

No. 620,931.

Patented Mar. 14, 1899.

W. KANE.

STEAM AND HOT WATER BOILER.

(Application filed July 13, 1898.)

(No Model.)

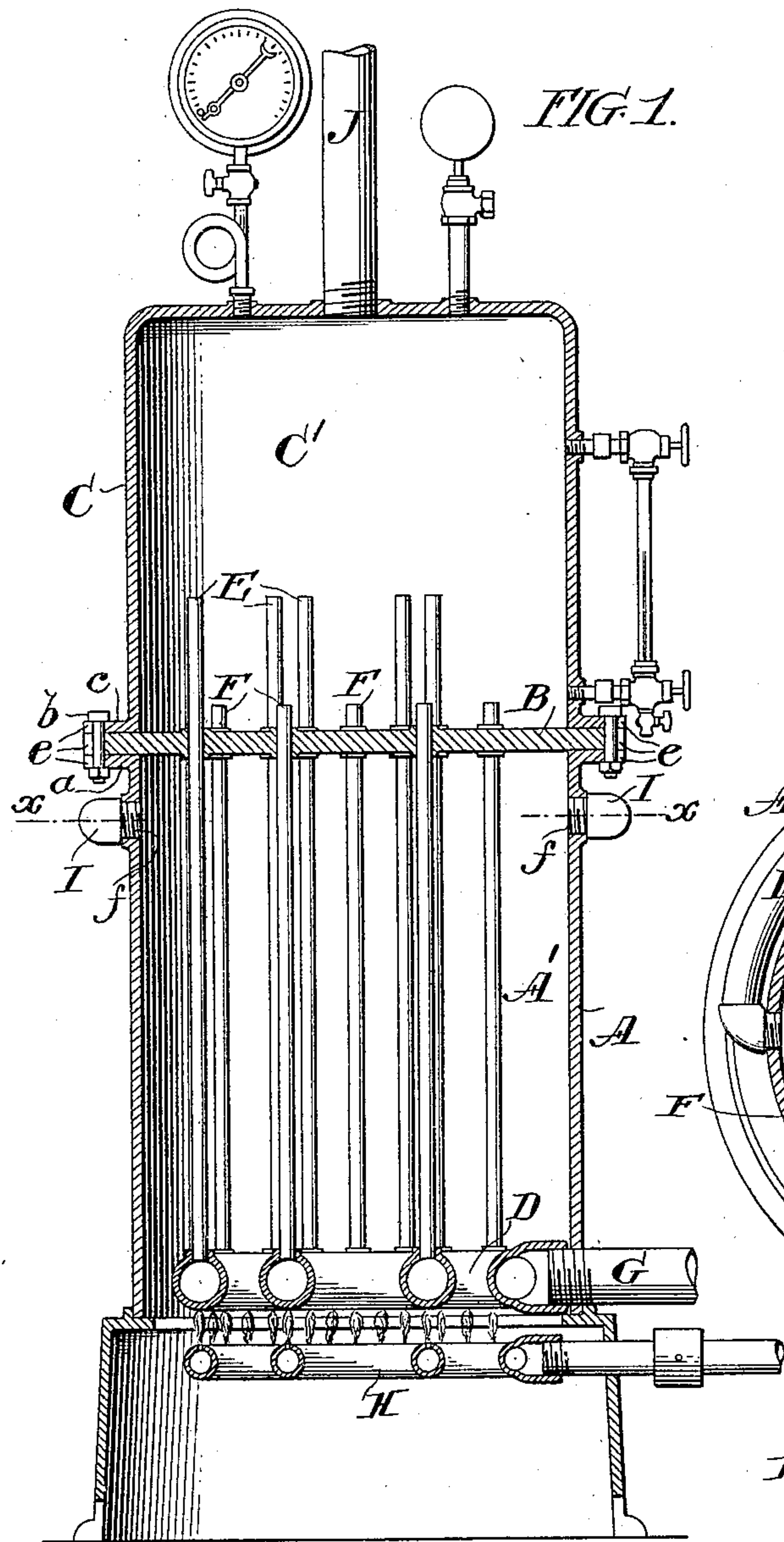


FIG. 1.

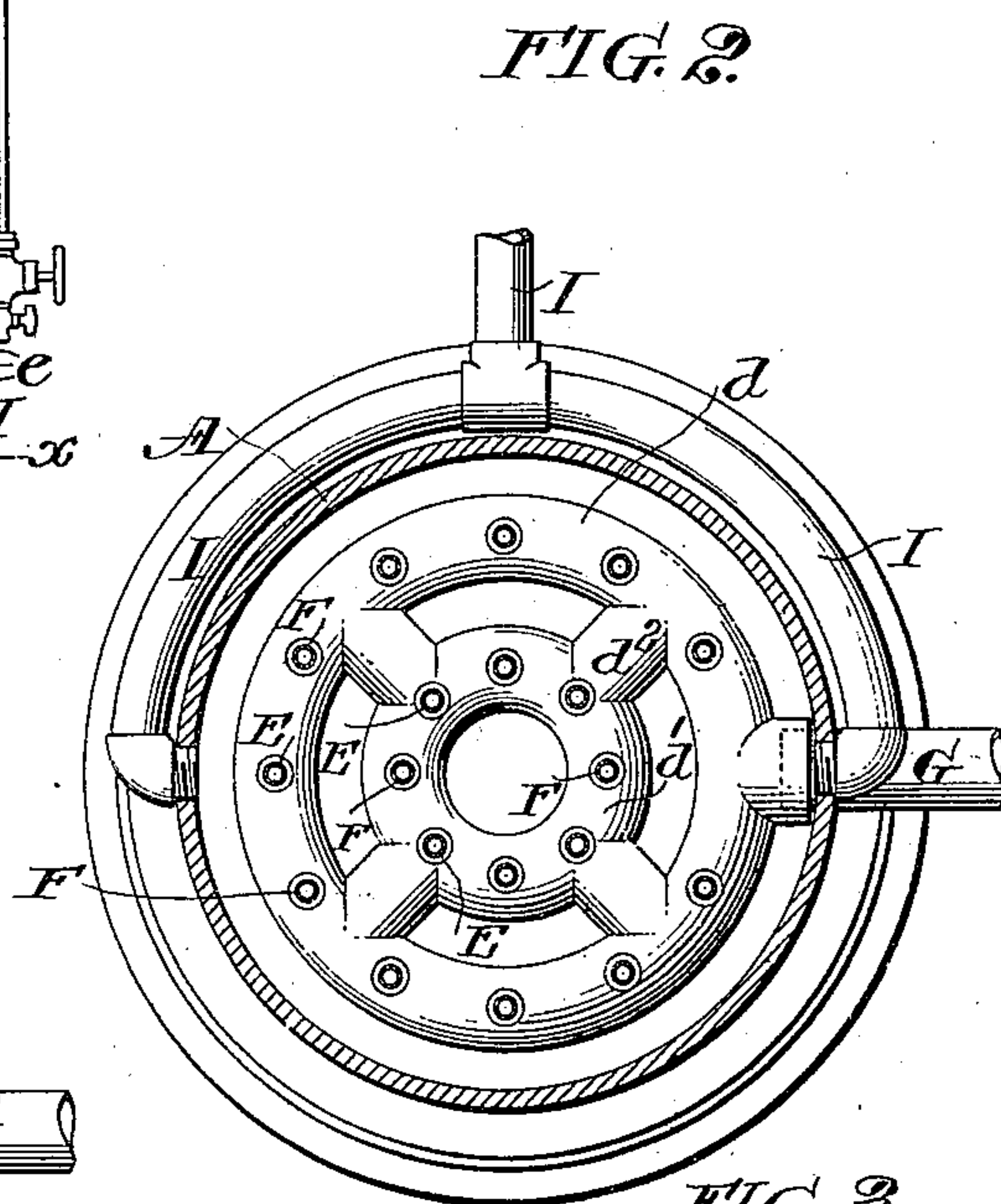


FIG. 2.

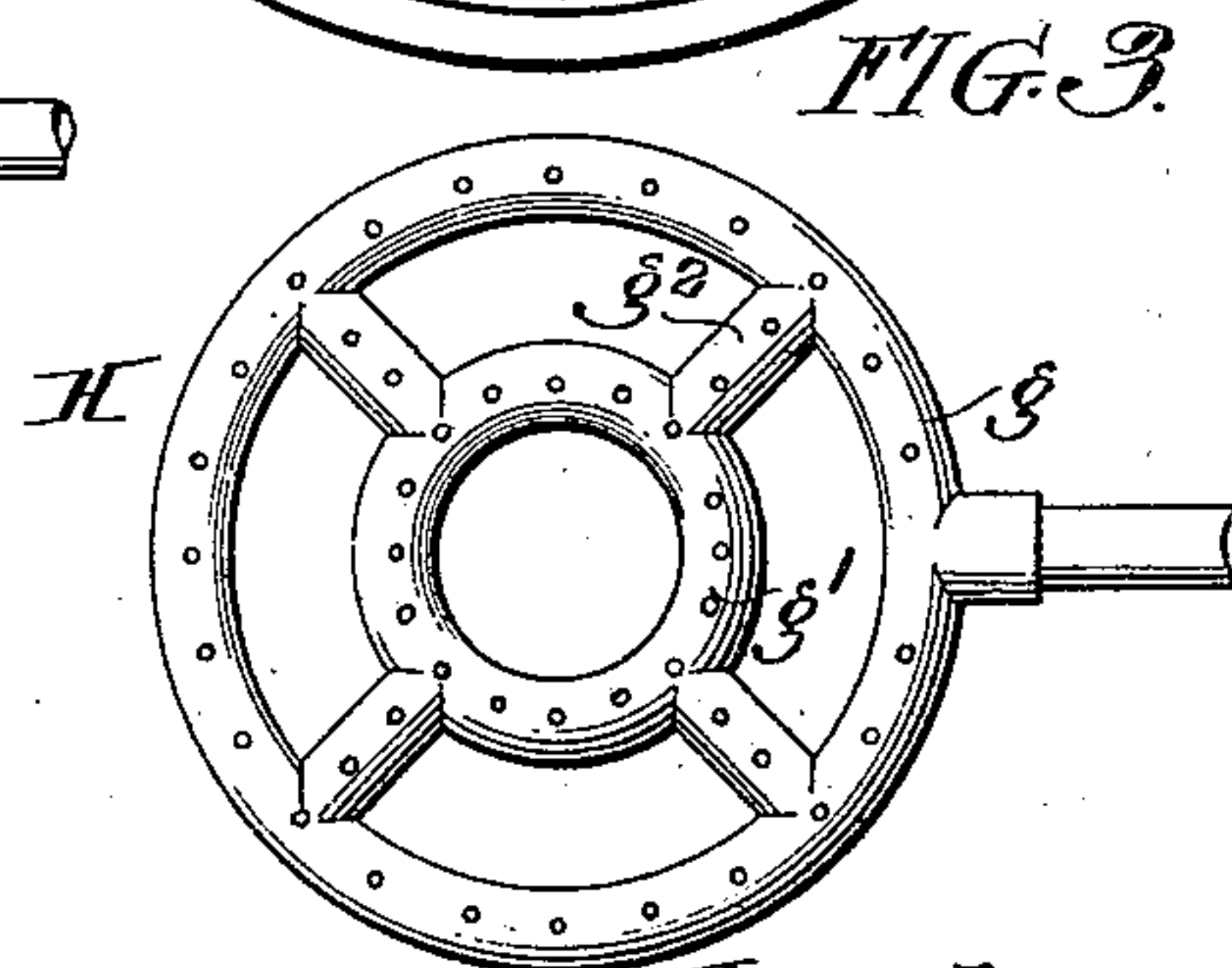


FIG. 3.

Witnesses:

Henry Denny
A. M. Kelly.

Inventor:

Wm Kane
By *Wm Kane*
Wm Kane

UNITED STATES PATENT OFFICE.

WILLIAM KANE, OF PHILADELPHIA, PENNSYLVANIA.

STEAM AND HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 620,931, dated March 14, 1899.

Application filed July 13, 1898. Serial No. 685,833. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KANE, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Steam and Hot-Water Boilers, of which the following is a specification.

My invention relates to steam and hot-water boilers; and it consists of the improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

It is one of the objects of my invention to provide a low-pressure boiler of simple and economical construction for the generation of steam or hot water which shall be quick and economical in its action in raising the temperature of the water or in generating steam.

It is also one of the objects of my invention to enable the water-circulating tubes and parts connected with them to be easily and quickly removed for the purpose of making repairs, so that the delay and annoyance usual to the making of repairs may be greatly reduced.

While my improved boiler may be used, so far as many of its principal features are concerned, with any suitable means for supplying heat, it is one of my objects to enable gaseous fuel to be satisfactorily employed and to avoid the escape of gases and odors therefrom into the room or building, and a part of my invention relates to improvements designed for this object.

By employing a series of water-tubes extending from a water-chamber of small cubical capacity, to which the heat is applied, into the dome or chamber in which the body of water is contained and arranging such tubes so that a portion thereof projects above the normal water-level in said dome or chamber, while the others are below the water-level, I am able to obtain a more efficient circulation and to raise the temperature of the whole body of water very rapidly.

By employing a removable crown-plate forming the base of the dome or upper chamber and connecting the water-tubes thereto I am able to easily and quickly remove the water-tubes and the water-chamber with which they are connected from the outer shell or casing of the boiler by the disconnection and removal of the crown-plate.

In the accompanying drawings, Figure 1 is a longitudinal vertical sectional view of a boiler embodying my invention. Fig. 2 is a horizontal sectional view of the same on the line xx of Fig. 1, and Fig. 3 is a plan view of the burner.

A is the outer shell or body, forming a hollow chamber A' , which is closed at the top by a crown-plate or diaphragm B.

C is a dome or cap located above the crown-plate B and forming therewith an upper closed water and steam chamber C' .

In my preferred construction the crown-plate B is detachably secured between flanges $a c$ of the shell and dome by bolts b . To facilitate the removal of the bolts, the flanges $a c$ and the edge of the plate B may be provided with notches e , in which the shanks of the bolts may fit, thus allowing the bolts to be removed when the nuts are loosened.

D is a hollow water-chamber located in the base of the chamber A' and provided with a series of water-tubes $E F$, extending up through the chamber A' and projecting through the crown-plate B, to which they are secured. A portion of these tubes, as E , are longer than the tubes F and project to a greater distance into the chamber C' , as shown, and these tubes are preferably arranged alternately long and short. The water-chamber D is connected with a suitable water-supply pipe or return G.

Heat may be supplied to the water-chamber D in any convenient manner. I have, however, shown my boiler adapted for use with gaseous fuel supplied by a burner H, located below the water-chamber D.

The preferred construction of the water-chamber D is illustrated in the drawings and consists of concentric tubular rings $d d'$, united by tubular connections d^2 . When this form of water-chamber is employed, the burner H is correspondingly constructed, consisting of concentric annular pipes $g g'$, united by connections g^2 , as shown in Fig. 3.

The chamber A' may be provided with outlets f near the top, through which the gases or products of combustion arising from the burners may pass off through pipes I and be conducted off to a flue or outlet, so as not to escape into the room or cellar in which the heater is located. To prevent the formation

of an unequal draft by the escape of the gases, I prefer to locate one outlet *f* on each side, as shown.

The chamber *C'* is provided with the usual steam or water outlet or supply pipe *J*, by which the steam or hot water is conducted to the heaters, radiators, &c., through the building, and the return of the cool water, or water of condensation, takes place through the pipe *G* to the chamber *D*.

The dome *C* may be provided with the usual safety-valve and pressure and water gages.

In utilizing the boiler for the generation of steam the water-level is maintained at a point between the tops of the long and short tubes, so that a body of water is maintained above the tops of the short tubes, while the long tubes project above into the steam-space. The heat from the burners *H* passes up into the chamber *A'*, heating the chamber *D* and also the tubes *E F* and plate *B*. When heat is applied to the chamber *D*, the heated water rises in the longer tubes *E* and overflows or boils over into the body of cool water in the chamber *C'*. Owing to the construction of the water-chamber *D* only a small volume of water is subjected to the heat at one instant, and consequently the temperature of this small volume of water will be very quickly raised, and as it is immediately introduced into the body of cool water it acts to quickly raise the temperature of the main body of water. This construction greatly facilitates circulation, as the long tubes commence to eject hot water into the open steam-space almost immediately the heat is applied, although the main body of the water still remains comparatively cool. From this it results that the temperature of the main body of water in the chamber *C'* is materially raised by the introduction of this heated water from the tubes *E* even before the heat, acting upon the plate *B*, is sufficient to materially affect the temperature. The heat arising from the burners *H* acts first to heat the small volumes of water in the chamber *D* and to cause that heated water to rise in the tubes *E* and flow into the chamber *C'*, and then arising in the chamber *A'* acts directly upon the plate *B* to further raise the temperature of the main body of water.

In utilizing the boiler as a hot-water heater the chamber *C'* is maintained full of water, the circulation being induced by the difference in the length of the pipes *E F*.

As the tubes *E F* are connected with the crown-plate *B* and water-chamber *D*, these parts may be easily removed from the shell or body for the purpose of making repairs. To accomplish this, the bolts *b* are removed and the dome *C* lifted off, the pipe *G* is disconnected, and the crown-plate *B*, with the tubes *E F* and water-chamber *D*, may then be lifted out of the shell *A*.

This construction enables repairs to be made very easily and expeditiously.

The details of construction shown may be varied without departing from the invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a steam or hot-water boiler, the combination of an outer shell, a plate detachably supported thereby, a series of circulating-tubes carried by said plate and extending down to the lower part of the outer shell, and a water-chamber carried by the lower ends of said tubes and communicating therewith, whereby said plate, tubes and water-chamber may be removed as an entirety from said outer shell.

2. In a steam or hot-water boiler, the combination of an outer shell, a plate detachably supported thereby, a detachable dome over said plate, a series of circulating-tubes carried by said plate and extending down to the lower part of said outer shell, and a water-chamber carried by the lower ends of said tubes and communicating therewith, whereby said plate, tubes and water-chamber may be removed as an entirety from said outer shell.

3. In a steam and hot-water boiler, the combination of an outer shell, a removable horizontally-disposed tubular water-chamber located in said shell, and a series of circulating-tubes connected with said removable water-chamber and communicating therewith, whereby said water-chamber and tubes may be removed as an entirety from said shell.

4. In a steam and hot-water boiler, the combination of an outer shell, a dome, a crown-plate located between said dome and shell and detachably connected therewith, a removable water-chamber located in said shell, and a series of tubes connected at their upper ends with said crown-plate and at their lower ends with said water-chamber and opening through said crown-plate.

5. In a steam and hot-water boiler, the outer body or casing *A, C*, formed with an upper closed chamber *C'*, a water-chamber *D* located at a distance below the base of the chamber *C'*, and a series of tubes leading from the water-chamber *D* and opening into the chamber *C'*.

6. In a steam and hot-water boiler, the outer body or casing *A, C*, formed with an upper closed chamber *C'*, a water-chamber *D* located at a distance below the base of the chamber *C'*, and a series of tubes leading from the water-chamber *D* and opening into the chamber *C'*, part of said tubes projecting into said chamber for a greater distance than others.

7. In a steam and hot-water boiler, the outer body or casing *A, C*, formed with an upper closed chamber *C'*, a water-chamber *D* located at a distance below the base of the chamber *C'*, and a series of alternately long and short tubes *E, F*, leading from the water-chamber *D* and opening into the chamber *C'*.

8. In a steam and hot-water boiler, the combination of an outer shell, a crown-plate carried by said outer shell and closing the top

thereof, a dome located over said crown-plate, a water-chamber located in the lower part of said outer shell, and a series of tubes connected at their lower ends with said water-chamber and projecting upward through the crown-plate, a part of said tubes projecting upward through said crown-plate a greater distance than others.

9. In a steam and hot-water boiler, the combination of an outer casing provided with an upper closed chamber, a water-chamber located below said upper closed chamber and consisting of a horizontally-disposed tubular structure, and a series of tubes leading from the water-chamber and projecting into said upper closed chamber, a part of said tubes projecting upward into said upper chamber for a greater distance than others.

10. In a steam and hot-water boiler, the combination of an outer casing provided with an upper closed chamber, a horizontally-disposed tubular water-chamber, located below said upper chamber, a series of tubes leading from said tubular water-chamber and opening into upper closed chamber, and a tubular gas-burner located below said tubular water-chamber.

11. In a steam and hot-water boiler, the combination of an outer casing provided with an upper closed chamber, a tubular water-chamber composed of the tubular rings d , d' , and connecting portions d^2 located below said upper chamber, a series of tubes leading from said tubular water-chamber and opening into

upper closed chamber, and a tubular gas-burner located below said tubular water-chamber.

12. In a steam and hot-water boiler, the combination of an outer shell, a crown-plate carried by said outer shell and closing the top thereof, said outer shell being provided with an outlet for the escape of gases below said crown-plate, a dome located over said crown-plate, a water-chamber located in the lower part of said outer shell, a series of water-circulating tubes connected with said water-chamber at their lower ends, and opening at their upper ends through said crown-plate, and a gas-burner located below said water-chamber.

13. In a steam and hot-water boiler, the combination of an outer shell, a crown-plate carried by said outer shell and closing the top thereof, said outer shell being provided with an outlet for the escape of gases below said crown-plate, a pipe or flue leading from said outlet, a dome located over said crown-plate, a water-chamber located in the lower part of said outer shell, a series of water-circulating tubes connected with said water-chamber at their lower ends, and opening at their upper ends through said crown-plate, and a gas-burner located below said water-chamber.

In testimony of which invention I hereunto set my hand.

WILLIAM KANE.

Witnesses:

J. W. KENWORTHY,

ERNEST HOWARD HUNTER.