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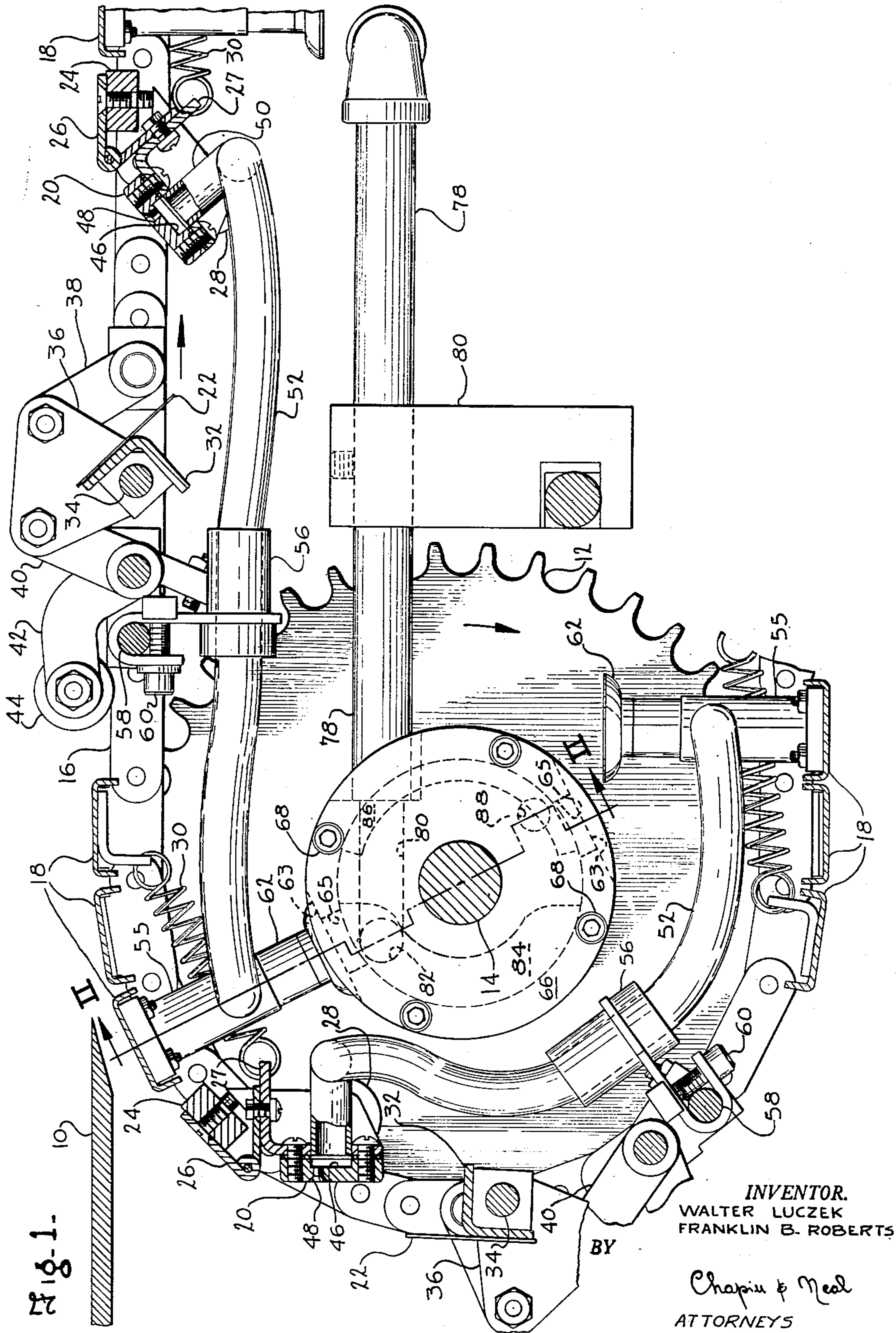
W. LUCZEK ET AL

2,952,957

SUCTION MEANS FOR WRAPPING INSTRUMENTALITIES

Filed Feb. 13, 1958

3 Sheets-Sheet 1



Sept. 20, 1960

W. LUCZEK ET AL

2,952,957

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Filed Feb. 13, 1958

3 Sheets-Sheet 2

Fig. 2.

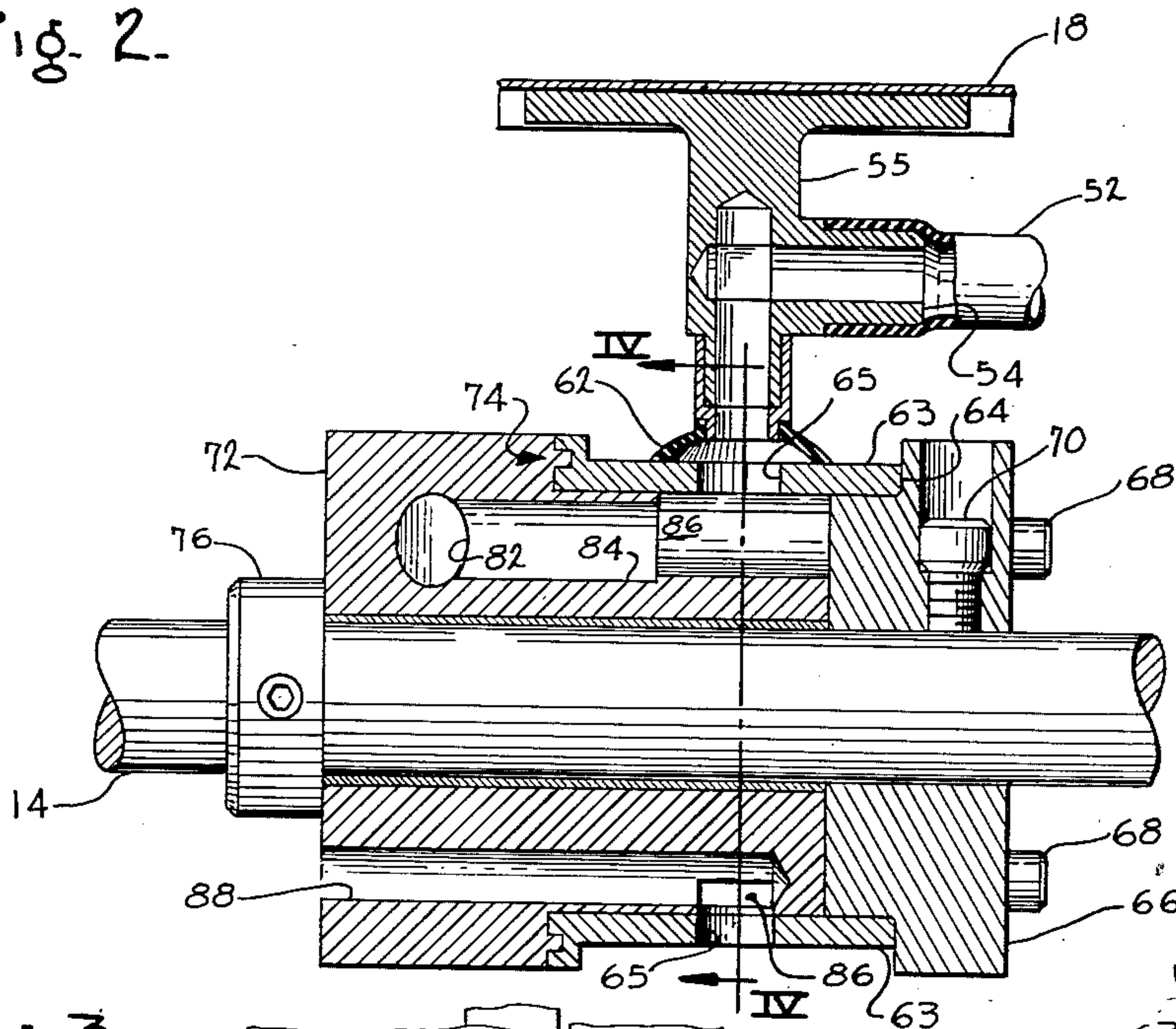


Fig. 3.

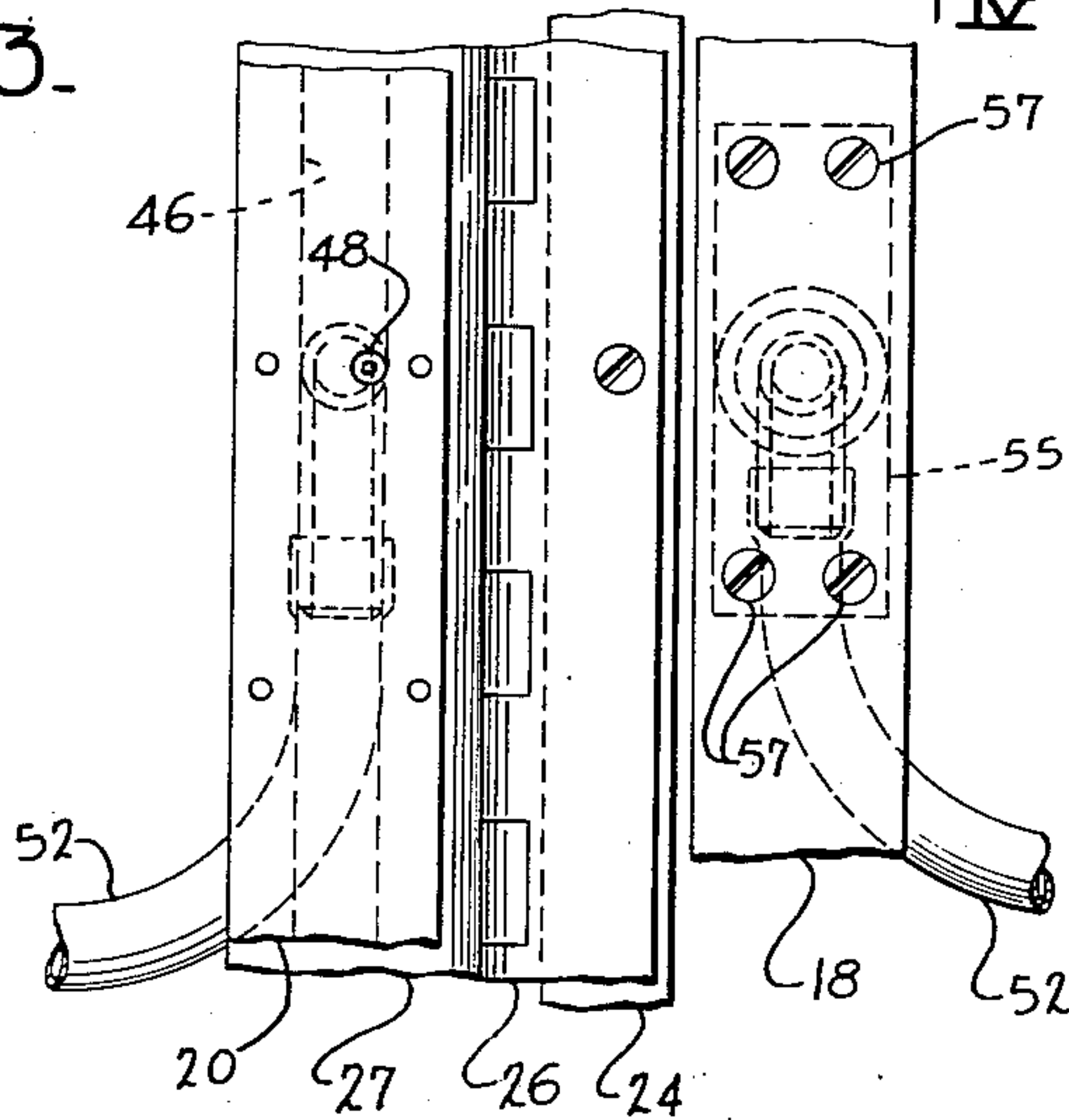
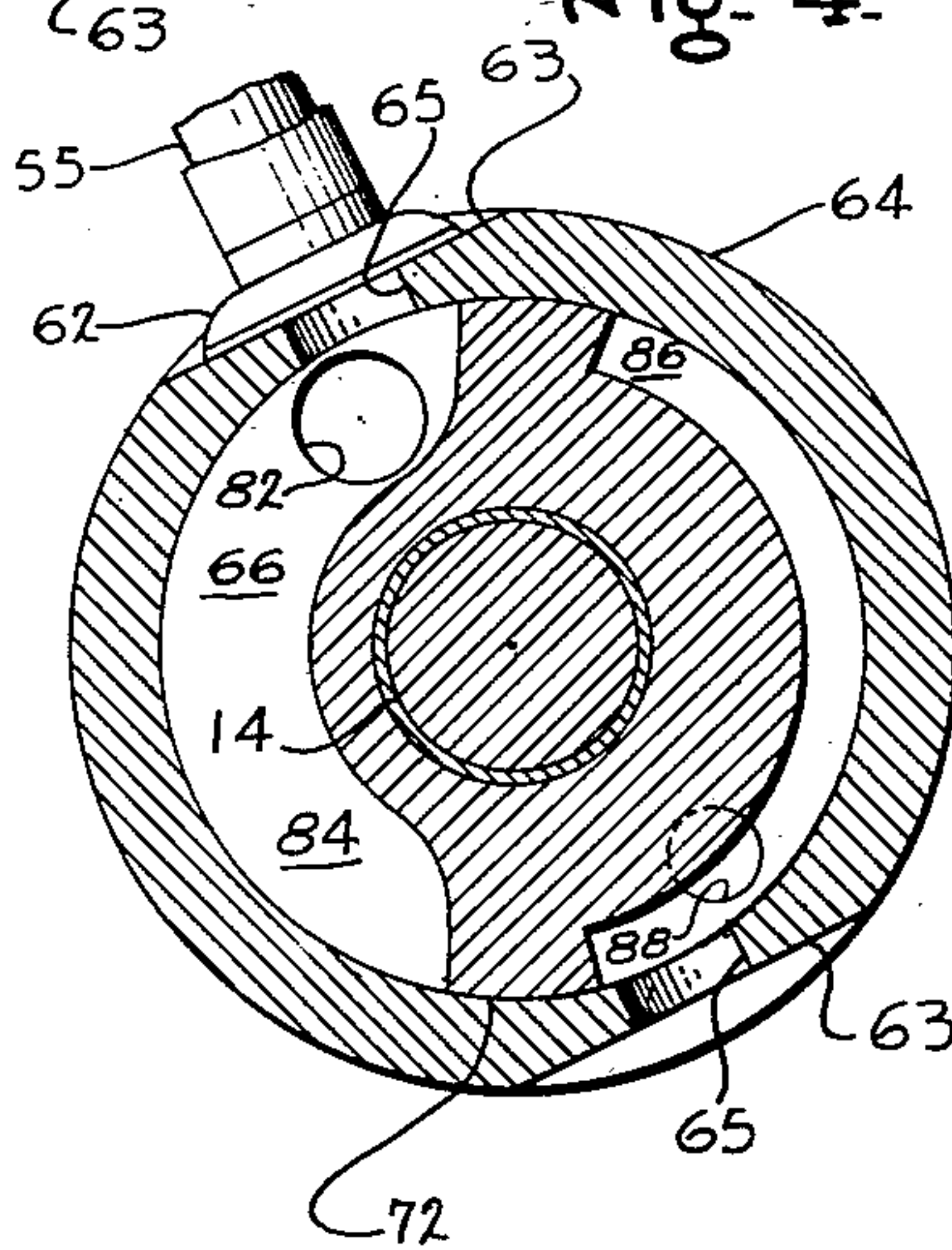


Fig. 4.



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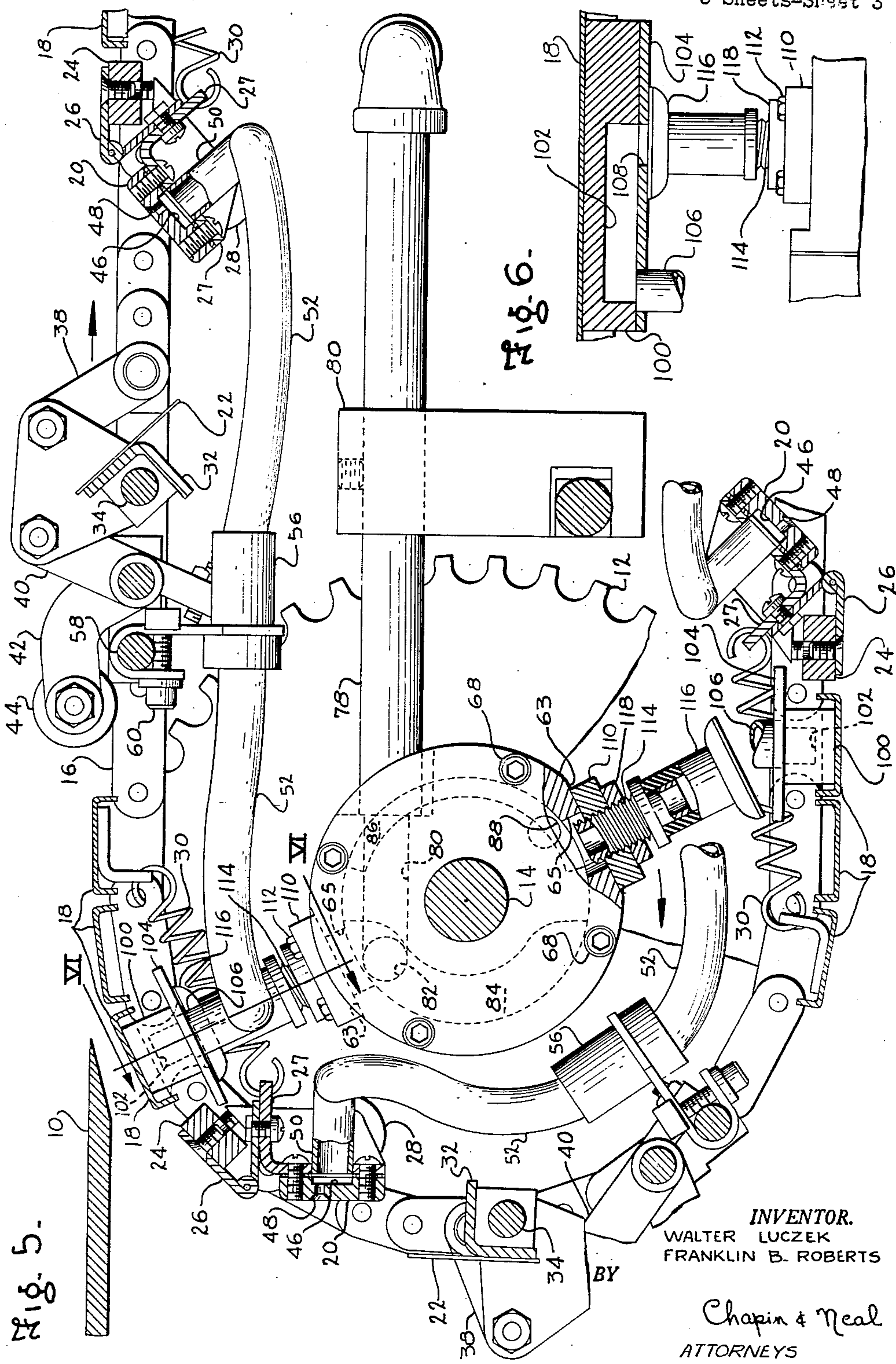
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Filed Feb. 13, 1958

3 Sheets-Sheet 3





1

2,952,957

## SUCTION MEANS FOR WRAPPING INSTRUMENTALITIES

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9 Claims. (Cl. 53—228)

The present invention relates to improvements in packaging machines and more particularly to improvements in wrapping machines of the type wherein articles are continually advanced, at least during their encirclement in a wrapper, in the fashion disclosed and claimed in U.S. Patent No. 2,810,246—Cornock, et al.

While several different embodiments of the Cornock, et al. invention are disclosed in the above-mentioned patent, the present invention more particularly deals with improvements over the embodiment seen in Figs. 12 through 20 thereof. In brief, this embodiment comprises an overhead conveyor having depending paddles which continuously advance articles, partially encircled in a wrapper, onto a continuously moving support with the trailing end of the wrapper depending through an opening therein. Articulated elements carried by this support include a suction member and a tucker blade movable therewith and articulated to lap the wrapper ends and complete the encirclement of the article as it is being advanced.

Suction has to be created in the suction member during at least a portion of the time that it moves with the article. In the Cornock et al. patent, the suction means for this purpose includes a conventional open-top suction box surrounded by a moving belt. A member movable with the supporting conveyor overlies an opening in the moving belt during advancement of the article and a flexible hose extends from this member to the articulated suction member to provide a passageway from the suction box to the suction member.

It has been found that the articulation of these lap forming instrumentalities is highly effective and in fact enables such rapid rates of operation that the use of the conventional suction box is undesirable because the moving belt surrounding it requires frequent replacement. This causes inconvenience and also considerable loss of production. The problem of belt replacement may be further aggravated by the nature of the goods being packaged. Thus, for example, if alcoholic beverages are being wrapped, breakage of a bottle and spilling of its contents onto the moving belt will cause it to deteriorate quite rapidly.

The object of the invention is to overcome the problems which have arisen from the use of an open tank suction system and to minimize, if not eliminate the need for repair and replacement of parts in the suction system of wrapping machines of the type above-described having suction instrumentalities moving in a closed path.

The above and other related objects and features of the invention will be apparent from a reading of the following description of the disclosure found in the accompanying drawings and the novelty thereof pointed out in the appended claims.

In the drawings:

Fig. 1 is a longitudinal section of a wrapping machine embodying the present invention and corresponding in a fragmentary sense to Fig. 12 of the above-mentioned patent;

2

Fig. 2 is a section taken on the line II—II in Fig. 1;

Fig. 3 is a fragmentary plan view of certain elements in Fig. 1;

Fig. 4 is a section taken generally on line IV—IV in Fig. 2;

Fig. 5 is a longitudinal section similar to Fig. 1 illustrating an alternate embodiment of the invention; and

Fig. 6 is a section taken on line VI—VI in Fig. 5.

Referring first to Fig. 1, 10 indicates a shelf over which articles partly encircled in wrappers are advanced to lap forming instrumentalities carried by laterally spaced chains 16 (only one of which is shown) which chains are trained around respective sprockets 12 secured to a shaft 14. Spaced along the chains 16 are groups of lap forming instrumentalities, each group comprising supporting members 18, a suction member 20 and a tucking blade 22. Extending between the chains 16 are bars 24 to which the suction members 20 are secured by a piano leaf hinge 26 by way of an angle bar 27. Each suction member 20 is provided with rolls 28 at either end which ride against cam rails (not shown) to control swinging movement of the suction member 20 toward and away from the bottom of the package being wrapped, with springs 30 holding the rolls 28 in engagement with said cam rails.

Each tucking blade 22 is mounted on an angle bar 32 which in turn is secured to a shaft 34 extending between a pair of plates 36 (only one of which is shown). A link 38 connects the forward upper end of each plate 36 to the chain 16, while a link 40 connects the rear ends of the plates 36 to said chain. An arm 42 extends from each link 40 and carries at its outer end a roll 44 which rides against a cam rail not shown. The motions imparted to the suction members 20 and tucking blades 22 to lap the ends of wrappers about articles are not effected by the improvements of the present invention, and what has been briefly described above corresponds to the description given in the above-mentioned patent in connection with Figs. 12–20 and reference is made thereto, if further details of construction or operation are desired.

Each suction member 20 has an internal chamber 46 with ports 48 being provided for suctional engagement with the article wrapper. The lower side of the chamber 46 is sealed off by the angle bar 27 (see also Fig. 3). An elbow 50 is welded to the angle bar 27 to provide a passageway from the suction chamber 46 to a flexible tube 52 which extends to a hollow stem 54 (see Fig. 2) laterally formed on terminal member 55. The terminal member is so called because it is the terminus of the suction passageway means extending from the suction member 20 and movable in the same closed path as the member 20. The terminal member 55 is secured to the underside of one of the supporting cross bars 18 by screws 57 (see Fig. 3) in the next preceding group of instrumentalities, with the tube 52 being supported intermediate its length by a collar 56 which is secured by a screw 60 to a rod 58 extending between the chains 16.

A rubber cup 62 is attached to the lower end of the hollow member 55 and is adapted to sealingly engage a flat 63 formed on a sleeve 64 (Figs. 2 and 4). The terminal member 55 may thus be placed in communication with the interior of the sleeve 64 through a port 65 formed in its flatted area as will later appear. A flange 66 is secured to one end of the sleeve 64 by screws 68, with the flange 66 in turn being secured to the shaft 14 by a set screw 70. The sleeve 64 is rotatably mounted on a fixed block 72 with a groove and rim arrangement as at 74 providing an air-tight seal therebetween. The block 72 is axially positioned on the shaft 14 by a locking collar 76.



A pipe 78 (Fig. 1) is connected to a vacuum pump or other suction creating means and is supported on a fixed block 72. The pipe 78 is threaded into the block 72 and communicates with passageways 80, 82 formed therein. The passageway 82 opens into a recess formed in the block 72 which recess in combination with the sleeve 64 forms a suction chamber 84 having an angular extent slightly less than 180° and disposed coextensively with the angle of wrap of the chains 16 around the sprockets 12.

A second angular recess is formed in the block 72 to provide in combination with the sleeve 64 a venting chamber 86 opposite the suction chamber 84 and sealingly spaced therefrom. The chamber 86 is at all times vented to atmosphere through a lateral passageway 88.

As has been mentioned, there are a plurality of groups of lap forming instrumentalities spaced apart along the chains 16. It will also be noted that a second flat 63 is formed on the sleeve 64 opposite the upper flat 63 also having a hole 65 for communication with the chambers 84 and 86 in desired timed relationship.

In the operation of the wrapping machine in which the described lap forming instrumentalities are incorporated it is necessary that a suction be created in the chamber 46 of the suction member 20 during at least the initial movement of the member 20 along the upper run of the chains 16, that is, beginning at a point spaced slightly beyond the shelf 10 and ending at a point slightly beyond the upper suction member 20 in Fig. 1. This end is attained in the present embodiment of my invention by one of the terminal members 55 being moved in timed relationship to sealingly engage one of the flats 63 as the member 55 commences to rotate about the shaft 14 (the lower member 55 in Fig. 1 is approaching this position). Thereafter, the terminal member is placed in communication with the suction chamber 84 and a suction created in the chamber 46 by way of the tube 52. The suction continues until the opening 65 passes beyond the suction chamber 84 (the upper member 55 in Fig. 1 is approaching this position). Further continued rotation of the sleeve 64 places the upper opening 65 in communication with the venting chamber 86, thus relieving the vacuum created in the terminal member 55 so that it may readily and freely be drawn away from the sleeve 64 as it moves along the upper run of the chains 16.

Referring now to Fig. 5, an alternate embodiment of the invention is seen which involves a modified terminal member arrangement. This arrangement employs the same lap forming instrumentalities as were previously described which are designated by the same reference characters without any detailed explanation being given. The same is true of the means forming the vacuum chamber 84 and venting chamber 86 and again the same reference characters are used to identify these unmodified elements without being described in detail.

The terminal member of the present embodiment is designated by reference character 100 and takes the form of a bar secured to the underside of a supporting member 18. The terminal member 100 is provided with a recess 102 which is covered over by a plate 104. An elbow 106 extends from the plate 104 and receives the flexible tube 52 extending from the suction member 20 of the next preceding group of lap forming instrumentalities. The chamber 46 thereof is thus placed in communication with the chamber defined by the recess 102.

A second opening 108 (Fig. 6) is provided in the plate 104 and is disposed to be placed in communication with the suction chamber 84 in the following fashion.

A pad 110 is secured to each flattened area 63 of the sleeve 64 by screws 112. A tube 114 is threaded into the pad 110 and is provided with a rubber cup 116 at its outer end. The tube is adjusted to bring the cup 116 into sealing engagement with the plate 104, this adjusted position being maintained by a lock nut 118. The timed relation is such that each cup 116 will overlies an open-

ing 108 to place the respective recess 102 into communication with the suction chamber 84 and venting chamber 86, and the tube 114 to create a suction in the members 20 as they pass along the upper flight of the chains 16.

Insofar as the manner of creating a suction in the members 20 is concerned, the two embodiments are functionally equivalent. However, the latter described embodiment further minimizes wear of parts by reason of the fact that as the terminal member 100 and the suction cup 116 approach each other they are traveling at approximately the same linear rate. Therefore, there is little or no relative movement between these two elements as they are brought into sealing contact.

Having thus described the invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. In a wrapping machine of the type having a suction wrapping instrumentality movable in an elongated closed path which turns about a given axis; a suction system comprising a flexible conduit connected to and communicating with the suction instrumentality, a terminal member movable in said closed path and spaced from said instrumentality and having a passageway therethrough, said conduit being connected to one end of said passageway and the other end of said passageway facing said axis as the terminal member rotates therearound, a suction chamber disposed radially of said axis, a cylindrical sleeve valve rotatable about said given axis sealing off said chamber and having a port opening into said chamber, said port being disposed for communication with said other passageway opening as the terminal member rotates about said axis, and means for rotating said sleeve and moving said terminal member in timed relationship to bring the other opening thereof into communication with the port of said sealing sleeve as the terminal member rotates about said axis.

2. In a wrapping machine of the type having a suction wrapping instrumentality movable in an elongated closed path which turns about a given axis; a suction system comprising a flexible conduit connected to and communicating with the suction instrumentality, a terminal member movable in said closed path and spaced from said instrumentality and having a passageway therethrough, said conduit being connected to one end of said passageway and the other end of said passageway facing said axis as the terminal member rotates therearound, a suction chamber disposed radially of said axis, a rotatable sleeve valve sealing off said chamber and having a port opening into said chamber during a predetermined angular portion of its rotation, said port being disposed for communication with said other passageway opening by engagement with said sleeve as the terminal member rotates about said axis, and means for rotating said sleeve and moving said terminal member in timed relationship to bring the other opening thereof into communication with the port of said sealing sleeve as the terminal member rotates about said axis and means for venting said passageway to atmosphere after said sleeve port passes out of communication with said chamber so that the terminal member may be readily disengaged from said sleeve.

3. In a wrapping machine of the type having a suction wrapping instrumentality, a pair of chains disposed in elongated closed paths and on which said instrumentality is mounted, a rotatable shaft, a pair of sprockets secured to said shaft and around which the chains are trained; a suction system comprising a flexible conduit connected to and communicating with said suction instrumentality, a terminal member also mounted on said chains and spaced from said suction instrumentality, said terminal member having a passageway therethrough with said flexible conduit communicating with one end of said passageway and the other end opening inwardly of said chains, a fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface



5

concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a port intermittently opening on said chamber as it rotates about said fixed block, said port being angularly and radially disposed to communicate with said other passageway opening as the terminal member rotates about the shaft and means to effect an air seal between the terminal member and the sleeve as the terminal member rotates about said shaft.

4. In a wrapping machine of the type having a suction wrapping instrumentality, a pair of chains disposed in elongated closed paths and on which said instrumentality is mounted, a rotatable shaft, a pair of sprockets secured to said shaft and around which the chains are trained; a suction system comprising a flexible conduit connected to and communicating with said suction instrumentality, a terminal member also mounted on said chains and spaced from said suction instrumentality, said terminal member having a passageway therethrough with said flexible conduit communicating with one end of said passageway and the other end opening inwardly of said chains, a fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a port intermittently opening on said chamber as it rotates about said fixed block, said port being angularly and radially disposed to communicate with said other passageway opening as the terminal member rotates about the shaft and means to effect an air seal between the terminal member and the sleeve as the terminal member rotates about said shaft, said fixed block also having a passageway vented to atmosphere and opening on said cylindrical surface at a point spaced from said cavity and disposed for communication with said port as the port rotates beyond said cavity to thereby vent said passageway to atmosphere and facilitate disengagement of the terminal member from the sleeve.

5. In a wrapping machine of the type having lap forming instrumentalities movable with the article being wrapped, a pair of transversely spaced chains between which said instrumentalities extend, said chains being trained about horizontally spaced pairs of rotatable sprockets, a rotatable shaft to which one pair of sprockets is secured, said instrumentalities comprising spaced groups with each group including a supporting member, a tucker blade and a suction member, said tucker blade and suction member being articulated to lap the wrapper applied to the article as they are carried along the upper run of the chains; an improved suction system comprising a flexible conduit connected to and communicating with the suction member of one group, a terminal member secured to a supporting member of a preceding group of instrumentalities, said terminal member having a passageway therethrough with said flexible conduit communicating with one end of said passageway, a resilient sealing cup surrounding the other end of said passageway and facing said shaft as the terminal member rotates therearound, a fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft for rotation therewith, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a flat formed thereon and a port in said flattened area intermittently opening on said chamber as it rotates about said fixed block, said flattened area being disposed to sealingly receive said resilient cup with said port being placed in communication with the said other end

6

of the passageway of the terminal member as the terminal member rotates about said shaft.

6. In a wrapping machine of the type having lap forming instrumentalities movable with the article being wrapped, a pair of transversely spaced chains between which said instrumentalities extend, said chains being trained about horizontally spaced pairs of rotatable sprockets, a rotatable shaft to which one pair of sprockets is secured, said instrumentalities comprising spaced groups with each group including a supporting member, a tucker blade and a suction member, said tucker blade and suction member being articulated to lap the wrapper applied to the article as they are carried along the upper run of the chains; an improved suction system comprising a flexible conduit connected to and communicating with the suction member of one group, a terminal member secured to a supporting member of a preceding group of instrumentalities, said terminal member having a passageway therethrough with said flexible conduit communicating with one end of said passageway, a resilient sealing cup surrounding the other end of said passageway and facing said shaft as the terminal member rotates therearound. A fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft for rotation therewith, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a flat formed thereon and a port in said flattened area intermittently opening on said chamber as it rotates about said fixed block, said flattened area being disposed to sealingly receive said resilient cup with said port being placed in communication with the said other end of the passageway of the terminal member as the terminal member rotates about said shaft, said fixed block having a second relieved area disposed oppositely of said suction chamber and spaced a short distance from the end thereof, said second relieved area being vented to atmosphere thereby providing means to vent said terminal member through said port to facilitate disengagement of the resilient cup from the sleeve.

7. In a wrapping machine of the type having a suction wrapping instrumentality, movable in an elongated closed path and turns about a given axis; a suction system comprising a flexible conduit connected to and communicating with the suction instrumentality, a terminal member movable in said closed path and spaced from said instrumentality and having a passageway therethrough, said conduit being connected to one end of said passageway and the other end of said passageway facing said axis as the terminal member rotates therearound, said other passageway being disposed outwardly of said axis a distance substantially equal to the distance of said closed path from said axis, a suction chamber disposed radially of said axis, a rotatable sleeve valve sealing off said chamber and having a ported portion into said chamber, said ported portion being disposed for communication with said other passageway opening as the terminal member rotates about said axis and means for rotating said sleeve and moving said terminal member in timed relationship to bring the other opening thereof into communication with the port of said sealing sleeve as the terminal member rotates about said axis.

8. In a wrapping machine of the type having a suction wrapping instrumentality, a pair of chains disposed in elongated closed paths and on which said instrumentality is mounted, a rotatable shaft, a pair of sprockets secured to said shaft and around which the chains are trained; a suction system comprising a flexible conduit interconnected to and communicating with said suction instrumentality, a terminal member also mounted on said chains and spaced from said suction instrumentality, said terminal member having a passageway therethrough with said flexible conduit communicating with one end of said



passageway and the other end opening inwardly of said chains and terminating at a point substantially approximate to the pitch line of said chains; a fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a port intermittently opening on said chamber as it rotates about said fixed block, said port extending through a radial projection extending from said sleeve and terminating at a point matching the distance of said other passageway opening from said shaft, said port being angularly disposed to communicate with said other passageway opening as the terminal member rotates about the shaft and means to effect an air seal between the terminal member and the sleeve as the terminal member rotates about said shaft.

9. In a wrapping machine of the type having lap forming instrumentalities movable with the article being wrapped; a pair of transversely spaced chains between which said instrumentalities extend; said chains being trained about horizontally spaced pairs of rotatable sprockets, a rotatable shaft about which one pair of sprockets is secured, said instrumentalities comprising spaced groups with each group including a supporting member, a tucker blade and a suction member, said tucker blade and suction member being articulated to form a lap as they are carried along the upper run of said chains, an improved suction system comprising a flexible conduit connected to and communicating with

the suction member of one group, a terminal member secured to a supporting member of a preceding group of instrumentalities, said terminal member comprising a flat blade the undersurface of which lies substantially in the plane of the pitch line of the chains, said terminal member having a passageway therethrough interconnecting the openings on said undersurface, said flexible conduit communicating with one of said openings, a fixed block mounted on said shaft intermediate said sprockets and having a cylindrical surface concentric of said shaft, a sleeve rotatably mounted on said surface and secured to said shaft for rotation therewith, said surface being relieved through a predetermined angular extent of the wrap of the chains around said shaft to form a suction chamber sealed off by said sleeve, said sleeve having a radial projection extending therefrom and a port formed therethrough and intermittently opening on said chamber as it rotates about said fixed block, said projection having a resilient cup at its outer end surrounding said port and disposed radially of said shaft a distance approximating the distance of the under-surface of said terminal member, said projection being angularly disposed to bring said cup into sealing engagement with the undersurface of said terminal member as the latter rotates about said shaft thereby placing said suction chamber in communication with said terminal member as it rotates thereabouts.

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