

(No Model.)

2 Sheets—Sheet 1.

C. C. HUGHES.
TELEPHONE TRANSMITTER.

No. 542,444.

Patented July 9, 1895.

Fig. 1.

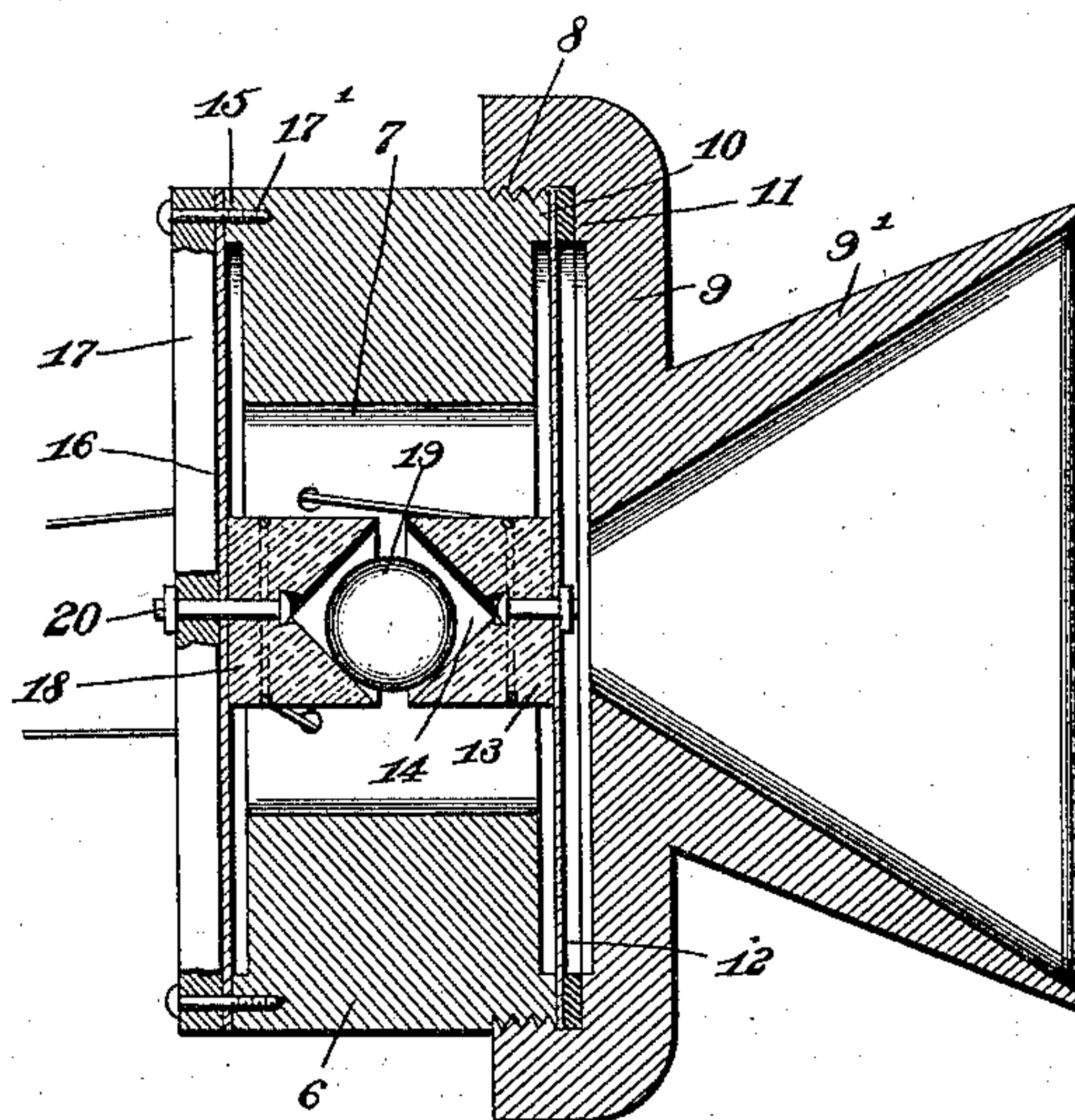
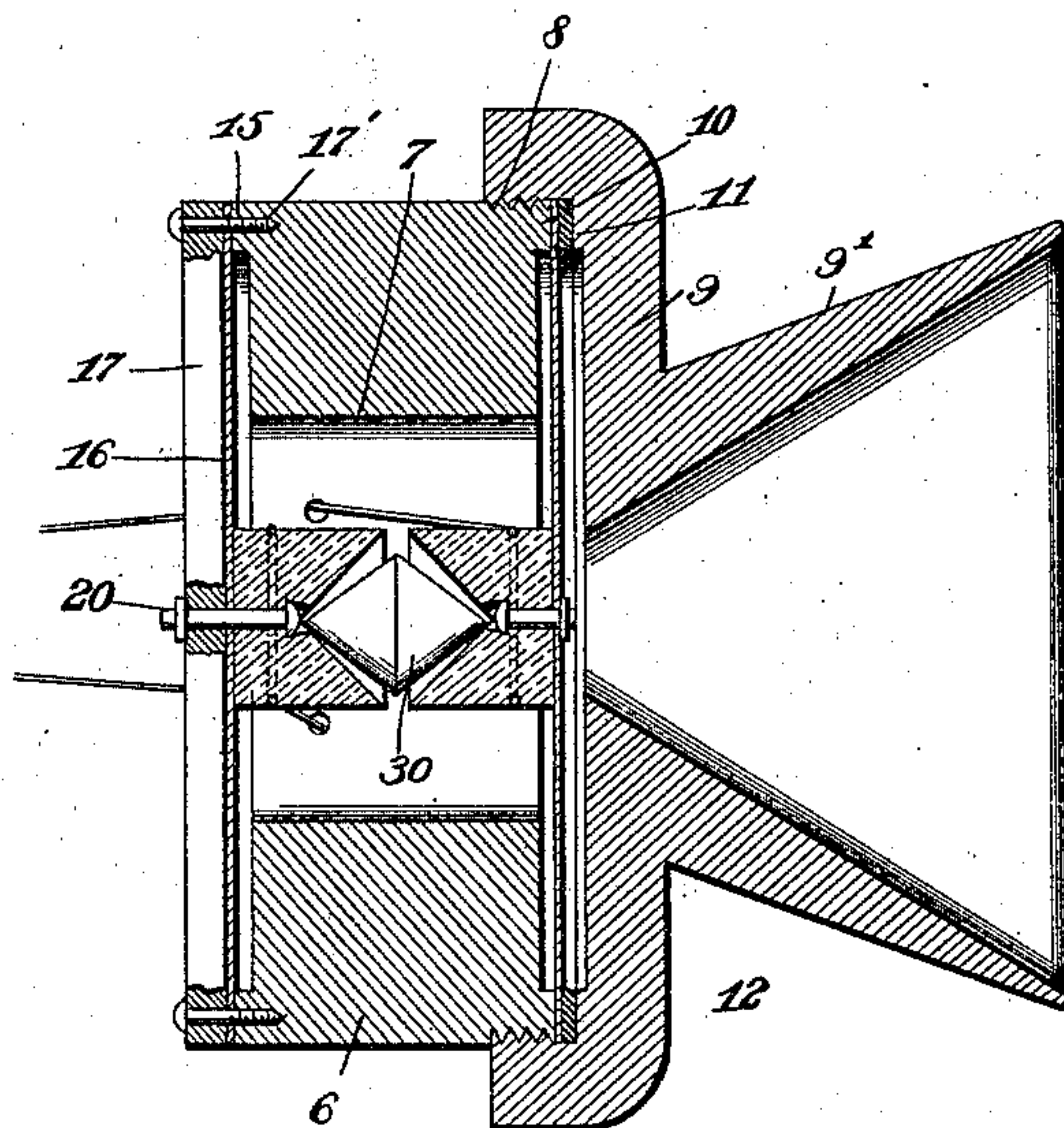


Fig. 3.



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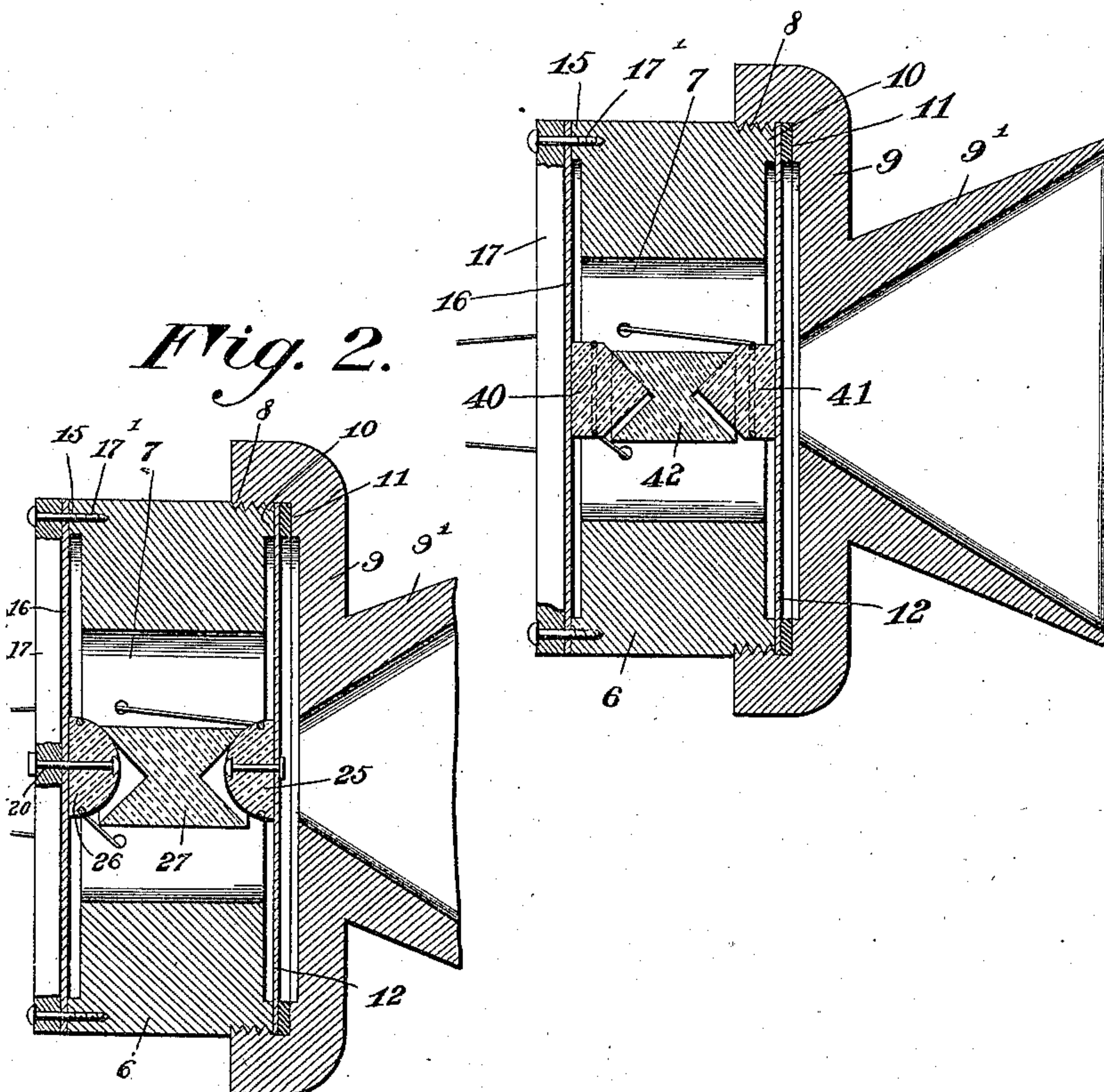
2 Sheets—Sheet 2

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Fig. 4.



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UNITED STATES PATENT OFFICE

CHARLES C. HUGHES, OF BALTIMORE, MARYLAND.

TELEPHONIC TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 542,444, dated July 9, 1895.

Application filed September 12, 1894. Serial No. 522,832. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. HUGHES, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Telephonic Transmitters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of telephonic transmitters known as "carbon" transmitters, and more particularly to the specific class of transmitters, multiple electrode, the object of my invention being to provide such construction as will produce a transmitter which will have the utmost delicacy of transmission, which shall not be liable to "buzzing" due to abrasion of the electrodes, which shall be compact in form, and shall be easy of manufacture, the said transmitter to be specially applicable to house systems and other short lines involving no induced currents, although it is found to operate equally well under all conditions.

With these objects in view, my invention consists in providing a suitable casing inclosing a preferably annular chamber, at one side of which and opening into said chamber is arranged the usual funnel, adjacent to whose inner opening is arranged a diaphragm having a button of peculiar form and of high electrical resistance secured thereto and diametrically opposite to a similar button attached to a second diaphragm which is secured in place on the opposite side of the casing by means of a suitable bridge and acts to form a closure for the other end of the said annular chamber. Placed loosely between these buttons is an electrode, preferably of similar material and varying in form in accordance with that of its adjacent buttons. Suitable connections are made from the buttons to the line and battery or battery and primary winding of induction-coil, as the case may be.

Referring now to the drawings forming a part of this specification and in which like symbols of reference indicate similar parts in the several views, Figure 1 is a vertical section of the preferred form of my invention. Fig. 2 is a modification showing a reversal of

the forms of the electrodes. Fig. 3 is a vertical section of a transmitter, showing the employment of a double cone in place of the ball in Fig. 1. Fig. 4 is a similar view showing a reversal in form of the electrodes shown in Fig. 3.

In constructing a transmitter in accordance with my invention, I form a preferably cylindrical casing 6, although it is evident that it may be of any desired form, inclosing a longitudinal chamber 7. The periphery of the casing 6 may be provided with screw-threads 8 at one edge thereof to receive the flange 9 of the usual conical mouthpiece 9'. The outer face of the casing 6—that is, the face adjacent to the mouthpiece—has a counter-sunk portion resulting in a shoulder 10, between which and a correspondingly-formed shoulder 11 on the flange 9 is held a diaphragm 12, of any suitable material, and at the center of which and on the inner surface is secured a button 13, whose free end is provided with a conical depression 14, the extent of whose angle is preferably 90 degrees.

The rear face of the casing 6 is counter-sunk in a manner similar to that of the front face, resulting in an annular shoulder 15, against which is clamped a second diaphragm 16 by means of an elastic bridge 17, arranged diametrically of the diaphragm. This bridge may be held in place by screws 17', as shown, or in any other manner whereby it may be adjusted when desired. Secured to the inner face of the diaphragm 16 and at the center thereof is a second button 18, similar in construction to 13, and arranged with its conical recess against that of the former, whereby a double conical chamber is formed, in which is held a sphere 19, whose diameter is slightly less than the perpendicular distance between opposite points in the surfaces of the depressions of the buttons. The buttons 13 and 18 may be secured to their respective diaphragms in any desired manner, such as by means of bolts, as shown, in which latter case the bolt 20 of the button 18 is passed entirely through the bridge 17. Suitable electrical connections are attached to the buttons 13 and 18, or in the event of iron diaphragms being used connection may be made with any portions of said diaphragms, as will be readily seen.

In Fig. 2 I have shown what is practically a transposition of the electrodes 13, 18, and 19, using instead of the recessed buttons hemispherical buttons 25 and 26, and instead
5 of the sphere 19 a cylinder 27, having conical depressions in its ends and held between the said buttons.

Fig. 3 represents an embodiment of my invention, in which all of the elements are identical in form and arrangement with those of
10 the elements shown in Fig. 1, with the exception of the free electrode 30, which in the latter instance is in the form of a double cone instead of a sphere.

In Fig. 4 I have shown a transposition in the form of the electrodes shown in Fig. 3, the two buttons 40 and 41 having conical extremities holding in suspension a cylinder 42
15 provided with conical depressions in its ends to receive the said conical extremities.

It will be noted that in each application of my invention as set forth in the drawings herewith the free electrode bears upon surfaces less than tangent—that is, the surfaces
20 are curved—whereby a variation in the extent of contact is secured in accordance with the vibration of the receiving-diaphragm, and in the case of the form shown in Fig. 1 as the electrodes 13 and 18 approach each other the
25 line of conductivity through the electrode 19 approaches the diameter, and at the same time the points of contact between the electrode 19 and the electrodes 13 and 18 tend to form an ever-increasing circle approaching
30 the great circle.

It will thus be seen that I have provided a very simple and cheap construction, having but few parts, readily adjustable, and the parts of which may be easily replaced. Moreover,
35 the free electrode in each construction is so formed and is so arranged with respect to its abutting electrodes as to prevent sliding and other objectionable motions and the resultant “buzzing” due to abrasion and loose motion
40 of the elements.

I do not limit myself to any particular material in the manufacture of my invention, as it will be readily understood that I may employ any resilient material for the diaphragms
45 and may use any substance for the electrodes, it being preferable, of course, to employ a material for the latter which possesses a high coefficient of resistance to electricity.

Having now described my invention and the means for carrying it into effect, what I
55 claim is—

1. In a telephone transmitter, an electrode having a cavity whose sections on planes perpendicular to the direction of motion are arcs of circles of gradually varying radii, and the
60 co-operating electrode having an exterior surface whose sections in the same planes are also arcs of circles of varying radii, the radii of the arcs of normal contact of the electrodes differing in value.

2. A telephone transmitter, comprising a diaphragm adapted to receive sound waves, an electrode secured thereto, a second diaphragm having a similar electrode secured
65 thereto, each of said electrodes having a cavity whose sections in planes perpendicular to the direction of motion are arcs of circles of gradually varying radii, and a free electrode held in suspension by the aforesaid electrodes,
70 and having an exterior surface whose sections in planes perpendicular to the direction of motion are also arcs of circles of varying radii, the radii of the arcs of normal contact of the electrodes differing in value.

3. In a telephone transmitter, the combination of a diaphragm adapted to receive sound waves, an electrode secured thereto and having a reentrant conical surface, a second diaphragm provided with an electrode secured
75 thereto having a reentrant conical surface, a free electrode arranged to move over said surfaces in accordance with sound-waves to vary the area of the mutual contact of the surfaces of the electrodes.

4. In a telephone transmitter, the combination with a diaphragm provided with an electrode secured thereto having a reentrant conical surface, a second electrode provided with a suitable support, and having also a reentrant conical surface, and a free electrode in
80 contact with said surfaces and adapted to move thereover to vary the area of contact in accordance with sound-waves acting on the said diaphragm.

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

CHARLES C. HUGHES.

Witnesses:

WM. E. DELLA,

THOS. M. DOBBIN.