May 27, 1941. C. A. NEWHALL 2,243,115

FOLDING MACHINE

Filed Aug. 21, 1939 2 Sheets-Sheet 1

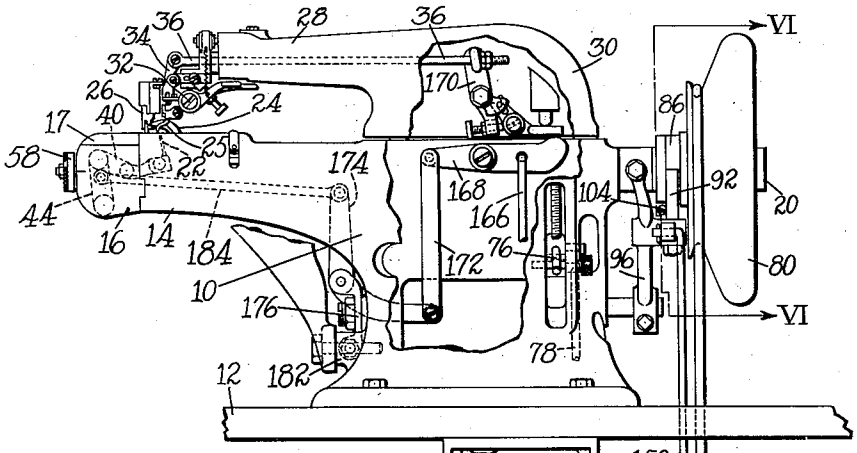


Fig. 1

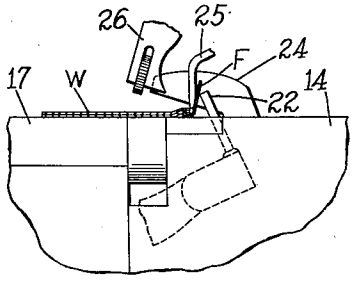


Fig. 2

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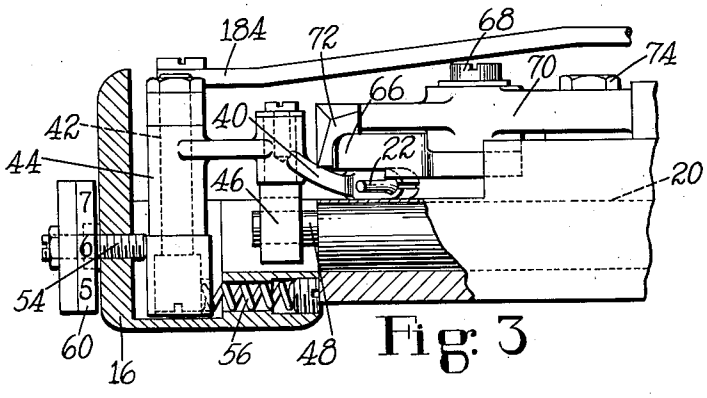


Fig. 3

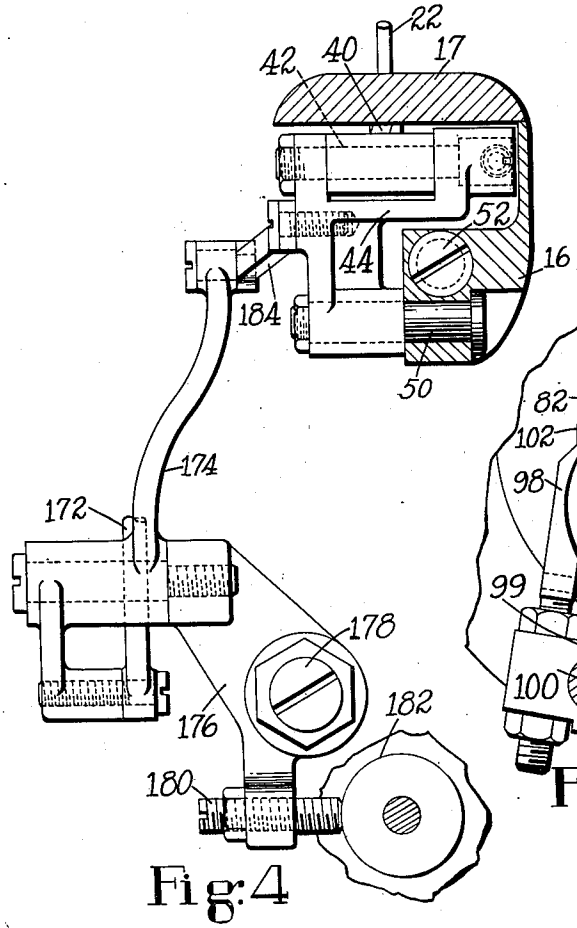


Fig. 4

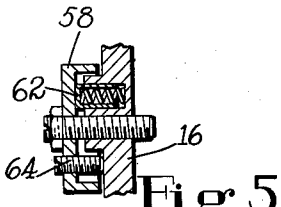


Fig. 5

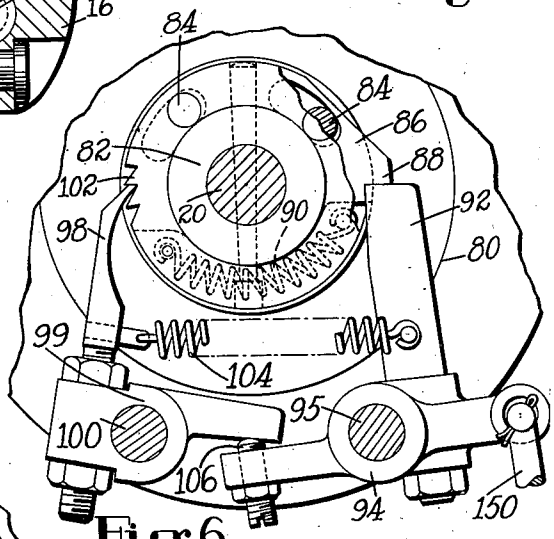


Fig. 6

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2,243,115

UNITED STATES PATENT OFFICE

2,243,115

FOLDING MACHINE

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Application August 21, 1939, Serial No. 291,152

12 Claims. (Cl. 12—55)

This invention relates to improvements in folding machines for operating upon shoe parts and is herein illustrated as applied to a machine designed for use in folding work pieces to which French binding has been sewn.

To facilitate the easy operation of such machines it is desirable that the work pieces shall not be gripped by the operating tools of the machine when the latter comes to a stop, and it is further equally desirable that the operator shall be able to insert a new piece of work without effort on his part. To this end an object of the invention is to provide an improved control mechanism for machines of this type, and in accordance with an important feature of the invention, the control mechanism is arranged to lift the creaser foot away from the work and substantially simultaneously to displace the lip turner or folding finger with respect to the work and the creaser foot. As herein shown, this control mechanism is interconnected with a clutch and transmitter control mechanism, thereby to insure stopping of the machine so that its drive shaft occupies a predetermined position, and hence the hammer is left elevated away from the anvil, whereby these tools do not grip the work.

Still another feature of the invention resides in an improved mounting for the lip-turner-supporting lever which permits ready displacement thereof, as above described, and also permits displacement of the lip turner in case a thickened portion of the work is encountered. As herein illustrated, a tiltable support for the fulcrum of the lip-turner lever is spring-pressed against an adjustable stop. This and other features of the invention will be described in the following specification taken in connection with the accompanying drawings.

Fig. 1 is an elevation of a folding machine for shoe parts, together with a transmitter and treadles for controlling the machine;

Fig. 2 is a detail view on much larger scale showing the work-engaging tools in open position;

Fig. 3 is a horizontal section through the projecting end of the lower arm of a folding machine to show the mounting of the lip turner;

Fig. 4 is a transverse section through this arm just outside the lip-turner support;

Fig. 5 is a detail of the adjusting screw for the lip-turner support; and

Fig. 6 is a vertical section on the line VI—VI of Fig. 1, showing part of the clutch.

The invention has been illustrated as applied to a folding machine of the general type shown in Letters Patent of the United States No. 1,702,598, granted February 19, 1929, upon the application of P. R. Glass. The patented machine is arranged for skived leather folding, whereas the operating tools of the illustrated machine are applied to the folding of French-binding work, but the invention generally is equally applicable to either sort of machine. Such folding machines include a base 10 supported on a bench 12 and provided with an outwardly extending lower arm 14 having a detachable hollow end casting 16 which has a cover 17 and is attached to the arm by a screw 52. In this base there is journaled a drive shaft 20 by means of which power is supplied for operation of a lip turner 22 and of a hammer and anvil work-feeding arrangement 24. The work is held against the support provided by the arm 14 by means of a creaser foot 26 which is pivoted on a bracket extending outwardly from the overhead arm 28 forming a part of a hollow cover 30. One form of support for such a creaser foot is illustrated in Letters Patent of the United States No. 2,087,971, granted July 27, 1937, upon the application of Joseph Harrington, Jr. The support for the creaser foot pivots around the axis of the screw 32, and in the arrangement herein shown an upstanding arm 34 attached to the creaser foot support is provided, to which arm 34 there is connected an operating rod 36 arranged for movement under the control of the operator by connections which will be later described.

The lip turner 22 is clamped in the end of a lever 40 (Fig. 3) which is fulcrumed at its other end upon a pin 42 carried in a forked supporting arm 44, the position of which may be adjusted as will be presently described. The lever 40 is provided at an intermediate point with a slotted member 46 engaging an eccentric portion 48 of the drive shaft 20. By means of this driving arrangement the lip turner 22 is oscillated in a path more or less parallel with the inclined face of the creaser foot 26, thereby folding the French binding F attached to the work W (Fig. 2) around the lower corner of the creaser foot. The forked supporting member 44 is tiltably mounted upon a pin 50 secured in the casting 16, and the position of the supporting arm 44 is determined by an adjustable stop screw 54 against which the arm is held by a compression spring 56. In order that the position of the stop screw 54 may readily be duplicated, it is provided with a hand wheel 58 having indicia 60 on its circumference. A spring-pressed drag button 62 (Fig. 5) is provided for preventing unintended rotation of the stop screw, and inward movement of the hand wheel toward the body of the machine is limited by another stop screw 64. As in the patented machine, the folded margin of the work is pressed down upon the body of the work by means of a hammer 66 pivotally mounted at 68 upon an arm 70 carrying an anvil 72 with which the hammer cooperates to complete the fold.

The anvil-carrying arm 70 is clamped by a bolt 74 to an oscillating shaft, not shown, whereby a feeding movement is imparted to the work during the time when it is gripped between the hammer and anvil. It will be understood that the oscillatory movement of the anvil arm 70 is effected by cam connections to the drive shaft 20, as described in the aforementioned Glass patent for example. The extent of the feeding movement may be controlled by adjustment of the position of a feed shortening lever 76 (Fig. 1), and this adjustment is conveniently effected by a treadle rod 78 connecting the lever 76 to an arm 79, to be later described.

A clutch of the Horton type is provided for connecting a loose pulley 80 to the drive shaft 20 at the will of the operator. This clutch, as is illustrated in Letters Patent of the United States No. 2,044,501, granted June 16, 1936, upon the application of P. R. Glass, comprises one portion 82 pinned to the drive shaft and is adapted to be locked to another portion on the pulley 80 by means of rolls 84. These rolls 84 are retained in position by means of a cage 86 having a lug 88. This cage is turned with respect to the shaft 20, whenever it is permitted to do so, by means of a spring 90, thus causing the rolls 84 to lock together the clutch parts or "throw in" the clutch, and at such times the cage turns with the drive shaft. When the clutch is to be thrown out, however, a stop arm or a dog 92 is moved into position to underlie the lug 88 and to hold the cage 86 against rotation, thus freeing the rolls. This dog 92 is secured to a lever 94 pivoted upon a stud 95 in one arm of a bracket 96 secured to the frame of the machine. Cooperating with the dog is a pawl 98 secured in a lever 99 pivoted at 100 upon the other arm of the bracket 96 and normally held for engagement with ratchet teeth 102 on the cage 86 by means of a spring 104 which interconnects the pawl 98 and the dog 92. In order that the pawl may be released whenever the dog is moved out of "stop" position, the levers 94 and 99 have tails the former of which is provided with an abutment screw 106.

The supply of power to the folding machine can conveniently be effected through a transmitter 110 of the so-called sewing machine type, which is secured to the underside of the bench 12. This transmitter includes a bracket 112 in which is journaled a shaft carrying a transmitting pulley 114 belted to the loose pulley 80 of the folding machine and provided with a braking drum 116. Loose on the same shaft is a stepped pulley 118 to which power may be supplied from any convenient source. The transmitter also includes a lever 120, one end of which is normally held up by means of a spring 122 and the other end of which is provided with a friction brake 124 cooperating with the drum 116. This lever also has a depending fork 126 for pushing the driven stepped pulley 118 into frictional engagement with the transmitting pulley 114.

Folding machines of this general type have commonly been provided with a pair of treadles 130 and 132 rockably mounted in a supporting base 134. The left-hand treadle 130 is pinned to a shaft 136 to the other end of which there is connected a forked member including the arm 79 extending toward the operator and an arm 138 extending away from the operator. The left-hand treadle has been used previously solely for adjusting the feed shortening mechanism by means of the treadle rod connection 78, while the right-hand treadle 132 was used for stopping and starting the machine. To this end the treadle 132 is loosely pivoted on the shaft 136 and has a treadle rod 140, 142 connected to the transmitter lever 120. This treadle 132 is also provided with a rigidly attached plate 144 overlying a stop 146 on a treadle rod 148, 150 the upper end of which is connected to the lever 94 in which is mounted the dog 92.

For the purposes of this invention and in order that the work-engaging tools may be surely withdrawn from the work when the machine is stopped, the treadle 130 is now provided with an arm 152 sliding loosely on a rod 154 which is attached at 156 to the rod 140 controlling the transmitter. The arm 152 cooperates with a collar 158 on this rod 154 so that when the heel of the left-hand treadle 130 is depressed the transmitter lever is moved slightly to remove the brake 124 and by light pressure upon the transmitter clutch to cause a slipping drive of the pulleys 114, 80, thereby to turn the roll cage 86 and bring the lug 88 thereon firmly into engagement with the dog 92. At the same time, a rod 160 loosely connected to the arm 138 is pushed upwardly, and this by means of a crosspiece 162 underlying a collar 164 on the rod 148 positively pushes the dog 92 into engagement with the roll cage 86 to catch the lug 88.

In addition, the treadle rod 160 is arranged, when the heel end of the treadle 130 is depressed, to lift the creaser foot 26 and to move the lip turner 22 out of its normal path of movement. To this end the rod 160 has an extension 166, the upper end of which is connected to a lever 168 pivotally mounted inside the frame of the machine. Raising the right-hand end of this lever 168 operates to rotate a lever 170 to the upper end of which is attached the rod 36 which lifts the creaser foot. At the same time the left end of the lever 168 is connected by a link 172 to a bell-crank lever 174 which is pivotally mounted on a bracket 176 (Fig. 4) secured to the frame by an attaching screw 178 and held in adjusted position by a screw 180 which rests against a boss 182 on the frame of the machine. This lever 174 is joined by a link 184 to the tiltable support 44 for the lip-turner lever, and when the bell-crank lever 174 is tilted to draw the link 184 to the right in Fig. 1, the lip-turner lever 40 will slide along the eccentric portion 48 of the shaft and move the lip turner 22 bodily away from the creaser foot and also change its path of movement if power were to be supplied to the machine in this condition.

In using the machine, the treadle 132 will be depressed at its toe end to throw in the clutch of the transmitter and to, at the same time, withdraw the dog 92 and the pawl 98 from the Horton clutch of the folding machine. When this treadle is released so that the springs 122 and 104 are effective to bring the transmitter and the Horton clutch back to stop position, the latter will normally act through the dog 92 to stop the shaft 20 in a fixed angular position with respect to the folding machine, thus bringing the hammer to open position.

Moreover, the operator, by depressing the heel end of the other treadle 139, can push up on the rod 160 and thereby lift the creaser foot 26 and draw the lip turner 22 to the right away from the creaser foot and the work. At the same time that he does this, he will positively push up on the rod 148, 150 to press the dog 92 against the

roll cage 86 and will, at the same time, by drawing down on the rod 154 move the transmitter lever 120 slightly (there being a lost motion before the collar 158 is engaged). This will result in supplying enough power to the driving pulley 80 so that the roll cage 86 is turned, if necessary, thereby positively bringing the lug 88 into engagement with the dog 92 and absolutely determining the correct stop position of the shaft. Thus the hammer will surely be away from its anvil so that the piece of work is not grasped between them. Obviously, too, the work is not held by the other operating tools of the machine because of the lifting of the creaser foot and the displacement of the lip turner. This permits the operator to remove one piece and readily insert another piece of work.

Having described my invention, what I claim is new and desire to secure by Letters Patent of the United States is:

1. In a shoe-part-folding machine, a power-operated shaft, shoe-part-engaging tools arranged to be moved by said shaft, a clutch for controlling the supply of power to the shaft, said tools including a power-operated lip turner, and operator-controlled means for moving the lip turner bodily away from the work out of its normal path of movement and controlling the clutch.

2. In a shoe-part-folding machine, a power-operated shaft, shoe-part-engaging tools arranged to be moved by said shaft, a clutch for controlling the supply of power to the shaft, a creaser foot cooperating with said tools to determine the line of fold, and single operator-controlled means for lifting said creaser foot away from the work and controlling the clutch.

3. In a shoe-part-folding machine, a power-operated shaft, shoe-part-engaging tools some of which are arranged to be moved by said shaft, a clutch for controlling the supply of power to the shaft, said tools including a creaser foot engaging the work and a lip turner movable by said shaft in a predetermined path with respect to a surface of said creaser foot, and operator-controlled means for throwing out the clutch and moving said lip turner bodily away from the creaser foot out of its normal path of movement.

4. In a shoe-part-folding machine, a power-operated shaft, shoe-part-engaging tools some of which are arranged to be moved by said shaft, a clutch for controlling the supply of power to the shaft, said tools including a creased foot engaging the work and a lip turner movable by said shaft in a predetermined path with respect to a surface of said creaser foot, and single operator-controlled means for throwing out the clutch, moving said lip turner bodily away from the creaser foot, and lifting the creaser foot out of engagement with the work.

5. In a shoe-part-folding machine, a creaser foot cooperating with the body of the work, an oscillatable lip turner for folding the margin of the work around a corner of the creaser foot, an anvil, a cooperating hammer, a drive shaft for oscillating said lip turner and said hammer, a clutch controlling the supply of power to the drive shaft constructed and arranged to stop said shaft in a predetermined position with the hammer separated from the anvil, said clutch including a dog cooperating with a shoulder on a clutch part, a spring biasing said dog toward said shoulder, and operator-controlled means additional to said spring to positively push said dog into line with said shoulder.

6. In a shoe-part-folding machine, a creaser foot cooperating with the body of the work, means for folding a margin of the work around a corner of the creaser foot, a drive shaft for oscillating said folding means, a clutch controlling the supply of power to the drive shaft, said clutch including a dog cooperating with a shoulder on a clutch part, and single operator-controlled means for pushing said dog into clutch-engaging position and for lifting the creaser foot.

7. In a shoe-part-folding machine, a creaser foot cooperating with the body of the work, an oscillatable lip turner for folding the margin of the work around a corner of the creaser foot, a drive shaft for oscillating said lip turner, a clutch controlling the supply of power to the drive shaft, said clutch including a dog cooperating with a shoulder on a clutch part, and operator-controlled means for pushing said dog into clutch-engaging position and for moving said lip turner bodily away from the work out of its path of oscillation.

8. In a shoe-part-folding machine, a creaser foot cooperating with the body of the work, an oscillatable lip turner for folding the margin of the work around a corner of the creaser foot, a drive shaft for oscillating said lip turner, a clutch controlling the supply of power to the drive shaft, said clutch including a dog cooperating with a shoulder on a clutch part, a friction clutch transmitter for rotating the shouldered clutch part, and single operator-controlled means for positively moving said dog to engage said shoulder and lifting the creaser foot and for supplying power through the transmitter to move said shouldered clutch part into engagement with said dog.

9. In a shoe-part-folding machine, folding instrumentalities including a lip turner, a lever carrying said lip turner, means for oscillating said lever, a movable support for the fulcrum of said lever, a spring urging said support in one direction, and an adjustable stop limiting the movement of said support under the action of said spring.

10. In a shoe-part-folding machine, folding instrumentalities including a lip turner, a lever carrying said lip turner, means for oscillating said lever, a movable support for the fulcrum of said lever, a spring urging said support in one direction, an adjustable stop limiting the movement of said support under the action of said spring, and operator-controlled means for moving said support against the force of said spring.

11. In a shoe-part-folding machine, folding instrumentalities including a lip turner, a lever carrying said lip turner, a pivoted support forming a fulcrum for said lever, a power operated shaft for oscillating said lip-turner lever about its fulcrum, and operator-controlled means constructed and arranged to move said lip turner with respect to the work irrespective of the position of the associated shaft.

12. In a shoe-part-folding machine, folding instrumentalities including a lip turner, a lever supporting said lip turner, a movable support serving as the fulcrum for said lip-turner lever, a shaft provided with an eccentric for oscillating said lever, and operator-controlled means for moving said support in a direction substantially parallel to the axis of said eccentric.

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