2 Sheets—Sheet 1.

C. NEER.

GOVERNOR ATTACHMENT.

No. 181,096. Patented Aug. 15, 1876.

Fig. 4.

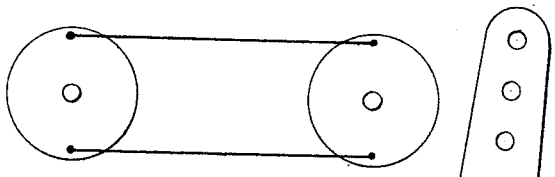
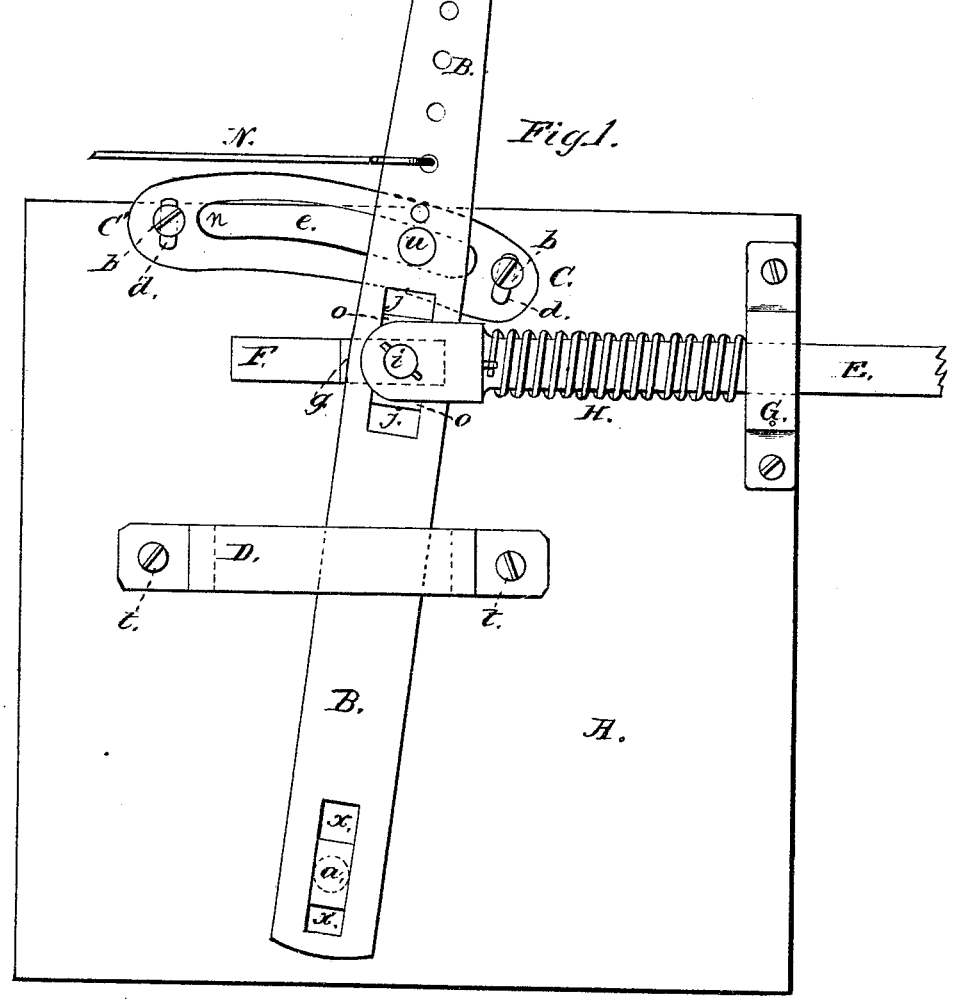


Fig. 1.



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2 Sheets—Sheet 2.

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GOVERNOR ATTACHMENT.

No. 181,096. Patented Aug. 15, 1876.

Fig. 2.

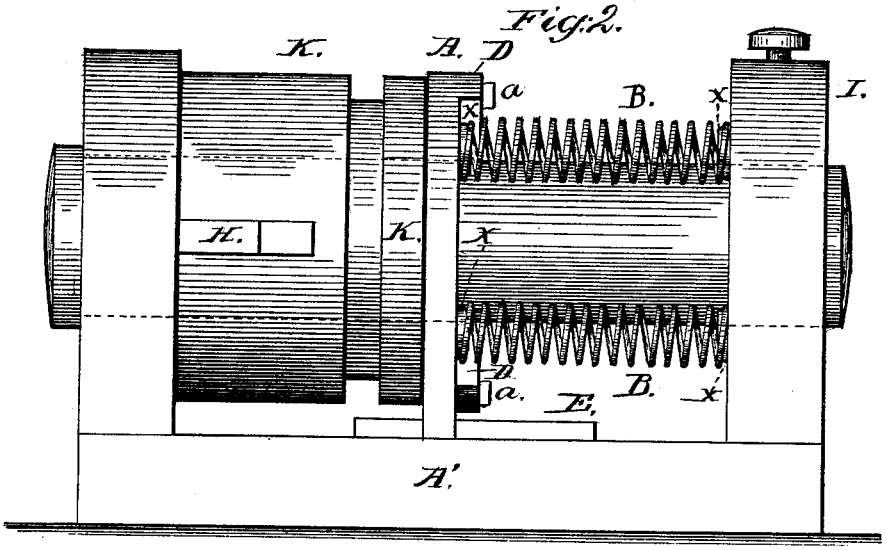
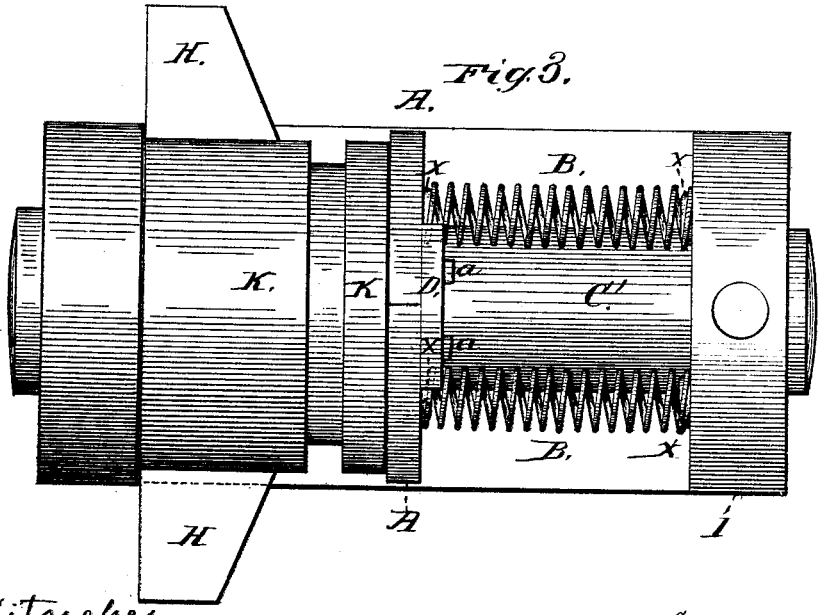


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES NEER, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN GOVERNOR ATTACHMENTS.

Specification forming part of Letters Patent No. **181,096**, dated August 15, 1876; application filed June 5, 1876.

To all whom it may concern:

Be it known that I, CHARLES NEER, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Governors or Regulators for Machinery propelled by Steam, Water, or other Motive Power, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The device set forth in this specification is principally designed to render more perfect the operation of my controlling and regulating apparatus for machinery propelled by steam, water, or other motive power, for which I obtained a patent from the United States Patent Office dated the 11th day of April, 1876, and numbered 175,839; but it may be used in connection with other forms of governors or regulators.

The object of my improvement herein set forth is to remedy any possible defect that might occur in the motion of the devices which operate the valves or devices regulating the amount of steam or other motive power admitted to the primary driving machine or engine.

By reference to my patent above referred to it will be seen that the coiled springs F, which are interposed between the studs E of the disks D and D′, cannot press against the studs of the disk D at right angles with a radial line from the center of the disk to the faces of the said studs, but said pressure will be on a line less than a right angle with said radial lines, and consequently said pressure will be exerted to a considerable extent centrifugally, and therefore cannot exert its full force in the line of motion of the studs E of the disk D; and as the springs F are being more and more compressed by increased resistance their pressure on the studs E of the disk D will be less and less centrifugal, because of the lessening of the distance between the studs E of the two disks. Thus a slight want of correspondence between the resistance of the machinery driven by the disk D and the motion of the devices operating the valve or device for regulating the supply of steam or other motive power admitted to the primary driving-machine is produced.

In order to remedy the defect above mentioned, I construct an apparatus shown in Figure 1 of this specification, where A is a suitable frame or support, made in any desirable form and of any suitable metal, to which is attached the lever B by means of the oscillating fulcrum-pin *a*, the tenon of which is round, and passes through and oscillates in a suitable hole in the frame or support A; but the part seen at *a*, which works in the slot *x* in the lever B, may be square or oblong, as seen in Fig. 1. This slot is made long enough to allow the lever B to slide up and down on the oblong part of the said fulcrum-pin *a*. On the frame A, and under the lever B, is placed a guide-piece, one end of which is marked *c* and the other end *c′*, and it is secured to the frame A by the screws *b b*, which pass through slots *d d* and into the frame A. These slots are for the purpose of allowing the guide-piece to be adjusted to any desired position by raising or depressing either end. In this guide piece *c c′* is a groove or mortise, *e*, which is in the form of a segment of a circle in radius about equal to its distance from the fulcrum-pin *a*, on which the lever B oscillates. This guide-piece is so placed on the frame A that its slot or mortise *e* will be somewhat farther from the fulcrum-pin *a* of the lever B at its end marked *n* than it is at the other end. In said lever, and in a suitable place to pass into the slot *e* of the guide *c c′*, is rigidly placed a pin, *u*, the inner end of which works neatly and freely therein as the lever B oscillates from side to side. This pin *u* and slot *e* will therefore regulate the endwise motion of the lever, causing it to slide up on its fulcrum-pin *a* as it moves with its pin *u* toward the end of the slot marked *n*. Thus it will be lengthening its leverage as it moves toward *n*, and shortening the same as it moves in the opposite direction.

Now, as it is desirable to have the rod E, which connects with the valve or device to regulate the admission of the steam, water, or other motive power to the primary moving engine, to move in the line of its own center, there is formed in the frame or supporting-stand A, exactly opposite the center-line of the rod E, a slot, F, in which works a slide, *g*, on the front end of which is formed a round tenon or pin, *i*, and this pin passes through

the slide-block *o*, which works in the mortise *j* of the lever B, and the inner end of the rod E is made with a head large enough to be slotted or forked, so that it will freely pass over and inclose within its sides or jaws both the lever B and the slide-block *o;* and as the pin *i* of the slide *g*, which passes through the slide-block *o*, passes also through the jaws of the head of the rod E, the latter must, when it moves, move in a line to correspond with the slot F, in which the slide *g* works. At G, Fig 1, is seen a guide-block, through which the rod E works. Around the rod E is coiled a drawing-spring, H, which is designed, when not counteracted, to keep the lever B drawn toward itself as far as it is allowed to come, thus tending to close the valve. At D is represented any convenient and suitable form of a keeper to hold the lever B in its proper place. *t t* are screws securing D to the frame A. It is designed to attach the rod N, Fig. 1 of my patented device above referred to, to the lever B, Fig. 1 of this application, and for this purpose is formed a series of holes seen in the upper end of said lever. This series of holes is to allow the rod N of my patented devices referred to to be attached to any desired point of the lever B, so as to increase or decrease its leverage at pleasure.

This frame or supporting-stand, with its devices, may be placed in any proper and suitable position, and secured in any desirable manner, so that it will operate between the rod N, Fig. 1 of the patent above referred to, and the valve or device for regulating the amount of steam, water, or other power admitted to the primary moving engine.

Now, as before mentioned, there will be a slight lack of correspondence between the pressure of the spring F of the patent issued to me as above mentioned and the motion of the devices for regulating the valve-gearing of the same, in consequence of the fact that the said springs press against the studs E of the disk to be driven, not at right angles with the radial lines from said studs to the center of the disk, but to a certain extent centrifugally, and therefore there is a slight loss of correspondence between the force exerted by the spring and the effect of that force in driving the disk; and as the springs are being more and more compressed by any increase of resistance offered by the disk, it follows that their pressure upon the studs E are correspondingly approaching nearer and nearer to a right angle with the radial lines above mentioned, and it also follows that a given force applied to the springs at the commencement of their compression will not produce the same effect that the same amount of additional force will produce at or near their greatest compression, and therefore the valve-gearing should be so arranged that the valve would be opened in a slightly-decreasing proportional degree as the resistance offered to the machinery was increased, and this is effected by the device represented in Fig. 1 of this application, by the change of leverage which is produced by the adjustment of the guide-piece *c c'*, which controls the degree of leverage of the lever B.

Now, in the drawing this guide-piece is seen with the end *c* depressed and the end *c'* elevated; and it will be seen that as you depress the end at *c* and elevate the end at *c'*, you decrease the relative motion of the rod E in regard to that of the rod N, as the lever oscillates or moves toward the end *c'*, for as it so moves it is clear that the upward endwise motion of the lever, caused by its pin *u* moving toward the elevated end of the slot *e*, will increase the distance from the fulcrum-pin *a*, upon which the lever oscillates, to the point of attachment of the rod N with the same; and as the distance from the said fulcrum-pin *a* to the pin *i*, to which the rod E is attached, remains almost exactly the same, it must follow that the relative motion of the valve-rod E is correspondingly decreased, as compared with the motion of the rod N, for their comparative motions must always correspond with their comparative distances from the fulcrum-pin of the lever B, to which they are attached.

If thought desirable to dispense with the use of the coiled spring H on the rod E of Fig. 1, it may be done by means of two levers or pulleys placed at any convenient distance apart, and then stretching two wires or rods from the one to the other, one of the wires or rods connecting with the lower ends or sides, and the other with the upper ends or sides, of the said levers or pulleys, as seen in Fig. 4, and then connecting the rod N, Fig. 1, of the device patented to me, as before mentioned, with one of these wires or rods at any convenient distance from one end, and the rod N of Fig. 1 of this application to the same wire or rod at any desirable distance from its other end; and as these two rods or wires connecting their respective ends or sides of the levers or pulleys above mentioned serve to keep each other stretched tightly, there can be no lost motion between the two rods N and N above mentioned, and thus the said rods N and N may be a considerable distance from each other without any defect in their operation in consequence of such distance.

In my specification of the governor and indicator, as patented to me as before mentioned, there is described a coiled spring, *v*, on and around the shaft C', which presses backward the grooved collar K toward the disk D', and by that means keeps the bevel ends of the arms H firmly against the cams G of the disk D, Fig. 1. Now, if any accident happen by which this spring *v* should be injured, it might be, in many situations, a very difficult matter to replace it; and in order to avoid that difficulty, I propose, in any case where it might occur, to use, in place of the spring *v* around the shaft, two or more springs, as shown in Figs. 2 and 3 of this specification.

In order to apply the two or more springs above mentioned, I make a collar or ring, A,

forming it in two sections or parts, of such size on its inner edge or circle as to surround the shaft C′, allowing it to revolve freely within the collar or ring without touching it, and its face between its inner and outer circumferences of sufficient width to receive properly the ends of the coiled springs B. The two sections or parts of this collar or ring A, Figs. 2 and 3, are firmly joined and held together by two connecting-pieces, one at the upper and one at the lower part of the ring, as shown at D D D in said figures. Said connecting-pieces are securely bolted to the two sections of the ring, in such a manner as to hold them firmly together, so as to form a complete ring; and in order to prevent this ring from turning with the shaft C′ and collar K, it is made with a groove in its lower edge, which works and moves longitudinally on the rib E, (shown in Fig. 2;) and at a proper distance from this ring or collar is placed a collar or bearing, I, for one end of said springs B to rest against. This collar may be a journal-bearing for the shaft, or it may be any suitable device through which the shaft may pass, and in which it may revolve freely, and it must be of strength and stability sufficient to resist the pressure of the springs B; and on the inner sides of the ring A and bearing I are suitably placed pins X, upon which the ends of the springs are placed, so that they may be held in their proper position. These springs, it will be readily seen, will perform the same office as the spring *v*, which is coiled around the shaft C′, as seen in the case or device patented to me as above mentioned, and they have this important advantage of it, that if any accident happens to them they can be very easily replaced.

Having thus fully described the construction and operation of the invention or improvements herein set forth, what I claim as new, and desire to secure by Letters Patent, is—

1. In a governor or regulator, the lever B, with its mortise *x* and pin *u*, in combination with the guide-piece *c* and *c′*, with its mortise or groove *e*, all as and for the purpose set forth.

2. In a governor or regulator, the lever B, with its mortise *j*, in combination with the slide-block *o*, working in said mortise, the slide-block *g*, working in the mortise F of the frame A, all as shown and described.

3. In a governor or regulator, the lever B, with its mortise *j*, slide-block *o*, working in said mortise, in combination with the slide-block *g*, working in the mortise F of the frame A, and the rod E, connected with the slide-block *g* by the pin *i*, all as and for the purpose set forth.

4. In a governor or regulator, the combination of the drawing-spring H, rod E, and lever B, all substantially as described, and for the purpose set forth.

5. In a governor or regulator, the collar or ring A, made in two sections or pieces, and joined together by the two connecting-pieces D D, in combination with the rib E, on which it slides, all as and for the purpose set forth.

6. In a governor or regulator, the combination of the collar or ring A, the bearing or collar I, and springs B, as seen in Figs. 2 and 3, all as set forth and described, and for the purpose indicated.

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