N. C. LOCKE.

FIRE PUMP GOVERNOR.

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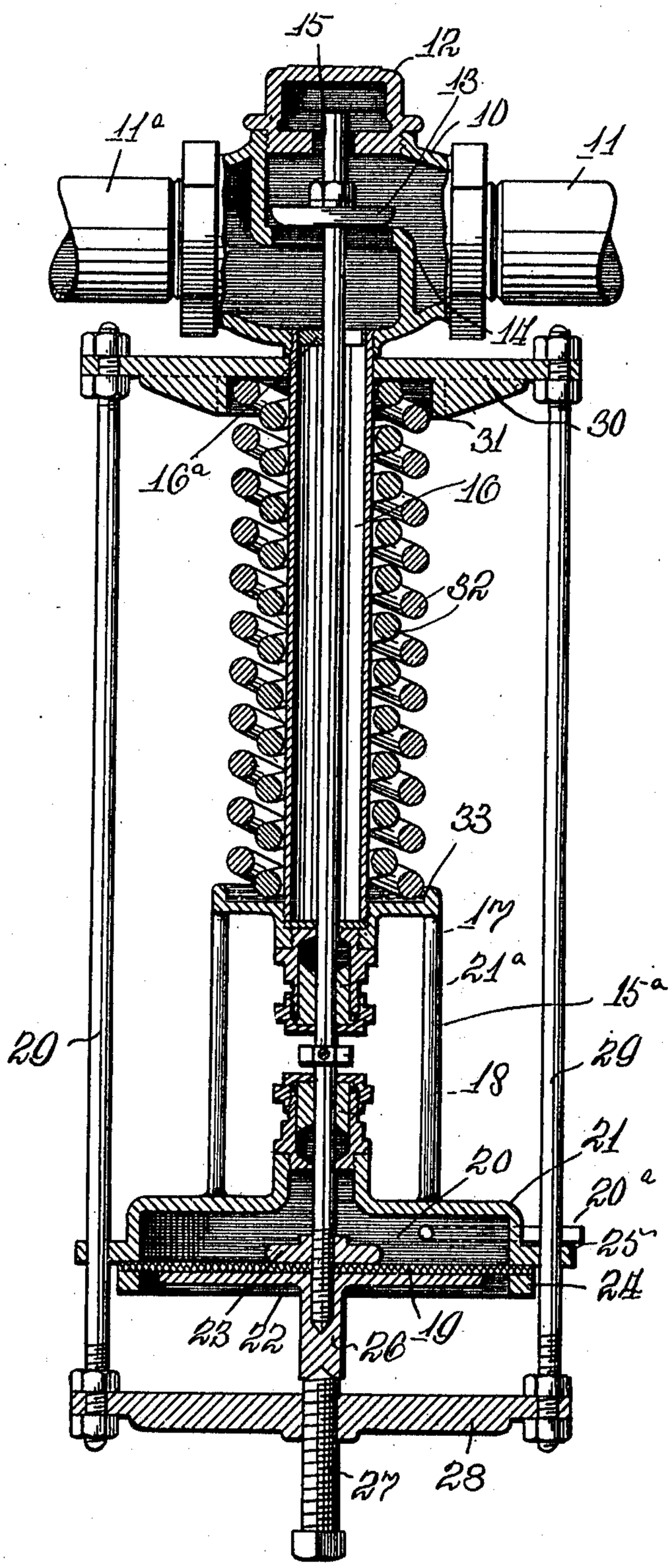

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FIRE-PUMP GOVERNOR.

970,630. Specification of Letters Patent. Patented Sept. 20, 1910.

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To all whom it may concern:

Be it known that I, NATHANIEL CHASE LOCKE, of Salem, county of Essex, in the Commonwealth of Massachusetts, have invented a new and useful Improvement in Fire-Pump Governors, of which the following is a full, clear, and exact description.

My invention relates to improvements in fire pump governors such as are adapted to automatically start a pump on the lessening of water pressure in a service pipe or main.

The invention is especially valuable in connection with automatic sprinkler systems, and the object of the invention is to produce a thoroughly automatic governor which will be absolutely reliable, and will on the lessening of water pressure caused for instance by the starting of the sprinkler or sprinklers, open the valve to the steam pump, thus starting the latter.

The invention is also intended to produce a governor which will open the valve more or less, according to the requirements of the case, so that if a large amount of water is needed the valve will be opened full head, and if none is needed the valve will be tightly closed.

Another object of my invention is to produce a single seated valve which operates by the pressure in a service pipe so as to remain normally closed, but which will be opened by a spring in case the water pressure lessens, thereby obviating the use of a double-balanced valve or of piston operated valves, as both these latter varieties are likely to become choked and furred with sediment where they are long out of use, and will therefore fail to act when an emergency arises. The single seated valve which forms my invention, however, and the means for operating it, are reliable and will always work without fail.

Another object of my invention is to construct the apparatus so that a valve can be renewed or repaired or the valve seat repaired, without taking the governor from the steam pipe. This is an important matter, as it is absolutely necessary that a governor of this class should be in actual use practically all the time so that if it is needed it will do its duty, as the valve is expected to take the place of an engineer or other employee, and act at once to turn on the steam when the services of the pump are required. The most important feature of my invention is this. Heretofore it has been the practice to use small diaphragms in operating regulators where the pressure is high, say fifty pounds and upward, and large diaphragms for lower pressure. In my invention I reverse all this. I use a large diaphragm for high pressure with a powerful spring for controlling this pressure. In this way a sufficient working force is created to operate a single seated valve against high steam pressure, which would be impossible in any regulator as heretofore constructed. In the class of governors to which this invention relates, I have found it necessary to make a valve for the governor with a single seat chiefly for two reasons. First, no double seated valve such as is ordinarily called a balance valve, can be made to close tight and remain so, and second, the construction of a double seated valve as usually made, would forbid the changing or renewing of the valve disk, as can be done in this construction with a single disk. Therefore, with my construction it is possible to repair the governor and renew the valve without disconnecting it from the pipe or having the fire pump out of commission for more than a few minutes.

Reference is to be had to the accompanying drawings forming a part of this specification in which similar reference characters indicate corresponding parts.

The figure is a sectional elevation of the valve showing my improvements, the valve being shown in connection with the pump steam supply pipe.

The valve casing 10 is of the ordinary type and is connected with the steam pipe sections 11 and 11ª, so that the steam can flow through the valve and through the pipe when the valve is opened. The casing 10 has a removable bonnet or cap 12 which screws into the casing as usual in valves, the bonnet being placed immediately opposite or above the single seated valve 13, and the opening through the casing is large enough to permit the removal of the valve when necessary. The valve 13 is shaped on its inner or under side so as to seat upon the perforated partition 14, and the valve is secured in the usual way to an elongated stem 15 which extends downward through the valve casing and through a guide 16ª and through a pipe 16 which is attached to the casing and opens from it, and which also connects

with the framework 21ª of the diaphragm casing 21 hereinafter referred to. The pipe 16 is really a water leg as it catches and retains the water of condensation and this water lubricates the stuffing box and prevents it from drying up and causing great friction. The pipe also serves as a guide for the inside spring hereinafter described and prevents it from coming in contact with the outside spring.

The stem 16 also extends downward through the stuffing boxes 17 and 18, the former serving to prevent the escape of the steam from the pipe 16 and the latter to prevent the escape of water from the diaphragm chamber 20, which is formed in the casing 21 immediately above the diaphragm 19. The stem 15 is provided with a squared section 15ª so that it can be gripped with a wrench and held while the valve is being adjusted or removed. The diaphragm is the ordinary flexible diaphragm except that it is of large area, and it is held between the plate 22 and nut 23 in the usual manner, while its edges are clamped between the collar 24 and flange 25 on the casing 21. The diaphragm which I use is relatively large in proportion to the valve 13, contrary to usual practice, but I am enabled to use the large diaphragm by having the pressure controlled by the powerful springs 32 heretofore mentioned. I have found in practice that the diameter of the diaphragm should be at least five times that of the valve 13, that is to say, if the valve is a two inch valve the diaphragm must be at least a ten inch diaphragm, and with these proportions the apparatus would be suitable to a pressure of one hundred and ten pounds. The plate 22 also has a shank 26 which receives the threaded end of the stem 15 and in the lower end of which is seated a screw 27 which is threaded into the cross-bar 28, and the latter is attached by means of nuts to the side bars 29 which are in turn attached to the yoke 30, this having a seat 31 to receive the heavy double springs 32 which are coiled around the pipe 16, and at their lower ends are seated in the socket 33 on the upper part of the framework 21ª. The latter is integral with or secured to the casing 21. The chamber 20 connects by a pipe 20ª with the service pipe in which water under pressure is held, and this pressure is considerably greater than the pressure of the springs 32 so that the water pressure will normally act on the diaphragm 19 and pull down the stem 15 and valve 13 against the tension of the springs so that the valve is normally closed. The springs 32 surround the water leg or pipe 16 so that they are in position to do the best work, and they are thus out of the way of steam and water and therefore not likely to corrode. On the back side of the valve, that is on the side connecting by means of the pipe 11, is the boiler steam pressure. If now the water pressure lessens by the starting of a sprinkler head or for some other reason, the pressure against the diaphragm 19 will be lessened so that the spring pressure will be sufficient to open the valve 13 and permit the steam to pass beneath it and so on to the pump which is started, and it will be seen that if several sprinkler heads start, and there is a great reduction for any reason in the water pressure, the valve 13 will be opened wider and a large volume of steam permitted to pass. Either pipe 11 or 11ª can be next the boiler and the apparatus will work. It will be noticed that the parts 28, 29 and 30 form a spring actuated frame sliding on the pipe 16 and acting in opposition to the water pressure in the chamber 20 to open the valve 13.

It will be seen that the structure is very simple, that it is absolutely automatic, and that the valve 13 can be removed and replaced or repaired by simply taking off the bonnet 12, without removing the rest of the parts, it being understood, of course, that steam will be temporarily turned off from the pipe 11 during this operation.

It will also be seen that the spring tension can be regulated by means of the screw 27, and that therefore the mechanism can be as nicely adjusted as by the use of any ordinary double-balanced valve, and it will be observed that there is nothing about the apparatus to cause it to stick in case of long disuse.

It will also be noted that the governor cannot be applied in any way so that it will not work, that is, it may be reversed and still it will operate. This avoids the danger of not working, which happens in the case of other governors when attached wrong end to, a mistake which frequently occurs.

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

1. An apparatus of the kind described, comprising a valve casing adapted to connect with a steam service pipe, a single seated valve in the casing, a steam and water leg opening from the under side of the valve casing, a water chamber containing water under pressure beneath the water leg, a diaphragm in said chamber, a stem connected with the diaphragm and with the valve, a slide frame connected with the diaphragm, and a coil spring arranged around the water leg and actuating the slide frame.

2. An apparatus of the kind described, comprising a valve casing adapted to connect with a steam supply pipe, a diaphragm chamber below said casing and adapted to connect with water under pressure, a diaphragm forming one wall of said chamber, a stem connected with the valve and with

the diaphragm, a movable framework supporting said diaphragm chamber, and a spring supported in said framework and acting against the water pressure.

3. An apparatus of the kind described, comprising a valve casing, a single seated valve therein, a diaphragm chamber located between said casing and adapted to connect with water under pressure, a diaphragm forming one wall of said chamber, a stem connected with the valve and with the diaphragm, a movable framework supporting said diaphragm, and adjustable means in said framework supporting said stem.

4. An apparatus of the kind described, comprising a valve casing adapted to connect with a steam supply pipe, a removable bonnet on said casing, a single seated valve within said casing and located between said bonnet and the valve seat, a diaphragm chamber adapted to connect with water under pressure, a diaphragm forming one wall of said chamber, a stem connected with the valve and the diaphragm, a framework movably supported by said diaphragm chamber, a spring supported by the framework and acting on the diaphragm chamber against the water pressure, and adjustable means in the framework for supporting the stem.

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