J. Bell,

Steam Engine Governor.

No. 99,751. Patented Feb. 15. 1870.

Fig: 1.

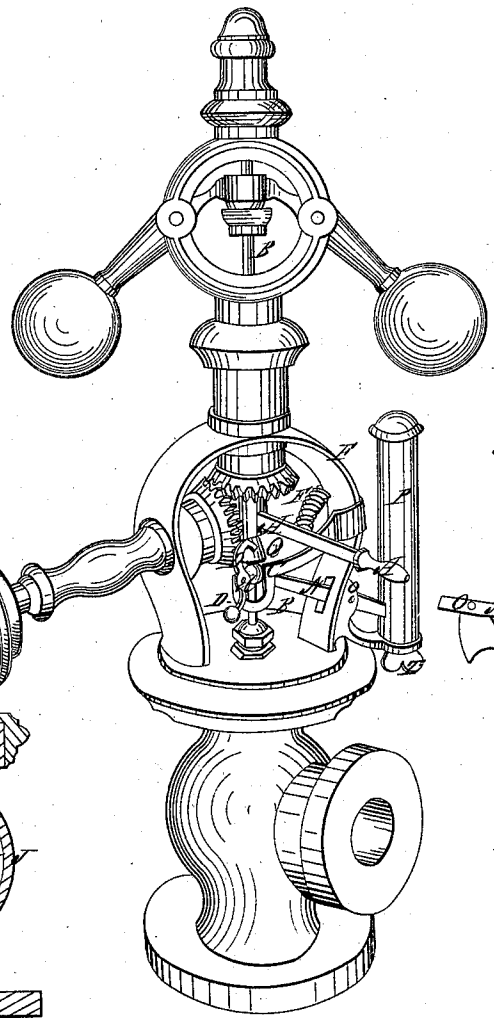


Fig: 3.

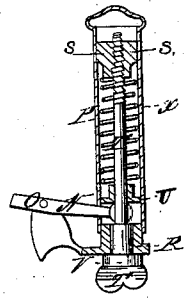
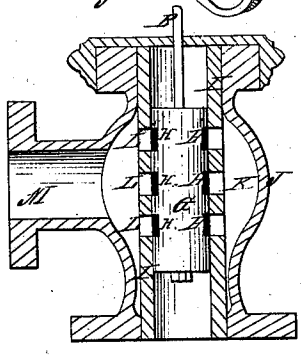


Fig: 2.



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Letters Patent No. 99,751, *dated February* 15, 1870; *antedated January* 29, 1870.

IMPROVEMENT IN GOVERNORS FOR STEAM AND OTHER ENGINERY.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOSEPH BELL, of Cincinnati, in the county of Hamilton, and State of Ohio, have invented a certain new and useful Improvement in Governors for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making part of this specification, in which—

Figure I is a perspective view of my improved governor.

Figure II is a vertical section of the lower part of the governor, showing the arrangement of the valve.

Figure III is a vertical section of P and its connections, Fig. I.

Prior to the date of my invention many governors for steam-engines have been devised and applied to use. In some of these the number of revolutions desired to be made per minute by the crank-shaft of the engine was regulated by the diameter of the pulley on the crank-shaft and a pulley which operates the governor.

In other governors the number of revolutions desired to be made had been regulated by means of a lever, pivoted at a convenient point to allow one end of said lever to be connected to the stem which operates the governing-valve, and the other end of said lever extending beyond the governor, and having a movable weight arranged to slide back and forth, thus increasing or decreasing the amount of resistance the governor-balls had to contend with, and by this means regulating the revolutions of the crank-shaft.

The objects of my invention are to obviate the difficulties incident to working the old governor, retaining at the same time its good features, and consists—

First, in mechanism for preventing the engine from running very rapidly in case the belt driving the governor should break or slip off.

Second, in mechanism for regulating the number of revolutions of the crank-shaft of an engine which is intended to be made per minute.

In order that others skilled in the art to which my invention appertains may understand the same, I will proceed to describe its construction and mode of operation.

A is an arm, attached permanently to a valve-stem, B, said valve-stem B having both a sliding and rotating motion, as hereinafter more fully described.

C is a brace, fastened permanently to the frame F of the governor-stand, and over which the handle A slides.

D is a weighted pawl, pivoted at *d*.

E is a spiral spring, connecting the arm A and frame F.

G is a hollow cylindrical balance-valve, to govern the admission of steam to the engine.

H H H are ports or apertures through which the steam passes on its way to the engine.

I is a bush or cylinder, which is fitted permanently into the hollow globe J.

L L L are apertures or ports in the bush or cylinder I, through which the steam passes to come in contact with the valve G.

K is a chamber surrounding the bush I, and receives the steam, through the pipe M, from the boiler.

N, Figs. I and II, is a lever, pivoted at O.

P is a cylinder, which fits nicely over a collar, R, and so constructed as to slide on said collar.

S is a nut, fastened permanently into the cylinder P.

T is a thumb-screw, which works in the nut S, and has a collar, V, larger than the diameter of the hole in R on its lower end, which collar V plays against the lower bearing of R.

X is a spiral spring, which envelopes the thumb-screw T, the upper end of which bears against the nut S.

U is a collar which sets over the end of the lever N, and slides easily up and down the interior of the cylinder P, and against which the lower end of the spiral spring X rests.

Q is a cone-shaped collar, permanently fastened to the stem B, the apex of which fits snugly in a cavity in the shoulder of the handle A.

The operation of the governor is as follows:

When the engine is to be started the handle A is shipped or pulled over until it engages with the weighted pawl D, the valve G, being permanently attached to the stem B by means of an open frame on the lower end of G, will turn with the handle A. When the handle A is in a position to be caught by the weighted pawl D, and just above a slot in the brace C, the ports H H H will be on a vertical line with those in the cylinder I. When the engine is started the balls of the governor will fly out from centrifugal action, and being connected with the stem B will depress the arm A, and thus cause it to enter a slot in the frame C; the weighted pawl D then drops out of way, and assumes the position shown in Fig. I.

The steam entering the globe J surrounds the cylinder I and enters the apertures L L L, and comes in contact with the valve G as the action of the governor-balls raises or lowers the valve G. The openings formed by the ports H H H and L L L are increased or diminished according to the pressure of steam admitted, or the different degrees of resistance the engine contends with, thus forming a simple and efficient governor.

But if the belt which drives the governor should break or slip off the pulleys, the balls dropping from force of gravity would open the ports, admitting steam to the engine to their widest capacity; but as the balls drop, the arm A is raised out of the slot in the brace

C, and the tension of the spiral spring E draws said arm around until it comes in contact with a shoulder on the brace C, and just far enough to place the ports in the valve G against the blank surface of the cylinder I, thus preventing the steam from entering the engine, thereby stopping it; or the spring and arm may be so arranged as to leave the valve-ports in G sufficiently open to barely run the engine.

I will now describe my improved mechanism for preventing the engine from running away in case the belt which connects the crank-shaft with the governor should happen to break or slip off.

In the drawing, Fig. I, the end of the lever N is made to surround the stem B, and its upper surface bears against the cone Q. This lever is pivoted at O, the other end entering a slot in the cylinder P, and surrounds the thumb-screw T, its upper side bearing against the flange U, as clearly shown in Fig. III. By turning the thumb-screw in the proper direction the cylinder P is made to slide over the flange R, thus compressing the spring X, which, being connected to the flange U, creates a pressure against the end of the lever N, which communicates said pressure to the end of the lever N, connected with the stem B, thus causing the governor-balls to contend with a greater pressure as the thumb-screw is tightened; and the governor-balls not raising as high as when the pressure is removed, would open the ports of the valve G and cylinder I, admitting steam to the engine, wider, and cause the crank-shaft of the engine to make more revolutions per minute than if the pressure were removed. By thus turning the thumb-screw, compressing or distending the spiral spring, a greater or lesser number of revolutions of the crank-shaft per minute can be made with the greatest facility and accuracy while the engine is running.

Having thus described my invention,

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

1. The combination of the handle A and spring E, as described.

2. The combination of the handle A, spring E, and weighted pawl D, as described.

3. The lever N, receiving its power from a spring, X, as described.

4. The combination of the screw T, nut S, spring X, and lever N, as described.

5. The brace C, having the slot described for the handle A to move in, in combination with the handle A and pawl D, as described.

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Witnesses:

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