

Feb. 26, 1974

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3,794,545

TIE-BAND APPLICATOR APPARATUS

Filed Feb. 10, 1972

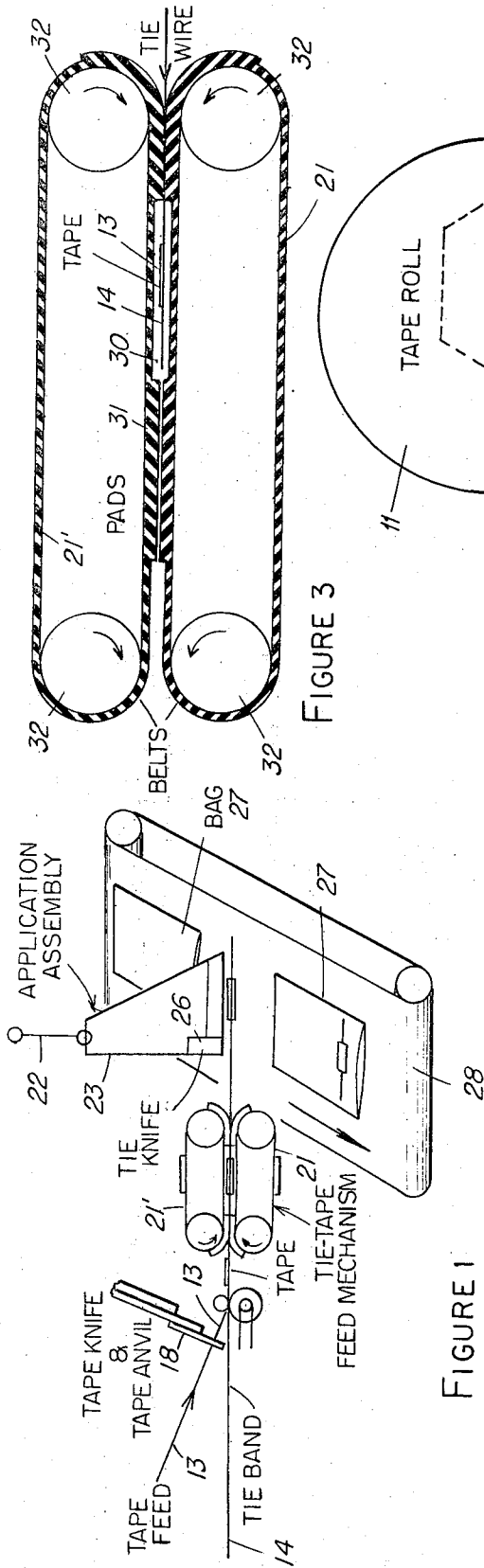


FIGURE 3

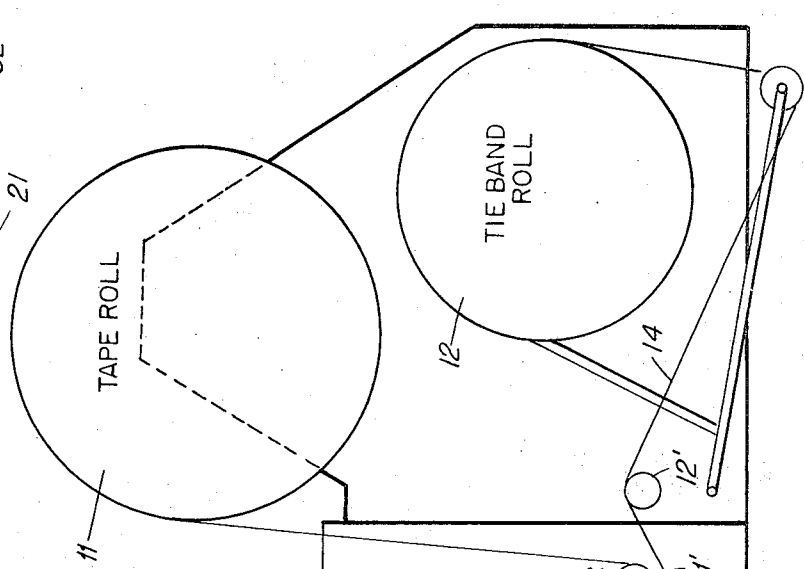
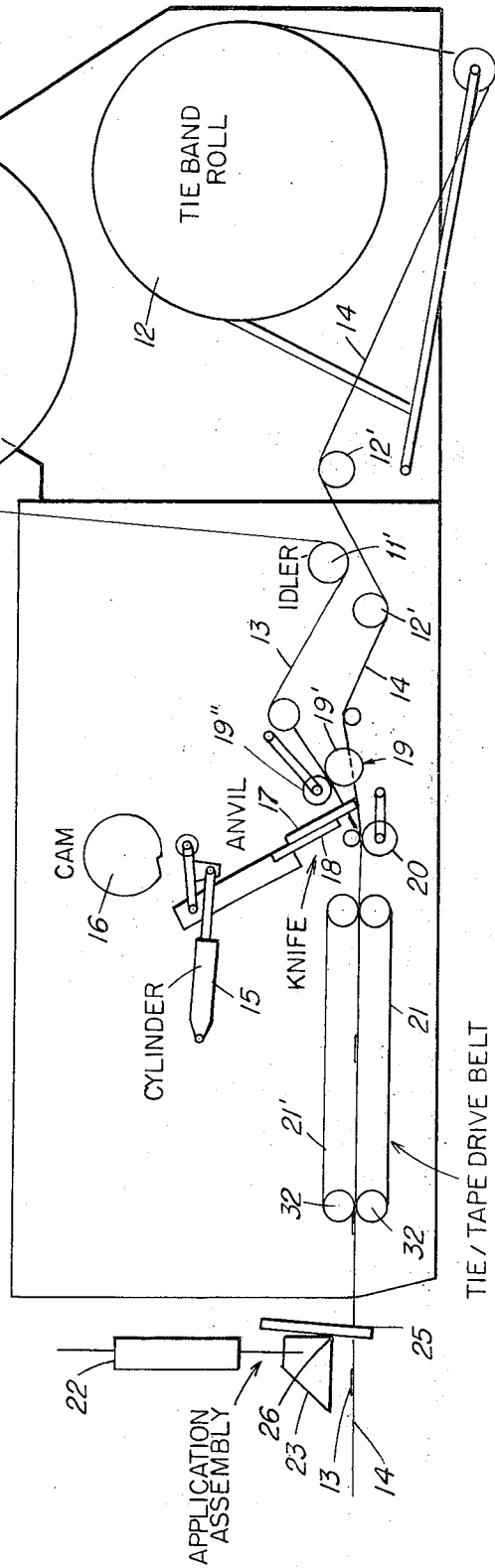


FIGURE 2



1

2

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TIE-BAND APPLICATOR APPARATUS
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Filed Feb. 10, 1972, Ser. No. 225,131

Int. Cl. B32b 31/00

U.S. Cl. 156—519

1 Claim

ABSTRACT OF THE DISCLOSURE

An apparatus for applying a closure device to the exterior surface of a bag-like object, the closure being capable of ready detachment from the bag so that the closure may be employed to effect sealing of an open mouth bag structure. The apparatus includes a device for feeding a closure element, the element may be either coated with a pressure sensitive adhesive or have affixed thereto a length of adhesive tape, into the proximity of a bag structure which is advancing on a conveyor device. The closure, with the adhesive strip thereon, is subsequently applied to the exterior wall of the bag surface by means of a reciprocating applicator assembly.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to an apparatus which is employed to apply a closure device such as a wire twist-tie on the exterior surface, preferably near the open mouth area, of a bag structure and in particular a thermoplastic bag structure. The closure is applied utilizing the apparatus of the present invention in such fashion that it may be easily removed from the area adjacent the open mouth of the bag, making it easily available when it is desired to secure the bag mouth in a closed condition.

Description of the prior art

Applicant is not aware of any pertinent prior art in the area of mechanisms or apparatus for applying releasably attached closures, utilizing tape, to bag structures.

SUMMARY OF THE INVENTION

The present invention relates to an apparatus comprising a mechanism for feeding a closure device, such as a twist-tie (a plastic or paper coated thin wire), into contact with a segment of adhesive coated material, e.g. an adhesive coated paper tape; and subsequently affixing the adhesive material to a continuous length of tie band material; and finally severing the tie band with the adhesive tape affixed thereto and immediately, after severance, affixing the tie band, utilizing the adhesive tape thereon to the exterior surface of a bag structure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of the tie band applicator device of the present invention.

FIG. 2 is a schematic side elevational view of the tie band and tape system thread path of the apparatus of the present invention.

FIG. 3 is a schematic side elevational view of the tie band-tape system dispensing device.

DESCRIPTION OF SPECIFIC EMBODIMENTS

The following brief description is broken into two segments, i.e. segment (A) which describes the actual sequence for application of a tie band onto the exterior surface of a bag structure, supported on a continuously moving surface; and segment (B) describing the operation of the basic components of the apparatus comprising the present invention.

(A) ACTION SEQUENCE

[The following sequence is best understood by reference to FIG. 1.]

(1) A bag structure passing through a photoelectric circuit (not shown) on the bag folding conveyor signals the start of the closure application operation.

(2) A section of tie wire, with tape attached thereto as illustrated in FIG. 1, is positioned and ready to be severed by the tie band applicator cut-off knife. The tie band is subsequently attached to the bag, as the tie band applicator assembly, an integral part of the tie band cut-off knife, is cycled downwardly into contact with the bag carried on the moving conveyor and presses into contact with the bag. The bag is momentarily stopped by the contact action of the tie band applicator. The bag, now with the closure device, i.e. tie band, resumes its travel along the conveyor belt as soon as the tie tape has been applied, and the tie tape applicator is cycled upwardly to its ready position to sever the subsequent tie band-tape assembly and apply it to the next bag on the continuously moving conveyor. It will be noted that while the bag is stopped by virtue of the pressure applied against the bag by the tie tape applicator, the conveyor belts are continuing to slip underneath the bag.

(3) When the tie wire applicator has resumed its ready position, as above described and illustrated in FIGS. 1 and 2, a piece of adhesive tape is cut, indexed forward and attached to the continuous length of tie material and subsequently the combination of tape and continuous tie wire is indexed forward and positioned, as shown in FIG. 1, beneath the tie band knife applicator whereby the tie band applicator is now ready to apply the tie-tape assembly as the tie is severed, to the next bag carried along on the continuously moving conveyor belts.

(B) FUNCTION OF INDIVIDUAL COMPONENT SYSTEMS OF APPARATUS ASSEMBLY

Generally, the basic components in the apparatus assembly of the present invention may be considered as subdivided into three basic component systems, namely, the (1) Tape Feed System; (2) the Twist Tie Feed System; and (3) the Twist Tie-Tape Applicator System.

(1) TAPE FEED SYSTEM

As more clearly illustrated in FIG. 2 the tape feed system comprises a series of rollers and drive wheels. The tape is drawn from a roll and, optionally, may be subsequently creased in the center thereof to form a "V" shaped cross section which makes the tape more adaptable for projection through an anvil assembly, against which the tape is subsequently cut to a predetermined length with the tape cutter knife and is subsequently laminated to the continuous twist tie wire passing through the nip of a pair of counter rotating rollers used to laminate the tape piece to the continuous twist tie wire.

(2) TWIST TIE FEED SYSTEM

As shown in FIG. 2 a continuous length of twist tie material is drawn from a twist tie-band roll by a pair of continuously rotating superimposed belts. These belts, as more clearly illustrated in FIG. 3, are contoured around their circumference to prevent that portion of the continuous twist tie-band, with adhesive coated tape attached thereto, from coming into contact and sticking or adhering to the belts.

(3) TWIST TIE-TAPE APPLICATOR ASSEMBLY SYSTEM

The applicator assembly for applying a segmented length of twist tie with the tape laminated thereto to a bag structure comprises a pneumatically actuated applicator foot and twist tie cut-off assembly as illustrated in

FIG. 2. As the pneumatically actuated applicator assembly cycles downwardly towards a bag structure, passing beneath the applicator, the cut-off knife, an integral part of the applicator foot, severs a length of twist tie material, with adhesive coated tape attached thereto, from the continuous length of twist tie material and, as the applicator assembly continues its downward motion, momentarily presses the moving bag to the belt conveyor system supporting the bag. The twist tie, with attached adhesive coated tape is pressed onto the bag with the applicator foot, and is now adhesively secured to the bag structure by the length of adhesive coated tape which had been previously laminated to the twist tie as above described. The bag conveyor system comprises a plurality of longitudinally spaced belts, which continue to advance as the bag is held momentarily beneath the pressure of the applicator foot. Subsequently the applicator foot is retracted upwardly, allowing the bag with the attached twist tie to continue on its path along the moving conveyor system to, for example, a packaging station.

EXAMPLE

As shown in FIG. 2 a continuous length of tape 13 coated on one side thereof with a pressure sensitive adhesive material, a $\frac{3}{8}$ inch wide masking tape, identified by the manufacturer as 3M, No. 234, was drawn from tape supply roll 11 and around idler roll 11' by roller 29. Tape 13 was passed through creasing assembly 19 where it was impressed into a groove around the periphery of roller 19' utilizing rotating impressing wheel 19" (a part of creasing assembly 19) as illustrated in FIG. 2. The temporary "V" shaped cross section crease, imparted to the tape 13 as a result of this creasing operation permitted ease of passage thereof to laminating assembly 20 which comprised a pair of counter-rotating rollers in nipping engagement. Simultaneously with the withdrawal of tape 13 from tape supply roll 11, a continuous length of twist tie 14, which was a one piece polyethylene profile extruded over 26 gauge (0.018 inch) soft annealed carbon steel wire, approximately $\frac{3}{4}$ inch wide, a wire thickness of 0.006 inch and a composite thickness of about 0.036 inch, was withdrawn from twist tie supply roll 12 and passed, as illustrated in FIG. 2, through a series of idler rollers (12') and through the laminating assembly 20. As illustrated in FIG. 2, tape 13 was cut prior to entry thereof into laminator assembly 20 utilizing a knife 18 and anvil 17 arrangement. The tape cutting step was intermittent and controlled by cam mechanism 16 and pneumatic cylinder 15. The length of tape segments which were cut was approximately one inch. Upon passage of the tape, now in adhesive contact with continuous twist tie 14, through laminator rollers 20, the tape became adhesively fastened to the continuous length of twist tie material 14. Twist tie material 14 was drawn from twist tie supply roller 12 by counter-rotating belts 21 and 21' which are mounted and driven by rollers 32. Rubber belt members 21 and 21', as more clearly illustrated in FIG. 3, are contoured so that the exterior surface of the respective belts have a plurality of integral resilient rubber pads which alternate on the respective belts 21 and 21' with recessed areas 30.

As shown in FIG. 3 the continuous twist tie length 12 with a segmented portion of tape 13 adhesively secured therethrough was drawn through dispensing belts 21 and 21' in such a manner that that portion of the continuous twist tie 14, which had adhesively secured thereto segmented tape portion 13, passes between respective dispensing belts 21 and 21' in recessed areas 30, to prevent the adhesive coated tape from coming into contact with and sticking to belts 21 and 21'. Upon exit from dispensing belts 21 and 21' the continuous twist tie length 14 with

segmented portions of tape 13 adhesively secured thereto pass to the twist tie-tape applicator assembly 22, 23 and 25 as illustrated in FIGS. 1 and 2. Pneumatic cylinder 22 was actuated by means (not shown) causing applicator foot assembly 23 to move downwardly. Cut-off knife 26, an integral part of the base of applicator foot 23 severed twist tie 14 (approximately a $6\frac{1}{2}$ inch length thereof) with segmented tape 13 attached thereto. Applicator foot 23 continued downwardly bringing twist tie 14 and segmented tape 13 into contact with bag 27. The pressure of applicator foot 23 bearing momentarily on bag 27 caused the twist tie 14 tape segment 13 assembly to be releasably affixed adjacent the open mouth of bag 27. As illustrated in FIG. 1 applicator foot assembly was subsequently retracted into position for the next cut-off and application of the following length of twist tie-tape assemblage to the succeeding bag 27 on continuous conveyor belt system 28.

In the foregoing specific example of the method and operation of the apparatus of the present invention, specific materials, i.e. adhesive coated tape and coated-wire (e.g. wire encased in a plastic or paper-like continuous sleeve) twist tie, were employed to illustrate more clearly the present method and apparatus. However it will be clearly understood that the present method and apparatus may be employed to affix to bag structures a wide variety of different types of detachable closures, e.g. flexible plastic straps, rigid plastic closure clips and the like. Moreover such closures need not be detachably affixed utilizing adhesive coated tape. For example, the closure itself may be coated on at least one side with pressure sensitive adhesive material to effectively secure it to the bag structures and the like. Also the bags to which such closures are affixed need not be separate and individual but may be continuous bag structures which are detachably secured together.

Although the present invention has been described with preferred embodiments, it is to be understood that modifications and variations may be resorted to, without departing from the spirit and scope of this invention, as those skilled in the art will readily understand. Such variations and modifications are considered to be within the purview and scope of the appended claims.

What is claimed is:

1. An apparatus for applying a detachable closure onto the exterior surface of a bag structure which comprises (a) means for supplying a length of adhesive coated tape to a tape cutting means; (b) said tape cutting means including an actuating means for severing a predetermined length of said tape; (c) means for supplying a length of coated wire to a laminating station, said laminating station comprising means to adhesively secure said predetermined length of tape to said coated wire; (c) an application assembly means for severing a predetermined length of said wire, with said tape adhesively adhered thereto, said applicator means subsequently bringing said tape and wire assemblage into pressure contact with a bag structure.

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U.S. Cl. X.R.

156—521; 93—8 WA