

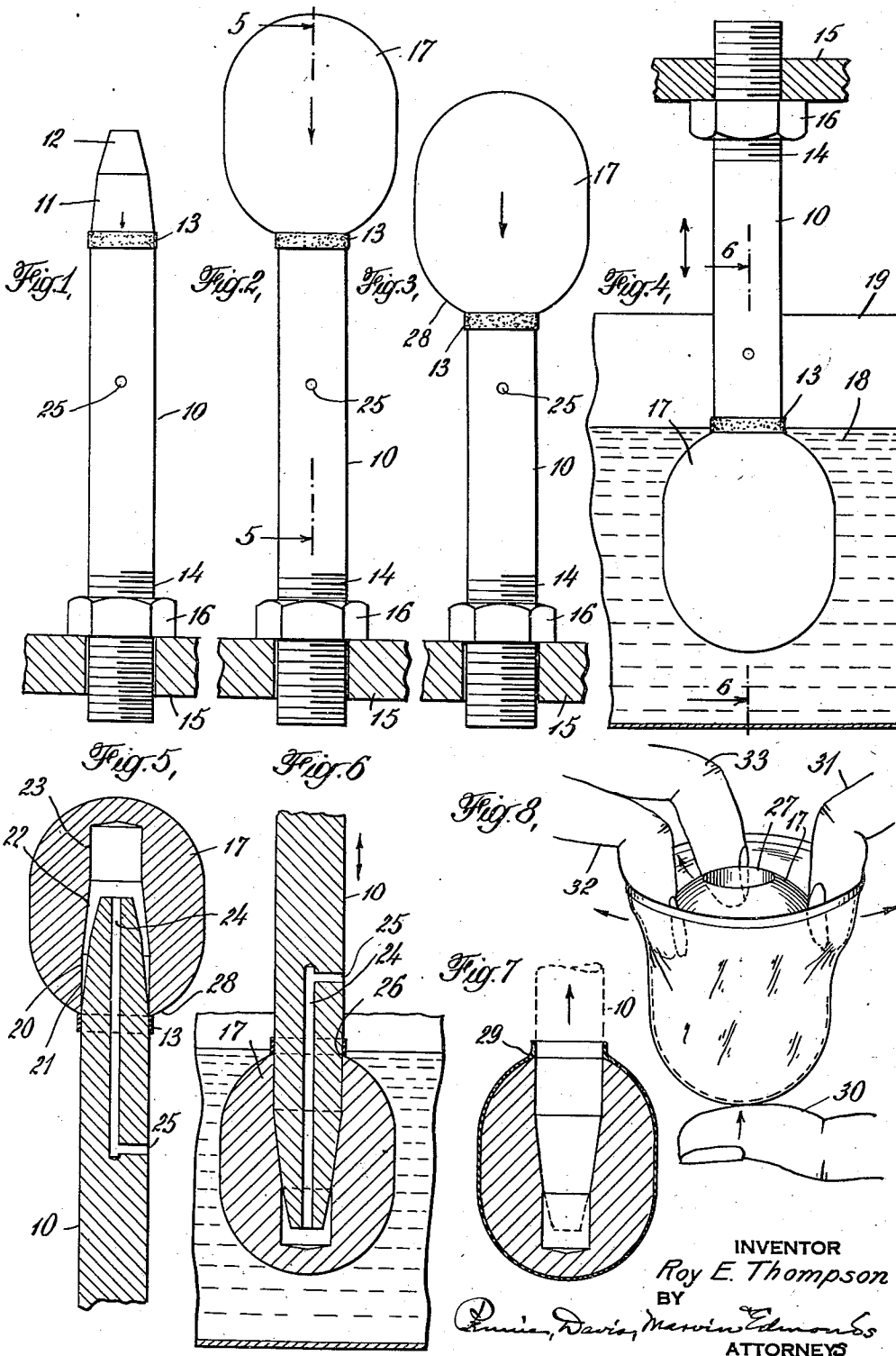
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METHOD OF MANUFACTURING THIN RUBBER ARTICLES

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METHOD OF MANUFACTURING THIN
RUBBER ARTICLESRoy E. Thompson, Nyack, N. Y., assignor to Lorica
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6 Claims. (Cl. 18—53)

This invention relates to thin rubber, or hol-
low elastic, articles and has for its object certain
new and useful improvements in the method of
manufacturing such articles. The invention re-
lates more particularly to improvements in the
art of making sanitary elastic sheaths by the dip-
ping process, the sheaths being formed by a
sheath proper and a band integrally attached
thereto at its opening. In accordance with these
improvements, elastic bands of predetermined
size and elasticity may be provided at the open
ends of finger cots, thumb guards, rubber gloves,
breast nipple sheaths, and other hollow elastic
sheaths of a similar nature, in which the opening
is substantially smaller in cross-section than the
sheath itself.

In sanitary elastic sheaths of the kind con-
templated, little or no reliance is placed on the
sheath proper for attachment to the body. The
sheath proper is merely intended to cover a part
of the body, and depends essentially and pri-
marily on its built-in elastic band for attach-
ment to the body. The band is alone sufficient
for the purpose, and this leaves the sheath free
for its intended sanitary purpose. The sheath
protects the part covered from contamination by
outside sources; and prevents contamination of
other parts by the part covered. The sheath is
particularly useful in preventing loss or discharge
of medication from the part covered to surround-
ing parts. The sheath is also useful in function-
ing as a cover and a support for a bandage or
other cover placed over the affected part. The
sheath may contain an absorbent, such as gauze,
cotton, or the like, with or without medication,
for treating the part affected.

It is important that the opening of the hollow
elastic articles be suitably reinforced. To accom-
plish this result, it is the practice in some cases
to roll the elastic material at the opening into a
bead. While a round bead of this kind is satis-
factory for some purposes, it is highly disadvan-
tageous for others. For example, when the article
is tightly fitted over a part of the body, such
as a thumb, finger, wrist, breast nipple, etc., so
as to be securely attached thereto, the rounded
bead tends to dig into the flesh in an uncom-
fortable and painful manner. It is also difficult
to control the elasticity of a rolled bead; the
larger the bead in cross-section, the less readily
it stretches. If, therefore, the bead is rolled to a
size sufficiently large to inhibit painful digging
into the flesh, it will often lose its desired elas-
ticity.

I have found that the disadvantages of the

rounded bead may for the most part be avoided
by reinforcing the opening of the hollow article
with an especially added elastic band that is flat
or substantially flat; and a band may be selected
which will not painfully dig into the flesh and
which will at the same time remain securely at-
tached to the body. Having decided on a band
of optimum width, thickness and elasticity, the
manufacturer may be assured that after the band
is integrally attached to the hollow elastic article
at its opening, the band portion of the article
will have the desired characteristics.

The provision of an elastic band integrally at-
tached to a hollow elastic article is, however, con-
siderably complicated when the cross-section of
the band is substantially smaller than the cross-
sectional area of the hollow article. This is
especially true of elastic sheaths or bags made
by the dipping process, in which the sheath has
an opening very much smaller in cross-section
than the sheath proper. A form, having sub-
stantially the size and shape of the article to be
formed, is dipped into a suitable coating liquid.
The coating remaining on the form must be re-
moved, and therein lies the difficulty when the
coating is to be integrally secured to an elastic
band. As a result of my investigations, I have
discovered improvements in method and appara-
tus which make it possible integrally to attach
an elastic band of predetermined characteristics
to a thin elastic hollow article at its opening.

The invention will be more fully understood by
referring to the accompanying drawing, taken in
conjunction with the following description, in
which:

Fig. 1 is a diagrammatic representation of a
shaft, showing an elastic band suitably mounted
around one end thereof, useful in a practice of
the invention;

Fig. 2 is a similar view, showing a head pre-
liminarily mounted on the shaft of Fig. 1;

Fig. 3 is a view similar to Fig. 2, but showing
the head and elastic band in final position on the
shaft;

Fig. 4 is a view similar to Fig. 3, showing the
head, elastic band and shaft assembly immersed
in a body of coating liquid;

Fig. 5 is a cross-sectional view on the line
5—5 of Fig. 2;

Fig. 6 is a cross-sectional view on the line 6—6
of Fig. 4;

Fig. 7 is a cross-sectional view of the assembly
in part showing the head, its coating and the
band as a unit separated from the shaft; and

Fig. 8 is a diagrammatic representation illus-

trating the removal of the elastic bag from the head.

Referring to Fig. 1, the apparatus shown comprises a shaft 10, preferably made of metal, such as aluminum, the head-end of which has a tapered section 11 extending from the main body of the shaft to a tapered end or tip portion 12. This figure also shows an elastic band 13 suitably placed in approximate position over the tapered or head-end of the shaft. The other end 14 of the shaft is threaded so as to be screwed in a base 15 and to accommodate a lock nut 16. This permits adjustment of the length of the shaft extending from the base.

Fig. 2 shows a head 17 having substantially the size and shape of the finished article, in this case an elastic sheath several times larger in cross-sectional area than the cross-sectional area of its opening. The head, like the shaft, is preferably made of metal, such as aluminum with a polished, smooth surface. As shown in this figure, the head is mounted over the tapered portion of the shaft 10, and the head engages the nearest rim of the band 13.

In Fig. 3, the head is shown mounted in final position on the shaft. As the head is moved down the shaft, the head pushes the annular band down the shaft into its final position. While this occurs, the rim of the band is and remains in contact with the head.

Referring to Fig. 4, the apparatus described is shown with the free end of the shaft extending upwardly and the head-end of the shaft, at least so much of it as is covered by the head and the band, submerged in a body of suitable coating liquid 18 confined in a container 19.

The construction of the head and shaft is shown more particularly in Figs. 5 and 6. The head is provided with a shaft-opening 20 adapted to receive the head-end of the shaft. The fore portion 21 of the shaft-opening has a diameter substantially the same as that of the main body of the shaft, so that the head may be snugly fitted onto the shaft. The shaft-opening also contains a tapered portion 22 complementary to the tapered portion 11 of the shaft. The bottom of the shaft-opening is a practically straight wall portion 23 adapted to receive the tapered tip portion 12 of the shaft.

The shaft is provided with an air vent passageway 24 extending from the tip of the head-end of the shaft longitudinally through the center portion of the shaft, and ending as an opening 25 in the side of the shaft at a distance sufficiently removed from the final resting place of the band on the shaft so as not to be covered by coating liquid in the dipping process.

In the arrangement shown in Fig. 5, the head is preliminarily placed over the shaft and is brought in engagement with the rim of the annular band across the tapered portion 11 of the shaft; whereas in Fig. 6 the head and elastic band are shown mounted in final position on the shaft, with the head and part of the band submerged in the coating liquid.

The shaft is adapted to support the elastic band at the line of juncture 26 (see Fig. 6) between the two when the head is mounted on the shaft. The shape of the head is such that a snug fit is provided between the head and shaft at the line of juncture, so that coating liquid cannot seep into the shaft opening. The head and band rim are also in close contact with one another so that coating liquid cannot penetrate to the shaft and

adhere thereto. To this end, the outer surface of the head comes substantially to a sharp line of intersection with the surface of the shaft opening in the head so that the edge 27 (see Fig. 8) effectively permits engagement with the rim of the band mounted on the shaft. The band may then in turn be pushed forward on the shaft while frictionally supported by the shaft.

The surface 28 of the head at and near the entrance of the shaft-opening 20 tapers away from the shaft at an angle, preferably less than 90°, sufficiently small to prevent a substantial build-up of rubber at the annular line of juncture 29 between the head and the elastic band, when the assembly is dipped in a body of coating liquid. With an angle of the degree contemplated, excess coating liquid may readily drain away from the band. If there should be a substantial build-up of rubber, it would of course alter the elasticity characteristics of the band portion of the sheath.

Fig. 7 shows the head, its adhering coating and the elastic band as a unit, from which the shaft has been separated or removed. The dotted outline in the figure shows the position previously occupied by the shaft.

The apparatus may be used as follows in the practice of the invention. The annular elastic band 13, preferably of predetermined width, thickness and elasticity, is freely dropped over the tapered portions 12 and 11 of shaft 10. The internal diameter of the band is the same as that of the sheath when finished, and is substantially the same as the outside diameter of the shaft. When the band is dropped around the shaft in this manner, it engages the shaft frictionally and assumes what may be deemed a preliminary position.

The head 17, which has the size and shape of the sheath proper, is then fitted over the tapered portions 12 and 11 of the shaft, as shown in Figs. 2 and 5. The head engages the nearest rim of the elastic band, and as the head is pushed down the shaft, the band is also moved along the shaft. When the head is brought in final position on the shaft, that is, when it is securely attached to the shaft, the head and band assume the position shown in Figs. 3, 4 and 6, in contact with one another. During the mounting operation, air trapped in the shaft-opening 20 is vented through the passageway 24 to the outside atmosphere, in amount sufficient to prevent the building up of pressure.

With the base end of the shaft extending upwardly, the head and band are submerged in a suitable coating liquid, such as liquid rubber latex, liquid rubber, or liquid rubber cement, etc. The head is permitted to remain submerged until a thin coating of the liquid adheres to the head and the outside of the annular band.

The shaft and head are then withdrawn from the body of coating liquid, and the entire assembly is preferably placed in a drying room maintained at an appropriate temperature. If desired, and this is sometimes the preferred practice, the shaft and head assembly is subsequently returned for another dipping in the coating liquid, so that a second coating may be built onto the first coating; after which the shaft and head assembly is again returned to the drying room. This procedure may of course be followed as often as is necessary to produce a sheath of desired properties.

After the coating on the head and elastic band has been suitably treated in this manner, the

shaft is withdrawn or separated from the head. Due to the use of the air-vent passageway 24, a vacuum is not set up in the shaft-opening of the head to retard the separation. This may be done by grasping the head with one hand and the shaft with the other, and then pulling the two apart. Since the coating on the head is integrally attached to the band, the coating and band remain with the head as the shaft is pulled through and away from the band.

Since the band extends freely away from the head at its opening, as shown in Fig. 7, it provides a most important means for removing the resultant elastic sheath or bag from the head without injury to the sheath. The elastic band portion of the sheath is suitably stretched into an enlarged opening and the head is removed. One method of removing the head from the sheath is illustrated in Fig. 8. The operator, for example, places his right thumb 30 at the base of the coated head, and inserts his right fore finger 31, as well as his left fore and middle fingers 32 and 33, into the interior of the annular band in any desired order. The three fingers are pulled apart and shoved deeper into the interior of the sheath as it separates from the head. The elastic band portion of the sheath is stretched in this manner until the opening is sufficiently large to permit the expulsion of the head therethrough. This is accomplished by shoving the thumb 30 toward the fingers.

Special precautions are taken to remove stickiness from the inside and outside surfaces of the sheath. To this end, the head, coating and band assembly, as shown in Fig. 7 with shaft removed, is dropped into a body of suitable powder, such as talcum or other appropriate material well-known to the art. The powder promptly removes the stickiness from the outside surface of the coating. The operator then grasps the assembly, as shown in Fig. 8, and expels the head through the enlarged opening of the elastic band portion, preferably while the entire assembly is under the powder. As the head is propelled through the enlarged opening, the sheath is turned inside out, thus assuring contact of powder with both sides of the sheath.

The sheaths are then picked out of the powder, shaken to remove excess powder and are appropriately packaged. If imperforate sheaths are desired, it is advantageous to test for pin holes by blowing them up with a certain amount of air. I claim:

1. In the method of manufacturing elastic bags by the dipping process, the bag being formed of a bag proper and a band integrally attached thereto at its opening, and the opening being substantially smaller in cross-section than the interior of the bag when both are unextended, the steps which comprise placing an elastic band about one end of the shaft, mounting a head having substantially the size and shape of the bag proper on said end of the shaft, bringing the head in final position on the shaft in contact with the nearest rim of the band, with the opposite end of the shaft extending upwardly dipping the head downwardly into a body of coating liquid up and onto the elastic band to form a thin coating over the head and onto and adhering to the band, and removing the resulting elastic bag with the elastic band integrally attached thereto from the head.

2. In the method of manufacturing elastic bags by the dipping process, the bag being formed of a bag proper and a band integrally attached

thereto at its opening, and the opening being substantially small in cross-section than the interior of the bag when both are unextended, the steps which comprise placing an elastic band of substantially the size of the opening about a shaft having a diameter substantially as large as the opening of the bag, mounting a head having substantially the size and shape of the bag proper onto the head-end of the shaft, bringing the head in final position on the shaft in contact with the rim of the band on the shaft, with the opposite end of the shaft extending upwardly dipping the head downwardly into a body of coating liquid up and onto the elastic band to form a thin coating over the head and onto and adhering to the band, withdrawing the shaft and head with its adhering coating from the body of coating liquid, separating the head together with its coating and the band integrally attached thereto as a unit from the shaft, suitably stretching the elastic band portion of the resulting elastic bag on the head into an enlarged opening, and removing the bag from the head by passing the head completely through the enlarged opening.

3. Method according to the preceding claim, in which the resulting elastic bag is treated to remove stickiness directly before and after the head is passed through its opening.

4. In the method of manufacturing elastic bags by the dipping process, the bag being formed of a bag proper and a band integrally attached thereto at its opening, and the opening being substantially smaller in cross-section than the interior of the bag when both are unextended, the steps which comprise placing an elastic band of substantially the size of the opening about a shaft having a diameter substantially as large as the opening of the bag, mounting a head having substantially the size and shape of the bag proper and a rounded outer surface coming substantially to a sharp angular line of intersection with the surface of the shaft onto the head-end of the shaft, bringing the head in final position on the shaft in contact with the nearest rim of the band on the shaft, with the end of the shaft extending upwardly dipping the head downwardly into a body of coating liquid up and onto the elastic band to form a thin coating over the head and onto and adhering to the band, withdrawing the shaft and head with its adhering coating from the body of coating liquid, draining excess coating liquid from the annular band and the head to prevent excessive build-up of coating material at the line of juncture between the two, separating the head together with its coating and the band integrally attached thereto as a unit from the shaft, suitably stretching the elastic band portion of the resulting elastic bag on the head into an enlarged opening, and removing the bag from the head by passing the head completely through the enlarged opening.

5. In the method of manufacturing elastic bags by the dipping process, the bag being formed of a bag proper and a band integrally attached thereto at its opening, and the opening being substantially smaller in cross-section than the interior of the bag when both are unextended, the steps which comprise placing an elastic band of substantially the size of the opening about a shaft having a diameter substantially as large as the opening of the bag, mounting a head having substantially the size and shape of the bag proper and a shaft opening extending into the interior thereof onto the head end of the shaft,

pushing the elastic band with the head along the shaft while the head is being tightly fitted thereon, so as to leave the head in effective contact with the nearest rim of the band, with the end of the shaft extending upwardly dipping the head downwardly into a body of coating liquid up and onto the elastic band to form a thin coating over the band and onto and adhering to the band, withdrawing the shaft and head with its adhering coating from the body of coating liquid, separating the head together with its coating and the band integrally attached thereto as a unit from the shaft, suitably stretching the elastic band portion of the resulting elastic bag on the head into an enlarged opening, and removing the bag from the head by passing the head completely through the enlarged opening.

6. In the method of manufacturing elastic bags by the dipping process, the bag being formed of a bag proper and a band integrally attached thereto at its opening, and the opening being substantially smaller in cross-section than the interior of the bag when both are unextended, the steps which comprise placing an elastic band of substantially the size of the opening about a

5 shaft having a diameter substantially as large as the opening of the bag proper and an air vent passageway, mounting a head having substantially the size and shape of the bag proper and a shaft opening extending into the interior thereof onto the head-end of the shaft, bringing the head in final position on the shaft in contact with the nearest rim of the band, venting air from the shaft opening in the head through said
10 air vent passageway so that air pressure within the shaft opening is not set up to oppose tightening of the head on the shaft, dipping the head downwardly into a body of coating liquid up to and onto the band to form a thin coating around the head and onto and adhering to the band,
15 withdrawing the shaft and head with its adhering coating from the body of coating liquid, separating the head together with its coating and the band integrally attached thereto as a unit from the shaft, suitably stretching the elastic
20 band portion of the resulting elastic bag on the head into an enlarged opening, and removing the bag from the head by passing the head completely through the enlarged opening.

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