

W. A. LORENZ.

APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.

APPLICATION FILED MAY 13, 1907.

Patented Aug. 27, 1912.

5 SHEETS—SHEET 1.

1,037,159.

Fig. 17

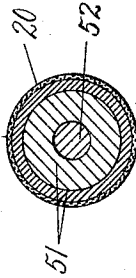


Fig. 11

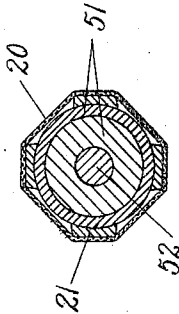
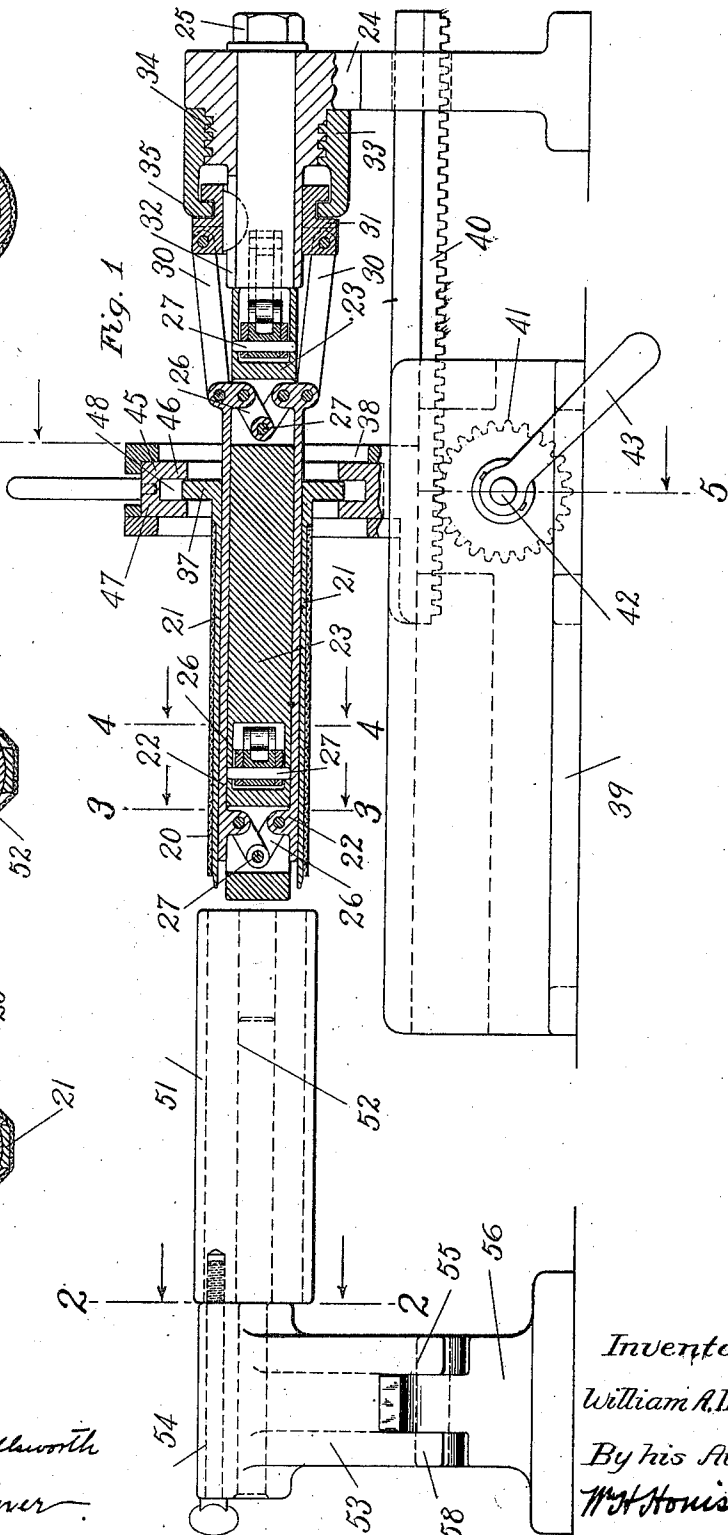
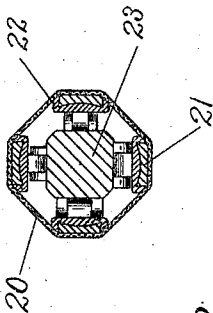


Fig. 9



Witnesses:
Janette L. Cellworth
H. Mallner

Inventor:
William A. Lorenz
By his Atty
W. H. Honiss

W. A. LORENZ.
 APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.
 APPLICATION FILED MAY 13, 1907.
1,037,159. **Patented Aug. 27, 1912.**
 5 SHEETS—SHEET 2.

Fig. 2

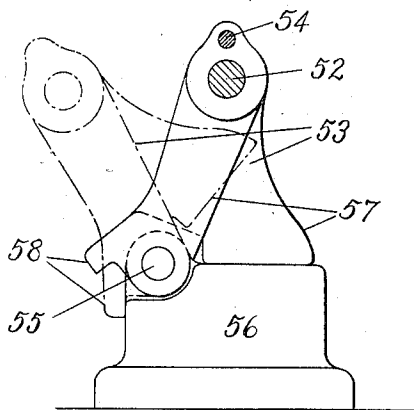


Fig. 3

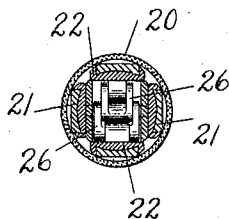


Fig. 4

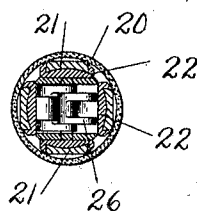


Fig. 6

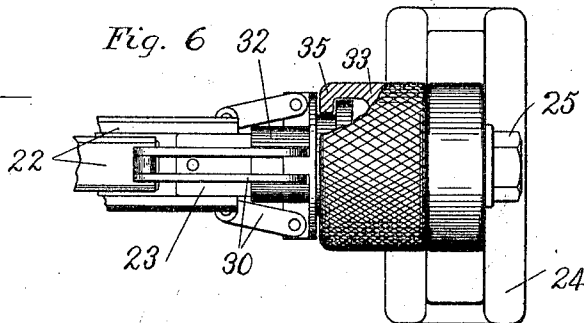


Fig. 5

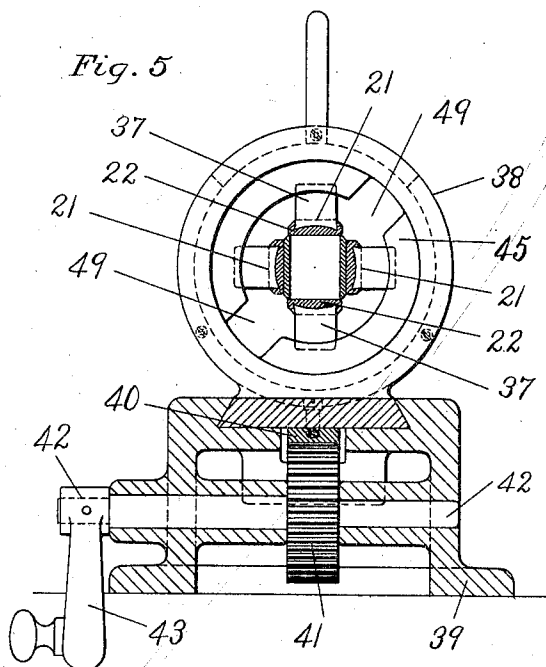
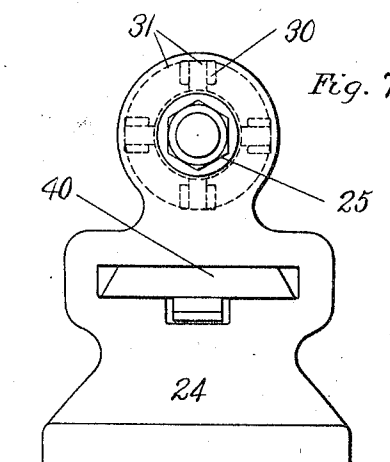


Fig. 7



Witnesses:

Janette P. Ellsworth
 H. Mallner

Inventor:

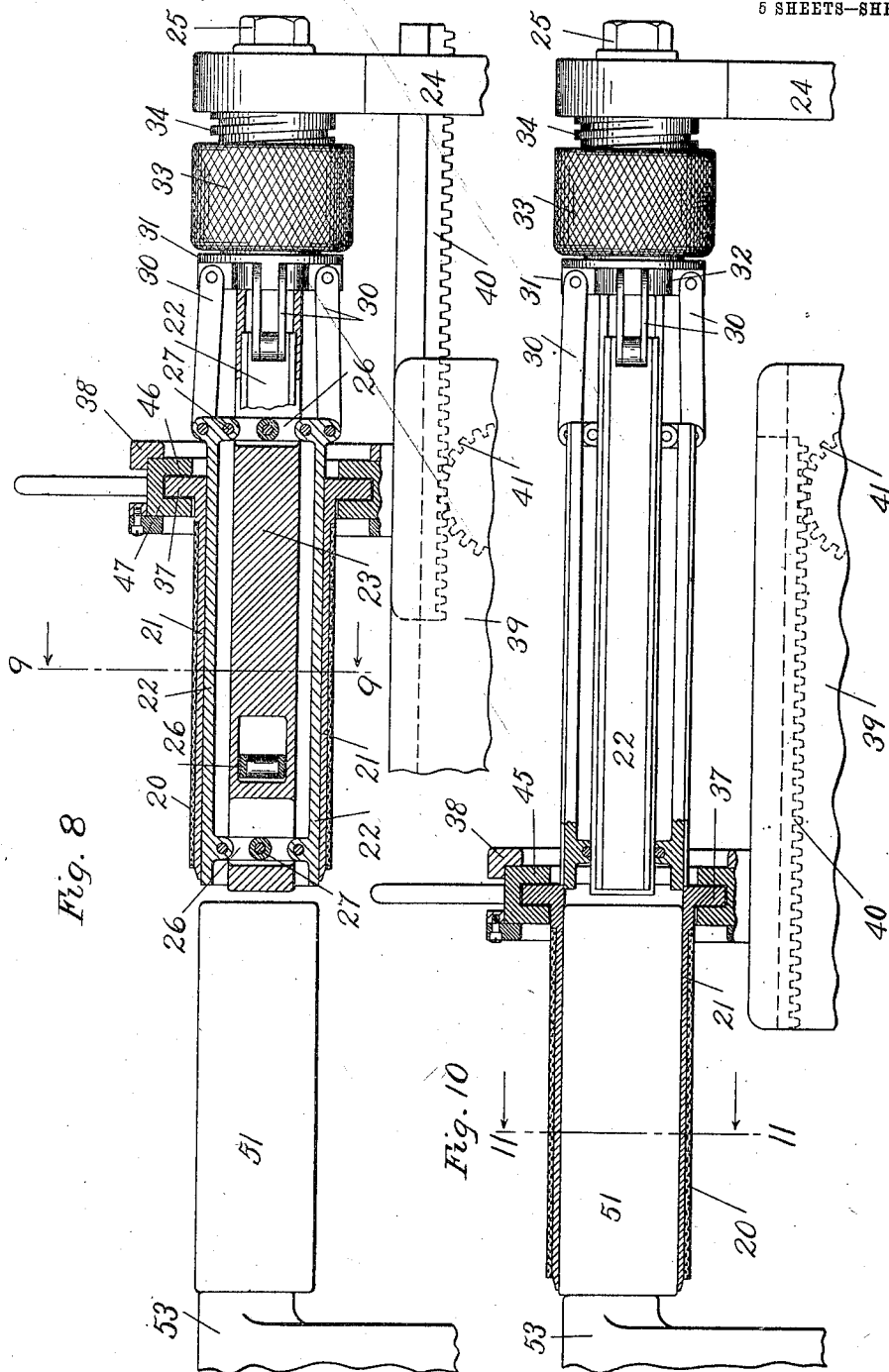
William A. Lorenz
 By H. H. Honiss, Atty

W. A. LORENZ.
 APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.
 APPLICATION FILED MAY 13, 1907.

1,037,159.

Patented Aug. 27, 1912.

5 SHEETS—SHEET 3.



Witnesses:
 Janette S. Cellsworth
 H. Mallner

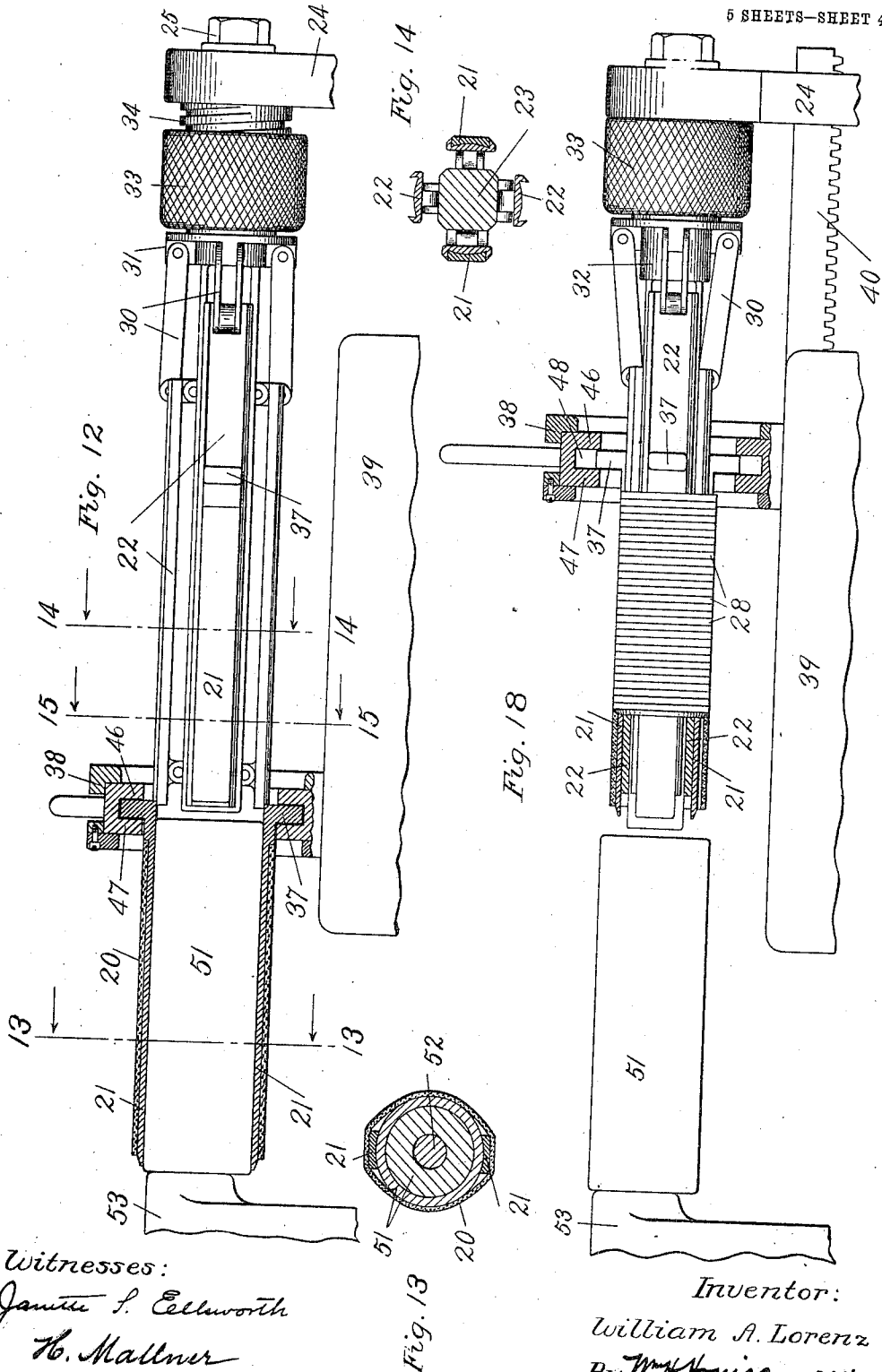
Inventor:
 William A. Lorenz
 By W. H. Honiss. Att'y

W. A. LORENZ.
 APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.
 APPLICATION FILED MAY 13, 1907.

1,037,159.

Patented Aug. 27, 1912.

5 SHEETS—SHEET 4.



Witnesses:
 Janette S. Cellworth
 H. Mallner

Inventor:
 William A. Lorenz
 By W. A. Norris, Atty

W. A. LORENZ.
 APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.
 APPLICATION FILED MAY 13, 1907.

1,037,159.

Patented Aug. 27, 1912.

5 SHEETS—SHEET 5.

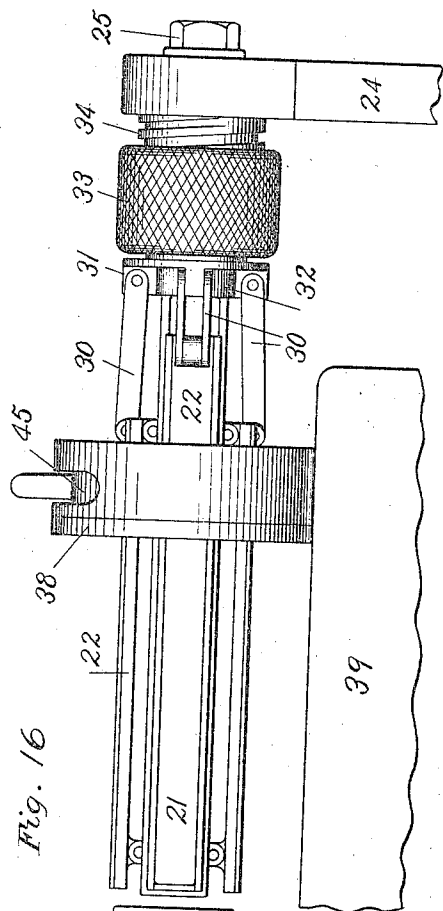


Fig. 16

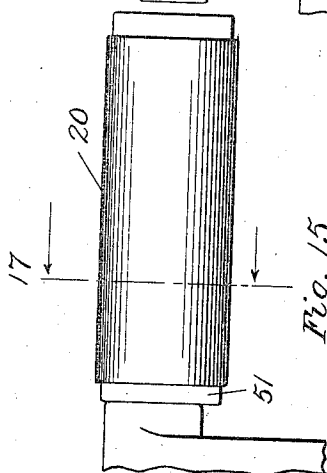
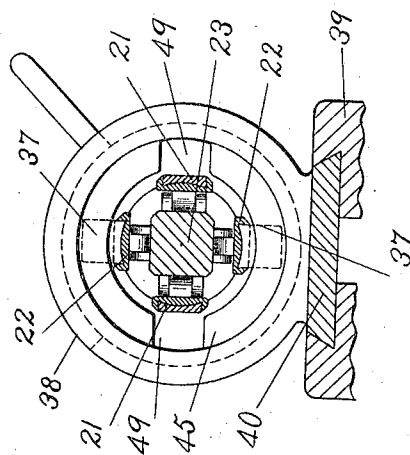


Fig. 15



Witnesses:
 Janette L. Cellsworth
 H. Mallner

Inventor
 William A. Lorenz
 By W. H. Honiss, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ, OF HARTFORD, CONNECTICUT, ASSIGNOR OF ONE-HALF TO BEECH-NUT PACKING COMPANY, OF CANAJOHARIE, NEW-YORK, A CORPORATION OF NEW YORK, AND ONE-FOURTH TO WILLIAM H. HONISS, OF HARTFORD, CONNECTICUT.

APPARATUS FOR MOUNTING AND DISMOUNTING FLEXIBLE TUBES.

1,037,159.

Specification of Letters Patent.

Patented Aug. 27, 1912.

Application filed May 13, 1907. Serial No. 373,451.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Apparatus for Mounting and Dismounting Flexible Tubes, of which the following is a full, clear, and exact specification.

This invention comprises an improved apparatus for expanding and mounting flexible tubes upon a larger mandrel and for dismounting them therefrom.

The embodiment of this invention herein shown and described is particularly adapted for use in the manufacture of rubber gaskets to be employed in the hermetic sealing of cans, jars and receptacles employed in the hermetic sealing of cans, jars and other receptacles commonly employed for the packing of food products.

Figure 1 of the drawings is a side view of this improved apparatus, a portion thereof being in section along the longitudinal center of the machine. Fig. 2 is a sectional view on the line 2—2 of Fig. 1, showing the mandrel support of the apparatus. Fig. 3 is a sectional view of the tube support on the line 3—3 of Fig. 1, showing the ports in their collapsed position, with a gasket tube surrounding the mandrel. Fig. 4 is a sectional view on the line 4—4 of Fig. 1, showing another portion of the tube support with a gasket tube thereon. Fig. 5 is a sectional view on the line 5—5 of Fig. 1, showing the transfer carriage and the base, in which it slides. Fig. 6 is a plan view of the right hand end of the outer portion of the apparatus, shown in Fig. 1. Fig. 7 shows the right hand end of Fig. 1. Fig. 8 is a side view of the upper portion of the apparatus, shown in Fig. 1, in which the parts are expanded, together with the gasket tube carried thereby. Fig. 9 is a sectional view on the line 9—9 of Fig. 8, showing the tube support with the expanded tube stretched thereon. Fig. 10 is a side view, partly in section, of the same parts shown in Fig. 8, in which the carriage has moved the four transfer blades, together with the expanded gasket tube, over the mandrel. Fig. 11 is an end view in section on the line 11 of Fig. 10. Fig. 12 is a side view of the apparatus partly

in section showing the parts represented in Fig. 10, with two of the transfer blades withdrawn from the gasket tube, and two more blades about to be withdrawn. Fig. 13 is a cross sectional view on the line 13—13 of Fig. 12, showing the two remaining blades between the mandrel and tube before withdrawal. Fig. 14 is a cross sectional view on the line 14—14 of Fig. 12, showing two of the transfer bars or blades upon their expanded guides. Fig. 15 is a cross sectional view on the line 15—15 of Fig. 12, showing the engagement of the carriage with the two transfer blades shown in Fig. 12 and ready to be withdrawn from beneath the tube. Fig. 16 is a side view of the upper portion of the apparatus, showing all four transfer blades withdrawn from the gasket tube, and showing the latter deposited upon the mandrel. Fig. 17 shows a sectional view on the line 17—17 of Fig. 16, of the mandrel and the gasket tube deposited thereon. Fig. 18 is a side view of the apparatus, showing the cut gaskets upon the collapsed tube support. This improved apparatus herein shown and described is adapted to perform an intermediate operation in the manufacture of rubber or other suitable gasket material. By the methods of manufacture to which the present invention relates, these tubes are mounted upon mandrels which are then mounted for rotation upon centers or upon a spindle while the gaskets are cut from the tube by a succession of circumferential cuts penetrating the wall of the tube, either at right angles with its axis, when making gaskets having a rectangular cross-section, or at an angle with that axis in making acute angled gaskets. The constrictive action of the tube due to its elasticity is utilized by pushing or pulling it over a mandrel of a diameter larger than the normal diameter of the tube. This mounting operation involves obvious difficulties, due to the flexible elastic and clinging character of the gasket material. The constrictive action of the tube around the mandrel surface interferes with the free distribution of the material and holds it in a more or less unequally distributed condition while being cut, with the result that the material more or less unequally changes its form as the strains are released by the cutting away of the successive rings,

thereby producing gaskets that are irregular in size or contour. Moreover, on account of the clinging and elastic character of the gasket material, it is necessary to have the gasket cutting tool, which is extremely thin and sharp, entirely penetrate the wall of the tube in order to insure complete separation of all the gaskets, thus bringing the cutting edge of the tool against or into the surface of the mandrel, and the repeated cuts of the tool score and roughen that surface, thereby increasing the difficulty of drawing or pushing or otherwise mounting the gasket tubes thereon. This roughness, and the clinging character of the gasket material, also interfere materially with the expeditious removal of the cut rings from the mandrel. Any attempt to remove the cut gaskets wholesale or several at a time from the mandrel is resisted by the clinging action of the several gaskets, each acting independently; and their resistance is still greater when of the acute angled form shown herein, because of the fact that their overlapping conical faces tend to telescope and wedge each other when attempts are made to push them longitudinally of the material. According to the present invention these difficulties are avoided by expanding or distending the tube circumferentially by means of bars or blades extending longitudinally inside of the wall of the tube and placed at intervals around the circumference thereof, spreading the bars outwardly to an extent sufficient to enable the bars to slide upon the outer side of the mandrel, then transferring the tube to the mandrel by carrying the expanded tube longitudinally of the mandrel to its desired resting place; and then withdrawing the bars or blades by successive steps; that is to say separately, or at least less than the whole number at one time, thereby leaving the tube clinging to the mandrel. Having thus mounted the tube upon the mandrel the latter is separated into gaskets by any desired method or apparatus. Then the cut gaskets are transferred from the mandrel by again inserting the aforesaid bars or blades approximately to their former places between the inner sides of the gaskets and the surface of the mandrel; thus expanding the gaskets and transferring their hold from the outer surface of the mandrel to the outer sides of the transfer bars or blades. The latter are then coincidently withdrawn from the mandrel; or the mandrel is withdrawn from the bars, the gaskets remaining upon the outer sides of the bars by their clinging action. After removal from the mandrel the bars are collapsed and the gaskets removed.

The apparatus herein shown and described for carrying out this process includes transfer bars or blades, means for supporting,

guiding, expanding and contracting the blades, and means for moving the blades to transfer the tubes to and from the mandrel while in their expanded condition.

Referring to the drawings, the tube 20 surrounds and rests upon the transfer bars 21, which are here shown to be four in number. The number, width and other dimensions or proportions of these bars should, however, be suited to the size, thickness, length and other governing characteristics of the tubes to be handled. These bars are supported by longitudinally extending expander guides 22, which are longitudinally channeled to receive the transfer bars (Figs. 3, 4 and 9) or otherwise adapted to support and guide the transfer bars for longitudinal movement. The inner surfaces of the bars are preferably curved as herein shown, approximately to the curvature of the mandrel. These expander guides 22 are mounted for inward and outward expanding and contracting movement relative to a common center. In the present instance they are pivotally mounted at their opposite ends to a central support 23 which is supported in a projecting or overhanging position by the bracket 24, preferably being removably secured thereto by means of a nut 25. The expander guides 22 are as herein shown preferably connected by means of links 26 with pivots 27 arranged near the opposite ends of the guides and proportioned so as to maintain the expander guides in approximately parallel relation to each other as they are swung outwardly and inwardly from and toward their common center. These guides are shown in their inward or contracted position in Fig. 1 and in their outward or expanded position in Fig. 8, in which latter position the position and relation of the links and bars is such as to practically constitute a toggle joint, the effective force of which increases as the guides approach their outer position shown in Fig. 8, thus increasing with the increasing resistance of the distended tube.

For convenience in connecting and manipulating the expander guides 22 so as to move them coincidently through their inward and outward movements, they are herein shown to be connected by means of the connecting rods 30, with an expander head 31, which is mounted for longitudinal sliding movement upon a boss or hub 32 of the bracket 24, the boss being squared or provided with a spline or other suitable means to prevent the expander head from rotating, while permitting it to slide freely in a longitudinal direction. The longitudinal movement of the expander head is effected in any convenient way. In the present embodiment it is effected by means of a screw-nut 33, which screws upon the threaded portion 34 of the bracket 24 and

engages with the expander head 31 in any convenient way, as by the annular flange 35. For convenience in turning the screw-nut 33 it may be knurled or squared, or be provided with holes to receive a lever or spanner wrench.

As a means for enabling the transfer bars 21 to be moved longitudinally relative to the expander guides 22, to transfer the tube from the tube support to the mandrel as illustrated in Figs. 8 and 10, the transfer bars are provided with arms 37 which extend outwardly from the guides 22 into engagement with selecting and moving devices appurtenant to the transfer carriage 38, which is mounted for sliding movement upon a base 39 by means of a shaft 42 provided with any convenient lever or crank 43 to enable the pinion to be rotated by hand.

In order to enable the longitudinal movement of the transfer bars relative to the expander guides to be effected either coincidentally or selectively, in succession, I preferably provide selecting mechanism which in the present instance consists of a selector head 45 mounted for rotary movement in the transfer carriage 38. This head as herein shown consists of an annular ring having internal flanges 46 and 47, separated by an annular groove 48 for receiving the outwardly projecting arms 37 of the transfer bars. These flanges are provided with interruptions 49 (Figs. 5 and 15) wide enough to permit the arms 37 of the transfer bars to pass through when the selector head is turned to the proper position, the number and arrangement of these interruptions being suited to the number and positions of the bars employed. When in the position shown in Fig. 5 the selector head engages all of the transfer bars 21 coincidentally. But when moved so as to bring the interruptions 49 into coincidence with any of the arms 37 the corresponding transfer bars may be left stationary while moving the remaining bars, this feature being of particular utility in connection with the transferal of the tubes or cut gaskets from the blades to the mandrel, and vice versa.

The mandrels 51 are made of a size and length suited to the tubes to be mounted thereon, it being understood that they are of a diameter sufficiently larger than that of the tube to enable the latter by its own constrictive action, to cling to the mandrel with sufficient force to hold itself in place while being cut or otherwise operated upon. As a convenient way of supporting these mandrels in position relative to the tube support these mandrels are mounted upon a central stud 52 appurtenant to the bracket 53. Some suitable means as a screw 54 should be provided for holding the mandrel against lengthwise displacement while the

tube and the blades are being dismounted or withdrawn therefrom. In order to enable the mandrels when thus supported to be swung into and out of alinement with the tube support the bracket 53 is preferably pivoted as at 55 (Fig. 2) upon a base 56, suitable stops 57 and 58 being provided for the alined and out of line positions, respectively, of the bracket.

The operation of this device is as follows:—The tube support being placed in its collapsed position shown in Fig. 1, a tube is placed thereon by slipping it endwise over the transfer bars 21, in which position it rests as shown in the end views (Figs. 1, 3 and 4). A mandrel 51 of suitable size is secured to the bracket 53 and swung to the position shown in full lines in Fig. 2, bringing the mandrel into alinement with the tube and its support. Then the tube is expanded by screwing the nut 33 toward the left as viewed in Fig. 1, thus moving the expander head 31 and spreading the expander guides 22 outwardly to the position shown in Fig. 8, thereby distending the tube as is also shown in cross-section in Fig. 9, the amount of expansion being sufficient to carry the inner sides of the transfer bars 21 out to at least the diameter of the mandrel 51. The selector head 45 being turned to the position shown in Fig. 5 so as to engage the arms 37 of all of the transfer bars, the latter are then moved longitudinally toward the left to the position shown in Fig. 10 by means of the transfer carriage 38 through the medium of its rack and pinion connection with the crank 43. The selector head 45 is then moved to the position shown in Fig. 15, with the interruptions or recesses 49 clearing the arms of two of the transfer bars; but remaining in engagement with the other pair of arms. The transfer carriage is then moved back toward the right, withdrawing the said pair of arms, but leaving the tube clinging to the mandrel and to the other pair of arms as shown in Fig. 13. The transfer carriage is then moved again to the left and the selector head turned so as to engage the arms of the remaining transfer bars, which by repetition of the movement of the transfer carriage to the right is withdrawn from the tube, leaving the latter to settle down upon and cling to the mandrel as shown in Fig. 17. The mandrel support 53 is then swung back to the position shown by dot-and-dash lines in Fig. 2, thus carrying the mandrel out of alinement with the tube support and enabling the mandrel to be removed. The mandrel having the tube thus mounted thereon is then transferred to any suitable apparatus for cutting the tube into gaskets of the required size, as shown by the circumferential lines in Fig. 18. Then the mandrel carrying the cut gaskets is returned, and again secured upon

the mandrel support, and the latter is swung forward to its full line position of Fig. 2, in alinement with the tube support. Then with the selector head 45 turned to a position to engage two of the transfer bars or blades, the latter are pushed forward between the surface of the mandrel and the inner wall of the cut gaskets, as indicated in Fig. 13, the clinging friction of the remaining circumferential portions of the gasket against the surface of the mandrel tending to prevent the gaskets from being pushed endwise. Then the transfer carriage is moved back and the two other or remaining blades are similarly pushed into position indicated in Fig. 11, thus distending the gaskets so that their inner surfaces wholly, or at least approximately, clear the surface of the mandrel. Then the selector head is turned to engage all of the transfer bars, whereupon the transfer carriage is again moved to the right, carrying with it the gaskets stretched around the outer surfaces of the transfer bars 21. The transfer bars and their expanding guides are then collapsed to the position shown in Fig. 18 by turning the screw-nut toward the right so as to collapse the parts to their contracted condition shown in Fig. 1, whereupon the gaskets may be readily removed. If desired, the gaskets, or any desired number of them, may be tied together prior to removal by passing a string longitudinally through one of the intervals between the transfer bars, either prior to or after the collapsing operation.

The mandrels 51 may be of any desired material. In some instances, and particularly when employed for the cutting of gaskets, it may be found desirable to provide the mandrel with a protecting outer surface of rubber, by stretching or cementing a rubber tube thereon.

In some instances, and particularly when the tube is light and thin, or of a character easily stretched, it may be unnecessary to employ the expanding and collapsing movements, in which case the expander guides may be dispensed with and the transfer bars mounted on rigid supports or guides in line with the peripheral surface of the mandrel. Or, the expander guides shown herein may be left in their expanded condition shown in Figs. 8 and 9, and the tube may be stretched over the transfer bars by hand or in any other convenient way. This modification, however, does not, or at least need not, interfere with or modify the process of transferring the tubes to and from the mandrel, or modify the construction or operation of the transferring and selecting mechanism.

Although this apparatus is herein shown and described in its specific application to the manufacture of gaskets, it is obvious

that it may also be employed for other purposes, which involve the mounting or dismounting of sleeves or tubes of flexible material. The apparatus may be modified in many ways both generally and in detail to adapt it to different purposes. The various members of the apparatus may be disposed vertically instead of horizontally as herein shown, or may be otherwise altered or transposed to suit different conditions.

I claim as my invention:—

1. The combination in means for mounting flexible tubes, of a plurality of transfer members extending longitudinally within the tube and arranged at intervals circumferentially of the tube, spreader guides mounted for substantially radial movement, and supporting the said members for sliding movement, and means for spreading the said guides outwardly.

2. The combination in means for mounting flexible tubes, of a plurality of expander guides mounted for outward movement relative to a common center, transfer members supported on the said guides for movement longitudinally thereof, and means for effecting the said outward movement of the guides.

3. Means for expanding and mounting flexible tubes, including expander guides mounted in parallel relation for movement in an outward direction relative to a common center, transfer members mounted for longitudinal movement on the said guides, means for moving the guides, and means for moving the transfer members longitudinally of the guides.

4. Means for expanding and mounting flexible tubes, including in combination a central support, a plurality of guides mounted on the support for outward movement relative to a common center, transfer bars mounted for longitudinal movement on said guides, means for moving the said guides outwardly, and means for sliding the transfer bars longitudinally of said guides.

5. Means for expanding and mounting flexible tubes, including in combination, expander guides pivotally mounted for outward swinging movement relative to a common center, transfer bars mounted for longitudinal movement on said guides, means for swinging the said guides to spread them outwardly, and means for sliding the said bars on their respective guides.

6. Means for expanding flexible tubes, including a plurality of spreader guides pivoted for swinging movement in an approximately parallel relation to each other, and outwardly from a common center, transfer bars mounted for longitudinal movement on said guides, and means including a screw nut for spreading the said guides coincidently to distend the tube circumferentially.

7. Means for expanding flexible tubes and

transferring them to a mandrel, including in combination a central support, expander guides mounted in said support for outward movement relative to a common center, transfer bars mounted for longitudinal movement on said guides, means for expanding the guides, means for supporting a mandrel in substantial alinement with the expanded tube, and means for moving the transfer bars longitudinally to transfer the expanded tube to the mandrel.

8. The combination, in means for mounting flexible tubes, of expander guides mounted for outward movement relative to a common center, transfer members supported on the said guides for movement longitudinally thereof, means for effecting the said outward movement of the guides, and means for moving a plurality of the transfer members longitudinally of the guides.

9. The combination, in means for mounting and dismounting flexible tubes, of a mandrel, a plurality of transfer members supported for movement longitudinally of the mandrel, and means for selectively moving the said transfer members.

10. The combination, in means for mounting and dismounting flexible tubes, of a mandrel, a plurality of transfer members supported for movement longitudinally of the mandrel, and means for moving the said transfer members longitudinally either all coincidently, or some of them selectively.

11. The combination, in means for mounting and dismounting flexible tubes, of a plurality of expander guides mounted for outward and inward movement relative to a common center, transfer members supported on the said guides for movement longitudinally thereof, means for effecting the said movements of the guides, and a transfer carriage, provided with means for selectively engaging some or all of said transfer members to move them longitudinally with the carriage.

12. The combination, in means for mounting and dismounting flexible tubes, of a plurality of expander guides mounted for outward and inward movement relative to a common center, transfer members supported on the said guides for movement longitudinally thereof, means for effecting the said movements of the guides, a transfer carriage movable longitudinally of the guides, and a selector head mounted for rotary movement on the carriage and provided with means for selectively engaging with the said transfer members.

13. The combination, in means for mounting flexible tubes, of a plurality of expander guides mounted for inward and outward movement relative to a common center, transfer members supported on the said guides for movement longitudinally

thereof and provided with outwardly extending arms, means for effecting the inward and outward movements of the guides, a transfer carriage movable longitudinally of the guides, a transfer head mounted for rotary movement on the carriage and encircling the said guides, and provided with abutments for selectively engaging with the said arms of the transfer members to move them longitudinally with the carriage.

14. The combination, in means for mounting and dismounting flexible tubes, of a plurality of expander guides mounted for inward and outward movement relative to a common center, transfer members supported by the said guides for movement longitudinally thereof and provided with outwardly extending arms, means for effecting the inward and outward movements of the guides, a transfer carriage movable longitudinally of the guides, a transfer head mounted on the said carriage and provided with interrupted flange abutments for selectively engaging the said arms of the transfer members to selectively move some of them, or all of them, longitudinally of the said guides.

15. The combination in means for mounting flexible tubes, of a mandrel, a tube support, means appurtenant to the support for expanding the tube and transferring it to the mandrel, and a mandrel support mounted to carry the mandrel into and out of alinement with the tube support.

16. The combination, in means for mounting flexible tubes, of a mandrel, a tube support, means appurtenant to the support for expanding the tube and transferring it to the mandrel, and a mandrel support mounted for swinging movement to carry the mandrel into alinement to receive the tube, and to carry the mandrel out of said alinement to facilitate removal of the mandrel.

17. The combination, in means for mounting flexible tubes, of a mandrel, a plurality of transfer bars extending longitudinally within the tube, means for supporting the bars in position to slide over the mandrel, and means for moving the said bars to carry them with the tube upon the mandrel.

18. The combination, in means for mounting flexible tubes, of a mandrel, a plurality of transfer bars extending longitudinally within the tube, means for supporting the said bars with their inner surfaces in approximate alinement with the peripheral surface of the mandrel, and means for sliding the bars and the tube together upon the mandrel.

19. The combination, in means for dismounting flexible tubes from a mandrel, of a plurality of transfer bars inserted between the inner wall of the tube and the periph-

eral surface of the mandrel, and means for withdrawing the bars and the tube together longitudinally from the mandrel.

20. The combination, in means for dis-
5 mounting flexible tubes from a mandrel, of
a plurality of transfer bars extended lon-
gitudinally between the inner wall of the
tube and the peripheral surface of the man-
drel, and disposed at intervals around that
10 peripheral surface, and means for with-
drawing the said bars and the tube lon-
gitudinally from the mandrel.

21. Means for transferring flexible tubes
to or from a mandrel, including in combina-
15 tion a plurality of transfer bars extending
longitudinally between the inner wall of
the tube and the peripheral surface of the
mandrel and disposed at intervals around
that peripheral surface, means for expand-
20 ing the said bars in a substantially parallel

relation, and means for moving the said
bars and the tube longitudinally on the man-
drel.

22. Means for transferring flexible tubes
to or from a mandrel, including in combina- 25
tion a plurality of transfer bars extending
longitudinally between the inner wall of
the tube and the peripheral surface of the
mandrel, and disposed at intervals around
that peripheral surface, means applied ap- 30
proximately at the opposite ends of the
bars for expanding them against the wall
of the tube, and means for moving the said
bars and the tube longitudinally on the
mandrel.

WILLIAM A. LORENZ.

Witnesses:

NELLIE PHOENIX,
EDWARD H. LORENZ.