Feb. 7, 1933. R. D. HEAPS 1,896,671

WATER HEATING APPARATUS

Filed July 30, 1930

Fig. 1.

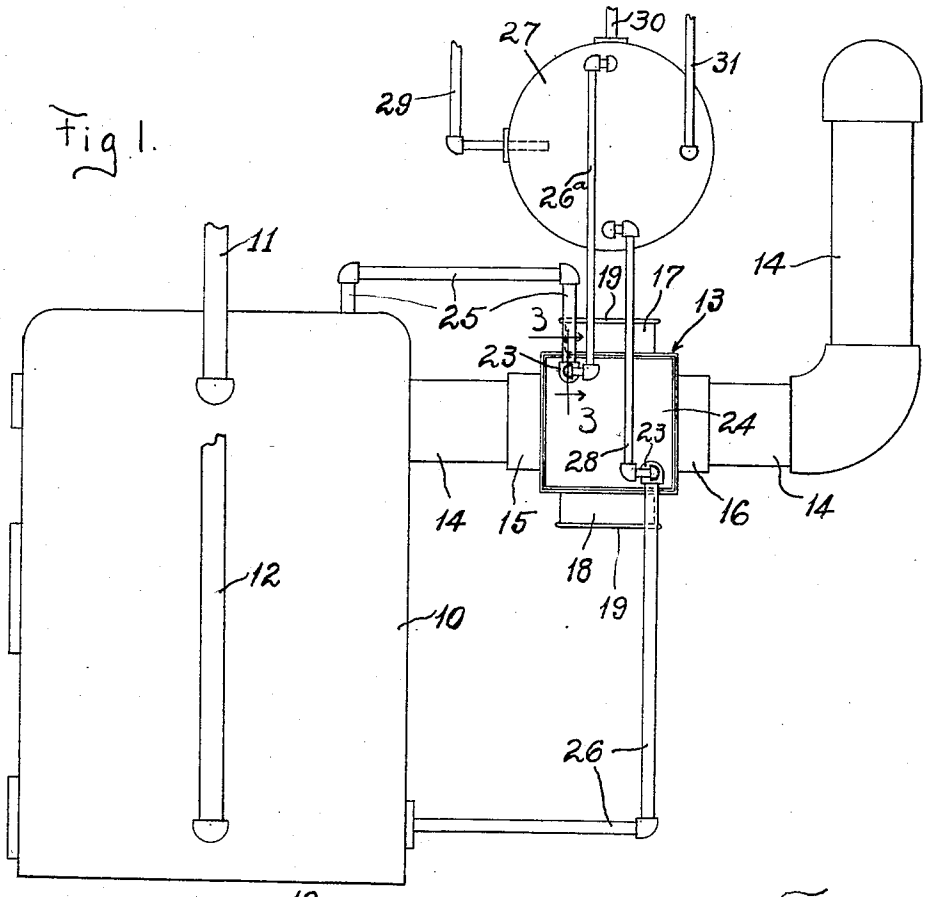


Fig. 2.

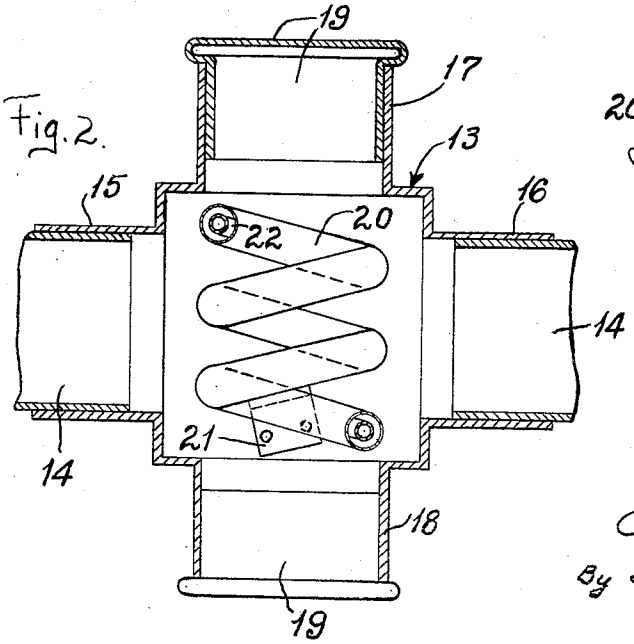
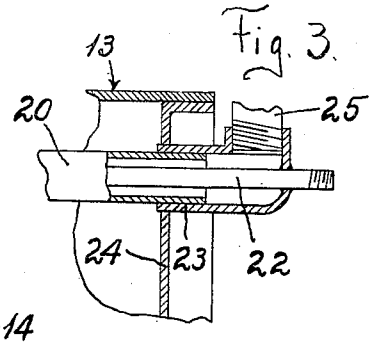


Fig. 3.



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WATER HEATING APPARATUS

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My invention relates to water heating apparatus and it has for its object the provision of a new and improved form and arrangement of parts by which a supply of water may be heated through the medium of the hot gases escaping through the flue from a boiler or furnace. To this end, it is one of the objects of my invention to provide an improved arrangement comprising a casing or housing through which the hot gases escape from the furnace, with a double coil arrangement therein for direct heating of the water passing through one of the coil parts and indirect heating of the water passing through the other coil part.

It is still another object of my invention to improve apparatus of this type in sundry details hereinafter pointed out. The preferred means by which I have accomplished my several objects are illustrated in the drawing and are hereinafter specifically described. That which I believe to be new and desire to cover by Letters Patent is set forth in the claims.

In the drawing,—

Fig. 1 is a view, more or less diagrammatic, showing my improved apparatus in connection with a boiler and water storage tank;

Fig. 2 is a vertical cross section through the center of the housing of my improved apparatus; and

Fig. 3 is an enlarged detail view, being taken substantially at line 3—3 of Fig. 1.

Referring to the several figures of the drawing, in which corresponding parts are indicated by the same reference characters, 10 indicates a boiler, being shown as the boiler of a hot water or steam heating plant, the hot water pipe being indicated by the numeral 11 and the return pipe by the numeral 12. A casing or housing 13 is shown interposed between portions of the metal pipe 14 by which the smoke and hot gases are conducted away from the furnace 10.

As is best shown in Fig. 2, the housing 13 is provided with oppositely extending pipe sections 15 and 16 at opposite sides thereof for reception of the pipe sections 14, the arrangement being such that the pipe sections 14 of standard size fit snugly within the pipe sections 15 and 16. Additional oppositely extending pipe sections 17 and 18 are also provided for use alternatively in place of either one or both of the pipe sections 15 and 16. By this arrangement the utmost ease is provided in the matter of installation of the water heating apparatus. Closure caps 19 of any approved type are provided for closing such two of the pipe sections 15, 16, 17 and 18 as are not used in the installation. Inasmuch as the caps 19 are readily removable at any time, ready access to the interior of the casing for cleaning the parts therein is provided.

Within the housing 13, I have provided a double coil arrangement comprising a coil 20 supported in the housing upon a shoulder 21, and a second coil part 22 located within the coil 20. At opposite ends of the coils 20 and 22, fittings 23 are provided for connecting the ends of the coil 20 in communication with other pipes, the ends of the coil 22 being extended through the walls of the fittings as is clearly shown in Fig. 3. The fittings 23 and the ends of the coil 20 extend through a flanged plate 24 which closes the face of the housing 13. By the engagement of the fittings 23 with the plate 24, the coils are held in position upon the shoulder 21 with the required firmness.

As is shown in Fig. 1, one of the fittings 23 is connected by means of a line of piping 25 with the upper end of the water jacket portion of the furnace 10, while the other fitting 23 is connected by means of a line of piping 26 with the lower end of the water jacket portion of said furnace. The upper end of the coil 22 is connected by means of a line of piping 26*a* with a storage tank 27 at the upper portion of the tank, and the lower end of the coil 22 is connected by a line of piping 28 with the lower part of said storage tank 27. In the arrangement shown a cold water pipe 29 is connected with the tank 27. Pipes 30 and 31 are connected with the tank 27 for supplying water therefrom for domestic purposes, it being understood that water is delivered through the pipe 29 under pressure for effecting the delivery of water through the supply pipe 30.

As is shown in the drawing, the ends of the pipe 22 have brazed connections to the fittings 23, but tight joints might be provided in any other suitable manner. As will be readily appreciated, the double coil device may be easily removed as a unit with the plate 24 whenever desired.

In the embodiment of my invention as shown, with a fire provided within the fire-box of the boiler 10 in the usual manner, hot water rises through the pipe 11 to a series of radiators, the water returning to the boiler for reheating through the pipe 12. At the same time, the hot gases passing outwardly and upwardly through the smoke stack 14 heats the water within the coil 20 causing a circulation of water upwardly through the coil and through the pipe 25 to the supply of water in the boiler 10, a supply of comparatively colder water passing upwardly to the coil through the pipe 26. At the same time, water fed to the coil 22 through the pipe 28 from the tank 27 is heated within the coil 22 through the effect of the hot water passing through the coil 20. Such water within the coil 22 rises through the pipe 26*a* to the storage tank 27, serving to keep the water within the tank 27 at the desired high temperature without danger of the temperature rising too high therein.

Inasmuch as the water flowing through the boiler 10 and through the heating system comprising the pipes 11 and 12, and through the coil part 20 connected to the boiler by the pipes 25 and 26 is kept in constant circulation for the heating effect without any considerable consumption or waste of such water, it will be understood that regardless of the degree of hardness of such water there is a very slight deposit of lime or similar materials within any part of the system. By reason of the fact that the water passing through the coil 22 and the pipes 26*a* and 28 to the storage tank 27 is subject to indirect heating only, it will be appreciated that there will be practically no deposit of lime or other like material within the coil 22 or any other portion of the system.

The arrangement is such that when there is practically no heat passing upwardly through the flue pipes 14 the water is free to flow through the pipe 25 to the coil 20, returning to the furnace through the pipe 26, serving thus to heat the water in the tank from that in the boiler.

By the use of my improved apparatus, I am enabled to make a very great saving, since the main supply of water being heated by the boiler 10 is heated in part by the effect of the hot gases which would otherwise be lost. At the same time, the auxiliary supply of water for domestic uses is heated entirely by such hot gases.

While I prefer to employ the arrangement as shown in my drawing, when my invention is being employed for the purpose of supplying water for domestic uses in connection with a hot water heating system, it will be understood that the invention is not to be limited to the arrangement as shown, except so far as the claims may be so limited by the prior art, it being understood that changes would be made in the arrangement to meet varying conditions in any case where the hot water supply were to be used otherwise than as above indicated in connection with the embodiment illustrated.

I claim:—

1. In an apparatus of the type described, the combination of a boiler, a storage tank for hot water, a double coil arrangement comprising two coil parts one inside of the other, means for connecting the outside coil part into a circuit with said boiler, other means for connecting the inside coil part into a circuit with said storage tank, and means for applying heat exteriorly to said coils whereby the boiler water supply has heat applied directly thereto and the storage tank water supply is heated indirectly from the hot water in said outside coil.

2. In an apparatus of the type described, the combination of a boiler, a housing connected in the smoke flue of said boiler, a double coil arrangement in said housing comprising two coil parts one inside of the other, means for closing the ends of said outside coil part about the inside coil part and for connecting said outside coil with the water chamber of said boiler, a tank, and means for connecting said inside coil with said tank for delivering hot water to the tank from said inside coil independently of said outside coil part.

3. In an apparatus of the type described, the combination of a boiler, a housing connected in the smoke flue of said boiler, a double coil arrangement in said housing comprising two coil parts one inside of the other, fittings on the ends of the outside coil part with the ends of the inside coil part extending tightly through openings in the walls of the fittings, connections through said fittings between said outside coil part and the water chamber of said boiler, and connections with said inside coil part for delivery of hot water therefrom independently of said outside coil part.

4. In an apparatus of the type described, the combination of a boiler, a housing connected in the smoke flue of said boiler, a double coil arrangement in said housing comprising two coils parts one inside of the other, fittings on the ends of the outside coil part with the ends of the inside coil part extending tightly through openings in the walls of the fittings, connections through the medium of said fittings between said outside coil part and the water chamber of said boiler, a storage tank, and connections between

said inside coil part and said storage tank for delivering hot water to said tank from said coil.

5. In a water heater for use in connection with a boiler and a domestic water storage tank, the combination of a casing, means for connecting said casing in the flue of the boiler for the passage of the heated gases from the boiler therethrough, water heating means within said casing comprising a double tube arrangement in the form of a tube within a tube, means for connecting the outside tube of said double tube means in a circuit with said boiler, and means for connecting the inside tube of said double tube means in a circuit with said storage tank.

6. In a water heater for use in connection with a boiler and a domestic water storage tank, the combination of a casing, means for connecting said casing in the flue of the boiler for the passage of the heated gases from the boiler therethrough, water heating means within said casing comprising a tube within a tube extending substantially across said casing a plurality of times for effective contact with the hot gases therein, means for connecting the outside tube means in a circuit with said boiler, and means for connecting the inside tube means in a circuit with the storage tank.

7. In a water heater for use in connection with a boiler and a domestic water storage tank, the combination of a casing, means for connecting said casing in the flue of the boiler for the passage of the heated gases from the boiler therethrough, water heating means within said casing comprising a double coil arrangement in the form of a tube within a tube, means for connecting the outside tube in a circuit with said boiler, and means for connecting the inside tube in a circuit with said storage tank.

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