Feb. 17, 1953 J. S. WILLIS 2,628,580

SEWING MACHINE FOR MAKING FRENCH BINDINGS

Filed March 6, 1951 2 SHEETS—SHEET 1

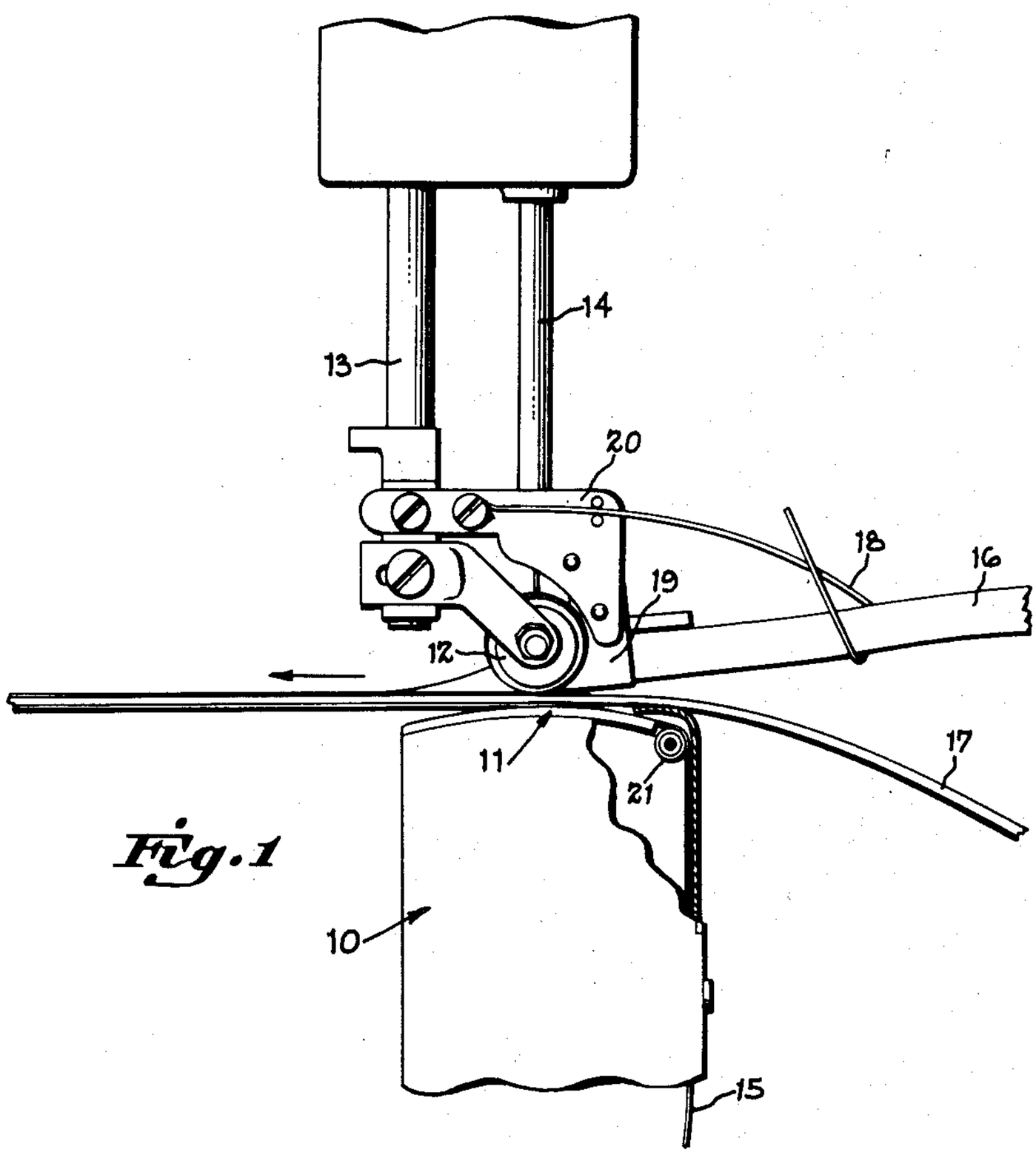

Fig. 1

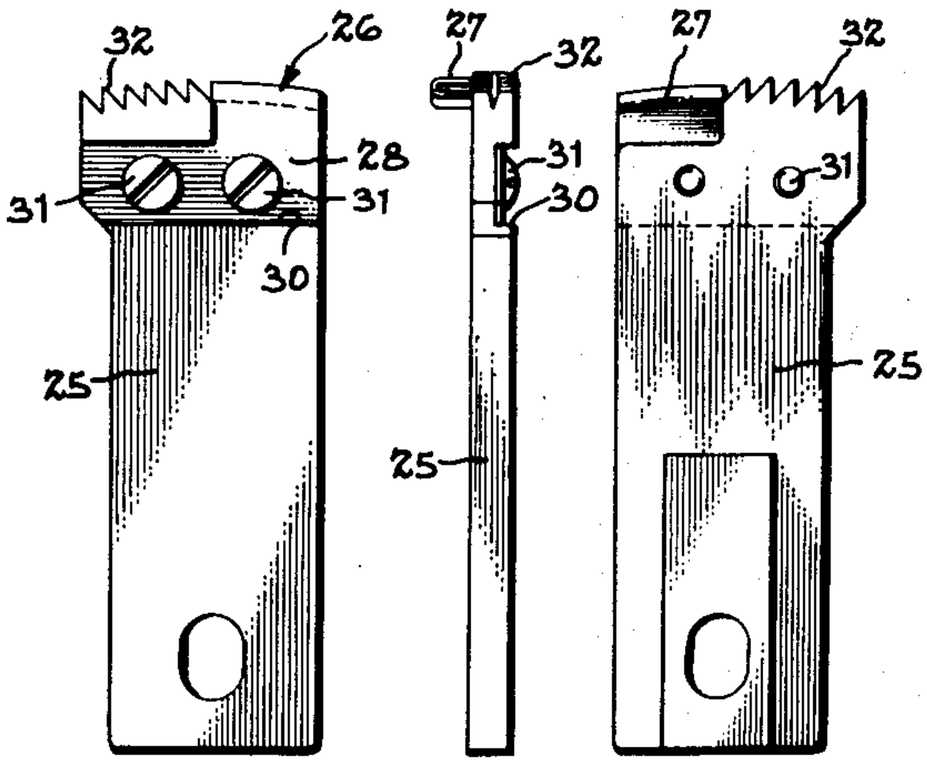

Fig. 2

Fig. 3

Fig. 4

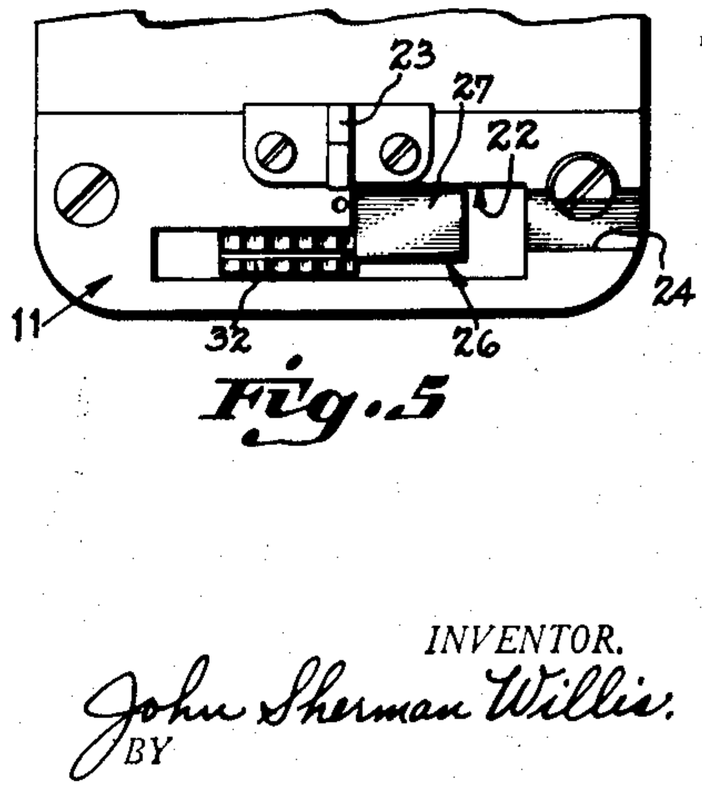

Fig. 5

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SEWING MACHINE FOR MAKING FRENCH BINDINGS

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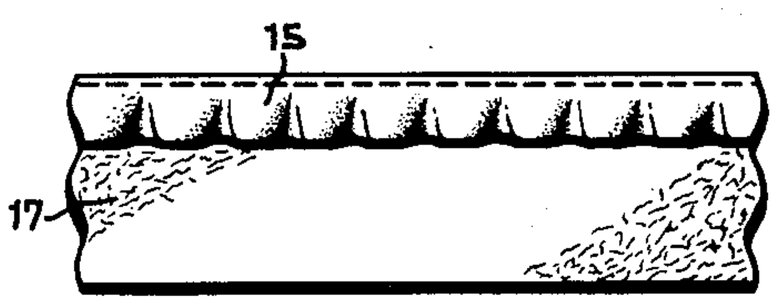

Fig. 6

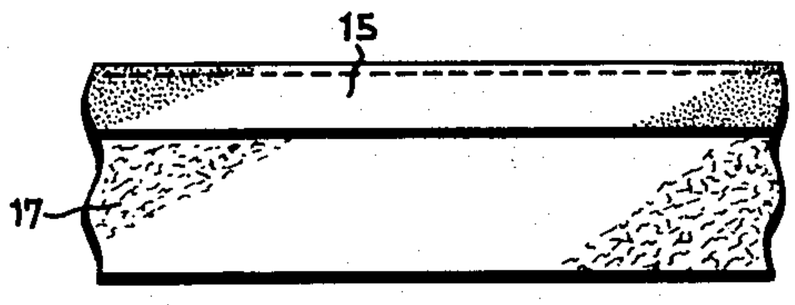

Fig. 7

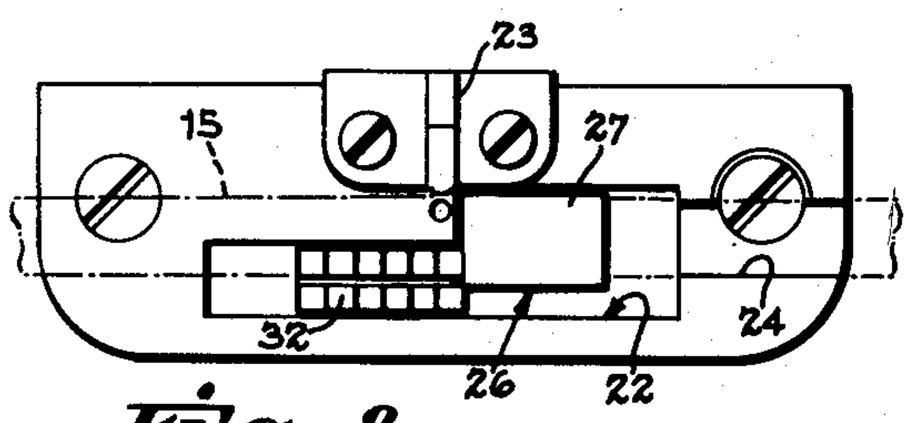

Fig. 8

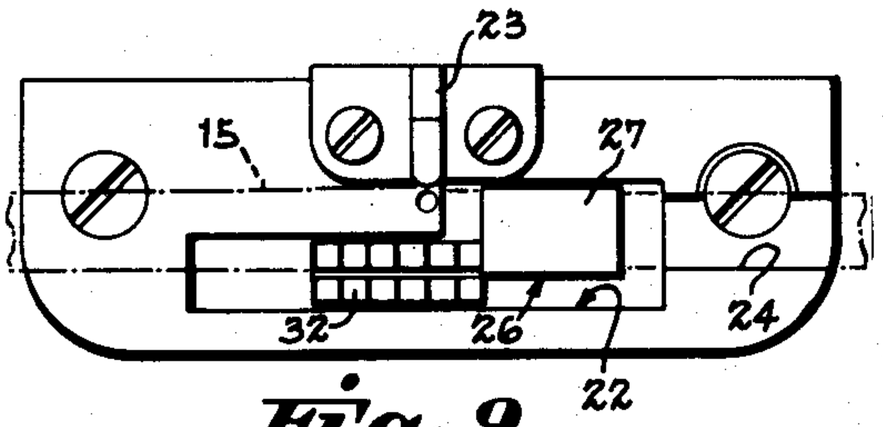

Fig. 9

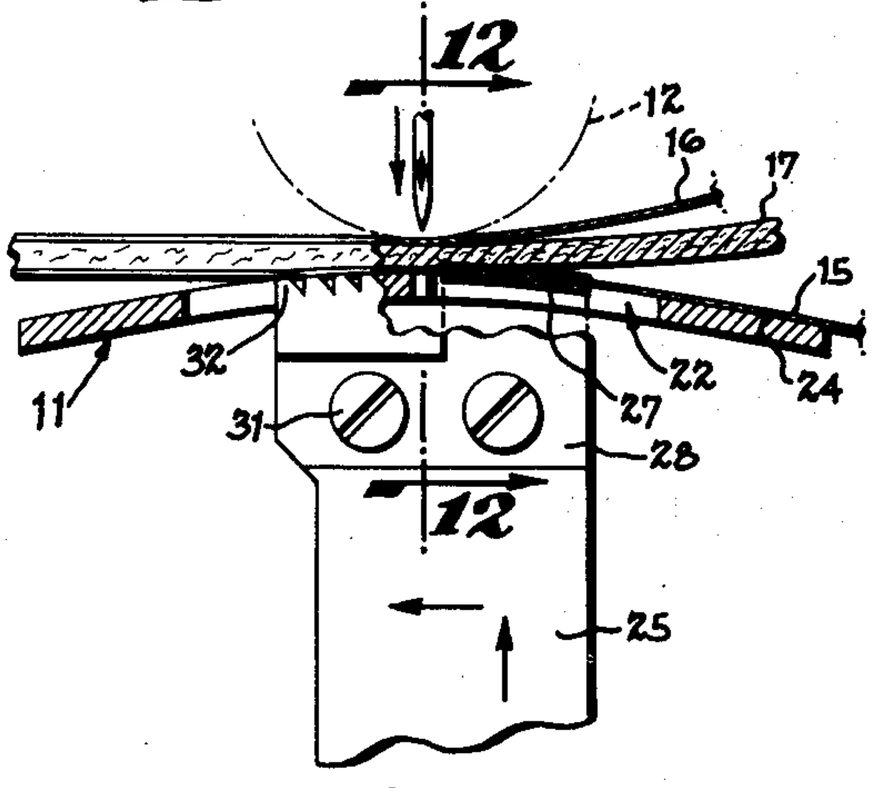

Fig. 10

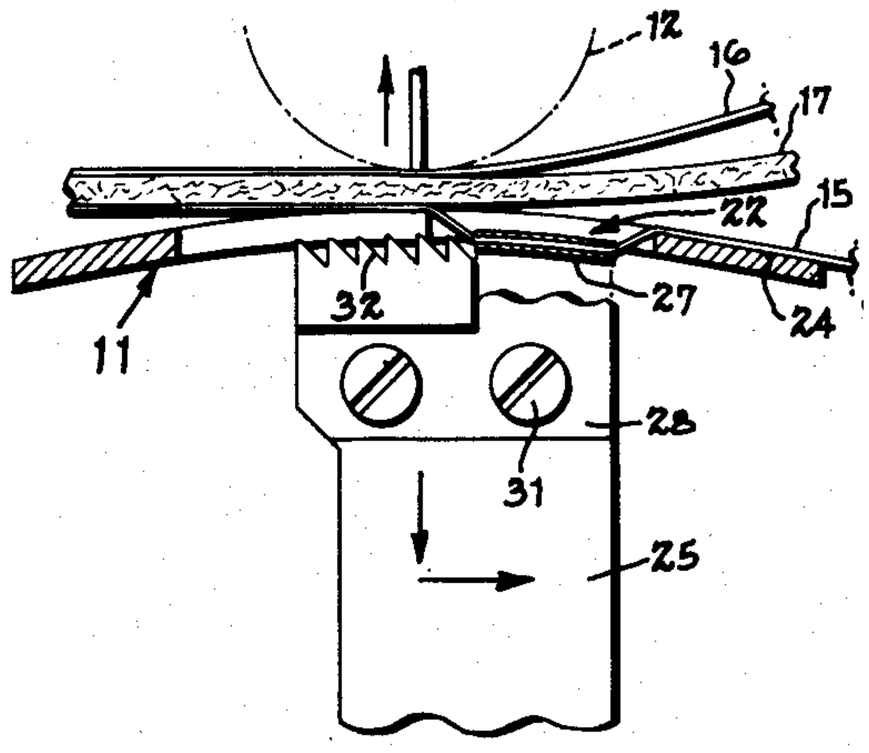

Fig. 11

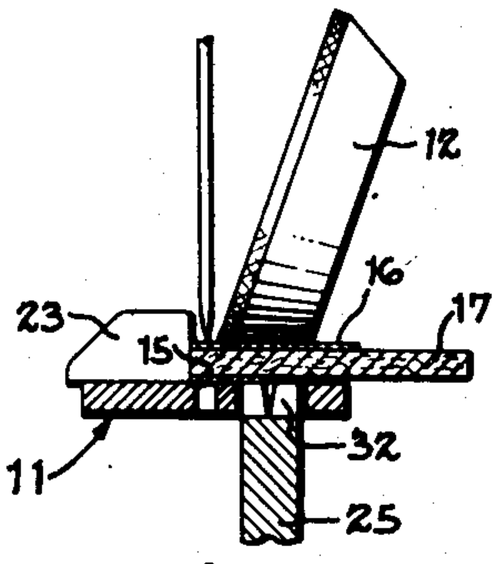

Fig. 12

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SEWING MACHINE FOR MAKING FRENCH BINDINGS

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Application March 6, 1951, Serial No. 214,109

5 Claims. (Cl. 112—28)

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This invention relates to sewing machines of the type which are used for making French cord bindings in the manufacture of shoes and other leather articles. Specifically, the invention is directed to an improved guide for the adhesive coated reinforcing tape which is used in these French bindings.

Attention is directed to United States Patent No. 1,909,206 which discloses a preferred method of forming French bindings. Briefly, this method comprises stitching a strip of adhesive coated reinforcing tape and a ribbon of French cord material simultaneously to opposite sides of a piece of leather along the edge to be bound, then rolling the French cord ribbon material over the exposed edge of the leather and adhesively securing it to the reinforcing tape by pressure. In this method, reinforcing tape having both sides coated with adhesive is used.

However, the same type binding job can be made by utilizing reinforcing tape which has adhesive on one side only. In this case, the ribbon of French cord material is coated on one side. The reinforcing tape is run along the edge to be bound with the adhesive side against the leather. At the same time, the ribbon of French cord material is stitched onto the opposite face of the leather with the adhesive side out; and when the French cord material is rolled over the exposed edge of the leather, its adhesive coating is laid against the exposed face of the reinforcing tape, and when pressure is applied, the pieces are bound securely together.

United States Patent No. 1,938,289 discloses a post-type sewing machine which is adapted for French binding work. The improvement of this invention may be used in machines of this type; however, its utility is not limited to them. It can be installed in any sewing machine having a drop-feed type of feed dog, whether it be a post type, a cylinder type or one having a flat bed.

During the sewing operation, the adhesive coated reinforcing tape is stitched to the underside of the leather and the ribbon to the upper side. The present invention is concerned with the problem of guiding the reinforcing tape into position in the sewing machine so that it is laid in place smoothly; the primary object of the invention being to lay-in the tape in relaxed condition, free of wrinkles, so that an absolutely smooth and even binding job results.

The tackiness of the adhesive on the reinforcing tape creates quite a problem in guiding it. It must be laid-in in precise alignment relative to the needle. In order to place it exactly, it is

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necessary to use a guide in which the reinforcing tape fits snugly. Thus, there is an appreciable amount of friction between guide and tape.

When adhesive coated reinforcing tape was first suggested for use in making French bindings, the tapes available had a tendency to stretch considerably. Over the years, the tape manufacturers have improved the tapes to the point where only a minute amount of stretching occurs, but it still exists even if only to a small degree. The feed motion in a sewing machine is a reciprocating one, and on each forward stroke of the feed dog the tape is literally jerked forward. The feed movement is only somewhere in the neighborhood of $\frac{1}{16}$ of an inch, but the feed motion is quite rapid, and the feed dog teeth come up and hit the tape when they are already moving forward; thus, because of the friction between the reinforcing tape and guide, there is quite a bit of tension placed upon the tape at the start of the feed stroke, and any tendency for the tape to stretch is greatly accentuated. According to one view, the following things occur under these operating circumstances. With the guide holding the tape back and the feed dog pulling forward, the tape appears to let go suddenly and come forward with a snap. Once it is started forward, the tape, by its momentum, tends to overtravel the movement of the feed dog, so that an excess amount of tape is laid onto the leather and stitched to it in this condition. Whether or not this observation is entirely correct or not is rather difficult to ascertain, but something causes the tape to be overfed because the result is a wavy strip which does not adhere very well to the leather.

In past constructions, the guide for the adhesive coated reinforcing tape was placed on the needle plate of the sewing machine adjacent the forward edge of the feed dog aperture in the plate. Thus, the guide was spaced from the needle and, of course, was stationary relative to the plate. The stretching and snap action discussed above apparently resulted from a combination of the spacing and stationary mounting of the tape guide.

The present inventor has found that by mounting the reinforcing tape guide right on the feed dog, so that it reciprocates with it, the reinforcing tape is laid onto the leather smoothly, relieved of all tension or slack.

It has not been determined exactly why this simple expedient operates as successfully as it does. Three theories are submitted; however, it is very difficult to see exactly what happens during the feed stroke of the feed dog because it

works so rapidly in normal operation, and thus, these theories are submitted unsubstantiated.

One of the theories of operation is that the present guide, being on the feed dog, smooths out the reinforcing tape when it retracts with the feed dog after a forward feeding motion. Since the backward movement of the feed dog occurs just before the needle enters the material, the stitch is taken in smooth tape. Another theory suggested is that the downward movement of the tape guide creates slack in the tape so that when it is fed forward on the next stroke by the feed dog teeth, it is laid onto the leather in a relaxed condition. In addition to this, it has been suggested that since the guide is moving forward with the feed dog, there is no tension placed on the tape in an effort to overcome the friction between the tape and guide.

In the preferred embodiment, part of the tape guide extends out to the side of the feed dog in line with the needles. In order to accommodate the guide, the usual opening in the needle plate is made larger, and of such a shape that the front edge of the guide, when at the foremost point of its stroke, just clears the needle. It has been found that this results in a smoother line of tape when French binding is being applied to curved pieces of leather, particularly at reverse curves where it is necessary to zig-zag the tape. This particular feature of the invention along with others will be discussed in connection with the detailed description of the drawings which follows:

In the drawings:

Figure 1 is a side elevational view of a post-type sewing machine embodying the present invention.

Figure 2 is an enlarged side elevational view of a feed dog having the reinforcing tape guide of this invention affixed to it.

Figure 3 is an end elevational view of the assembly shown in Figure 2.

Figure 4 is an elevational view of the feed dog showing the side opposite that illustrated in Figure 2.

Figure 5 is a fragmentary top plan view of the sewing machine post showing the needle plate and feed dog assembly.

Figure 6 is a fragmentary elevational view of the underside of a partially prepared French binding showing the results of prior sewing machines in applying the adhesive coated reinforcing tape.

Figure 7 is similar to Figure 6 but showing binding tape as applied by the improved guide.

Figure 8 is an enlarged view similar to Figure 5 showing the feed dog and guide assembly at the forward end of its stroke.

Figure 9 is a view similar to Figure 8 showing the assembly retracted.

Figure 10 is a fragmentary side elevational view showing the feed dog and guide assembly at the forward end of its stroke.

Figure 11 is a view similar to Figure 10 but showing the assembly retracted.

Figure 12 is a fragmentary cross sectional view on the line 12—12 in Figure 10.

Only a portion of the sewing machine is shown in the drawings since it is a conventional post-type commonly used in making French bindings. In Figure 1, the post is indicated generally at 10 and the needle plate at 11. The plate is curved and mounted on top the post. In this particular instance, a presser roller 12 is utilized, the roller being secured at the lower end of a mounting

shaft 13 to the rear of a reciprocating needle mounting 14. Also, in Figure 1, there is shown the three pieces comprising a French binding, that is, a strip of adhesive coating reinforcing tape 15, a strip of French binding ribbon 16 and a piece of leather 17 on which the ribbon and tape are being sewn. It will be noted that the ribbon 16 is guided by means of a wire loop 18 and also a channel plate 19, both of which are mounted on a bracket 20 affixed to the lower end of the presser roller mounting shaft 13. The reinforcing tape 15 is fed up through the post 10 from a roll located under the base of the machine and over the roller 21 onto needle plate 11. The above described parts of the machine are conventional and it is not believed necessary to go into the detail of their constructions.

The present invention is concerned particularly with the needle plate 11 shown in Figure 5, and the feed dog assembly shown in Figures 2, 3, and 4. The plate itself differs from conventional plates in that the aperture in which the feed dog reciprocates is enlarged to include a portion offset from the usual feed dog aperture toward the right in front of the hole in the needle plate through which the needle passes. The aperture is indicated generally at 22, and it will be noted that it extends as close to the hole through which the needle passes as is possible. The reason for this will be explained below. The needle plate also has on it a work guide such as that shown at 23, however, this guide is used conventionally and its particular shape and construction are not important aspects of the present invention. Other types of work guides will serve as well. In addition, a groove 24 is provided at the forward side of the needle plate, the reinforcing tape passing through the groove after leaving roller 21.

The essential part of the invention is shown in Figures 2–4. The feed dog indicated by the numeral 25 in these figures is of conventional construction except that the toothed top at the infeed end has been cut away and a seat provided for a reinforcing tape guide 26. Preferably, the guide is formed from thin steel which is bent to provide a horizontally disposed flattened loop portion 27 comprising the throat through which the tape passes and a portion depending at right angles from the throat. The depending portion of the guide comprises a flange 28 affixed to the left side of the feed dog 25, the dog being machined out to provide a seat 30 which is cut to fit the flange. The guide may be affixed to the feed dog in the seat by a pair of bolts as shown at 31–31. It will be noted that the seat recesses the flange so that the heads of the bolts do not extend beyond the outer face of the feed dog, see Figure 3. The upper side of the loop or throat portion 27 of the guide is substantially in line with the upper ends of the rack teeth 32 of the feed dog and lies on the general curve of the teeth. It will be noted that approximately half of the conventional feed dog teeth is removed in order to accommodate the guide. However, it has been found that this does not in any way affect the operation of the sewing machine nor decrease its efficiency.

The modified feed dog is mounted in the post 10 and operatively connected inside it in the conventional manner so that it is caused to move up and down and reciprocate back and forth in somewhat of a rectilinear motion, catching material moving through the sewing machine on the up stroke, carrying it forward the distance

of one stitch, and then lowering and retracting to a starting position of the cycle. The cycle of the feed dog relative to the cycle of the reciprocating needle mounting 10 is the same as that used in conventional machines. That is, the needle enters material being sewn just after the feed dog reaches its foremost point of travel and remains in the material during the backward stroke of the feed dog, withdrawing from it just before the feed dog starts its forward motion.

It will be noted from Figure 5 that the guide extends out substantially horizontally on the side of the feed dog, which places it in alignment with the needle, and that the guide is in such a position on the feed dog that at the forward end of the feed dog stroke it is as close to the needle as possible.

As stated above, the exact reason for the highly successful operation of the present improvement when compared with past constructions is not very easily determined. However, the results obtained are quite obvious. Figures 6 and 7 are provided to serve as a comparison between reinforcing tape sewn on a conventional machine having a stationary guide and tape laid-in by the improved reciprocating guide. It will be noted in Figure 6 that the tape is wavy, the result of having been laid on the leather while slack and then stitched to the leather in this condition. The waviness may be caused from any one of a number of things. As near as it can be determined, the main reason for it is the momentum imparted to the tape in jerking it from a standstill where it is adhered slightly to a stationary guide. Undoubtedly, the slight stretchability of the reinforcing tape has something to do with the wrinkled condition. Or, as has been suggested, the feed dogs themselves may cause a wrinkling of the reinforcing tape which is set permanently by the stitching. In the present device, all such wrinkling is smoothed out.

Attention is now directed to the diagrammatic views of Figures 8–12, inclusive. Starting with Figure 10, it will be noted that the feed dog and guide assembly is at its foremost point and the needle is just ready to pierce the ribbon, leather and tape. From this point, the feed dog moves down and retracts to the position shown in Figure 11. In doing so, the tape, between the point secured by the needle and that which is inside the throat of the guide, is smoothed out, probably due to the slight friction which exists between the tape and the inside of the guide. Now, when the feed dog starts forward again, the tape between the forward edge of the guide is in relaxed condition and since the guide moves forward with the feed dog, no additional stresses are placed on the tape. Thus, when the needle comes down, it is sewn in place while in the relaxed condition. It may be that the smoothing out of the tape on the retracting stroke is the primary reason for the success of the improvement or it may be the fact that there is no relative movement between the guide and tape on the forward stroke. In any event, it has been found that the tape is laid in an absolutely smooth condition so that every bit of its adhesive surface is in contact with the leather, making a better and tighter seal than has been possible heretofore.

It has also been found that the present feed dog and guide assembly, because of its position relative to the hole through which the needle reciprocates, makes it easier to secure French binding to sharp curves. The tape guide 26

comes about as close to the work guide 23 as it is possible to do, so that if a turn is made in the leather there is little chance for the tape to wrinkle between the forward edge of the guide and the point at which the needle comes down. In the stationary guides used heretofore, since they were mounted near the forward edge of the needle plate, there was considerable space between them and the point at which the needle descended. Thus, as viewing Figure 8, if the leather were swung clockwise, the tape would extend out from under the side of the leather and be stitched to it in this condition. On the other hand, if the curve were in the other direction and the leather were swung counterclockwise, the tape would be caused to swing inwardly under the edge of the leather and be stitched in place, spaced from its correct flush relationship at the very edge of the leather. In the present embodiment, there is so little space between the needle and the forward edge of the guide, when the guide is at the end of its forward stroke, that even though the leather be turned very sharply, the tape is held and guided at a point so close to the point of the angle that it is not moved appreciably with respect to the edge of the leather. Thus, when it is sewn in position, it more nearly follows the desired flush relationship relative to the side of the leather.

Having described my invention, I claim:

1. In a French binding sewing machine having a needle plate and a feed dog, the improvement comprising a guide for the reinforcing tape utilized in these bindings, said guide having a flattened loop defining a passageway, said guide mounted on the feed dog at the tape infeed end and disposed toward the sewing machine needle side thereof, said guide being so positioned on the feed dog that at the foremost point of movement of the feed dog the forward edge of the guide just clears the sewing machine needle when said needle is in its down position, and said needle plate having an aperture therein to accommodate the guide in addition to the feed dog.

2. In a sewing machine of the post-type commonly used for sewing French cord material and adhesive coated reinforcing tape on leather for making French bindings, the improvement comprising a reinforcing tape guide, said guide including a flattened loop portion which has a passageway through it for the tape and a flange portion depending from the loop portion which is adapted to be secured to the sewing machine feed dog, said feed dog being of the conventional type except modified to accommodate the guide in such a position that when the feed dog is at the foremost point of its feed movement the forward edge of the guide just clears the sewing machine needle, and a needle plate having an aperture therein of such a size and shape that it accommodates the feed dog and guide for feeding motion.

3. In a French binding sewing machine having a needle plate and a feed dog, the improvement comprising a guide for the reinforcing tape utilized in these bindings, said guide having a flattened loop defining a passageway for the tape, said guide mounted on the feed dog at the tape infeed end and extending substantially horizontally from the feed dog at the side thereof adjacent the sewing machine needle, said guide being so positioned upon the feed dog that at the foremost point of movement of the feed dog the forward edge of the guide just clears the sewing machine needle, and said needle plate having an

aperture therein to accommodate the guide, said aperture being larger than the guide in the direction of tape feed motion providing a space between the infeed side margin of the aperture and the infeed side end of the tape guide when the tape guide is in the rearmost position.

4. In a swing machine adapted for making French bindings, said sewing machine having a needle, needle plate and a feed dog, said feed dog being adapted for reciprocating movement in a plane which is at one side of said needle, the improvement comprising a guide for the reinforcing tape utilized in these bindings, said guide configurated to provide a substantially horizontally disposed flattened loop defining a passageway, and said guide mounted on the feed dog at the tape infeed end and disposed toward the sewing machine needle side thereof, with the passageway aligned with the movement of the feed dog.

5. In a sewing machine adapted for making French bindings, said sewing machine having a toothed feed dog, the improvement comprising a guide for the reinforcing tape utilized in these

bindings, said guide having a substantially horizontally disposed flattened loop portion defining a passageway, said guide mounted on the feed dog at the tape infeed end thereof with the passageway aligned and arranged with respect to the teeth of the feed dog so that at least one edgewise portion of the tape is adapted to be guided over said teeth.

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The following references are of record in the file of this patent:

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