

(No Model.)

2 Sheets—Sheet 1.

F. H. RICHARDS.  
TELEPHONE TRANSMITTER.

No. 513,730.

Patented Jan. 30, 1894.

Fig. 2.

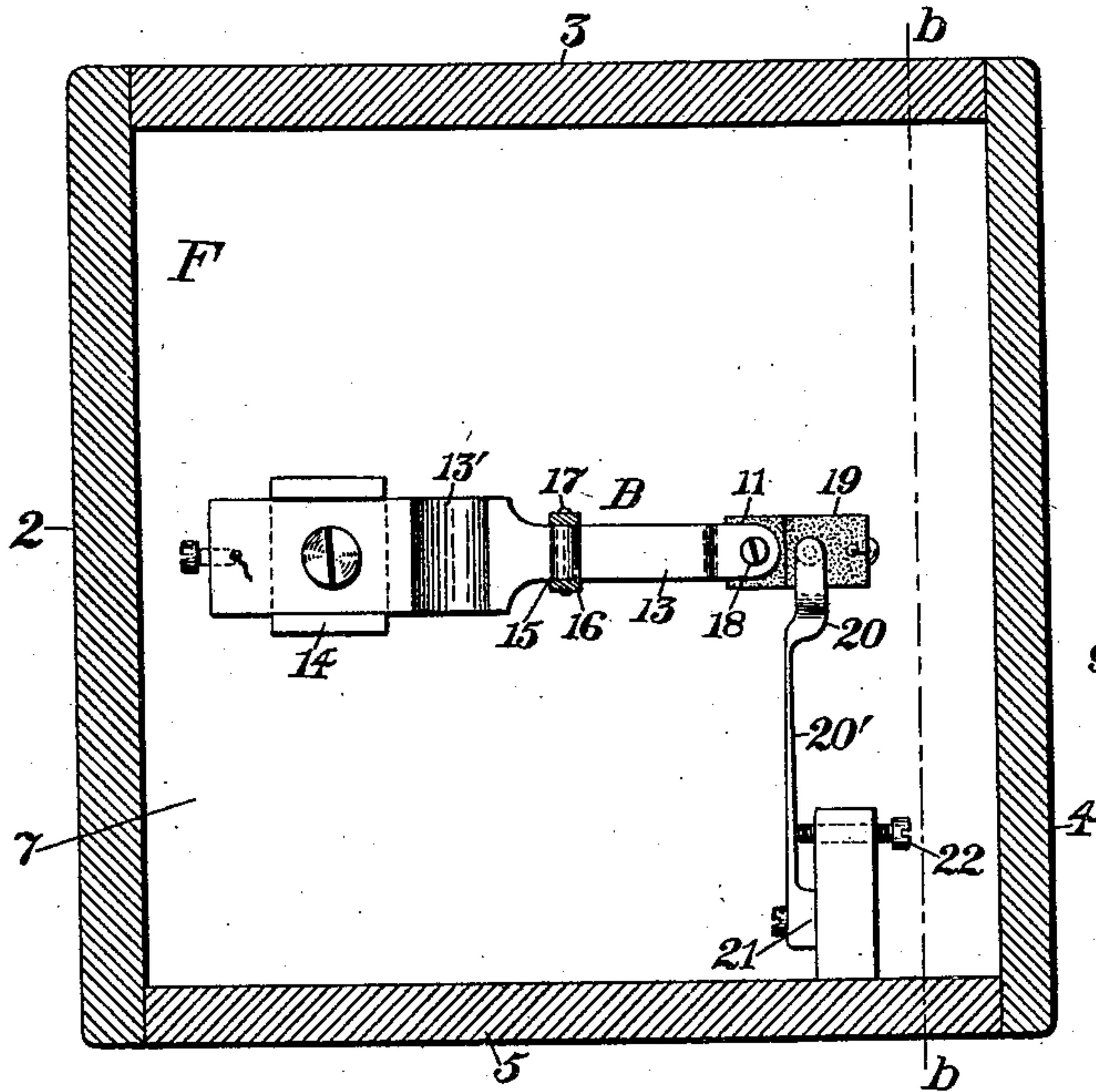


Fig. 3.

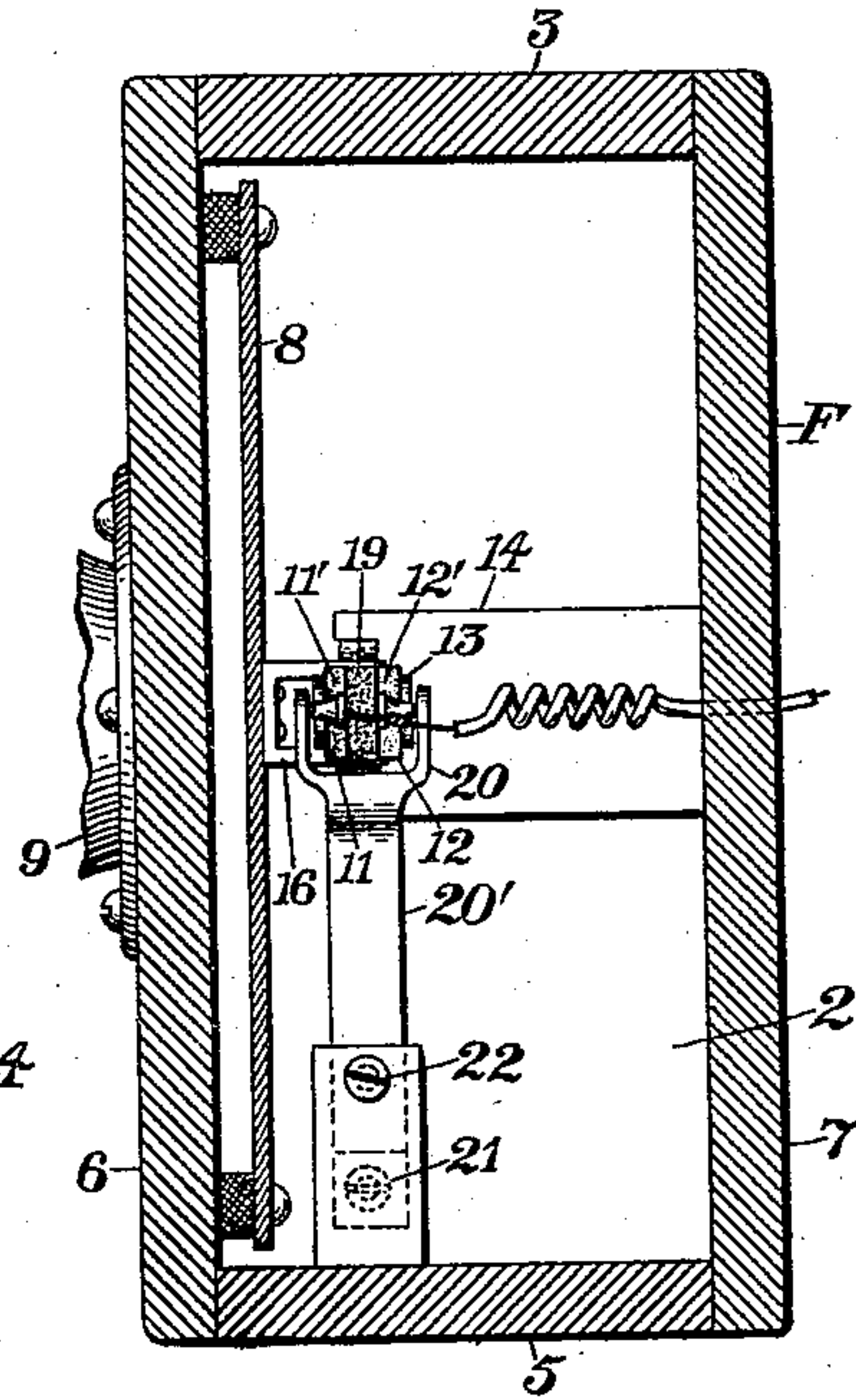


Fig. 1.

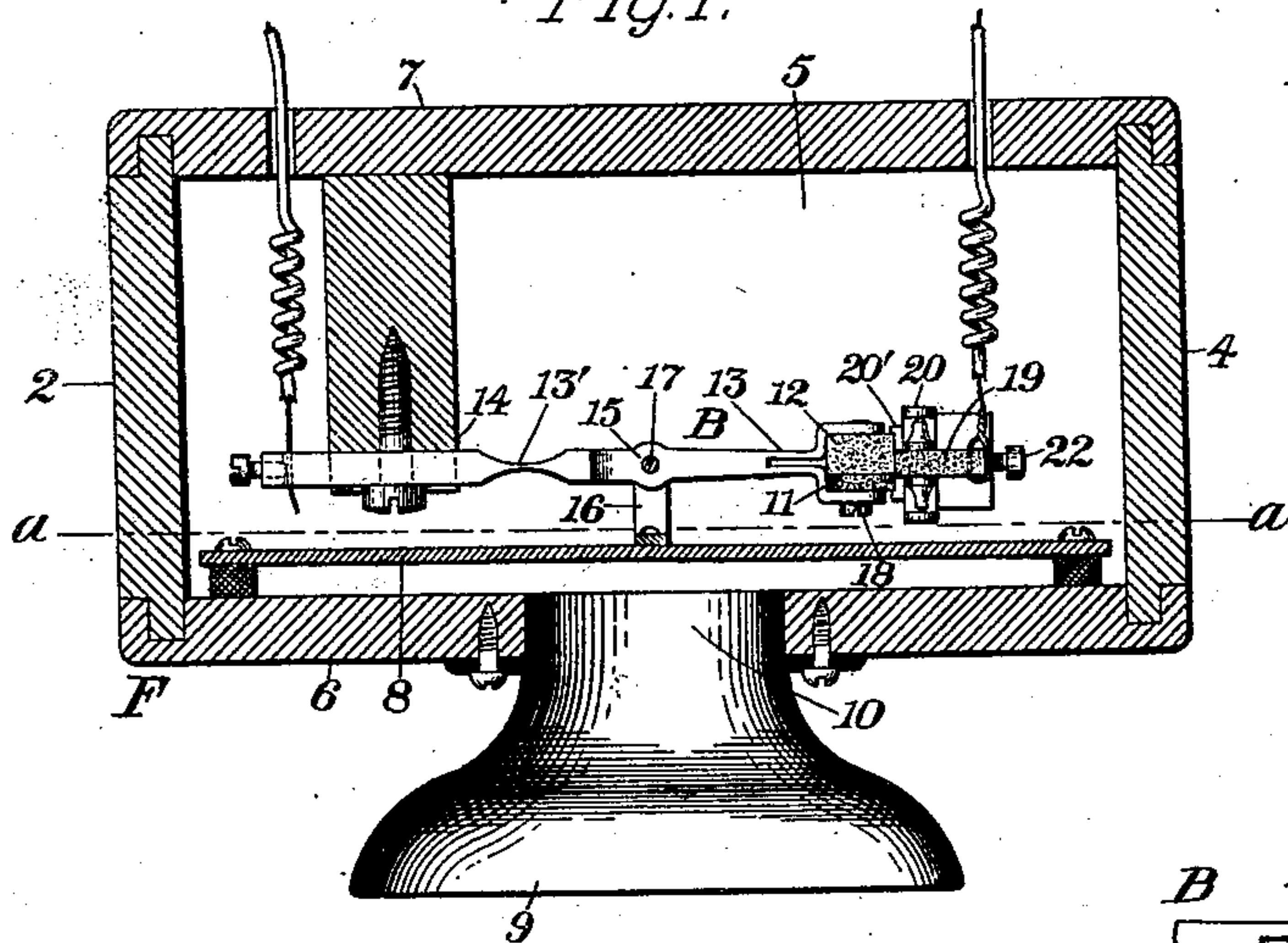


Fig. 4.

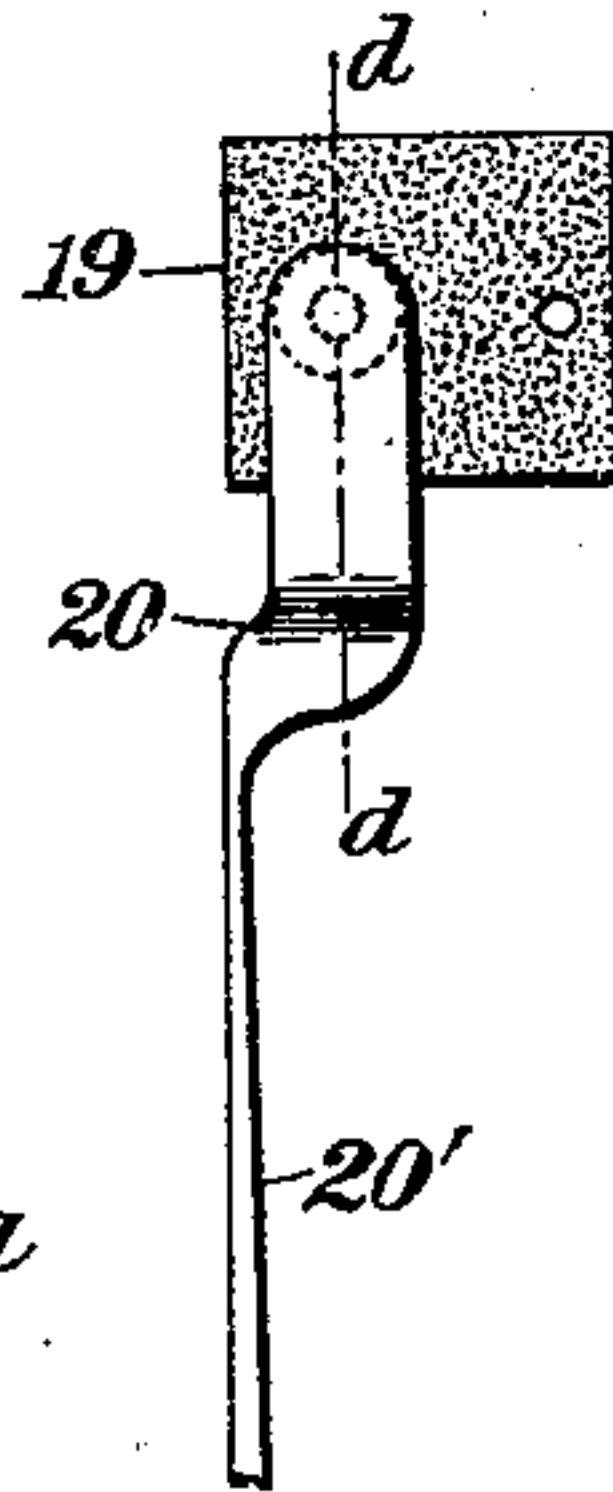


Fig. 5.

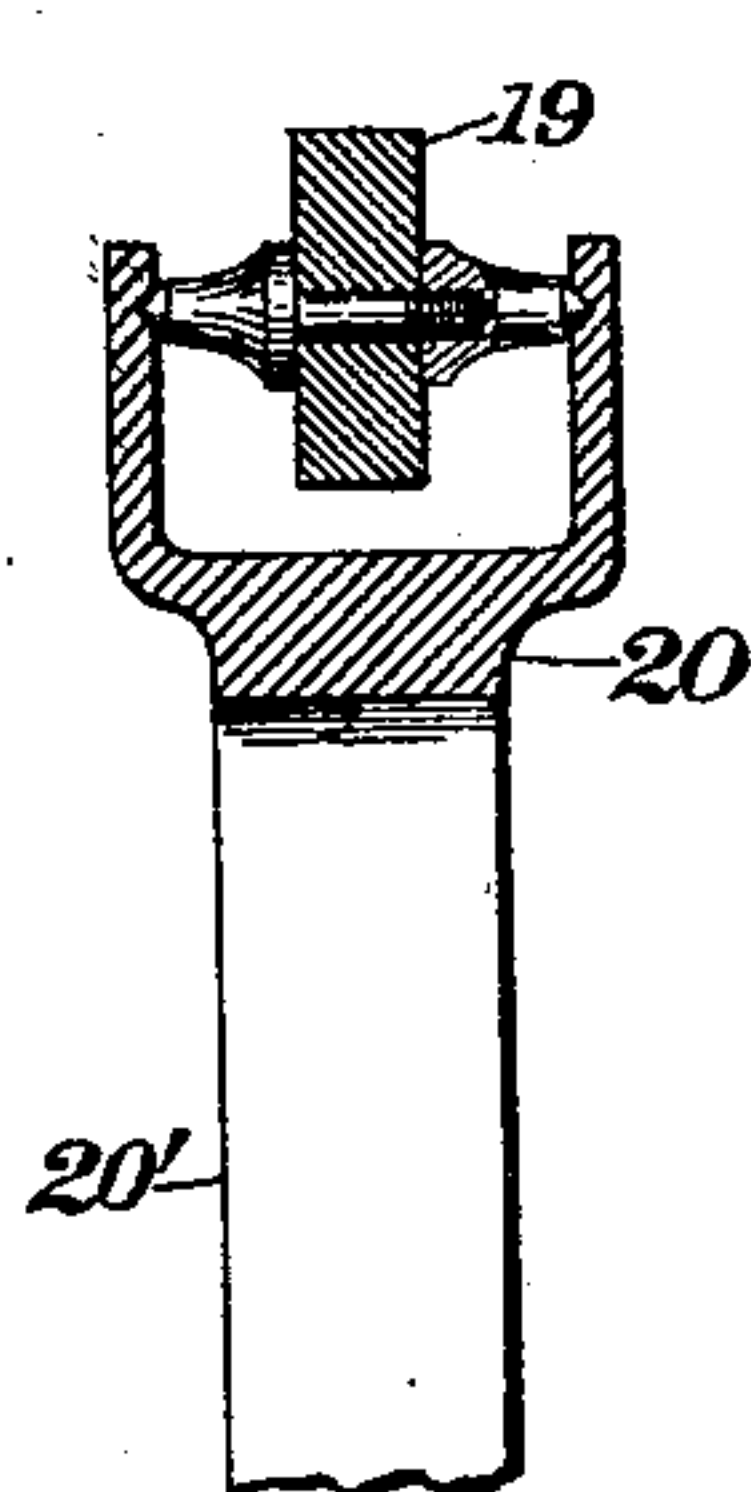


Fig. 6.

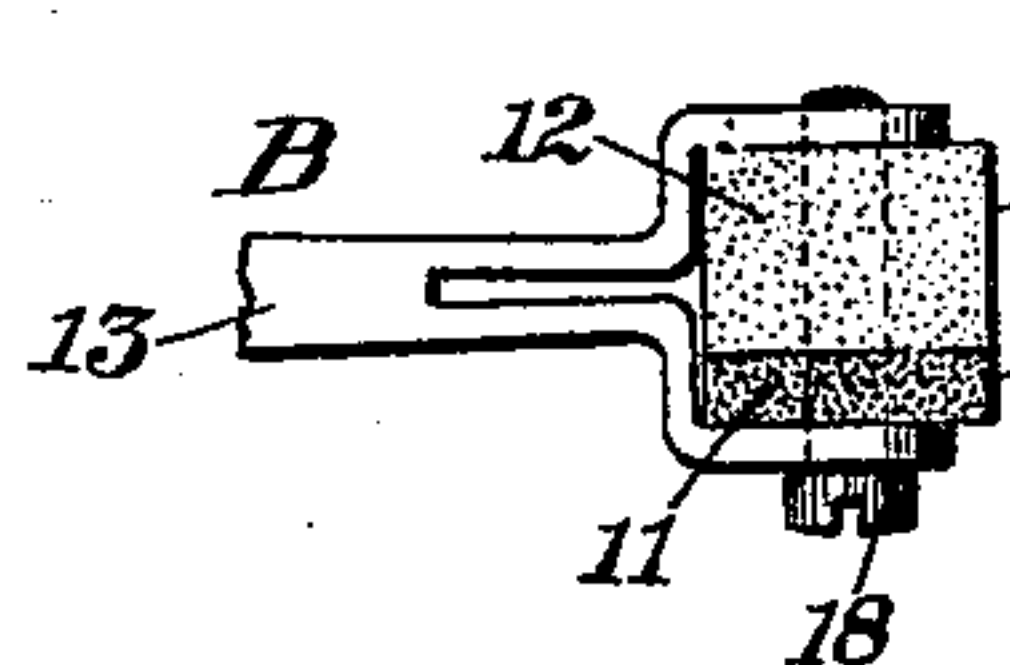
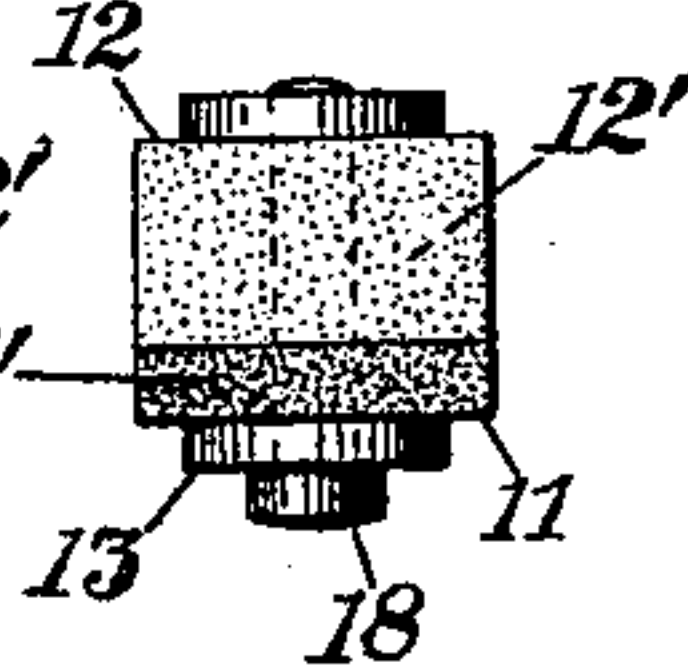


Fig. 7.



Witnesses:  
John L. Edwards Jr.  
Fred. J. Dole.

Inventor:  
F. H. Richards



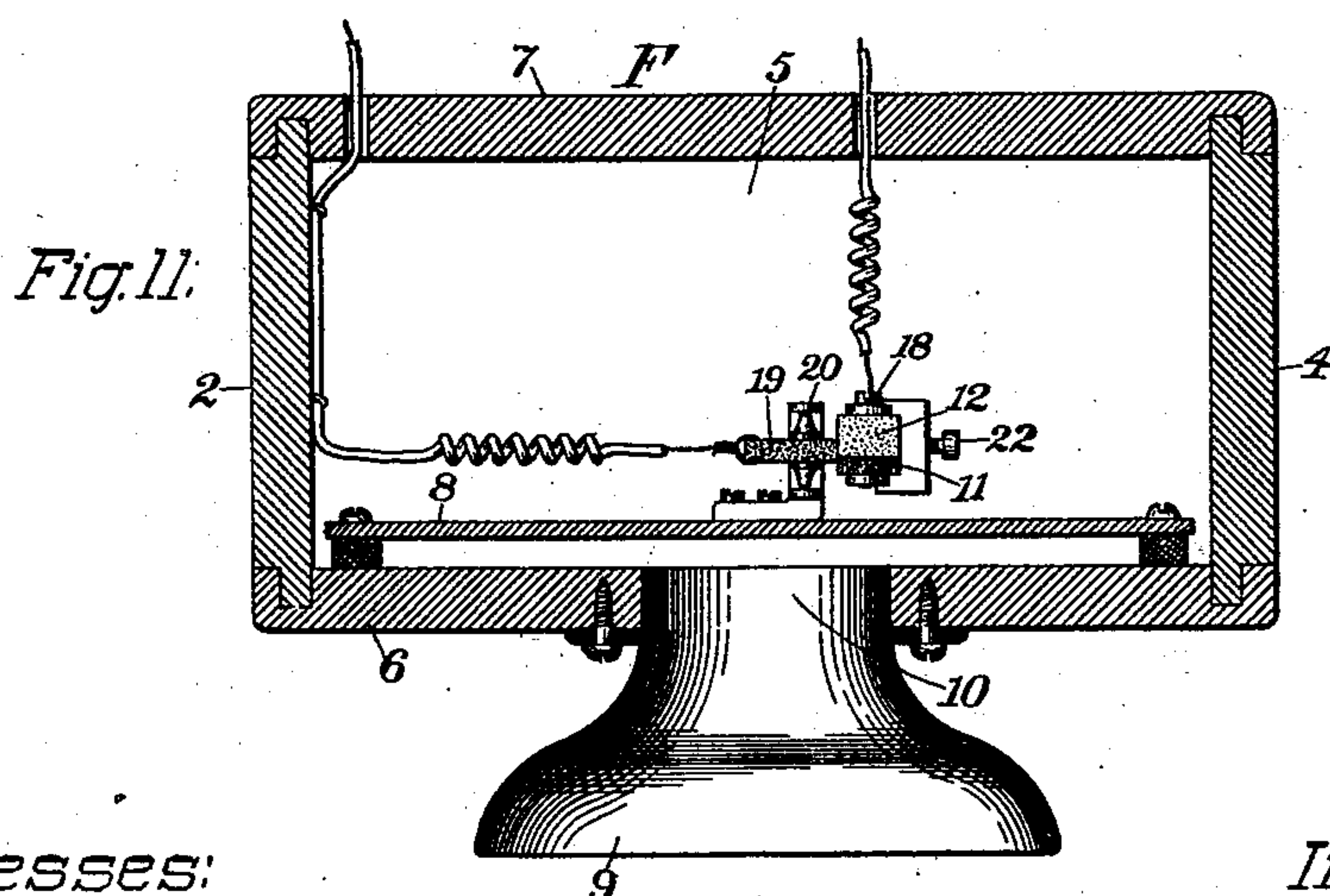
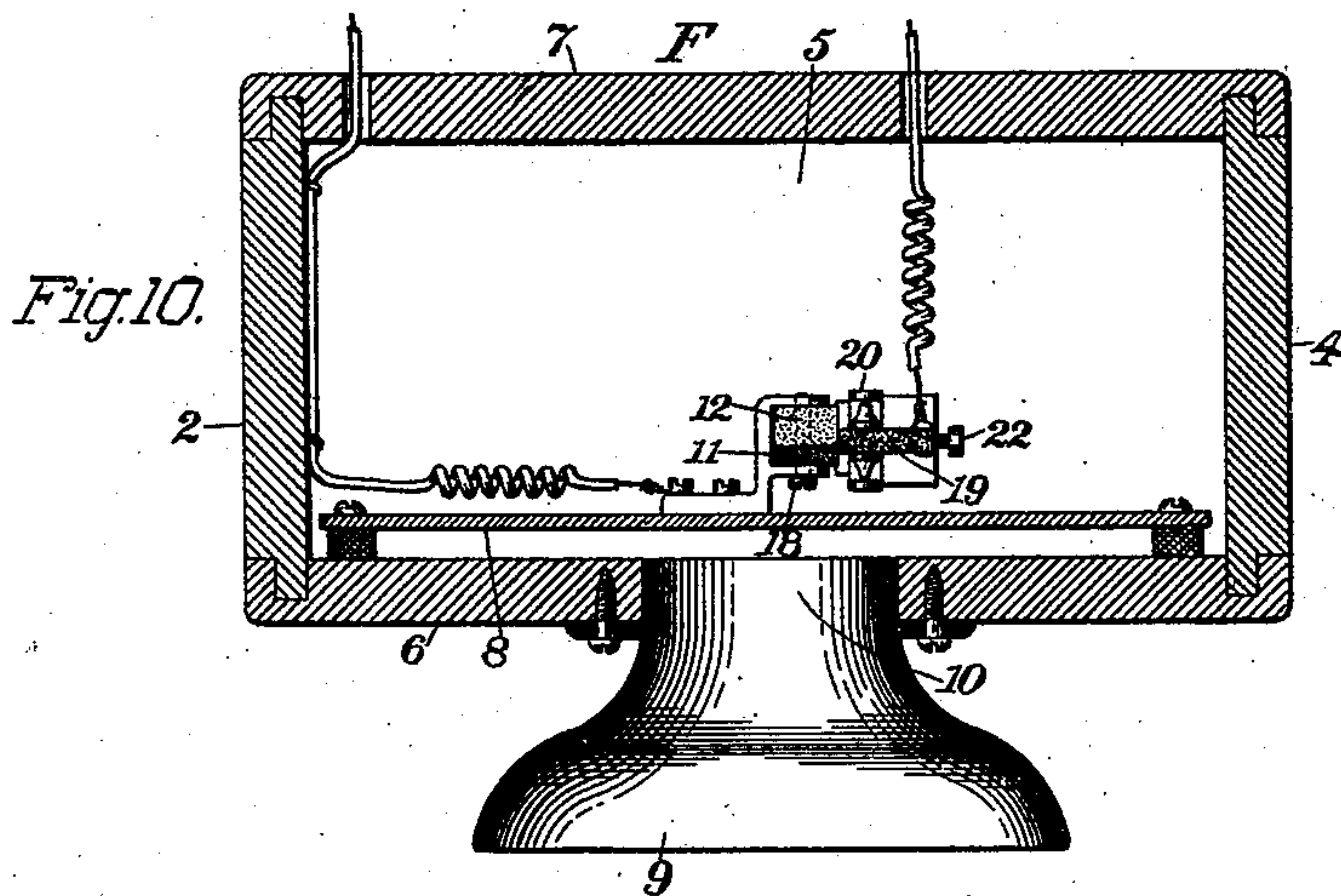
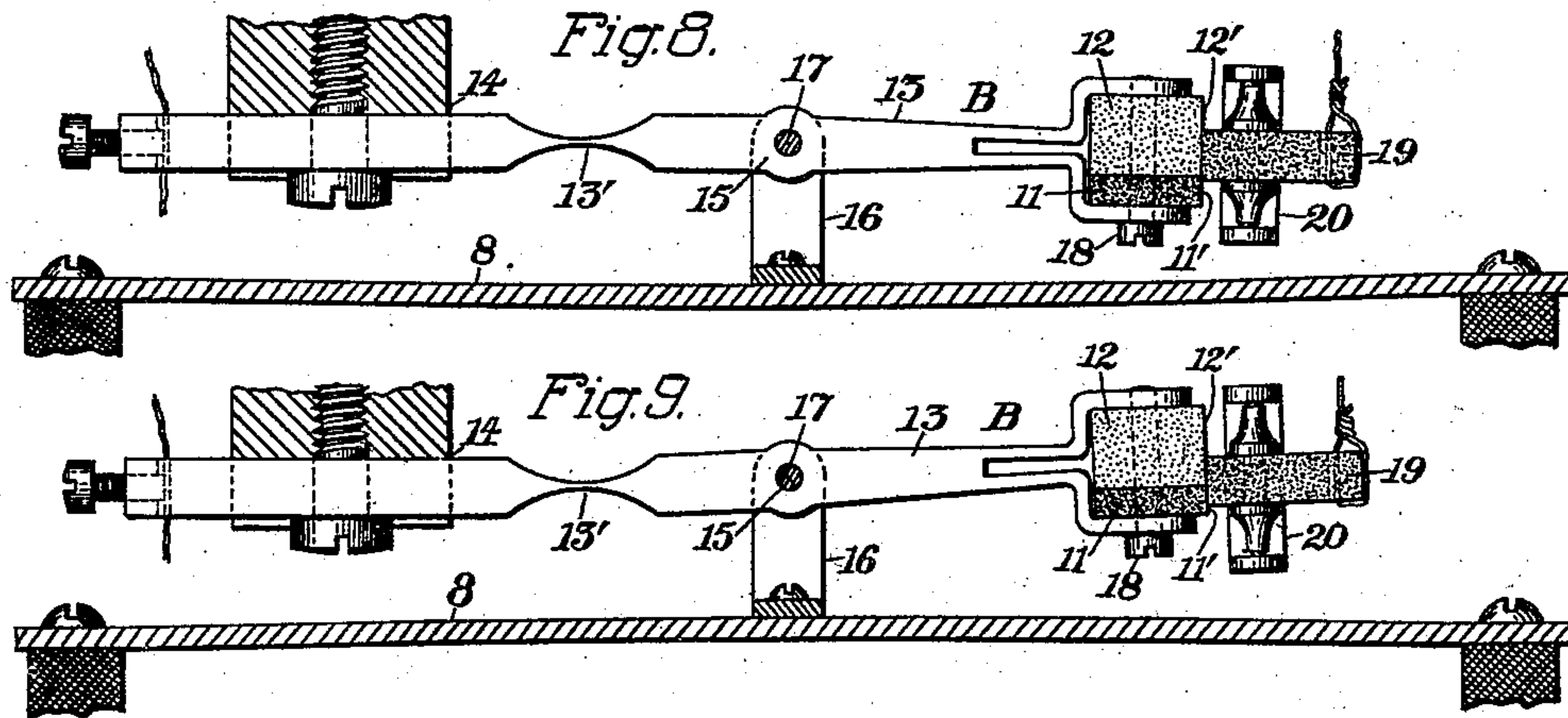
(No Model.)

2 Sheets—Sheet 2.

F. H. RICHARDS.  
TELEPHONE TRANSMITTER.

No. 513,730.

Patented Jan. 30, 1894.



Witnesses:  
John L. Edwards Jr.  
Fred. J. Dole.

Inventor:  
F. H. Richards.



# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 513,730, dated January 30, 1894.

Application filed July 31, 1893. Serial No. 481,937. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Telephone-Transmitters, of which the following is a specification.

This invention relates to transmitters for electric speaking telephones; the object being to furnish an improved instrument of this class, in which the required undulatory currents may be produced by variations of the current-strength resulting from a variation in the amount of contact between surface-contacting electrodes.

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional plan view of a telephone transmitter made according to my present invention. Fig. 2 is a front sectional elevation of the same, on line *a-a*, Fig. 1. Fig. 3 is a transverse sectional view on line *b-b*, Fig. 2. Fig. 4 is an enlarged front view of the follower electrode and its carrier, and Fig. 5 is a sectional view of the same on line *d-d*, Fig. 4. Fig. 6 is an enlarged top view of one form of the vibrator electrode and its carrier, and Fig. 7 is an end-view of the same. Figs. 8 and 9 are partial plan views, similar to a portion of Fig. 1, for illustrating the operation of the instrument. Figs. 10 and 11 are plan views similar to Fig. 1, for illustrating modified forms of the transmitter.

Similar characters designate like parts in all the figures.

My improved telephonic instrument consists of a suitable framework, a plate sensitive to sound-waves, one electrode having a compound working-face, a follower electrode bearing upon the working-face of the other electrode, and means operatively connecting one of the electrodes with the plate so that the vibratory action of the plate operates to vary the amount of contact between the electrodes by sliding one of these upon the other in the direction of their electrical contacting surfaces.

In the drawings, I have shown the "vibrator electrode" provided with said compound working-face and operatively con-

nected with the plate so that the working-face and electrode partake of the vibratory action of the plate and move against the follower-electrode.

The frame *F* may be of any convenient description, being preferably of box-like form, and consisting of the four sides 2, 3, 4 and 5, the front-plate 6, and the back-plate 7, all suitably held together. The diaphragm, or sensitive plate, 8, is fixed in place just within the front-plate, after the ordinary manner of supporting the sensitive plates of telephonic instruments, and a mouth-piece, 9, is or may be provided around the aperture 10, of the front-plate for directing the sound-waves against the diaphragm. This plate and some suitable connection therewith, constitute the means for actuating the vibrator-electrode, as hereinafter more fully set forth.

The vibrator, or compound-electrode, which is designated in a general way by *B*, consists (as shown in Figs. 1 to 10, inclusive) of an electrode, 11, and a non-conducting element, 12, whose working-surface 12' constitutes a true extension of the working-surface 11' of the electrode. These two working surfaces constitute the "working-face." This vibrator may be fixed to the diaphragm directly, as shown in Fig. 10; or, it may be carried upon the end of the lever or "vibration-multiplier," 13, as shown in Figs. 1, 2 and 3, supported at 14, on the back-plate 7 of the frame. Said vibrator-lever 13 is shown having therein a reduced portion 13', constituting a spring-pivot, and is connected at 15 by the connecting-piece 16 and pivot 17, with the middle portion of the sensitive plate 8. By this means, the movement of the vibrator is multiplied over that of the plate itself, for the purpose of increasing the variation in the amount of contact between the two electrodes and thus increasing the variation in current-strength and the resultant electrical undulations for transmitting speech. The compound vibrator-electrode may be carried directly upon the diaphragm; according to the modification illustrated in Fig. 10; and this arrangement of the two electrodes may be reversed, as in Fig. 11, all within the scope of my invention.

The electrodes are usually and preferably of carbon, and one of them has contiguous



thereto a non-conducting element, 12, of suitable substance, as hard-rubber, glass or the like, fixed beside of the electrode, and forming together therewith a continuous working-  
 5 surface or vibrator-face comprising two portions or "fields" of which one, 11, Fig. 6, is the electrical field, and the other 12, is the non-electrical field. The two elements 11 and 12 are conveniently held together in the  
 10 bifurcated end of the lever 13, by means of the ordinary binding-screw 18.

The follower consists of an electrode 19, similar to that of the vibrator, and is supported to bear against the vibrator but not to  
 15 partake of the reciprocatory or vibrating movements thereof; said electrode 19 is pivotally supported in a carrier 20, upon the upper end of the spring 20' which carries said follower, but, being set edgewise to the normal movement of the vibrator, does not permit said follower to partake of the vibratory  
 20 movements of the vibrator. Said follower-carrying spring 20' is shown fixed at 21 to the framework of the instrument, and an adjusting-screw, 22, is shown bearing against said  
 25 spring for the purpose of adjusting the tension of the same.

The follower-electrode is shown set to bring it by the greater part of its width to one side  
 30 of the vibrator-electrode; the follower-electrode, however, bears with its entire surface against the aforesaid working-face 12' of the vibrator, so that the pressure upon any given area of either electrode is not materially increased or diminished by the sliding action of  
 35 the one upon the other; the proper uniform pressure of the follower against the vibrator being maintained by the follower-carrying spring.

The action of the voice upon the diaphragm  
 40 8 imparts thereto a vibratory movement which is transmitted through the connection 16 and the lever 13 (when the lever is used) to the vibrator-electrode 11, imparting to this a relatively considerable movement. The operation  
 45 of the vibrator-electrode against the face of the follower-electrode 19 carries the same laterally of the opposite contacting terminal 12 to reduce and increase alternately the extent  
 50 of the surface-contact between said electrodes, as illustrated in Figs. 8 and 9, respectively. This variation of the amount of contact between the electrodes causes a variation in the current-strength passing through the  
 55 same, and thereby, probably by varying the

heat of the carbons, gives rise to the undulatory currents required for transmitting speech.

According to my present invention, the relative distance between the electrodes 11 and 19 need not be variable, but the working variation is restricted to the amount of contact  
 60 between the electrodes, and this variation of surface-contact is effected by a movement of one electrode upon the other in the plane of their contacting surfaces. 65

The modification illustrated in Fig. 11 is not specifically claimed herein, but constitutes in part the subject-matter of a separate application, Serial No. 492,698, filed December 4, 1893. 70

Having thus described my invention, I claim—

1. In a telephonic transmitter, the combination with a plate sensitive to sound-waves, of a vibration-multiplier operatively connected with the plate, a compound electrode  
 75 substantially as described, carried by said multiplier and having a working-face comprising an electrical and a non-electrical field, and an electrode bearing against said working-face and extending onto both the said  
 80 fields, and having its working movement in the direction of said working face, substantially as described.

2. In a telephonic transmitter, the combination with a plate sensitive to sound-waves and with the compound electrode operatively connected therewith and having a working-face comprising an electrical and a non-electrical field, of the opposite electrode bearing  
 90 against said working-face and having a supporting pivot, and an electrode-carrier supporting said electrode by its pivot to bear against said working-face, substantially as described and for the purpose specified. 95

3. In a telephonic-transmitter, the combination with the compound electrode having two fields substantially as described and adapted to have a vibratory movement in the direction of the field-surfaces, of means for  
 100 actuating the compound electrode from sound-waves, and a non-vibratory electrode held in contact with the compound-electrode and extending onto both of said fields, substantially as set forth.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,  
 JOHN L. EDWARDS, JR.