

T. J. DAVIS.

REGULATOR FOR HYDRAULIC STEAM PUMPS.

No. 521,365.

Patented June 12, 1894.

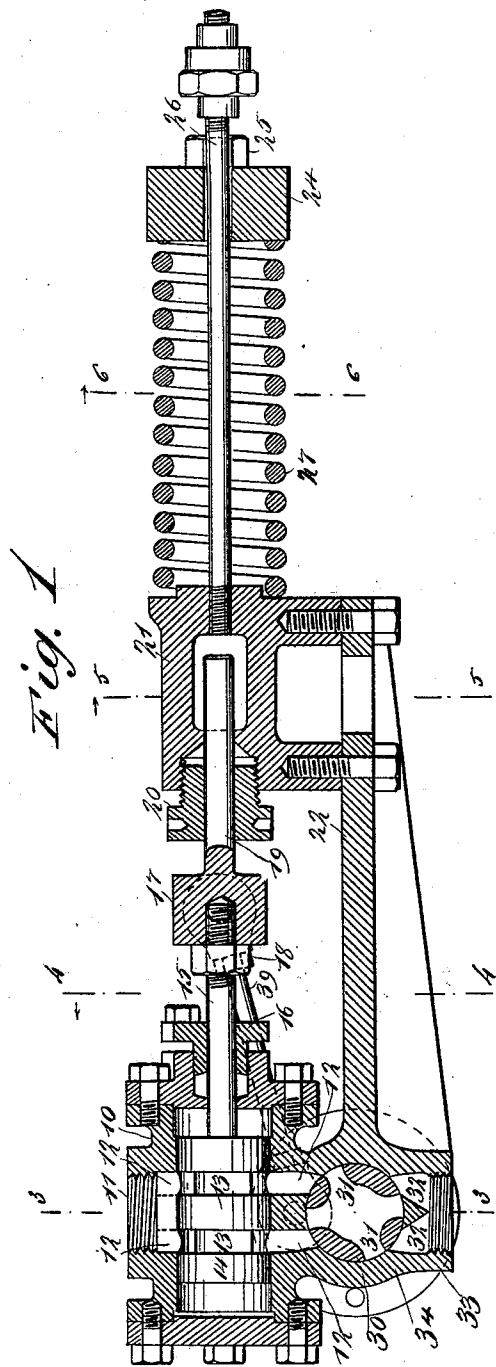
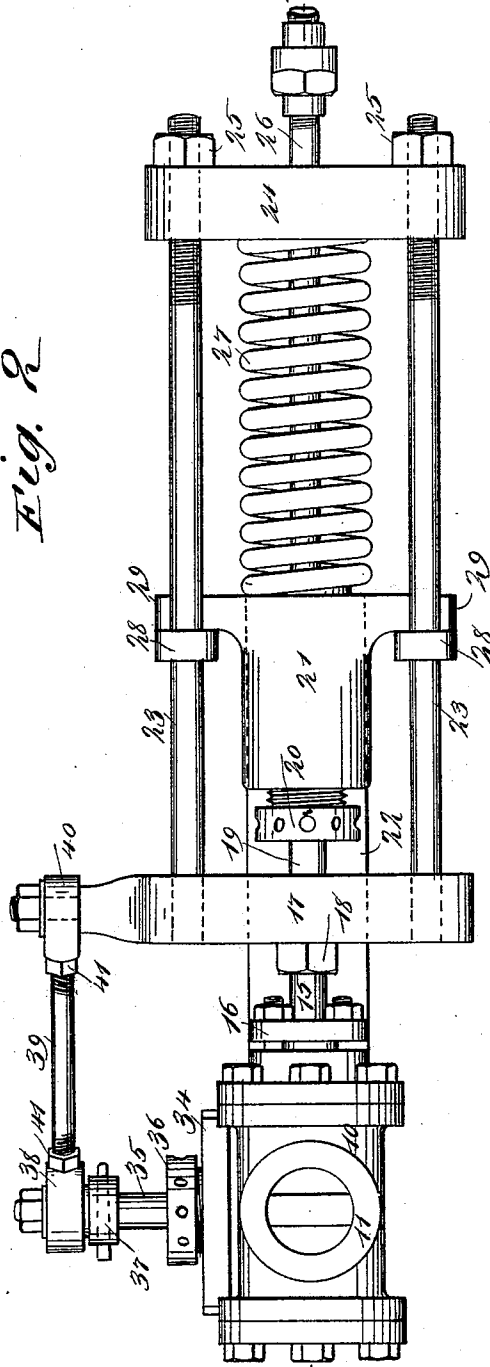


Fig. 1

Fig. 2



WITNESSES:

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*C. Sedgwick*

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*T. J. Davis*  
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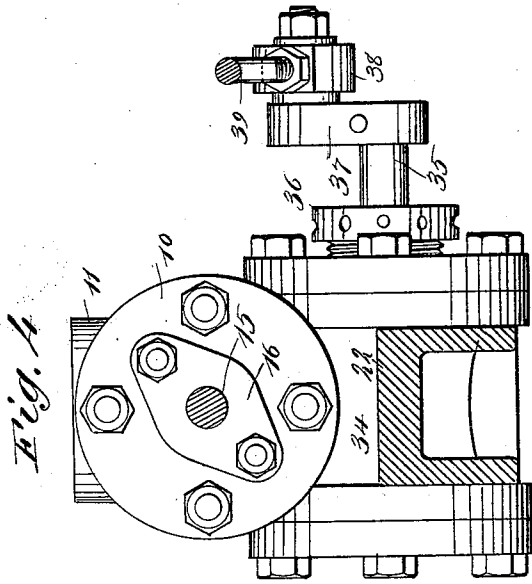


Fig. 4

Fig. 6

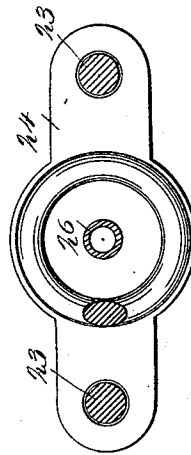


Fig. 7

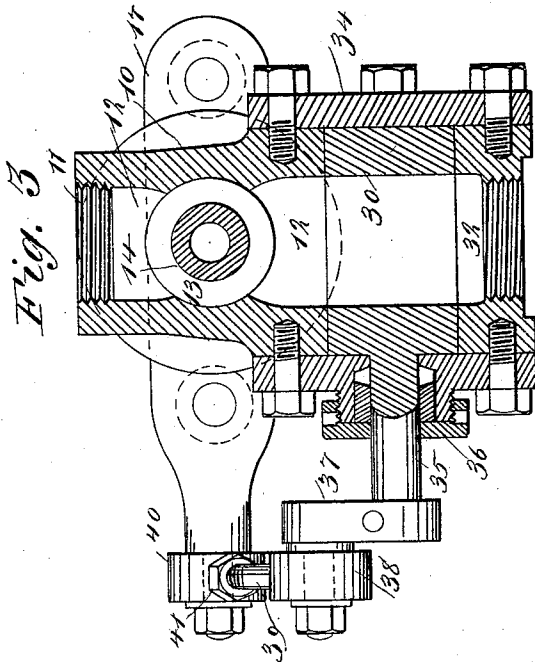
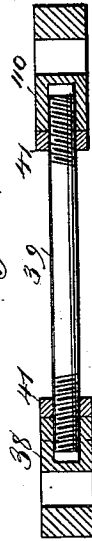
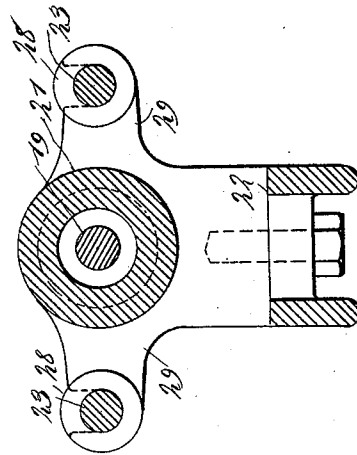


Fig. 5

Fig. 5



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# UNITED STATES PATENT OFFICE.

THOMAS J. DAVIS, OF CHARLOTTE, NORTH CAROLINA.

## REGULATOR FOR HYDRAULIC STEAM-PUMPS.

SPECIFICATION forming part of Letters Patent No. 521,365, dated June 12, 1894.

Application filed September 27, 1893. Serial No. 486,614. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS J. DAVIS, of Charlotte, in the county of Mecklenburg and State of North Carolina, have invented a new and Improved Regulator for Hydraulic Steam-Pumps, of which the following is a full, clear, and exact description.

My invention relates to improvements in regulators for hydraulic steam pumps; and the object of my invention is to produce a simple, durable, and positively operating regulator which may be applied to any form of hydraulic steam pump without alteration or modification, which is adapted to perfectly control the speed of the pump, and which is also adapted to stop the pump when the desired pressure is attained, the regulation of both speed and pressure being attained in a very smooth and easy manner so that no excessive strains are made on any part of the mechanism of either the regulator or the pump.

To these ends my invention consists of certain features of construction and combinations of parts, as will be hereinafter described and claimed.

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

Figure 1 is a longitudinal section of my improved regulator on the line 1—1 of Fig. 2. Fig. 2 is a plan view of the regulator. Fig. 3 is a cross section on the line 3—3 of Fig. 1. Fig. 4 is a cross section on the line 4—4 of Fig. 1. Fig. 5 is a cross section on the line 5—5 of Fig. 1. Fig. 6 is a cross section on the line 6—6 of Fig. 1; and Fig. 7 is a sectional view of the crank connections between the rotary piston valve and the sliding regulating bar.

The regulator is provided with a cylindrical valve casing 10, having a suitable steam inlet 11, and in the casing are transverse ports 12 which extend through the valve casing and are adapted to register with ports 13 grooved in the face of the slide piston valve 14 which moves longitudinally in the valve casing, and which is secured to a piston rod 15 sliding in a packing nut 16, and it is screwed into a sliding cross bar 17 at its outer end, being ad-

justed on the cross bar and held there by means of a nut 18. The cross bar 17 is connected to a plunger 19 which slides in the packing nut or stuffing box 20, and in the cylinder 21, the latter being supported on an arm 22 which extends from the lower steam controlling valve casing, as hereinafter described, and the cylinder 21 is connected with the water which is pumped under pressure. The cross bar 17 is secured to guide rods 23 which extend outward and are threaded at their outer ends, these ends being secured to a yoke 24, being adjusted thereon and held thereto by nuts 25 on the outer ends of the guide rods. The yoke 24 slides on the pipe 26 which also acts as a guide and which delivers into one end of the cylinder 21 and is adapted to connect with the receptacle into which the water is pumped under pressure.

The yoke 24 is normally pressed outward by a spring 27 which is coiled around the pipe 26, and the pressure of the spring is such as to hold the collars 28 on the guide rods 23 against the lugs 29 on the sides of the cylinder 21 when the regulator is in normal position and the pump is working under water pressure, these lugs 29 serving as guides for the rods 23, and when the collars 28 are against the lugs, as described, the ports 13 of the piston valve 14 register with the ports 12 of the valve casing, thus throwing the steam inlet wide open and permitting the pump to run at its maximum speed.

The tension of the spring 27 is regulated by the nuts 25, and the plunger 19 is moved so as to gradually close the steam ports and overcome the resistance of the spring 27 by the pressure of water in the cylinder 21, and when the required pressure is reached the ports 12 will be closed.

Beneath the valve 14 and at right angles thereto is a rotary valve 30, which is cored out in the center, and it is provided with radial ports 31 which are adapted to register with the ports 12 of the valve casing 10 and also with ports 32 in the discharge or outlet 33 of the valve casing 34 in which the valve 30 turns, and this outlet connects directly with the cylinder of the steam pump, while the valve casing is formed integral with the casing 10 and with the supporting arm 22 of the cylinder 21.

The valve 30 is provided with a stem 35 which projects outward through a packing nut or stuffing box 36, and has at its outer end a crank 37 on which is a collar 38 connecting by a rod 39 with a similar collar 40 on one end of the sliding cross bar 17, and the rod 39 is threaded at its ends which enter the collars 38 and 40, the rod being adjustable lengthwise by means of the lock nuts 41 thereon. It will be seen that by adjusting the length of this connecting rod or pitman, the requisite port openings may be assured.

As shown by the drawings, in Fig. 2 the plunger 19 and cross bar 17 are held at the extreme right end of their stroke, with the collars 28 of the guide rods 23 against the lugs 29, and this brings the ports 12 and 13 into registry so as to open the steam ports wide. The piston rod 19 is adjusted so that the steam will enter the ports 31 of the valve 30 and pass through the ports 32 to the cylinder of the steam pump. It will be seen that this connecting rod may be adjusted so as to give just the amount of opening for steam required.

As the pump apparatus and the pressure in the hydraulic cylinder or other article connected with the pump increases, the pressure in the cylinder 21 is also increased and the plunger 19 is gradually moved so as to move the piston valve 14 and gradually close the ports 12, and this pressure overcomes the tension of the spring 27, as described, and acts also on the connecting rod 39 and rotary valve 30, actuating this latter valve so as to gradually open its ports, as the ports 12 are closed, until finally when the desired pressure is reached the tension of the spring 27 is overcome, the ports 12 are entirely closed and the ports 31 are wide open. It will be observed that this arrangement of the two valves causes the ports 31 to open as the pressure increases and more steam is required in the cylinder, and when the desired pressure is reached the pump stops with the ports of the valves in the position described, that is, with the ports 12 closed and the ports 31 wide open. As soon as the pressure in the hydraulic apparatus is reduced or removed, the spring 27 throws the slide bar 17, valve 14, and valve 30 back to their original position, and the pump immediately starts at full speed.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. A regulator for steam pumps, comprising a sliding piston valve in the steam inlet of the pump, a rotary valve arranged also in the inlet and at right angles to the ports of the sliding valve, a spring-repressed cross bar connected with the rod of the sliding valve, a crank connection between the cross bar and the rotary piston valve, a cylinder connected with the water under pressure from the pump, and a plunger slidable in the cylinder and secured to the cross bar, substantially as described.

2. A regulator for steam pumps, comprising a valve casing having ports therein and adapted to connect with the steam supply of the pump, a sliding piston valve having ports to register with those of the valve casing, a second rotary valve arranged adjacent to the sliding valve and provided with ports to register with the ports of the valve casing, a spring-repressed cross bar connected to the piston rod of the sliding piston valve, an adjustable crank connection between the cross bar and the stem of the rotary valve, a cylinder connected with the water under pressure from the pump, and a plunger arranged to slide in the cylinder and connected with the cross bar so as to push the latter against the tension of its spring, substantially as described.

3. The combination, of the cross bar pressed in one direction by a spring and in the opposite direction by water under pressure from a steam pump, a two-part valve casing adapted to be arranged in the steam inlet of the pump, one part of the valve casing having internal diametrical ports registering with the other part of the valve casing, a sliding piston valve held to move opposite the ports in the valve casing and connected with the cross bar, a rotary cored valve arranged at right angles to the sliding valve and provided with ports to register with those of the valve casing, a crank on the stem of the cored valve, and an adjustable connection between the crank and the cross bar, substantially as described.

THOMAS J. DAVIS.

Witnesses:

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CLARENCE G. WEARN.