

## REVERSING MECHANISM FOR ROTATING SHAFTS.

Patented Feb. 23, 1909.

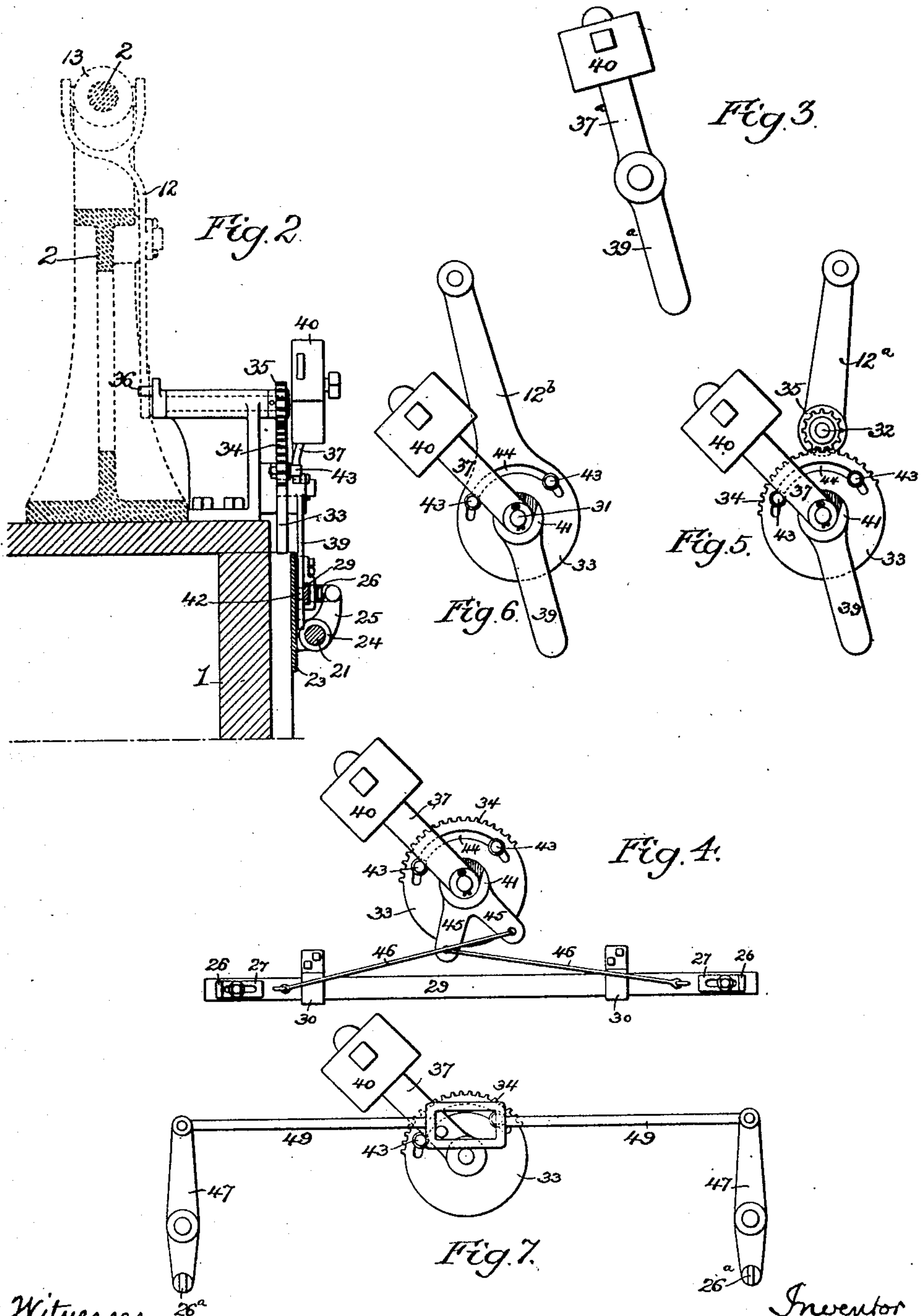
2 SHEETS—SHEET 1.

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**REVERSING MECHANISM FOR ROTATING SHAFTS.**  
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**913,195.**

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# UNITED STATES PATENT OFFICE.

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## REVERSING MECHANISM FOR ROTATING SHAFTS.

No. 913,195.

Specification of Letters Patent.

Patented Feb. 23, 1909.

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*To all whom it may concern:*

Be it known that I, WILLIAM H. BROWN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Reversing Mechanism for Rotating Shafts, of which the following is a specification.

The object of my invention is to provide simple, efficient, and automatic means for causing reversal in the direction of rotation of a shaft at predetermined intervals, which may, if desired, be varied to accord with the requirements of any particular circumstances under which a machine is being operated.

In the accompanying drawings:—Figure 1 is an end view of part of a dyeing machine which I have selected as a means of illustrating my invention, those features of the machine which have heretofore been used being represented by dotted lines and the features to which my present invention relates being shown by full lines; Fig. 2 is a vertical section on the line *a—*a**, Fig. 1, and Figs. 3 to 8 inclusive, are views illustrating various modifications of my invention.

Referring in the first instance to Figs. 1 and 2 of the drawings, 1 represents the end of a dye tub, upon the top of which is mounted a framework 2, having, at the top, bearings for a transverse shaft 3, which is provided with a chain wheel 4, whereby it may be rotated by means of a chain belt running to a similar chain wheel on any adjacent power shaft. The shaft 3 also has, at each end, a pair of bevel wheels 5 and 6, and it can be moved longitudinally in its bearings so as to cause either the bevel wheels 5 or the bevel wheels 6 to engage with bevel pinions 7 at the upper ends of vertical shafts 9, which are adapted to suitable bearings on the frame 2, and carry, at their lower ends, propeller wheels 10 rotatable in openings in a horizontal partition 11 contained within a circulating chamber of the dye tub, whereby, when they are rotated in one direction, flow of the dye liquor from top to bottom of the tub will be effected, and when they are rotated in the opposite direction, will cause corresponding reversal in the direction of such flow. A lever 12, which engages a grooved collar 13 on the shaft 3, serves to effect the longitudinal movements of said shaft necessary to carry either the bevel wheels 5 or the bevel wheels 6 into mesh with

the bevel pinions 7, and thereby effect change in the direction of rotation of the propellers 10. All of these parts have heretofore been employed in connection with dyeing machines of the type to which my invention relates, but hitherto the operation of the lever 12 has been effected by hand and it has been customary to arrest the rotation of the shaft 3 while such change is being effected. My invention, as used in this connection, has for its purpose the automatic reversal of the direction of rotation of the mechanism at predetermined intervals, whereby this operation can be effected at proper times during the dyeing process without any care or attention on the part of the dyer and with greater exactitude than when such change is dependent upon its action.

Upon one of the vertical shafts 9 is a bevel pinion 14, which meshes with a bevel wheel 15 on a short horizontal shaft 16, suitably mounted on the top of the tub, this shaft having a chain wheel 17, which, through the medium of a chain belt 19, drives a chain wheel 20 secured to one end of a screw shaft 21, the latter being free to turn in bearings 22 secured to a bar or plate 23, mounted upon the end of the tub, the bearing portions of the screw shaft being preferably reduced in diameter so as to form shoulders which prevent any longitudinal movement of said screw shaft. By the use of the chain wheels and chain belt for driving the screw shaft, positive motion is transmitted thereto and the shaft is driven in strict consonance with the propelling mechanism which causes the flow of the dye liquor. A nut 24 is in engagement with the screw shaft 21, and is prevented from turning thereon in any suitable way, said nut having, in the present instance, a bearing against the plate 23 for this purpose, and the nut is provided with a projecting arm 25, adapted to contact with lugs 26 which project from slides 27 adjustable longitudinally on a bar 29, the latter being carried by suitable bearings 30 on the plate 23, and being free to slide longitudinally in said bearings. By the use of the plate 23, the parts mounted thereupon can all be assembled and fitted in the machine shop and then applied to their proper position upon the tub and supported thereon by the use of a few wood screws at each end of the plate, my invention being thus readily applicable to machines already in use.



The frame 2 is provided with bearings for a pair of shafts 31 and 32, the shaft 31 having secured to it a disk 33 with toothed segment 34 and the shaft 32 having a spur wheel 35 in mesh with said toothed segment. The shaft 32 also has a crank pin 36, which engages with a slot in the lower arm of the lever 12, whereby, when said crank pin occupies a position at one end of its throw, it will movesaid lever to position for that adjustment of the shaft 3 which maintains the bevel wheels 5 in mesh with the bevel pinions 7, and when at the other extreme of its throw will move the lever to position for adjustment of the shaft 3 which maintains the bevel wheels 6 in mesh with the bevel pinions 7. Loosely mounted on the shaft 31 are two arms 37 and 39, the arm 37 being provided with a weight 40, and the arm 39 having, by preference, a slotted hub 41, which permits a certain amount of play of the arm 37 in respect thereto, the lower end of the arm 39 projecting between lugs 42 on the slide bar 29. The weighted arm 37 plays between projecting studs 43 on the disk 33, which studs may be fixedly mounted on the disk, although they are preferably adjustable from and towards each other in a slot 44 in said disk, as shown in Fig. 1.

Supposing that the parts are in the position shown in Fig. 1 with the nut 24 traveling on the screw shaft 21 in the direction of the arrow shown in said figure, the arm 25 of said nut, when the latter approaches the predetermined limit of its travel in this direction, strikes the projecting lug 26 at the left hand end of the slide bar 29, and thereby causes the latter to partake of the further movement of the nut, the effect of this movement being to cause the right hand pin 42 on the slide bar to move the arm 39 in the direction of the arrow, which movement is imparted, through the medium of the hub 41, to the weighted arm 37 and continues until said arm 37 passes beyond the vertical position, whereupon the weight will cause said arm to fall to the right, and it will, by contact with the right hand pin 43 on the disk 33, move the latter in the direction of the arrow, so that its toothed segment 34 will cause partial rotation of the spur wheel 35 and shaft 32, the crank pin 36, therefore, acting upon the slotted lower portion of the lever 12 to shift the same from the position shown in Fig. 1 to the reverse position, and thus cause such movement of the shaft 3 as will carry the bevel wheels 6 out of engagement with the bevel pinions 7 and move the bevel wheels 5 into engagement therewith, thereby effecting change in the direction of rotation of the propeller wheels 10 and a corresponding change in the direction of flow of the dye liquor through the tub. A corresponding change in the direction of rotation of the screw shaft 21 also takes place,

the nut 24 starts on its return travel, and, when its arm 25 contacts with the lug 26 at the right hand end of the slide bar 29, effects a restoration of the parts to the positions shown in Fig. 1.

While I prefer to provide the arm 39 with a slotted hub in order that the said arm may have a free fall in either direction, and thus acquire some momentum before striking the pin 43 and also in order that the extent of movement of the arm 37 shall be less than that of the weighted arm 39 and thereby prevent excessive movement of the slide bar 29, said arms 37 and 39 may be rigidly connected, or formed in one piece, if desired, as shown, for instance, in Fig. 3, or the movement of the slide bar 29 may be shortened by providing the slotted hub 41 with two short arms 45, connected to the slide bar by crossed rods 46, as shown in Fig. 4, or this latter construction may be adopted even if the arms 45 are rigidly connected to or formed in one piece with the arm 37, and instead of providing the shaft 32 with a crank pin for engaging a slotted portion of the shifting lever 12, said shaft may constitute the fulcrum shaft of the lever, as shown in Fig. 5, or the shaft 32 and the parts carried thereby may be dispensed with if desired, by connecting the lever 12 directly to the disk 33, as shown in Fig. 6, or by transmitting movement to said lever 12 from the shaft 31 in the same manner as it is now transmitted thereto from the shaft 32, or the slide bar 29 and its appurtenances may, if desired, be abandoned and the nut 24 may be caused to act directly upon levers 47 connected by a rod 49 to the weighted arm 37, as shown in Fig. 7, said connection being preferably slotted to provide the desired limit of free movement of the arm 37, or other modifications in detail may be adopted within the knowledge of those skilled in the art without departing from the essential features of my invention. By adjusting from or towards each other, upon the slide bar 29, the slides 27, which carry the contact lugs 26, the intervals between the successive reversals in the direction of rotation of the shafts 9 may be increased or diminished to any desired extent.

Instead of mounting the spur wheels 5 and 6 fixedly upon the shaft 3, I may, in some cases, mount said spur wheels rotatably upon said shaft and retain them longitudinally thereon, as shown in Fig. 8, each spur wheel having a clutch member 5<sup>a</sup> or 6<sup>a</sup> for engagement with a clutch member 50 which is secured to and rotates with the shaft 3, and can, by the longitudinal movement of said shaft, be caused to engage with either of the clutch members 5<sup>a</sup> or 6<sup>a</sup>, as desired.

I claim:—

1. The combination of a rotating shaft, reversing devices operating in conjunction therewith and including a lever, a screw



shaft operating in consonance with said rotating shaft, a traveling nut on said screw shaft, and means, interposed between said nut and the reversing lever, whereby the latter is shifted at predetermined intervals, one of the elements of said interposed mechanism being a weighted and swinging arm which can fall by gravity whenever it passes, in either direction, beyond a vertical line.

2. The combination of a rotating shaft, reversing devices operating in connection therewith and including a lever, a screw shaft, operating in consonance with said rotating shaft, a traveling nut on said screw shaft, and means, interposed between said nut and the reversing lever, whereby the latter may be shifted by the nut at each end of the traveling movement of the latter, said interposed means including a weighted and swinging arm which can fall by gravity whenever it passes in either direction beyond a vertical line, and means acted upon by the arm in its fall and serving to transmit the movement of said arm to the reversing lever.

3. The combination of a rotating shaft, reversing devices operating in connection therewith and including a lever, a screw shaft operating in consonance with said rotating shaft, a traveling nut on said screw shaft, and means interposed between said nut and the reversing lever, whereby the latter may be shifted by the nut at each end of the traveling movement of the latter, said interposed means including a weighted and swinging arm, free to fall by gravity whenever it passes in either direction beyond a vertical line, a toothed segment moved by said falling arm, a spur wheel meshing with said segment, and means whereby the movement of said spur wheel is transmitted to the reversing lever.

4. The combination of a rotating shaft, reversing devices operating in connection therewith and including a lever, a screw shaft operating in consonance with said rotating shaft, a traveling nut on said screw shaft, and means, interposed between said nut and the reversing lever, whereby the latter may be shifted by the nut at each end of the traveling movement of the latter, said interposed

means including a slide bar with lugs to be acted upon by the nut, a weighted and swinging arm which is free to fall by gravity whenever it passes in either direction beyond a vertical line, means whereby said swinging arm is acted upon by the slide bar, and means for transmitting movement of the arm to the reversing lever.

5. The combination of a rotating shaft, reversing devices operating in connection therewith and including a lever, a screw shaft operating in consonance with said rotating shaft, a traveling nut on said screw shaft, and means interposed between said nut and the reversing lever, whereby the latter may be shifted by the nut at each end of the traveling movement of the latter, said interposed means including a swinging arm to which movement is imparted whenever the nut reaches the predetermined limit of its travel in either direction, a swinging and weighted arm having a lost motion connection with said first arm and free to fall by gravity whenever it passes in either direction beyond a vertical line, and means whereby the movement of said swinging and weighted arm is transmitted to the reversing lever.

6. The combination of a machine having, as one of its elements, a rotating shaft, reversing devices therefor, and means for effecting automatic shift in the position of said reversing devices at predetermined intervals, said means being carried by a single plate secured to the machine.

7. The combination of a main rotating shaft, reversing devices therefor, and automatic shifting mechanism for said reversing devices, said mechanism including a screw shaft separate from the main rotating shaft, a traveling nut on said screw shaft, and means for positively driving said screw shaft from the main rotating shaft, but at a lower rate of speed.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM H. BROWN.

Witnesses:

HAMILTON D. TURNER,

KATE A. BEADLE.