

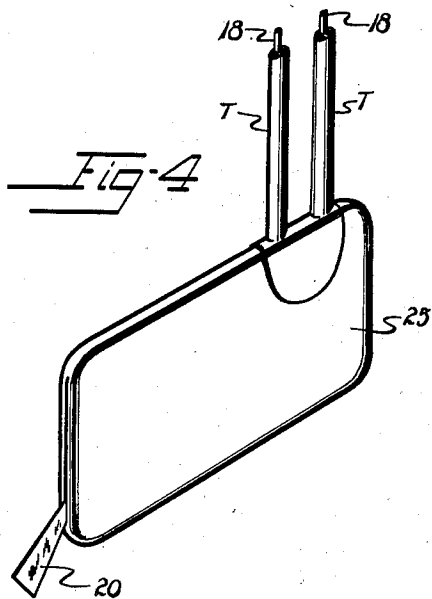
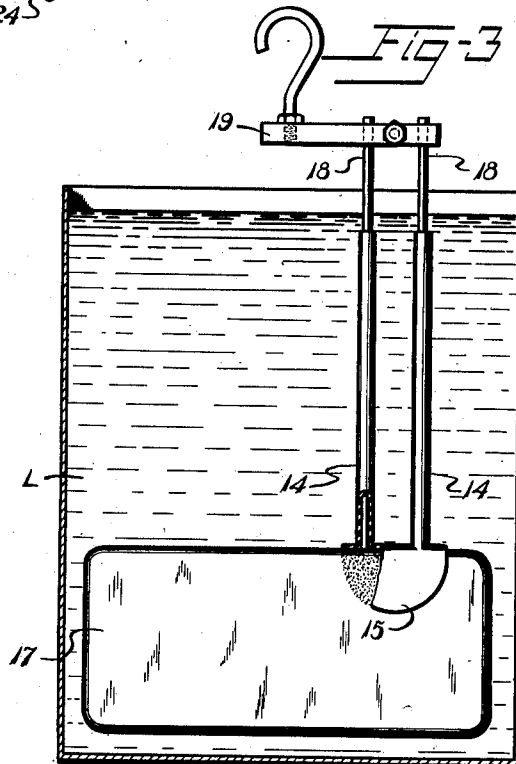
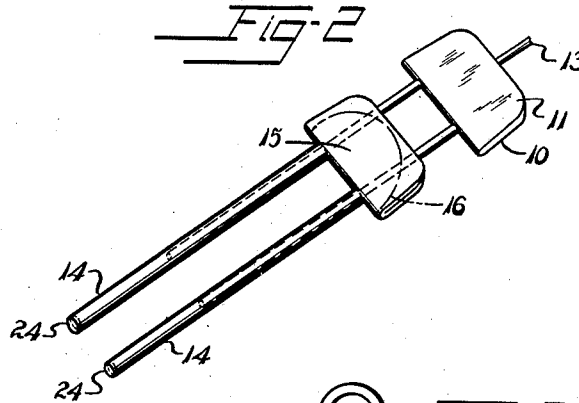
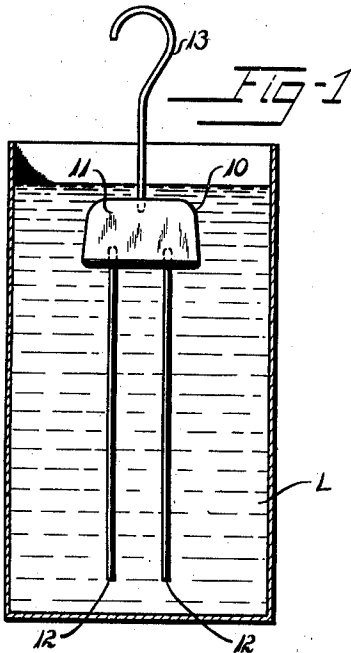
Nov. 23, 1943.

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2,335,204

BLOOD PRESSURE BAG OR SIMILAR ARTICLE

Original Filed Aug. 17, 1940 2 Sheets-Sheet 1



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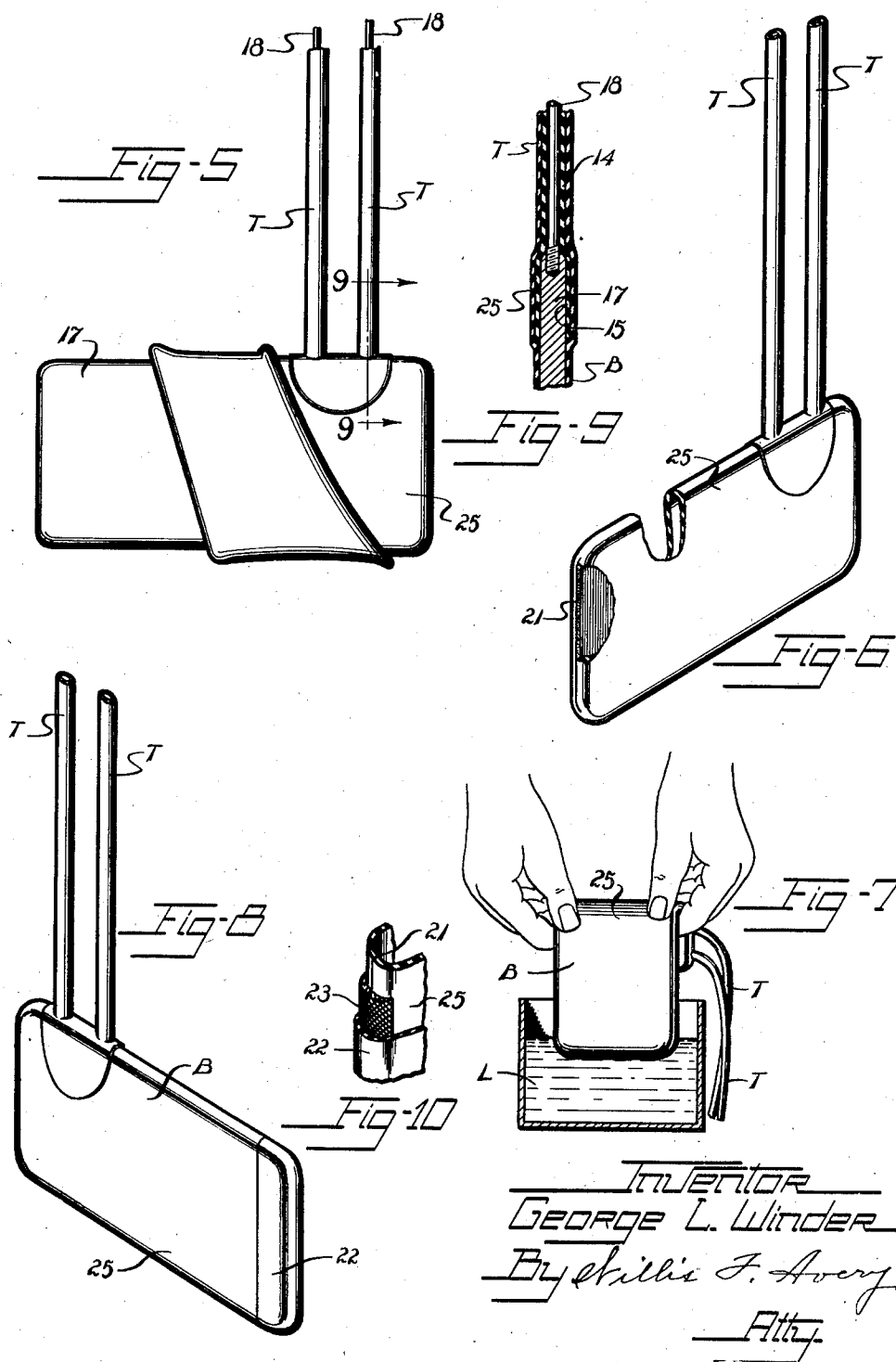
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,335,204

BLOOD PRESSURE BAG OR SIMILAR
ARTICLE

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Original application August 17, 1940, Serial No.
353,145. Divided and this application May 29,
1942, Serial No. 445,079

5 Claims. (Cl. 128—327)

This invention relates to hollow rubber articles provided with communicating tubes extending therefrom and especially to blood pressure bags embodying novel constructional features and to economical and efficient procedure for manufacturing such articles. The invention will be described in detail with reference to the accompanying drawings of which:

Fig. 1 is a sectional elevation illustrating a preliminary step in the manufacture of a tube assembly employed in the present invention and showing an auxiliary deposition form immersed in a liquid rubber composition for receiving a coating of rubber.

Fig. 2 is a perspective view illustrating a further step in the process and showing the tube assembly being removed from the auxiliary deposition form.

Fig. 3 is a sectional elevation illustrating a further step in the process and showing the tube assembly associated with a principal deposition form and the composite assembly immersed in a liquid rubber composition for receiving a coating of rubber.

Fig. 4 is a perspective view showing the composite assembly of Fig. 3 with a rubber coating thereon and further illustrating the step of slitting a portion of the coating to permit removal of the principal form.

Fig. 5 is an elevation illustrating the step of removing the rubber coating from the principal deposition form.

Fig. 6 is a perspective view, partially broken away and sectioned for clarity of illustration, showing the coating after removal from the principal form and further illustrating a preliminary step in sealing the slit in the coating.

Fig. 7 is a sectional elevation illustrating a further step in sealing the slit and showing an end portion of the coating immersed in a liquid rubber composition.

Fig. 8 is a perspective view showing a finished blood pressure bag made in accordance with the present invention.

Fig. 9 is a vertical section taken on line 9—9 of Fig. 5.

Fig. 10 is a fragmentary elevation, broken away and sectioned, showing an end portion of a blood pressure bag embodying a modification of the invention in which a reinforcing element is included in the region of the slit.

Equipment used by physicians for determining the blood pressure of patients includes a unit known in the art as a blood pressure bag. Such blood pressure bags customarily are made of rubber or analogous material and include a gen-

erally rectangular flat hollow bag B and a pair of communicating tubes T, T extending from one of the longer edges of the bag at a position adjacent one end thereof as indicated in Fig. 8.

According to the present invention, such a blood pressure bag is made by a process in which a tube assembly is first formed independently, after which the bag portion is formed in contiguous cohering relation with a portion of the tube assembly.

To form the tube assembly, I utilize an auxiliary deposition form indicated generally by the numeral 10. The auxiliary form 10 includes a relatively small trapezoidal plate member 11 provided with two rod-like stems 12, 12 extending from one edge of the plate member 11 in the plane of the plate, the stems 12 corresponding in size and length to the interior diameter and length of the tubes desired in the blood pressure bag. The form 10 may have a supporting member such as the hook 13 extending from the opposite edge of the plate. To produce the tube assembly, the auxiliary form 10 is coated with rubber as by immersing the form in a liquid rubber composition such as any suitably compounded latex L as illustrated in Fig. 1. Desirably the form 10 is pre-coated with a composition adapted to coagulate latex compositions as described in U. S. Patent No. 1,908,719, and such coagulant composition desirably should contain a powdery separating material as described in U. S. Patent No. 1,924,214. The form 10 is completely immersed in the latex as shown in Fig. 1 and is permitted to remain therein until a rubber deposit from .015 to .025" thick (when finished) has been deposited over the entire form. The form then desirably is raised until the liquid level of the latex is just below the edge of the plate member 11 and deposition on the immersed stems 12 is then continued until the total rubber deposit on the stems is from .030 to .060" thick (when finished). Such continued deposition may be effected by progressive action of coagulant initially applied to the form, or the stems 12 may be re-dipped a number of times, either with or without intermediate coagulant treatments, to build up the desired thickness of rubber. The form 10 together with the deposited rubber coating is then removed from the latex and the rubber deposit is dried but not vulcanized. The rubber coating is then slit around the top edge of the plate 11 to permit removing the tube assembly from the form as shown in Fig. 2, after which the ends of the tubes are opened by cutting off the closed ends as indicated at 24, 24.

It will be appreciated that the tube assembly so produced comprises a pair of relatively long rubber tubes 14, 14 which terminate in a flaring, flange-like member 15 comprising two generally parallel flaps. As will appear more clearly later, the flaring member 15 will constitute a reinforcing element in the finished bag. To insure a neat product, the exposed end of the element 15 desirably should be trimmed smoothly as along the semi-circular dotted line shown in Fig. 2 and indicated by the numeral 15.

I then provide a principal deposition form including a main portion 17 of generally flat rectangular configuration adapted to form the bag portion of the final product. The principal form also is provided with two rod-like stems 18, 18 which extend outwardly in the plane of the form from one of the longer edges of the main portion 17 at a position adjacent one end thereof as shown in Fig. 3. The stems 18 desirably should be somewhat longer than the rubber tubes 14 of the prepared tube assembly, but otherwise should correspond in size to the tubes.

I next place the prepared tube assembly on the principal form by sliding the tubes 14 down over the stems 18 until the flaring flange or reinforcing element 15 embraces closely the portion of the main form adjacent the bases of the stems 18 as may be seen more clearly in Fig. 3. Desirably the underside of the reinforcing element 15 is cemented to the form 17 by means of a thin coating of rubber cement or other suitable adhesive which will prevent seepage of liquid rubber composition between the two members during subsequent operations while permitting ready removal of the completed article including the element 15. A suitable supporting clamp 19 is then attached to the extending ends of the stems 18 and the composite assembly of the principal form with the tube assembly thereon is immersed in a liquid rubber composition, such as a suitably compounded rubber latex L, and a coating of rubber 25, for example, about .025" thick is deposited over the entire assembly including the exposed portions of the principal form and the outer surfaces of the tube assembly. As before, such deposition may be facilitated by the use of any appropriate coagulant for latex. The assembly with its over-all coating of rubber is then removed from the latex and the rubber is dried, but not vulcanized.

To permit removal of the principal form, I then slit a portion of the rubber deposit 25, preferably along the major length of the shorter edge of the deposit removed from the tube assembly. Such slitting conveniently may be accomplished simply by progressively pressing a heated cutting element 20 or other suitable instrument against the rubber along the edge (Fig. 4). The principal form is then removed through the opening made by the slit by doubling the rubber coating back over the form as shown in Fig. 5, and stripping the tubes from the stems.

To seal the opening made by the slit, the cut edges at the slit preferably are coated with rubber cement or other rubber adhesive as indicated at 21 (Fig. 6) and the cemented edges are pressed into abutting relation. To insure against leakage at the seal and to reinforce the seal against failure when the bag is inflated, a reinforcing cap of rubber 22 is produced thereover as by immersing the end portion, for example about one inch, of the bag in latex L or other liquid rubber composition as shown in Fig. 7. This procedure may be

repeated several times to build up a rubber cap of any desired thickness.

It is also possible to utilize a coagulant to produce a heavier cap with a lesser number of dips and the coagulant may be applied to the entire area to be capped or to a desired restricted portion thereof. In the latter case, the cap will be thicker over the area to which coagulant was applied.

Finally, the entire article is thoroughly dried and vulcanized by heating in the usual manner to produce a finished blood pressure bag as shown in Fig. 8.

For further reinforcing the seal at the slit, when desired, a strip of textile fabric 23 (Fig. 10) or other reinforcing material may be placed over the slit prior to application of the rubber cap 22, or the fabric strip may be interposed between any of the successive deposits constituting the cap 22. In either case, the fabric 23 preferably is pretreated with latex or other rubber composition to secure more perfect anchorage in the rubber.

It will be appreciated from the foregoing that a blood pressure bag or other article produced according to the present invention includes a hollow bag portion B with two communicating tubes T, T, extending therefrom and that the reinforcing element 15 is attached to the interior face of the wall 25 of the bag and is continuous with the inner portion 14 of the tubes T, as more clearly shown in Fig. 9. The outer portions of the tubes T are continuous with the wall 25 of the bag B so that an unusually strong and essentially unitary structure is produced which effectively resists failure heretofore experienced at the junction between the tubes and the bag. Furthermore, the products of the present invention include a reinforcing cap over the slit at the end of the bag which insures effective sealing and reinforcement against failure upon inflation. The cap also serves to provide a balanced appearance. It will further be appreciated that the constituent parts of the articles cohere and form an essentially unitary structure, although the several individual parts may still be identified in the finished product.

The term "rubber" has been used in a generic sense to include not only natural Hevea rubber but also all analogous natural and synthetic rubbers and rubber-like materials.

While the invention has been described in considerable detail in connection with the manufacture of blood pressure bags, the principles herein set out obviously may be applied with advantage in the manufacture of numerous other articles. It will likewise be understood that many modifications and variations in details of the procedure and materials described may be effected without departing from the spirit and scope of the invention as defined by the appended claims.

This application is a division of my copending application, Serial No. 353,145, filed August 17, 1940, now U. S. Patent No. 2,313,792, granted March 16, 1943.

I claim:

1. An article of manufacture formed of rubber and comprising a hollow bag portion, a communicating tube extending therefrom, and a reinforcing element attached to the interior wall of the bag portion in the region about the tube, the inner portion of the tube wall being continuous with the said reinforcing element and the outer portion of the tube wall being continuous with

the wall of the said bag portion, the constituent parts of the article being cohered to form an essentially unitary structure.

2. A medical accessory unit formed of rubber and comprising a hollow bag portion, a communicating tube extending from the bag portion, a reinforcing element attached to the interior wall of the bag portion in the region about the tube, said reinforcing element being a continuation of the structure of the tube, and a reinforcing cap covering an edge portion of the bag substantially spaced from the tube, the constituent parts of the article being cohered to form an essentially unitary structure.

3. A blood pressure bag or similar article formed of rubber and comprising a hollow bag portion of generally rectangular flat configuration, a plurality of communicating tubes extending from the bag portion at a position adjacent one end thereof, and a reinforcing element attached to the interior wall of the bag portion in the region about the tubes, said reinforcing element being a continuation of the structure of the tubes.

4. A blood pressure bag or similar article formed of rubber and comprising a hollow bag portion of generally rectangular flat configura-

tion, communicating tubes extending from the bag portion at a position adjacent one end thereof, a reinforcing element attached to the interior wall of the bag portion in the region about the tubes, said reinforcing element being a continuation of the structure of the tubes, and a reinforcing cap covering the end of the bag portion removed from the tubes, the constituent parts of the article being cohered to form an essentially unitary structure.

5. An article of manufacture formed of rubber and comprising a hollow bag portion, a communicating tube extending outwardly therefrom, and a reinforcing element attached to the wall of the bag portion in the region about the end of the tube, the wall of said tube comprising two distinct concentric wall portions, one of said wall portions being continuous with the said reinforcing element and the other of said wall portions being continuous with the wall of the said bag portion, all the aforesaid portions presenting the continuous, grainless rubber structure characteristic of rubber deposited in situ from latex and all the portions which are in contiguous relation being cohered to form an essentially unitary structure.

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