

May 2, 1961

H. C. PAPE ET AL

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Filed June 12, 1958

6 Sheets-Sheet 1

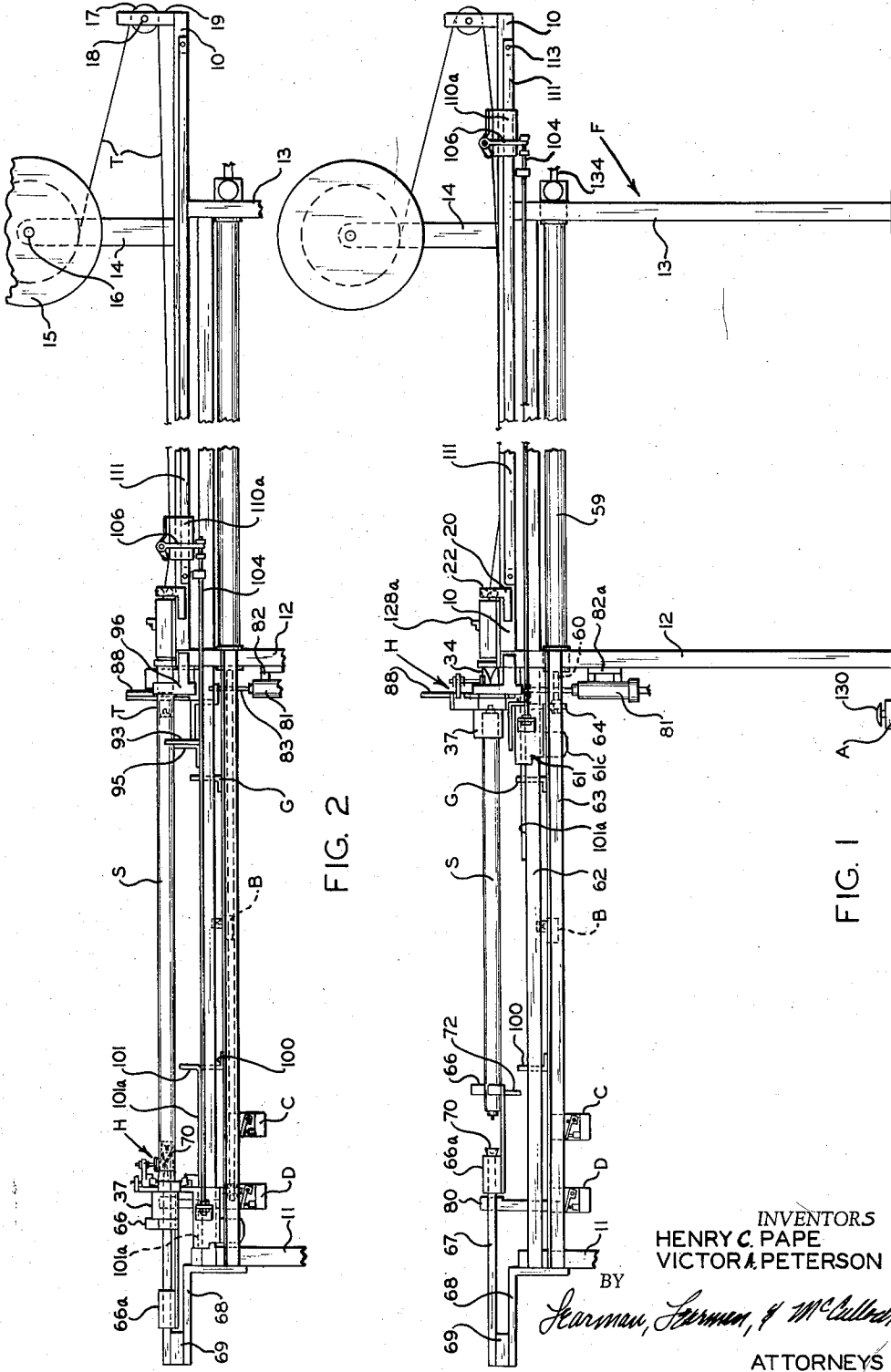


FIG. 2

FIG. 1

INVENTORS
HENRY C. PAPE
VICTOR A. PETERSON

BY
Seaman, Seaman, & McCulloch
ATTORNEYS

May 2, 1961

H. C. PAPE ET AL

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Filed June 12, 1958

6 Sheets-Sheet 2

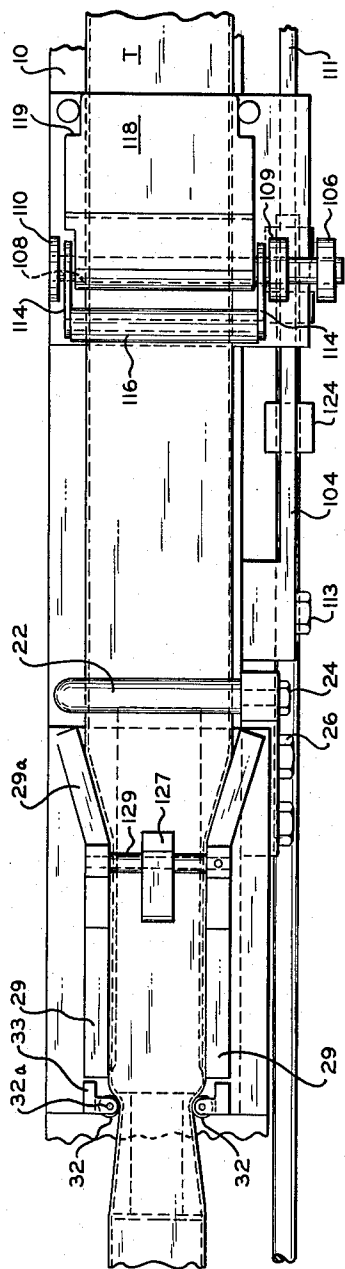


FIG. 4

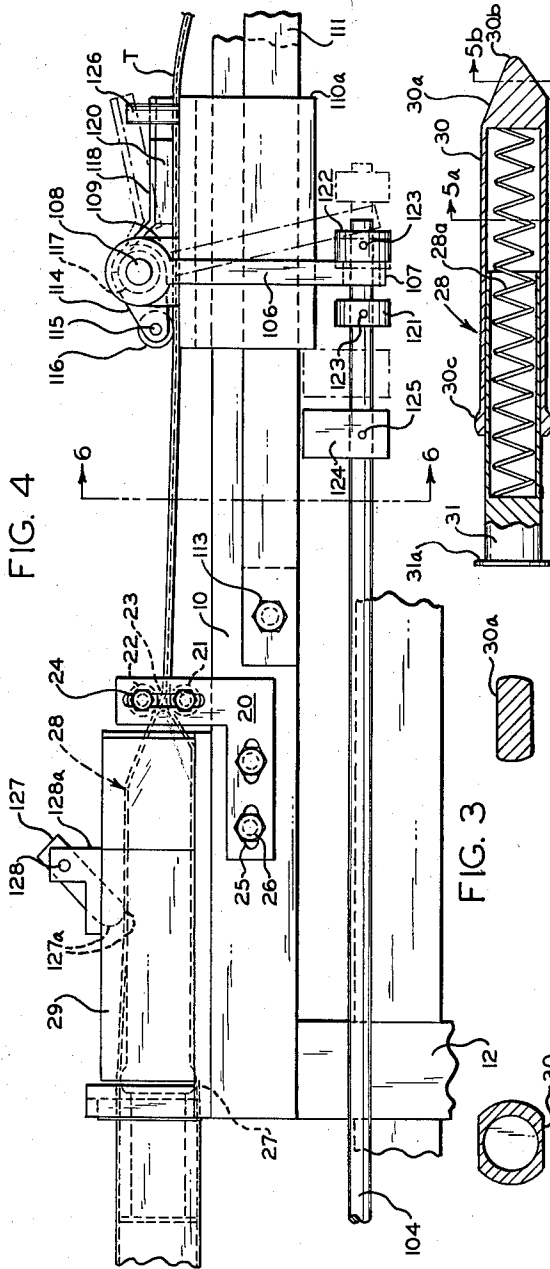


FIG. 5

FIG. 3

FIG. 5b

FIG. 5a

INVENTORS
HENRY C. PAPE
VICTOR A. PETERSON

BY

Sherman, Sherman, & McClellan

ATTORNEYS

May 2, 1961

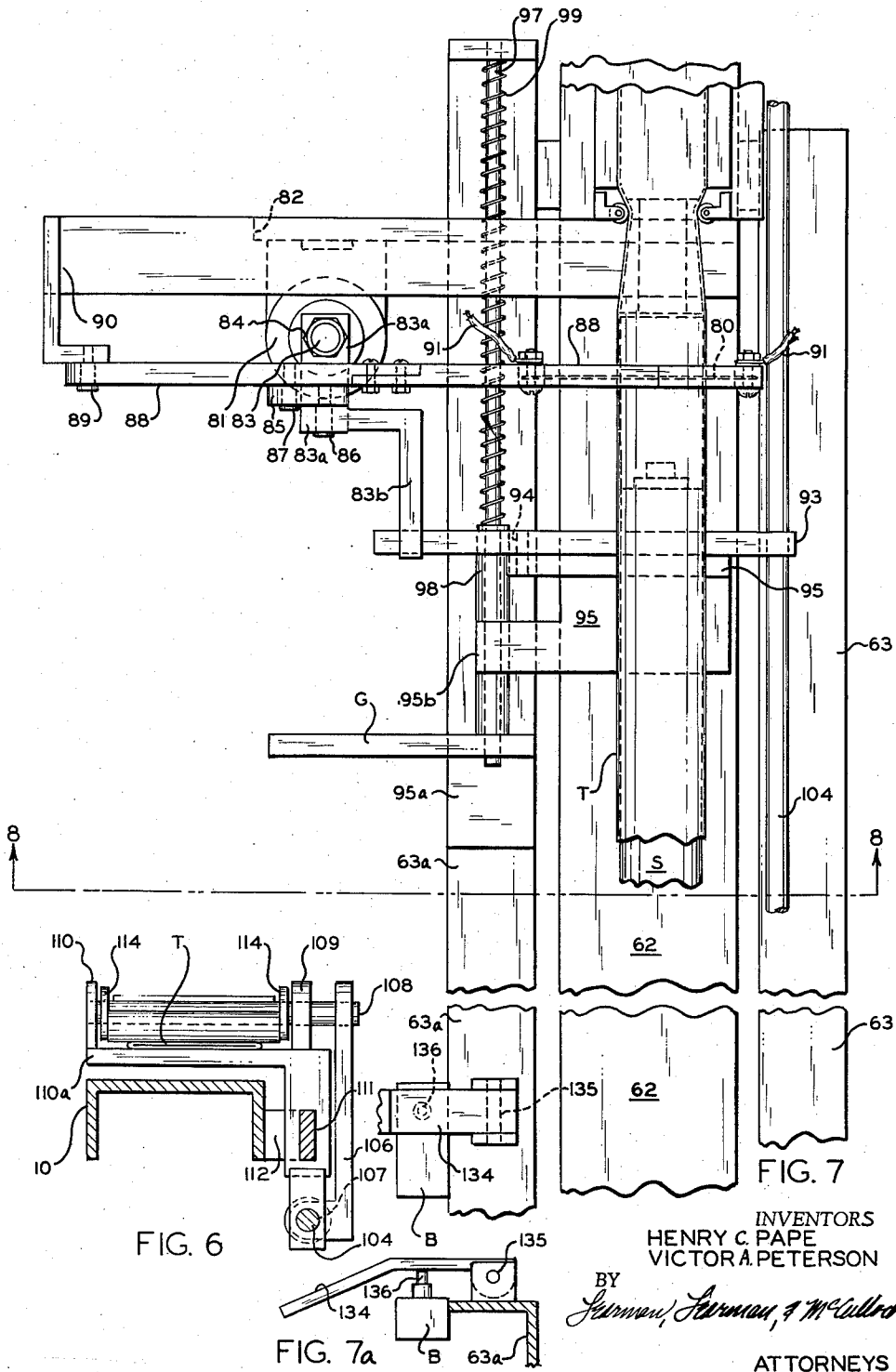
H. C. PAPE ET AL

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Filed June 12, 1958

6 Sheets-Sheet 3



INVENTORS
HENRY C. PAPE
VICTOR A. PETERSON

BY
Samuel, Samson, & McCulloch

ATTORNEYS

May 2, 1961

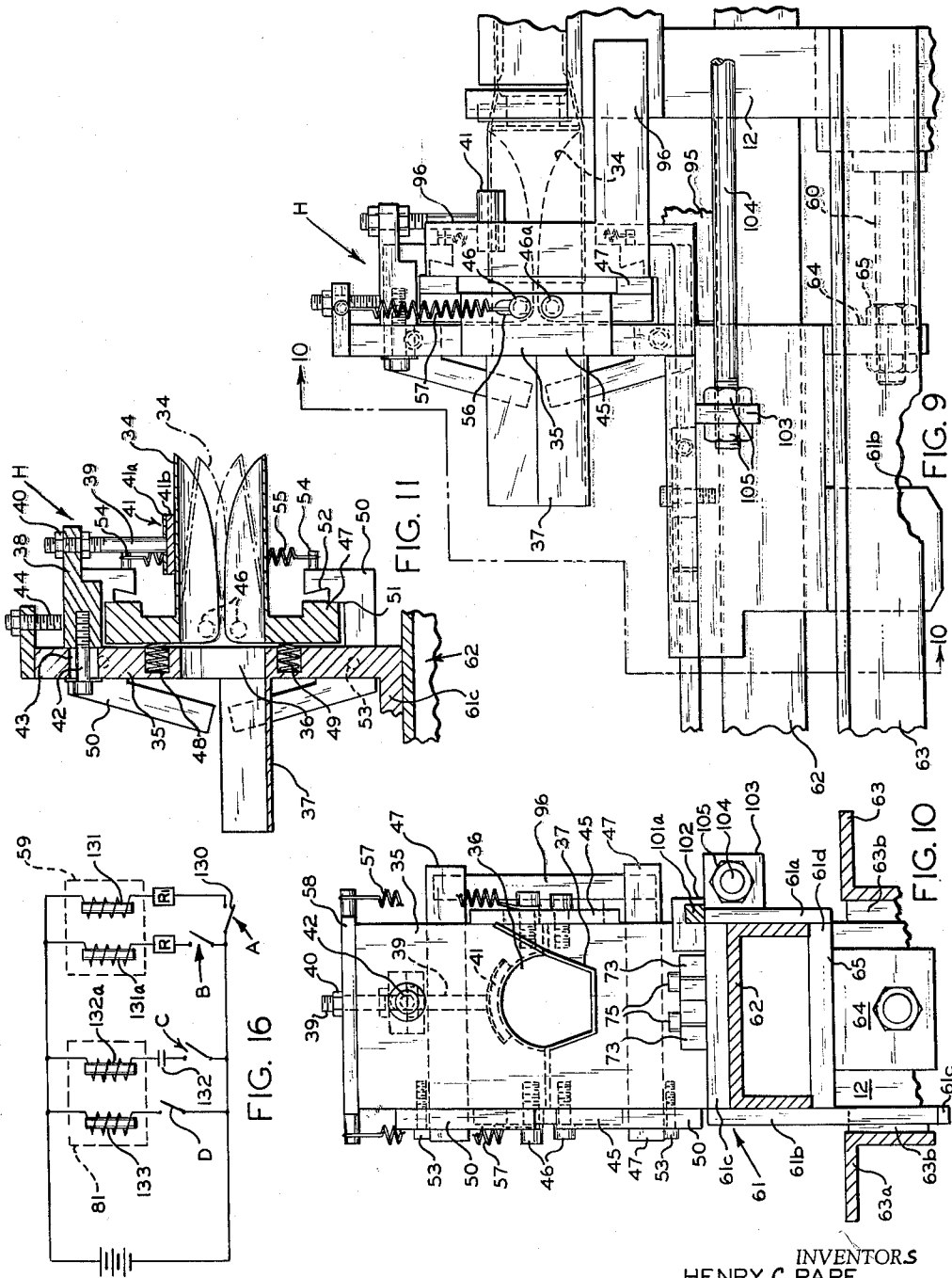
H. C. PAPE ET AL

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Filed June 12, 1958

6 Sheets-Sheet 5



INVENTORS
HENRY C. PAPE
VICTOR A. PETERSON

BY
Swann, Swann & McCulloch

ATTORNEYS

May 2, 1961

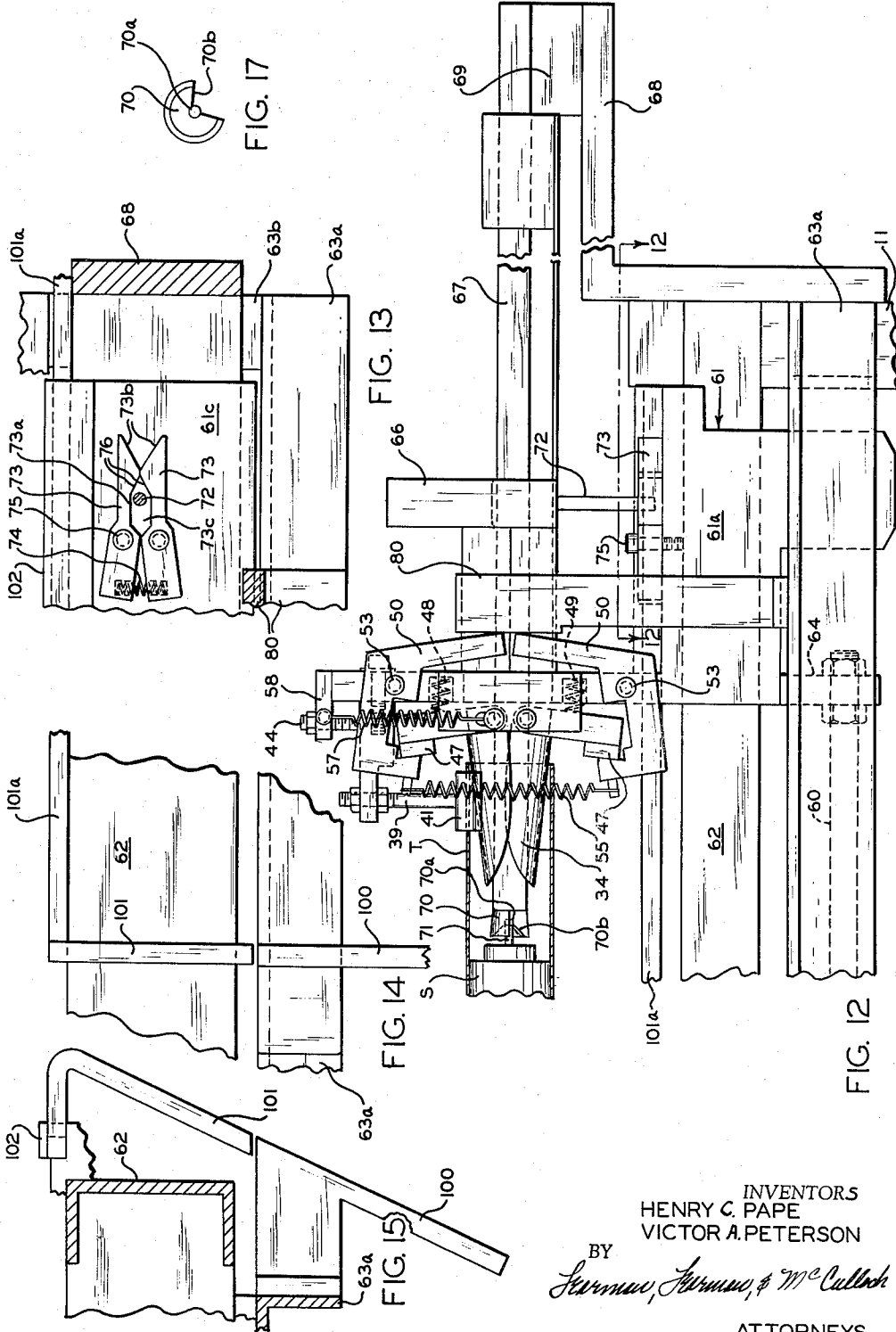
H. C. PAPE ET AL

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Filed June 12, 1958

6 Sheets-Sheet 6



INVENTORS
HENRY C. PAPE
VICTOR A. PETERSON

BY
Sumner, Sumner, & McCulloch

ATTORNEYS

1

2,982,068

SHADE ROLLER PACKAGING APPARATUS

Henry C. Pape and Victor A. Peterson, Saginaw, Mich.,
assignors, by mesne assignments, to Slick Airways,
Inc., Burbank, Calif., a corporation of Delaware

Filed June 12, 1958, Ser. No. 741,654

26 Claims. (Cl. 53—186)

This invention relates to apparatus for applying a collapsed length of packaging tubing over shade rollers with shades rolled thereon, and like articles, and to certain novel and useful improvements therein.

The packaging of elongate products of this nature has heretofore, so far as we are aware, been accomplished manually in a manner which is time-consuming and expensive in terms of the labor required. In this type of packaging operation the design of a machine for efficiently accomplishing the packaging operation is rendered difficult by the nature of the very thin plastic packaging which it is desirable to use, because the tubing which is supplied in collapsed or flat form is not at all stiff and has no rigidity. Further, it is desirable that this tubing material, which buckles under its own weight, extend from the article at both ends so that the ends can be simply twisted and clamped and the packaging operation is further obviously complicated by this requirement.

It is one of the prime objects of this invention to provide a relatively simple and inexpensive machine for applying such a length of tubing to a rolled shade in a manner under the control of a single machine operator who need only load the machine at the end of each cycle prior to initiating another cycle.

A further object of the invention is to provide, in a machine of this design, relatively few cooperable parts for spreading and gripping the collapsed tubing and drawing it over an article in axial alignment therewith while at the same time providing independent means operating in conjunction with the parts for pulling off an additional length of tubing from a reel or the like so that the means for gripping the free end of the tubing will not be disengaged by the resistance of the reel on which the tubing is wound.

Another object of the invention is to provide means automatically operative when the tubing has been drawn over the article to sever the length of tubing in a practical and efficient manner from the supply thereof.

A further object of the invention is to provide in a machine of this character means for automatically operating clamping means which, once the tubing has been drawn over the article, is operable to release the free or leading end of the tubing and thence is later automatically operable to grip the newly severed end of the tubing supply once again after returning to position.

Another object of the invention is to provide, in a machine of the type described, support means onto which a shade roller can be loaded which is movable out of position to permit loading of the pin end of the roller into a support socket which permits automatic ejection or discharge of the article from the side of the machine opposite that from which loading takes place.

A further object of the invention is to provide a packaging or stuffing machine of the character described wherein the gripping head for drawing the tubing in an axial direction over the article passes over the whole length of the article and beyond the initially remote end

2

thereof and the means for supporting the said end of the article during the packaging operation.

A still further object of the invention is to provide a machine for accomplishing the objects described which utilizes mechanical and electro-pneumatic parts of durable and reliable character and need use in its virtually automatic operation only a very simple circuit arrangement.

Other objects of the invention will become apparent and features which are considered characteristic of the invention are hereinafter described and set forth with particularity in the appended claims, it being understood that changes may be made in the form, size, proportion and details of construction, without departing from the spirit, or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is a side elevational view showing a shade, rolled on a conventional shade roller, loaded in position on the machine prior to commencement of the tubing or packaging operation;

Figure 2 is a similar view illustrating the position of the various parts once the length of tubing has been drawn over the article and prior to severing of the length of tubing and ejection of the packaged article;

Figure 3 is an enlarged, fragmentary, side elevational view illustrating the manner in which the collapsed tubing is spread, and showing also the mechanism for drawing the portion of the tubing behind the spreader means or mandrel forwardly, the latter parts being shown in forward position as in Figure 2;

Figure 4 is a top plan view of the mechanism shown in Figure 3;

Figure 5 is a partly sectional, side elevation view of the tube spreader parts only;

Figure 5a is a transverse, sectional view of the mandrel member only taken on the line 5a—5a of Figure 5;

Figure 5b is a similar transverse, sectional view taken on the line 5b—5b of Figure 5;

Figure 6 is a transverse, sectional view taken on the line 6—6 of Figure 3;

Figure 7 is an enlarged, top plan view illustrating particularly the means for severing the length of tubing once it has been drawn over the article;

Figure 7a is a side elevational view of the switch for restoring the reciprocating head to initial or rear position;

Figure 8 is a transverse, sectional view taken on the line 8—8 of Figure 7, diagrammatic lines indicating the manner of ejection of the article;

Figure 9 is an enlarged, side elevational view illustrating the reciprocating gripper head in initial or rearward position, the gripping jaws being shown in clamped engagement with the free or leading end of the packaging tubing;

Figure 10 is a transverse, sectional view taken on the line 10—10 of Fig. 9;

Figure 11 is an enlarged, sectional, elevational view through the gripping head, diagrammatic lines indicating the inoperative position of the pivotal clamping jaws;

Figure 12 is a side elevational view of the gripping head shown at the front end of the machine at the end of its stroke and taken from the opposite side of the machine from the previous side elevational views, the jaws being in released condition when the head is in forward position;

Figure 13 is a fragmentary, top plan view taken on the line 13—13 of Figure 12 and illustrating the means carried by the gripping head for moving the initial article support yoke rearwardly and restoring it to position;

Figure 14 is an enlarged, fragmentary, top plan view of a forward portion of the machine, taken from the same

side of the machine as are Figures 12 and 13, and showing the article discharge guides in alignment;

Figure 15 is a fragmentary, transverse, or end elevational view thereof;

Figure 16 illustrates an electrical circuit for operating the various fluid pressure cylinders which actuate certain operative elements; and

Figure 17 is an end view of the socket for holding one end of the shade roller during the packaging operation.

Referring now more particularly to the accompanying drawings in which we have shown a preferred embodiment of the invention only, a letter F generally indicates a relatively narrow table or support frame which in the embodiment shown includes a top 10 at the right end of the machine (Figures 1 and 2) and legs 11, 12, and 13, the legs 12 and 13 supporting the channel or top member 10. Supported on the top 10 near the rear end of the machine on a post or bracket 14 is a reel 15 mounted for rotation on a pin 16 which has the collapsed plastic tubing T rolled thereon. Any suitable plastic film such as polyethylene film may be employed and it is to be understood that the film on the reel 15 is in collapsed or flat form as illustrated in Figure 6 of the drawings. The tubing can be formed by heat sealing the lapped side edges of a sheet of film which is formed into tubular shape, however, in the interest of clarity tubing formed in this manner is not specifically illustrated in the drawings.

From the reel 15 the leading end of the tubing T is drawn around a guide sheave 17 rotatably mounted on a pin 18 carried on a support post 19 at the extreme rear end of table top surface 10, and extends longitudinally along the table top surface. Mounted on an angle bracket 20 (Figures 1-4) fixed to the sides of table top 10 is a pair of non-rotatable annular guides 21 and 22 providing a space or nip between them through which the tubing T passes. It will be seen that the nip between the rolls 21 and 22 is at a level substantially above the top of the table 10 and a slot 23 in the bracket 20 permits vertical adjustment of the securing bolts 24 (Figure 3) which mount the guides 21 and 22 in position. Slots 25 in the bracket 20 permit adjustable mounting of the bracket 20 by means of bolts 26 also, as will be apparent.

A plate 27 is mounted on supporting surface 10 to support a spreader member or mandrel generally indicated at 28 (and shown in detail in Figure 5) which is maintained in axial alignment with the length of tubing by side guide members 29 mounted on the plate 27, the members 29 having convergent wing sections 29a.

The purpose of guides 29a is to guide the film tubing from its flat or collapsed state, in which it is considerably wider than its normal diameter when in annular form, as the spreader 28 operates to shape it to annular form. The spreader member 28 comprises a tubular rear section 30 which has a nose portion 30a having sloped upper and lower walls converging to form a relatively blunt nose 30b which is of sufficient thickness so that it cannot pass between the nip of guides 21 and 22, but is still sufficiently narrow so that it enters the nip to some degree. This section 30 has upper and lower walls which are curvilinear, but relatively flat as indicated in Figure 5a, and curvilinear side walls, and at its front end has an annular bead portion 30c. The nose portion 30a is shaped as shown in Figure 5b and, as shown in Figure 3, the width of portions 30a and 30 is slightly greater than the diameter of the tubing when it has assumed annular form.

Received within the rear section 30 of mandrel 28 is a telescopic front tubular member 31 having at its front end a flange 31a. A coil spring 28a urges the sections 30 and 31 to the relatively separated position in which they are shown in Figure 5. Roller members 32 rotatably carried by pins 32a supported by brackets 33 which are mounted on side guides 29 serve to maintain the section 30 in the position in which it is shown in Figures 3 and 4 with its nose portion 30b just entering the nip between

rolls 21 and 22. The flange 31a is of slightly less diameter than the completely expanded diameter of the tubing T as will be seen from an inspection of Figure 9 but is of sufficient diameter to maintain the tubing T in sufficiently expanded condition so that it readily receives the clamping jaws 34 when these jaws are in compressed or inward position as illustrated by the diagrammatic lines in Figure 11.

The purpose of spring 28a is to return the section 31 to "out" position after it has been pushed into section 30 in a manner which will be described, by jaws 34. Section 31 when in "out" position maintains the tubing T in spread condition at a distance considerably forward of the end 30c of section 30 when the gripping head, which is generally referred to by letter H, has moved forwardly to the position in which it is shown in Figure 9. The reciprocal head H, which pivotally supports jaws 34, includes a transverse plate member 35 having an opening 36 therein (Figure 10) permitting passage of the tubing T therethrough, and generally semi-annular receptacle 37 extends forwardly from the plate 35 as shown for the purpose of supporting the front end of the shade roller S when the latter is in initial or rear position as in Figure 1.

Supported on the rear face of plate 35 is a rearwardly extending bracket 38 which mounts a threaded post 39 by means of nuts 40, the post 39 having fixed thereon a curvilinear pad 41 which serves as a stationary jaw against which the upper movable jaw 34 can clamp. Jaw 41 preferably includes a steel backer plate 41a supporting a resilient fibre or foam pad 41b, and member 38 is rigidly secured in position by a bolt 42 passing through an opening 43 in the plate 35. Clearly the bolt 42 will have some vertical adjustment in the passage 43 and a set screw 44 is employed to reinforce part 38 against the clamping pressure applied.

Supported on the sides of transversely disposed plate 35 are side plates 45 which pivotally mount the jaws 34 on pins 46 and 46a. The jaws 34 comprise bell crank members which have bars 47 fixed thereon. Mounted in openings 48 provided in the transverse plate 35 are springs 49 which bear against the bell crank jaws 34 and normally urge them into compressed or released relation as demonstrated by the diagrammatic lines in Figure 11. Bell crank latch members 50, however, control the position of the bell crank jaws 34 and it will be seen that these latch members 50 have notches 51, and adjacent notches 52, provided for the purpose of selectively accommodating the bars 47 on the pivotal clamp members 34 dependent on the position of latch members 50. The latter members can be tripped in a manner which will be later described and are pivotally secured on pins 53. They have rearwardly projecting lugs 54 to which a spring 55 may be secured which normally tends to urge the levers 50 to the position to which they are shown in Figure 11 in which levers 50 lock the jaws 34 in clamped position, the spring 55 being in a state of tension and tending to draw the lugs 54 toward one another.

The plates 45, which pivotally carry the jaws 34, are provided with slots 56 through which the upper pin 46 extends and springs 57 connected between the upper pin 46 and a top member 58 operate to exert an upward force on pin 46, acting in opposition to the force exerted by the top spring 49. Springs 57 reinforce the clamping force exerted by the upper jaw 34 when the upper latch 50 holds it in "out" position. Dependent on the pivotal position of latches 50, jaws 34 will be maintained either in clamping position when the bars 47 are engaged in notches 51, as in Figure 11, or in compressed position when the bars 47 are engaged in notches 52, as demonstrated in Figure 12. The trip members which engage the latches 50 to release jaws 34 or to cause them to assume a clamping position are located in a stationary position on the frame F and will be presently identified.

The head H is, of course, as previously noted, carried forwardly and rearwardly in a reciprocating stroke by

a double acting, compressed air operated cylinder 59 which is fixed between the legs 12 and 13 on the front. This conventional solenoid valve operated, air cylinder is of the very common and well known type which has a pair of solenoid valves in one end thereof for causing air to be delivered selectively to opposite ends of the cylinder so that the piston rod 60 thereof is either extended or retracted. Plate 45 has a dependent slide housing 61 guiding on the channel member 62 which forms part of the frame structure F and is supported between legs 11 and 12, housing 61 comprising side plates 61a and 61b connected by a top plate 61c and a bottom plate 61d. The guide housing 61 rides between angle members 63 and 63a, which form part of the frame and are connected to legs 11 and 12 by spacers 63b, and a member 64 depends from the rear end of bottom plate 61d of the guide housing 61 to connect the head H with cylinder (59) piston rod 60, nut 65 securing the threaded end 60 of the rod to the lug 64.

When the shade roller S is initially placed in position, as indicated in Figure 1, its front end is supported by the trough-like member 37 extending forwardly from the reciprocable head H and its rear end is supported by a yoke member 66 which is open at the upper end thereof to permit ready insertion of the rear end of shade roller S. Yoke 66 is slideable rearwardly on a rod 67, supported on rear leg 11 by angle bracket 68 and block 69, and has a slide bearing 66a slideably mounted on rod 67 to move rearwardly thereon to a position in which yoke 66 is located rearwardly of the front end of rod 67, as shown in Figure 2. The front end of rod 67 has a generally coniform socket 70 provided with an opening 70a to receive the projecting pin 71 on the one end of the shade roller S when the latter is moved forwardly with the head H. Thus, initially when the head H is moved forwardly by the piston rod 60 of cylinder 59, shade roller S will be carried with it until the pin 71 is engaged in fixed socket 70, whence continued forward movement of the head H will draw the tubing T over the full length of shade roller S and the travel of head H is such, as shown in Figure 2, that the leading end of the tubing T is, in fact, drawn over the socket end 70 and thus projects a short distance beyond the front end of the shade roller S.

Yoke 66 is pushed forwardly by the support 37 of head H and has a dependent rod 72 (see Figure 12) which, on the forward stroke of head H, enters between a pair of levers 73 (Figure 13) which are normally maintained in the position shown in Figure 13 by a spring 74, the levers 73 being pivotally mounted as at 75 on plate 61c and being cut away as at 73a to provide a rod or pin receiving opening 73c between them. Cam surfaces 73b are provided on the front ends of levers 73 so that when the head H which carries levers 73 is moving forwardly and comes into engagement with the depending rod 72, the rod 72 (when bearing 66a can move no further) will spread the levers 73 against the action of spring 74 and open them sufficiently for the rod 72 to be accommodated within the opening 73c. On the return stroke of head H, then, the yoke 66 will be drawn forwardly by the levers 73 until guide 66a engages the enlarged socket end 70 of rod 67, whence the yoke 66 can proceed rearwardly no further and rod 72, acting against cam surfaces 76 of the levers 73, operates to open the levers 73 and is released therefrom. The function of the levers 73 is then to return yoke 66 to the position in which it is shown in Figure 1 and it accomplishes this by releasably enclosing rod 72 on the forward stroke of the head when guide 66a comes into engagement with block 69, the yoke 66 being pushed rearwardly by the member 37 on head H.

When the head H is moved forwardly from the position in which it is shown in Figure 1 the jaws 34 are, of course, in clamping position (as in Figure 9) and carry the tubing T forwardly. Once head H has reached the

position in which it is shown in Figure 2, however, forward of socket 70, levers 50 come into engagement with a trip or stop 80 (Figure 12) supported in fixed position on the angle member 63a on the same side of the apparatus as levers 50, and levers 50 are pivoted to release jaws 34 so that springs 49 can move them into compressed "in" position.

When the head H is in its forward position a cutoff mechanism, shown particularly in Figures 7 and 8, is actuated by a switch in a manner to be described to move a "hot" wire 80 down through the tubing T at a point between the end of the shade roller S and the flange 31a to sever the tubing. Air cylinder 81, of the same type as cylinder 59, is secured to the leg 12 by a strap 82. Its piston rod 83 has an angular extension part 83a secured thereon by nuts 84. The angular part 83a pivotally mounts a link 85 as at 86 and link 85 is pivotally connected at 87 to the wire carrying member 88 as shown in Figure 8. The member 88 is pivotally supported as at 89 from an angle bracket 90 which is fixed to the channel member 62 and wires 91 lead to terminals 92 on the member 88 to supply the current to wire 80 which is maintained red-hot during the operation of the machine.

The member 83a is formed with a forwardly extending section 83b which overlies a flipper ejecting member or bar 93 pivotally carried at 94 by a slideable support plate 95 which supports the front end of the shade roller S when the head H moves forwardly. Plate 95 has a downwardly inclined surface 95a which cooperates with a sloped fixed guide surface G when plate 95 is in its forward position. When the cylinder 81 is actuated so that member 80 is moved downwardly through the tubing T, section 83b moves downwardly toward flipper bar 93 at the same time and engages it at about the time that wire 80 has completely severed the tubing T. Flipper 93 is pivoted upwardly about pin 94 so that the opposite end of flipper 93 engages the shade roller S and pushes it toward the left in Figure 8. Shade roller S then, as indicated by the diagrammatic lines in Figure 8, rolls down the inclined flipper bar 93 and inclined surface 95a to the surface G and thence to a suitable disposal basket or chute located at the far side of the machine.

It will be observed that the socket 70 (see Figure 12) has a cut-out 70b at this same side of the machine and thus when the flipper 93 is actuated the pin 71 is permitted to leave the socket 70 and the weight of the shade roller S draws the front end of the tubing along with the shade roller off the compressed jaws 34 and socket 70. At this point the head H is actuated rearwardly to initial position by a switch suitably placed to be engaged by the shade roller S and on the return stroke of head H an angular trip or stop 96 fixed to channel 10 is in such position as to be engaged by the bars 47 in their return with head H. Their engagement with trip 96 causes them to be pivoted to clamping position once again at the appropriate moment, when the compressed jaws 34 have entered the tubing T once again while in compressed relation and have pushed section 31 telescopically into spreader member 30 in so doing, as shown in Figure 9.

Support plate 95, which is slideably mounted on rod 97 (Figure 7), is supported thereon by slide bearing 95b and is pushed forwardly thereon upon return of the head H to initial or rearward position. The sleeve 98 on rod 97 when pushed forwardly by member 95 compresses spring 99, which accordingly returns the member 95 to the position in which it is shown in Figure 7 once again when the head H moves forwardly.

Near the front end of the machine similar guides are provided (see Figures 2, 14 and 15), guide 100 being a stationary guide fixed to angle 63a and guide 101, which has a longitudinally disposed bar section 101a, being a reciprocable guide which is carried by head H but slides

in a slide bearing 102 (Figure 10) mounted on slide housing 61. Slide guide 101 is carried from the forward position in which it is shown in Figure 1 forwardly with head H but is stopped from proceeding further forwardly by stop 101b which is positioned so that guide 101 will line up with guide 100.

Also carried by head H on a member 103 projecting from side plate 61a of the slide housing 61 (see Figure 10) is a rod 104 whose threaded end is fixed to member 103 by nuts 105 as shown in Figure 9. The rod 104 carries at its rear end (Figures 3 and 4) mechanism for gripping the tubing forwardly of the mandrel or spreader 28 and drawing it forwardly when the head moves forwardly so that the resistance of the tubing to unwinding from reel 15 does not pull the tubing from the clamped jaws 34. An angular link 106 having an opening 107 therein slideably mounting the link 106 on rod 104 (see Figure 6) is rigidly fixed to a shaft 108 which is journaled in bearings 109 and 110 provided on a slide 110a mounted on a slide bar 111. The stationary bar 111 is supported by spacer blocks 112 on top of channel 10 and bolts 113 secure the bar 111 in position. Also mounted on shaft or pin 108 but not fixed thereto are arms 114 which support a pin 115 on which tubing engaging roller 116 is journaled for rotation. Shaft 108 has a rearwardly extending angular plate 118 fixed thereon, plate 118 being notched as at 119 as shown and having a fibre pad or the like 120 connected thereto which can engage the tubing T. The lever 106 is slideably mounted on rod or shaft 104 between a pair of blocks 121 and 122 which are pinned to the rod 104 as at 123. Also, a block 124 is pinned to the rod 104 forwardly of block 121 as at 125 and it will be seen that the opening 107 is of sufficient diameter so that lever 106 can tilt on rod 104. When the head H is started forwardly from the rear or initial position in which it is shown in Figure 1, link 106 is tilted so that plate 120 engages the tubing T. This occurs because stop 124 comes into engagement with slide 110a before pins 126 come into engagement with notches 119. When head H moves forwardly block 122 pushes against lever 106 to cause plate 118 to tightly clamp tubing T against member 110a and carry the tubing forwardly. When the head reaches the forward position, however, rod 104 will be stopped again at the limit of its travel in the forward stroke and link 106 will carry to the position shown in Figure 3. In this position the plate 118 does not bear against the tubing T but, instead, simply slides over it to its rearmost or initial position when the head H and rod 104 are moved rearwardly.

The operation of the various elements is initiated very simply by a foot pedal operated switch A and three micro-switches B, C, and D, and the operation of the machine is virtually automatic. To keep the operation under the control of an operator, the switch A, which has the depressible contact member 130, is provided and the operator then can initiate each tubing or packaging operation. The switch A, which is a normally open switch, is connected in series with solenoid valve 131 in air cylinder 59, which when energized channels compressed air under pressure to the right end of cylinder 59 (Figure 1) and bleeds it from the left end of the cylinder so that piston rod 60 is moved forwardly and carries head H forwardly.

The operator only depresses foot pedal 130 to make the circuit, of course, after placing a shade roller S in position as shown in Figure 1 with one end supported by the member 37 and the other supported by yoke 66. When head H is in rearmost or initial position, jaws 34 are in the position in which they are shown in Figure 9 and securely clamp the leading end of the tubing T as indicated. As head H moves forwardly, it initially carries the shade roller S with it until the forward or leading end of the shade roller S is deposited in the socket 70 with its pin 71 entering the opening 70a in the

socket, the head H thence proceeding forwardly relative to the shade roller S and drawing the tubing over the full length thereof. The support member 95 is returned by spring 99 as the head H moves rearwardly to furnish a support for the rear end of the shade roller S and spring 28a also returns member 31 to its normal forward position.

In passing forwardly, the head H, carrying with it the side plate 61b of slide housing 61 which has a dependent trip or cam surface 61c, passes over and depresses a micro-switch C. The normally open switch C does not energize the solenoid valve 132a of air cylinder 81 at this time, however, because the circuit line is held open by the contacts 132 of a holding relay R. At the end of the forward stroke of head H, when head H has proceeded forwardly of socket 70 as shown and trip 80 has actuated latches 50 to release clamp jaws 34 (see Figure 12), a switch D is closed by cam surface 61c. The normally open switch D is disposed in series with solenoid valve 133 in air cylinder 81 and, when valve 133 is energized, air under pressure is channeled to the upper end of cylinder 81 and bled from its lower end so that piston rod 83 is lowered. This causes "hot" wire 80 to be pivoted about fulcrum 89 down through the tubing T to sever it at a point rearward of the rear end of shade roller S. At the same time, after the severing action is completed, part 83b engages flipper lever 93 as previously described and shade roller S is ejected. As it travels downwardly on surfaces 95a and 95 it depresses a normally open limit switch B which is mounted on angle member 63a. Limit switch B, as is the case with the other switches, has a lever member 134 pivoted as at 135 outwardly of the switch B and its depressible contact 136. Switch B closes the line through solenoid valve 131a in air cylinder 59, which then channels compressed air to the left end of cylinder 59 in Figure 1 and bleeds air from the right end thereof. Piston rod 60 is then moved from left to right to draw head H back to initial position. The closing of normally open switch B also energizes holding relay R, which closes the contacts 132 which are in circuit with solenoid valve 132a. With contacts 132 now in closed position, normally open switch C is actuated by trip surface 61c during the rearward travel of head H to initial position and completes the circuit to energize solenoid valve 132a, which channels air under pressure to the lower end of cylinder 81 and bleeds it from the upper end of the cylinder so that the piston rod 83 is forced upwardly and cutting or severing wire 80 is returned to "up" position as shown in Figure 8. Flipper bar 93 is also released and is free to return to the position in which it is shown in Figure 8, the bar being mounted off center at 94 so that it is returned by the forces of gravity. Relay R1 in circuit with switch A is energized upon closing of switch A to start the next cycle to open the contacts 132 which were closed by relay R upon actuation of switch B.

When the head H reaches its rearmost position the jaws 34, which have been in released or inward position, have entered the free end of the tubing T and pushed member 31 into the mandrel sleeve 30. At this point, bars 47 contact the stationary trip 96, which moves them into the notches 51 of the latch members 50 and causes the jaws 34 to clamp the severed end of the tubing T once again, ready for the next packaging cycle. The spring 55 pivots the latches 50, of course, when the bars 47 are released from notches 52. As has been previously explained, the plate 118 operates during the forward stroke of head H to draw a new supply of tubing from reel 15 and on the return stroke of head H simply slides over the tubing to its retracted or initial position once again.

It should be apparent that we have perfected a relatively simple machine for performing a difficult tubing or packaging operation, which is of an extremely practical character. It is to be understood that various equivalent

changes can be made in the various elements of the invention without departing from the scope of the invention, which is defined by the sub-joined claims.

We claim:

1. In apparatus for applying a collapsed, packaging tube over an article comprising a shade rolled on a shade roller and like articles; means for supporting a length of tubing in longitudinally extended position; means entering one end of said tubing for holding the tubing in open position; means for supporting said article in axial alignment with said end of said tubing; a reciprocable gripping head including curvilinear gripping members in axial alignment with said end of tubing; automatically releasing latch means actuating said gripping members into gripping relation with the end of said tubing; means moving said head axially relative to said article to draw said tubing over said article to cover said article, and for returning said head; and means for releasing said latch means when said head reaches a predetermined position in its forward stroke.

2. In apparatus for applying a collapsed packaging tube over an article comprising a shade rolled on a shade roller and like articles; table means for supporting a length of collapsed tubing forming a part of a supply thereof; a spreader member having a tapered nose entering the free end of said length of tubing; elongated guide means for said tubing and the spreader member therein extending longitudinally with said length of tubing; means for supporting said article in axial alignment with said tubing; a gripping head for gripping the free end of said tubing; means moving said gripping head and drawing said tubing over said article; and means for releasing said gripping head from the tubing.

3. The combination defined in claim 2 in which a pivotal finger on said table bears on the portion of said length of tubing accommodating said spreader member and permits movement of said tubing in one direction toward said article while resisting its movement in the opposite direction.

4. The combination defined in claim 2 in which means gripping a section of said length of tubing which is collapsed behind said spreader member is connected to and moves with said gripping head to draw said length of tubing behind said spreader member forwardly when said gripping head is actuated.

5. The combination defined in claim 4 in which said supply of tubing is rolled on a reel and has the said length extending therefrom.

6. The combination defined in claim 2 in which said length of tubing passes between spaced apart members with a nip positioned substantially centrally relative to said spreader member; and said spreader member is in bearing engagement with said members with its tapered nose at said nip.

7. In apparatus for applying a collapsed, packaging tube over an article comprising a shade rolled on a shade roller and like articles; means for supporting a length of tubing; a reciprocably supported gripping head for gripping the one end of said tubing; means for supporting said article in axial alignment with said tubing; inner clamp means on said gripping head in one position arranged to enter said length of tubing and outer clamp means disposed peripherally outward of said length of tubing, said clamp means embracing the end of said tubing when the gripping head is in one position; means operable to move said inner clamp means peripherally outwardly into clamping engagement with the outer clamping means to grip the tubing therebetween; means for moving said gripping head forwardly relative to said article to draw said tubing over the article and for returning said gripping head; and means for releasing said inner clamping means from its clamping position prior to returning said gripping head to original position.

8. The combination defined in claim 7 in which said

means for moving said inner clamp means outwardly comprises spring biased latch means operable by a trip supported to engage said latch means upon the return of said head to original position.

9. The combination defined in claim 8 in which a trip operates said latch means to release said inner clamp means near the end of the forward stroke of said gripping head.

10. In apparatus for applying a collapsed, packaging tube over an article comprising a shade rolled on a shade roller and like articles; table means; means for supporting a length of tubing thereon; a gripping head mounted for reciprocating movement for gripping the one end of said tubing; means for moving said gripping head forwardly and returning it to position; means associated with said gripping head in generally axial alignment with said length of tubing for supporting the one end of said article; a first support for initially supporting the opposite end of said article movable on said table means; a second support for the said opposite end of said article when the said head is moved forwardly relative to said article, spaced forwardly of said first support and the article; means connected to said means moving said gripping head for moving said first support rearwardly beyond said second support when the gripping head is moved forwardly and carries said article to said second support in the stroke drawing the tubing over said article; means for releasing said gripping head from said tubing when the gripping head is in forward position; and means on said means moving said gripping head back to original position moving said first support back to its original position.

11. The combination defined in claim 10 in which said length of tubing is drawn from a supply thereof and means is operated when said gripping head is in forward position for severing the length of tubing on said article from said supply thereof.

12. The combination defined in claim 11 in which said means severing said length of tubing comprises an electrically heated wire mounted on a frame pivotal transversely to the tubing from a position out of the path thereof; means operative for swinging said frame and wire through said tubing when the gripping head is in forward position; and means operable on retraction of the gripping head to restore said frame and wire to original position.

13. The combination defined in claim 10 in which said means moving said first support back to its original position comprises a pair of spring closed, spreadable jaws carried by said head which have cam surfaces spreading them to receive said first support means when the gripping head is moved into engagement with said first support means on its forward stroke; and stop means limiting return movement of said first stop means with said gripping head and causing said jaws to open and release said first stop means.

14. The combination defined in claim 10 in which said second support has a flared socket with a pin hole therein for receiving the pin end of said article, the said socket having a cut out at one side permitting ejection of the article.

15. In apparatus for applying a collapsed, packaging tube over an article comprising a shade rolled on a shade roller and like articles; a longitudinally disposed table surface for supporting the leading end of a coiled supply of flattened plastic tubing mounted on a reel at one end of said table surface and having a leading end providing an elongate length of tubing drawn from said reel; a pair of spaced apart guides on said table mounted thereabove to provide a nip above the surface of the table through which the length of tubing passes; a spreader tube having a tapered nose bearing on said guides at the nip to spread said tubing to annular form as it issues from the nip; a gripper head, mounted for reciprocating movement,

11

having pivotal curvilinear inner clamp jaws normally spring biased to a position in which they are inward of the inner periphery of the annularly spread end of said length of tubing; a curved outer stationary jaw on said gripping head at the outer periphery of said tubing; trip means movable to pivot said inner jaws to a position in which they engage the inner periphery of said tubing end and said tubing end is clamped by an inner jaw and said outer jaw; releasable latch means holding said jaws in clamped position; a receptacle-like support carried by said gripping head forwardly of the jaws in axial alignment therewith for supporting one end of said article; a yoke-shaped support forwardly thereof for initially receiving the opposite end of the article reciprocable on said table longitudinally; a second support of lesser diameter than said tubing having a socket fixed forwardly of said yoke support and article thereon; fluid pressure cylinder means for moving said gripping head forwardly until said opposite end of the article is engaged in said socket and continuing movement of said gripping head forwardly relative to said article to draw said tubing over said article; means connected with said cylinder means for moving said yoke-shaped support forwardly beyond said article as said gripping head moves forwardly; trip means engaged by said gripping head at the forward end of the path of travel for operating said latch means and releasing said clamp jaws from gripping engagement; a cut off wire supported pivotally to swing transversely to said tubing near the gripping head when the latter is in rear position; switch means operable to swing said wire through said tubing and cut off the length thereof from said supply actuated by the said head at the forward position of the stroke of the gripping head; trip means in the path of said latch means at the end of the return stroke of said gripping head for operating said clamp jaws to cause them to grip the end of said tubing from which the said length was cut; and means connected to said cylinder means rearwardly of said guides for drawing said tubing rearward of said guides forwardly with the gripping head while preventing its return with said gripping head during the retract stroke thereof.

16. In apparatus for applying a flexible, collapsible, packaging tube over an article comprising a shade rolled on a shade roller and like articles; means for supporting said article; means for drawing a tube section from a length of tubing over one end of said article; means operable after said tube section has been drawn over said article for severing said tube section from the length of tubing; and a flipper bar actuated by said means severing said tube section to displace said article from said support means.

17. The combination defined in claim 15 in which said latter means includes a rod carried by said head; a lever mounted on said rod and carried thereby; a rock shaft on said lever; and a clamp plate fixed to said shaft and operated by said lever.

18. The combination defined in claim 15 in which a spring returned reciprocable support plate is provided for supporting the rear end of said article when said head is drawn forwardly.

19. In packaging apparatus for applying a flexible, collapsible, packaging tubing axially over an elongated article such as a shade rolled on a shade roller; frame means; attaching means mounted on said frame means for operatively attaching to one end of said tubing; support means on said frame for supporting said article in generally horizontal position in longitudinal alignment with said tubing and including a support for the end of said article remote from the said tubing end; and means for moving one of said attaching means and said support means supporting longitudinally past the other for enclosing said article on the article support within said tubing; said enclosed article being removable from said support means.

20. The combination defined in claim 19 in which said

12

support comprises an axially projecting socket of a diameter to enter said tubing having a side portion cut away so that said article can be ejected laterally.

21. In apparatus for applying a flexible, collapsible, packaging tubing axially over an article such as a shade rolled on a shade roller; frame means; movable, tubing-drawing means mounted on said frame means for movement axially in an article entubing stroke and for operatively engaging one end of said length of tubing; support means for said article including an initial support member for said article mounted for movement on said frame means within the stroke of said tubing-drawing means; and means moving said tubing-drawing means longitudinally relative to said article for drawing said tubing over the article also initiating movement of said initial article support member for displacing it to a non-interfering position.

22. In apparatus for applying a flexible, collapsible, packaging tubing from a supply thereof over an article such as a shade rolled on a shade roller; frame means; a gripping head on said frame means for gripping the leading end of said length of tubing; means for moving said gripping head longitudinally relative to said article to encase said article in said length of tubing and for returning said gripping head; spreader means supported from said frame means entering the free end of said tubing; and means fixed on said frame means bearing on said tubing and spreader means which permits movement of said tubing in one direction toward said article while resisting its movement in the opposite direction.

23. In apparatus for applying a flexible, collapsible, packaging tubing from a supply thereof over an article such as a shade rolled on a shade roller; frame means; attaching means on said frame means for operatively attaching to one end of said tubing; support means for said article on said frame means; means moving one of said attaching means and means supporting said article longitudinally past one another for encasing said article in a section of said tubing; means operable after said encasing operation for severing said section of tubing from said supply; and ejector means initiated by said last mentioned means for removing the encased article from its support means.

24. In apparatus for applying a flexible, collapsible, packaging tubing from a roll supply thereof over an article such as a shade roller; frame means; a gripping head on said frame means for gripping the leading end of said tubing; means for moving said gripping head longitudinally forwardly relative to said article to encase said article in a section of said tubing; and means gripping the tubing a substantially spaced distance behind said gripping head relative to the direction of encasing movement thereof and independently thereof connected to move with said gripping head on the article encasing stroke thereof.

25. In apparatus for applying a flexible, collapsible, packaging tubing from a supply thereof over an article such as a shade rolled on a shade roller; frame means; a gripping head on the frame means for gripping the leading end of said length of tubing; an axially extending spreader member for holding said tubing open, having a guide surface thereon; means for moving said gripping head axially forwardly relative to said article to encase said article in a section of said tubing; and guide means on said frame member for holding said spreader member from axial movement with said gripping head and tubing while it is encased within said tubing comprising a projecting member having a curved surface engaging said tubing extending into the axial path of said guide surface forwardly thereof.

26. In apparatus for applying a flexible, collapsible, packaging tubing from a supply thereof over an article such as a shade roller; frame means; a gripping head on the frame means for gripping the leading end of said length of tubing; motion transmission means for moving

13

said gripping head in a forward, article-encasing stroke and a return stroke; article support means on the frame means within the limits of the forward stroke of the gripping head for positioning an article in axial alignment with said gripping head and the leading end of the tubing so that said tubing is drawn over the said article and encased therein; said gripping head being releasable from the leading end of said tubing after its forward stroke.

References Cited in the file of this patent

UNITED STATES PATENTS

462,974 Allen ----- Nov. 10, 1891

1,913,828
2,303,421
2,479,552
2,609,983
5 2,665,043
2,736,477
2,757,500
2,759,648
10 2,847,806

14

Brennan ----- June 13, 1933
Anderson ----- Dec. 1, 1942
Blessing ----- Aug. 23, 1949
Denton ----- Sept. 9, 1952
Draper ----- Jan. 5, 1954
Krebs et al. ----- Feb. 28, 1956
Heinl et al. ----- Aug. 7, 1956
Piazzè ----- Aug. 21, 1956
Wang ----- Aug. 19, 1958