

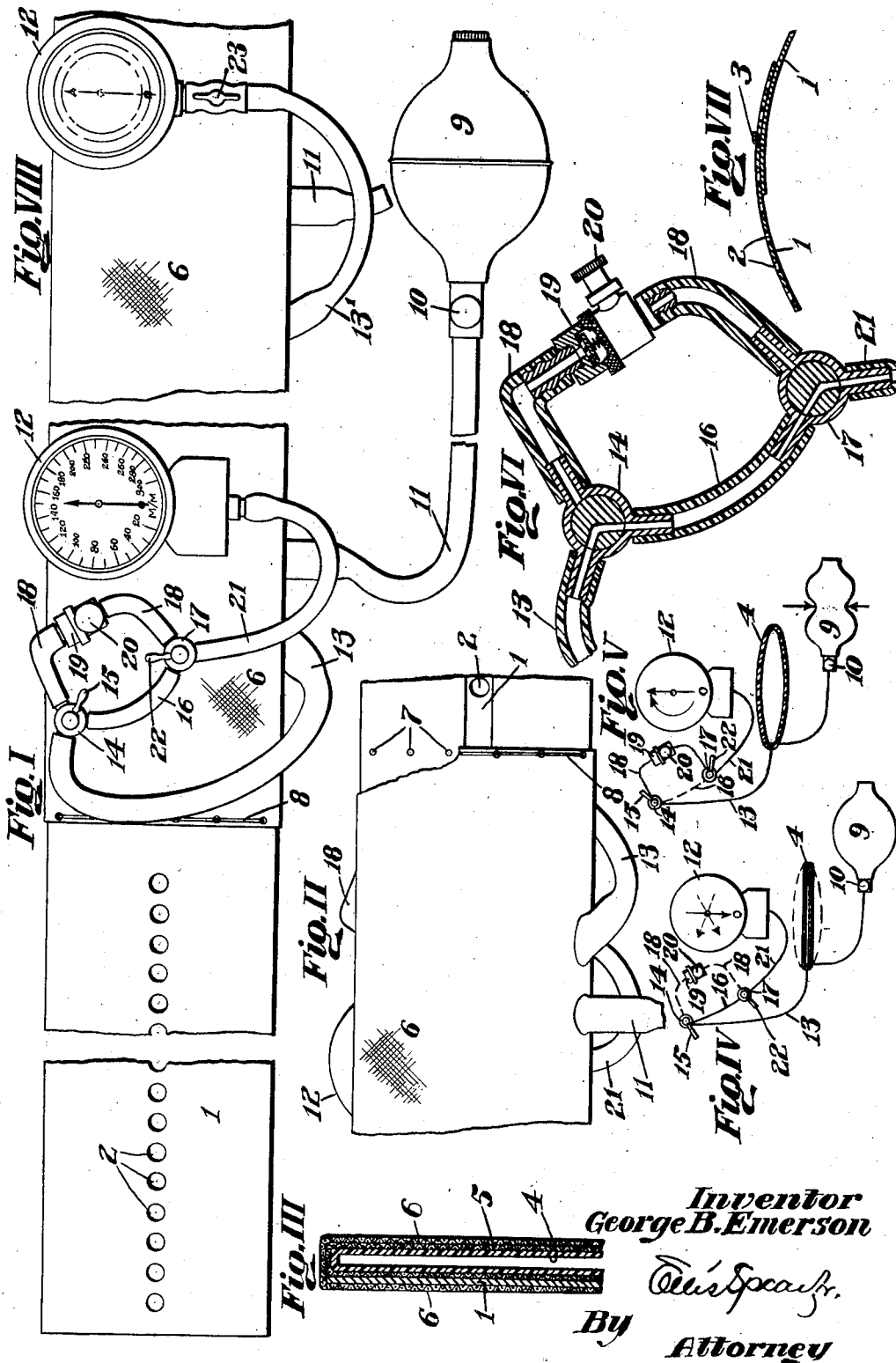
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ARTERIOMANOMETER

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ARTERIOMANOMETER

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The observation of blood pressures in medical practice has become so general as to need no introductory comment. The manometer is an accepted instrument of diagnosis and in general use in the profession.

The observation of pressures in different areas of the body is less generally utilized and this apparently because the usual manometer is primarily in the nature of an upper arm tourniquet and generally applied to the shallow location of the arterial system at that area. Both upper and lower limb observations are important where the pressure of a specific artery, such as the radial, brachial, popliteal or femoral, or where kymographic tracings are desired.

My invention contemplates also a wider basis of observation and a more accurate system of analysis of pressures which vary in different parts of the body.

Thus accuracy is due to the fact that both the systolic and diastolic sounds are intensified as a result of the stronger resistance to pressure of my metallic band or cuff. The special structure of the metallic band permits a more rapid adjustment to the limb and also causes less disturbance to the subject.

For simplicity I refer to human anatomy but it will be understood scientifically that the subject matter may be of any specie.

The usual manometer is essentially a tourniquet, i. e. a bandage or limp device adapted to be wound about the upper arm or like member. As such it has less inherent resistance to back pressures than a similar metallic structure and is not adapted to accommodate and analyze combined pressures such as those of respiration or independent muscular expansion and contraction.

Without intent to be limited thereby, I will discuss the problem as I see it and present my solution which for want of a better term I have referred to generally as an arteriomanometer. This I have illustrated in the accompanying drawing to which I shall make reference in explanation of the embodiments therein shown. In the drawing:

Fig. I is an outer face view of such a manometer the wall or shell being broken between its ends to shorten the view.

Fig. II a fragmentary view of the inner or air bag side of the stud carrying end of the device.

Fig. III is a transverse partial section showing the bag and strip assembly and encasement.

Fig. IV is a diagrammatic indication of the connections for system as used for direct or continuous pressure under the control of the inflation bulb.

Fig. V an indicated diagram of the system with the pressure under the control of the by-pass check.

Fig. VI is a sectional view of the direct and by-pass systems and valves.

Fig. VII is a sectional view showing the adjustable interlock of the wall strip, and

Fig. VIII a modified form of air and pressure connection.

In the instrument shown I provide a band or wall 1. This is preferably of spring brass say No. 30 gage, or other material capable of resisting pressure, but flexible enough to be bent into a circular or annular form. It is provided with adjusting holes 2 adapted to be engaged by a small stud hook 3 when the band is properly fastened to arm position.

By making the strip 1 of proper length say twenty inches in length and usually five inches wide, it is adapted to use on upper limbs only, while the lower limbs and torso require a longer band. For torso observations such as at the chest, I simply provide my manometer in greater length and of the same width.

On the inner face of the strip 1 I mount an elongated rubber bag or bladder 4. This is preferably enclosed in a protective covering 5 of fabric. Over this bag supporting region of the device I draw a tubular fabric tunic 6 which holds the bag in place and is itself held at the inner end of the bag which extends to about the middle of the strip 1, where it is laced through a transverse series of small holes 7 by a cord 8. From this line of lacing the inner face of the band is covered by two strips of felt which extend over the surface of the metal band except along the line of the adjusting holes 2 so that it will not come in contact with the skin.

The bag 4 is inflated by the usual inflation bulb 9 having the usual inflation check valve 10, but provided with a release knob so that the bag can be deflated. The bulb tube 11 is connected to the bag 4 being lead through the edge of the tunic.

Connected with the air bag 4 also is the usual pressure gage 12 but in this connection I preferably provide for a dual system of control giving increased possibilities of observation and diagnosis.

The tube 13 leading from the bag 4 passes out through the edge of the tunic 6 and is attached to one of the nipples of a two-way valve 14 having a handle 15.

From another nipple of the casing of the valve 14 runs a tube 16 which is connected to a second two-way cock 17, to which the pressure gage tube 21 is connected. The third nipples of the valves 14 and 17 are connected up by a by-pass 18 in which is a check valve 19 and vent 20 so that pressure on the gage can be held by the check valve 19 or relieved at 20 as desired. The importance of the check valve is that the pressure registered on the dial may be held while

the bag may be entirely deflated through the tube 18. The diagnostician is not influenced by changing registration on the dial, as the diagnosis must be made from the sounds of the pulse beat coming through the stethoscope. When the systolic sound reaches the ear the vent is instantly closed, thereby holding the pressure in the bag. The handles on the two-way cocks are then turned so that the pressure is directed through the tube 16. Such direct pressure is now registered upon the dial. Both systolic and diastolic pressures may be recorded in this manner.

In operating the systems as shown in Figs. IV and V for a direct pressure sustained by the bulb 9, the valve handles 15 and 22 are set as in Fig. IV giving the direct connection shown in the section Fig. VI. This gives the diagnostician his usual manometric basis of applied pressure and release on the usual scale of increase or decrease.

By my second system I provide for a by-pass of the pressure supply. The cocks 14 and 17 are turned as indicated by the position of the handles 15 and 22 in Fig. V.

Under this system the observer has another basis of diagnosis. The pressure is built up and held by the check valve 19 in the by-pass 18. He is therefore able to hold at any point of pressure and even detach or remove the apparatus without losing its register.

This is in contrast with Fig. VIII which represents an apparatus in accordance with my invention connected directly in the usual manner as by the bulb tube 11 to the air bag 4 and direct to the gage 12 by the tube 13¹. In this case an air cock 23 is used adjacent the gage for cutting off the pressure when desired.

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

1. In a blood pressure testing apparatus, a flexible strip, means for adjustably fastening it about a member, an inflatable bag carried on the inner face of the strip, an inflation means connected with the bag, a pressure gage, a conduit connection between the gage and bag including a by-pass, a check valve in the by-pass, a positive release at the check valve, a two-way valve at each end of the by-pass whereby the gage may be actuated direct or through the check valve of the by-pass, and a release at the inflation means for venting the inflation system.

2. In a blood pressure testing apparatus, a flexible metal strip, means for adjustably fastening it about a member, an inflatable bag carried on the inner face of the strip, an inflation means connected with the bag, a pressure gage, a conduit connection between the gage and bag including a by-pass, a check valve in the by-pass, and means for cutting the by-pass in or out whereby the gage may be actuated direct or through the check valve of the by-pass.

3. In a blood pressure testing apparatus, a flexible metal strip, means for adjustably fastening it about a member, an inflatable bag carried on the inner face of the strip, an inflation means connected with the bag, a pressure gage, a conduit connection between the gage and bag including a by-pass, a check valve in the by-pass, means for cutting the by-pass in or out whereby the gage may be actuated direct or through the check valve of the by-pass, and a release at the inflation means for venting the inflation system.

4. In a manometer for taking blood or related body pressures, a flexible band adapted to over-

lappingly encircle an included body area to be tested, means whereby said band may be adjusted to predetermined diameters and locked at any selected position of adjustment about the included body area to be tested, an inflatable air sac mounted on the inner face of said band, an inflation means connected with said air sac, a pressure gage, a conduit connection between said gage and air sac including a by-pass, a check-valve in the by-pass, and means for cutting the by-pass in or out whereby the gage may be actuated direct or through the check-valve of the by-pass.

5. In a manometer apparatus for taking blood or related pressures of the body, a band having an air sac, said band being of resonant material of a length sufficient to enable the band to be overlapped upon itself and locked about an included body area as a completely encircling member which when the air sac is inflated acts both as a constrictive element to shut off the artery and as a continuous and unbroken sound reflective surface for the systolic and diastolic sounds which may be heard when the artery is shut off, means whereby said band may be adjusted to predetermined diameters and positively locked at any selected position of adjustment about the included body area against dislodgment therefrom when the air sac is inflated, and means for inflating said air sac.

6. Apparatus as claimed in claim 5 wherein the means which permits and holds the adjustment of the band includes a fastener at one end of the band which is selectively engageable in any of a series of alined holes extending from the opposite end of the band towards the center thereof.

7. Apparatus as claimed in claim 5 wherein the air sac is arranged upon the inner face of the band and is covered by a protective covering and wherein a gauge is disposed exteriorly of the band and is adapted to be operatively connected with the air sac.

8. Apparatus as claimed in claim 5 wherein the inner face of the air sac is covered by a protective covering and wherein a tubular tunic is attached to said protective covering and is extended over the outer face of the band and is attached to the band intermediate of the ends thereof.

9. Apparatus as claimed in claim 5 wherein the inner face of the air sac is covered by a protective covering which extends along the inner face of the band from a point intermediate of the ends of the band towards one end of the band, and wherein that part of the inner face of the band which is not covered by said protective covering is substantially covered by a separate lining member.

10. Apparatus as claimed in claim 5 wherein the inner face of the air sac is covered by a protective covering which extends along the inner face of the band from a point intermediate of the ends of the band towards one end of the band, and wherein that part of the inner face of the band which is not covered by said protective covering is substantially covered by a separate lining member there being a tubular tunic attached to said protective covering and said tunic extending over the outer face of the band and being attached to the band substantially at the inner end of the protective covering.

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