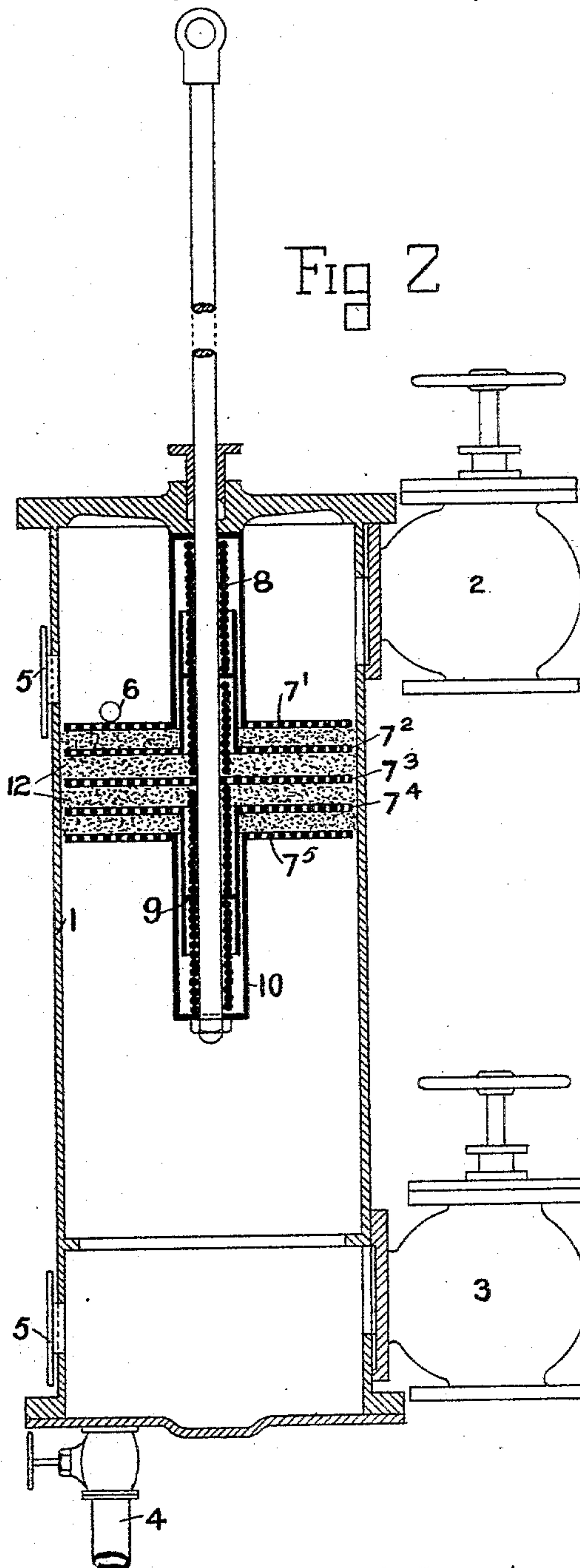
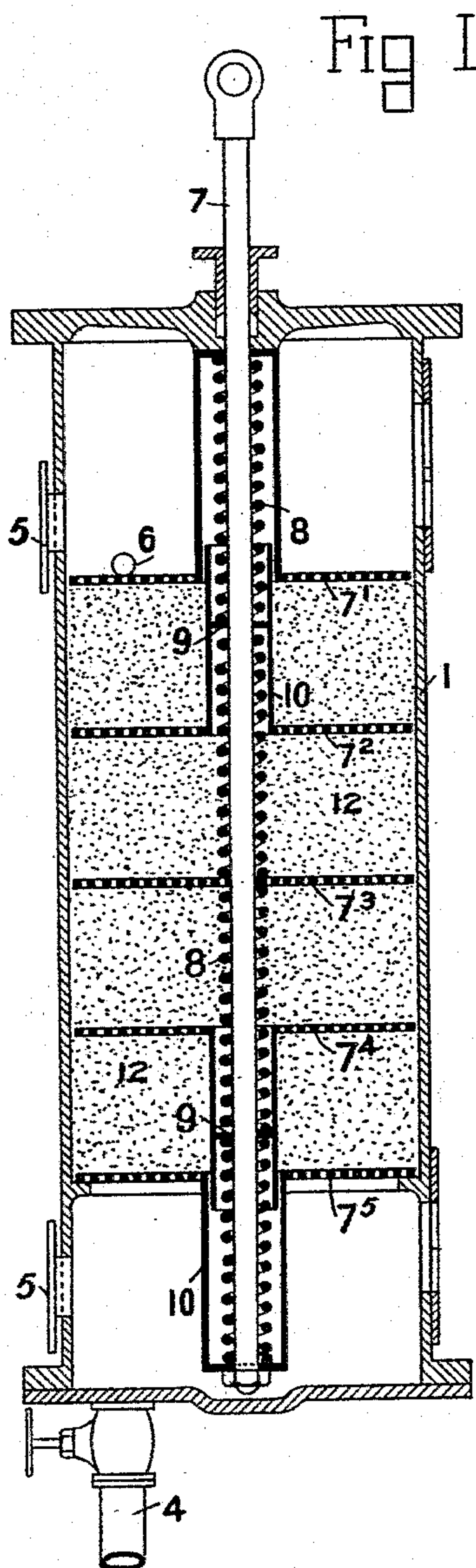


(No Model.)

A. HARRIS.
FEED WATER FILTER.

No. 515,769.

Patented Mar. 6, 1894.



Witnesses

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UNITED STATES PATENT OFFICE.

ANTHONY HARRIS, OF MIDDLESBOROUGH, ENGLAND.

FEED-WATER FILTER.

SPECIFICATION forming part of Letters Patent No. 515,769, dated March 6, 1894.

Application filed May 11, 1893. Serial No. 473,868. (No model.)

To all whom it may concern:

Be it known that I, ANTHONY HARRIS, a subject of the Queen of Great Britain, residing at Middlesborough, in the county of York, in the Kingdom of England, have invented certain new and useful Improvements in Feed-Water Filters, of which the following is a specification.

The object of this invention is an apparatus by which the impurities which contaminate the feed water of steam boilers, especially those of surface condensing engines, may be readily separated, and one that may be employed either in conjunction with a feed water filter of any other description or may take the place of and act as a filter, and the feed water may pass direct from it into the boiler. The opening out and cleansing of filters for boilers usually occupy a considerable time, and it is very difficult to attend to this work, especially when at sea.

My present invention is designed to arrange a filter in such a manner that it may be thoroughly cleansed without being opened at all except at rare intervals when the filtering medium becomes worn out or so saturated with unremovable impurities as to fail to act as required.

The invention is best described by aid of the accompanying drawings which show two vertical sections of a filter, Figure 1, in its ordinary condition for filtering; Fig. 2, when compressed for cleansing purposes.

1 is a cylinder (preferably, I employ two of these). It is closed at top and bottom with cylinder lids in the ordinary manner.

2 and 3 are delivery and inlet valves: 4, sludge valve: 5, cleansing doors: 6, an opening into the cylinder from a steam pipe from the boiler for injecting steam or hot water. This steam pipe is supplied with a stop cock and is used as required.

7 is a piston rod; and 7' 7², &c., a series of pistons fitting the cylinder. These pistons, except the central one, (when there is an uneven number) are provided with sleeves 10 which, on opposite sides of the central piston, project outward, or toward the adjacent ends of the cylinder, and each inner sleeve is smaller in diameter than the next outer one, so that they may "telescope" when the pistons are drawn together, as represented in

Fig. 2. Each sleeve is provided with a partition or diaphragm 9, and between the several partitions are coiled springs 8, which, operating from the center outward, press the pistons on opposite sides of the center outward toward their respective ends of the cylinder, as represented in Fig. 1 and support the upper pistons from the lower one. These sleeves are long enough, as regards the two connected with the pistons on opposite sides of the central piston, to contain one of the springs closely compressed, or if there be an even number of pistons, then the two central sleeves unitedly contain a sufficient space to hold one spring. The two sleeves beyond these each contain, besides this space, an additional space nearly sufficient to accommodate another spring, and so on. This will be seen more clearly in Fig. 2, where the springs are all tightly compressed. The pistons are all loose on the piston rod,—that is, the rod is movable through them,—except the lower one 7⁵, the end of the sleeve of which is connected with the rod, so that when the rod is drawn through the cylinder the piston 7⁵ will be positively moved toward the opposite end, compressing the springs 8, and gradually closing the pistons together, as represented in Fig. 2, where by the soft filtering material, with which the spaces between the pistons are filled, is compressed. Each piston is finely perforated throughout its area, and is covered with metallic gauze or other coarse filtering material in such manner that the gauze only lies against the piston at sundry points or lines. Between the various pistons, and sometimes between the top and bottom ones and the top and bottom of the cylinder, I loosely pack the spaces with sponge or other compressible filtering material 12.

The mode of action is as follows:—The filter being built up as shown in Fig. 1, the lid is fixed in place and the water passed through it, circulating preferably upward from the valve 3 to the valve 2. It will be noticed that valve 3 does not enter into the filter itself but about the middle of a sludge chamber below the filter, this sludge chamber being separated from the filter by the bottom piston. This sludge chamber is usually kept emptied and not filled with filtering material; sludge can, therefore, settle in it. When the filter begins

to clog, the piston rod 7 is drawn up in the manner shown in Fig. 2, the delivery valve 2 having previously been closed. The water, being unable to escape from between the filters in any other manner, passes downward to the sludge chamber, the great pressure caused by the compression forcing out the dirt to a great extent with the water; this water is run off by the sludge valve. In order to further assist this action, steam or hot water from the boiler or both, hereafter spoken of under the simple word steam, is led in at 6, and the top chamber, which is preferably kept clear of filtering material, gets filled with steam under high pressure, and this steam, forcing its way through the pistons 7', 7², &c., and through the interposed filtering material forces the dirty water and dirt down into the sludge chamber; the lower valve 3 being now opened and water passed through the valve 2 downward for a short time the sludge which has accumulated is forced out at the sludge cock; the pistons are now let down into the position shown in Fig. 1, the sludge cock closed, and the valve 4 opened. The doors 5 are sometimes used for cleaning out the top and bottom chambers.

The valves I prefer to use are described in my British Patent No. 6,801 of 1891, these having the advantage that, when the desired pressure is exceeded, the feed water passes direct to the boiler, and at the same time the attendant is informed, by a steam whistle on the dirt channel, that the filter is foul.

It is obvious that the filter may vary much in shape, and that it may be, and in fact usually is, combined with other filters when the water is desired to be very pure. It may be reversed so as to work the opposite way, or be horizontal or inclined. The pistons may be flat, dished or conical, and heavy weights can take the place of the springs, or the pistons may be held apart and brought up to each other by right and left handed screws or equivalent mechanism. Further, the number of pistons is immaterial, for very small filters one only is requisite. This one can be screwed up tight for cleaning purposes to one or to each end of the cylinder alternately. The inlet and outlet valves may be provided with self-closing valves or grates, so that the pistons may move the entire length of the cylinder in cleansing instead of only as far as shown in Fig. 2.

I declare that what I claim is—

1. In a filter the combination of a chamber having inlet and outlet passages at opposite ends, a series of finely perforated and movable pistons normally supported at intervals in said chamber springs interposed between said pistons to press and hold them apart, and means for forcibly moving said pistons in succession toward one end of the chamber, as and for the purpose described.

2. The combination of a chamber having inlet and outlet passages at opposite ends, a series of finely perforated pistons disposed at

intervals within the chamber and adapted to receive and hold between them compressible filtering material, a piston rod projecting through one end of the chamber and connected with the farthest piston toward the opposite end, and passing loosely through the other pistons, as and for the purpose described.

3. A filter comprising a vertical cylinder or chamber having valved water passages at its top and bottom, a steam inlet near its top, and a sludge valve at the bottom, in combination with a series of finely perforated pistons disposed in said chamber at intervals, one above the other springs between said pistons to separate and hold them apart, and means for moving said pistons toward each other and toward the top of the chamber.

4. A filter comprising a vertical cylinder or chamber having valved water passages at top and bottom, a series of perforated pistons disposed in said chamber at intervals, one above the other, springs between adjacent pistons to hold the same apart and to support the upper pistons from the lower one, and means for forcibly elevating the lower piston.

5. The combination with the vertical cylinder or chamber 1, having valved passages at top and bottom, a series of perforated pistons in said chamber and interposed springs supporting each upper piston from the one next below, and a piston rod connected with the lower piston for forcibly raising the same.

6. The combination with the vertical chamber or cylinder 1, of a series of perforated pistons within the cylinder, springs between the pistons to separate the same, a piston rod connected with the lower piston for forcibly raising the same, a valved inlet at the bottom, a valved outlet at the top, and a sludge valve at the bottom.

7. The combination with the cylinder or chamber 1, of a series of perforated pistons within the same provided with telescopic sleeves, and with partitions 9 in said sleeves to form spring seats, coiled springs disposed in said sleeves to hold the pistons apart, a piston rod passing through said sleeves, and springs from the top downward and connected with the sleeve of the lower piston for forcibly raising the latter, valved inlet and outlet passages in the cylinder, and a sludge valve at the bottom.

8. The combination of the chamber 1, the pistons 7' 7², &c., provided with sleeves 10 and distance pieces 9 the springs 8 disposed between said distance pieces to hold the pistons apart, a rod 7, or equivalent means for drawing the whole up tight, substantially as and for the purposes described.

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

ANTHONY HARRIS.

Witnesses:

W. P. THOMPSON,
H. P. SHOBRIDGE.