

(No Model.)

J. H. WHITE.
PHONOGRAPH.

No. 440,524.

Patented Nov. 11, 1890.

Fig. 2.

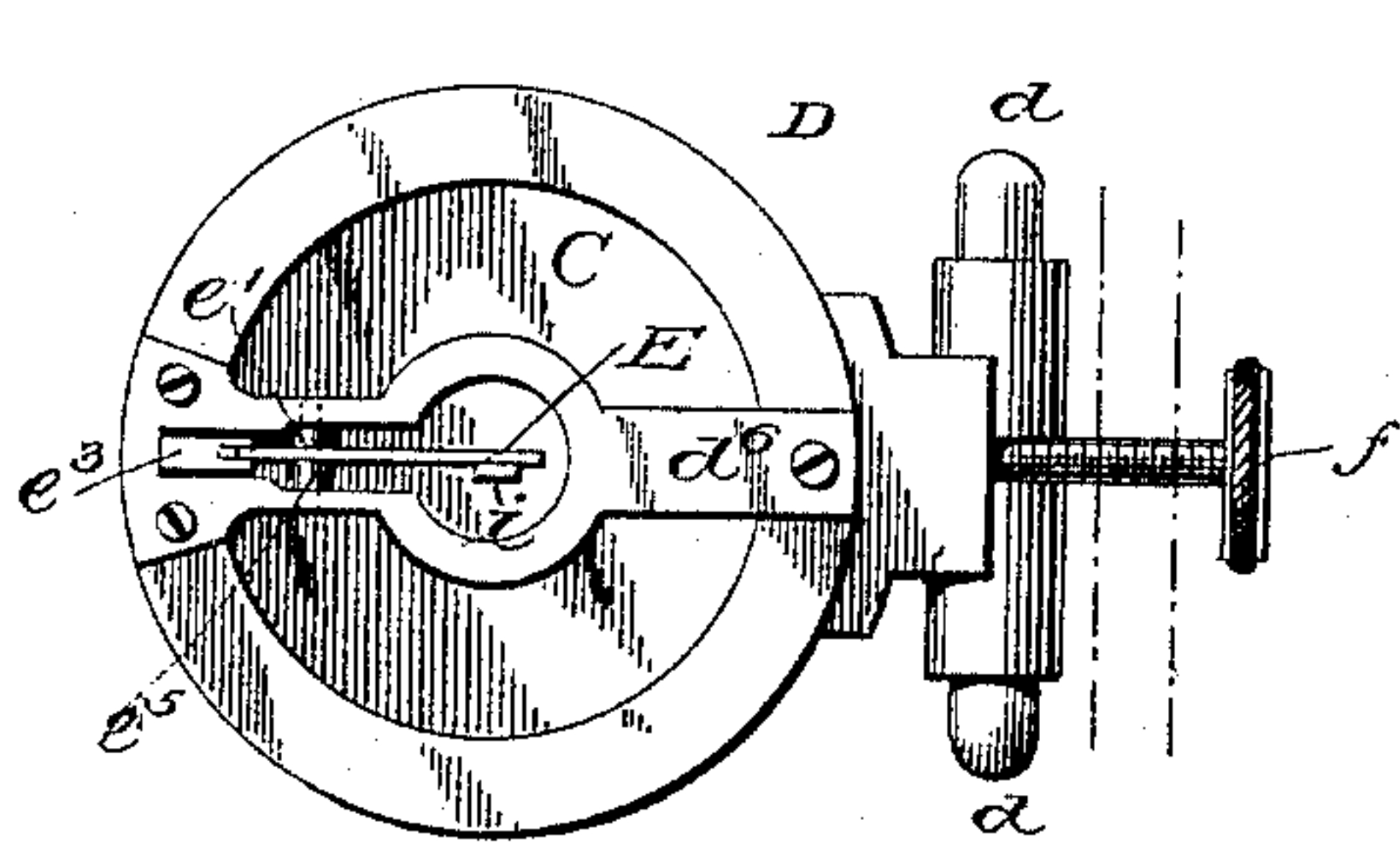


Fig. 1.

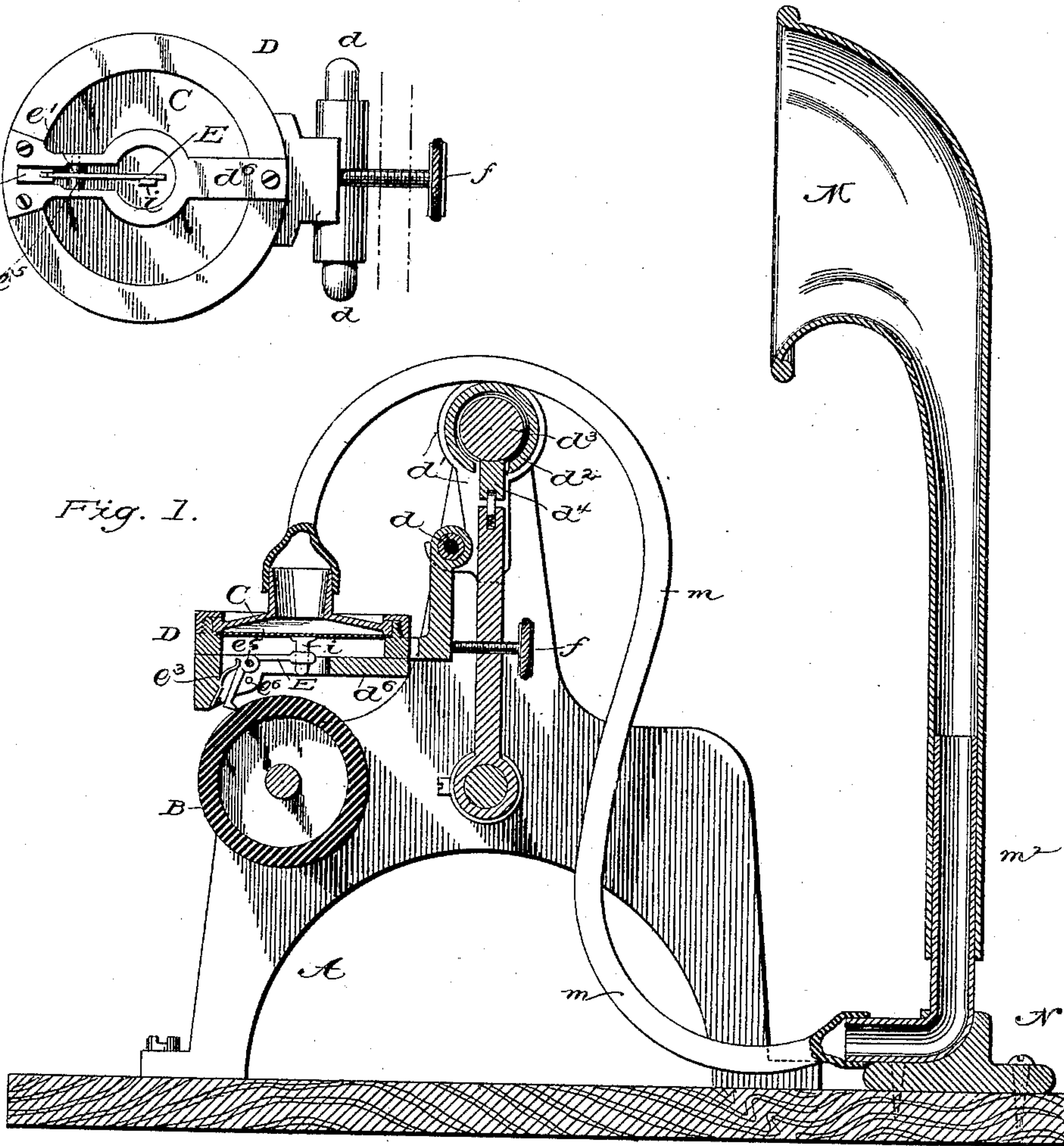


Fig. 3.

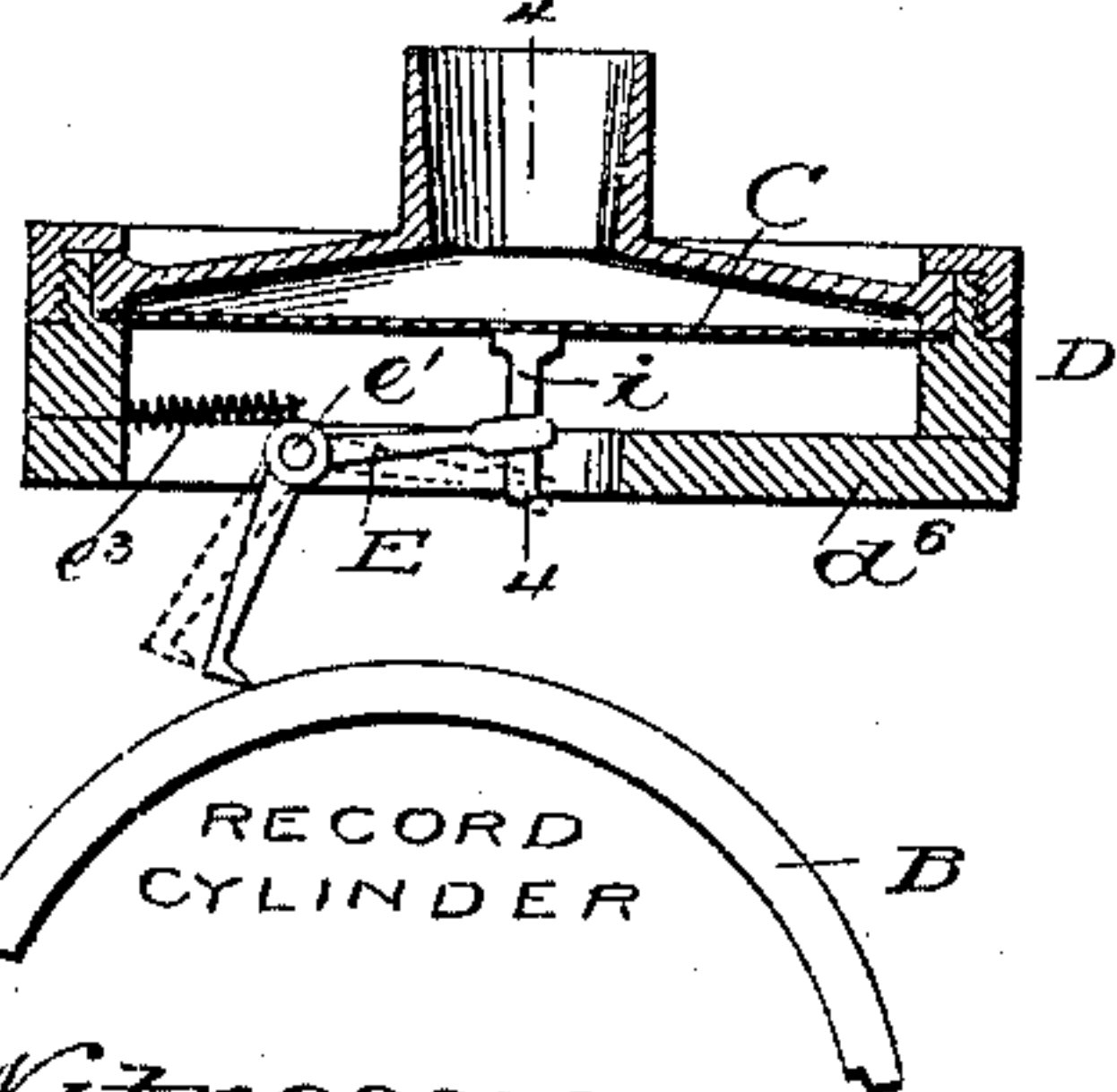


Fig. 4.
on line 4-4

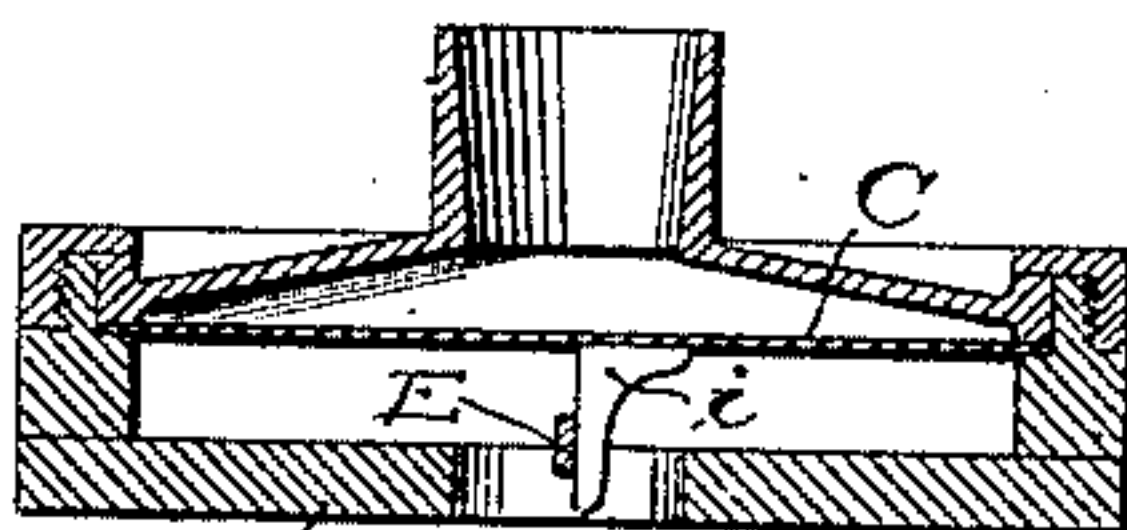


Fig. 5.

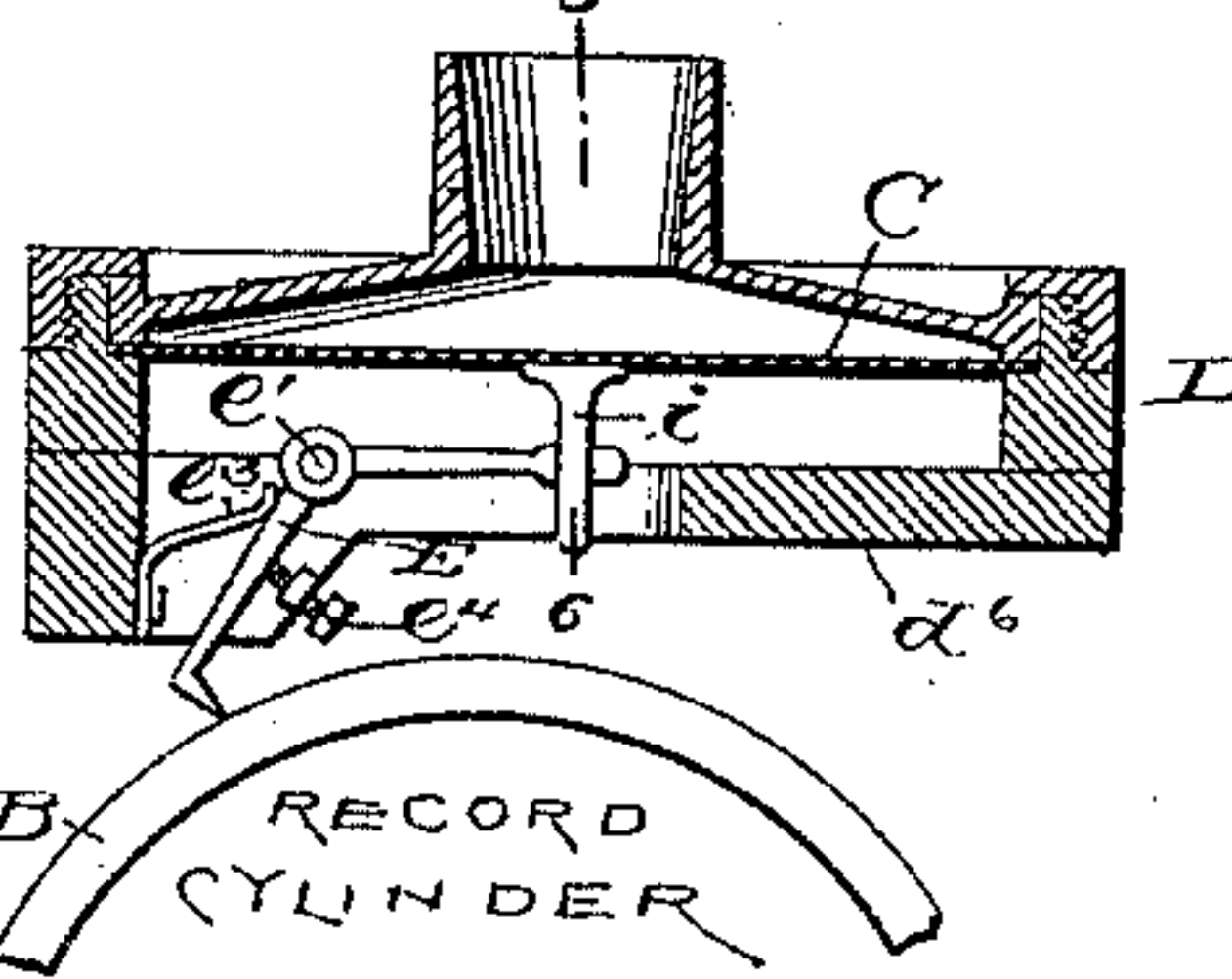


Fig. 6.
on line 6-6

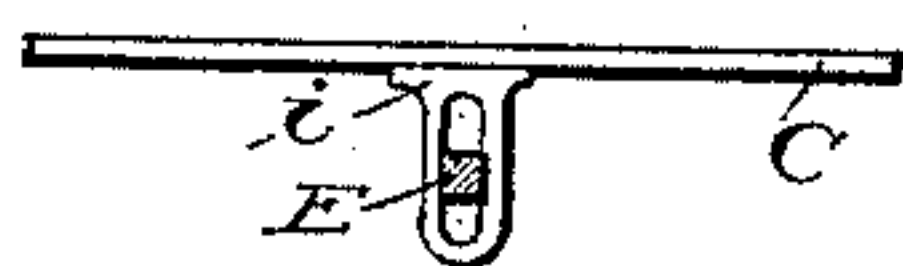


Fig. 7.

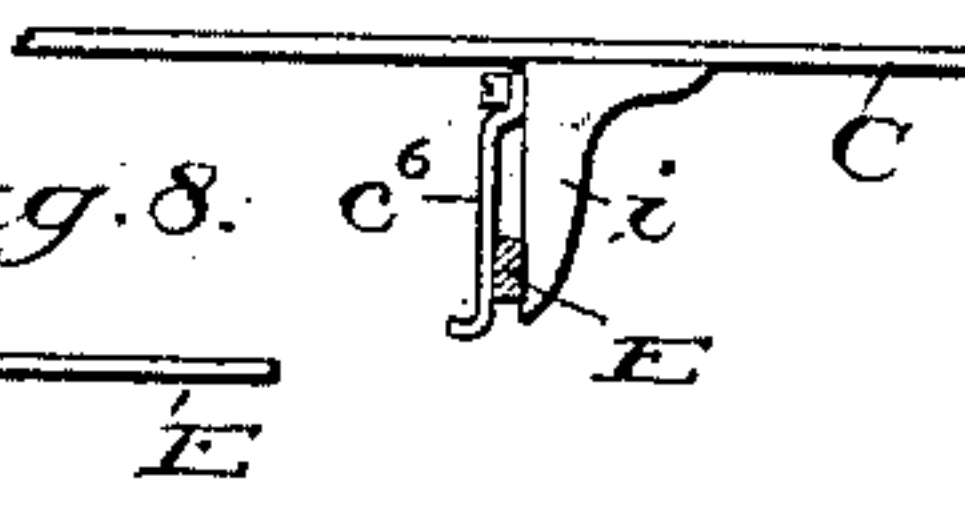
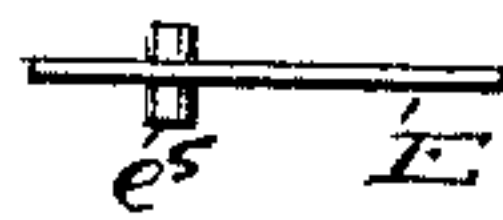


Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN H. WHITE, OF WASHINGTON, DISTRICT OF COLUMBIA.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 440,524, dated November 11, 1890.

Original application filed June 19, 1889, Serial No. 314,813. Divided and this application filed January 3, 1890, Serial No. 335,793.
(No model.)

To all whom it may concern:

Be it known that I, JOHN H. WHITE, of Washington, in the District of Columbia, have invented certain Improvements in Phonographs, of which the following is a specification, the same being a division of an application for Letters Patent for improvements in phonographs, filed by me June 19, 1889, Serial No. 314,813.

My invention relates to that class of instruments in which the sounds are reproduced by a diaphragm actuated by a style which traverses a record-groove in the surface of a cylinder or sheet.

The invention relates to the connection between the reproducing diaphragm and the pivoted arm or style through which it is actuated by the record-sheet.

My object is to overcome those difficulties which are experienced by the reason of the style and diaphragm being moved abnormal distances by extreme irregularities in the record.

The improvement consists, broadly, in so connecting the lever or other style-carrier that it will impart motion to the diaphragm solely by frictional contact between the parts. In the preferred form of apparatus the diaphragm is provided with a central stud or arm, against the side of which the operating-lever acts frictionally, the parts being so adjusted that, although they move together under ordinary conditions, they may move independently when either of the parts receives an impulse of such strength or suddenness as to overcome frictional engagement. This feature of my invention is susceptible of embodiment in various equivalent forms, a number of which are illustrated in the drawings.

With the exception of the parts specifically claimed herein, the instrument may be of any approved form—such, for example, as that shown in my application for patent, April 9, 1889, Serial No. 306,497. I have therefore illustrated in the drawings only such parts as are necessary to an understanding of my improvements.

In the accompanying drawings, Figure 1 is a vertical cross-section through a phonograph having my improvement incorporated therein. Fig. 2 is a bottom plan view of the diaphragm-

frame and attendant parts. Fig. 3 is a cross-section through my reproducing device in another form. Fig. 4 is a cross-section on the line 4 4 of Fig. 3. Fig. 5 is a section showing the device in still another form. Fig. 6 is a section on the line 6 6 of Fig. 5. Fig. 7 is a view showing another form of the frictional connection. Fig. 8 is a bottom plan view of the reproducing style or lever.

Referring to the drawings, A represents the frame of the machine; B, the grooved record-cylinder, which is mounted and rotated within the frame in the ordinary manner; C, the reproducing-diaphragm, peripherally sustained in a supporting-frame D, which latter is connected by the horizontal journals or trunnions d to a carriage d' , arranged to slide on a horizontal guide d^2 . The movement of the carriage is effected by the feed-screw d^3 , located within the tubular guide and engaging the nut d^4 on the carriage, whereby the diaphragm and style are caused to traverse the cylinder in the usual manner.

The diaphragm C is constructed of sheet metal or other suitable material fixed rigidly within its sustaining-frame and provided at the center with an arm i , rising perpendicularly therefrom.

E represents the reproducing style or lever, preferably made of angular form, as shown, and mounted midway of its length on a horizontal pivot e' , seated in the diaphragm-frame. One end of this style is adapted to enter and receive motion from the grooved record-cylinder, while the opposite end is arranged to bear directly against the arm on the diaphragm. The pressure and friction between the end of the style and the arm on the diaphragm are such that the arm operated by the cylinder will in turn vibrate the diaphragm in such manner as to faithfully reproduce the recorded sounds, while at the same time the lever and diaphragm are each permitted to move independently of the other when either is subjected to a very sudden and violent strain sufficient to overcome the frictional resistance between the parts. A spring e^3 is commonly attached to the diaphragm-frame and arranged to act on the style, as shown in the drawings, in order to hold the lower end of the lever normally in

contact with the record-cylinder and to insure the restoration of the parts to an operative position after their normal relations have been disturbed. I prefer to mount the style, as shown in Figs. 1 and 2, in a slot or opening in a bar d^6 , screwed to the under side of the diaphragm-frame; but it is to be understood that it may be supported on the said frame in any appropriate manner.

In order to prevent side-play of the style and to maintain it properly in position, I prefer to form it, as shown in Figs. 1, 2, and 8, with a long transverse sleeve or bearing e^5 to receive the supporting-pivot. I recommend, also, the use of a stop to limit the motion of the style and to prevent its end from being driven too deeply into the cylinder. In Fig. 1 this stop consists of a pin e^6 inserted transversely through the style support.

Passing now to Figs. 3 and 4, the diaphragm is mounted and provided with an arm or stud arranged to bear directly against one side of a pivoted style in the same manner as in Figs. 1 and 2. In place, however, of the flat spring shown in the first form of the device, a spiral spring e^3 is employed, one end being connected by the diaphragm-frame and the other attached to the style near its pivot.

In Figs. 5 and 6 the style is formed and pivoted to the diaphragm-frame in essentially the same manner as in the preceding figure; but instead of bearing on one side only against an arm on the diaphragm its upper end is inserted through a divided elastic arm fixed to the diaphragm, (shown in Fig. 6,) the arm embracing and bearing frictionally against both sides of the style. A spring e^3 bears against the style, as in Fig. 1. The motion of the style is limited by an adjustable stop-screw e^4 .

In Fig. 7 is shown a diaphragm provided with a rigid perpendicular arm to bear frictionally against the side of the style, and also provided with a spring-arm e^6 , which acts against the opposite side of the style. In this manner the style is confined subject to a yielding or spring pressure between the arm and the spring.

It will be observed that in each form of my device the connection between the style and the diaphragm is a tubular frictional one, and as such it is to be distinguished on the one hand from rigid or positive connections, and on the other hand from connections made from india-rubber, cork, or other elastic material.

It will of course be understood that the form of the style and the manner of supporting the same may be modified at will, my invention including any style which is connected to the diaphragm through the medium of surfaces and frictional contact.

In order to control the relation of the diaphragm to the cylinder I mount in the traveling carriage which supports the diaphragm-frame a screw f , acting against the diaphragm-frame to limit its descent, and by turning this screw the frame may be raised or lowered at will.

The trumpet shown in the drawings forms no part of the present invention.

Having thus described my invention, what I claim is—

1. In combination with the diaphragm, the actuating style having solely a frictional connection therewith, substantially as described, whereby said parts are caused to move in unison under ordinary conditions, but permitted to move independently in the event of either receiving an excessive or violent movement.

2. The pivoted style, the spring urging the same toward the record-surface, and the diaphragm having the arm connected solely by frictional contact to the style to vibrate the same, said elements combined substantially as described.

3. In a phonograph, the record-surface, in combination with the pivoted style, the stop limiting its motion toward the record-surface, the spring urging the style toward said surface, the diaphragm and the arm on the diaphragm acting frictionally on the style.

4. In a phonograph, and in combination with the pivoted style and the diaphragm, a stud on the diaphragm having two surfaces perpendicular to the diaphragm between which the end of the style is held with a spring-pressure.

5. In combination with the record-cylinder, the traveling carriage, and the guide for said carriage, the diaphragm-sustaining frame hinged to the carriage, and an intermediate adjusting device to sustain the frame and diaphragm in the desired relation to the cylinder.

In testimony whereof I hereunto set my hand, this 12th day of December, 1889, in the presence of two attesting witnesses.

JNO. H. WHITE.

Witnesses:

W. R. KENNEDY,
F. STANLY ELMORE.