March 15, 1949. C. A. OLSEN 2,464,602

TAPING MACHINE

Filed July 11, 1945 5 Sheets-Sheet 1

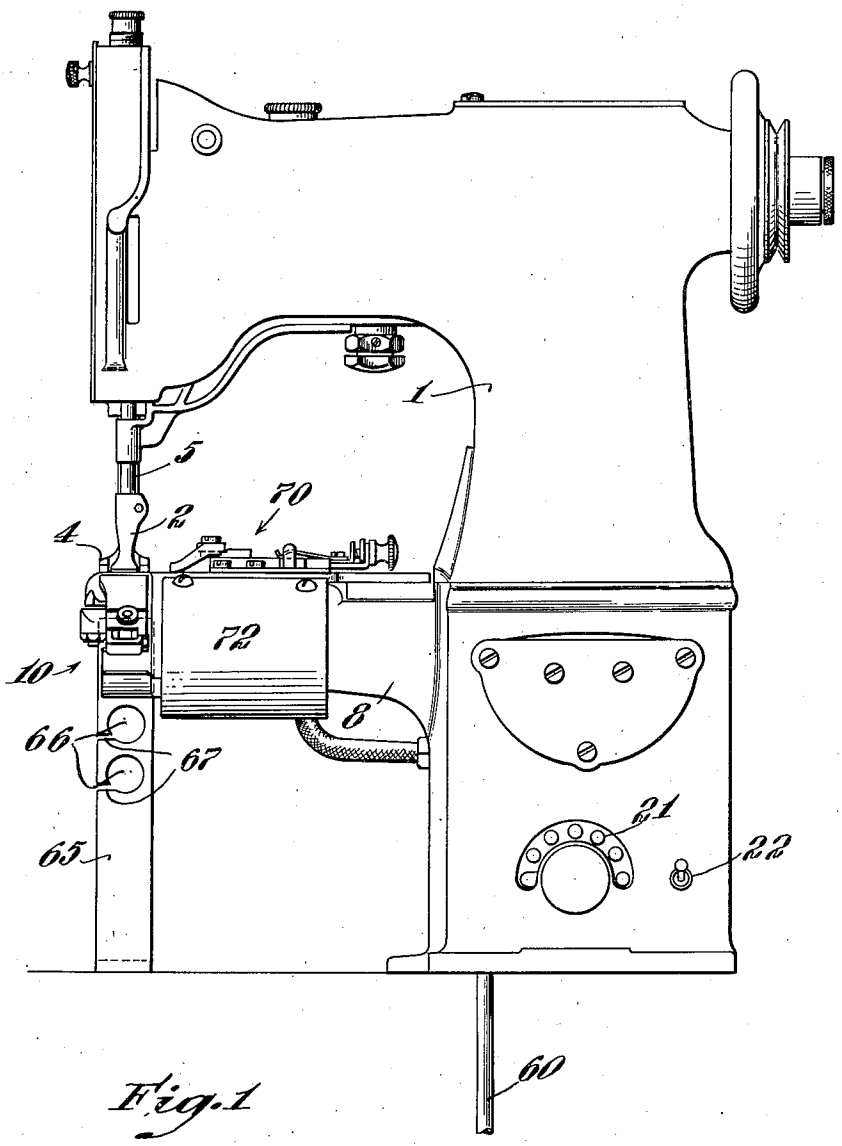


Fig. 1

Inventor
Carl A. Olsen
by Pobcats, Cushman & Woodbury
Attys

March 15, 1949. C. A. OLSEN 2,464,602

TAPING MACHINE

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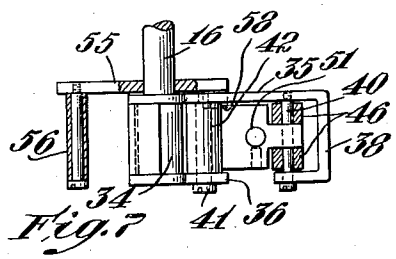


Fig. 7

Fig. 2

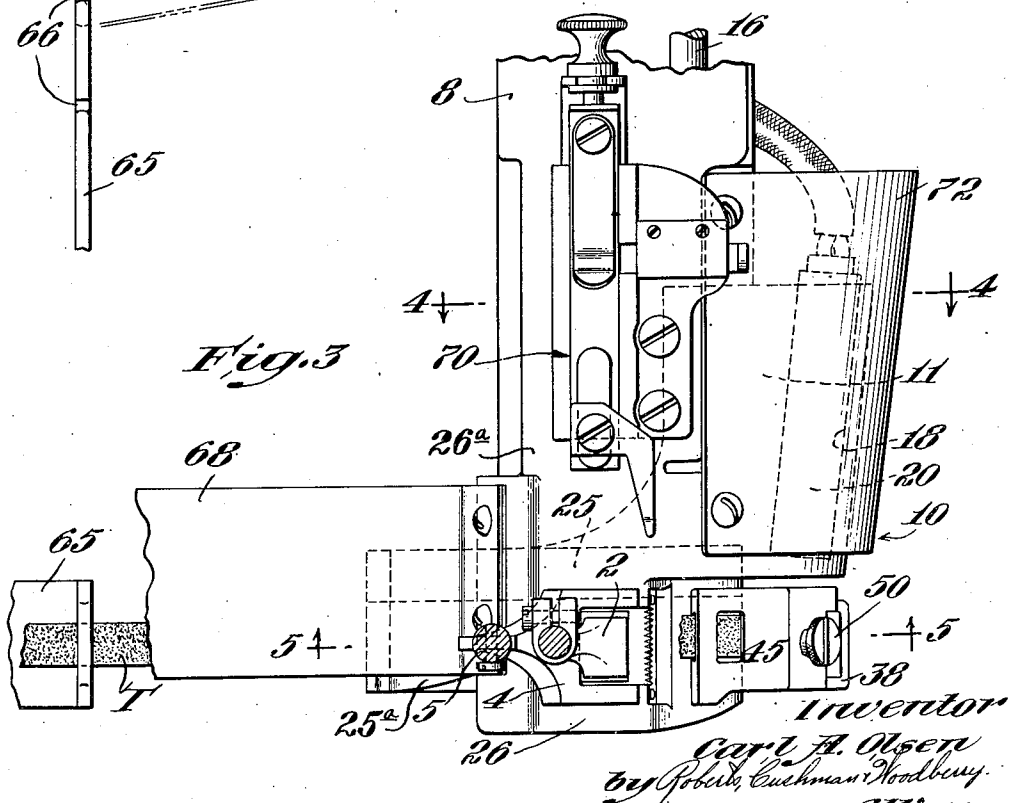


Fig. 3

Inventor
Carl A. Olsen
by Roberts, Cushman & Woodbury
Att'ys.

March 15, 1949. C. A. OLSEN 2,464,602

TAPING MACHINE

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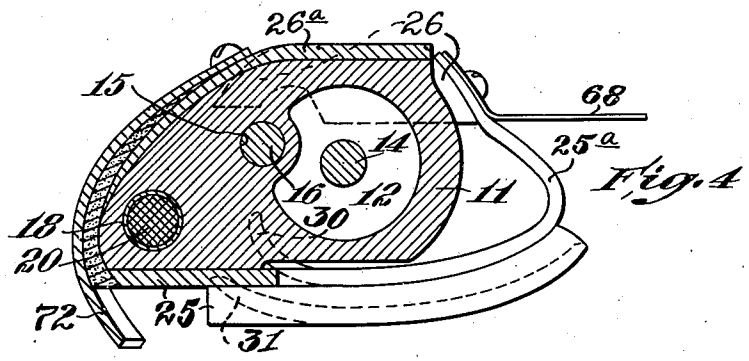


Fig. 4

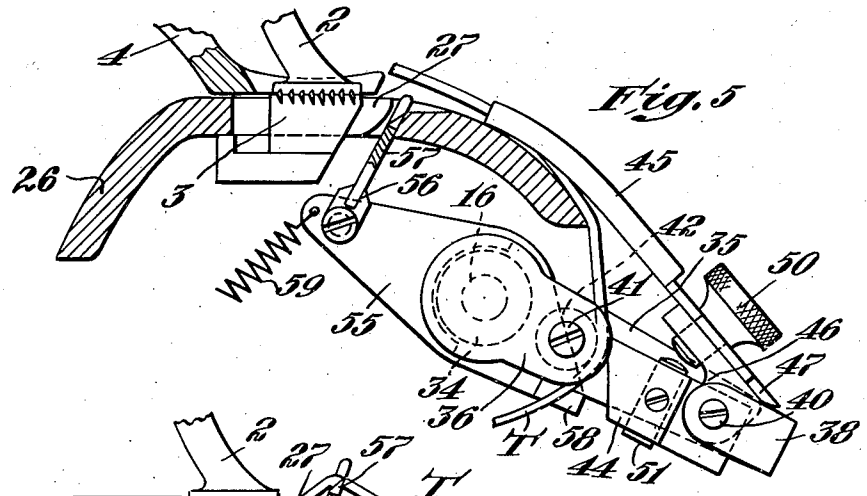


Fig. 5

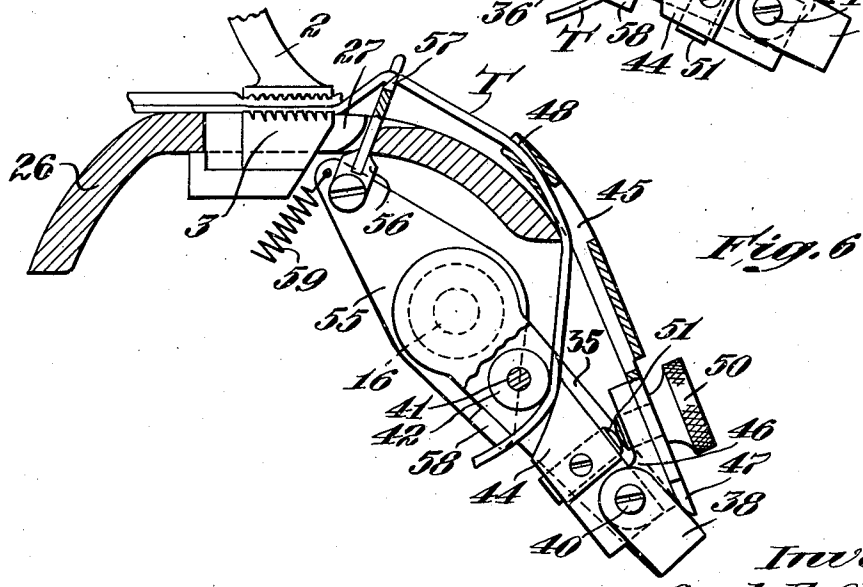


Fig. 6

Inventor
Carl A. Olsen
by Roberts, Cushman & Woodbury
Attys.

March 15, 1949. C. A. OLSEN 2,464,602

TAPING MACHINE

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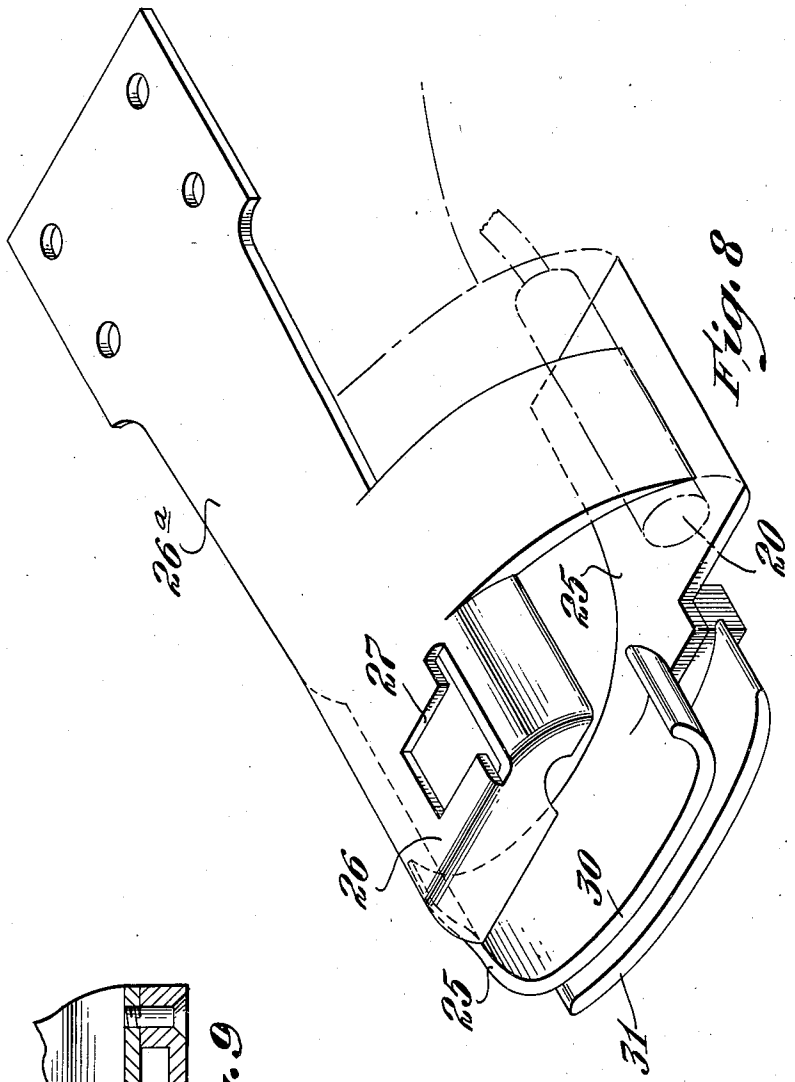


Fig. 8

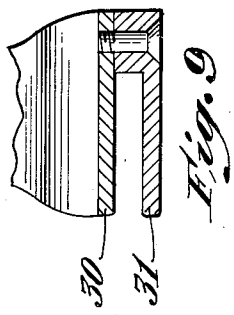


Fig. 9

Inventor
Carl A. Olsen
by Roberts, Cushman & Grover
Att'ys.

March 15, 1949. C. A. OLSEN 2,464,602

TAPING MACHINE

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Fig. 10

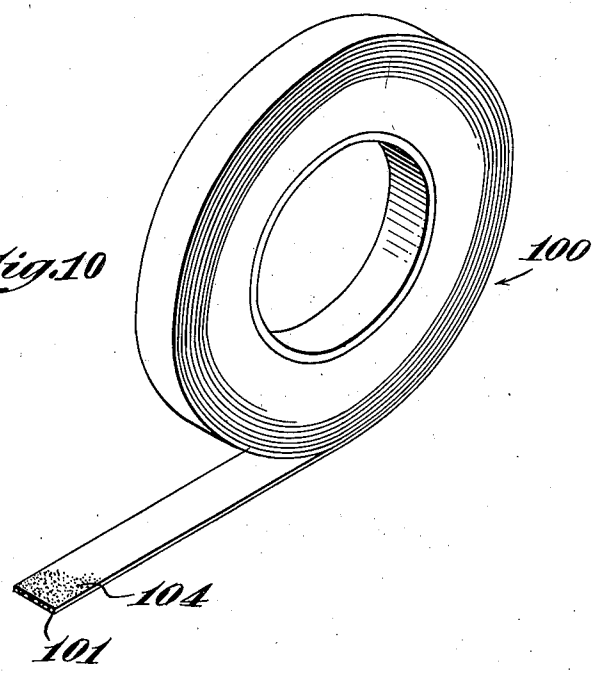
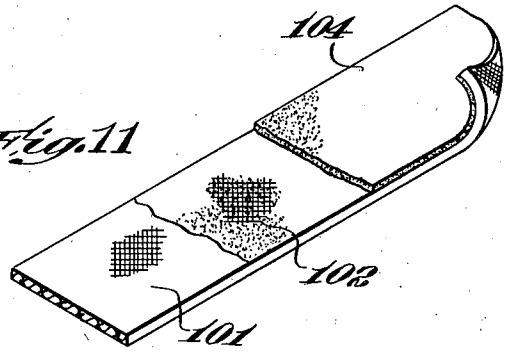


Fig. 11



Inventor
Carl A. Olsen
by Roberts, Cushman & Woodbury
Att'ys.

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UNITED STATES PATENT OFFICE

2,464,602

TAPING MACHINE

Carl A. Olsen, Acton, Mass.

Application July 11, 1945, Serial No. 604,374

3 Claims. (Cl. 12—59.5)

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This invention relates to an improved method of and machine for applying thermo-adhesive tapes to sheet materials, particularly to irregular articles such as shoe uppers, and also to an improved thermo-adhesive tape capable of yielding so as to conform to irregular contours.

In the application of thermo-adhesive tapes to irregularly shaped articles such as shoe uppers, it is necessary to maintain the tape under the proper degree of tension so as to avoid a distortion and also accurately to control the heat applied to the gummed or adhesive surface of the tape so that the tape will be sufficiently adhesive firmly to adhere to the sheet material, but not sufficiently fluid to cause offsetting of the adhesive and fouling of the feeding and applying instrumentalities of the machine. The control of the heating of the adhesive surface of such tapes has been extremely troublesome because of such variable factors as the speed of the operator, the particular type of adhesive, the character of the adhesive tape and the material to which the adhesive surface is applied, and various other factors the effects of which cannot be accurately predicted so as to permit a predetermined setting of the taping machine.

A further difficulty encountered in applying thermo-adhesive tape to shoe upper sections and like irregular sheet materials is attributable to the yieldable or elastic character of the sheet materials and the incapability of the thremo-adhesive tape to yield sufficiently to conform to uneven contours without producing blisters and other irregularities in the taped material.

The principal objects of the present invention are to provide a method of and apparatus for applying thermo-adhesive tapes which overcomes the aforementioned difficulties and to provide an improved thermo-adhesive tape which is normally resistant to deformation but which, when heated to a degree suitable for application to a shoe upper or like sheet material, is capable of yielding so as to conform to irregular contours.

More specific objects are to provide a taping machine which permits the operator quickly and easily to control the degree of heat applied to a thermo-adhesive tape for any desired operating speed of the machine, and to provide a machine in which such adjustments may be conveniently made without interrupting the operation or otherwise impairing production.

Further objects will be apparent from a consideration of the following description and the accompanying drawings, wherein

Fig. 1 is a side elevation of a taping machine

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constructed in accordance with the present invention;

Fig. 2 is an elevation of the tape-applying, feeding and heating instrumentalities and associated parts;

Fig. 3 is a top plan view of the parts shown in Fig. 2;

Figs. 4 and 5 are enlarged sections on the lines 4—4 and 5—5, respectively, of Fig. 3;

Fig. 6 is a view similar to Fig. 5, but showing the operation of the cutting instrumentalities;

Fig. 7 is a detail of the tape cutting mechanism and associated parts;

Fig. 8 is an enlarged isometric view of the member and associated parts constituting the work rest and tape-heating and guiding means;

Fig. 9 is a section on the line 9—9 of Fig. 8;

Fig. 10 is a perspective view of a roll of thermo-adhesive tape suitable for use by the machine shown in Figs. 1 to 6; and

Fig. 11 is an enlarged fragmentary perspective illustrating the structure of the tape shown in Fig. 8.

The particular embodiment herein shown comprises a frame 1 which may be of the general form of a conventional sewing machine, the frame housing the operating mechanism for the presser foot 2 and feeding plate 3, both of which are of suitable size and shape to engage a tape T of the width being employed. An enlarged presser foot 4 is carried by the rod 5 which is connected with the operating mechanism, the construction and arrangement of these parts being substantially identical to those shown in United States Patent No. 2,017,727, granted to me October 15, 1935, to which reference may be had for a more complete description.

In accordance with what is now considered the preferred arrangement, the horn 8 is provided with a tape guiding and heating mechanism 10 which comprises a casting 11 (Fig. 4) rigidly secured to the horn 8 adjacent to its outer end. The casting 11 is formed with a longitudinally extending chamber 12 through which extends the driving shaft 14 for the feeding plate 3, a longitudinally extending bore 15 which rotatably supports a rock shaft 16, and a second chamber 18 which receives an electrical heating element 20, as shown in Figs. 3 and 4. The driving shaft 14 is connected to the feeding plate 3 in the conventional manner and the rock shaft 16 extends outwardly beyond the horn 8 and is connected with the tape severing means hereinafter described. The electrical heating element 20 is preferably of the conventional cartridge type and is

connected with a hand operated rheostat 21 and switch 22, both conveniently located at the base of the frame 1, as shown in Fig. 1.

The lower face of casting 11 may be formed integral with or otherwise joined to a member 25 so as to provide a good thermal connection permitting conduction of heat from the heating element 20 to all parts of the member 25. As shown in Figs. 3, 5, 6 and 8, the member 25 is formed with an integral extension 25a (Figs. 2 and 4), the upper end of which is integrally joined to a plate-like member, the outer end portion of which provides a work rest 26 and its inner portion 26a extending rearwardly over the top of casting 11, as shown in Figs. 3 and 4. The work rest 26 is formed with an opening 27 to accommodate the presser feet 2 and 4 and feeding plate 3, and the lower part of the member 25 is slotted or otherwise shaped to provide curved, spaced flanges 30 and 31 which define guiding and heating surfaces between which the thermo-adhesive tape T is drawn and simultaneously heat-conditioned. As illustrated in Figs. 2 and 8, the front of the work rest 26 is formed with a curved downwardly inclined surface to cooperate with the upwardly inclined curved surfaces of the flanges 30 and 31, it being noted that the ends of these surfaces terminate in spaced relation to the outer end of the rock shaft 16 so as to accommodate the tape severing mechanism presently to be described.

The tape severing and guiding mechanisms comprise a sleeve 34 (Fig. 7) fast to the outer end of the shaft 16 and a pair of arms 35 and 36 secured to the sleeve 34. The arm 35 is formed with a U-shaped end 38 which provides spaced supports for a pintle 40, and the end portion of the arm 36 and the intermediate portion of the arm 35 are formed with aligned openings to receive a pintle 41 which rotatably supports a guide roll 42 over which the tape T is drawn. The pintle 40 pivotally supports a pawl or dog 44, the end of which normally lightly bears against the face of the tape T extending about the roller 42, as illustrated in Fig. 5. A guiding nose 45 is provided adjacent to its lower end with a pair of spaced depending lugs 46 which are mounted on the pintle 40 so as to permit the guiding nose to undergo a slight pivotal movement when the arm 35 is swung from one position to another. The free end of the guiding nose 45 is formed with a tape passage 48 (Fig. 6) and its opposite end is formed with a threaded opening which receives a thumb screw 50 arranged to cooperate with a set screw 51 carried by the pawl 44 so that the position of the nose 45 and the engagement of the pawl 44 with the tape T may be varied when the arms 35, 36 are swung downwardly, as illustrated in Fig. 6.

A rocker arm 55 is freely supported by the shaft 16, and pivotally secured to the upper end of this arm is a cutter support 56 which carries a cutter element 57 positioned so as to project through the opening 27 in the work rest at a point closely adjacent to the front end of the feed plate 3, as illustrated in Figs. 5 and 6. The lower end of the arm 55 is formed with a laterally projecting lug 58 and engageable with the lower edge of the arm 35, and a spring 59, secured to the free end of the arm 55, is effective not only to hold the lug 58 in engagement with arm 35, but also to effect return of the arm 55 to normal position (Fig. 5) after having been swung to tape severing position by the arm 35.

As previously indicated, the shaft 16 extends

through the frame of the machine and is suitably connected with an operating link 60 (Fig. 1) which, in turn, is connected with any conventional type of pedal or like actuating member positioned for convenient operation, as shown for example in Patent No, 1,801,972, granted to me April 21, 1931. When the operating link 60 is pulled downwardly, the shaft 16 and arm 35 are rocked in a clockwise direction (Figs. 5 and 6) and due to the engagement between the lug 58 and arm 35, the cutter 57 is swung upwardly to sever the tape T which is firmly held by the presser foot 4. It will be noted that in swinging the arm 35 downwardly the end of the thumb screw 50 is brought into engagement with set screw 51 and hence the pawl 44 is more firmly pressed into engagement with the tape T and is thus operative to lock the tape. Thus, the tape T is firmly held by the presser foot and the pawl 44 during the cutting operation, and after the tape has been severed, the pressure on the operating rod 60 is released, whereupon the shaft 16, arm 35, guide nose 45 and associated parts are swung in a counterclockwise direction (Figs. 5 and 6) back to normal position by a suitable spring (not shown) and the arm 55 and associated parts are independently returned to normal position by spring 59. Due to the engagement of the pawl 44 with the tape T, the return movement of the arm 35 and associated parts from the position shown in Fig. 6 to that shown in Fig. 5 effects a slight feeding of the tape T so that the guide nose 45, when returned to normal position, presents a free end portion of tape of sufficient length to be conveniently fed or positioned beneath the presser foot 2 and feeding plate 3. Since the feeding of the tape T, effected by the return movement of the arm 35, is dependent upon the feeding engagement of the pawl 44 with the gummed surface of tape T, and as the engagement of thumb screw 50 and set screw 51 may be varied to cause the pawl 44 to grip the tape for a relatively greater or lesser period during the return movement of the arm 35, it will be seen from a study of Figs. 5 and 6 that by varying the relative position of screws 50 and 51, the feeding action of pawl 44 may be varied so as to effect feeding of a relatively greater or lesser amount of tape during the return movement of arm 35.

Operating in conjunction with the member 25 and associated parts is an auxiliary tape guide comprising a vertically extending member 65 positioned between the tape supply roll (not shown) and the member 25. The member 65 is formed with a series of openings 66, each communicating with a slot 67 through which the tape T is positioned in the associated opening. The lower end of the guide member 65 may rest upon the bench supporting the machine, as indicated in Fig. 1, and its upper end may be integral with or joined to a horizontally extending supporting member 68 secured to the member 25, as illustrated in Fig. 2, so that the entire tape heating and guiding mechanism (parts 10, 25 and 65) constitute a unit which may be conveniently attached to and removed from the machine.

The member 65 is so positioned with respect to the member 25 that any one of the openings 66 (here shown by way of example as being three in number) may cooperate with either the heating flange 30 or 31 so that the tape T may be guided in varying degrees of contact therewith. It will be observed that the size and shape of the flanges 30 and 31 and their respective dis-

tances from the heating element 20 are such that they are operative to provide differential heating effects on a length of tape drawn over their surfaces. In other words, the size and shape of the flanges 30 and 31 and their respective positions relative to the heating element 20 are such that a length of tape T drawn over the surface of the flange 30 will be heated appreciably more than if drawn over the surface of the flange 31, assuming the same rate of travel and taking into account the more rapid rate of heat dissipation and such other factors as would necessarily affect the heat transfer to one of the flanges as compared to the other. If, therefore, the tape be positioned in the top opening 66 of the guide 65 and drawn beneath and in contact with the flange 30, as illustrated by the solid line in Fig. 2, the tape will then be heated the maximum amount for a given setting of the rheostat 21 and a given speed of operation; and if a lesser degree of heat be desired, the tape may be positioned either beneath the flange 31, or in one of the lower guide openings 66, or both, as illustrated by the dot and dash lines of Fig. 2. In this manner the operator may quickly and conveniently vary the heating of the tape for any desired operating speed of the machine, and it will be observed that such control may be in conjunction with that afforded by the rheostat 21 and both types of control may be exercised without the necessity of interrupting operation since the operator may readily change the position of the tape not only from one guide opening to another, but also from one heating flange to the other, as well as manipulate the rheostat during the operation of the machine.

In order to assist the operator in applying the heated tape to a shoe upper section or like sheet material, any conventional work holding means, positioned to cooperate with the work rest, may be provided. As here shown by way of example, an adjustable work guide or holder 70 (Figs. 1 to 3) is secured to the horn 8 so as properly to position and hold a shoe upper section, it being understood that any other suitable type of work guide or holder may be provided, depending upon the particular type of work to which the tape is being applied.

In order to prevent injury to the operator and possible injury to the work, the casting 11 is provided with a layer of heat insulating material 71 and a shield 72, as shown in Figs. 1 and 3. As here shown, the shield 72 may constitute, in effect, a continuation of the work rest over which the work is drawn as the tape is being applied.

Although a thermo-adhesive tape such as is described in United States Patent No. 1,668,399 may be employed, for the most satisfactory results I prefer to use a specially prepared tape produced from a woven tube having a weight of the order of four to twenty yards per pound and a thread count of the order of 60 x 60. In accordance with the preferred practice of this aspect of the invention, such a tube is first cut spirally so as to produce a bias-cut strip having a weight of the order of six yards per pound. The strip thus prepared is then sized to effect an appreciable stiffening and locking of the cross-yarns, the drying operation being conducted on a tenter so as to secure a prestretched fabric strip sufficiently stiff to resist deformation when subjected to forces of a low order of magnitude. A suitable thermo-adhesive coating, such as

gutta-percha base composition, is then applied to the dried prestretched fabric, using a heated spreader bar or the like so that the adhesive coating is firmly anchored to the sized fabric. After cooling, the coated fabric is then slit to the desired widths and wound on cores into rolls 100 (Fig. 10) of the desired length.

The product thus produced comprises a bias-cut prestretched woven fabric 101 (Fig. 11) having a weight of the order of 2.7 ounces per square yard, the constituent yarns or threads being coated with a size 102 which provides a partial but substantial stiffening effect, and a thermo-adhesive coating 104 firmly united to the sized base. The coating 104 cooperates with the size 102 to produce a reinforcement which is normally effective to maintain the tape relatively non-yieldable and resistant to deformation when subjected to forces of a low order of magnitude, but when heated to the softening point of the adhesive or otherwise subjected to a moderate degree of heat such as produced by the heating flanges 30 and 31, the tape becomes readily conformable to irregular contours.

When the length of such tape is drawn from the supply roll, it is capable of resisting distortion, but after being drawn across the heating surface of the flanges 30 or 31 and the work rest, the adhesive coating 104 is softened sufficiently to become tacky. At this point the sizing 102 is effective to prevent distortion or elongation due to feeding the tape and hence the tape does not undergo dimensional changes prior to the application to the work. However, the forces incident to application of the preheated tape to the work are sufficient to distort the tape so that it may readily conform to curved contours such as are encountered in shoe upper sections, and when the adhesive cools it assumes its original condition and hence is effective to maintain the shape imposed on the tape and thus provides a smooth effective reinforcement free from blisters and other irregularities.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. In a tape machine having feeding and pressing means for applying thermo-adhesive tape to sheet material, tape guiding and heating mechanism comprising a member shaped and arranged to define a plurality of spaced arcuate surfaces over which the thermo-adhesive tape is drawn and a work rest surrounding the operative parts of said feeding and pressing means, means for heating said surfaces and work rest, and an upright member disposed in advance of said mechanism and having vertically spaced channels in alignment with said arcuate surfaces, said upright member being selectively operative to guide said tape in varying degrees of contact with said surfaces.

2. In a tape machine having feeding and pressing means for applying thermo-adhesive tape to sheet material, tape guiding and heating mechanism comprising means defining a work rest surrounding the operative parts of said feeding and pressing means, and a plurality of spaced vertically aligned guiding surfaces adjoining and in heat transfer relation to said work rest and over which the thermo-adhesive tape is drawn in traveling to the work rest, an electrical heating element in fixed heat transfer relation to said

work rest and spaced surfaces, said heating element being effective to produce differential heating effects on said surfaces.

3. In a tape machine having feeding and pressing means for applying thermo-adhesive tape to sheet material, tape guiding and heating mechanism comprising a work rest over which the tape passes, the lower part of said work rest having a plurality of laterally projecting flanges defining spaced surfaces over which the tape is drawn in traveling to the work rest, heating means disposed in heat transfer relation to said work rest and flanges and operative to produce differential heating effects on said surfaces, and means for guiding said tape over any one of said surfaces and in varying degrees of contact with the selected surface.

CARL A. OLSEN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,323,212	Bulley	Nov. 25, 1919
1,556,124	O'Donnell	Oct. 6, 1925
1,646,212	Osgood	Oct. 18, 1927
1,694,796	Ridderstrom	Dec. 11, 1928
1,851,005	Glines	Mar. 29, 1932
1,958,544	Montaine	Mar. 15, 1934
2,340,127	Karlson	Jan. 25, 1944
2,367,663	Borglin	Jan. 23, 1945