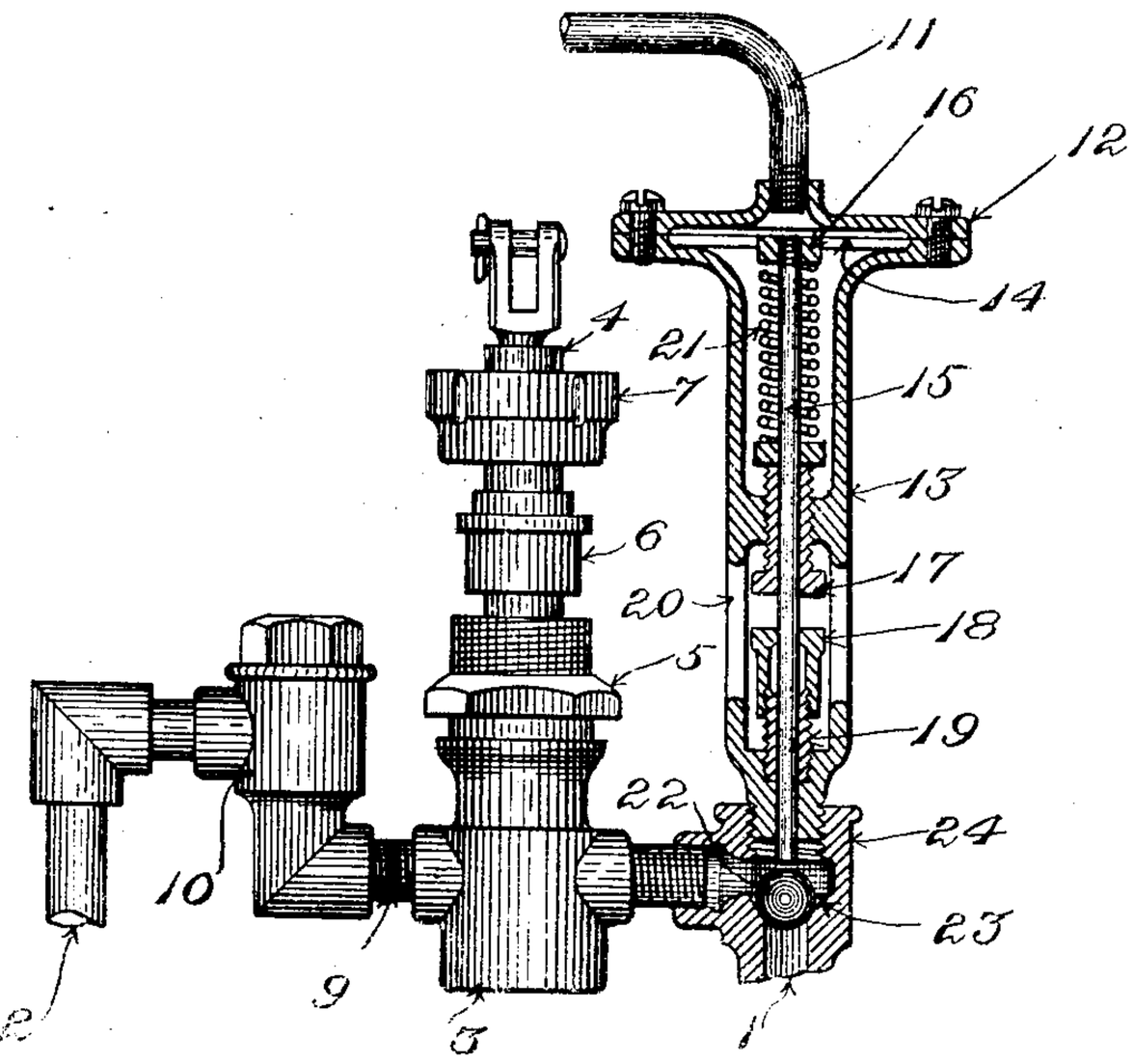
No. 765,026. PATENTED JULY 12, 1904.

W. B. MASON.

PUMP REGULATOR.

APPLICATION FILED JUNE 15, 1903.

NO MODEL.



Witnesses
Oscar F. Hill
Alice H. Morrison

Inventor:
William B. Mason
by Macleod Calver & Randall
Attorneys.

No. 765,026. Patented July 12, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM B. MASON, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE MASON REGULATOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PUMP-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 765,026, dated July 12, 1904.

Application filed June 15, 1903. Serial No. 161,520. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MASON, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Pump-Regulators, of which the following is a specification, reference being had therein to the accompanying drawing.

In automobiles where flash or semiflash boilers are employed a very careful and exact regulation of the supply of the feed-water is necessary. The pump ordinarily used to force the feed-water into the boiler is of so high power that if allowed to run continuously it will force water into the boiler until the pressure rises to an undesirably high point. It is therefore necessary to provide some means which will control the supply of feed-water and which will in turn be automatically controlled by the pressure on the boiler. Previously this has been accomplished by the introduction of a regulating-valve into the feed-pipe between the feed-pump and the boiler. This arrangement is subject to certain very serious difficulties. When the pressure between the pump and the boiler reaches, as it frequently does, five hundred pounds or more, great difficulty is found in getting the said valve to seat properly. It is also necessary when such arrangement is employed to provide some means for the disposal of the feed-water delivered by the pump when the said valve in the pump-outlet is closed. This is commonly provided by means of a by-pass pipe around the pump. My invention overcomes these difficulties and provides a means for regulating the feed-water supply without the necessity of a by-pass about the pump and by a valve which is at no time under excessive pressure. I accomplish this result by introducing a valve controlled by a pressure-operated regulator subjected to boiler-pressure in the suction-pipe between the feed-pump and the source of water-supply. By thus locating the valve it is subjected only to such differences of pressure as are caused by the sucking action of the pump. This is ordinarily very slight, and the valve is thus enabled to operate exactly and without the difficulties arising when the valve is under high pressure.

With these ends in view I have made the herein-described device, which is fully set forth in the following description in connection with the accompanying drawing, and the novel features thereof are pointed out and clearly defined in the claims at the close of the specification.

In the drawing I have shown my device applied to the water-supply system and having the regulator and valve in section for greater clearness.

In the drawing, 1 is the supply-pipe of the feed-pump and leads to a suitable source of water-supply not necessary to be shown. 2 is the boiler supply-pipe of the feed-pump and opens into a boiler, also not necessary to be shown. 3 is the barrel of the feed-pump, in which operates a pump-plunger, the top of which is seen at 4. This pump-plunger 4 is operated in any convenient manner, either by hand or, as is commonly the case, by power. The top of the pump-barrel 3 is closed by a clamping-nut 5 and a stuffing-box gland 6, held in place by a stuffing-box nut 7. The discharge side of the pump-barrel 3 is connected by a threaded connection with a check-valve 10 in the boiler supply-pipe 2. This check-valve 10 is of ordinary construction and may be a ball check-valve, a cone check-valve, or of any other suitable and convenient form.

The feed-pump and its parts are of well-known form and are not a part of my invention.

In the supply-pipe of the feed-pump is placed the ordinary ball check-valve. Operating in connection with this is the regulator, which I will now describe. This regulator is operated by the boiler-pressure being connected with the boiler by a pipe 11. In practice I use a regulator having a casing composed of two parts—a body 13 and an upper part 12—between which is placed a diaphragm 14, of suitable material. The connecting-pipe 11, leading from the boiler, is attached to the

part 12 of the regulator-casing. On the opposite side of the diaphragm 14 is a valve-spindle 15, provided with a button 16 in contact with the diaphragm. The said spindle 15 is guided by the adjusting-screw 17, set in the middle of the body part 13 of the regulator-casing, and by a stuffing-box composed of two parts 18 and 19, set in the end of the body part 13 of the casing.

Between the button 16 and the screw 17 about the spindle 15 is a spring 21, which serves to return the diaphragm 14 and attached spindle 15 to normal position after the pressure on the upper side of the said diaphragm has been released. The pressure exerted upon the diaphragm 14 by the spring 21 may be regulated by turning the head of the adjusting-screw 17, thereby moving the said screw with relation to the body 13 of the regulator-casing. To this end I make the said casing 13 in skeleton, as shown at 20, in order that the screw 17 and stuffing-box 18 may be adjusted as desired. The lower end of the spindle 15 is at certain times in engagement with the movable part of the check-valve in the feed-water-supply pipe. In the drawing I have shown this movable part as a spherical ball 22, seated on a valve-seat 23, formed in the check-valve casing 24. It may be made of conical or other shape, if preferred, and a corresponding seat formed in the check-valve casing. This movable part rises with every stroke of the feed-pump, allowing water to pass from the water-supply into the feed-pump. When the spindle 15 of the regulator is moved downward by the pressure upon the upper side of the diaphragm 14, its lower end engages the top of the said movable part, and the said movable part is thereby held firmly against its seat 23. Should the rise in boiler-pressure above the predetermined point be only slight, the spindle of the regulator will be moved downward very little and the movable part of the valve will be limited somewhat in the extent of its motion, thereby reducing the amount of feed-water which can pass to the feed-pump and boiler. When the pressure on the diaphragm 14 is released, the diaphragm resumes its normal position and the spindle 15 is lifted out of the way of the movable part 22, thus again allowing water to pass to the feed-pump.

The operation of my device is as follows: The spring 21 is set at any desired pressure—as, for instance, three hundred and fifty pounds—by turning the adjusting-screw 17. So long as the pressure in the boiler is below the point at which the spring is set the diaphragm and its attached spindle 15 remains in the position shown in the drawing. When the pressure in the boiler rises above the point at which the spring is set, the diaphragm 14 is moved downward slightly, together with the spindle 15, and the end of the spindle 15 engages the movable part or ball 22, holding the said movable part firmly upon its seat and preventing the passage of any feed-water to the pump. As is customary in automobiles, the feed-water pump operates continuously. With my device when the check-valve is closed by the regulator the feed-water pump by its upstroke makes a partial vacuum between the under side of the pump-plunger and the check-valve. This vacuum is released as the pump-plunger is lowered in the downstroke. While this vacuum behind the pump-plunger might be injurious to a pump operating under very small pressures, in the case of an automobile, where the pump is forcing water into a boiler against very considerable pressures, this vacuum behind the pump-plunger has no injurious effect. When the pressure in the boiler and in the connecting-pipe 11 falls below the predetermined point at which the spring of the regulator is set, the diaphragm 14 resumes its normal position, and the spindle 15 thereby releases the movable part 22 of the check-valve and allows water from a source of supply to pass again to the feed-pump. The feed-pump then continues to force water into the boiler until the supply to the feed-pump is again cut off by the action of the regulator under another rise of pressure in the boiler.

In the drawing I have shown the regulator as operating directly upon the check-valve in the supply-pipe of the feed-water pump. Of course it is evident that the regulator may operate a valve placed anywhere between the feed-pump and the source of water-supply with equal ease and certainty of operation. I have found it convenient and effective in practice to control the supply to the pump by having the regulator operate, as shown, directly upon the check-valve in the pump supply-pipe.

What I claim is—

1. The combination of a source of water-supply, a feed-pump connected therewith at its inlet end and with a boiler at its outlet end, a water-inlet check-valve between the pump and the source of water-supply, and a pressure-receiving device connected to the steam-space of a boiler, said pressure-receiving device coöperating with said valve so as to limit the opening movement of or entirely close said valve when the boiler-pressure reaches a certain predetermined point.

2. The combination of a source of water-supply, a feed-pump connected therewith at its inlet end and with a boiler at its outlet end, a water-inlet check-valve between the pump and the source of water-supply, and a regulator responsive to changes in boiler-pressure and operating to close the said check-valve when a predetermined boiler-pressure has been reached, substantially as described.

3. The combination of a source of water-supply, a feed-pump connected therewith at its inlet end and with a boiler at its outlet end,

a water-inlet check-valve between the pump and the source of water-supply, a pressure-receiving device, connected to the steam-space of the boiler, an adjustable spring acting on said pressure-receiving device in opposition to the boiler-pressure, and a rod connected with said pressure-receiving device and arranged to engage said valve so as to limit its opening movement or entirely and positively close said valve at certain predetermined boiler-pressures.

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

WILLIAM B. MASON.

Witnesses:
WM. A. MACLEOD,
GEORGE P. DIKE.