

[54] VACUUM WHEEL APPARATUS FOR APPLYING TABBED STRIPS OF ADHESIVE TAPE

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[57] ABSTRACT

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A device for applying strips of tape having a pressure-sensitive adhesive disposed on one side thereof onto articles. The device forms a pull tab, suitable for gripping, from a portion of the tape strip and applies the tabbed strip to an article. The tab permits easy gripping and removal of the tape from the article.

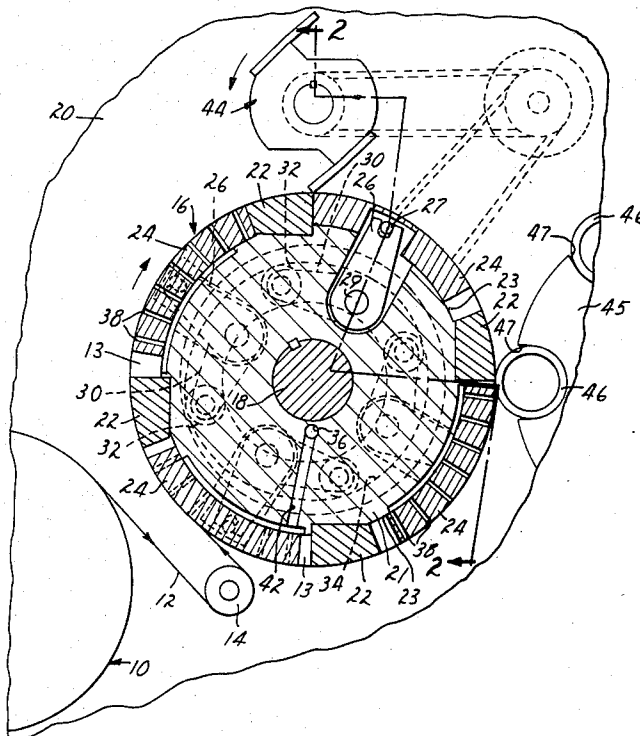
[51] Int. Cl.²..... B65C 9/04; B32B 31/00

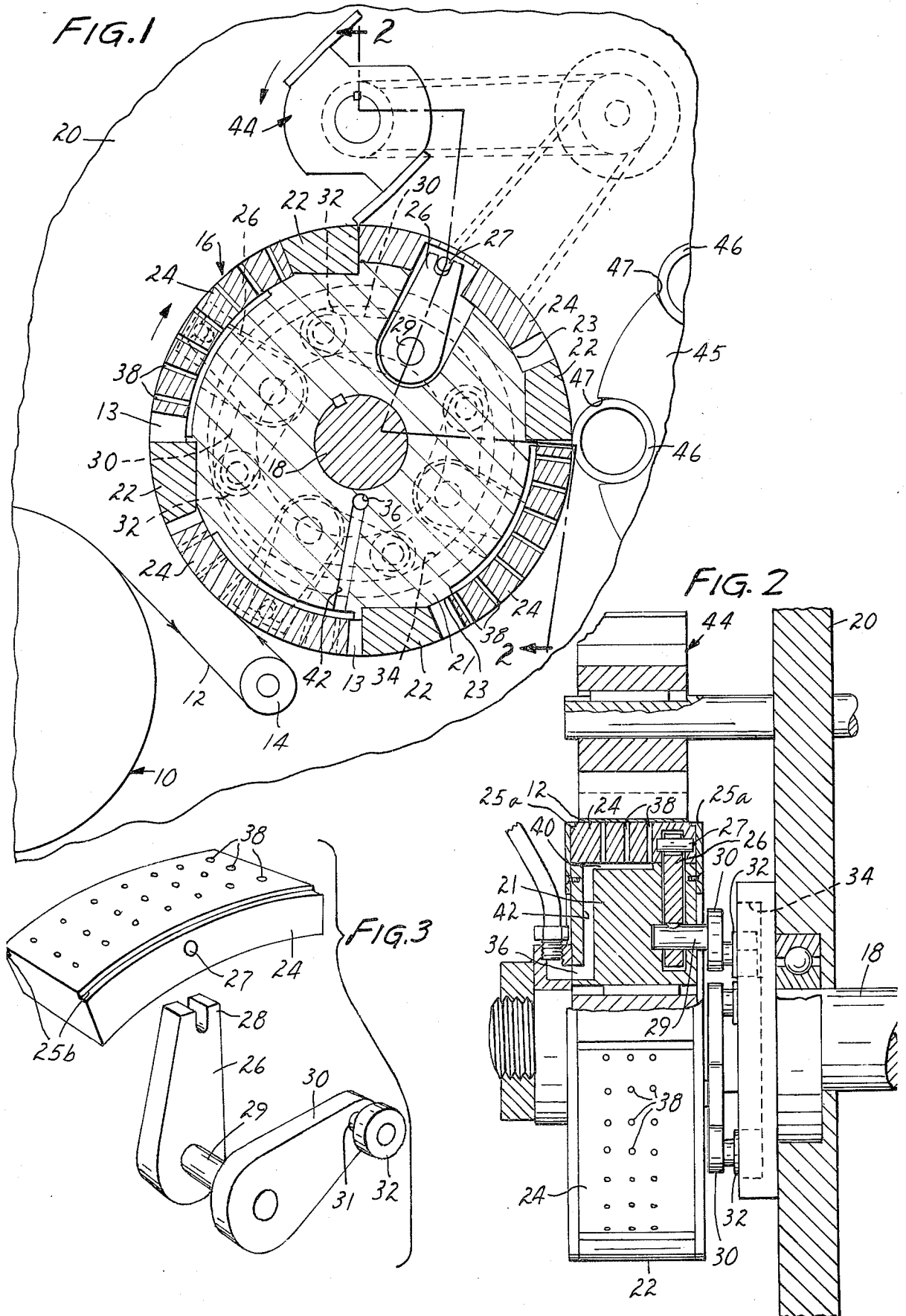
[58] Field of Search 156/444, 443, 519, 521, 156/517, 568, 227, 446, 458

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3 Claims, 3 Drawing Figures

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VACUUM WHEEL APPARATUS FOR APPLYING TABBED STRIPS OF ADHESIVE TAPE

BACKGROUND OF THE INVENTION

1. Field of The Invention

In one aspect, this invention relates to tape applying machines; more specifically, this invention relates to machines which form a tab on the tape before applying the tape to an article.

2. Prior Art

The tape applying vacuum wheels presently available receive a strip of tape on the applying wheel with the adhesive coated surface exposed. If it is desired to apply a strip of tape with a tab section which does not adhere to the substrate, a strip of film is applied along one edge of the tape to cover a portion of the adhesive. When the tape is severed across its width, a tabbed strip of tape is formed which is as long as the tape is wide.

The prior art devices have proved useful but they require the use of a film to form a tab which necessitates additional handling to load and feed the film and the length of the strip applied is limited to the width of the tape and this severely limits the length of the tape strip which is applied. Also, the tape strip on the prior art machines cannot be applied under tension since the tape is held on the wheel only by a vacuum.

BRIEF SUMMARY OF THE INVENTION

The tape applying wheel of this invention solves the problems of the prior art. The wheel folds the tape upon itself, an adhesive coated surface to an adhesive coated surface, so the tape forms a tab suitable for gripping without the need for an additional film. The applicator also holds the formed tab during application of the tabbed strip to a substrate thereby allowing the tape to be applied under tension and the tape strip can be formed to the desired length irrespective of the tape's width.

The apparatus of this invention comprises a frame having an ovoid cam race mounted thereon. A vacuum wheel is rotatably mounted on a supporting shaft attached to the frame, the shaft being positioned within the cam race. A plurality of fixed anvils are evenly circumferentially spaced about the periphery of the vacuum wheel. A plurality of oscillating vacuum applying segments, smaller than the space between adjacent anvils and having a perforated applying surface are movably mounted between the anvils. The segments are adapted for arcuate oscillatory motion on the periphery of the vacuum wheel in the space between the anvils.

The oscillating segments have a leg with one end attached thereto and with the end distal said segment rotatably mounted to the vacuum wheel by means of a pin. Each leg has an associated linking arm having one end fixedly attached to a pin with a fixed angular relationship between the linking arm and the leg attached to the pin. A cam follower mounted on the end of the linking arm opposite the pin is adapted for movement within the ovoid cam race.

Vacuum means supply a vacuum to the applying surface of the oscillating segments and the spaces between the applying segment and a complementary anvil.

A supply of tape having a pressure-sensitive adhesive on one side thereof is fed onto the anvils and applicat-

ing segments with the adhesive exposed. As the vacuum wheel rotates, the cam follower moving in an ovoid path moves the linking arm which in turn causes the applying surface to oscillate closing the space between the anvil and the applying segment. Tape spanning the space is drawn into the space between the segment and anvil by the vacuum and will be formed into a tab by the pressure of an end of the segment against an end of the anvil when in a closed position.

BRIEF DESCRIPTION OF THE DRAWING

A further understanding may be had by referring to the accompanying drawing in which:

FIG. 1 is a side view with the applying wheel shown in one embodiment of this invention;

FIG. 2 is a front sectional view taken along the line 2-2 of FIG. 1; and

FIG. 3 is an exploded view of an applying segment with its associated leg and linking arm.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing in which like reference numerals refer to like parts, tape 12 from a supply roll 10 is fed continuously onto applying segments 24. The tape 12 is fed onto the segments 24 so that the adhesive is exposed. As the tape is being fed to the wheel, it bridges a gap 13 between applying segments 24 and anvils 22 which anvils 22 are spaced circumferentially, a distance exceeding the arcuate length of the segments defining a recess for the segments. A vacuum applied to the peripheral surface of the applying segments 24 holds the tape 12 firmly on the applying segment. As vacuum applying wheel 16 rotates, positioning means afford movement of each segment in the recess formed by the anvils 24 and wheel 21 to position the segment in a particular position in relationship to the trailing anvil at various positions during the rotation of the wheel. As illustrated, a cam follower 32 in a cam race moves linking arms 30, pins 29 and leg 26 causing the segments 24 to oscillate in the recesses. As the wheel 21 is rotated from the tape supply station, segments 24 are moved in the direction opposite the direction of rotation of the wheel 21; the segments will move from an open position with respect to their complementary trailing anvil to a closed position. A vacuum applied to the gap 13 draws the tape into the narrowing gap to fold the tape during such movement with the adhesive surface of the tape being in contact with itself to form a permanent tab.

After a tab is formed, the wheel is rotated to the severing station where severing means cuts the tabbed strips of tape to the desired length. As shown, the tabbed strip then contacts a revolving object 46, e.g., a tube which is held in a feed member 45 having a plurality of depressions which are suitable for holding the tube and carrying it to the applying station. The strip is applied about the circumference of the tube 46 which rotates in a direction opposite that of the vacuum wheel 16. The tab on the tape is held during application to keep tension on the tape then the segments are moved in the direction of rotation of the wheel to again form a gap between the segment 24 and the trailing anvil. The tension allows the tape to be applied to irregularly shaped substrates. The tension will stretch the tape to conform to the substrates.

In greater detail, a continuous length of tape 12 is drawn from a convolutely wound roll of tape 10 by a driven feed roller 14 and fed onto the periphery of a vacuum wheel designated generally 16. The vacuum wheel 16 is rotatably mounted on a shaft 18 attached to housing 20, the axis of the shaft being perpendicular to the housing. A supporting disc 21 has a plurality of fixed anvils 22 evenly spaced about the periphery. A plurality of vacuum applying segment heads 24, corresponding in number to the anvils 22, are disposed about the disc 21. The applying segments 24 are mounted for arcuate oscillatory motion in the recess between the anvils 22, the segments being shorter than the recess providing a gap 13 between the trailing edge of a segment and the next anvil in one position of the segments.

The applying segments 24 are held in position on the periphery of wheel 21 by means of lips 25a projecting from each side of the vacuum wheel engaging complementary grooves 25b along the sides of the segments. The lips 25a will retain the applying segments 24 in position about the periphery but allow free movement of the segments between the anvils. The legs 26 have a bifurcated end which engages a pin 27 in the applying segments. The legs 26 are mounted to the disc 21 by shafts 29, the shafts being free to rotate on the shaft so that the angle therebetween remains constant. The other free end of the linking arm 30 opposite the shaft 29 is free for movement about the axis of shaft 29.

A cam follower 32, mounted on the free end of the linking arm 30 distal to the shaft 29, is adapted to move in the ovoid cam race 34. As cam follower 32 moves in the ovoid cam race 34 about the axis of shaft 10, the free end of linking arm 32 will move in an ovoid path toward and away from the axis of shaft 18. This motion will cause a corresponding oscillating motion in the connected linking arm, leg and applying segment.

As the tape is fed onto an applying segment, there will be a gap 13 between the applying segment and its complementary anvil. A source of subatmospheric pressure, i.e., vacuum means not shown, is connected to a manifold 36 which transmits the vacuum pressure to apertures 38 on the exposed surface of the applying segments 24 by means of a thin depression 40 on the surface of the supporting disc and a plurality of radial bores 42 formed in the disc 21. The thin depression 40 also opens to the gap 13 to pull the tape into the gap as the segments 24 move toward their complementary anvils 22.

After a tab has been formed in the tape 12, the wheel is rotated to the severing stations where cutting means, such as a rotary shear 44, will sever the tape to the desired length adjacent the tabbed end of a length of tape carried by the applying segment 24. The cut length of tape is then carried to an applying station.

As shown, the cylindrical tube 46 is held in an applying position in the depression 47 by feed member 45 about their axes to permit oscillating of the segments 24 in the recesses. One end of each linking arm 30 is also connected to a corresponding arm and leg being fixedly mounted which has a number of depressions suitable for holding tubes to be taped. There are means (not shown) to rotate the tube 46 in a counterclockwise direction as the applying wheel moves in a clockwise direction. The tabbed segment of tape 12 will be wrapped firmly about the object 46, the tabbed portion being firmly gripped between an applying segment

and a trailing anvil. This allows the tape to be applied under tension providing a good contact. When the tabbed portion is reached, the segment is moved in the direction of rotation of the wheel and the wheel releases the tab and the adhesion of the tape to the article is sufficient to pull the tab from between the segment and its complementary anvil. The empty applying segment then rotates into position to receive the tape feed from the supply 10.

While this invention has been described with respect to placing a tabbed length of tape on a cylindrical or circular object, it is also useful for placing tabbed lengths of tape on boxes, joining parts or other applications which use a tape closure.

Various modifications and alterations of this invention will become obvious to those skilled in the art without departing from the scope and the spirit of this invention, and it is to be understood that this invention is not limited to the illustrative embodiments set forth hereinbefore.

What is claimed is:

1. An apparatus for forming and applying a tabbed strip of adhesive tape to an object comprising:

a frame;
a wheel mounted for rotation on a supporting shaft attached to said frame;

a plurality of fixed anvils evenly spaced about the periphery of said wheel;

a plurality of oscillating vacuum applying segments, having a perforated applying surface, supported for arcuate oscillatory motion in the space between said fixed anvils, each of said oscillating segments moving from an open to a closed position with respect to a complementary fixed anvil and each of said applying segments having a leg with the end of said leg distal said segment and fixedly mounted to a pin rotatably mounted on said vacuum wheel;

positioning means are provided for rotating said pins to move said segments through the desired oscillatory movement upon rotation of said wheel;

vacuum means for supplying a vacuum to said applying segments and the area between said applying segments and said fixed anvils for holding the tape on the segments and for drawing the tape into the gap between an end of the segment and the complementary fixed anvil;

feed means for feeding tape from a supply of tape having a pressure-sensitive adhesive disposed on one side thereof to said applying segments with the adhesive exposed; and

cutting means for severing said tape placed upon said wheel into lengths;

whereby as said vacuum wheel rotates tape is fed onto the surface of the wheel and is cut into lengths with said segments moving with relation to said anvils to form a tab on the tape when one of the applying segments is moved to a closed configuration, said tab being formed as the tape spanning the space between one of said applying segments and one of said fixed anvils in the open configuration is drawn by the vacuum into the space between said segments and is formed into a tab by the pressure between the segment and anvil as they move to the closed position.

2. An apparatus for forming and applying a tabbed strip of adhesive tape to an object comprising:

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a frame;
 an ovoid cam race disposed on said frame;
 a vacuum wheel rotatably mounted on a supporting shaft attached to said frame, said shaft being located on an axis positioned within said cam race; 5
 a plurality of fixed anvils evenly spaced about the periphery of said vacuum wheel;
 a plurality of oscillating vacuum applying segments, having a perforated applying surface, adapted for arcuate oscillatory motion in the space 10
 between said fixed anvils, each of said oscillating segments moving from an open to a closed position with respect to a complementary fixed anvil and each of said applying segments having a leg with the end of said leg distal said segment, fixedly 15
 mounted to a corresponding pin rotatably mounted on said vacuum wheel;
 linking arms having one end fixedly attached to said pins at a fixed angular relationship to said leg;
 a cam follower mounted on the other end of said linking arm opposite said pin, said cam follower being 20
 adapted for movement in said ovoid cam race;
 vacuum means for supplying a vacuum to said applying surface and the area between said applicat-

ing segments and said fixed anvil when they are in the open position;
 feed means for feeding tape from a supply of tape having a pressure-sensitive adhesive disposed on one side thereof to said applying segments with the adhesive exposed; and
 cutting means for severing said tape disposed on the surface of the wheel into lengths,
 whereby as said vacuum rotates said cam follower moves in an ovoid path moving said linking arm which in turn causes said applying surface to oscillate from an open configuration with a space between the fixed anvil and one of the applying segments to a closed configuration, the tape spanning the space between one of said applying segments and one of said fixed anvils in the open configuration will be drawn by the vacuum into the space between said segments and will be formed into a tab by the pressure between the segment and anvil in the closed position.

3. The apparatus of claim 2 wherein said cutting means is a rotary shear adapted to cooperate with said fixed anvils to sever said tape therebetween.

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