

Feb. 8, 1938.

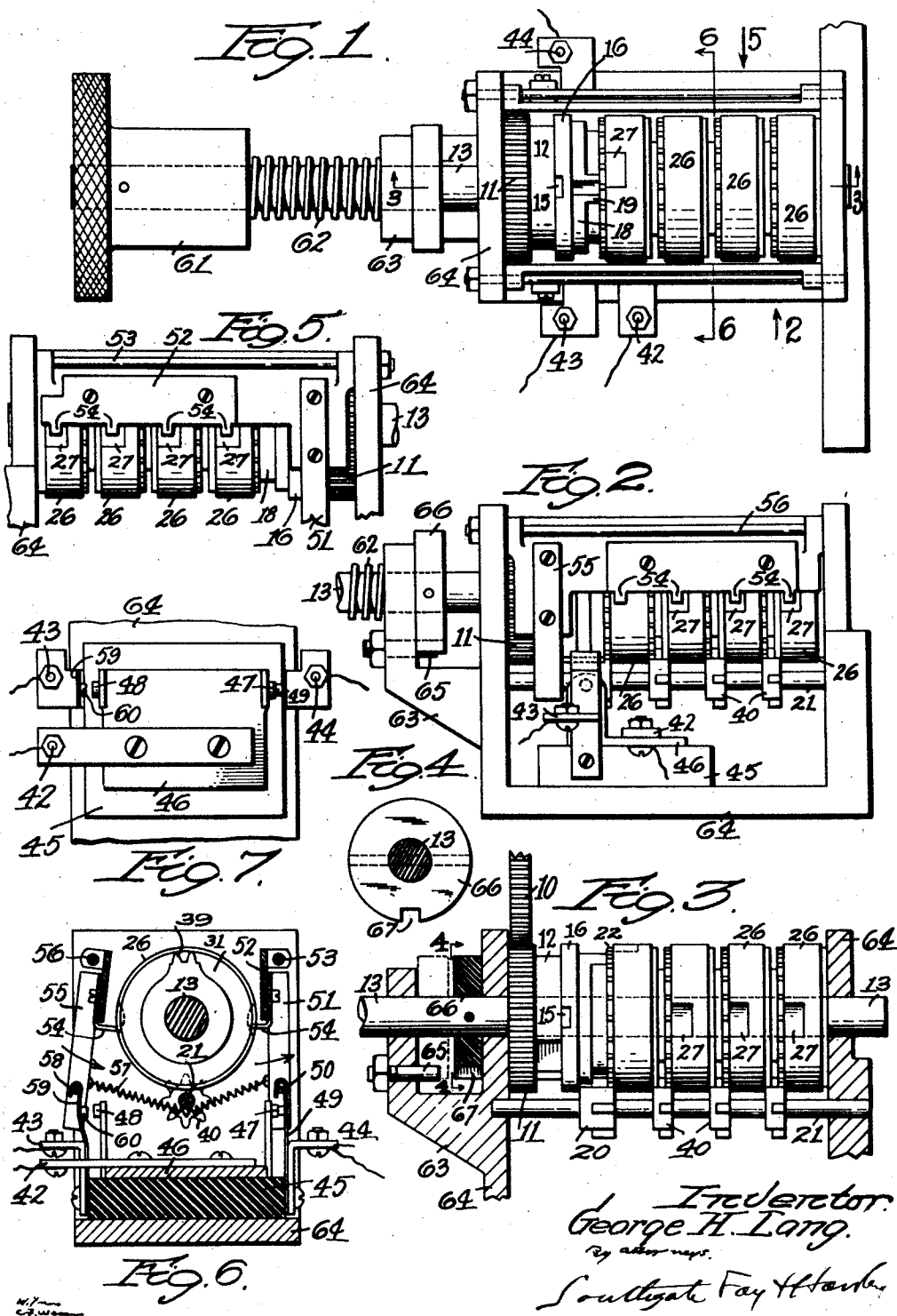
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REVERSING DEVICE

Filed Dec. 28, 1935

2 Sheets-Sheet 1



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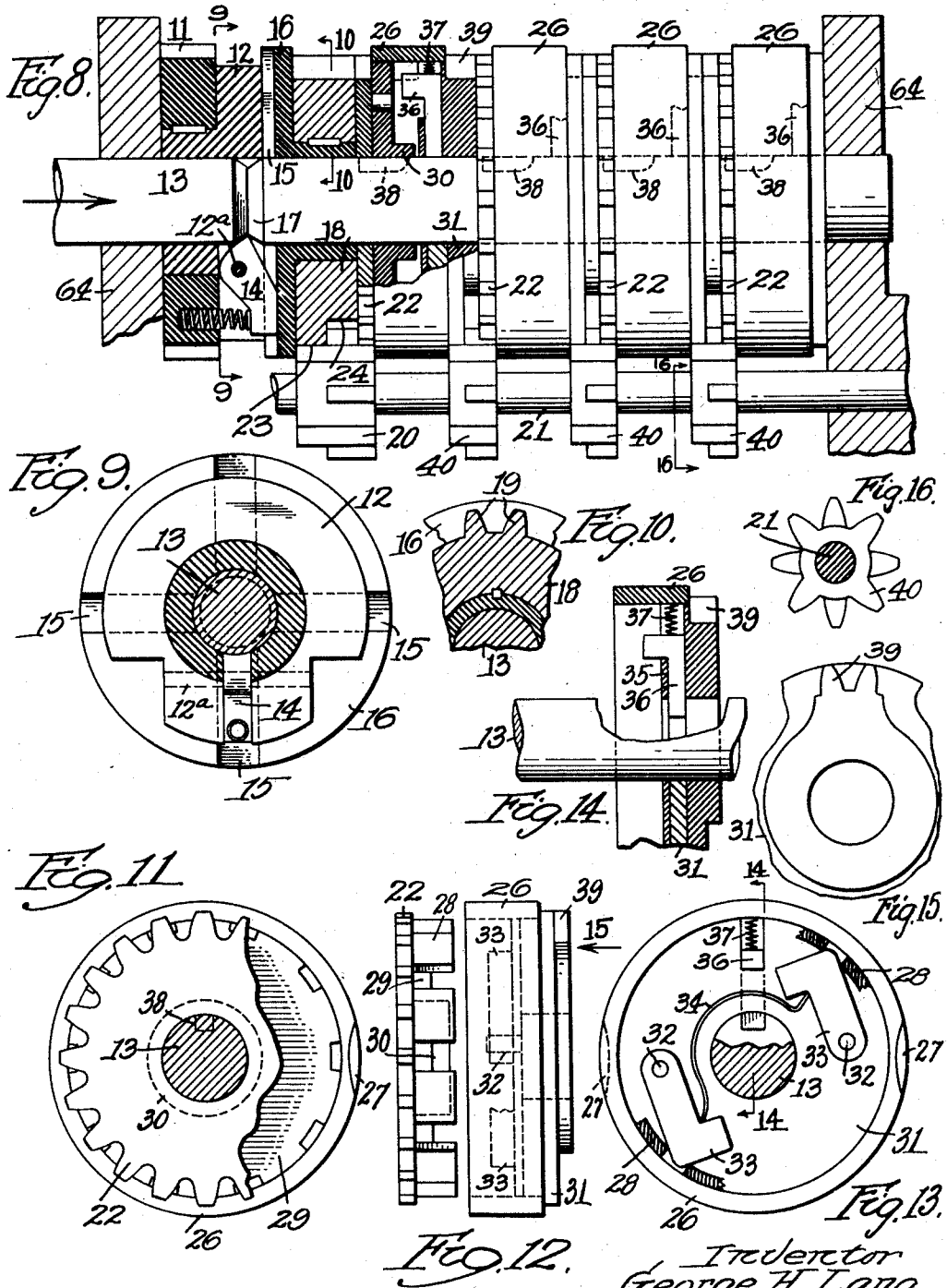
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Inventor
George H. Lang.
By *Attorneys*
Southgate Fay & Hardy

W.H. ...
C. W. ...

UNITED STATES PATENT OFFICE

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REVERSING DEVICE

George H. Lang, Boston, Mass.

Application December 28, 1935, Serial No. 56,475

9 Claims. (Cl. 74-1)

The principal objects of this invention are to provide an adjustable device for limiting the number of turns a roll, such as a beam roll, will take before the motor or other mechanism rotating it will be reversed; to provide a device of this character which will be reversed and restarted automatically to wind the cloth back and forth a plurality of times through a dye vat, bleach tank or the like; to provide a limiting device to add, subtract and reset with complete accuracy; to provide a locking means therefor; to provide such a device in which the point of reversal will always be the same independently of any shrinkage of the cloth being operated upon; to provide a construction which embodies a positive resetting device acting in both directions and to provide for oscillating the beam roll at either end of the run of goods.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a plan of a limiting and reversing device constructed in accordance with this invention;

Fig. 2 is a side view of the same, looking in the direction of the arrow 2 in Fig. 1;

Fig. 3 is a side view of the interior of the device with some of the parts in the front removed, and some of the parts in section on the line 3-3 of Fig. 1;

Fig. 4 is a sectional view on the line 4-4 of Fig. 3 showing the locking collar in elevation;

Fig. 5 is a side view taken in the direction of the arrow 5 in Fig. 1;

Fig. 6 is a sectional view on the section line 6-6 of Fig. 1;

Fig. 7 is a plan of the base of the machine;

Fig. 8 is an enlarged view, partly in central section, of the wheels and operating features;

Fig. 9 is a sectional view on the line 9-9 of Fig. 8;

Fig. 10 is a sectional view on the line 10-10 of Fig. 8;

Fig. 11 is an end view of one of the wheels;

Fig. 12 is a side view of the same with the parts separated;

Fig. 13 is an inside view of one of the elements thereof with parts removed;

Fig. 14 is a sectional view on the line 14-14 of Fig. 13;

Fig. 15 is an end view of a part of one of the wheels as indicated by the arrow 15 in Fig. 12, and

Fig. 16 is a sectional view on the line 16-16 of Fig. 8, showing one of the pinions.

This device is adapted to be used as a means for reversing a motor after it is run for a period and then, after it is run in the reverse direction, changing it back and repeating that process continuously for some time. In using it on a dye jigger in which the cloth is wound up on one beam roll by the operation of one motor and then wound up on another beam roll by the operation of another, two of these devices are used so that the motor for the beam roll from which the cloth is being unwound will continue to rotate in reverse direction. The motors ordinarily are operated synchronously in this respect. Power for each of the beam rolls may be independent or from a common source for all rolls and it may be a motor, as shown in drawings or any other power unit.

Only one of these instruments is shown. In ordinary operation it is rotated by a train of gears represented by the gear 10 which meshes with a gear 11 keyed to a disc 12. The gear and disc are capable of rotating freely on an axially movable shaft 13. On the disc 12 is pivoted, on a pin 12^a, a spring pressed key 14 having two straight edges 14^a and 14^b, one adapted to enter a diametrical slot 15 in a disc 16 and the other adapted, when pivoted back, to just escape this slot so that the rotation of the gear 11 will not be imparted to this disc 16. This key is operated through a corner on it by a V groove 17 extending circumferentially around the shaft 13. In Fig. 8 the shaft 13 is in such a position that rotation will be transmitted to the disc 16 and if the shaft is pushed in the direction of the arrow, it will swing the key and take it out of the slot 15 so that power will not be transmitted.

The disc 16 has a hub to which is keyed a gear 18 having two teeth 19 spaced close to each other at the proper pitch. The space between the teeth extends all the way across the gear 18 but an otherwise cylindrical surface 23 of the same radius as the outer ends of the teeth extends about half way across the gear. The other half of the gear 18 is taken up by an otherwise cylindrical surface 24 of the same radius as the bottoms of said teeth 19.

The teeth 19 are intended to mesh once during each revolution with a pinion 20 loosely mounted on a shaft 21 parallel with the shaft 13. Therefore, when the gear 18 has completed one revolution this pinion 20 will be advanced one step, that is, the pitch of the two teeth. Also meshing with the pinion 20 is a gear 22 and that gear

is advanced the same circumferential distance by meshing with the teeth of the pinion 20. Some of the teeth on the gear 20 extend clear across this pinion and therefore engage the circumferential surface 23 on the gear 18. This surface is unbroken except for a space that is continuous with the space between the two teeth mentioned. Therefore, the pinion 20 is held by the circumferential surface 23 against any rotation or slippage between the acts of turning it between two teeth.

The gear 22 is not keyed to the shaft 13. Adjacent to it is a wheel 26 that is cylindrical but in this case is provided with two notches 27 not directly opposite each other. The gear 22 is provided with laterally projecting teeth 28 spaced apart and mounted on a circular disc 29 that is secured to, or otherwise constitutes a part of, the gear 22. This disc 29 also has a collar 30 at the center. The teeth 28 extend inside the wheel 26 which is provided with a disc 31 on the opposite end. This disc on the inside is provided with two pins 32 on which are mounted a pair of ratchet pawls 33, each one having a rounded projection for engaging in the spaces between the teeth 28. These pawls are pressed apart by a spring 34 which keeps both of them in position to enter said spaces and rotate the next wheel 26 in one direction only, step by step, by the intermittent motion of the gears. Also in the disc 31 is a radial passage 35 in which is located a key 36 which is spring-pressed inwardly by a spring 37 so that this key can project into a keyway 38 in the shaft 13. The gear 22 is locked fast in its operating position to the disc 26 by the key 36 being in engagement with one of the slots between the teeth 28. This insures a positive drive through the intermittent gearing of all the parts of the device in either direction of rotation. Normally the key is pressed out by the cylindrical part of the shaft and is allowed to enter a keyway in the shaft only when the shaft is pushed to the right from the normal running position shown in Fig. 8. In that figure when the pinion 20 is turned, it transmits its rotation to the gear 22. The rotation of the shaft 13 picks up all the wheels 26 in this way, one by one, so that finally all are keyed to the shaft. The dropping of the keys for this purpose disengages the keys from the slots between the teeth 28.

The gear 22 meshes with the pinion 20 and at each revolution of the gear 18 the pinion 20 is rotated two teeth and the gear 22 also. In other words, ten revolutions are counted between gears 18 and 22 on the machine but not registered. It will be seen, therefore, that each unit of this machine consists of the gear 22, the disc 31 and the parts between and that as many of these units may be used as desired, four being shown. The connection between any two adjacent units is a loose pinion 40 constructed similar to pinion 20 and mounted loosely on the shaft 21. In the unit just being discussed the disc 31 carries a double tooth 39 adapted to turn the second gear 40 on the shaft 21.

The rest of the wheels are arranged in the same way. The machine operates like a counting machine but without any numerals or any means for registering or recording the computations. It is set to wind a certain yardage of cloth on one beam roll and to rewind it on another and so on.

It is provided with a terminal 42 always connected with one side of a motor, not shown,

which motor operates the gear 10 and on opposite sides there are two terminals 43 and 44, connected with the other side of the motor in such a way as to rotate the motor forward and reverse. On an insulating plate 45 is a metal plate 46 carrying the terminal 42. Extending up from the metal plate 46 are two contacts 47 and 48. The terminals 43 and 44 are mounted on the insulator 45 and the terminal 44 has on it a spring contact strip 49 adapted to be brought into engagement with the contact 47 to close the circuit here. This spring 49 is in the form of a hook engaging a pin 50 carried by an insulating arm 51 fixed on a frame 52 which is pivoted on a longitudinal rod 53. This frame extends the length of the machine and is provided in the present case with four projections 54 which are adapted to rest on the surfaces of the wheels 26 and to hold the arm 51 back. Thus the contacts 47 and 49 cannot touch until all four of the notches 27 are in alignment and receive the four projections 54, in which case the contact will be made.

On the other side these features are duplicated to control a frame carrying an arm 55 swinging on a rod 56. The arms 51 and 55 are yieldingly pressed inward by a spring 57. This arm 55 is connected by a pin 58 with a spring metal hook 59 on which is a contact 60. The spring hook 59 is mounted on the terminal 43. This contact 60 engages the contact 48 when allowed to by the lining up of the notches 27 on that side.

When all the projections 54 on either side rest in the notches 27 the contacts will be made to complete a circuit to reverse the motor and start winding in the opposite direction.

The motor is started in the usual way by a push button, not shown, and a stopping push button, not shown, is employed when the machine has been run in each direction enough to accomplish the purpose intended, as for example to color the cloth to the proper shade.

Most of the novel features of the invention reside in the resetting device. Fixed on the end of the shaft 13 is an operating hand wheel 61 pressed outwardly by a spring 62 which abuts against an integral bracket 63 on the frame 64 of this machine. Thus the shaft is yieldingly but strongly pressed to the left. The bracket 63 carries a straight short rod 65. The shaft 13 has fixed to it a locking disc 66 provided with a notch 67 for receiving the rod 65.

With the parts running and in the position shown in Figs. 1 and 2, the shaft 13 is locked against turning by the rod 65 and disc 66. At any time the operator can push the wheel 61 in toward the machine and turn the key 14 to disconnect the disc 16 from its source of power. This motion of the shaft 13 to the right also brings all the keyways 38 into registration with the respective keys 36. Then all the wheels 26 are keyed to the shaft 13 and will rotate with it, as soon as the shaft has been rotated by the wheel 61 through one revolution. This hand wheel is used to reset the machine to zero. When the shaft is turned until the wheels 26 are picked up one by one by the keys 36 dropping into the keyways 38 and brought to the position in which all four projections 54 are in the notches 27 on the side on which the contacts 47 and 49 are located, these contacts will complete the circuit through the terminal 44. At the same instant the notch 67 in the disc 66 comes back to the rod 65 and the spring 62 forces the shaft 13 to the left. This,

of course, leaves the whole device set back to zero.

Prior to this time the cloth is tested for color. This is done by cutting one end of the cloth and comparing it with a standard. It would provide a spot of too high a color on the part of the cloth in the dye if the machine were allowed to remain stationary during the period when the color is being tested. The cloth is passed back and forth for a short distance in the dye. The machine is caused to rock during this period to spread out the color so that it will not be noticeable. This rocking motion is initiated by pressing a so-called rock switch 85, which connects the contacts 48 and 47 with their source of power to reverse the rotation until about three revolutions of the beam roll have been completed. Then contacts 48 and 60 cause reversal in the opposite direction for about three revolutions, and this reversal or rocking continues as long as said contact is closed. This rocking will continue until all the projections 54 on the second side rest in their notches. Then another reversal will take place. This rocking action is intended to continue as long as the operator desires. Then this machine will serve to rock the beam rolls to move the cloth a short distance back and forth in the vat.

It will be seen, therefore, that this machine will limit the number of turns a beam or other roll will make before it is reversed by the reversal of a motor which rotates it. It reverses and re-starts automatically a plurality of times. The point of reversal is always the same, irrespective of shrinkage of the cloth. The resetting device is easily operated and is positive. It can be used in dyeing, bleaching or washing and can be operated for the process of rocking.

Having thus described my invention and the advantages thereof I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I do claim is:—

1. In a device for controlling the duration of operation of a machine and reversing it, the combination of a series of rotatable wheels and carrying means for rotating one wheel one step when the next wheel has completed a revolution, the combination therewith of an axially movable shaft on which said wheels are rotatably mounted in one portion of the shaft, and a radially movable key carried by each wheel, said shaft having corresponding key-ways normally out of registration with the keys but so located as to be brought into registration with all of them when the shaft is moved in one direction from normal position, to key the wheels to the shaft.

2. In a device for controlling the duration of operation of a machine and reversing it, the combination of two rotatable wheels and carrying means for rotating the second wheel one step when the first wheel has completed a revolution, with an axially movable shaft on which said wheels are rotatably mounted, a radially movable key carried by the second wheel, said shaft having a corresponding keyway normally out of registration with the key but so located as to be brought into registration with it when the shaft is moved in one direction from normal position to key the second wheel to the shaft, a spring for moving the key into the key-way, a constantly operated member for normally rotating the wheels, and means for disconnecting said member from the wheels when the shaft is moved in a direction to bring the key-way into registration with the key.

3. In a device for controlling the duration of operation of a machine and reversing it, the combination of an axially movable shaft, a gear rotatably mounted on the shaft, a wheel rotatable on the shaft having means for the purpose of rotating the wheel with the gear, said wheel having a segment of a gear attached thereto consisting of two teeth, a freely rotatable pinion adapted to mesh with the last named gear, and a complete gear loose on the shaft and meshing with said pinion and driven thereby when the pinion turns.

4. In a device for controlling the duration of operation of a machine and reversing it, the combination of an axially movable shaft having a circumferential groove, a gear rotatably mounted on the shaft, a pawl carried by the gear and having a projection entering said groove, a wheel rotatable on the shaft having a radial slot into which said pawl is adapted to project for the purpose of rotating the wheel with the gear, said pawl and groove being so related to each other that, when the shaft is moved axially toward the wheel, the pawl will be removed from the radial slot and the gear will be disconnected from the wheel, said wheel having a segment of a gear attached thereto consisting of two teeth, a freely rotatable pinion adapted to mesh with the last named gear, a complete gear loose on the shaft and meshing with said pinion and driven thereby when the pinion turns, whereby the two toothed gear will turn the pinion two teeth during each rotation of said two toothed gear and turn said complete gear one step.

5. In a device for controlling the duration of operation of a machine and reversing it, the combination of a series of wheels so arranged that the complete rotation of each wheel will turn the next wheel one step, of a shaft on which the wheels are mounted, said shaft being movable axially, means by which the axial movement of the shaft will disconnect the wheel from its driving means, and means whereby the rotation of said shaft through 360° will move the shaft back and lock it against further rotation.

6. In a device for controlling the duration of operation of a machine and reversing it, the combination of a series of wheels, a gear for driving the machine, a shaft on which the wheels are mounted to freely rotate, said shaft being axially movable, means whereby, when the shaft is moved, the connection of the driving gear to said wheels will be broken and the rotation of the shaft one revolution will set all the wheels to the reversing position.

7. In a device for controlling the duration of operation of a machine and reversing it, the combination of a series of wheels, a gear for driving the machine, a shaft on which the wheels are mounted to freely rotate, said shaft being axially movable, means whereby, when the shaft is moved, the connection of the driving gear to said wheels will be broken and the rotation of the shaft one revolution will set all the wheels to reversing position, a disc fixed to the shaft and having a notch, a rod in fixed position at the same distance from the center of the shaft as the notch, and a spring for moving the shaft back when the notch registers with the pin and thereby locking the shaft in that position.

8. In a device of the character described, the combination of a series of wheels, of a gear for driving the device, a shaft on which the wheels are mounted to freely rotate step by step, said shaft being axially movable, means whereby,

when the shaft is moved, the connection of the driving gear will be broken and the rotation of the shaft one revolution will set all the wheels to the same relative position, and the return of the shaft axially to its normal position will lock the wheels to their corresponding parts.

9. In a device of the character described, the combination of a series of rotatable wheels and carrying means for rotating one wheel one step when the next wheel has completed a revolution,

an axially movable shaft on which said wheels are mounted, and a movable key carried by each wheel to lock the moving parts of each wheel together, said shaft having corresponding key-ways normally out of registration with the keys but so located as to be brought into registration with all of them when the shaft is moved in one direction from normal position, to key the wheels to the shaft.

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