(No Model.)

D. B. MARSH.

APPARATUS FOR EXAMINING HEARTS, LUNGS, &c.

No. 592,154. Patented Oct. 19, 1897.

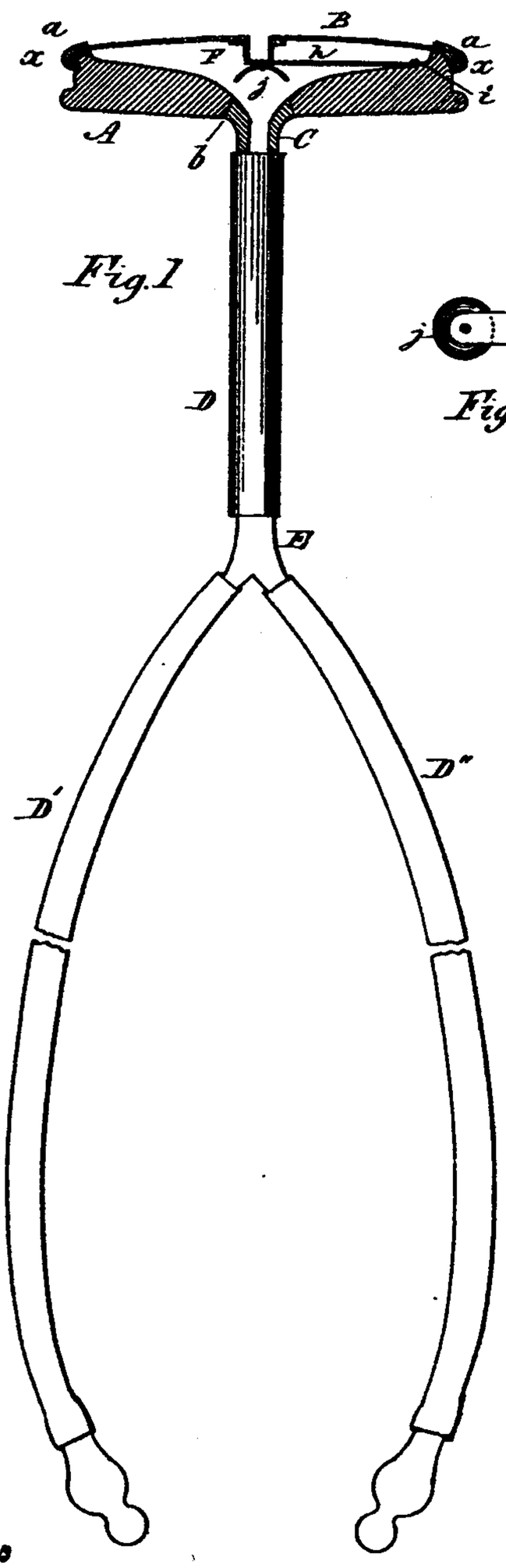

Fig. 1

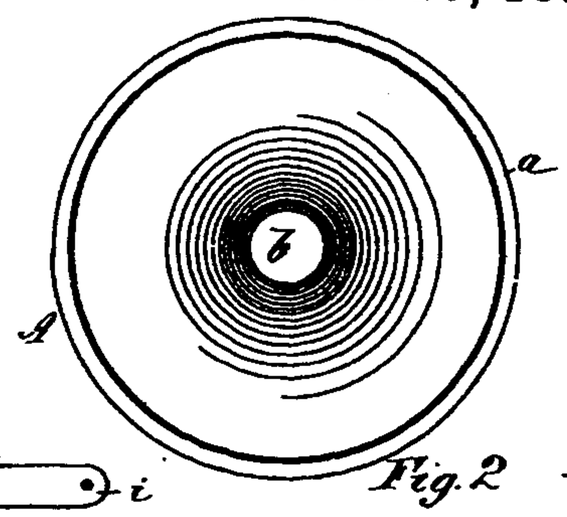

Fig. 2

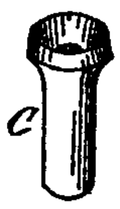

Fig. 8.

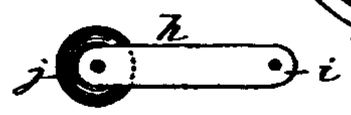

Fig. 9

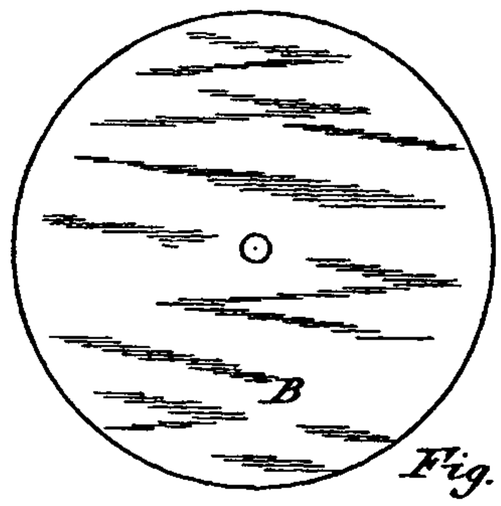

Fig. 3

Fig 4

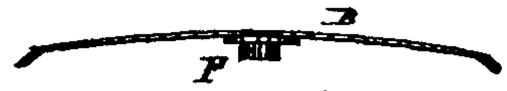

Fig. 5

Fig. 6

Fig. 7.

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UNITED STATES PATENT OFFICE.

DANIEL BRAND MARSH, OF BLACKHEATH, CANADA.

APPARATUS FOR EXAMINING HEARTS, LUNGS, &c.

SPECIFICATION forming part of Letters Patent No. 592,154, dated October 19, 1897.

Application filed September 14, 1896. Serial No. 605,703. (No model.)

To l whom it may concern:

Bknown that I, DANIEL BRAND MARSH, clerman, a citizen of the Dominion of Canadaiding at Blackheath, in the county of Weorth, in the Province of Ontario, Domiof Canada, have invented certain new andeful Improvements in Apparatus for Exaning the Condition of the Heart, Lungs, &c.; d I do hereby declare that the following i full, clear, and exact description of the estruction and operations of the same.

Thnvention relates to a very useful, handffective, and sensitive instrument for testinhe condition of the lungs, heart, &c., whichan be done conveniently and correctlyithout removing the clothing of the personperated upon.

Thevention consists in a circular metallic disk pn on the outside and the interior sauceraped on the bottom, and provided with a eaded margin. A diaphragm of thin sheet gta-percha, mica, or equivalent material iut to the shape of the disk and laid thereond fastened thereto by a screw-bezel. A hole nade through the center of the disk to receia small pendant, which is hollowed out in tinner side to complete the saucer shape one disk. To the under side of the disk is swed a thin steel plate which serves as a viltor, also to hold a small saucer-shaped ita corresponding to the saucer completby the pendant when applied to the diskThe purpose of the plate is to receive viltions from the diaphragm, the said saucer-pe being fastened to the vibrator, and throg the vibrations from the inside of the saucelate toward the inside of the correspondinone on the disk, and being conveyed by ubber tube to a branch to which two rubbcubes are attached, terminating in ear gutpercha tips for inserting in the ears of thperator.

By refece to the drawings forming part of this specation it will be seen that Figure 1 represena side view of the instrument. Fig. 2 repents a plan or top view of the disk with phragm removed. Fig. 3 represents a plaiew of the diaphragm detached. Fig. 4 repents an edge view of the diaphragm dehed from the disk. Fig. 5 represents a ilar view of the diaphragm, showing its m in cross-section when secured on the disk. Fig. 6 represents a side view of the localizer, detached. Fig. 7 represents the localizer attached to the diaphragm on the disk. Fig. 8 represents a side elevation of the pendant detached from the under side of the disk. Fig. 9 represents a plan or top view of the vibrator and small saucer-shaped plate attached thereto.

A represents a metallic disk, which may be of brass or other metal, having an opening *b* in its central portion, and its interior bottom hollowed out or slightly concaved toward the central opening *b*, as shown in Fig. 1. The outer top edge of the disk A is beveled outward at *a*, so that when the diaphragm B, which is laid level upon it, becomes slightly raised toward the center the circular-threaded bezel-ring *x* is screwed down upon it.

C is a small tube pendant enlarged at its upper end, concaved to complete the concavity of the disk and made to be inserted and fit into the bottom opening *b* of the said disk, and, when in that position, a rubber tube D is attached to it, and a branch E inserted in the said tube D, into the arms of which two rubber tubes D′ D″ are secured, the bottoms of the tubes having ear-tips *e e* attached. I employ a diaphragm, as at B, Fig. 4, having a central circular projection F for holding a projecting localizer *g*, (shown detached at Fig. 6,) which is made of solid gutta-percha or ebony, is threaded at its small end, and screwed into the said diaphragm prepared for it, and is for the purpose of making more specific examinations.

h is a thin vibrating plate secured to the interior of the disk by a small pin or screw *i*. On the outer end of the said vibrator is attached a small convex plate *j*, which is made to hang over the concave opening in the pendant C. The vibrator *h* receives the vibrations from the diaphragm B and the convex-shaped plate *j* throws the vibrations to a focus in the center of the pendant C, and thence are transmitted to the ears of the operator by the tubes D D′ D″.

The operation of the apparatus in practice is as follows: In examining a patient for a general examination the first thing the operator does is to place the ear-tips *e e* of the rubber tubes in his ears, the instrument provided with diaphragm B, Fig. 5, is placed over the

supposed affected portion of the body without removing the clothing, then the pendant C is placed in the opening *b* of the disk A, the rubber tubes being attached thereto, when the action of the heart and lungs or stomach can be distinctly heard by the operator. The loudness of the beats of the heart and respiration of the lungs can be easily heard, affording a physician the opportunity of learning the condition of the heart, lungs, and stomach to some extent, or any inflamed portion of the body. For a more specific examination, say of the lungs or the heart, and to localize any particular diseased portion, the localizer *g* is attached to the diaphragm, and the large end of said localizer is placed over the supposed seat of trouble or derangement and is moved from place to place until the diseased portion is found, which is determined by the sounds indicated through the ear-tubes.

Having thus described my device and its advantages, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with the disk A the vibrating plate *h*, attached to the inner surface of the disk, and to its outer end is secured a convex-shaped plate *j*, to transmit and focus vibrations from the diaphragm B to the pendant and ear-tips, substantially as specified.

2. In an apparatus for examining the hrt and lungs, a metallic disk, having a ceral opening, and a vibrating diaphragm deh-ably fastened to said disk, in combinon with a plate-spring fastened at one end the said disk and at the other end in contacth the center of the inner side of the diaphm, a convex plate attached to the said spr; at this central point and presenting its concity inward and a tube leading from the oping of the said disk and provided with brahes which are adapted to be applied to thars substantially as set forth.

3. In a stethoscope a convex plate *j*, iombination with a vibrating diaphragwith which it moves, a concave disk to wh the said diaphragm is attached, and a te extending from said disk, the concavele of the said plate *j* being arranged over t outlet-opening of the said disk and serig to transmit sound more perfectly throu the said tube substantially as set forth.

Dated at Hamilton, Ontario, Cana, this 15th day of August, A. D. 1896.

DANIEL BRAND MASH.

In presence of—
W. G. THOMPSON,
WM. BRUCE.