C. E. LINDGREN.

AUTOMATIC WATER CONTROLLER FOR BOILERS.

APPLICATION FILED MAR. 2, 1910.

974,085.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.

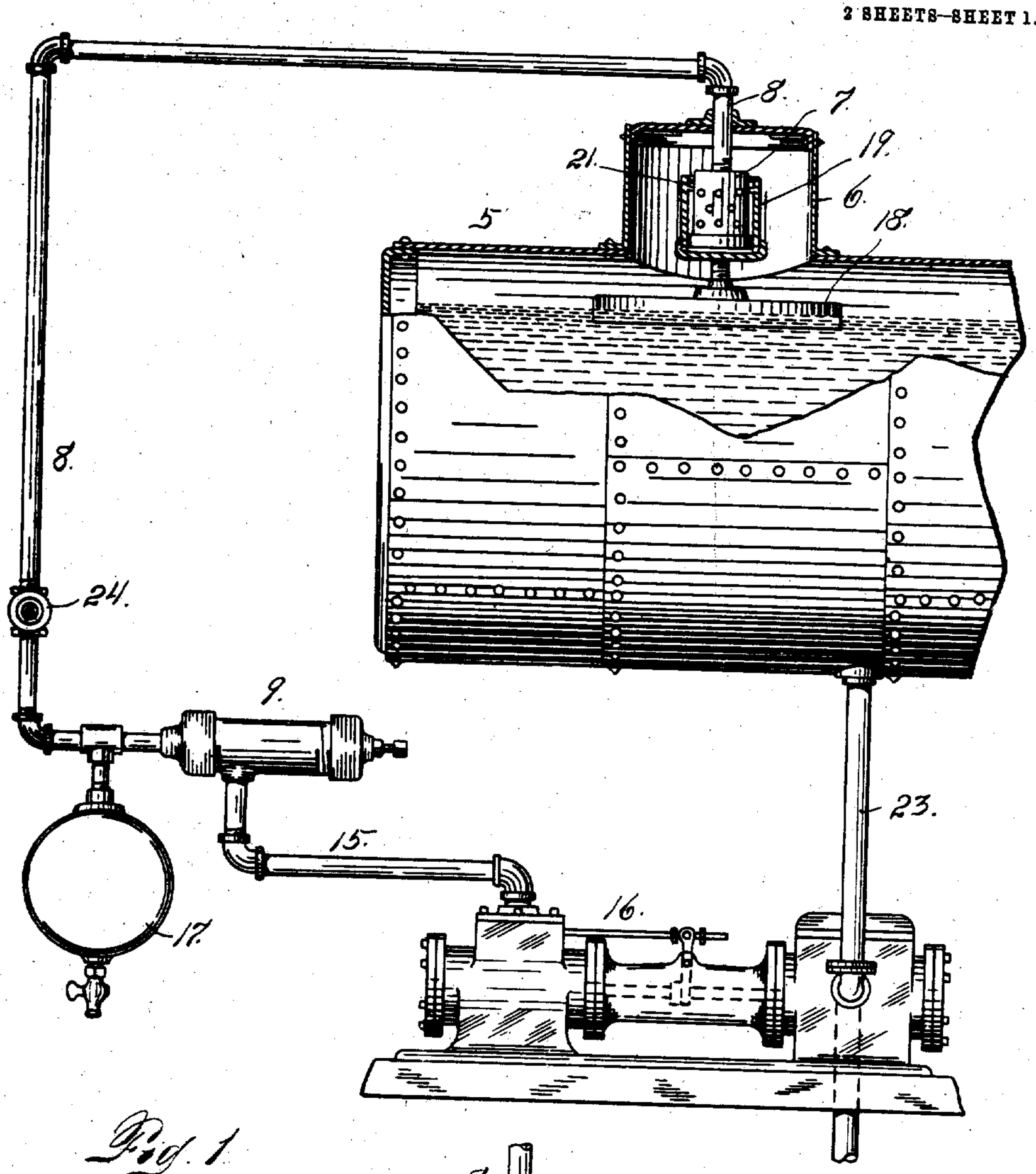

Fig. 1

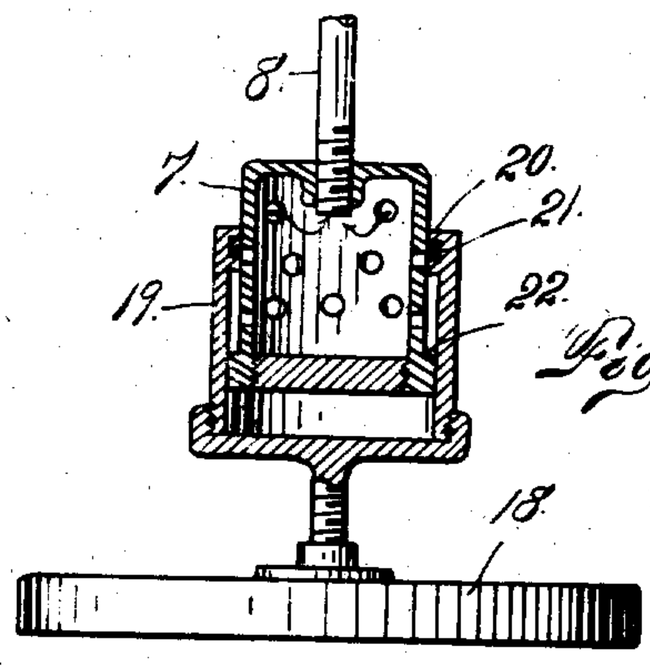

Fig. 2

Witnesses
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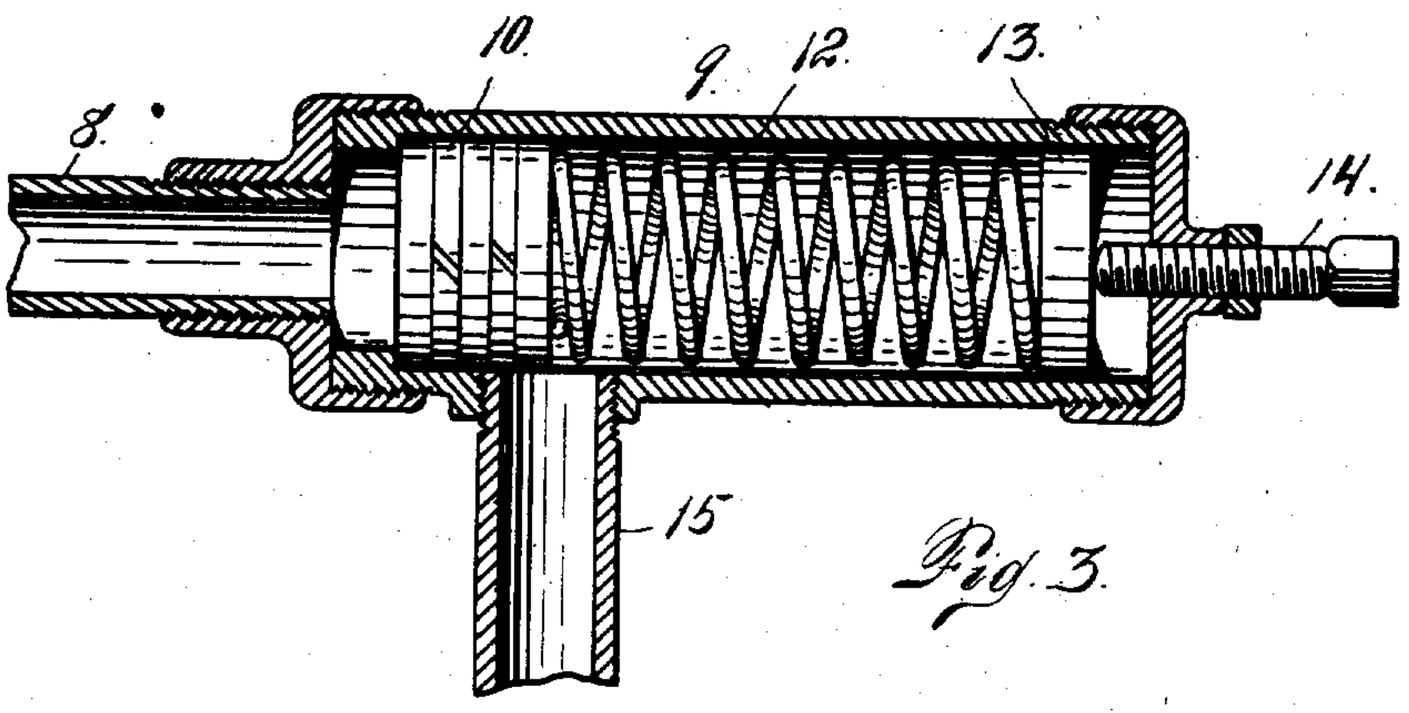

Fig. 3.

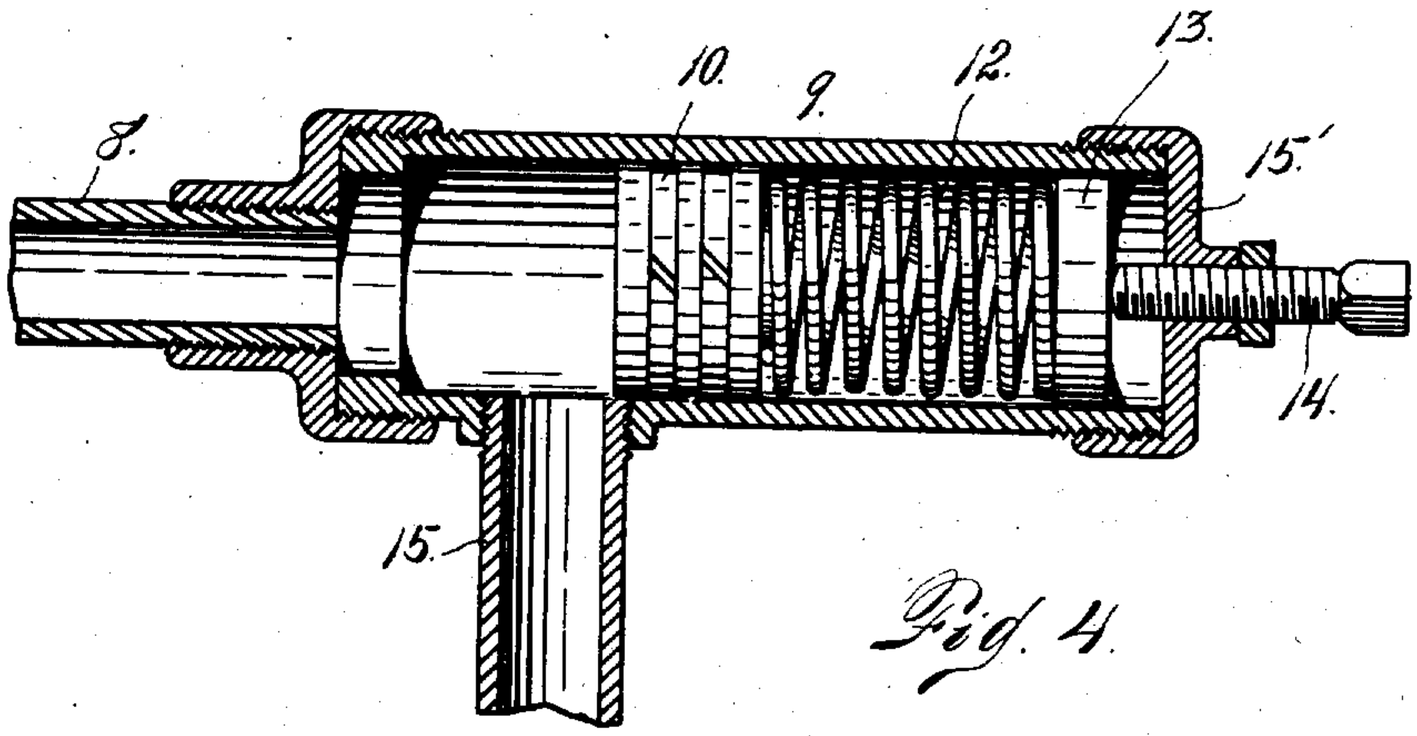

Fig. 4.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC WATER-CONTROLLER FOR BOILERS.

974,085. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed March 2, 1910. Serial No. 546,954.

To all whom it may concern:

Be it known that I, CARL E. LINDGREN, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Automatic Water-Controllers for Boilers; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means for automatically controlling the water supply of boilers, whether of the stationary or locomotive type.

In my improved construction provision is made for automatically regulating the supply of steam to the pump which supplies the boiler with water. This is accomplished by means of a perforated casing located in the steam dome of the boiler and connected by means of a pipe with the pump. A float located in the boiler carries a shell which surrounds the perforated casing and is adapted to cut off the supply of steam thereto from the boiler, when the float is raised a predetermined distance. In other words, when the water reaches a predetermined depth in the boiler, being the highest level desired, the steam is cut off from the pump and the supply of water to the boiler ceases. Then as the water lowers in the boiler, due to the generation of the steam, the float will drop and gradually uncover the perforations in the casing and allow steam to pass to the pump for the purpose of keeping up the supply of water. Interposed in the pipe connection between the perforated casing and the pump is a cylinder in which is located a piston acted on by a coil spring normally, or when steam is cut off from the pump, occupying a position whereby the passage of water from the steam pipe to the pump is prevented. This construction prevents the water of condensation in the steam pipe from entering the pump and flooding the same.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a fragmentary view of a boiler equipped with my improvement, the connections between the boiler and the pump being also illustrated. Fig. 2 is an enlarged sectional view of the perforated casing and the float carrying the steam cut-off shell or hood. Fig. 3 is a sectional view taken through the tension cylinder, the spring-actuated piston being shown in its normal position or when the steam from the boiler is cut off from communication therewith. Fig. 4 is a similar view showing the piston acted on by the steam to allow the latter to pass to the pump. Figs. 3 and 4 are shown on a larger scale than the corresponding construction in Fig. 1.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the boiler which, as shown in the drawing, is equipped with a dome 6 in which is located a perforated casing 7 from which leads a pipe 8 to a cylinder 9 containing a piston 10 acted on by a coil spring 12, one extremity of which is engaged by a follower 13 which is in turn engaged by a tension-screw 14 threaded in the cap 15′ of the cylinder. From this cylinder leads a pipe 15 to the pump. This pipe 15 is located near one extremity of the cylinder, namely, that where the pipe 8 enters. Connected with the pipe 8 between the boiler and the cylinder is a receptacle 17 adapted to receive the water of condensation from the pipe 8. The spring 12 should be maintained at such a tension that the piston 10 will not move against the spring sufficiently to uncover the pipe 15, until the steam pressure is sufficient to operate the pump. Hence, after the steam is cut off from the pipe 8 and the latter begins to cool, the spring 12 will act on the piston 10 and throw the latter to the position shown in Fig. 3, whereby communication between the pipe 8 and the pump is cut off, thus preventing the water of condensation from entering the pump.

Located within the boiler 5 below the dome 6 is a float 18 upon which is mounted a shell or hood 19 which surrounds the perforated casing 7 and is adapted to cover the perforated wall of the casing when the boiler is full, the float in this event being in the

position shown in Fig. 1. This shell is provided at its upper extremity with an inwardly projecting flange 20 in which is located a packing ring 21 to prevent the entrance of steam. This flange is adapted to engage a shoulder 22 formed on the lower part of the casing, when the hood is at its lowest limit of downward movement, or in position to uncover all of the perforations of the casing. This construction prevents the float and its hood from becoming disengaged from the perforated shell during the cleaning out of the boiler, or when the water is drained therefrom sufficiently for the purpose.

From the foregoing description the use and operation of my improved construction will be readily understood. If we assume that the boiler is full, as shown in Fig. 1, the float being carried upwardly with the water causes the hood to rise to a corresponding extent, whereby all of the perforations of the casing 7 are covered or cut off from communication with the steam, hence the steam cannot pass to the pump and the latter will cease to operate. Now as the water is used in the boiler for the generation of steam, its level falls and the float moving downwardly therewith gradually uncovers the perforations of the casing 7 and allows steam to enter the pipe 8. If this pipe is cold when the steam enters it, there will be some water of condensation which, however, will be caught by the receptacle or trap 17. However, as the hood descends a greater volume of steam enters the pipe 8 and when the pressure is sufficient for the purpose, the piston 10 will be moved against its spring 12 a sufficient distance to uncover the extremity of the pipe 15 communicating with the cylinder 9, allowing the steam to pass to the pump which, being set in motion, will supply the boiler with water through the feed pipe 23.

By virtue of the cylinder 9, the piston 10 and the spring 12, together with the follower 13 and the tension screw 14, provision is made whereby the steam is prevented from passing to the pump until the pressure is sufficient to start the latter, and when the steam pressure rises to this extent, the piston will be moved sufficiently to uncover the pipe 15 and allow the steam to pass to the pump for operating purposes. In the meantime, it will be understood that the water of condensation is cut off from the pump and caused to enter the trap or receptacle 17.

The pipe 8 is provided with a valve 24 which is normally open but which may be closed when for any reason it may be desired to do so.

Having thus described my invention, what I claim is:

1. The combination with a boiler, a pump, and a connection between the boiler and the pump for supplying water to the former, of a perforated casing located in the steam space of the boiler above the water level, the said casing having a shoulder formed on its lower extremity, a pipe connection between the said casing and the pump, a hood surrounding the said casing and vertically movable thereon, the said hood having a flange surrounding the upper extremity of the hood and adapted to come into engagement with the shoulder formed on the casing to limit the downward movement of the hood, and a float connected with the hood, and arranged to rise and fall as the water level fluctuates in the boiler, for the purpose set forth.

2. The combination with a boiler and a pump connected with the boiler to supply water thereto, of a perforated casing located in the dome of the boiler, a pipe connection between the casing and the pump, a cylinder interposed in the pipe leading from the casing to the pump, a spring-actuated piston therein normally arranged to cut off communication between the said pipe connection and the pump, a trap interposed between the said casing and the cylinder for catching the water of condensation between the cylinder and the casing, and a float-actuated hood located in the boiler connected in operative relation with the perforated casing, whereby as the water rises and falls in the boiler the entrance of steam to the casing is automatically regulated.

3. The combination with a boiler, a pump, and a pipe connection between them for supplying steam to the pump, and a connection between the pump and boiler for supplying water to the latter, of a perforated casing located in the steam space of the boiler above the water level and in communication with the pipe connection between the boiler and pump, the said casing having a shoulder on its lower extremity, and float actuated hood located in the boiler slidably supported on the casing for regulating the passage of steam to the perforated casing as the water level fluctuates in the boiler, the said hood having a flange surrounding the said upper extremity of the hood and adapted to come into engagement with the shoulder formed on the casing to limit the downward movement of the hood, for the purpose set forth.

4. The combination with a boiler, a pump, and a connection between the pump and boiler for supplying water to the latter, of a perforated casing located in the boiler above the water level, float-actuated means adapted to open and close the perforations of the said casing as the water fluctuates in the boiler, a pipe leading from the said casing, a cylinder with which said pipe communicates, a piston in said cylinder, a spring acting on the piston, a follower engaging the spring, a tension screw arranged to act on

the follower for regulating the spring's tension, and a pipe leading from the cylinder to the pump, the construction being such that the piston when in its normal position cuts off the passage of steam from the cylinder to the pump, while when the piston is acted on by the steam pressure of the boiler, the piston is moved against the tension of the spring to permit the passage of steam to the pump, substantially as described.

5. The combination with a boiler, a pump, and a connection between the pump and the boiler for supplying water to the latter, of a perforated casing located in the steam space of the boiler, a float-actuated hood having a telescopic connection with the perforated casing, a pipe connection between the said casing and the pump, and a spring-actuated piston interposed in the said pipe connection, a spring acting on the piston, a follower engaging the spring, a tension screw acting on the follower for regulating the tension of the spring to hold the piston in a position to normally cut off the steam from the pump until the pressure becomes sufficient to operate the pump.

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

CARL E. LINDGREN.

Witnesses:
VIRGINIA I. DAVIS,
ELIZABETH BOWEN.