No. 630,754. Patented Aug. 8, 1899.

A. SNYDER.

PUMP GOVERNOR.

(Application filed Nov. 18, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2

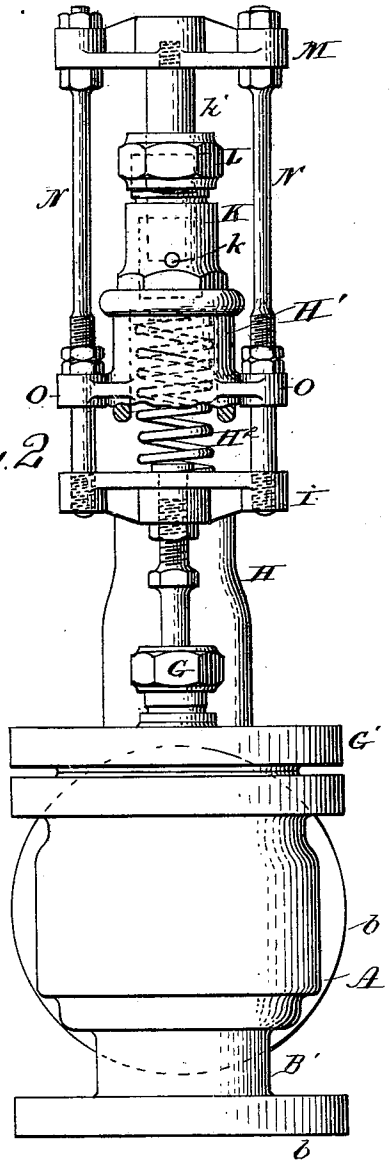

Fig. 1

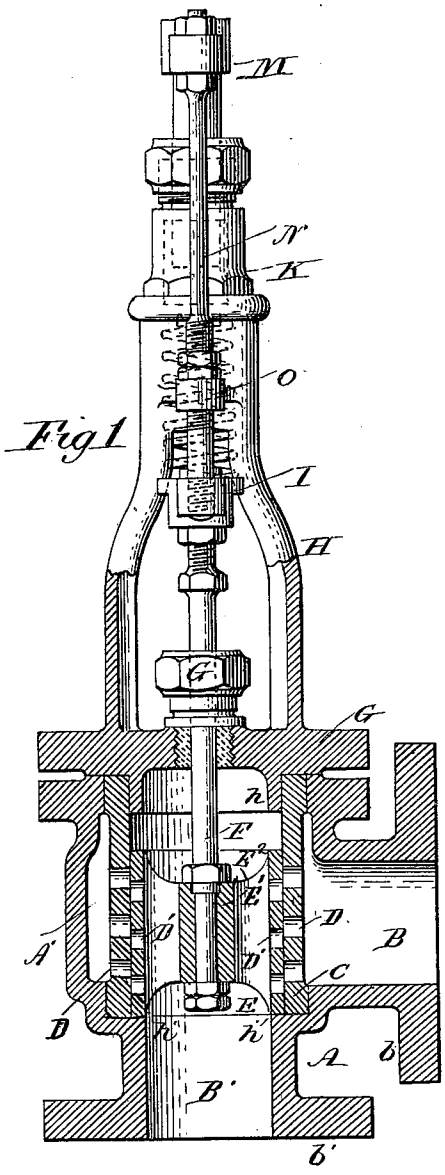

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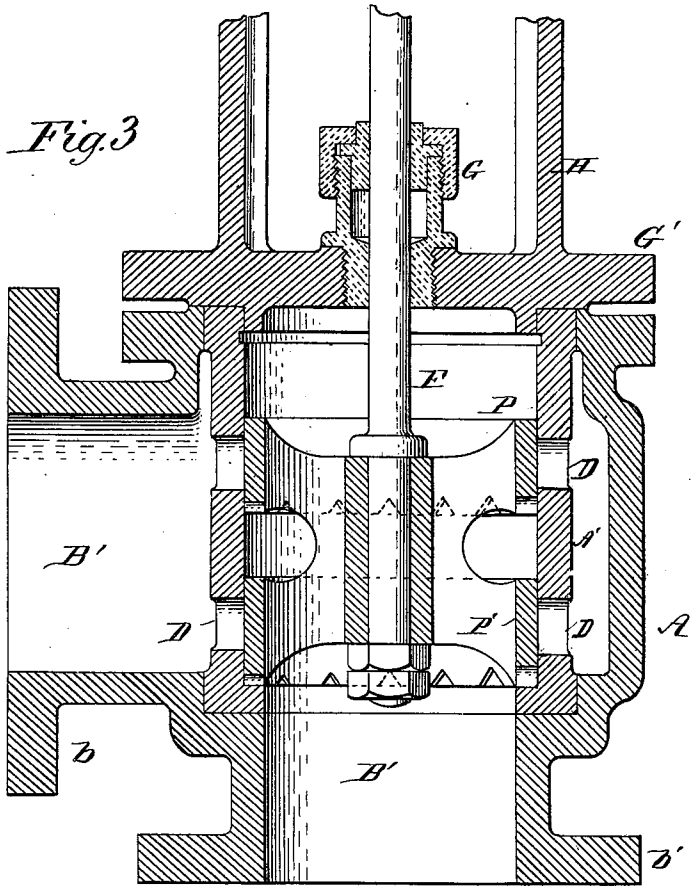
Fig. 3



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UNITED STATES PATENT OFFICE.

AUGUST SNYDER, OF ALLEGHENY, PENNSYLVANIA.

PUMP-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 630,754, dated August 8, 1899.

Application filed November 18, 1897. Serial No. 659,001. (No model.)

To all whom it may concern:

Be it known that I, AUGUST SNYDER, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pump-Governors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has relation to pressure governors or regulators for steam-pumps when the latter are employed for the purpose of transmitting hydraulic pressure or power to engines to operate heavy machinery—such as metal shears, punches, &c.—and has for its object the provision of a method and means whereby the regulation of the pump is rendered entirely automatic and its operation governed and controlled by the variations in the resistance of the work to be done. The conditions under which the regulation is effected are that the steam-supply valve to the pump is opened or closed to a greater or less degree according to the requirements of the work, the greater the resistance the more steam supplied to the pump, and vice versa.

The pump, which is of any suitable type, is provided with a hollow reciprocating throttle-valve having ports which under a full head of steam register with other ports in a surrounding bushing. Accordingly as the valve is moved toward or from this point of full registration and full steam-head the ports are enlarged or diminished in area, and this enlarged or diminished area is controlled by the increase or decrease of back-water pressure upon a plunger or piston attached to the valve-stem and working in a box or cylinder, into which enters a branch pipe from the pump connection or water-supply. When the resistance of the work is beyond the capacity of the pump under a given steam-supply less than the maximum, the hydraulic pressure acts upon the regulating piston or plunger attached to the valve and further opening the valve enlarges the steam-supply. When the resistance decreases and the hydraulic pressure of water upon the plunger is relieved, a spring operates to correspondingly close the valve and to diminish the supply of steam to the pump. When the machinery operated by the pump is doing no work, the steam-supply to the pump is just sufficient to keep it in available operation, and the pump cannot run beyond the limits of safety. Its effective working operations are automatically controlled and regulated by the work which it has to do, the regulating mechanism being highly sensitive to and quick acting under any variation in the resistance of the work.

The invention herein disclosed consists in the method and means hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a central vertical sectional view of my improved regulator. Fig. 2 is a side elevation of the same. Fig. 3 is a central vertical section of a modified form.

A designates the valve-chest, having on one side the steam-inlet B and at its lower end the steam-outlet B′, leading to the pump, with the usual connecting-flanges *b b′*. To the interior of this chest is fitted a vertical cylindrical bushing C, having several rows of holes D in horizontal and vertical series, their aggregate area being equal to the area of the steam-inlet, so that a full head or supply of steam may pass through such bushing when its holes are fully uncovered. Within this bushing is arranged the steam-valve E, consisting of a hollow cylinder having a central hub E′, supported by webs or spokes E^2 and bored to receive the valve-stem F, which passes through a stuffing-box G, secured by screwing into the casing-head G′. The valve E is also formed with holes D′, corresponding in number, shape, and area to the holes in the bushing C and adapted to register with the latter when the valve is at the middle point of its stroke, at which point a full head of steam will pass through both bushing and valve to the pump. The stroke or play of the valve is limited in its upward movement by the flange *h* of the casing-head G′ and in its downward movement by the internal shoulder or abutment *h′*, inside the valve-casing below the steam-inlet.

The bushing C is surrounded by an annular space A′ in the valve-chest with which the steam-inlet is in communication.

Cast upon or attached to the head of the valve-casing is a two-limbed pedestal H, the

limbs of which unite at the top to form a head H′, which is recessed for the reception of a spiral spring H^2, which rests upon a horizontal cross-piece or yoke I, into which the upper end of the valve-rod is screwed. Above said recessed head portion of the pedestal H is provided a cylinder K, having at one side a small port *k*, to which is connected a pipe leading from the water-chamber of the pump. Within this cylinder K is arranged a plunger or piston *k*′, which rises through the screw-head L of the cylinder and is attached at its upper end to a yoke M, corresponding to the yoke I, and connected to the latter by vertical side rods N N, which slide through brackets O O, formed on opposite sides, respectively, of the pedestal-head H′. These rods are threaded between their ends and jam-nuts applied above the brackets O O, limiting the downward movement of the slide, of which the rods are part.

The operation of the regulator will be readily understood. In the position of the parts shown in the drawings the steam-ports through the valve and its surrounding bushing are partially opened and at the point of minimum supply of steam to the pump, as when the pump is simply running without doing any work, and the pumped water instead of going to the working cylinder is allowed to waste. Now when the hydraulic piston of the shears or other machinery starts to work and the shears or other device meets with the resistance of its work, as in cutting through metal, the hydraulic pressure being insufficient to move the piston accumulates within the pump and its connections and acts upon the piston or plunger *k* of the regulator, causing it to rise and lift the steam-valve until by the increase in the flow of steam through the enlarging ports in the valve and its surrounding bushing the pump gains power and does effective work, the resistance of the work being overcome. When a full head of steam is required, the valve-ports enlarge to their full capacity. Under a less requirement the ports open to meet the demands of the pump. When the work is through or the resistance diminishes, the valve being relieved from the effect of the hydraulic pressure from the pump is caused to descend by the action of the spring H^2.

In case the hydraulic pressure becomes excessive, tending to raise the valve beyond the point of full steam-supply, the ports begin to close, and thus shut off the supply of steam to the pump, thus arresting the accumulation of back pressure and preventing the injurious consequences which might otherwise ensue. Thus the regulation of steam-supply is double acting and the operation of the pump kept within effective and safe limits under all contingencies.

In Fig. 3 of the drawings I have shown a valve of a single-acting character. Such valve instead of being formed with round holes similar to those in the surrounding bushing is composed of two rings P and P′, having $\wedge$-shaped notches in their lower edges, which notches may be of like or varying area. As the valve is raised or lowered under increase or decrease of pressure these notches uncover or cover the holes in the bushing gradually to prevent shock and jar on the pump. The other structural features of the regulator shown in Fig. 3 are substantially the same as in Figs. 1 and 2.

Having thus described my invention, what I claim is—

In a pressure-governor, the combination of a steam-valve and an automatic regulator connected therewith, said regulator comprising a plunger, a cylinder in which said plunger works, a spring, against the upper end of which said cylinder abuts, a branch water-supply pipe leading into said cylinder, from the water-pressure system of the pump, a yoke upon which said spring rests, a corresponding yoke above the cylinder, to which the piston is attached, side rods connecting the two yokes, and brackets formed on the cylinder-castings, through which the rods play, the parts being so arranged that the plunger and valve will move under the force of the hydraulic pressure and admit steam to the engine-cylinder proportionate to the amount of such pressure.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUST SNYDER.

Witnesses:
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