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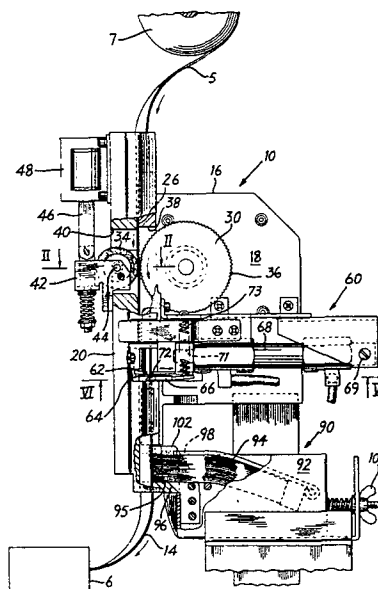
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Method and apparatus for feeding tape to a carton sealing operation.

Adhesive faced tape employed in a carton sealing operation is fed through apparatus in which the tape is held distended in an arcuate shape to facilitate feed, severing and adhesive activating of same without hazard of wrinkling, pleating or otherwise undesirably causing folds in the tape to thereby ensure that a smooth, properly activated adhesive continuing length of such tape is fed to the carton sealing operation.



EP 0 031 585 A2

METHOD AND APPARATUS FOR FEEDING TAPE TO A CARTON
SEALING OPERATIONBACKGROUND OF THE INVENTION

Various means and apparatus are known for use in the
5 sealing of cartons, i.e., applying sealing tape to seal closure
flaps to the carton main body. Representative of apparatus which
can be employed for sealing filled cartons by applying sealing tape
along expanses thereof to tightly seal closure carton flaps to the
main carton body are described in, for example, U.S. Patents Nos.
10 3,461,020 and 4,039,367. It has been found that when employing an
adhesive tape which is of relatively thick character and where the
same has an activatable adhesive on one face thereof, difficulties
can be encountered in the ultimate secure adhesion of the tape to
the carton surfaces. To offset or overcome this difficulty, it is
15 known to use relatively thin tape of somewhat flimsy paper con-
struction carrying an adhesive coating on one face thereof, rep-
resentative of such tapes being those known commonly in the art as
sixty-pound and thirty-five pound paper tapes. A difficulty with
using the lighter or flimsy paper tape stems from the operation of
20 feeding the same through an adhesive-activating unit wherein it is
also common to sever the tape into finite lengths commensurate for
the length of cartons involved. Such flimsy paper tape has a
tendency to wrinkle during its passage through known tape feeding
mechanisms leading to jams as well as failure to properly activate
25 the adhesive face of the tape in the manner required.

The present invention overcomes the foregoing described
difficulties in providing for the utilization of lightweight or
flimsy paper-type tapes carrying an adhesive-coated layer on one
face thereof by allowing for activation of the adhesive while at
30 the same time ensuring smooth and unimpeded transport of the tape
through the tape feeding mechanism immediately prior to the carton
sealing unit at which a finite length of tape is actually secured

1 to the carton to effect closure of same.

SUMMARY OF THE INVENTION

5 The present invention provides a method and apparatus for feeding lengths of carton sealing tape, e.g., tapes of the "flimsy" paper type as well as other heavier tape types to a carton sealing operation. In accordance with the present invention, sealing tape which has an uncoated back side and an activatable adhesive layer on the front side thereof, is fed from a continuous supply thereof, 10 such as a roll of such tape, along a predetermined travel course. Depending on the particular carton sealing apparatus employed, such travel course may involve a number of alterations in the tape travel direction, but at least a segment of such travel course is required to be in a straight line path. While the tape is transit- 15 ing the straight line travel path, the same is distended into an arcuate shape condition so that the major portion of the tape extends laterally of the straight line travel path and also such that the adhesive carrying front side is disposed in a concave disposition. While the tape is in its distended condition and at a 20 location a distance in advance of the end of the straight line travel path, that is, intermediate the ends of the straight line travel path, the tape is severed with a cutting action directed crosswise of the tape travel path to provide a finite length section of the tape. Further, and while the tape is still in its 25 distended condition, the adhesive on the front side of the tape length is activated by passing the said front side in contact with an activating unit. In connection with the utilization of tape embodying a water-activated adhesive therein, the same can be 30 activated with a brush unit that engages against the front side of the face to moisten the adhesive layer.

1 The apparatus provided by the present invention includes
an elongated housing which is provided with a tape feed through
2 passage generally extending from one end of the housing to the
other, the housing passage being provided in arcuate shape form so
5 that the travel of the tape through the passage will cause it to
assume a distended condition. This distended condition of the tape
in effect increases the section modulus of the same thereby stiffen-
ing same and reducing, if not completely eliminating, the tendency
of the tape to fold along its longitudinal axis. This is parti-
10 cularly important inasmuch as flimsy tape of the sixty-pound or
lighter paper weight type is readily susceptible to folding into a
number of pleats along its longitudinal axis when the same is fed
in a purely flat condition through a tape feeding mechanism or
adhesive actuating component.

15 Means are provided in the housing to effect feed of the
tape therethrough and such means conveniently can be provided in
the form of a drive roller and a companion friction roller unit,
each of which is disposed in the housing such that during their
rotation, peripheral portions thereof extend into the housing
20 passage to engage the tape and thereby feed same through the
housing. Inasmuch as the feeding of the tape through the feeding
mechanism involves supplying a continuous length feed thereof
to the feed mechanism and since a finite length section thereof
only should be provided to the carton sealing operation, means are
25 provided in the housing to sever the tape at a predetermined time
and thus provide a finite length section of the same. The severing
means can be provided in the form of movable and fixed knife
members disposed within the housing at a location intermediate the
ends of the passageway, with the movable knife being stroked in
30 timed relationship to bring its cutting edge in a cutting traveling

1 course across a cutting or anvil edge on the fixed knife component
to thereby sever the tape. The movable knife may be provided with
a substantially straight line cutting edge, whereas, it is advant-
5 ageous to provide the fixed knife with an arcuate profile corres-
ponding to the shape of the passage in the housing and thereby
providing that the tape is severed at its marginal portions first
and then inwardly along a cutting line progressively directed
towards the longitudinal centerline of the tape, the tape remaining
10 in its distended condition during the time same is being severed.
Immediately downstream of the point at which the tape is cut, i.e.,
adjacent the exit end of the housing passage, there is provided
adhesive activating means in the form of a brush disposed in a pot
member, the tip ends of the bristles of the brush being disposed in
15 the passageway and the pot functioning as a reservoir for holding
the activating agent, i.e., water.

The invention accordingly comprises the features of
construction, combination of elements, arrangement of parts and
steps of assembly which will be exemplified in the construction and
method herein set forth and the scope of the invention will be
20 indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

A fuller understanding of the nature and objects of the
invention will be had from the following detailed description taken
25 in conjunction with the accompanying drawings in which:

FIGURE 1 is a side elevational view of the tape feeding
apparatus of the present invention.

FIGURE 2 is a sectional view on enlarged scale as taken
along the line II-II of FIGURE 1 and illustrating the arcuate
30 cross-section shape of the through passage in the housing and the

1 manner in which the feed and friction rollers engage the tape
present in the passageway to drive same through the apparatus.

FIGURE 3 is an end elevational view of the apparatus as
viewed from the left end in FIGURE 1.

5 FIGURE 4 is a top plan view of the apparatus shown in
FIGURE 1.

FIGURE 5 is a perspective view of the adhesive activating
unit disposed at the lower end of the housing.

10 FIGURE 6 is a plan view in section depicting the cutting
action of the cutting knife unit employed to progressively sever
the tape into a finite length section, the cutting action being
directed from the marginal portions of the tape inwardly towards
the longitudinal centerline thereof.

15 Throughout the following description, like numerals are
used to denote like parts in the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

20 With reference now to FIGURE 1, there is depicted therein
the manner in which carton sealing tape 5 is fed to a carton
sealing operation in accordance with the present invention and
employing the apparatus of the invention. A continuous length of
tape off-feeds from a suitable roll stock 7 thereof and is directed
in a predetermined travel course which includes transit through the
apparatus 10 and more particularly through a passage 12 (FIGURE 2)
25 in the apparatus, with a sectioned length 14 of tape exiting from
the bottom of the apparatus 10 and being delivered to a tape
applying and wipe down unit 6 depicted schematically, such unit for
example being of the type shown in U.S. Patent No. 3,461,021 which
unit applies tape to carton end walls and upper and/or lower wall
30 surfaces in the manner best shown in FIGURES 9-12 of said patent.

1 The apparatus 10 includes a housing 16 which housing
includes a main housing part generally denoted at 18 and a door
part 20 hingedly connected to the main housing part as at 22 and 24
(FIGURE 3) the door being shown in closed position in FIGURE 1 and
5 in its open position in FIGURE 5. The main housing part 18 has a
front wall 26 which is of convex arcuate configuration and which
defines one wide boundary of the tape feed through passage 12
formed in the housing, the other boundary of such passage being
defined by the concave arcuate shaped face 28 of the door 20 and
10 which juxtaposes spacedly from the front wall 26 of housing part 18
when the door 20 is closed. The passageway 12 thus formed in the
housing is as indicated of arcuate profile and extends fully
through the housing from the upper to lower ends thereof along a
substantially straight line course providing that the continuous
15 length of tape entering the housing transits such a straight line
travel course but is held in a distended condition in which it is
arcuately curved outwardly from the straight line travel course and
most readily discerned with reference to FIGURE 2.

By thus distending the tape, the travelling mass thereof
20 is rigidified, it being believed that by thus enhancing the section
modules, the tape is more readily and conveniently severed as well
as fed through the housing without hazard that the same will be
caused to become wrinkled or accordion folded along its longi-
tudinal length which condition could lead to jamming of the appar-
25 atus as well as failure to properly activate the adhesive face
thereof.

The feeding of the tape through the housing 16 is ac-
complished by means of a feed roller 30 rotatable about a fixed
axis in the housing main part 18 and driven by a motor 32 (FIGURE
30 2), and a complementary or friction roller 34. The feed roller,

which has a knurled peripheral surface as at 36 is, as noted,
mounted in the main housing part, whereas, friction roller 34 is
mounted on the door part 20 and the two have when the door is
closed a peripheral rotary travel course such that each extends a
5 distance into the passage 12 to engage the tape 5 and thus feed
same through the housing. Both the housing wall 26 and door part
20 are slotted as at 38, 40 respectively to accommodate the roll-
ers.

The friction roller 34 is carried on a mounting member 42,
10 on the door 20, which mounting member in turn is pivoted as at 44
to the door structure. Thus, the friction roller can be moved into
and out of contact with the tape. To actuate or oscillate the
friction roller 34 between engage and non-engaged positions with
the tape, the mounting member 42 is connected to the armature 46 of
15 a solenoid unit 48, the operation of the solenoid oscillating the
mounting member 44 to thereby move the friction roller into and
out of contact with the tape. It will be appreciated that since
ultimately a finite length section of tape must be delivered to the
tape applying and wipe down unit, at a particular and appropriate
20 time the friction roller will be disengaged by action of the
solenoid so that the rotation of the feed roller 30 alone will be
insufficient to drive tape through the housing. A short time
thereafter the severing of the continuous length of tape to provide
the finite section length occurs.

25 Disposed just below the feed and friction rollers 30, 34
is a cutting knife unit generally denominated at 60 which unit is
used to effect severing of the tape. The knife unit comprises a
fixed knife member 62 carried in the door part 20 and provided with
an arcuate shape in correspondence to the arcuate shape of the
30 passageway 12 and provided further with a cutting edge part 64

1 (FIGURE 1). A movable knife member 66 is carried in the main
housing part 18 and is operated or reciprocated by a fluid
actuated cylinder unit 68, the latter being pivoted in the housing
part 18 as at 69, the movable knife being fixed to the rod 71 of
5 the cylinder. As can be seen in FIGURE 6, the action of the
cutting knife unit is such as to effect a cutting of the distended
tape first at the marginal portions thereof with such cutting
action being continued progressively towards the longitudinal
centerline of the tape. The movable knife member 66 which moves
10 in generally straight line has, for a substantial portion of
its expanse, a straight line cutting edge section of slightly
bowed profile as at 70. The marginal extremities of the movable
knife at its front or cutting edge part are formed in the manner
of forwardly and downwardly sloping lugs 72. Further compression
15 springs 73 carried in housing part 18 are connected to the broad
blade structure of knife 66 and tend to pull the knife 66 upwardly.
This is provided so that the door 20 can be closed against the front
wall 26 without hazard that the fixed knife 62 carried on the door
would jam against the movable knife 66 and prevent complete door
20 closure. Thus as the door is closed, the movable knife cutting
edge 64 engages against lugs 72 and forces them and hence the
movable knife downward slightly to allow for full door closure
clearance and into proper cutting edge relationship with the fixed
knife member 62.

25 As will be noted in FIGURE 1, the front wall 26 of the
housing main part 18 and the door part 20 are slotted as at 80 to
accommodate passage of the movable knife therethrough.

30 Disposed immediately below the cutting knife unit 60 and
adjacent the lower terminal end of the housing passage straight
section is the adhesive activating means 90 the activating means

1 assembly being shown in FIGURE 6. It will be understood that the
tape passing through the feed apparatus is one which requires
application of an activating agent to the adhesive layer mounted on
the front face of the tape, the front face of the tape being that
5 lying immediate the front wall of the housing main section, whereas,
the rear face of the tape is juxtaposed with the wall face of the
door part 20. In the instance where the adhesive is a water-
activated one, the activating means comprises a pot 92 functioning
as a reservoir to hold a quantity of water. Disposed within the
10 pot and arranged at an inclination upwardly from the bottom thereof
is a brush unit 94 provided with bristles the tip ends of which are
disposed in the passageway 12 and conform in arcuate profile there
with. There can also be located in the pot 92, a brush comb
15 assembly 95 comprised of a plurality of spaced and vertically
oriented plates 96 which extend between the bristles of the brush
so as to define a plurality of bundles of bristles. The plates
function to rigidize the bristles to prevent deflection of same and
ensure firm contact of the tip ends thereof with the adhesive face
of the tape. There is also provided on top of the comb 95, a comb
20 guard 98 which is slotted as at 102 so that same may embracingly
gird the comb plates 26. The positioning of the brush unit 94 can
be altered to ensure proper application of water to the adhesive
face of the tape by means of adjusting screw 104 which moves the
brush toward and away from the passageway 12. Following the sever-
25 ing of the finite length section of tape and moisturizing of the
adhesive layer thereon, the tape length feeds into the tape ap-
plying and wipe down unit 6 in a manner well understood by those
skilled in the art and in which the tape length is applied and
rolled onto a carton for sealing same.

While there is above disclosed only certain embodiments of the method and apparatus of the present invention, it will be appreciated that variations therein can be effected without departing from the scope of the inventive concept herein disclosed.

5 For example, the brush comb assembly 95, plates 96 and comb guard 98 can be dispensed with without altering the effectiveness of the brush bristle tip ends with the adhesive face of the tape inasmuch as the arcuate profiling of the tip ends to conform with that of the distended tape eliminates any tendency of the bristles to spread. Further, it will be appreciated that the apparatus depicted is intended for use in conjunction with a tape applying and wipe down unit associated with applying tape to the tops of cartons. Apparatus for use with tape applying and wipe down units for applying tape to the bottoms of cartons would be identical 15 with that disclosed except the components would be arranged in a reversed orientation, i.e., the tape would feed from bottom to top, the feed and friction rollers would be at the bottom of the apparatus and the adhesive activator at the top.

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WHAT IS CLAIMED IS:

1. A method for feeding lengths of carton sealing tape to a carton sealing operation, the sealing tape having an uncoated back side and an activatable adhesive layer on the front side thereof, said method comprising

5 feeding the tape from a continuous supply thereof along a predetermined travel course, at least a segment of said travel course being a straight line path,

10 distending said tape while it is traveling in said straight line path into an arcuate shape condition extending laterally of said straight line travel path with the adhesive carrying front side thereof in concave disposition,

15 severing said tape while it is in distended condition and at a location a distance in advance of the end of said straight line travel path to provide a finite length of such tape, and

activating the adhesive on said tape length while it is in distended condition and at a location immediately adjacent the end of said straight line travel path.

2. The method of claim 1 in which the tape is severed with a cutting action initiated at the marginal edges thereof and directed progressively in the direction of the longitudinal centerline of said tape.

3. The method of claim 1 in which the tape activatable adhesive is a water-activatable type activated by applying water thereto.

4. Apparatus for feeding lengths of carton sealing tape to a carton sealing operation, the sealing tape having an uncoated back side and an activatable adhesive layer on the front side thereof, said apparatus comprising

a continuous length supply of tape,

a housing, said housing having a tape feed through passage therein, said passage extending in a substantially straight line tape travel course from point to entry of tape thereto to exit therefrom, said passage having an arcuate-shaped cross-section whereby during travel of the tape through said passage it is distended laterally of the straight line travel course,

means carried in said housing for feeding the tape through said passage with the adhesive carrying front face thereof in concave disposition,

means disposed in said housing intermediate the ends of said passage for severing said tape to provide a finite length of such tape, and

means disposed in said housing adjacent the exit end of said passage for activating the adhesive on said tape length.

5. The apparatus of claim 4 in which the means for feeding tape through said passage comprises a drive roller rotatable about a fixed axis, the periphery of said drive roller traversing a rotary travel path a portion of which passes through said passage for drivably engaging the tape in said passage.

6. The apparatus of claim 4 in which said drive roller is disposed at one side of said passage for engaging the front side of said tape, said apparatus further comprising a friction roller carried in said housing at the other side of said passage for engaging the rear side of said tape, there being means connected with said friction roller for selectively moving it into and withdrawing it from a position wherein the rotary travel path of the periphery thereof passes through said passage and in engagement with the tape in said passage.

7. The apparatus of claim 6 in which said friction roller is rotatably carried in a mounting member, said mounting member being pivoted to said housing, said friction roller selective movement means comprising a power-operated device connected to said mounting member for oscillating same and thereby moving said friction roller into and out of contact with said tape.

8. The apparatus of claim 7 in which said power-operated device is an electrically-operated solenoid.

9. The apparatus of claim 4 in which said severing means comprises a knife unit carried in said housing, said knife unit including a movable knife member supported for generally straightline sliding movement crosswise of the tape travel in said housing passage to effect cutting of said tape.

10. The apparatus of claim 9 further comprising means for reciprocating said movable knife member in said housing between cutting and non-cutting positions.

11. The apparatus of claim 10 in which said reciprocating means comprises a fluid operated cylinder unit.

12. The apparatus of claim 10 in which said movable knife member in a non-cutting position is located in said housing remote from and facing the front side of said tape, and said knife unit further comprises a fixed knife member located in said housing at the rear side of said tape, said movable knife member in moving from non-cutting to cutting position passing closely adjacent said fixed knife member to cooperate therewith in effecting severing of the tape.

13. The apparatus of claim 12 in which said movable knife member has a substantially straight main cutting edge section, and a slightly bowed main body part.

14. The apparatus of claim 13 in which said fixed knife member has a cutting edge following a course conformable with that of the arcuate cross-section of said housing passage.

5 15. The apparatus of claim 4 in which the activatable adhesive on said tape is a water-activatable type, the means for activating same comprising a brush, the tip ends of the brush bristles extending into said passage, and a pot in said housing receiving said brush and defining a reservoir for water.

10 16. The apparatus of claim 15 in which the bristle tip ends of said brush follow a course in correspondence to the profile of said housing passage.

15 17. The apparatus of claim 15 in which said brush pot is movably mounted on said housing, there being means for adjustably positioning said pot closer to and further away from said passage to correspondingly alter the extent to which the tip ends of the bristles extend into said passage.

20 18. The apparatus of claim 12 in which said housing includes a main housing part, said main housing part having a front wall of convex arcuate profile defining one wide boundary of said passage, and a door hinged at one side of said main housing part front wall and closeable thereagainst, said door having a concave arcuate profile at the side thereof which spacedly juxtaposes with said main section front wall when the door is closed to define the other wide boundary of said passage.

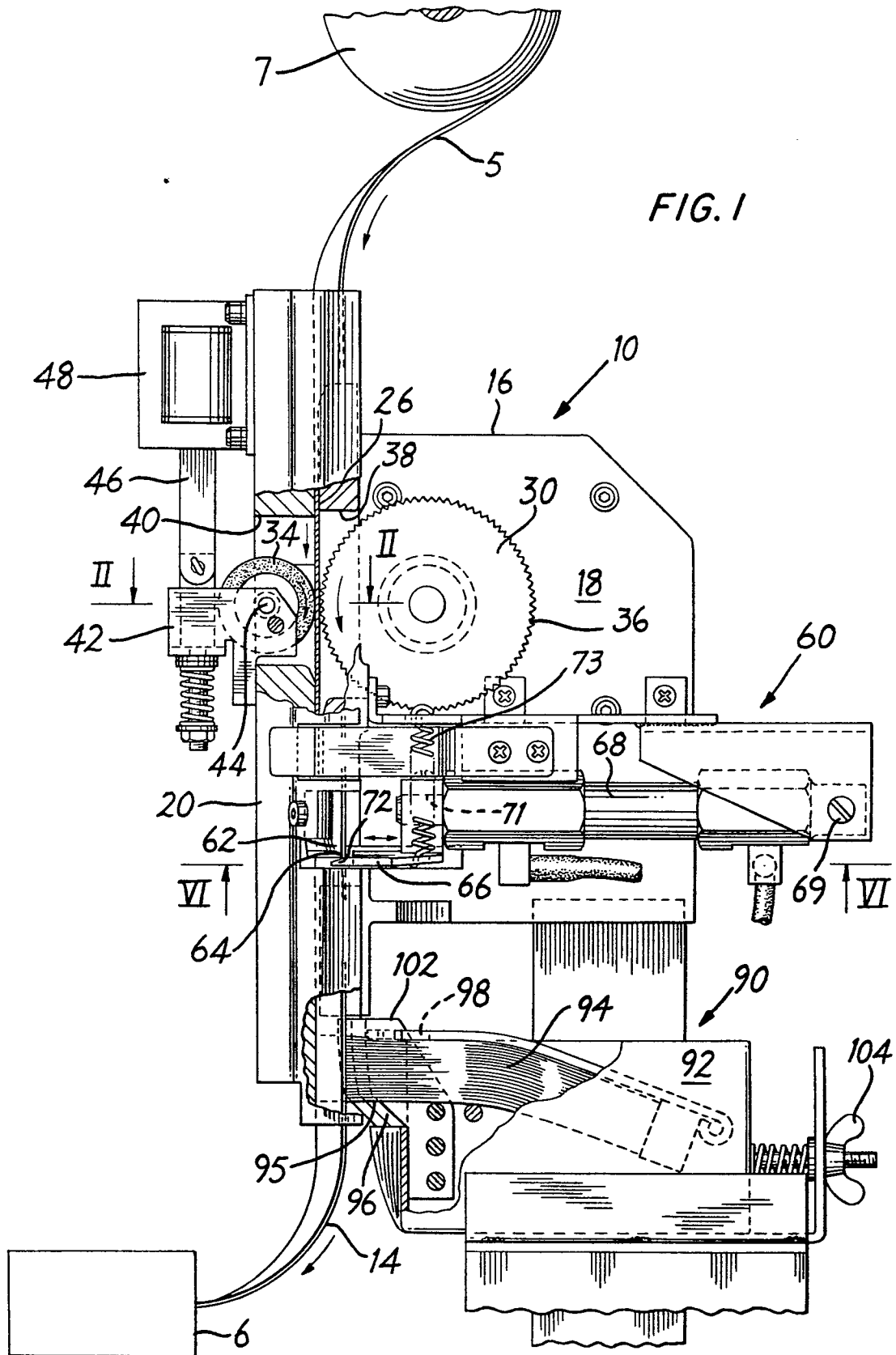
25 19. The apparatus of claim 18 in which said movable knife member and the adhesive activating means are carried in said main housing part, and said fixed knife member is carried on said door.

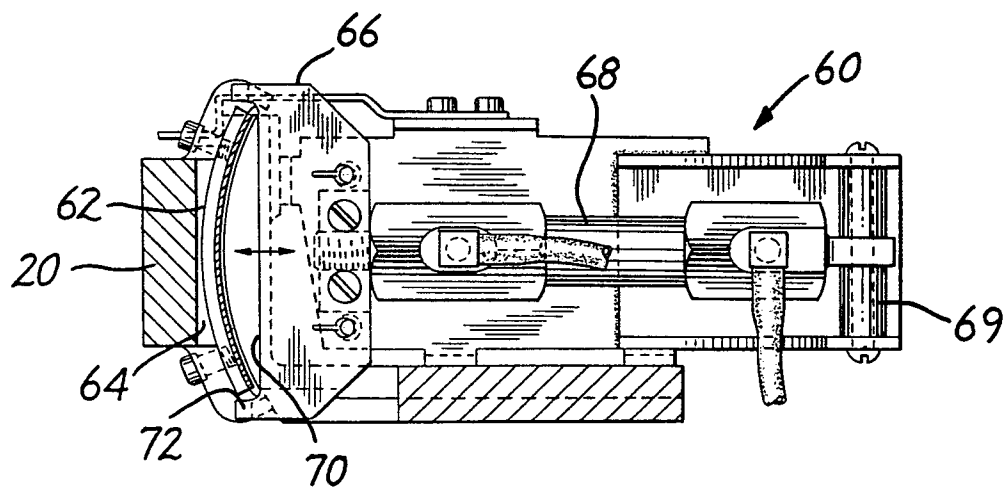
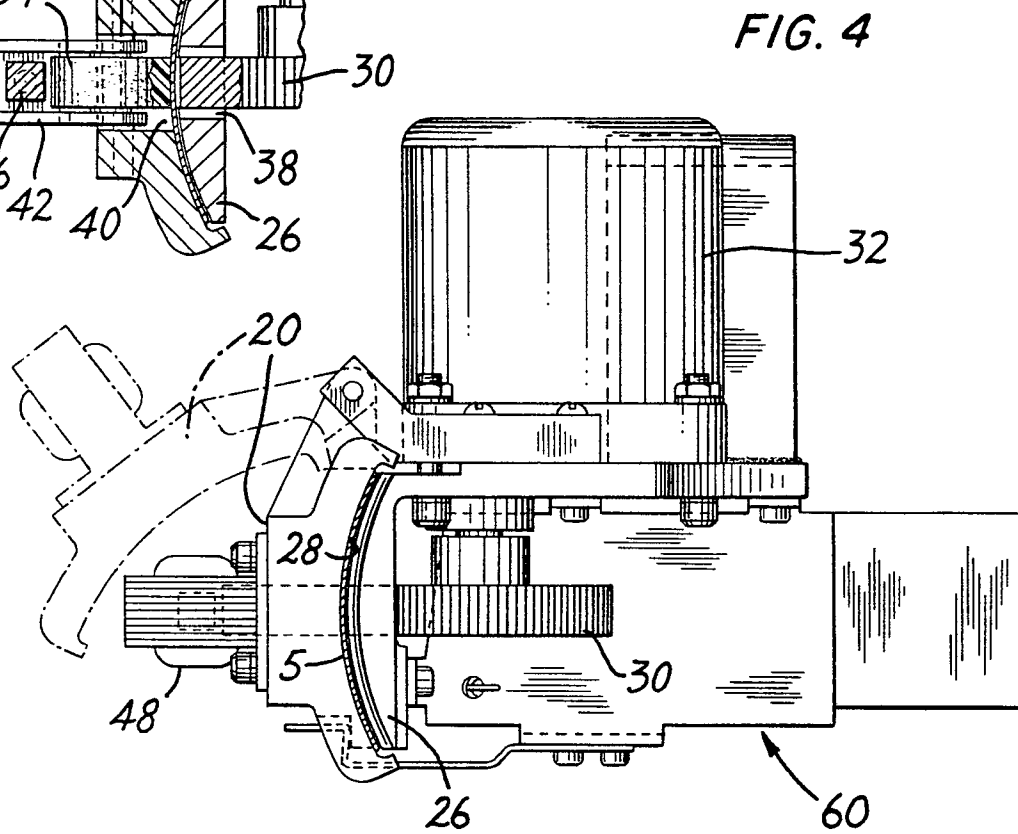
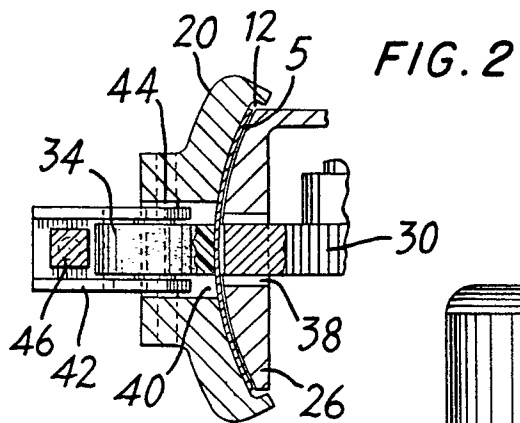
20. The apparatus of claim 19 in which said tape feeding means comprises a drive roller carried in said housing and a friction roller carried on said door, both said rollers extending into said passage for drivably engaging said tape.

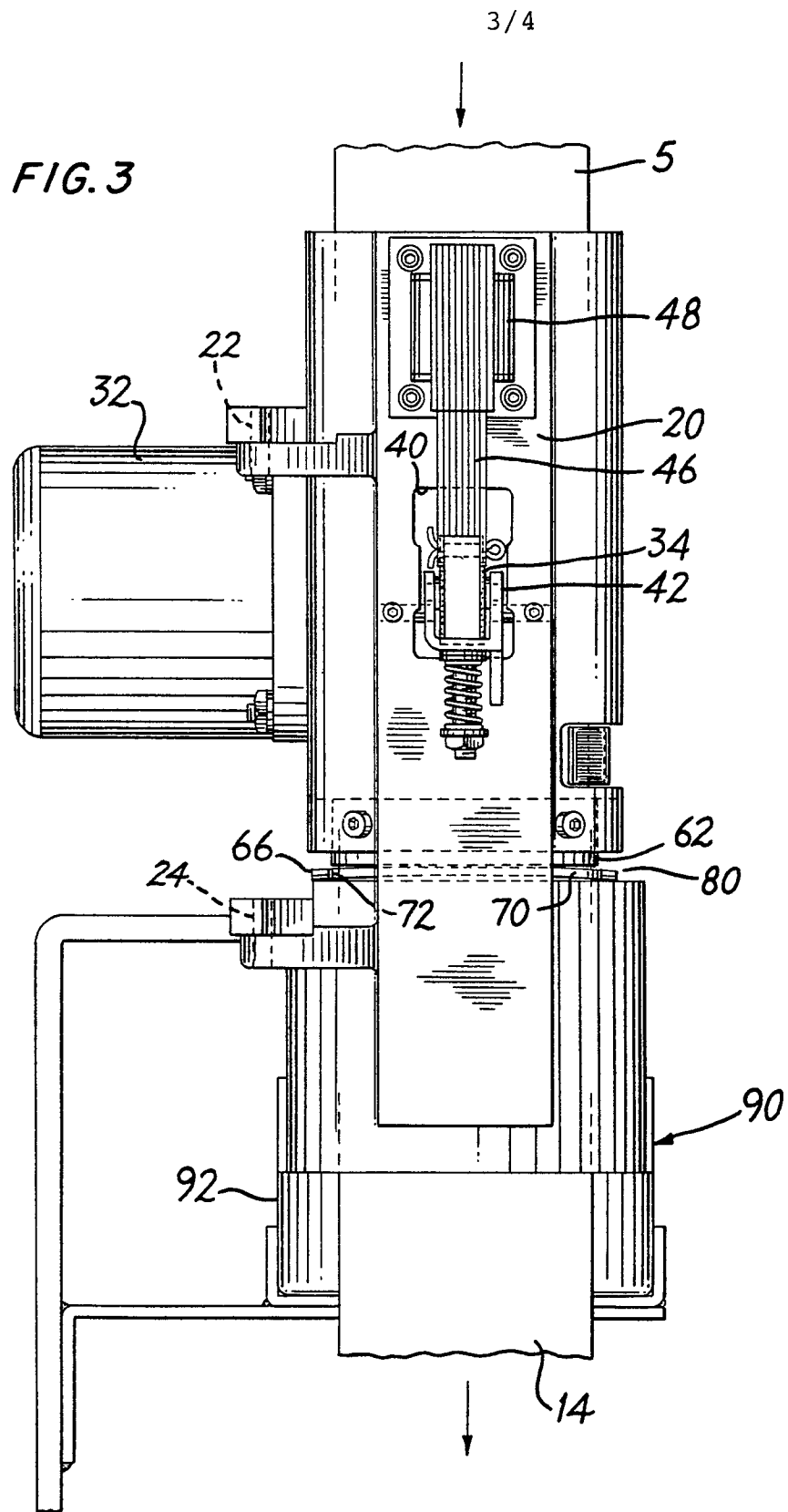
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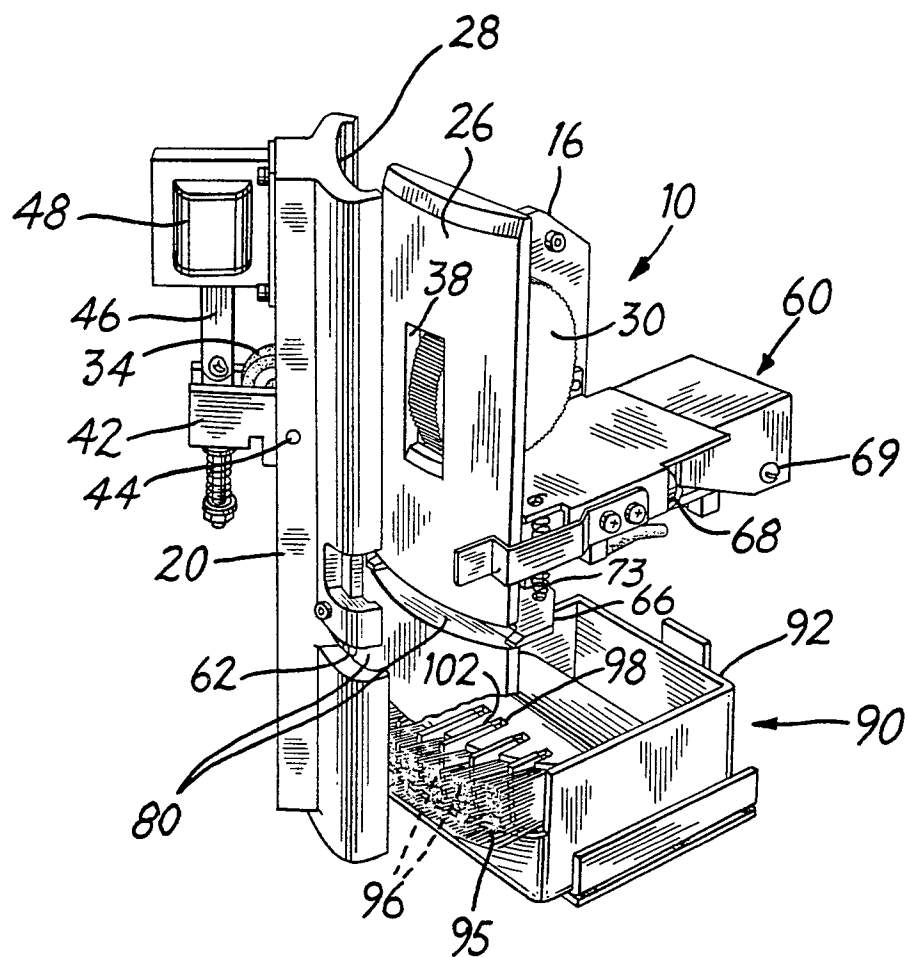
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21. The apparatus of claim 18 further comprising biasing means applying an upwardly directed force to said movable knife member, said movable knife member having a straight cutting edge the terminus portion of which extend frontally and downwardly relatively of said straight part, the fixed knife member engaging said terminus portions to yieldably displace said movable knife downwardly counter to said bias means when said door is closed to thereby fix the cutting edge relationship between said fixed and movable knives.







**FIG. 5**