Feb. 27, 1940. T. J. DOYLE 2,191,646

APPLYING BINDING TO INSOLES

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Fig. 1.

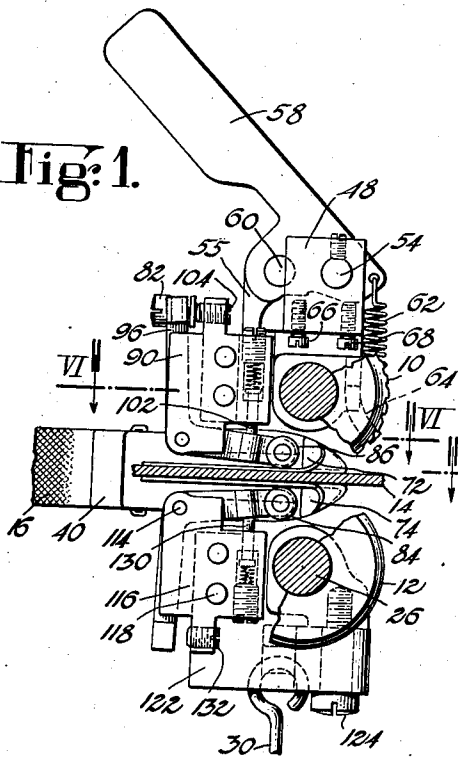


Fig. 2.

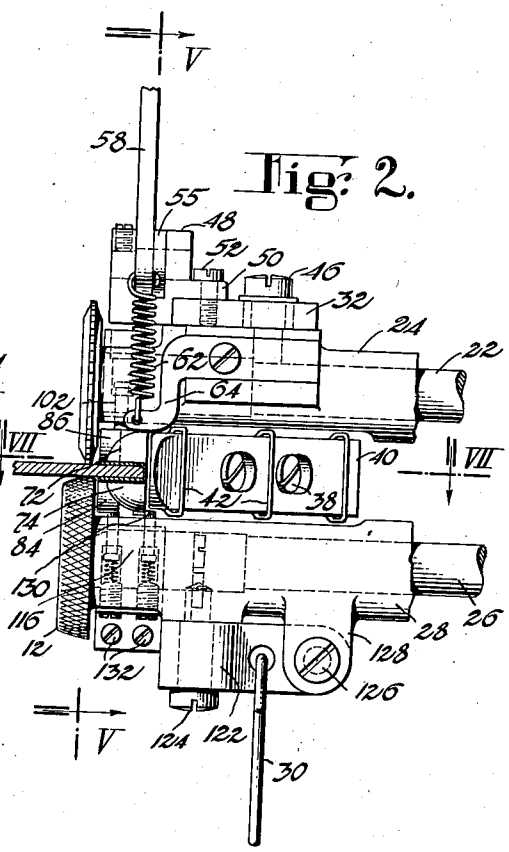


Fig. 3.

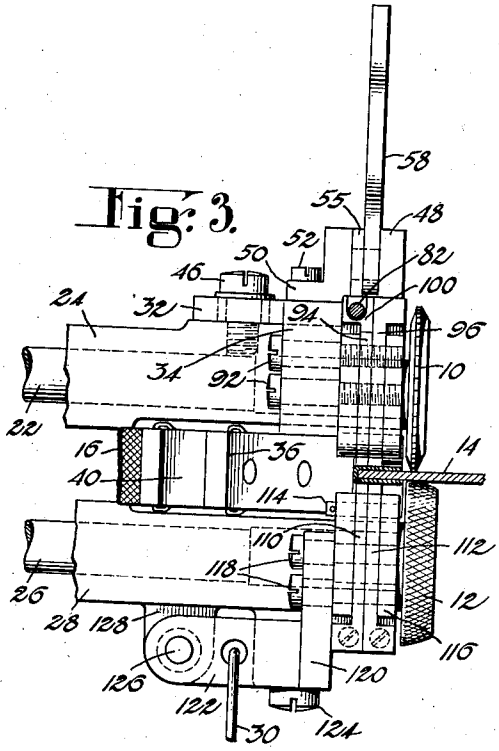
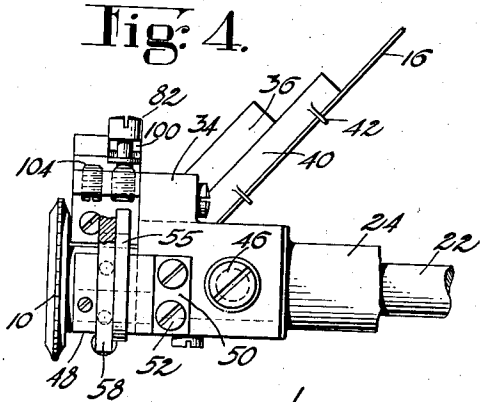


Fig. 4.



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Fig. 5.

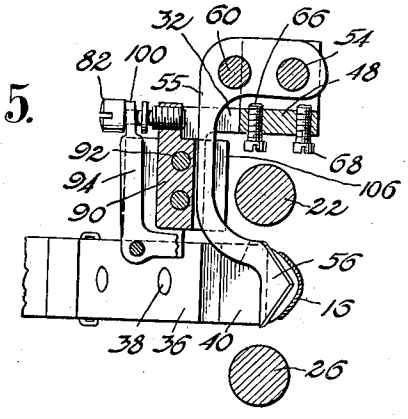


Fig. 6.

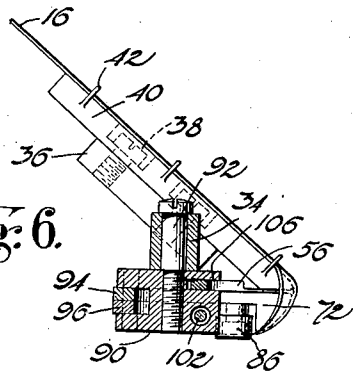
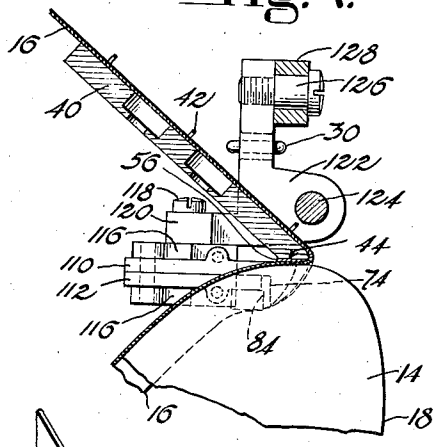


Fig. 7.



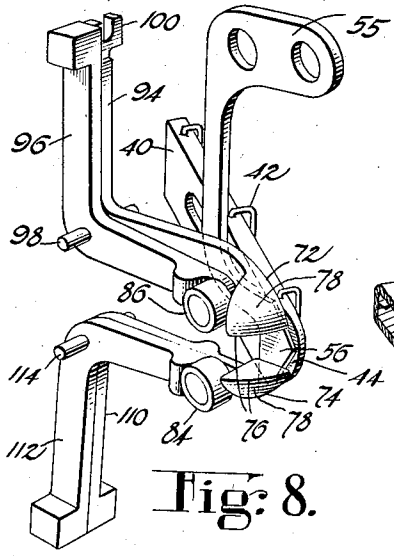


Fig. 8.

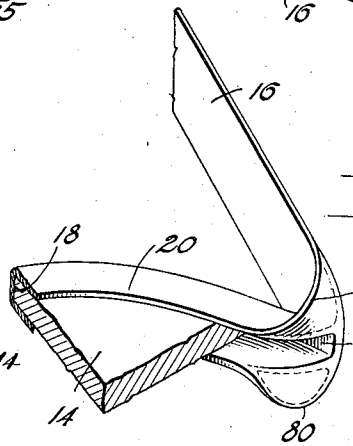


Fig. 9.

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UNITED STATES PATENT OFFICE

2,191,646

APPLYING BINDING TO INSOLES

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Application December 22, 1937, Serial No. 181,185

16 Claims. (Cl. 12—17)

This invention relates to machines for applying edge-binding strips and is herein illustrated as embodied in a machine for folding an adhesively coated binding around the edge of a piece of work, such as the insole of a shoe.

Edge-binding strips which have been employed for trimming the edge of an insole, which is to be embodied in a strap sandal, have commonly been attached by stitching and are made from bias-cut material so that they will stretch as curved portions of the work are bound. Nevertheless, difficulty has been experienced in getting the binding to lie smoothly on the marginal faces of the work which varies in thickness and edge contour around its periphery. It has been proposed, therefore, to employ a binding, one surface of which is provided with a pressure-sensitive adhesive such as is found in surgeon's tape.

It will be clear that the application of such a binding requires accurate positioning of the strip with respect to the edge of the work so that the marginal portions shall be of the desired width, i. e., equal or otherwise as desired, and requires that these marginal portions shall lie flat on the work without either wrinkles or portions which are not firmly attached.

An object of the invention is to provide an improved machine, for applying such binding strips, by which work of a high quality may be produced with a minimum of skill on the part of the operator and in which a high rate of production may be maintained.

The illustrated machine is provided with a continuous feed mechanism and employs a guide of the English type by which the strip is automatically reversed or turned inside out as it is drawn continuously through the guide by the work.

One feature of the invention resides in an improved guide of the English type in which certain of the strip-reversing portions serve as presser members to cause the binding to be engaged progressively inwardly across the margin of an insole and which are made yieldable or self-adjusting to conform to changes in the thickness of the insole as these changes appear around its periphery. This guide is so arranged also that a firm abutment is provided against which the binding may be pressed by the edge of the work thereby to attach the binding to the edge or periphery of the work and in which this abutment is unaffected by the changes in the position of the presser members as the thickness of the work varies.

In accordance with still another feature, the machine comprises a channel-shaped guideway for the adhesive binding, at the inner end of which is the before-mentioned abutment against which the binding may be pressed by the work to cause the binding to adhere to the edge of the work, and also comprises continuously acting supplemental means for pressing the edges of the binding against the margins of the work.

Another feature resides in the provision, in a machine of this type, of an improved cutting-off knife which, as illustrated, is positioned between a fixed strip-guide and the self-adjusting strip-reversing presser members.

These and other features of the invention will be described in the following specification, taken in connection with the accompanying drawings, in which

Fig. 1 is an end elevation, with parts broken away, of the operating portion of the machine;

Fig. 2 is a side elevation of these same machine parts viewed from the ingoing side, while

Fig. 3 is a similar elevation viewed from the outgoing or delivery side;

Fig. 4 is a plan view;

Fig. 5 is a vertical section on the line V—V in Fig. 2;

Fig. 6 is a horizontal section on the line VI—VI of Fig. 1;

Fig. 7 is primarily a section on the line VII—VII of Fig. 2 but showing the upper presser members in full lines;

Fig. 8 is an angular view, shown on a large scale, of the binding guide and the binding pressing members separated from the rest of the machine, and

Fig. 9 is an angular view of a fragment of the work showing how the binding is reversed as it is guided from a source of supply and applied to the work.

It will be understood that a binding strip 16 has been provided having, on one face, a coating of pressure-sensitive adhesive and that it is to be wrapped around the edge of the work, its mid portion being secured to the edge 18 of a semi-rigid piece of work, such as an insole 14, as illustrated in Figs. 2 and 9, while its marginal portions 20 are folded around and pressed into firm engagement with the marginal upper and lower faces of the insole. To this end, the machine embodies guiding and folding mechanism, and feeding mechanism including a toothed upper feed roll 10 and a rounded feed roll 12 between which the insole is gripped, and by which the work will be fed in a line of feed extending horizontally from right to left, as viewed in Fig. 7. As illus-

trated, the upper feed roll 10 is mounted on a driven shaft 22 journaled in a fixed portion 24 of the frame of the machine. The lower feed roll 12 is mounted on a shaft 26 which is journaled in a hinged frame 28 pivotally attached to the frame of the machine at a point to the right of what is shown in Fig. 2, this pivoted member 28 being normally held upwardly to the position shown in Fig. 2 by a spring (not shown). This enables the feed rolls 10 and 12 to be separated in accordance with changes in the thickness of the work and to grip the work firmly regardless of the thickness. When a piece of work is to be inserted, the lower feed roll may be separated from the upper roll by pulling down on a treadle rod 30. A similar arrangement of driven feed rolls will be found in Letters Patent of the United States No. 2,042,479, granted June 2, 1936, on the application of C. A. Newhall.

The binding 16 will commonly be supplied in the form of a roll (not shown) and will be, when it leaves the roll, substantially flat, as indicated at the upper part of Fig. 9. It would be inconvenient, however, to have this straight portion approach the machine along the line of feed. Accordingly, the binding is reversed or turned inside out as it is folded around the edge of the insole 14 into a position in which the edges of the binding are above each other on opposite sides of the work. This change of shape of the binding from a flat condition to one in which it is attached to the insole may best be accomplished without strain on the binding and without friction in the guide if the leading-in portion 40 of the guide is at an acute angle to the line of feed and extends inwardly toward the insole and rearwardly toward the work-entering side of the machine.

In order to support the binding guide, there is mounted on the frame portion 24 a composite block made up of a horizontal plate 32, a vertical rectangular bar 34 (Figs. 3 and 4) and a plate 36 positioned diagonally with respect to the line of feed. To this lower plate 36 there is adjustably attached by screws 38 the upright leading-in guide portion 40 having wire loops 42 through which the binding strip 16 may be threaded as it is led up to the machine from a source of supply (not shown). It will be noted in Fig. 7 that the end of the guide 40 is provided with a vertical surface 44 which forms an acute angle with the surface to which the wire loops 42 are attached. Furthermore, the end of the guide is rounded, as best shown in Figs. 5 and 8. The curvature of this end of the guide is such that it agrees with the natural bend of the binding as it is reversed, as illustrated in Fig. 9. By thus rounding the end of the guide, any tendency to stretch the edges of the binding is avoided and there is no tension on the edges of the binding as there would be if a square-ended guide member were employed.

The plate 32 is adjustably secured to the frame portion 24 by the screw 46 and attached to it is a grooved block 48 having a flange 50 through which pass attaching screws 52. A pivot rod 54 passes across the groove of this block and serves as a fulcrum for a cutting-off knife 55 (Figs. 1 and 5) attached to a handle 58 by a rivet 60 and having a spear-point blade 56. This knife handle 58 is normally drawn to the position shown in Fig. 1 by a spring 62, the lower end of which is attached to a hook 64. Stop screws 66 and 68 pass through the bottom of the groove in the block 48 and are arranged to limit the movement of the knife. The spear-point blade is positioned immediately adjacent to the inclined end 44 of the guide 40 and is adapted to sever the binding at a point where the latter is bent around the end of the guide 40 and between that guide and the edge of the insole.

As the work, such as an insole, is guided through the machine, its edge 18 (Figs. 7 and 9) is pressed into engagement with the portion 70 of the binding strip which turns forward around the end 44 of the guide 40 and in so doing, the strip will be caused to adhere to the edge of the work. It will be noted that the binding passes in front of the face of the knife 56, which latter rests against the abutment provided by the inclined end 44 of the guide, thus furnishing a firm surface higher than the work is thick and against which the edge of the work may press the binding to provide proper adhesion of the binding to the edge of the work.

The binding is then bent around the work by the channel guide comprising the members 72 and 74 and the abutment 44, 56 and is pressed into engagement with the upper and lower margins of the work by these presser members 72 and 74 positioned above and below the work. The face of each of these members which rests in contact with the work is triangular and includes a diagonal edge 76 (Fig. 8) around which the binding is reversed as it is folded around the work (Figs. 1 and 9). As the diagonal edges 76 are pressed flatwise against the binding, they cause it to engage the margin of the insole, first at points near the edge of the insole and then gradually at points nearer the inside of the margin of the insole, whereby the formation of wrinkles is avoided. It will be understood that the bias-cut material of which the binding is constructed is stretched considerably, to enable it to be pressed against the insole without the formation of wrinkles because of the frictional resistance provided by the members 72 and 74. The outer surfaces 78 of these members are curved both horizontally and vertically to cause them to fill the bulge 80 naturally formed in the binding being reversed, as shown in Fig. 9, and thus enable the binding to run smoothly through the guide. It is also to be noted that the members 72 and 74 are positioned close to the feed rolls 10 and 12 so that the machine is suitable for operation on relatively limp material having an irregular edge contour.

Any adjustment of the space between the flat surfaces of these presser members in order to accommodate variations in thickness of the insole, results only in exposing more or less of the abutment surface provided by the knife 56 resting against the end 44 and does not open any cracks by which wrinkles might be formed in the binding as would be the case if the guide 40 were to be subdivided and the respective parts moved in unison with the presser members 72 and 74. The upper presser member 72 is held in a fixed position which may be adjustably determined by means of a grooved screw 82 (Fig. 5), while the lower presser member 74 is spring-held against the work, as will be later described. To hold the work at substantially a uniform plane and to again press the edges of the binding continuously against the work, spring-pressed supporting and presser rolls 84 and 86 are provided and the mounting of these

rolls and the presser members will next be described.

The upper presser member 72 and the roll 86 of the machine are mounted in a recessed block 90 attached to the vertical block 34 by means of screws 92 (Fig. 6). The block 90 is grooved at its forward and lower sides to receive two bell cranks 94 and 96 which are mounted on a transverse pivot pin extending substantially at right angles to the direction of feeding movement of the work. The bell crank 94 which supports the presser member 72 has a forked upper end 100 to receive the grooved adjusting screw 82. At the same time, the presser roll 86 mounted on the lower end of the bell crank 96, is held in engagement with the work by a spring-pressed pin 102 (Fig. 1). The limit of the movement of the bell crank 96 when no work is in position is determined by a stop screw 104. It will be noted also that the block 90 is cut away at 106 (Figs. 5 and 6) to receive the upright portion of the cutting-off knife 56.

In a similar fashion, bell cranks 110 and 112 are provided to support the lower presser member 74 and the lower presser roll 84, and these are mounted on a pivot pin 114 passing transversely of the recess formed in a block 116 (Figs. 1 and 3) which is attached by screws 118 (Fig. 3) to the upright portion 120 of a bracket 122 clamped to the hinged frame 28 by means of a vertical screw 124 and another screw 126 which latter extends through a lug 128 depending from the hinged frame 28. To hold the lower presser member 74 and the supporting roll 84 in contact with the work, spring-pressed pins 130 are furnished in the block 116. This block is also provided with stop screws 132 (Figs. 1 and 2) for limiting the movement of the bell cranks 110 and 112.

In the operation of the machine, a binding strip is inserted through the wire loops 42 of the guide 40 with its adhesive surface faced outwardly. The end of this binding is then bent around the end 44 of the guide 40 and an insole is brought manually into engagement with the mid-portion of the binding strip, pressing it against the abutment of the guide. To facilitate this, the hinged frame 28 is lowered by means of the treadle rod 30 and then released to allow the work to be gripped between the feed rolls 10 and 12. These rolls, being positively driven, carry the work along and, with it, the binding strip, which is progressively wrapped around the margins of the insole by means of the presser members 72 and 74. The edges of the strip are then even more firmly pressed into contact with the work by the presser rolls 84 and 86. After the whole of the periphery of the insole has been covered with the binding, the latter may be severed by manually actuating the knife 55, the point 56 of which is passed through the taut binding strip like a spear.

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

1. In a machine for applying an adhesive binding strip around the edge of an article, work-feeding mechanism, a guide for the binding strip, said guide extending rearwardly toward the ingoing side of the machine at an angle of less than ninety degrees to the path of feeding movement, and presser means adjacent said work-feeding mechanism and closely associated with said guide and positioned above and below the work, said presser means being constructed and arranged to bring the marginal portions of the adhesive strip into engagement with the margins of the opposite faces of the work.

2. In a machine for applying an adhesive binding strip to the curved edge and adjacent margins of an insole, a binding-strip-folding guide having an abutment against which the edge of the insole may press the mid-portion of the binding strip to attach it to the edge of the work, said guide also being provided with means for folding the binding strip progressively across the adjacent margins of the insole, and rollers closely adjacent to said folding means engaging the folded portions of the binding strip to press them firmly against the margins of the insole.

3. In a sole-edge binding machine, a binding-strip-folding guide for forming an adhesive binding strip around the edge of a piece of work and having portions engaging the margins of said work, and feed rolls closely adjacent to said folding guide for engaging the margin of the work to carry it through said guide, one of the margin-engaging portions of the guide being mounted for yielding movement to accommodate variations in the thickness of the work.

4. In an edge-binding machine, work-feeding mechanism, and a binding-strip-folding guide comprising separable members having diagonal edges and constructed and arranged to apply heightwise pressure to press the binding into contact with the work progressively across the margin of the work from the outer edge inwardly thereof.

5. In an edge-binding machine, means for feeding the work along a path, guide members engaging the binding strip on opposite superposed margins of the work, said members having edge portions inclined to the path of feed and extending from the edge of the work inwardly and forwardly, and means yieldably holding one of said guide members with its edge portion flat against the work thereby to press the extreme margins of the binding strip toward the work in a heightwise direction at a time later than the portions close to the edge of the work.

6. In an edge-binding machine, work-feeding mechanism, a binding-strip-reversing guide comprising separable members having diagonal edges and constructed and arranged to press the binding progressively across the margin of the work from the outer edge inwardly thereof, and means for supporting one of said members for adjustment heightwise to accommodate variations in the thickness of the work.

7. In an edge-binding machine, a binding guide comprising an abutment against which the mid-portion of the binding strip may be pressed by the edge of the work, said guide also comprising members separable in the direction of the thickness of the work and operable to apply pressure in a heightwise direction to the binding strip progressively across the margin of the work from the outer edge inwardly thereof, and supplemental means for pressing a margin of the strip firmly against the work.

8. In an edge-binding machine, a binding guide comprising an abutment against which the mid-portion of a binding strip may be pressed by the edge of the work, said guide also comprising separable members operable to press the binding strip progressively across the margin of the work from the outer edge inwardly thereof, and supplemental members for pressing the

margins of the strip firmly against the work, one of said margin-engaging members being supported for adjustment heightwise of the work to accommodate variations in the thickness of the work.

9. In a machine for applying an adhesive binding strip around the edge of an article, a channel-shaped guide for the binding strip having at the inner end of the channel a flat abutment against which the strip may be pressed by work presented progressively thereto, said guide having edges diagonal to the direction of work movement and operating to bend the margins of the strip into full contact with the margins of the work, and continuously acting supplemental means for pressing the margins of the strip firmly against the work.

10. In an edge-binding machine for semirigid work pieces, a strip reversing binding-strip guide providing an abutment to receive the pressure of the edge of the work presented progressively thereto and to press the mid portion of the binding into engagement with the edge of the work, members associated with said guide for pressing the marginal portions of the binding against the opposite faces of the work and operating progressively from the edges of the work inwardly to bring the edges of the binding against the work, one of said members being mounted for adjustment to compensate for variations in the thickness of the work, and other means positioned above and below the work for pressing the binding firmly against said margins.

11. In an edge-binding machine, means for moving a piece of work along a predetermined path, a binding guide positioned at an acute angle to said path, and associated pressure applying members having operative edge portions pressing the binding against the work, said edge portions being positioned also at an acute angle to said path and diverging from the guide inwardly of the work.

12. In an edge-binding machine, a guide plate for adhesively coated binding rigidly supported in upright position with its curved end having a portion positioned to receive the thrust of the edge of a piece of work passing through the machine thereby to cause the binding to adhere to said edge, and presser members above and below the margin of the work having surfaces which are curved heightwise to correspond approximately with the curvature of the end of the guide and curved horizontally from the edge of the work inwardly thereby to press the binding progressively from the edge of the work toward the inner portion of the work.

13. In an edge-binding machine, a rigidly supported binding guide approaching the edge of the work at an angle thereto, strip-margin-reversing members positioned adjacent to said guide, and a cutting-off knife interposed between the end of said guide and said members.

14. In an edge-binding machine, means for feeding the work along a path, and a strip-reversing guide for applying said binding to the edge and adjacent margins of the work, said guide having a margin-engaging portion which is pivoted about an axis substantially normal to the path of feeding movement.

15. In a machine for applying an adhesively coated binding to the edge and adjacent margins of a piece of work, an abutment against which the edge of the work may press the binding strip to attach it to the edge of the work, and means for pressing the binding to the margins of the work automatically adjustable for variations in the thickness of the work without affecting said abutment.

16. In a machine for applying an adhesive binding strip to the edge and adjacent margins of a piece of work, an abutment against which the edge of the work may press the binding strip to attach it to the edge of the work, said abutment being substantially wider than the thickness of the work, and means associated with the abutment for pressing the binding strip against the margins of the work, said means being automatically adjustable in accordance with variations in the thickness of the work and constructed and arranged thereby to expose more or less of the abutment.

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