F. A. NIEBERDING.

WATER HEATER.

APPLICATION FILED MAR. 14, 1913.

1,127,078.

Patented Feb. 2, 1915.

2 SHEETS—SHEET 1.

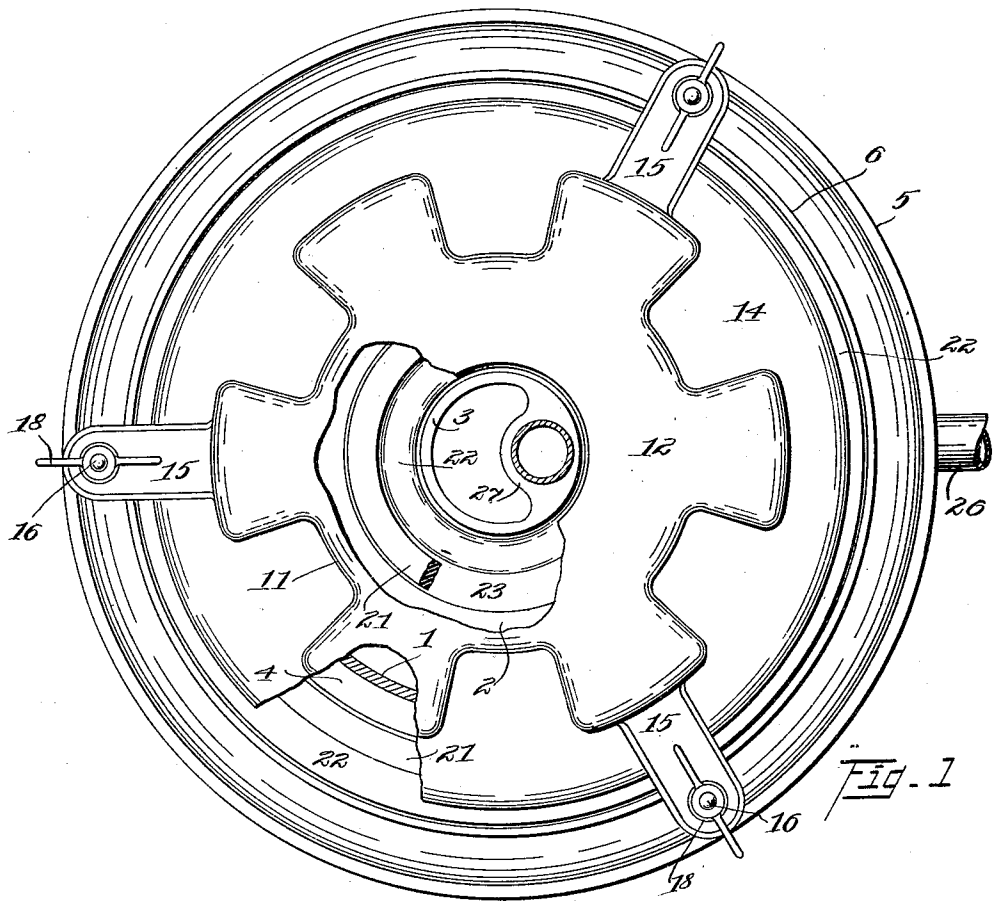


Fig. 1

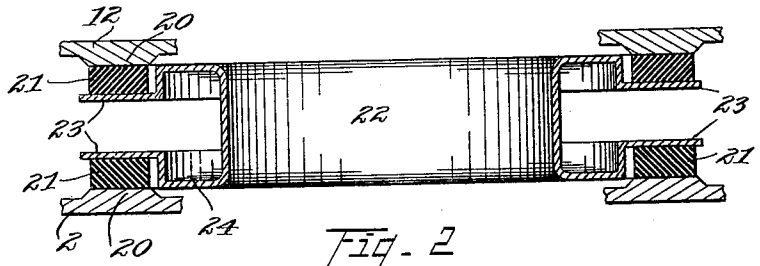


Fig. 2

Witnesses:-

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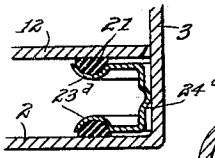


Fig. 7.

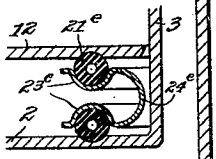


Fig. 8.

Fig. 3

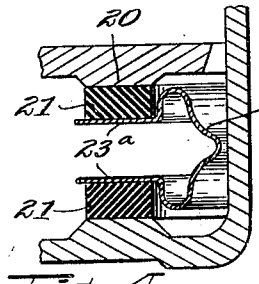


Fig. 4

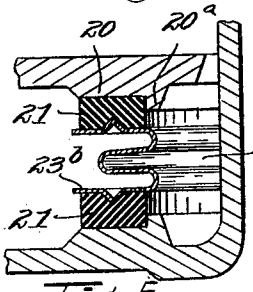


Fig. 5

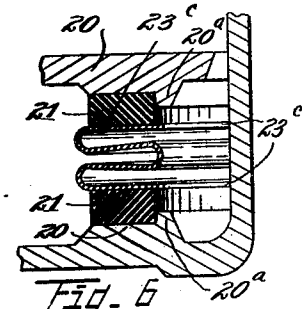


Fig. 6

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UNITED STATES PATENT OFFICE.

FRANK A. NIEBERDING, OF CLEVELAND, OHIO.

WATER-HEATER.

1,127,078. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed March 14, 1913. Serial No. 754,277.

To all whom it may concern:

Be it known that I, FRANK A. NIEBERDING, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Water-Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to the type of water heater shown in my prior Letters Patent of the United States No. 980,327, issued January 3, 1911, which comprises, generally, two shells fitting one within the other and between which water is adapted to circulate in the form of a thin sheet and be heated by a gas burner which is located beneath the inner shell, a suitable packing means being employed between the adjacent edges of the two shells to prevent the leakage of water therebetween.

The form of packing which is shown in my former patent has proven very satisfactory under ordinary conditions, but I have found that, when the pressure within the heater becomes excessive (due to the generation of steam therein) the resiliency of the packing material permits it to yield and withdraw from the surface with which it ordinarily engages, allowing the water and steam to escape. While I am convinced that only rubber, or material possessing substantially the same characteristics as rubber, can be successfully employed as packing in this connection, unless such material is reinforced by a comparatively stiff backing to give to it its initial pressure, the undesirable action above set forth may result at times. Beyond this increased initial pressure, which I obtain through my present construction, the action of the present packing is identical with that of the previous form wherein the increased pressure within the heater contributes to the more effective action of the packing means.

It is to this improved packing means that my present invention particularly relates, and it has for its object, in addition to the provision of a packing means which is extremely efficient in the prevention of leakage at the joints of the heater, those objects which were attained by my former construction, to wit: to provide a water heater which shall be efficient in operation, insuring rapid and economical heating of the water supplied therethrough; which shall be comparatively simple and inexpensive of production; and which may be readily assembled and disassembled for purposes of repair and cleaning.

These and further objects I attain by the construction illustrated in the accompanying drawings, wherein—

Figure 1 is a plan of my water heater, certain parts being broken away to show portions of the improved packing means applied thereto; Fig. 2 is a sectional detail of the preferred form of my packing means; Fig. 3 is a central vertical section through the water heater; while Figs. 4, 5, 6, 7 and 8 show modified forms of the packing means.

In the drawings, 1 represents the vertical, corrugated wall of the inner shell of the water heater which is formed at its top with the horizontal wall 2 from the central portion of which rises the circular neck 3. To the neck 3 may be applied the usual flue for carrying off the products of combustion. The lower portion 4 of the inner shell is flared outwardly in a horizontal plane, having an upwardly curved peripheral lip 5, and a vertical, annular flange 6 projects upwardly from the portion 4 just inside the lip 5. Depending from the inner edge of the portion 4 is an annular flange 7 by which the inner shell is supported from the frame 8 which carries the gas burners 9.

The outer shell comprises a vertical, corrugated wall 11 and a horizontal top wall 12 which are similar to the corresponding walls of the inner shell, the central portion of the latter wall being provided with a circular opening 13 through which the neck 3 of the inner shell is adapted to project, and the lower edge thereof is flared outwardly to form a horizontal flange 14. Extending radially from the bottom of the outer shell are perforated ears 15 through which project threaded studs 16 that are carried by bosses 17 located between the lip 5 and the flange 16 of the inner shell. Thumb nuts 18 are adapted to be screwed upon the studs 16 and hold the shells together. While I have shown but three of the lugs 15 in my drawings, any desired number may be employed.

The opposed faces of the horizontal walls 2 and 12 and the corresponding faces of the portion 4 and the flange 14 of the inner and outer shells, respectively, are provided with annular seats 20 against which the packing rings or washers 21 of rubber or like ma-

terial are adapted to bear. These packing rings or washers are held firmly against their respective seats by a hollow spring metal ring 22 which, in its preferred form, comprises two parallel annular flanges 23 which bear directly upon the inner sides of the packing rings or washers 21. The edges of these flanges which are farthest removed from the space inclosed by the shells of the heater, are joined by a portion of the ring 22 which is substantially rectangular in cross section, the vertical dimensions of the rectangular portion 24 being greater than the distance between the inner sides of the packing rings or washers, whereby a vertical shoulder is provided for locating and maintaining in proper position the packing rings or washers 21. This enlarged portion of the ring 22 also insures a correct placing of the parts with respect to the neck 3 in one case, and the flange 6 in the other.

In assembling the heater, the lower packing rings or washers 21 may be placed upon their respective seats 20, the spring metal rings 22 may then be placed upon these rings or washers, the upper rings or washers 21 placed upon their respective flanges 23 and the outer shell of the heater lowered into position over the inner shell and held thereon by the thumb nuts 18, sufficient pressure being applied to the lugs 15 by the thumb nuts to cause each of the packing means to be firmly clamped between its respective seats with the ring 22 slightly under tension. When thus assembled, it will be apparent that there will be a comparatively thin space between the inner and outer shells which is distributed over an area of considerable extent, and that water contained within this space will be quickly affected by the heat applied to the interior of the inner shell from the burners 9. It will be readily understood also that, in the event of the generation of steam within the heater, the pressure produced thereby will act upon the interior of the rings 22 and increase their action upon the packing rings or washers 21 in proportion to the pressure of the steam.

For the purpose of supplying water to the space between the inner and outer shells, the inner shell is provided near its bottom with a connection 25 which may be internally threaded for the reception of the end of the supply pipe 26, said pipe discharging into the lower portion of the annular space adjacent the lower packing means. At its upper end, the inner shell is provided with a connection 27 which is preferably cast within the neck 3 of the shell and extends to the top of the neck and is provided with an internal thread for the reception of the lower threaded end of the outlet pipe 28.

In Fig. 4 I have shown a modified form of packing means which is identical with the previously described form except for the cross sectional shape of the enlarged portion 24^a. The action of the two forms is the same.

Fig. 5 illustrates a further modification of the packing means wherein the portion of the ring 22^b which connects the outer edges of the flanges 23^b is corrugated to provide the required springing action, and the flanges 23^b are provided with ribs which occupy grooves in the packing rings or washers. The form shown in Fig. 6 is substantially a reversal of that shown in Fig. 5 except that the portion intermediate of the flanges 23^c is of greater extent in order to provide a space within which the steam pressure may act to increase the force with which the flanges 23^c (which are smooth in this case) bear against the packing rings or washers. While the forms shown in Figs. 5 and 6 may be more easily produced than the forms illustrated in the previous figures, I do not consider them as effective, and moreover, with these latter forms it is necessary to provide the edges of the seats 20 with lips 20^a to retain the packing rings or washers in proper position.

Throughout the figures of the drawing so far referred to, the packing rings or washers are shown as substantially rectangular in cross section. I wish it to be understood, however, that rings or washers of varying shapes and sizes may be employed without diverging from my invention; as, for instance, in Fig. 7 I have shown the packing rings or washers 21 as solid members of semi-circular cross section; while in Fig. 8 the packing rings or washers 21^e are shown as circular cross sectional tubes which occupy the substantially semi-circular seats in the flanges 23^e of the spring ring 24^e and similar seats in the opposed faces of the casing members.

Although I have described my water-heater as being used in connection with a gas burner, it is obvious that it is as well adapted for use with stoves or heaters wherein solid fuel is employed as the heat producing medium, or heat may be supplied thereto from an electric heating element.

Having thus described my invention, what I claim is:—

1. In a water heater, the combination, with a pair of casing members, of a packing means interposed between their adjacent edges and comprising a pair of yielding members, one for each edge, and a hollow member holding said packing members against their seats, the interior of the hollow member communicating with the interior of the casing.

2. In a water heater, the combination, with a pair of casing members, of a packing means interposed between their adjacent edges and comprising a pair of yielding

members, one for each edge, and a hollow spring member, the interior of which communicates with the interior of the casing, interposed between said packing members.

3. In a water heater, the combination, with a pair of generally bell shaped casing members fitting one within the other and flared at their bottoms to form a pair of horizontally disposed annular flanges and contracted at their tops to provide for each a substantially horizontal wall, of packing means interposed between the horizontal flanges and between the horizontal top walls and comprising a pair of yielding members, and a hollow spring member, the interior of which communicates with the interior of the casing, interposed between said yielding members and assisting to retain the same on their seats.

4. In a water heater, the combination, with a pair of generally bell shaped casing members fitting one within the other and flared at their bottoms to form a pair of horizontally disposed annular flanges and contracted at their tops to provide for each a substantially horizontal wall, the flanges and walls having opposed annular seats, of a packing means interposed between the adjacent seats and comprising a pair of rings of yielding material, one for each of the seats, and a hollow annular spring member, the interior of which communicates with the interior of the casing and having a pair of flanges which bear against the inner surfaces of the aforesaid rings.

5. In a water heater, the combination, with a pair of generally bell shaped casing members fitting one within the other but separated sufficiently to provide a narrow space therebetween, the members being flared at their bottoms to form a pair of horizontally disposed annular flanges and contracted at their tops to provide for each a substantially horizontal wall, the intermediate portions of the casing members having complementary corrugations, and an inlet and outlet connection carried by the inner member for the aforesaid space, of a packing means interposed between the adjacent surfaces of the horizontal flanges and of the top walls and comprising a pair of rings of yielding material, and a hollow spring member, the interior of which is adapted to communicate with the interior of the casing, separating and holding said rings to their seats.

6. A packing means of the character described comprising, in combination, a pair of yielding members, and a hollow member spacing said yielding members apart, the hollow member having a seat for each of the aforesaid yielding members, the edge of one of the seats being connected to the edge of the other by a resilient portion of said hollow member.

7. A packing means of the character set forth comprising, in combination, a pair of yielding members, and a hollow member spacing apart said yielding members, the hollow member being composed of thin resilient material having a seat for each of the aforesaid yielding members, one of said seats being located adjacent each of its edges, the edge of one of the seats being connected to the edge of the other by the central portion of said hollow member.

8. A packing means of the character set forth comprising, in combination, a pair of annular yielding members, and an annular hollow member spacing said yielding members apart, the hollow member being composed of thin resilient material and having a seat for each of the aforesaid yielding members, one of said seats being located adjacent each of its edges, the edge of one of the seats being connected to the edge of the other by the central portion of said hollow member.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FRANK A. NIEBERDING.

Witnesses:
J. B. HULL,
BRENNAN B. WEST.

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