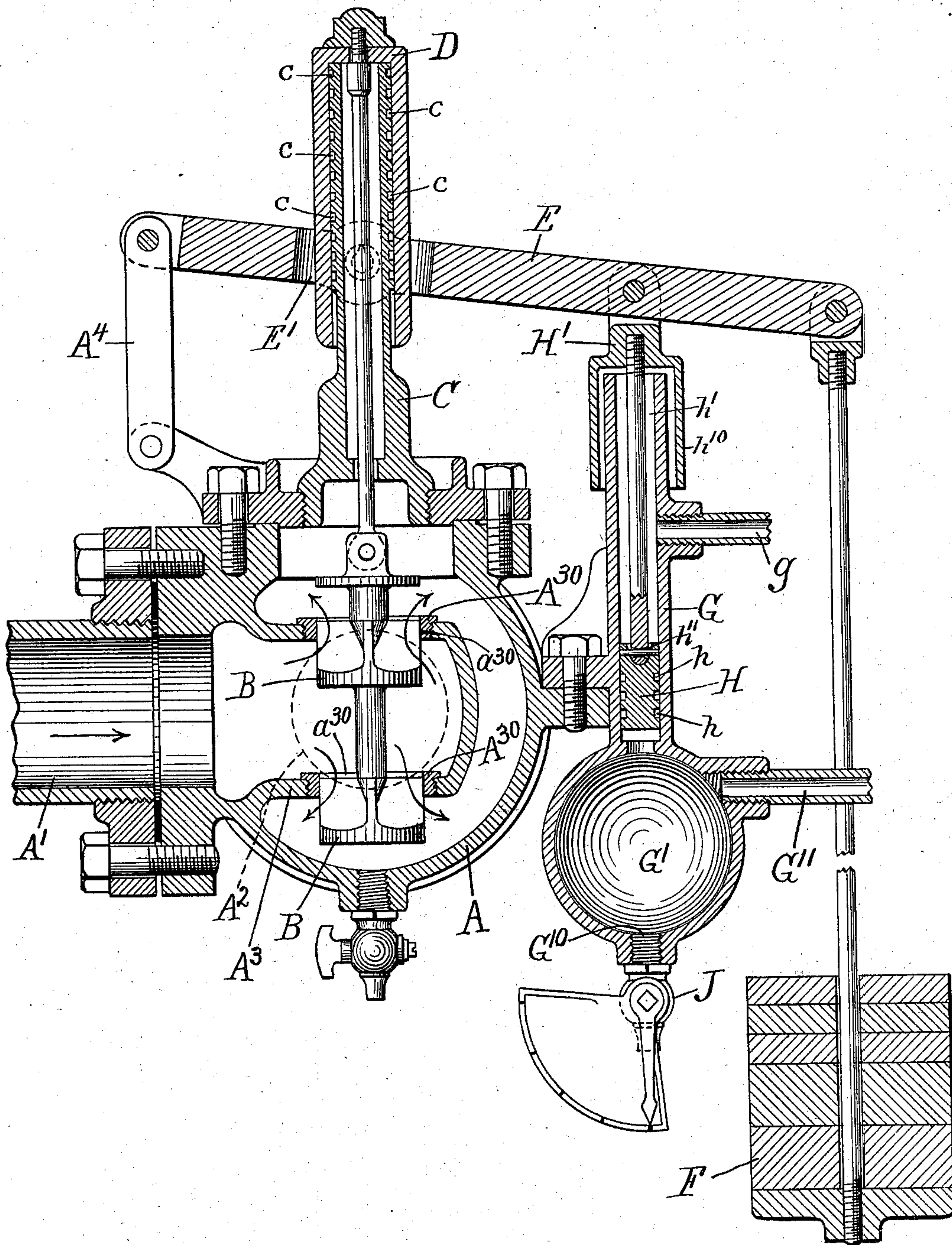


(No Model.)

G. W. WRIGHT.
PUMP REGULATOR.

No. 559,560.

Patented May 5, 1896.



Witnesses.

E. T. Wray.

Frank Elliott

Inventor.

George W. Wright
by Burton W. Burton
his attys

UNITED STATES PATENT OFFICE.

GEORGE W. WRIGHT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CHICAGO
REGULATOR COMPANY, OF SAME PLACE.

PUMP-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 559,560, dated May 5, 1896.

Application filed September 4, 1894. Serial No. 522,024. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WRIGHT, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Pump-Regulators, which are fully set forth in the following specification, reference being had to the accompanying drawing, forming a part thereof.

In the drawing the figure is a vertical section axially through the steam-controlling valve and regulator-cylinder of my invention, showing other parts in elevation.

The steam-controlling valve constitutes no part of my invention; but its description is necessary to the understanding of the operation of the entire device.

A is the valve-body, having steam-inlet at A' and steam-outlet at A², the form of valve shown being an angle-valve, so that the outlet is represented only by dotted line.

A³ is a diaphragm or partition having two seats A³⁰ A³⁰ for the balanced valve, which comprises the two piston-valves B B, which play in the ports a³⁰ a³⁰.

C is a tubular extension, rigid with the valve-body, in line with the stem of the balanced valve, and said stem extends up into and through said tubular extension and is made fast at the upper end to the head of a cylinder or sleeve with a closed end D, which fits outside of and is adapted to play longitudinally upon the tubular extension C. Said tubular extension on its exterior surface is provided with annular grooves or pockets c c c c, &c., which receive water of condensation from the steam, which passes freely up through the tubular extension around the valve-stem and constitutes a water packing for the sleeve or cap D.

E is a yoke-lever fulcrumed upon a bracket-arm A⁴, rigid with the valve-body, and pivotally connected at the yoke portion E' to the exterior of the sleeve D.

F is a weight upon the free arm of the lever E. It will be understood that the valve is balanced except as to such pressure as may be exerted by the steam on the discharge side against the head of the sleeve or cap D over the annular area of that head which is exposed to such pressure, and that such pressure tends constantly to close the valve. The weight F on the lever E operates against this

tendency. When this valve is connected to a steam-pump, the weight is set to counter-balance the pressure of steam. When the pump is working, steam-pressure on the farther side of the valve-ports increases as the lift or work done by the pump increases, and the weight F will therefore be adjusted to hold the valve open until a certain maximum desired pressure of steam corresponding to the maximum height of water or force of current is attained. When this maximum pressure is experienced, the valve will be shut off, (except to the extent necessary to supply the waste by condensation of the water packing in the pockets c.) When the consumption reduces the water-pressure below this point, the weight operates to open the valve to renew the supply.

The defect observed in the use of this valve alone as a regulator is that too great an interval is observed between the fall of the water or diminishing of the water-pressure and the resultant diminution of the steam-pressure on the farther side of the valve-ports and consequent lack of promptness in the action of the pump to renew the water supply. In other words, the device as a regulator is not sufficiently sensitive. The purpose of my invention is to overcome this defect by interposing a device which shall be exposed directly to the water-pressure and which shall operate directly upon the connections of the steam-valve to open and close it as the water-pressure changes. For this purpose I provide the cylinder G, which is illustrated as secured rigidly to the valve-body. In this cylinder is a piston H, whose stem H', protruding at the top, is pivotally connected to the lever E beyond the connection of that lever to the sleeve D. This piston has water-packing grooves h, and its cylinder has the drip-port g, through which any leakage of the water packing escapes. At the lower end of the cylinder is a large chamber G' for the accumulation of sediment, the connection to the water supply being made at G¹¹ at the upper side of such chamber. At the bottom of the sediment-chamber I make a waste or drainage port G¹⁰, which I provide with a valve J, which may be of any type such that the degree of opening may be regulated with nicety.

The piston-stem comprises the rod h' and the cap h¹⁰, which overhangs and encircles

the upper end of the cylinder G, such cap being interiorly enough larger than the cylinder is exteriorly to allow quite free play of the cap about the cylinder, and the rod h' , which is screwed into the cap at the upper end and is rigid therewith, is pivotally connected at the lower end at h^{11} to the piston H. This construction, it will be seen, permits any necessary lateral oscillation of the piston-stem as the lever E rises and falls. This prevents any binding of the piston or its stem in its action. The piston H being water-packed there is practically no friction, or at least the minimum friction, in the cylinder, and such piston may be made so free that there shall be no solid contact, or contact solid with solid, between the piston and cylinder, the bearing of the piston throughout all its play being in the water film which will exist about it, because the drip-pipe g leading from the cylinder above the play of the piston may carry off a steady stream of water without detriment or inconvenience, although in practice the piston may be made substantially frictionless without being so free as to make the waste through the drip-pipe g very great.

In the use of this device it will be seen that the water-pressure, which is experienced against the under side of the piston H, operates against the weight F and tends to close the valve. The valve J, which controls the drainage-port from the cylinder G, will be set to permit waste at such rate that the resultant diminished pressure upon the under side of the piston H will be sufficient to so far counteract the effect of the weight F when the pressure is at the desired maximum as to prevent the weight from opening the valve so long as that condition obtains. When, however, the water-pressure falls, the drainage becoming in excess of the supply, the chamber G' and the cylinder G are quickly emptied and the support which the piston H has been giving to the lever F is withdrawn, and the weight F thereupon acts instantly to open the valve. This renders it possible to make the weight F in excess of what it would be if it were used to operate only against the steam-pressure on the head of the sleeve D, the excess being counteracted by the upward pressure of the piston H so long as the desired maximum of water-pressure exists, but no longer, and when the water-pressure falls the excess of weight operates instantly to give an additional supply of steam to restore the water-pressure. The total effect, therefore, of the combination of my device with the valve described, or with any regulating-valve, is to communicate almost instantly to the steam-valve the change of pressure of the water, causing the steam-valve to respond, therefore, instantly to such changes and making an extremely sensitive regulator.

Compactness in the arrangement of the several devices which coöperate, as of the steam-valve and the governor, is important, and the steam-valve being hot and the governor-

chamber being near it the latter will become heated sometimes to quite a high temperature and the water therein will often be raised considerably in temperature. Most natural waters such as afford the source of supply for waterworks, even though they do not deposit sediment readily or rapidly while standing in their normal condition and at their normal temperature, will deposit a sediment which will form a hard scale when raised materially above their normal temperature, and in any governor of the class to which this belongs, which for convenience must be located near enough to the steam-valve, so that it is of necessity raised in temperature by the proximity of the latter, such scale will be formed wherever the form of the device is such that sediment can be deposited, unless at such natural place of deposit circulation can be maintained to keep the deposit moving, or unless it can at frequent intervals be blown out by sufficient pressure. In view of this fact it is important that the piston-cylinder of the governor is expanded below the path of the piston in the sediment-chamber G', and that through this chamber constant circulation is readily maintainable, and such circulation can be made as rapid as the full pressure of the mains will produce with the wide-open drain-cock whenever it is desired forcibly to eject any sedimentary accumulation before the same can become hardened into a scale.

I claim—

1. In combination with the steam-controlling valve of a steam-pump, a chamber which has a by-communication with the water-pressure maintained by the pump, a piston adapted to be actuated in such chamber by such water-pressure, and connected with and adapted to operate the steam-controlling valve; said chamber being expanded below the travel of the piston therein to form an enlarged sediment-chamber; and suitable means for evacuating such sediment-chamber.

2. In combination with the steam-controlling valve of a steam-pump, a chamber which has a by-communication with the water-pressure maintained by the pump, a piston adapted to be actuated in such chamber by the water-pressure therein and connected with and adapted to operate the steam-controlling valve, such chamber being expanded below the travel of the piston therein to form an enlarged sediment-chamber and being provided with a drainage-port at the bottom thereof, and a valve controlling said port adapted to be operated at will.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 1st day of September, 1894.

GEO. W. WRIGHT.

Witnesses:

JOS. SCHNEIDER,
CHAS. S. BURTON.