

H. E. HANSEN.
COLLAPSIBLE MANDREL.
APPLICATION FILED JUNE 21, 1909.

1,040,536.

Patented Oct. 8, 1912.

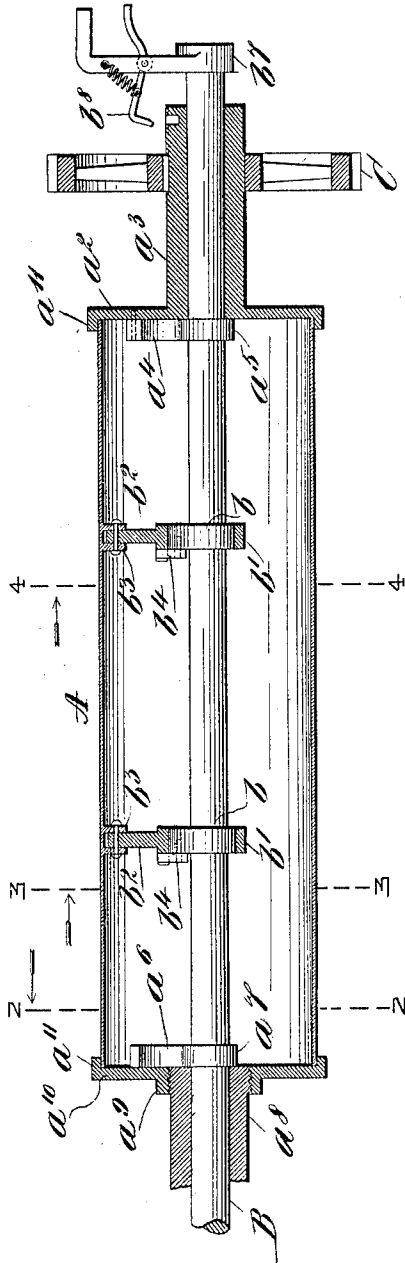


FIG. 1.

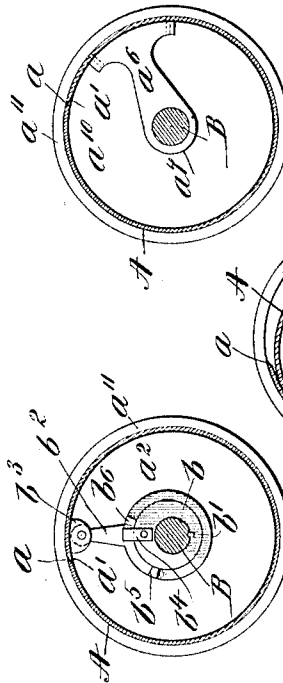


FIG. 2.

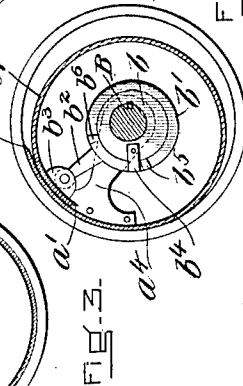


FIG. 3.

FIG. 4.

WITNESSES:
M. E. Flaherty.
J. H. McPherson.

INVENTOR:
Harold E. Hansen
by his atty
Charles Raymond & Co.

UNITED STATES PATENT OFFICE

HAROLD E. HANSEN, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO STANDARD FIBRE COMPANY, OF SOMERVILLE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

COLLAPSIBLE MANDREL.

1,040,536.

Specification of Letters Patent.

Patented Oct. 8, 1912.

Application filed June 21, 1909. Serial No. 503,316.

To all whom it may concern:

Be it known that I, HAROLD E. HANSEN, of Somerville, in the county of Middlesex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Collapsible Mandrels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My invention especially relates to a collapsible mandrel adapted to receive successive windings of paper or other material which after it has become wound upon the mandrel and by reason of shrinkage or its adhesion to the surface of the mandrel cannot be removed therefrom unless the mandrel is collapsed. I would further say that the mandrel is especially adapted for the formation of vulcanized fiber tubes.

The special object of my invention is to provide a collapsible mandrel that is not only collapsible but capable also and provided with means whereby the mandrel may be wound inwardly upon itself for freeing practically the entire surface of the mandrel from the tube wrapped or formed upon it.

My invention accordingly relates especially to the means by which the collapsing and winding of the mandrel may be accomplished.

It relates also to various other details of construction furthering the utility of the mandrel in the work which it is designed to accomplish, all of which can best be seen and understood by reference to the drawings, in which—

Figure 1 shows the mandrel in longitudinal vertical section. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3 of Fig. 1. Fig. 4 is a section on line 4—4 of Fig. 1, showing the mandrel wound inwardly upon itself.

In the drawings:—A represents the mandrel. This comprises a flexible tube preferably made of sheet metal or other elastic material of sufficient strength to withstand distortion under such pressure as the mandrel may be subjected to. The mandrel is split longitudinally along one side by which it may be collapsed and wrapped inwardly upon itself as will hereinafter be explained. In this connection it is to be observed that the longitudinal split in the mandrel lies between edges a , a^1 which present flush ex-

terior surfaces in order to preserve a proper continuity in the rounding surface of the mandrel at the point of the split in it.

At one end of the mandrel is a head a^2 attached to a trunnion a^3 . Just inside the head a^2 and attached to it and also to the interior of the mandrel at a point just adjacent to the split in it and on the side of the edge a is an arm a^4 . This arm in addition to being secured to the head a^2 is also provided with a hub a^5 embracing a shaft B around which the hub fits loosely. At the other end of the mandrel is an arm a^6 embracing the shaft B by a hub a^7 . The arm a^6 like the arm a^4 is attached to the interior of the mandrel at a point just adjacent to the split in it and on the side of the edge a . To the hub of the arm a^6 is attached a trunnion a^8 . On the trunnion a^8 just outside the hub of the arm a^6 there is threaded a hub a^9 carrying a head a^{10} closing the end of the mandrel opposite the end thereof closed by the head a^2 . Both the head a^2 and the head a^{10} closing the respective ends of the mandrel are each provided with an annular flange a^{11} extending inwardly from the rim of the head and overlapping the ends of the mandrel. These flanges act to center the mandrel and to define its proper shape and size both laterally and circumferentially; the mandrel, in other words, being non-extensible beyond the limits defined by these flanges.

In connection with the parts above described it will be explained that the trunnions a^3 and a^8 connecting as they do with the mandrel form the immediate part for supporting it by which it may be turned. The trunnions themselves are supported to turn in bearings (not shown) and the mandrel is turned by power applied to a gear C arranged upon the trunnion a^3 .

The shaft B extends through the mandrel and preferably also through both trunnions, the arrangement of the shaft being such that it may turn within the respective trunnions forming bearings therefor. This shaft forms the immediate instrument or means by which the mandrel is contracted or expanded as will now be explained.

Located on the shaft B inside the mandrel are one or more sets of means or devices by which the mandrel is collapsed and wound inwardly upon itself upon turning the shaft B. Each one of these means or devices com-

prises primarily a cam b keyed to the shaft B to turn with it. On the cam is what may be termed a cam ring b^1 . Attached to this ring is an arm b^2 which is loosely connected
 5 with the interior of the mandrel at a point b^3 preferably just adjacent to the longitudinal slit in it and on the side of the edge a^1 . Now the form and arrangement of the cam b with respect to the cam ring b^1 is such that
 10 when the shaft B is turned the mandrel will be contracted by the edge a^1 thereof drawing inwardly and away from the edge a of the mandrel. Arranged upon the side of the cam b is an arm b^4 projecting from the cam
 15 in such manner that as the cam is turned this arm will engage either one or the other of the lugs b^5 , b^6 arranged upon the cam ring. The disposition of the lug b^5 is such that as the cam is turned after contracting
 20 the mandrel the arm b^4 on the cam will engage the lug b^5 on the cam ring when the edge a^1 of the mandrel has been drawn inwardly and clear of the edge a . Thereupon the arm b^4 on the cam engaging the lug b^5
 25 will, as the cam is further turned, act to turn the cam ring and this through the connecting arm b^2 will draw the edge a^1 of the mandrel forward and under the edge a and wind the mandrel inwardly upon itself,
 30 thereby diminishing the circumferential size of the mandrel and loosing the tube which may be formed upon it. In this connection it is to be observed that the mandrel is held so that it may be wound inwardly upon
 35 itself by the trunnion a^3 which connects with the mandrel on the side of the edge a thereof as before explained. During the operation, also, of contracting the mandrel it will be held as against any tendency to distortion by means of the flanges a^{11} on the
 40 heads a^2 , a^{10} embracing the respective ends of the mandrel.

The mandrel may be restored to its normal expanded position simply by turning the
 45 shaft B and cam upon it in a reverse direction. Thereupon the cam will act to return the mandrel to its expanded position. Before becoming fully expanded, however, the arm b^4 on the cam will have engaged the
 50 lug b^6 on the cam ring and will have moved the cam ring a sufficient amount to unwind the mandrel sufficiently for its edge a^1 to be forced outwardly by and into proper contiguity with the edge a when the mandrel
 55 becomes restored to its normal expanded position. In other words, the disposition of the lug b^6 on the cam ring is such that this effect may be accomplished. The expanded position of the mandrel is, as before described, defined by the flanges on the heads
 60 embracing the respective ends of the mandrel. In this connection attention is also directed to the fact that the size of the cam and the disposition of the parts connecting
 65 it with the movable side or edge of the man-

drel is such that the cam cannot expand the mandrel beyond its proper and normal position of expansion.

For turning the shaft B and expanding and contracting the mandrel there is arranged upon the end of the shaft B extending beyond the end of the trunnion a^3 a handle b^7 by which the shaft may be turned. During the rotation of the mandrel in order that there may be no displacement of the shaft B tending to contract the mandrel I prefer that the shaft B be locked to the trunnion a^3 . Any suitable releasable means may be provided for connecting these parts. I have shown a latch b^8 pivoted upon the handle b^7 and adapted to engage the trunnion a^3 . This latch is easily accessible from the handle b^7 for turning the shaft, on which account the latch may be released at the same time the handle b^7 is grasped for turning the shaft.

In connection with the bearings for supporting the respective trunnions I prefer that the bearing supporting the trunnion a^3 may be a removable bearing, or in other words, one capable of being disengaged from the trunnion a^3 . The reason for this is that after the mandrel has been contracted and the tube formed upon it loosened it is oftentimes desirable to remove the tube from the mandrel as a tube and not by cutting it off the mandrel. By providing a removable bearing for the trunnion a^3 this may be accomplished, first removing, however, the head a^{10} from the end of the mandrel off
 10 which the tube is to be drawn for this head is larger than the mandrel and the tube could not well be drawn off without removing the head. The head may be removed simply by unscrewing it from the trunnion a^3 .

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. In a device of the character specified, 11 the combination of a split mandrel, a mounting therefor, fixtures connecting with said mandrel on one side of the split therein for rigidly holding said portion of the mandrel, a shaft extending inside said mandrel and operable from outside the same, and means connecting with said mandrel on the other side of the split therein and with said shaft to turn therewith, whereby said mandrel may be wound inwardly upon itself by said 12 shaft as the same is turned.

2. In a device of the character specified, the combination of a split mandrel, a shaft inside said mandrel, a cam on said shaft and operated thereby as the shaft is turned, 12 means influenced by the turning of said cam upon turning said shaft for drawing inwardly said mandrel at the point of the split edge thereof, and means whereby as said cam is further turned by the turning of 13

said shaft said mandrel may be wound inwardly upon itself for contracting the same.

3. In a device of the character specified, the combination of a split mandrel, a shaft, a cam on said shaft, a cam ring connecting with the mandrel, a lug on said cam ring, and an arm on said cam arranged to engage said lug as said cam is turned, substantially as and for the purposes set forth.

4. In a device of the character specified, the combination of a split mandrel, trunnions supporting said mandrel, a shaft extending through said mandrel and arranged to turn in said trunnions, means connecting said trunnions with said mandrel for holding the mandrel on one side of the split therein, and means interposed between said shaft and said mandrel on the other side of the split therein whereby said mandrel may be wound inwardly upon itself upon turning said shaft in said trunnions.

5. In a device of the character specified, the combination of a split mandrel, trunnions supporting said mandrel, a flanged head carried by one of said trunnions and

embracing one end of said mandrel, said head fixedly connecting also with said mandrel on one side of the split therein, and a flanged head embracing the other end of said mandrel and detachably connecting with the other of said trunnions.

6. In a device of the character specified, the combination of a split mandrel, trunnions supporting said mandrel, flanged heads loosely embracing the ends of said mandrel, fixtures connecting with said mandrel on one side of the split therein for rigidly holding said portion of the mandrel, a shaft extending inside said mandrel and operable from outside the same, and means connecting with said mandrel on the other side of the split therein and with said shaft to turn therewith whereby said mandrel may be wound inwardly upon itself by said shaft as the same is turned.

HAROLD E. HANSEN.

Witnesses:

JOHN E. R. HAYS,
M. E. FLAHERTY.

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