(No Model.)

# A. E. JOHNSON.

## MEANS FOR FEEDING AND CONTROLLING SUPPLY OF WATER TO BOILERS.

No. 572,171. Patented Dec. 1, 1896.

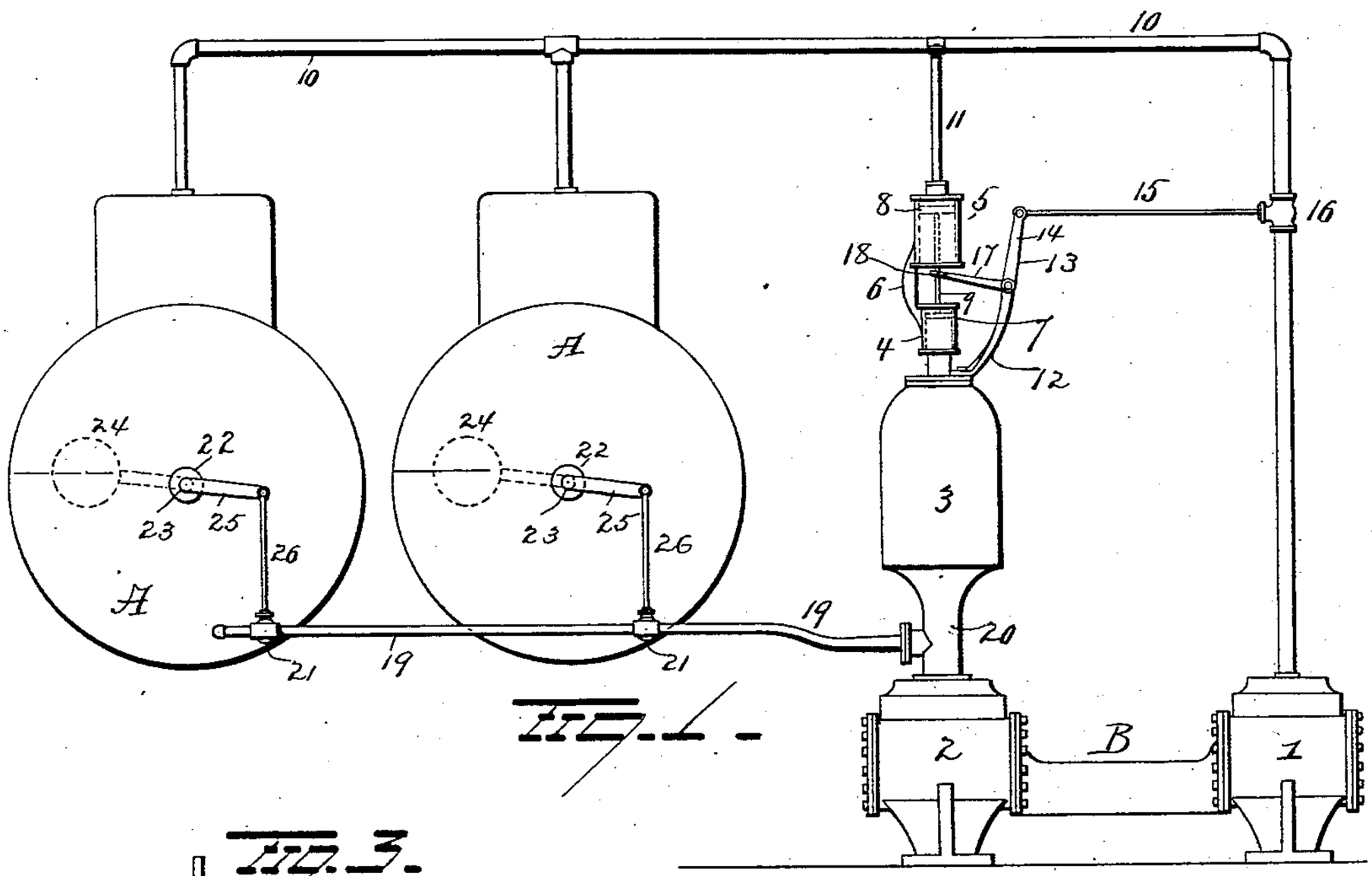


FIG. 1.

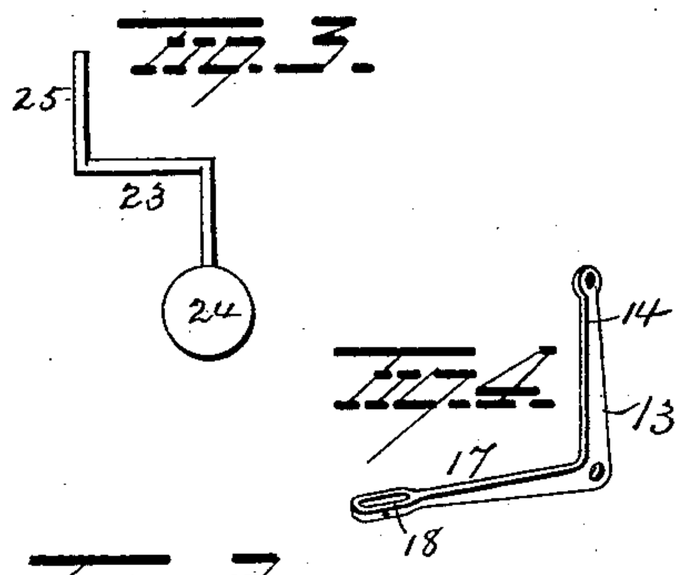


FIG. 3.




FIG. 4.

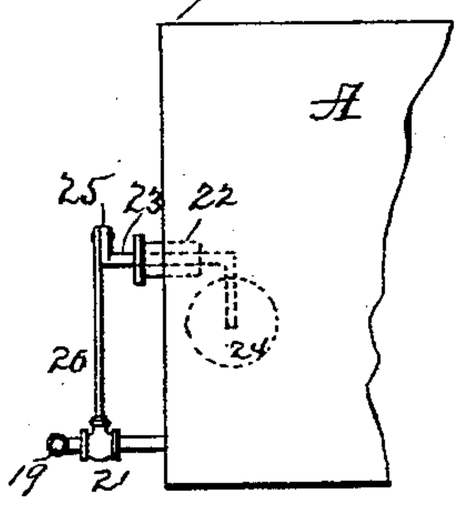


FIG. 2.

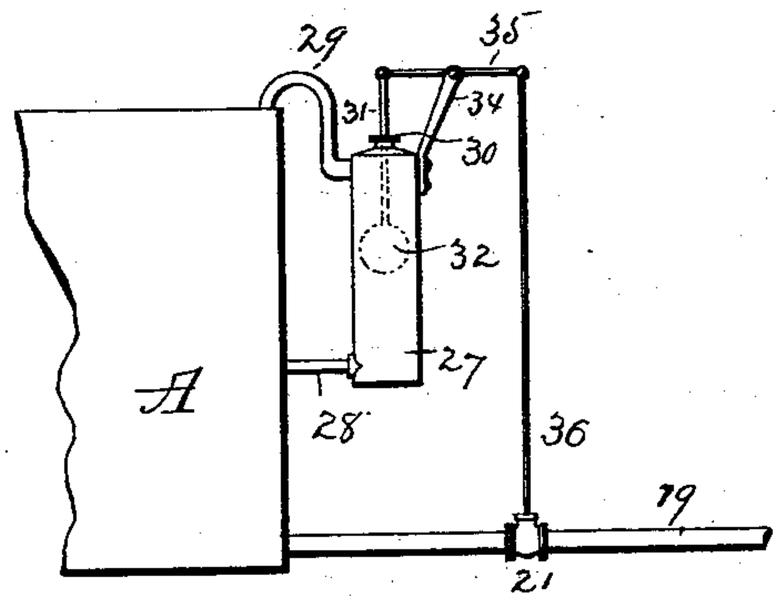


FIG. 5.

Witnesses
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# UNITED STATES PATENT OFFICE.

AMOS ELLMAKER JOHNSON, OF NORTHUMBERLAND, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO LOUISIANA P. JOHNSON, OF SAME PLACE.

## MEANS FOR FEEDING AND CONTROLLING SUPPLY OF WATER TO BOILERS.

SPECIFICATION forming part of Letters Patent No. 572,171, dated December 1, 1896.

Application filed July 28, 1896. Serial No. 600,795. (No model.)

*To all whom it may concern:*

Be it known that I, AMOS ELLMAKER JOHNSON, a resident of Northumberland, in the county of Northumberland and State of Pennsylvania, have invented certain new and useful Improvements in Means for Feeding and Controlling the Supply of Water to Boilers; and I do hereby declare the following to be 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.

My invention relates to an improvement in means for feeding and controlling the supply of water to boilers, the object of the invention being to provide simple and efficient means whereby a uniform level of water can be automatically maintained in any number of boilers.

With this object in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claim.

In the accompanying drawings, Figure 1 is a view illustrating my improvements. Figs. 2, 3, and 4 are views illustrating certain details. Fig. 5 is a view of a modification.

A A represent steam-boilers, and B a steam-pump, the latter comprising a steam-engine 1 and a water-pump 2, with which latter an air-chamber 3 communicates. A small cylinder 4 is disposed above and communicates with the air-chamber 3. Another small cylinder, 5, slightly larger than the cylinder 4, is supported about five or six inches above said cylinder 4 by means of an arm 6. Pistons 7 8 are located within the respective cylinders 4 5 and are connected by a piston-rod 9. A steam-pipe 10 communicates with the boilers A A and conducts steam to the engine portion of the steam-pump. With the steam-pipe 10 the upper cylinder 5 communicates by means of a small pipe 11.

A rigid arm 12 projects upwardly from the air-receptacle 3, and to the free end of this arm a bell-crank lever 13 is pivotally connected. The arm 14 of the bell-crank lever is connected by means of a rod 15 with a valve 16 in the steam-pipe 10, and the arm 17 of said bell-crank lever is provided with an elongated slot 18, through which the piston-rod 9 passes. A water-pipe 19 communicates at one end with the neck 20 at the lower end of the air-receptacle 3, and is adapted to conduct water (forced through it by the pump) to the boiler A, the water passing from said feed-pipe 19 to the boilers through inlets having valves 21.

In the drawings I have shown two boilers, but it will be understood that my improvements are applicable for operation with any number of boilers and will operate as well with fifty as with one. In the end of each boiler a bushing 22 is inserted and forms a bearing for a small crank-shaft 23. On the inner end of this crank-shaft (within the boiler) a float 24 is secured, and from the outer end of said crank-shaft an arm 25 projects. The arms 25 are connected, by means of rods 26, with the valves 21. It will be seen that when the water in the boiler rises or falls the crank-shaft 23 will be turned and the valve 21 will be closed or opened. The pressure in the air-chamber or receptacle is always equal to the pressure in the boiler into which the water is being pumped plus the friction of the water in the feed-pipe and the height of water in boiler above the pump. If the pump stood on a level with the water-line in the boiler, we would only have to pump against steam-pressure in the boiler and the friction in the feed-pipes, but the boilers are usually several feet higher than the pump, in which case the higher the boiler above the pump the greater the force required to elevate the water, which makes the pressure on the lower piston 7 greater to the square inch than the steam-pressure per square inch on the upper piston 8. Hence the necessity for making the area of the upper piston the greater.

If the valves in the feed-pipe be all closed without also closing the valve which admits steam to the pump, the pump would continue to operate and increase pressure in the feed-pipe and air-chamber sufficient to burst them.

If the floats in the boilers rise and close the

valve 21 in the feed-pipe, the pressure in the air-chamber, instead of bursting the feed-pipe, will force the piston in the small cylinder 4 up and close the valve in the steam-pipe leading to the pump automatically. When any of the valves in the feed-pipe open, (by the floats following the water down in the boilers,) the pressure of steam on the piston in the upper cylinder 5 will force said piston down and open the valve in the steam-pipe leading to the pump automatically. My improved apparatus will keep the water at a uniform height in as many boilers as are connected to the same feed-pipe.

In cases where the boiler is bricked up, and when the "surging" of the water would be violent on account of heavy work done by the engine, the modified form of construction shown in Fig. 5 would be found convenient. In this form of the invention I provide a cylinder or column 27, communicating at its lower end with the boiler by means of a pipe 28 and at its upper end with the steam-space of the boiler by means of a pipe 29, the cylinder or column being so disposed as to always have the same level of water in it as in the boiler. The upper end of the cylinder or column is provided with a stuffing-box 30, through which a rod 31 is adapted to pass. To the lower end of the rod 31 a float 32 is attached. An arm 34 is secured to and projects from the upper end of the column of cylinder 27, and to said arm a lever 35 is pivoted at a point between its ends. One end of the lever 35 is pivotally connected to the rod 31, and to the other end of said lever a rod 36 is attached, the other end of said last-mentioned rod being attached to the valve 21. From this construction and arrangement of parts it will be seen that the rise and fall of the water in the boiler and in the column will effect a movement of the float, which movement will be transmitted to the valve and operate the same in the manner above explained.

My improvements are simple in construction and effectual in all respects in the performance of their functions.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details herein set forth.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination with a boiler, a steam-pump, a feed-pipe having a valve therein and adapted to conduct water to the boiler, and a steam-pipe leading from the boiler to the steam-pump, of a crank-shaft mounted in the wall of the boiler, a float secured to said crank-shaft, an arm on the outer end of said crank-shaft, a connection between said arm and the valve in the feed-pipe, an air-chamber communicating with the pump, a cylinder communicating with the air-chamber, a cylinder communicating with the steam-pipe leading to the pump, pistons in said cylinders, a rod connecting said pistons, a bell-crank lever having one arm connected with said piston-rod, a valve in the steam-pipe leading to the pump and a connection between said valve and the other arm of the bell-crank lever, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AMOS ELLMAKER JOHNSON.

Witnesses:
REUBEN JOHNSON,
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