T. MONTGOMERY.

PRESSURE REGULATOR.

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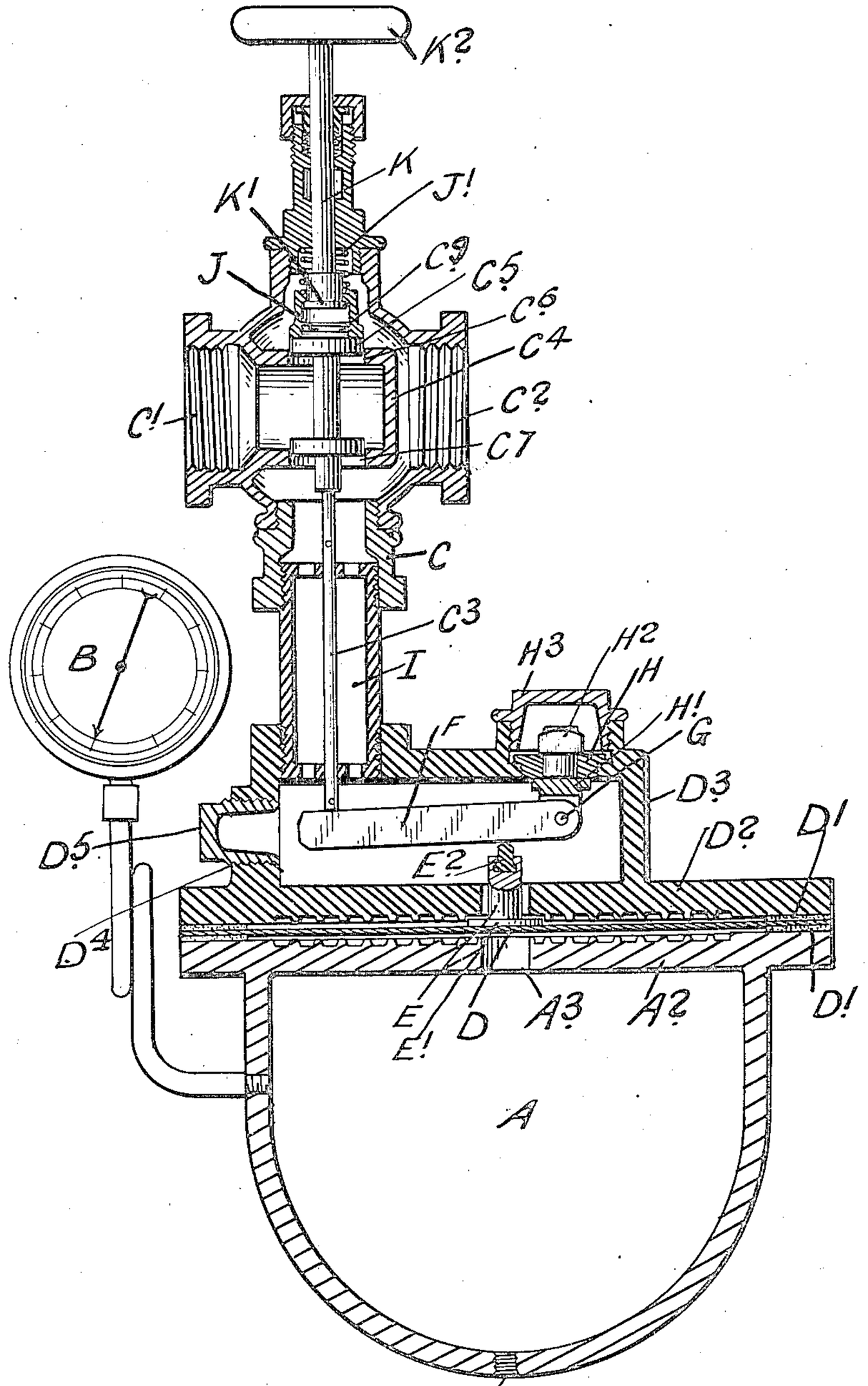

WITNESSES

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THOMAS MONTGOMERY, OF SARNIA, ONTARIO, CANADA.

PRESSURE-REGULATOR.

No. 915,204. Specification of Letters Patent. Patented March 16, 1909.

Application filed March 2, 1908. Serial No. 418,885.

To all whom it may concern:

Be it known that I, THOMAS MONTGOMERY, of the town of Sarnia, in the county of Lambton, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is the specification.

My invention relates to improvements in automatic regulating devices for controlling fan engines for producing forced or induced drafts for boilers, and the object of the invention is to devise a simple, positive and quick acting valve of this class whereby a uniform steam pressure in the boiler may be maintained continuously.

A further object is to provide a means for cleansing the valve during the running of the engine without detaching any of the working parts.

A still further object is to make the device operable as a pressure reducing valve.

To effect these objects I have constructed my valve in the manner, which I shall presently describe.

The invention is shown in the accompanying drawing which shows a sectional view of the device.

A is a chamber which is designed to be filled with air or other expansive fluid from the inlet A', and hermetically sealed, B is a gage which indicates the air pressure in chamber A. When the device is used to regulate the speed of fan engines and the like, the pressure of air in chamber A should be the same as the steam pressure required in the boiler. When the device is used to reduce or regulate pressure of gas or fluids, as hereinafter described, the air pressure in chamber A should be the same as the pressure required for the gas or fluid to be regulated.

C is the valve casing, which is placed on the steam line leading from the boiler to the fan engine and is provided with the oppositely located ports C' and C^2 into which the pipe line is fitted.

A^2 is the top of the chamber, A and A^3 is the central orifice in the top.

D is a diaphragm supported on the outer periphery between suitable edge packing rings D'.

D^2 is a supplemental top, which is suitably fastened to the top A^2 preferably around the edge and provided with a chamber D^3 having an opening D^4 closed by a screw plug D^5. Both the top A^2 and the top D^2 are provided with annular corrugations as indicated.

E is a pin having a flanged bottom E', which rests centrally on the plate D.

E^2 is a pointed minor pin held in the top of the pin E and contacting with the lever F.

It will be noted that the orifice A^4 through which the pin E extends is larger than the pin, thereby leaving an annular orifice to allow steam pressure to act upon the upper side of the diaphragm D as will hereinafter appear.

H is a flanged screw ring, which fits the orifice in the top of the chamber D^3.

H' is a jaw pin having the jaw lowermost, such jaw pin extending through the ring H and being held in position at the top by a nut H^2.

The lever F hereinbefore referred to is fulcrumed on a pin G extending through the jaws of the pin H'.

I is a hollow bearing standard, which is screwed into the bottom of the valve casing C and into the top of the chamber D^3.

C^3 is the valve rod, which extends through the bearings in the standard I, and C^4 is a double partition forming a chamber in the center of the valve casing C.

C^5 is the double connected valve, the top and bottom disks of which fit in the orifices C^6 and C^7 respectively in the partition C^4 The top of the valve is provided with a reduced screw extension C^9.

J is a nut, which is held on the flange K' at the bottom of the rod K, which at the top is provided with a hand wheel K^2 and extends through a stuffing box or gland.

J' is a spiral spring extending between the nut J and the stuffing box.

The full steam pressure is exerted on the top of the diaphragm D. When the steam pressure falls below that of the air pressure in the chamber A the expansion of the air forces the diaphragm D upwardly. The movement of such diaphragm is transmitted through the lever F and the valve rod C^3 to the valve C^5 lifting the same from its seat and allowing more steam to pass to the engine, thus increasing in speed, driving the fan faster, and thereby creating more draft and air pressure and consequently raising the steam pressure. When, however, the steam pressure arrives at a point above that of the air pressure the diaphragm is forced downwardly. The spring J' then forces the valves

C^5 to their seats, thus shutting off the supply of steam to the engine and decreasing its speed and consequently diminishing or shutting off the draft. The required amount of the lap of the valve on the seat is arranged for by the turning of the hand wheel K^2 to the right or left allowing the minimum speed of the engine to be controlled.

The maximum speed of the engine is controlled by the throttle valve close to the engine.

If for any reason the valve C^5 should stick on its seat or not work freely it may be relieved by operating the hand wheel K^2. Again if any difference in pressure on either side of the diaphragm should become excessive the corrugations in the top A^2 and supplemental top D^2 will prevent the diaphragm being distorted by being forced too far in either direction.

When I utilize my valve as a pressure reducing device to reduce steam, air or gas from a higher to a lower pressure it is placed in a supply line aforesaid, the port C' being connected to the high pressure. The chamber A would in this case be charged with air or other expansive fluid to a pressure corresponding to that of the reduced pressure required. The reduced pressure is then exerted on the top side of the diaphragm D while the corresponding air pressure acts on the other.

When the reduced pressure falls below that of the air pressure in the chamber A the diaphragm D is then forced upwardly by the expansion of air or other expansive fluid stored in the chamber A. The movement of the diaphragm D is transmitted through the lever F and valve rod C^3 to the valve C^5 thus allowing more steam to pass to the low pressure side, which continues until the low pressure exceeds that of the air in the chamber A when the diaphragm is forced downward and the spring J' instantly forces the valve C^5 to its seat and the supply of steam is shut off, thereby maintaining a constant pressure on the low pressure side of the valve.

The amount of steam which it is desired to pass through the valve C^5 when it is in its closed position can be controlled by the adjustment of the hand wheel K^2, and thus prevent any perceptible fluctuation in the pressure on the lower pressure side.

It will thus be seen that my invention is not only valuable as an automatic regulating valve for fan engines, but also as a pressure reducing valve, which is an important desideratum.

It will be seen from this description that by the use of an air reservoir as described, I am enabled to dispense with the use of levers, springs and other analogous devices to counteract the steam pressure which has to be regulated. In fact the diaphragm shown in the drawings floats between the pressure of air on the one side and pressure of steam on the opposite side thereof, so that the slightest inequality of pressure on either side causes the diaphragm to move and thereby a most sensitive regulator is provided.

What I claim as my invention is:

1. In automatic regulating devices for fan engines and the like, the combination with the main air reservoir filled with air at a predetermined pressure and hermetically sealed and provided with a top having an orifice therein and a flat outer surface, of a diaphragm lying normally parallel with the surface, a supplemental top having an inner surface parallel to the plane of the outer surface of the top, packing rings holding said diaphragm normally midway and parallel to the outer surface of the top and inner surface of the supplemental top, the supplemental top being provided with a central orifice and an outer chamber located and communicating with the steam line, a valve in the steam line and means between the valve and the diaphragm operated from the diaphragm for adjusting the position of the valve as and for the purpose specified.

2. In automatic regulating devices for fan engines and the like, the combination with the main air reservoir filled with air at a predetermined pressure and hermetically sealed and provided with a top having an orifice therein and a flat outer surface provided with annular corrugations forming grooves communicating with each other, of a diaphragm lying normally parallel with the surface of the top, a supplemental top having an inner surface parallel to the plane of the outer surface of the top and provided with annular grooves communicating with each other, packing rings holding said diaphragm normally midway and parallel in the outer surface of the top and inner surface of the supplemental top, the supplemental top being provided with a central orifice and an outer chamber located and communicating with the steam line, a valve in the steam line and means between the valve and the diaphragm operated from the diaphragm for adjusting the position of the valve as specified.

3. In automatic regulating devices for fan engines and the like, the combination with the main air reservoir filled with air at a predetermined pressure and hermetically sealed and provided with a top having an orifice therein and a flat outer surface, of a diaphragm lying normally parallel with the surface, a supplemental top having an inner surface parallel to the plane of the outer surface of the top, packing rings holding said diaphragm normally midway and parallel between the outer surface of the top and inner surface of the supplemental top, the supplemental top being provided with a central orifice and an outer chamber located and communicating with the steam line, a valve

in the steam line, a pin held in the central orifice in the supplemental top and provided with a reduced upper end forming a pressure point, a lever fulcrumed in the chamber and with which the pressure point contacts in proximity to the fulcrum, the opposite end of said lever operating the valve as and for the purpose specified.

4. In a device of the class described, the combination with the valve casing having the U-shaped wall in the center thereof provided with top and bottom orifices and ports oppositely located in the steam line, of the double valve provided with a screw top, a nut fitting on the screw top, a rod having a flanged bottom over which the nut fits and a suitable adjusting handle and a spring tending to hold the nut on the flange of the rod as and for the purpose specified.

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Witnesses:
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