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J. E. L. OGDEN.

APPARATUS FOR CONTROLLING FEED WATER.

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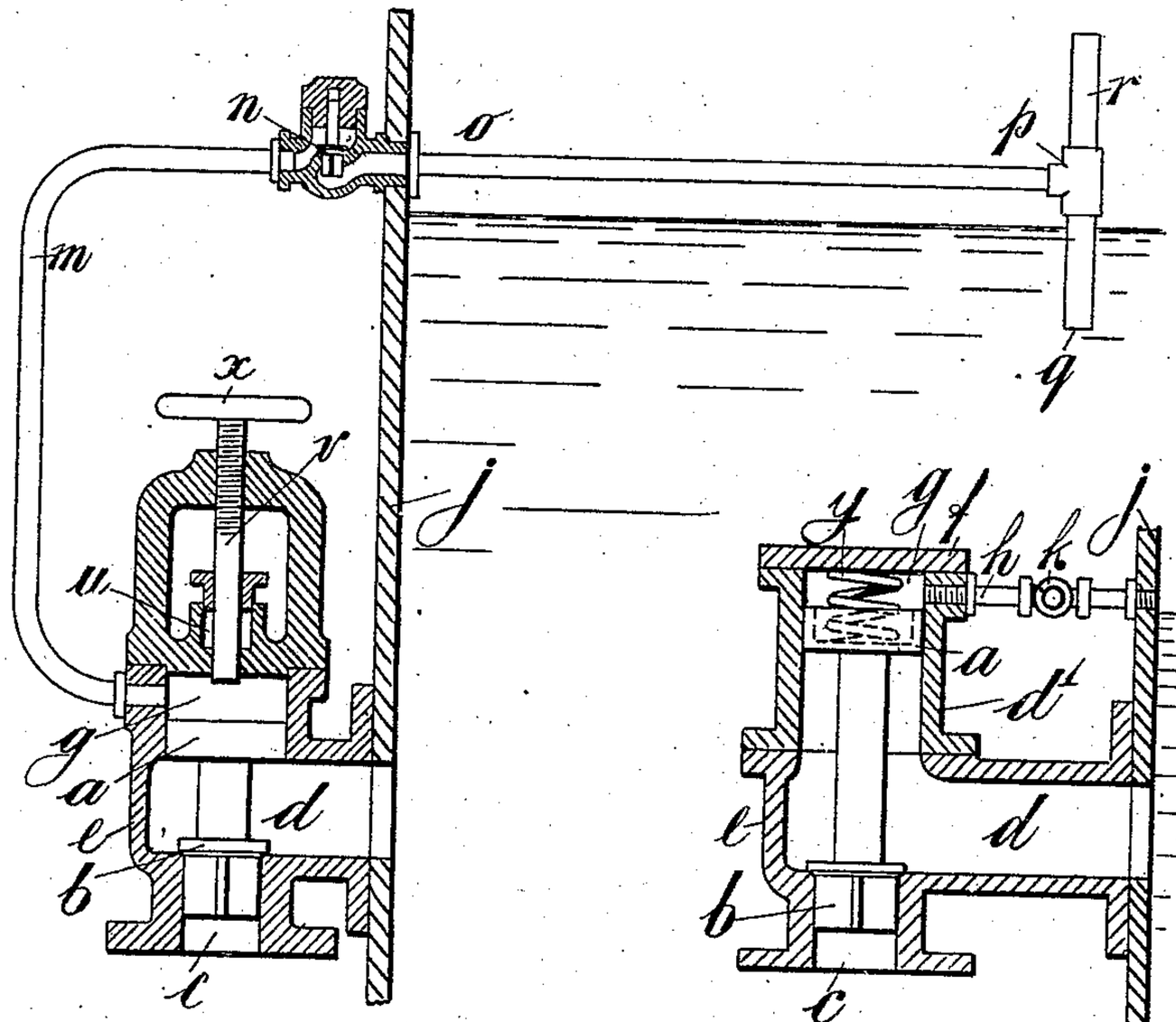

Fig. 2

Fig. 1

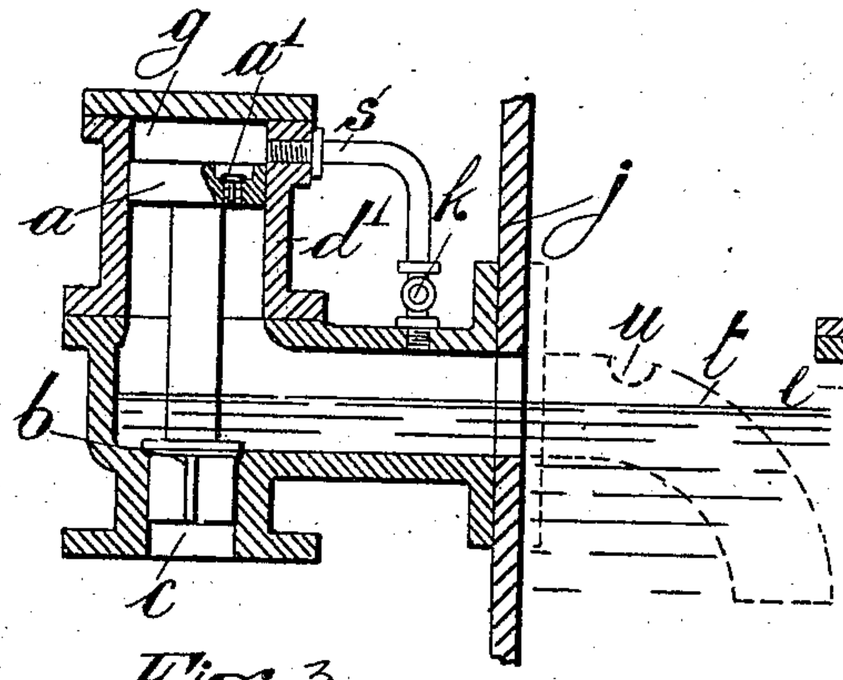

Fig. 3

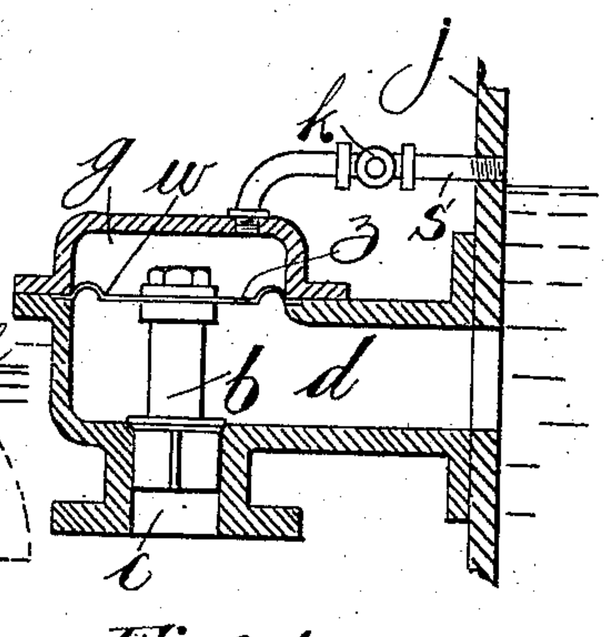

Fig. 4

Attest:

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APPARATUS FOR CONTROLLING FEED-WATER.

No. 850,045. Specification of Letters Patent. Patented April 9, 1907.

Application filed March 10, 1906. Serial No. 305,317.

To all whom it may concern:

Be it known that I, JOHN EDWARD LEWIS OGDEN, a subject of Great Britain, residing at Penshurst, Lincoln Drive, Liscard, in the county of Chester, England, have invented new and useful Improvements in Apparatus for Controlling the Supply of Feed-Water to Boilers, of which the following is a specification.

This invention relates to apparatus for controlling the supply of feed-water to boilers, my object being to enable such supply to be controlled in a simple and effective manner by apparatus conveniently arranged on the exterior of the boiler.

Four examples showing how my invention is applied are illustrated by Figures 1 to 4 of the accompanying sheet of explanatory drawings, each view or figure being a sectional elevation.

As will be hereinafter shown, the four examples all work in the same manner and differ only in constructional details.

Referring to Fig. 1, a piston *a* is formed integrally with a check-valve *b*, which serves as the usual check-valve ordinarily employed on the feed-pipe to the boiler. The said piston *a* serves as an automatic retarder of the check-valve *b* in the manner hereinafter described. The water from the feed-pump or its equivalent passes to the check-valve by way of the passage *c* and when the check-valve is lifted enters the boiler by the passage *d*. The piston *a* is an easy fit within the cylinder *d'*, which is connected to the check-valve casing *e*, as illustrated, or it may be formed integrally with such casing.

The device formed by the parts aforesaid is situated outside the boiler, being preferably attached to the boiler front plate *j*, as indicated. The water in the boiler is shown to the right of the plate *j*. The top end of the cylinder is closed by a cap *f*. The space *g* above the piston is connected by the pipe *h* with the normal steam-space in the boiler. The said pipe *h* is, however, so situated that when the water in the boiler rises unduly high it has access to this pipe and passes through the same to the space *g* of the cylinder *d'*. Thereafter when water is pumped into the boiler and the check-valve rises and falls during the pumping action the piston *a* has to displace the water above it before it can rise. The piston is therefore forced to act sluggishly, and the check-valve is prevented from opening its full amount, thereby limiting the supply of water to the boiler. As before mentioned, the piston *a* is an easy fit within the cylinder *d'*, so that water can leak past the piston. Consequently when the water-level in the boiler falls somewhat the leakage past the piston, together with the return of part of the water to the boiler through the pipe *h*, causes the space *g* to get wholly or partly emptied of water and filled with steam, thus allowing the piston and check-valve to work more freely.

I may, if desired, place a valve *k*, of an ordinary screw-down type, on the pipe *h* for regulation of the retarding action of the water on the movement of the check-valve, such regulation being effected by varying the extent of opening given to the valve *k*. In some cases I employ an ordinary non-return valve instead of the screw-down valve *k*.

In the arrangement shown at Fig. 2 a check-valve *b* and piston *a* are employed, substantially as in Fig. 1, and the space *g* above the piston is put into communication with the interior of the boiler by the pipe *m*, provided with an automatic non-return valve *n*. A hand-operated or screw-down valve, such as *k*, Fig. 1, may be substituted for the non-return valve *n*. The check-valve *e* is placed, as will be seen, considerably below the normal water-level in the boiler. The pipe *m* is connected to the pipe *o*, situated within the boiler. Such pipe *o* has a T-shaped end *p*, having a branch *q* extending below and a branch *r* above the normal water-level. The valve *n* is placed at or about the highest safe water-level. When the water in the boiler rises above the level of the valve *n*, it can pass along the pipes *o* and *m* and gain access to the space *g* above the piston *a*. The piston is thus prevented from moving upward more than a very small amount, owing to the water trapped in the pipe *m*. The slight leakage of water past the piston allows the latter to get a slight movement; but as long as the level in the boiler is above the automatic valve *n* very little, if any, feed-water can pass into the boiler. When the water-level in the boiler falls somewhat, so that the pipe *m* contains a certain amount of steam, then the piston *a* can rise by compressing the steam, thus allowing the check-valve *b* to open for the passage of feed-water.

I may, if desired, combine the arrangement shown in Figs. 1 and 2, employing one

check-valve and one piston, but two pipes, for connecting the space *g* with the interior of the boiler, one pipe having an automatic valve, such as *n*, and the other a hand-operated or screw-down valve, such as *k*.

The T-headed end of the pipe *o* insures purity or cleanliness of the water and steam passing into the pipe *o*, for such water and steam are not drawn from the water-level in the boiler, but from a considerable distance below and above the water-level, respectively. This is an important advantage in the working of the apparatus when the water supplied to the boiler is not very pure.

When my apparatus is applied to marine boilers or in other cases where the boiler is not steady, the pipe *o* may be carried to a suitable place in the boiler where the water-level is least affected by the rocking or surging. The T-headed pipe may be used with the arrangement of the apparatus shown at Fig. 1.

Instead of connecting the space *g* directly with the interior of the boiler by a pipe *h*, as shown at Fig. 1, I may, as shown at Fig. 3, connect the said space by a pipe *s* with the passage *d*, by which the feed-water enters the boiler after passing the check-valve *h*. A hand-operated valve *k* or a non-return valve can be fixed in the said pipe *s*. When this arrangement is adopted, it is of course desirable that the apparatus be fitted so that the center of the passage *d* is about at the normal water-level of the boiler. For delivering the feed-water below the water-level in the boiler a curved pipe *t* (shown in dotted lines) may be employed. The said pipe *t* is provided with an aperture *u* on its upper side to permit steam to pass to the pipe *s*. A short pipe or tube may extend upward from the hole *u* for the purpose of obtaining clean steam.

The piston *a* in each of the arrangements shown may be provided with an auxiliary valve controlling a passage through the piston. The said valve, which is illustrated by *a'*, Fig. 3, allows water to pass from the under side of the piston *a* to the space *g* above the same, but will prevent its return in the opposite direction. The object of such auxiliary valve is to allow the check-valve *b* to close more quickly.

In Fig. 2 a rod *v* is shown which is screw-threaded and passes through a stuffing-box *u* into the space *g*. This rod is provided with a hand-wheel *x* and can be used for regulating the lift of the check-valve or for holding it closed whenever desirable. The rod can also be used for exerting pressure on the piston *a* should the piston or valve stick in a raised position.

Instead of forming the piston *a* integrally with the check-valve *b* it can be made in a separate piece and rigidly attached to the valve *b*. It may in many cases be possible when fitting my apparatus to the existing fittings of a boiler to utilize the existing check-valve.

I may employ a flexible diaphragm-piston instead of a rigid piston, as aforesaid. A check-valve fitted with a diaphragm or flexible piston *w* instead of a rigid piston is shown in Fig. 4. I may, if desired, cut holes or slits in this diaphragm to allow of a certain leakage of fluid past it. Thus a hole may be made at *z* in the diaphragm *w* in Fig. 4. I may, if desirable, in any case employ a spring *y*, Fig. 1, to assist in closing the check-valve.

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

1. In apparatus for controlling the supply of feed-water to boilers, the combination with the usual, boiler check-valve of a retarder automatically preventing the opening of the said valve for the further admission of water to the boiler when the level in the latter rises above the normal, substantially as set forth.

2. In apparatus for controlling the supply of feed-water to boilers, the combination with the exterior of a boiler of a feed-water check-valve, a casing with internal seating for the said valve, a piston integral with the valve, a cylinder for the said piston opening into the said valve-casing, a connection between the upper part of the said cylinder and the interior of the boiler, and a valve in the said connection, substantially as set forth.

3. In apparatus for controlling the supply of feed-water to boilers, the combination with the exterior of a boiler of a feed-water check-valve, a casing with internal seating for the said valve, a piston integral with the check-valve, a valve in the said piston, a cylinder for the piston opening into the said valve-casing, a connection between the upper part of the said cylinder and the interior of the boiler, and a valve in the said connection, substantially as set forth.

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

JOHN EDWARD LEWIS OGDEN.

Witnesses:
VIVIAN ARTHUR HUGHES,
JAMES MOREHOUSE.