H. W. ROYCE.

AUTOMATIC CONTROLLER.

APPLICATION FILED MAR. 10, 1917.

1,252,497.

Patented Jan. 8, 1918.

2 SHEETS—SHEET 1.

Fig. 1

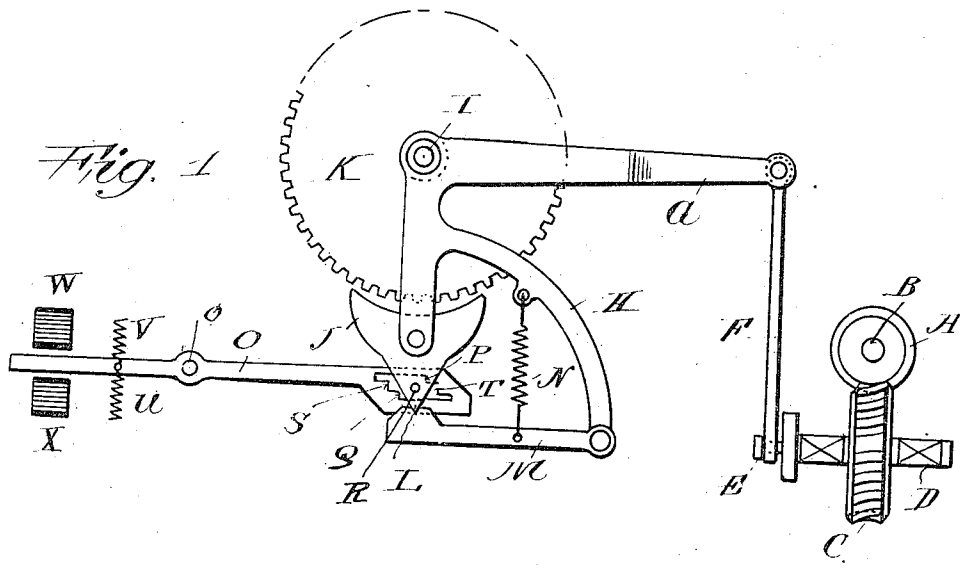
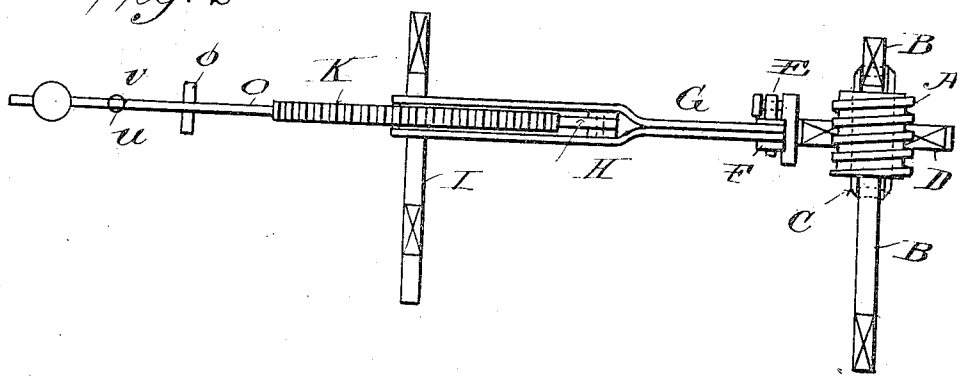


Fig. 2



Howard W. Royce Inventor

By his Attorney

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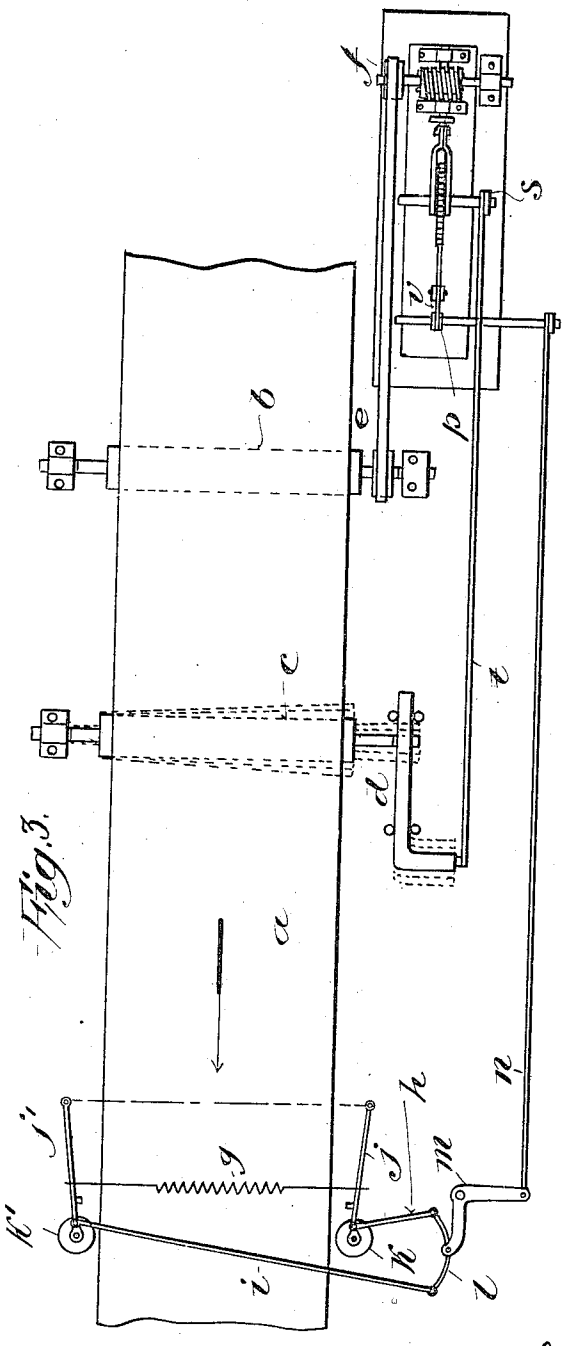


Fig. 3.

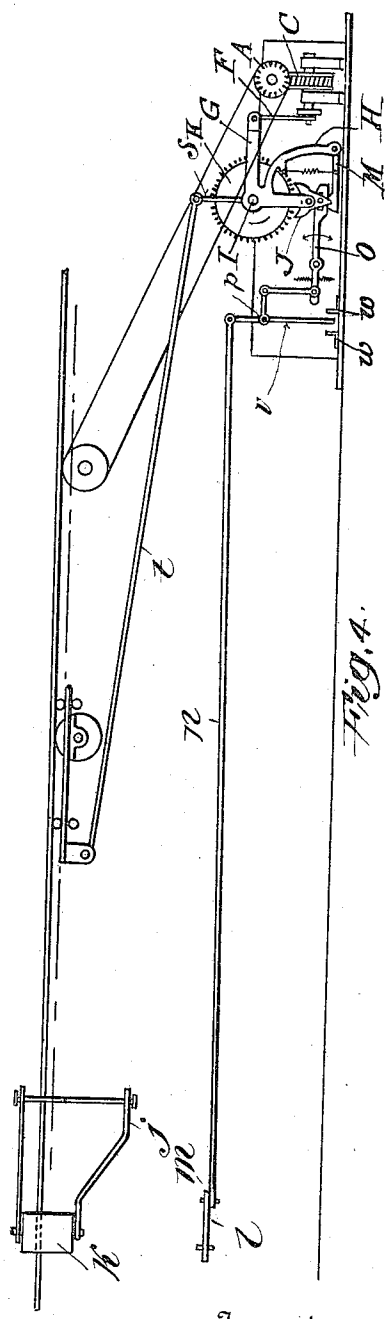


Fig. 4.

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UNITED STATES PATENT OFFICE.

HOWARD W. ROYCE, OF CHICAGO, ILLINOIS, ASSIGNOR TO SEMET-SOLVAY COMPANY, OF SOLVAY, NEW YORK, A CORPORATION OF NEW YORK.

AUTOMATIC CONTROLLER.

1,252,497. Specification of Letters Patent. Patented Jan. 8, 1918.

Application filed March 10, 1917. Serial No. 153,856.

To all whom it may concern:

Be it known that I, HOWARD W. ROYCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Automatic Controller, of which the following is a specification.

My invention relates to means for effecting the control of moving parts of apparatus or mechanical devices by, in general, setting in operation regulating means whereby any abnormal movement of such part or device may be checked and its normal position maintained.

The object of my improvements is to provide a device of this class which shall be simple in construction and certain and efficient in operation and which while idle under normal conditions shall, when required, be set in motion to perform its work quickly and by the use of a very small amount of power.

To this end my invention consists in the construction and combination of parts hereinafter described and claimed and illustrated in the accompanying drawings, which show an embodiment thereof.

I wish it understood, however, that I do not limit myself to the specific mechanical construction shown, many modifications of which may be made without departing from the spirit of my invention.

The invention will be best understood by reference to the drawings, Figure 1 of which shows a side elevation and Fig. 2 a plan view of the controller proper, while Fig. 3 illustrates by a plan view and Fig. 4 by a side view the application of the controller to the prevention of lateral movement of a traveling conveyer belt.

Referring to the drawings, and describing first the controlling device, A indicates a worm gear, mounted on shaft, B, which is driven at constant speed from any suitable source of power. Meshing with the worm, A, is a worm wheel, C, mounted on shaft, D, to which is connected a crank, or eccentric, E, the motion of which, through arms F, G, imparts a rocking movement to frame, H, which is loosely pivoted on shaft, I. J, is a pawl pivotally mounted on frame, H, and adapted when in the proper position to impart rotary movement to a toothed wheel, K, mounted on shaft I. Normally the point, L, of the pawl, J, is held engaged in a notch in an arm, M, pivotally secured to the frame, H, and held against the pawl by a spring, N, whereby the pawl, J, is normally held in a fixed position in relation to the frame, H, and out of engagement with the wheel, K.

O, is an arm, pivotally mounted at, *o*, one end of which lies adjacent to the pawl, J, and is provided with shoulders, P, Q, S, T, one or the other of which, as such end is moved up or down, is adapted to be interposed in the path and obstruct the movement of a pin, R, secured to the pawl, J. Normally the arm, O, is held in such a position by springs U, V, that the pin, R, does not contact with either of the shoulders P, Q, but moves freely back and forth with the movement of the pawl, J, between shoulders, S, T. The arm, O, is arranged to be tilted in one direction or the other by any abnormal movement of the moving part of mechanism or apparatus, the regulation of which it is the office of the controller to initiate. When so tilted one of the shoulders, P, Q, is interposed in front of the pin, R, thus obstructing its movement and causing the point, L, of the pawl, J, to be thrown out of the notch in the arm, M, and the pawl to be tilted so that one or the other of its teeth engages the teeth of the wheel, K. Thus the wheel, K, and shaft, I, are rotated and by such rotation regulating mechanism is set in action whereby the desired regulation is effected.

In Figs. 3 and 4 is illustrated the specific application of the controller above described to the regulation of the movement of a conveyer belt, *a*, traveling upon rollers, as *b*, *c*, so as to control the tendency of such belt to diverge from the straight lines of travel to one side or the other.

On each side of the belt, *a*, are located rollers, *k*, *k'*, mounted in pivotally supported frames, *j*, *j'*. The frames, *j*, *j'*, are connected by a spring, *g*, and are respectively connected by rods, *h*, *i*, with the ends of a yoke, *l*, which is centrally, pivotally connected to one arm of a bell crank, *m*.

To the other arm of the bell crank, *m*, is connected one end of a rod, *n*, the other end of which is connected to a crank, *v*, pivoted at, *p*, the other arm of which is pivotally connected with the arm, O, of the controller.

One end of the shaft of the roller, *c*, on which the belt, *a*, travels is mounted in a sliding bearing, *d*, to which is connected one

end of a rod, *t*, the other end of which is connected to an arm, *s*, which is secured to the shaft, I, of the wheel, K.

When, by reason of divergence from its proper line of travel, the belt, *a*, contacts with and pushes to one side one of the rollers, *k*, *k'*, as, for example, the roller, *k*, the frame, *j*, is pushed over, thus moving the yoke, *l*, and bell crank, *m*, so that the rod, *n*, is pushed forward and through the movement of the crank, *v*, that end of the arm, O, to which the crank, *v*, is attached is depressed, thus lifting the other end of the arm, O, and bringing the shoulder, Q, in the path of movement of the pin, R. By this means the movement of the pawl, J, to the left is obstructed and the point, L, of the pawl is thrown out of the notch in the arm, M, to the right, thus tilting the pawl to the right and causing its right hand tooth to engage with the toothed circumference of the wheel, K. Thus the wheel, K, and the arm, S, are moved from right to left, step by step, and the rod, *t*, which is connected to the arm, S, and the sliding bearing, *d*, are pushed forward. In this manner the roller, *c*, is caused to assume an angular relation to the belt, *a*, and by its movement the belt is moved back into its proper line of travel. As the belt in moving from left to right comes in contact with the roller, *k'*, the movement of the yoke, *l*, and the connected parts is reversed. The end of the arm, O, adjacent to the pawl, J, is depressed bringing the shoulder, T, in front of the pin, R, whereby the point, L, of the pawl is thrown back into the notch in the arm, M, and the parts resume their normal position. In case of a still further and abnormal movement of the belt to the right of its line of travel, the end of the arm, O, adjacent to the pawl is still further depressed so as to bring the shoulder, P, in front of the pin, R, thus throwing the point, L, out of the notch to the right and causing the wheel, K, to rotate from right to left and bringing the belt back to its normal position through a movement of the several parts in the opposite direction from that above described. Any excessive movement of the crank, *v*, is prevented by means of the limit stops, *w*, which engage the end of the downward extension of the crank arm.

Other means than that described for effecting the movement of the arm, O, and, by it, the engagement of the pawl, J, will readily occur to those skilled in the art. Thus the movement of the belt, or other device, the movement of which is to be regulated, may be utilized to close a circuit through one or the other of two electromagnets, W, X, whereby the end of the arm, O, will be moved in one direction or the other. The controlling device may also be utilized for many other purposes than that specifically illustrated and described, such as maintaining constant temperatures, pressures, etc., and I do not wish to limit my invention in this respect.

It will be noted that the amount of power required to move the arm, O, which is practically balanced, is very slight and hence the controller is quick and sensitive in operation and may be successfully applied to the control of devices which move but slightly out of the normal, or, in their movement, exert very little force.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination with an adjusting mechanism of a member adapted by its movement to operate the adjusting mechanism, a second normally moving member adapted to impart movement to said first member but normally out of engagement therewith and means adapted to be interposed in the path of movement of said second member and to be actuated by the movement of the part to be adjusted, the movement of said means causing said second member to engage and move said first named member.

2. In a controlling device the combination of a toothed member adapted by its movement to set in operation mechanism for adjusting the movement of the part to be controlled, a normally moving pawl adapted to engage said member but normally out of engagement therewith and means operated by the movement of the part to be controlled to obstruct the movement of said pawl and thereby throw it into engagement with said member.

3. In a controlling device the combination of a toothed member adapted by its movement to effect the adjustment of the part to be controlled, a normally moving pawl adapted to engage said member but normally out of engagement therewith, a pivoted arm having shoulders adapted to engage said pawl and thereby throw it into engagement with said member and means actuated by the movement of the part to be controlled to bring said shoulders into engagement with the pawl.

4. In a controlling device the combination of a toothed member adapted by its movement to effect the adjustment of the part to be controlled, a rocking frame, a pawl pivotally mounted therein and adapted to engage said member, means carried by said frame for normally holding the pawl out of engagement with said member and means actuated by the abnormal movement of the part to be controlled for causing said pawl to engage with said member.

5. In a controlling device the combination of a toothed member adapted by its movement to effect the adjustment of the part to

be controlled, a pivotally mounted pawl adapted to engage said member, means for normally holding the pawl out of engagement with said member and means actuated by the abnormal movement of the part to be controlled for disengaging the pawl from said holding means and causing it to engage with said member.

6. In a controlling device, the combination of a toothed member adapted by its movement to effect the adjustment of the part to be controlled, a pivotally mounted pawl adapted to engage said member, means for normally holding the pawl out of engagement with said member, a pivotally mounted arm having shoulders adapted to engage said pawl and means actuated by the abnormal movement of the part to be controlled for causing one or another of said shoulders to engage said pawl and throw it out of engagement with said holding means and cause it to engage said toothed member.

7. In a controlling device the combination of a toothed member adapted by its movement to effect the adjustment of the part to be controlled, a rocking frame, a pawl pivotally mounted on said frame and adapted to engage said member, means for normally holding the pawl out of engagement with said member and in a fixed position in relation to said frame and means actuated by the abnormal movement of the part to be controlled for changing the position of the pawl in relation to the frame and throwing it into engagement with said member.

8. The combination with a conveyer belt of a roller actuated by said belt, a sliding bearing for said roller, a toothed member, means actuated by said toothed member to impart a step by step movement to said bearing, a pawl adapted to engage said member and means actuated by the sidewise movement of the belt to cause said pawl to engage said member.

9. The combination with a conveyer belt of a roller actuated by said belt, a sliding bearing for said roller, a toothed member, means actuated by said toothed member to impart a step by step movement to said bearing, a pawl adapted to engage said member, a pivoted arm having shoulders adapted to engage said pawl and means actuated by the sidewise movement of the belt to cause said shoulders to engage said pawl and throw it into engagement with said toothed member.

In testimony whereof I have affixed my signature, this 5th day of February A. D., 1917.

HOWARD W. ROYCE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."