

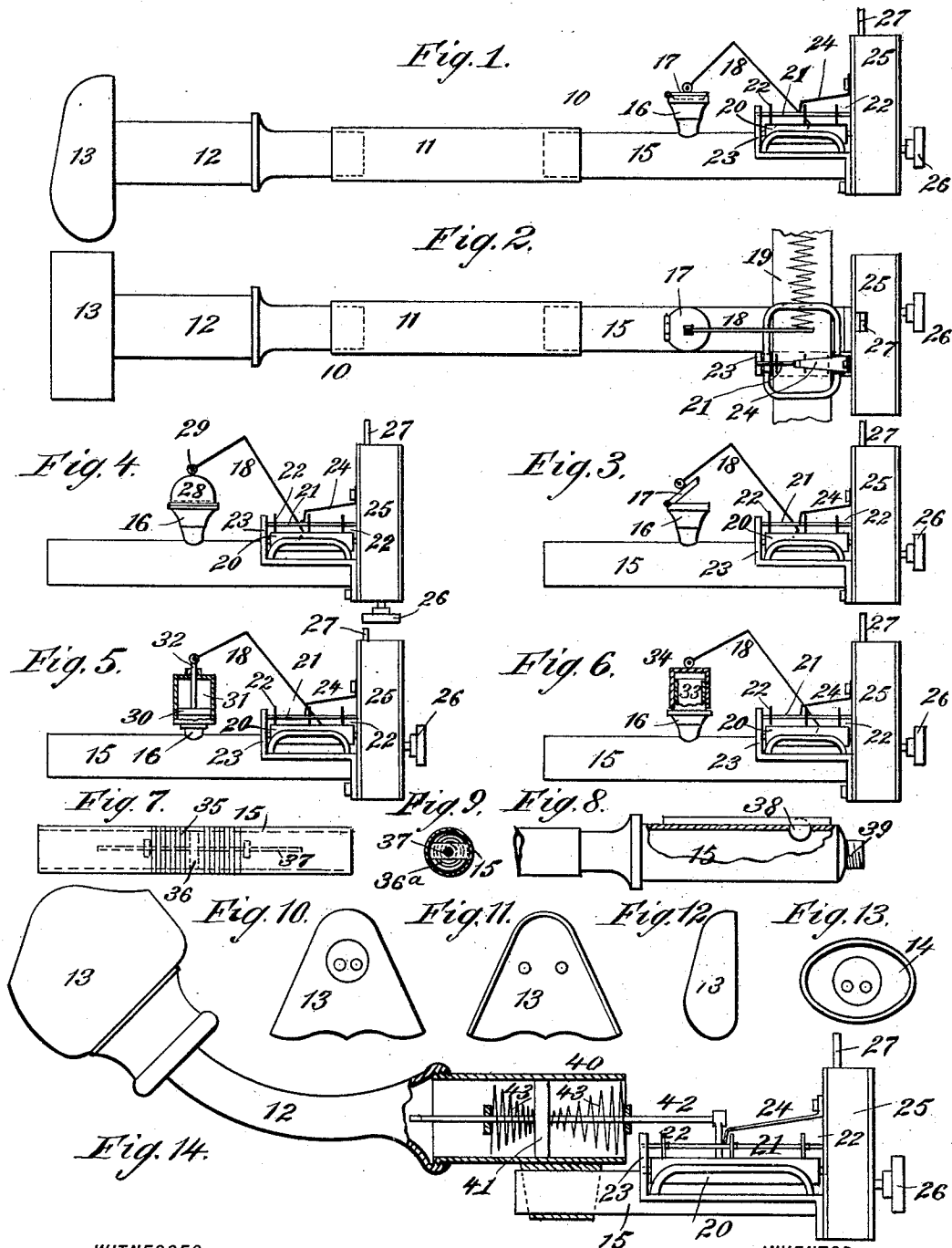
(No Model.)

K. M. TATA.

APPARATUS FOR RECORDING THE RESPIRATIONS OF THE BODY.

No. 408,938.

Patented Aug. 13, 1889.



WITNESSES:

Down Twitchell
to Sedgwick

INVENTOR:

K. M. Tata

BY

Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

KHURSEDJI MANEKJI TATA, OF NAVSARI, NEAR BOMBAY, INDIA.

APPARATUS FOR RECORDING THE RESPIRATIONS OF THE BODY.

SPECIFICATION forming part of Letters Patent No. 408,938, dated August 13, 1889.

Application filed October 16, 1888. Serial No. 288,226. (No model.) Patented in England July 3, 1888, No. 9,680.

To all whom it may concern:

Be it known that I, KHURSEDJI MANEKJI TATA, of Navsari, near Bombay, India, have invented a new and Improved Apparatus for

5 Indicating and Recording the Respirations of the Body, of which the following is a full, clear, and exact description, and which has been patented in England, numbered 9,680, and dated July 3, 1888.

10 My invention relates to an improvement in apparatus for indicating the respirations of the body, and has for its object to accomplish this result in a simple and effective manner—namely, by placing one end of a tube over the

15 nose or mouth of the person whose respirations are to be measured or recorded, the other end of the said tube being provided with a valve so constructed as to be susceptible to slight movements of the air, or with

20 a membranous or other diaphragm, or with any other substance or body to which light breathing will impart motion. This valve, diaphragm, or other body is provided with a needle or pointer for the purpose of indicating, measuring, or recording the number or

25 strength of the respirations.

The invention will be hereinafter described in connection with the drawings, and specifically pointed out in the claims.

30 Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the instrument, illustrating the valve closed. Fig. 2 is a plan view of the same, with the upper or pressure roller removed. Fig. 3 is a partial side elevation illustrating the valve as open and the needle in operation. Figs. 4, 5, and

40 6 are side elevations of modified forms of the instrument, Figs. 5 and 6 being partially in section. Figs. 7 and 8 are side elevations of further modifications, Fig. 8 being represented as partially broken away; and Fig. 9 is a transverse section of Fig. 7. Figs. 10, 11, and 12 are respectively back, front, and side views of the nose-piece. Fig. 13 is a front elevation of a mouth-piece; and Fig. 14 is a partial side elevation, in section, of a further modification.

50 In carrying out the invention the tube 10

may be made in one or more parts and of any suitable shape or material.

In Figs. 1, 2, 3, 4, 5, and 6 the tube consists of a central section 11 of india-rubber or other elastic material, one widened end section 12 constructed of papier-maché, caoutchouc, or similar substance not cold to the touch, provided with a nose-piece 13, preferably screwed thereon, so that it may be removed and a mouth-piece 14 substituted 60 when required, one form of which is illustrated in Fig. 13. The other end section 15, attached to the intermediate section 11, is constructed, preferably, of metal, and from the upper surface of the metal section a short 65 tube 16 is projected, provided with a hinged gravity cover or valve 17, adapted to rest upon a suitable seat.

When the instrument is in position for use, the tube 10 will be horizontal and the tube 70 16 vertical, as shown, in order that the weight of the valve 17 will keep it closed until the breath of the patient acts upon the under side to open the same, as best shown in Fig. 3.

75 The central elastic tube 11 is usually attached by simply stretching it over the ends of the sections 12 and 15 in the ordinary manner; or suitable screw-collars may be fitted upon its ends and screwed over or into the 80 ends of the sections 12 and 15, which are provided with screw-threads for this purpose, if desired, the different parts of the tube being so made that the tube may be shortened when necessary.

85 The valve 17 carries a bent or angled needle 18, loosely pivoted thereto, the end of which is adapted to puncture small holes in a traveling strip of paper 19; or the end of the needle may be so blunted as to trace a 90 line upon the traveling paper, which is previously smoked, or otherwise prepared, so as to show delicate tracings thereon, as best shown in Fig. 2. As the valve opens and closes, the end of the needle will travel across 95 the width of the paper while the paper is traveling longitudinally under the needle, so that an irregular line will be traced upon the paper, as is also illustrated in Fig. 2.

The paper 19 passes between a roller 20 100

and a spindle 21, carrying two pressure-rollers 22, which spindle and roller are journaled in suitable vertical bearings 23, attached to the upper face of the tube-section 15 at or near the outer end.

The spindle may constitute a friction-roller itself, if desired, and the said spindle or roller is retained in contact with the lower roller 20 by a spring 24, secured at one end to a case 25, the said case being rigidly fastened to the outer end of the tube-section 15.

The case 25 is adapted to carry the mechanism for revolving the lower roller 20. The mechanism constitutes no part of my invention, and ordinarily consists simply of a train of wheels and a mainspring attached to any suitable winding apparatus 26, and provided with a stop 27 of any approved construction.

The paper 19 is made of just sufficient length to pass through the rollers in a given time—for example, one minute—or a length of paper may be used with divisions thereon corresponding with the time it will take to pass through the rollers—for instance, in one minute or half-minute divisions. By this means the apparatus may be in use for any length of time, and the respirations in one minute compared with those of any other minute, and so on.

Where it is not required to take a tracing of the respirations the apparatus may be constructed without the mechanism and tracing-needle, or the mechanism and tracing-needle may be detached, by unscrewing or otherwise parting them from the case 25, and the valve-seating be of some resonant material, and the valve provided with an abutting pin, so that a sound will be emitted each time the valve falls. Thus the eyes of the physician or other person may be fixed upon a watch or clock.

The above-described apparatus is suitable for indicating the number of expirations in any given time, and their strength may be determined by the distance the tracing shows the needle to have traveled transversely; but since the valve falls by its own weight no indication of the inspirations will be given.

The form of instrument illustrated in Fig. 4 is designed to indicate both the expirations and inspirations. The tube 16 in this event is closed by means of a bag-shaped diaphragm 28 of any suitable material, which will be alternately blown out and drawn into the tube 16. This diaphragm has a needle 29, passing vertically through its center, to which the bent or angled tracing-needle 18 is loosely pivoted. In using this form of the invention it is advisable to place the apparatus so that the tube 16 will be horizontal, and to this end the winding device 26 is located so that the case 25 may stand upon its side when desired.

In the modification illustrated in Fig. 5 the valve is substituted by a piston 30, sliding within a cylinder 31, the tracing-needle being attached to the piston-rod 32.

In Fig. 6 the valve or diaphragm is replaced

by an open cylinder 33, provided with a sliding cap or cover 34, to which the tracing-needle 18 is secured.

Figs. 7 and 9 illustrate a simple and cheap form of my invention, in which the recording mechanism is dispensed with. In this modification the tube 15 is formed of glass and provided with any number of graduated rings 35, formed therein or thereon. A circular diaphragm 36 is held to travel in the tube, and a needle 37 is passed through the diaphragm and fixed thereto, the said needle being held to reciprocate in suitable bearings. A volute spiral spring 36^a is secured to each side of the diaphragm coiled around the needle, and the outer ends of the springs are confined by the needle-bearings. The longitudinal travel of the needle within the tube 15 as it is alternately blown out and drawn in by the respirations will indicate the strength of the same, and their number may be readily counted as the diaphragm strikes the needle-bearings, the strength being indicated, if the diaphragm does not strike the bearing, by the registration of the diaphragm with the several rings.

In the form illustrated in Fig. 8 it will be observed that a thermometer 38 is placed within the tube 15, its bulb being in contact with the air inside said tube, so that the temperature of the breath may be read off from the outside of the tube. The thermometer may, however, be placed in any suitable part of the tube through which the breath passes, and may or may not be used, as found desirable. The tube is illustrated as provided with a screw-head 39, onto which the nose or mouth piece 13 and 14 may be secured.

Figs. 10, 11, and 12 illustrate, respectively, back, front, and side views of a preferred form of nose-piece; and Fig. 13 illustrates a front view of a suitable mouth-piece for use with the instrument. The nose-piece 13 and the mouth-piece 14 are constructed to fit over the nose or mouth, and are provided with apertures to establish communication between the said pieces and the end section 12. A pencil-point may be attached to the end of the indicating-needle and made to trace upon the traveling paper, in lieu of using the specially-prepared paper hereinbefore described.

In Fig. 14 I have illustrated another modification in which the recording mechanism is used in connection with the form of device shown in Fig. 7. The central section 40 is of metal and provided with a diaphragm 41, having a needle 42 passing through its center and attached thereto. The needle is held to slide in suitable bearings produced in the section, and the needle is made of sufficient length to project beyond the ends of the section, and between the needle-bearings and the diaphragm a volute spiral spring 43 is coiled around the needle. The mouth or nose piece section 12 is screwed upon one end of section 40, and the section 15, having the paper-carrying mechanism attached, is inserted in a

sleeve integral with the under side of the central section 40. The outer end of the needle reciprocating over the roller 20 is provided with a marking-arm adapted to travel over the recording-strip when said strip is placed in position upon said roller.

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

1. An instrument for indicating and recording the respirations of the body, comprising a tube provided with a mouth or nose piece, a vibratory body connected to the tube and adapted to be operated by the breath of the patient, a needle connected to and operated by the said vibratory body, and a strip of paper traveling under the end of the needle, substantially as described.

2. An instrument for indicating and recording the respirations of the body, comprising a tube provided with a mouth or nose piece, a vibratory body connected to the tube adapted to be operated by the breath of the patient, a needle connected to the vibratory body and operated thereby, a strip of paper under the end of the needle, and rollers between which the strip of paper travels, substantially as described.

3. An instrument for indicating the respirations of the body, comprising a tube provided with a mouth-piece, a needle held to slide in bearings in the tube, a diaphragm se-

cured to the needle, and springs surrounding the needle on opposite sides of the diaphragm, substantially as herein shown and described.

4. An instrument for indicating and recording the respirations of the body, comprising a tube having a mouth or nose piece, a needle sliding in bearings in the tube and projecting from one end of the same, a diaphragm secured on the needle, springs on opposite sides of the diaphragm and surrounding the needle, and paper-feeding mechanism arranged for feeding a strip of paper under the end of the needle, substantially as described.

5. In an instrument for indicating and recording the respirations of the body, the tube 40, having the mouth or nose section 12 attached thereto, the needle 42, sliding in bearings in the tube 40, the diaphragm 41, secured on the needle, and the springs 43 on opposite sides of the diaphragm, in combination with the section 15, secured to the tube 40, the paper-feeding rollers 20 and 22, mounted on the said section 15, and the spring 24, for holding the upper roller in contact with the lower roller, substantially as herein shown and described.

KHURSEDJI MANEKJI TATA.

Witnesses:

G. F. WARREN,

Notary Public, London, England.

WALTER J. SKERTEN,

17 Gracechurch Street, London.