

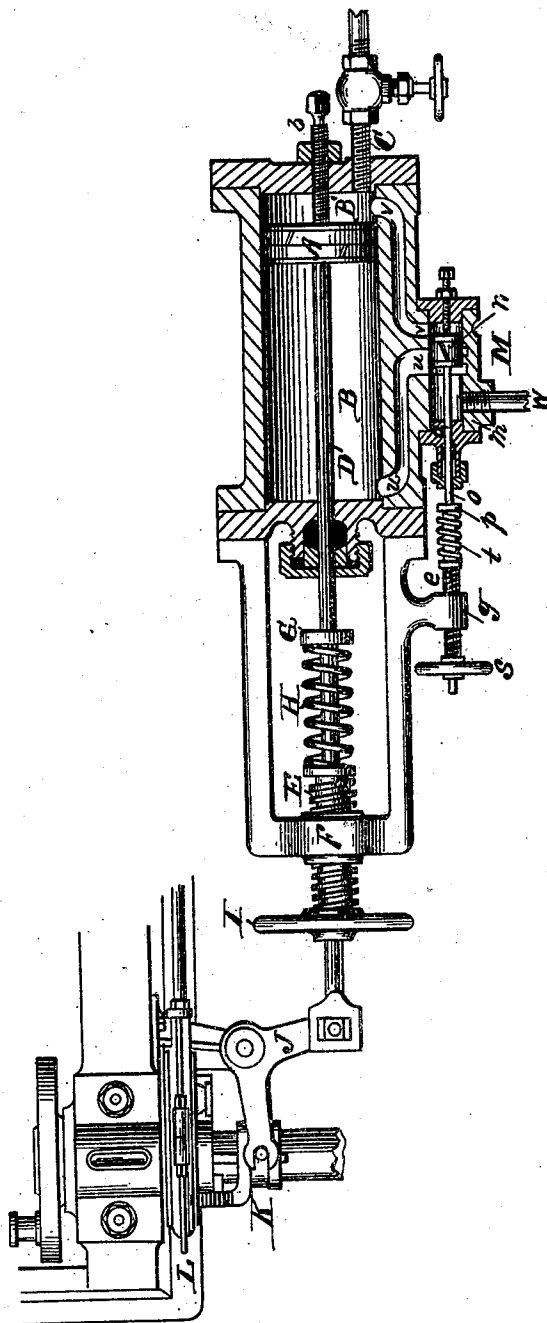
(No Model.)

E. AUSTIN.

PRESSURE REGULATOR FOR PUMPING ENGINES.

No. 503,068.

Patented Aug. 8, 1893.



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PRESSURE-REGULATOR FOR PUMPING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 503,068, dated August 8, 1893.

Application filed July 13, 1892. Serial No. 439,863. (No model.)

To all whom it may concern:

Be it known that I, EUGENE AUSTIN, a citizen of the United States, residing at Detroit, county of Wayne, and State of Michigan, have
5 invented a certain new and useful Improvement in Pressure-Regulators for Pumping-Engines; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the
10 art to which it pertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

The object of my invention is to provide a
15 simple and effective mechanism for controlling the admission of steam to an engine employed in pumping water, compressing air, &c., whereby the pressure resulting from the operation of the pump is made to vary the
20 point of cut off, so that when pumping against light pressure the cut off will occur early in the stroke and but little steam will be admitted to the cylinder, the cut off occurring later as the pressure and load upon the engine
25 increases until a certain regulatable degree of pressure is reached, after which further increase of pressure is prevented by the cut off diminishing the admission of steam, and so checking the motion of the engine. The
30 operation desired is such that the consumption of steam will be automatically adapted to the work done, increase of pressure beyond a certain pre-determined amount prevented, and if a break in the pipes should occur,
35 causing the pressure to fall below a certain amount, the admission of steam will be at once diminished, so that the engine cannot "run away" but will run very slowly or altogether stop. The intention is to prevent
40 injuring the pipes, &c., by over pressure, and to prevent damage by the discharge continuing through a broken pipe, should such an accident occur.

To accomplish these ends my invention consists in the combination of a cylinder containing a piston operated by the pressure produced by pumping with mechanism for shifting an eccentric on the shaft of the engine, or operating a link or other known means of

varying the point of cut off, and also in the
50 combination with such cylinder and piston of a pressure valve whereby the operation of such piston is regulated and controlled.

The accompanying drawing represents a
55 plan view, partly in section, of my regulating device arranged to control a shifting eccentric on an engine shaft, which may operate a slide valve, or an independent cut off valve for the distribution of steam in the cylinder
60 of the engine.

Letter A, designates a piston contained in a cylinder, B, which is connected by means of a pipe, C, to the water main or reservoir. The piston rod, D, passes through a threaded
65 sleeve E, and yoke F, and has on it a collar G, whereon an adjustable pressure may be brought to bear by means of the spring H, when compressed by the sleeve E, turned by the hand wheel I. The end of the piston rod is connected with the bell crank J, which
70 operates the sliding collar K, on the engine shaft, which by a rack and pinion movement shifts the eccentric I. Or the piston rod may be connected by any suitable means with a
75 link valve gear or any other convenient means of changing the point of the cut off. Pressure admitted by the pipe C, against the piston causes it to move and vary the cut off in one direction; the elasticity of the spring shifts it in the other direction, when the
80 pressure diminishes.

It is obvious that if the arrangement be such that the cut off will occur when the piston is at what we may call the end of the cylinder, (marked B') where the pipe C, enters,
85 any pressure admitted sufficient to compress the spring will move the piston and valve gear so as to hasten the cut off and admit less steam to the engine, and that this alone would prevent the pressure rising above any
90 desired amount, determined by the compression put upon the spring, H, by means of the hand wheel, I, and sleeve, E. This, without any further elaboration would be a useful device,
95 but so arranged it would be necessary to have some additional means of restraining the motion of the engine, since diminution of the pressure would cause the cut off to occur later,

admit more steam and render the engine liable to attain too high a rate of speed. I prefer, therefore, to so arrange the device that when the piston is at the water end, B', of the cylinder, the valve gear will be in the position to give an early cut off, and increase of pressure will move the piston and valve gear in the direction of later cut off, so that the power of the engine will be made to increase in proportion to the load, and to provide an additional device for limiting the attainable pressure, and for slowing or stopping the engine in case of accident. Such a device is the pressure valve M, shown in the drawing attached to the cylinder B. It consists of a cylindrical seat or casing *m*, containing a piston, *n*, with its rod, *o*, having a collar, *p*, and passing through a threaded bracket, *g*, sleeve, *e*, hand wheel, *s*, and spring, *t*. Passages *u*, and *v*, connect the valve with the ends of the cylinder B, B', and a passage, *w*, connects with a waste pipe. When the valve is in the position shown, there is no communication between the ends B and B' of the cylinder, but the inner end B, is connected with the waste pipe.

My invention as now described operates as follows:—Pressure from the main or reservoir acting against the piston A, tends to move it in opposition to the spring, H, in the direction to adjust the cut off for greater admission of steam as the pressure increases, and the strength of the spring may be so adjusted that the admission will be in direct ratio to the pressure, which will cause the speed of the engine to be perfectly adapted to the amount of work it is performing. So long as the pressure in the cylinder B, does not reach an amount sufficient to overcome the valve spring, *t*, the valve *n*, will remain in the position shown. But should the pressure exceed that amount, the valve *n*, will move, cutting off connection with the waste pipe, and establishing a communication between the ends of the cylinder B, B' thus tending to equalize the pressure on the opposite sides of the piston A. The force of the spring H, being then less resisted, will at once move back the piston, A, and hasten the cut off, thus checking the motion of the engine, until the pressure falls enough to allow the valve, *n*, to again cut off communication between the ends of the cylinder B, B', and restore the difference of pressure on the piston, A, which again controls the adjustment of the cut off. Practically these events will succeed each other imperceptibly, the valve *n*, as soon as the prescribed limit of pressure is reached, taking such a position as to maintain the requisite difference of pressure on the sides of piston A, to keep the pressure in the main and the motion of the engine uniform, yet yielding sensitively to the slightest change of conditions. Should a break occur in the main, so that the pressure falls below that required

to balance the initial strength of the spring H, the cut off will at once be adjusted and thereby to the earliest point permitted (this being regulated by the stop-screw *b*), so that the engine will slow down to a stop.

My invention is also appreciable to direct acting pumping engines, commonly called "steam pumps" in which case the piston rod D, is so connected as to operate a throttle valve in the steam supply pipe.

The invention described is a very simple, inexpensive and efficient device for accomplishing the purposes intended.

I do not claim broadly the principle of controlling a pumping engine by means of the pressure it produces, nor of controlling thereby the operation of a centrifugal or other, speed governor, nor of utilizing such pressure to throw into action some mechanism whereby the engine is made to operate a valve to vary the admission of steam, nor of simply connecting a pressure gage or equivalent device with the throttle valve of an engine so as to control the admission of steam, as I am aware that many such applications have been made and patented. In all such devices hitherto made the action is such that increase of pressure and consequent duty of the engine diminishes the admission of steam and the capacity of the engine to do its work, while a sudden fall of pressure causes a large increase in the admission of steam and a violent increase in the speed of the engines. My invention, on the other hand, operates to increase the admission of steam and the power of the engine in proportion to the increase of the load, so long as the prescribed limit of pressure is not reached, and only when that limit is exceeded to diminish the admission of steam to the extent required.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pressure regulator for pumping engines, a pressure valve in combination with a cylinder and piston connected with the pressure main, and with the cut off mechanism, or the throttle of a steam pumping engine, so arranged that when the pressure rises to any degree determined by the adjustment of the pressure valve, communication shall be opened between the ends of the cylinder on opposite sides of the piston, allowing it to be urged by the spring in a direction to diminish the admission of steam, substantially in the manner and for the purposes described.

2. A pressure regulator for pumping engines, consisting of the piston A, cylinder B, rod D, threaded sleeve E, yoke F, spring H, and pressure valve M, to be connected with the pressure main and with the cut off mechanism or throttle of a steam pumping engine, to operate in the manner and for the purposes substantially as described.

3. In a pressure regulator for pumping engines, a piston in a cylinder connected di-

rectly with the pressure main, an adjustable
spring and the cut-off mechanism or the throt-
tle of a steam engine so arranged as to be
urged by the pressure from the main in a di-
5 rection to increase the admission of steam,
and by the spring in a direction to diminish
the admission of steam, in combination with
means adapted to balance the device when

the prescribed pressure is reached, substan-
tially as described.

In testimony whereof I sign this specifica-
tion in the presence of two witnesses.

EUGENE AUSTIN.

Witnesses:

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