

Nov. 6, 1923.

1,472,931

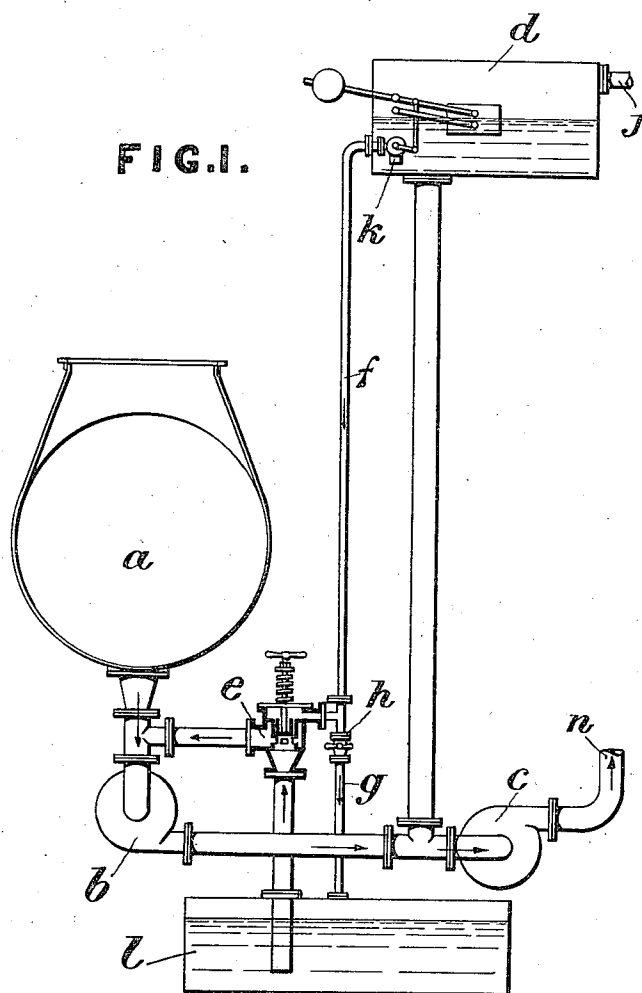
D. B. MORISON

FEED WATER CONTROL SYSTEM

Filed Nov. 27, 1922

2 Sheets-Sheet 1

FIG. 1.



INVENTOR:

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by Spear, Middleton, Donaldson & Hall
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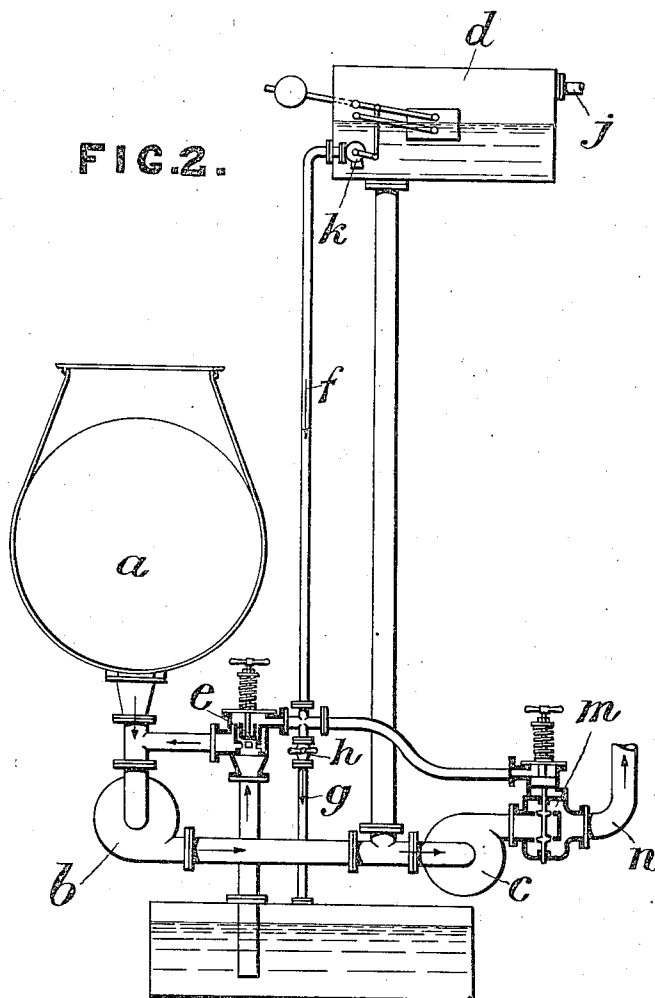
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INVENTOR:

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UNITED STATES PATENT OFFICE.

DONALD BARNS MORISON, OF HARTLEPOOL, ENGLAND.

FEED-WATER-CONTROL SYSTEM.

Application filed November 27, 1922. Serial No. 603,602.

To all whom it may concern:

Be it known that I, DONALD BARNS MORISON, of Hartlepool, in the county of Durham, England, have invented certain new and useful Improvements in Feed-Water-Control Systems, of which the following is a specification.

This invention relates to feed water control systems of the kind in which a tank or vessel contains a float which controls the supply of supplementary water into the system.

The invention consists broadly in the provision in association with a main condenser, and a pump for withdrawing condensate from the main condenser and discharging it directly to the suction of the boiler feed pump, of a head tank having a pipe connected up to the suction side of the feed pump and means controlled by a float within the head tank for controlling the operations of the feed pump. The float within the head tank may also be utilized for automatically controlling a bye-pass back to the main condenser or other suitable situation.

The invention further consists in the utilization of the float in the elevated tank for operating a valve to effect hydraulic control of a further valve or valves for regulating the flow of water into or from the system.

The invention also comprises apparatus whereby the control of the supply of water into the feed system is operated hydraulically under the control of the float. A throttle valve arranged on the discharge side of the feed pump may be operated in similar manner and my invention also contemplates a system wherein a valve admitting water to the feed system and a valve throttling the discharge from the system are both hydraulically controlled from the same float operated valve. In feed water systems it is often desired to maintain a certain pressure or head of water on the suction side of the feed pump, and for this purpose the tank or vessel referred to is arranged at such a height as will produce the desired pressure on the suction side of the pump. It is also usual to provide a valve for admitting water from the feed or reserve tank into the condenser or condensate pump suction so that a supplementary supply of water may be admitted when required. In ac-

cordance with the present invention the float is arranged to hydraulically control this valve in such a manner that when the float is in its normal position the valve admitting water into the system is closed, while when the float falls below its normal position the valve admitting water into the system is opened and the supplementary water admitted immediately restores the pressure on the suction side of the feed pump by raising the level of the water in the tank. When desired, the float may operate in a similar manner a throttle valve placed on the discharge side of the feed pump, so that the valve is closed by the falling float when the level of water in the tank is lowered, and opened when the water level rises. Thus, should the demands of the boiler be such that the water required is in excess of the condensate discharged from the condenser, and the float in the tank falls, the valve on the discharge side of the feed pump is throttled until the supplementary water enters the system and restores the pressure on the suction side of the feed pump, thus any serious reduction of pressure in the system is avoided and a supply of water sufficient for the boilers is always available.

Fig. 1 illustrates diagrammatically one convenient form of my invention showing the method of controlling the supply of water into the system, and Fig. 2 shows diagrammatically a modified form of Fig. 1, in which the float also controls the throttle valve arranged on the discharge side of the feed pump.

In Fig. 1, *a* is the condenser from which the condensate is removed by the extraction pump *b* which discharges directly, or otherwise, into the suction of the boiler feed pump *c* which discharges to the boilers through the pipe *n*. *d* is a tank which is arranged at such a height as will give the desired pressure at the suction of the feed pump *c*, and *e* is the valve which controls the admission of water into the system. In the illustration, the valve *e* is shown admitting water into the suction of the condensate pump, but the admission may be arranged elsewhere if desired. For example, the valve *e* may be connected to the main condenser. As will be seen from the drawing the valve *e* which is shown as of the piston type, is lifted by a spring, but is nor-

mally held closed by the pressure of water from the elevated tank with which it is in communication by way of valve *k* and pipe *f*. *g* is a leak-off pipe through which the escape of water is controlled by the valve *h*.
 5 When the plant is working under normal conditions the level of the water in the elevated tank *d* remains practically constant, any excess passing through the over-flow pipe *j* into the feed tank or elsewhere. When
 10 however, the load on the main engine is reduced and the condensate discharged by the extraction pump *b* is insufficient for the requirements of the plant, the level of the water in the tank *d* falls, the float closes the
 15 valve *k* when the upper side of the piston in the valve *e* is relieved of the pressure of water and the spring opens the valve which admits water from the feed or reserve tank
 20 *l* into the system. As soon as the load on the main engine increases and the water is more than sufficient for the requirements of the boilers, the level rises in the tank *d*, the valve *k* is opened, and the pressure on the
 25 piston of the valve *e* is increased when the valve closes and the supply of supplementary or additional water is cut off.

In Fig. 2 the valve *e* is controlled by the float and operates in a similar manner to
 30 that described in Fig. 1. As the level of water in the tank *d* falls the pressure of water in the pipe *f* is lowered by reducing the quantity of water flowing through the valve *k* until the falling float closes the valve
 35 *k* and the pressure of water in the pipe *f* is completely relieved.

When the pressure in the pipe *f* falls the valve *e* opens and admits water from the feed or reserve tank *l* into the system. At
 40 the same time the falling pressure on the top of the piston of the valve *m* allows the spring to close the valve *m* and so throttle the discharge from the feed pump *c* until sufficient water has entered the system on
 45 the suction side to restore the level of water in the tank *d*.

The valves *e* and *m* come into operation when the water in the tank *d* is at a predetermined level which may be the same or
 50 different for each valve, but such levels may be varied by varying the leak-off through the valve *h*.

Although I have shown by way of example certain constructions, it is to be understood that the valves *e* and *m* and the
 55 various parts may be constructed in any con-

venient manner so long as they permit of the operation herein described.

What I claim and desire to secure by Letters Patent is:—

1. A feed water system comprising a condenser, a pump to which condensate from the condenser flows, an elevated tank and a connecting pipe between said elevated tank and the suction pipe of said pump.

2. A feed water system comprising a condenser, a pump to which condensate from the condenser flows, an elevated tank, a connecting pipe between said elevated tank and the suction side of said pump, a float in
 70 said tank, a valve directly operated by said float, said valve operating to effect control of the feed water system.

3. A feed water system comprising a condenser, a pump to which condensate from
 75 the condenser flows, an elevated tank, a connecting pipe between said elevated tank and the suction side of said pump, a float in said tank, a valve directly operated by said float, said valve operating to effect hydraulic
 80 control of a valve for regulating the flow of water to the feed system, from a source of supply.

4. A feed water system comprising a condenser, a pump to which condensate from
 85 the condenser flows, an elevated tank, a connecting pipe between said elevated tank and the suction side of said pump, a float in said tank, a valve directly operated by said float, said valve operating to effect hydraulic control
 90 of a valve for regulating the flow of water from the feed system to the boilers.

5. A feed water system comprising a condenser, a pump to which condensate from
 95 the condenser flows, an elevated tank, a connecting pipe between said elevated tank and the suction side of said pump, a float in said tank, a valve directly operated by said float, said valve operating to effect hydraulic control
 100 of a valve for regulating the flow of water from the feed system to the boilers, a supply tank, a pipe connection between said supply tank and the suction side of the feed system, a valve in said pipe for controlling the flow of water to the feed system
 105 from said supply tank under control of said hydraulic control valve and said float operated valve.

In testimony whereof, I affix my signature.

DONALD BARNES MORISON.