May 29, 1934. J. M. SMITH 1,960,353

FORMING BODY

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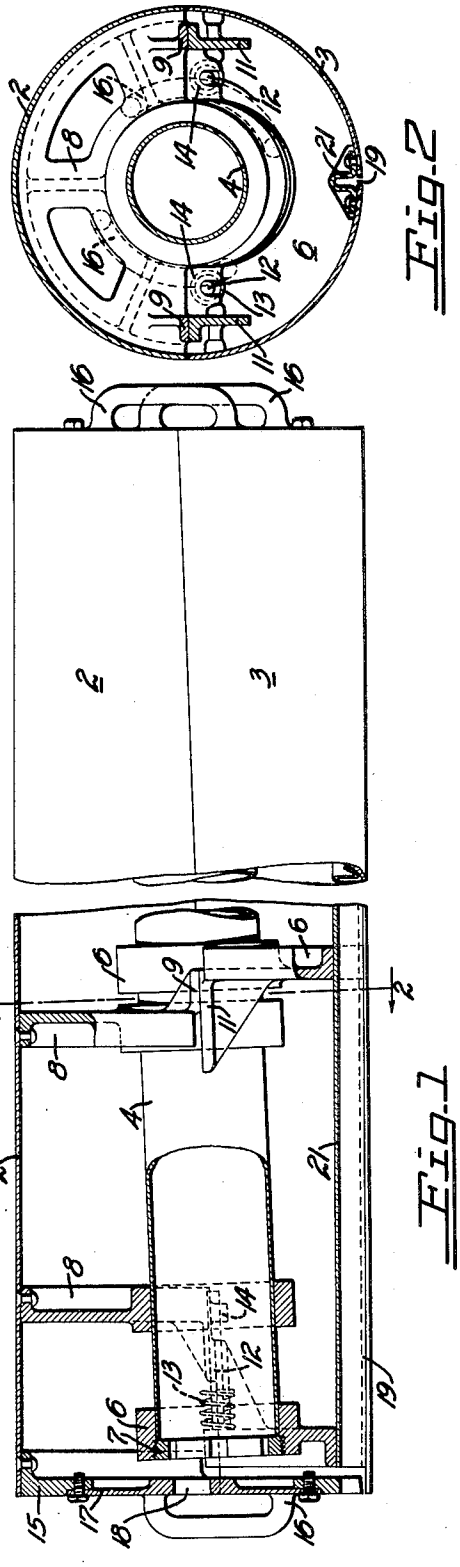


Fig. 1

Fig. 2

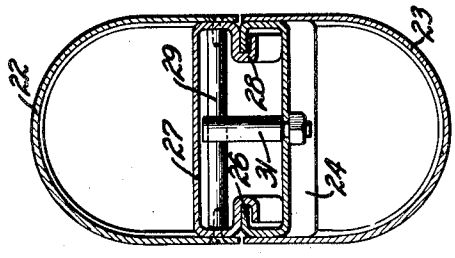


Fig. 4

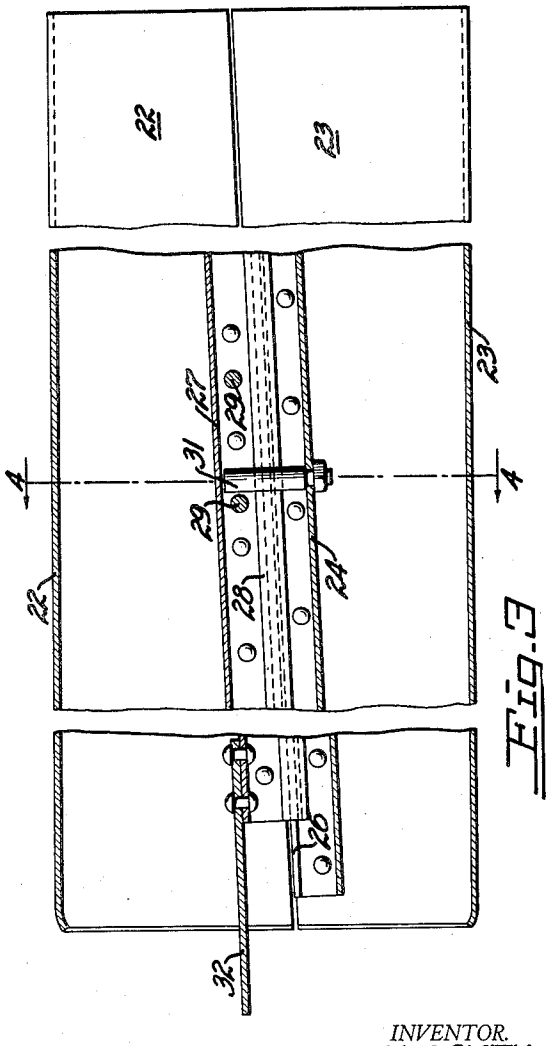


Fig. 3

INVENTOR.
JAY M. SMITH.
BY Charles S. Evans
HIS ATTORNEY

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FORMING BODY

Jay M. Smith, San Francisco, Calif., assignor to Plant Rubber & Asbestos Works, San Francisco, Calif., a corporation of California

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3 Claims. (Cl. 242—72)

My invention relates to a forming body, and particularly to a collapsible body for use in connection with the making of tubes from sheets of material.

It is among the objects of my invention to provide a forming body from which a tube may be readily removed after it has been formed.

Another object of my invention is to provide a forming body which comprises a core built up of relatively movable sections; the arrangement of the sections being such that movement of one section relative to another operates to reduce the cross-sectional area of the core.

Further objects of my invention include the provision, in a forming body of the character described, of means for slidably connecting the core sections together, and of means for limiting the relative movement between the sections.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawing:

Figure 1 is a side elevational view of the forming body of my invention as embodied in a mandrel construction; portions of the mandrel being shown in vertical section to disclose the construction more clearly, and other portions being omitted to shorten the length of the view.

Figure 2 is a transverse vertical sectional view of the mandrel showing the internal construction, the plane of section being indicated by the line 2—2 of Figure 1.

Figure 3 is a side elevational view of a modification of the forming body of my invention; portions of the forming body being shown in vertical section to disclose the construction more clearly.

Figure 4 is a transverse vertical sectional view of the structure shown in Figure 3, the plane of section being indicated by the line 4—4 of Figure 3.

In terms of broad inclusion, the forming body of my invention comprises a core upon which material may be formed in the nature of a tube; the body being collapsible to reduce the size of the core so that the tube may readily be removed after it has been formed. The core is preferably separated into a plurality of sections, and means are provided for slidably connecting the sections together. Stop means are also preferably provided for limiting the relative movement between the sections.

The core is preferably separated into sections along a plane extending longitudinally of the core and at an angle with the core axis, so that the core sections operate as wedges when one section is moved relative to another. When the core sections are in registration the body is of normal shape, but when one section is moved relative to another the cross-sectional area of the core is reduced. This collapsing of the body to reduce the size of the core permits a tube to be readily removed after it is formed.

In the preferred form of my invention the forming body is in the nature of a mandrel; the core being of normally circular cross-section to provide a cylindrically shaped mandrel. With this construction a sheet of material may be wrapped on the core to form the tube.

In a modified form of structure embodying the improvements of my invention a forming body is provided upon which a tube having a shape other than that of circular cross-section may be formed. In this case the tubes are formed on a mandrel and then are shaped on the forming body. The body is collapsible in a manner similar to the mandrel described above.

In greater detail, and referring particularly to Figures 1 and 2, the forming body of my invention, as embodied in a mandrel construction, comprises a hollow cylindrically-shaped core separated into sections 2 and 3. The separation of the core into the sections is preferably along a plane extending longitudinally of the core and at an angle with the core axis. Separated in this manner the resulting core sections are wedge-shaped, and when fitted together make up a complete and uniformly circular core, but when one section is slid past the other the mandrel is collapsed and the cross-sectional area reduced in planes taken normal to the core axis.

Means are provided for slidably connecting the sections together. As best shown in Figure 1, a bar or tube 4 is disposed within the core and is positioned with its axis lying in the plane which divides the core into its sections. The bar 4 is fixed to the section 3 by a series of brackets 6. As best shown in Figure 2, these brackets are semi-circular in shape and are each provided with a head which surrounds the bar or tube 4. The tube is held against endwise movement in the brackets by a ring 7 threaded into the end bracket 6.

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The other core section 2 is slidably mounted on the central bar 4 by the brackets 8, which are similar to the brackets 6. Core section 2 is held against rotation on the tube 4 by suitable guideways associated with the brackets 6 and 8. Preferably guide arms 9 are formed on the brackets 8 and adjacently positioned guide arms 11 are formed on the bracket 6. These arms have smooth opposing faces adapted to slide one on the other. By this arrangement the core sections 2 and 3 are adapted to slide one past the other in a longitudinal direction, but are held against relative rotation.

Means are provided for limiting relative movement between the sections, and means are also provided for reducing the shock associated with the stop means when relative movement between the sections is brought to an abrupt stop. The end bracket 6 of the core section 3 is provided with a pair of inwardly projecting rods 12, about each of which is positioned a spring 13. The rods 12 project past an adjacent bracket 8 of the core section 2, and this latter bracket is provided with the yoke pieces 14 straddling the rods 12. By this arrangement the section 2 may move freely from a normal position as shown in Figure 1, to a collapsed position with the yoke members 14 against the springs 13.

An end plate 15 is suitably secured in each end of the core; one plate being secured to the core section 2, and the other plate being secured to the core section 3. Each plate is provided with a pair of handles 16, for assisting in collapsing the core and for aiding in mounting the same in the wrapping machine. As shown in Figure 1 the end plate 15 at the left of the core is provided with a removable portion 17, for exposing the end bracket 6 to assist in assembling the core.

A square-shaped aperture 18 is provided adjacent the central portion of each end plate 14. These apertures serve to receive the spindles upon which the mandrel is mounted. Means are also provided for receiving the end of the sheet used in forming the tube. A slot 19 is cut along the length of the core section 3, and a yoke-shaped bar 21 is straddled over the slot and suitably secured to the core section to provide a trough-shaped recess in which the end of the sheet may be inserted. This construction is probably best shown in Figure 2.

The use of the above described mandrel in connection with the making of tubes from sheet material is as follows: With the core sections 2 and 3 in registration, as shown in Figure 1, the mandrel is mounted on the spindles of a suitable machine designed for supplying material to a rotating mandrel. After being placed in the machine the leading edge of the sheet material is inserted thru the slot 19, and the mandrel is then rotated to wrap on a plurality of layers of the material. As the material is wrapped a cementing fluid is applied so that the several convolutions are adhesively united together. After the desired thickness of tubing has been built up the supply of material is severed from the tube. Upon the completion of these operations the mandrel with the newly formed tube is removed from the machine.

After the cement in the tube has set the tube may be readily removed by collapsing the mandrel. This is preferably accomplished by suspending the mandrel on a suitable hook engaged with one of the handles 16 shown at the right end of the core in Figure 1. Suspended in this manner the core section 2 either drops down by its own weight, or will do so when given a slight tap with a hammer. In the collapsed condition of the mandrel the cross-sectional area of the core is considerably reduced and the tube may readily be stripped off. After unhooking the mandrel from the suspended position the core section 2 may readily be slid back to its normal position and the mandrel is again ready for use.

The above described mandrel forms a tube having a circular cross-section. When it is desired to form a tube having a shape other than circular a second forming body similar to that shown in Figures 3 and 4 is preferably employed. This forming unit is adapted to receive a tube taken from the mandrel shown in Figure 1 before the cement has completely hardened; the second forming body serving to change the shape of the tube and hold that shape while the cement is hardening.

This second forming body preferably comprises a hollow open ended core, with the end edges of the core turned in slightly to assist in inserting the same thru a tube. The core may have any desired shape; an oblong shape being shown merely for purposes of illustration. As was the case in connection with the mandrel shown in Figure 1, the core of the latter forming body is separated into two sections 22 and 23. Since the sides of the forming body, as best shown in Figure 4, are straight and substantially parallel, a somewhat different slide structure than that shown in Figures 1 and 2 may be employed.

The section 23 is provided with a cross-plate 24 having the inturned flanges 26. The cross-plate is suitably secured to the section 23, and is positioned with its flanges 26 lying in the plane separating the core sections. A second cross-plate 27 having the inturned yoke flanges 28 is provided in the core section 22. This latter plate is positioned so that its yoke flanges slidably engage the flanges 26 of the cross-plate 24. By this arrangement one of the core sections may be slidably moved relative to the other.

Means are provided for limiting the relative movement between the sections. To this end a pair of cross-rods 29 are secured in the section 22 and between the plate 27 and its flanges 28. A pin 31 is secured to the cross-plate 24 in the section 23, and is arranged to project between the cross-rods 29. The pin and rods are arranged so that when the stop pin is against one of the stop rods the core sections are in registration, as shown in Figure 3.

When the lower section 23, as shown in the figure above referred to, is moved toward the right the core collapses and the cross-sectional area of the same becomes smaller. This movement is finally limited by the other cross-rod 29, and when the stop pin 31 abuts this latter stop rod the mandrel is in the final collapsed condition. In order to facilitate handling the forming body a handle bar 32 is preferably provided and is suitably secured to the cross-plate 27 of section 22.

In using the forming body the section 23 is slid past the section 22 to collapse the body. In this collapsed condition the core is inserted in a newly formed tube. By now forcing the section 23 back to its normal position the tube is spread out and assumes the shape of a core. When the cement has finally hardened the tube may be readily removed by again collapsing the body.

I claim:

1. A collapsible forming body comprising a hol-

low core separated into sections along a plane extending longitudinally of the core and at an angle with the core axis, means arranged within the core for slidably connecting said sections together, and stop means comprising a spring pressed bumper for limiting relative movement between said sections.

2. A mandrel comprising a hollow core separated into sections along a plane extending longitudinally of the core and at an angle with the core axis, a bar within the core and positioned with its axis lying in said plane, and means mounting both of said sections on said bar.

3. A mandrel comprising a hollow core separated into sections along a plane extending longitudinally of the core and at an angle with the core axis, a bar within the core and positioned with its axis lying in said plane, a bracket fixed on said bar for supporting one of said sections, and a bracket slidable along said bar for supporting the other section.

JAY M. SMITH.

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