To all whom it may concern:

Be it known that we, JOHN H. SUTHERLAND and HOLTON J. SUTHERLAND, citizens of the United States, residing at Swampscott, county of Essex, State of Massachusetts, have invented a certain new and useful Improvement in Pattern-Binding Machines, of which the following is a specification, reference being had thereto in the accompanying drawings.

The invention relates to a new and useful improvement in pattern binding machines. It relates to that type of such machines employed in applying a metal binding along the edge of flat patterns of various kinds, and is especially adapted for use in connection with boot and shoe patterns.

The present application is an improvement on the machine shown and described in Letters Patent No. 1,135,469, granted to said H. J. and J. H. Sutherland, April 13, 1915.

In the machine shown in said patent, the pattern with the binding started on the edge of the pattern is fed between two presser rolls, one of which is movable towards and from the other roll, and the binding is pinched onto the pattern as it passes between the rolls. There is also provided a back stop against which the base of the U-shaped folded binding engages while the pattern and binding are passed between the rolls so as to hold the binding in proper relation to the pattern. The stop is preferably mounted on a turret on which are mounted a plurality of stops of varying sizes and shapes, said turret being adjustable on its axis so that one stop or another may be brought into operative position, as desired. Some of these stops consist of rolls and the said rolls are rotatable on their axes to prevent friction. One feature of the present invention consists in providing a positive feed connection between the lower presser roll and the turret mounted roll, so that the presser roll and the turret roll shall have the same peripheral speed.

Another feature consists in forming the two presser rolls with short peripheral teeth which engage the pattern, each of said teeth being disposed diagonally of the periphery of the roll, the teeth being arranged so that the lines of the teeth on the two rolls are divergent on the side toward the inner face in such manner as to at all times force the edge of the pattern and the binding thereon up against the stop roll or turret roll.

Another feature of the invention consists in providing an eccentric mount for the turret, so that the turret roll may be positioned either on or off center, as desired, with relation to the axis of the presser roll. Another feature relates to the means for holding the turret in its adjusted position on its axis. Another feature relates to the means for raising the upper presser roll for the purpose of removing and inserting the work, and consists in providing means by which a slight backward turn of the crank after the machine has stopped will lift the upper roll.

Another feature relates to the mounting for the former block, so that it can be readily shifted to different positions. Other features will be apparent from the following description of the invention, the novel features of which will be clearly understood from said description when taken in connection with the accompanying drawings, and will be clearly pointed out and defined in the claims at the close of the specification.

In the drawings:

Figure 1 is a side elevation partly in section of a machine embodying the invention.

Fig. 2 is a front elevation.

Fig. 3 is a rear elevation.

Fig. 4 is an enlarged side view of the presser rolls and adjacent mechanism.

Fig. 5 is a front elevation of the parts shown in Fig. 4.

Fig. 6 is a fragmentary view inside elevation showing the presser rolls and the means of feeding the work.

Fig. 7 is a front elevation of the turret.

Fig. 8 is a rear elevation of the lower presser roll.

Fig. 9 is a view similar to Fig. 5 showing the presser rolls and turret, the turret being adjusted by the eccentric to a different position from that shown in Fig. 5.

Fig. 10 is a detail sectional view of the clutch shown in Figs. 1 and 3.

Fig. 11 is a section on line 11 of Fig. 1, showing the method of mounting the upper shaft.
Fig. 12 is a plan view of a shoe pattern showing the binding partially applied thereto.

Referring now to the drawings, the machine is provided with a base 1, which is adapted to rest on a table or work bench and has rising from one end thereof a standard 2, at the upper end of which is a head 3. From this head extend back over the base the two horizontal arms 4, 5, respectively, which form supports for the several operating parts of the machine.

A shaft 6 is journaled at one end in the head 3 and at its other end in the bearing 7 rigidly connected with the horizontal arm 4. The said shaft extends through said bearing and has mounted thereon a turret 8 and a presser roll 9, the presser roll 9 being fast on the shaft so as to rotate therewith and the shaft passing loosely through the turret which is held from rotation.

A shaft 10 is journaled at one end in the head 3 and at its other end in a bearing 11, which is hung by a link 12 from a rocking lever 13 pivoted at 14, so that said lever may be rocked on its pivot to raise the bearing 11 and thereby, when desired, lift the forward end of the shaft 10. The rear end of said lever 13 is connected with a vertical rod 15 which passes down through an apertured guide 16, the lower end of said rod 15 being connected with a treadle 17, which may be operated by the foot to turn the lever 13 on its fulcrum and thereby lift the movable end of the shaft 10, when desired.

Other means are also provided, which will be hereinafter described, whereby the said shaft may be lifted by turning the crank backwards.

On the other end of the shaft 10 there is mounted a presser roll 18 to cooperate with the presser roll 9 for pinching the binding onto the pattern. It is important that the two presser rolls should be at all times maintained out of contact with each other, being spaced apart just enough to allow for the proper pressure, according to the thickness of the binding and pattern.

The bearing 11, which supports the outer end of the shaft 10, is engaged by a spring 19, one end of which is secured to the upper arm 5 by a bolt 20, the other end resting under tension upon the upper end of the bearing block 11. In order to limit the downward movement, however, of the said bearing block 11, a collar 22 is mounted on the rod 15, the upper end of said collar normally resting against a shoulder 23 formed on the head at the lower end of the guide 16 through which the rod 15 extends.

Said collar 22 is adjustable by means of a set screw 24 so as to vary the adjustment and thereby regulate the limit of the downward position of the free end of the shaft 10 and of the pressure of the presser roll 18.

The shaft 6 is provided with a crank 25 for rotating the same, and on said shaft is mounted a gear 26 which engages with a gear 27 mounted on the upper shaft 10, whereby the rotation of the shaft 6 by the crank will also cause the rotation of the shaft 10 and the rotation of the two presser rolls 9 and 18.

The gears 26 and 27 have a slightly greater clearance between them than is usual with gears of this type, to allow for movement of the upper shaft 10 when said shaft is tipped axially by the lever 13.

Means are provided for regulating the tension of the spring 19. The means provided are as follows: A screw 28 passes down through a block 29 mounted on the upwardly extending side flanges of the upper arm 5, its lower end engaging with the upper face of the spring 19, said screw having a knurled head 30 to operate the said screw. By turning said screw the pressure of the screw on the spring 19 will be varied, thereby varying the tension of the spring. A lock nut 31 is provided for the said screw, which rests upon the upper side of the block 29.

As already stated, the pattern, as indicated at 32, is fed between the two presser rolls 9, 18 to pinch the binding 33 thereon, and, as already stated, it is important to have a stop for the base of the binding and for the edge of the pattern, so that they will not be pushed too far in and also to serve as a guide. In order to provide a variety of stop members, the turret 8 is rotatably adjustable.

As shown in Fig. 7, this turret has provision for four different stops arranged 90° apart on the periphery of the turret. These stops are shown at 34, 35, 36 and 37. The stops 34, 35 and 37 are shown as rollers of different sizes. The stop 36 as indicated in Fig. 4 is shown as a thin blade, the blade being specially used for binding in slots.

These stop members 34, 35 and 37 are all mounted on pivots 48, so that they can turn on their axes when in operative position during the feed of the pattern and binding.

In the drawings, the roller 34 is the one shown in operative position in the machine. In the form of machine shown in Patent No. 1,133,469, previously referred to, these rolls were turned only by their frictional engagement with the base of the binding and were not positively rotated. One object of the present invention is to provide positive means for rotating said stop rolls in unison with the rotation of the presser rolls. To that end the rolls 34, 35 and 37 are provided with teeth 88 and the inner face of the lower presser roll 9 is formed with teeth 89, which engage with the teeth 88 and therefore cause a positive rotation of said stop rolls as the shaft rotates.
It is also desirable to provide means to force the pattern with the applied binding against the stop roll. As heretofore made, the binding on the pattern is held against the stop roll by the hand of the operative while the pattern and binding are passing between the presser rolls, and the operative has to be especially careful that he always maintains the pattern and the binding in proper alignment and engaging position with the stop roll. Sometimes, however, there is a tendency for the pattern to slip away, either due to carelessness of the operative or otherwise, and it therefore sometimes happens that although the binding may be kept against this stop roll the pattern may slip out a little, and this leaves a little space between the base of the binding and the edge of the pattern, whereas the base of the binding should be in contact with the edge of the pattern at all places. In order to aid in overcoming this danger, I provide means by which there is a constant feed pressure on the pattern to force it up against the stop roll. To this end I form knurled or toothed surfaces 40 and 41, respectively, on the periphery of the upper and lower presser rolls, these knurls being in the form of shallow teeth extending diagonally across a portion of the width of the periphery, as shown in Fig. 6. It is essential that the teeth slant in a certain direction in relation to the travel of the pattern, and to this end the teeth on the lower roll converge with relation to the teeth on the upper roll toward the outer side as viewed in elevation, so that the effect of such construction is to force the pattern inwardly toward the stop roll 34 and to press the binding 33 up against the stop roll, while the edge of the pattern is firmly set against the inner face of the base of the binding.

Sometimes it is desired to have the stop roll or turret roll so positioned that the axis of the roll is centered with relation to the axis of the two presser rolls and sometimes it is desired to have the roll somewhat off center. In Fig. 5 of the drawings, the roll is shown as off center and in Fig. 9 it is shown as positioned on the center. Usually it is desired to have it off center. The off center arrangement practically results in making the base of the U-shaped binding convex instead of flat.

Means are provided whereby it may be easily adjusted either on center or off center within limited range. The means which we have provided for this adjustment is as follows:

The turret 8 instead of being mounted directly on the lower shaft 6 is mounted on an eccentric bushing 42, the turret being formed with a circular opening 43 which fits over the periphery of the eccentric 42. Said eccentric is adjustably mounted in the frame of the machine and to this end is provided with a hub 21 (see particularly Figs. 1 and 4) which is mounted in the bearing portion 7 of said frame.

It is also formed with an arc shaped slot 44 which is engaged by a pin or screw 45 projecting from and in threaded engagement with said frame. By partially rotating the eccentric on its axis it may be adjusted to different positions within the limits allowed by the slot 44 and is then clamped in its adjusted position by setting up the pin 45 so that its head 46 will bind.

It is obvious that by varying the position of the eccentric on its axis, the position of the turret will be changed so that the turret will be either centered with relation to the two presser rolls or be thrown off center at varying positions as desired, thereby varying the position of the particular stop roll which is in operative position at the time.

By loosening the screw 45 the eccentric may be readjusted, thereby readjusting the turret and then by setting up the screw the turret will be clamped in the adjusted position.

We provide means for positively locking the turret in its adjusted position so that it cannot rotate accidentally after it has been adjusted. To this end the turret is formed with four flat faces 47, 90° apart into which are set the several pins 48 on which the several turret or stop rolls are mounted. A clamping screw 52 is provided with a broad head or cap 53 which extends over and bears against one of the flat faces of the turret so that when said screw is set up with the head of the screw bearing firmly against the flat face of the turret, said turret cannot be rotated.

We have hereinbefore described the tipping of the upper shaft 10 at its rear end so as to raise and lower the forward end and the upper presser roll by means of a treadle and a connecting rod 15.

It is found in practice that it is a good deal of strain on the operator to keep the foot constantly on the treadle which is necessary when it is operated by means of the foot, owing to the frequent necessity for raising and lowering said upper presser roll, and we have, therefore, provided means whereby said presser roll and its shaft may be tipped by a slight backward turn of the crank 25 and consequent slight backward rotation of the shaft.

The means whereby the upper shaft may be tipped by means of the crank, is as follows:

The upper shaft 10 is extended through the upper gear wheel 27 and on this extension is mounted a clutch, preferably one commonly termed the "Horton clutch," which operates as follows: Mounted fast on
said shaft is a disk 54 which fits loosely within the flanged rim of a shell 55. Said disk 54 is formed with a series of peripheral notches 56, which together with the shell form pockets in which are held balls 57 seated upon springs 58. Projecting from the rim of the shell 55 is an arm 59. A connecting rod 60 engages loosely with said arm 59, at one end, and at its other end it is loosely connected with an extension 61 on the lever 13, as shown in Figs. 1 and 3.

When the crank is turned in the ordinary direction for operating the machine, that is, in a clockwise direction, as viewed in Fig. 3, the disk 54 will rotate with the shaft 10 in the direction of the arrow in said figure and there will be no driving connection between the said disk 54 and the shell 55. When, however, the crank is turned in the reverse direction, the balls 57 will become wedged into the tapering ends of the slots 56 and therefore bind the shell 55 to the disk 54, consequently causing the shell 55 to rotate during the backward rotation of the crank. This will cause the arm 59 to move backwards as viewed in Figs. 3 and 10, thereby pulling down the connecting rod 60 and the rear end of the lever 61 and lever 13, and tipping up the forward end of the upper shaft 10 so as to lift the upper presser roll the same way as when the lever is tilted by the foot pedal.

In order to permit the said shaft 10 to be tipped up in the manner already described, the rear bearing for the same is mounted on trunnions (see Fig. 11). The said bearing consists of a block 81 having trunnions 62 which are journalled in bearings 63 in the head 3 of the frame.

The shafts 6 and 10, respectively, preferably have mounted on the end toward the head, collars 64 and 65, respectively, which bear against the head of the frame and may be adjusted axially of the shaft so as to prevent endwise movement of the shaft.

Where the binding has to follow the contour of an indentation such, for example, as shown in Fig. 12, or any other substantial change in the contour, the binding must be shaped before it is applied. In order to provide a former adapted for shaping the binding to the contour of indentations of various sizes, a forming block 69 is provided having different sections or portions thereof of different diameters so as to provide for curves of varying sizes.

It is important that the operative should have the forming block always convenient of access, and some operations find it convenient to have it nearer to the presser rolls than others, owing to the difference in the size of the hands and other physical differences in the operative. To this end an adjustable mount is provided so that the forming block may be shifted according to the requirements of the operative. If it is too near it will be in his way during his work and liable to result in danger to his hands; on the other hand, if it is too far away there is too much loss of time. To this end there is provided a holder 67 connected with the outer end of the base 1 of the machine, said holder being formed with a plurality of sockets 68 in a line parallel with each other, so that some of them are nearer to the position directly beneath the presser rolls than are the others. The forming block 69 which contains a series of forming members of varying sizes all rigidly connected with the said former, is provided with a bore by which it is mounted upon a spindle 70, said spindle having a collar 71 on which said forming block is seated, and the lower end of said spindle is adapted to be received into any of the sockets 68 in the holder 67. If the operative wishes to have the forming block nearer to or farther from the work he has simply to lift the spindle out of one of the sockets and insert it into another one of the sockets, and clamp it in its adjusted position, if he desires, by means of a thumb screw 72.

What we claim is:

1. In a machine of the character described, two cooperating presser rolls, a stop roll and a positive drive connection between one of the presser rolls and the stop roll in such manner that said stop roll and said last mentioned presser roll have the same peripheral speed.

2. In a machine of the character described, two presser rolls and a stop roll, means whereby both of said presser rolls are positively driven at the same peripheral speed, said stop roll and one of said presser rolls being formed with interengaging teeth whereby the rotation of said last mentioned presser roll gives a positive rotation to the stop roll at the same peripheral speed as the said presser rolls.

3. In a pattern binding machine, two presser rolls between which the pattern and binding are fed to secure the binding to the pattern, a stop roll against which the fold of the binding is pressed by the pattern while passing between the presser rolls, said stop roll and one of the presser rolls having interengaging teeth, whereby the rotation of the said toothed presser roll causes the said stop roll to rotate at the same peripheral speed as the presser roll.

4. In a binding machine, two presser rolls between which the pattern and binding are fed to secure the binding to the pattern, a stop roll for the bound edge of the pattern, said presser rolls being formed with peripheral teeth which extend diagonally of the periphery and positively press the edge of the pattern against the said stop roll.

5. In a binding machine, two presser rolls...
between which the pattern and binding are fed to secure the binding to the pattern, a stop roll for the bound edge of the pattern, said presser rolls being formed with peripheral teeth which extend diagonally of the periphery and positively press the edge of the pattern against the said stop roll, the teeth on one of the two presser rolls being in diverging relation to the teeth on the other presser roll, the divergence being toward the stop roll.

6. In a machine of the character described, two parallel rotary shafts, cooperating presser rolls mounted on said shafts between which a pattern and binding strip are to be fed for securing the binding to the pattern, a turret, an eccentric bushing on which said turret is rotatably mounted, one of said shafts passing loosely through said turret and eccentric, and a plurality of stop members mounted on the periphery of said turret, said eccentric being rotatably adjustable with relation to said turret, whereby the said stop members may be varied in position relative to a plane through the axes of the two presser rolls.

7. In a machine of the character described, two parallel rotary shafts, cooperating presser rolls mounted on said shafts between which a pattern and binding strip are to be fed for securing the binding to the pattern, a turret through which one of said shafts passes loosely, said turret having mounted on the periphery thereof a guide stop for the edge of the pattern and folded binding, and an eccentric bushing for said turret, said bushing being rotatably adjustable on its axis with relation to the turret, whereby the guide stop on the turret may be positioned, either in alignment with the plane of the axes of the two presser rolls or out of alignment therewith, as desired.

8. In a machine of the character described, two parallel rotary shafts, cooperating presser rolls mounted on said shafts between which a pattern and binding strip are to be fed for securing the binding to the pattern, a turret through which one of said shafts passes loosely, said turret having mounted on the periphery thereof a guide stop for the edge of the pattern and folded binding, and an eccentric bushing for said turret, said bushing being rotatably adjustable on its axis with relation to the turret, whereby the guide stop on the turret may be positioned, either in alignment with the plane of the axes of the two presser rolls or out of alignment therewith, as desired.

9. In a machine of the character described, a rotary shaft, a turret, an eccentric bushing for said turret through which said shaft loosely passes, and a work member mounted on the periphery of said turret, said eccentric being rotatably adjustable with relation to said turret, whereby the said work member may be varied in position relative to the axis of the shaft.

10. In a machine of the character described, two rotary shafts which are normally parallel with each other, one above the other, the upper shaft being pivoted at one end in such manner as to permit the said shaft to be tipped on its pivot and thereby raise the other end, a crank for rotating the lower shaft, driving connection between said two shafts whereby when the crank is turned in one direction both shafts will be rotated, and means whereby when the crank is turned in the reverse direction the said upper shaft will be tipped on its pivot.

11. In a machine of the character described, two rotary shafts which are normally parallel with each other, one above the other, the upper shaft being pivoted at its rear end in such manner that the shaft will be tipped up on its rear end, thereby raising the opposite end with relation to the lower shaft, a crank for rotating the lower shaft, a two-part clutch mounted on the upper shaft, one member of which is fast on said shaft, the other member being loose on said first clutch member, means whereby when said crank is rotated in the direction for operatively rotating said shafts the said clutch will remain inoperative, means whereby when the crank is turned in the reverse direction said clutch members will be locked together, and means whereby when the crank is further turned backward the said upper shaft will be tipped up on its pivot, thereby raising the forward end with relation to the lower shaft.

12. In a machine of the character described, two rotary shafts which are normally parallel with each other, one above the other, cooperating presser rolls mounted on said shafts at their forward ends, a rocker bearing for the rear end of the upper shaft, a vertically movable bearing for the forward end of said upper shaft, a lever from which said front bearing is suspended, said lever being fulcrumed intermediate its ends, a spring which normally holds the said forward bearing in such position that the upper shaft is in parallel relation to the lower shaft, a crank for rotating the lower shaft, driving connection between the said two shafts, whereby when the crank is turned in one direction both shafts will be rotated so as to rotate both of said presser rolls in operative manner to secure the binding strip to the pattern, and means whereby when the crank is turned in the reverse direction the said lever will be rocked on its fulcrum and the upper shaft.
will be tipped on its pivot and the upper roll raised.

13. In a machine of the character described, two rotary shafts which are normally parallel with each other, one above the other, cooperating presser rolls mounted upon said shafts, the upper shaft being oscillatable longitudinally in such manner that the roll-carrying end may be raised from its normal position, a spring under tension which normally holds the said shaft in its parallel relation to the lower shaft, a crank for rotating the lower shaft, a two-part clutch mounted on the upper shaft, one member of which is fast on said shaft, the other member being loose on said first clutch member, means whereby when said crank is rotated in the direction for operatively rotating said shafts and presser rolls the said clutch will remain inoperative, means whereby when the crank is turned backwards the said clutch members will be locked together, a link connection between said normally loose member of the clutch and the said pivoted lever, whereby when the said crank is turned backward the rear arm of said lever will be pulled down and thereby raise the forward end of said upper shaft and the presser roll thereon.

14. In a machine of the character described, a frame having a base, two parallel rotary shafts mounted in the frame and extending over the base and having mounted thereon cooperating presser rolls to secure a binding to a pattern, a former member provided with a stem and a former holder connected with the outer end of the base, said former holder being provided with a plurality of sockets at varying distances from a vertical line through the presser rolls, each of said sockets being adapted to receive the stem of said former member. 

15. In a pattern binding machine, a frame, two parallel rotary shafts mounted in the frame, cooperating presser rolls mounted respectively on said shafts to secure a binding to a pattern, a former member having portions of different diameters coaxial with each other and having a central axial bore, a spindle which engages with said bore and has a shoulder on which the former member is seated and has a stem, and a holder member connected with said frame provided with a plurality of sockets at varying distances from the presser rolls, each of said sockets being adapted to receive the stem of the former member.

16. In a machine of the character described, two rotary shafts which are normally parallel with each other, one of said shafts being above the other, cooperating presser rolls mounted on said shafts between which a pattern and binding strip are to be fed for securing the binding to a pattern, the upper shaft being journaled at its rear end in a pivoted bearing, in such manner that it may be rocked in a vertical plane and thereby raise the forward end of the shaft and the presser roll carried thereon, a lever fulcrumed intermediate its ends, one arm of which is connected with the bearing for the forward end of said upper shaft, a connecting rod connected with the other arm of said lever, whereby the said lever may be rocked on its fulcrum to tip said shaft, a tension spring which normally holds said shaft in its normal downward position, and a stop on said connecting rod which engages a fixed member on the frame to limit the downward position of the said upper shaft and its roll with relation to the lower presser roll.

In testimony whereof we affix our signatures.

JOHN H. SUTHERLAND.

HOLTON J. SUTHERLAND.