R. HERMAN.

VARIABLE SPEED CONTROLLER.

APPLICATION FILED OCT. 29, 1912.

1,147,089.

Patented July 20, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

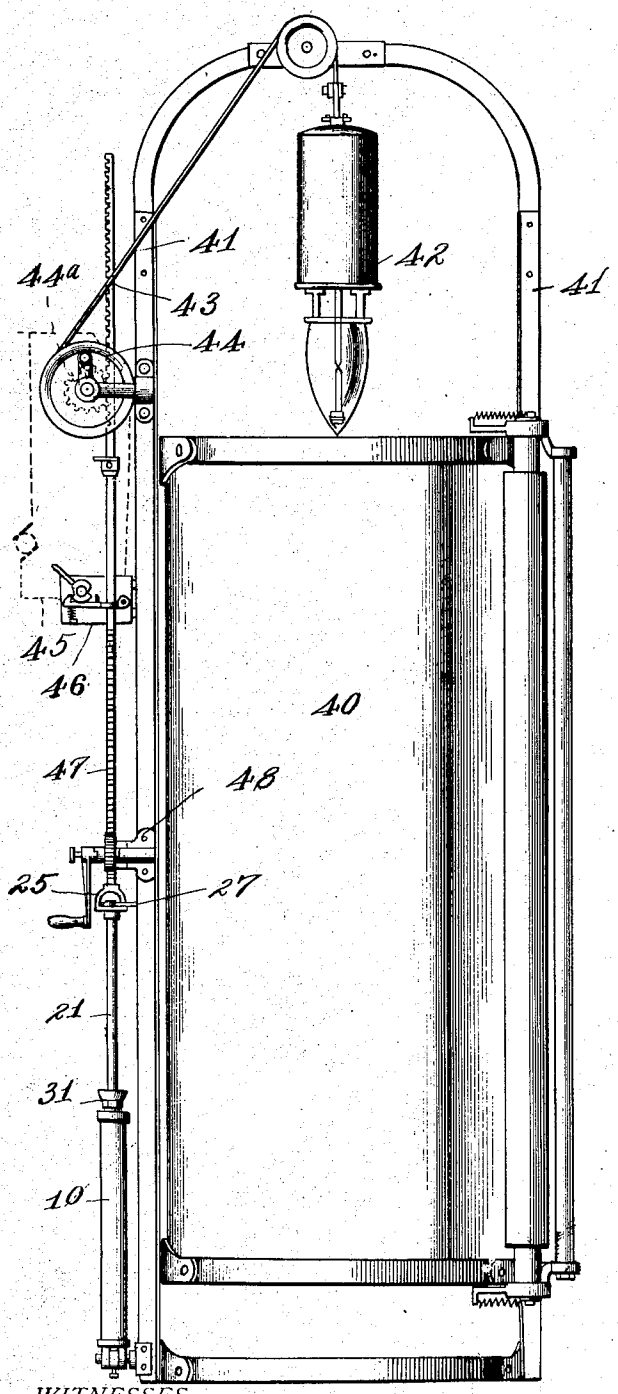
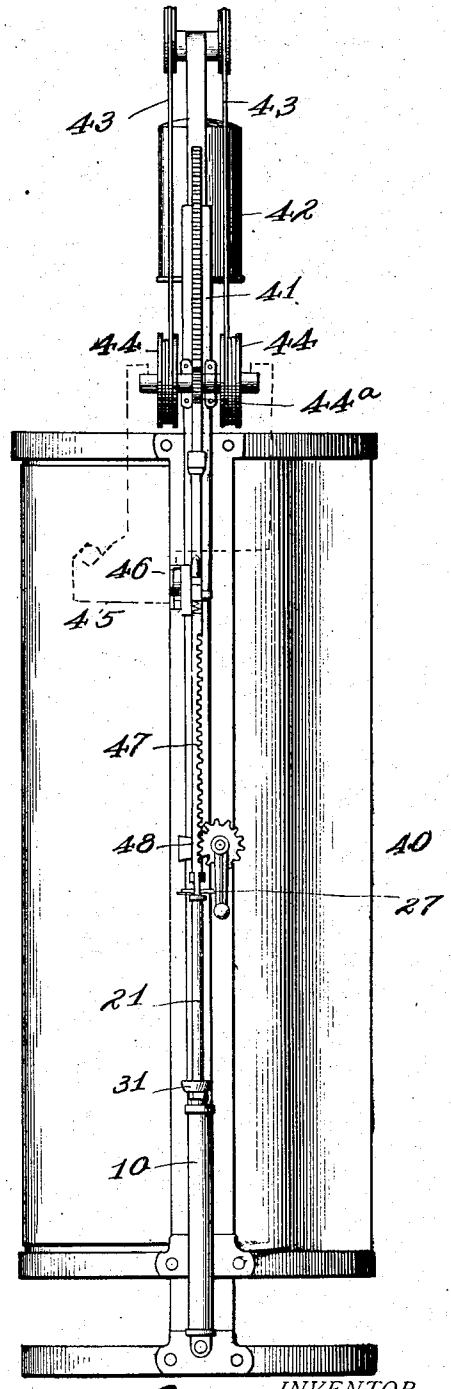


Fig. 2.



WITNESSES

G. A. Vanderschmidt

M. E. Lowry

INVENTOR

R. Herman

By A. M. Wilson

Attorney

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2 SHEETS—SHEET 2.

Fig. 3.

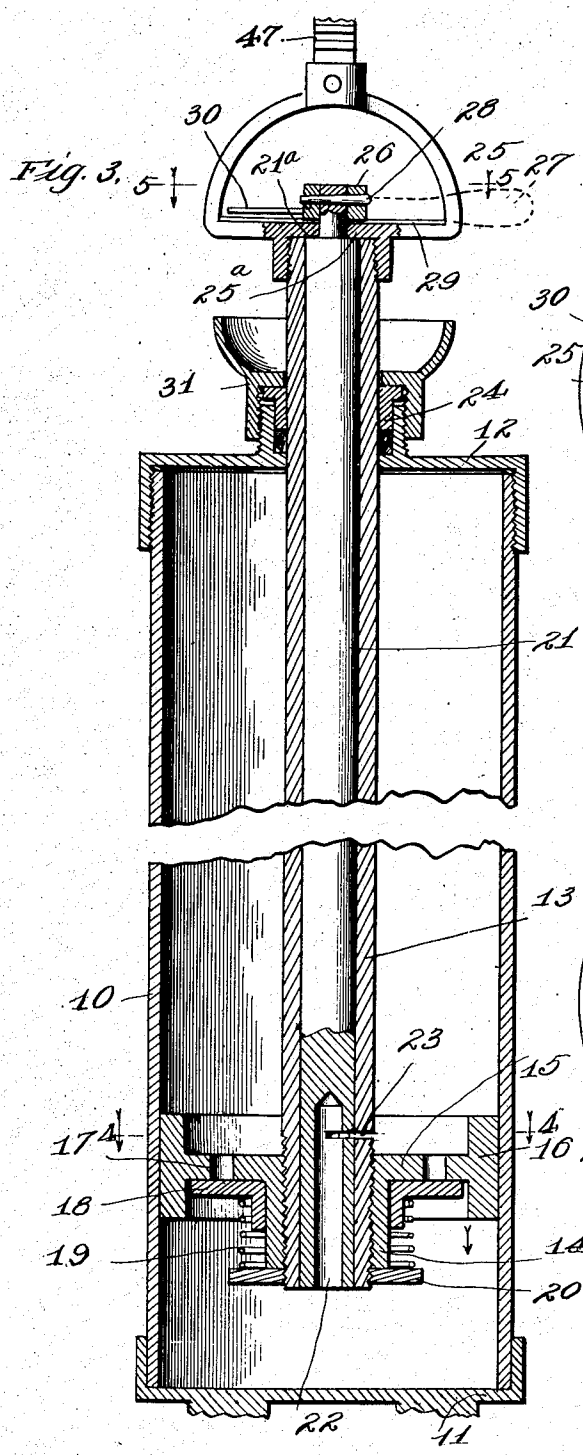


Fig. 5.

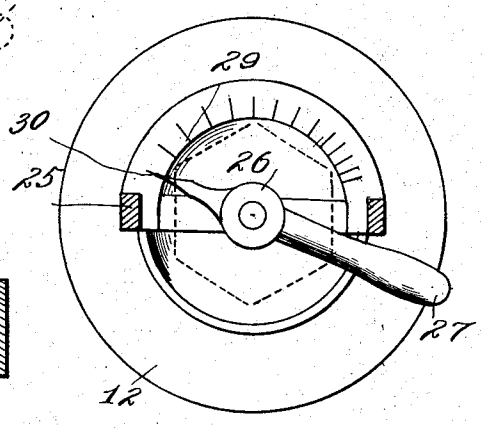
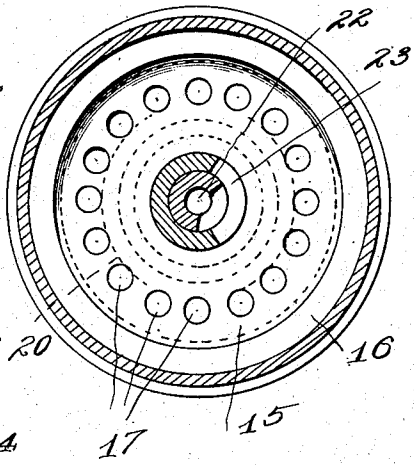


Fig. 4.



WITNESSES

G. A. Vanderschmidt

M. E. Lowry

INVENTOR

R. Herman

By A. M. Wilson

Attorney

UNITED STATES PATENT OFFICE.

REINHOLD HERMAN, OF CRAFTON, PENNSYLVANIA.

VARIABLE-SPEED CONTROLLER.

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Application filed October 29, 1912. Serial No. 728,521.

To all whom it may concern:

Be it known that I, REINHOLD HERMAN, a citizen of the United States, and residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Variable-Speed Controllers, of which the following is a specification.

My invention relates to improvements in variable speed controllers, and has particular relation to devices in which the controller acts as a timing element in performing work.

Among the objects of my invention are: (1) To provide a device of this character in which a reciprocating member has its movement in one direction capable of variation in speed of movement per unit of time, thereby controlling the movements and operation of a work performing device. (2) To provide a device of this character involving the principle of transference of liquid to opposite sides of a piston, and in which the pressures are exerted in a direction to substantially prevent leakage of the fluid. (3) To provide a device of this character involving the employment of a fluid transference to opposite sides of a piston and which is constructed in a manner to substantially eliminate the introduction of air into the device during operation thereof.

Other and further objects of the invention are to provide a device which is simple and efficient in operation, durable in construction, not liable to be damaged, easy to install and maintain in operative condition, and which can be maintained at a relatively low cost.

To these and other ends, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views: Figure 1 is a front elevation of a blue printing apparatus, showing my invention in use. Fig. 2 is a side elevation of the same. Fig. 3 is a central longitudinal sectional view taken through the improved controller. Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3, and, Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 3.

The present invention is designed more particularly for use in connection with blue-printing apparatus where the source of light in the form of a lamp is adapted to coöperate with the printing frame for the purpose of providing the print, the controlling device acting to control the speed of travel of the lamp or control the time of exposure. While I have shown the device in connection with blue-printing apparatus, it is to be understood that I do not limit its application to this particular kind of apparatus, but reserve the right to use it in connection with any mechanism which is to be controlled either as to time or speed or both.

Referring more particularly to Figs. 3, 4, and 5, 10 designates a cylinder having its lower end 11 closed to prevent fluid leakage, either by forming the end integral or by the use of a cap, the upper end of the cylinder being closed by a cap 12, preferably threaded to the cylinder and rendered substantially fluid-tight by the use of packing. Coöperating with the cylinder is a piston structure by means of which the fluid within the cylinder is transferred from one side of the piston to the other in either direction, depending upon the direction of movement of the piston, said piston structure comprising the following elements: 13 designates a tubular member, forming part of the piston rod, which member has its lower end threaded externally to receive the threaded boss 14 of the piston, the latter having a web 15, the outer portion of which is flanged annularly as at 16 to provide a face coöperating with the inner walls of the cylinder to provide a piston action between the two. The web 15 is provided with one or more openings 17 extending therethrough in any preferred arrangement, these openings forming ports for the passage of fluid in one direction, being closed against the passage of the fluid in the opposite direction by an annular valve 18 which surrounds the boss 14, which valve is normally held to its seat by means of a spring 19 positioned between the valve and a member 20 threaded to the sleeve member 13 below the boss 14, said member 20 not only acting as a support for the spring but also to practically lock the piston member in position on the sleeve. In the form shown in the drawings, the valve is located on the

under side of the web, thereby providing for the movement of the liquid through the ports 17 from the upper side of the piston to the lower side, this transference being provided by a movement of the piston in an upward direction, the spring 19 yielding to permit the valve to move a distance sufficient to provide for this transference; obviously, an attempt to move the piston downwardly would cause the valve to be held firmly to its seat both by the spring and by the pressure of the fluid against the face of the valve, thus preventing any transference of the fluid through the ports from the under to the upper side of the piston.

The transference of the fluid from the under to the upper side of the piston is provided by a member mounted within and fitting the interior of the tubular or sleeved member 13, said inner member being shown as in the form of a rod 21 which is substantially equal in length to the length of the member 13, although this may vary if desired, said rod having its lower end formed with a recess or depression 22 open at its lower end and extending inwardly of the rod a distance sufficient to carry it slightly above the plane of the upper face of the web 15, the sleeved member 13 and the bar or rod 21 being provided with a kerf 23 which affords communication between the recess 22 and the cylinder above the piston, the kerf 23 being preferably provided after the parts are secured in position in order that its area in the direction of the length of the bar or rod and the sleeve 13 will remain constant throughout the kerf depth through these parts, the kerf forming a restricting passage-way for the fluid during fluid transference.

In order to provide the reciprocating movements to the piston, I extend the sleeve 13 and bar 21 through the cap 12, preferably employing a gland connection 24 for the purpose of preventing leakage around the sleeve, and threading to the upper end of the sleeve a stirrup member 25, which in turn is connected to mechanism which is adapted to travel in the direction of length of the piston rod, the stirrup having an inwardly-extending flange 25^a which is adapted to overhang a shoulder 21^a on the bar or rod 21, said shoulder being provided by reducing the upper end of said bar or rod, said reduced end extending through the flange 25^a and having secured thereto above said flange, the hub 26 of an actuating handle 27, said hub being secured in any suitable manner, as by a pin 28 passing through the hub and the reduced end of the bar or rod.

29 designates an indicating plate positioned between the hub 26 and flange 25^a in any suitable manner, being preferably secured to the stirrup, said hub 26 and shoulder 21^a practically coöperating with the flange to prevent relative longitudinal movement of the sleeve 13 and rod 21. The hub 26 is provided with a pointer 30 which is adapted to traverse the indicator 29 when the handle is shifted to rotate the rod or bar 21. This particular mounting of the indicating plate 29 provides, in connection with the pointer 30, an indicator in which the pointer and scale retain their several positions regardless of the movement of the piston, the distance between the planes provided by the path of movement of the pointer and that provided by the face of the indicating plate remaining constant, the result being that the pointer may be shifted with accuracy at any point in the movement of the piston itself. The advantage of this will be obvious in that changes in the speed of travel of the piston may be made while the piston is traveling.

As will be readily understood from Figs. 3 and 4, the sleeve member 13 is held fixedly against a rotative movement, while the rod or bar 21 in rotatable, the length of rotation being substantially controlled by the stirrup 25, as will be obvious from Fig. 5. It will be clear that if the kerfed portion of the bar or rod 21 is brought so as to have its bottom walls co-incide with the bottom walls of the kerf of the sleeve 13, there will be provided a maximum opening through the kerf for the transference of the fluid; if however, the handle 27 be moved so as to rotate the bar or rod 21, the area of the exposed portion of the kerf will be reduced, thereby reducing the amount of liquid which may pass through the kerf per unit of time and thus retard the movement of the piston in the cylinder. Obviously, this rotative movement of the rod or bar 21 may be continued until the area of the exposed portion is so small as to provide but slight leakage, in which case the movement of the piston will be extremely slow.

In connection with the blue-print apparatus disclosed herein, I preferably provide for variations in movement by the transference of the fluid through the kerf 23, so as to provide a travel of the piston at any desired speed ranging from the requirement of a period of three seconds for the travel of the piston a distance of a foot to a requirement of three minutes to provide an equal length of travel, this ratio in the particular instance shown permitting of any variation from 1 to 180. If desired, I may employ a drip cup 31 secured to the flange of the cup 12.

As will be seen, the direction of movement of the piston under the greater pressure is toward the bottom of the permanently closed end of the cylinder, thereby eliminating liability of the fluid being forced outward through the cylinder and

providing a leak, while the movement of the piston in the opposite direction or toward the end through which the piston rod structure extends, is at greatly decreased pressure, the fluid passing through the openings 17 without providing a material pressure to the cylinder end and yet enabling of a comparatively rapid transference, this reduction in pressure tending to eliminate liability of the fluid being forced outward through the gland packing. Furthermore, the movement of the piston in the direction away from the cap end 12, being relatively slow, will not tend to provide a vacuum which would serve to draw any air through the gland packing or to cause air to be drawn through the fluid into the transfer controlling mechanism, consequently the piston structure is not liable to trap air, a result which would tend to provide for an uneven movement of the piston and consequently a jumping action of the lamp in operation. The particular manner in which this movement is obtained in connection with the blue-printing apparatus provides for this particular direction of movement in the device. The particular construction of the various parts contained in the blue-print apparatus is not disclosed herein, but for the purpose of explaining the operation, I indicate the printing frame at 40, the supporting frame therefor at 41, the lamp at 42, the lamp cables at 43, the rotary circuit connector at 44, the circuit at 45, the cut-out at 46, the connections between the stirrup 25 and the rotary circuit connector 44 at 47, and the returning device at 48.

The connections 47 include a rack structure and a pinion 44^a carried by the shaft of the rotary circuit connector, the arrangement being such that when the weight of the lamp is brought into play, it will tend to unwind the cables from the circuit connector 44 and this movement will cause the rack 47^a to descend and travel in the same direction as the lamp is traveling. By the use of a suitable stop mechanism which may be adjusted on the connections 47, the cut-out 46 becomes actuated to break the circuit and cut out the lamp, the result being that the speed of travel of the lamp may be controlled with accuracy through the operation of the handle 27, while the length of movement can be controlled by the adjustability of the stop so that there is provided means for automatically cutting out the circuit at the end of any pre-determined period of time and thus provide for the making of prints with the adjustments as to time of exposure extremely accurate.

While I have herein shown and described a preferred form in which my invention may be provided and employed, it will be readily understood that changes and modifications therein may be required or desired to meet the exigencies of use, and I desire it to be understood that I reserve the right to make any and all such changes or modifications as may be so required or desired in so far as the same may fall within the spirit and scope of the invention as set forth in the accompanying claims.

Having thus described my invention, what I claim as new is:—

1. In a variable speed controller, a casing, a piston adapted to travel axially thereof and having a supporting member extending through one end of said casing, a member extending through said support and adapted to coöperate therewith to regulate the passage of fluid from one side to the other of the piston, said latter member being rotatable with respect to the supporting member and held against axial movement relative thereto, said holding means being located outside of the casing.

2. In a variable speed controller, a casing, a piston adapted to travel axially thereof and having a supporting member extending through one end of said casing, a member extending through said support and adapted to coöperate therewith to regulate the passage of fluid from one side to the other of the piston, said latter member being rotatable with respect to the supporting member and held against axial movement relative thereto, said holding means being located outside of the casing, said holding means carrying mechanism which, by the rotation of the rotatable member will provide visual indications pertaining to the speed of travel of the piston, said mechanism including a stationary and a rotatable member, the plane of the path of travel of said latter member being constant in distance to the plane of the stationary member.

3. In a variable speed controller, a cylinder, a piston movable axially thereof and adapted to provide a relatively free transference of fluid in one direction through the piston by movements of the latter longitudinally of the cylinder in the opposite direction, said piston including a piston rod structure projecting beyond one end of the cylinder, said structure comprising a tubular member secured to the piston, and a rotatable member therein and having its inner end recessed to form a liquid chamber, said tubular member and rotatable member having co-inciding openings communicating with said chamber adapted to vary the passage of fluid from said recess to the cylinder, said tubular member and said rotatable member having a common external support adapted to prevent relative longitudinal movement of the members.

4. In a variable speed controller, a cylinder, a piston movable axially thereof and adapted to provide a relatively free transference of fluid in one direction through the

piston by movements of the latter longitudinally of the cylinder in the opposite direction, said piston including a piston rod structure projecting beyond one end of the cylinder, said structure comprising a tubular member secured to the piston, and a rotatable member therein and having its inner end recessed, said tubular member and rotatable member having co-inciding openings adapted to vary the passage of fluid from said recess to the cylinder, said tubular member and said rotatable member having a common external support adapted to prevent relative longitudinal movement of the members, said support including a handle carried by the rotatable member and adapted to actuate said rotatable member.

5. In a variable speed controller, a cylinder, a piston movable axially thereof and adapted to provide a relatively free transference of fluid in one direction through the piston by movements of the latter longitudinally of the cylinder in the opposite direction, said piston including a piston rod structure projecting beyond one end of the cylinder, said structure comprising a tubular member secured to the piston, a rotatable member therein and having its inner end recessed to provide a liquid passage, said tubular member and rotatable member having co-inciding openings communicating with said recess adapted to vary the passage of fluid from said recess to the cylinder, a stirrup member secured to the free end of the tubular member and having a flange adapted to overlie the rotatable member, and a handle secured to said rotatable member, said handle coöperating with said flange to retain the rotatable member against axial movement relative to the tubular member.

6. In a variable speed controller, a cylinder, a piston movable axially thereof and adapted to provide a relatively free transference of fluid in one direction through the piston by movements of the latter longitudinally of the cylinder in the opposite direction, said piston including a piston rod structure projecting beyond one end of the cylinder, said structure comprising a tubular member secured to the piston, a rotatable member therein and having its inner end recessed, said tubular member and rotatable member having co-inciding openings adapted to vary the passage of fluid from said recess to the cylinder, a stirrup member secured to the free end of the tubular member and having a flange adapted to overlie the rotatable member, and a handle secured to said rotatable member, said handle coöperating with said flange to retain the rotatable member against axial movement relative to the tubular member, said stirrup member having an indicator, and said rotatable member carrying a device adapted to co-act with the indicator to locate the rotatable member in position to provide for a predetermined speed of fluid transference.

In testimony whereof I affix my signature in presence of two witnesses.

REINHOLD HERMAN.

Witnesses:
JAMES M. SPEAR,
A. M. WILSON.