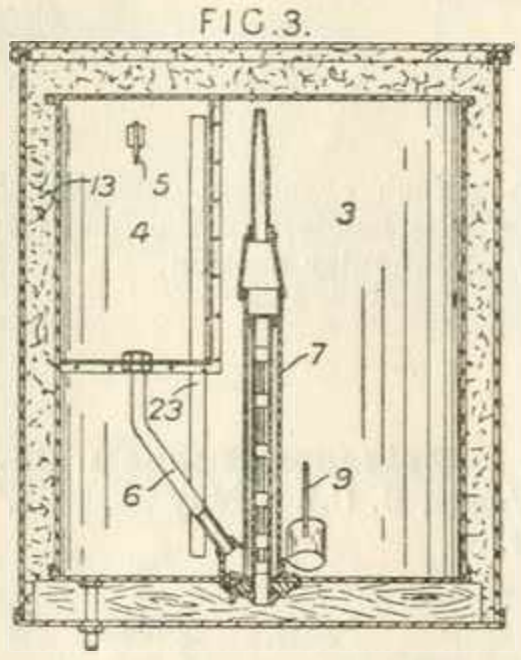
FIG. 1.



Heating water.—An installation comprises a cold-water tank CW.3, a boiler HW.1, a bath 5, a valved pipe CW.7 connecting the tank and boiler, a cold-water pipe CW.12 leading to the bath from a point in the pipe CW.7 between the valve and the boiler, and a hot-water pipe HW.9 leading from the lower end of the boiler to the bath and other delivery points.

234,364. Humm, R. W. Oct. 20, 1924.
No Patent granted (Sealing fee not paid).

FIG. 3.

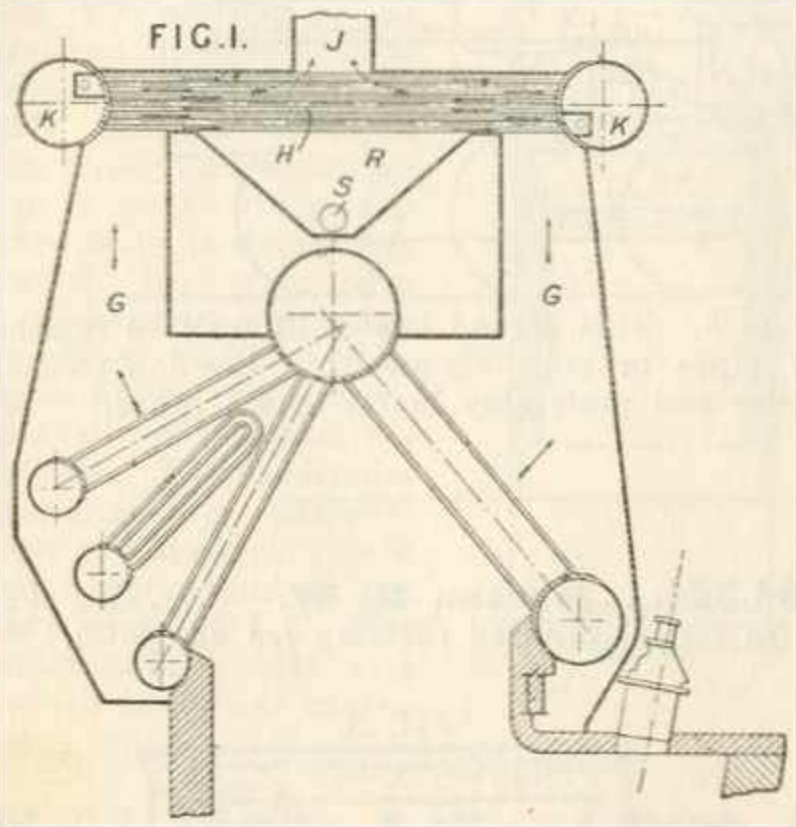


Heating water.—A hot-water tank 3, which may be heat-insulated with cow-hair packing 13, has within it a supply-tank 4 with ball-valve 5, and also a heating chamber 7, connected at its lower end by a pipe 6 with the bottom of the supply tank, extending at its upper end above the level of the water in the supply tank, and delivering into the hot-water tank 3. Heating means, for example electric elements as shown, are inserted in a casing within the heating chamber 7. In operation, water flowing from the supply-tank 4 by way of the pipe 6 is heated in the chamber 7 and overflows from the top into the tank 3. When this is full, water passes up the stand-pipe 23 into the supply tank 4 and hence is re-circulated by way of the pipe 6. A float-lever 9 may be arranged to operate, by means of a cord, a spring-held pointer, on a scale graduated to indicate the quantity of water in the tank 3.

234,372. Yarrow, H. E. Nov. 7, 1924.

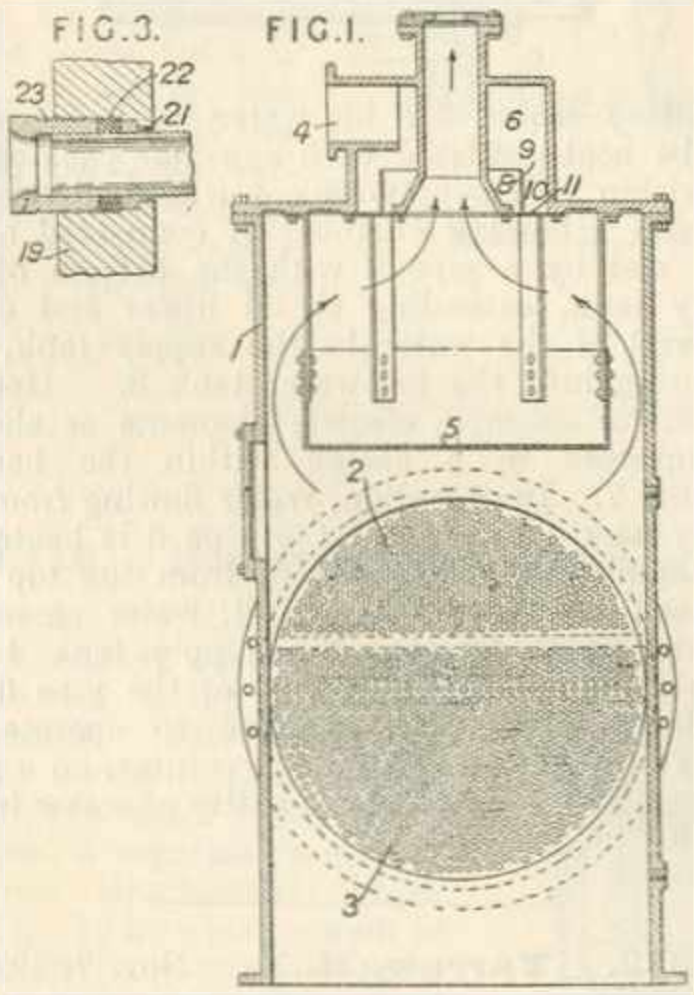
Feed-water, heating.—A feed-water heater suitable for a Yarrow boiler comprises horizontal tubes H expanded into drums K which may be divided into compartments as shown. The feed-water heater is arranged above the boiler, and is traversed by hot gases from the flues G, which

pass to the uptake J. A soot hopper R is arranged below the feed water heater, and is pro-



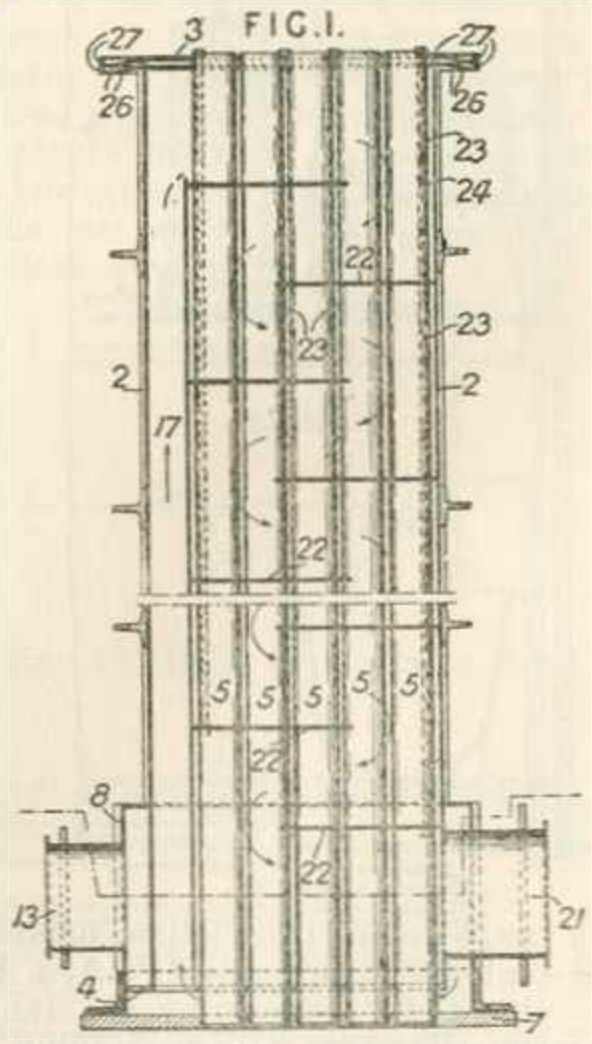
vided with a rack or screw conveyer S. In a modification, the headers of the feed water heater may be of rectangular section.

234,448. Griscom-Russell Co., (Assignees of *Jones, R. C.*). May 24, 1924, [*Convention date*].



Feed-water, heating.—An apparatus for treating liquids such as boiler feed-water, in which the liquid is heated to expel the contained gases, comprises a containing shell 1, a heating element divided into two independent groups of tubes or passages 2, 3, whereby two different sources of heating fluid may be utilized without intermixture, and an auxiliary inlet for admitting heating fluid from a third source directly into the shell. The raw liquid enters the shell through an inlet 4 and falls into an annular chamber 8 formed between the outer wall of the gas discharge passage 6 and a cylindrical partition 9, a second chamber 10 being formed between the partition and the outer wall of the shell. A perforated plate 11 forms the bottom of the two chambers, the chamber 8 communicating with a single ring of perforations through which the liquid entering the chamber 8 passes as a closed ring of falling drops on to a distributing plate 5. The overflow from the chamber 8 passes into the chamber 10 and through the perforations in the bottom thereof on to the plate 5. The tubes 2, 3 are supported at each end in a plate 19, Fig. 3, the holes through which the tubes pass being of larger diameter than the tubes to permit ready removal of the latter. A fluid-tight joint is effected by means of packing 22 compressed against a retaining ring 21 by a screw ferrule 23. An auxiliary inlet for introducing steam directly into the shell is provided above the tubes.

234,766. Calorizing Co., (Assignees of *Mantle, G. D.*). May 28, 1924, [*Convention date*].



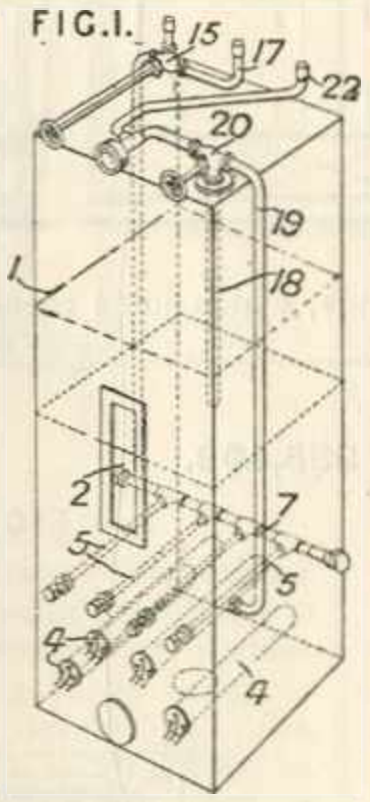
Heating gases.—In air and gas heating apparatus of the kind described in Specification 221,188, [*Class* 64 (iii), Surface apparatus &c.], in which the air or gas to be heated is passed first over the hottest portions of metal heating-tubes, then over the coldest portions, and finally over

portions at intermediate temperatures, the air or gas is passed through the highest temperature region at a high velocity. The apparatus shown comprises a casing 2 with end header-plates 3, 7 for tubes 5, through which the heating-gases flow upwards. An intermediate tube plate 4 is spaced a short distance from the lower plate 7, and the air or gas to be heated, after passing from the inlet 13 through the casing 8, surrounding the lower end of the main casing, flows at a high velocity through the restricted space between the plates 4, 7. The air then passes upwards through the conduit 17, and finally downwards along a zig-zag course around the tubes 5 to the exit 21. The baffle plates 22 are suspended from the upper header-plate on rods 23, and are separated by tubular spacers 24. Expansion of the tubes 5 is allowed for by connecting the upper header-plate to the main shell by a flexible expansion fitting consisting of annular plates 26 and spacer rings 27.

234,886. Empson, A. W. Feb. 29, 1924.

Heating liquids. — Oil to be purified is first subjected to intimate contact with hot water, and then to centrifugal action to separate water and other impurities. Water is supplied through a pipe 17 and 3-way cock 15 to a tank 1 fitted with electric heaters 4, and oil is sprayed through perforated pipes 5 below the water level, passes upwards, and eventually leaves the tank by a pipe 18, 3-way cock 20, and pipe 22 leading to the separator. The oil spray pipes are connected with a manifold 7, and their free ends are fitted with detachable caps or plugs to facilitate cleaning. At starting, water is supplied until the level in the tank is above the normal 2 so that sufficient hot water may be pumped through pipes 19 and 22 to the separator in order to heat the latter and to provide the necessary water seal. Water may be returned periodically from the separator to the pipe 17. Specification 224,935, [*Class* 91, Oils &c.], is referred to.

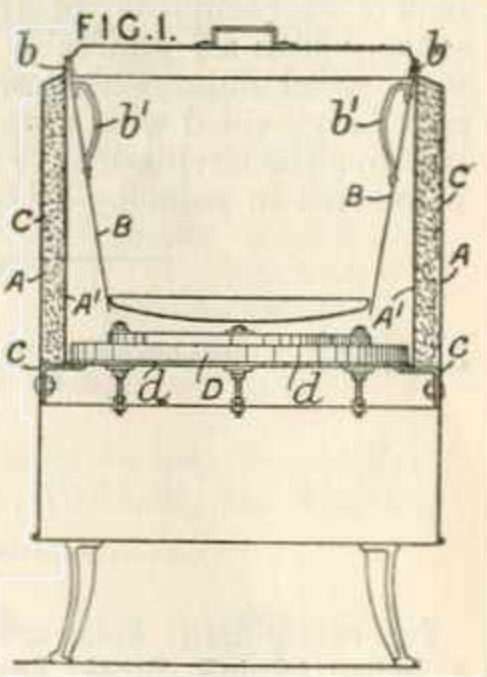
FIG. 1.



234,975. Kay, B. May 13, 1924.

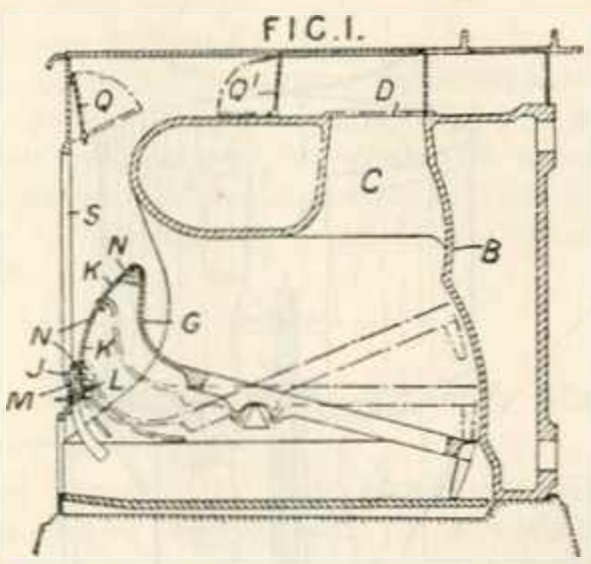
Washing-boilers.— An electric washing-boiler comprises an insulated outer casing, an inner tapered container having a rim which rests on the top of the casing and closes the annular heating chamber between the container and casing, and an electric heating element carried by the casing below and out of contact with the container. The casing A has a shell A^1 for holding insulating material C in position and has brackets *c* for supporting the heating element D the base *d* of which is solid and forms a complete closure of the bottom of the casing A. The inner container B is tapered and the beaded supporting edge *b* acts as a closure at the top of the casing. Handles b^1 are provided on the container.

FIG. 1.



235,005. Ure, G. A. June 17, 1924.

FIG. 1.

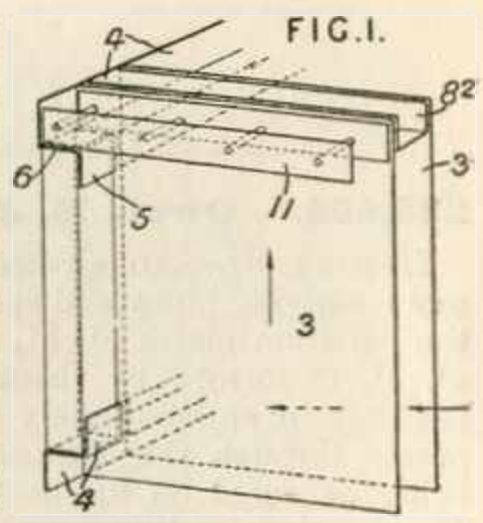


Internally-fired boilers.—A saddle boiler B used in a boiler-stove comprises dependent side members and a damper-controlled flue C through the top member.

235,149. Roszak, C. June 5, 1924, [*Convention date*].

Heating air. — A heat-exchanger comprises plates 3 supported by angle-pieces 4 two of which only are shown in slots in the two parts 5, 6. These pieces 4 support in any one of the cells thus formed, distance pieces, two on opposite edges being channel-shaped as 8^2 and two ladder-like as 11. The distance-pieces are arranged to form through-ways at right-angles in adjacent cells. The plates are kept in position by an outside framework and spring-pressed end-plates.

FIG. 1.



235,308. Thompson, T. March 12, 1924.

Block-form boilers. — Cylindrical boilers 3, 4 extend from front to back of a kitchen range. They are provided with removable longitudinal baffles 15 which cause the water to traverse the length of the boiler four times in passing from the inlet 16 to the outlet 17. The two boilers may be connected in parallel or in series, and may be disconnected by means of a stop-cock 38. Either boiler may be isolated from the fire by a removable plate 37 acting in conjunction with a web 36 on the underside of the hot-plate. Another form of range described is provided with a pair of cylindrical boilers at each side of the fire-space, which are preferably formed with gilled outer surfaces. They may be provided with drop legs to improve the circulation, or may be connected in pairs by a box cover at their front ends, which joins them in series.

FIG.1.

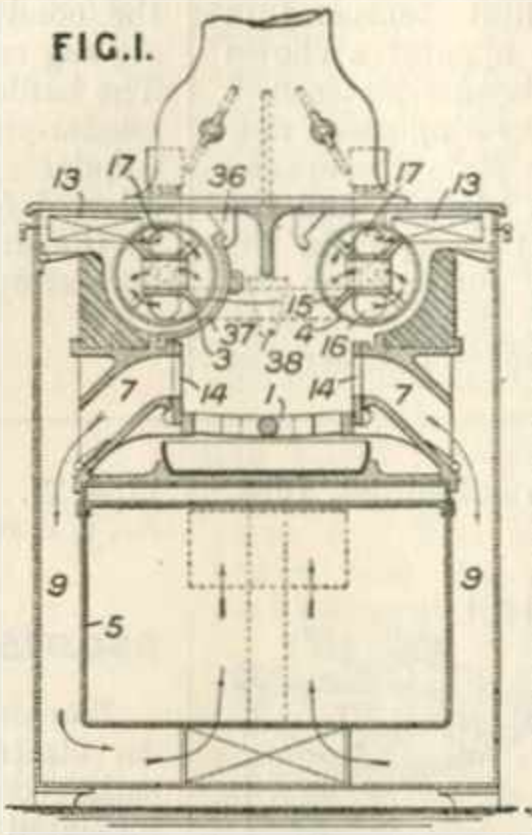
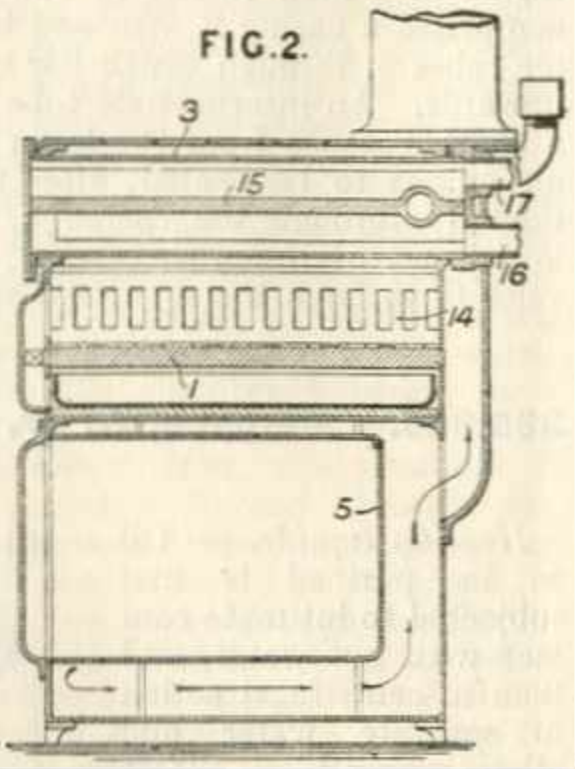


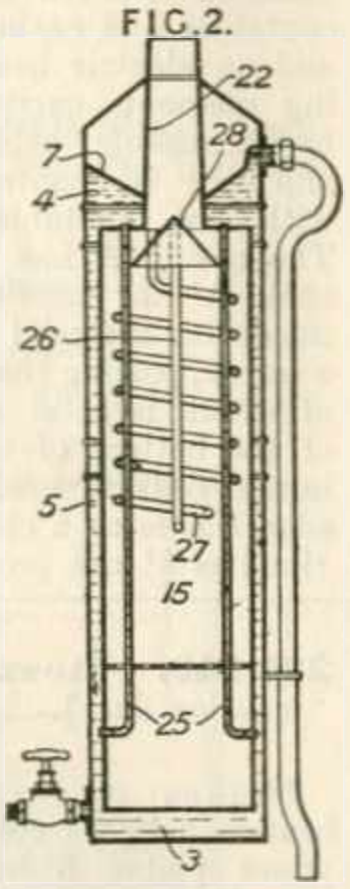
FIG.2.



235,343. Hichens, E. L. April 16, 1924.

Internally-fired boilers.—A boiler having upper and lower water spaces 4, 3 connected by an annular space 5 enclosing a combustion chamber 15, is provided with an upper conical wall 7, a series of water tubes 25, 26, 27 and a baffle 28 disposed within the combustion chamber beneath the chimney 22.

FIG.2.



235,498. Owen, B. J. March 5, 1924.

Heating air.—An air-heater comprises one or more sinuous pipes e disposed so as to traverse the partition plates b^1, b^2, and the compartments c^1, c^2, c^3 formed by them, successively and repeatedly in approximately parallel formation. Air passes through the compartments in succession, being deflected on to the pipes by baffles as k^2. Any heating medium may flow through the pipe e, but preferably an oil burner f supported by a bracket f^1 supplies hot gases forced into the pipe by a blower f^2.

(*For Figures see next column.*)

235,498.

FIG.1.

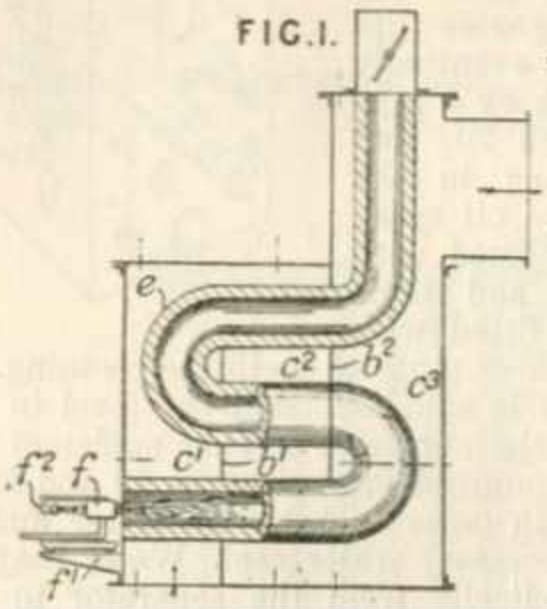
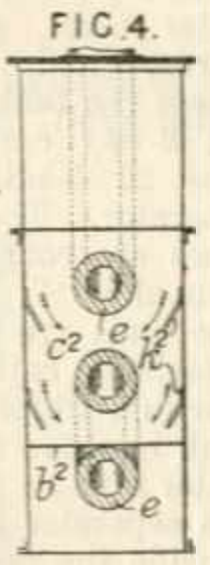
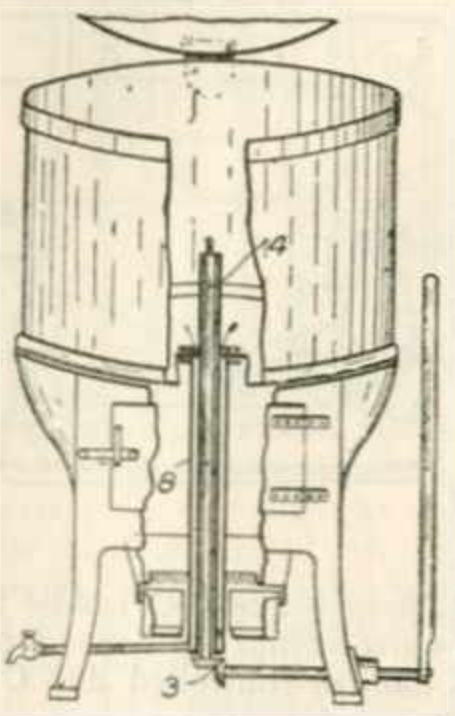


FIG.4.

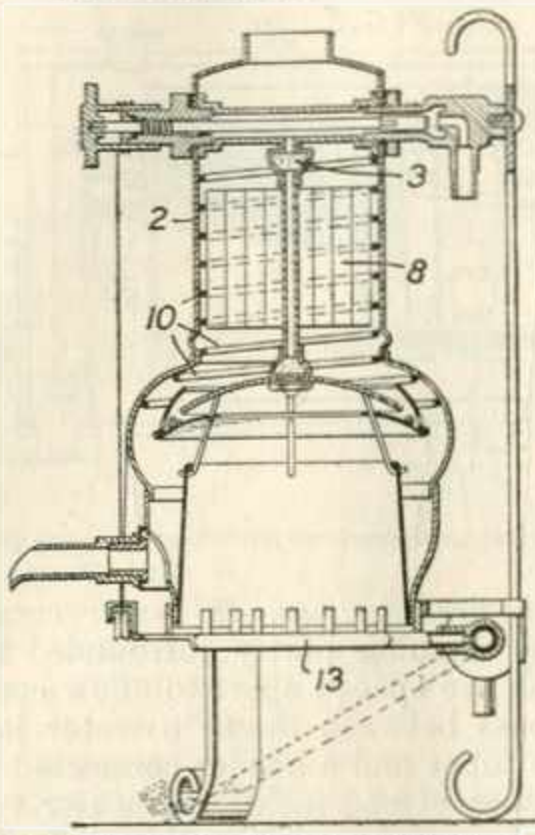


235,775. Bachrach, H. Nov. 20, 1924.



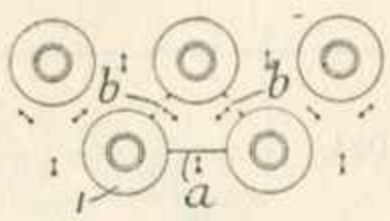
Washing-boilers.—A dolly for a washing-boiler with a furnace beneath it is driven by a shaft 4 and gearing 3 below the furnace, the shaft being enclosed by the vertical annular discharge pipe 8 traversing the furnace.

235,799. Smith, T. H., and **Smith, C. H.** April 17, 1924.



Heating water.—A direct-contact water-heater comprises a casing 2 having a water distributor 3 at its upper end, a tower 8 formed from a mass of twisted strip or wire, and a metal strip or wire 10 disposed between the casing and the tower, all conveying the water downwardly in contact with the uprising hot gases from a burner 13.

235,963. Bell, J. E. March 27, 1924. *Addition to* 200,060.



Feed-water, heating.—In a steam generating plant as described in the parent Specification, an economizer section comprises tubes with corrugated envelopes disposed in staggered relationship in rows transverse to the gas flow, the tubes being so spaced that the mean width *a* of the gas passage between two adjacent tubes in the same row is about equal to twice the mean width *b* between two adjacent tubes in adjacent rows.

235,990. Lambert, A. J., and **Kerr, G. C.** April 16, 1924.

Boilers.—A plurality of cells 10, 11 containing liquid are arranged side by side in a horizontal layer or layers and are connected together by passages 17 - - 30 of small capacity in such a manner that the liquid passes successively through all the cells. The cells are so proportioned that the depth of each cell is not greater than its diameter or the length of its greatest dimension if non-circular. The lid of each cell is in contact with or very close to the surface of the liquid. Sets of cells and their interconnecting passages

FIG. 1.

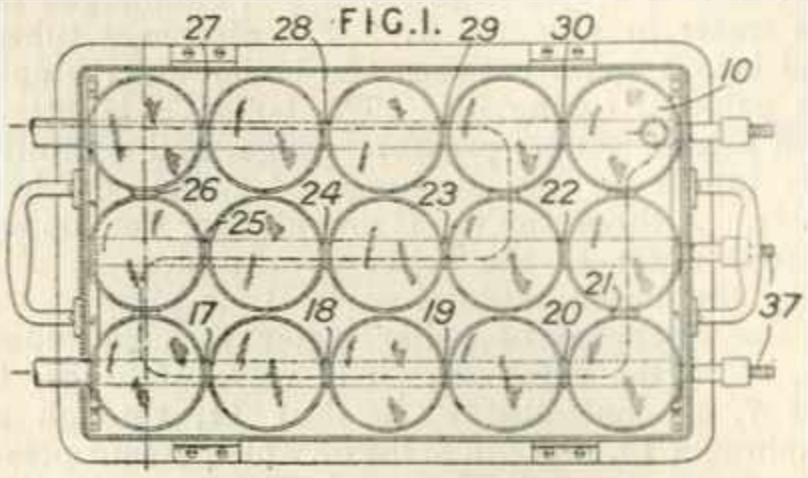
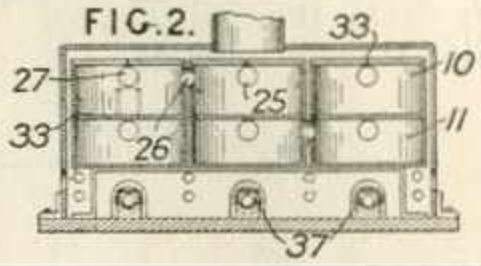


FIG. 2.



may be formed in one piece as a die-casting. In the example shown, the cells 11 in the lower layer fit upon the base of the cells 10 in the upper layer and are heated by burners 37. A vent-hole 33 is provided in each cell. In a modification the cells are lozenge-shaped in plan, those in the lower layer being staggered relatively to those in the upper layer.

Reference has been directed by the Comptroller to Specifications 15541/91, 17614/01, *and* 163/05.

236,090. Riva, O. B. July 2, 1924, [*Convention date*].

FIG. 8.

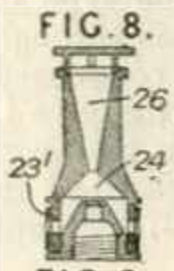


FIG. 6.

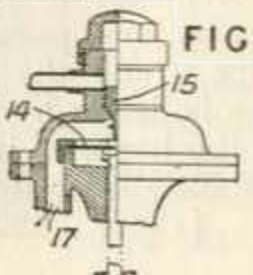


FIG. 7.

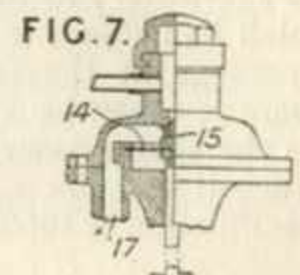
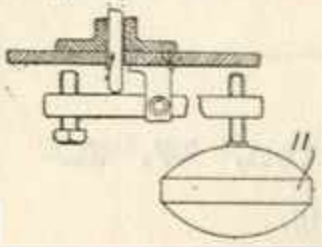


FIG. 9.



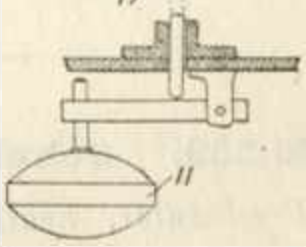
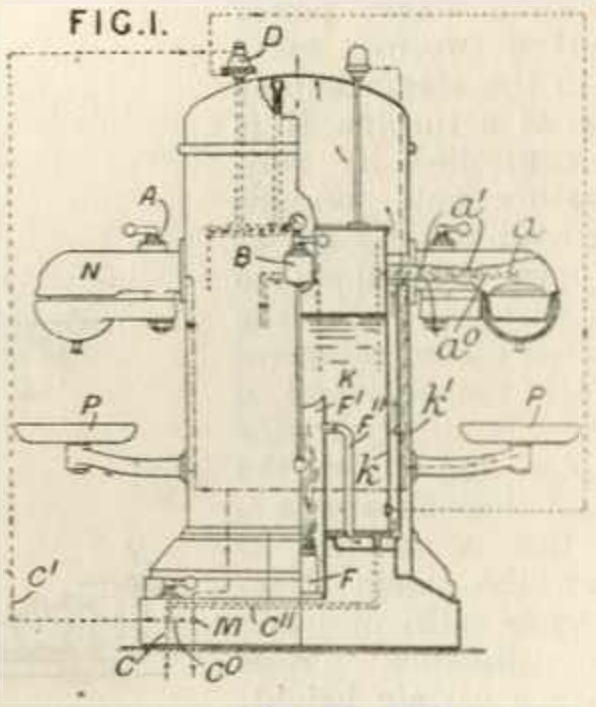


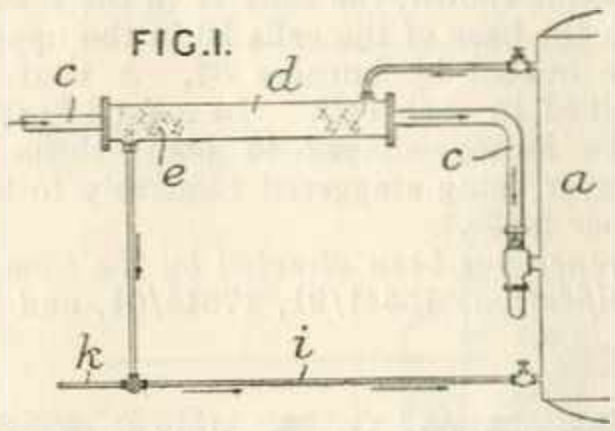
FIG. 1.



Internally-fired boilers.—Apparatus for the preparation of coffee by infusion comprises a source of heat F, enclosed in a combustion chamber F^1, provided with discharge tubes F^{11}, submerged in the water in a boiler K. The discharge tubes lead into a space between the boiler walls *k* and the external casing k^1. The boiler K is fitted with a level gauge, pressure gauge, and a multi-way tap B for the discharge of steam or hot water. A three-way tap C provides for the supply of feed water to the boiler by the pipes *c*, c^{11}, or by the automatic-inlet valve D via pipes *c*, c^1, or the discharge of boiler water through pipes c^{11}, c^9 to the sump M. The valve 15, Figs. 6 and 7, is controlled by a float 11, through a diaphragm 14, on both sides of which steam pressure from the boiler acts. Water enters the boiler through pipe 17.

236,115. Kemp, J. W. Jan. 12, 1925.

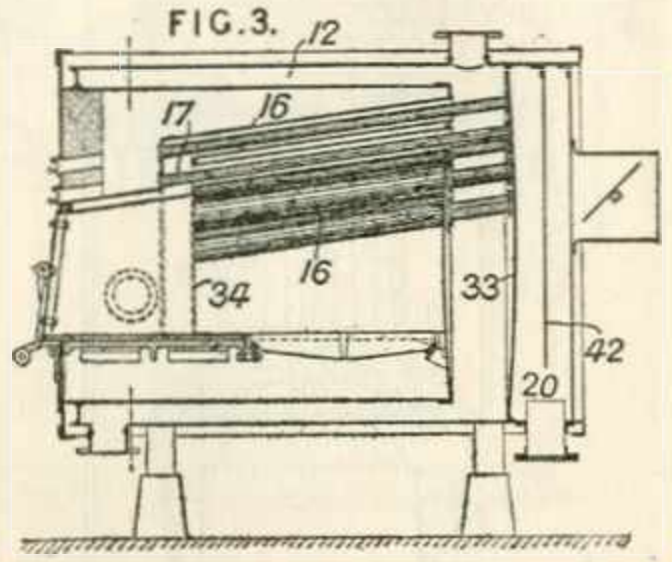
FIG.1.



Feed-water, heating.—A heater of the type in which live steam from the boiler *a* passes through a passage in the feed-pipe *c* and the condensed steam is taken back to the boiler as by the pipe *i*, has the steam passage in the heater *d* in the form of a coil or helix *e*, substantially as described in Specification 10501/02, [*Class* 123, Steam generators]. A branch *k* enables condensate to be discharged to a hot-well, if desired.

236,148. Huygen, F. C. June 26, 1924, [*Convention date*].

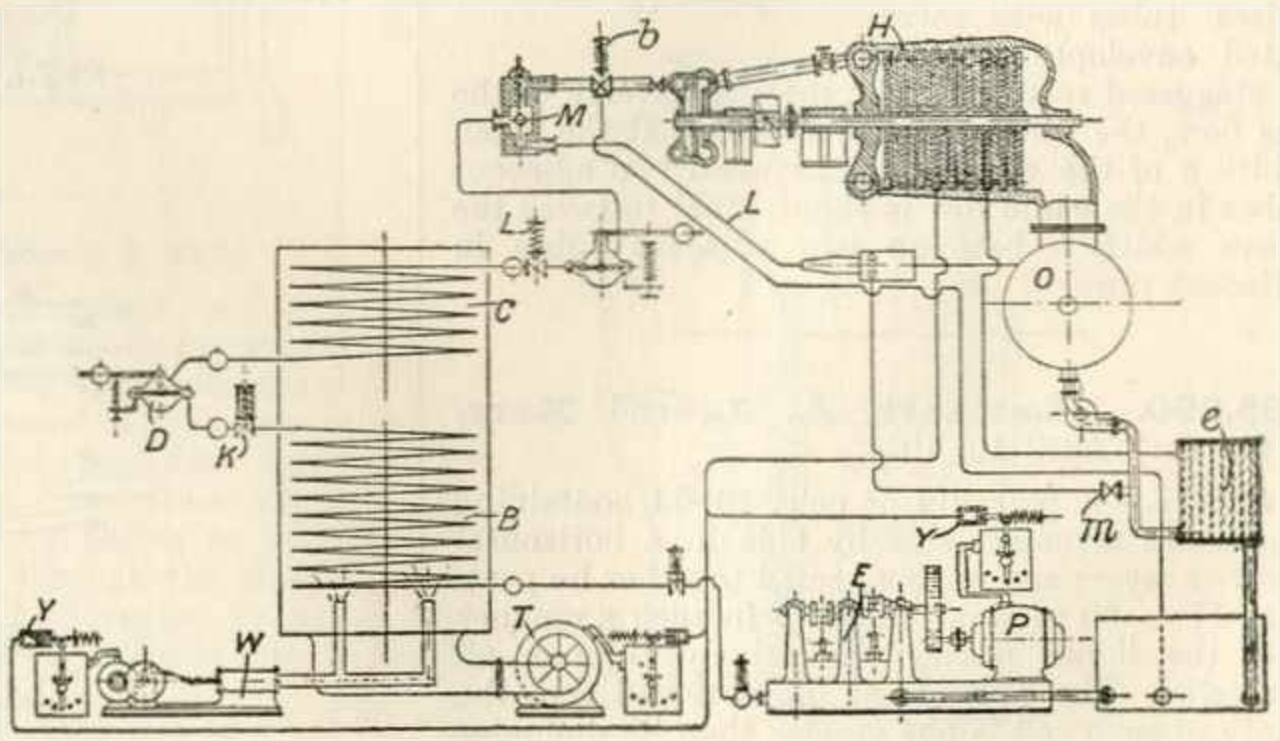
FIG.3.



Internally-fired boilers.—A boiler comprises a combustion chamber partly surrounded by water tubes which are spaced apart to allow combustion gases to pass between them, a water jacket enclosing the tubes and a header connected to them, and fire tubes placed inside the water tubes and adapted to convey the combustion gases from the space between the tubes and the jacket to the uptake. In a horizontal boiler for heating water, two rows of water tubes 16 around the upper part of the combustion chamber open into a front crescent-shaped water chamber 34 and into a rear circular water chamber 33. The chambers are in communication with the surrounding water jacket 12. The combustion gases pass forwardly through the fire tubes 17 inside the water tubes to the smoke box 20, which is fitted with a vertical baffle plate 42 directing the gases downwardly along the boiler rear plate.

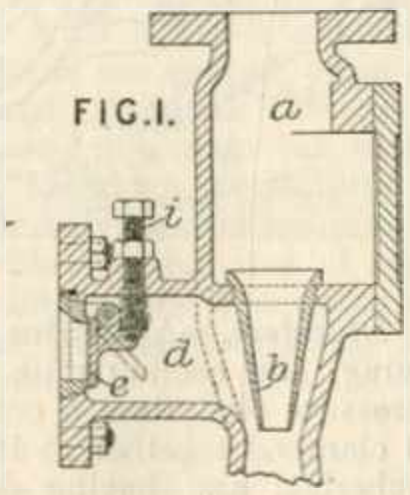
236,253. Johnston, W. A. March 4, 1924.

Feed-water, heating.—In a steam power plant a two-way valve M in the steam supply pipe of a turbine H is so controlled by temperature and pressure operated devices so as to open the supply to the turbine when the desired steam temperature is reached, and to close the supply to the turbine and divert the steam through a pipe L to the condenser O when the steam temperature falls, or when the pressure rises above a certain height.



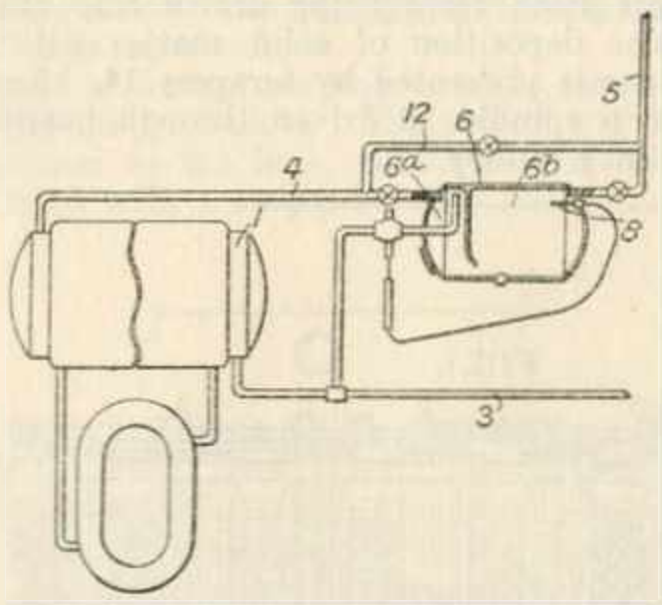
The condensate from the condenser O passes through a heater *e* supplied with steam from a stage of the turbine. Part of the condensate may be taken through a valve *m* and injected into the steam passing from the two-way valve into the condenser. A pressure relief valve *b* in the turbine supply pipe discharges into the hot well.

236,435. Hiller, E. G. Nov. 10, 1924.



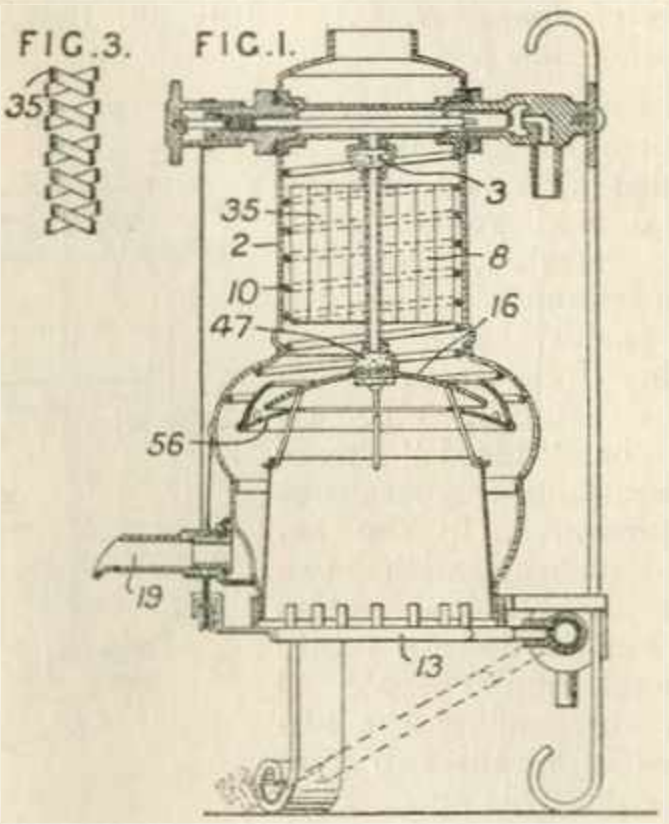
Feed - water, heating.—In a circulator for an economizer or feed - water heater of the kind comprising an injector device for drawing hot water from a part of the heater and mixing it with the cold supply water, a non-return valve for preventing supply water from passing into the inlet for the hot water is so mounted in the casing containing the injector device that they form a single unit. The casing comprises a cold water inlet chamber *a*, a nozzle *b* through which the cold water is delivered, and a hot water inlet chamber *d*, which surrounds the nozzle and which is fitted with a pivotally mounted non-return valve *c*. The opening of the valve may be variably limited by an adjustable screwed bolt *i*.

236,836. Bren, P. T. Jan. 27, 1925.



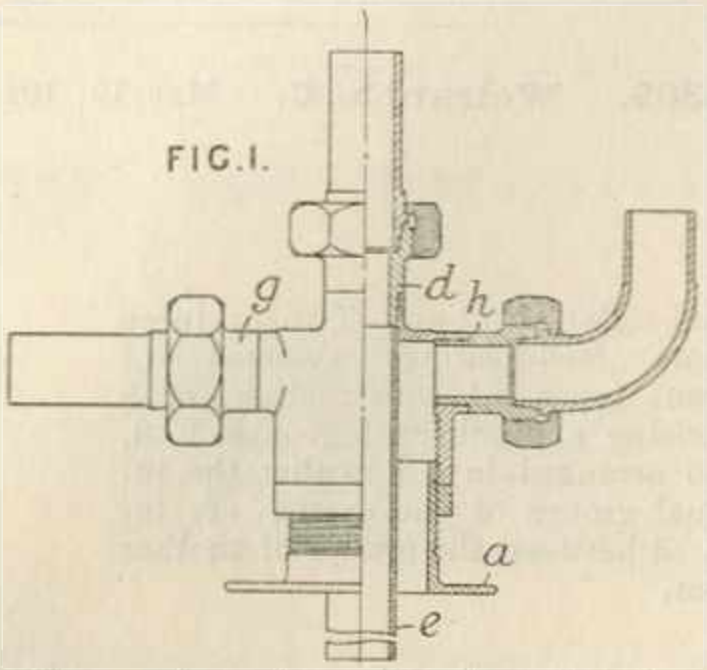
Heating water.—In warm-water supply plant, including a thermostatically-controlled addition of cold water to the delivery, a container 6 is provided, having a mixing-chamber 6ª connected to the cold-water supply 3 and a supply-chamber 6ᵇ connected to the delivery pipe 5, the thermostatic control means 8 being fitted as shown, outside the mixing-chamber, and operated by the temperature in the supply-chamber. A by-pass 12 in the hot-water pipe 4 from the heater 1 enables the mixing device to be cut out when desired.

237,012. Smith, T. H., and **Smith, C. H.** April 17, 1924.



Heating water.—Gases from a burner 13 rise between plates 56, 16 to mix with water falling from a distributor 3 over a series of vertical members 35, each composed of metal strip or wire bent into open coils, for example, double coils as shown in Fig. 3. A second distributor 47 may be provided to cool the plate 16. Heated water falls into an annular space surrounding the burner and is discharged therefrom through the spout 19. The central tower 8 made up of the coiled strips may be spaced from the outer casing 2 by a helical strip or wire 10.

237,470. Taylor, C. Oct. 29, 1924.



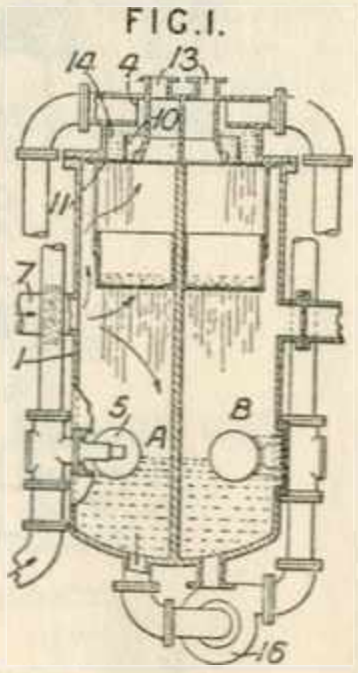
Heating water.—A combined union for hot-water tanks comprises a coupling *a* secured centrally in the upper end of the cistern, a central

...ter *d* connected to the cold-water supply and having an extension pipe *e* passing through the tank to the bottom. Other unions *g*, *h* are connected to the flow pipe from the boiler and the service pipe respectively.

237,564. Griscom-Russell Co., (Assignees of *Jones, R. C.*). July 28, 1924, [*Convention date*].

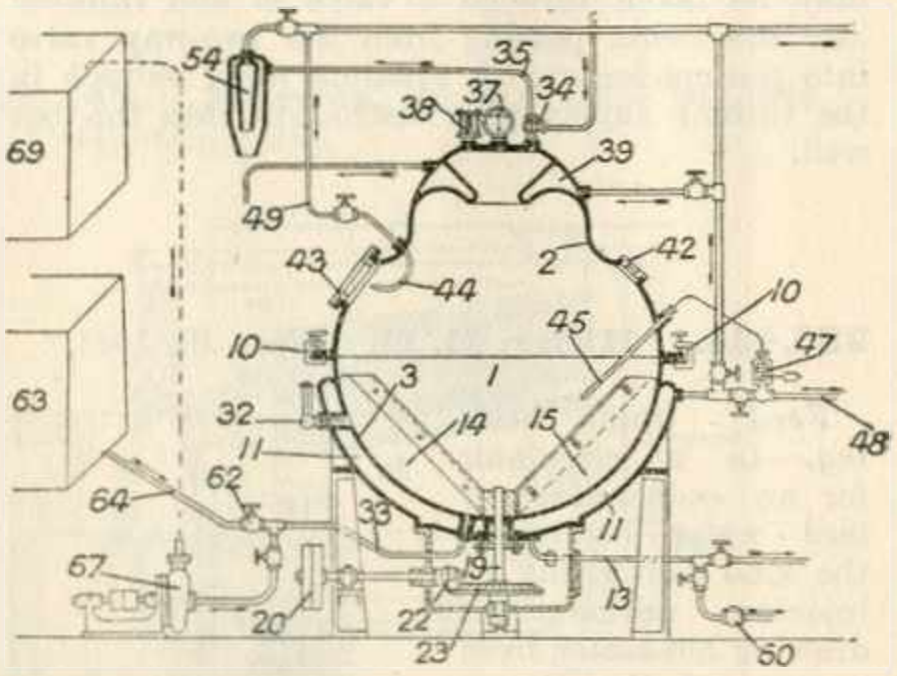
Feed-water, heating.—A direct-contact heater is provided with two or more vertical and radial partitions forming compartments through which the feed passes, being heated therein by steam from various sources, e.g. exhaust or "bleed" steam at increasing temperatures and pressures. In the example shown, with two compartments, feed enters at 4 and is delivered into the semi-circular space 14 partly surrounding the air-escapes 13 for the two compartments. This space 14 is further divided by a semi-circular partition 10, the perforated plate 11 thus causing a screen of falling water about the exit 13, even if only a small quantity of water is being fed. Steam enters at 7. Supply of water is regulated by a float 5, and the heated water is fed from one compartment A to the next B at a higher pressure by a pump 16, the operations being repeated therein with a fresh supply of steam. In a modification, the compartments may operate in parallel instead of successively.

FIG. 1.



The Specification as open to inspection under Sect. 91 (3) (a) comprises also a modification in which the compartments are superposed, being connected by pipes having pumps therein or loop arrangements for gravity feed from one to the next. This subject-matter does not appear in the Specification as accepted.

237,899. Armitage, F. L. Aug. 2, 1924, [*Convention date*].

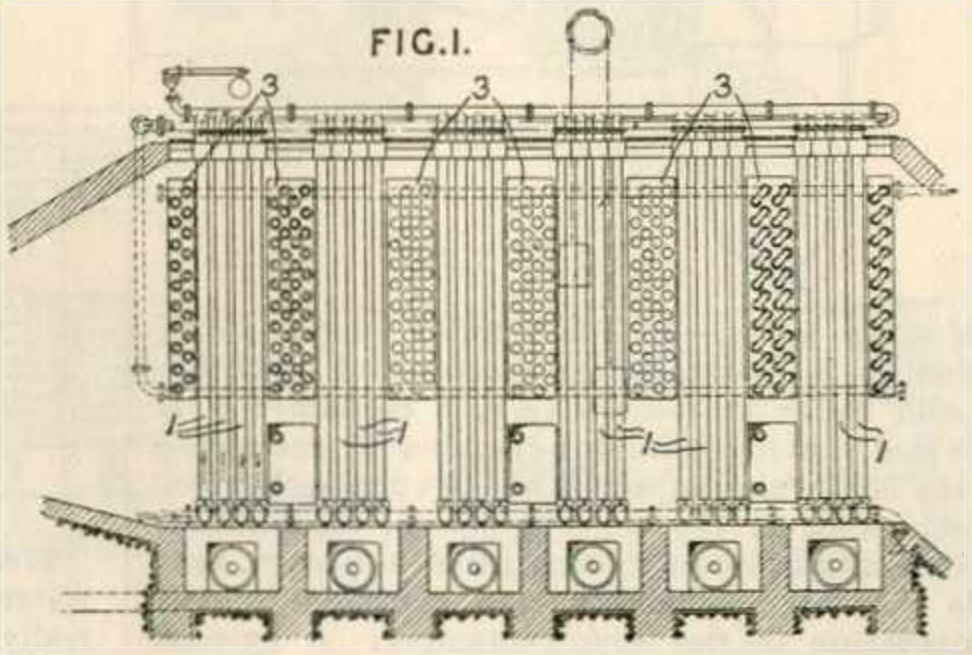


Digesters.—Apparatus for pasteurizing, deodorizing, and cooling milk or cream under reduced pressure comprises a container 1 in two parts 2, 3 clamped together at 10, the part 3 being hemispherical and having double walls enclosing a heating and cooling space 11. Steam is supplied to the space 11 by a pipe 48 and escapes through a pipe 13, 60; the steam supply is regulated by a thermostat 45 controlling a valve 47. For cooling, the steam is replaced by cold water or brine. The reduced pressure is applied by an injector 54 connected with the container 1 by a pipe 35. The container 1 is filled through pipes 64, 33 under the influence of reduced pressure, and is evacuated through the pipe 33 by a pump 67. A pressure-gauge 37, a low-pressure safety valve 38, a thermometer 32, and glass-covered inspection ports 42, 43 are provided, the cover of the port 43 being cleaned by a spray from a glass pipe 44 connected with the water-supply system 49. An annular water-cooled baffle 39 prevents froth from being drawn into the pipe 35. The deposition of solid matter within the container is prevented by scrapers 14, 15 revolving on a spindle 19 driven through gearing 22, 23 from a pulley 20.

238,309. Weirauch, C. May 19, 1924.

Feed-water, heating.—Two or more separate feed-heating systems of different types of construction, each comprising a number of groups 1, 3, are so arranged in a flue that the individual groups of one system are interposed between the groups of another system.

FIG. 1.



238,510. Sacerdote, S. Aug. 14, 1924, [*Convention date*].

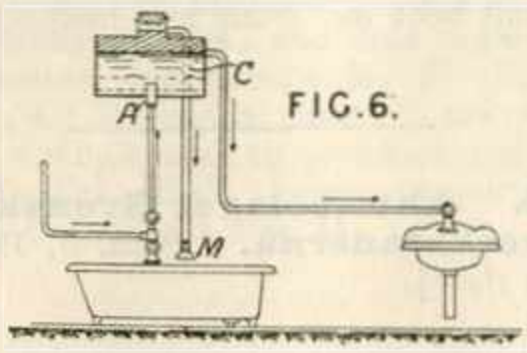


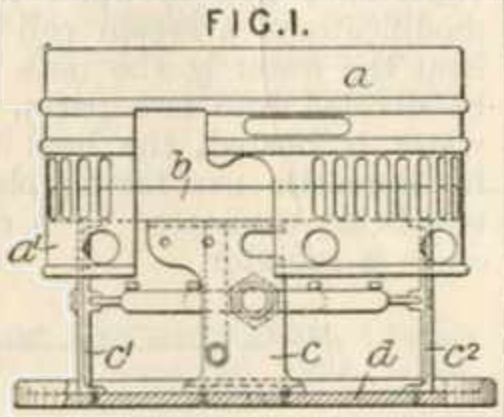
FIG.6.

Heating water.—The hot-water tank of a supply system is provided with a small auxiliary outlet pipe for intermittent use. Cold water is admitted to the bottom of the tank through a valve-controlled pipe A, and the main hot water supply, e.g. to a bath, is drawn off through a large pipe M. A smaller valve-controlled pipe C leads to a basin or the like, so that loss of heat due to the frequent cooling of the hot water in pipe M is avoided. The water is heated by an electric resistance element.

238,678. Barralet, J. H., and **New Geysers, Ltd.** July 24, 1924.

Geysers. — The main body *a* of the geyser is supported above the base plate *d* by means independent of the separate slotted lower portion or fret a^1 which surrounds the burner. The supporting means may include a condensation ring *b* on legs *c*, c^1, c^2, the part a^1 being adapted to slide upwards for cleaning the base-plate. The slotted part a^1 may be secured to the legs and have a hinged door connected with a swing burner.

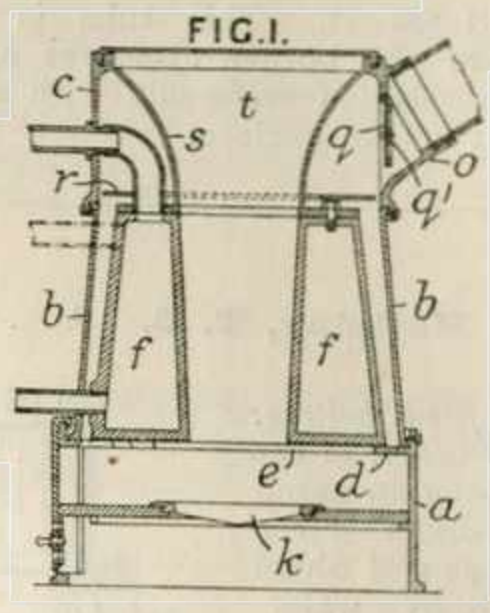
FIG.1.



238,968. Jones C. E. Arengo-. June 2, 1924.

Boilers.—A water-heater of the type comprising an annular boiler *f* arranged over a grate *k*, the centre space of the boiler forming a fuel-magazine, and the combustion products passing up round the outer wall, is provided with a removable sleeve *s* and a baffle-ring *r* resting on top of the boiler, thus forming an annular flue to which the combustion product outlet *o* is connected and also a hopper *t* for the fuel. The boiler is removably supported on lugs *d* projecting from a flange *e* on the base section *a* of the stove body. In a modification the boiler is of

FIG.1.



elongated form in plan, consisting of semicircular end sections with interposed straight side members.

239,026. Hardy, J. A. May 1, 1925.

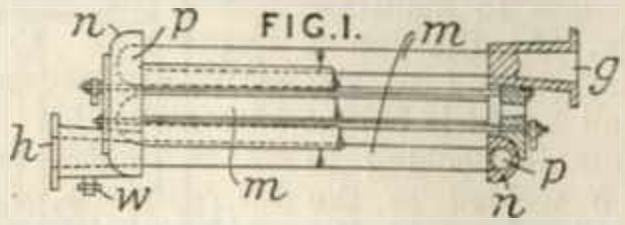
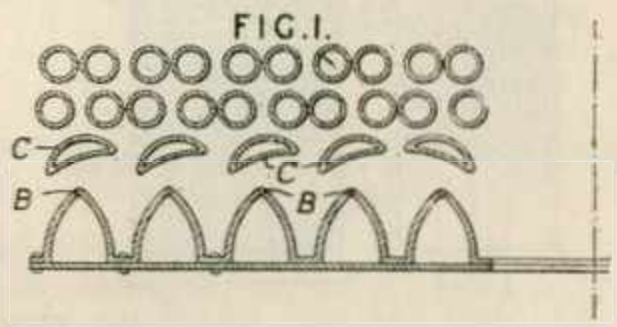


FIG.1.

Feed-water, heating.—A heater of the type arranged in the steam or water space of a boiler at or about the water level comprises a number of spaced parallel tubes *m* closed at their ends by a pair of headers *n*, one header having an inlet *g* and the other an outlet *h*, passages *p* being provided in the headers to connect alternate pairs of tubes together to form a continuous conduit or conduits running alternately backward and forward through the heater. The outlet is connected to a tube leading to the lowest part of the boiler water space. A short depending pipe *w* may be provided from the outlet port to allow of a circulation when feed is not entering the boiler.

239,038. Taylor, W. Martin-. Aug. 19, 1924.

FIG.1.

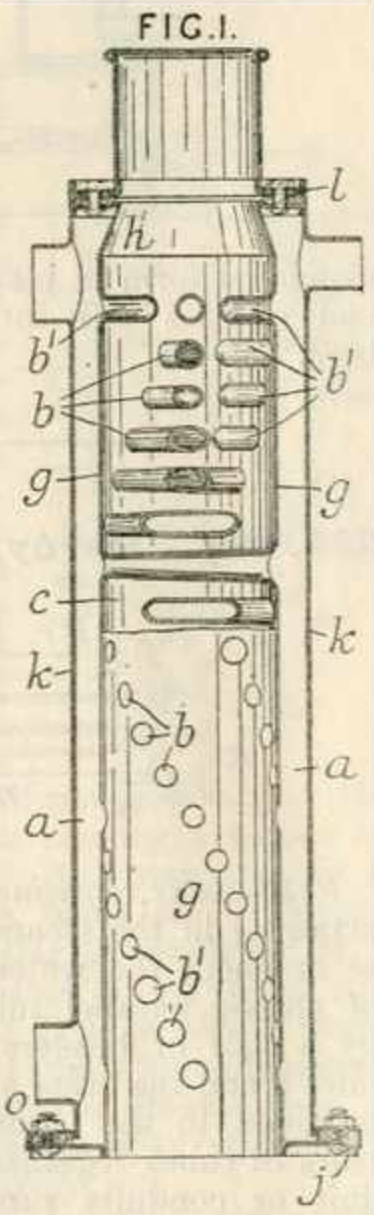


Water-tube boilers. — In boilers of the type described in Specifications 22370/07 and 117,529 the tube C constituting the lowest spiral is formed so that condensate may drip clear of the

burner apertures B. This tube is disposed directly above the burner apertures and is of flattened cross-section preferably with a concave or re-entrant under surface.

239,040. Halliday, T. E. Aug. 23, 1924.

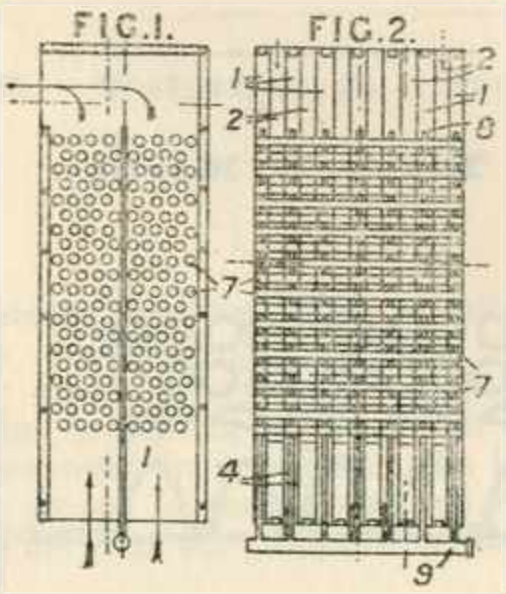
FIG.1.



Internally-fired boilers. —In a water heater of the type comprising an annular water-chamber *a* the central fire-box *c* of which is traversed by water-tubes *b* spirally arranged, these tubes are tapering in form. Additional close-ended tubes b^1 may be fitted projecting into the flue space *c*. The walls of the jacket *k* may be fitted at top and bottom with rings having up-turned edges to facilitate assembly. At the top a ring *l* is welded to the outer wall *k* and is bolted with suitable packing to a ring *h* welded to the inner wall *g*. At the bottom a ring *o* on the outer wall is bolted to a ring *j* secured to the inner wall. The heater may be used as a by-pass heater in an ordinary domestic water system, or may be used as a geyser.

239,042. Solomiac, E. J. E. Aug. 27, 1924.

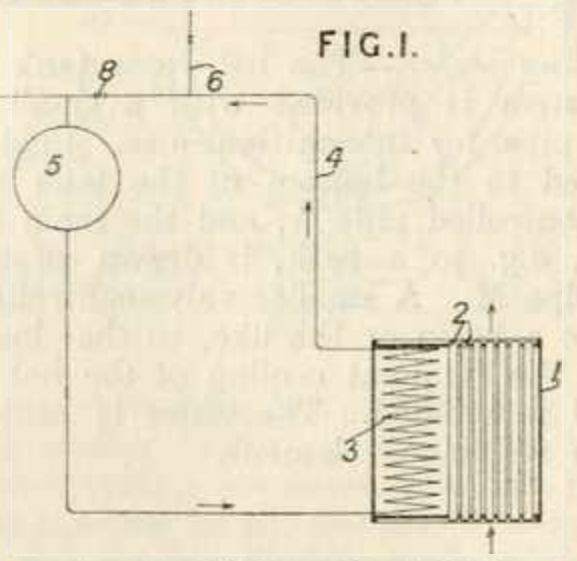
FIG.1. FIG.2.



Heating air.—A casing is divided by iron plates 4 into parallel compartments which are traversed by tubes or bars 7 preferably of copper, disposed in a staggered arrangement. Heating medium, such as hot gases, passes up alternate compartments 1, the others 2 conveying air to be heated, in a counter-current direction. Perforated tubes 8 connected to a heater 9 may be provided for blowing out soot &c. from the heating compartments.

239,530. Aktiebolaget Svenska Järnvägsverkstaderna. Sept. 5, 1924, [*Convention date*].

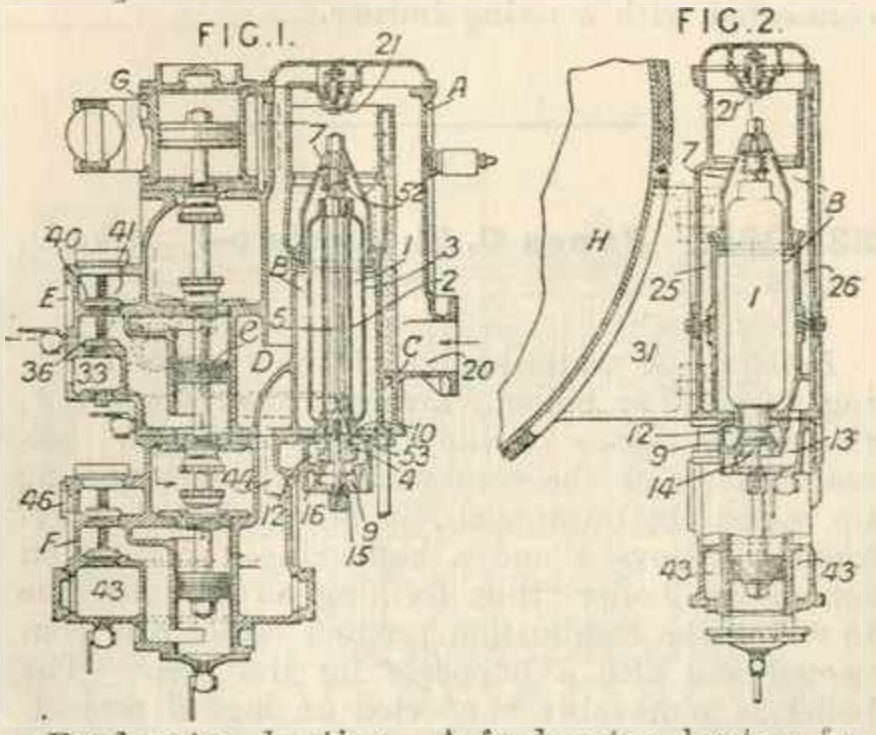
FIG.1.



Heating water. — Water, heated for example by hot gases passing through flues 2 in a tank 1, transfers its heat to water for domestic purposes passing through a coil or coils 3 in a circuit including a storage tank 5. Service pipes 6 leading from the riser pipe 4 and a valve 8 prevents back flow of water from the tank 5. In modifications a steam coil may also be used to heat the water in the tank 1, or the tank 1 may be divided into two parts, in one of which the water is heated, the heat transfer to the water for domestic use taking place in the other, the two being connected by a circuit which may include a radiator.

239,838. Worthington Pump & Machinery Corporation, (Assignees of *Le Cain, J. A.*). Sept. 12, 1924, [*Convention date*].

FIG.1. FIG.2.

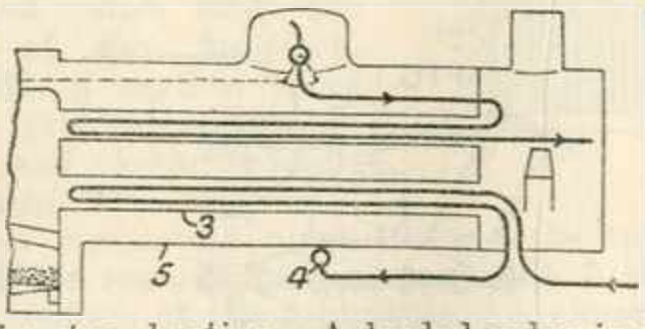


Feed-water, heating.—A feed-water heater for locomotive use comprises a heat exchange

chamber A receiving steam from a connection 20 and cold water from one or more spray nozzles 21, a float chamber B, a storage chamber C, a cold water supply chamber D communicating with the spray nozzles, and cold water supply, and hot water feed pumps E, F. The chambers A, B, C, D, and a pump E are preferably formed of a single casting to which the pump F is secured, the whole being supported by a bracket 31 from the boiler H.

240,113. Muchka, J. Sept. 17, 1924, [*Convention date*].

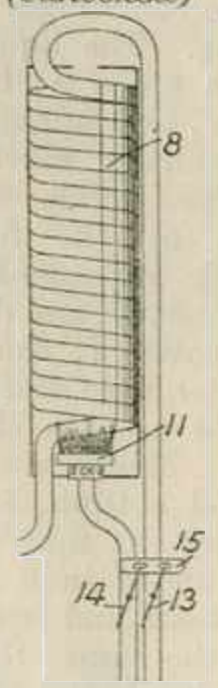
FIG.1.



Feed-water, heating.—A loaded valve is placed between a smoke gas feed-heater and a boiler to maintain a pressure in the heater above that in the boiler. The heater is kept full of water and does not communicate with the boiler steam space. The water supply to a feed-heater arranged in the smoke-tubes of a locomotive is controlled by the engine valve-gear, and the feed pump forcing the water through the heater is driven by the engine rod-work, as described in Specification 189,093. In a stationary boiler, the supply is so controlled as to keep the boiler water-level constant. The water may be preheated in an open exhaust steam feed-heater. Feed-water forced through a feed-heater arranged in smoke-tubes 3 enters the boiler 5 through a spring-loaded valve 4.

240,179. Deltheil, R. E. G. Sept. 18, 1924, [*Convention date*]. *No Patent granted (Sealing fee not paid).*

FIG.2.
(Cancelled)



Portable and small liquid-heaters. — The Specification as open to inspection under Sect. 91 (3) (a) comprises a water-heater for use in washing dishes and consisting of a coil 8 through which the water passes, the coil being heated by a Bunsen burner 11. Hand-levers 13, 14 controlling, respectively, the supply of water and gas are connected together by a slotted rod 15 so that the coil cannot be heated when empty. This subject-matter does not appear in the Specification as accepted.

240,417. Cochrane Corporation, (Assignees of *Gibson, G. H.*). Sept. 26, 1924, [*Convention date*].

FIG.1.

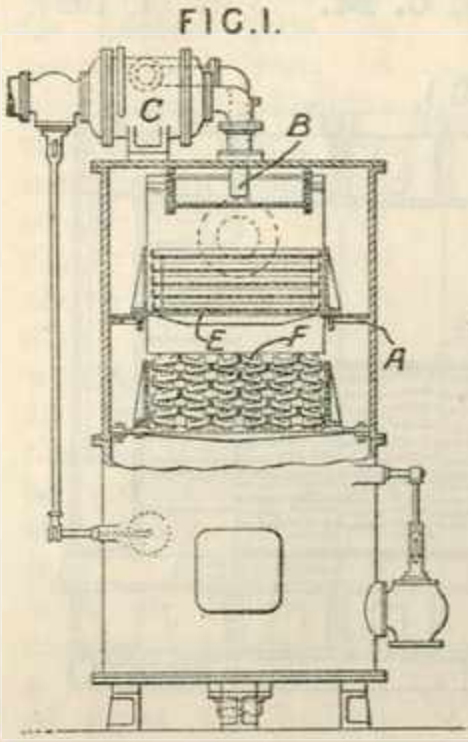
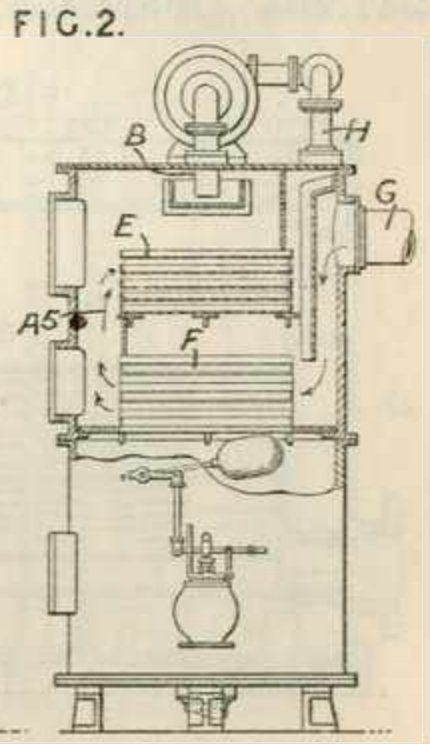


FIG.2.



Feed-water, heating.—Water is heated and de-aerated by the direct contact of steam, which first flows in superposed horizontal streams through a de-aerating compartment and then passes together with liberated air to a heating compartment, from which the air and remaining uncondensed steam are withdrawn. A tank A contains upper and lower groups of trays or baffles E, F, over which water admitted at the top of the tank through a pipe B flows in divided streams. Steam admitted from a pipe G is directed downwardly to the lower trays, from which it passes upwardly through a duct A^5 to the upper trays. Uncondensed steam and liberated air are taken off through a pipe H and led through a tubulous heat-exchanger C in the water-supply pipe. The trays F are slightly inclined and are formed with ribs for retarding the flow of water. In a modification, the heating steam is generated from the de-aerated water collecting in the bottom of the tank, the collected water being heated by tubular apparatus supplied with steam bled from a turbine.

240,501. **Marks, E. C. R.,** (*Peoples Savings & Trust Co. of Pittsburgh*). March 25, 1924.

FIG.1.

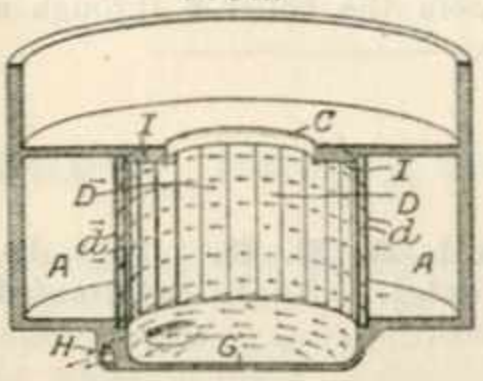
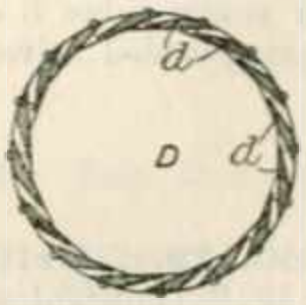


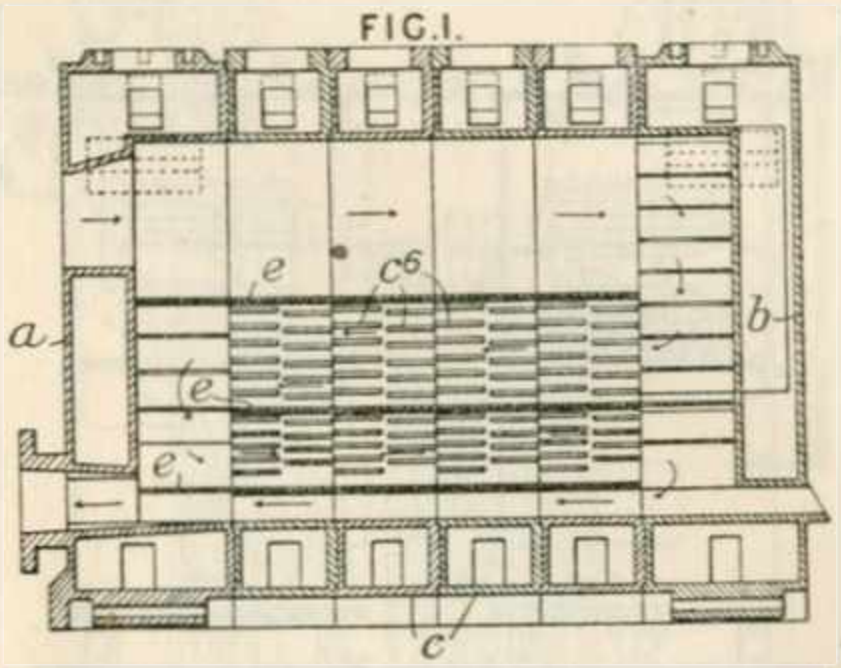
FIG.2.



Feed-water, heating.—A non-rotary apparatus for the centrifugal treatment of fluids is used for heating. The liquid or gas to be treated is led from a space A, Fig. 1, through a ring of long, narrow, overlapping blades *d*, Fig. 2, which give it a whirling movement in the space D. The contained solids or heavier components are received by the fixed bowl G and discharged through a tangential duct H, while the lighter constituents are delivered through an outlet C in a cover I, the opening C having a smaller diameter than the bowl G. A unit of this kind may be used in the feed water line of a steam boiler. Modifications are provided with bowls at top and bottom, and additional outlets; a serial arrangement may be used. The apparatus may be arranged in a boiler and adapted to receive both steam and feed-water for rectifying and purifying the same, the feed-water being introduced at the lower end of the ring of blades, and being raised to boiling temperature by the whirling steam. Specifications 24253/06, 6206/12 and 203,395, [all in *Class* 23, Centrifugal machines &c.] are referred to.

241,264. Pattison, C. M. July 14, 1924.

FIG.1.

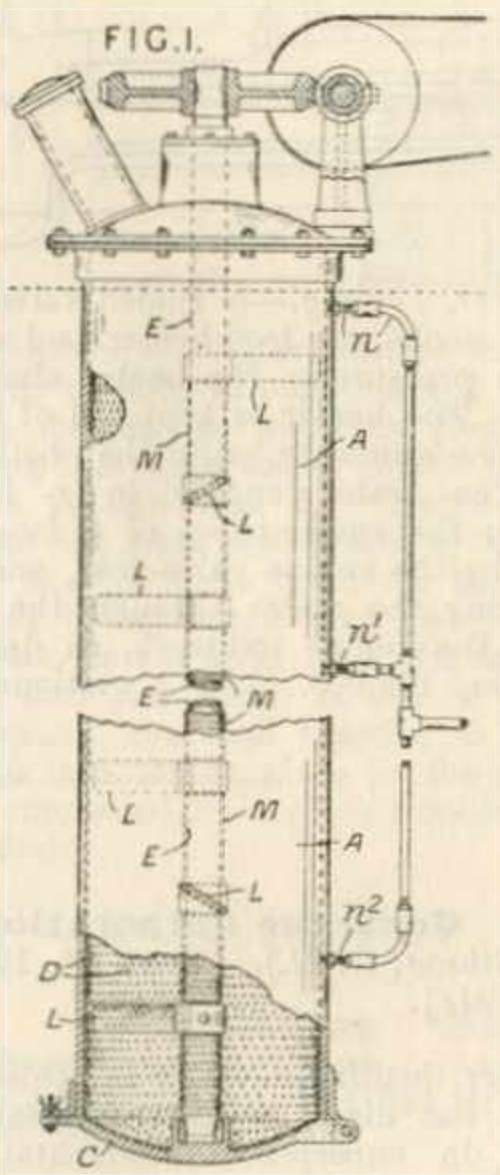


Heating water; internally-fired boilers. — A boiler, which may be heated by products of combustion from an external source, is constructed preferably in sections *a*, *b*, *c*, and comprises a box-like water-jacketed chamber having a series of partitions *e*, arranged in staggered relation to provide a tortuous path for the heating gases, and a multiplicity of heat-absorbing fins or webs c^6. The fins may taper and project between the fins on the opposite side and may also be inclined instead of horizontal as shown in the Figure. Specification 219,067 is referred to.

Reference has been directed by the Comptroller to Specifications 21617/11, [*Class* 123 (ii), Steam generators], and 191,946.

241,298. Downs, C., and **Bellwood, R. A.** July 22, 1924.

FIG.1.



Digesters.—Apparatus for the treatment of palm fruit &c. to remove and soften the fibrous covering comprises a long cylindrical container A in which rotate beaters on a shaft E, the container being provided with a lining or inner surface of a grater or other abrasive character; the beaters are similarly formed and rasp-like sleeves M are provided on the shaft E. The container is supplied with steam by branched pipes *n*, n^1, n^2, and the bottom C, provided with a shaft bearing is pivoted. The liner D, blades L, and sleeves M may be formed of pierced or expanded metal.

241,712. Geveke, H. L. Oct. 24, 1924.

Water - tube boilers. — In a central heating system of the kind in which the boiler is located in one of the fire-places, the boiler is built up entirely of a number of heating tubes forming vertical front, rear, and side walls 4, 3, and 14 respectively enclosing the combustion space, and an horizontal bottom wall 9 serving as a grate, the boiler being adapted to be introduced as a self-contained unit into the cavity of the fire-place. The sets of vertical tubes 3, 14 preferably connect upper and lower collecting mains 2, 1 associated with the circulating pipes 10, and the tubes 4 connect the main 2 with a ring main 5 shaped to the contour of the firing-hole. A closer contact with the flames is obtained by bending the sets of tubes 3, 4 inwardly as shown. An adjustable slide is provided for regulating the draught and the distribution of heat to the room.

FIG. 2.

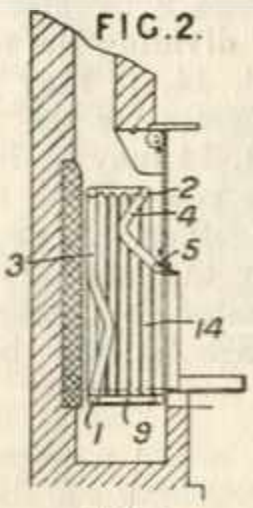
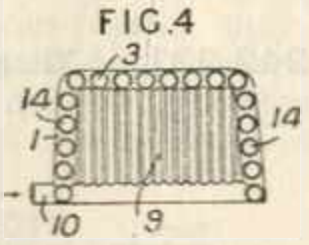
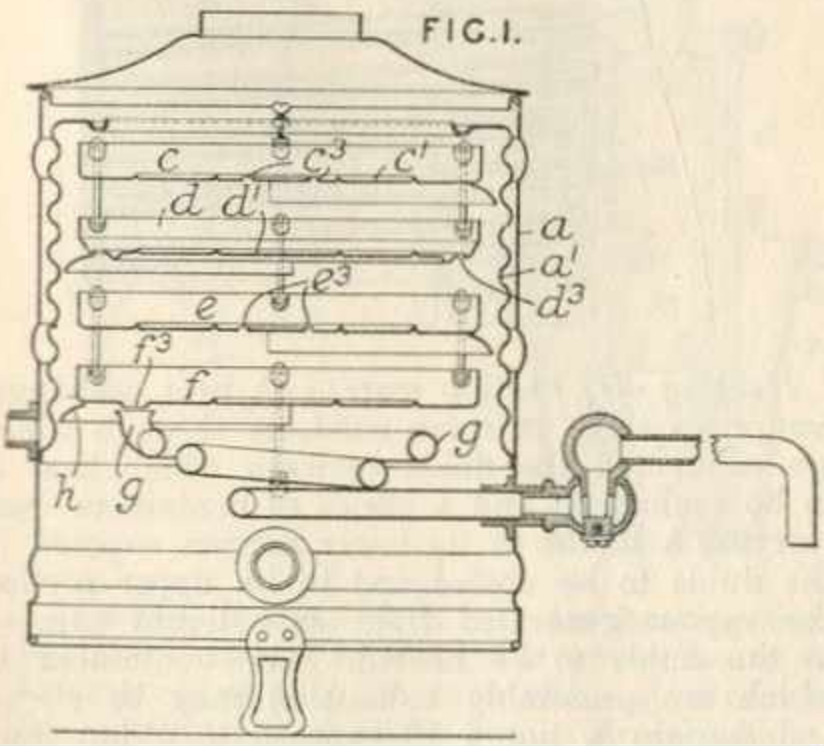


FIG. 4



241,727. Aldam, E. H. Nov. 13, 1924.

FIG. 1.



Heating water; geysers.—A corrugated lining a^1 forms, with the outer casing *a*, a water jacket for the heating chamber in which are a plurality of flanged trays *c* - - *f*, each having circumferentially arranged staggered ridges c^1 to break up the flow of water which is from the circumference to the centre and vice versa in alternate trays. Perforations c^3, d^3, e^3, preferably with upstanding edges, allow the water to drop from tray to tray while an aperture f^3 in the tray *f* registers with the end of a coiled pipe *g* forming the outflow. Baffles *h* cause the heating gases to pass between the trays.

241,939. Siemens - Schuckertwerke Ges., (Assignees of *Simmermacher, W.*). Oct. 24, 1924, [*Convention date*].

Feed-water, heating. — Boiler feed-water before entering a hot-water storage tank *b*, Fig. 1, is heated to a constant temperature by surplus boiler steam in a mixing device *c* comprising rows of opposite inclined nozzles *k*, Fig. 3, which are opened in turn by a slide *m* operated by a piston acted upon by steam or other pressure varying in accordance with the steam consumption. The pressure of the feed-water supplied to the mixing device by a pump *e* is maintained constant, and the boiler steam pressure being approximately constant, the respective opposite nozzles are so designed that the water is heated to the required constant temperature. The feed-water may be first heated by exhaust steam in a mixing device similar to that described.

FIG. 1.

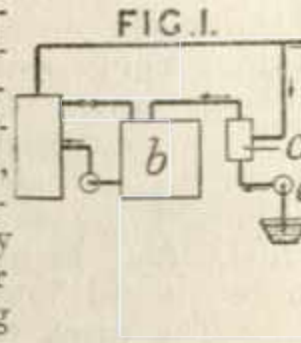
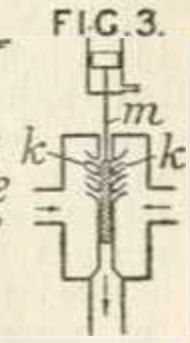


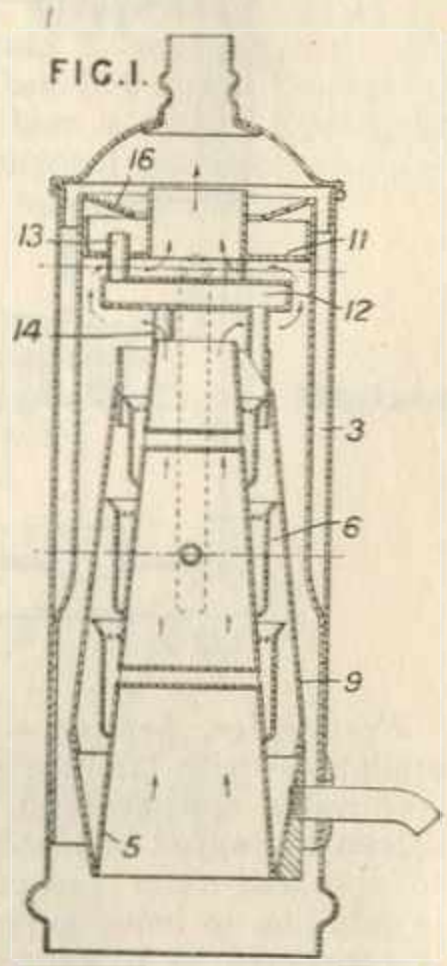
FIG. 3.



242,066. Reynolds, J. E. Oct. 27, 1924.

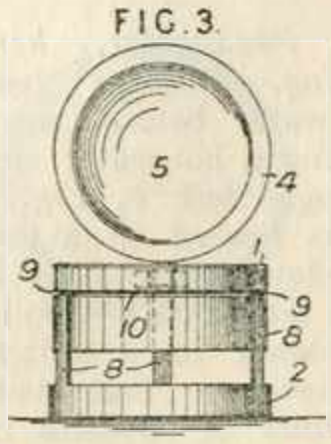
Geysers.—A geyser of the type having a conical central flue 5 round which are fitted cup-like rings 6 over which water to be heated falls in succession from a preliminary - heating member has this member in the form of a hollow baffle-plate 12 disposed above the flue 5. A dish 11 fed with water over the plate 16 from an outer heating-jacket 3 may be mounted above the baffle 12 and may communicate with it through a number of pipes 13, a further plurality of pipes 14 leading water to the uppermost ring 6. A cone 9 may surround the cups.

FIG. 1.



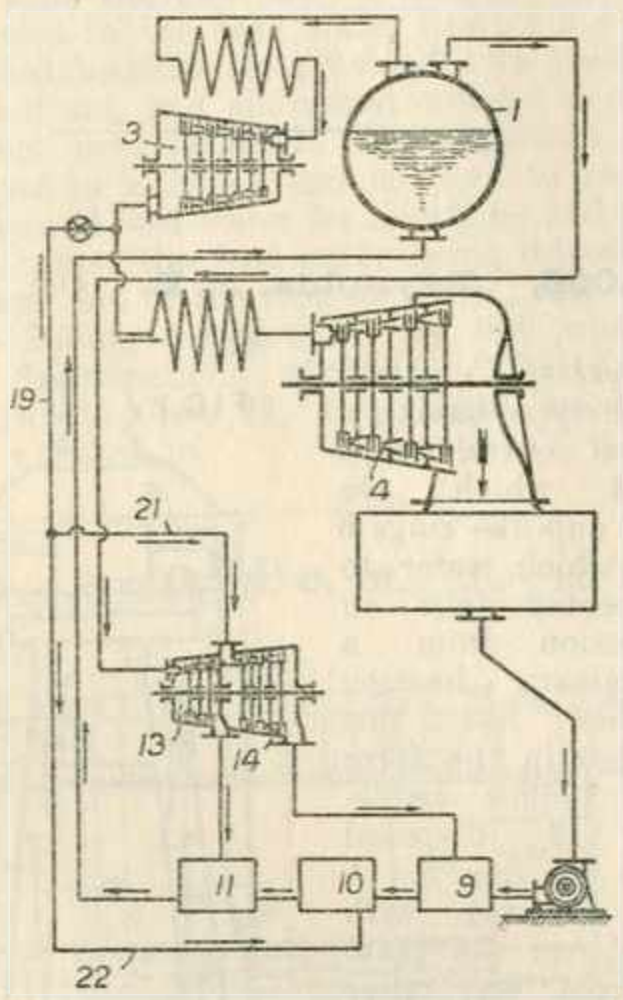
242,160. Schwieger, A. April 6, 1925.
No Patent granted (Sealing fee not paid).

FIG. 3.



Heating water.—A vessel 1 for heating the water in a shaving equipment has a heating device 2 telescopically connected to it by arms 8, the container for the shaving appliances, fuel, &c. being adapted to be packed into the vessel. The arms 8 are formed with projections 9 adapted to engage a groove 10, or a rib, on the vessel 1 and to support it in the position for heating, the said projections 9 engaging with the lid 4 when the vessel 1 is closed on to the heater 2.

242,210. Anderhub, W. Nov. 15, 1924, [*Convention date*].



Feed-water, heating.—In a steam turbine installation with multi-stage preheating of the feed-water and at least one auxiliary turbine driven by tapped or bleeder steam and connected to the feed-water heater, the auxiliary turbine in addition to being supplied with bleeder steam is connected to a source of approximately constant pressure, so that under all conditions of working it furnishes a certain minimum power. A steam boiler 1 supplies the main turbine 3, 4 and also a section 13 of the auxiliary turbine, which has another section 14 receiving bleeder steam from the main turbine by way of pipes 19, 21. The steam from the section 13 passes into the highest stage 11 of the feed-water preheater, the next stage 10 being heated by bleeder steam from the pipes 19, 22, and the lowest stage 9 by steam from the section 14. Instead of dividing the auxiliary turbine into two sections 13, 14, it may be provided with two groups of nozzles for the two steam sources. The sections 13, 14 may be housed in two casings, which may be coaxial, or the two sections may be geared together. A separate steam boiler may be used for the auxiliary turbine, and this boiler may be heated by steam from the main boiler. The stage 10 may be omitted.

242,231. Engelhart, G. K., (Assignee of *Grady, C. B.*). Oct. 30, 1924, [*Convention date*].

FIG. 5.

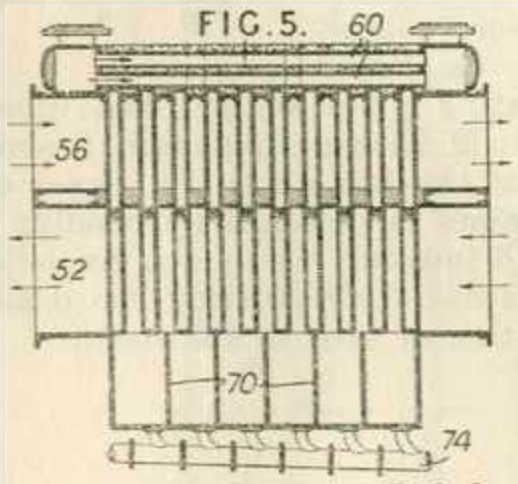


FIG. 11.

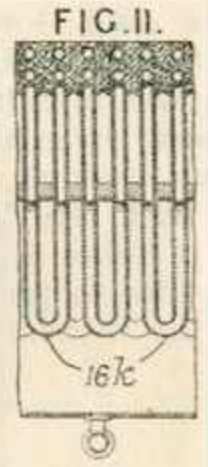
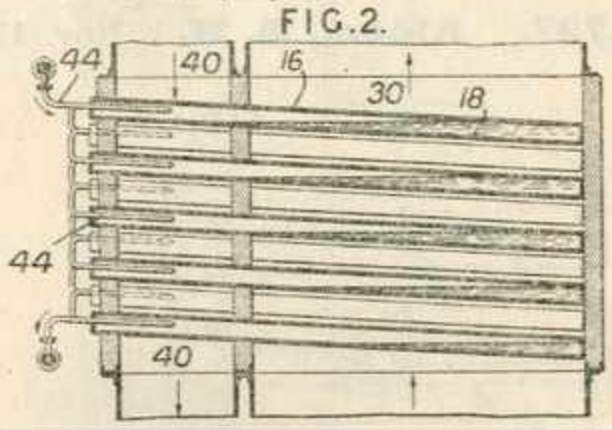


FIG. 2.



Heating air; heating water.—A heat exchanger comprises three or more conduits through which are conducted the fluids between which heat is to be exchanged and a series of containers each carrying a liquid in its lower portion exposed to the fluids to be cooled and in its upper portion the vapour generated from said liquid exposed to the fluids to be heated. The containers 16 which are preferably exhausted may be sloped and contain a liquid 18 exposed to a hot fluid passing through a duct 30. The vapour generated is exposed to a fluid to be heated passing through a duct 40 and also to another fluid circulated through pipes 44. The apparatus may be adapted to transfer heat from boiler gases passing through a flue 52, Fig. 5, to air passing through a flue 56 and water passing through pipes 60, the containers in this case being arranged vertically and acting as baffles to trap the dust in the waste gases which is received in compartment 70 and transferred to a pipe 74 by suction or by a stream of water. The containers may be formed in the shape of **U**-tubes 16^k, Fig. 11.

242,373. Lambert, A. J., and **Kerr, G. C.** Aug. 21, 1924. *Addition to* 235,990.

Block-form boilers; internally-fired boilers. — The apparatus for heating liquids described in the parent Specification is modified by arranging the cells 6 so that the flow is through the cells in each group in series while groups are arranged in parallel. The cells may have fixed lids to enable them to be used under pressure. Each cell may be subdivided by partitions. The outflow 5 from each cell in a series may be arranged to be at a lower level than that of the preceding cell. An arrangement of cells 45, Fig. 11, in series-parallel may be enclosed in an outer water-holding casing 46 which is itself of cellular construction. Specifications 9896/87 and 14334/92 are referred to.

FIG. 2.

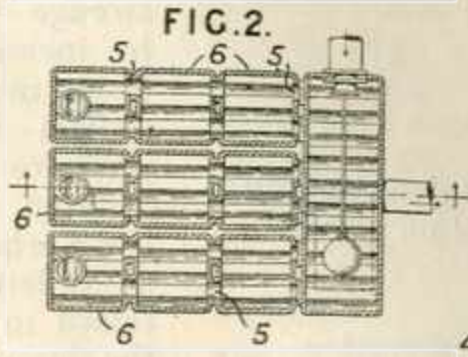
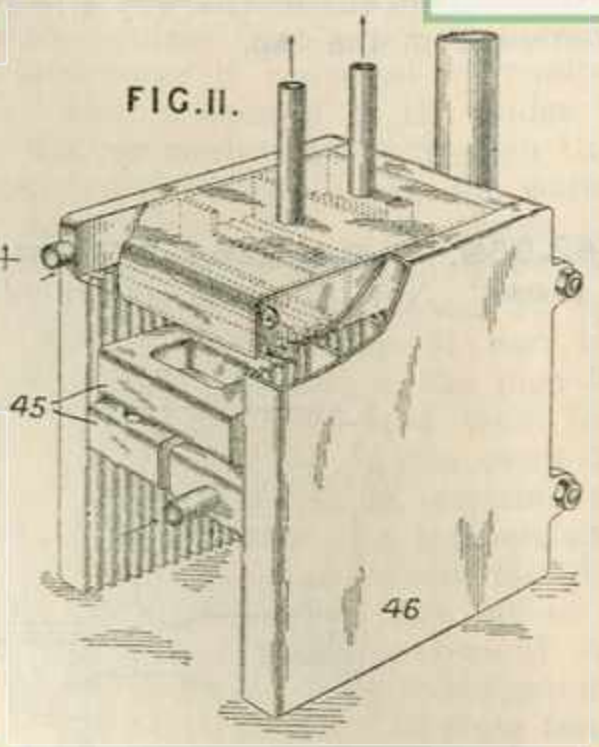


FIG. II.



242,680. Smith, S. C. May 12, 1924.

FIG. 5.

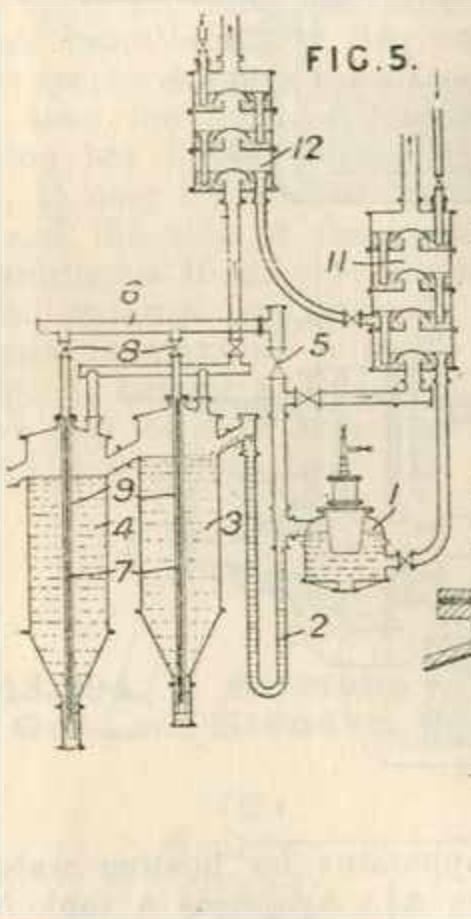
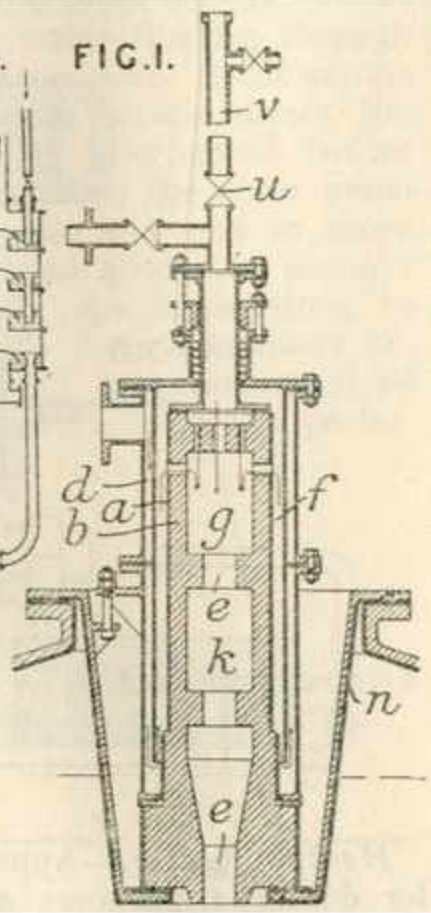


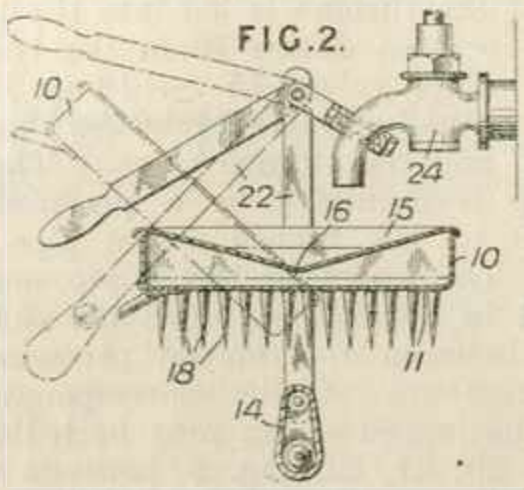
FIG. I.



Heating liquids.—A burner for heating liquids by direct contact of hot gases comprises a combustion chamber *g*, *k*, from the end *e* of which the combustion products issue directly into the liquid, means being furnished for preheating one or more elastic fluid elements of the constituents for combustion before entry into the combustion chamber; the preheater is also adapted to insulate the combustion chamber from heat loss. The combustion chamber is lined with refractory material *b* inside a pressure-resisting casing *a*, and air is preheated in jackets *d*, *f*. The burner is bolted to a seating *n*, which is covered with non-corrodible material such as rubber when used for heating corrosive liquors. In a burner, itself adapted for immersion in the liquid, the outside of the burner and nozzle is covered with the non-corrodible material, and the lower part may be water-jacketed. The burner is provided with a nozzle *e* of reduced area to ensure high velocity of effiux. An example of application of the burner is shown in Fig. 5, and refers to the treatment of ores by hot acid brine. The heating vessel 1 is provided with a burner as described, and the liquor to be heated enters at the top of the tower 11 or 12, where it meets ascending gases and passes to the heating vessel, overflowing thence through the pipe 2 to the leaching vessels 3, 4. For agitating the contents of the vessels 3, 4 gases from the vessel 1 pass by a valve 5, main 6, and valves 8 to the inner of concentric tubes 7, 9 rising through the outer, carrying with them a certain quantity of the pulp which is discharged through perforation in the tubes 9 at the surface level.

242,700. Hudson, J. J. C., and **Hudson, G. C.** Aug. 11, 1924.

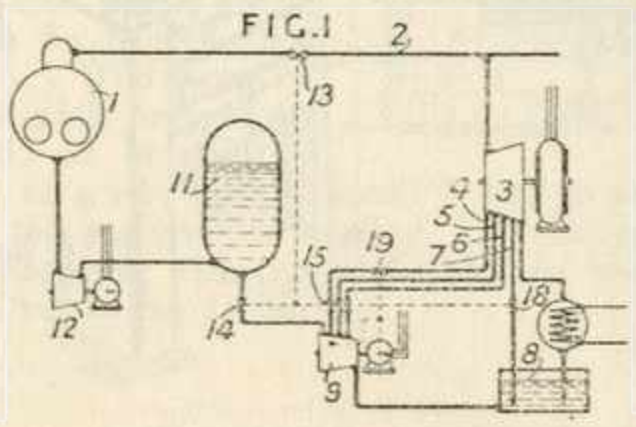
FIG. 2.

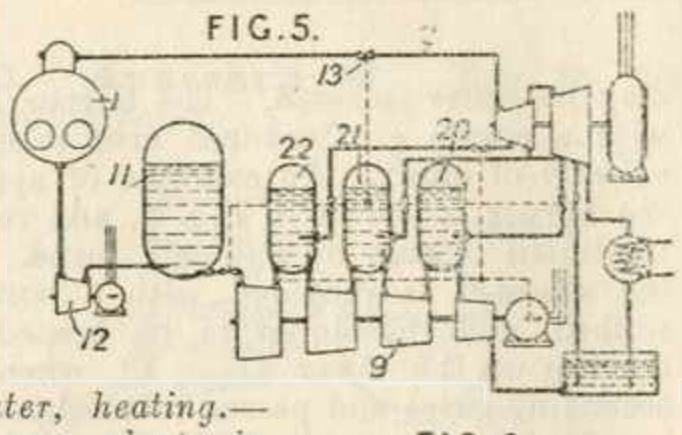


Geysers.—Water to be heated passes into an open distributing-tray 15, provided with a perforation 16, extending across, but separate from a heating-surface 11 furnished with heat conducting pins 18 exposed to the heat of a gas burner 14. The tray 15, receptacle 10 and burner 14 may be mounted in a frame 22 which

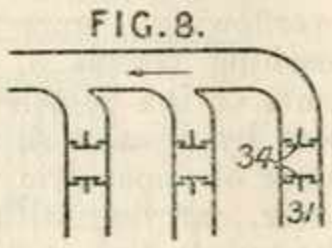
can be supported on a tap 24 so as to be capable of movement out of the way when cold water is wanted from the tap.

242,959. Siemens - Schuckertwerke Ges. Nov. 15, 1924, [*Convention date*].

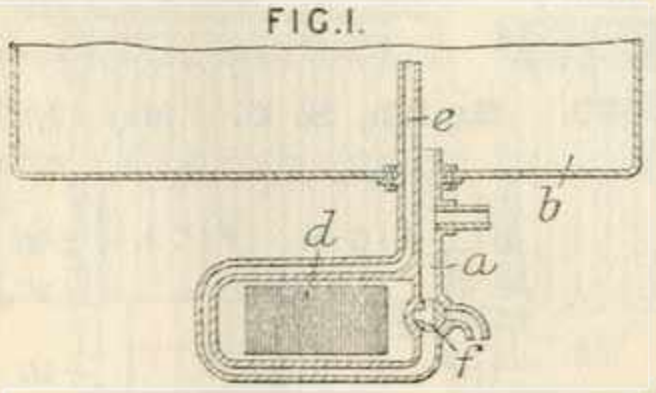


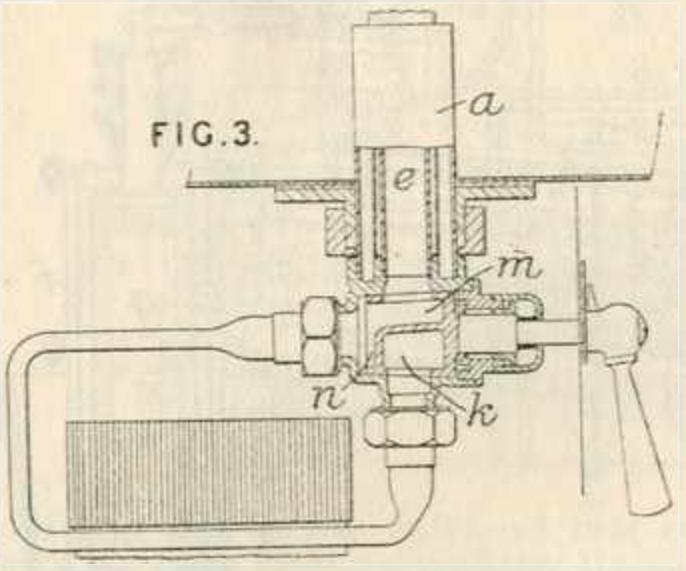


Feed-water, heating.—In a power plant in which feedwater is heated in a rotary feed-pump by tapped steam from a prime-mover, the quantities of tapped steam and water supplied are regulated according to the quantity of excess steam available, and the speed of the pump is regulated according to the pressure in one of the tappings. Tapped steam from three stages 4, 5, 6, Fig. 1, of a turbine 3 driven by steam from a boiler 1 is supplied to a pump 9 drawing feed-water from a tank 8 and supplying it to a store vesssel 11. Steam from the lowest stage 7 of the turbine is led into the tank 8. A pressure operated device 13 in the boiler steam pipe 2 controls valves 15 . . 18 in the tapped steam pipes and a valve 14 in the pipe between the pump and the storage vessel. The speed of the pump is regulated by a pressure operated device 19 in the tapped steam pipe from the stage 4. The speed of the pump may also be controlled in dependence upon the difference in pressure between the tapped pressure and the counter pressure of the corresponding pump stage. The tapped steam may be led into water reservoirs 20, 21, 22, Fig. 5, between the stages of the feed-pump 9. The centrifugal pump 12 between the storage vessel and the boiler may be regulated in accordance with the boiler pressure or the difference of pressure in the boiler and in the storage vessel. The pressure in the storage vessel may be maintained constant. This may be effected by an additional pump placed between the pump 9 and the storage vessel, the speed of the additional pump being controlled in accordance with the pressure in the outlet pipe of the pump 9. In a modification, the storage vessel pressure is maintained constant by increasing the number of steps in the pump 9 by means of runners, each step leading to outlets which are changed according to the pressure required. Each of the outlets 31, Fig. 8, from the additional steps may be fitted with two spring or weight-operated valves 34 opening at different pressures. When the pressure is raised in one of the stages to the desired limit, the lower valve in the corresponding outlet is lifted, and when the pressure rises above the limit the upper valve is closed.



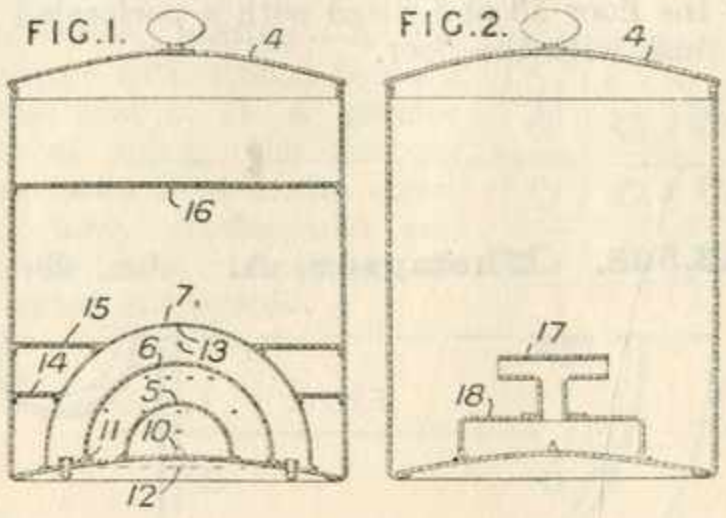
243,043. Lauth, C. H. July 22, 1924.





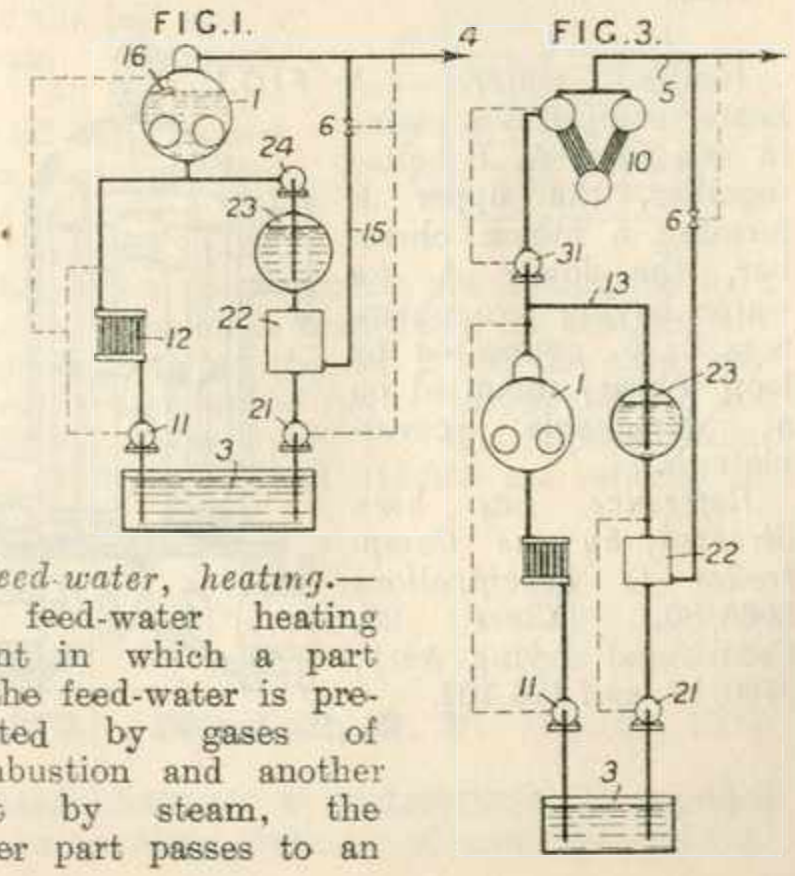
Heating water.—Apparatus for heating water for domestic purposes &c. comprises a tank *b*, Fig. 1, a heating transformer *d*, and a circulating pipe having branches *a*, *e* opening into the lower and the upper parts of the tank respectively, the pipe being provided with a three-way valve *f* adapted, when in the position shown, to allow the water to circulate and when in one or the other of two alternative positions to be withdrawn from either the top or the bottom of the tank. In a modification, the circulating pipe is formed with two spaced and pipe-connected branches provided with interconnected valves. In another arrangement, the parts *a*, *e*, Fig. 3, of the pipe are arranged annularly and communicate with a three-way valve formed with passages *k*, *m*, *n*.

243,064. Hill, E. J. Nicholson-, King, F., Rickard, P. E., and **Hetherington, J.** Aug. 20, 1924.



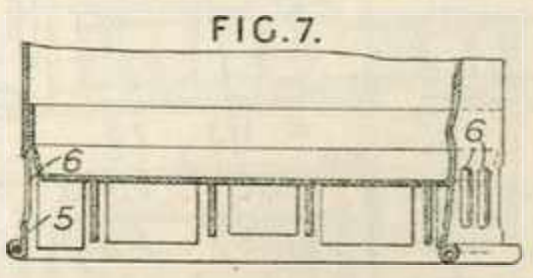
Boiling-pans.—In water or other liquid heating apparatus, circulating devices are provided which are completely covered by the liquid whereby the hot liquid or vapour is sprayed or projected wholly or mainly across the normal path of circulation of the liquid. The vessel 4, heated at the bottom, has a series of perforated domes 5, 6, 7, provided with apertures 10, 11, 12 at their bases whereby the water flowing through the apertures takes a sinuous path. Perforations 13 take the form of nozzles which direct the rising hot liquid outwardly. Perforated baffles 14, 15 may be mounted between the outer dome 7 and the side of the vessel and one or more diaphragms 16 may be placed above the dome 7 with external or internal pipe connections to assist circulation. A single domed member 18, Fig. 2, having a T-piece 17 may be employed and may be used in connection with the perforated diaphragms.

243,094. Siemens - Schuckertwerke Ges., and **Stender, W.** Aug. 30, 1924.



Feed-water, heating.—In feed-water heating plant in which a part of the feed-water is preheated by gases of combustion and another part by steam, the latter part passes to an accumulator from which it is fed to the boiler, whilst the former portion passes direct to the boiler or to an economizer from which the boiler is fed. The feed-water is conveyed by pumps 11, 21, Fig. 1, from a tank 3 to the boiler 1 either through the economizer 12 or through the steam feed-water heater 22 from which the water passes to an accumulator 23. The excess of steam over requirements, on the opening of the automatic valve 6, passes to the heater 22 by way of the pipe 15. The pump 21 can be regulated by the steam pressure in the pipe 5, and a pump 24 supplies the feed from the accumulator 24 to the boiler 1. In the event of the accumulator being emptied on account of excessive consumption of steam, the temperature regulating device which normally controls the pump 11 is put out of action by the fall of a float 16 in the boiler and the full output of the pump is fed to the boiler. In a modification, the boiler fed by the economizer is separate from the boiler fed by the accumulator, and the two feed pipes are connected by a cross pipe. In another form, the high pressure boiler 10, Fig. 3, is fed by the pump 31 partly with water from a low pressure boiler 1 fed by the economizer 12, and partly with warm water from the accumulator 23, the pump 31 being regulated in accordance with the level of the water in the boiler, the pump 11 in accordance with the pressure behind the the low pressure boiler, and the pump 21 in accordance with the temperature behind the steam feed water heater 22. In the event of the pump 11 supplying more than the pump 21, the excess flows into the accumulator through the pipe 13. In a further form, the whole of the output of the low pressure boiler 21 is supplied to the accumulator whence supplies are drawn by a single pump to the boilers.

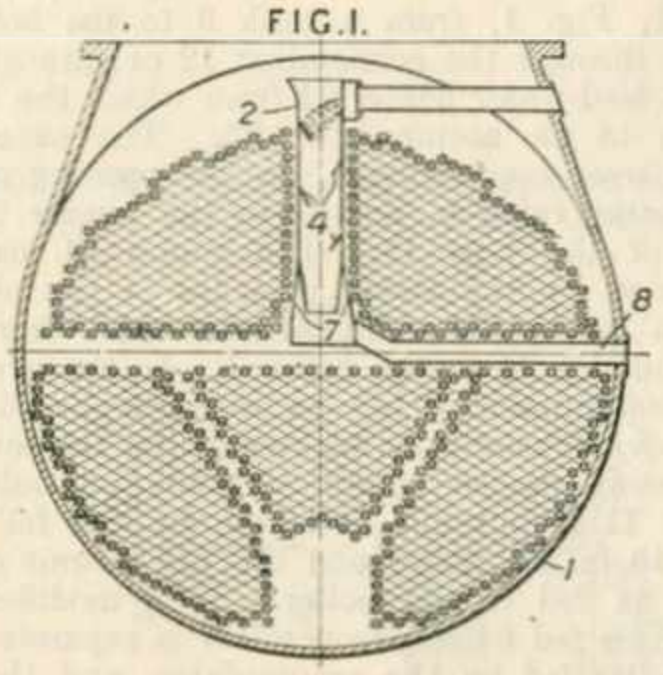
243,172. Lack, S. W., and **Shepherd, A. J.** Dec. 3, 1924.



Boilers. — A boiler, or other water-heating vessel has the underside of the bottom provided with a series of heat-conducting vanes or slats arranged in rows intersecting at right-angles, thus providing a series of tortuous passages for the flow of the heating gases. The vanes, which may be of plain, curved, angular, or corrugated form, may be integral with the bottom or may be brazed or otherwise attached thereto, and vanes remote from the centre may be thinner, wider, and of greater depth than those nearer the centre. The vanes may be surrounded by a depending "skirt" portion 5 having perforations 6.

243,420. Morison, R. B., Tucker, R. E., and Evans, H. R., (Representatives of *Morison, D. B.*). Aug. 21, 1924.

FIG.1.



Feed-water, heating. — A method of heating boiler feed-water by direct contact with exhaust steam consists in spraying the water into a vessel arranged in the line of the exhaust steam, the relative volumes of the steam and feed-water being such that the water is heated to a temperature closely approximating to the vacuum temperature in the condenser with no appreciable condensation of the steam. The feed-water is sprayed into a long narrow vessel 2 arranged in the inlet of the surface condenser 1 and having baffles 4, the water passing through the pipe 8 to the feed-pump, while the steam escapes through openings 7 into the tube space of the condenser.

243,455. Griffiths, A. B., and **Fryer, C. F.** Sept. 1, 1924.

FIG.1.

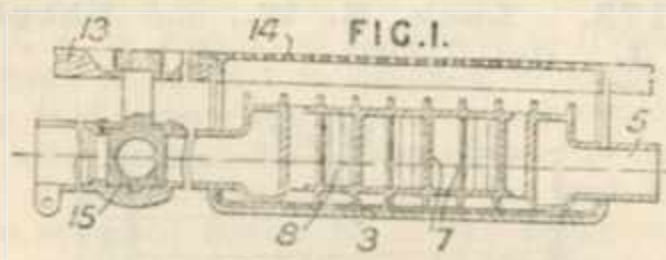
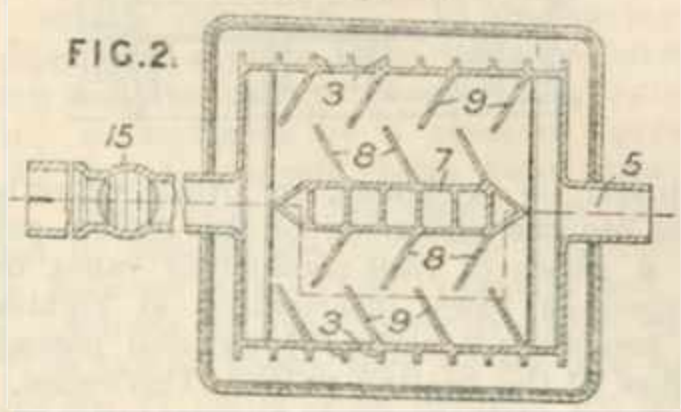


FIG.2.



Heating air.—In a combined heater and exhaust silencer let into the floor of a motor vehicle, a chamber with baffle plates is enclosed in an outer casing with a perforated cover. When the cock 15 is wholly or partly opened, the exhaust enters a divided chamber, having opposed baffle plates 8, 9 and leaves through the exit 5. The dividing wall 7 is provided with air cavities, the whole being formed as a single casting with external ribs 3. The chamber is enclosed in an asbestos lined casing supported by the floor 13 and fitted with a perforated cover 14 flush with the floor.

243,568. Thompson, A. Jan. 28, 1925.

FIG.1.

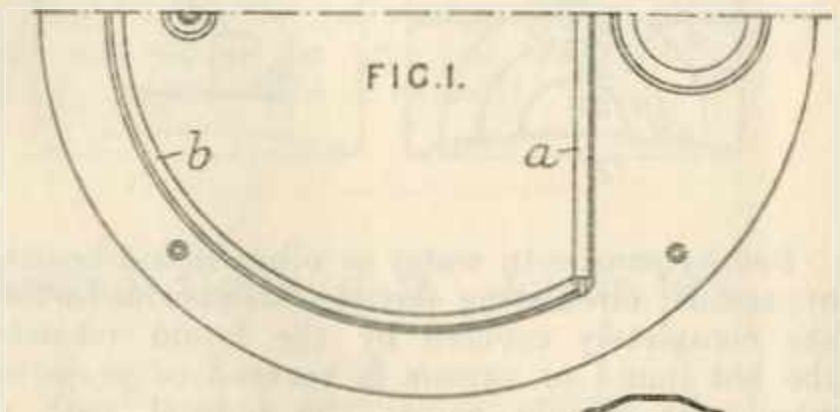
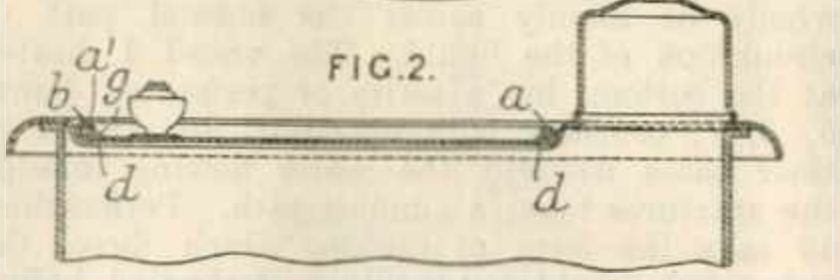


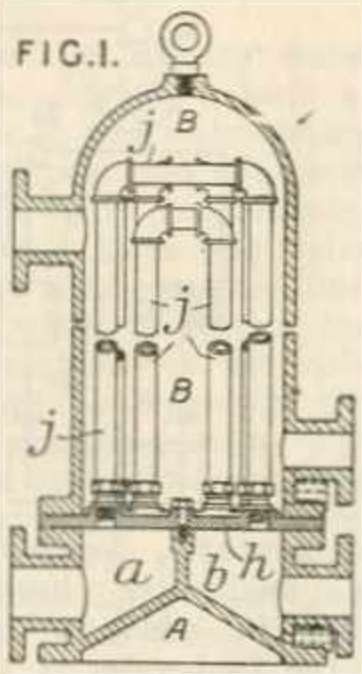
FIG.2.



Washing-boilers. — In gas-heated domestic washing pans or boilers the straight and curved edges *a*, *b* of the hinged lid are seamed over to the underside and the joint *d* between the edge of the seam and the main body of the plate, soldered. Wire a^1 is inserted to stiffen the edge and the lid is dished so as to leave a rounded corner at *g* to facilitate cleaning.

243,578. Newnes, J., Birkett, N., and **Birkett & Sons Ltd., T. M.** Feb. 19, 1925.

FIG.1.



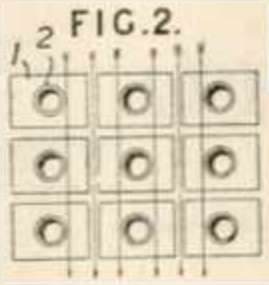
Heating water. — A heater comprises a casing in two parts A, B bolted together, the upper B forming a steam chamber, the lower A for water having two chambers *a*, *b*, connected by loop tubes *j* mounted on a detachable cover-plate *h*.

Reference has been directed by the Comptroller to Specifications 3066/80, [*Class* 23, Centrifugal drying &c.]; 5780/15, *and* 126,102.

243,656. Babcock & Wilcox, Ltd., *(Deutsche Babcock & Wilcox Dampfkessel-Werke Akt.-Ges.).* Aug. 29, 1925.

Feed-water, heating.—A fuel economizer with ribbed tubes 2 has the ribs 1, of a greater dimension across the flow of heating gases than in the direction of flow. Rectangular and oval ribs are described, in some cases corrugated.

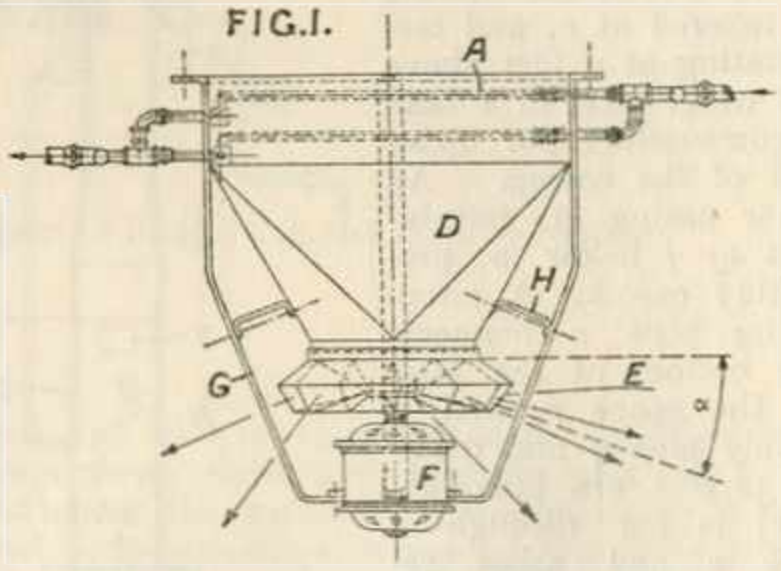
FIG.2.



243,732. Soc. Anon. des Etablissements Olivet et Mazars. Nov. 29, 1924, [*Convention date*].

Heating air.—Apparatus for the production of hot air for heating and drying operations comprises a steam-heated radiator A connected by a casing D to the suction opening of a motor-driven centrifugal fan E which draws the air through the radiator and projects it in a conical stream. The radiator is preferably of square cross-section and is of copper with steel fins and the projected stream of hot air forms an angle of from 10° to 45° with the horizontal plane. The motor F is supported by iron standards G having struts H to prevent vibration, the whole apparatus being adapted to be suspended from the ceiling of a room. Regulating shutters may be provided in the upper part of the apparatus for controlling the flow.

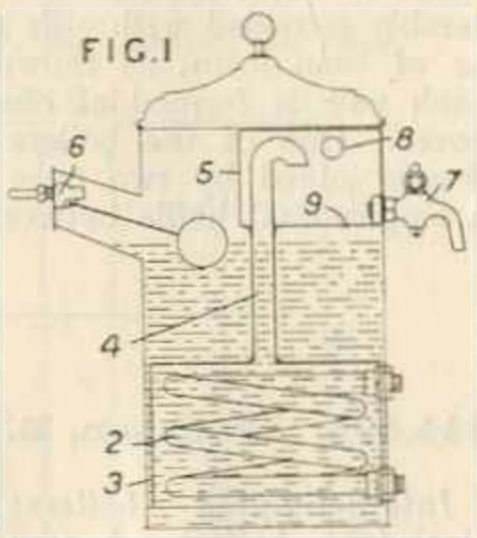
FIG.I.



243,855. Jackson Boilers, Ltd., and **Hargreaves, H.** Oct. 10, 1924.

Heating liquids.—A water boiler is provided with a steam heating coil 2 in the base, a bell 3 covering the coil, a pipe 4 which delivers boiling water from the top of the bell into a separate compartment 5 having a draw-off tap 7, and and a float-controlled water inlet 6. The bell, delivery pipe, and hot water compartment are detachable as a single unit, which is detachable on breaking the connection between the coil 2 and the outer casing, and removing the tap 7. An overflow 8 and slow-leakage hole 9 are provided. Specifications 16804/07, 9048/08, and 211,335 are referred to.

FIG.1



243,875. Mitchell, G. P. Oct. 30, 1924.

Washing-boilers.—A washing-boiler is provided with an auxiliary container adjacent to, and connected to it, the auxiliary container only being heated. The boiler *b*, Fig. 1, is connected to a pipe coil *c* in the casing *e*, heated by a gas burner *d*. The connecting pipe c^1 at the bottom of the boiler is covered by a shield *m* and the pipe c^2 at the top terminates in a rose c^3. The pipe c^2 may be flexible and may be bent towards the side of the boiler when in use. In a modification, the pipe coil *c* may be replaced by an annular vessel *n*, Fig. 5, having internal ribs *o* which are subjected to the heat of a burner below. Hot air may pass through an opening *h* into space *k* surrounding the boiler, and thence to a flue *l*.

FIG.5.

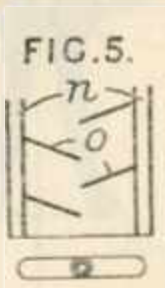
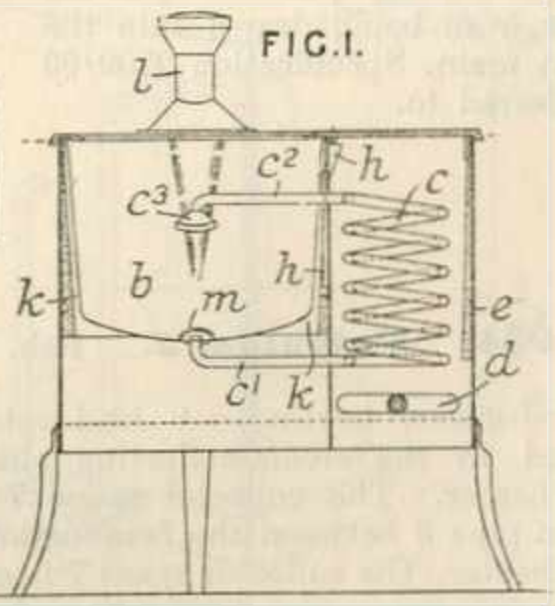
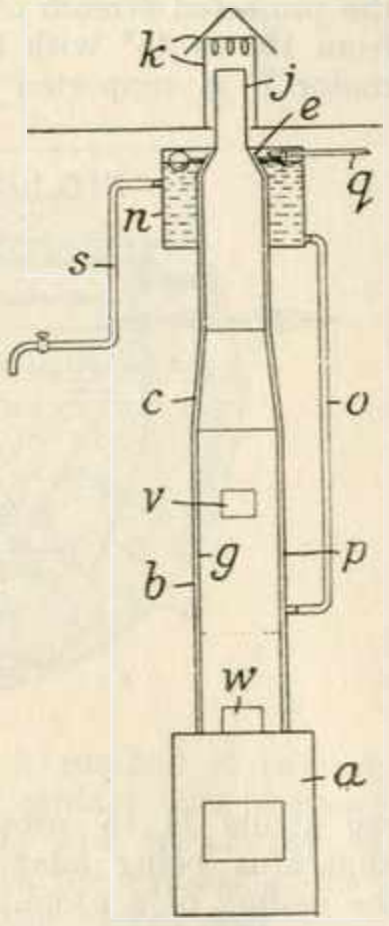


FIG.I.



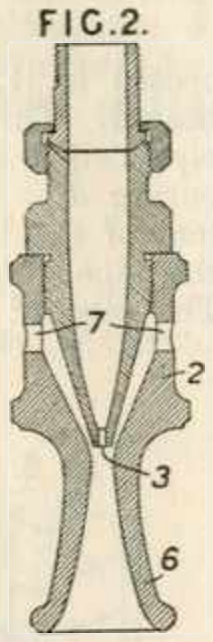
241,905. Moore, F. Dec. 24, 1924.

Boilers. — An apparatus for heating water for domestic supply comprises a vertical casing *b*, tapered at *c*, and terminating at *e* just above the water level in a tank *n* surrounding the upper end of the casing. An inner casing *g* terminates at *j* below a protecting cap *k*. A circulating pipe *o* connects the bottom of the tank to the space *p*, and a supply pipe *q* and draw-off pipe *s* are provided. Fuel is fed through a door *v* and ashes removed through a door *w*. A box *a* for fuel is provided.



243,924. Barrowfield Iron Works, Ltd., and **Chambers, R. L.** Jan. 23, 1925.

FIG.2.

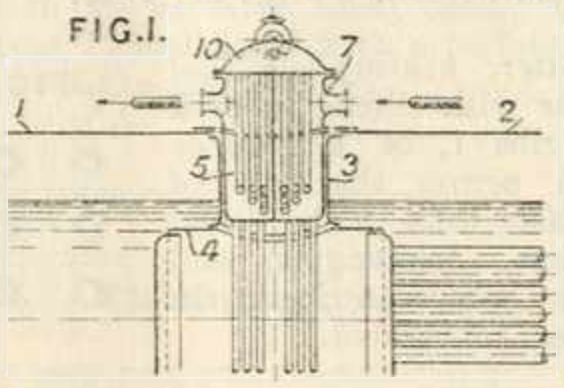


Heating water.—Steam is injected beneath the surface of water, particularly the water in the lutes of gas-holders, through the nozzle 3 of an injector 2. Holes 7 communicate with the atmosphere and the nozzle 6 only is submerged. On turning off the steam, the air ports 7 prevent water from being drawn into the steam main. Specification 2709/93 is referred to.

243,934. Vejvalka, J. Feb. 9, 1925.

Feed-water, heating.—A feed-water heater is located in the steam-collecting chambers of a superheater. The collector space 7 is extended into a pipe 3 between the combustion chamber 4 superheater. The collector space 7 is extended into a pipe 3 between the combustion chamber 4 and the boiler shell 1, 2. **U**-shaped tubes 5 of a feed-water heater opening into a water chamber 10 are located in the collecting chamber and the water chamber is divided into two compartments by a partition having a valved opening for regulating the quantity of water flowing through the heater.

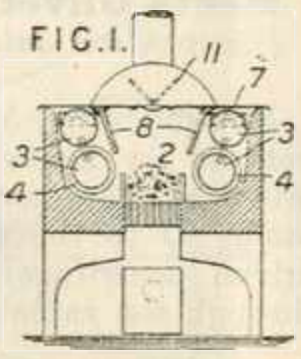
FIG.1.



The steam collecting chambers and water chambers may be in separate parts.

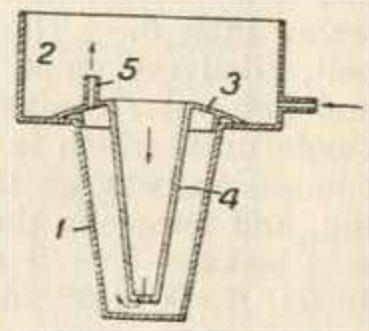
244,172. Thompson, T. Sept. 12, 1924.

FIG.1.



Boilers. — In an ovenless cooking-stove having separate boilers 3, one for hot-water supply and the other to serve a heating-system, arranged on each side of the fire-space 2, baffles or webs 8 depending from the hot-plate 7 are provided to direct the gases round the boilers. Dampers 11 control the flow of the gases through each boiler chamber, and a damper-controlled opening (not shown) connecting the fire-space directly to the uptake is also provided. In a modification, firebrick walls on either side of the fire-space protect the boilers from the direct heat, and the baffles 8 are pivotally mounted and may be given limited movement by adjusting handles. The boilers are preferably provided with gills 4, and may be single, or of twin form, as shown; in the latter case, each pair is formed at one end by a box-form cover. One of the boilers may consist of two drums joined by two rows of water-tubes, with a longitudinal baffle between the rows.

244,594. Jackson, E. Dec. 30, 1924.

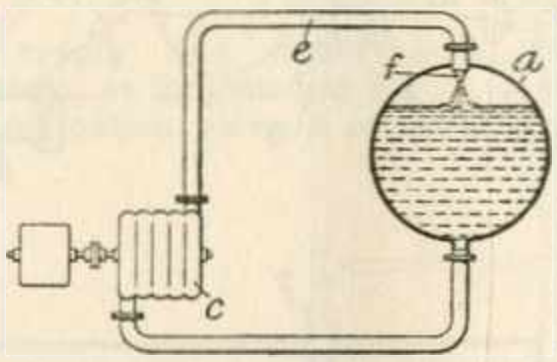


Internally-fired boilers; block-form boilers.—A central heating-cylinder 1 of a café or like hot-water boiler is provided with a loose lid 3 bearing a feed pipe 4, which may be parallel-sided, extending substantially to the bottom of the cylinder. Incoming water may pass to a tank 2 formed above the cylinder and the lid may carry the delivery pipe 5 to the usual collecting box for boiling water.

APPENDIX

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

157,903. Scheitlin, E. May 17, 1919, [*Convention date*].



Heating by friction.—Liquid is circulated from a vessel *a* through a power-driven pump *c* and a delivery pipe *e* which is fitted with one or more throttling devices *f*. The liquid is thereby heated.

165,207. Fishley, R. March 23, 1920.

FIG.1.

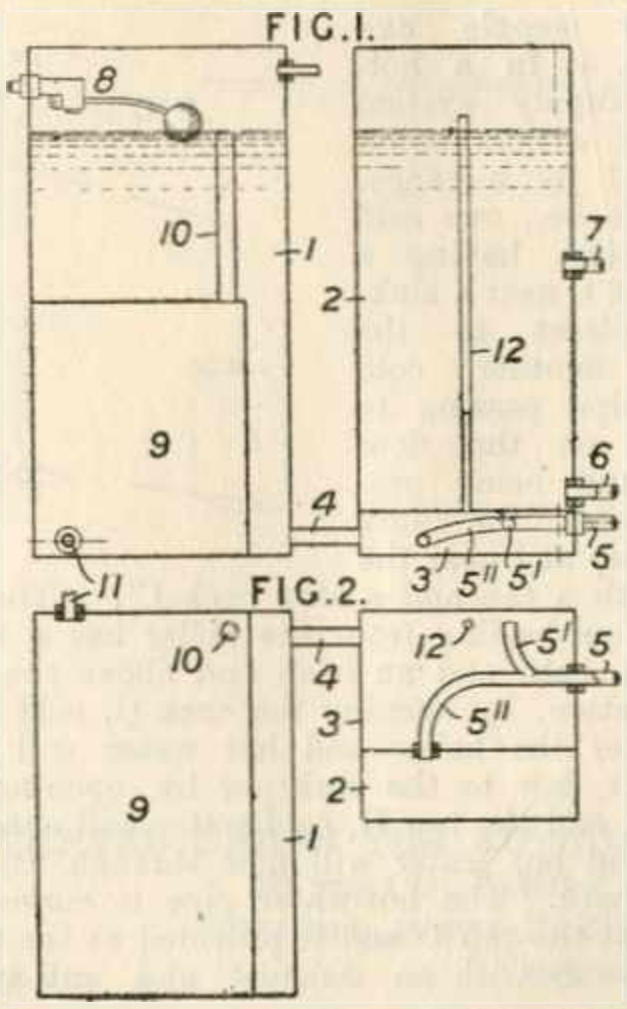
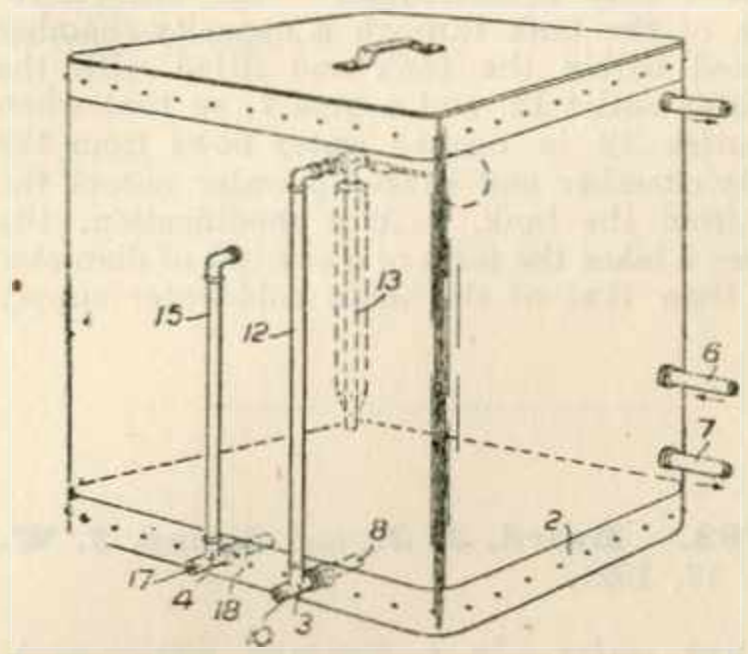


FIG.2.

Heating water.—In a hot-water supply system, a cold storage tank 1 and a hot circulating-tank 2, provided at their bottoms with chambers 9, 3 respectively which extend across part only of the bottom of the tanks, are placed at the same level and communicate with one another by a pipe 4, The hot tank is connected with a boiler by flow and return pipes 5, 6, the flow pipe 5 having two branches 5^{I}, 5^{II}, one of which is led into the chamber 3 and the other into the main part of the tank 2, and this hot tank is also provided with a draw-off pipe 7 which is connected to the tank at such a level determined by the relative areas of the two tanks that a quantity of hot water equal to the full capacity of the hot tank is drawn off by the time the water reaches such level, even if, through failure of the main supply no water should come in through the valve 8. The chamber 9 is provided with a filling-pipe 10 and a draw-off pipe 11 for a cold-water supply and the chamber 3 is fitted with a small air pipe 12 to prevent an air-lock.

184,659. Dyer, J. H. July 11, 1921.



Heating water.—A tank or cistern particularly for use above domestic baths for supplying hot water is provided with a flange 2 projecting below the bottom of the tank in which T-pieces 3 and 4 are fitted. Pipes 8, 12, 13 conduct cold water to the tank, cold water is drawn off from pipe 10, and hot water from pipes 15, 17, 18. The cold-water pipe 13 is jacketed to reduce its cooling action on the hot water in the tank. The usual pipes to the boiler are shown at 6, 7.

184,859. Borgars, W. H. May 18, 1921.

FIG. 1.

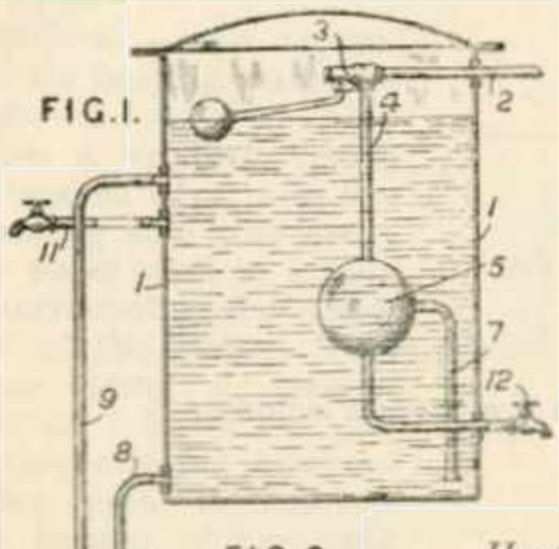
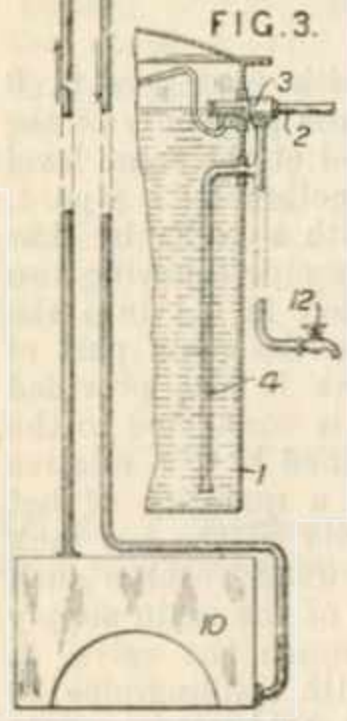


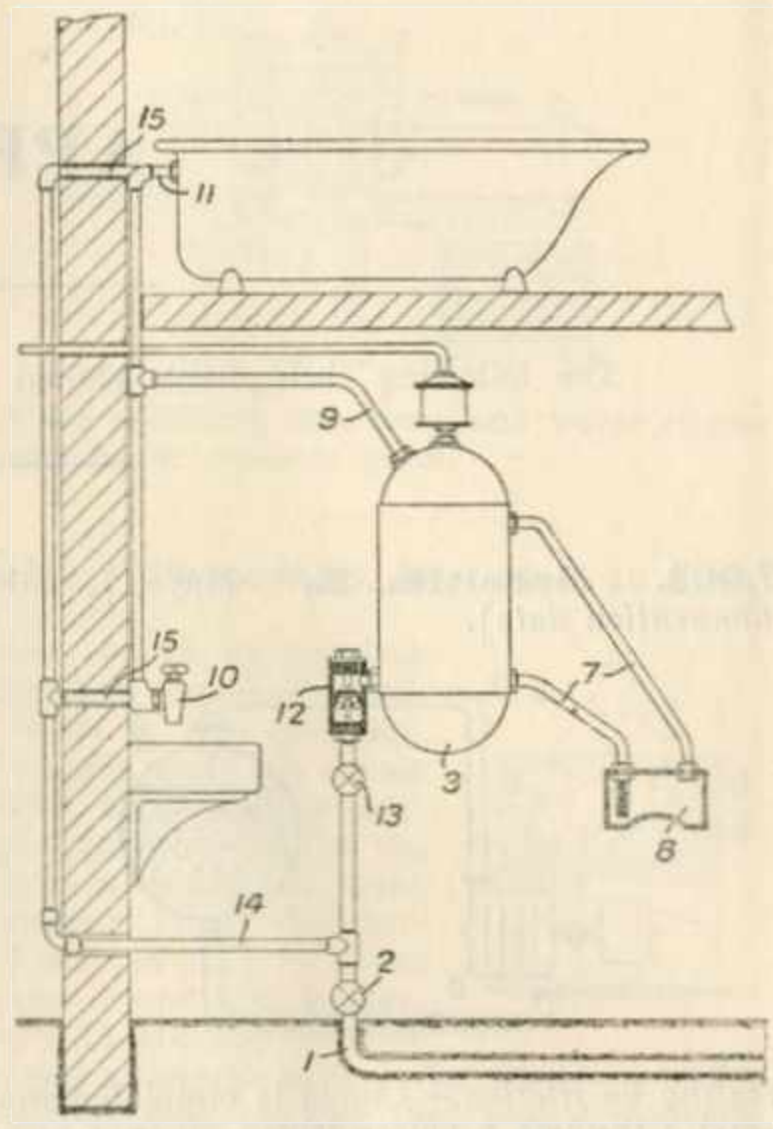
FIG. 3.



Heating water.—Relates to a hot and cold water system of the type comprising a single water-storage tank 1, a cold-water supply pipe 2 serving said tank through a ball valve 3, flow and return pipes 8, 9 between a boiler 10 and the tank 1, a hot-water outlet 11 from the tank or boiler circuit, and a cold-water outlet 12 from the supply-pipe 2. The supply-pipe 2 is provided with a conduit 4 communicating between the outlet side of the ball-valve and the interior of the tank, and cold-water outlet 12 is arranged to branch from said conduit at a point below the water-level in the tank. Preferably the conduit 4 and outlet 12 are located wholly within the tank 1. The conduit 4 may communicate with the lower portion of the tank through a capacity-chamber 5 located within the tank and fitted with the cold-water outlet 12, and a pipe 7, so that when the outlet 12 is opened water flows from the capacity-chamber and make-up water enters the latter from the tank. In a modification, the chamber 5 takes the form of a conduit of diameter larger than that of the main cold-water supply pipe.

194,793. Baird, J. J., and **Jones, J. W.** Dec. 17, 1921.

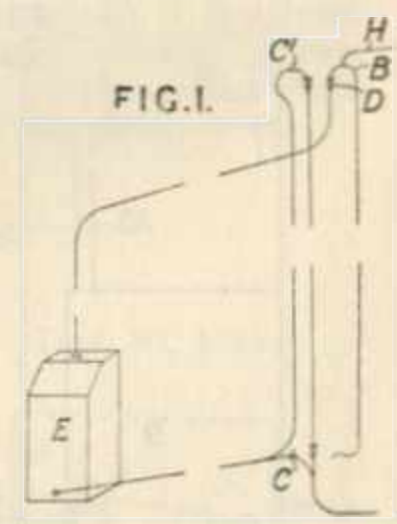
Heating water.—In a domestic water-supply system of the type in which a hot-water storage cylinder 3 is supplied from a high-pressure main 1 and is provided with pipes 7 leading to a boiler 8 and a pipe 9 for supplying hot water to taps 10, 11, a non-return valve 12 is fitted on the cylinder supply pipe to prevent emptying or syphoning out of the storage cylinder through the cold-water supply taps whenever the water supply is cut off from the main by a stop cock 2. The cold water taps of the system are supplied by pipes 14, 15, and an additional stop cock 13 may be provided on the pipe 1 between



the valve 12 and pipe 14 for cutting off the hot water system from the cold water main 1.

199,061. Percival, B. Jan. 21, 1922.

FIG. 1.



Water supply and delivery. — In a hot-water supply system provided with a boiler E heated by a range, fire-grate &c., one cold water pipe, having a stop cock C near a sink, leads direct to the boiler, another cold water pipe passing to a bath on the floor above and being provided near the sink with a tap and near the bath with a tap and a stop cock C¹. The hot-water pipe leading from the boiler has a tap D near the bath and an open end above the sink. In operation, by opening the cock C, cold water will enter the boiler and hot water will automatically flow to the sink; or by opening the cock C¹, and the tap D, cold water will enter the boiler and hot water will flow through this tap to the bath. The hot-water pipe is curved upwardly at the tap D and is provided at the top of the curve B with an exhaust and anti-syphon pipe H.

Reference has been directed by the Comptroller to Specification 5111/81, [*Class* 135, Valves &c.].

199,086. Phillips, H. C. March 10, 1922.

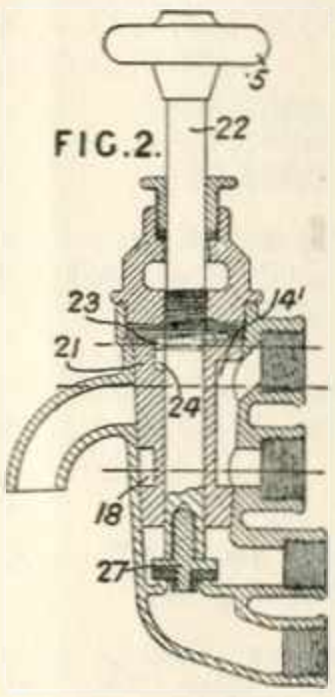


FIG. 2.

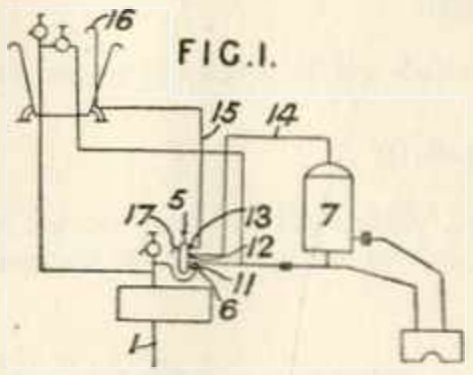


FIG. 1.

Water supply and delivery.—A hot-water supply system, as indicated in Fig. 1, is provided with a combination valve 5 comprising a single actuating-spindle for operating simultaneously a pressure-water inlet valve and a three-way hot-water discharge valve; the inlet valve normally closes the connections 6, 11 between the cold-water main 1 and the bottom of the storage cylinder 7, but opens this connection on actuation of the spindle, while the three-way valve, having passages 12, 13 which initially connect the cylinder top through pipe 14 to the expansion pipe 16 through the pipe 15, first connects the still interconnected cylinder and expansion pipe to the discharge tap outlet 17, and then disconnects the said expansion pipe 16 leaving only the top of the cylinder 7 and the outlet 17 connected. In the embodiment shown in Fig. 2, the inlet valve 27 is a lift valve operated by a screwed spindle 22 and the three-way valve consists of a rotary plug 21 operated from the same spindle 22 by means of a sliding feather 23 and slot 24. The plug 21 is formed within an annular recess 18 for continuous connection with the cylinder top, and with a longitudinal passage 14¹ in communication with the recess 18 and extending approximately half way round the plug.

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

101, Printing other than letterpress or lithographic.
102, Pumps and other means for raising and forcing liquids, (*excepting* Rotary Pumps).
103, Railway and tramway vehicles.
104, Railways and tramways.
105, Railway signals and communicating-apparatus.
106, Registering, indicating, measuring, and calculating, (*excepting* Signalling and indicating by signals).
107, Roads and ways.
108, Road vehicles.
109, Ropes and cords.
110, Rotary engines, pumps, blowers, exhausters, and meters.
111, Sewage, Treatment of, (*including* Manure).
112, Sewing and embroidering
113, Ships, boats, and rafts, Div. I.
114, ——————— Div. II.
115, ——————— Div. III.
116, Shop, public-house, and warehouse fittings and accessories.
117, Sifting and separating.
118, Signalling and indicating by signals, (*excepting* Railway signals and communicating-apparatus).
119, Small-arms.
120, Spinning, (*including* the preparation of fibrous materials *and* the doubling of yarns and threads).
121, Starch, gum, size, glue, and other stiffening and adhesive materials.
122, Steam-engines, (*including* Details common to fluid-pressure engines generally).
123, Steam generators, (*excepting* Furnaces).
124, Stone, marble, and the like, Cutting and working.
125, Stoppering and bottling, (*including* Bottles, jars, and like vessels).
126, Stoves, ranges, and fireplaces.
127, Sugar.
128, Table articles and appliances.
129, Tea, coffee, cocoa, and like beverages.
130, Tobacco.
131, Toilet and hairdressing articles, and perfumery.
132, Toys, games, and exercises.
133, Trunks, portmanteaux, hand and like travelling bags, baskets, hampers, and other wickerwork.
134, Umbrellas, parasols, and walking-sticks.
135, Valves and cocks.
136, Velocipedes.
137, Ventilation.
138, Washing and cleaning clothes, domestic articles, and buildings.
139, Watches, clocks, and other timekeepers.
140, Waterproof and similar fabrics.
141, Wearing-apparel.
142, Weaving and woven fabrics.
143, Weighing-apparatus.
144, Wheels for vehicles, (*excepting wheels for* Locomotives and tramway and traction engines; Railway and tramway vehicles; *and* Toys).
145, Wood and wood-working machinery.
146, Writing-instruments and stationery, and writing-accessories, (*including* Educational appliances).

(B.)—List of Classes, 1909 to 1925 (3 periods as above).

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

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

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

FIFTY YEARS SUBJECT INDEX, 1861–1910.

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

For a continuation of the "Fifty Years Subject Index," the searcher should consult the Abridgment Volumes for the periods 1909–15 and 1916–20 and the annual and quarterly indexes from 1921 onwards.

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