Jan. 8, 1957 S. SESERMAN 2,776,636

FOLDERS AND BINDERS FOR FLEXIBLE SHEET MATERIALS

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Fig. 1.

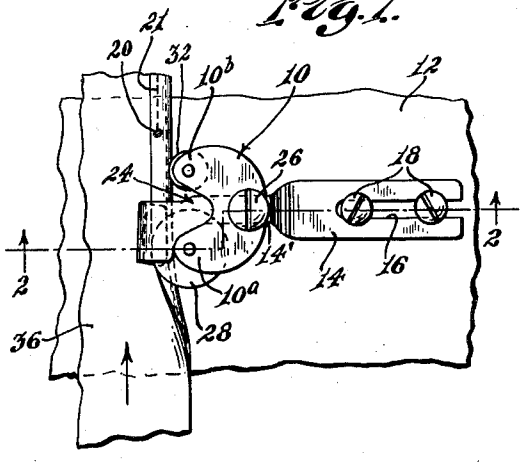


Fig. 2.

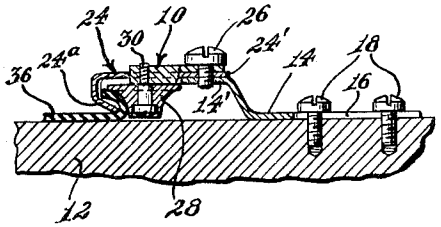


Fig. 3.

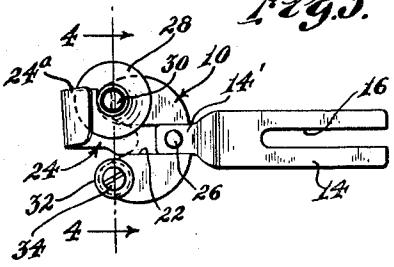


Fig. 4.

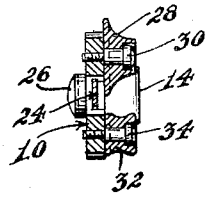


Fig. 5.

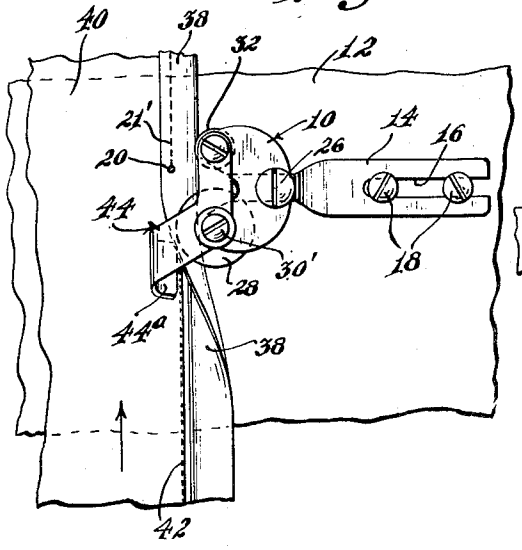
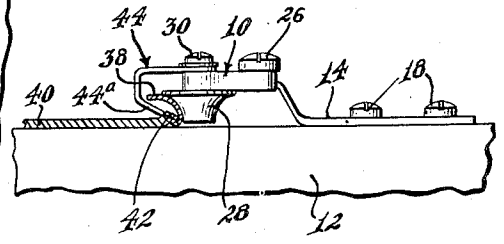


Fig. 6.



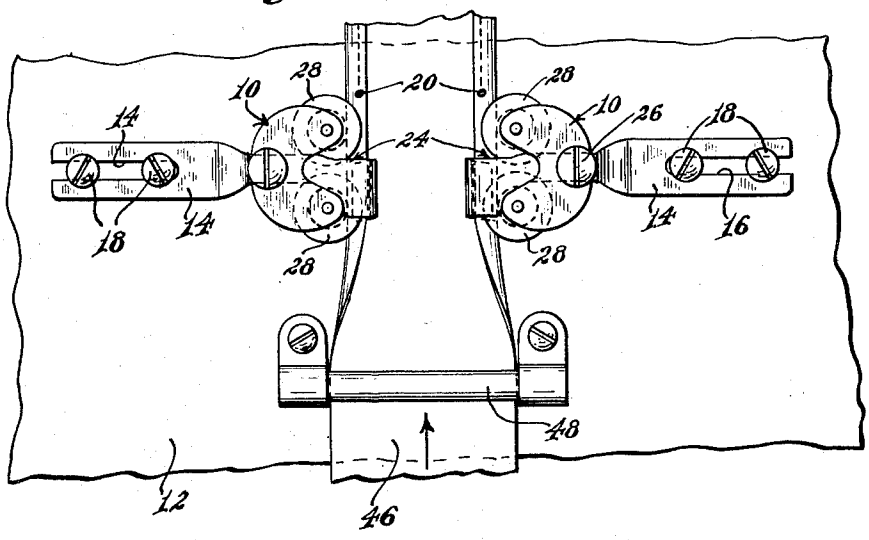
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FOLDERS AND BINDERS FOR FLEXIBLE SHEET MATERIALS

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Fig. 7.



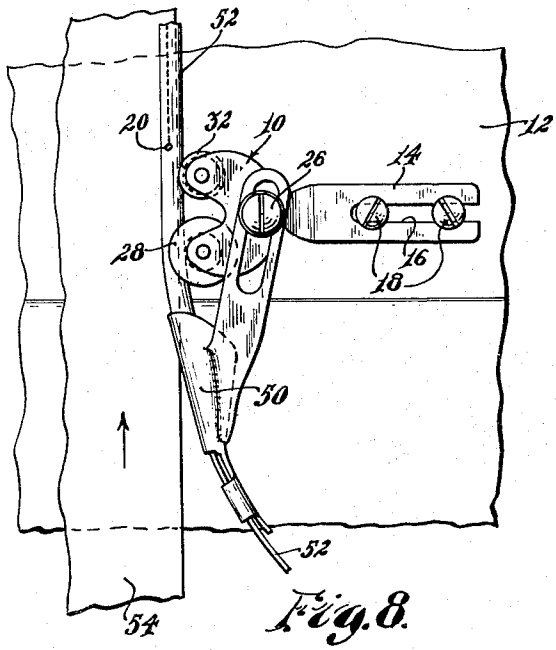


Fig. 8.

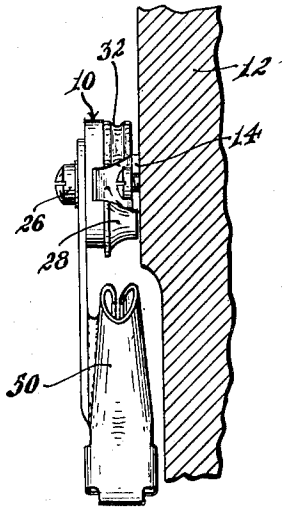


Fig. 9.

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United States Patent Office 2,776,636 Patented Jan. 8, 1957

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FOLDERS AND BINDERS FOR FLEXIBLE SHEET MATERIALS

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Application March 9, 1954, Serial No. 415,066

5 Claims. (Cl. 112—147)

This invention relates to improvements in folders and binders for flexible sheet materials. More particularly it provides edge folders and edge binders designed to fold or bind an edge portion of flexible sheet material as the edge portion of the material is being advanced into the action of a sewing machine needle, or to a position where staples, or the like, may be driven therethrough in spaced succession.

Various devices have been proposed heretofore designed to fold an edge portion of sheet material, and to fold and apply a binding strip over an edge portion of sheet material. However, the prior folders and binders of which I am aware have not been entirely satisfactory in that friction frequently prevents a desired free and easy feed of the material or materials to the action of a sewing machine, or a stapling machine, and, in the case of edge binding, it has not been practicably feasible, with the prior edge-binding devices, to apply the folded binding strip with uniform tightness to both concave and convex edges as well as to relatively straight edges. For example, in the shoe industry, various shoe parts frequently are required to have their edges bound all around the contours of the parts. Heretofore, it has been possible, with due care, to fold and apply a binding strip to such edges with a satisfactory degree of tightness along and around convex portions of the edges, but it has been impracticably difficult, if not impossible, to attain any satisfactory degree of tightness of the binding strip at and along concave portions of the edges.

It is among the objects of my present invention to provide folders and binders for flexible sheet material wherein frictional resistance to feed of the material or materials is reduced to a minimum by a coacting pair of spaced rollers which engage the work at relatively closely spaced locations along the direction of feed of the work, with one of said rollers participating in the folding of an edge portion of the sheet material, or of a binding strip which is being applied to an edge of the sheet material. According to the invention, in its application as a folder, an edge portion of an advancing sheet engages one roller and is turned inward thereby and, in conjunction with a folding guide, is folded over upon the adjacent sheet material with a second grooved roller engaging the folded edge adjacent to the region of stitching or stapling of the fold, the two said rollers and said folding guide coacting to minimize friction and to produce a continuously uniform fold along an edge portion of sheet material regardless of whether the edge contour is straight, convex or concave, or is an edge contour having both convex and concave portions.

Another object of the invention is to provide a folder and/or binder for flexible sheet material comprising folding means including a roller which minimizes frictional resistance to feed of the sheet material which is being folded, and a second roller having a grooved periphery for engaging, guiding and steadying the folded edge of the sheet material as it advances from the folding means into the action of the needle of a sewing machine, or

into the action of a stapling machine, which is to secure the fold along an edge portion of the sheet material.

Yet another object of the invention is to provide a folder and/or binder for flexible sheet material which more effectively folds and applies a binder strip to an edge of a sheet element as compared with prior binding devices and procedures. The invention employs a binding strip folding means in coaction with a pair of rollers which are spaced apart along the path of advance of the work from the strip folding means to a sewing machine needle, or the like, with the two said rollers acting to press the folded binding strip into tight engagement with the edge which is being bound, and with one of the said rollers laying the folded strip over upon the adjacent margin of the sheet whose edge is being bound.

It is, moreover, my purpose and general object to improve upon prior folding and binding devices and procedures by minimizing frictional resistance to the advance of work through the folder and/or binder, and to improve the character of a fold, or a bound edge, as compared with folds and bound edges attainable with the prior comparable devices.

In the accompanying drawings:

Fig. 1 is a top plan view of a folder and/or binder embodying features of the invention, it being shown in the process of folding an edge portion of a sheet of flexible material whose folded edge is advancing into the action of a sewing machine needle;

Fig. 2 is a cross-sectional view approximately on line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of the folder and/or binder of Figs. 1 and 2;

Fig. 4 is a cross-sectional view on line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 1 but showing a modified form of folder and/or binder;

Fig. 6 is an edge elevation of the folder and/or binder of Fig. 5, the work being shown in cross-section;

Fig. 7 is a top plan view showing a pair of folders operating at the opposite edges of a strip of flexible sheet material;

Fig. 8 is a top plan view of a modification showing a conventional strip folder substituted for the folder guide of Fig. 1 in a device for binding an edge of sheet material; and

Fig. 9 is an edge view of the device of Fig. 8 with the support in cross-section.

Referring to the drawings, and more particularly to Figs. 1–4, a head member **10** is adapted to be adjustably secured on any suitable support **12** by means of the mounting foot **14** which has a relatively long notch **16** therein for passage of screws **18** by means of which the foot **14** may be secured to the support **12** with permissible adjustment along a line passing through the axes of the two screws **18**.

Ordinarily, the support **12** will be a part of a sewing machine whose needle is indicated in cross-section at **20** in Fig. 1. However, the folder and/or binder of the invention may, if desired, be associated with a stapling machine, or the like.

As best seen in Figs. 2 and 3, the under side of head member **10** is grooved at **22**, and the shank **24** of a folder guide **24** is seated in the groove **22** with the body portion of the folder guide extending beyond the head member **10** at that side of the latter which is remote from the foot **14**. Foot **14** has a reduced relatively short shank part **14'** which seats in groove **22** against the shank **24'** of folder guide **24**, and both shanks are secured within the groove by the screw **26**.

Head **10** has the spaced roller-carrying portions 10^a, 10^b thereon and a wiping roller **28** is rotatably mounted on portion 10^a, by means of screw **30**, and a peripherally grooved roller **32** is rotatably mounted on portion 10^b

by means of screw 34. Folder guide 24 has a lip portion 24a bent downward and inward around the larger diameter portion of the wiping roller 28 for coaction with the roller 28 in accomplishing folding of an edge portion of flexible sheet material such as the sheet 36 of Figs. 1 and 2.

In use, the folder of Figs. 1–4 acts on the edge portion of a sheet element 36 as illustrated in Figs. 1 and 2. The sheet element is advanced in the direction of the arrow in Fig. 1 and is pressed toward the roller 28 which turns or wipes the edge margin of the sheet element over upon the lip 24a of the folder guide 24, as best seen in Fig. 2, with the lower edge of lip 24a engaging the sheet material inside the fold. Roller 32 engages the folded edge of the sheet element as the fold advances from the folder guide 24 toward the sewing machine needle 20, in Fig. 1, and the two rollers, in conjunction with folder guide 24, effectively guide and maintain a uniform fold as the fold moves into the action of needle 20 to be stitched as at 21 in Fig. 1. It is important to note, however, that the folded material is constantly in engagement with the two rollers 28, 32 which rotate freely and minimize frictional resistance to advance of the folded sheet material to and through the location of stitching of the fold. Also important is the fact that the spaced rollers 28, 32 are adapted to engage the edge of the fold not only when the edge contour is straight, as in Fig. 1, but also when the edge contour has either concave or convex curvatures. Hence, uniformity of the fold may be maintained along the edge portions of elements, such as shoe parts whose edge contours may have both concave and convex portions, without generated friction interfering with the free advance of the work.

Figs. 5 and 6 illustrate a modification which is especially well adapted for so-called outside folding and particularly for folding a collar 38 of relatively thin material over the edge of a substantially thicker sheet element 40 to whose edge the thinner collar material may be stitched as at 42. This has been a difficult operation to perform with any prior sheet folding device. The invention, however, readily accomplishes the folding of such a collar with uniform results and without the sluggishness of feed which has characterized the prior comparable procedures. The folder of Figs. 1–4 may be employed, if desired, but I have found it preferable to advance the folder guide of Figs. 5 and 6 beyond the wiping roller 28, as compared with Figs. 1–4, and this involves a modified mounting of the folder guide. In Figs. 5 and 6, the folder guide 44 is secured to head 10 by a screw 30' which may serve also to secure wiping roller 28 to the head. Folder guide 44 has a lip 44a turned downward and inwardly generally similar to the lip 24a of Figs. 2 and 3. However, the lip 44a engages the slightly up-turned stitched edge of sheet element 40 at a location in advance of wiping roller 28 for guiding the collar 38 into the action of roller 28 which latter turns the collar over the stitched edge while lip 44a holds said edge in proper relation, as best seen in Fig. 6. The smaller roller 32 engages the edge of the folded collar in the same manner described in connection with Figs. 1–4. However, the wiping roller 28 preferably is located closer to the needle 20 in Fig. 5, for stitching the collar, as at 21', at a location between the two rollers 28, 32. Here again the rollers minimize frictional resistance to advance of the work, eliminating the sluggishness which has characterized the prior comparable devices of which I am aware. Uniformity of the collar fold is assured due to the coaction of the two rollers and the folder guide lip 44a.

Fig. 7 shows a pair of folders, generally similar to the folder of Figs. 1–4, operating at the opposite edges of a strip 46 of flexible sheet material which may come to the folders from a guide roll 48. Both rollers of each folder in Fig. 7 are shown as wiping rollers similar to the roller 28 of Figs. 1–6. Obviously, a smaller roller

32 may be employed on each folder, if desired, as in Figs. 1–6.

When the invention is to be employed for folding and applying a binding strip to the edge of a sheet element, the binding strip may be turned over the edge of the sheet element and both be fed into the action of the wiping roll 28 and folder guide 24 of the Figs. 1–4 embodiment, with the binding being stitched the same as the fold in Fig. 1.

Preferably, however, a binding operation will be performed with the modified form of device as illustrated in Figs. 8 and 9 wherein a conventional type of strip folder 50 is adjustably secured to head 10 in advance of the wiping roller 28. The binding strip 52 passes through the folder 50 and, as the folded strip delivers from the folder, the edge portion of the sheet element 54 whose edge is to be bound is advanced between the folded margins of strip 52 and the wiping roller 28 presses the binding strip tightly against the edge of sheet element 54 while pressing the upper margin of the strip into position to be stitched by the needle 20. The needle preferably does its stitching between the two rollers 28, 32 while both rollers are urging the binding strip into tight engagement with the edge of element 54. The wiping action of roller 28 on the binding strip is especially important in the accomplishment of uniformly tight binding of element 54, and this uniformity is maintained regardless of whether the edge contour of element 54 is straight, or concave, or convex. In other words, the invention binds concave edges as well as uniformly as convex and straight edges, and does it without any sluggishness of feed of the work.

It will be apparent from the foregoing description, in connection with the drawings, that the invention utilizes a coacting pair of rollers in conjunction with a folder guide for accomplishing mere folding operations and utilizes the same or similar rollers in conjunction with a conventional strip folder for accomplishing edge binding operations more uniformly tight than has been commercially practicable heretofore, especially around edges having concave edge contours.

Various changes may be made in the details of the disclosed folder and/or binder devices within the scope of the appended claims, and it is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

I claim as my invention:

1. In a device for providing a finished edge on a flexible sheet element, a head having a pair of rollers mounted in spaced relation thereon, means for mounting said head above and in predetermined spaced relation to a support with said rollers between said head and the support, one of said rollers having a smaller-diameter portion adjacent to said support with annular curving extent to a larger-diameter portion which is adjacent to said head, guide means on said head in a predetermined relationship to said one roller whereby a flexible sheet element advancing along the support is acted upon by said guide means and said one roller to effect folding-over and holding of one portion of the sheet element in overlying relation to another portion thereof, the said curving portion of said one roller being in engagement with said edge fold of the sheet element, and said larger-diameter portion of said one roller being in overlying relation to said folded-over portion of the sheet element, the other of said rollers being arranged and adapted to engage said edge fold of the advancing sheet element as said element advances from said one roller.

2. In a device for providing a folded edge on a flexible sheet element, a head having a pair of rollers mounted in spaced relation thereon, means for mounting said head above and in predetermined spaced relation to a support, with said rollers between said head and the support and rotatable on parallel axes perpendicular to the support, one of said rollers having a smaller-diameter portion ad-

jacent to said support with annular curving surface extent to a larger-diameter portion which is adjacent to said head, guide means mounted on said head in a predetermined relationship to said one roller whereby a flexible sheet element advancing along the support is acted upon by said guide means and said one roller to effect folding-over and holding of one portion of said sheet element in overlying relation to another portion thereof, the other of said rollers having a grooved periphery for engaging the folded edge fold of said sheet element as the sheet element advances from said one roller.

3. In a device for providing a folded edge on a flexible sheet element, a head having a pair of rollers mounted in spaced relation thereon, means for mounting said head above and in predetermined spaced relation to a support, with said rollers between said head and the support and rotatable on parallel axes perpendicular to the support, a folder guide mounted on said head and having extent as a channel around and in spaced relation to a peripheral portion of one of said rollers, said one of the rollers having a smaller diameter portion adjacent to said support with annular curving surface extent to a larger diameter portion which is adjacent to said head, whereby an edge portion of a flexible sheet element advancing along said support and urged laterally into engagement with said one roller becomes turned over upon adjacent material of said sheet element into said channel of said folder guide with the bottom wall of the channel limiting the permissible turn-over of said edge portion of the sheet element, the other of said rollers being peripherally grooved for engaging the folded edge of said sheet element as the element advances from said one roller and folder guide.

4. In a device for providing a folded edge on a flexible sheet element, a head having a pair of rollers mounted in spaced relation thereon, means for mounting said head above and in predetermined spaced relation to a support, with said rollers between said head and the support and rotatable on parallel axes perpendicular to the support, a folder guide mounted on said head and extending outward from the head and in spaced relation around a peripheral portion of one of said rollers thereby to provide a guide passage between said folder guide and said one roller, said one roller having a surface curving in axial direction whereby an edge portion of a flexible sheet element advancing along said support and urged laterally into engagement with said one roller becomes turned over upon adjacent material of said sheet element and into said guide passage between the folder guide and said one roller, the other of said rollers being peripherally grooved for engaging and guiding the folded edge of said sheet element as it advances from said one roller.

5. In a device for providing a finished edge on a flexible sheet element, a head having a pair of rollers mounted in spaced relation thereon, means for mounting said head above and in predetermined spaced relation to a support with said rollers between said head and the support, one of said rollers having a surface curving in axial direction for engaging and wiping sheet material advancing along the support in engagement with said one roller, means mounted on said head for folding a binding strip of flexible sheet material advancing through said folding means and delivering therefrom with the folded edge of the binding strip in engagement with said curving surface of said one roller whereby said one roller wipes said binding strip into tight engagement with the edge of a flexible sheet element which advances along the support with said binding strip and whose edge portion is between the folded edge margins of the binding strip, the other of said rollers being peripherally grooved for engaging said folded edge of the binding strip and wiping it toward the edge of said sheet element as the sheet element and binding strip advance from said one roller.

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