Feb. 23, 1965 W. M. SCHOLL 3,170,354

ADHESIVE TAPE PERFORATING MACHINE

Filed Aug. 2, 1962 2 Sheets-Sheet 1

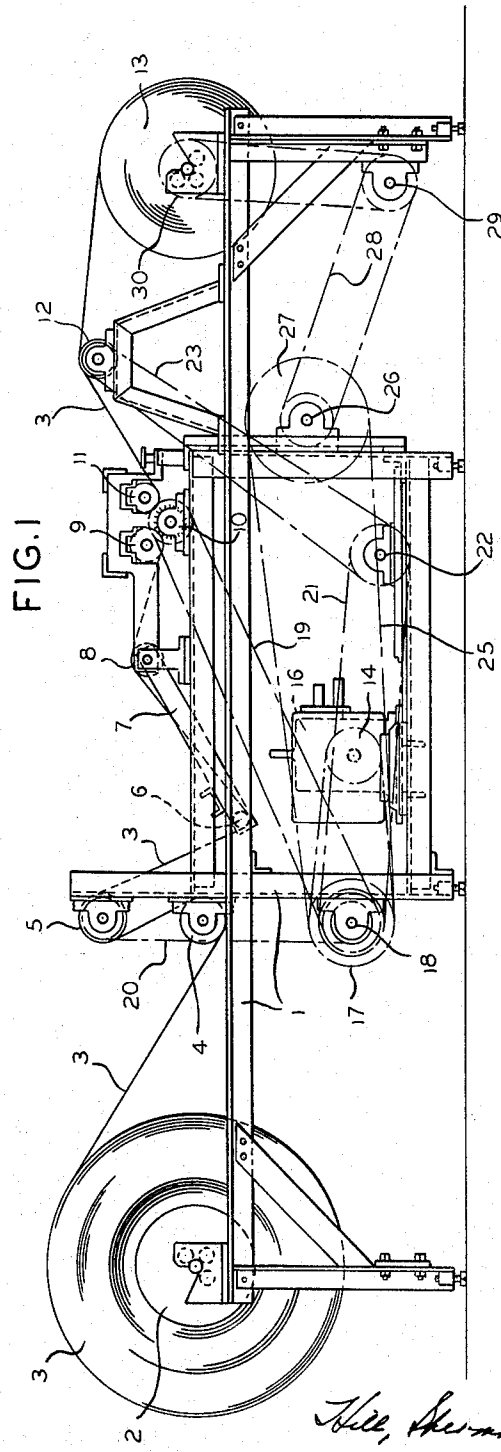


FIG. 1

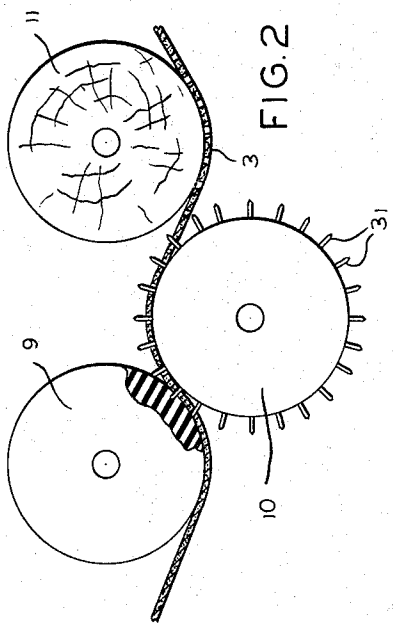


FIG. 2

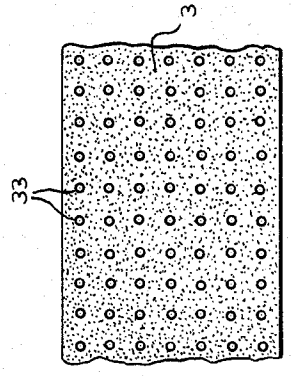


FIG. 5

INVENTOR.
WILLIAM M. SCHOLL
BY
Hill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

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ADHESIVE TAPE PERFORATING MACHINE

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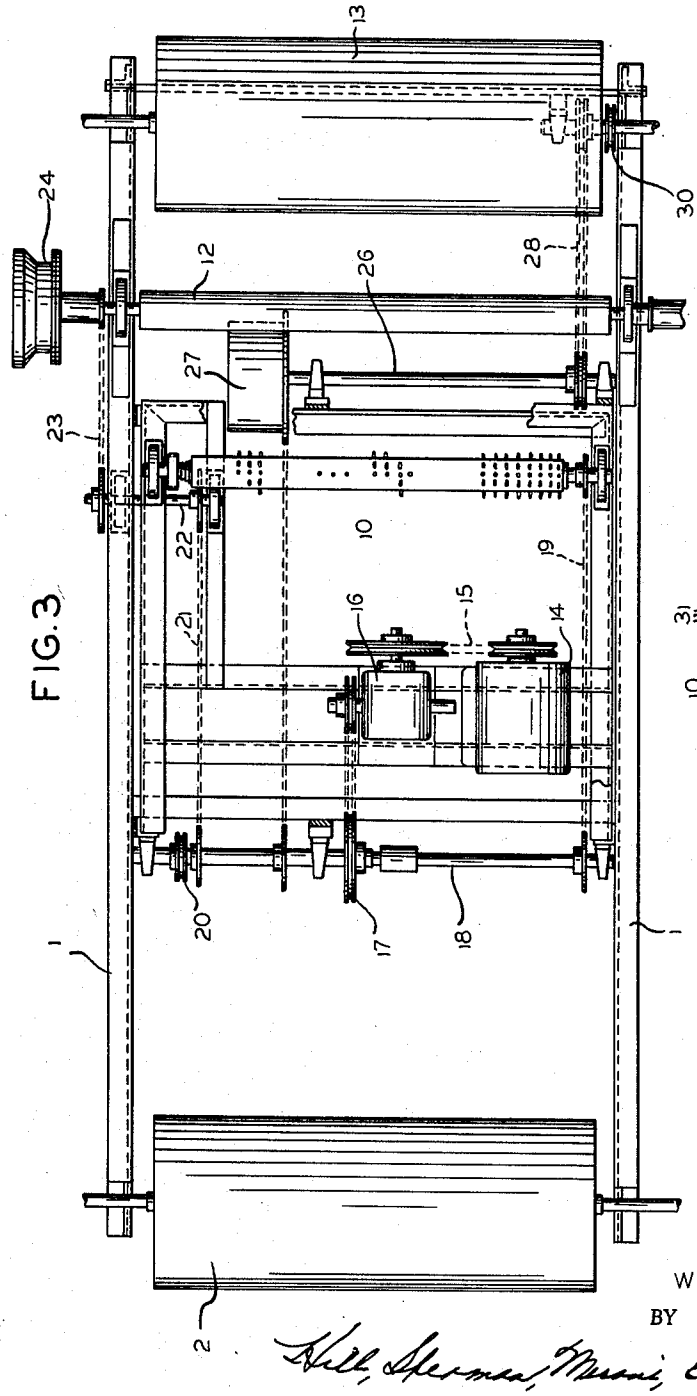


FIG. 3

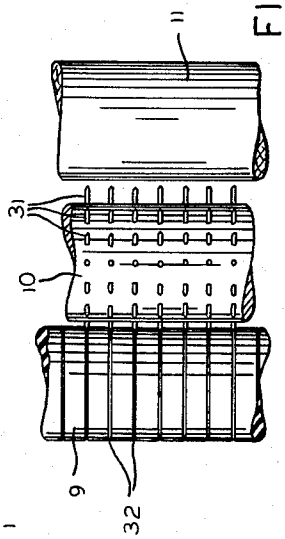


FIG. 4

INVENTOR.
WILLIAM M. SCHOLL

BY

Hill, Sherman, Meroni, Gross & Simpson

ATTORNEYS

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ADHESIVE TAPE PERFORATING MACHINE

William M. Scholl, 211–213 W. Schiller St., Chicago, Ill.

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8 Claims. (Cl. 83—347)

This invention relates to improvements in an adhesive tape perforating machine, and more particularly to a machine arranged to perforate adhesive tape by forcing needles through the tape in order to render the tape porous, the machine being highly desirable for use on surgical adhesive tape of the type applied directly to the human body, although the invention will have other uses and purposes as will be apparent to one skilled in the art.

In the past, various attempts have been made to perforate adhesive tape and the like with machines embodying a so-called needle roll, namely a roll having numerous pins or needles projecting circumferentially of the roll. Endeavors have been made to utilize such a roll and pass the tape over the roll solely by virtue of tension on the tape, but those endeavors proved futile because the tape merely rode up on the points of the needle and actual penetration of the tape was very scattered so that the tape was totally unsatisfactory for commercial use. In other instances a grooved roller was associated with the needle roller so that when the needles passed through the tape they entered grooves in the anvil roll. This arrangement also proved unsatisfactory since the grooved rollers tended to break up, probably because of an accumulation of mass and cloth threads within the grooves, and ultimately lateral pressure snapped off the ridges in the roll between the adjacent grooves. Areas where the ridges had been broken off resulted in tape which was unsatisfactory due to poor penetration of the needles. Briefly, attempts made heretofore of perforating adhesive tape with the use of a needle roll were objectionable because of unsatisfactory needle penetration, and because costly parts of the apparatus were objectionably short lived.

With the foregoing in mind, it is an important object of the instant invention to provide a tape perforating machine embodying a needle roller with means associated with that roller to positively force the tape against the roller so as to insure complete penetration by the needles at all times.

Also an object of this invention is the provision of a tape perforating machine which not only effects positive perforation of the tape by means of a needle roller, but in which the parts associated with the needle roller are extremely long lived.

Still another feature of this invention is the provision of a tape perforating machine embodying a needle roller with other means disposed adjacent that needle roller and cooperating therewith to insure pressure contact of the tape with the needle roller over a relatively wide arc so as to provide positive penetration of the tape.

Another object of the invention resides in the provision of a tape perforating machine embodying a needle roller and in which a silicone rubber roller is utilized as an anvil for the needle roller, the needles penetrating directly into the silicone rubber roll.

It is a further feature of this invention to provide a tape perforating machine embodying a needle roller with a rubber roll acting as an anvil for the needle roller, and a third roll disposed to the other side of the axis of the needle roller out of contact therewith but positioned to

insure positive engagement over a relatively wide area of the tape with the needle roll.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of an adhesive tape perforating machine embodying principles of the instant invention;

FIGURE 2 is a fragmentary enlargement, somewhat diagrammatic in character, showing the disposition of the rolls at the perforating station;

FIGURE 3 is a top plan view of the structure of FIGURE 1, with parts removed and parts broken away;

FIGURE 4 is a fragmentary enlarged top plan view showing the roll arrangement at the perforating station; and

FIGURE 5 is a fragmentary face view of the perforated tape.

As shown on the drawings:

It will be understood that in the illustrated embodiment of the instant invention, frame means are fabricated from separate pieces in a well known manner, and suitable bearings are provided wherever needed for roll shafts, drive shafts, and the like, also in a known manner so such parts need not be specifically described herein.

In the illustrated embodiment of the instant invention there is shown an overall frame structure **1**, at one end of which a bulk supply roll **2** is mounted which carries a supply of adhesive tape **3** thereon. This bulk supply roll is a freely running roll, rotating by virtue of a pull on the tape web **3**.

The adhesive tape **3** may have any suitable form of backing, such as fabric, a plastic film, or other suitable material and on its underside as the same is seen in FIGURE 1 it carries a pressure sensitive adhesive mass. As the tape web leaves the supply roll **2**, it next passes beneath a freely running guide roll **4**, which may satisfactorily be a steel roll, and then passes upwardly over a driven pull roll **5** which is preferably equipped with a known form of slip clutch. Upon leaving the pull roll **5**, the web **3** then passes beneath an idler roll **6** carried in a U-shaped yoke **7**, and this idler roll may be in the form of a dancer roll, or the yoke **7** may be secured in position with the roll **6** bearing against the tape to a desired extent depending upon the needed tension. The web next passes over a straightening roll **8**, which is reversely grooved or threaded at opposite ends so as to eliminate any creases that may have occurred in the tape web.

Following the straightening roll, the tape web passes beneath an idling anvil roll **9**, over a part of the circumference of a needle roll **10** which is driven, and beneath an idling tension applying roll **11**, and then over a driven pull roll **12** to a driven take-up roll **13**.

The various drive connections may be by way of belt and pulley, chain and sprocket, or a combination of both, as shown. These various drives are indicated somewhat diagrammatically by dotted lines in FIGURES 1 and 3. The prime mover may be in the form of an electric motor **14** which through a belt and pulley assembly **15** drives a speed reducer **16** which in turn actuates a pulley **17** fixed to a main drive shaft **18**.

From this main drive shaft **18** the needle roll **10** is driven through a chain and sprocket assembly **19**. The

pull roll 5 is driven from a vertically disposed pulley and belt assembly 20. A chain and sprocket assembly 21 effects the drive of a transverse stub shaft 22, and from that shaft a chain and sprocket assembly 23 drives the aforesaid pull roll 12 through a Wichita air tube disc clutch, indicated at 24.

The drive for the take-up roll 13 also emanates from the shaft 18 by way of a chain and sprocket assembly 25 driving a transverse shaft 26 through an air tube disc clutch 27, and from the shaft 26 a belt and pulley assembly 28 drives a lower shaft 29 from which a belt and pulley assembly 30 effects the drive of the roll 13.

The use of the slip clutches at various points in the mechanism maintains a constant tension upon the tape 3. The operation is preferably continuous, the tape web 3 moving at a constant speed through the machine from the supply roll 2 to the take-up roll 13.

In reference now more particularly to FIGURES 2 and 4, it will be noted that the anvil roll 9 is preferably a silicone rubber roll, and the roll 10 is provided with numerous needles 31 projecting therefrom which bite directly into the silicone roll 9 through the tape web as seen best in FIGURE 2. The tension applying roll 11 can satisfactorily be made of wood and is disposed so that the pins or needles 31 just clear the roll without contacting it, as also seen clearly in FIGURE 2. The arrangement of the rolls 9 and 11 in relation to the needle roller 10 is such that the tape web 3 is maintained in circumferential contact with the needle roller for at least one-fourth the circumference of the needle roller, thus insuring positive penetration of the tape web by the needles 31. With the tape web passing under the anvil roll, over the needle roll, and under the tension roll 11, the tape is effectively forced over the needles on the roll 10 and it cannot ride up on the points of the needles and avoid proper penetration.

The anvil roll 9 need not be provided with any needle receiving configuration whatever at the outset. It has been found, however, that after some usage the needles 10 groove the silicone roller 9 somewhat as indicated at 32 in FIGURE 4, and these grooves will be narrower than the diameter of a needle and thus give a snug fit when a needle penetrates the tape web. The silicone roller 9 may satisfactorily be of 60 to 70 Durometer hardness. As the tape passes between the anvil roll and the needle roller, it is provided with spaced apertures 33 therethrough as seen in FIGURE 5, the distances between such apertures being variable and the size of the apertures being variable to some extent dependent upon the diameter of the needles 31.

The pull roll 12 is preferably covered with a silicone sheet or the equivalent so as to give a fairly loose windup on the finished bulk or take-up roll 13 so as to eliminate the possibility of a too tightly wound roll of adhesive tape requiring an objectionable amount of tension to unwind the same.

The operation of the machine is quite simple and economical. Once the tape has been threaded through the machine from the supply roll 2 to the final take-up roll 13 the machine may be started and permitted to automatically continue running until all of the tape has been perforated and wound on the take-up roll 13. The silicone anvil roll 9 is extremely long lived, and the tape is forced positively toward the needle roller so as to insure positive penetration, and the entire machine is economical both to build and operate.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In an adhesive tape perforating machine,
means for moving an adhesive tape web having pressure sensitive adhesive on one side thereof along a predetermined path,
a needle roller for perforating said tape web over which the web travels with the adhesive bearing side next to the roller, and
an anvil roll of silicone rubber into which the needles of said needle roll extend after passing through the tape web.

2. In an adhesive tape perforating machine,
means for moving an adhesive tape web having pressure sensitive adhesive on one side thereof along a predetermined path,
a roller carrying numerous needles extending radially therefrom and over which the web must travel with its adhesive side next to the roller, and
an anvil roll into which said needles penetrate through the tape web,
said anvil roll being of material to which adhesive will not adhere if carried there by said needles.

3. In an adhesive tape perforating machine,
means for moving an adhesive tape web along a predetermined path,
a roller carrying numerous piercing needles extending radially therefrom and over which the web must travel, and
roller means adjacent said needle carrying roller so arranged as to force said web into approximately one quarter circumferential contact with the needle carrying roller.

4. In an adhesive tape perforating machine,
means for moving an adhesive tape web along a predetermined path,
a needle roller having numerous radially extending piercing needles thereon to perforate the tape web as it passes over the roller,
an anvil roller into which the needles penetrate through the tape web, and
a plane roller with its circumferential face spaced from said needles but extending below the upper part of the needle roller opposite said anvil roller to force the tape web against the needle roller and insure penetration thereof by said needles.

5. In an adhesive tape perforating machine,
means for moving an adhesive tape web along a predetermined path,
a needle roller having numerous radially extending piercing needles thereon to perforate the tape web as it passes over the roller, and
a silicone rubber anvil roller into which said needles penetrate through the tape web,
said anvil roller being initially solid but which during use by way of successive needle penetrations acquires grooves therein of slightly less width than the diameter of a needle.

6. In an adhesive tape perforating machine,
means for moving an adhesive tape web along a predetermined path,
three rollers in said path having their axes generally at the apices of a triangle with two of the rollers spaced apart and extending beyond the adjacent part of the third roller on each side thereof, and
said third roller having numerous radially extending piercing needles thereon to perforate the tape web as it undulates by said rollers with said two spaced rollers forcing the web against the third roller to insure penetration.

7. In an adhesive tape perforating machine,
means for moving an adhesive tape web along a predetermined path,
three rollers in said path having their axes generally at the apices of a triangle with two of the rollers spaced apart and extending beyond the adjacent part of the third roller on each side thereof,
said third roller carrying numerous piercing needles thereon to perforate the web,

one of the other two rollers being an anvil roller of a material into which the needles penetrate through the tape web, and

the remaining roller being a tension roller spaced from contact with said needles.

8. In an adhesive tape perforating machine,

means for moving an adhesive tape web along a predetermined path,

three rollers in said path having their axes generally at the apices of a triangle with two of the rollers spaced apart and extending beyond the adjacent part of the third roller on each side thereof,

said third roller carrying numerous piercing needles thereon to perforate the web,

drive means for said third roller,

one of the other rollers being a silicone rubber anvil idler roller, and

the remaining roller being a plane surfaced idler tension roller.

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