J. O. FOWLER.

HEATING APPARATUS.

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1,167,894. Patented Jan. 11, 1916.

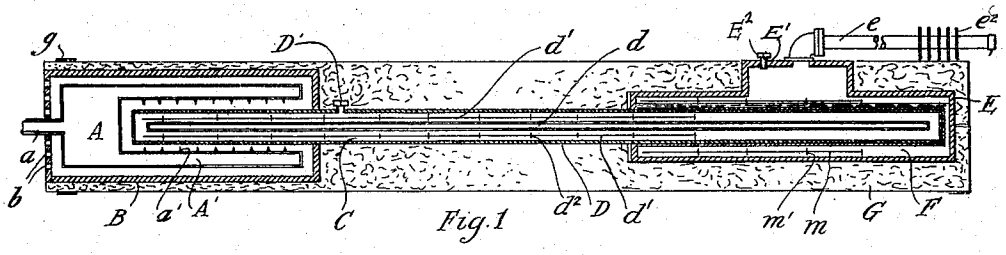


Fig. 1

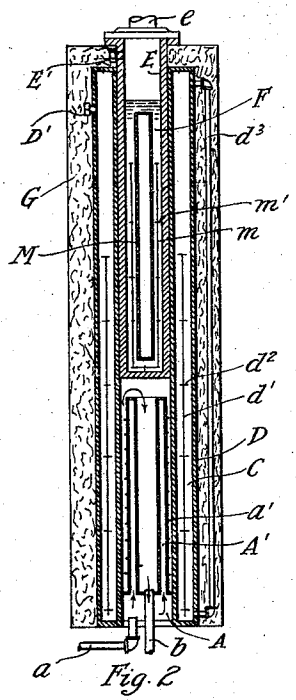


Fig. 2

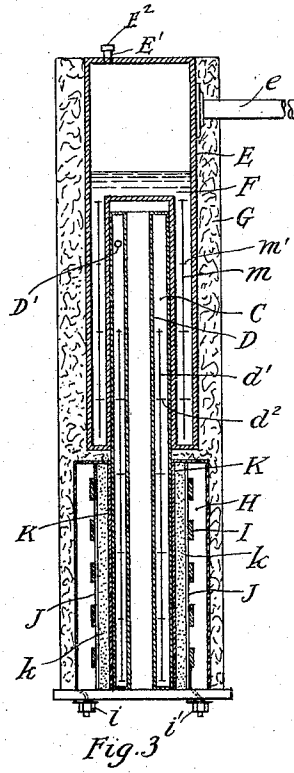


Fig. 3

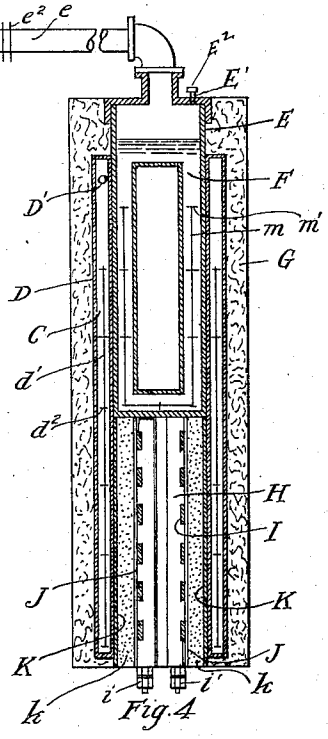


Fig. 4

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HEATING APPARATUS.

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To all whom it may concern:

Be it known that I, JONATHAN O. FOWLER, a citizen of the United States of America, and a resident of New York, in the county and State of New York, have invented a certain new and useful Heating Apparatus, of which the following is a specification, the same being a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to heaters, and particularly to means for transmitting heat from a heating device to a steam boiler or other heat distributing apparatus or thermal storage device, and it has for its object the provision of an apparatus of the kind set forth, simple in construction, inexpensive to manufacture, and efficient in practical use.

To attain the desired end, the invention consists in the construction, arrangement and operation of parts as hereinafter set forth.

I have found it desirable to use a medium for transmitting heat from any suitable or desired generator, as those in which coal, oil, gas or electricity are used, to a heat distributing apparatus, preferably a steam boiler or other thermal storage device preferably having radiating appurtenances, which, under the peculiar conditions of use, are sometimes required to be located at a distance from the heater proper, in which cases, occasionally, in the heat transmitting medium the heat will rise to great intensity, and I prefer in such instances to use a pyrostatic liquid which will not produce much pressure at high temperatures and which has great power of carrying heat and will stand great heat without any alteration of the substance of the same. A variety of mediums may be utilized for the above named purpose, as for example, paraffin oil, a saturated solution of caustic soda or potassa, preferably the former, or glycerin.

In order to enable the invention to be fully understood I shall proceed to explain the same by reference to the drawings, illustrative of embodiments of my invention, which accompany and form a part of the specification, and in which—

Figures 1 to 4 represent views in longitudinal section of apparatuses constructed according to my invention.

Like letters of reference indicate like parts in all the views.

Referring particularly by reference symbols or characters to the drawings, in Figs. 1 and 2 of which the primary heat unit is illustrated as a gas furnace, (although manifestly those furnaces employing coal or oil could equally well be used) A denotes the mixing chamber wherein air is mixed with the gas entering at the pipe *a* in order to form a Bunsen burner, the mixed air and gas being burned at the jets *a'* located in the cylindrical extension A' thereof, the products of combustion escaping at at least one orifice *b*. In the structure shown in Fig. 1, the jets *a'* are arranged internally and cylindrically, and the gas heater is inclosed in a casing B which forms a supporting means for the whole apparatus.

I provide a secondary or transmitting-medium heat unit consisting preferably of a liquid C having the characteristics named above and being inclosed in a tubular casing D, one end of which casing, as the inner one, being constructed and arranged to lie within the cylindrically arranged gas jets *a'*. In order to form a thin sheet or wall of the heat transmitting medium adjacent to the casing thereof I preferably insert a closed tube *d* within the said casing, exterior of which I preferably place a separator tube *d'* open at each end and preferably perforated and held in place intermediate the tube *d* and the casing D by heat distributing projecting lugs or rings d^2, the said separator tube assisting in the circulation of the heat transmitting medium.

I preferably subject the filled casing D to the maximum degree of heat that it will be subjected to in the operation of my apparatus and allow the surplus or excess fluid caused by the expansion of the same to escape by the vent D' which is then sealed, which vent D' may also be employed to serve to fill the casing D. The said casing D may be of any length desired, and at the point or location to which the heat is required to be transmitted I may inclose the outer end of the casing D with a heat distributing device as a boiler consisting preferably is led having relatively horizontally diffusing or radiating heat unit as a liquid to be vaporized, as water F, from which at least one heat distributing steam pipe *e* preferably is led having relatively horizontally

disposed radiating rings e^2 which may be varied in number at will, and which pipe may serve for embodiment in any suitable or desired heat distributing device. Within the casing E, I preferably use a separator tube m and heat distributing lugs or rings m' similar to those described and designated by the reference characters d', and d^2. I preferably provide the pipe e with a vent E′ which, after the air is expelled by the steam generated by heating the casing E, may be sealed, which vent E′ may also serve to fill the casing E and also, when desired, to allow the heat to escape. The pipe e and attachments therefor preferably serve to form a closing or covering device for the end of the diffusing or radiating heat unit.

The structure shown in Fig. 2 is somewhat similar to that illustrated in Fig. 1 except that in this case the gas jets a' are arranged so as to lie external of the cylindrical burner. In this instance both the heating casing E and the burner are located within the cylindrical casing D of the heat transmitting medium C, and in order to form a thin sheet or wall of water I preferably locate within the casing E a closed tube M which answers in this respect for a similar purpose as the outer end of the casing D in the structure shown in Fig. 1. In this embodiment I preferably provide the cylindrical casing D with an exterior connection by a pipe d^3 in order to assist the circulation of the heat transmitting medium C.

In the above embodiment of the invention, the lower portion of the primary heat unit A constitutes a transverse part as a partition, at one side of which is the heat generating means and at the other face of the same is placed the transmitting-medium heat unit C. In connection with the foregoing parts means are provided to contain a thermal storage fluid F, such for example, as heated water, steam, hot air, etc., the whole being supported by the side portions of the outer casing of the apparatus. The transmitting-medium heat unit is surrounded by a non-heat-conducting material G and is inclosed within the compartment or vessel containing the thermal storage fluid, which vessel is provided with projecting heat radiating devices, the packing serving to insulate the last named heat unit and fluid.

In Figs. 3 and 4 structures are illustrated which embody the same general arrangement of parts except that an electrical heater is employed comprising a resistance flat wire I having terminals i and i', which wire is wound internally in Fig. 3 and externally in Fig. 4 on a porcelain or other non-conducting refractory spool H, which wire may be enameled and is preferably cemented to the spool by any suitable cement as silicate of potassium. A plate of mica J is preferably cemented to the same, and between the latter and the casing K of the heater, which is preferably made of sheet brass, is placed a good heat conductor, as sand k, or a mixture of sand and soluble glass, whereby the heat from the heating medium, comprising the resistance wires, is conveyed to the diffusion wall K. In order to retain the heat in each of the above named apparatuses and to prevent useless loss by convection or radiation of any heat I preferably inclose the primary heat unit and the transmitting-medium heat unit (after being charged for use) in a suitable non-heat-conducting sectional packing G, as of asbestos which may be held in position by securing devices g and may also surround the thermal storage unit, whereby very little of the heat generated by the primary heat unit can escape.

The primary heat unit will, in practice, be subject to more or less variations or fluctuations, but the secondary or transmitting-medium heat unit will be practically constant, under different conditions, to produce a constant radiating heat unit and to cause steam or other elastic fluid of a given pressure to be generated and maintained, inasmuch as the radiation from the pipe e and the degree of the heat in the radiating unit may be controlled as by the use of a more or less number of radiating devices as rings e^2 and an outlet E′ and detachable or separable closure E^2, in order to equalize the diffusion of the heat with the generation thereof in the casing E, and also as the high heat retaining properties of the transmitting-medium will not be affected by any temporary variation or fluctuation of the primary heat unit, owing to which, the heating properties of an apparatus constructed according to this invention will be more lasting and will continue to be exercised for a greater period of time after the source of power of the primary unit is cut off than where the latter device alone is employed, the initial heating of the heat generator, the transmitting-medium heat unit and the thermal storage fluid being in the present instance practically instantaneous.

Owing to the close proximity of the transmitting-medium with the primary heat unit and also with the thin sheet or wall of the fluid to be treated, the transfer of heat from the primary heat unit to the liquid to be vaporized will be rapid and complete, as practically no radiation of heat can take place except at the pipe e, and also as the apparatus is thoroughly protected from climatic changes. The containing casings for the transmitting-medium and the heater are ordinarily made of thin and good heat conducting material, brass being preferably used. The water container or boiler and steam pipes are preferably made of iron tubing. The parts are so arranged that the primary heat unit and the transmitting-me-

dium heat units may be detachable and used at will from the radiating heat unit and from each other. Although the apparatus is illustrated in connection with gas and electric heaters, it is obvious that the same may be used in connection with any of the coal furnaces that are in common use or with any of the mineral oil burners that are well known, as the heat generating medium.

The primary heat unit is ordinarily arranged so that the heat produced thereby will not exceed a maximum degree of intensity or efficiency. If, however, heat at a given temperature be continuously applied to the transmitting-medium heat unit, the latter, on account of its being confined in its casing, will increase in efficiency, provided radiation is prevented, to a far higher degree than if the heat was allowed to escape. Therefore if the radiating heat unit be also confined, and the latter physically applied to the transmitting-medium heat unit as by being contained within or inclosing the same, the radiation can be so regulated as to continuously maintain, even after the primary heat is deënergized, the latter two heat units at a very high temperature whereby the radiating heat unit will serve to act as a very efficient heater whether located adjacent to or at a distance from the primary heat unit. As the transmitting-medium heat unit will, under conditions of use, only absorb a limited degree of heat, the maximum intensity of which adjustably stored heat will not be beyond the point of safety (and which maximum load can be predetermined by the construction employed) no danger can ever arise of heating the radiating heat or secondary thermal storage unit to such an undue extent as to endanger the integrity of the casing thereof especially if the outlet thereof is employed.

The transmitting-medium heat unit or heat-storage unit may consist of a solid body if preferred, as a mass of metal filings, or solid metal, as a massive piece of iron, which may be protected from the action or influence of exterior elements when exposed thereto by being thermally insulated by means of the use of lamp black or powdered silica as well as by, or in lieu of, the employment of said asbestos heretofore described.

The spool H, which has been previously designated as a porcelain one, is preferably made of any desired cementitious material, as kaolin, or well cured concrete containing the proper proportion of Portland cement.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for, obviously, modifications will occur to a person skilled in the art.

What I claim is:—

1. In a heating apparatus, a casing comprising side supporting means and a transverse part to support and having an opening for a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device comprising a supplemental shell or casing respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, and having at least one outlet and a separable closure to close the same at will, and also having located therein relatively horizontally disposed devices adapted to distribute heat, the transmitting-medium heat unit and thermal storage fluid being surrounded by a sectional heat non-conducting material, and means to hold the latter in position, the whole being supported by the first named casing.

2. In a heating apparatus, a casing comprising side supporting means and a transverse part to support and having an opening for a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting medium heat unit, the whole being supported by the said casing.

3. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing and comprising a circulating liquid medium to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, the whole being supported by the said casing.

4. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to

convey it away from the latter and to store the same, and a device comprising a supplemental shell or casing respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit.

5. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, and also having located therein relatively horizontally disposed devices adapted to distribute heat.

6. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, the transmitting-medium heat unit and the thermal storage fluid being surrounded by a sectional heat non-conducting material and means to hold the latter in position.

7. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, the whole being supported by the said casing.

8. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, and having at least one outlet and a separable closure to close the same at will.

9. In a heating apparatus, a casing comprising side supporting means and a transverse part to support a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, the transmitting-medium heat unit being inclosed within the thermal storage fluid container and the latter being surrounded by a sectional heat non-conducting material, and means to hold the latter in position.

10. In a heating apparatus, a casing comprising side supporting means and a transverse part to support and having an opening for a heater, heat generating means located at one side of the said transverse portion, and a separate and independent transmitting-medium heat unit positioned at another side of the casing to receive heat from the heat generator and to convey it away from the latter and to store the same, and a device comprising a supplemental shell or casing respectively separable from and independent of and extending above the transmitting-medium heat unit to contain a thermal storage fluid kept heated by the said transmitting-medium heat unit, and having at least one outlet and a separable closure to close the same at will, the transmitting-medium heat unit being inclosed within the thermal storage fluid container and the latter being surrounded by a sectional heat non-conducting material, and means to hold the latter in position.

11. In a heating apparatus, a casing comprising supporting means and a partition thereof, heat generating means located at one side of the said partition, and a transmitting-medium heat unit positioned at the other side thereof to receive heat from the heat generator and to convey it from the same, and superposed means to contain a thermal storage fluid heated by the transmitting-medium heat unit, the whole being supported by the said casing.

12. In a heating apparatus, a compart-

ment to contain a thermal storage fluid heated by a transmitting-medium heat unit, heat generating means, and a transmitting-medium heat unit located below the said fluid to receive heat from the heat generator and to convev it away from the same to the thermal storage fluid, the transmitting-medium heat unit being inclosed within the said compartment.

13. In a heating apparatus, a casing having at one end heat generating means, an intermediate transmitting-medium heat unit to receive heat from the heat generator and to convey it away from the same, and a superposed vessel to contain a thermal storage fluid heated by the transmitting-medium heat unit, the said vessel being made with projecting heat distributing devices, the whole being supported by the said casing.

14. In a heating apparatus, a casing comprising supporting means and a partition thereof, heat generating means located at one side of the said partition, and on the other a transmitting-medium heat unit to receive heat from the heat generator and to convey it away from the same, and a superposed vessel to contain a thermal storage fluid heated by the transmitting-medium heat unit, and an inclosing heat non-conducting material located around the said vessel, the whole being supported by the said casing and the heat non-conducting material serving to insulate the transmitting-medium heat unit and the thermal storage fluid.

In testimony of the foregoing specification I do hereby sign the same in the city of New York, county and State of New York, this 24th day of May, 1912.

JONATHAN O. FOWLER.

Witnesses:

ROB. SCHWARZ,

BENJ. F. HOARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."