K. A. PALMER AND J. C. IRVIN.

TUBE FOLDING MACHINE.

APPLICATION FILED JULY 6, 1918.

1,305,666.

Patented June 3, 1919.

5 SHEETS—SHEET 1.

Fig. 1

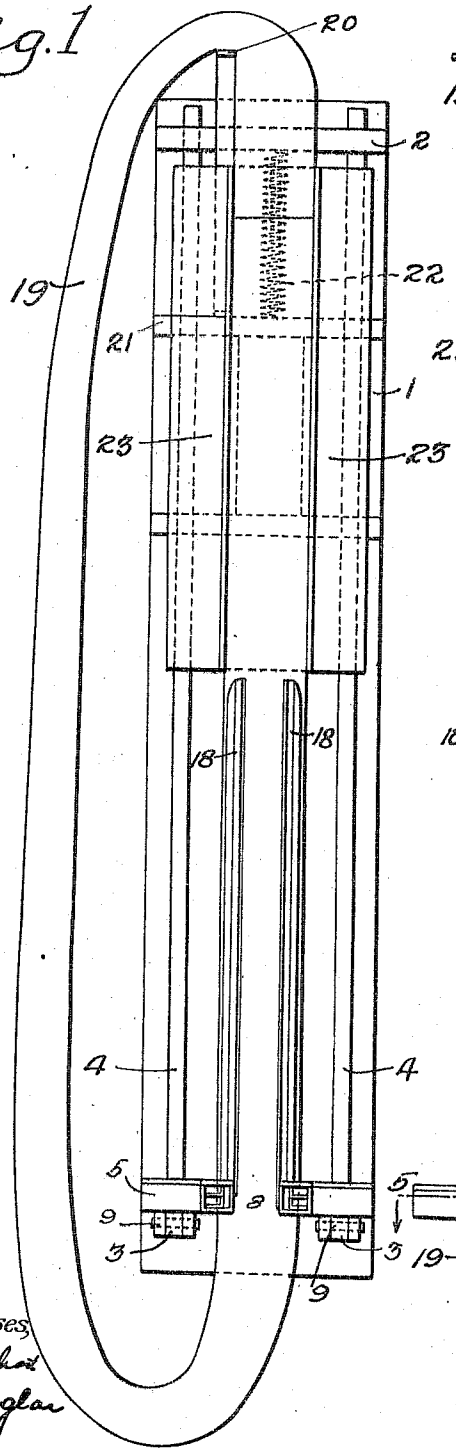
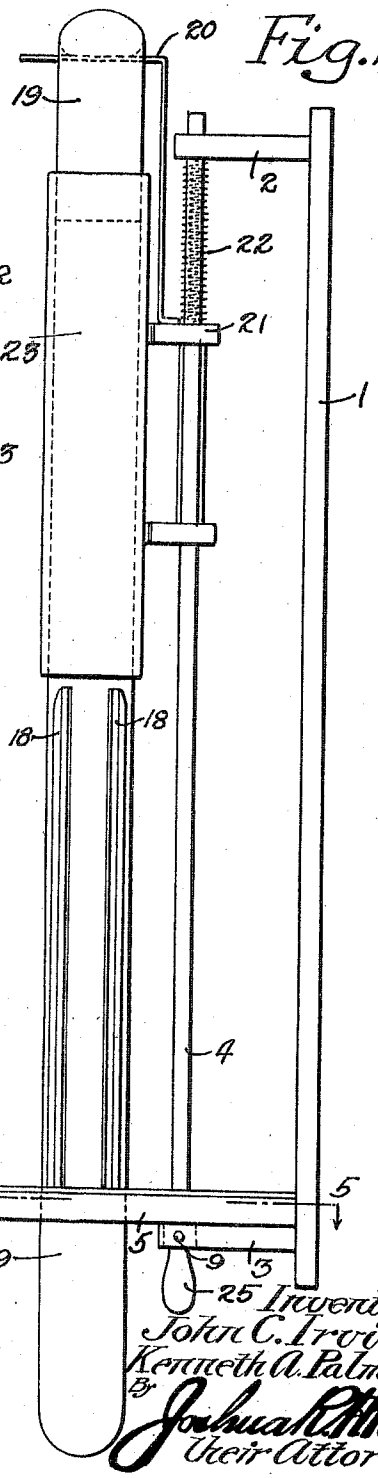


Fig. 2.



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Fig. 3.

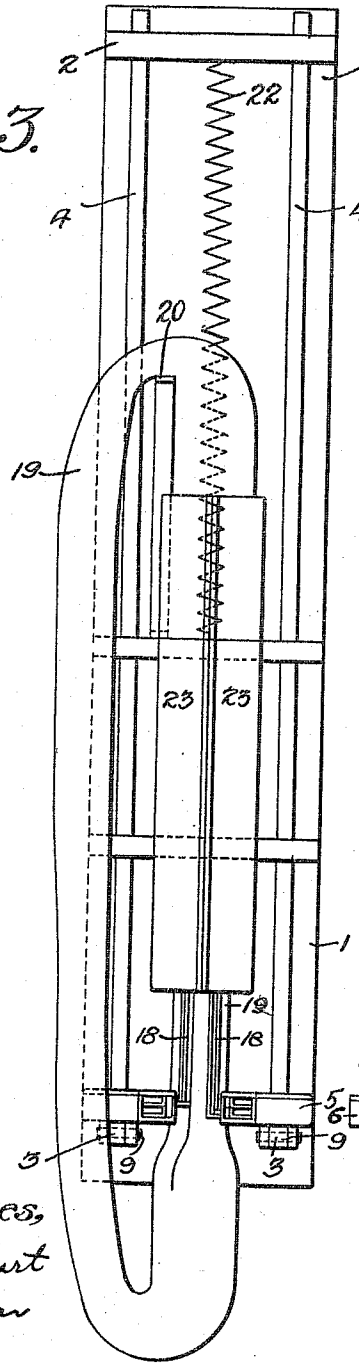
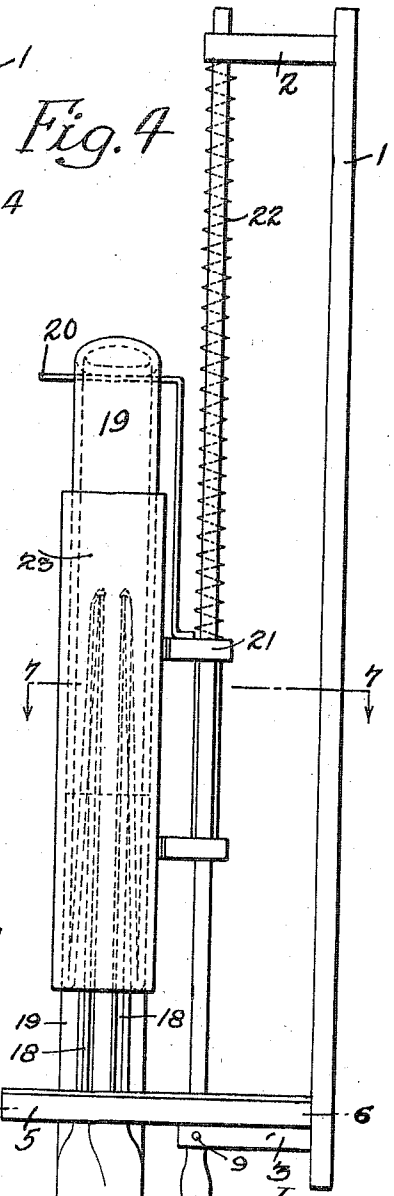


Fig. 4



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5 SHEETS—SHEET 3.

Fig. 5.

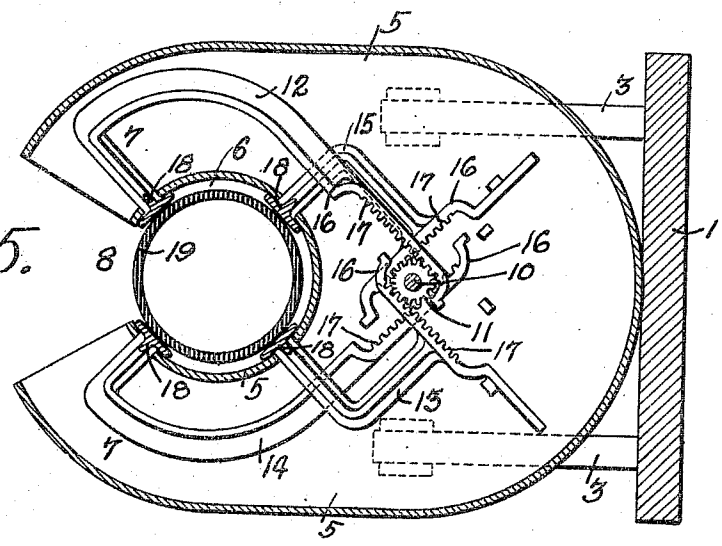
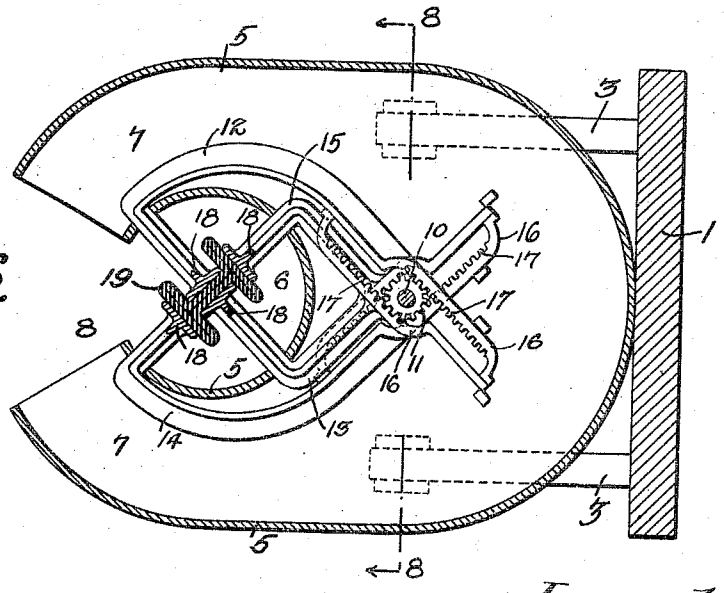


Fig. 6.



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5 SHEETS—SHEET 4.

Fig. 7.

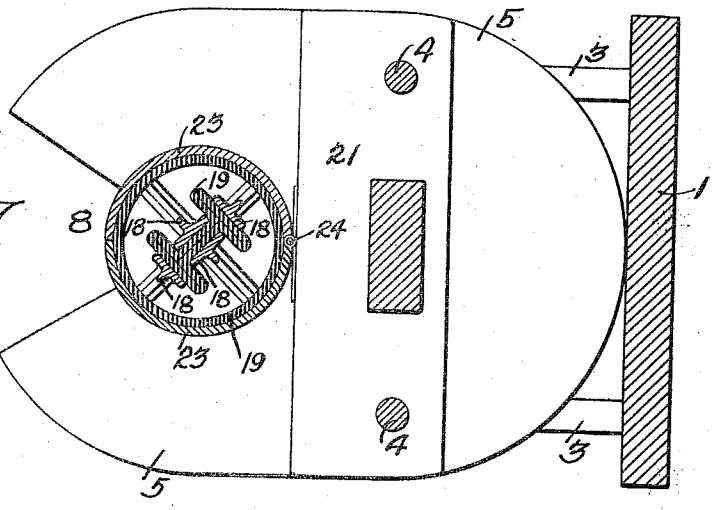
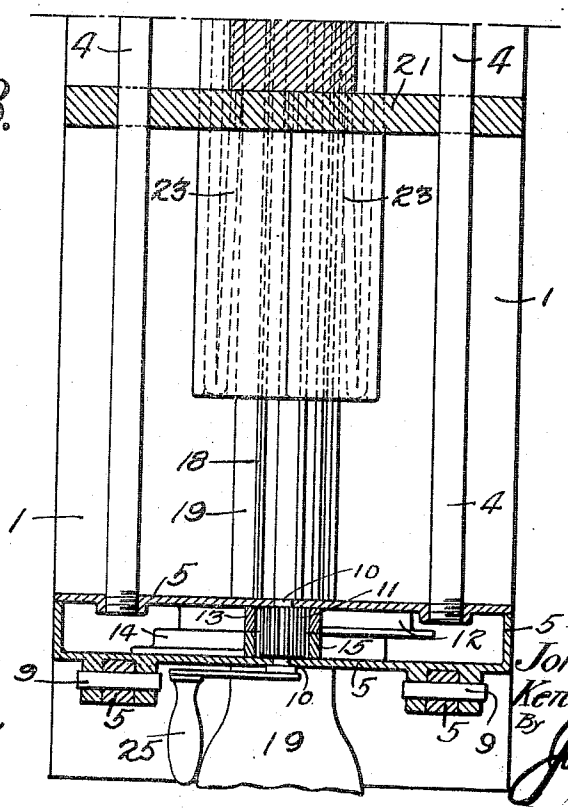


Fig. 8.



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5 SHEETS—SHEET 5.

Fig. 13

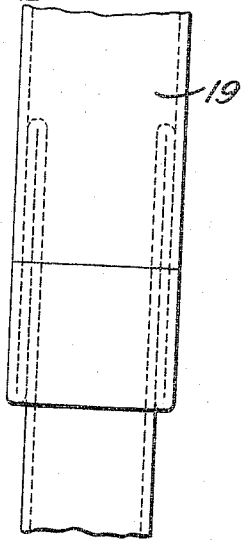


Fig. 14.

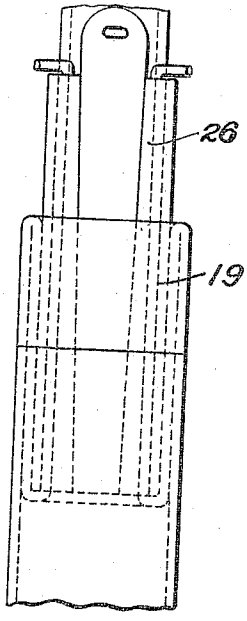


Fig. 9.

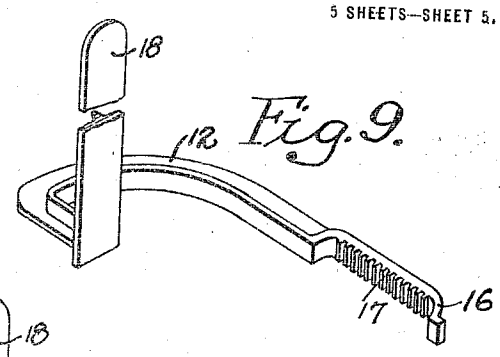


Fig. 10.

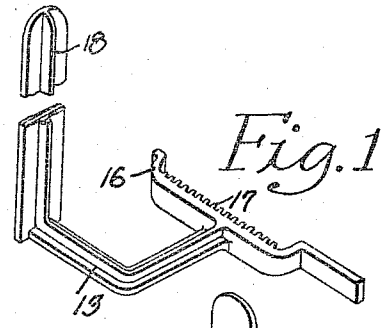


Fig. 12.

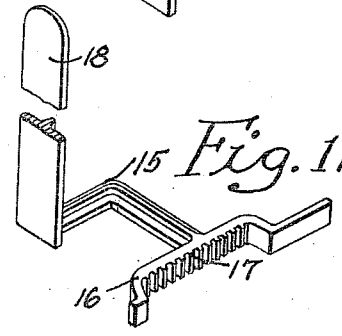
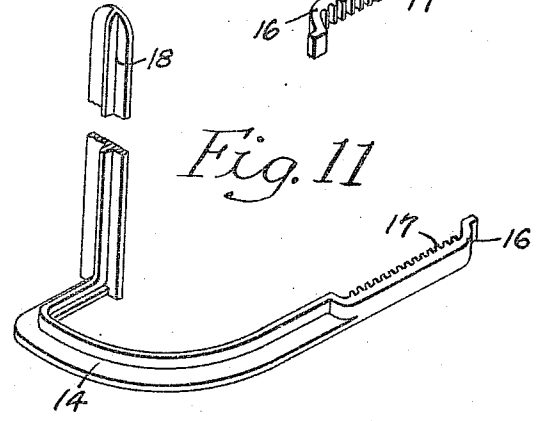


Fig. 11



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UNITED STATES PATENT OFFICE.

KENNETH A. PALMER AND JOHN C. IRVIN, OF NEW YORK, N. Y.

TUBE-FOLDING MACHINE.

1,305,666. Specification of Letters Patent. Patented June 3, 1919.

Application filed July 6, 1918. Serial No. 243,668.

To all whom it may concern:

Be it known that we, KENNETH A. PALMER and JOHN C. IRVIN, citizens of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Tube-Folding Machines, of which the following is a specification.

One object of our invention is to provide a machine for folding or turning rubber tubes, such for example as the inner tubes of automobile tires, so that the seam formed by cementing together the opposite ends of the tube, will be so positioned that a mandrel can be inserted within the fold of the tube and thereby form a smooth and solid filling piece on the outside of which the seamed portion of the tube fits; thereby permitting said seamed portion of the tube to be properly vulcanized.

Another object is to so construct our invention that it will be of simple and durable construction and can be quickly operated to perform the above mentioned function.

These objects, and other advantageous ends which will be described hereinafter, we attain in the following manner, reference being had to the accompanying drawings in which—

Figure 1 is a front elevation of our improved machine showing a rubber inner tube inserted therein and in a position ready to be folded, as above described,

Fig. 2 is a side elevation of Fig. 1,

Fig. 3 is a front elevation of the same general nature as Fig. 1 showing the parts having been operated to fold the tube,

Fig. 4 is a side elevation of Fig. 3,

Fig. 5 is an enlarged transverse sectional plan view taken on the line 5—5 of Fig. 2,

Fig. 6 is an enlarged transverse sectional plan view taken on the line 6—6 of Fig. 4,

Fig. 7 is an enlarged transverse sectional plan view taken on the line 7—7 of Fig. 4,

Fig. 8 is a fragmentary sectional elevation taken on the line 8—8 of Fig. 6,

Figs. 9, 10, 11, and 12 are perspective views of certain arms which form a part of our invention,

Fig. 13 is a fragmentary elevation showing the character of the fold produced by our improved machine, and

Fig. 14 is a fragmentary elevation showing a mandrel inserted within the fold of the tube and forming a smooth filling piece around which the seamed portion of the tube fits.

Referring to the drawings, 1 represents an upright supporting member which, for example, can be in the form of a board adapted to be attached to a wall. The support 1 has brackets 2 and 3 on its forward face and uprights bars 4 extend between these two brackets and form a rail upon which certain elements slide, as will hereinafter be more fully described.

A base 5 has an opening 6 extending from top to bottom and is made hollow, as shown at 7. The forward portion of the base 5 is cut away at 8 to provide an entrance passage for the rubber tube into the opening 6, as will hereinafter be described. The base 5 is pivotally mounted, as shown at 9, to the brackets 3. A small shaft 10 extends through the bottom of the base 5 and into the hollow portion thereof and is provided at its inner portion with a toothed pinion 11. Four arms 12, 13, 14, and 15 are slidably mounted within the hollow portion of the base 5 and these arms are arranged in pairs, the arms 12 and 13 constituting one pair while the arms 14 and 15 constitute another pair. Each of these arms is provided with a tail portion 16 having a toothed rack 17 thereon adapted to mesh with the toothed pinion 11. Each pair of the arms is arranged to slide in a different plane and the toothed pinion 11 is sufficiently long to have its teeth mesh with the teeth of the racks 17 of all the arms.

It will be noted that the racks of each pair engage oppositely disposed portions of the pinion. Therefore, a rotation of the pinion in one direction will cause the respective arms of each pair to move in opposite directions. The outer end of each of the arms is provided with an elongated finger 18. The rubber tube to be folded is indicated at 19 and is adapted to be inserted through the entrance passage 8 while the arms are in their positions shown in Figs. 1, 2, and 5. The portion of the tube 19, which has the seam to be vulcanized, is hung in a substantially vertical position, as shown in Figs. 1 and 2, and is supported at its top on an angle 20, said angle 20 being mounted on a

frame 21 which is slidably mounted on the bars 4 and is normally held in an upper position by means of a coiled spring 22, the latter being attached to the bracket 2.

A pair of arcuate grippers 23, hinged together at their rear, as shown at 24, are supported on the frame 21 and the seamed portion of the tube 19 extends longitudinally through these grippers. When the tube is in the position, as above described and as illustrated in Figs. 1, 2, and 5, the shaft 10 is rotated by means of a handle 25 and this action serves to rotate the pinion 11, thereby actuating the arms 12, 13, 14, and 15, and to move the fingers 18 into engagement with the tube 19 to squeeze the lower portion of the tube 19 in the position illustrated in Fig. 6. While the lower portion of the tube is being held in this position, the grippers 23 can be moved together to grasp the upper portion of the tube 19 and while thus grasping said upper portion of the tube 19, they can be slid downwardly on the rails 4, against the action of the spring 22, and thus carry with them the upper portion of the tube 19 and cause it to telescope or fold over the portion of the tube which is being held by the fingers 18.

It will be noted that the construction of the fingers 18 is such that they will hold the tube in a squeezed position and permit the upper portion of the tube to be folded, as above described, the folded portion also passing around the upper portion of the fingers.

After the proper length of fold has been secured the grippers 23 can be released and the spring 22 will serve to move them to their normal position and by slightly loosening the pressure of the fingers 18 the folded tube can be removed from the machine, the base being pivotally mounted, as above described, permitting it to tilt and with it the fingers so that the tube can be readily withdrawn.

Fig. 13 shows the tube folded and Fig. 14 shows a mandrel 26 which is inserted within the folds to form a smooth and solid filling therefor and a backing for the seamed portion of the tube 19 so that the tube having the mandrel thus inserted can be placed within a vulcanizing mold and the portion adjacent the same will be smooth and thus capable of being efficiently vulcanized.

While we have described our invention as taking a particular form, it will be understood that the various parts of our invention may be changed without departing from the spirit thereof, and hence we do not limit ourselves to the precise construction set forth, but consider that we are at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A machine, for telescopically folding a flexible tube, including two means adapted to grasp different and connected portions of said tube within its length and being relatively movable to telescopically fold one of said portions over the other of said portions, substantially as described.

2. A tube folding machine including means movable into engagement with the outer surface of a portion of the length of said tube to compress the same; and gripping means for engagement with the outer surface of another portion of said tube, said gripping means being movable relatively to said first means to move said latter mentioned portion in the direction of the length of said first mentioned portion whereby the second mentioned portion is telescopically folded over the first mentioned portion, substantially as described.

3. A tube folding machine including a plurality of elongated fingers for engagement with the outer surface of a portion of the length of said tube; common means operative to move said fingers in directions to compress and squeeze said portion of the tube between them; and gripping means for engagement with another portion of said tube and movable relatively to and in the direction of the length of said first portion of the tube to fold said second mentioned portion over the first mentioned portion, substantially as described.

4. A tube folding machine including a plurality of elongated fingers for engagement with the outer surface of a portion of the length of said tube; arms connected to said fingers and having toothed racks thereon; a pinion for engagement with said toothed racks; means for rotating said pinion to move the racks and thereby actuate said fingers in directions to compress and squeeze said portion of the tube between them; and gripping means for engagement with another portion of said tube and movable relatively to and in the direction of the length of said first portion of the tube to fold said second mentioned portion over the first mentioned portion, substantially as described.

5. A tube folding machine including a plurality of elongated fingers for engagement with the outer surface of a portion of the length of said tube; arms connected to said fingers; a hollow base forming a housing for said arms and having a portion through which parts of said arms movably project, said portion of the casing providing an opening through which the tube extends, said base also having a passage leading from its outside to said opening to permit entrance of the tube into the latter; means for

moving said arms whereby the fingers are actuated to compress said portion of the tube; and gripping means for engagement with another portion to said tube and movable relatively to and in the direction of the length of said first portion of the tube to fold said second mentioned portion of the tube over the first mentioned portion thereof, substantially as described.

6. A tube folding machine including a hollow base providing an opening for the tube and a passage for said tube into the opening; arms positioned within said base and having portions slidably extending into said opening; fingers located on said latter portions of the arms for engagement with a portion of said tube; means for moving the arms to cause said fingers to compress said portion of the tube; means forming a pivotal mounting for said base; and gripping means for engagement with another portion of said tube and movable relatively to and in the direction of the length of said first portion of the tube to fold said second mentioned portion of the tube over the first mentioned portion thereof, substantially as described.

7. A tube folding machine including means movable into engagement with the outer surface of a portion of the length of said tube to compress the same; a rail; a frame slidable on said rail; and grippers supported on said frame, said grippers being adapted to be opened to receive another portion of said tube and moved together to grip said latter mentioned portion of the tube and then moved in the direction of the length of said first portion of the tube and as prescribed by said rail whereby said second mentioned portion of the tube is folded over said first mentioned portion thereof, substantially as described.

8. A tube folding machine including means movable into engagement with the outer surface of a portion of the length of said tube to compress the same; a rail; a frame slidable on said rail; grippers supported on said frame, said grippers being adapted to be opened to receive another portion of said tube and moved together to grip said latter mentioned portion of the tube and then moved in the direction of the length of said first portion of the tube and as prescribed by said rail whereby said second mentioned portion of the tube is folded over said first mentioned portion thereof; and means for automatically moving said grippers to their normal positions when they are released, substantially as described.

9. A tube folding machine including a plurality of elongated fingers for engagement with the outer surface of a portion of the length of said tube and adapted to compress and squeeze said portion of the tube into a compact form; and gripping means for engagement with another portion of said tube and movable relatively to and in the direction of the length of the first portion of the tube to telescopically fold said second mentioned portion of the tube over the first mentioned portion of the tube, substantially as described.

10. A machine, for telescopically folding a flexible tube, including means for engagement with the outer surface of a portion of the length of said tube to compress and squeeze the same into a compact form; and means for gripping the outer surface of another portion of said tube, said gripping means being movable relatively to and in the direction of the length of said first portion of the tube to telescopically fold said second mentioned portion over the first mentioned portion, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

KENNETH A. PALMER.
JOHN C. IRVIN.

Witnesses:
PETER S. O'HARA,
LEWIS MILTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."