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, in the State of New Jersey, have invented a certain new and useful Improvement in Phonograph-Recorders, (Case No. 789,) of which the following is a specification.

In experimenting with my phonograph I have discovered that imperfections are produced in the record made by the machine by reason of the momentum of the recording-diaphragm and attached parts; also by reason of lost motion when the recording-point is mounted on a pivoted lever, as I prefer to mount it, and also by reason of the straining of the diaphragm, due to the attachment of the recording-point to such diaphragm, and due to the differences in the directions of movement of the recording-point and the diaphragm. These imperfections in the record become audible, as scratching and other foreign noises, when the sounds are reproduced.

The object I have in view is to overcome these defects in phonograph-recorders, with the results of making the reproduced sounds more clear, and also permitting the employment of a more sensitive reproducer.

In constructing my phonograph recorder I make a positive connection between the diaphragm and the recording-point, so that there will be no loss of movement in communicating the vibrations of the diaphragm to the recording-point. The recording-point is mounted upon a rigid lever or arm which takes the lateral thrust of the recording-point and relieves the diaphragm from the strain due to said thrust. This rigid carrying-lever is also preferably a short lever, and is mounted to turn in bearings, so that the movement of the recording-point will be oblique to the recording-surface for the purpose of making the recording-waves more abrupt at one end than at the other.

In the preferred construction of my phonograph-recorder the lever carrying the recording-point is pivoted, as just stated, one or more of the pivotal bearings being friction bearings having a considerable pressure exerted upon them, so that the movements of the lever, the recording-point, and the diaphragm will be retarded by the friction bearings, thus overcoming the momentum of the parts. The lever is also made extremely light by making it from a thin plate, it having sufficient width to give the desired rigidity which is required to take the lateral thrust of the recording-point. The friction at the bearings of the pivotal lever is preferably obtained by means of a spring placed under tension, and this spring tension is also preferably adjustable, so that the requisite amount of pressure can be obtained. The pressure of the spring on the bearings of the lever also serves to take up any lost motion. To prevent the positive attachment of the indenting point with the diaphragm from straining the diaphragm, I make the connection one which is capable of yielding in the direction of the length of the carrying-lever. This connection is preferably a 70 link pivoted to the lever, as well as to a block, cemented or otherwise secured to the diaphragm. Where the recording point is supported directly from the diaphragm, no supporting lever or arm being employed, the retardation necessary to overcome the momentum may be produced by means of friction-springs which embrace the recording-point bearing against its opposite sides. This way of applying the friction may also be used when the recording-point is mounted upon an arm or lever. Instead of employing friction-springs for producing the retardation a dashpot may be employed for the purpose. It will be seen that all these retarding devices are non-resilient and constant in their action and do not change the character of the vibrations of the diaphragm, which are given it by the sound-waves, but only serve to retard the movement and thus to overcome the momentum. The elastic or resilient damping devices that have heretofore been used with diaphragms of phonographic apparatus produce quite a different effect from the non-resilient retarding devices, since by reason of their resilience they change the character of the diaphragm vibrations and produce false movements which serve to injure rather than improve the character of the record.

In the accompanying drawings, forming a part hereof, Figure 1 is a vertical section of the preferred form of my recorder. Fig. 2 is a bottom view of the same. Fig. 3 is a vertical section of the recorder, showing a modifi-
The text is a detailed description of a recording device, specifically a friction instrument designed to record movements. It includes descriptions of the components, their functions, and the mechanical principles behind their operation. The text is technical and detailed, focusing on the design and operation of the device, including the movement of the lever, the frictional forces involved, and the recording mechanism. The device seems to be a sophisticated mechanical instrument, likely used for scientific or industrial measurement purposes. The references to specific figures (e.g., Figs. 1, 2, 3, 4, 5, 6) suggest that this is part of a larger set of instructions or specifications, possibly from a technical manual or patent. The text is clear and structured, typical of engineering or scientific documentation.
What I claim as my invention is—
1. In phonograph-recorders, the combination, with the diaphragm, of the recording-point connected therewith, and a non-resilient retarding device for overcoming the momentum of the diaphragm and attached parts by constantly retarding the movement in both directions, substantially as set forth.

2. In phonograph-recorders, the combination, with the diaphragm, of the recording-point attached thereto, a lever or arm by which said recording-point is carried, and a non-resilient retarding device for overcoming the momentum of the diaphragm and attached parts by constantly retarding the movement in both directions, substantially as set forth.

3. In phonograph-recorders, the combination, with the diaphragm, of the recording-point connected thereto, and a pivoted lever carrying such recording-point and having one or more friction bearings, substantially as set forth.

4. In phonograph-recorders, the combination, with the diaphragm, of the recording-point connected thereto, a pivoted lever carrying said recording-point, and a spring producing friction at the bearings of the lever and taking up the lost motion, substantially as set forth.

5. In phonograph-recorders, the combination, with the diaphragm, of the recording-point connected thereto, a pivoted lever carrying the recording-point, and an adjustable spring-friction exerted upon said lever, substantially as set forth.

6. In phonograph-recorders, the combination, with the diaphragm, of the recording-point, a lever or arm carrying such recording-point, and a positive connection between the recording-point and the diaphragm, such connection being constructed to yield in the direction of the length of the carrying lever, substantially as set forth.

7. In phonograph-recorders, the combination, with the diaphragm, of the pivoted lever carrying the recording-point, and the link connecting such lever with the diaphragm and pivoted at both ends, substantially as set forth.

This specification signed and witnessed this 14th day of July, 1888.

THOS. A. EDISON.

Witnesses:

WILLIAM PELZER,
A. W. KIDDE.