June 24, 1958 L. ROSEMAN 2,840,374

STRIP FEEDING MEANS WITH COMPENSATOR FOR STRIPS OF VARYING WIDTH

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Fig. 1.

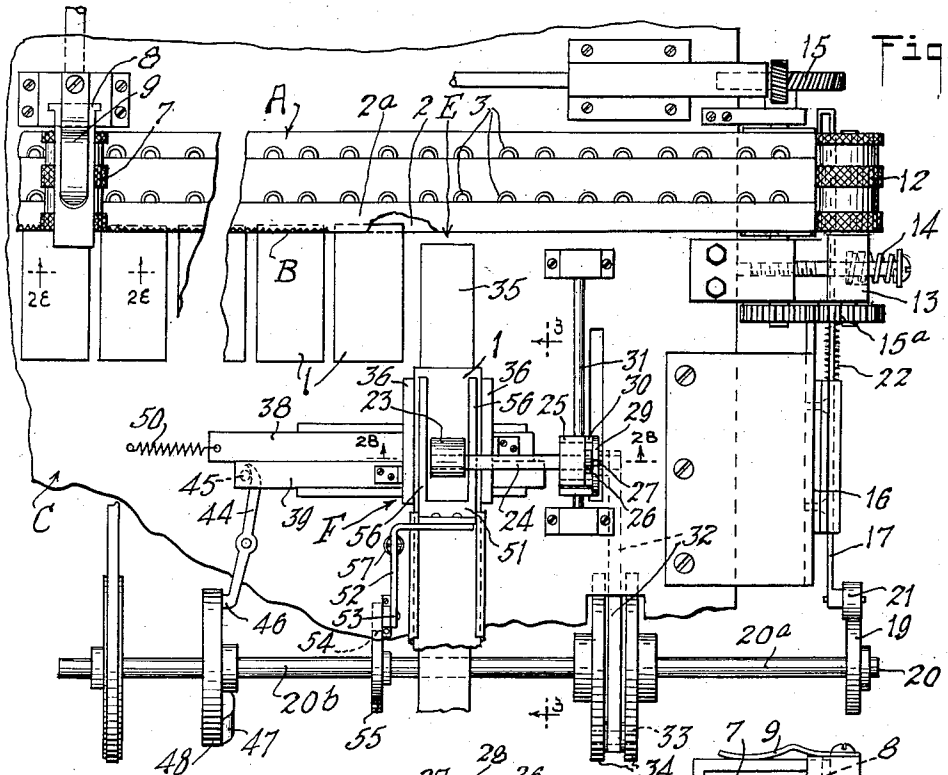


Fig. 2.

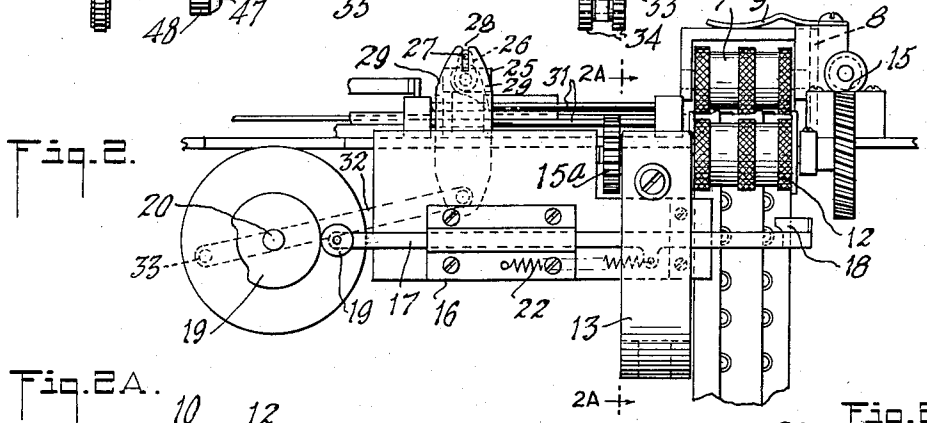


Fig. 2A.

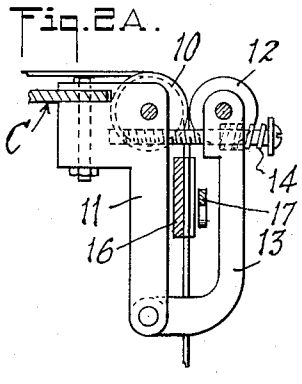


Fig. 2B

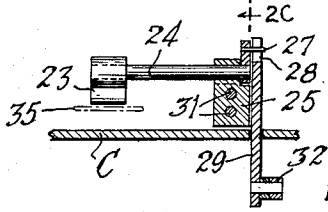


Fig. 2C.

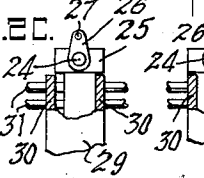
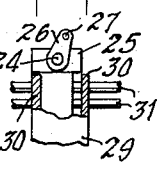


Fig. 2D.



INVENTOR.
LEO ROSEMAN

BY

Harry B. Cook,

ATTORNEY

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Fig. 3.

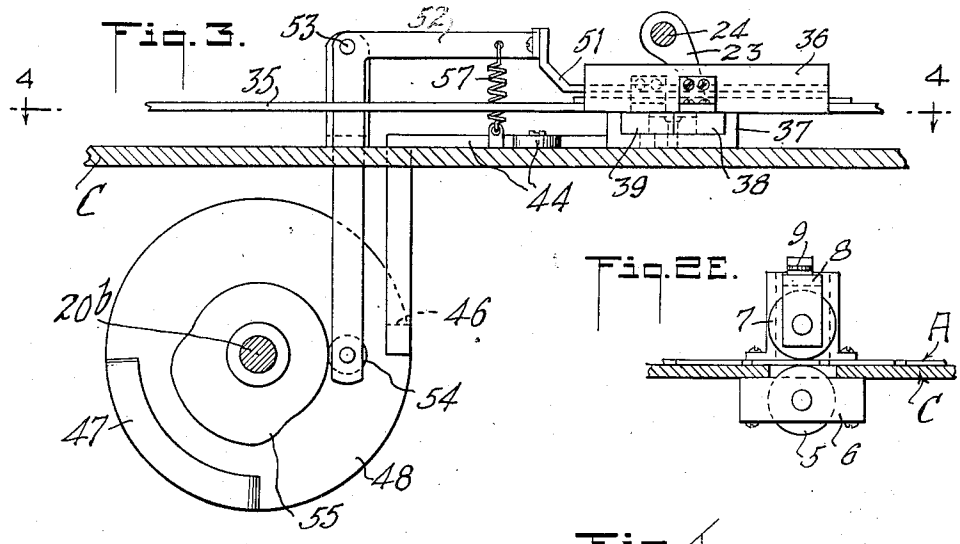


Fig. 2E.

Fig. 4.

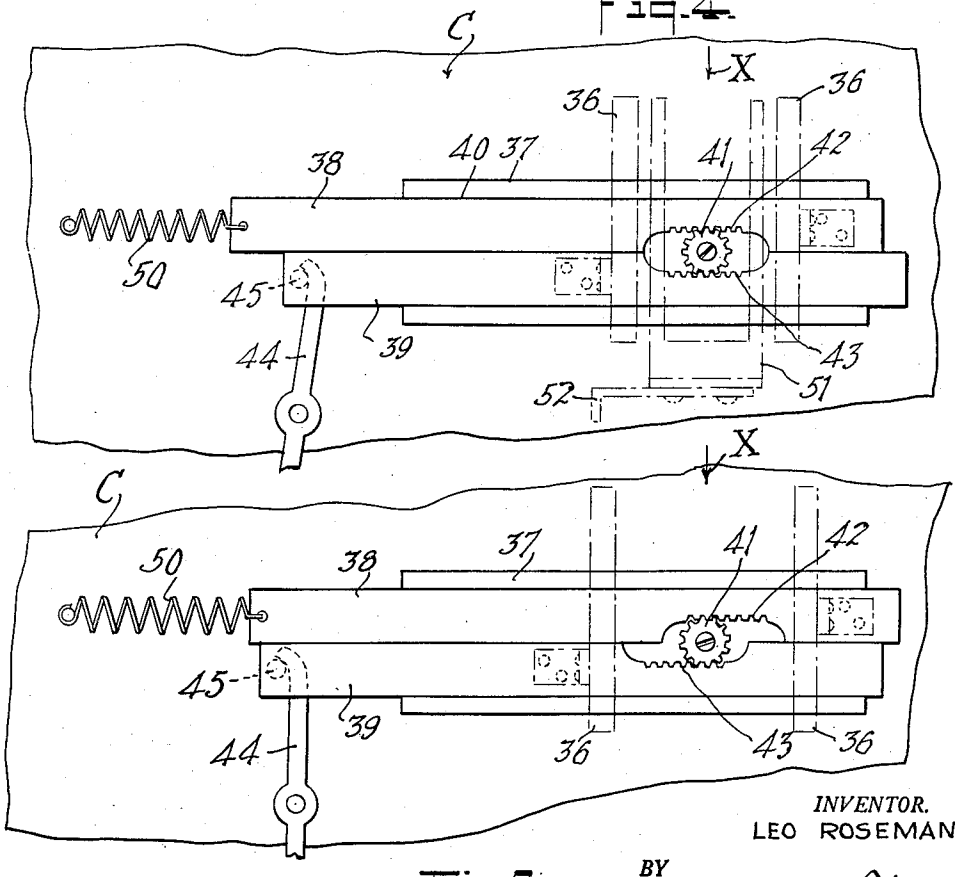


Fig. 5.

INVENTOR.
LEO ROSEMAN

BY

Harry B. Cook,

ATTORNEY

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STRIP FEEDING MEANS WITH COMPENSATOR FOR STRIPS OF VARYING WIDTH

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Fig. 6.

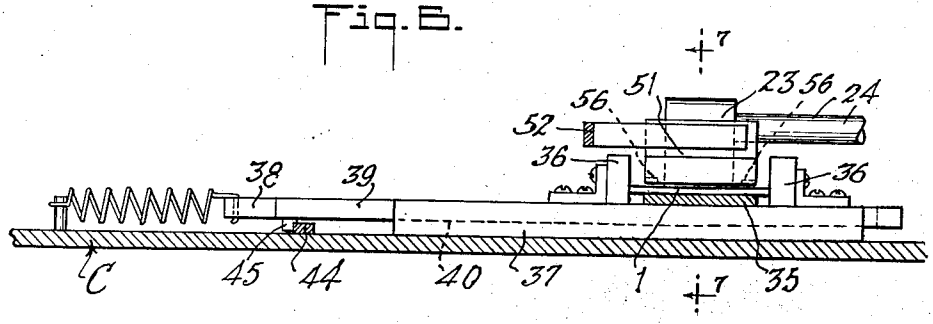


Fig. 7.

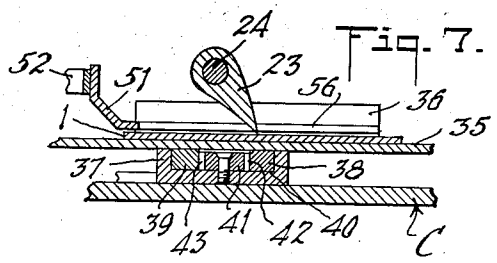
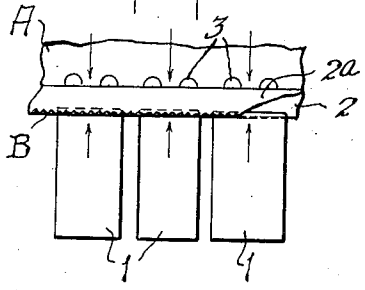


Fig. 8.



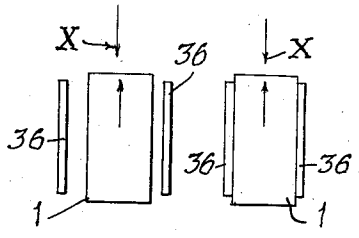


Fig. 9. Fig. 9A.

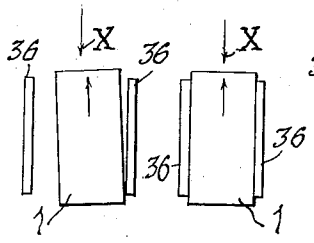


Fig. 10. Fig. 10A.

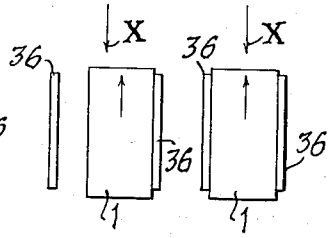


Fig. 11. Fig. 11A.

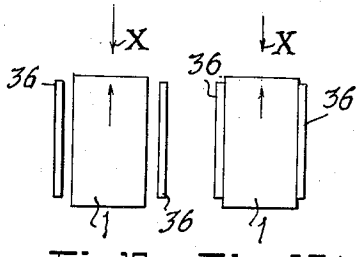


Fig. 12. Fig. 12A.

INVENTOR.
LEO ROSEMAN

BY

Harry A. Cook,

ATTORNEY

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2,840,374

STRIP FEEDING MEANS WITH COMPENSATOR FOR STRIPS OF VARYING WIDTH

Leo Roseman, Newark, N. J.

Application January 31, 1956, Serial No. 562,409

14 Claims. (Cl. 271—55)

This invention relates particularly to a machine for sewing a plurality of short elastic straps between longitudinal flaps of a long continuous strip of material in spaced relation longitudinally of said long strip, and more particularly the invention is directed to a machine for stitching onto a continuous strip of fastener tape having fastener elements spaced longitudinally thereof, a plurality of elastic straps each in substantial alignment with one or a series of the fastener elements or the like. Machines of the same general type are described and claimed in my Patent No. 2,695,578.

In a machine of this character it is essential that each elastic strap be fed into accurate alignment with its corresponding fastener elements or the like on the continuous strip, and this constitutes a problem, particularly with elastic straps as they are presently made. It is well known that elastic straps or tapes are manufactured in pieces many yards in length and are rolled on spools or reels for use by, for example, garment manufacturers who cut the elastic strip into a plurality of shorter pieces for use in garments such as brassieres. The long elastic strip slightly varies in width at different zones of its length due to manufacturing difficulties, and sometimes different rolls of elastic strips that are sold as of the same width, actually slightly vary in width. Moreover, the longitudinal edges of the long strips are sometimes slightly curved.

In machines of the type contemplated by the invention, it is essential that the short pieces of the elastic strip be accurately fed into a position in alignment with their respective fastener elements or the like, and this constitutes a difficult problem, especially with elastic strips of varying width as described. Therefore, a prime object of the invention is to provide novel and improved means to feed and guide the short elastic straps into proper relation to their fastener elements or the like and to compensate for slight variations in the width of successive straps as well as to compensate for slight curvature of the longitudinal edges of the straps.

Another object is to provide a compensating mechanism of the general character described which shall move and hold successively fed straps with their longitudinal median lines in a common straight path, that is, with the longitudinal median line of each strap in endwise alignment with the next preceding strap.

A further object is to provide a novel and improved combination of such a compensating mechanism, means for feeding the elastic straps longitudinally and means for moving the long continuous strip or fastener tape longitudinally in a direction at an angle to the direction of movement of the straps, all in timed relation to each other so that each strap shall be positioned accurately in alignment with its corresponding fastener elements on the fastener tape or the like.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings in which—

Figure 1 is a schematic top plan view of a machine

embodying the invention with portions broken away for clearness of illustration;

Figure 2 is a front elevational view of the machine approximately from the plane of the line 2—2 of Figure 1;

Figure 2A is a fragmentary side elevation of one set of feed rollers for the fastener tape;

Figure 2B is a fragmentary vertical sectional view on the plane of the line 2B—2B of Figure 1;

Figure 2C is a fragmentary vertical sectional view approximately on the plane of the line 2C—2C of Figure 2B showing the pawl-operating crank in the pawl-releasing position;

Figure 2D is a similar view showing the pawl-operating crank in the pawl-driving position;

Figure 2E is a fragmentary vertical sectional view on the plane of the line 2E—2E of Figure 1;

Figure 3 is an enlarged fragmentary transverse vertical sectional view approximately on the plane of the line 3—3 of Figure 1;

Figure 4 is an enlarged top plan view of the compensating mechanism with portions omitted for clearness in illustration and showing the guide plates for the elastic straps in one position;

Figure 5 is a similar view showing the parts with the guide plates in their normal separated position;

Figure 6 is an enlarged transverse vertical sectional view approximately on the plane of the line 6—6 of Figure 1;

Figure 7 is a fragmentary vertical sectional view approximately on the plane of the line 7—7 of Figure 6;

Figure 8 is a fragmentary plan view of a piece of fastener tape having a plurality of elastic straps of varying widths attached thereto;

Figure 9 is a diagrammatic view of the strap guide plates of the compensating mechanism in their normal position to receive a strap;

Figure 9A is a similar view showing the guide plates in guiding relation to the strap;

Figure 10 is a view similar to Figure 9 showing a strap fed into an out-of-line or improper position between the compensator plates;

Figure 10A is a similar view showing the strap straightened or aligned into its proper position;

Figure 11 is similar to Figure 10 and shows a strap in another improper or laterally displaced position;

Figure 11A shows the compensator plates properly positioning the strap shown in Figure 11;

Figure 12 is like Figure 9 but shows a strap of greater width; and

Figure 12A shows the compensator plates in guiding relation to the strap shown in Figure 12.

For the purpose of illustrating the principles of the invention, I have shown the invention embodied in a machine for inserting elastic short straps 1 between lower and upper flaps 2 and 2a of a main continuous strip of fabric A which has a plurality of fastener elements 3 in the form of wire eyes stitched thereon to form a fastener tape. In the present instance, the eyes are arranged in groups or series each comprising two eyes spaced apart longitudinally of the strip a distance less than the width of the strap 1 that is to be inserted between said flaps, adjacent series of eyes being spaced apart a distance somewhat greater than the distance of spacing of the eyes of each series. Generally the straps 1 will be sewed onto the main strip A in spaced relation longitudinally thereof by a line of stitches B, with each strap in alignment or opposite one series of the fastener elements 3 as best shown in Figure 1, or as shown for example in my above mentioned Patent No. 2,695,578.

The main strip A is moved longitudinally and horizontally over a suitable bed plate C by mechanism that

will stop the feeding movement of the strip at predetermined intervals, and the straps 1 are fed and inserted between the flaps of the main strip in proper alignment with their respective series of fastener elements while the movement of the main strip is interrupted. The straps 1 as they are severed from, for example, a long roll of elastic material are so adjusted and guided that their leading ends will be accurately disposed in proper alignment with their respective series of eyes when said ends of the straps enter between the flaps of the main strip A, by a compensating mechanism which operates in timed relation to the feeding movements of the main strip.

Any suitable means may be utilized for moving the main strip A longitudinally, for example the means disclosed in my Patent No. 2,695,578, but inasmuch as such means per se is immaterial to the invention, for simplicity I have shown a feeding means somewhat of the type described in my United States Patents Nos. 1,742,221 and 1,801,570. This means is shown as comprising a feed roll 5 journaled in suitable bearings 6 beneath the bed plate C, and an upper feed roll 7 journaled on a bearing block 8 above said bed plate and normally influenced toward the roll 5 by a compression spring 9. The two rollers grip the main strip A between them and one of the rollers, in the present instance the roller 5, is connected to suitable apparatus for rotating the rollers intermittently for moving a series of the fastener elements 3 in succession to a predetermined point, for example a strap inserting station, during each step of movement in timed relation, for example to a stitching-forming mechanism. If desired a presser foot and feed dog in connection with control means therefor, as shown in my Patent No. 2,695,578, could be used in place of the rolls 5 and 7. Means like that shown in my Patent No. 1,801,570 has been shown to pull the strip from a supply and to positively stop the main strip at the proper point, although apparatus such as shown in my aforesaid Patent No. 2,695,578 might be used to stop the strip. As shown here, a roll 10 is journaled on a bracket 11 depending from the bed plate C, with which cooperates another roll 12 journaled on an arm 13 which is pivotally connected to the bracket 11. These two rolls grip the main strip A between them and are normally pressed together by a spring 14. The roll 10 is positively driven through gearing 15 from the same source of power and in timed relation to the driving means for the roll 5 and the rolls 11 and 12 are geared together at 15*a*. Mounted on another bracket 16 depending from the bed plate, is a stop bar 17 provided at one end with a stop finger 18 adapted to conform to the sides of the eyes 3 of the fastener tape, and means is provided for automatically actuating the stop bar so that its finger 18 is projected into and withdrawn from the path of movement of the eyes of the tape in timed relation to the interruption of the movement of the tape by the rolls 5, 7. As shown, a cam 19 is mounted on a shaft 20 which may have the same driving source as the rolls 5, 7, and the cam coacts with a follower roller 21 on the end of the stop bar 17 opposite the finger 18, the stop bar being normally biased by a spring 22 to move the finger 18 into the path of movement of the eyes 3 and the bar being actuated by the cam 19 out of said path of movement of the eyes. When an eye is engaged by the finger 18, feeding movement of the main strip is positively interrupted, which is old in the art.

As shown in the drawings, the movement of the main strip A is always interrupted with a series of elements 3 disposed at a strap inserting point or station E (Figure 1), and suitable feeding mechanism moves one of the straps 1 through said station so as to insert the leading end of the strap between the flaps of the main strip A. As shown, the strap feeding means comprises a dog 23 fixedly connected to a short shaft 24 which is journaled in a block 25 and has a short crank arm 26 carrying a pin 27 which is movable in a notch 28 in the upper end of a carrier 29 which has two spaced parallel arms 30 that are slidable horizontally on guide rods 31 mounted on the bed plate C. The block 25 is also slidable on the rods 31 between the arms 30, there being lost motion between said arms and said block so that the dog 3 is caused to dig into a strap 1 upon movement of the carrier, crank arm 23 and the dog in one direction, that is, to the right of Figure 2 and as shown in Figures 7 and 2D, and to swing the dog clear of the strap upon movement of the carrier 29 and the crank arm in the opposite direction as indicated in Figure 2C. In this way the elastic strap 1 is fed step by step. The carrier is shown as driven by a link 32 one end of which is connected to the carrier while the other end is connected to a wrist pin 33 connecting crank disks 34 which are mounted on and driven by the shaft 20. In the present instance the shaft 20 is shown in two sections 20*a* and 20*b* each of which is journaled in suitable bearings not shown and each of which has one of the crank disks 34 connected thereto. The straps 1 are slid in succession on a guide plate 35 in any suitable way. Preferably there will be means for severing the straps from a roll of elastic material and dropping the severed straps in succession on the guide plate 35 where they are engaged by the dog 23 which will engage and push each strap toward the main strip A each time it moves in the direction toward the main strip.

An important feature of my invention is a compensating means or compensator for positively lining up the straps 1 with the strap inserting station E so that each strap will be accurately presented to the main strip A in accurate alignment with its respective series of fastener elements 3, even when the straps vary in width or become laterally dislocated or oblique to the direction of feeding movement, or have slightly curved edges. This compensator F comprises two opposed parallel compensator plates 36 that are slidably mounted on a base plate 37 to move toward and from each other. One compensator plate is rigidly connected to an actuating bar 38 while the other compensator plate is connected to an actuating bar 39. These bars are slidably mounted in side by side relation in a groove 40 in the base plate 37, and pinion 41 is journaled on said base plate between said actuating bars and meshes with rack 42 and 43 on the respective actuating bars 38 and 39 (Figures 4 and 5). One of the bars, in the present instance the bar 39, is periodically slid in one direction by suitable means such as a lever 44 one end of which abuts a pin 45 on the bar 39 which the other end carries a shoe or cam follower 46 which cooperates with a cam projection 47 on one face of a disk 48 mounted on and rotated by the shaft 20*b* which in turn may be driven by the same source of power, and in timed relation to the rolls 5, 7. The other actuating bar 38 is normally influenced in one direction by a tension spring 50. It will thus be seen, with reference to Figures 4 and 5, that when the lever 44 is swung in one direction by the cam 47, the bar 39 will be slid to the left of Figure 4, and due to the pinion and rack connection of the bars, the other bar will be slid to the right in Figure 4 so as to move the compensator plates apart from the heavy broken line position of Figure 4 to the heavy broken line position of Figure 5, while when the cam 47 moves out of engagement with the shoe 46, the spring 50 will slide the bars in opposite directions as shown in Figure 4 to move the compensator plates toward each other or closer together. The compensator plates are moved at the same speed toward and from each other.

Normally the compensator plates are spaced apart a distance greater than the width of the straps and are disposed at opposite sides of the guide plate 35 equidistantly from a point X between them in the center line of the normal path of movement of the straps as shown in Figure 5 and diagrammatically in Figure 9. Then one

of the straps 1 is slid between the compensators by the feed dog 23, as shown in Figures 1 and 9. Should the strap be laterally displaced from the normal path of movement as indicated by the arrows in Figure 9, when the compensator plates are moved together, one thereof will engage the strap before the other and slide the strap to its proper central position with respect to the path of movement, and then the other compensator plate will engage the opposite longitudinal edge of the strap as shown in Figure 9A. After the strap has been properly positioned and the feed dog is in position to feed the strap, the compensator plates are moved apart again to permit the strap to be fed to the main strip and allow the next strap to be slid between the compensator plates. If the strap should be obliquely disposed to the path of movement, it will also be properly aligned as shown in Figures 10 and 10A. Figure 11 shows the strap laterally displaced a greater distance than in Figure 9 while Figure 11A shows the strap properly centered. Figure 12 shows the operation of the compensator with a strap much wider than the straps shown in Figures 9–11 inclusive. It might be pointed out here that the movement of the compensator plates toward each other under the influence of the spring 50 is stopped by the edges of the strap, the plates thus moving closer together for narrower straps and being held farther apart by wider straps. In all cases the compensator plates will remain equidistantly spaced from opposite sides of the center line of movement of the straps which is indicated by the arrows in Figures 4 and 5, and the tension of the spring will be regulated so that it does not flex the straps.

For the purpose of holding flat the edge portions of the straps as the straps enter between the compensator plates, a cover 51 is provided. This cover is shown as U-shaped in plan view with its base portion fastened to one end of a lever 52 which is pivotally mounted at 53 on a bracket on the bed plate C and urged by a spring 57 to move the cover toward the guide plate 35, and has a follower roller 54 at its other end engaging a cam 55 on the shaft 20*b*. The arms 56 of the cover straddle the feed dog 23 and are disposed above the edges of the elastic strap as shown in Figures 1, 6 and 7, and the cover is actuated in timed relation to the movement of the compensator plates so that the cover is pressed downwardly by the spring 57 and lightly against the strap to flatten the strap edges if they are curled when the compensator plates move toward each other and so that the cover is elevated by the cam clear of the strap for feeding of the latter when the compensator plates are moved apart to receive another strap between them.

It will also be observed that the compensator plates will also align straps whose longitudinal edges are slightly curved.

While the now preferred embodiment of the invention has been illustrated and described for the purpose of explaining the principles of the invention, it will be understood that many modifications and changes can be made in the construction of the apparatus embodying the invention and that the invention may be utilized in other types of machines, all within the spirit and scope of the invention.

What I claim is:

1. The combination of a bed, means on said bed for feeding elongate straps longitudinally and horizontally in succession in a straight path, a pair of elongate vertical plates normally spaced equidistantly from and parallel to the center line of said straight path of movement of said straps with the space between said plates greater than the width of said straps, and means mounting said plates on said bed to move at the same speed toward said center line to engage the longitudinal edges of a strap that is between the plates and laterally move the strap to align the center line of said strap with said center line of said path of movement.

2. The combination as defined in claim 1 with the addition of yielding means for moving said plates toward each other, and means for moving said plates away from each other.

3. The combination as defined in claim 1 wherein the last-named means includes a base, a pair of elongate actuator bars longitudinally movable in side-by-side relation on said base plate, one of said plates being rigidly connected to each of said actuator bars with their planes perpendicular to the direction of movement of said actuator bars, and means connecting said bars for simultaneous movement at the same speed.

4. The combination as defined in claim 3 with the addition of yielding means for moving one of said bars in the direction to cause movement of said plates toward each other into yielding contact with the longitudinal edges of a strap between said plates, and means for moving the other actuating bar in the opposite direction.

5. The combination as defined in claim 3 with the addition of yielding means for moving one of said bars in the direction to cause movement of said plates toward each other into yielding contact with the longitudinal edges of a strap between said plates, and means for moving the other actuating bar in the opposite direction, said yielding means including a tension spring having its ends connected respectively to said bar and to said bed, and the last-named means including a movable cam and a cam lever pivoted intermediate its ends which engage respectively the corresponding actuating bar and said cam.

6. The combination of a bed plate and means for alternately moving longitudinally in a predetermined path along said bed plate an elongate strip of material having elements spaced longitudinally thereof and stopping said strip to present said elements successively at a predetermined point at one side of said path of movement, means operative in timed relation to the first mentioned means to feed elongate straps longitudinally along said bed along a normal path and center line of which passes through said predetermined point in timed relation to the movement of said elongate strip and to position the leading end of each strap in overlapping relation to a portion of said elongate strip while said strip is stopped, a pair of elongate vertical plates normally spaced equidistantly from and parallel to the center line of the normal path of movement of said straps with the space between said plates greater than the width of said straps, and means mounting said plates on said bed to move at the same speed toward said center line to engage the longitudinal edges of a strap that is between the plates and laterally move the strap to align the center line of said strap with said center line of said path of movement and with said element that is disposed at said predetermined point.

7. The combination of a bed plate and means for alternately moving longitudinally in a predetermined path along said bed plate an elongate strip of material having elements spaced longitudinally thereof and stopping said strip to present said elements successively into juxtaposition to a predetermined point at one side of said path of movement, means operative in timed relation to the first named means to feed elongate straps in succession longitudinally along said bed in a normal path the center line of which passes through said predetermined point in timed relation to the movement of said elongate strip to position the leading end of each strap in overlapping relation to a portion of said elongate strip while said elongate strip is stopped, and means to momentarily engage and laterally move said straps for aligning the center line of each strap with said center line of said path of movement and with said element on said elongate strip that is disposed at said predetermined point.

8. The combination as defined in claim 6 with the addition of yielding means for moving said plates toward each

other, and means for moving said plates away from each other.

9. The combination as defined in claim 6 wherein the last-named means includes a base, a pair of elongate actuator bars longitudinally movable in side-by-side relation on said base plate, one of said plates being rigidly connected to each of said actuator bars with their planes perpendicular to the direction of movement of said actuator bars, and means connecting said bars for simultaneous movement at the same speed.

10. The combination as defined in claim 9 with the addition of yielding means for moving one of said bars in the direction to cause movement of said plates toward each other into yielding contact with the longitudinal edges of a strap between said plates, and means for moving the other actuating bar in the opposite direction.

11. The combination as defined in claim 1 wherein the last-named means includes a pair of actuator members, one of said plates being connected to each of said actuator members, and means connecting said actuator members for simultaneous movement in opposite directions at the same speed.

12. The combination as defined in claim 11 with the addition of yielding means for moving said actuator members in one direction to move said plates toward each other, and means for moving said actuator members in the other direction to move said plates apart.

13. The combination as defined in claim 6 wherein the last named means includes a pair of actuator members each having one of said plates connected thereto, means connecting said actuator members for simultaneous movement in opposite directions at the same speed, yielding means for moving said actuator members in one direction to move said plates toward each other, and means for moving said actuator members in the opposite direction to move said plates apart.

14. The combination of a bed plate and means for moving longitudinally along said bed plate an elongate strip of material into juxtaposition to and past a predetermined point, means to feed elongate straps in succession longitudinally along said bed in timed relation to the movement of said elongate strip and in a normal path the center line of which passes through said predetermined point at an angle to said elongate strip so as to bring the leading end of each strap into a position to be joined to a portion of said elongate strip, and means to momentarily engage and laterally move said straps for aligning the center line of each strap with said center line of said normal path of movement.

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