

(Model.)

T. A. EDISON.  
PHONOGRAPH RECORDER.

No. 394,105.

Patented Dec. 4, 1888.

FIG. 1.

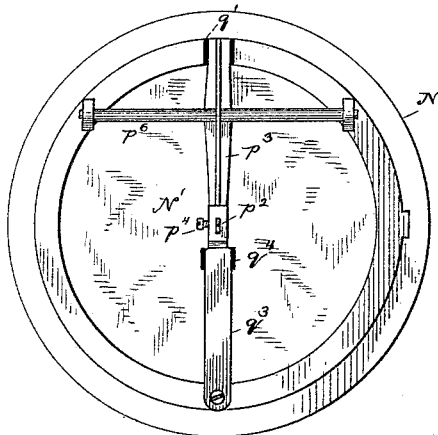
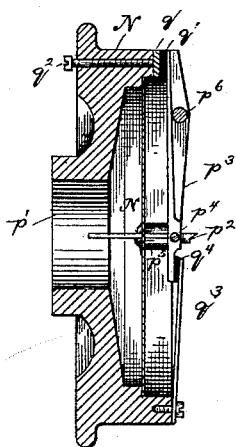


FIG. 2.



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# UNITED STATES PATENT OFFICE.

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## PHONOGRAPH-RECORDER.

SPECIFICATION forming part of Letters Patent No. 394,105, dated December 4, 1888.

Original application filed November 26, 1887, Serial No. 256,189. Divided and this application filed March 2, 1888. Serial No. 265,887. (Model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonograph-Recorders, (Case No. 760, division of Case No. 741,) of which the following is a specification.

The object I have in view is to produce an efficient recording instrument for phonographs; and my invention consists in the several novel features and combinations, as fully hereinafter explained, and pointed out by the claims.

In the accompanying drawings, forming a part hereof, Figure 1 is a bottom or rear view of the recorder on an enlarged scale, and Fig. 2 a sectional view of the same.

N is a metal plate forming the body of the recorder. It has an opening,  $p'$ , passing centrally through it, to which the speaking-tube of the phonograph is applied. The back of the plate N is recessed to form a circular chamber, on a shoulder in which is placed the diaphragm  $N'$ , which is preferably made of celluloid or some other light material, and is placed in the recess at the back of the plate N, but is left free at its edges. The recording-point  $p^2$  is secured to the center of the diaphragm by wax or in any other suitable way. This point is constructed of a thin plate of steel, which is cut or ground to a point on one edge, and is beveled backwardly away from that edge, so as to give a support for the indenting-point and prevent vibration of that point in operation. This point passes through the end of the lever  $p^3$ , and is secured therein by a set-screw,  $p^4$ , the point being surrounded between the lever and the diaphragm by a small tube,  $p^5$ , of rubber or other suitable material. The lever  $p^3$  is rigid in its construction, and is mounted upon a cross-pin,  $p^6$ , of considerable length, which is journaled at its ends at the sides of the plate N. The lever  $p^3$  extends beyond the pivoting-pin  $p^6$ , and rests at its outer end against a block,  $q$ , which is faced with a piece of pure india-rubber,  $q'$ . This block is set in a recess in the edge of the plate N, and is adjusted forward by a screw,  $q^2$ . The adjustable block  $q$  and its elastic face

$q'$  form a yielding limiting-stop for the movement of the indenting-point. The other end of the lever  $p^3$  extends beyond the indenting-point  $p^2$ , and receives inward pressure from a spring,  $q^3$ , which is secured to the rim of the plate N, opposite to the block  $q$ , and presses the lever  $p^3$  and the indenting-point inwardly, so as to give the center of the diaphragm a slight inward bend, producing an initial strain upon the diaphragm. Between the end of the spring  $q^3$  and the lever  $p^3$  a piece of india-rubber,  $q^4$ , is placed. The lever  $p^3$ , being rigid in its construction and in its support by the long bearing, prevents any vibration of the indenting-point, while the adjustable limiting-stop formed by the block  $q$  and rubber  $q'$  limits the movement of the diaphragm to a small compass.

This construction of recorder I have found exceedingly effective in use. The diaphragm is highly sensitive and responds accurately to speech-vibrations. The movement of the indenting-point is quite free within exceedingly small limits, but the resistance to its movement increases enormously as the extent of the movement is increased; hence the importance of the fundamental tones in the operation of the instrument is reduced, while the hissing tones, which produce movements of a small extent, are given an undue importance in the record. This makes the reproduced sound clear and intelligible, since the hissing sounds are brought out clearly and can be distinguished from the scraping noises of the instrument.

It will be observed that the diaphragm is under constant tension, and can have no movement at all except that which is permitted by the elasticity of the yielding limiting-stop  $q'$ . Heretofore the diaphragm of the phonograph-recorder and the indenting-point have not been limited in their forward movement except by the capacity of the diaphragm for vibration. This has permitted strong waves, owing to great momentum and the small amount of energy stored up as a retracting force, to give abnormal and untruthful vibrations to the diaphragm. With my present recorder the diaphragm does not force the lever forward into space, but compresses

matter always in contact—viz., the rubber  $q'$ ; hence nearly all the work is stored up in the compression of  $q'$  to effect the return movement, and the momentum becoming a small factor compared to the power stored up, the diaphragm is not given untruthful vibrations. This principle of construction of the recorder I have termed a "closed" or "constrained" system of movement as distinguished from the open or free system of movement heretofore employed.

What I claim is—

1. A phonograph-recorder having, in combination, a diaphragm, an indenting-point secured to the center of said diaphragm, a rigid lever and spring acting to force the point back against the diaphragm, and a yielding limit-stop limiting the outward movement of the diaphragm, substantially as set forth.

2. A phonograph-recorder having, in combination, a diaphragm, an indenting-point moved by such diaphragm, and a limiting-stop limiting the outward movement of the diaphragm and indenting-point, substantially as set forth.

3. A phonograph-recorder having, in combination, a diaphragm, an indenting-point moved by such diaphragm, and a yielding limiting-stop limiting the outward movement of the diaphragm and indenting-point, substantially as set forth.

4. A phonograph-recorder having, in combination, a diaphragm, an indenting-point moved by such diaphragm, and an adjustable limiting-stop limiting the outward movement of the diaphragm and indenting-point, substantially as set forth.

5. A phonograph-recorder having, in combination, a diaphragm with free edges, an indenting-point secured to the center of the diaphragm, a rigidly-constructed pivoted lever connected with said indenting-point at one end and resting against an adjustable yielding limit-stop at the other end, and a spring pressing the lever inwardly, so as to put the diaphragm under an initial strain, substantially as set forth.

6. A phonograph-recorder having, in combination, a diaphragm, an indenting-point moved by the diaphragm, a rigidly-constructed lever carrying such indenting-point, and a long pivotal bearing for such lever, substantially as set forth.

This specification signed and witnessed this 20th day of February, 1888.

THOS. A. EDISON.

Witnesses:

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