May 11, 1954 F. R. POOLE ET AL 2,678,040

SPHYGMOMANOMETER IN THE FORM OF A CUFF

Filed March 16, 1953

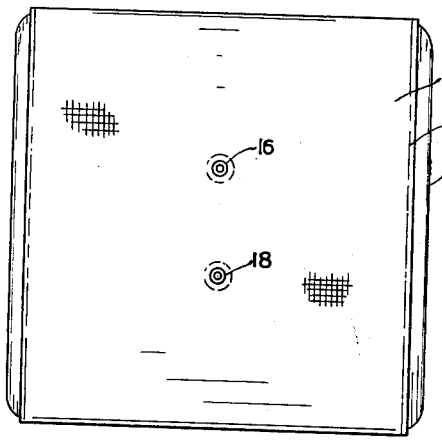


Fig. 1

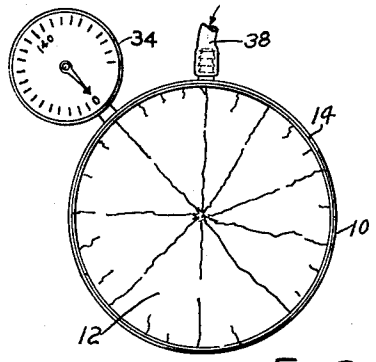


Fig. 2

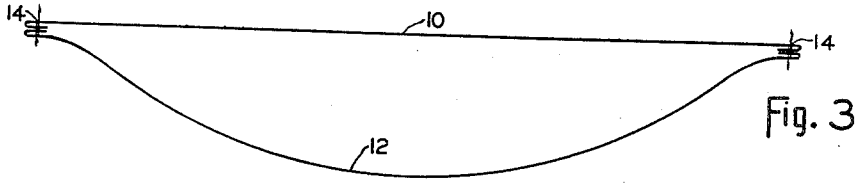


Fig. 3

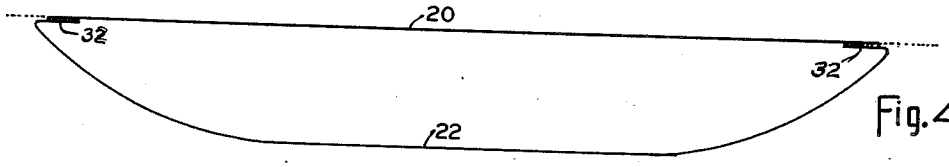


Fig. 4

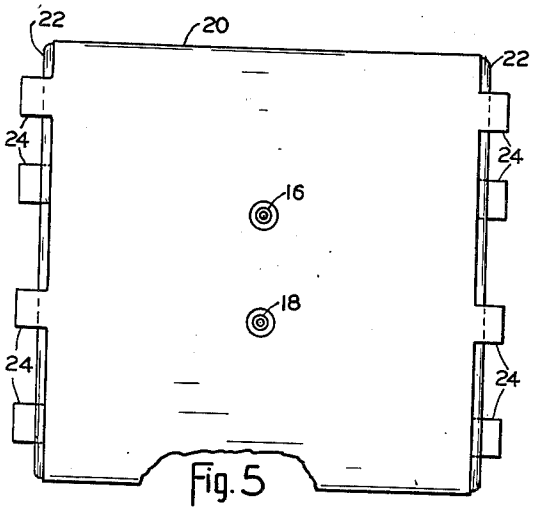


Fig. 5

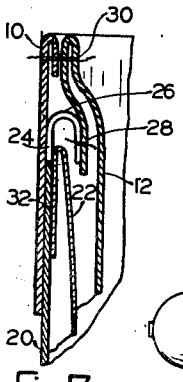


Fig. 7

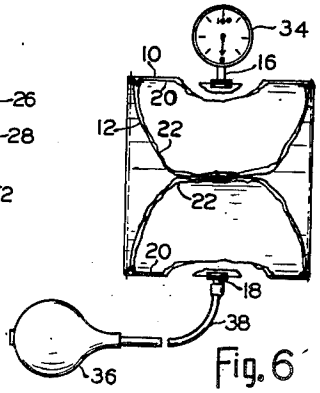


Fig. 6

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SPHYGMOMANOMETER IN THE FORM OF A CUFF

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Application March 16, 1953, Serial No. 342,628

5 Claims. (Cl. 128—2.05)

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This invention relates to a novel blood pressure measuring apparatus or sphygmomanometer, and the principal object of the present invention is to make the same of a new construction which is simple enough for self-application by the person wishing to determine his blood pressure. There are those who require the taking of their blood pressure daily, or at less frequent intervals, and in the prior art, this has only been possible by having someone else apply the sphygmomanometer and take the readings, but by means of the present invention the person conveniently is enabled to take the readings himself as often as he wishes.

Another object of the invention resides in the provision of a sphygmomanometer which is of particularly light weight and easy in application and is made in the form of an annulus or cuff which can be slipped up the arm by the person using it and this cuff is provided with an inflating bulb which may be operated by the hand of the limb upon which the cuff is applied, and the cuff also is provided with a gauge which is set so that the person taking the pressure may read it directly, as the hand is engaged in pumping the air pressure.

Further objects of the invention resides in the provision of a non-stretchable sphygmomanometer in the form of a cuff including an inner bladder made of fabric, water-proofed by means of a coating, said bladder being formed of two parts in the form of an annulus, the inner part being larger than the outer part and overlapping the outer part at the edges, said bladder being covered by a fabric envelope made in the form of an annulus and having a larger inner part secured to a smaller outer part, none of the parts being stretchable in any way, all to the end that the cuff sphygmomanometer may be pumped up to a condition wherein the inner part thereof impinges upon the limb of the user without any pressure being registered upon the dial, so that an absolutely accurate reading is obtainable as distinct from sphygmomanometers using rubber bladders which require pressure to stretch them out even before pressure is applied to the user's limb.

The invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a view in elevation showing the outside of the device flat and deflated;

Fig. 2 is an end view on a smaller scale illustrating the sphygmomanometer pumped up sufficiently for the inner fabric member parts to just contact each other and illustrating that the gauge is still uneffected and registers zero;

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Fig. 3 is an enlarged sectional view showing the outer envelope;

Fig. 4 is an enlarged view on the same scale as Fig. 3 and showing the inner bladder;

Fig. 5 is a view in elevation of the bladder;

Fig. 6 is a sectional view on a reduced scale of the entire device; and

Fig. 7 is an enlarged section through the seam of the inner bladder and the outer envelope.

In the first place, it is emphasized that the entire sphygmomanometer in the present case is made of non-stretchable fabric, preferably nylon, and it comprises an outer annular envelope or cover and an inner annular coated bladder, neither of which is stretchable, and the inner bladder being larger than the envelope. Each annular member, i. e. the cover and the bladder, comprises two parts, an inner part and an outer part, and each inner part is wider than the outer part, overlapping the latter at the edges.

The sphygmomanometer is shown generally in Fig. 1 wherein the outer fabric member of the envelope is indicated at 10. When uninflated, the inner part of the outer envelope is visible as at 12, the two parts being secured by a seam 14. Extending through the outer part 10 are a pair of nipples 16 and 18, and the hole in member 10 through which they protrude is preferably made by heat so as to prevent any unravelling of the outer part 10.

The envelope is shown enlarged in Fig. 3 wherein the outer part 10 is disclosed of a certain length and the inner part 12 there is disclosed as having a greater length. This fact is of importance and is thus emphasized. The same construction obtains as to the inner bladder (Figs. 4 and 5) wherein the outer part thereof 20 is smaller than the inner part thereof at 22 and the latter is apparent at the edges of the bladder (see Fig. 5). The nipples 16 and 18 are hermetically sealed to the outer member 20 to provide access from the exterior of the sphygmomanometer to the interior of the bladder.

The outer part 20 of the inner bladder is provided with a series of laterally extending tabs 24 which are used to secure the bladder to the envelope or cover and which prevent any relative shifting of one with respect to the other. These tabs are folded over as at 26 (see Fig. 7). They are then sewed to the inner part 12 of the cover as at 28, and the part 12 is then sewed at 30 to the outer part 10. All of these seams are made after turning the edges of the respective members inwardly and the inner part 22 of the bladder is secured to the outer part 20 thereof in the same manner as at 32 although this particular seam may be made adhesively or by heat or pressure sealing.

The dial gauge 34 applied to one of the nipples 16 or 18, and the bulb 36 applied to the other

nipple, may be conventional and well known and form no part of the present invention except that the position of the gauge **34** is such as to be easily readable with the sphygomomanometer cuff in place on the arm, and the bulb has a tube **38** so that if the cuff is placed upon the left arm, the left hand may be easily used to inflate the device while the right hand is then free for determining the pulse, and both diastolic and systolic readings are easily obtained by the operator of the device himself.

Referring now to Figs. 2 and 6, there is shown the sphygmomanometer wherein the bulb **36** has been pumped enough to just cause the inner members of the device to come together without exerting any pressure on each other. This has taken several strokes of the bulb but does not create any pressure within the device and this in turn is due to the construction above described wherein the inner part **22** of the bladder and the inner part **12** of the envelope are both larger than the respective outer parts thereof and this provides sufficient material for the effect described, it being remembered that none of the material is stretchable.

Therefore it will be seen that the smallest limb may be placed in the cuff, and when such limb is impinged upon by the inner parts **12** (**22**) as shown in Fig. 6, the reading will be zero on the gauge until actual pressure is applied to the member, and thus an absolutely accurate reading is obtained with the sphygmomanometer cuff of the present invention. If there were any stretching of the fabric, then there would be pressure required to occasion such stretching and thus in Figs. 2 and 6 there would be a reading on the dial even though there were no pressure exerted on a member in the cuff.

The above also goes to show why the single cuff may be applied to any limb of any size and no adjustment of any kind is necessary. The present device accurately determines the desired pressure reading on the smallest limb up to and including any limb which may be thrust into the cuff when it is entirely evacuated. Valve means may be applied to the bulb so that the thumb of the hand in which the bulb is held and by which it is squeezed may easily provide for evacuation of the air so as to obtain both the diastolic and systolic pressures with the one application of the device.

It is also an important part of the present invention to provide against any ballooning of the outer members and of course this is accomplished because the materials are non-stretchable and also because the outer members are smaller than the inner members as above described, so that once the inner circumference is in contact with any object or limb, all pressure is directed inwardly, and all of the pressure is all about such object or limb. There is no "one spot" pressure applied to a single position, and there are no gaps in the pressure which is even all about the object or limb, so that complete occlusion is accomplished.

The novel sphygmomanometer cuff will not roll upon the limb and there is nothing in the construction of the present device to crack, pinch or irritate as is the case in articles made of rubber. The present device does not blanch the skin or leave any marks on the skin surface. No complicated stays, hooks, or reenforcements are needed and the blood pressure is completely accurate and has equal pressure thereabout regardless of the degree of the pressure, as distinct from the case of the usual wrap-around device, etc. of the prior art.

We claim:

1. A self-applied sphygmomanometer in the form of an annulus adapted to be slid upon the limb of the user, a gauge and pressure bulb attached to the sphygmomanometer, the gauge facing the user and the bulb being operable by the hand of the limb to which the sphygmomanometer is applied, the other hand of the user being free to aid in determining pulse, said sphygmomanometer comprising non-stretchable material and the interior wall of the annulus being loose and full and greater in extent that the exterior wall thereof.

2. A self-applied sphygmomanometer in the form of a cuff and comprising an annular cover and an annular bladder in the cover, a pressure indicating gauge and a pressure bulb connected to the bladder, the material of the cover and bladder both being non-stretchable and the interior part of the bladder being greater in extent than the exterior part thereof so that the interior part of the bladder becomes pressed inwardly upon itself upon the application of air through the bulb into the bladder and the sphygmomanometer fails to become distended outwardly.

3. A self-applicable sphygmomanometer in the form of an annulus, said sphygmomanometer comprising an inner bladder, and an outer covering, the bladder and covering each comprising two parts, one part forming an inner wall and the part forming an outer wall as regards the annulus, each inner wall being greater in extent than the respective outer walls and providing for distortion inwardly toward the center of the annulus but not outwardly thereof so that all the pressure of the sphygmomanometer is inwardly directed.

4. A self-applicable sphygmomanometer in the form of an annulus, said sphygmomanometer comprising an inner bladder, and an outer covering, the bladder and covering each comprising two parts, one part forming an inner wall and the part forming an outer wall as regards the annulus, each inner wall being greater in extent than the respective outer walls and providing for distortion inwardly toward the center of the annulus but not outwardly thereof so that all the pressure of the sphygmomanometer is inwardly directed, and impinges upon any size of limb in the annulus, the bladder and covering parts being non-stretchable.

5. A self-applicable sphygmomanometer in the form of an annulus, said sphygmomanometer comprising an inner bladder and an outer covering, the bladder and covering each comprising two parts, one part forming an inner wall and the part forming an outer wall as regards the annulus, each inner wall being greater in extent than the respective outer walls and providing for distortion inwardly toward the center of the annulus but not outwardly thereof so that all the pressure of the sphygmomanometer is inwardly directed and impinges upon any size of limb in the annulus, the bladder and covering parts being non-stretchable woven fabric, the bladder being coated and impervious, and means securing the bladder to the covering.

No references cited.