

No. 768,185.

PATENTED AUG. 23, 1904.

J. W. KURTZ.  
TELEPHONE.

APPLICATION FILED OCT. 17, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

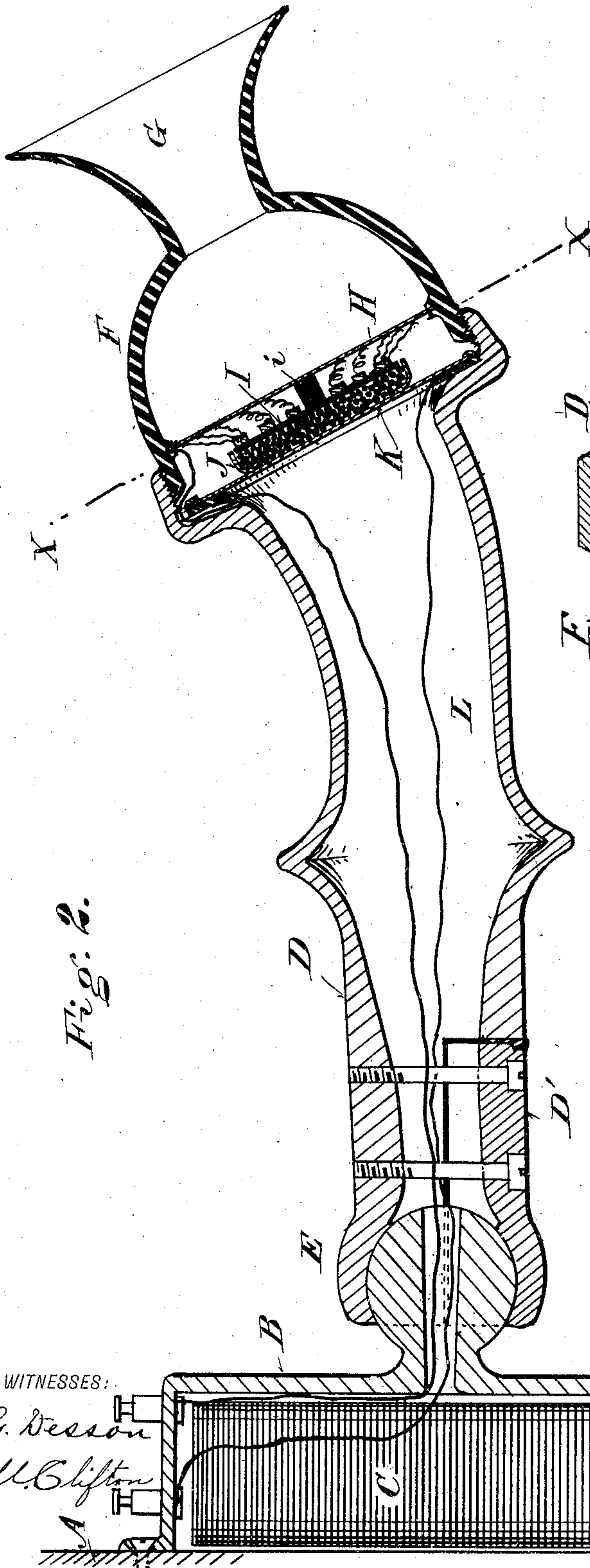


Fig. 2.

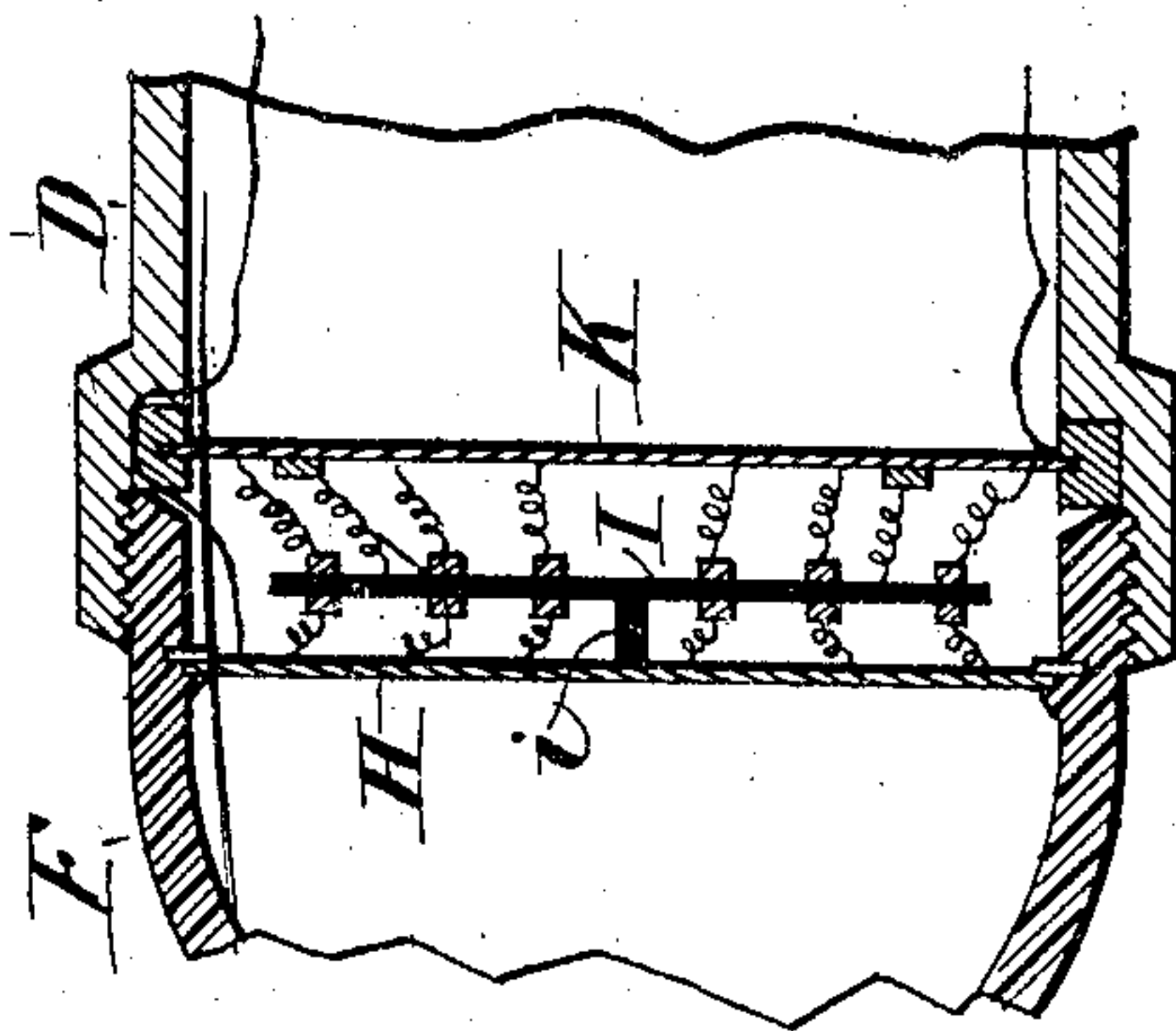


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

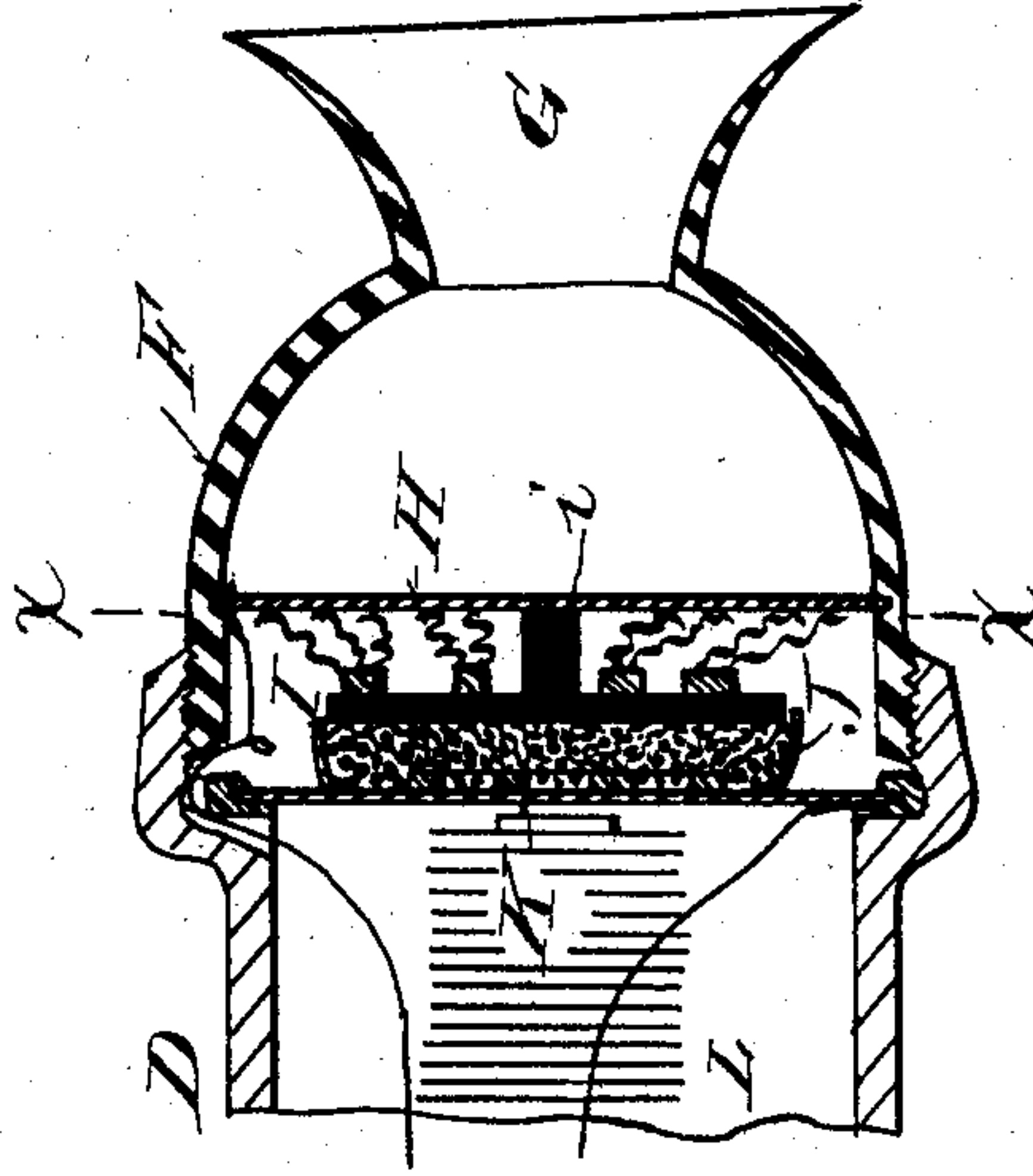
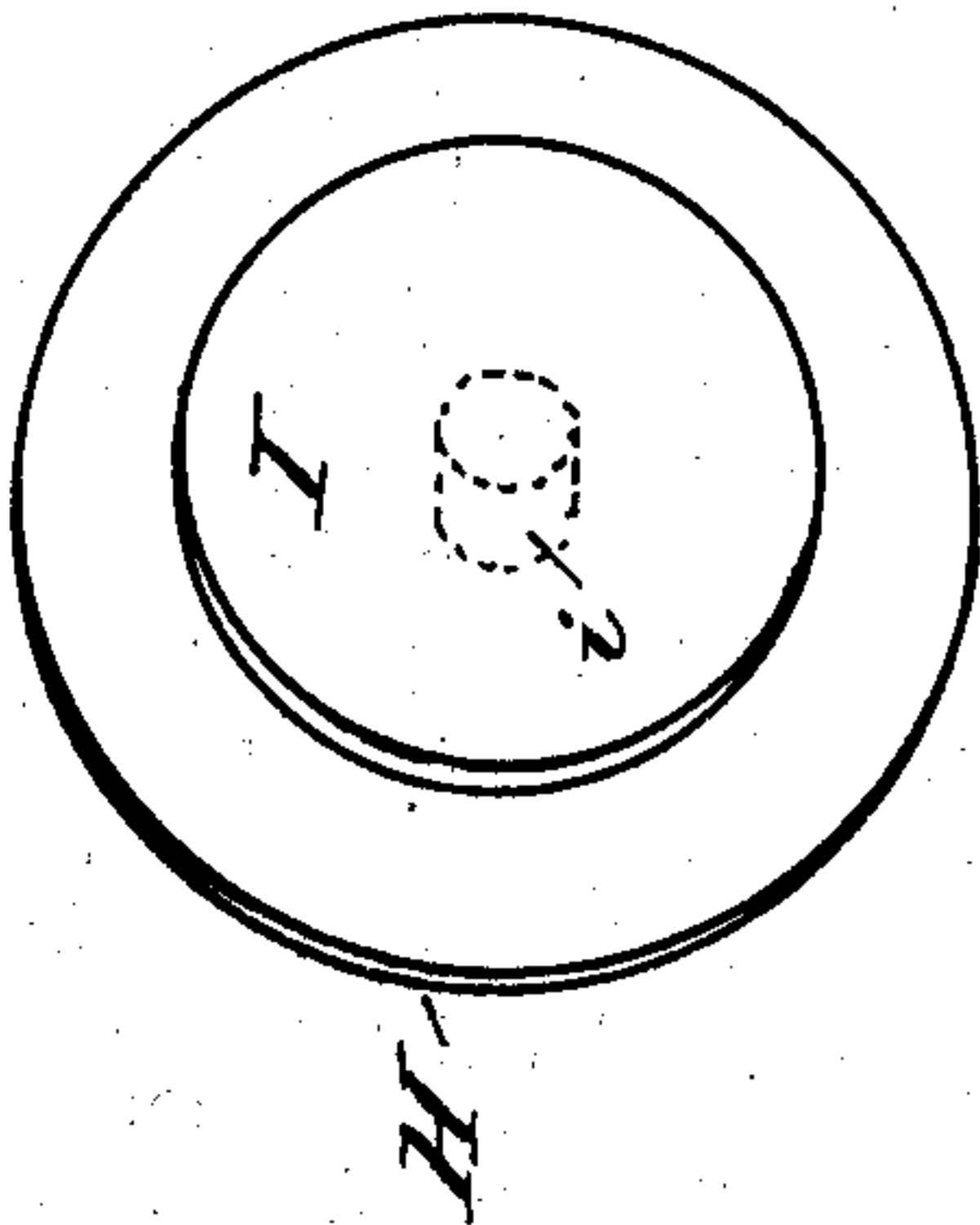


Fig. 6.

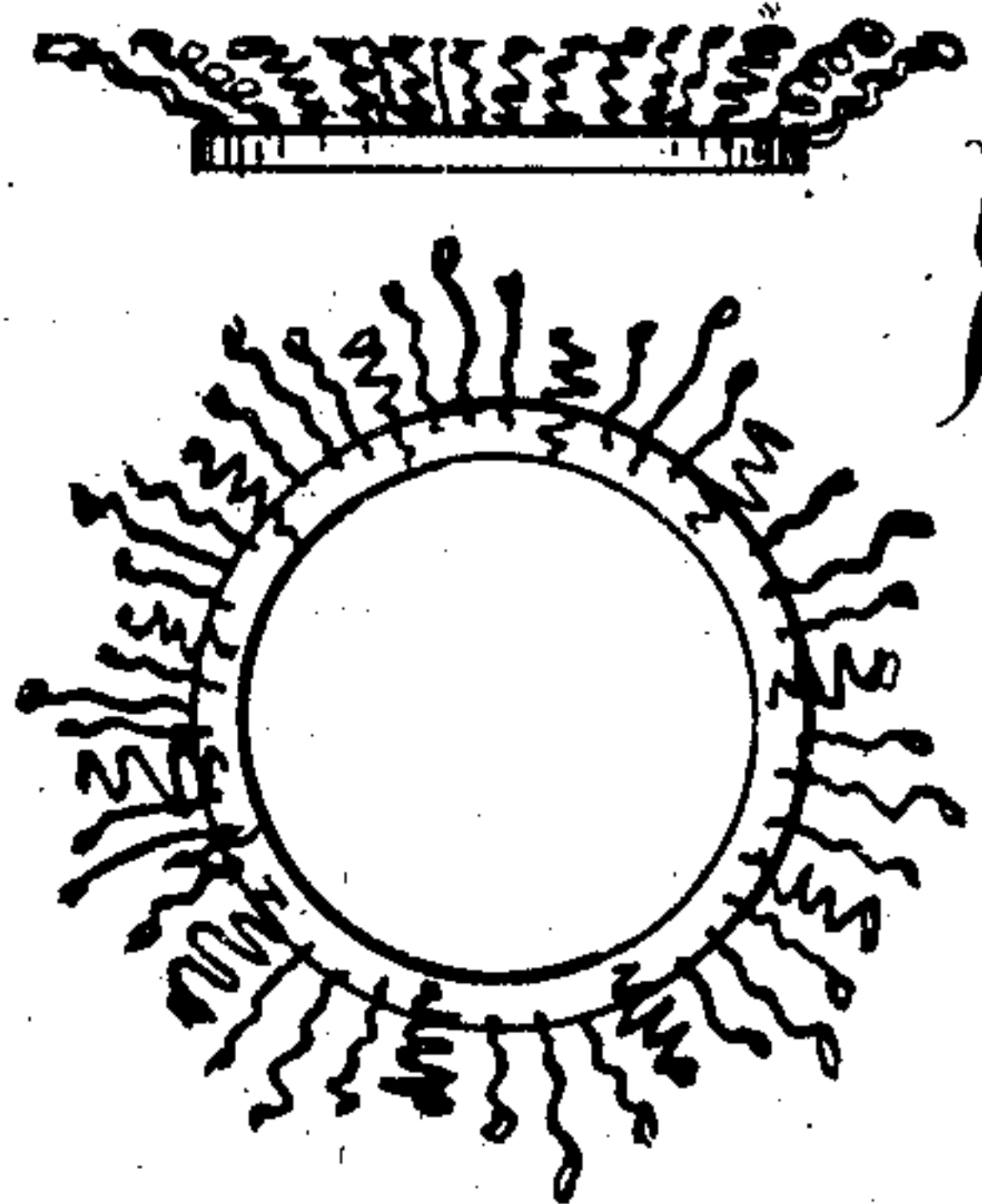
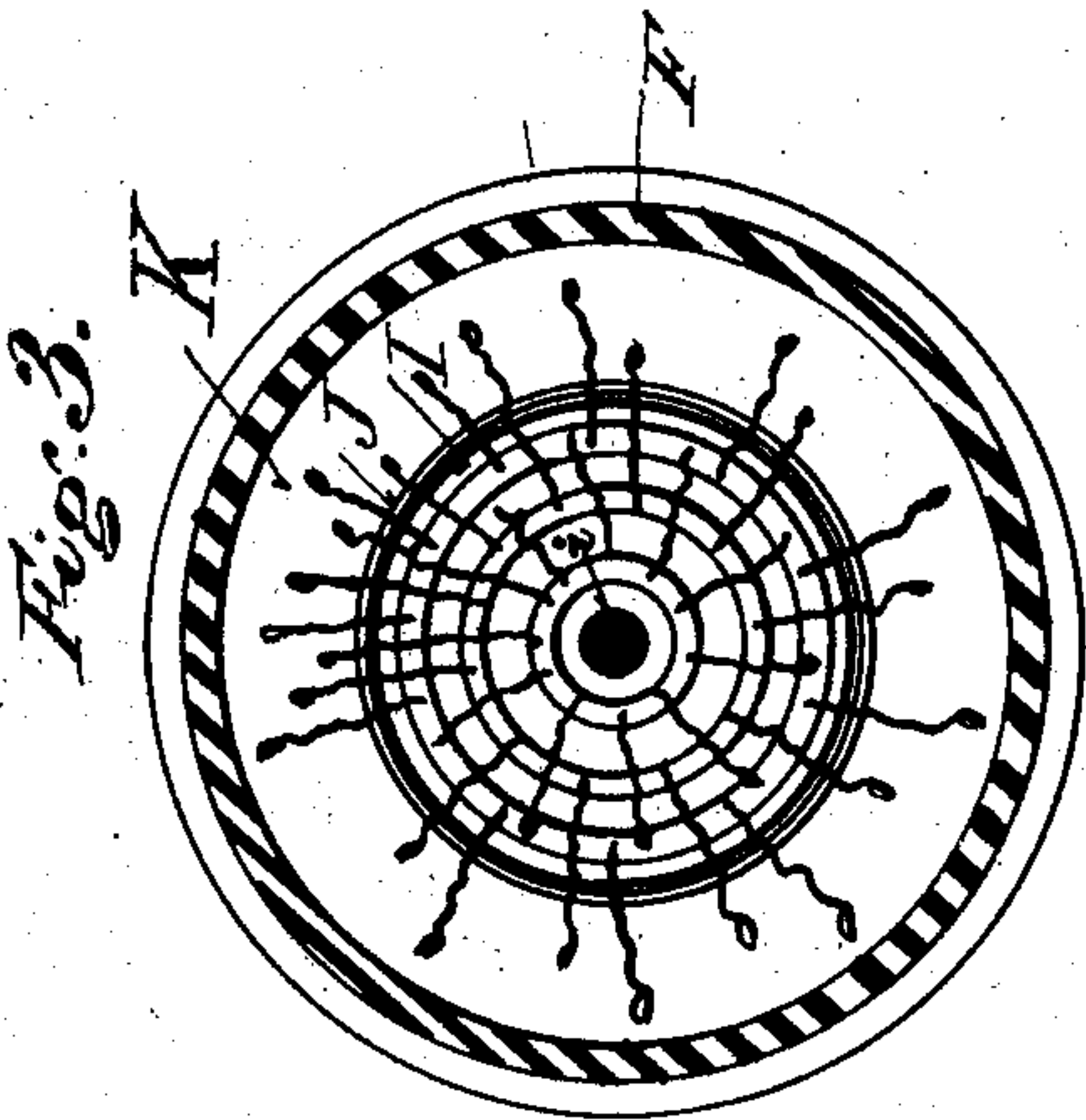


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 768,185, dated August 23, 1904.

Application filed October 17, 1902. Serial No. 127,735. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN WILLIAM KURTZ, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Telephones, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in telephones, having special reference to the diaphragm portions used to receive or transmit sound.

The object of my invention is to increase the efficiency, adaptability, and tone of a telephone transmitter or receiver of improved form and construction, whereby the ability to transmit sound, the adjustability of pitch to suit various users, and the clearness and mellowness of tone are secured in my invention.

With this object in view my improvements have reference to a triple diaphragm, to a multiple arrangement of points of contact yieldingly applied to one or more diaphragms, have reference to a combination of carbon granules and yielding metallic points in contact with a diaphragm, have reference to a combination of said diaphragms in connection with magnetic and battery circuits, and have reference to other points of construction and arrangement hereinafter described and claimed.

In the accompanying drawings, on which like reference-letters indicate corresponding parts, Figure 1 represents a sectional view of two diaphragms and interposed yielding contacts, illustrating my invention and the adjacent parts in which they are mounted; Fig. 2, a longitudinal sectional view of the support and diaphragm of my construction; Fig. 3, a plan view of the multiple contacts with the outer diaphragm removed and view taken on the line X X, Fig. 2; Fig. 4, a detached view of the outer diaphragm and middle diaphragm combined therewith; Fig. 5, a detail view of a set or ring of multiple contacts; Fig. 6, a partial sectional view, similar to Fig. 2, and showing a combined carbon and filament diaphragm contact and magnet combined with the triple diaphragm.

In the ordinary form of diaphragm used for transmission of sounds the vibrations are transmitted mainly from the center of the diaphragm or receive the impressions at the center of a magnetized plate, as in a receiver. My principle consists in the use of a diaphragm, preferably electrically connected to both poles of a battery, so as to be in equilibrium electrically though charged to any desired amount, together with the taking up of the electrical or other vibrations of said diaphragm by multiple points of contact with said diaphragm, as in the accompanying exemplification of my invention, which vibrations thus taken up from the whole surface of the diaphragm receiving them, as in a transmitter, increase and improve the effect transmitted to a second or middle diaphragm having a yielding contact with the third or inner diaphragm.

The essential principle of my invention is the provision of a diaphragm adapted to be vibrated by sound-waves and the taking up of such vibrations by a multiple number of yielding contact-points applied to the surface of the diaphragm. A loud noise would cause a vibration that would be taken up by a large number of these contact-points, while a low sound would cause only such contacts to act that were in the immediate neighborhood of the sound-wave, and being many would collect and convey it uniformly to the ear or transmit the same otherwise. To illustrate this, I will refer to the action of a pool of water agitated by a stone dropped into the same. The waves are transmitted outward from the center or place where the stone struck the surface in what appear to be concentric circles or undulations; but under the microscope these appear as independent circles radiating outward in all directions. It is on the same principle that my multiple contacts applied to the surface of the vibrating diaphragm take up the vibrations at two or more points, which vibrations are afterward united and transmitted onward with increased volume and power. Thus instead of depending upon one central contact for the vibrating diaphragm, as in the old form now in use, I provide multiple contacts that take up and



utilize the auxiliary vibrations and combine all in one full round mellow tone, the pitch of which is determined by the pressure with which the contacts are adjusted against the diaphragm. This diaphragm may be of mica or other non-electric material, or the diaphragm may be of platinum or other metal adapted to be electrified, as hereinafter described. In either case the principle of taking up the vibrations produced in the diaphragm by means of the multiple number of yielding contact-points constitutes the essential feature of my invention.

Referring to the drawings, the letter A represents the back board of a telephone-cabinet or other support on which is mounted the base B, conveniently inclosing an induction-coil C and carrying an arm D, having a ball-and-socket or other universal joint at E with said base. The arm is preferably hollow, of a suitable size and length, forming a sounding-chamber for the diaphragm carried at the outer end, at which a hemispherical or dome-shaped cap F forms the outer sound-chamber for the diaphragm of my peculiar construction carried therein. A flared tube G communicates with the chamber F to transmit or receive sound therefrom. The cap is adjustably connected with the arm D by screw-threads or otherwise.

Within the cap F, secured by notches or otherwise therein, is mounted a plate H, of tintype, platinum, or other metal or material adapted to be electrically sensitized. A carbon disk or plate I is supported on or otherwise connected with the plate H by the stem J and fits within the cup J, containing carbon granules or other yielding contact-points. By the central support the edges of the carbon disk possess a yielding quality, aiding the multiple contacts to provide a yielding connection with the diaphragm. Any means to support the carbon disk in connection with the plate H may be employed. The cup J is supported on the third or inner diaphragm K, communicating with the sounding-chamber L of the hollow-arm. Distributed upon the surface of one side of the diaphragm H are multiple contacts consisting of inclined or spiral filaments of platinum or wire with platinum points or other suitable material, which thus act with a yielding pressure or contact on said surface of the diaphragm. These contacts are arranged in circles or otherwise, as may be desired, and are preferably inclined from the ring or base in which they are mounted toward the diaphragm adjacent. The filaments may be used alone or otherwise or combined with the carbon or other backing to the disk. The diaphragms are properly insulated and are electrically connected by wires with both poles of the battery and the inductive coil C. The plate H is therefore electrically sensitized, and when subject to sound vibrations the electrical pulsations are taken up by

the multiple points in yielding contact therewith and a yielding multiple contact for the diaphragm is provided. Useless vibrations are thus checked and the vibrations of the whole surface are collected. The middle diaphragm of carbon or other material connected to the diaphragm H receives a modulated and definite influence, which it transmits by its wide-spreading disk in a yielding manner to the yielding back or mass of loose carbon particles or other yielding material supported by the third or inner plate K. The tone or timbre is thus mellowed and cleared from the crackling vibration or explosions generally impairing the efficiency of the ordinary transmitter or receiver. The sounding-chamber L in the hollow arm or elsewhere improves the quality of the tone, as the body of a guitar or violin increases the resonance of the string vibrations. The outer sounding-chamber in the cap F likewise improves the effect of the tone given to or received from the diaphragm H.

While I have described the combination as a transmitter, the same construction and arrangement may be used as a receiver. In Fig. 6 I have shown a magnet in connection with the diaphragm described in Fig. 2 and may use such magnetic influence to increase the power of the instrument with excellent results. The magnet may be used together with the electrical connections of the diaphragm, or the magnet alone may be used and the battery connections dispensed with; but in the latter case the result is not so good as in the construction previously described.

The yielding backing of the plate I may be obtained by carbon granules, as before described, and such being held with a solid disk carried by a diaphragm, or yielding contacts by filaments on the same principle as described for the plate H may be interposed between the diaphragms I and K. (See Fig. 1.) The combination of filaments and carbon granules may also be used. A magnet with the diaphragm may also be used for the transmitter, if desired. By the adjustment of the plate H and the carbon disk I toward or away from the diaphragm K the quality of the tone is affected. When the pressure on the multiple contact-points engaging the diaphragms H and I is increased, the tone becomes shriller and sounds farther away. On the other hand, the lessening of the pressure by separation of the diaphragms results in a mellow and full tone and a readiness to receive and transmit sound. Platinum filaments or copper-wire filaments with platinum points avoid rust and corrosion from dampness. The universal joint at E is preferably constructed by a ball-and-socket connection of the base and arm and has a detachable portion D', secured by screws, so as to be mounted with holding pressure on the ball portion. Sufficient friction between the parts is thus maintained to support the



arm. The hole in the center allows the passage of the wires electrically connecting the diaphragms with the battery and induction-coil.

5 Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

10 1. The combination with two vibratory diaphragms, an interposed carbon plate, a set of multiple contacts with one diaphragm connected with the middle carbon diaphragm, a yielding connection between said carbon diaphragm and the other outer diaphragm, and a support for said diaphragm.

15 2. The combination with two vibratory diaphragms, of an interposed carbon diaphragm carried by one of the outer diaphragms, multiple contacts connected with said carbon diaphragm and yieldingly applied to the supporting-diaphragm, and a collection of granular carbons carried by the other diaphragm in contact with the middle carbon diaphragm and adjunctive devices operating therewith.

20 3. The combination with a suitable casing, and a vibratory diaphragm therein, of a carbon piece supported on said diaphragm, carbon granules mixed with platinum filaments contacting with said carbon piece, an inner diaphragm supporting said granules and filaments, and operative connections for said diaphragms.

25 4. The combination with a suitable casing and a vibratory diaphragm therein, of a carbon plate supported by a stem from said diaphragm, multiple contacts engaging with said diaphragm and communicating with said plate, an inner vibratory diaphragm opposite said plate, interposed carbon granules and platinum filaments yieldingly connecting said plate and inner diaphragm, and operative connections for said diaphragms.

30 5. An improved telephone, comprising a collection of granular carbon and yielding filaments intermixed, constituting multiple yielding contacts substantially as described.

35 6. An improved telephone, comprising vibratory diaphragms, and inclined yielding filaments constituting sound-transmitting contacts, having their outer ends spread out over

the surface of one diaphragm and supported 50 by the adjacent diaphragm at their inner ends.

7. An improved telephone, comprising the herein-described triple diaphragm H, I, and K, the interposed filaments and carbon granules, the magnet L adjacent to the diaphragm K, 55 and operative connections, substantially as shown and described.

8. An improved telephone, comprising a vibratory diaphragm and multiple contact-points yieldingly engaged with said diaphragm, consisting of a plurality of independent spring filaments each having its end inclined at its contact with said diaphragm, and a support for the other ends of said filaments, and means to collect and transmit the 65 individual, varying vibrations received by said filaments, substantially as described.

9. An improved telephone, comprising a casing, a vibratory diaphragm therein, a carbon plate opposite said diaphragm, a series of rings carried by said plate, and a series of filaments extending from each ring, having a yielding contact with said diaphragm, and operative connections for said carbon plate to transmit the multiple vibrations thus collected and combined. 75

10. An improved telephone, comprising a suitable casing, a triple diaphragm mounted in said casing forming a sounding-chamber between the two outer diaphragms and a sounding-chamber on both sides of said triple diaphragm, and adjunctive devices operating therewith. 80

11. An improved telephone, comprising a hollow arm D, a screw-threaded adjustable 85 cap F, a triple diaphragm mounted within said cap opposite the chamber in the arm, one diaphragm being carried by the cap and thereby adjustable with regard to the adjacent diaphragms, and yielding contacts operatively 90 connecting said diaphragms and regulated by adjusting the cap and outer diaphragm.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WILLIAM KURTZ.

Witnesses:

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W. K. BURR.