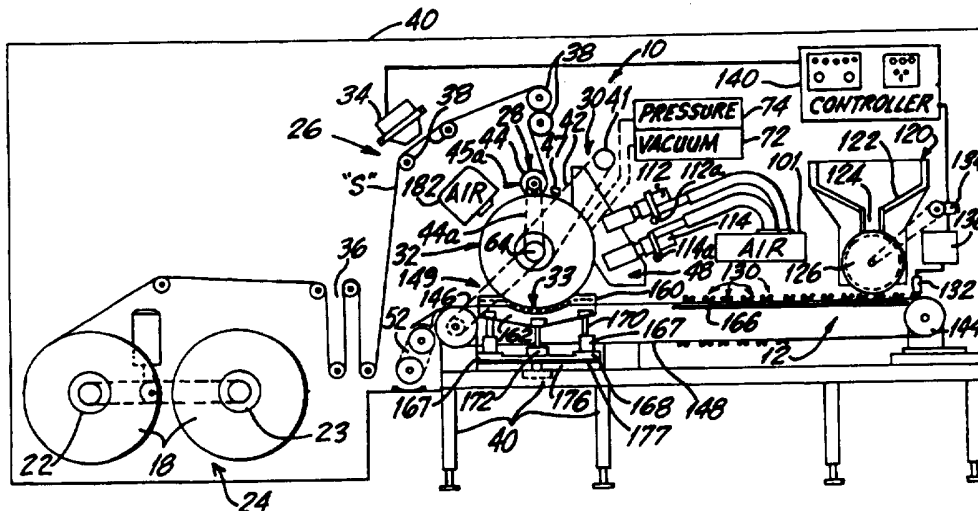




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : B65C 9/18, 9/24	A2	(11) International Publication Number: WO 96/15943 (43) International Publication Date: 30 May 1996 (30.05.96)								
<p>(21) International Application Number: PCT/US95/15379</p> <p>(22) International Filing Date: 20 November 1995 (20.11.95)</p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>08/342,780</td> <td>21 November 1994 (21.11.94)</td> <td>US</td> </tr> <tr> <td>08/427,289</td> <td>21 April 1995 (21.04.95)</td> <td>US</td> </tr> <tr> <td>08/551,986</td> <td>2 November 1995 (02.11.95)</td> <td>US</td> </tr> </table> <p>(71) Applicant: CMS GILBRETH PACKAGING SYSTEMS, INC. [US/US]; Suite 219, 8 Neshaminy Interplex, Trevese, PA 19053 (US).</p> <p>(72) Inventors: RELLO, Robert, M.; 5966 Ash Court, Slatington, PA 18080 (US). YAGER, Michael; 173 East Overbrook Road, Shaver, PA 18708 (US). MARTINEZ, Ramon, A.; Marion Terrace, 3 Academy Road, Wilkes-Barre, PA 18702 (US).</p> <p>(74) Agents: MARCUS, Harry, C. et al.; Morgan & Finnegan, L.L.P., 345 Park Avenue, New York, NY 10154 (US).</p>	08/342,780	21 November 1994 (21.11.94)	US	08/427,289	21 April 1995 (21.04.95)	US	08/551,986	2 November 1995 (02.11.95)	US	<p>(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).</p> <p>Published Without international search report and to be republished upon receipt of that report.</p>
08/342,780	21 November 1994 (21.11.94)	US								
08/427,289	21 April 1995 (21.04.95)	US								
08/551,986	2 November 1995 (02.11.95)	US								

(54) Title: METHOD AND APPARATUS FOR WRAPPING CYLINDRICAL ARTICLES WITH HOT MELT ADHESIVE BACKED LABEL



(57) Abstract

A method and apparatus is disclosed for applying a label onto a substantially cylindrical article by using a bottom feed conveyor unit (12). The label drum (32) defines an article wrapping position at a lower portion of the label drum. A thin layer, heat activated adhesive backed label (5) is fed onto the surface of the drum so that the adhesive back faces outward from the drum. The label drum is rotated to move the label retained thereon into the article wrapping position. As the label is moved, the adhesive is heated so that the adhesive obtains a sufficient temperature to melt. A cylindrical article (A) is conveyed substantially horizontally along a conveyor into the article wrapping position and into rotative engagement with the label retained on the label drum so as to transfer the label onto the cylindrical article by wrap-around labeling. In one embodiment, the articles such as crayons are tapered and the crayons are fed so that a different end-to-end pressure against the label is maintained relative to the leading edge of the label to ensure end-to-end alignment of the label on the crayon.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

° **METHOD AND APPARATUS FOR WRAPPING CYLINDRICAL
ARTICLES WITH HOT MELT ADHESIVE BACKED LABEL**

FIELD OF THE INVENTION

 This invention relates to a method and apparatus for
applying a label to a cylindrical article such as a crayon
5 with a heat activated adhesive backed label, and which in-
cludes in one embodiment a bottom feed conveying unit.

BACKGROUND OF THE INVENTION

10 Many millions of crayons and other similar articles are
sold throughout the world by different vendors in
competition with each other. Increases in the number of
articles which are to be produced per minute, reduction in
costs, and increased efficiency are necessary and desirable
in this competitive global market.

15 Crayons are typically made from a soft material such as
paraffin wax, which is impermeable to moisture but sometimes
difficult to wrap with a label because the crayon's surface
is slick, making adhesive adherence difficult. Also,
crayons and other similar articles are sometimes tapered
20 about 0.005 to 0.010 inches over their two to four inch
length. This taper makes application of a label to the
crayon even more difficult because the label ends often will
not align together due to the taper.

25 In one prior art method, a precut label having an inex-
pensive flour based adhesive on one side thereof is placed
over a slot. The crayon is laid on the label and pushed
into the slot. The label is bent around the crayon and then
the crayon is rolled at least about one revolution to wrap
the label about the crayon. The crayon and moist adhesive
30 must then be allowed to dry. Typically, the machines used
for labelling these crayons in accordance with this prior
art method produce about 180 crayons a minute.

35 Because of increased competition and the concomitant
necessity to increase production and reduce costs, it is
desirable to increase labeling speeds of crayons and other

similar articles to at least about 500 to 600 pieces per
minute. Glue-solvent technology offers some possibilities
for increasing labelling speeds. However, this technology
is not as desirable because the solvents used in such large
production runs are environmentally undesirable and may not
work with wax-like crayons and other similar articles where
a large adhesive label surface is required.

In one aspect of the invention an apparatus and method
applies a label onto a substantially cylindrical article
using a label drum to feed labels to an article wrapping
position where cylindrical articles are labeled. A thin
layer heat activated adhesive backed label is fed onto the
surface of the label drum so that the adhesive back faces
outward from the drum. The adhesive is heated as the drum
rotates so that the adhesive obtains a sufficient
temperature to melt.

Substantially cylindrical articles, such as crayons,
are conveyed from a hopper and chute located at the top
portion of the label drum into a serpentine track, and then
into a star wheel transfer assembly which rotates and guides
the crayons onto the surface of the label drum. The label
film is fed through a dancer and feed roll assembly and then
fed to the bottom portion of the label drum into a cutting
roll assembly where the film is cut and transported as cut
labels onto the drum. As the drum rotates, labels move
upward into an article wrapping position located at the top
portion of the label drum at the point where the articles
are discharged from the serpentine track and star wheel
transfer assembly.

It has been found that during high production speeds
when many crayons are labeled, an operator has trouble
visually inspecting the articles fed from the hopper,
through the serpentine track and into the star wheel
transfer assembly. Additionally, the article feed mechanism
in one aspect of the present invention has many different
transfer points such as from the hopper into the serpentine
track and to the star wheels. These transfer points may

create bottlenecks during high production speeds. It would
be desirable if an article feed system could be used which
facilitates operator inspection, such as a conveyor unit
oriented near the bottom of the label drum and has fewer
transfer points, such as a straight linear track, as
compared to a system using a large number of transfer
points. Fewer transfer points would also allow greater
control over article feed and simplify delivery. It would
also be desirable to have a bottom feed unit where the taper
of articles can be compensated.

10

SUMMARY OF THE INVENTION

15

20

In accordance with the present invention, an apparatus
applies a label to a substantially cylindrical article such
as a crayon and has a label drum which is rotated by a main
drive mechanism. A label feed mechanism includes a cutting
drum and feeds a thin layer, heat activated adhesive backed
strip of label material onto the surface of the cutting
drum, which cuts the strip into label segments and feeds
them onto the label drum so that the adhesive back faces
outward from the drum. The adhesive is heated as the label
drum rotates so that the adhesive obtains a sufficient
temperature to melt.

25

30

Substantially cylindrical articles such as tapered
crayons are conveyed into tangential spinning engagement
with the drum and into rotative engagement with the leading
edge of the label as the label moves into an article
wrapping position so that the label wraps about the crayon
and adheres thereto. In one aspect of the invention, the
cylindrical articles, i.e. crayons, are about two to four
inches long and tapered along their length by about 0.005 to
0.010 inches.

35

The articles are conveyed into tangential spinning en-
gagement with the drum and into engagement with the leading
edge of a label at a skewed angle so that the label wraps
about the tapered article with end-to-end alignment thereof.
As the article is conveyed onto the drum, the wider "butt"

end of the article engages the leading edge of the label
before the more narrow end. A star wheel transfer assembly
can be used to convey the articles onto the drum surface.
The articles are held in article holding notches of the
starwheel in a skewed configuration.

The label drum in one aspect of the present invention
includes orifices located at an area of the drum surface
where a label is positioned. Vacuum is drawn through the
orifices for retaining the label on the drum surface as the
drum rotates. Air is then blown through the orifices
underlying the leading edge of the label to blow the leading
edge of the label onto the article at the article wrapping
position.

A heat source initially heats the adhesive and ensures
that the hot melt adhesive has obtained a sufficient
temperature to melt so that it adheres to the cylindrical
article and to the label overlap when wrapped. The articles
can be a wide variety of different articles such as a wax
crayon. When crayons are used, the hot melt adhesive layer
positioned on the label is about 0.0005-0.001 inches thick.
It has been found that a low temperature hot melt adhesive
having a melting range of about 140 to about 170 degrees
Fahrenheit is sufficient for use with the invention.
Typical adhesives could include Findley Adhesives Inc. 300-
634 and H.B. Fuller Company HM-0727 hot melt adhesives.

In another aspect of the invention, pressure is
imparted onto the article as it is wrapped. A pressure
plate is positioned adjacent the article wrapping position
and it is biased into engagement with the article. The
camber of the pressure plate is varied relative to any
articles conveyed on the surface of the drums so as to
impart a side-by-side differential pressure against an
article during labelling to ensure end-to-end label
alignment over the article. Also, the pressure plate is
adjustable for varying the wrapping pressure of the label on
the article.

° A preferred crayon formed by this process of the present invention includes a cylindrical crayon body that is tapered along its length having a butt end with a diameter that is at least about 0.005 inches larger than its opposing end. The hot melt adhesive backed label is wrapped circumferentially about the crayon body. The label has leading and trailing edges and the leading edge is applied onto the crayon body at a skewed angle relative to the longitudinal axis of the body so that the label is wrapped circumferentially about the crayon body with end-to-end label alignment. The adhesive adheres the label to the crayon body and to the label overlap. Rotation under the pressure pad after wrapping of the label cools the adhesive.

In yet another aspect of the invention, the apparatus includes a label drum which defines an article wrapping position at the lower portion of the drum. A label feed mechanism feeds a thin layer, heat activated adhesive backed label onto the surface of the drum so that the adhesive back faces outward from the drum. The drum is rotated to move the label retained thereon into the article wrapping position.

A hot blower heats the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt. Cylindrical articles are conveyed substantially horizontally along a predetermined path of travel defined by a conveyor and into the article wrapping position located at the bottom portion of the label drum and into rotative engagement with the label retained on the label drum so as to transfer the label onto the cylindrical article by wrap-around labelling. The article is conveyed along a substantially arcuate path around the lower portion of the label drum and into engagement with the label.

In another aspect of the invention, the labels are fed from a position located adjacent the upper portion of the label drum. The label feed mechanism includes a label strip feeder and a label strip cutter for cutting the strip of label material into rectangular sized labels, and a

mechanism for feeding the cut labels onto the surface of the drum.

The conveyance system includes a horizontally configured conveyor, which has article carriers positioned thereon for conveying an article to the article wrapping position. The article carriers can be biased upward toward the label drum for exerting pressure onto the articles during labeling. Additionally, the side-to-side pressure of the article carriers can be changed for changing the camber of the articles during labeling to help ensure end-to-end label alignment on the articles.

In still another aspect of the invention, each of the article carriers comprises spaced rollers for supporting an article on the conveyor. The rollers including outwardly extending pins with brass bearing members. Two opposing guide plates are positioned at the lower portion of the label drum adjacent the article wrapping position and include grooves for receiving the pins in a predetermined arcuate path so that the carriers and articles thereon are conveyed in an arcuate path around the lower portion of the label drum. The guide plates can be supported on bearings, such as Thompson Bearings, so that the guide plates can be raised and lowered. Means is located at either guide plate to allow one guide plate to be raised higher than the other, thus allowing greater pressure to be applied on one side of the crayon. In this manner, the article taper can be compensated to allow end-to-end label alignment.

A preferred crayon formed by this process of the present invention includes a cylindrical crayon body that is tapered along its length having a butt end with a diameter that is at least about 0.005 inches larger than its opposing end. The hot melt adhesive backed label is wrapped circumferentially twice about the crayon body. In one aspect, the label includes printed indicia and a registration mark used for determining cut points on the label. The registration mark is positioned such that when the article is labeled, the registration mark is covered and

° a desired printed indicia is exposed. The label has leading and trailing edges. In one aspect of the present invention the leading edge can be applied onto the crayon body at a skewed angle relative to the longitudinal axis of the body so that the label is wrapped circumferentially about the crayon body with end-to-end label alignment. The adhesive adheres the label to the crayon body and to the label overlap. Rotation against the label drum after wrapping of the label cools the adhesive.

In still another aspect of the present invention, a label is applied onto a substantially cylindrical article using a conveyor that supports the article on a substantially horizontal chain conveyor formed of two chain loops each formed from a plurality of interconnected chain links. Substantially parallel support rods extend between the chain loops and support the chain links. The support rods are spaced at a distance sufficient to allow an article to rest thereon. The labels are transferred onto the cylindrical article by wrap around labeling.

DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will be appreciated more fully from the following description, with reference to the accompanying drawings in which:

Figure 1 is a schematic, elevation view of the overall apparatus which applies labels onto cylindrical articles such as crayons in accordance with the present invention.

Figure 1A is a schematic sectional view taken along line 1A-1A of Figure 1, showing the tapered track.

Figure 2 is a schematic, isometric view of the label drum showing the star wheel assembly, heater assembly and pressure pad assembly.

Figure 3 is a schematic, isometric view of a lower portion of the label drum showing the jet air nozzles, cutter assembly and discharge chute.

Figure 4 is a schematic, isometric view of the label drum showing the heater assembly.

Figure 5 is a partial sectional view of the label drum showing twelve evenly spaced label retaining insert plates positioned on the outer surface of the drum.

Figure 6 is a top plan view of a label retaining insert plate.

Figure 7 is a side elevation view of a label retaining insert plate.

Figure 8 is a sectional view of the hub showing the first vacuum and pressure manifolds and blow off manifold.

Figure 9 is a sectional view of the hub showing the second vacuum manifold and blow off manifold.

Figure 10 is an exaggerated schematic, isometric view of a crayon positioned skewed in an article receiving slot of a star wheel.

Figure 11 is an exaggerated schematic, isometric showing the leading edge of a label engaging the butt end of the crayon during label wrapping.

Figure 12 is an isometric view of a novel crayon in accordance with the present invention which has been wrapped by the method of the present invention and showing with hidden lines the initially skewed leading edge of the label.

Figure 13 is a schematic, elevation view of another embodiment of the machine of Figure 1 showing the overall apparatus which applies labels onto cylindrical articles such as crayons in accordance with the present invention using a bottom feed conveying unit.

Figure 14 is a schematic, isometric view of the label drum showing the label feed and cut mechanism, the heater assembly and bottom feed conveying unit.

Figure 15 is a schematic, isometric view of a portion of the label drum showing the jet air nozzles and a portion of the cutter assembly.

Figure 16 is a schematic, isometric view of a portion of the bottom feed conveyor unit showing an article carrier formed of two rolls having outwardly extending pins which

are received within the guide groove of the conveyor guide plate.

Figure 17 is a sectional view of a pin taken along line 12-12 of Figure 9.

Figure 18 is an exaggerated schematic, isometric view showing the leading edge of a label engaging the butt end of the crayon during label wrapping.

Figure 19 is an isometric view of a novel crayon in accordance with the present invention which has been wrapped by the method of the present invention and showing with hidden lines the leading edge of the label engaging the butt end of the crayon during label wrapping, as well as a covered registration mark, and unexposed printed indicia.

Figure 20 is a schematic sectional view taken along line 20-20 of Figure 11 showing the double wrapped crayon.

Figure 21 is a schematic, elevation view of another view of the machine of the present invention which applies labels onto cylindrical articles such as crayons in accordance with the present invention using another type bottom feed conveying unit with a chain link conveyor.

Figure 22 is a schematic, isometric view of the label drum showing the label feed and cut mechanism, the heater assembly and bottom feed conveying unit.

Figure 23 is an isometric view of the vacuum wheel that feeds articles onto the conveyor.

Figure 24 is a plan view in partial section showing the chain links and chain of the chain conveyor.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, there are illustrated three different embodiments of the present invention. The first embodiment is illustrated in Figures 1 through 12 and shows the machine with articles feed along a serpentine to the top part of the label drum. Figures 13 through 20 illustrate a second embodiment using a bottom feed unit and an article with a printed indicia and registration mark, Figures 19 and 20. Figures 21 through 24 illustrate a third

embodiment where the bottom feed unit comprise a chain conveyor.

Referring now to Figures 1 through 12 and the first embodiment, and more particularly to Figure 1, there is illustrated at 10 a schematic, overall illustration of the apparatus for applying a label onto a substantially cylindrical article such as tapered crayon wherein the label has seams aligned end-to-end on the article (Figure 12).

The labels are thin layer, heat activated adhesive backed labels typically having at least one layer of paper with the adhesive applied evenly on one side. Throughout this description, the labels will be referred to by the letter "L." The apparatus 10 may be used for applying a label to different tapered and nontapered articles and crayons requiring good end-to-end alignment of the label ends and high production speeds, which the apparatus and method of the present invention can provide.

The apparatus 10 is suitable for high quality cylindrical labelling of different articles requiring the application of thin labels having a thickness typically less than about 0.005 inches. Throughout the description and drawings, the cylindrical articles on which the labels are applied will be referred to as crayons and will be illustrated as such and given the reference letter "A." The illustrated crayons are typically formed from paraffin wax, and have a surface which is smooth and slick, making it resistant to water and some adhesives. In one desired application, the crayons are tapered, having one end about 0.322 inches diameter and the other end about 0.314 inches diameter, giving a taper of 0.007 inches from the wide "butt" end 14 of the crayon to the more narrow end 16. (Figure 12) The crayons typically are about two to four inches long.

In one aspect of the invention, the label material applied to the illustrated crayons typically includes one layer of paper which is coated completely on one side with the heat activated adhesive. The paper can be a course

grain paper which is inexpensive, but economical and practical considering the numerous crayons which are labelled. In accordance with the present invention, the heat activated adhesive layer is applied at about a one half to one mil coating thickness i.e., 0.0005-0.001 inches. The adhesive is a low temperature heat activated adhesive which melts at a temperature range of about 140 to 170 °F. Typical examples include a hot melt adhesive sold by Findley Adhesives, Inc.

In accordance with the present invention, the label materials are initially supplied as a roll 18 of strip label material "S" which can be positioned on a mandrel 22 of a feeder assembly indicated generally at 24. In the illustration, a double mandrel 22, 23 each holds a roll 18. As one roll 18 is used, the other roll 18 or mandrel 23 then is fed which maintains production. The strip "S" of label material is then fed through a feedroll assembly, indicated generally at 26, and to a cutting drum assembly, indicated generally at 28, which is operatively connected to the main drive motor and transmission assembly 30 of a label transport drum indicated generally at 32. A registration and sensing system 34 sense label indicia to ensure proper cutting on the strip and ensure quality cutting of the labels. The registration can include a FIFE label edge registration control sensing system for printed label registration marker. The feedroll assembly 26 includes a dancer roll assembly 36 and feedrolls 38 which move the strip S into the cutting drum assembly 28.

The label transport drum 32 typically is supported on a frame assembly 40. The main drive motor and transmission assembly 30 is supported by the frame 40 and rotates the label transport drum 32 as well as the cutting drum assembly by a suitable transmission 28. The cutting drum assembly 28 includes a cutting roll 44 which is mounted to the machine frame 40 and positioned adjacent the label transport drum 32 at a lower portion thereof as shown in Figure 1. The cutting roll 44 cuts the label strips into segments, i.e.,

labels, which are then fed onto consecutive label receiving
positions, indicated at 46, of the label transport drum 32.
(Figures 2, 3, and 5) Each label moves with the rotating
drum 32 into a heat tunnel, indicated at 48, where the
adhesive is melted, and then into an article wrapping
position, indicated at 50, where crayons are fed into
tangential spinning engagement with the drum surface and
into rotative engagement with a leading edge of the label
"L" as the label moves into the article wrapping position so
that the label wraps about the crayon and adheres thereto by
means of the melted adhesive. The wrapped crayons are then
discharged into a discharge chute 52.

Referring now to Figures 5-9, details of one embodiment
of the label transport drum 32 which can be used for the
present invention is shown. As illustrated, a label drum,
indicated at 60, is rotatably received over a central hub
62. As shown in Figures 8 and 9, respective first and
second radially extending, slotted vacuum manifolds 64, 66
and blow-off manifolds 68, 70 are formed on the outer
surface of the hub 62. The vacuum and blow-off manifold at
64, 68 of Figure 8 are aligned circumferentially with each
other, as are the manifolds 65, 70 of Figure 9 with each
other. Respective sources of vacuum and pressure (shown
schematically at 72, 74, Figure 1) operatively connect to
horizontal vacuum manifolds 72a, and gate manifolds 72b, and
horizontal pressure manifolds 74a, and gate manifold 74b.
An air pressure manifold 76 provides air against a leading
edge of a label. As will be explained later, the second
vacuum manifold extends a further arc distance 79 than the
first vacuum manifold 64. The second vacuum manifold 66
retains the label on the drum surface if a label is not
transferred onto an article. Once the drum 60 continues its
rotation, the blow-off manifolds 68, 70 exert pressure on
the label to blow it from the drum surface. Further details
of a hub and drum label construction which can be used in
the present invention are set forth in United States Patent

5,344,519, issued September 6, 1994, the disclosure which is hereby incorporated by reference.

Twelve evenly spaced label retaining insert plates, indicated at 78, are positioned on the surface of the label drum 60 (Figure 5). Each insert plate 78 is rectangularly configured (Figure 6), and has a top surface that is configured substantially similar to the curvature of the drum surface. Screws 79 can secure the plates 78 to the drum 60 and be used on every plate 78 or every other plate, with every other unscrewed plate held by contiguous screwed plates. The under surface of each insert plate includes two plenums formed in the surface as shown in Figure 6. A first plenum 80 is formed on the undersurface and has orifices 82 extending upward which communicate with a surface of the insert plate at that area where the leading edge of a label is to be positioned. The first plenum communicates with a port 84 in the drum 60 which is positioned in circumferential alignment with the first vacuum manifold 64 and pressure manifold 76.

A second plenum 86 is formed in the undersurface and has orifices 88 extending upward therethrough to communicate with the surface of the insert plate at an area where the trailing edge and midportion of the label are positioned. The second plenum 86 extends to a port 90 of the drum which is aligned circumferentially with the second vacuum manifold.

Each insert plate has a resilient pad 92 (Figures 2, 3, 5, and 7) placed over a substantial portion of the outer surface of the insert plate. The orifices 82, 88 are formed within the resilient pad. The resilient pads 92 can be formed preferably from silicon or other similar material. The pads 92 are contiguous with each other (Figures 3 and 5) and form a soft cushion on which the crayon rolls during wrapping and also forms a smooth surface on which the label lies as the label moves from its initial position after cutting when it is first fed onto the drum surface and then moves into the article wrapping position 50 (Figure 2).

Because the silicon pads 92 act somewhat as a cushion, the
crayon is deflected slightly into the cushion material by
means of a pressure applicator, indicated at 96, so as to
create a "footprint" in the soft cushion material. During
crayon wrapping, the air is squeezed out between the crayon,
label and pad surface, allowing better wrapping of the label
about the crayon. Additionally, the silicon pads 92 have
greater friction between the crayons in the drum surfaces
compared to steel or an aluminum surface so that less
pressure need be applied by the pressure applicator.

The label retaining insert plates 78 are limited in the
illustrated embodiment to about a four and one-half inch
long label corresponding to about four and a half inch wide
insert plate. This has been found adequate for labelling
most conventional crayons and other similar articles.

If longer labels are to be used for larger diameter
articles, the insert plates 78 can be made deeper and fewer
in number, and thus longer along the arcuate portion of the
top surface since the plate is longer and has a longer
surface length on which the arc extends. However, the
length is still limited because too deep an insert plate 78
would interfere with the drum rotation about the hub. A
larger label drum 60 and hub 62 would have to be
constructed. Further details of one example of the plate
construction which could be used for the present invention
can be found in the incorporated by reference '519 patent.

Once the label is received into the label receiving
position 46 on the label transport drum 32, vacuum holds the
label onto the drum surface. The label transport drum
rotates and moves the label into the heat tunnel 48 where
the adhesive is heated to its melting point. At high
operating speeds of about 500 to 600 articles per minutes,
the heat time is about 0.25 seconds.

As shown in Figure 4, the heating tunnel 48 is defined
by two opposing side bracket plates 102, 104, a front and
rear end plate 106, 108 and a top cover plate 110, and forms
a heat tunnel positioned closely adjacent the surface of the

label transport drum in a position before the article
wrapping position as shown in Figure 2. Two high powered
ceramic heater and blower assemblies 112, 114 are mounted on
the top plate 110 at the front and rear portions. Both
heaters produce a 1,000°F blast of hot air. The first rear
heater 114 amplifies and heats the heat activated adhesive,
and the second front heater 112 amplifies that heat to
ensure that the hot melt adhesive melts adequately. The
total time in which the label is contained within the heat
tunnel is about 0.25 seconds, and corresponds to the high
operating speeds of about 500 to 600 crayons per minute.
Temperature sensors 115, preferably thermocouples, sense
temperature in the heating tunnel 48. The heater and blower
assemblies 112, 114 then are adjusted accordingly. The
system can be temperature controlled through a closed loop
controller.

The labels then continue into the article wrapping
position 50 where they engage the crayons which had been fed
from a hopper 120 positioned at the top portion of the frame
40 (Figure 1). The crayons are retained in the hopper 120
and a large gear 122 positioned at the lower discharge end
of the hopper grabs a crayon at the eleven o'clock position
and rotates it approximately ninety degrees to release it
into a serpentine guide 124. The crayons continue downward
through the serpentine guide 124, through a gate 126, and
into a double star wheel assembly indicated generally at
128. The gate 126 between the serpentine transfer and first
starwheel transfer roll is formed of latex rubber and soft
enough so that it does not break the crayon it engages. The
gate 126 is normally biased in the closed position to
prevent crayons from moving from the serpentine into the
first starwheel transfer roll. A cylinder 126a actuates a
piston 126b which raises the gate 126 to allow transfer of
crayons from the serpentine 124 into the article receiving
positions of the first starwheel. The serpentine transfer
124 has an inner and outer rail 124a, 124b. The spacing
between the inner rail 124a has a larger gap than the

spacing of the outer rail 124b to accommodate the taper of
the crayons 140 (Figure 1A).

The double starwheel assembly 128 can be driven off the
main drive system or a separate drive system and only for
the starwheel assembly. In the illustrated embodiment, the
starwheel assembly includes two starwheels. Article
receiving slots 140 of the first star wheel 130 receive the
crayons and transfer them into the second star wheel 132.
The second star wheel has its article receiving slots 142
formed such that the article, i.e., crayon, is slightly
skewed about 0.5 degrees (angle X°) within the slots (Figure
10). This skewing can be accomplished by forming the slots
142 so that the crayon lies skewed therein, or by using
inserts (not shown) which skew the crayon when positioned
within the slot 142. As the second starwheel 132 rotates,
the crayon moves downward into tangential spinning
engagement with the drum surface and into engagement with
the leading edge of a label at a skewed angle.

As shown in Figure 11, the crayons are conveyed onto
the drum surface so that the wider "butt" end 14 of a crayon
first engages the leading edge of a label before the
opposing end. This effectively compensates for the taper of
the crayon. At the same time, the leading edge ports 84 in
the drum are aligned with each insert plate move over the
pressure manifold 76. The jet of the leading edge of the
label air from the manifold forces outward into engagement
with the crayon.

During labeling, the pressure applicator 96 imparts
pressure to the crayon as it is wrapped. The pressure
applicator 96 includes a pressure plate 140 (Figure 2) that
has a bottom surface engaging the crayon. The pressure
plate 140 is spring biased and supported by a second support
plate 142 fixed to the frame. Two respective pinion gears
144, 146 are positioned on the support plate 142 and mesh
with each other. The pinion gears 144, 146 have threaded
central shafts which engage the spaced pressure plate 140.
A third gear (not shown) engages both pinion gears 144, 146,

and is rotatable by a handle-shaft 148. As the handle-shaft
148 is turned, the third gear turns both gears so that they
rotate in opposite directions, thus biasing the pressure
plate against the side of the crayon. The amount of biasing
force against the ends of the crayon determines how much the
label can be aligned. The pressure plate 140 can also be
adjusted closer or farther from the label transport drum,
which varies the pressure of wrapping the label on the
article. Also, the crayon, once wrapped, is rolled further
under pressure from the pressure plate which further cools
the adhesive.

The label then wraps around the crayon and the adhesive
cooled as it rolls and then moves into the discharge chute
52 where it is then transferred into an article conveyor
150. Because the label engaged the "butt" end of the crayon
first during wrapping, the taper is compensated for with the
result that the label ends are aligned (Figure 12). Without
skewing the article slightly, the label ends would not be
aligned.

The resilient pads 78 can become very hot during high
speed operation, especially materials like silicon, and
therefore a bank of airjets 152 are positioned after the
discharge chute 52. These jets blow high speed air onto the
silicon pads to cool same. A compressed air source and
lines 154 provide the necessary air flow. A controller 156
is mounted as a movable swing arm 158 and controls machine
operation. It can be easily swung out of the way.

In operation, a strip S is initially fed from a feed
roll 18 into the feed roll assembly 26 and cutter drum
assembly 28. The registration and sensor unit maintains
proper registration of any label indicia with the cutting
drum so that labels are properly cut at proper indicia and
transferred exactly onto the label retaining positions 46 of
the label transport drum 42. The drum rotates and moves
labels through the heating tunnel 48, and then into the
article wrapping position 50 where the leading edge of the
label is forced upward into engagement with the skewed

crayon, which has been fed from the second transfer roll.
During wrapping, because the butt end of the crayon engages the leading edge of the label first, the label is wrapped and has end-to-end alignment of labels. The label then moves to a point where it is discharged into the chute and then transferred onto the conveyor.

Referring now to Figures 1, through 20, the second embodiment using a bottom feed unit is illustrated. Those structural elements in this second embodiment that are the same as the structural elements described in the first embodiment maintain the same reference number.

Referring now to Figure 13, there is illustrated at 10 a schematic, overall illustration of the apparatus for applying a label onto a substantially cylindrical article such as tapered crayon wherein the label has seams aligned end-to-end on the article (Figure 19) by using a bottom feed conveying unit, illustrated generally at 12. The bottom feed conveying unit 12 of this embodiment of the present invention allows an operator to visually inspect articles during advancement into an article wrapping position.

As in the previous embodiment of Figures 1 to 12, the machine of the present embodiment can work with the labels are thin layer, heat activated adhesive backed labels typically having at least one layer of paper with the adhesive applied evenly on one side.

The label material typically includes printed indicia 17b which will be exposed after wrapping. A registration mark 17a can be included on the label material. This registration mark 17a is sensed by registration sensors during film feed to ensure proper cutting of the label at the desired point. Typically, a crayon or other article is double wrapped (Figure 20a), and the registration mark 17a covered. The printed indicia 17b, such as advertising and date codes, is exposed.

In accordance with the present invention, the label materials are initially supplied as a roll 18 of strip label material "S" which can be positioned on a mandrel 22 of a

feeder assembly indicated generally at 24. In the illustration, a double mandrel 22, 23 each holds a roll 18. As one roll 18 is used, the other roll 18 on mandrel 23 then is fed which maintains production. The strip "S" of label material is then fed through a feedroll assembly, indicated generally at 26, and to a cutting drum assembly, indicated generally at 28, which is operatively connected to the main drive motor and transmission assembly, indicated generally at 30, of a label drum indicated generally at 32. The cutting drum assembly 28 is located so that label material is fed and cut at the upper portion of the label drum 32. As the label drum 32 rotates, the label moves into an article wrapping position 33 located at the bottom portion of the label drum 32 where the articles are fed from the conveying unit 12.

A registration and sensing unit 34 senses the label registration mark to ensure proper cutting of the strip on the desired cut line and ensure quality cutting of the labels. The cutpoint on the strip label is based on the registration point. The registration and sensing unit 34 can include a FIFE label edge registration control and an optical system for reading printed label registration markers. The feedroll assembly 26 includes a dancer roll assembly 36 and feedrolls 38 which move the strip S into the cutting drum assembly 28.

The label drum 32 typically is supported on a frame assembly 40. The main drive motor and transmission assembly 30 is supported by the frame 40. The motor 41 rotates the label transport drum 32 by a suitable transmission 42. In the illustrated embodiment, the drive motor and transmission 30 rotates the label drum in a clockwise position.

The cutting drum assembly 28 includes a cutting roll 44 which is mounted to the machine frame 40 and positioned adjacent the label transport drum 32 at an upper portion thereof as shown in Figure 13. The cutting roll 44 has a carbide knife 45 positioned thereon (Figure 14) which cuts the label strip into rectangular segments, i.e., labels "L", having leading and trailing edges, L1, L2. The leading edge

1 L1 is transferred onto a label receiving position, indicated
2 at 46, of the label transport drum 32. (Figures 14 and 15).
3 The rest of the label then transfers to the label drum. The
4 roll 44 is rotated by a transmission 44a driven from the
5 label drum 32. The vacuum roll 44 can include vacuum draw
6 which originates from a vacuum hose 44b connected to an
7 internal manifold and orifices of the vacuum roll.

8 In one aspect of the present invention, the cutting
9 roll 44 can include a carbon steel substrate formed at the
10 periphery of the roll and can be received over a central
11 mandrel. In accordance with the present invention, the
12 surface of the cutting roll 44 is enhanced. A nickel alloy
13 coating is deposited onto the substrate and has micropores.
14 A polytetrafluoroethylene (Teflon) polymer is integrated
15 within the nickel alloy coating to form an integrated
16 surface layer of about 0.001 to 0.002 inches. The
17 integrated surface layer has a surface hardness of about 65
18 to 68 Rockwell C scale. This surface has a coefficient of
19 friction of about 0.03 (with 8 or lower RMS) so as to reduce
20 the tendency of the label to build static and to aid in
21 label transfer from the cutting drum onto the label drum.
22 The cutting roll 44 with this surface has an operating heat
23 resistance range of about -150 to +950°F.

24 The integrated surface can be formed by a coating
25 process known commercially by the trade designation
26 Magnaplate HMF and provided by General Magnaplate
27 Corporation, 1331 Route 1, Linden, New Jersey 07036.

28 Typically, when applying this surface enhancement, the
29 substrate is pretreated and the nickel alloy is deposited on
30 the substrate surface. Micropores are enlarged and the
31 Teflon infused into the surface layer. The Teflon then is
32 integrated within the layer.

33 Besides the improvements of hardness and reduced
34 coefficient of friction, the cutting roll has improved
35 durability and anti-static electrical properties. The
impregnated surface layer imparts dielectric resistance, a
low dissipation factor, and very high surface resistivity.

It is believed that the surface resistivity is about 60 micro ohm/cm over a wide range of frequencies. The impregnated surface layer also has corrosion resistance. Salt spray per ASTM B-117 exceeds 336 hours when the thickness is 0.001 inches or greater. The Equilibrium Wear Rate (EWR) using Taber Abrasion testing methods (CS-10 wheel): 0.2 - 0.4 mg per 1000 cycles.

The cutting roll 44 is positioned adjacent the drum and a stationary knife 45a (Figure 1) engages the cutting knife 45 to cut labels. Also, on-drum cutting can be used where the knife 45 engages a hardened surface of the label drum. An example of such cutting system is disclosed in United States Patent No. 5,350,482 to Westbury, the disclosure which is hereby incorporated by reference. The choice of cutting method depends on the labels used, the speed of operation, operator demands, as well as other factors related to the type of labeling operation.

In accordance with the present invention, a static eliminator 47 (Figure 13) is positioned just after the cutting drum assembly 28. The static eliminator 47 is beneficial because it reduces the heavy charge build-up. This can be critical because in very low humidity conditions the charge contained on the label causes the labels to stick to the surface of the cutting roll 44. The static eliminator 47 eliminates this charge which allows the label to transfer efficiently to the label drum 32.

Each label moves with the rotating label drum 32 into a heating tunnel, indicated at 48, where the adhesive is melted, and then into the article wrapping position 33, located at the bottom portion of the label drum 32, where crayons or other articles are fed by the conveying unit 12 into tangential spinning engagement with the drum surface and into rotative engagement with a leading edge L1 of the label "L" as the label moves into the article wrapping position 33. The label wraps about the crayon twice and adheres thereto by means of the melted adhesive. The wrapped crayons are then discharged into a discharge chute

or discharge conveyor assembly illustrated generally at 52
° (Figure 13).

As noted in the description of the previous embodiment,
Figures 1 through 12 illustrate silicon pads 92. Because
the silicon pads 92 act somewhat as a cushion, the crayon is
5 deflected slightly into the cushion material by means of
upward pressure exerted by the conveying unit against the
crayon and label drum 32, so as to create a "footprint" in
the soft cushion material. During crayon wrapping, the air
is squeezed out between the crayon, label and pad surface,
10 allowing better wrapping of the label about the crayon.
Additionally, the silicon pads 92 have greater friction
between the crayons in the drum surfaces compared to a steel
or an aluminum surface so that less pressure need be applied
by the upward biasing pressure of the conveyor.

15 In accordance with the present embodiment, the heaters
112, 114 can be pivotally mounted on shafts 112a, 114a or on
a slide plate (not shown) so that respective heaters can be
pivoted or moved out of proximity to the label drum (Figure
13).

20 As shown in Figure 13, the crayons, are retained in a
hopper, indicated at 120, spaced from the label drum. The
hopper 120 includes a basin 122 with an inclined floor in
which the crayons are contained. The lower portion of the
basin has a through channel 124 which feeds into a large
25 vacuum wheel 126 positioned at the lower discharge end of
the basin and grabs a crayon at the 12:00 position, holds
the crayon with its formed slots by vacuum and rotates it
approximately 180 degrees to release it onto a carrier,
indicated generally at 130, of the conveyor. The vacuum
30 wheel 126 includes a source of vacuum (not shown) for
retaining the crayons within the slots formed in the wheel.

A sensor 132 indicates when a carrier 130 is
approaching the drop off point of the vacuum wheel and
signals to a controller 140 the sensed location of the
35 carrier. Vacuum wheel rotation is then timed so that the

crayon is dropped onto the carrier 130 when the carrier is
° opposite the drop off point defined by the lower-most point
of the vacuum wheel 126. Vacuum wheel rotation can be
controlled by a drive mechanism 134 which operatively
connects to the sensor 132 via circuitry 136 and the
controller 140.

5 As shown in Figure 13, the conveyor 12 includes a
distal drive wheel 144 mounted to the frame 40 and a first
proximal drive wheel 146 adjacent the article wrapping
position. An endless, looped and lugged conveyor belt 148
is coupled about the two drive wheels, which also are geared
10 to receive the lugs 148a of the belt (Figure 14). The
proximal drive wheel 146 is mounted on a support shaft 146a
rotatably mounted between shaft supports 147 fixed to the
frame 40. In a preferred embodiment, the distal drive wheel
146 includes a gear linkage (indicated generally at 149)
15 which is geared to the label drum drive with a clutch
mechanism for overload protection. In another embodiment,
a drive motor could drive the distal drive wheel 144 to move
the conveyor 148. The controller 140 could operatively
connect to the motor to allow an operator to control the
20 conveyor.

Carriers 130 are spaced two inches apart on the belt
148. (For purposes of illustration, Figure 14 illustrates
only one carrier and Figure 13 has only part of the belt
showing carriers 130.) Each carrier is about four inches
25 wide corresponding to the width of the conveyor belt 148.
The carriers are supported and secured to the belt 148 by
threaded fasteners (not shown) extending through the bottom
portion of the carrier and extending into fastening plates
150 secured onto the belt 148. The plates 150 includes
30 threaded holes 151 which receives bolts (not shown) for
holding the carriers 130. The plates 150 can be configured
to allow different configured carriers to be secured to the
belt to accommodate different articles (Figure 16).

In the present illustrated embodiment of Figure 16,
35 each carrier 130 includes roll supports 152 which support

two rolls 154, 156 on which a crayon rests. The rollers
154, 156 are preferably formed as Nilotron rollers, although
other materials can be used if the materials can hold up to
wear.

Each roll has outwardly extending shafts 154a, 156a and
a brass bearing member 154b, 156b, rotatably positioned over
each shaft 154a, 156a. The members 154b, 156a are freely
rotatable thereon. The shaft and members 154a, b, 156a, b
enter a groove 160 of respective parallel spaced guide
plates 162 at the article wrapping position 33. As shown in
Figure 13, the carriers 130 follow the arcuate configured
groove 160 so that the carriers 130 move around the lower
portion of the label drum 32. This allows a crayon within
the carrier 130 to engage the surface of the label drum
throughout its lower periphery. In a preferred aspect of
the invention, a rigid support surface 166 is located
underneath the conveyor belt 148 proximal to the article
wrapping position at a point where the conveyor approaches
the label drum so that the carriers 130 will not exert
downward pressure on the conveyor belt and cause slack,
which could create error during labeling.

The guide plates 162 are each mounted on two Thompson
Bearings 167 which allows the guide plates to be raised and
lowered independently of each other. The Thompson Bearings
167 rest on a horizontally configured support plate 168.
The Thompson Bearings include a shaft 170 received within a
bearing housing 171 as is conventional. Two jack screws 172
are positioned on either side of the article wrapping
position 33 and rest on the support plate 168. The jack
screws 172 raise the guide plates 162 toward the label drum
and move the carriers 130 closer toward the surface of the
label drum, thus engaging the crayons carried thereon into
engagement with the surface of the label drum. The amount
that the jack screws 172 are turned corresponds to the
desired pressure on the crayon during labeling. Also, the
jack screws 172 can be turned to vary the camber of the
article relative to the label to aid in ensuring end-to-end

alignment during labeling. The jack screws 172 can be hydraulically operated coupled to a motor and drive mechanism (not shown in detail) so that an operator can readily control the camber and pressure of the crayon during labeling via the controller 140.

As illustrated in Figures 13 and 14, the support plate 168 is supported on a mounting plate 176 at each corner by jack screws 177. The support plate 168 is gimbed at the center so that the camber of the support plate 168 can be varied. The mounting plate 176 is closely spaced to the support plate 168. Small, finite adjustments in the camber of the support plate 168 relative to the mounting plate 176 are made by individually turning desired jack screws 177.

As the label drum 32 continues its clockwise rotation, the labels then continue into the article wrapping position 33 where they engage the crayons advancing along the article conveyor 12.

As shown in Figure 18, the crayons are conveyed onto the drum surface so that the crayon engages the leading edge of a label. At the same time, the leading edge ports 84 in the drum that are aligned with each insert plate move over the pressure manifold 76. The jet of air from the manifold forces outward the leading edge of the label into engagement with the crayon.

The label then wraps around the crayon twice and the adhesive is cooled as it rolls. During labeling side-to-side pressure on the crayon is varied to compensate for crayon taper. The original registration mark 17a is covered and printed indicia present on the label exposed. The crayon then moves into the discharge chute or conveyor 52.

The resilient silicon or similarly formed pads 78 can become very hot during high speed operation, and therefore a bank of airjets 180 (Figure 15) are positioned on the label drum side opposing the heater assembly. These jets 180 blow high speed air onto the silicon pads to cool same. A compressed air source and lines 182 provide the necessary air flow.

In operation, a strip S is initially fed from a feed roll 18 into the feed roll assembly 26 and cutter drum assembly 28. The registration and sensor unit maintains proper registration of any label points with the cutting drum so that labels are cut at proper points and transferred exactly onto the label retaining positions 46 of the label transport drum 42. The drum rotates and moves labels through the heating tunnel 48, and then into the article wrapping position 33 where the leading edge of the label is forced upward into engagement with the crayon, which has been fed into engagement with the drum by the conveyor. During wrapping, the applied differential pressure causes the label to skew during labeling with the result that the label is wrapped and has end-to-end alignment. The label then moves to a point where it is discharged into the discharge conveyor.

Referring now to Figures 21 through 24, a third embodiment of the labeling machine is illustrated, which includes a bottom feed unit in the form of a chain conveyor.

Referring now to Figure 21, there is illustrated at 10 a schematic, overall illustration of the apparatus for applying a label onto a substantially cylindrical article such as a tapered crayon wherein the label has seams aligned end-to-end on the article (Figure 19) by using a bottom feed conveying unit, in the form of a chain conveyor, illustrated generally at 12. The bottom feed conveying unit 12 of the present invention allows an operator to visually inspect articles during advancement into an article wrapping position.

As shown in Figure 1, the crayons, are retained in a hopper, indicated at 120, spaced from the label drum. The hopper 120 includes a basin 122 with an inclined floor in which the crayons are contained. The lower portion of the basin has a through channel 124 which feeds into a large vacuum wheel 126 positioned at the lower discharge end of the basin and grabs a crayon at the 12:00 position, holds the crayon with its formed slots by vacuum and rotates it

approximately 180 degrees to release it to rest between support rods 130 of the conveyor. The vacuum wheel 126 includes a source of vacuum (not shown) for retaining the crayons within the slots formed in the wheel.

A sensor (not shown) could be used to indicate when a rod 130 is approaching the drop off point of the vacuum wheel 126 and signal to a controller 140 the sensed location of the carrier. Vacuum wheel rotation is then timed so that the crayon is dropped onto the support rods 130 when the two support rods are opposite the drop off point defined by the lower-most point of the vacuum wheel 126. Vacuum wheel rotation can be controlled by a drive mechanism 134 which operatively connects to the sensor 132 via circuitry 136 and the controller. Once the crayon or other article has dropped onto the conveyor, each crayon resting on two support rods 130 is aligned by engaging a registration wheel 139.

As shown in Figure 21, the chain conveyor 12 includes a distal drive sprocket 144 mounted to the frame 40 and a first proximal drive sprocket 146 adjacent the article wrapping position. An endless conveyor chain 148 is coupled about the two drive sprockets. (Figure 22). The proximal drive sprocket 146 is mounted on a support shaft 146a rotatably mounted between shaft supports 147 fixed to the frame 40. In a preferred embodiment, the distal drive sprocket 146 includes a gear linkage (indicated generally at 149) which is geared to the label drum drive with a clutch mechanism for overload protection. In another embodiment, a drive motor could drive the distal drive sprocket 144 to move the conveyor 148. The controller 140 could operatively connect to the motor to allow an operator to control the conveyor.

As illustrated in Figures 23 and 24, the chain conveyor 12 is formed from an endless conveyor chain 148 that includes two chain loops indicated generally at 150a, 150b (a portion shown in Figure 24), each formed from a plurality of interconnected chain links 151. As is typical, each

chain link 151 includes a guide hole 152. The support rods 130 include shafts 154 that enter through the guide holes 152 and "lock" the chain loops together.

Each support rod 130 has outwardly extending shafts 154 and a brass bearing member 156, rotatably positioned over each shaft 154, (Figure 24). The brass members 156, are freely rotatable thereon, and could be retained by a washer and locknut 157 or an E-clip such as known to those skilled in the art. Typically, the support rods 130 are spaced such that the pitch between the crayons resting on the rods 130 is about one inch.

The shaft and members 154, 156, enter a groove 160 of respective parallel spaced guide plates 162 at the article wrapping position 33. As shown in Figure 21, the conveyor follows the arcuate configured groove 160 so that any crayon carried thereon moves around the lower portion of the label drum 32. This allows a crayon held on the rods 130 to engage the surface of the label drum throughout its lower periphery. In one aspect of the invention, a rigid support surface 166 can be located underneath the conveyor proximal to the article wrapping position at a point where the conveyor approaches the label drum so that the conveyor chain 148 will not exert downward pressure and cause slack, which could create error during labeling.

In operation, a strip S is initially fed from a feed roll 18 into the feed roll assembly 26 and cutter drum assembly 28. The registration and sensor unit maintains proper registration of any label points with the cutting drum so that labels are cut at proper points and transferred exactly onto the label retaining positions 46 of the label transport drum 42. The drum rotates and moves labels through the heating tunnel 48, and then into the article wrapping position 33 where the leading edge of the label is forced upward into engagement with the crayon, which has been fed into engagement with the drum by the conveyor. During wrapping, the applied differential pressure causes the label to skew during labeling with the result that the

label is wrapped and has end-to-end alignment. The label
° then moves to a point where it is discharged onto a
discharge conveyor chain 190 or other similar discharge
device known to those skilled in the art.

It should be understood that the foregoing description
of the invention is intended merely to be a illustrative
5 thereof, and that other embodiments, modifications and
equivalents may be apparent to those skilled in the art
without departing from its spirit.

10

15

20

25

30

35

WHAT IS CLAIMED IS:

1. A method for applying a label onto a substantially cylindrical article comprising the steps of
feeding a thin layer, heat activated adhesive backed label onto the surface of a rotating label transport drum so that the adhesive back faces outward from the drum,
heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt, and
transferring the label onto a cylindrical article at an article wrapping position.
2. A method according to claim 1 including the step of moving the label past a heat source to initially heat the adhesive, and then ensuring that the heat activated adhesive has obtained a sufficient temperature to melt so that it adheres to the cylindrical article.
3. A method according to claim 1 wherein the articles are crayons and the heat activated adhesive layer positioned on the back of the paper is about 0.0005-0.001 inches thick.
4. A method according to claim 3 wherein the heat activated adhesive has a melting range of about 140 to about 170 degrees Fahrenheit., and including the step of heating the heat activated adhesive for about 0.25 seconds.
5. A method for applying a label onto a crayon comprising
feeding a thin layer, heat activated adhesive backed label onto the surface of a rotating label transport drum so that the adhesive back faces outward from the drum,
the heat activated adhesive layer having a thickness of about 0.0005-0.001 inches thickness and a melting temperature of about 140 to about 170 degrees Fahrenheit,
heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt,

conveying crayons into tangential spinning engagement with the drum and into rotative engagement with the leading edge of the label as the label moves into a crayon wrapping position so that the label wraps about the crayon and adheres thereto.

6. A method according to claim 5 including the step of rotating the crayon to cool the heat activated adhesive.

7. A method according to claim 5 including the step of moving the label past a heat source to heat initially the adhesive, and ensuring that the heat activated adhesive has obtained a sufficient temperature to melt so that it adheres to the cylindrical crayon.

8. A method for applying a label onto a cylindrical article that is somewhat tapered along its length comprising the steps of

feeding a substantially rectangular configured, thin layer, heat activated adhesive backed label onto the surface of a label transport drum,

heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt, and

conveying tapered articles into tangential spinning engagement with the drum and into engagement with the leading edge of a label at a skewed angle so that the label wraps about the tapered article with end-to-end alignment thereof.

9. A method according to claim 8 including conveying the article onto the drum so that the wider "butt" end of the article engages the leading edge of the label before the more narrow end.

10. A method for applying a label onto a substantially cylindrical article comprising the steps of

35

feeding a thin layer, heat activated adhesive
backed label onto a label receiving position of a rotating
label transport drum having label receiving positions formed
of a substantially smooth, resilient material such as
silicon,

heating the adhesive as the drum rotates so that
the adhesive obtains a sufficient temperature to melt,

transferring the label onto a cylindrical article
at an article wrapping position, and

blowing a jet of air onto the resilient surface
for cooling the surface during subsequent label applying and
ensuring rapid cooling of melted adhesive during labeling.

11. A method according to claim 10 including the step
of moving the label past a heat source to initially heat the
adhesive, and then ensuring that the heat activated adhesive
has obtained a sufficient temperature to melt so that it
adheres to the cylindrical article.

12. A method according to claim 10 wherein the
articles are crayons and the heat activated adhesive layer
positioned on the back of the paper is about 0.0005-0.001
inches thick.

13. A method according to claim 10 wherein the heat
activated adhesive has a melting range of about 140 to about
170 degrees Fahrenheit.

14. An apparatus for applying a label onto a substan-
tially cylindrical article comprising
a label transport drum,
means for rotating said label transport drum,
means for feeding a thin layer, heat activated
adhesive backed label onto the surface of said drum so that
the adhesive back faces outward from the drum,

means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

means for conveying substantially cylindrical
articles into tangential spinning engagement with the drum
and into rotative engagement with the leading edge of the
label as the label moves into an article wrapping position
so that the label wraps about the article and adheres
thereto.

15. An apparatus according to claim 14 including a
heat source to initially heat the adhesive, and a heat
source for ensuring that the heat activated adhesive has
obtained a sufficient temperature to melt so that it adheres
to the cylindrical article.

16. An apparatus according to claim 14 wherein the
articles are crayons and the heat activated adhesive layer
positioned on the back of the paper is about 0.0005-0.001
inches thick.

17. An apparatus according to claim 14 wherein said
heating means heats the heat activated adhesive to a range
of about 140 to about 170 degrees Fahrenheit.

18. An apparatus for applying a label onto a crayon
comprising

A label transport drum,
means for rotating said drum,
means for feeding a thin layer, heat activated
adhesive backed label onto the surface of said drum so that
the adhesive back faces outward from the drum, the heat
activated adhesive layer having a thickness of about 0.0005-
0.001 inches thickness and a melting temperature of about
140 to about 170 degrees Fahrenheit,

means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

means for conveying crayons into tangential
spinning engagement with the drum and into rotative
engagement with the leading edge of the label as the label
moves into the crayon wrapping position so that the label
wraps about the crayon and adheres thereto.

19. An apparatus according to claim 18 including a
heat source to initially heat the adhesive for ensuring that
the heat activated adhesive has obtained a sufficient
temperature to melt so that it adheres to the crayon.

20. An apparatus for applying a label onto a
cylindrical article that is somewhat tapered along its
length comprising

a label transport drum,
means for rotating the label transport drum,
means for feeding a substantially rectangular con-
figured, thin layer, heat activated adhesive backed label
onto the surface of said label transport drum,
means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

means for conveying articles into tangential spin-
ning engagement with the drum and into engagement with the
leading edge of a label at a skewed angle so that the label
wraps about the tapered article with end-to-end alignment
thereof.

21. An apparatus according to claim 20 including means
for conveying the article onto the drum so that the wider
"butt" end of the article engages the leading edge of the
label before the more narrow end.

22. An apparatus according to claim 20 including a first heat source to initially heat the adhesive, and a second heat source for ensuring that the heat activated adhesive has obtained a sufficient temperature to melt so that it adheres to the cylindrical article.

23. An apparatus according to claim 20 wherein the articles are crayons and the heat activated adhesive layer positioned on the back of the paper is about 0.0005-0.001 inches thick.

24. An apparatus according to claim 20 wherein the heat activated adhesive on said label has a melting range of about 140 to about 170 degrees Fahrenheit.

25. An apparatus for applying a label onto a substantially cylindrical article comprising
a label transport drum,
means for rotating said drum,
means for feeding a thin layer, heat activated adhesive backed label onto a label receiving position of said drum, said drum having label receiving positions formed of a substantially smooth, resilient surface such as silicon,
means for heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt,
means for conveying substantially cylindrical articles into tangential spinning engagement with the drum and into rotative engagement with the leading edge of the label as the label moves into an article wrapping position so that the label wraps about the article and adheres thereto, and
means for blowing a jet of air onto the resilient drum surface for cooling the surface during subsequent label applying and ensuring rapid cooling of melted adhesive during labeling.

35

26. An apparatus according to claim 25 wherein said
° means for blowing a jet of air comprises a bank of jet
nozzles positioned adjacent the label transport drum.

27. An apparatus according to claim 25 including a
heat source to initially heat the adhesive, and a heat
5 source for ensuring that the heat activated adhesive has
obtained a sufficient temperature to melt so that it adheres
to the cylindrical article.

28. An apparatus according to claim 25 wherein the
10 articles are crayons and the heat activated adhesive layer
positioned on the back of the paper is about 0.0005-0.001
inches thick.

29. An apparatus according to claim 25 wherein the
15 heat activated adhesive on said label has a melting range of
about 140 to about 170 degrees Fahrenheit.

30. An article comprising
an elongated substantially cylindrical article
20 having opposing ends,
a substantially rectangular configured label
wrapped circumferentially about said article, said label
having trailing and leading edges, with the trailing edge
overlapping the leading edge of the label,
25 and a heat activated adhesive coated on the label
and adhering to the article for retaining the label thereto.

31. An article according to claim 30 wherein the
article has a tapered body with a butt end having a larger
30 diameter than the opposing end, the leading edge of the
label being applied onto the article in a position that is
skewed relative to the longitudinal axis of the body and at
an angle wherein the label is wrapped circumferentially
about the tapered article with end-to-end alignment thereof.

35

32. A crayon comprising
° a cylindrical crayon body that is somewhat tapered
along its length, and having a butt end with a diameter that
is at least about 0.005 inches larger than its opposing end,
and
a heat activated adhesive backed label wrapped
5 circumferentially about the crayon body, said label having
leading and trailing edges, said leading edge being applied
onto the crayon body skewed relative to the longitudinal
axis of the body at an angle so that the label is wrapped
circumferentially about the crayon body with end-to-end
10 alignment thereof, said adhesive adhering said label to the
crayon body.

33. A cylindrical crayon according to claim 32 wherein
the heat activated adhesive has a melting temperature of
15 about 140 to 170 degrees Fahrenheit.

34. A crayon comprising
a cylindrical crayon body having opposing ends,
a substantially rectangular configured label
20 having at least one paper layer and being wrapped
circumferentially about the article, the label having
trailing and leading edges with the trailing edge
overlapping the leading edge of the label, and
a heat activated adhesive of about 0.0005-0.001
25 inch thickness coated on the label and adhering to the
crayon for retaining the label thereto.

35. A crayon according to claim 34 wherein the heat
activated adhesive has a melting temperature of about 140 to
30 170 degrees Fahrenheit.

36. A crayon according to claim 34 wherein the crayon
body has a butt end with a diameter that is at least about
0.005 inches larger than its opposing end, and wherein the
35 leading edge of the label is applied onto the crayon body

skewed relative to the longitudinal axis of the body at an angle so that the label is wrapped circumferentially about the crayon with end-to-end alignment thereof, said adhesive adhering said label to the crayon body.

37. A method for applying a label onto a substantially cylindrical article comprising the steps of

5 feeding a thin layer, heat activated adhesive backed label onto the surface of a label drum so that the adhesive back faces outward from the drum,

rotating the drum to move the label retained thereto into an article wrapping position positioned at a

10 lower portion of the drum,

heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt,

conveying a cylindrical article substantially

15 horizontally along a predetermined path of travel into the article wrapping position at the lower portion of the label drum and into rotative engagement with a label retained on the label drum, and

transferring the label onto the cylindrical

20 article by wrap around labeling.

38. A method according to claim 37 including conveying the article along a substantially arcuate path around the lower portion of the label drum and into engagement with the outer drum surface.

25

39. A method according to claim 37 including feeding film onto the label drum at a position adjacent the upper portion of the drum.

30

40. A method according to claim 37 including conveying the cylindrical article along a horizontally configured conveyor.

35

41. A method according to claim 37 including supporting the article on the conveyor between spaced rollers.

42. A method according to claim 41 wherein the spaced rollers include outwardly extending pins and including the step of guiding the pins in an arcuate configured guide groove for guiding the article in an arcuate path around the lower portion of the label drum.

43. A method according to claim 37 wherein the articles are crayons and the heat activated adhesive layer positioned on the back of the paper is about 0.0005-0.001 inches thick.

44. A method according to claim 37 wherein the heat activated adhesive has a melting range of about 140 to about 170 degrees Fahrenheit, and including the step of heating the adhesive for about 0.25 seconds.

45. A method for applying a label onto a tapered crayon comprising

feeding a thin layer, heat activated adhesive backed label onto the surface of a label drum so that the adhesive back faces outward from the drum, the heat activated adhesive layer having a thickness of about 0.0005 to 0.001 inches thickness and a melting temperature of about 140 to about 170 degrees Fahrenheit, the label also having a leading edge

rotating the drum to move the label retained thereto into an article wrapping position positioned at a lower portion of the drum,

heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt,

conveying a tapered crayon substantially horizontally along a predetermined path of travel into the article wrapping position at the lower portion of the label

drum and into rotative engagement with the leading of a
° label retained on the label drum while maintaining a
differential end-to-end pressure against the article while
also transferring the label onto the cylindrical article by
wrap around labeling with end-to-end label alignment.

46. A method according to claim 45 including conveying
5 the article along a substantially arcuate path around the
lower portion of the label drum and into engagement with the
outer drum surface.

47. A method according to claim 45 including conveying
10 the cylindrical article along a horizontally configured con-
veyor.

48. A method according to claim 45 including
15 supporting the article on the conveyor between spaced
rollers.

49. A method according to claim 48 wherein the spaced
rollers include outwardly extending pins and including the
step of guiding the pins in an arcuate configured guide
20 groove for guiding the article in an arcuate path around the
lower portion of the label drum.

50. A method for applying a label onto a cylindrical
article that is tapered along its length comprising the
25 steps of

feeding a substantially rectangular configured,
thin layer, heat activated adhesive backed label onto the
surface of a label drum, the label having a leading edge,
rotating the drum to move the label retained
30 thereon into an article wrapping position at a lower portion
of the drum,

heating the adhesive as the drum rotates so that
the adhesive obtains a sufficient temperature to melt, and
conveying a tapered article having a wider "butt"
35 end substantially horizontally along a predetermined path of

travel into the article wrapping position at the lower
° portion of the label drum and into rotative engagement with
the leading edge of a label retained on the label drum while
maintaining a differential end-to-end pressure against the
article while transferring the label onto the cylindrical
articles that the article is labeled with end-to-end
5 alignment thereof.

51. A method for applying a label onto a
substantially cylindrical article comprising the steps of
feeding a thin layer, heat activated adhesive
10 backed label onto a resilient, polymeric surface of a label
drum so that the adhesive back faces outward from the drum,
rotating the drum to move the label retained
thereto into an article wrapping position positioned at a
lower portion of the drum,
15 heating the adhesive as the drum rotates so that
the adhesive obtains a sufficient temperature to melt,
conveying a cylindrical article substantially
horizontally along a predetermined path of travel into the
article wrapping position at the lower portion of the label
20 drum and into rotative engagement with a label retained on
the label drum while transferring the label onto the
cylindrical article by wrap around labeling, and
blowing a jet of air onto the resilient, polymeric
surface for cooling the surface during subsequent label
25 applying and ensuring rapid cooling of melted adhesive
during labeling.

52. A method according to claim 51 including blowing
a jet of air through a bank of jet nozzles positioned
30 adjacent the label drum.

53. A method for applying a label onto a substantially
cylindrical article comprising the steps of

35

feeding a thin layer, heat activated adhesive
backed label onto the surface of a label drum so that the
adhesive back faces outward from the drum,
rotating the drum to move the label retained
thereto into an article wrapping position positioned at a
lower portion of the drum,
heating the adhesive as the drum rotates so that
the adhesive obtains a sufficient temperature to melt,
conveying a cylindrical article substantially
horizontally along a predetermined path of travel into the
article wrapping position at the lower portion of the label
drum and into rotative engagement with a label retained on
the label drum,
transferring the label onto the cylindrical
article by wrap around labeling, and
while also eliminating static on the label to pre-
vent the label from sticking to the drum surface during
labeling.

54. An apparatus for applying a label onto a substan-
tially cylindrical article comprising
a label drum defining an article wrapping position
at a lower portion of the label drum,
means for feeding a thin layer, heat activated
adhesive backed label onto the surface of said drum so that
the adhesive back faces outward from the drum,
means for rotating the label drum to move the
label retained thereon into the article wrapping position,
means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and
means for conveying a cylindrical article substan-
tially horizontally along a predetermined path of travel
into said article wrapping position at the lower portion of
the label drum and into rotative engagement with a label
retained on the label drum so as to transfer the label onto
the cylindrical article by wrap-around labeling.

55. An apparatus according to claim 54 wherein said
conveying means includes a horizontally configured conveyor,
said conveyor having article carriers thereon for conveying
an article to said article wrapping position.

56. An apparatus for applying a label onto a
cylindrical article that is tapered along its longitudinal
direction comprising

a label drum defining an article wrapping position
at a lower portion of the label drum,

means for feeding a rectangular configured, thin
layer, heat activated adhesive backed label onto the surface
of said drum so that the adhesive back faces outward from
the drum, said label having a leading edge,

means for rotating the label drum to move the
label retained thereon into the article wrapping position,

means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

means for conveying a cylindrical article substan-
tially horizontally along a predetermined path of travel
into said article wrapping position and in a substantially
arcuate path around the lower portion of the label drum and
into rotative engagement with a label for transferring the
label onto the cylindrical article while also maintaining a
differential end-to-end pressure against the article for
ensuring end-to-end alignment of the label about the tapered
article.

57. An apparatus according to claim 56 wherein said
conveying means includes a horizontally configured conveyor,
said conveyor having article carriers thereon for conveying
an article to said article wrapping position.

58. An apparatus for applying a label onto a substan-
tially cylindrical article comprising

° a label drum defining an article wrapping position at a lower portion of the label drum, and having a plurality of label receiving positions formed of a substantially smooth, resilient polymeric surface,

means for feeding a thin layer, heat activated adhesive backed label onto the surface of said drum so that the adhesive back faces outward from the drum,

means for rotating the label drum to move the label retained thereon into the article wrapping position,

means for heating the adhesive as the drum rotates so that the adhesive obtains a sufficient temperature to melt, and

means for conveying a cylindrical article substantially horizontally along a predetermined path of travel into said article wrapping position and into rotative engagement with a label retained on the label drum for transferring the label onto the cylindrical article by wrap around labeling, and

means for blowing a jet of air onto the resilient drum surface for cooling the surface during subsequent label applying and ensuring rapid cooling of melted adhesive during labeling.

59. An apparatus according to claim 58 wherein said means for blowing a jet of air comprises a bank of jet nozzles positioned adjacent the label drum.

60. An apparatus according to claim 58 wherein said polymeric surface is formed on a silicon layer.

61. An apparatus for applying a label onto a tapered crayon comprising

a label drum defining a crayon wrapping position at a lower portion of the label drum,

means for feeding a thin layer, heat activated adhesive backed label onto the surface of said drum so that the adhesive back faces outward from the drum, the heat

activated adhesive layer having a thickness of about 0.0005
° to about 0.001 inches thickness and a melting temperature of
about 140 to about 170 degrees Fahrenheit, said label also
having a leading edge

means for rotating the label drum to move the
label retained thereon into the crayon wrapping position,

5 means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

10 means for conveying a crayon substantially
horizontally along a predetermined path of travel into said
crayon wrapping position and into rotative engagement with
the leading edge of the label retained on the label drum for
transferring the label onto the crayon by wrap around
labeling with end-to-end label while also maintaining a
differential end-to-end pressure against the article to
15 ensure end-to-end label alignment.

62. A crayon comprising
a cylindrical crayon body having opposing ends,
a substantially rectangular configured label, said
20 label having printed indicia and a registration mark used
for determining cut points on the label, said label having
at least one paper layer and being wrapped circumferentially
at least twice about the article so that the registration
mark is covered and a desired printed indicia is exposed,
25 and

a heat activated adhesive coated on the label and
adhering to the crayon for retaining the label thereto.

63. A crayon according to claim 62 wherein the heat
30 activated adhesive has a melting temperature of about 140 to
170 degrees Fahrenheit.

64. A crayon according to claim 62 wherein the heat
activated adhesive is about 0.0005 to 0.001 inch and coated
35 on the label.

65. An article comprising
an elongated substantially cylindrical article
having opposing ends,
a substantially rectangular configured label, said
label having printed indicia and a registration mark used
for determining cut points on the label, said label being
5 wrapped circumferentially at least twice about said article
so that the registration mark is covered and a desired
printed indicia is exposed,
and a heat activated adhesive coated on the label
and adhering to the article for retaining the label thereto.

10

66. A method for applying a label onto a substantially
cylindrical article comprising the steps of
feeding a thin layer, heat activated adhesive
backed label onto the surface of a label drum so that the
adhesive back faces outward from the drum,
15 rotating the drum to move the label retained
thereto into an article wrapping position at a lower portion
of the drum,
heating the adhesive as the drum rotates so that
20 the adhesive obtains a sufficient temperature to melt,
conveying a cylindrical article into an article
wrapping position at the lower portion of the label drum and
into rotative engagement with a label retained on the label
drum by moving the articles while supporting the articles on
25 a substantially horizontal chain conveyor formed of two
chain loops each formed from a plurality of interconnected
chain links, and including substantially parallel support
rods extending between the chain loops and supported by the
chain links, wherein said support rods are spaced a distance
30 sufficient to allow an article to rest thereon, and
transferring the label onto the cylindrical
article by wrap around labeling.

67. A method according to claim 66 including conveying
35 the article along a substantially arcuate path around the

lower portion of the label drum and into engagement with the outer drum surface.

68. A method according to claim 66 including aligning the ends of the articles by engaging the ends with a registration wheel.

69. A method according to claim 69 wherein each chain link includes a guide hole, and wherein the spaced rods are received within the guide holes, and each rod includes a shaft extending outwardly from the chain link, and including moving the conveyor and receiving the shaft into an arcuate configured guide slot for moving the articles supported on the rods around the lower portion of the drum into a label wrapping position.

70. A method according to claim 66 wherein the articles are crayons and the heat activated adhesive layer positioned on the back of the paper is about 0.0005-0.001 inches thick.

71. A method according to claim 66 wherein the heat activated adhesive has a melting range of about 140 to about 170 degrees Fahrenheit, and including the step of heating the adhesive for about 0.25 seconds.

72. An apparatus for applying a label onto a substantially cylindrical article comprising
a label drum defining an article wrapping position at a lower portion of the label drum,
means for feeding a thin layer, heat activated adhesive backed label onto the surface of said drum so that the adhesive back faces outward from the drum,
means for rotating the label drum to move the label retained thereon into the article wrapping position,

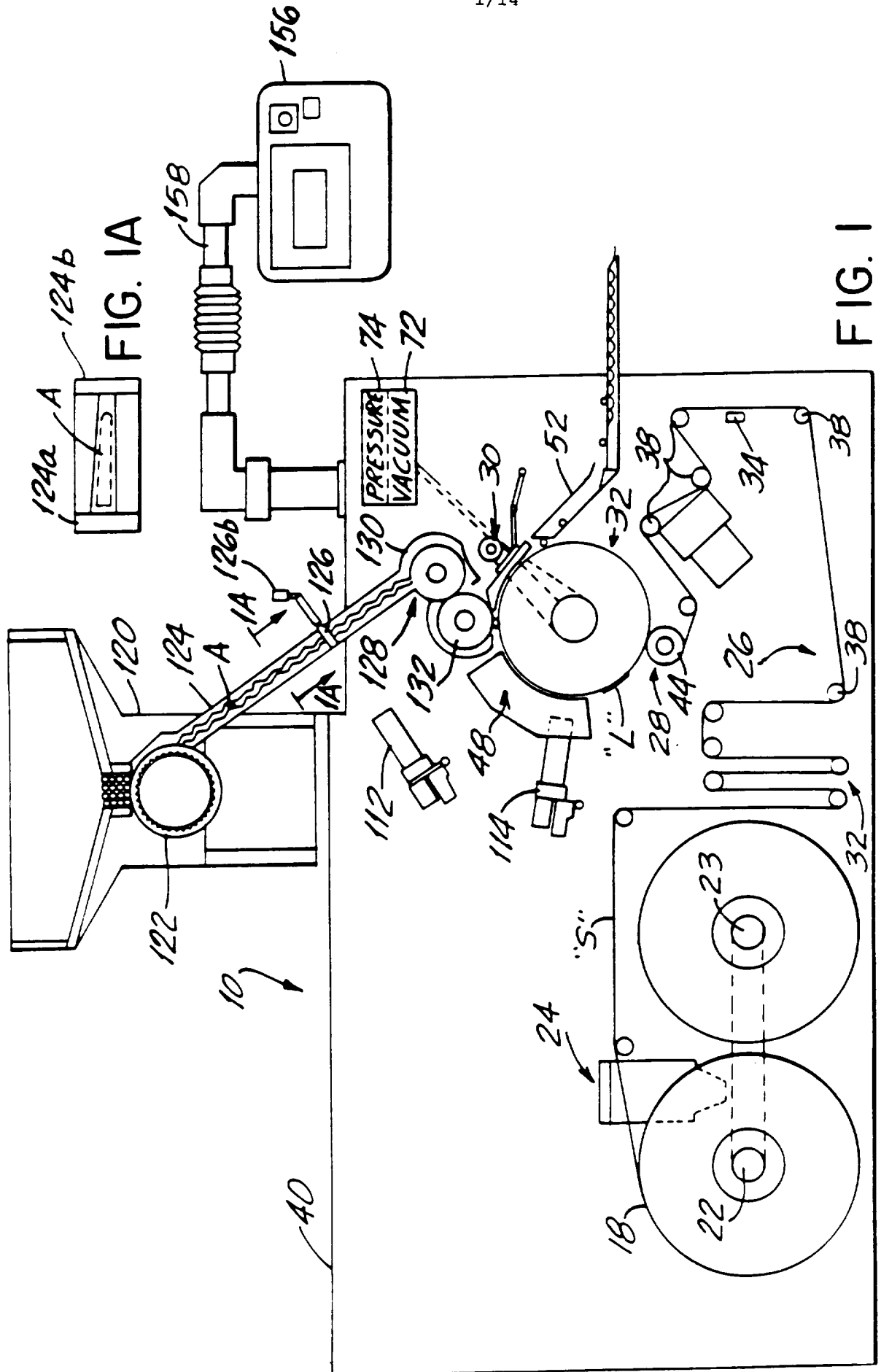
means for heating the adhesive as the drum rotates
so that the adhesive obtains a sufficient temperature to
melt, and

a substantially horizontal chain conveyor formed
of two chain loops each formed from a plurality of
interconnected chain links, and including substantially
parallel support rods extending between the chain loops and
supported by the chain links, wherein said support rods are
spaced to form a support surface on which the articles rest,
said horizontal chain conveyor extending into an article
wrapping position at the lower portion of the label drum
wherein the conveyor moves articles into rotative engagement
with a label retained on the label drum so that the label is
transferred onto the label on the cylindrical article by
wrap around labeling.

73. An apparatus according to claim 72 wherein said
support rods include outwardly extending pins and bearings
positioned on the pins, and including means positioned adja-
cent said article wrapping position for guiding the bearings
in a predetermined arcuate path so that the articles are
conveyed in a substantially arcuate path around the lower
portion of said label drum.

74. An apparatus according to claim 72 wherein the
articles are crayons and the heat activated adhesive layer
positioned on the back of the paper is about 0.0005-0.001
inches thick.

75. An apparatus according to claim 72 wherein said
heating means heats the heat activated adhesive to a range
of about 140 to about 170 degrees Fahrenheit.



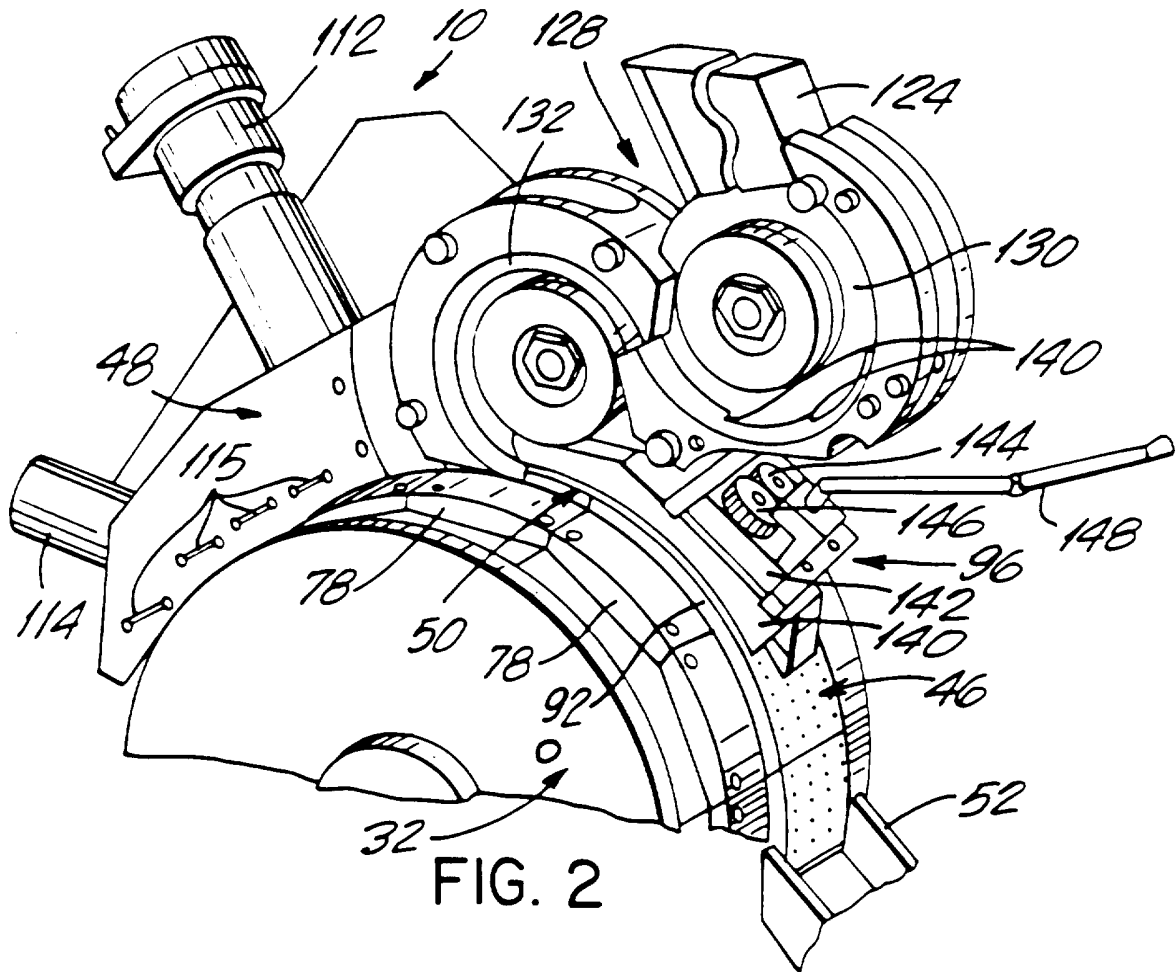


FIG. 2

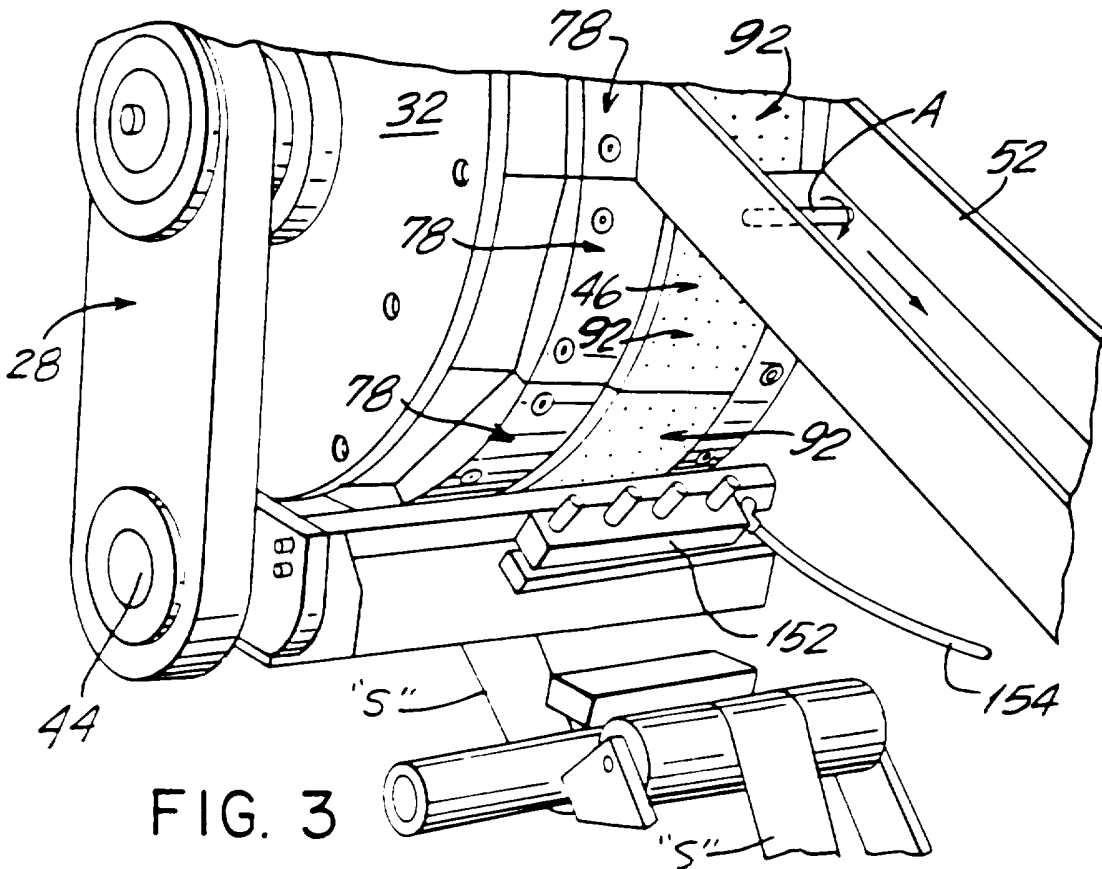


FIG. 3

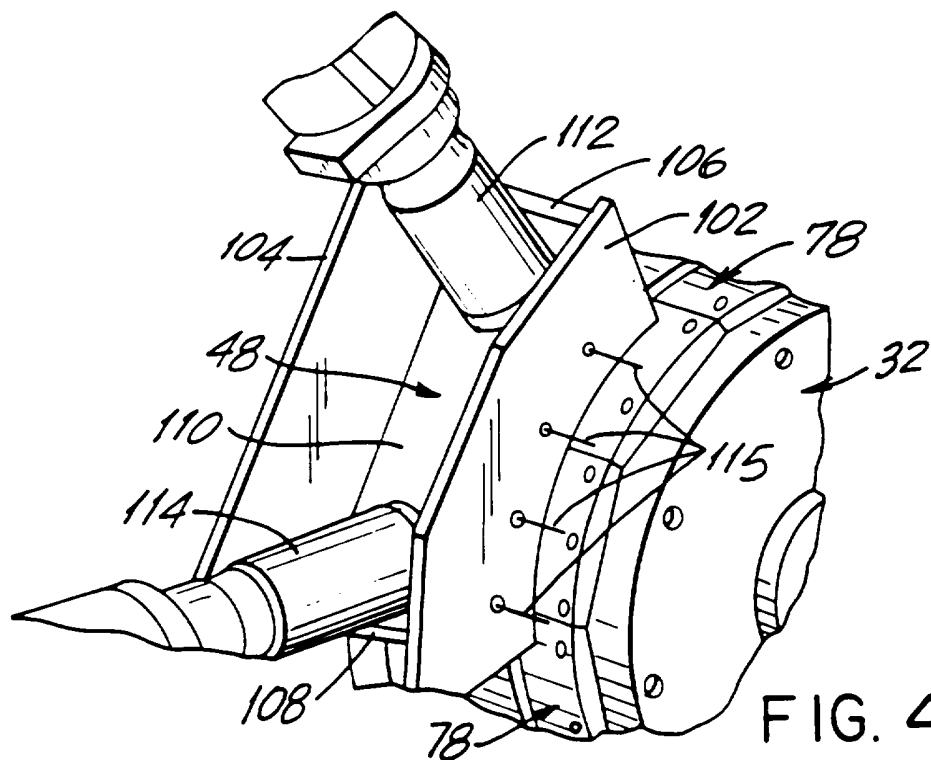


FIG. 4

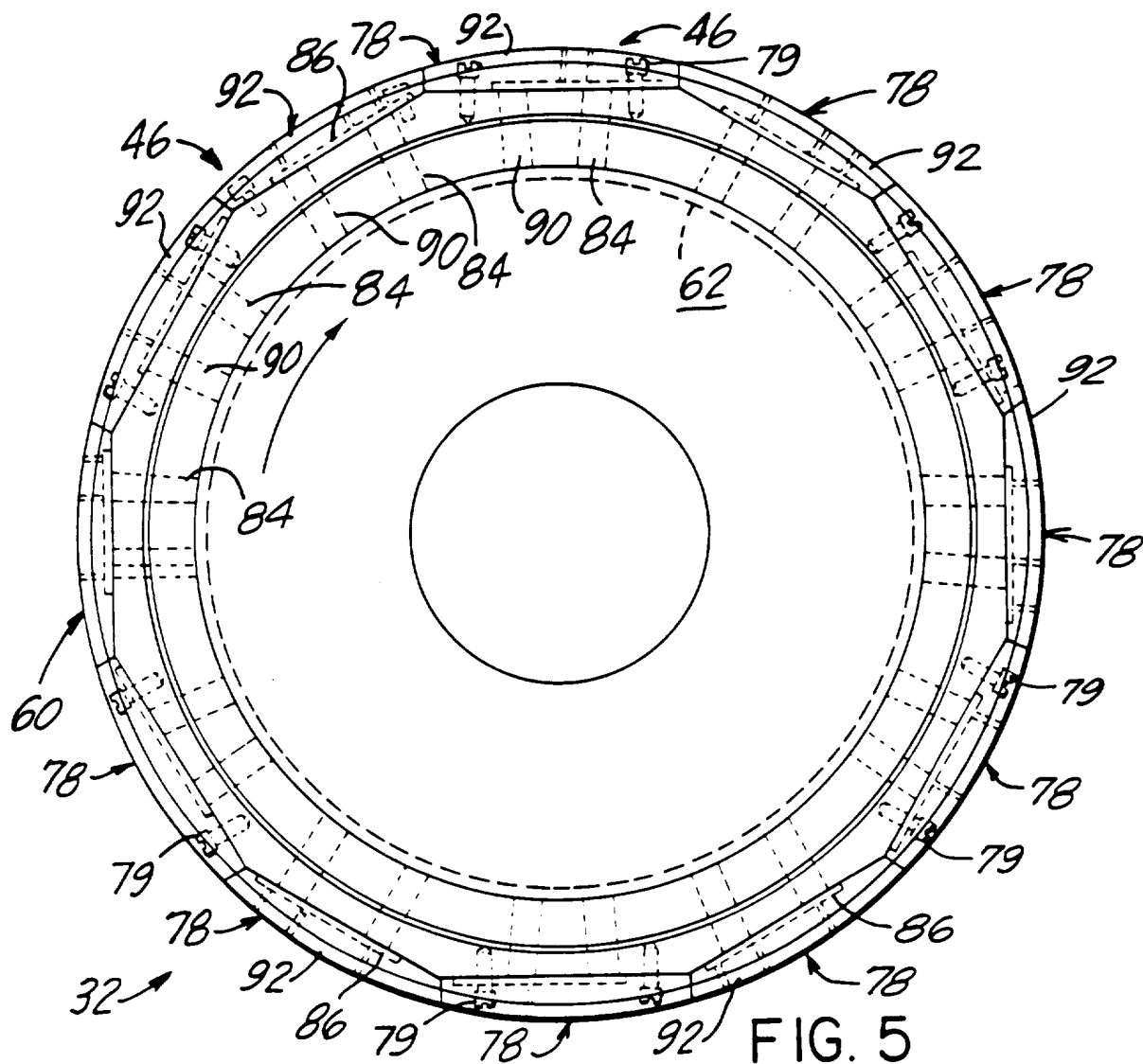


FIG. 5

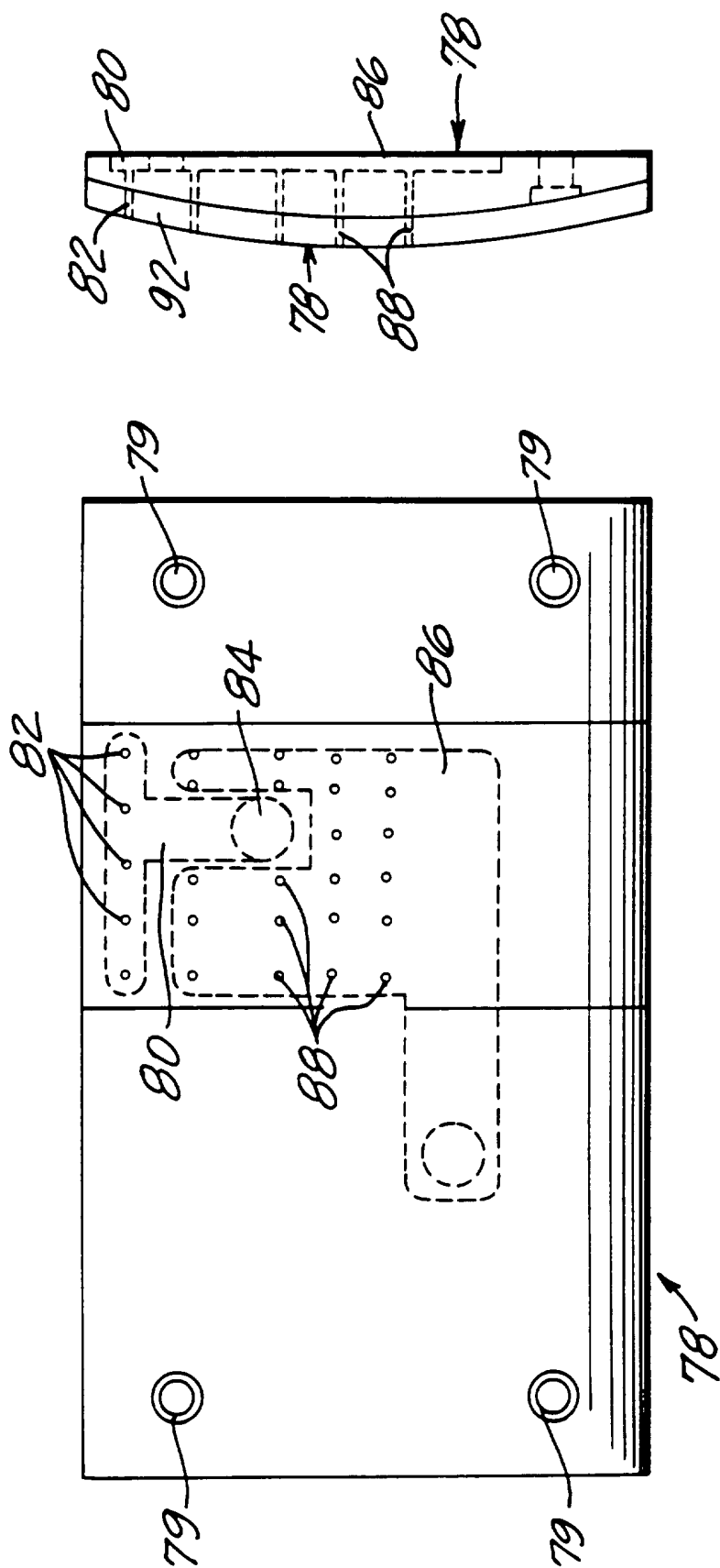


FIG. 7

FIG. 6

5/14

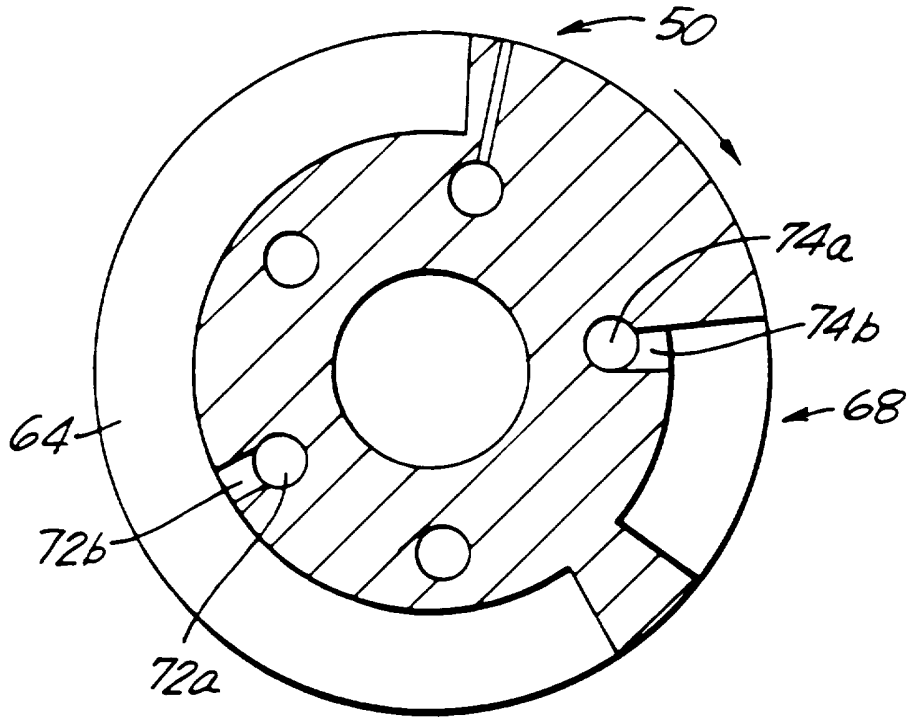


FIG. 8

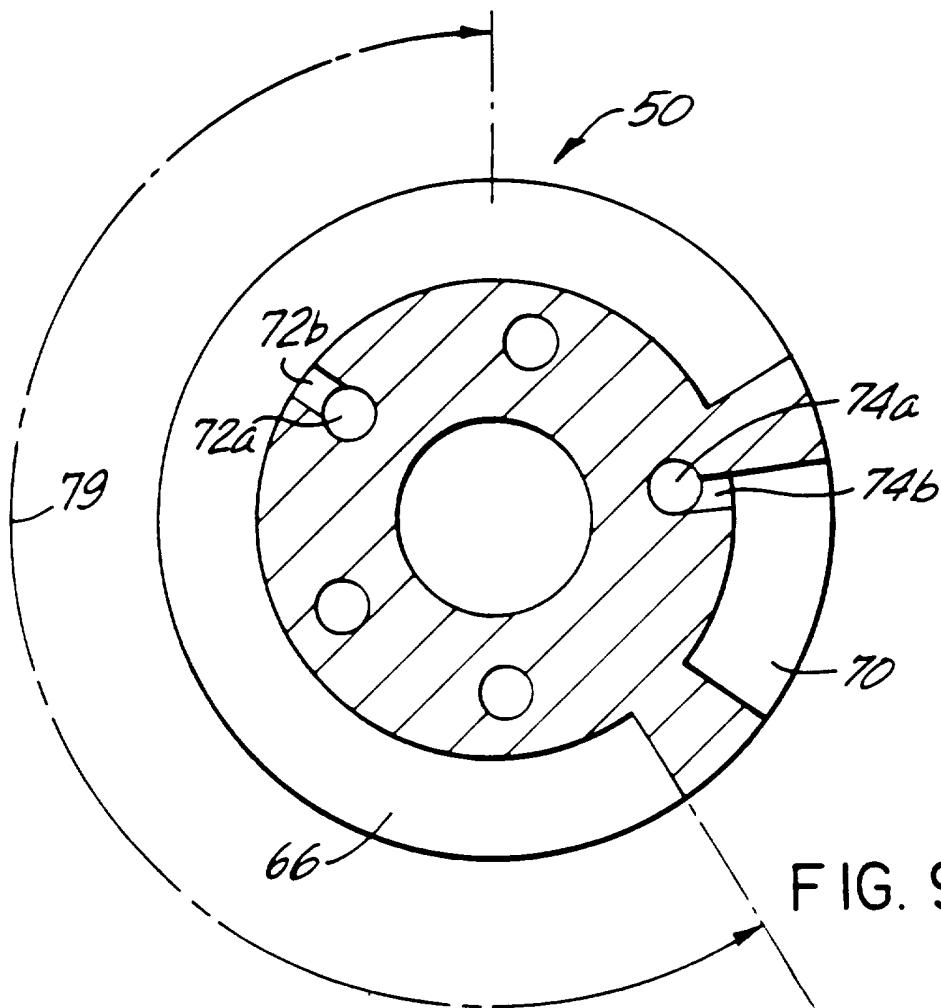


FIG. 9

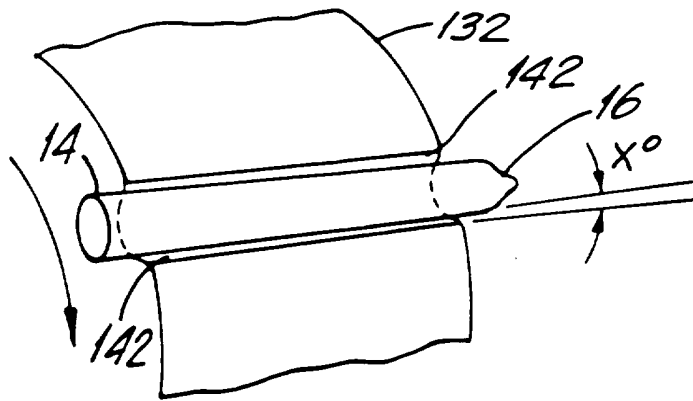


FIG. 10

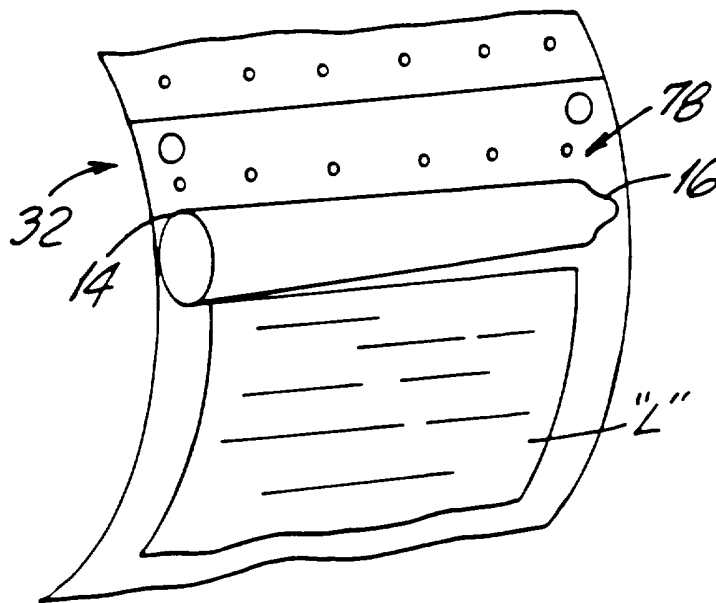


FIG. 11

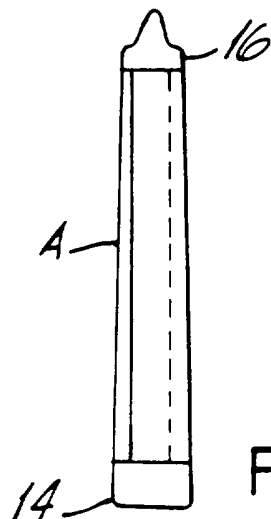


FIG. 12

SUBSTITUTE SHEET (RULE 26)

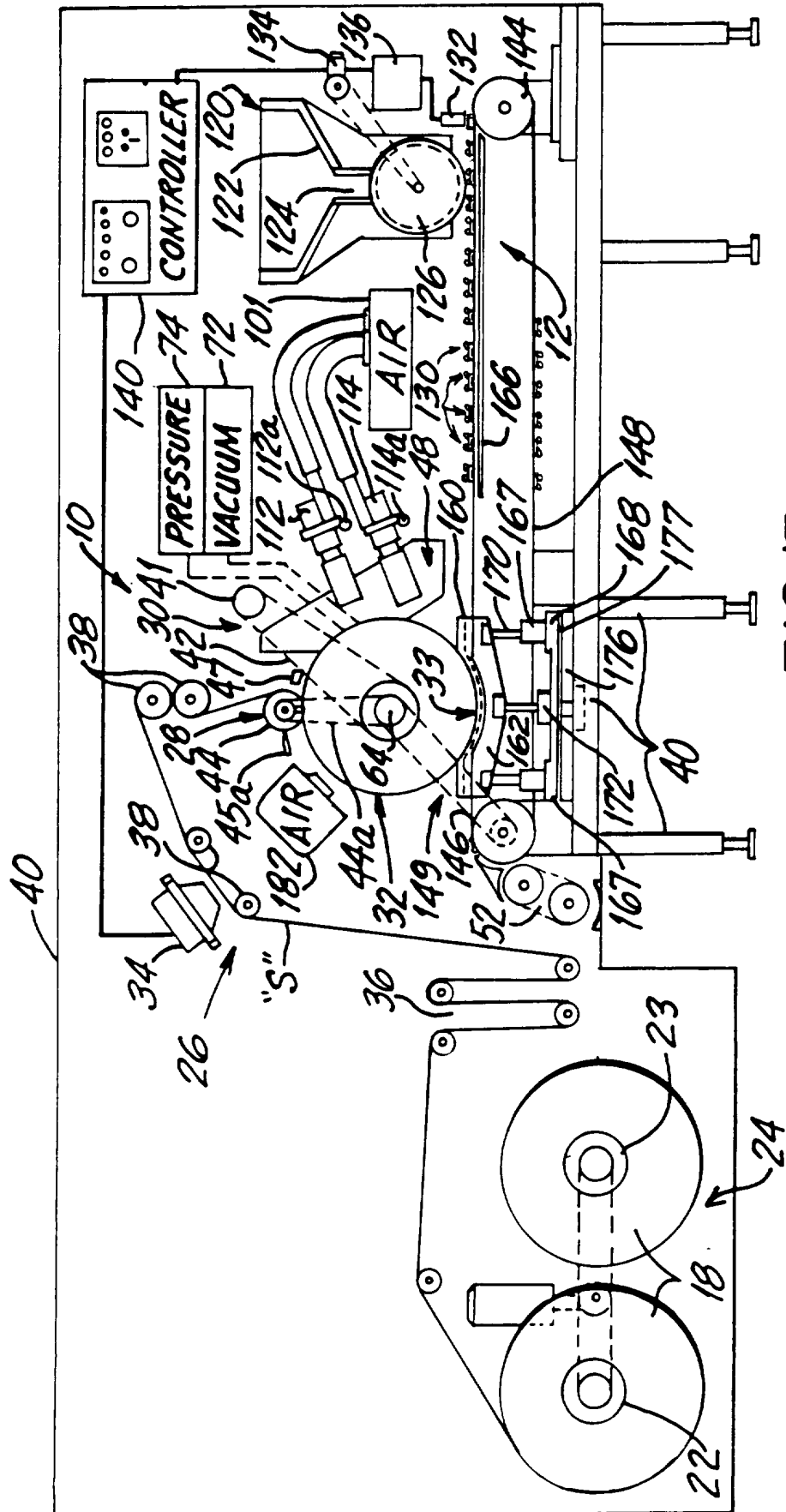


FIG.13

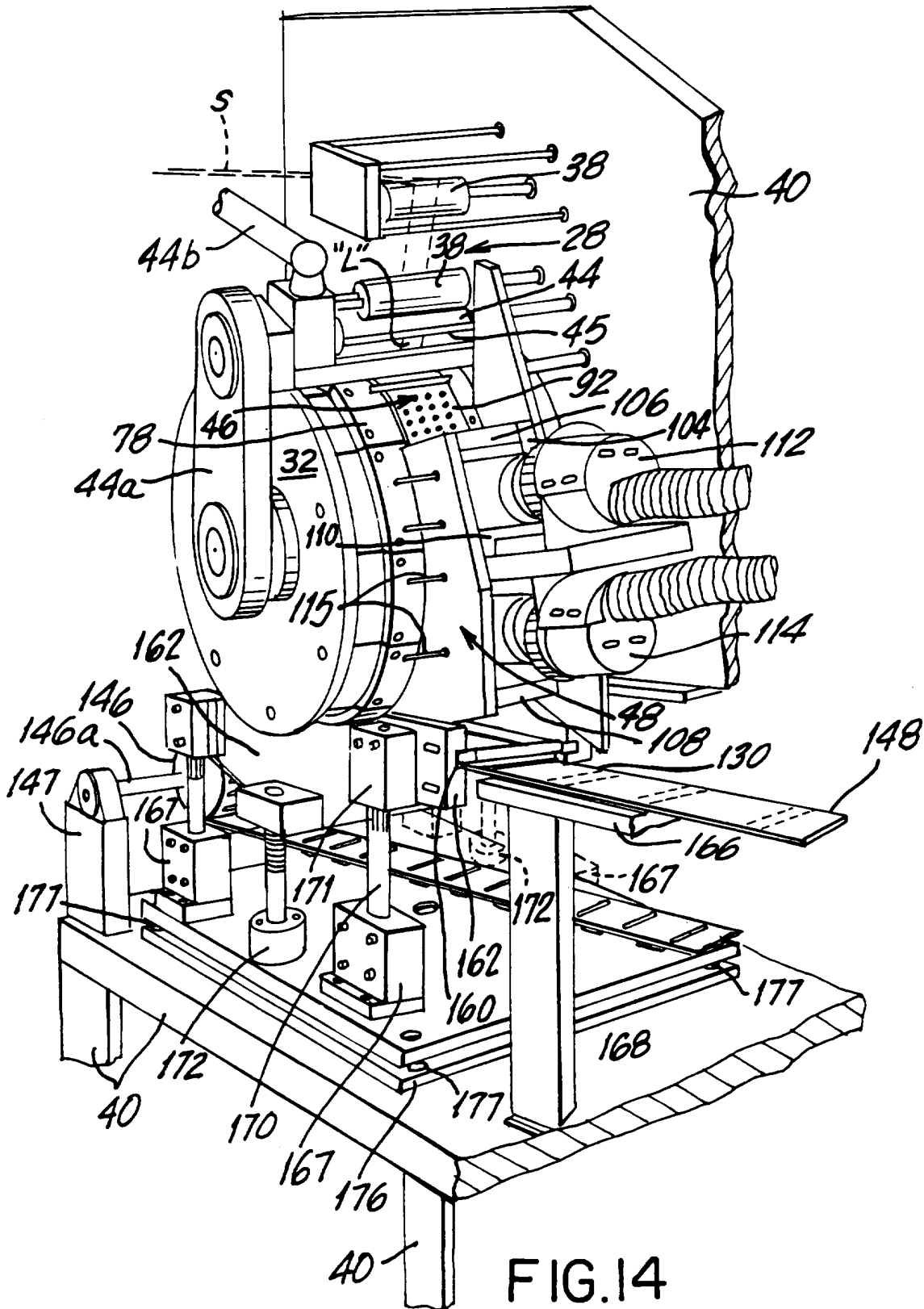


FIG. 14

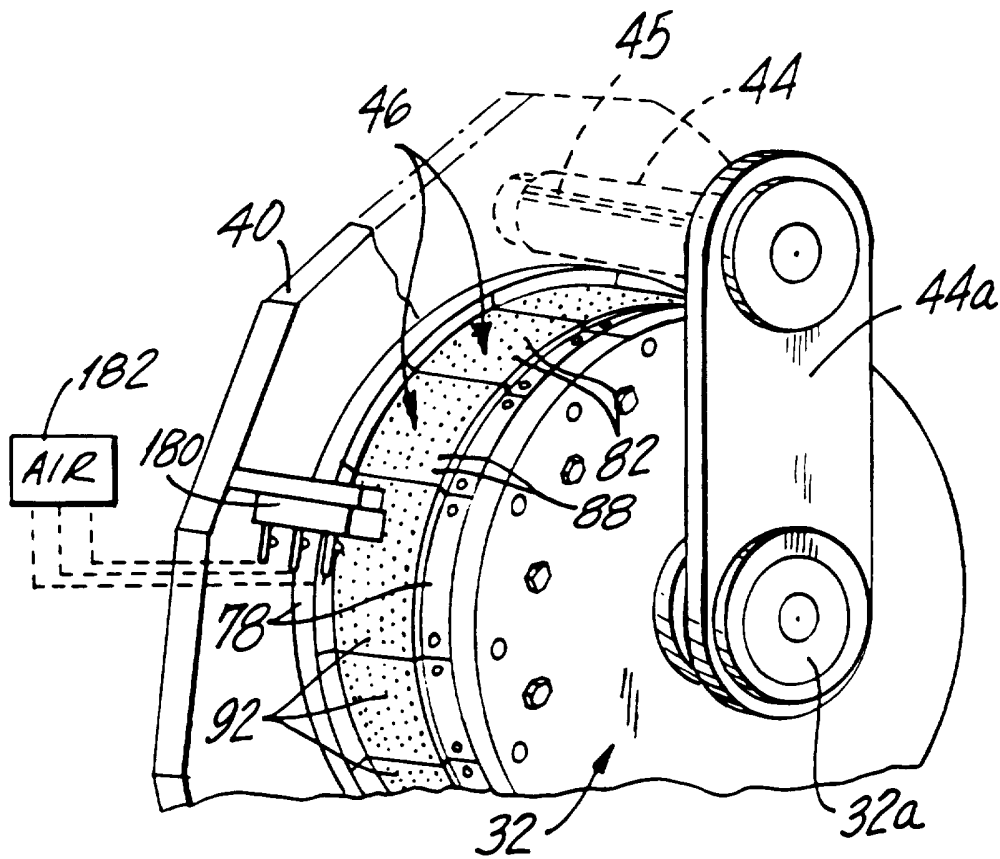


FIG. 15

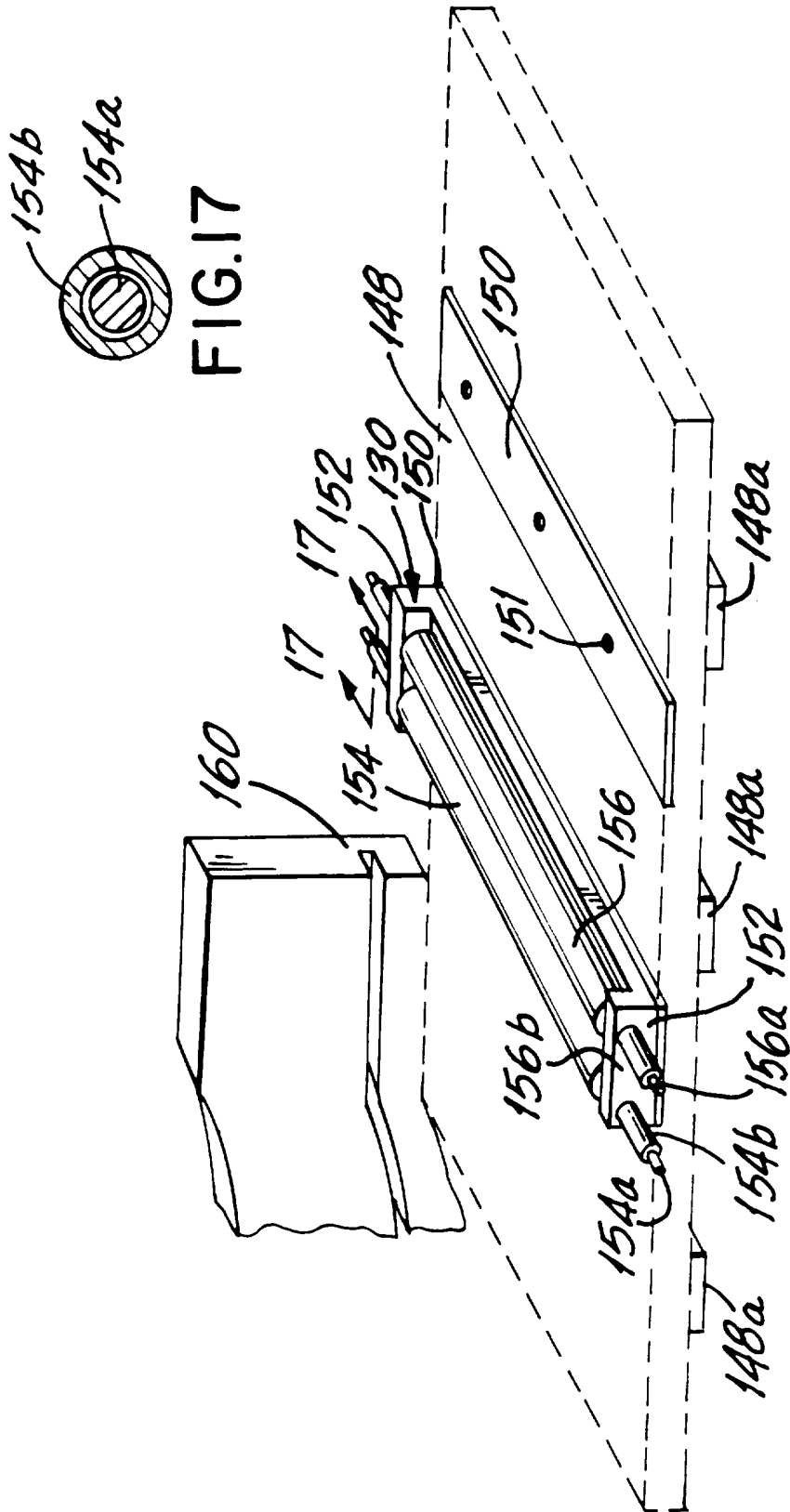


FIG.17

FIG.16

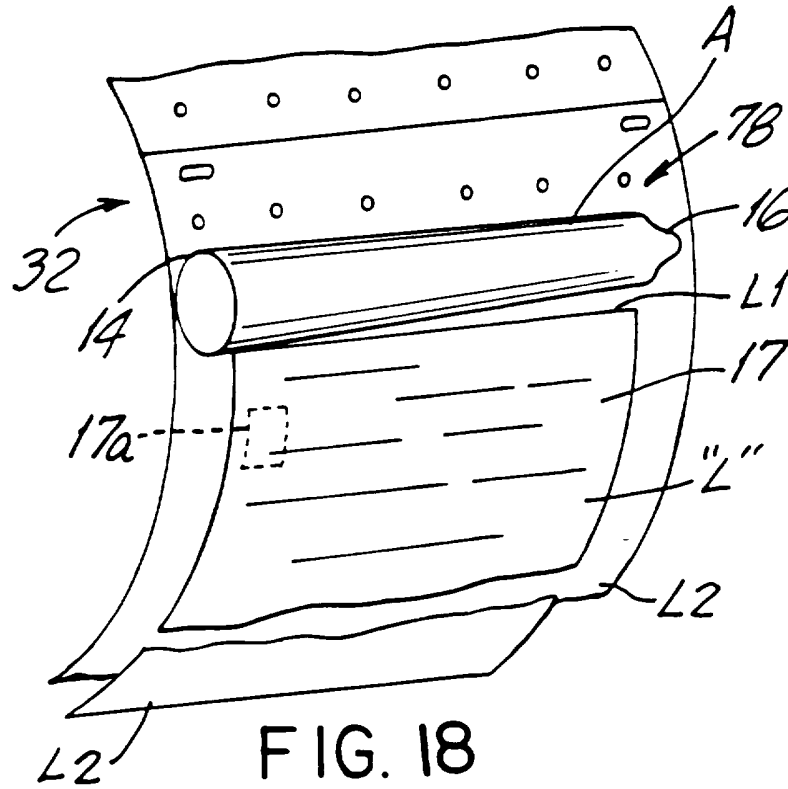


FIG. 18

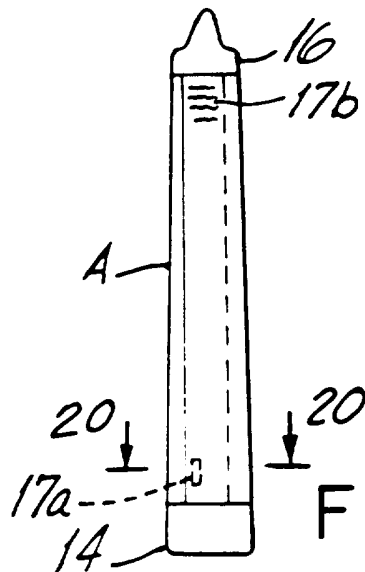


FIG. 19

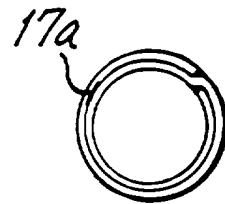


FIG. 20

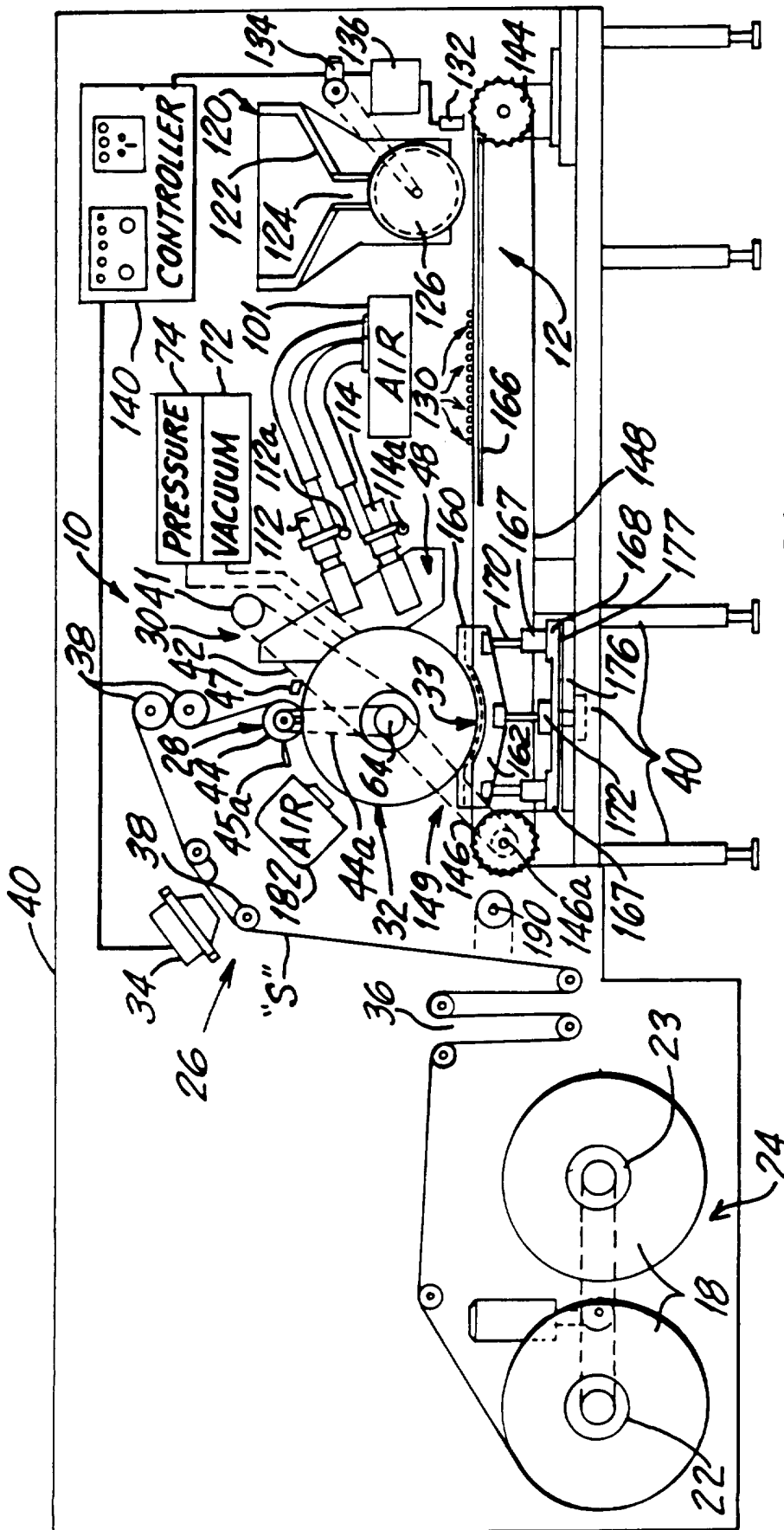


FIG.21

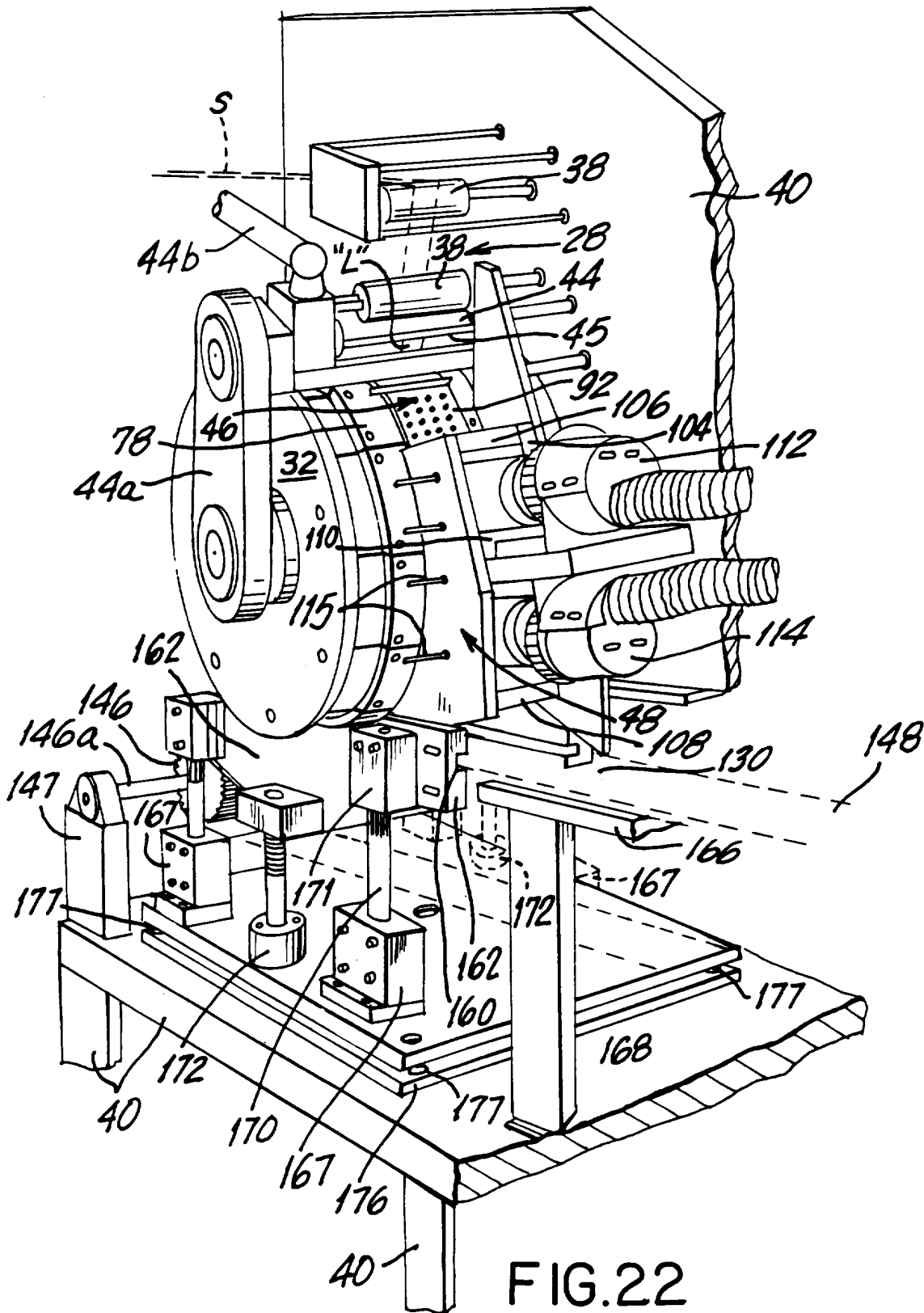


FIG. 22

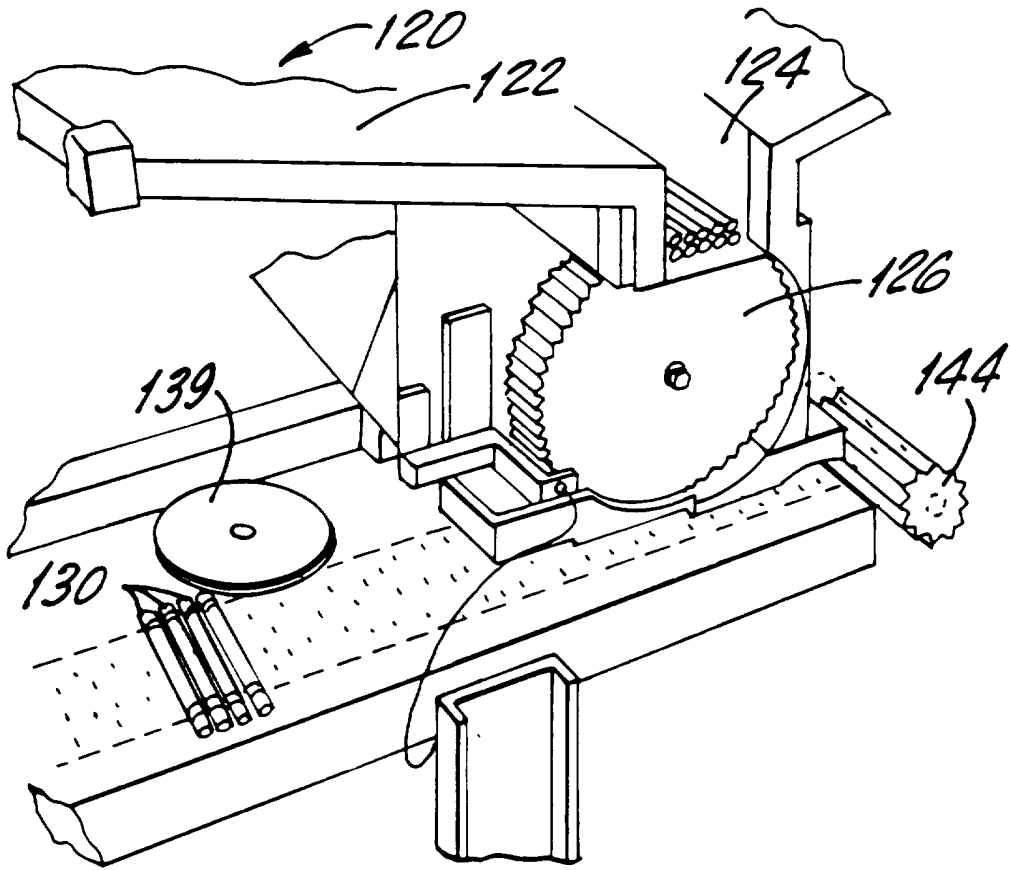


FIG. 23

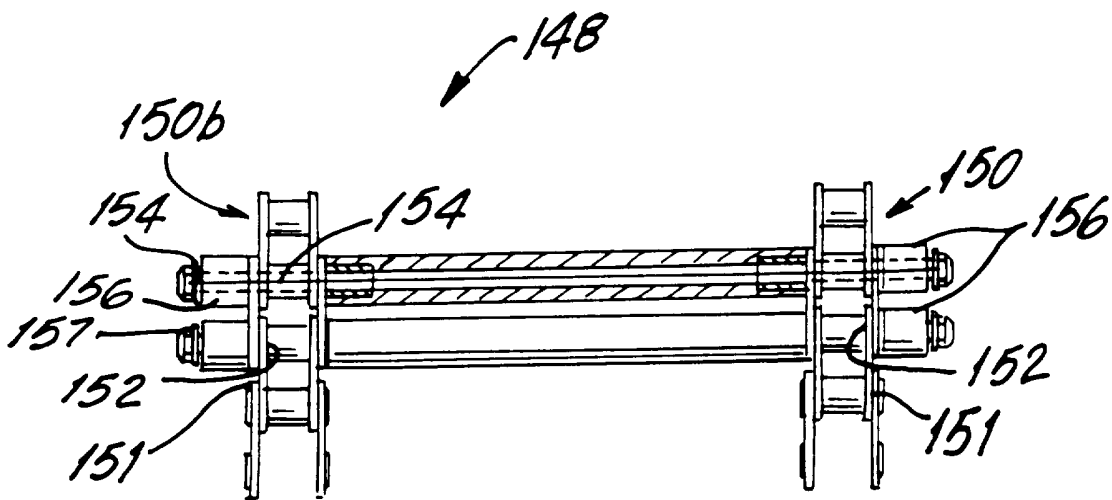


FIG. 24