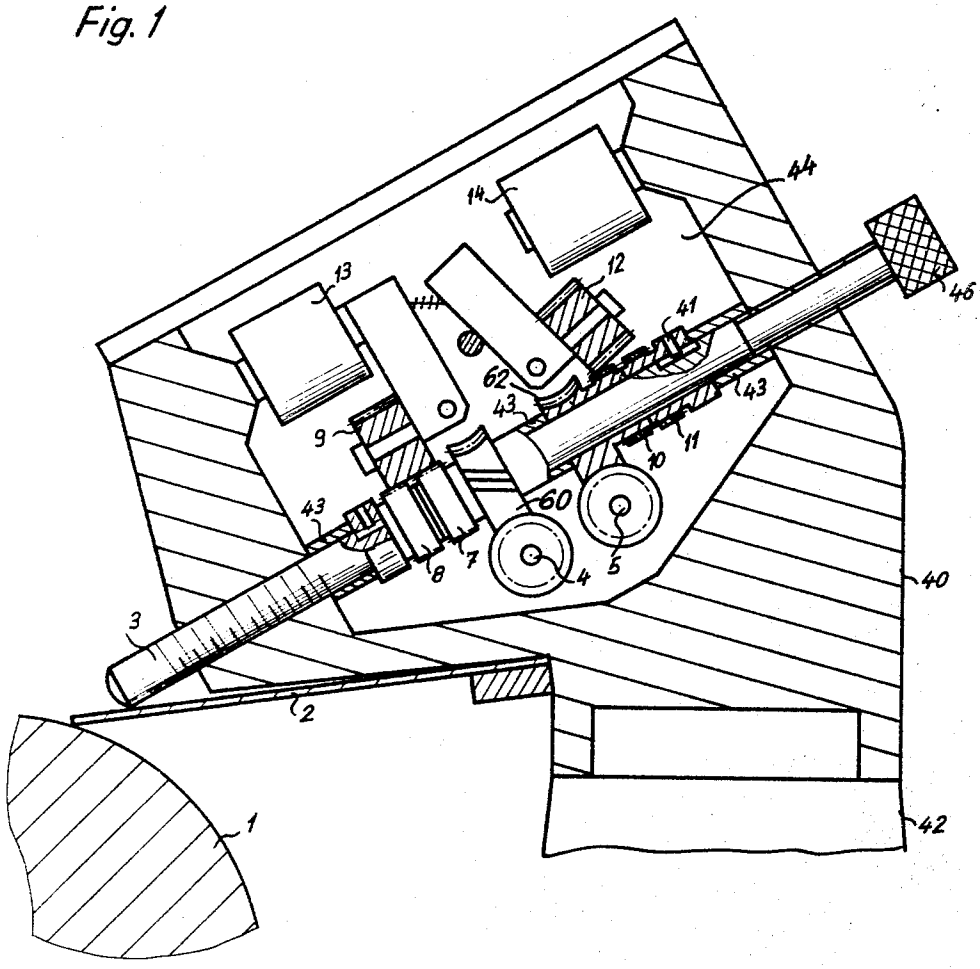
July 11, 1967 P. HEIMLICHER 3,330,393

ZONE SCREW ADJUSTING DEVICE

Filed Sept. [illegible], 1966 2 Sheets-Sheet 1

Fig. 1



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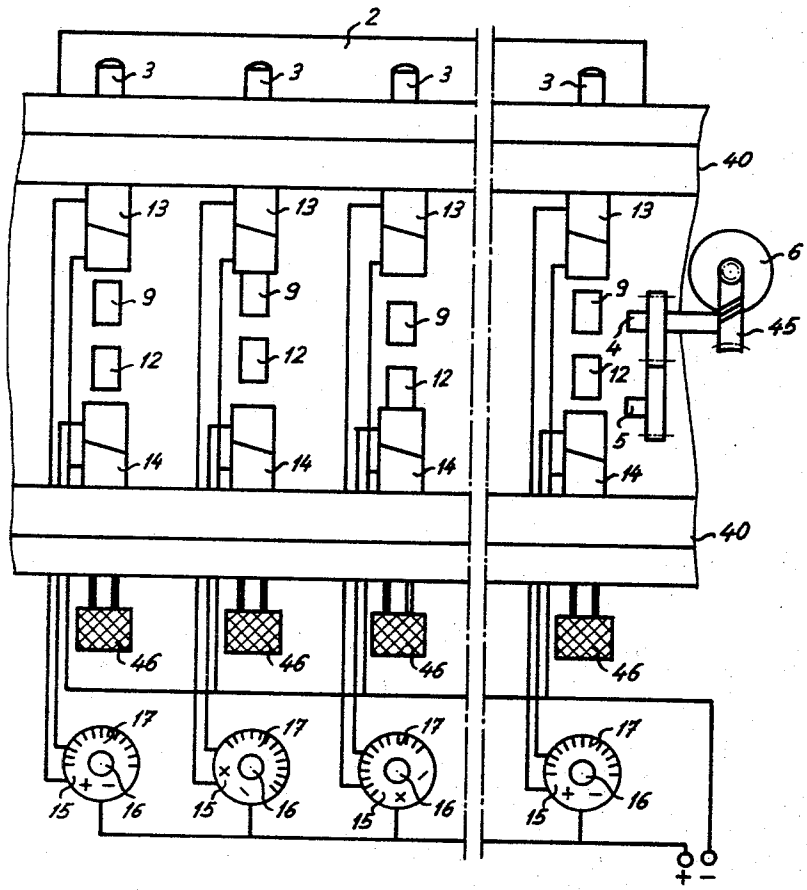
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Filed Sept. 1, 1966 2 Sheets-Sheet 2

Fig. 2



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ZONE SCREW ADJUSTING DEVICE

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Claims priority, application Switzerland, July 18, 1963, 8,009/63
4 Claims. (Cl. 192—142)

ABSTRACT OF THE DISCLOSURE

An apparatus for controlling the position of a rotatable zone screw by remote control is disclosed herein. The apparatus includes a rotatable hand wheel for each zone screw which is to be controlled which may be rotated clockwise and counterclockwise to drivingly rotate an individual zone screw at a remote location by an amount corresponding to the amount of rotation of the hand wheel and in the same direction of rotation.

The specific apparatus for effecting the control of the zone screw includes a hand wheel control which is connected electrically with a separate solenoid for rotation in each direction. The solenoids are located adjacent respective drive means for the zone screw for rotating the zone screw in the direction selected for a given period of time corresponding to the amount of rotation of the hand wheel. The drive mechanism includes a clutch which is engaged by the respective solenoid to cause mating of gears for driving the zone screw in the selected direction.

Summary of the invention

This application is a continuation-in-part of application Ser. No. 382,021 filed July 13, 1964, now abandoned.

This invention relates in general to an apparatus for turning adjustment devices, and in particular to a new and useful device for turning of zone screws, hand wheels of turning bars, regulating rollers and similar adjustment means in printing machines.

The present invention is particularly applicable for use in printing machines where zone screws, turning bars, regulating screws and the like are distributed over widely spaced locations, particularly in rotary processes. It would be troublesome if the operating personnel for such machines would have to run to all of these locations while the machine is in operation to effect adjustment. It is generally known to provide operating handwheels which are accessible from the operating side and from the operating floor. This often requires extensive linkages, chain or cable systems, or similar connecting mechanisms which greatly impair the accessibility of the machine. It has also been a practice to adjust the zone screws, turning bars, regulating rollers, etc., electrically, pneumatically or hydraulically or to effect their control from central locations by push buttons. Generally the operators do not like to use such push buttons because it is difficult to estimate correctly the time during which a button must be pushed in order to obtain a desired amount of displacement.

A device has also been provided where individual zone screws can be coupled electrically by electric remote control to a common worm shaft or chain system, the latter being turned manually through a linkage so that the operators can get a feeling for the amount of displacement which they are effecting. The disadvantage of such an arrangement is that for a single displacement at least two operating elements must be actuated and complicated linkages are necessary for the rotation of the worm shaft. For the remote control displacement of regulating rollers, manual regulation has been abandoned, particularly in

quality color printing machines, in favor of electric adjusting devices. Such devices are very costly and this expenditure is not always justified.

In accordance with the present invention there is provided an inexpensive adjusting means for regulating at a remote station the individual adjusting elements and in which the operation is carried out by an operator who is able to sense the amount of movement which is effected. Such movement is adapted to the feeling of the operating personnel's hands. The method of the invention is characterized in that at a remote location rotary knobs or hand wheels are provided upon whose rotation by a certain angle clockwise or counterclockwise electrical means are connected such that the zone screw or similar adjusting devices are displaced by a comparable amount.

Accordingly, it is an object of the invention to provide a method of operating an adjustment part of a printing machine employing a constant speed electrical driving motor for rotating the adjustment parts comprising rotating a rotary knob or hand wheel located remotely to effect the controlled rotation of the motor by a predetermined amount in order to precisely adjust the position of the adjusting part.

A further object of the invention is to provide a device for operating adjustable elements in a printing machine from a remote location comprising a driving motor for rotating the adjustable device and an electrical system connected through selected couplings to a remotely located hand wheel or control knob for effecting connection of the selected coupling to rotate the element in a precise amount corresponding to the rotation of the hand wheel or adjusting knob.

A further object of the invention is to provide a device for the control of elements of a printing machine which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described a preferred embodiment of the invention.

FIG. 1 is a somewhat schematic partial transverse sectional view of an adjusting screw or zone screw for a doctor blade of a printing machine constructed in accordance with the invention; and

FIG. 2 is a schematic top plan view of the printing machine indicated in FIG. 1.

Referring to the drawings in particular, the invention as embodied therein in FIGS. 1 and 2 comprises a printing machine including a doctor or fountain roller **1** against which an ink knife or doctor blade **2** is adjusted by means of a zone screw or adjusting element **3**. The zone screw **3** is threaded into a carriage or machine part **40** mounted on a machine frame **42**. Upon rotation of the knob **46** secured thereto in one direction, the screw **3** is advanced toward knife **2** and upon rotation in an opposite direction it is moved away from the knife.

The carriage **40** is hollowed at **44** and carries elongated worm shafts **4** and **5** which rotate in opposite directions and which are driven by a constant speed electric motor **6** (FIG. 2) driving through a bevel gear **45**. The worm shaft **4** rotates the screw **3** in one direction through a coupling comprising coupling gears **7**, **8** and **9**, whereas the worm gear **5** rotates the screw **3** in an opposite direction through a coupling formed by the form gears **10**, **11** and **12**. The adjusting screw **3** may also be adjusted manually by rotating a hand adjusting element or knob **46**.

In accordance with one aspect of the invention, the

screw 3 is freely rotatable between the housing parts on a sleeve or sleeve parts 43 which maintain the separate coupling gear sets, comprising gears 7 and 8 and the gears 10 and 11, in the orientation indicated, during rotation of the screw 3. Each gear 7, 8, 10 and 11 is separate. Gears 7 and 10 are respectively connected to or formed integrally with worms 60 and 62. And gears 8 and 11 are connected via a bolt 41 (one of which is shown) to the screw 3 for rotation therewith. When the cogwheel 9 is engaged with the gear set 7 and 8 it interconnects this set to drive the screw 3 through gear 4. When the coupling 13 is disengaged and the coupling 14 is engaged the clutch arm carrying the cogwheel 12 is moved to engage the driving set 10 and 11 to cause driving through the gear 5 which always rotates in an opposite direction from the gear 4 so that the screw is rotated in an opposite direction.

In accordance with another aspect of the invention, there is provided remote controlled couplings or actuators for a plurality of adjusting screws 3 which are located at spaced lateral positions across the width of the carriage 40. The remote control is effected, as best indicated in FIG. 2, through timing switches 15 which are provided for each screw 3. The timing switch 15 is an element which in the trade is designated as a timer and it may comprise a type made by Omniray of Zurich, Switzerland and referred to as an atcotrol timer. Each timer 15 includes a graduated dial or scale 17 which extends in both a plus and minus direction to indicate the amount of rotary movement of the adjusting knob 16 which is associated therewith. The knob 16 with the dial 17 includes a sweeping contact (not shown) which is moved away from the zero no contact position to close an electric circuit for either the driving magnetic clutch 13 or 14 in accordance with the direction of rotation of the dial away from zero. The connected clutch is maintained in operation until the dial under the action of a return spring (not shown) is moved back to zero.

The knob 16 is rotated either clockwise or counterclockwise by a selected amount in order to effect a corresponding adjustment of the screw 3. Adjustment of each screw 3 is made by rotating the knob 16 in a desired direction to effect the same proportional and directional rotation of the screw 3. During the set running time, a respective magnet 13 or 14 is energized through the connecting lines shown from the power supply indicated through the timer which completes the connection when the dial is moved away from zero. By a proper selection of the speed of the motor 6 and the proper transmission ratio in respect to the driving gears, including the worm shafts 4 and 5, a precise angular rotation of the set screw 3 will be effected by the selection of the amount of rotation of the knob 16. Thus, the operator has the feeling that he is turning the zone screw directly.

There is no need that the mechanism operate to report back the amount of adjustment which is actually carried out by the screw 3, because the speed of the motor 6 is chosen to achieve a precise rotative movement. Minor inaccuracies will be corrected by the operator by carrying out a second regulation if necessary. This is not any disadvantage, since the angle of adjustment selected by the operator is based on an estimate which may or may not be very accurate. In some instances, however, it is desirable to have a reporting mechanism for indicating

the amount of movement which is carried out by the adjusting screw 3.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A zone screw adjusting device comprising a housing having a threaded bore, a zone screw threaded into the bore of said housing and being rotatable in one direction to advance said screw and in an opposite direction to retract said screw by threaded engagement with said housing, a driving motor, first and second drive shafts connected to said motor for rotation thereby in respective opposite directions of rotation, first coupling means connected to said first shaft and said screw for rotating said screw in one direction to advance it in said housing, second coupling means connected to said second shaft and said screw for rotating said screw in an opposite direction to retract it in said housing, and an electrical control connected to said first and second coupling means for selectively connecting said first and second coupling means to said first and second shafts including a power supply, a timer connected between said power supply and said first and second coupling means having a graduated dial with a zero position in which neither of said first and second coupling means is actuated and being displaceable in respective opposite directions away from said zero position to connect said first coupling to said shaft for rotation of said screw in one direction when the dial is moved in that direction and for an amount of rotation in proportion to the movement of said dial away from zero and to connect said second coupling to said second shaft for rotation of said screw in an opposite direction when said dial is moved in that direction and for an amount in proportion to the movement of said dial away from zero, said first and second coupling means comprising a first gear rotated by a respective one of said first and second shafts and a second gear connected to said screw for rotation therewith and a coupling gear for drivingly connecting said first and second gears together.

2. A zone screw adjusting device, according to claim 1, wherein said first and second gears are positioned around said zone screw, said second gear being connected to said zone screw.

3. A zone screw adjusting device, according to claim 2, wherein said first and second gears are arranged side-by-side, said coupling gear being arranged to span said first and second gears.

4. A zone screw adjusting device, according to claim 3, wherein said first and second coupling gears include a pivotal lever member carrying a coupling gear, said coupling gear being engageable with said first and second gears.

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