(No Model.)

R. C. M. BOWLES.

STETHOSCOPIC INSTRUMENT.

No. 526,802. Patented Oct. 2, 1894.

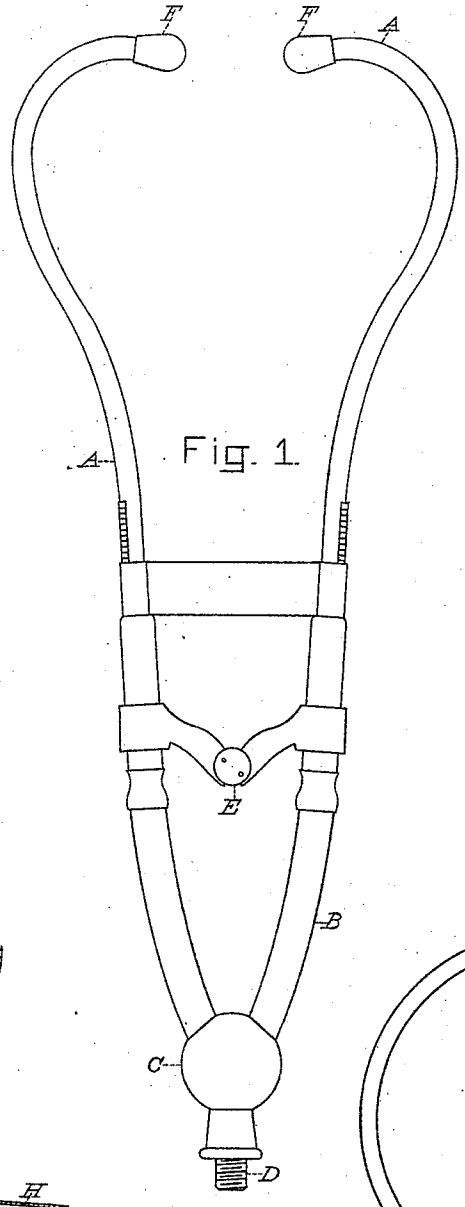

Fig. 1.

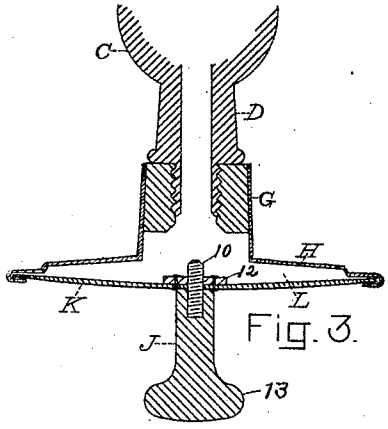

Fig. 3.

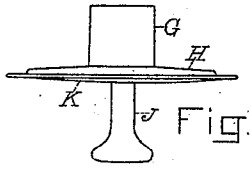

Fig. 2.

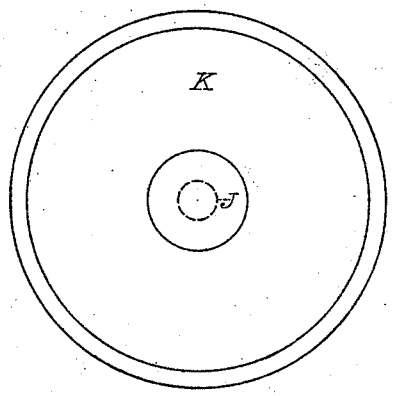

Fig. 4.

WITNESSES.

C. W. Bowles.
J. H. Bowles

INVENTOR.

R. C. M. Bowles.

UNITED STATES PATENT OFFICE.

ROBERT C. M. BOWLES, OF BOSTON, MASSACHUSETTS.

STETHOSCOPIC INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 526,802, dated October 2, 1894.

Application filed June 5, 1893. Serial No. 476,663. (No model.)

To all whom it may concern:

Be it known that I, ROBERT C. M. BOWLES, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Stethoscopic Instruments, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to stethoscopic instruments and has for its object to provide a more efficient instrument of the class described. Its substantial variation from the form of instrument in general use, is, in that a vibrant disk or diaphragm is employed to perform the work of the terminal "bell" or funnel of said instrument. Devices have appeared in which a diaphragm is used; but the diaphragm in these is placed within the bell or funnel of the usual form of instrument, and the said diaphragm is thus prevented from making contact with the body; and, when in use, practically forms the rear wall of a chamber, the front wall of which is formed by the body of the patient. The theory of this construction seems to have been that sounds proceeded from that portion of the body inclosed within the inside perimeter of the "bell" and traversing the hollow chamber, struck against the diaphragm and then passed up the tubing to the ear. Experiments seem to demonstrate that the sounds proceed largely, if not wholly, from that portion of the body covered by the edge of the bell; in which case their action upon the diaphragm would seem to be similar to that of a drum being beaten upon the edge of its frame. Experiment and practical demonstration, therefore, have convinced me that the efficiency of the stethoscope is greatly increased by so constructing the instrument, that the vibrant diaphragm shall be brought in contact with the body or with the clothing thereon, thus receiving the direct action of the vibration of the body. In order to more accurately locate the emanating point of abnormal sound, I prefer to provide the said diaphragm with a projection of smaller area than the diaphragm, and for the best results, I prefer to secure the said diaphragm to a second diaphragm provided with a hollow extension, the said diaphragms forming what I prefer to designate as a double diaphragm forming the walls of an air chamber, which in practice may and preferably will communicate with the usual ear tubes. These and other features of my invention will hereinafter be pointed out in the claims at the end of this specification.

In the accompanying drawings forming part of this specification, Figure 1 shows an elevation of the hearing tubes of a binaural stethoscope with which my invention may be employed; Fig. 2, an elevation of the preferred form of double diaphragm embodying my invention, the said device being adapted to be attached to the part shown in Fig. 1; Fig. 3, a vertical section on an enlarged scale of the device shown in Fig. 2, and Fig. 4, an under side view on an enlarged scale of the device shown in Fig. 2.

My improved instrument consists essentially of a diaphragm K forming the front wall of an air chamber L having its rear wall H preferably made sufficiently thin to form a second or rear diaphragm, which is provided, as herein shown, with a hollow extension G, forming an air passage for said chamber, the said extension being represented as integral with the rear wall H, the said diaphragms being made of metal, hard rubber, celluloid, membrane, silk, mica, or other suitable substances or combinations thereof.

The diaphragm K, which I prefer to designate as the front diaphragm, may be secured to the wall or rear diaphragm H in any manner suitable to permanently attach the diaphragm K to the rear wall H in vibratory condition, it being herein represented as secured by bending or spinning the edge of the wall or diaphragm H under or over the said diaphragm K, and for the best results, I prefer to make both diaphragms of sheet brass. The diaphragm K may and preferably will be provided with a projection, stem or rod J, of sound conducting material, such as metal, wood, rubber or other suitable material, and the said projection, stem or rod may and preferably will be secured to the front diaphragm K near its center, the said projection being herein shown as attached to the diaphragm K by a screw 10 extended through a suitable opening in the diaphragm K and engaging a threaded washer or nut 12. The

projection, stud or rod J may be made of any desired shape or size, and is herein shown as provided with an enlarged head 13.

The instrument, as thus far described, may be used in connection with the upper portion of the usual binaural stethoscope, which is shown in Fig. 1, and consists essentially of the sound conducting tubes A, B connected by the hinge or toggle E and provided with the ear pieces F, and secured to the bulb C, having the tubular screw-threaded extension D adapted to engage the screw-threaded extension G, or the said instrument may be used alone by applying the ear to the hollow extension G.

With my improved instrument, the patient may be examined without requiring the removal of all the clothing.

By means of the projection, stud or rod J, the sound is localized or confined to a substantially small area of surface, which in some cases, as for instance, in heart examinations, is desirable, and while I prefer to use the localizing projection, I do not desire to limit my invention in this respect, as the said projection might be omitted and the front diaphragm alone relied upon, which may be brought into direct contact with the body or clothing.

The diaphragm K, when made of metal, hard rubber, celluloid, mica and like substances, is in its natural state in vibratory condition and may be secured to the rear wall or diaphragm H after the manner herein shown, but when made of silk, membrane or like substances, the diaphragm will be secured to the rear wall or diaphragm in such manner as to render the membrane, silk, &c., taut or under tension, so that the same is thus made equivalent to a metal diaphragm and is attached to the rear wall or diaphragm in vibratory condition.

In the application of my improved instrument, it will be noticed that the diaphragm K is brought directly into contact with the body or clothing of the patient, or indirectly through the localizing projection, and as a result, the sound vibration is largely augmented and the efficiency of the instrument increased.

By making the rear wall H of the chamber L sufficiently thin to form a diaphragm, the sound vibration appears to be increased over that obtained with the front diaphragm alone, and while I prefer to construct the instrument with a double diaphragm as described, I do not desire to limit my invention in this respect, as the front diaphragm K alone increases the efficiency of the instrument over those now commonly in use.

I claim—

1. As an improved article of manufacture, a stethoscopic instrument provided with a diaphragm firmly secured at its rim or edge and provided with a localizing projection secured to the said diaphragm within its rim or edge, substantially as described.

2. As an improved article of manufacture, a stethoscopic instrument provided with a diaphragm firmly secured at its rim or edge and provided with a localizing projection detachably secured to the said diaphragm within its rim or edge, substantially as described.

3. As an improved article of manufacture, a stethoscopic instrument provided with an air chamber having front and rear walls in vibratory condition, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT C. M. BOWLES.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.