

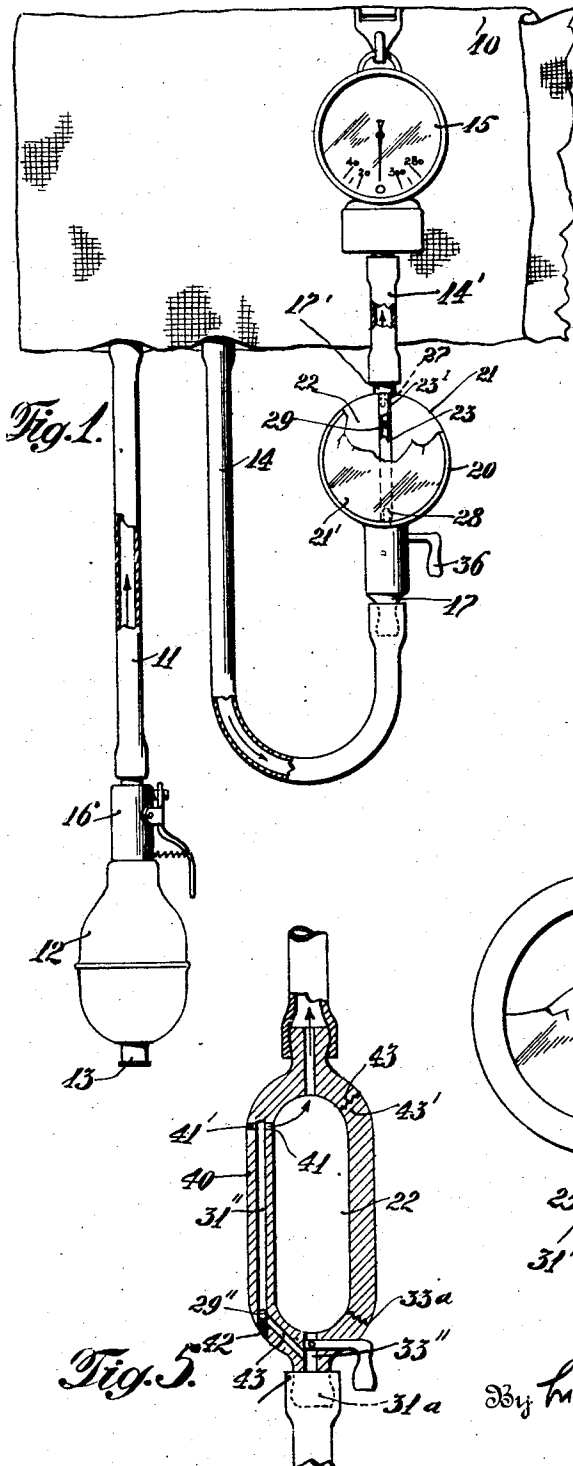
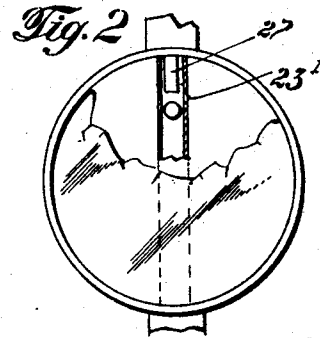
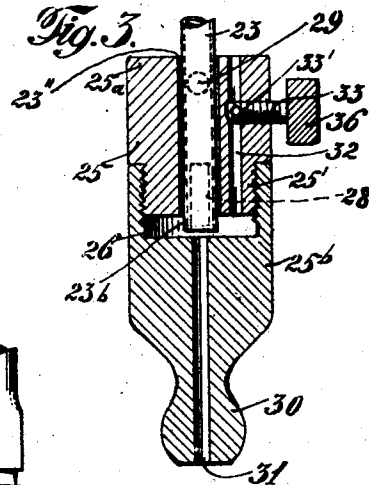
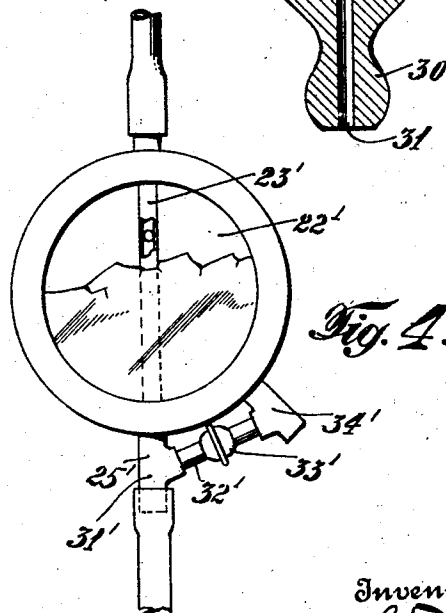
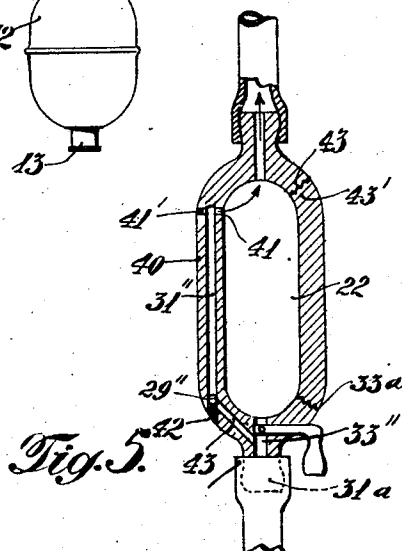
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VISIBLE PULSE AND DIASTOLIC INDICATOR

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VISIBLE PULSE AND DIASTOLIC INDICATOR.

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My present invention relates to means for giving visible pulse and diastolic indications for use in sphygmomanometry, and aims to provide a visible pulse and diastolic indicator which may readily, and with certainty of success, be applied to any usual type of construction of sphygmomanometer. Such an indicator provides, in a very compact construction, an attachment suitable for use with any usual or desired type of sphygmomanometer for converting the same into means for giving visible pulse and diastolic indications, and, at the same time, is so constructed and arranged as to provide a rugged and properly protected device. A further object of the present invention is to provide means for giving visible pulse and diastolic indications, in which is incorporated an indicating device capable of different ranges and capacities for giving indications of different sensitiveness, as desired, whereby the device is adapted for successful and convenient use for usual or for abnormal cases, without rendering the device bulky and heavy so as to interfere with its convenient transport and use in the ordinary type of case.

In the accompanying specification I have described, and in the annexed drawing shown, preferred embodiments of the present invention. It is, however, to be understood that my invention is not limited to the embodiments thereof which is herein shown and described for purposes of illustration only.

Referring to the drawings,

Figure 1 is a view showing the visible pulse and diastolic indicator comprising the herein described embodiment of the present invention, associated with one type of sphygmomanometer and pneumatic cuff;

Figure 2 is a plan view, on an enlarged scale, of the indicating device per se;

Figure 3 is a longitudinal sectional view, on an enlarged scale, of one form of supporting member and associated valve which may be used with the indicating means referred to;

Figure 4 is a plan view of a modified form of visible pulse and diastolic indicator; and Figure 5 is a view in longitudinal section of still another modification of visible pulse and diastolic indicator.

Referring to the herein described embodiments of the present invention, the same may comprise the usual pneumatic cuff for wind-

ing around the arm of the person whose blood pressure is to be measured, which cuff is herein generally designated by reference character 10. A tube 11 communicates with a rubber bulb or other means for generating air-pressure in the system, generally designated by reference character 12. The bulb is provided at its outer end with a one-way valve 13 for the admission of air to the system. A tube connection 14 communicates with a sygmomanometer, generally designated by reference character 15, which sphygmomanometer may be either of the mercury column or the aneroid type, here shown as the aneroid type. The tube 11 may be provided with any suitable means 16 for releasing the air pressure in the sphygmomanometer system.

Attached at any suitable point in the system, so as to give visible indications of the pressure conditions of the system, as by being tapped into the tube 14 at the point 17 and into the tube section 14' at the point 17', is a device, generally indicated by reference character 20, for giving visible pulse and diastolic indications. This device may comprise a suitable casing 21, which is preferably circular in outline, having a glass or other transparent face or cover 21' and providing an air chamber 22. Except in the manner hereinafter described in detail, the air chamber 22 is sealed against the ingress or egress of air from any outside source.

Within the air chamber 22 of the casing 21, and extending into and communicating with said air chamber, is a tube 23 which is preferably transparent, as by being made of glass, and which is preferably removably supported within the casing 21, as by being made to fit into a two-part plug 25, the upper part 25^a of which is preferably channelled or bored, as at 23'', to receive the lower end 23^b of the tube 23. In order to properly receive and retain the tube 23, the lower part 25^b of the plug 25 is provided with a threaded opening 26 into which the threaded nipple 25' of the upper section 25^a of the plug 25 tightly fits. In order to render the joint between the engaging threads of the parts 25^b and 25' absolutely air tight, the threads of the opening 26 may be coated with a suitable packing material, such as shellac.

The tube 23 is provided with an upper stop or buffer, which may be in the shape of a perforated thimble 27, and a lower stop or buffer, which may also be in the shape of

perforated thimble 28. Within the tube is a light readily air-operable indicating device, such as a pith ball 29. The lower buffer 28 should be so grooved or otherwise shaped
 5 that the pith ball will not, in its lowermost position in the tube 23, close the opening in the lower buffer 28 and thus act as a ball valve. The tube 23 communicates, by means of an opening 23', with the air chamber 22.
 10 The lower portion 25^b of the plug 25 is preferably provided with an extension in the form of a nipple 30 which is in turn provided with a passageway or channel 31. The upper portion 25^a of the plug 25 is provided
 15 with a by-pass or accessory passageway 32, controlled by a cock or valve 33 provided with a port or channel 33' so constructed and arranged as to control the connection of the channel 32 with the air chamber 22, thus al-
 20 lowing a greater or less portion of the air entering the channel 31 to be diverted into the channel 32 and thence into the air chamber 22 without passing through the tube 23.

The use of the device and the operation of
 25 the same in use are substantially as follows:—Assuming that the manometer is in the condition usual for making a reading of blood pressure, the compression bulb 13 is worked until a point of pressure above the
 30 maximum systolic pressure is reached, which point is indicated by the disappearance of the pulse, as determined by palpation at the wrist, or auscultation with a stethoscope in the cubital fossa. The valve leading from
 35 the pressure bulb then closing automatically, the valve controlling the outlet 16 is opened to allow a steady, slow exhaust of the pressure within the manometric system. The pressure should, for most efficient use, fall at
 40 the rate of about 1 mm. per beat.

Meanwhile, the valve 33 has been so operated, by means of the handle 36 forming a part of the valve, as to allow all the air to pass through the tube 23, by means of the
 45 channel 31, or a predetermined portion of the air to pass through the accessory channel 32, into communication with the air chamber 22 of the member 20, and thus into communication with the pressure system of the manometer.
 50

Whether the tube 23, either alone, or in conjunction with the channel 32, is to be used, depends upon the blood pressure characteristics of the patient whose blood pressure is being measured. If the pressure is
 5 not much above normal, the tube 23, alone, should be used, the channel 32 being closed by the operation of the valve 33. On the other hand, if the blood pressure of the pa-
 10 tient is much above normal, the accessory channel 32 is rendered operative by the suitable manipulation of the valve 33, thus sidetracking or by-passing a portion of the air which is normally passed directly through
 15 the tube 23, into the air chamber 22. In

other words, in the case of an abnormally strong or bounding pulse, the tube 23 might be too sensitive to be used alone in such a case. Accordingly, the valve 33 is operated to sidetrack some of the air from the tube 23,
 20 so that the air is divided between the tube 23 and the channel 32, which will give a proper reading within the range of the tube 23 for the abnormal pulse.

As the pressure in the manometer system
 25 continues to fall, slight bounding movements of the pith ball within the tube give warning that the pulse is about to return. These movements increase rapidly in magnitude, and then remain substantially uniform until
 30 the diastolic pressure is reached, whereupon there occurs a marked diminution in the amplitudes of the movements of the pith ball.

It will be noted that, by reason of the construction described above, means are pro-
 35 vided, of a simple but effective character, for giving reliable visible indications of the character of the pulse and of the point at which the minimum diastolic blood pressure is to be read. Any variation in the air pres-
 40 sure of the manometric system, communicated from the cuff 10, will impart an impulse to the pith ball within the tube in the casing, thus rendering visible any and all changes in the pressure of the system.
 45 Due to the provision of the perforated thimbles 27 and 28, which serve as buffers, the movements of the pith ball are kept within the desired upper and lower limits.

The provision of the air chamber 22 serves
 50 the very useful and important purpose of permitting substantially free movement of the air through the tube 23, due to the comparatively small volume of the tube as compared with the volume of the air within the casing 21, without, however, permitting any leakage of the pressure generated in the system by means of the pressure bulb 13.

It will be noted that the device is, therefore, capable of giving visible pulse and
 55 diastolic indications of different ranges and sensitiveness, depending upon the blood pressure characteristics of the person whose blood pressure is being measured. It will be further noted that since the tube 23 passes
 60 through the channel 23' of the upper portion 25^a of the plug 25 and into contact with a seat on the inner face of the upper portion 25^a of said plug, to which seat it may be attached by any suitable cement, gasket
 65 or other means, the lower portion 25^b of the plug, shielding the tube 23, may readily be removed by unscrewing the lower portion 25^b from the upper portion 25^a. This permits the ready inspection and repair of the
 70 more sensitive and fragile parts of the instrument.

Another advantage of the construction described above is that it constitutes a unit
 75 which may be readily attached to any well-

known or usual type of manometer and thus readily, but in an entirely efficient and accurate manner, adapt the same for giving visible sphygmomanometric indications.

5 In the modification shown in Figure 4 of the drawing, a by-pass 32' controlled by a valve 33' is provided so as to be external to the plug or equivalent device 25' having the channel 31' through which air passes
10 into the tube 23' in the manner described for the previous modification. Air passing through the by-pass 33' enters the air chamber 22' by means of the connection 34'. By the suitable manipulation of the valve 33', a
15 greater or less proportion of the air entering the channel 31' may be by-passed or diverted through the connections 32' and 34' directly into the chamber 22'.

In the modification shown in Figure 5 of the drawing I prefer that the channel 31'' shall be formed or molded in one side, preferably the comparatively thick side, of a hollow member 40 which may be made of a moldable transparent material, such as
25 bakelite or celluloid. The channel 31'' communicates with the air chamber 22'' by means of the opening 41 which may be bored from the outside of the casing and has its outer end closed, as indicated at 41'.

30 The pith ball or equivalent device is indicated at 29''. The lower end of the channel 31'' is closed by the plug 42. By means of an oblique channel 43 the passageway 31'' communicates with the channel 31^a. The
35 upper portion of the channel 31^a is controlled by a valve 33'' having the port 33^a.

The device may be made in one or more pieces as desired and possesses for certain purposes advantages over the other forms of the invention hereinabove shown and described. If desired to be made in two parts, one of the parts may be screwed into the other by means of the tapered threaded seats 43 and 43'.

45 What I claim is:

1. A visible pulse and diastolic indicator, comprising, in combination, a casing providing an air chamber, means for giving visible pulse and diastolic indications and regulat-
50 able means for said first mentioned means to adjust the indicator to pulsation and diastolic indications of different sensitiveness.

2. A visible pulse and diastolic indicator comprising, in combination, a casing providing an air chamber and having an aper-
55

ture in one side thereof, a channelled member fitting into said aperture, a tube carried by said channelled member so as to extend into said air chamber when the channelled member is within said aperture, said tube
60 communicating with said channel and with said air chamber, and air-operated means within said tube for giving visible pulse and diastolic indications.

3. A visible pulse and diastolic indicator 65 comprising, in combination, a casing providing an air chamber and having an aperture in one side thereof, and removable air-operated means fitting into said aperture and extending into said air chamber for
70 giving visible pulse and diastolic indications.

4. A visible pulse and diastolic indicator comprising, in combination, a casing providing an air chamber and having an aperture
75 in one side thereof, and removable air-operated means fitting into said aperture and extending into said air chamber for giving visible pulse and diastolic indications, said removable air-operated means comprising
80 an indicating device of variable range and capacity for giving visible pulse and diastolic indications of different sensitiveness.

5. A visible pulse and diastolic indicator comprising, in combination, a casing providing an air chamber and having an aperture
85 in one side thereof, a channelled plug fitting into said aperture, an indicator tube carried by said plug so as to extend into said air chamber when the plug is in position in said aperture, said tube communi-
90 cating with said channel and with said air chamber, a ball within said tube, a by-pass in said plug, and a valve within said plug controlling said by-pass and adapted, on being opened, to by-pass some of the air normally passing through the channel in said
95 plug, so as to give visible pulse and diastolic indications of different sensitiveness.

6. In a sphygmomanometer system, a 100 pneumatic cuff, means for pumping air into and releasing the same from the cuff, means for indicating the air pressure in said cuff, and a second indicator in the system for indicating the diastolic and systolic condi-
105 tions of the pulse.

In testimony, whereof, I have signed my name to this specification this fifth day of June, 1922.

NATHANAEL FEDDE.