

No. 752,921.

PATENTED FEB. 23, 1904.

H. G. PAPE.  
AUDIPHONE RECEIVER.  
APPLICATION FILED SEPT. 13, 1902.

NO MODEL.

Fig. 1.

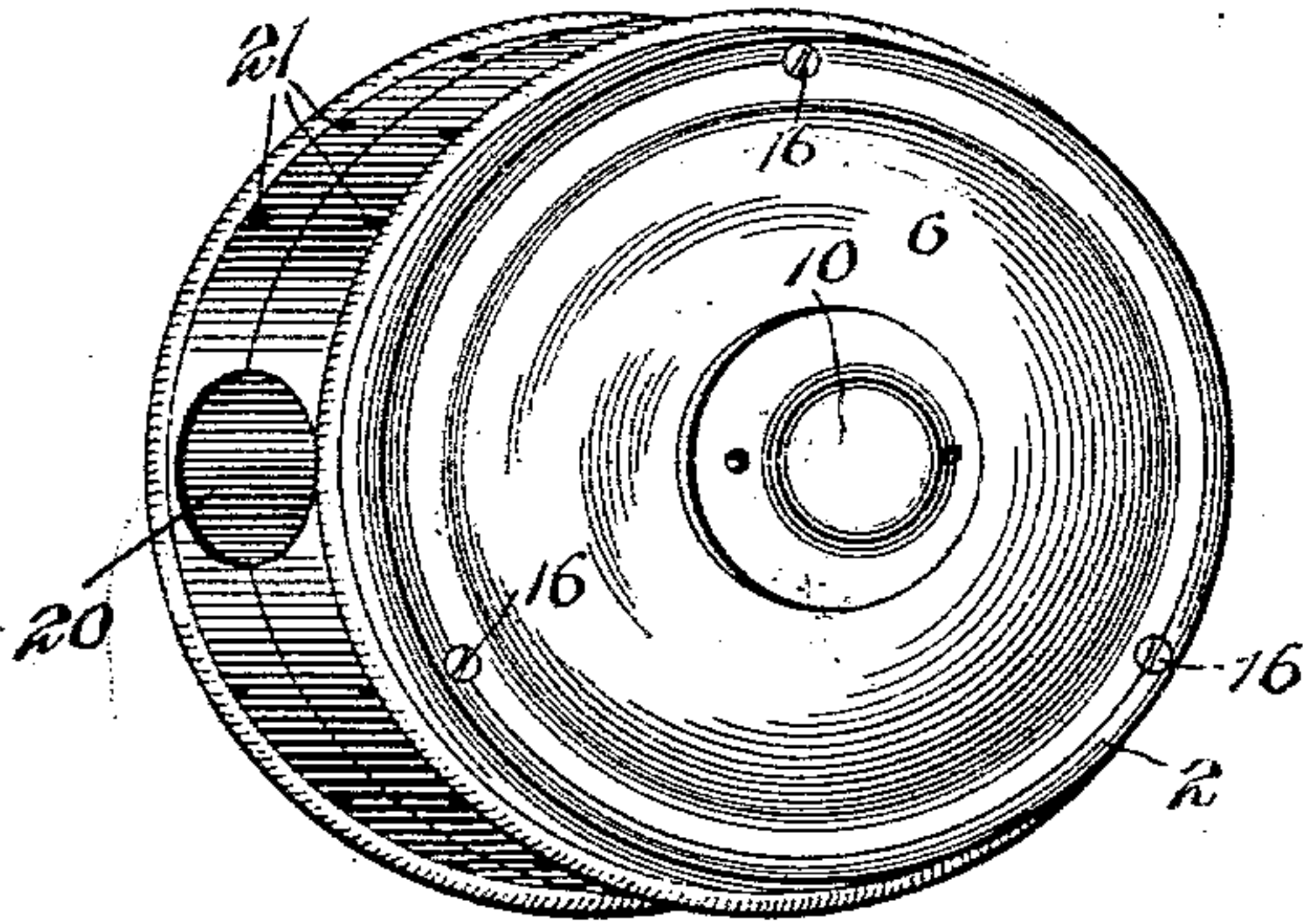


Fig. 2.

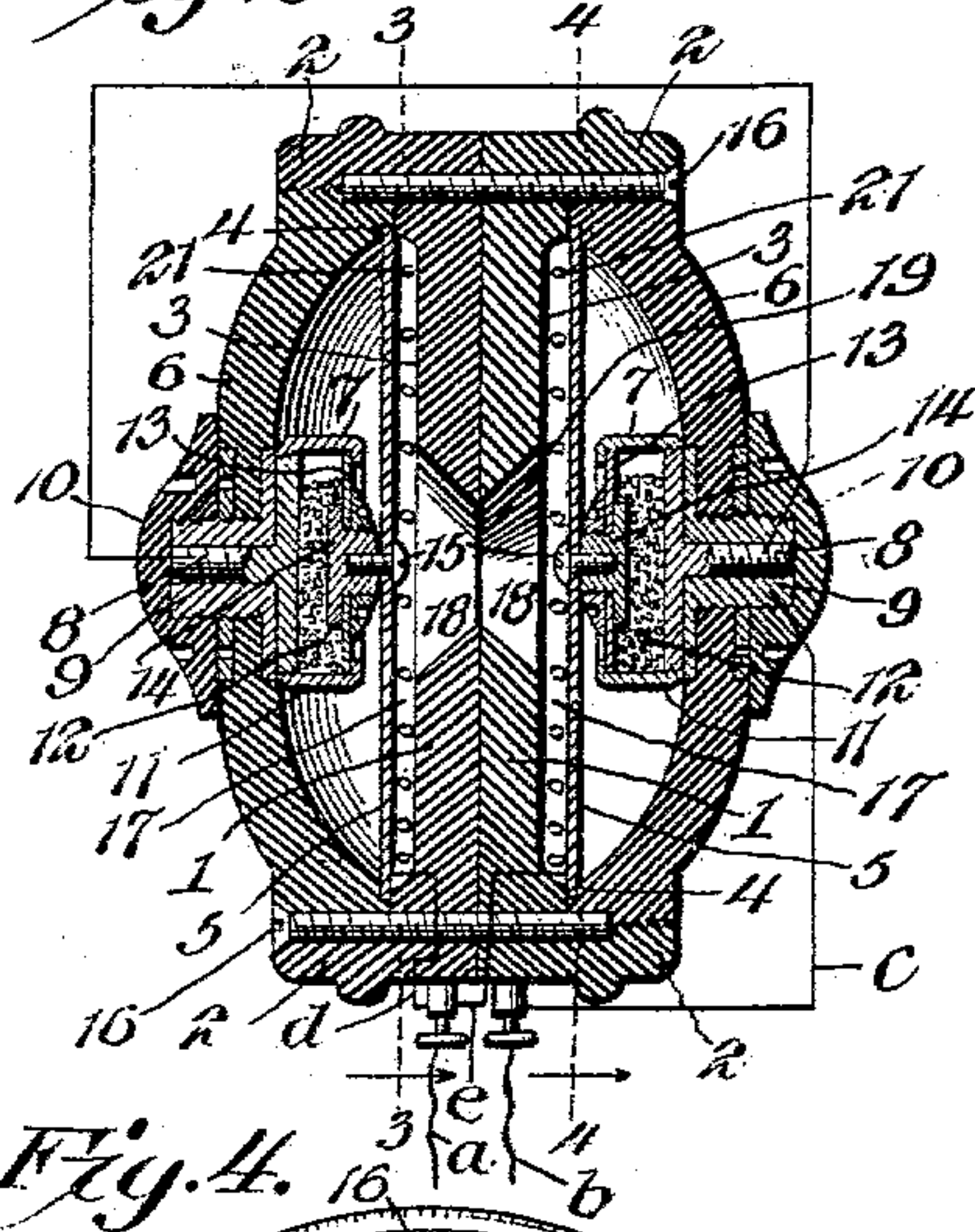


Fig. 3.

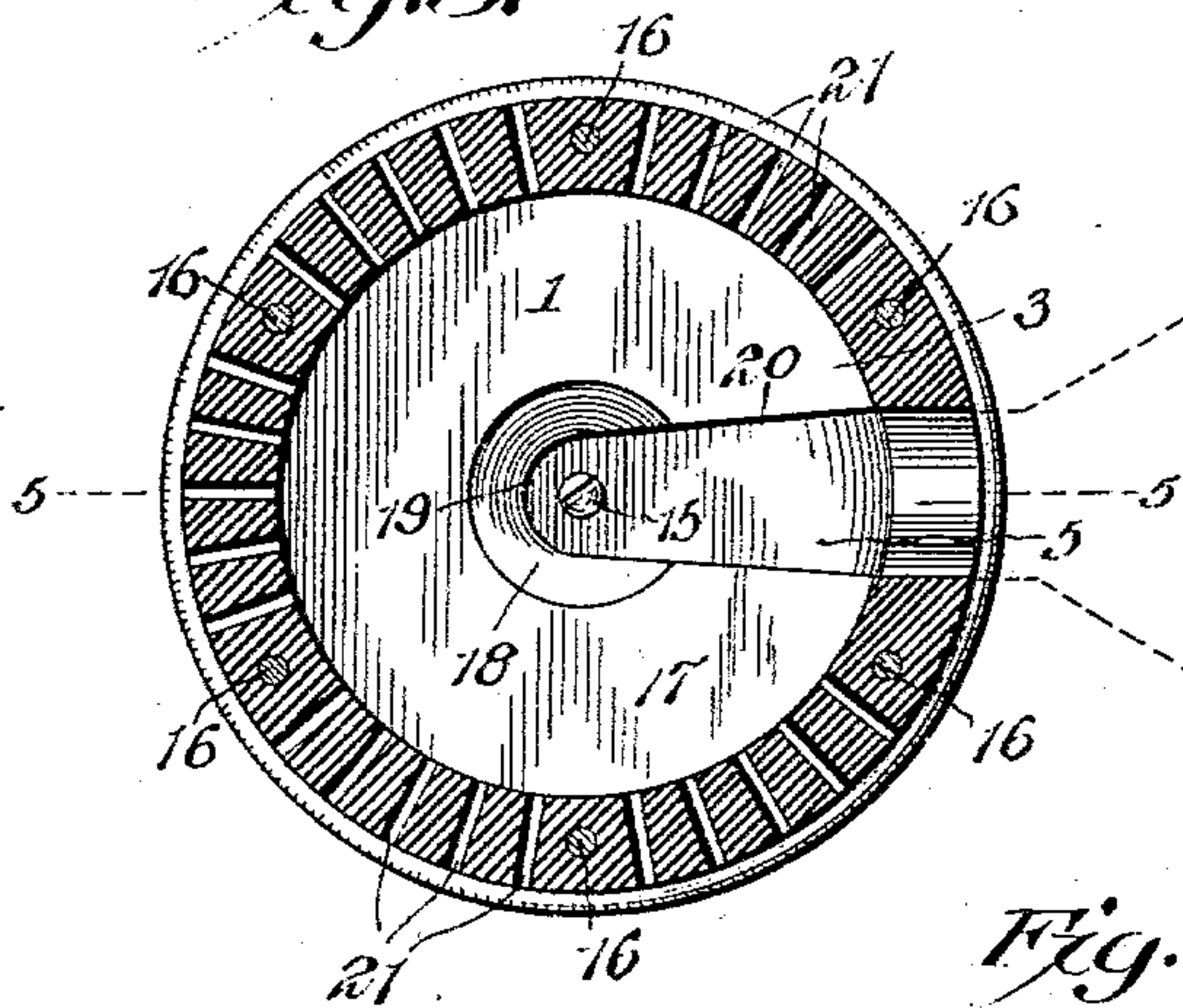


Fig. 4.

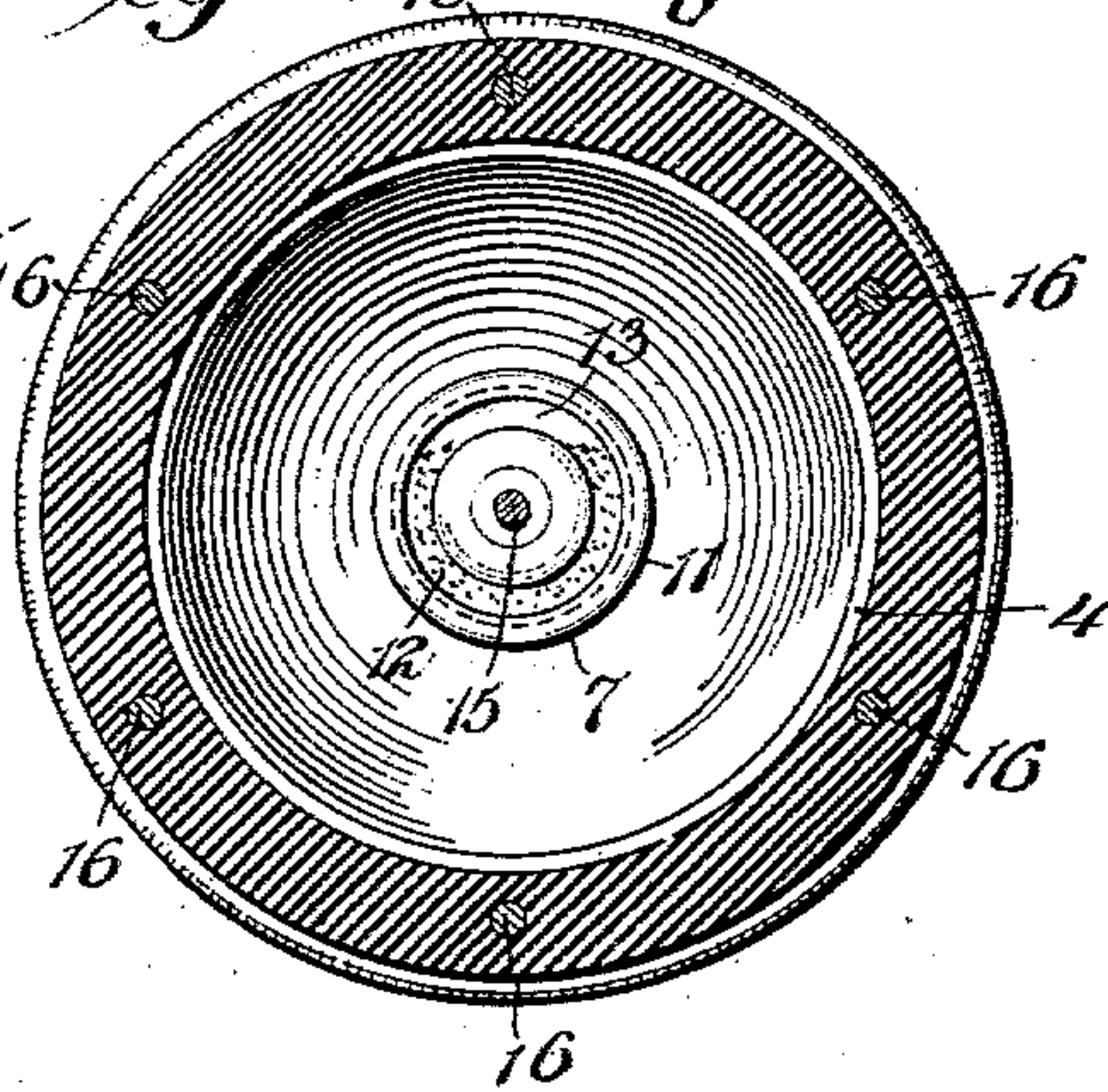
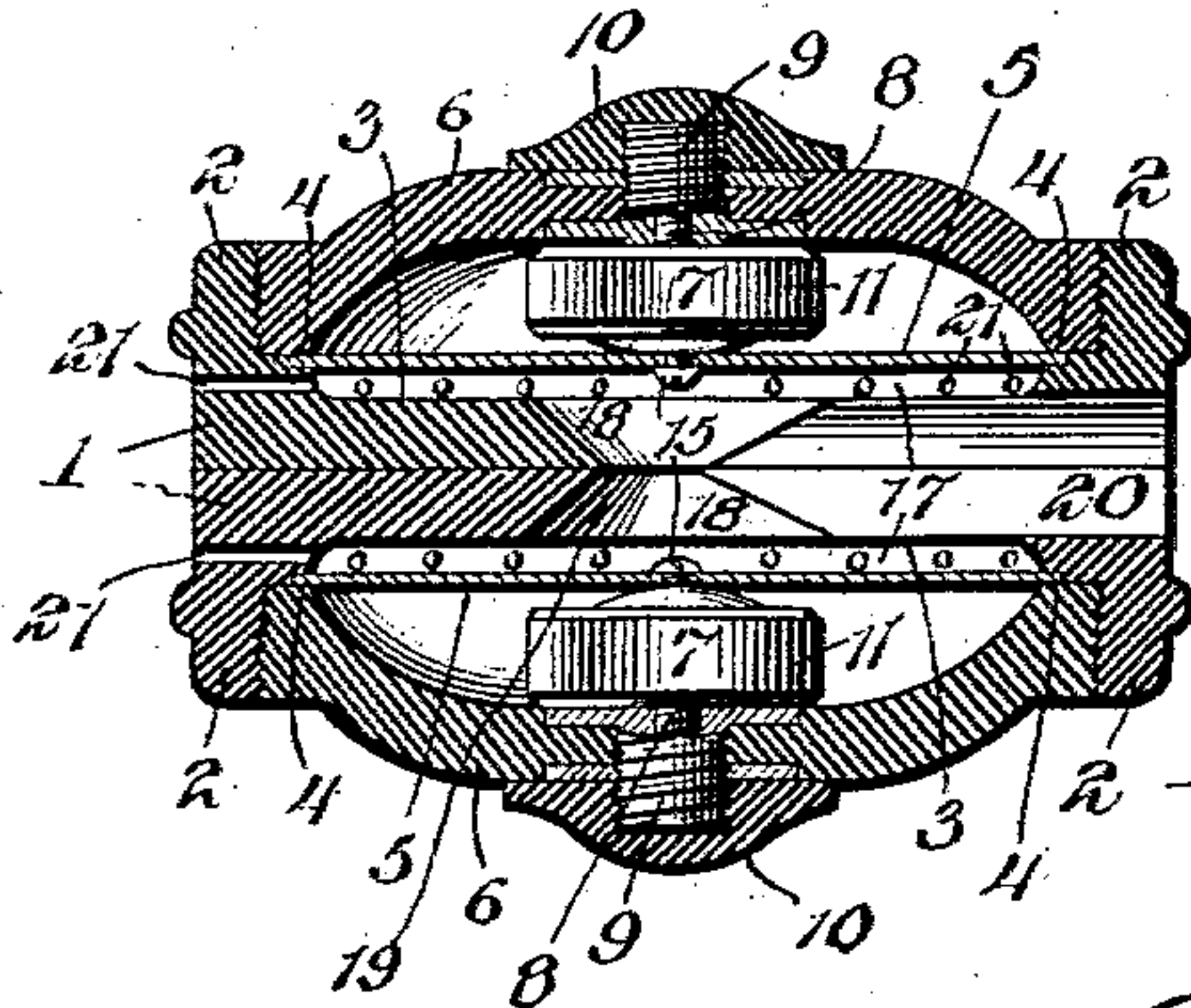


Fig. 5.



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# UNITED STATES PATENT OFFICE.

HERMANN G. PAPE, OF BROOKLYN, NEW YORK, ASSIGNOR OF THIRTY ONE-HUNDREDTHS TO JAMES McVEY, OF NEW YORK, N. Y.

## AUDIPHONE-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 752,921, dated February 23, 1904.

Application filed September 13, 1902. Serial No. 123,330. (No model.)

*To all whom it may concern:*

Be it known that I, HERMANN G. PAPE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Audiphone-Receiver, of which the following is a specification.

This invention relates to an instrument designed to be employed for the transmission of sound, and more particularly to what is known as an "audiphone-receiver."

The electrical audiphone is intended more especially for the use of deaf persons, and it bears a close analogy to a telephone apparatus, inasmuch as the transmission of sound is effected by microphonic action. It comprises what is known in this art as a "receiver," an earpiece, and intermediate electrical connections, the receiver corresponding in general function to the transmitter of a telephone apparatus and the earpiece corresponding generally with the receiver thereof.

The object of the invention is to produce an audiphone-receiver in which the sound-waves will be deflected in opposite directions against the centers of a pair of peripherally-confined diaphragms and will then be permitted to dissipate in a direction parallel with the diaphragms. The attainment of this object intensifies the transmitted sounds for the reason that the sound-waves act upon the most sensitive or responsive portions of the diaphragms and for the further reason that the dissipation of the sound-waves and their escape from the instrument prevents any tendency to reverberation, which would mar the sharp definition of sound-waves subsequently induced within the instrument.

A further object of the invention is to produce a multiple-diaphragm receiver having an inclosed funnel or passage leading inwardly from its periphery to a central sound-chamber formed in a wall or partition intermediate of the diaphragms, but spaced therefrom to define narrow dissipating-chambers having an opening or openings in their peripheral walls.

A still further object of the invention is to dispose button-electrodes directly opposite the

centers of the diaphragms and to connect each electrode and its diaphragm in multiple with the other electrode and its diaphragm, so that the derangement of one side of the instrument will not render it entirely useless.

Another object of the invention is to simplify the construction and arrangement of parts, thereby facilitating the repairing of the instrument and reducing the cost of manufacture.

To the accomplishment of the several objects stated and others subordinate thereto the invention in its preferred embodiment resides in an audiphone-receiver constructed as hereinafter described, illustrated in the accompanying drawings, and defined in the appended claims.

In said drawings, Figure 1 is a perspective view of my receiver. Fig. 2 is a diametrical sectional view thereof, showing the wiring in diagram. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a sectional view on the line 4 4 of Fig. 2; and Fig. 5 is another diametrical sectional view of the receiver on the line 5 5 of Fig. 3, the button-electrodes being shown in elevation.

Like characters of reference are employed to designate corresponding parts throughout the several views.

The receiver is in general form a circular body comprising separable sections, which when assembled form a hollow casing within which the diaphragms, electrodes, and sound-chambers are arranged. In the illustrated construction the instrument is in the form of a double receiver, each half or section of which is complete and effective for the reception and transmission of sound. Each side is made up of a hard-rubber disk 1, provided with a laterally-extended internally-threaded annular flange 2 and with a circular surface cavity 3 of somewhat less diameter than the internal diameter of the flange 3 to form an annular seat 4, against which is imposed the outer edge of a circular diaphragm 5, disposed parallel to and concentric with the disk 1. The diaphragms are preferably thin carbon disks, but may be made of any material possess-



ing in sufficient degree the properties of flexibility and electrical conductivity. The diaphragm 5 is secured in place by a concavo-convex externally-threaded cover-disk 6, 5 screwed into the annular flange 2 and bearing upon the outer edge of the diaphragm. The concavo-convex form of the disk 6 produces sufficient space beyond the diaphragm for the reception of a button-electrode 7, co- 10 operatively related to the adjacent diaphragm and having a threaded shank 8 screwed into a bushing 9, which is in turn screwed into an axial opening in the disk 6. The bushing 9 projects beyond the disk 6 to receive a hard- 15 rubber or other suitable cap 10, which adds to the finish of the instrument and assists in the retention of the bushing.

The button-electrode 7 is not novel, but may be described as comprising an annular 20 casing 11, containing a granular electrode—as, for instance, granulated carbon—12, inclosed at one side by a mica disk 13, at the center of which is located a nut 14, secured by screws 15 to the center of the diaphragm 5.

25 The two sides or units of the receiver, each of which is constructed as described, are brought together with the disks 11 in contact and are secured in any suitable manner—as, for instance, by screws 16. I wish 30 it to be distinctly understood, however, that the invention is not limited to this method of combining the individual receivers or units, as many other expedients for this purpose will readily suggest themselves to those skilled 35 in the art to which the invention appertains. When the two sides or units of the receiver are assembled, the latter will be seen to include a casing inclosing a pair of diaphragms arranged in parallel and a button-electrode 40 in coöperative relation with each diaphragm and disposed axially with respect thereto. The two disks 11 will combine to form a wall intermediate of the diaphragms and in spaced relation thereto, since the surface cavities 3 45 in the outer faces of the disks will produce between the diaphragms and the center wall of the casing narrow sound-dissipating chambers 17, substantially corresponding in diameter with the disks.

50 Each of the disks 11 is provided directly opposite the center of the adjacent diaphragm with a trunco-conical opening 18, which in conjunction with the similar opening in the other disk produces what I shall term a “cen- 55 tral” sound-chamber 19, flaring outwardly in opposite directions toward the diaphragms. To this oppositely-flaring central sound-chamber in the center wall of the casing the sound-waves are led through a funnel-shaped pas- 60 sage 20, formed in the center wall and extending radially from the periphery of the receiver to the central sound-chamber. This passage constitutes, in effect, an inclosed re-

ceiver-funnel, located wholly within the confines of the receiver-casing; but, if desired, it 65 may be supplemented by an external funnel, as indicated by dotted lines in Fig. 3.

The peripheral walls of the narrow sound-dissipating chambers 17 are pierced by any 70 desired number of radial apertures 21, parallel with the diaphragms and designed to permit the escape of air from the chambers 17 for the purpose of effecting the dissipation of the sound-waves from said chambers, and thus 75 eliminating any tendency to reverberation therein.

The line-wires *a* and *b* of the circuit in which the earpiece (not illustrated) is included are led to binding-posts mounted on the receiver at any desired point—as, for instance, upon the 80 periphery thereof, as shown in Fig. 2. From one of the binding-posts a wire *c* is led successively to the button-electrodes, the other side of the circuit being in electrical connection with both diaphragms through wires *d* 85 and *e* carried back to the other binding-post. By this character of wiring the two sides of the receiver are included in multiple in the circuit, and therefore while the electromotive force is increased by the duplication of the 90 circuit-closing agencies the device is still useful for the reception and transmission of sound, even though one side may become inoperative.

The operation of the receiver is as follows: 95 The waves produced by articulate or other sounds uttered in proximity to the receiver will pass through the receiving funnel or passage 20 of the latter to the central sound-chamber 19, whence they will be deflected in 100 opposite directions and directed against the diaphragms at their centers, where said diaphragms are most sensitive or responsive. The flexing of the diaphragms under the impulse of the sound-waves will vary the electro- 105 motive force in the circuit to secure a microphonic vibration of the diaphragm or diaphragms of the earpiece in a manner well understood in the art. The waves having performed their functions are permitted to dissi- 110 pate within the dissipating-chambers 17, reverberation within these chambers being prevented by the provision of the apertures 21 establishing communication with the outer 115 air.

It should be particularly noted that the central sound-chamber 19 is not only located directly opposite the central portions of the diaphragms, but that, furthermore, this chamber extends through the central wall of the casing 120 in a direction at right angles to the diaphragms, so that the latter will receive the full impact of the waves instead of having a glancing contact with the latter, as is the case in that type of instruments in which the 125 sound-waves are led directly to the diaphragms



from the periphery of the receiver. It should be noted, furthermore, that while the sound-dissipating chambers 17 open into the outer air these openings are located adjacent to the peripheries of the diaphragms and are disposed parallel to the latter. By reason of this arrangement the diaphragms will be unaffected by sound-waves entering through the apertures 21, because these waves will move parallel with the diaphragms instead of against the same and will enter the chambers adjacent to their stationary peripheries.

It will thus be seen that the several enumerated objects of the invention are accomplished by the employment of the construction and arrangement described; but I wish it to be understood that I do not limit myself to the structural details defined or to the use of the instrument in an audiphone.

I have already stated that the receiver of an audiphone performs the general functions of the transmitter of a telephone, and it is evident that the invention is of equal utility in either of the specified connections.

What I claim is—

1. An instrument of the character described, comprising a casing, a diaphragm rigidly retained at its periphery within the casing, an opening or passage in the casing leading to the center of the diaphragm, and a series of sound-dissipating openings in the casing at the periphery of the diaphragm and substantially parallel therewith.

2. In an instrument of the character described, the combination with a casing, a diaphragm having its entire periphery retained rigidly within the casing, an opening or passage in the casing leading to the center of the diaphragm, and a series of sound-dissipating openings leading from the periphery of the diaphragm to the outer air and disposed parallel with said diaphragm.

3. An instrument of the character described, comprising a substantially circular casing having a centrally-apertured wall, a peripherally-retained diaphragm spaced from the apertured wall to define an intermediate sound-dissipating chamber, the peripheral wall of the casing being formed with a circumferential series of radial openings located in a plane between the diaphragm and the apertured wall and parallel therewith, and an electrode in cooperative proximity to the diaphragm.

4. An instrument of the character described comprising separate connected members or units each including a casing, a diaphragm rigidly retained at its periphery within the casing, and a series of sound-dissipating openings leading from the periphery of the diaphragm to the outer air and disposed substantially with said diaphragm, and a receiving opening or passage extending from the exterior

of the instrument to the centers of the diaphragms.

5. An instrument of the character described, comprising a casing divided by a middle wall having an axial opening constituting a central sound-chamber, diaphragms spaced from the opposite sides of the middle wall to define intermediate sound-dissipating chambers, sound-dissipating openings disposed substantially parallel with the diaphragms and leading from the peripheries of said diaphragms to the outer air, electrodes in cooperative proximity to the diaphragms, and a receiving-passage leading from the exterior of the casing to the central sound-chamber.

6. An instrument of the character described, comprising a casing divided by a middle wall having an axial opening constituting a central sound-chamber, diaphragms spaced from the opposite sides of said wall to define intermediate sound-dissipating chambers, openings piercing the outer wall of the casing in planes between the middle wall and the diaphragms and disposed parallel with the latter, electrodes in cooperative proximity with said diaphragms, and a passage from the exterior of the instrument to the central sound-chamber.

7. An instrument of the character described, comprising a casing divided by a middle wall having an axial opening defining a central sound-chamber whose walls are flared in opposite directions from the middle of the chamber, diaphragms retained at their peripheries and spaced from the middle wall of the casing to define intermediate sound-dissipating chambers, circumferential series of radial openings piercing the outer wall of the casing in planes between the middle wall and the diaphragms, button-electrodes secured to the side walls of the casing and connected to the diaphragms at their centers, and a receiving-funnel formed in the middle wall of the casing and extending radially from the central sound-chamber to the periphery of the casing.

8. An instrument of the character described, comprising a casing having a centrally-apertured wall, a peripherally-retained diaphragm spaced from the apertured wall to define an intermediate sound-dissipating member, the wall of the casing being formed with a series of openings located in a plane between and extending parallel with the diaphragm and the apertured wall, and an electrode in cooperative proximity to the diaphragm.

9. An instrument of the character described, comprising a casing, divided by a middle wall having an axial opening flared in opposite directions from the middle of the wall, and constituting a central sound-chamber, diaphragms spaced from the middle wall of the casing to define intermediate sound-dissipating chambers, series of openings piercing the outer



wall of the sound-dissipating chambers and  
extending substantially around the instru-  
ment, said openings extending radially and  
being in planes parallel with the diaphragms,  
5 electrodes connected to the diaphragms, and  
a receiving-funnel formed in the middle wall  
of the casing and extending radially from the  
central sound-chamber to the periphery of  
said casing.

In testimony that I claim the foregoing as  
my own I have hereto affixed my signature in  
the presence of two witnesses.

HERMANN G. PAPE.

Witnesses:

WILLIAM F. TAYLOR,  
JOHN L. PETER.