

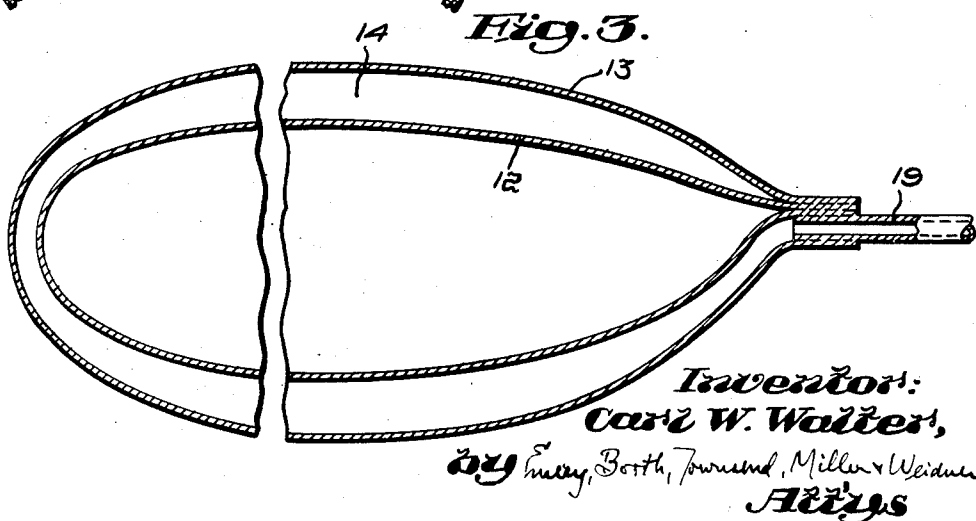
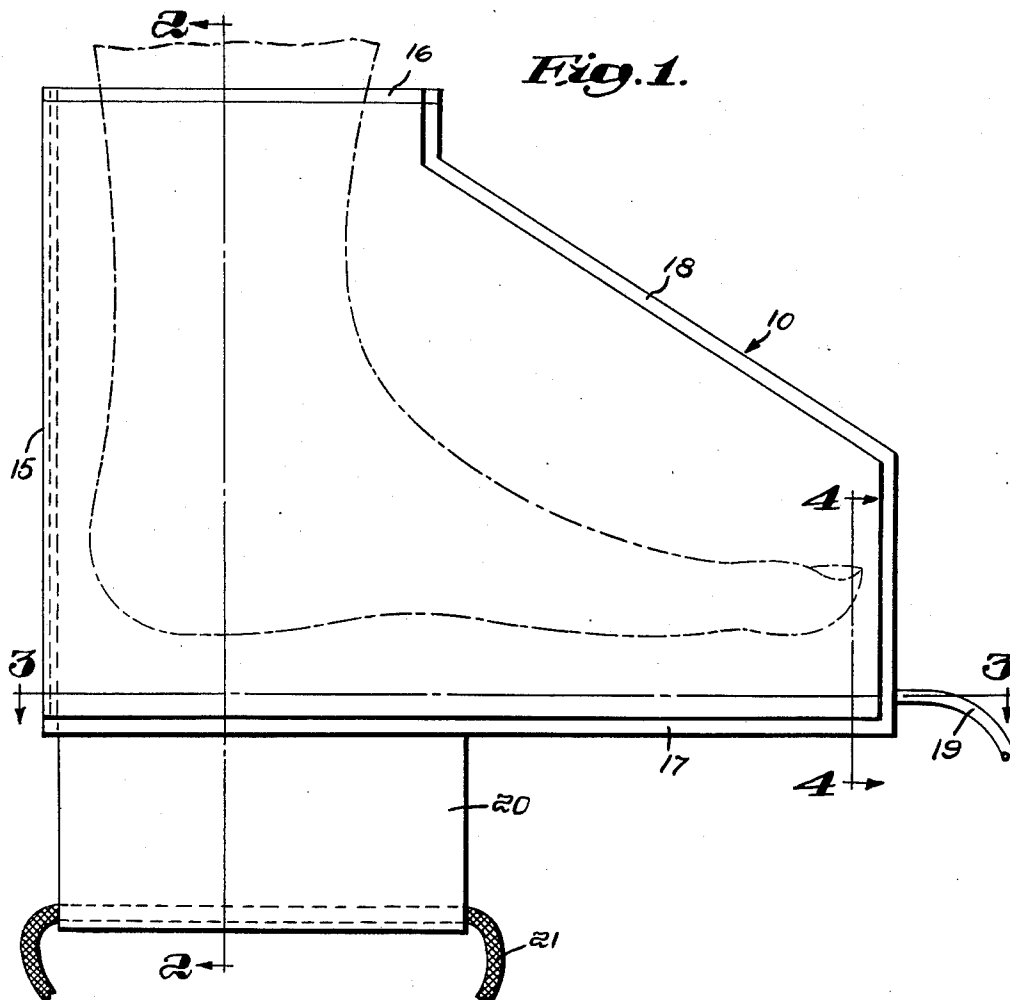
May 13, 1958

C. W. WALTER
INFLATABLE TRACTION

2,834,340

Filed March 9, 1954

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

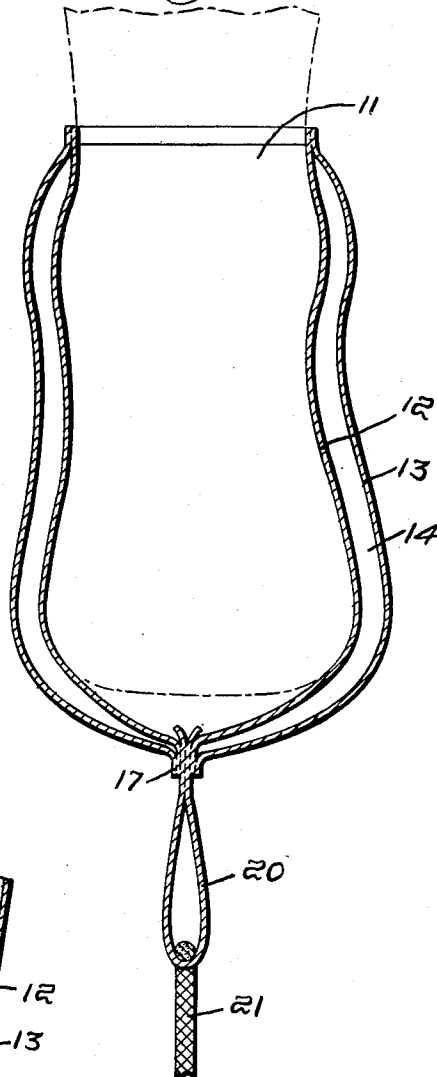
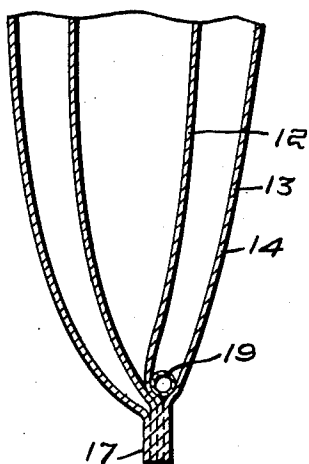


Fig. 4.



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INFLATABLE TRACTION DEVICE

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7 Claims. (Cl. 128—84)

This invention relates generally to article-holding devices and more particularly to devices for clasping or grasping various articles, particularly fragile or pressure-sensitive articles, for holding, positioning, supporting or tensioning the same. It has application for example, and as herein shown and described, to the clamping and holding of a body member or limb, particularly for applying traction thereto, as incident to fracture-setting operations and otherwise.

The invention aims to provide for the seizing or gripping of a body member or other article for holding, supporting, traction-applying or other purposes.

The invention has for its further object the provision of a compact, lightweight and inexpensive holding device of simple design and durable construction, and which lends itself to easy, certain manipulation, and to uniform, universal, low-pressure seizure of the held article.

The application of traction to the various body portions, members, or limbs, particularly the hands and feet, is a technique long employed for the setting of fractures; it may be useful also at times other than during operations. The various devices heretofore devised for the purpose have generally employed a sleeving which is applied to the fingers or toes and woven on the bias so as to clamp or grip the body member when an axial pulling or tractive force is applied. Commonly termed a "lover's lock," the grip effected by these sleeving members is such as to cause excessive unit loading of the flesh; the result of their use, even when arranged for the simultaneous grasping of several fingers or toes, is often the impairment of circulation sufficient to cause gangrene. Moreover, with such multiple arrangement there is the added problem of equalizing the tractive force on the several body members to which the sleeving is applied.

The invention embodiment herein disclosed as adapted particularly to such traction-applying will be seen to be free from the mentioned tendency to dangerous impairment of circulation and to apply gentle but firm grasping pressure uniformly and universally to the body member, obtaining desired traction without injurious constriction of the flesh. It will be found also to permit desired visual observation of the limb to which it is applied, while protectively enclosing the same.

The invention will be better understood from a consideration of the following specification taken in conjunction with the accompanying drawing in which:

Fig. 1 is a side view of one embodiment of the invention appropriate to and shown as applied to the foot;

Fig. 2 is a vertical section, looking from right to left, taken along the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section taken along the line 3—3 of Fig. 1; and

Fig. 4 is a vertical section, looking from left to right, taken along the line 4—4 of Fig. 1.

My novel holding or grasping device comprises generally and in the embodiment herein shown and described a wrapping, bag, or envelope 10 arranged and adapted to

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be drawn or received over and to envelop or embrace the article and more particularly the body member or limb to which it is intended to be applied. In the illustrative example, then, the envelope 10 has a general shape and proportion adapting it for fitting about the heel, toe and ankle of the foot, and is provided with an opening 11 through which the same may be introduced. Further in accordance with the invention, the envelope 10 is formed with double or inner and outer walls 12, 13, which walls are joined at their margins or edges so as to define therebetween a sealed fluid chamber 14. The bag 10 is thus fashioned of a plurality of flexible sheets, which sheets may be juxtaposed and joined in various ways. In the present embodiment two like sheets 12, 13 are seen to be placed side by side and then folded over at the vertical or heel-enclosing margin 15, Fig. 1. The free edges and more particularly the lateral top and bottom margins 16, 17 and the generally inclined or toe-enclosing margin 18 of the sheets is then brought together and joined or sealed in any convenient manner. If, for example, a plastic material is selected for the flexible sheets 12, 13, the sealing may be accomplished by dielectric means. It should be noted also that the opposite leaves of the folded inner sheet 11 are sealed together at the bottom and front margins 17, 18, but not at the top opening 11.

Further in accordance with the invention, means are provided for inflating and more particularly for supplying air or other gas pressure to the variable-volume fluid chamber 14 defined by and between the flexible sheets 12, 13. Such means are herein shown as a relatively short, small tube 19, desirably fashioned of the same material as the bag 10, and passed between and sealed to the walls 12, 13, herein at the front margin 18. A feature of the invention is the capacity of the device for lay-flat storage prior to use. It will be seen that the bag 10 may be flattened to the thickness of its double walls 12, 13 and then folded or rolled into a compact lightweight package. Thus the tube 19 is arranged to lie within the relatively narrow plane occupied by the bag when disengaged from the foot and collapsed.

The apparatus of the invention is distinguished further by provision for continuous, unrestricted visual observation of the held article, herein the body member subject to traction. Accordingly, my novel holding or grasping device is fabricated in its entirety from transparent material. The bag 10 thus demands a material which is transparent as well as formable in thin, light, tough, and flexible sheets compatible with the flesh and also impervious to air or other gas. I prefer to employ polyvinyl chloride, which is a plastic material characterized by the desired transparency as well as toughness and flexibility, and is readily sealed, as by high frequency.

Further in accordance with the invention, means are provided for coupling or connecting my novel grasping device to apparatus for subjecting the limb to desired longitudinal pull or traction. Such coupling or connecting means may comprise a relatively wide loop or strap 20, joined to the bag 10 at the bottom wall 17 opposite to top opening 11. The strap 20 is desirably fashioned of the same material as the bag, and may be integral with or fused to one or the other of its walls 12, 13. Further, the strap 20 is adapted to receive a link, loop or the like connecting means 21 of the traction apparatus, not shown.

It will be apparent from the foregoing that the article-holding device of the invention is simple and certain in operation. The bag or envelope is first applied to the indicated limb by passing its opening, herein the top opening 11, over the extremities of the same. The variable-volume chamber 14 is then expanded and the inner bag wall 12 collapsed by supplying air or other gas pressure to the said chamber through the tube 19. The pressure

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which may be expelled from the mouth is sufficient. Any convenient manner of applying the desired fluid pressure may, of course, be adopted; a suitable means would be a bulb such as used on a sphygmomanometer. As the envelope 10 and more particularly the chamber 14 is inflated by the pressure build-up, the inner bag wall 12 will collapse and press gently but firmly and also uniformly and universally about and against the limb. It will be seen that by reason of this uniform and universal or all-around application of pressure; excessive unit loading of any part of the limb or foot is avoided. Moreover, and by reason of the aforementioned transparency of the device, the limb may be observed at any and all times, and discoloration such as signifying dangerous impairment of circulation readily detected. The tube 19 is now closed, sealed, or tied off, and the desired pulling force or traction applied to the link 21, strap 20 and bag 10. It will be readily appreciated that by reason of the uniform pressure application and the substantially greater area of contact by which my novel device, is distinguished, a considerable and adequate tractive force may be applied to the limb without discomfort or injury to the same.

From the foregoing it will be appreciated that I have provided an improved article-grasping and holding device adapted in a disclosed embodiment to holding limbs and the like pressure-sensitive members, and effecting desired safe, low-pressure seizure of such members by a gentle but firm clamping uniformly and universally about and without discomfort or injury to the same. The invention has been shown further to be characterized by a compact, inexpensive, lightweight and durable construction and by a simplicity and certainty of operation.

It will be understood that my invention, either as to means or method, is not limited to the exemplary embodiments herein illustrated and described, and I set forth its scope in my following claims.

I claim:

1. An article-holding device comprising a flexible collapsible double-walled envelope shaped and proportioned to fit about the article and having an opening through which it may be introduced, said envelope formed of flexible sheets opposed and sealed together at their margins, communicating tube means sealed through said sheets and for inflating the envelope, and means on said sheets adapting the envelope for coupling to a traction device.

2. Apparatus for grasping a body member comprising a deformable collapsible inelastic envelope having an opening to receive the body member, said envelope formed by flexible plastic sheets juxtaposed and sealed to fit around the body member, means including a communicating tube for inflating the envelope, and means for coupling the envelope to a tensioning device for applying traction to said body member.

3. A limb-grasping device comprising a flexible, col-

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lapsible double-walled envelope formed of tough transparent plastic sheets juxtaposed and sealed to fit around the extremity of the limb, said envelope having its opposite inner walls joined except for an opening through which said limb extremity may be introduced, means including an entrant tube sealed between said sheets and for inflating the envelope, and connector means on said envelope and adapting it for engagement by a traction device.

4. A limb-grasping device comprising a flexible, collapsible double-walled envelope having an opening to receive and shaped and proportioned to fit around the extremity of the limb, said envelope formed by inner and outer sheets joined to define therebetween a sealed, variable-volume chamber, means for supplying pressure fluid to said chamber and for pressing its inner wall gently but firmly against the limb, and strap means integrally extensive of said envelope and for coupling to a traction device.

5. Apparatus for coupling a traction device to a body member comprising a flexible, collapsible inelastic bag having an opening to receive and adapted to fit around the body member, said bag having inner and outer walls defining therebetween a variable-volume chamber, means for pressurizing the chamber and seizing said inner wall uniformly about and to said body member, and a strap integrally joined to said bag opposite said opening and adapted for attaching to the traction device.

6. An article-holding device comprising a flexible collapsible envelope formed of a tough transparent plastic material and having inner and outer walls defining therebetween a variable volume chamber, said envelope shaped and formed conformantly to and with an opening for receiving the article; means including a communicating tube passed between and sealed to said walls and for inflating the envelope, and connector means projecting opposite said opening and fitting said envelope for coupling to a support.

7. A limb grasping device comprising a double walled envelope formed of opposed flexible inelastic sheets folded and sealed along margins fitting it to the limb and except at an opening between the opposite leaves of the inner wall through which said limb may be introduced, an inflating tube sealed between said sheets, and connector means on said envelope and for coupling it to a device for applying traction to the extremity of said limb.

References Cited in the file of this patent

UNITED STATES PATENTS

26,663	French	Jan. 3, 1860
1,196,887	Saemann	Sept. 5, 1916
1,634,873	Homan	July 5, 1927
2,291,785	Baudistel	Aug. 4, 1942
2,328,569	McGaw	Sept. 7, 1943
2,477,883	Lefohn	Aug. 2, 1949
2,669,989	Shoucair	Feb. 23, 1954