3 Sheets. Sheet 1.

S. Schofield,

Machine Brake.

No. 77,923. Patented May 12, 1868.

Fig: 1

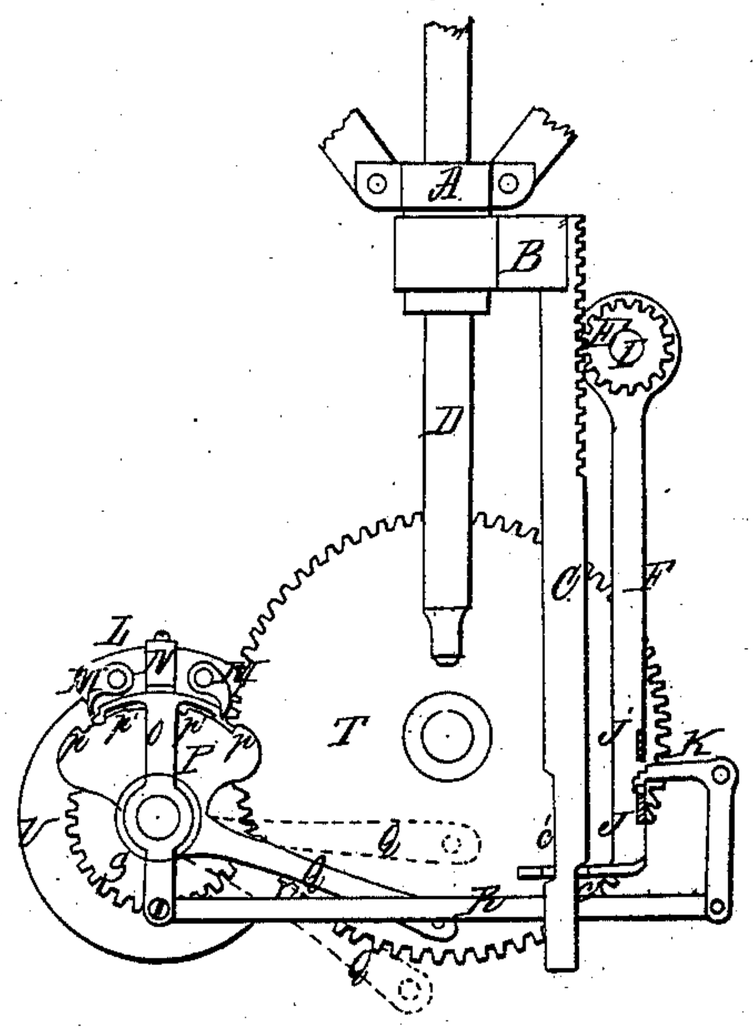


Fig: 4

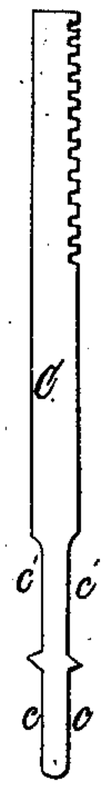


Fig: 2

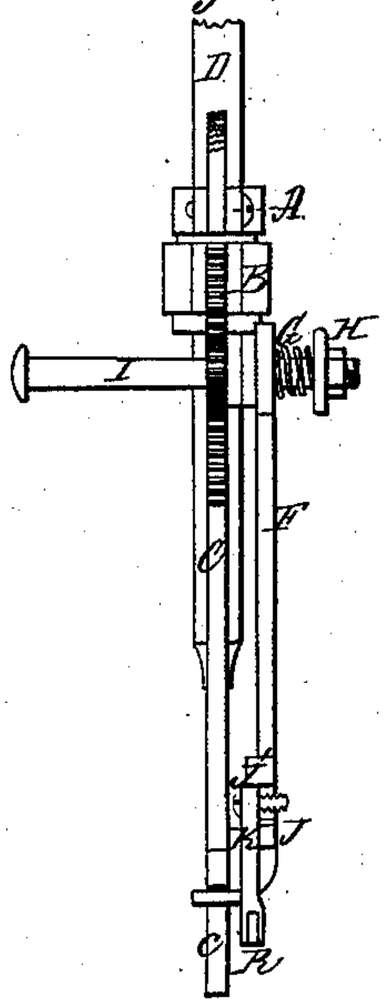


Fig: 5

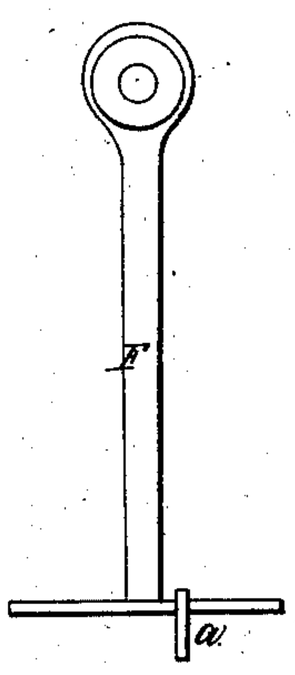


Fig: 3

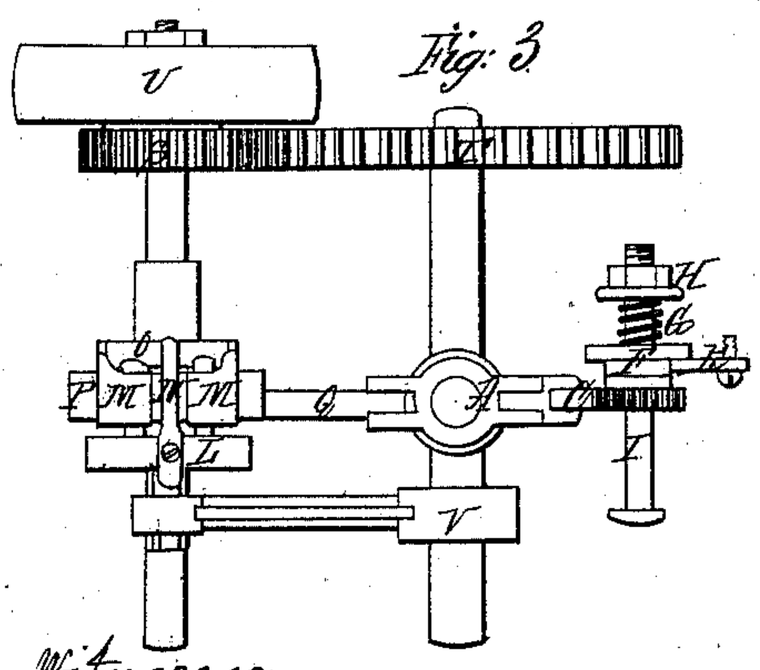


Fig: 7

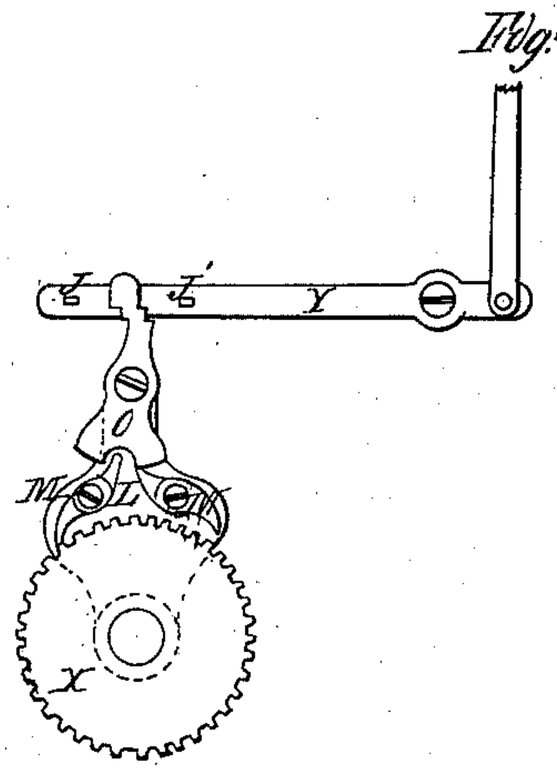
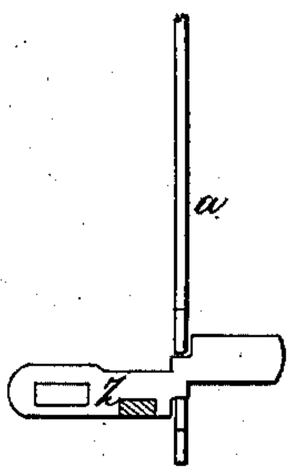


Fig: 6



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3 Sheets. Sheet 2.

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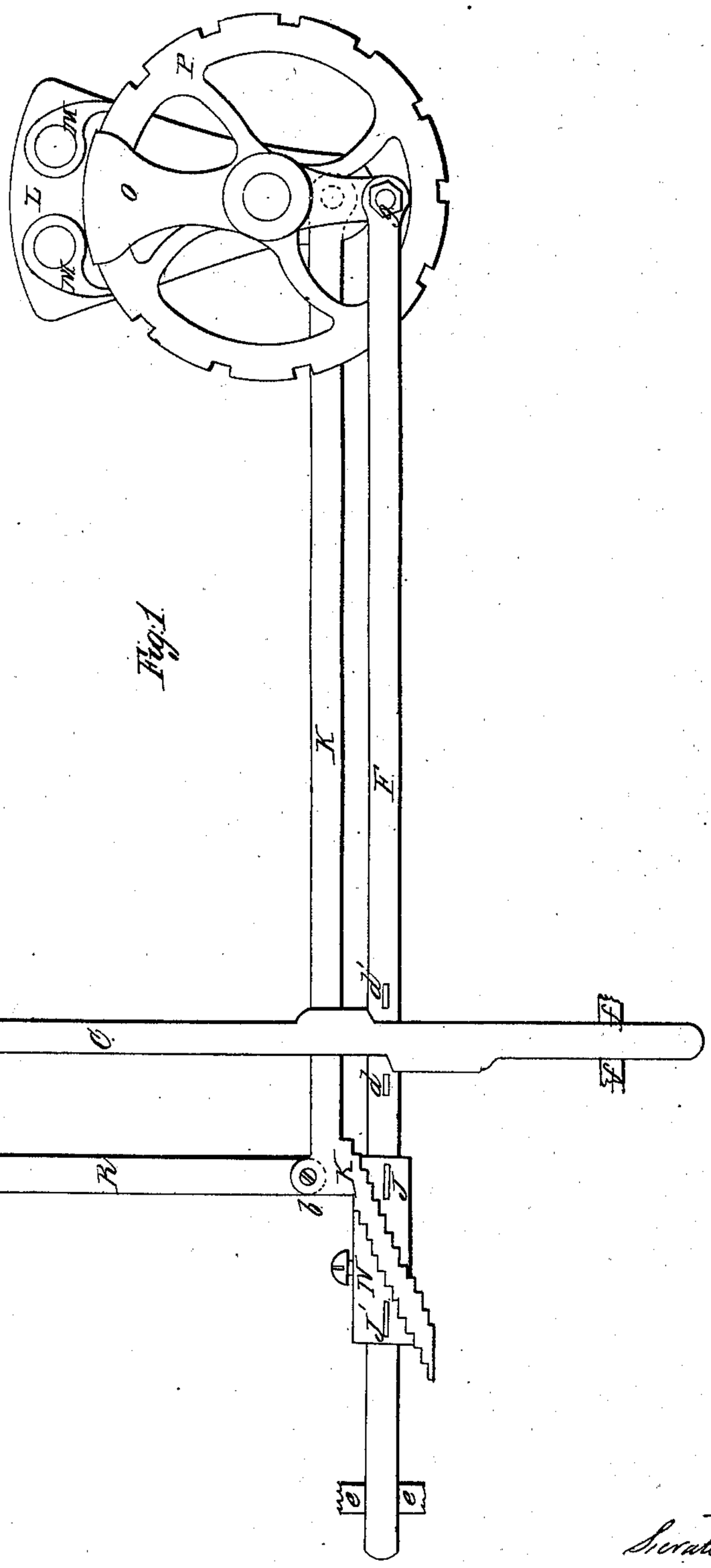
No. 77,923. Patented May 12, 1868.



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3 Sheets. Sheet 3.

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No. 77,923. Patented May 12, 1868.

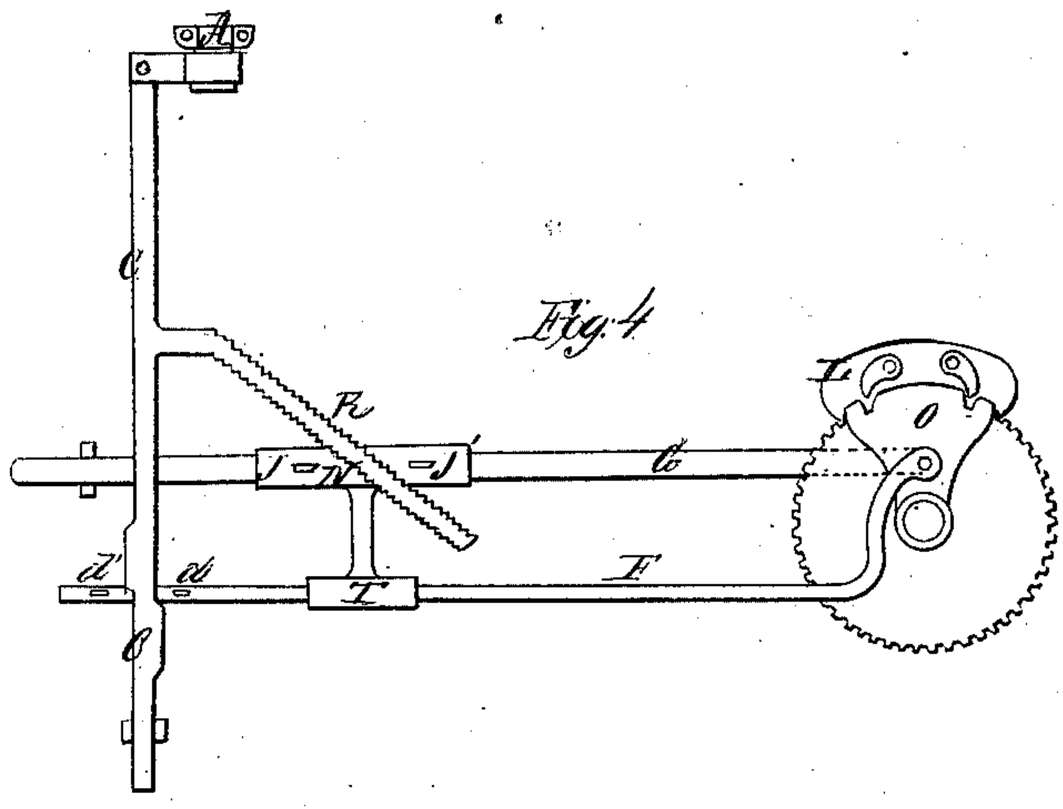


Fig. 4

Fig. 3

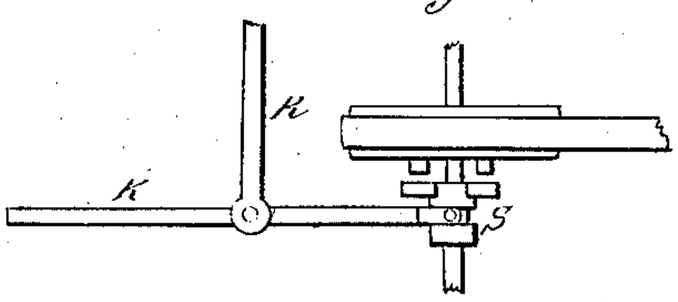


Fig. 2

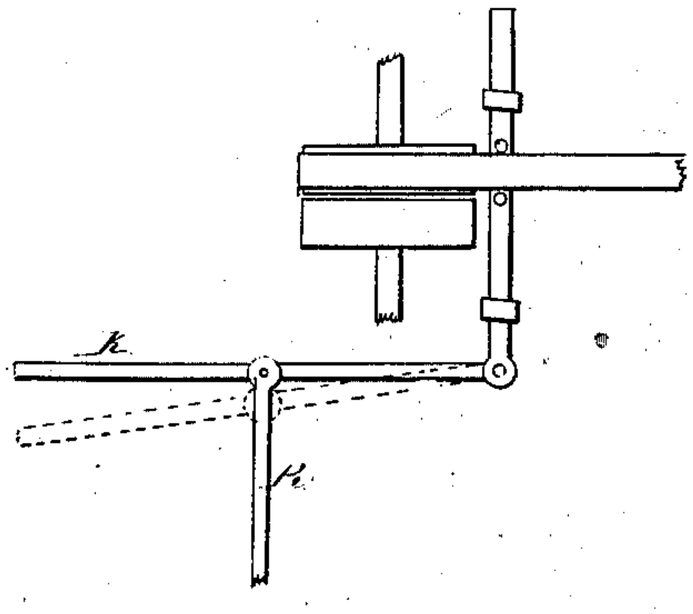
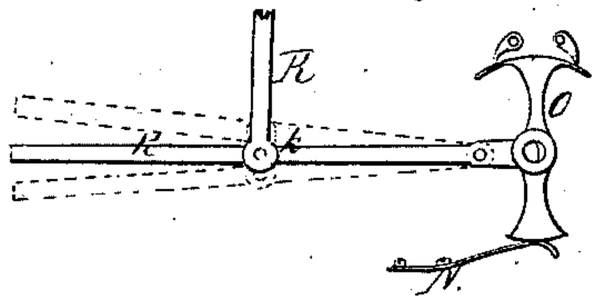


Fig. 1



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United States Patent Office.

SOCRATES SCHOLFIELD, OF PROVIDENCE, RHODE ISLAND.

Letters-Patent No. 77,923, *dated May* 12, 1868; *antedated March* 20, 1868.

IMPROVEMENT IN REGULATING AND DISPENSING-MECHANISM.

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, SOCRATES SCHOLFIELD, of Providence, in the county of Providence, and State of Rhode Island, have invented an Improvement in Regulating or Dispensing-Mechanisms; and do hereby declare that the following is a full and exact description, reference being had to the accompanying drawings, making a part of this specification.

The nature of my invention consists in a new and peculiar application of a vibrating-bar or lever, for the purpose of starting, stopping, reversing, or changing the action of machinery, without requiring or taking power from the indication or movement which shows such a change to be desirable.

My invention includes a vibrating-movement, commencing near or in connection with the device whose movement will cause the power of the machine to be dispensed as desired, which device may be either a clutch, belt, catch, or dog, or other equivalent, which has no positive or permanent connection with the governor, or other indicator of the required change, thus leaving such governor or other indicator free to assume and preserve a perfectly correct position under all circumstances. Now, by means of suitably-arranged pins, notches, elevations, or depressions, (attached to or in proper connection with a governor, or other indicator, so as to be moved by the same as the indication changes,) the previously-mentioned vibrating-movement can be obstructed, as desired, and the power of such vibrating-movement will then be thrown upon the device arranged to change the action of a machine.

This principle may be applied to the purpose of regulating the speed of machinery, from the indication, by any kind of governor. Also, for regulating heat, from the indication by a balanced thermometer, or from any other instrument in which the required change is produced by heat, and for a great number of similar purposes, being also applicable as a stop-motion, in various machines where extreme sensitiveness and delicacy are required.

My invention also consists in a peculiar arrangement of ratchet-teeth, whereby such ratchet may be made to assume and maintain different positions, as desired. One extreme may be applied to cause in machinery a motion in one direction, the other extreme to cause motion in the opposite direction, and a medium position to cause such motion to cease; or the different positions may be applied to produce various degrees of the same motion in any machine.

My invention also consists in a peculiar arrangement for embodying the action of a regulator in the position of certain elevations or depressions upon any suitable surface, whether plane or curved, thus making the regulator, without any alteration except in changing the plates furnished with such elevations or depressions, capable of any action desired.

By the use of this improvement, a regulator can be made to act upon a gate to a water-wheel with great rapidity, for the reason that the gate can be held stationary, or moved in either direction, at any time desired, without regard to the position of the governor.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figures 1, 2, and 3, of drawing A, represent different views of an application of my improvements to a water-wheel regulator, made to act by throwing into gear a more powerful machine, placed between it and the gate, figs. 1 and 2 being side views, and fig. 3 a top view of the same.

A represents a sliding collar, which may be connected to the common ball, or any other kind of governor. Upon a groove in the collar A is placed the strap B, to which are attached the rack and notched bar C. The teeth of the rack are cut for a space equal to the rise and fall of the governor, and strike into the gear E, turning loosely upon the shaft I, which is sustained by the framework of the machine.

The hub of the arm F is pressed against the gear E by the nut H and spring G, thus forming, between the gear E and arm F, an adjustable friction-joint. The lower end of the arm F is bent at right angles, and a notch cut to receive the lower end of the bar C, the width of this notch to be about the width of the bar C. Upon

each side of the bar C are cut the notches c' c'', which will allow the arm F a certain amount of motion. Upon the arm F are placed the pins J J′, between which vibrate the notched arm of the knee K.

The segment L, to which the dogs or catches M M are attached, receives a reciprocating motion from the eccentric, V. Upon the segment L is secured the spring N, passing over the notched segment P, and pressing with considerable force upon the vibrating-lever O, so that the friction may be sufficient to cause the lever to partake of the reciprocating motion of the segment L. The lever O is connected to the vibrating-knee K by the bar R.

To the segment P is connected the arm Q, from the end of which a connection may be made to another and separately-driven machine, to operate the gate. The outer notches p p are higher than the inner ones, p' p', and that portion of the lever O which forms the ratchet-guard is either inclined, or arranged in steps, so that the catches may be raised or lowered, to conform to the notches of the segment P. In some cases I use a spring-catch, instead of the gravitating-catch shown in the drawing.

Fig. 1 represents this machine at a point where the machine to which it is to be connected has been thrown out of gear, and has ceased to act on the gate. Now, if the collar A is depressed, the action of the rack upon the gear E and friction-joint will be such as to cause the lower end of the arm F to be moved to the depth of the notch c', and, if the motion of the collar A should continue, the gear E would turn upon the shaft I, without imparting further motion to the arm F; but as soon as the motion of the collar A takes a contrary direction, the lower end of the arm F will be moved back again through a space equal to the depth of the notch c'.

Now, as the vibrations of the catches M M are transmitted to the lever O by the friction of the spring N, and thence, by the bar R, to the knee K, the previous movement of the arm F will cause the pin J′ to obstruct the movement of the knee K, on account of the step-like form of the notches at its end, which vibrate between the pins J J′.

Now, the motion of the knee K being stopped, the motion of the lever O will also be stopped, the spring N and catches passing over its surface to a new position, so that the catch M will be left free to act upon the notch p', thus depressing the arm Q to the position shown in the lower dotted lines, thus causing another machine to be thrown into gear, by connecting with a clutch, or sliding a belt, or by changing the position of catches or dogs, or, by any other convenient means, causing the machine to do the work required to move the gate.

Now, when the work performed has been sufficient to so affect the speed as to cause the collar A to take a reverse direction, the arm F will instantly resume its former position, the notched end of the knee K will strike the pin J, the motion of the lever O will be obstructed, and the catches brought to a position in which they can only operate upon the notches p p, when the segment P and arm Q will be brought back to their former position, and the intervening machine become thrown out of gear, and cease its action upon the gate, as before.

The same operation will take place if the collar A is raised, but a reverse action will be produced, raising the arm Q to the position of the upper dotted lines, causing the intervening machine to act upon the gate in a contrary direction.

Figure 7 represents a different method of arranging the vibrating-lever O to raise or lower the catches, it being attached to the segment L, and sufficient friction secured to hold it in place by means of the screw W, upon which it turns, or by any other suitable device.

The lever O is to be set by means of the inclined step-like notches operating between the pins J J′, the position of these pins determining which way the power of the regulating-mechanism shall act. This arrangement is peculiarly applicable to those regulators where a rack takes the place of the ratchet-gear X, and where a direct reciprocating motion is imparted to the catches.

The arm Y, upon which the pins J J′ are placed, may be operated by a governor, for controlling and regulating the speed of machinery, or it may be operated by the pressure within a closed chamber, or boiler, or by the expansion and contraction caused by heat, for the purpose of controlling such pressure or degree of heat, or for any similar purpose.

The arrangement of a vibrating-lever or bar, held at any suitable point by friction, and placed in contact or connection with the device to be moved, constitutes a new invention, which is applicable for various regulating or dispensing purposes, and is especially desirable where the movement from which the machine must be made to operate is very weak. The slight directive power of the magnetic needle toward the north, or toward another magnet, is, by this means, capable of becoming the instrument for changing the movement of the most powerful mechanism, the magnetic needle, with the necessary modifications, taking the place of the arm F in fig. 1.

It is evident that the relative position of the notches c' c'' and arm F, in fig. 1, may be reversed, the rack and notches remaining stationary, while the gear E and arm F are attached to the governor, the operation and result being made the same as previously described.

In fig. 1, the notches c' c'' are so cut that the regulating-mechanism shall act only when the speed is departing from its medium rate, and ceasing its action when the extreme of variation has been reached.

Figure 4 represents the bar C, with notches so cut that the regulating-mechanism may commence its action as the variation in speed commences, continuing its action until the greatest limit is attained, and reversing its action as the speed returns to its medium rate, thus correcting any surplus in its previous action on the gate.

Figures 5 and 6 represent an arrangement where the step-like notches are attached to the arm F, and operate upon the bar a, which is attached to and moves back and forth with the vibrating-lever O. If the ratchet-catches are arranged to operate upon a rack, a single vibrating-bar and guard, operated and held in position by friction, will be sufficient to produce the result desired.

Another illustration of the principle of controlling the action of a governor by means of suitable elevations or depressions, similar to the notches c' c'', is shown in fig. 1 of drawing B, though the notched lever or bar

there used to move a common ratchet-guard is not included in my claim, being incapable of approaching in the slightest degree the extreme limit of sensitiveness and accuracy to be attained by the use of my improved arrangement of vibrating-bars or levers, as shown in drawings A and C.

A, in fig. 1 of drawing B, represents the sliding collar of a governor, to which the strap B is attached. R is a connecting-bar, working loosely at the two joints *a* and *b*. K is a bar, furnished at one end with inclined or step-like notches, as shown, the other end being jointed loosely to the lower part of the vibrating-arm L, which carries the catches so that the notches of the bar K will partake of the reciprocating movement imparted to the catches, and at the same time be controlled in their action upon the pins J J of the friction-collar N, between which they vibrate, by the rise and fall of the governor. The friction-collar N slides upon the bar F, held loosely at one end by the fixed support *e e*, the other being jointed to the lower part of the guard O.

By screwing up the nut *g*, a sufficient amount of friction may be secured to hold the guard securely in place when properly set by the action of the catches. The bar C is also secured to the strap B, the lower end being held loosely by the fixed support F F. This bar is furnished with suitable elevations and depressions, upon which the pins *d d'* act in a manner similar to the previous description in drawing A.

The various parts are represented in the drawing in a position where there is no action from the catches upon the ratchet-wheel P. Now, if the governor should rise, the vibrating-notches of the bar or lever K will strike against the pin J', thereby moving the guard O until the pin *d'* strikes against the side of the bar C, when a tooth of the ratchet-wheel P will be uncovered, and the catches will act. A continuation of the movement of the governor in the same direction, however, will not, under the arrangement shown, produce any further movement in the guard, the friction-collar N being merely slipped along the bar F, toward the support *e e*, the bar C and pin *d'* preventing any further movement of the bar F in that direction, but whenever the direction of the motion of the governor changes, a reverse action will take place.

Another arrangement, operating by means of my improved system of vibrating-bars or levers, is shown in fig. 4 of drawing C, where the notches which rise and fall with the governor do not have a reciprocating motion, as shown in drawing B.

A represents the sliding collar of the governor, with the bar C attached. This bar is to be so held that its only motion shall be with the rise and fall of the governor. A movement greater than that of the governor may be imparted to the bar C, by connecting the same to the collar A by means of a multiplying-lever or by a system of gearing. Upon one side of the bar C is attached the notched bar R.

The bar G is jointed to the arm L, which carries the catches and vibrates with the same. Upon this bar is placed the friction-collar N, or its equivalent, with its pins J J'. The outer end of the bar G is held by some fixed support. To the friction-collar N is also attached the friction-collar T, which operates upon the bar F, which is jointed to the vibrating-lever O, which raises the catches. Upon the bar F are placed the pins *d' d*, which operate against the bar C, and thus place the lever O in the required position with regard to the catches. Now, as the bar C rises with the governor, the vibrating friction-collar N will be moved along the bar G toward the catches, and this movement will cause the pin *d'* to vibrate against the side of the bar C, thereby keeping the vibrating-lever O in a position where one of the catches can act. Now, when the movement of the governor changes, the pin *d* will vibrate against the other side of the bar C, and the action of the catch will cease. The notched bar R and bar C may be controlled by two separate governors, if desired.

The drawings A, B, and C, illustrate some of the various modes by which the action of a governor may be transmitted, and its surplus absorbed, by a frictional or any equivalent device, and be again referred to the direct action of a governor, in order to control either the extent or time of its action on any dispensing-device; and this peculiar mode of action, irrespective of the arrangement and form of the devices, I claim as my improvement in any regulator.

It is not necessary that the extreme positions of the lever O should be controlled by the bar C, since it may be easily limited by a fixed point not in connection with a governor, but it is essential that the point where the catches shall cease to act shall be so controlled and determined.

In the preceding examples the vibrating-lever or bar has been applied for the purpose of raising or lowering catches or dogs, which engage with ratchet-teeth, and have themselves a reciprocating motion; but the same principle is also applicable where the device to be moved in or out of gear must, from its nature, be held stationary during the intervals of its required movement. The arrangement for this purpose is shown in figs. 1, 2, and 3 of drawing C.

The lever K in fig. 1 is jointed loosely upon one side of a ratchet-guard, O, and is to receive a reciprocating motion, as shown by the dotted lines, which may be imparted by the bar R, jointed at the point *k*, or by any other suitable means. The guard O being held in place by the friction of the spring N, or by any equivalent, can only be moved by obstructing the movement of the outer end of the bar K, which may be made to strike against notches or pins, in order to produce the movement desired.

Fig. 2 shows the application of this lever to the clutch S, which is to be so arranged, by means of suitable friction or otherwise, as to keep its place when once set by the action of the lever K.

Fig. 3 represents the application of the lever to move a belt. The outer end of the vibrating-lever K being obstructed by any suitable means, the power is immediately directed to move the guide which controls the position of the belt. The vibrating-lever K may be modified and arranged in various ways, but the examples shown sufficiently exemplify the principle involved.

The mode of action by the vibrating-bar or lever K, as shown in figs. 1, 2, and 3 of drawing C, is the reverse of that of the bar K, shown in fig. 1 of drawing B, since with the first we start from a ratchet-guard, clutch, or belt-guide, and from thence vibrate toward the part the movement of which is to cause a change in the position of such guard, clutch, or belt-guide, and in the other case we commence with a positive connection to the gov-

ernor, and vibrate toward the part whose movement will produce the required change in the power or action of the machine.

I claim as my invention, commencing at that part of a machine which dispenses the power, or changes its action, and from thence vibrating toward that part whose movement is to govern such dispensation, examples of which are shown in drawings A and C, and I do not claim a vibrating-lever or arm, when in direct and positive connection with any governor, or with any other similar device whose change of position or indication should produce a change in the action of any machine.

The advantage of the previously-described arrangement is evident, since, with my improvement, the action of a powerful machine may be changed without in any degree interfering with the correct action of that which is to cause the change, however weak the required indication may be, which is a matter of great importance in many cases.

Having thus described my invention, and what I deem to be a sufficient exemplification of the various methods of carrying it into effect, what I claim as my invention, and desire to secure by Letters Patent, is—

1. Causing the motion derived from any kind of governor, as transmitted in one direction, to be stopped and controlled by an obstructing point or notch, or system of elevations or depressions, operating under the action of a governor, transmitted in another direction, substantially as described.

2. Arranging the ratchet-teeth in steps, or one above the other, in connection with a guard operating to produce a corresponding change in the elevation of the catches, substantially as and for the purpose specified, in any regulating or dispensing-mechanism.

3. The combination of several elements, consisting, first, of a dispensing-device, second, of a vibrating-bar or lever, and third, of an opposing point, placed in connection or combination with any governor or other indicator of a desired change in the action of a machine, to operate substantially as described.

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