Oct. 15, 1968 L. M. VARGA 3,406,084

TAPE APPLICATOR

Filed Nov. 2, 1966 2 Sheets-Sheet 1

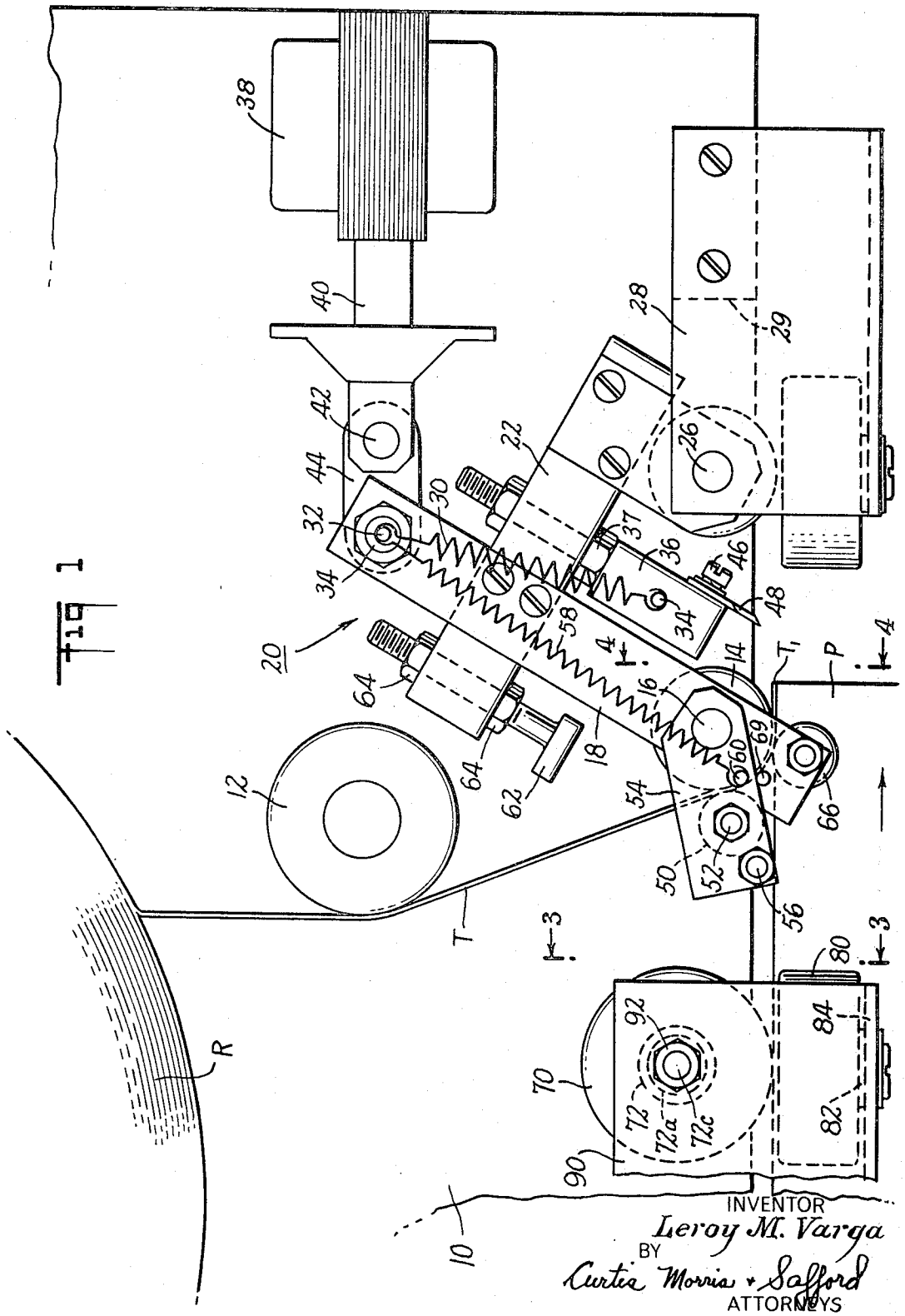


Fig 1

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Oct. 15, 1968 L. M. VARGA 3,406,084

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Filed Nov. 2, 1966 2 Sheets-Sheet 2

Fig 2

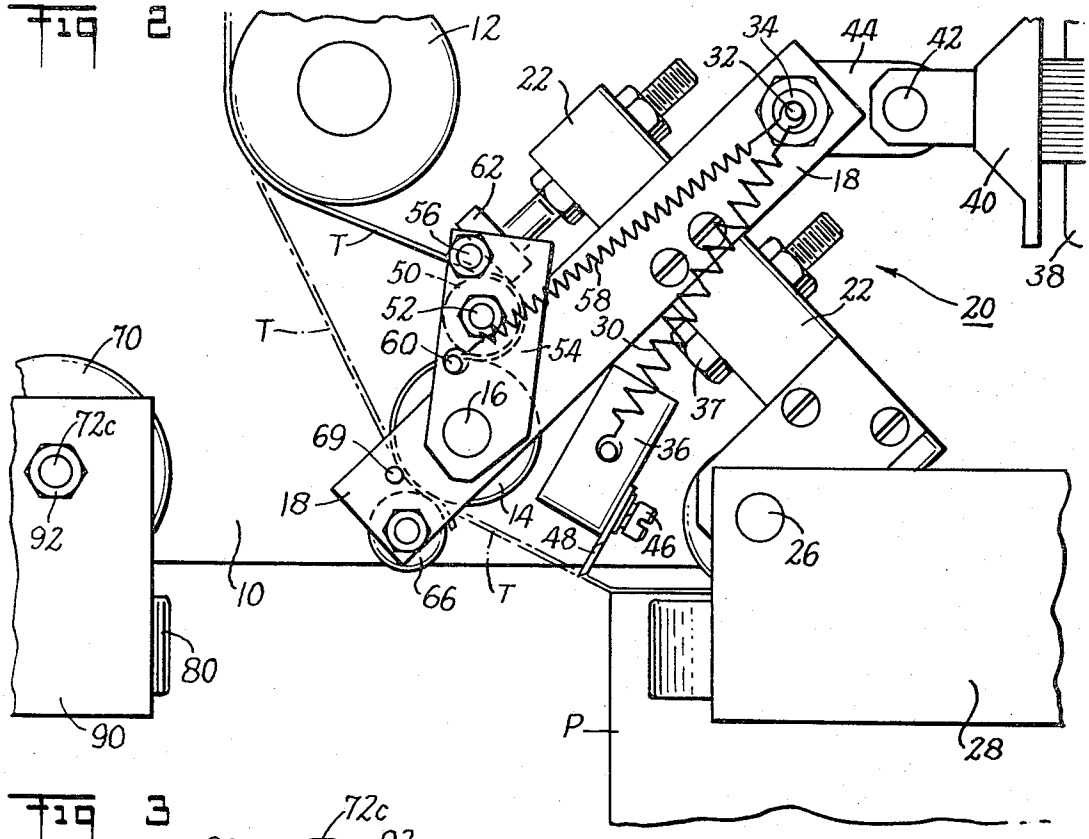


Fig 3

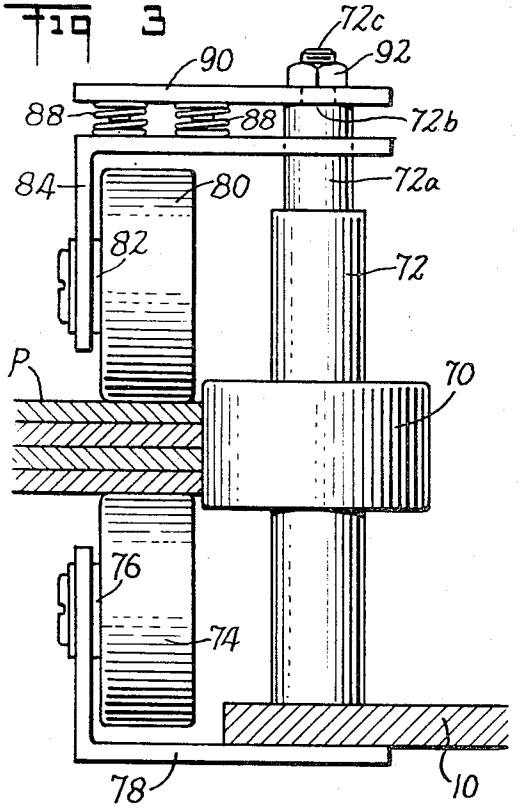
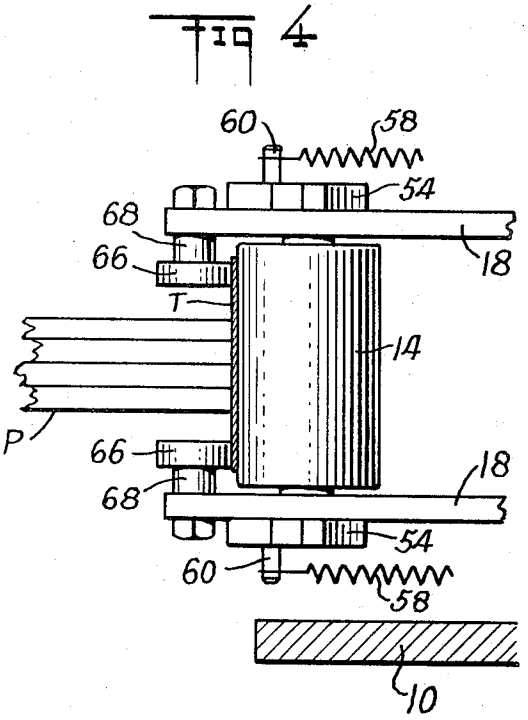


Fig 4



United States Patent Office 3,406,084 Patented Oct. 15, 1968

3,406,084

TAPE APPLICATOR

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6 Claims. (Cl. 156—522)

This invention relates to apparatus for applying adhesive tape to the surface of a package being moved relatively to the apparatus.

The invention is particularly useful in connection with packaging machinery through which materials to be packaged are mechanically transported. The invention provides a simple and inexpensive yet thoroughly practical apparatus by which gummed tape can be dispensed and applied to one or more surfaces of each of the moving packages and includes means for automatically applying the leading end of the tape in desired relation to the leading end of each package and for automatically severing the tape at such time that its trailing end falls in desired relation to the trailing end of the package. The apparatus also includes a reset mechanism by which a predetermined length of tape at the leading cut end of the tape may be dispensed to the next package without the necessity of pulling additional tape from the supply roll, this length of tape being sufficient that after it has been applied to the package, its adhesion to the package will impose on the tape sufficient tension to overcome the unrolling resistance of the supply roll and insure the continuation of tape feeding.

In the drawings:

FIGURE 1 is a top plan view of an illustrative apparatus embodying features of the invention, with the parts shown in tape-feeding position;

FIGURE 2 is a top plan view of a portion of the apparatus of FIGURE 1 with the parts shown in tape-cutting and resetting position;

FIGURES 3 and 4 are fragmentary vertical sectional views taken generally along the lines 3—3 and 4—4, respectively, in FIGURE 1.

As shown in FIGURE 1, the apparatus includes a tape supply means, such as a roll of tape R which is rotatably supported on a horizontal table **10**, with its central spool engaged on an upwardly projecting spindle (not shown). The tape T which is unwound from the outside of roll R extends past a guide roller **12** which is rotatably mounted in position to engage the outer (ungummed) surface of the tape and fix the transverse position of the tape at that point.

The tape T extends from the guide roller **12** to an applicator roller **14** which is rotatably mounted on a vertical shaft **16** whose upper and lower ends are supported near the ends of a pair of vertically spaced legs **18** of a support assembly, generally designated **20**. The lower leg **18** of the assembly, which appears only in FIGURE 4, has the same shape as the upper leg shown in FIGURES 1 and 2 and is positioned directly beneath it. The support assembly **20** also includes another pair of vertically spaced legs **22** extending perpendicularly to the legs **18** and having attached to their ends a pair of brackets **24** which are rotatably supported on a vertical shaft **26** extending between the table **10** and an upper horizontal plate **28** spaced above the plate **10** by a block **29**. Thus, the entire support assembly is mounted for pivotal movement about the shaft **26** to swing the applicator roller **14** between a tape-applying position, in which it engages the outer surface of the tape T to press it against the surface of the package P, as shown in FIGURE 1, and a retracted or reset position at which it is spaced from the package P, as shown in FIGURE 2.

The support assembly is urged to and normally maintained in the tape-applying position by a coil spring **30** which is tensioned between a pin **32** projecting upwardly from a vertical shaft **34** extending between the outer ends of the legs **18** and a pin **32** projecting upwardly from a fixed vertical post **36**. The movement of the support assembly by the spring **30** is limited by engagement of the head of a stop screw **37** adjustably threaded through the upper leg **22** with the adjacent edge of the post **36**. The support assembly is moved to the retracted position, as shown in FIGURE 2, against the resistance of the spring **30**, by means of a solenoid **38** whose armature **40** is connected by a pin **42** and a link **44** to the center of the vertical shaft **34**.

Adjustably secured on the post **36** by screws **46** is a cutting knife **48** whose cutting edge extends inwardly toward the tape T in the area between the applicator roller **14** and the package P. The cutting knife **48** is so positioned that, when the support assembly is in the tape-applying position, as shown in FIGURE 1, the cutting knife is clear of the tape T, and when the support assembly is moved to the retracted position, as shown in FIGURE 2, and as the package P continues to move through the machine, the tape T is pulled more nearly straight, as shown in broken lines in FIGURE 2, so that it moves against the edge of the cutting knife **48** and is cut thereby.

The gummed surface of the portion of the tape T between the supply roll R and the applicator roller **14**, is engaged by a reset roller **50** which is rotatably mounted on a vertical shaft **52** extending between reset arms **54** which are pivotally mounted on the vertical shaft **16**. The reset arms are rigidly interconnected by a vertical spacer bar **56** having nuts threaded onto its projecting ends, and are urged in a clockwise direction, as viewed in FIGURES 1 and 2, by coil springs **58** (see also FIGURE 4) which are tensioned between pins **60** projecting from the reset arms **54** and the aforementioned pin **32** (FIGURES 1 and 2) as well as a similar pin (not shown) on the lower leg **18** of the support assembly **20**.

The springs **58** are relatively weak, as compared to the spring **30**, so that, when the tape T is under the tension imposed by the movement of the package P and the unwinding resistance of the supply roll R, the reset roller **50** is pulled around to the normal tape-feeding position shown in FIGURE 1 at which the tape T extends in a substantially straight line from the supply roll R to the point of tangency of the applicator roller **14**. However, when the tape is cut, removing the tension thereon, the reset roller is pulled by the springs **58** in a clockwise direction, to the reset position shown in FIGURE 2, at which the spacer bar **56** engages the head of a stop screw **62** extending through the end of the arm **22** and adjustably secured thereto by nuts **64**. This movement of the reset roller **50** bends the tape T partially around the periphery of the applicator roller **14**, as shown in full lines in FIGURE 2, retracting the leading cut end T of the tape back to a point adjacent the portion of the applicator roller R which is tangential to the surface of the package P when the applicator roller is in tape-applying position. Thus the tape is "reset" with its leading edge in position to be pressed against the surface of the package when the applicator roller is returned to tape-applying position.

To hold the end of the tape against the surface of the applicator roller **14** and insure its proper placement against the surface of the package, a pair of retaining rollers **66** are rotatably supported on studs **68** at the end of the arms **18** in position to engage the gummed surface of the tape near its cut end T, when the tape is retracted to the reset position. As shown in FIGURE 4, these retaining rollers **66** are spaced to clear the upper and lower surfaces of the package P.

When the leading end of the tape is pressed against the moving package it adheres to the package and moves with it, easily pulling the length of tape which has been bent around the applicator roller **14** by the reset roller **50** and moving the reset roller back to its normal tape-feeding position against the light resistance of the springs **58**. When the reset roller reaches this position, further pulling of the tape requires unwinding of the supply roll R. However, the length of tape fed during the movement of the reset roller from its reset position back to its normal tape-feeding position is sufficient that the adherence of this length of tape to the surface of the package will overcome the unwinding resistance of the supply roll without pulling the tape off the package, so that the continuation of tape feeding is insured.

The counterclockwise movement of the reset arms **54** against the resistance of the springs **58** is limited by a stop rod **69** which extends above the upper leg **18** and engages the adjacent edge of the upper reset arm **54** when the reset arms are in tape-feeding position, as shown in FIGURE 1. This prevents the inertia of the reset arms **54** and roller **46** from carrying them into the path of the package P when the spring **30** returns the support assembly to tape-feeding position. This rod **69** may extend downwardly to the lower reset arm **54** and serve to retain the cut end of the tape adjacent the surface of the applicator roller where the tape is too narrow to be engaged by the retaining rollers **66**.

The package P may be conveyed through the machine by any conventional means (not shown), such as motor driven chains or belts. FIGURES 1 and 3 show an optional means for guiding the adjacent edge of the packages past the tape applicator. The particular mechanism illustrated is especially adapted to apply tape to the edge of a stack of sheet material such as wallboard or plywood, for example, as best seen in FIGURE 3, a stack of four such sheets. The edge of the stack is engaged and guided by a side guide roller **70** rotatably supported on a vertical shaft **72** which is cantilevered upwardly from the table **10**.

The edges of the sheets in the stack rest on a lower guide roller **74** rotatably supported on a stud **76** projecting horizontally from an angle bracket **78** secured to the table **10**. Arranged to engage and press downwardly upon the upper surface of the stack directly above the lower guide roller **74** is an upper guide roller **80** which is rotatably mounted on a stud **82** projecting from one end of an angle arm **84** whose other end is supported for vertical movement in a reduced portion **72***a* at the upper end of the shaft **72** and which is pressed downwardly by coil springs **88** compressed between the upper surface of the angle arm and the lower surface of a spring plate **90** rigidly held against a shoulder **72***b* on the shaft **72** by the nut **92** threaded on its upper end **72***c*. Thus the edges of the sheets in the stack are squeezed together by the rollers **74** and **84** immediately prior to the application of the tape T to the edge of the stack.

As shown in FIGURE 4, the width of the tape T may exceed the thickness of the package, leaving upper and lower marginal portions of the tape projecting above and below the package. As the package continues to move through the machine, these marginal portions of the tape are folded around the upper and lower corners of the edge of the package by flared guide members (not shown) and then are pressed against the top and bottom of the package either by rollers or by spring-loaded presser members.

If desired, tape may be simultaneously applied to both longitudinal edges of the package by similar applicator means at opposite sides of the machine. Then, in another stage of the machine, the package may be conveyed in a direction perpendicular to its original path and tape applied to the two ends of the package by similar applicator mechanisms at opposite sides of the second stage.

The energization of the solenoid **38** is controlled by

adjustably positioned switches arranged to be actuated by the packages as they move through the machine. These switches may be so positioned that the solenoid is de-energized to initiate the feeding of the tape at such time that its leading edge falls in any desired relation to the leading end of the package, for example, so that the two exactly coincide, as shown in FIGURE 1. Likewise, the solenoid may be energized to cause the cutting of the tape T at such time that its trailing end falls in any desired relation to the trailing end of the package. For example, if desired the tape can be caused to overhang the side of the package at each end, and the projecting portions of the tape bent around the ends of the package by suitable tape-bending and pressing elements past which the package moves in its subsequent passage through the machine.

It will thus be appreciated that the invention provides a simple and practical means by which the aforementioned and other apparent desirable objectives are achieved. However, it should be emphasized that the particular embodiment which is described herein and shown in the accompanying drawings is intended as merely illustrative of the principles of the invention rather than as restrictive of its scope, which is limited only by the appended claims.

What is claimed is:

1. Apparatus for applying adhesive tape to a package being moved relatively thereto, said mechanism comprising a support member, tape supply means spaced from one side of said package, an applicator roller rotatably mounted on said support member in such position as to engage the outer surface of a length of tape extending from said tape supply means to the surface of said package, said support member being mounted for movement between a tape-applying position at which said applicator roller engages the outer surface of said tape and presses the gummed surface of said tape against the surface of said package and a retracted position at which said applicator roller is spaced from said package, allowing the movement of said package to pull said length of tape straighter, means for moving said support member between said tape-applying position and said retracted position, a reset arm, a reset roller rotatably mounted on said reset arm in position to engage the gummed surface of said tape between said applicator roller and said tape supply means, said reset arm being mounted for movement of said reset roller transversely of said length of tape, yieldable means urging said reset arm and reset roller to move in such direction as to bend said tape, the pressure of said yieldable means being overcome by the tension imposed on said tape as said package moves relative to said mechanism thus more nearly straightening said tape and allowing feeding of a short length of tape to said package without removal of tape from said supply means, a cutting knife mounted in such position as to engage the outer surface of the portion of said length of tape between said applicator roller and said package and cut said tape when said support member is moved to said retracted position and to be clear of said tape when said support member is in said tape-applying position.

2. Apparatus as claimed in claim **1** in which said support member is pivotally mounted and the means for moving said support member includes a spring urging said support member to swing toward said tape-applying position and power means acting against said spring to move said support member to said retracted position.

3. Apparatus as claimed in claim **2** in which said power means is controlled by switches actuated by the ends of the packages.

4. Apparatus as claimed in claim **2** in which said reset arm is pivotally mounted on said support member and said yieldable means comprises a second, weaker spring engaging said reset arm and said support member.

5. Apparatus as claimed in claim **1** wherein the spacing of said cutting knife from the portion of said appli-

cator roller which is tangential to said package is approximately equal to the distance by which the leading cut end of said tape is pulled backwardly by said reset roller in bending said tape around said applicator roller so that after said tape has thus been pulled backwardly, said leading cut end is approximately at such tangential position in position to be applied to said package when said support member moves back to said tape-applying position.

6. Apparatus as claimed in claim 5 in which the length of tape which is initially fed to said package by movement of said reset roller against said yieldable means is

sufficient so that the adhesion between said length of tape and the moving package to which it is applied is sufficient to impose on said tape enough tension to overcome the resistance of said tape supply means and cause feeding of tape therefrom.

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BERNARD STICKNEY, *Primary Examiner.*