(No Model.)

4 Sheets—Sheet 1.

W. BRUENING.

PHONOGRAPH.

No. 462,687. Patented Nov. 10, 1891.

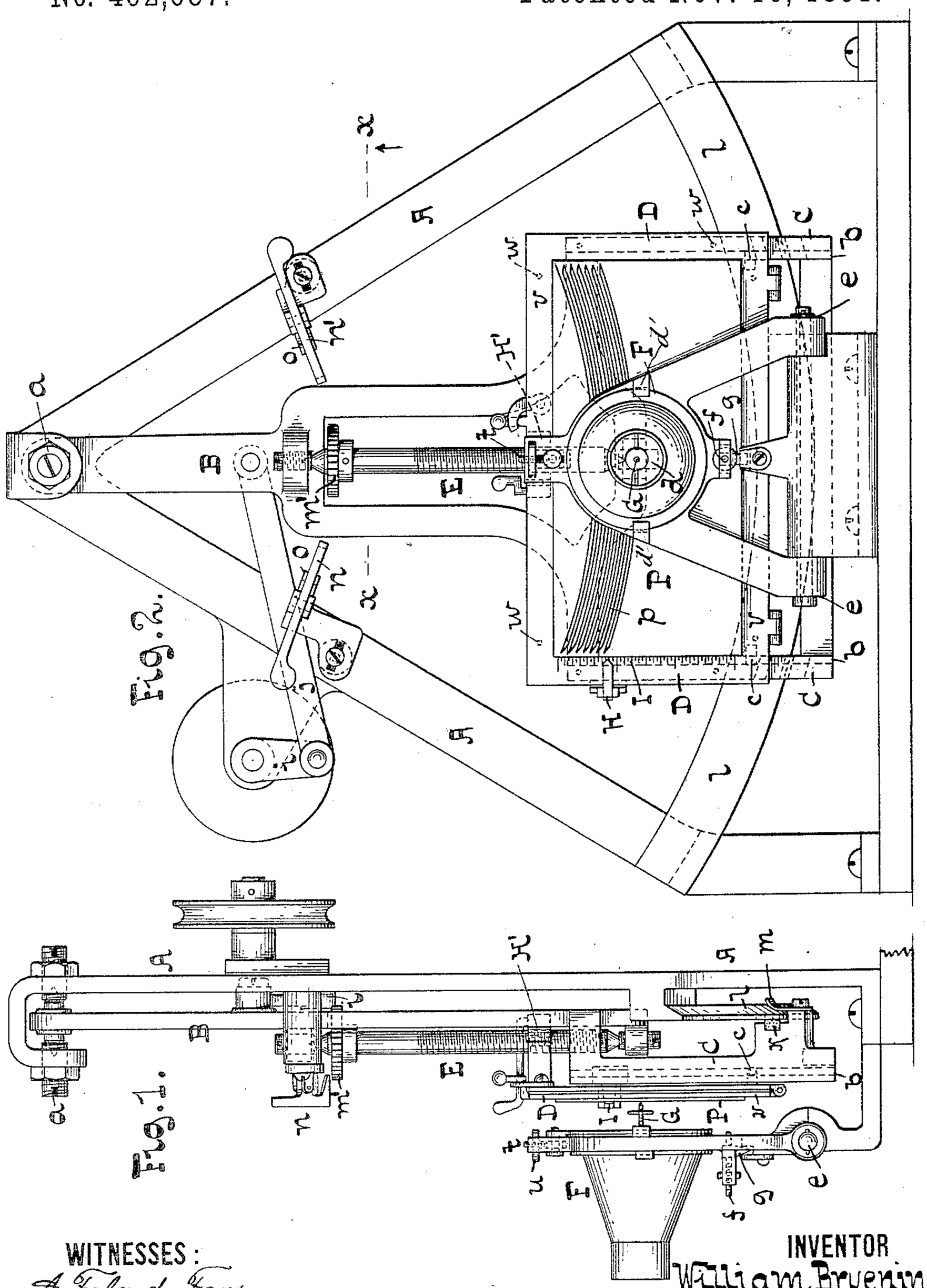


Fig. 2.

Fig. 1.

WITNESSES:
A. Faber du Faur
F. Fohr.

INVENTOR
William Bruening
BY A. Faber du Faur Jr.
his ATTORNEY

(No Model.) 4 Sheets—Sheet 2.

W. BRUENING.

PHONOGRAPH.

No. 462,687. Patented Nov. 10, 1891.

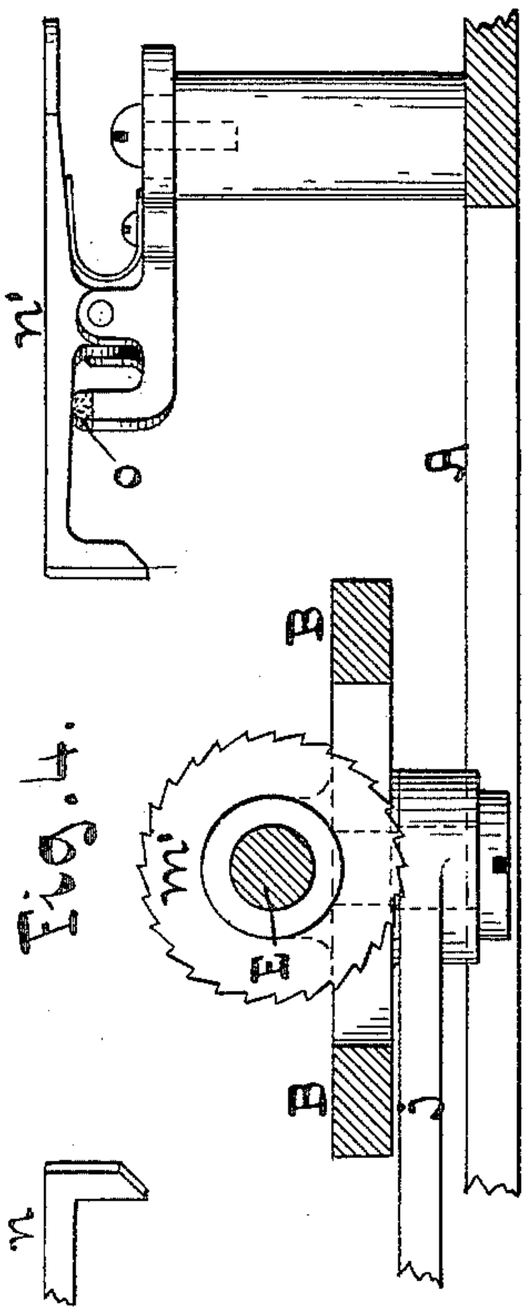


Fig. 4.

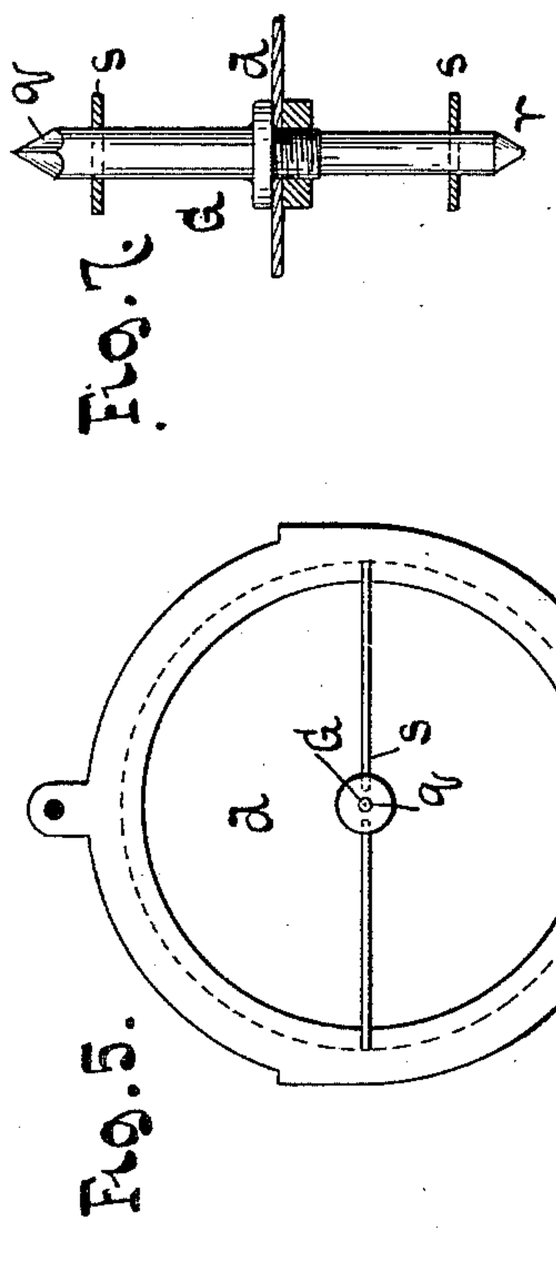


Fig. 7.

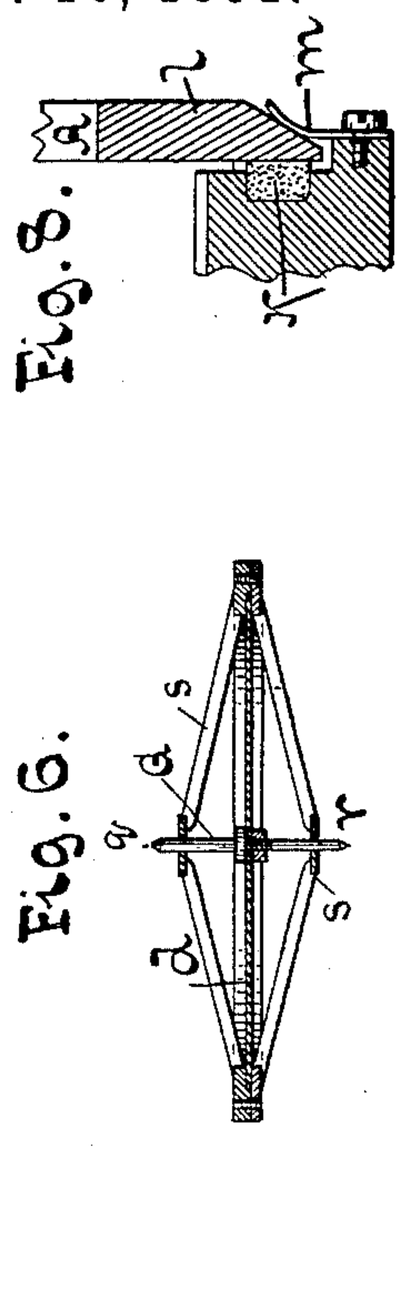


Fig. 8.

Fig. 5.

Fig. 6.

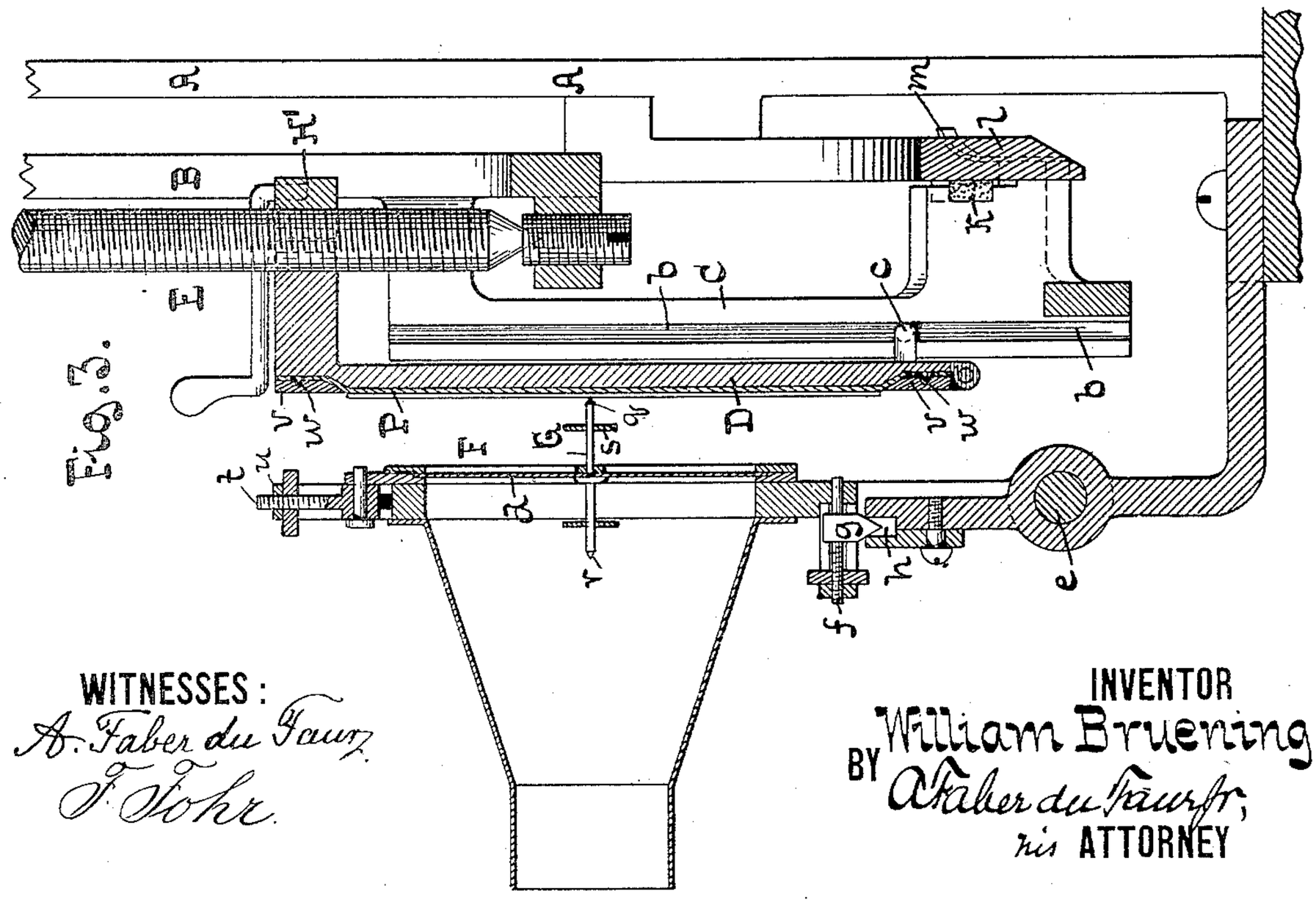


Fig. 2.

WITNESSES:
A. Faber du Faur
J. Lohr.

INVENTOR
William Bruening
BY A. Faber du Faur
his ATTORNEY

(No Model.) 4 Sheets—Sheet 3.

W. BRUENING.

PHONOGRAPH.

No. 462,687. Patented Nov. 10, 1891.

Fig. 9.

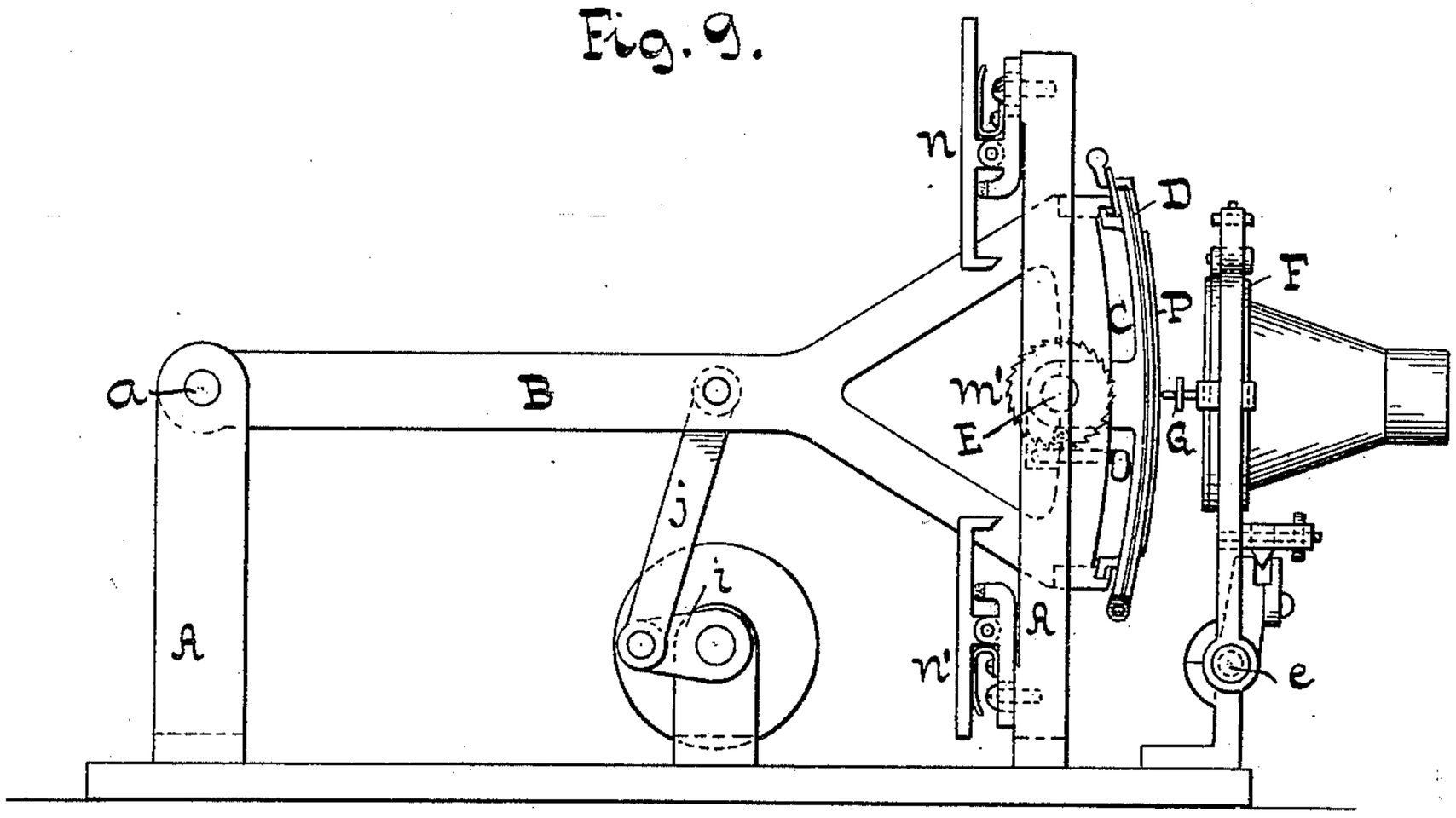
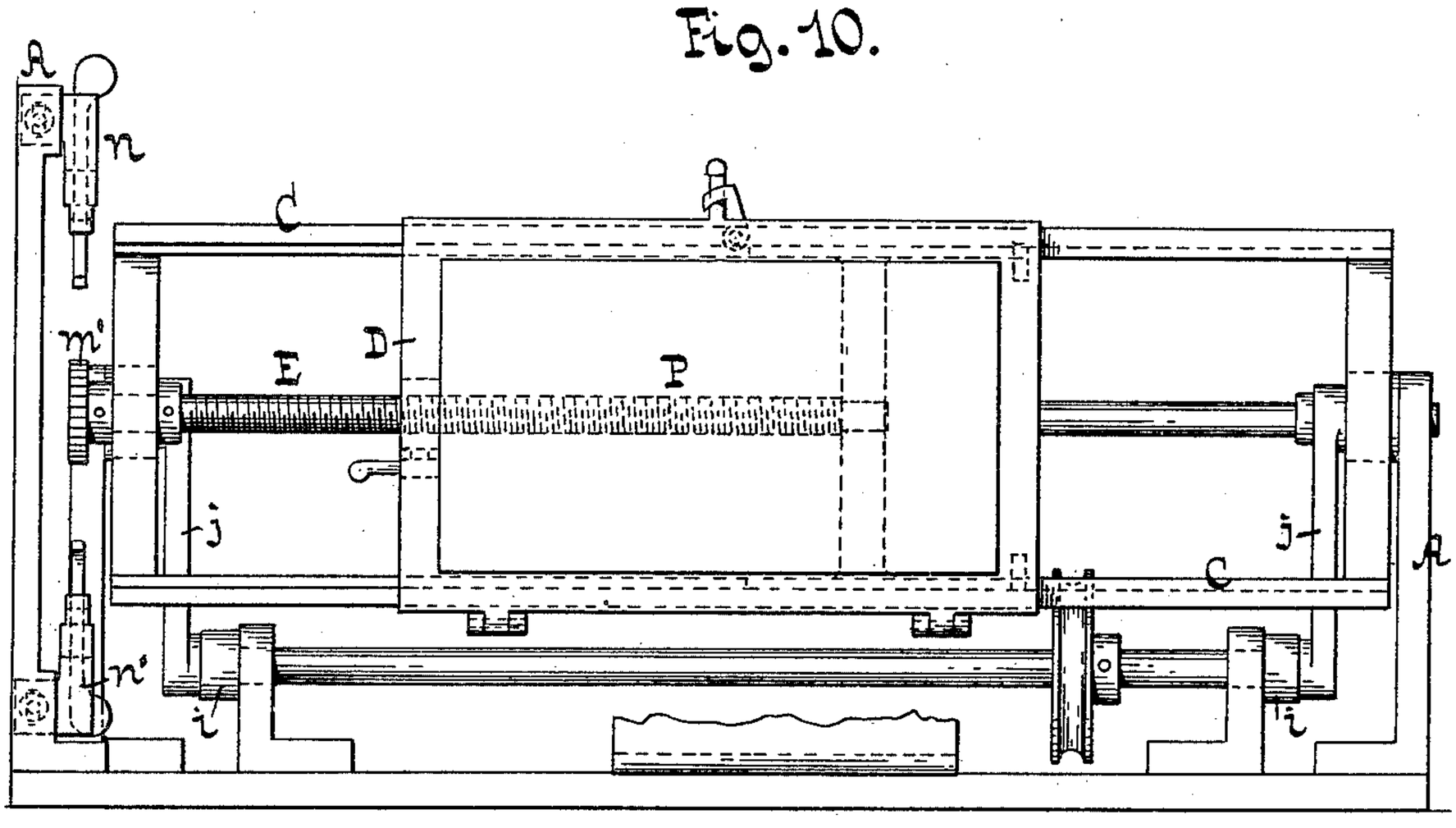


Fig. 10.



WITNESSES:
A. Faber du Faur
F. Fohr.

INVENTOR
William Bruening,
BY A. Faber du Faur Jr.,
his ATTORNEY

(No Model.) 4 Sheets—Sheet 4.

W. BRUENING.

PHONOGRAPH.

No. 462,687. Patented Nov. 10, 1891.

Fig. 11.

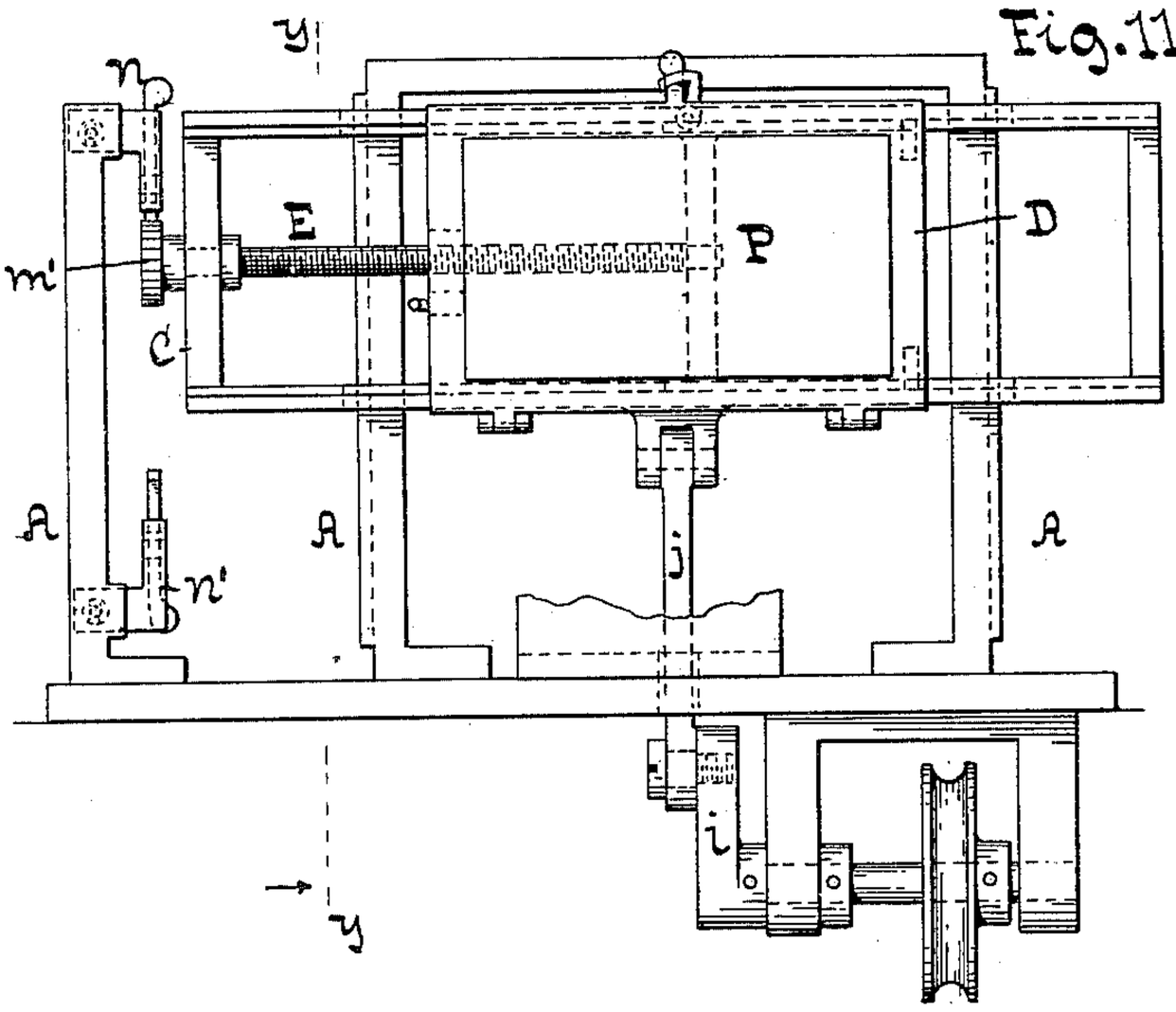


Fig. 12.

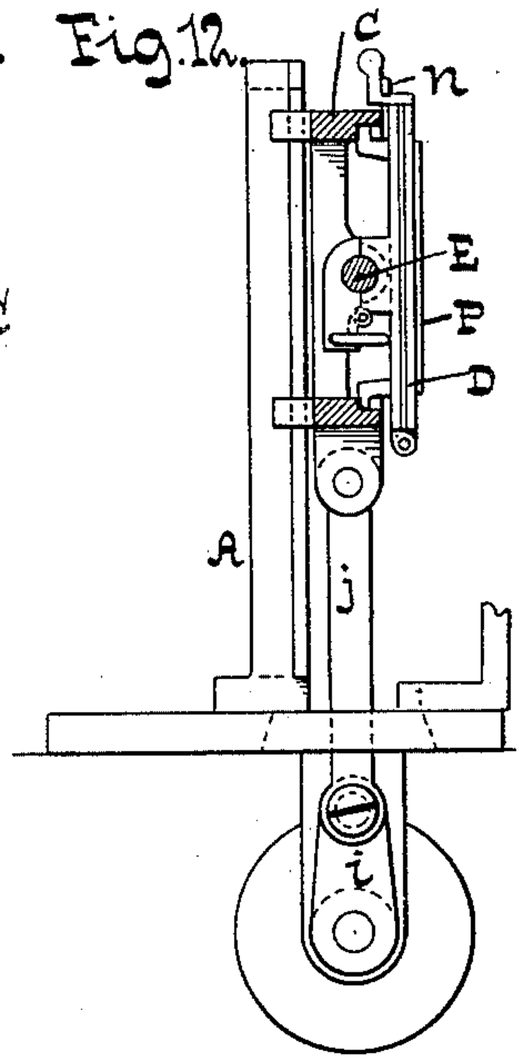


Fig. 13.

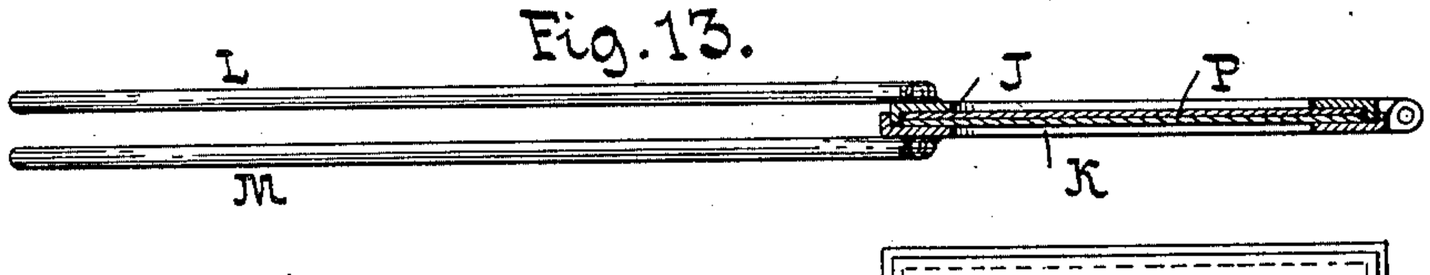


Fig. 14.

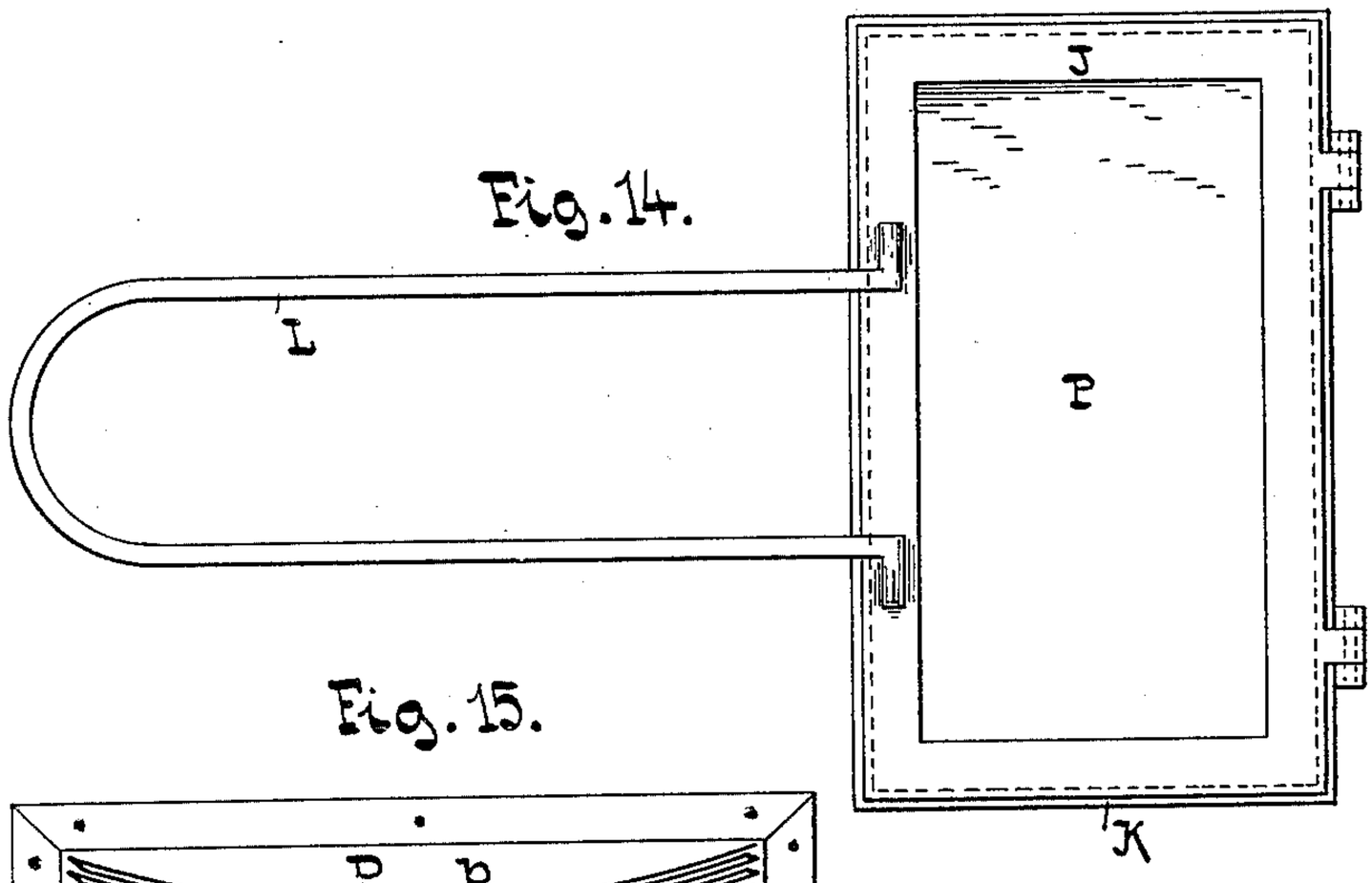
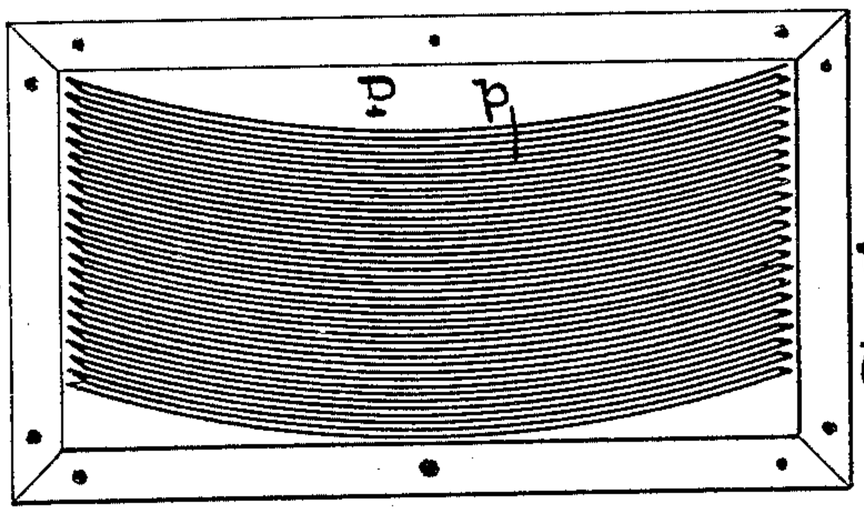


Fig. 15.



WITNESSES
A. Faber du Faur
F. Fohr.

INVENTOR
William Bruening.
by A. Faber du Faur Jr.,
his ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM BRUENING, OF EAST ORANGE, NEW JERSEY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 462,687, dated November 10, 1891.

Application filed January 14, 1891. Serial No. 377,724. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BRUENING, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention has reference to improvements in phonographs, and has for its object to provide at a reduced cost a phonograph adapted to give a clear and distinct reproduction of the sound recorded thereon.

To this end my invention consists, essentially, in a phonograph provided with a phonogram-blank or phonogram-holder having a reciprocating motion, means for feeding the holder transversely to the plane of reciprocation, and a recorder or reproducer, all of which, together with other novel features of my invention, is more fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of a phonograph constructed according to my invention. Fig. 2 is a front elevation thereof. Fig. 3 is a vertical central section on a larger scale than the preceding figures. Fig. 4 is a horizontal section in the plane *x x*, Fig. 1, drawn to the same scale as Fig. 3. Fig. 5 is a face view of the diaphragm and attachments. Fig. 6 is a central section of the same. Fig. 7 is an enlarged sectional view of the style. Fig. 8 is a cross-section illustrating details of construction. Fig. 9 is a side elevation of a modified form of the phonograph. Fig. 10 is a front view of the same, with the recording device removed. Fig. 11 is a similar view of a second modification. Fig. 12 is a vertical section in the plane *y y*, Fig. 11. Figs. 13 and 14 illustrate the construction of the dipping-frame used to construct the phonogram-blanks. Fig. 15 is a face view of a phonogram.

Similar letters indicate corresponding parts.

In the drawings, referring at present to Figs. 1, 2, and 3, the letter A designates a frame or standard, to which is pivoted at *a* a pendulous arm B, carrying at its lower end a carriage C, provided with transverse grooves or ways *b b*. In these ways is held, by means of the lugs *c c*, the phonogram or phonogram-blank holder D, which is fed transversely to the swinging or reciprocating motion of the carriage by means of a feed-screw E, having bearings at opposite ends in the arm A.

F is the recorder (or reproducer) containing a suitable diaphragm *d*, which has affixed thereto the style G, the latter being adapted to engage with the mass of the phonogram-blank P. The recorder is hinged at *e* to the frame A and can be readily swung out of the way when it is desired to insert the phonogram-blank or to remove the phonogram. It is adjusted to its proper position with relation to the phonogram by means of a screw *f*, passing through the recorder-frame, and through a block *g*, engaging a socket *h* in the rigid part of the frame A. (See Fig. 3 especially.) However, any other usual means could be employed to accomplish this end.

An oscillating motion is imparted to the arm B by any suitable means—such, for instance, as the crank *i* and link *j*, actuated either by a clock-movement or by any other known motor. In order that the carriage C may travel smoothly, it is provided with a pad or pads *k*, bearing against a rail *l* on the frame, a spring *m* bearing against the opposite side of the rail, holding the carriage to the latter and compensating for wear. (See Fig. 8).

To feed the holder forward once for each stroke or vibration of the arm B, any suitable means may be employed. For instance, as shown in the drawings, a ratchet-wheel *m'* is secured to the upper part of the feed-screw E, which is alternately engaged by spring-pawls *n* and *n'*, secured to the frame on opposite sides of the feed-screw. The pawls are adjustably secured to the frame for permitting the feed to be varied, and cushions *o o* may be provided to deaden the noise. The nut H' engaging the feed-screw is best made split to permit the holder to be readily removed, if found necessary.

In the operation of the phonograph the recording-point will cut into the phonogram-blank a series of approximately parallel tracks *p p* of varying depth, corresponding to the intensity of the sound vibrations, said tracks being jointed alternately at opposite ends, in which the reproducing-point subse-

quently travels. It is evident, however, that if the feed takes place just beyond the edges of the phonogram-blank, a series of disconnected approximately parallel tracks will be the result. It will be seen that these successive tracks are cut, traced, or indented by the sound-vibrations in opposite directions, consequently when the reproducing-point is placed in the track it must for a correct reproduction travel in said track in the same direction as the recording point had previously traveled in forming said track, otherwise the reproduction will be unintelligible. If it be found that the reproducing-point is traveling in the wrong direction, one of the pawls *n* or *n'* is lifted out of contact with the feed-wheel *m'*, thereby causing the feed to be missed once, consequently the reproducing-point on the continued motion of the phonogram will travel in the proper direction in said track. In order that the recording device may also serve as a reproducer, the style G extends on both sides of the diaphragm. One end thereof has a sharp-cutting edge, forming the recording-point *q*, and the other end a blunt or rounded edge *r*, forming the reproducing-point, so that by reversing the diaphragm the recorder can be changed to a reproducer. The style G may be made in two parts, or, as illustrated in Fig. 7, it is made integral and secured to the diaphragm by a screw-and-nut connection. In order that the recording-point can cut from both sides, it is pointed from four sides, as best seen in Fig. 7. To prevent the diaphragm from buckling, the opposite parts of the style are best guided in spiders *s*, located on opposite sides of the diaphragm, as shown in Figs. 5 and 6, said spiders consisting of metallic strips secured to the rim at their outer ends, and bearing at their inner ends plates having central holes, through which the opposite parts of the style pass. The diaphragm can be secured to the recorder-frame by any suitable means, and is made adjustable by a screw *t* and nut *u* connection. In the example here illustrated I have provided the recorder-frame with two ears *d'*, which embrace the recorder-rim at opposite sides, Figs. 1 and 2, and within which the recorder can be moved up or down by the adjusting device.

To secure the phonogram or phonogram-blank in the holder D, the latter is provided with a clamping-frame *v* (see Fig. 3) hinged thereto. Suitable pins, as *w*, placed in the holder at proper distances apart, serve as a guide to place the blank in its proper position, said pins passing through holes in the blank and entering corresponding recesses in the clamping-frame to securely hold the blank.

In preparing the phonogram-blanks a margin extending about the four sides is left uncoated, with which margin the clamping-frame engages. When the face of the holder is inclined, as shown in Fig. 3, the uncovered margin is slit diagonally at the four corners, or else the blank is first pressed to the proper shape in a suitable form.

A pointer, as H, secured to the carriage, and a scale, as I, Fig. 1, applied to the holder may be employed, the pointer being hinged, so that it can be thrown to one side when the clamping-frame is to be opened. By the use of the scale certain parts of the recorder can be noted for repetition.

If desired, the holder G can be centrally pivoted to a carriage located and working in the carriage C, whereby it can be adjusted about its center to cause the tracks on the phonogram to correspond with the arc in which the arm swings in case the holders of different phonographs should not exactly correspond.

It is evident that various modifications, all including a reciprocating motion of the phonogram or phonogram-blank holder, can be constructed, therefore I do not wish to restrict myself to any particular reciprocating motion.

In Figs. 9 and 10 I have shown the carriage formed on a pivotal arm as before, but on the outer end of the same the phonogram-blank being curved and presenting a segmental surface to the style.

In Figs. 11 and 12 the carriage is shown to reciprocate in a vertical plane in suitable ways formed in the frame A and the phonogram-holder feed at right angles thereto.

The means for imparting the reciprocating motion in the two latter cases are similar to those shown in the first example and need not be more fully described.

It will be noticed that the tracks produced by the recorder of the two latter phonographs will be parallel.

In place of reciprocating and feeding the phonogram-blank holder, the recording or reproducing device could have the two motions imparted thereto and the holder remain stationary; and, furthermore, instead of having the recording or reproducing device placed with its diaphragm parallel to the phonogram-holder, it could be placed at right angles thereto to obtain transverse vibration.

When a wax compound is used for phonogram-blank, a suitable dipping-frame, such as shown in Figs. 13 and 14, is made use of. It consists of two jaws J and K, hinged together, each of said jaws being made of an open frame-work and provided with a handle, as L and M. The blank is placed between said jaws and repeatedly dipped into the molten mass until the requisite thickness is obtained. When only one side of the blank is to be covered with the mass, two blanks are placed in the dipping-frame at one time.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph, a reciprocating phonogram-blank or phonogram-holder, means for feeding the holder transversely, and a recorder or a reproducer, substantially as described.

2. In a phonograph, a reciprocating carriage, a phonogram or phonogram-blank holder moving with said carriage, means for feeding the holder transversely, and a recorder or a reproducer, substantially as dscribed.

3. In a phonograph, a reciprocating carriage provided with ways, a phonogram-blank or phonogram-holder adapted to slide in said ways, and a feed-screw for advancing the holder, substantiallly as described.

4. In a phonograph, a phonogram-blank or a phonogram having a reciprocating motion imparted thereto, means for feeding said phonogram-blank or phonogram transversely, and a recorder or reproducer, substantially as described.

5. In a phonograph, a diaphragm having a style formed on opposite sides with a recording-point and a reproducing-point, and guides for said style, substantially as described.

6. In a phonograph, a reversible diaphragm provided with a style formed on opposite sides with a recording-point and a reproducing-point, substantially as described.

7. In a phonograph, a holder for the phonogram-blank or phonogram, consisting of an open frame, means for securing the phonogram-blank or phonogram therein, a scale I on said holder, and an index H, substantially as described.

8. In a phonograph, the reciprocating carriage C, the holder D, having a feed-motion transverse to the motion of the carriage, and the hinged adjustable recorder F, substantially as described.

9. A phonogram in which the successive tracks are cut from opposite directions, substantially as described.

10. A phonogram having parallel or approximately parallel tracks cut from opposite directions, substantially as described.

11. A phonogram having parallel or approximately parallel tracks thereon joined alternately at opposite ends, substantially as described.

12. A phonogram having parallel or approximately parallel tracks thereon joined alternately at opposite ends, the successive tracks being cut from opposite directions, substantially as described.

13. In a phonograph, the frame A, provided with a guide or guides, a carriage fitted to said guides, means for imparting a reciprocating motion to the carriage, a phonogram-blank holder, a feed-screw, and a recorder, substantially as described.

14. In a phonogram, a reciprocating carriage, a phonogram-holder moving with said carriage and having a feed-motion transverse to the same, and means for interrupting said feed, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 10th day of January, 1891.

WILLIAM BRUENING.

Witnesses:
CHAS. S. HAYES,
A. FABER DU FAUR.