2 Sheets--Sheet 1.

ROBERT SANDERSON.

Improvement in Steam-Valves and Governors.

No. 114,865. Patented May 16, 1871.

Fig. 1.

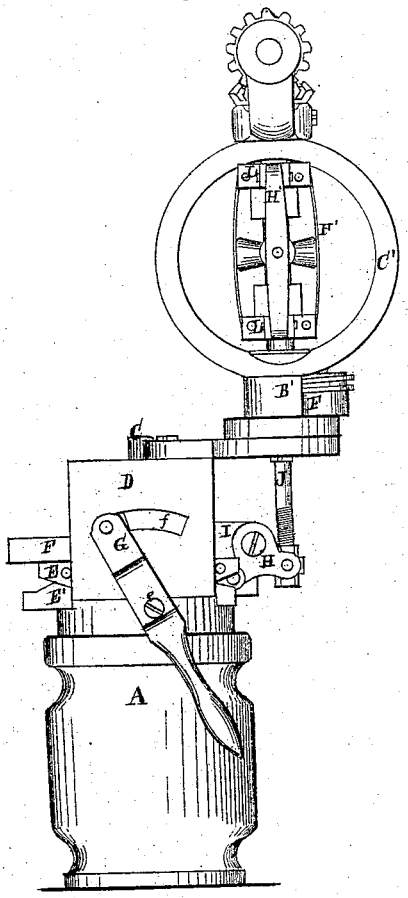


Fig. 2.

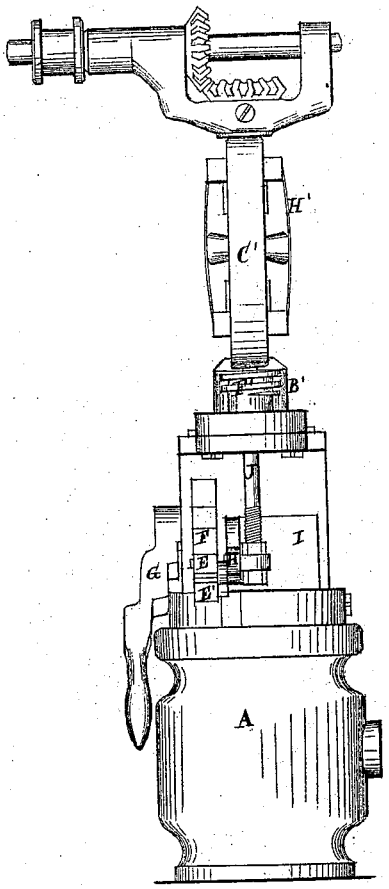
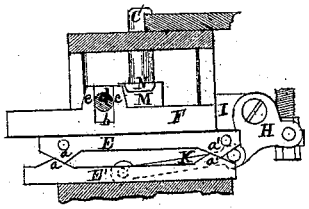


Fig. 3.



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2 Sheets--Sheet 2.

ROBERT SANDERSON.

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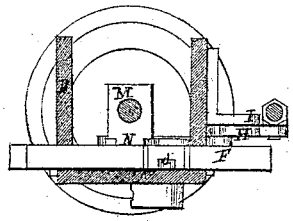
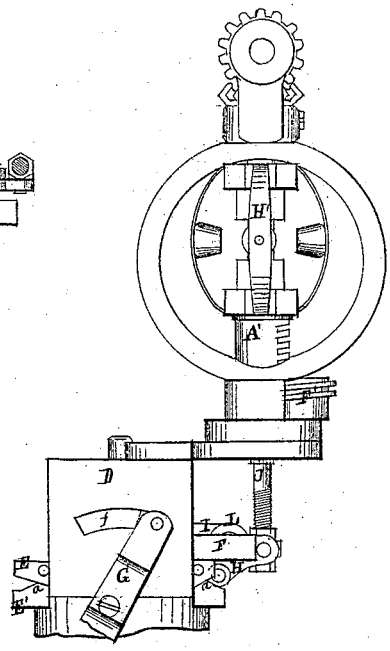
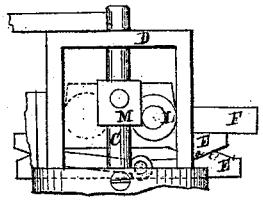
Fig, 4.



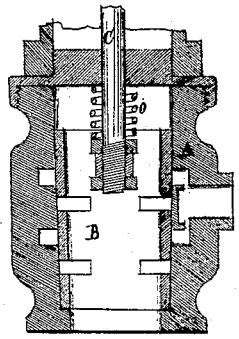
Fig, 5.



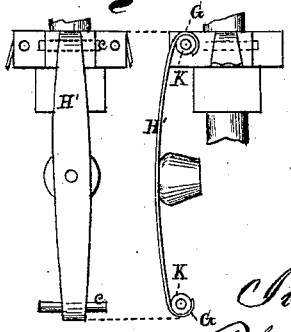
Fig, 6.



Fig, 7.



Fig, 8.



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ROBERT SANDERSON, OF CLEVELAND, OHIO.

Letters Patent No. 114,865, dated May 16, 1871.

IMPROVEMENT IN STEAM-VALVES AND GOVERNORS.

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, ROBERT SANDERSON, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Steam-Valve and Governor; and I do hereby declare that the following is a full and complete description of the same, reference being had to the annexed specification and the drawing making a part of the same.

Figures 1 and 2 are side elevations of the cut-off valve and governor while said governor is down.

Figure 3 is a detached section.

Figure 4 is also a detached section.

Figure 5 is also a side elevation, showing the governor expanded.

Figure 6 is a detached section.

Figure 7 is a transverse vertical section of the valve and valve-seat.

Figure 8 is a detached section.

Like letters of reference denote like parts in the different views.

The first part of my invention relates to the manner of operating a steam-engine cut-off valve, and which is done by means of slides having angular lugs on the faces thereof, and which are made to operate one upon the other by a bell-crank, whereby one of said slides is attached to and actuated by the governor for operating the valve referred to.

The second part of my invention relates to a worm-wheel and ratchet, whereby the valve can be operated by hand for starting or stopping the engine.

The third part of my invention relates to the peculiar manner of connecting the ball-springs of the governor to the fixed and active heads of said governor, so that the connections shall have a free-and-easy movement on friction-rollers placed on the pivoted pins of the joints, whereby the ends of the springs are attached to the heads, all of which is hereinafter more fully described and set forth.

In fig. 7, plate 2—

A represents the valve-seat or chamber, and

B the valve, of which C is the stem whereby the valve is lifted.

To the upper side of said valve-chamber is secured a case, D, figs. 1 and 2, plate 1, vertically through which and the top thereof passes the valve-stem C, as shown in fig. 6. Said top serves as a support and guide for the movement of the stem.

E E, fig. 3, are a pair of slides projected through said case close to one side, slots, G, fig. 2, being made in the sides of the case for their passage. A more complete view of said slides and their relative position to each other is shown in fig. 3, in which it will be seen that each slide is alike provided with two angular or V-shaped lugs, *a a*, one at each end, as shown, and which act reciprocally upon each other, as and for a purpose hereinafter described.

Resting upon the upper side of the slide E is a straight smooth bar or slide, F, in the middle of which is a deep rectangular notch, *b*, formed partially in the slide and above the slide by the studs *c*.

Inserted loosely in said slot is a pin, *d*, projecting from the end of the lever G, fig. 1, through the slot *f* in the side of the case.

Said lever G is pivoted at the point *e* to the case, the use of which will presently be shown.

H, figs. 1 and 3, is a bell-crank or lever pivoted to a stay, I, attached to the side of the case.

One arm of said crank is pivoted to the end of the stem J of the governor, whereas the other arm is connected to the slide E', referred to, by the intervention of a link, K, fig. 3, and whereby said slide is made to operate reciprocally upon the face of the companion-slide E by the movement of the governor, as will hereinafter be described.

To the inner side of the slide F above described is pivoted a friction-roller, L, fig. 6, whereby the valve B is lifted by means of its stem C.

To said stem is secured a collar, M, fig. 6, from the side of which projects a lip, N, fig. 3, under which the roller plies as the slide may be operated by the vibration of the lever G, thereby lifting the valve for a purpose presently shown.

The practical operation of the above slides, bell-crank, &c., for actuating the valve is as follows:

To the lower end of the lever G is connected the eccentric-rod of the engine, whereby the lever is made to vibrate alternately from the position shown in fig. 1 to that shown in fig. 5. This vibration of the lever actuates the slide F, which, as it passes from the position shown in fig. 3 to that shown in fig. 6, brings the friction-roller L pivoted to it under the projecting lip N, which will lift the stem C and open the valve thereto attached, but which is immediately closed or shut down by a spring, O, fig. 7, when the roller passes from under the lip, but is again raised on the reaction of the slide by the eccentric and again shut down by the spring immediately the roller passes from under the lip. By this means the valve is alternately opened by the eccentric and closed by the spring, thereby admitting and cutting off the steam from the cylinder, more or less, according to the length of the stroke or lift the valve may have.

The length of the stroke or lift of the valve is regulated by the two slides E E when actuated by the movement of the governor—thus: the position of the governor, as shown in fig. 1, is such as to give the shortest length to the stroke or lift of the valve, for

the reason that the stem J of the governor is down to its greatest length, thereby pushing the slide E', by means of the bell-crank or lever, back through the case D, and thus bring the contact of the lugs *a* of the slides back from the apex of their angle or their extreme points of contact, as shown in fig. 1, so that the inclines of the lugs lie upon each other, thereby bringing the slides closer together, the result of which will be to allow the slide F to descend and thereby bring the roller nearer the center of the vibration of the lever G, which, as a consequence, will act less extendedly upon the valve, so that the induction parts will not be closed as much, and therefore allow more steam into the cylinder, as it may run low in the boiler.

As an increase of steam produces an increased activity of the engine the governor consequently expands, and in so doing draws upward the outer arm of the bell-crank or lever H, which will draw forward the slide E', thereby bringing the inclines of the lugs *a* more directly upon each other, or their points of elevation nearer together, as indicated by the dotted lines *f*, fig. 3, the result of which will be to push upward the slide F and bring the roller L nearer to the end of the lever G, thereby giving more lift to the valve, which will cause it to cover more fully the steam-ports, and thus shut off the excess of steam from the cylinder, and, per contra, as the steam runs low the governor contracts and thereby pushes back the slide E', allowing the inclines of the slides to slide down upon each other to the position they hold, as shown in fig. 1. This movement of the slides lowers the slide F, bringing the wheel L nearer the fulcrum of the lever G, thereby shortening the throw of the slide, so that the valve-stem C will not be lifted so high, and therefore the steam-ports are less covered by the valve; hence more steam is admitted to the cylinder than when the stem and valve are raised by the elevation of the slides, as above described.

The second part of my invention relates to the manner of operating the valve by hand, when required, to start or stop the engine, and which is as follows:

A', fig. 2, is a sleeve fitted loosely to the stem J and to the inside of the neck B' of the governor-frame C'.

In the side of said sleeve are cut ratchet-teeth D', fig. 5, in which is made to engage the worm of the nut F', as shown in figs. 1 and 2. Now, on turning the nut in the proper direction, the sleeve A' will be screwed upward, thereby elevating the lower end of the governor, which will carry upward the stem J, and thus cause the bell-crank H to draw on the slide E' and elevate the slide F and extend the stroke or lift of the valve to the extent that it shall cover the steam-ports, if need be, and thus shut off the steam and stop the engine, but which may again be started by reversing the movement of the nut.

The third part of my invention relates to the manner of attaching the springs of the governor to the heads or collars thereof, and which is as follows:

Each end of the springs H' is so bent as to form an eye, G', as shown in fig. 8.

In said eye is inserted a roller, K', loosely fitted to the pin *c*, and on which it turns.

The ends of the springs embracing the rollers are placed in the notches of the collars L, and which are therein retained by inserting a pin, *c*, through the cheeks of the notches and through the roller, as shown.

By this means is made a simple and secure attachment of the springs to the collars, which allows the springs to swell out by the rapid revolution of the governor much more readily and easily than when connected to the collars by a hinged joint in the ordinary way; hence, the governor becomes more sensitive to a variable pressure of steam, and will, therefore, actuate the valve more immediately and effectually than when the springs are attached to the collars of the governor in the usual way.

The throw or lift of the valve, irrespective of its actuation by the governor, is determined by the position that the collar M, fig. 6, may have on the valve-rod C. Thus, the lower the collar may be on the rod, the nearer the lip N, fig. 3, thereon, will be to the friction-wheel L; therefore, the valve will be actuated more extendedly than when the collar is fixed to the rod further from the wheel. Said collar is secured to the rod by a set-screw; hence it can be easily secured to any point on the rod that may be desired for the lift of the valve.

Claims.

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

1. The slides E, E', and F, as constructed and arranged to operate in relation to each other and in combination with the valve-rod C, substantially in the manner as and for the purpose set forth.

2. The combination of the bell-crank H, slide E, and governor-stem or rod J, in the manner as and for the purpose specified.

3. The adjustable collar M, provided with a lip, N, in combination with the valve-stem C and friction-whee, or roller L, substantially in the manner as described and for the purpose set forth.

4. The thimble or sleeve A' and nut F', as arranged in combination with the governor-stem J and governor, in the manner as described, and for the purpose set forth.

5. The springs H, when constructed with an eye or hook, G, at each end, and a friction-roller, K, in combination with the collars L, in the manner as and for the purpose specified.

ROB. SANDERSON.

Witnesses:
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D. L. HUMPHREY.