

May 16, 1944.

E. T. WYMAN

2,348,773

PROTECTIVE SHEATH FOR SURGICAL AND MEDICAL USE

Filed Feb. 25, 1942

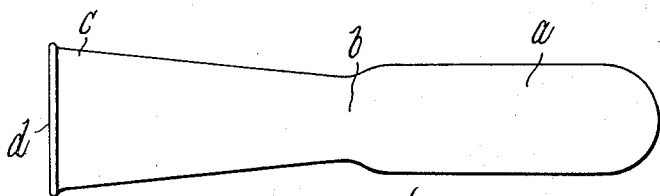


Fig. 1.

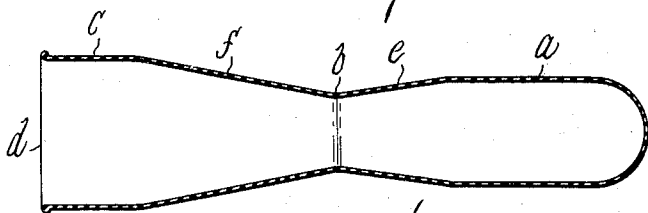


Fig. 2.

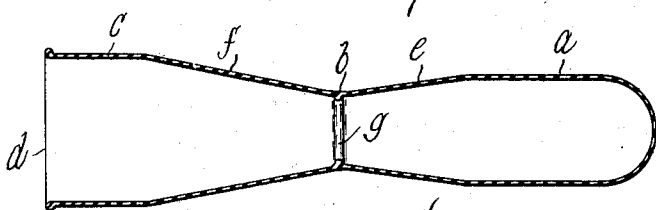


Fig. 3.

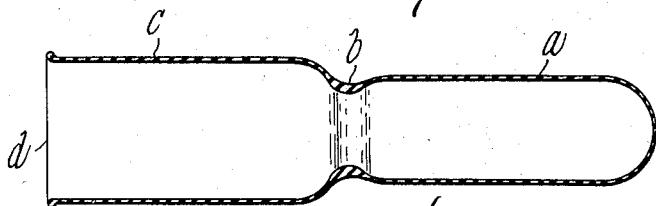


Fig. 4.

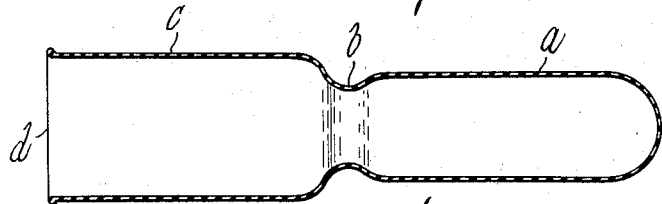


Fig. 5.

Inventor

Edward J. Wyman  
by Wright, Brown, Dumbly, Huey  
Attys.

# UNITED STATES PATENT OFFICE

2,348,773

## PROTECTIVE SHEATH FOR SURGICAL AND MEDICAL USE

Edwin T. Wyman, Brookline, Mass.

Application February 25, 1942, Serial No. 432,252

4 Claims. (Cl. 2—21)

The present invention relates to coverings in the nature of finger cots or sheaths for protection of a surgeon's fingers against infection when inserted into localities containing disease germs, and for analogous uses. In addition to the fundamental object of protection from infection, the invention has the further object of combining in a cot both means in the nature of a zone of reduced diameter, for binding it securely on the inserted member, and means for enlarging the constricted zone prior to the application of the sheath upon the finger, whereby to facilitate its application. The particulars in which the invention consists are described in the following specification with reference to drawing showing some of the forms in which cots or sheaths embodying the invention may be made.

In said drawing—

Fig. 1 is a side elevation of one form of such sheath;

Figs. 2, 3, 4 and 5 show in longitudinal section sheaths of specifically different forms, all embodying the same invention.

The herein-described protective cot is made of thin, highly flexible elastic and resilient material, preferably a vulcanized composition of natural rubber, or analogous material having similar properties. The precise composition used is not a limiting factor, and all compounds or materials suitable for the manufacture of articles having the characteristics of those herein described are within the scope of the protection which I claim.

The cot or sheath of this invention is generally similar to one of the finger portions of a rubber glove, but differs from those most generally used in being of varying diameters in different parts of its length. In other words, it is a tube open at one end and closed at the opposite end. Its length is preferably great enough to enclose the entire length of the finger on which it is designed to be applied. For a fraction of its length from its closed end, it is preferably of substantially uniform diameter. That fraction or portion is designated in the drawing by the reference character *a*. In Fig. 1 the portion *a* extends nearly or substantially half the length of the cot. In other forms the corresponding portion may be longer or shorter than this.

At a suitable location between the ends, preferably at or near mid length, and in any case at a substantial fraction of the length from each end, the cot is formed with a constriction *b* or zone of reduced diameter. The diameter of zone *b* is enough smaller than that of the portion *a*

to exert a constrictive force, by virtue of the resilience of the material, on the inserted finger, whereby to resist dislodgment of the cot from the finger. The portion *c* of the cot at and contiguous to its open end is of larger diameter, not only than the constriction *b*, but also larger than the portion *a*. The rim of the open end is reinforced by an integral bead *d*. All parts of the sheath are of generally circular outline in cross section.

By virtue of the enlargement of the open end to the extent indicated, the application of the sheath to the finger is greatly facilitated. Such sheaths are made with thin walls, the thickness of which approximates that of paper, being in the order of from two thousandths to eight thousandths of an inch. The portion *a* is generally of a diameter somewhat smaller than that of the finger so that, when applied, it will be stretched enough to fit smoothly without folds or wrinkles. And the constricted zone is of considerably smaller diameter to provide the necessary gripping effect. Prior to application, the beaded edge is rolled toward the closed end, causing the walls of the tube to be wrapped around it and to form a ring of ever increasing thickness as the rolling progresses. The initially large diameter of the bead, and the reinforcement given by the successive wraps of the thin rubber makes the ring so formed resistant to compression to such an extent that, when the rolling action proceeds across the constricted zone, the latter is stretched to a diameter which enables it to be passed with small resistance and no difficulty over the end of the finger. Then, in unrolling the tube toward the base of the finger, the constricted zone is brought to the prescribed location on the finger and is allowed to contract and exert its prescribed binding effect. The stretching of the constricted zone as described makes the application of a sheath provided with such a constricted zone as easy as the application of one having no such constriction.

The essential characteristics of the features herein described may have various forms. In Fig. 1 the enlargement is gradual from the constricted zone to the open end. In other words, the walls of the sheath taper conically from the open end of largest diameter to the constriction, and the walls of the part *a* join the constriction on reverse curves of smooth curvature.

In the form shown in Fig. 2, the large diameter portion *c* is cylindrical, as is also the closed end portion *a*, and the constriction *b* is formed by

the meeting of conical portions *e* and *f* tapering from their junctions with the parts *a* and *c* respectively.

The form shown in Fig. 3 is like that last described with the addition of an internal reinforcing bead *g* at the smallest diameter of the constriction.

In Fig. 4, the large diameter portion *c* is cylindrical, or of substantially uniform diameter, from the open end to the constriction *b*, and the latter merges with the walls of both portions *a* and *c* on smooth reverse curves. The walls of the constricted zone *b* are thickened, with the greatest thickness at the portion of least diameter and a gradual reduction of thickness toward the junction with the cylindrical portions. This, and the bead *g*, are two equivalent modes of providing greater thickness at the constriction whereby to obtain a more powerful binding effect thereof on the finger.

The form shown in Fig. 5 is like that of Fig. 4 with the exception that the walls of the constriction are of equal thickness throughout.

It will be readily appreciated that the bead *g*, or other provisions for increasing the thickness of the walls at the constricted zone, may be applied to any of the shapes of sheath in which the basic invention is embodied. It will also be appreciated that these features may be embodied in still other forms than those here shown and described. All aspects of the invention, however, contain the essentials of a thin walled sheath of which the diameter at the open end is larger than anywhere else in the length of the sheath, and in which there is a constriction at a suitable location between the ends smaller in diameter than any other part of the sheath.

What I claim and desire to secure by Letters Patent is:

1. A protective sheath having thin, flexible, elastic and resilient walls, closed at one end and open at the other end, having a constriction smaller in diameter than any other part of the sheath, spaced apart from both ends of the sheath and located at a substantial distance from the closed end, sufficient to enable such constriction to serve as a binder securing the sheath to the member on which it is applied, and said open end having a free rim which is capable of being rolled back on the contiguous walls in a manner to cause such walls to be wrapped around it; the sheath having its largest diameter at its open end.

2. A protective sheath as set forth in claim 1, in which the sheath is tapered with gradually reducing diameters from the portions adjacent to the closed and open ends, respectively.

3. A protective sheath as set forth in claim 1, in which the sheath is tapered with gradually decreasing diameter from the portion of largest diameter to the constricted zone.

4. A protective sheath having a closed end and an open end, made of elastic, flexible and resilient material with thin walls, the portion of the sheath adjacent to the closed end being of substantially uniform diameter for a substantial proportion of the entire length of the sheath from such end, the diameter at the open end being larger than the largest diameter of said portion and such open end having a free rim capable of being rolled on the contiguous walls and thereby wrapping said walls around it, the sheath having a constricted zone between its ends smaller in diameter than any other part of the sheath.

EDWIN T. WYMAN.