P. NICHOLSON.

SPHYGMOMANOMETER.

APPLICATION FILED DEC. 11, 1911.

1,134,632. Patented Apr. 6, 1915.

FIG. 1.

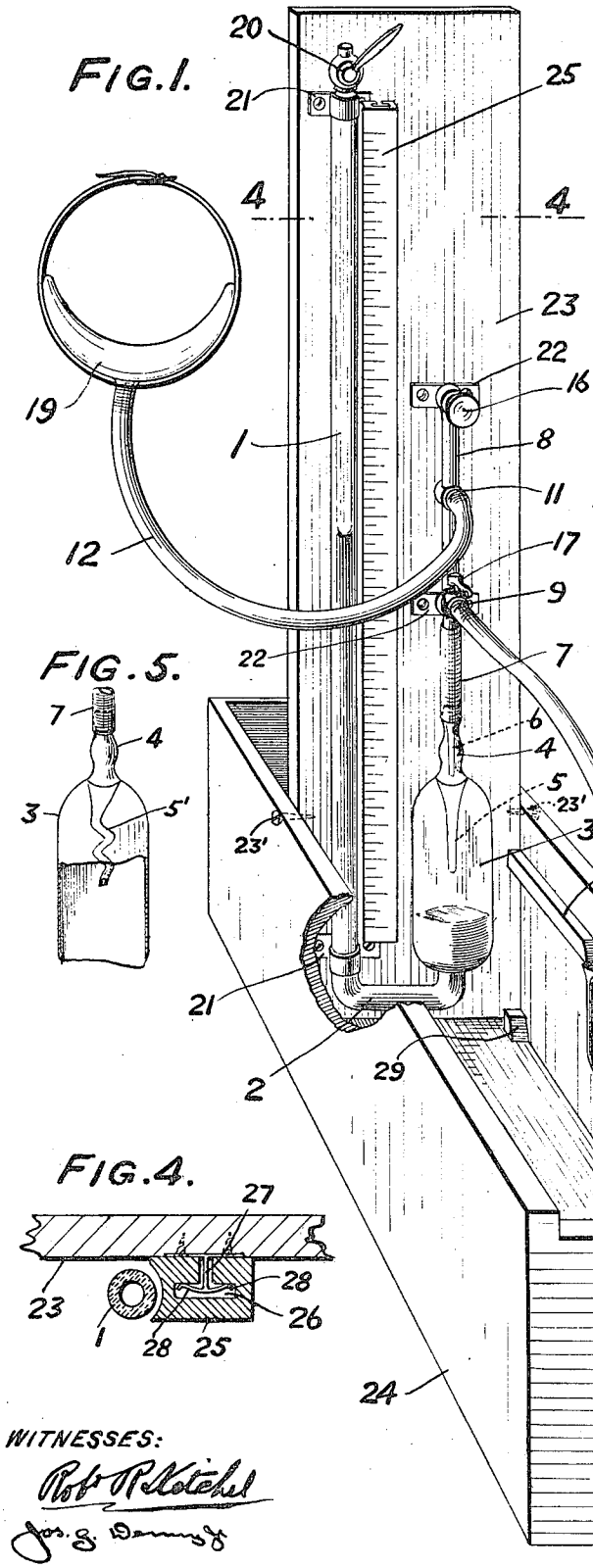


FIG. 2.

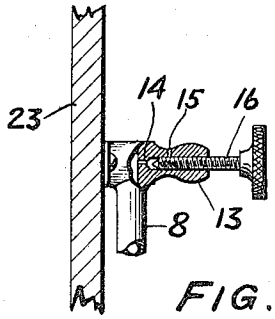


FIG. 3.

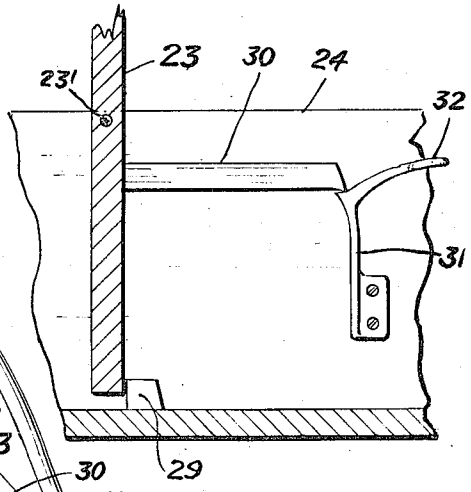


FIG. 5.

FIG. 4.

WITNESSES:

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SPHYGMOMANOMETER.

1,134,632. Specification of Letters Patent. Patented Apr. 6, 1915.

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To all whom it may concern:

Be it known that I, PERCIVAL NICHOLSON, a citizen of the United States, residing at Ardmore, in the county of Montgomery and State of Pennsylvania, have invented certain Improvements in Sphygmomanometers, of which the following is a specification.

My invention is designed to provide a simple, convenient, compact and accurate blood pressure gage that will retain the mercury used therein so that it shall not be lost or come in contact with the rubber tubing and metal parts connected therewith for transmitting the pressures and which can be obtained at a reasonable cost.

The characteristic features of my improvements are fully disclosed in the following description and the accompanying drawings in illustration thereof.

In the drawings, Figure 1 is a perspective view of an instrument embodying my invention; Fig. 2 is a sectional view of the needle valve with its connections; Fig. 3 is a sectional elevation of part of the instrument; Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1; and Fig. 5 is a view, part sectional, of a modified form of nozzle for passing air to the mercury cistern and preventing the passage of mercury therethrough.

The instrument, as illustrated in the drawings, comprises a long glass tube 1, of small bore, integrally connected by a U-shaped bend 2 with the cylindrical glass cistern 3 of comparatively large diameter, the cistern having the glass neck or nipple 4 on the top thereof, the small bore glass nozzle 5 fused within the top thereof so as to extend into the cistern, and the small bore glass nozzle 6 fused within the neck 4 so as to extend downwardly toward the cistern. A stout rubber tube 7 couples the neck 4 to the lower end of a metal tube 8 which is provided with the nipple 9 for making connection with the rubber tube 10, the nipple 11 for making connection with the rubber tube 12, and the valve seat 13 containing the passages 14 and 15 controlled by the needle valve 16. A cock 17 is placed in the nipple or branch 9, a metal pump 18 is connected with the tube 10, a pneumatic cuff 19 is connected with the tube 12 and a steel cock 20 is connected with the top of the tube 1. Clips 21 and lugs 22 are fixed to the lid 23 of a box 24 and engage the respective tubes 1 and 8. A 300 millimeter scale 25 is engaged to the lid 23 parallel to the tube 1 with relation to which it is adjustable, the scale having therein a longitudinal T-slot 26 and the lid having thereon T-clips 27 provided with resilient wings 28 which press the scale against the lid while permitting it to be moved longitudinally for adjustment.

The nozzle or small tube 6, designed to prevent any mercury which has worked through the nozzle or small tube 5 from reaching the rubber tube 7, may be omitted, as the passage through the nozzle 5 can be made sufficiently fine to effect the desired obstruction. Different forms of nozzles may be employed, such as the spiral or crimped form fused to the top of the cistern 3 illustrated in Fig. 5.

The lid 23, to which the instrument is attached, is connected with the box 24 by the pintles 23′. When the cock 20 is closed and the tubes 10 and 12, the pump 18 and the cuff 19 have been placed in the box, the entire instrument can be inclosed therein by lowering the lid. The cock 20 is attached so that when open it will engage the box and prevent the tube 1 from being brought to the horizontal position so that the mercury shall not be discharged. The instrument is brought to and held in the operative position by bringing the lid to the vertical position, when the lower end thereof engages the block 29 which is fixed in the box and the arm 30 thereon engages the spring latch 31 which is fixed in the box and can be disengaged by pressing on the arm 32 thereof.

In operation, the valve 16 is closed, the cock 20 is opened, the cuff 19 is adjusted upon the arm and the pump 18 is operated to force air through the tubes 10, 8, 6, and 5 to the cistern 3, and also through the tube 12 to the cuff 19, whereby the mercury is elevated in the tube 1 and the cuff 19 is inflated until its pressure obliterates the patient's pulse. The cock 17 may then be closed and the needle valve 16 is gradually opened to permit the gradual escape of air from the cuff through the passages 14 and 15, which is accompanied by the gradual fall of the mercury in the tube 1. When the pressure on the arm has been sufficiently relaxed to permit the patient's pulse to be

first palpable, which is observed by any of the usual methods, the height of the mercury indicated by the scale is observed, the reading taken indicating the pressure to be determined.

It will be understood that the large diameter of the cylindrical cistern 3 as compared with the passage through the tube 1 effects an extended and substantially uniform movement of mercury in the tube for a slight movement of the surface of the mercury in the cistern, which enables the use of a long and uniformly graduated scale, with resulting means for obtaining a reliable determination of the pressure desired.

As mercury will chemically combine with rubber and metals (excepting platinum, which is too expensive for use, and steel, which is difficult to work) with resulting coating of the glass by salts and sulfids formed thereby, the importance of the nozzle or nozzles so disposed that the point or points thereof do not touch the mercury in any position of the instrument will be understood as not only preventing loss of mercury but also preventing the coating of the glass and the deterioration of the connections otherwise resulting from the attack thereon.

Having described my invention, I claim:

1. In a sphygmomanometer, a long tube of comparatively small diameter having means at the top to communicate with the air when in use and having a return bend near its lower end, a cistern of comparatively large cross-section having its bottom connected with said bend, a tube having a small bore nozzle extending into the top of said cistern, said nozzle being adapted for preventing flow therethrough of liquid from said cistern, a scale for reading the height of liquid in said first-named tube, and means for forcing air through said nozzle into said cistern.

2. In a sphygmomanometer, a long glass tube of comparatively small bore having a U bend at the bottom thereof, a glass cistern of comparatively large diameter integrally connected with said bend, a glass nozzle of small bore extending into and integrally connected with said cistern with its lower end above the normal liquid level therein, and means for forcing fluid through said nozzle into said cistern.

3. In a sphygmomanometer, a long glass tube of comparatively small bore, a cylindrical glass cistern of comparatively large diameter with a neck on the top thereof, a glass tubular bend integrally connected with the bottoms of said tube and cistern, a glass nozzle of small bore having its base integrally connected to the top of and its point disposed within said cistern, means comprising a tube engaging said neck for forcing air into said cistern, and a scale for determining the height of liquid in said glass tube.

4. In a sphygmomanometer, a long tube of comparatively small bore, a cylindrical cistern of comparatively large diameter, a tubular bend connecting said tube and cistern, a tube having a small passage and connected to the top of and extending into said cistern, a body of mercury in said cistern with its surface constantly below said second tube, said second tube being adapted for connection with a pneumatic cuff and with air forcing means, and a scale for reading the height of the mercury in said first tube.

5. In a sphygmomanometer, a long glass tube of comparatively small bore having a return bend near its lower end, a glass cistern of comparatively large diameter having its bottom integrally connected with said bend and having a neck on the top thereof, a tube having a small passage and connected with the top of and extending into said cistern, a metal tube, a rubber tube connecting said neck and metal tube, said metal tube having means adapted to connect with the tube of a pneumatic cuff and with an air forcing device, and a needle valve for permitting the discharge of air from said metal tube.

6. In a sphygmomanometer, the combination with a box and a lid hinged thereto, of an integrally formed tube and cistern fixed to said lid, a valve at the top of said tube which is adapted when open for preventing the closing of said lid, said lid being closable when said valve is closed, a scale engaged to said lid in proximity to said tube, a nozzle extending into said cistern, a rigid tube fixed to said lid, a flexible tube connecting said rigid tube and cistern, said rigid tube being adapted for connection by a flexible tube with air forcing means, means for connecting said rigid tube with a pneumatic cuff, and a valve whereby said rigid tube communicates with the atmosphere.

7. In a sphygmomanometer, a long tube of comparatively small diameter and having a return bend near its lower end, a cistern of comparatively large diameter connected with said end, a tube having a small tortuous passage and extending into the top of said cistern, said passage being adapted for preventing flow therethrough of liquid from said cistern, and means for forcing fluid through said passage into said cistern.

8. In a sphygmomanometer, a long tube of comparatively small diameter and having a return bend near its lower end, a cistern of comparatively large diameter connected with said end, a tube having a small tortuous passage and extending into said cistern, said passage being adapted for preventing flow therethrough of liquid from

said cistern, an adjustable scale for reading the height of mercury in said tube first named, said tube being adapted for connection with air forcing means to apply air pressure to the liquid in said cistern, and with pneumatic means for obliterating the pulse.

In witness whereof I have hereunto set my name this 9th day of December, 1911, in the presence of the subscribing witnesses.

PERCIVAL NICHOLSON.

Witnesses:

Jos. G. Denny, Jr.,

Robt. R. Kitchel.