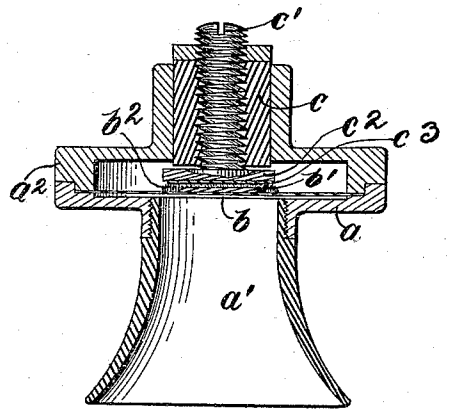
(No Model.) 3 Sheets—Sheet 1.

A. STROMBERG & A. CARLSON.

TELEPHONE APPARATUS.

No. 545,922. Patented Sept. 10, 1895.

Fig. 1.



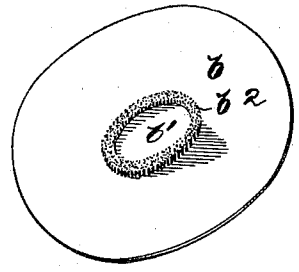


Fig. 2.

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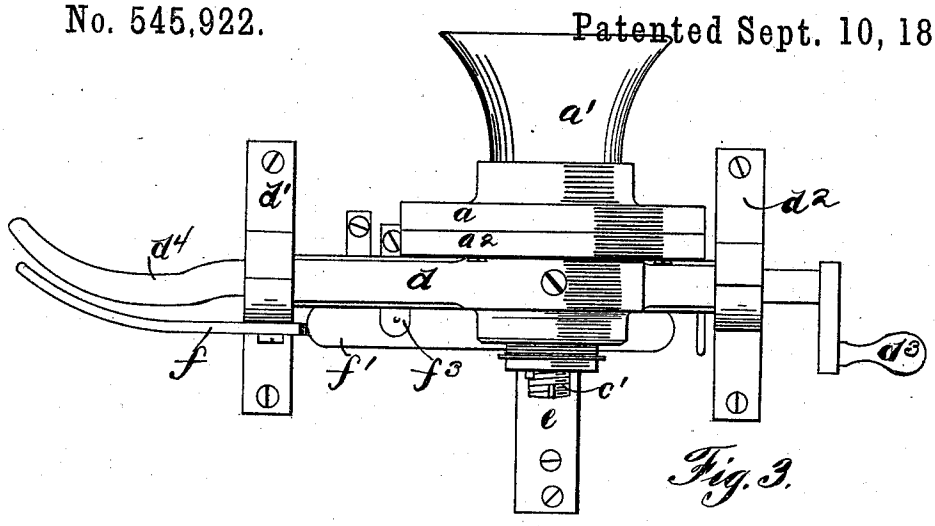

Fig. 3.

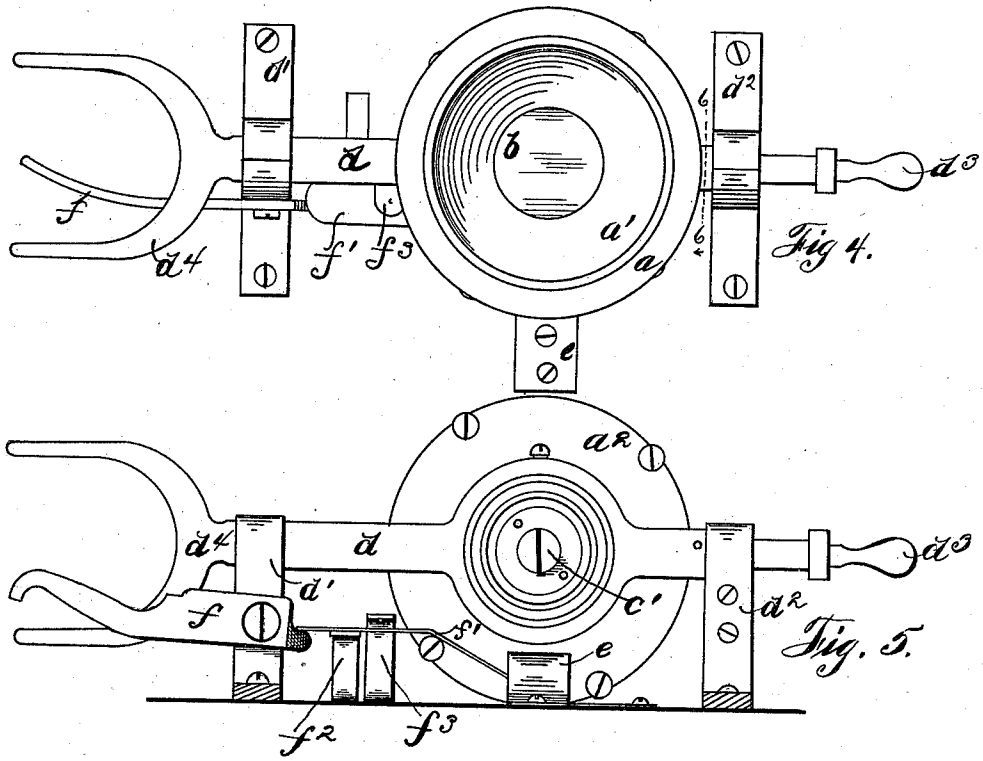

Fig 4.

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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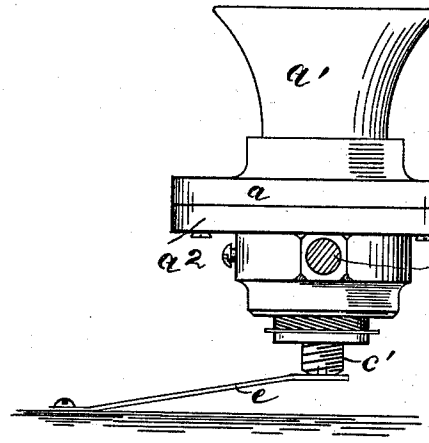
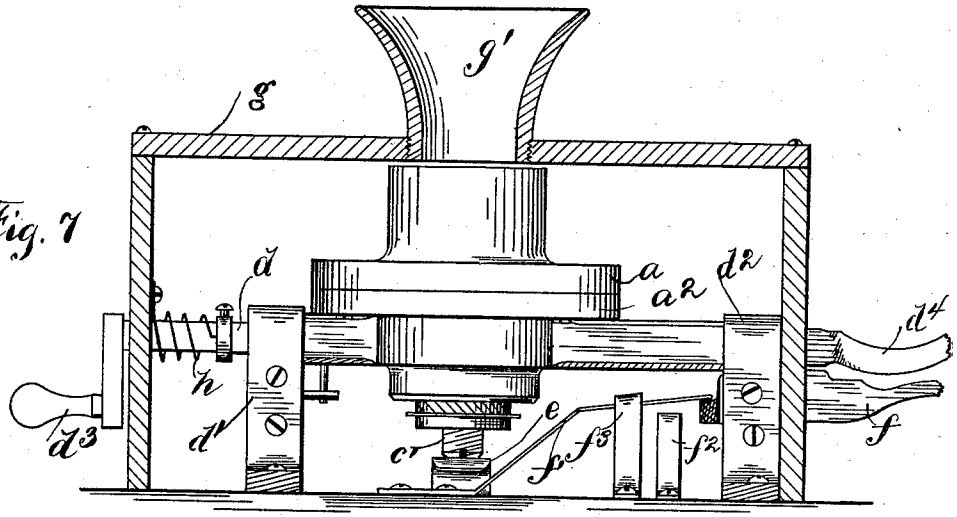


Fig. 6.

Fig. 7



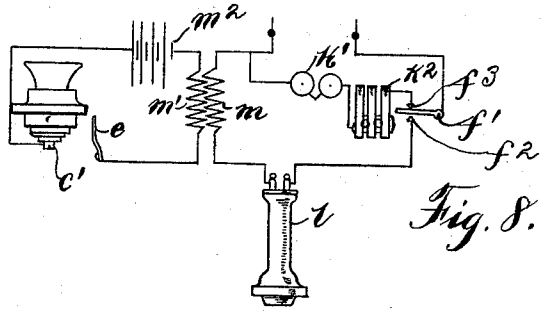


Fig. 8.

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UNITED STATES PATENT OFFICE.

ALFRED STROMBERG AND ANDROV CARLSON, OF CHICAGO, ILLINOIS.

TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 545,922, dated September 10, 1895.

Application filed March 29, 1895. Serial No. 543,660. (No model.)

To all whom it may concern:

Be it known that we, ALFRED STROMBERG and ANDROV CARLSON, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone Apparatus, (Case No. 20,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to telephone apparatus, and its object is to provide an improved form of telephone-transmitter employing granular carbon for effecting change of resistance; and further to provide an improved form of switch for opening and closing the transmitter-circuit; and further to prevent the packing of the granular carbon of the transmitter by necessitating the movement of the transmitter from an idle position into a position of use whenever it is desired to use the transmitter.

The transmitter of our invention comprises a diaphragm, upon the rear surface of which is mounted a carbon plate, the carbon plate being encircled by a band of yielding material, preferably a ring of plush. Mounted upon a support back of the diaphragm is a carbon block, against the face of which the plush ring is adapted to rest, a space being left between the carbon plate carried upon the diaphragm and the fixedly-mounted carbon block, which space is filled with granular carbon. The plush ring prevents the escape of the granular carbon from between the two carbon surfaces, and the vibration of the diaphragm effects the change of resistance through the granular carbon. In granular-carbon microphones considerable trouble has been experienced heretofore, due to the packing of the granular carbon. It is more convenient to mount the diaphragm in a vertical plane, and the continued use of the microphone causes a gradual settling of the granular material; and it is the object of our invention to provide means whereby the diaphragm when in use will occupy the desirable vertical position, but when not in use will be moved into a horizontal position, the granular carbon being more or less shaken up by movement from one position to the other, thus preventing the undesirable packing of the carbon. We mount the microphone upon a rotatable shaft, which when the telephone is not in use occupies a position to maintain the diaphragm of the microphone in a horizontal position. When it is desired to speak into the transmitter, the shaft is rotated to bring the diaphragm into a vertical position. We provide a handle upon the end of the shaft by means of which the transmitter may be moved into its alternate positions. We preferably arrange the local transmitter-circuit connections so that the rotation of the shaft that carries the transmitter to move the transmitter into its idle position will open the local circuit, the circuit being closed when the transmitter is moved into position for use. We provide a hook for the receiver upon the end of the rotatable shaft, so that the transmitter-diaphragm is maintained in the horizontal position so long as the receiver is hung up. When the receiver is removed from its hook, the shaft may be rotated by hand or automatically to bring the diaphragm of the transmitter into its vertical position.

We will describe our invention more in particular by reference to the accompanying drawings, in which—

Figure 1 is a sectional view of the transmitter of our invention. Fig. 2 is a view of the diaphragm, illustrating the location of the carbon plate and the surrounding ring of plush or similar material. Fig. 3 illustrates the transmitter mounted upon a rotatable shaft in accordance with our invention, the transmitter being shown in its idle position. Fig. 4 is a similar view showing the transmitter in position for use. Fig. 5 is a view from beneath, showing the transmitter in its idle position. Fig. 6 is a sectional view on line 6 6, Fig. 4. Fig. 7 is a view from above, illustrating a modification in which the transmitter is mounted in an inclosing box or casing provided with a mouthpiece. Fig. 8 is a diagram of the circuit connections.

Like letters refer to like parts in the several figures.

Referring to Fig. 1, the cap a, carrying the mouthpiece a', is mounted upon the casing a^2, the diaphragm b being clamped between the cap and the casing. Upon the diaphragm is mounted a carbon plate b', and surrounding

the plate b' is a ring b^2, preferably formed of plush, the backing of the plush being glued to the face of the diaphragm. We preferably secure the plate b' to the diaphragm by first electrolytically depositing a coating of copper upon the rear surface of the carbon plate, after which the copper coating thus formed is soldered to the face of the diaphragm. The diaphragm may be formed from a thin plate of carbon; but we prefer to form the diaphragm as above described, as a more stable construction is thereby obtained. A block c of insulating material is mounted in the rear of the casing a^2, and through the block passes a screw c', upon the end of which is mounted a disk c^2, carrying upon its face a carbon block c^3. The carbon block c^3 rests against the soft surface of the plush ring b^2, a space being left between the carbon plate b' and the carbon block c^3, which space is filled with granular carbon. The escape of the granular carbon is prevented by the plush ring b^2 resting against the face of the carbon block c^3. The adjustment of the microphone is obtained through the agency of the screw c', which may be turned to adjust the distance between the carbon surfaces. One side of the local battery may be connected with the screw c', while the other side is connected with the casing, the circuit being thus completed through the microphone. The microphone is carried upon a rotatable shaft d, mounted in standards d' d^2. Upon the end of the shaft d is provided a handle d^3, by means of which the shaft may be rotated. Upon the opposite end of the shaft is provided a hook d^4 for supporting the receiver.

When the receiver is on the hook, the transmitter is in the position illustrated in Fig. 3, the diaphragm occupying a horizontal position. When it is desired to speak into the transmitter, the receiver is removed from its hook and the shaft turned by means of the handle d^3 to bring the diaphragm of the transmitter into a vertical position. When conversation is completed, it is necessary to rotate the transmitter back to its idle position before the receiver can be hung up. Beneath the transmitter and upon the base-board supporting the standards d' d^2, is mounted a spring e, which forms one terminal of the local battery-circuit. The other terminal of the local circuit is connected with the casing of the transmitter or with one of the standards d' d^2.

When the transmitter is rotated into the position illustrated in Fig. 4, the screw c' makes contact with spring e, thus closing the local circuit of the battery through the transmitter. The movement of the transmitter into its idle position opens the local circuit. Upon the standard d' is pivoted a lever f, which extends into the path of the receiver as it is placed upon its hook. A spring f' is engaged by the end of lever f, and is adapted to rest upon contact f^2 when the telephone is removed from its hook to close circuit through the telephone, but is moved into engagement with contact f^3, when the receiver is hung up to close circuit through the call apparatus.

In Fig. 7 we have illustrated a transmitter inclosed in a casing or box g, carrying a mouthpiece g'. When the transmitter is in use, the diaphragm rests opposite the mouthpiece, and when not in use the diaphragm is moved away from the mouthpiece. In this figure we have illustrated a coiled spring h, surrounding the shaft d, which is adapted when the receiver is removed from its hook to rotate the shaft d and carry the transmitter into position for use, at the same time closing the primary circuit of the transmitter. A handle d^3 is provided for rotating the transmitter back into its idle position and to bring the switch-hook into a horizontal position in order that the receiver may be hung up. By this construction the transmitter may be automatically brought into the position of use and the primary circuit automatically closed by the removal of the receiver from the hook, while the return of the transmitter to its idle position and the opening of the primary circuit are effected automatically. In Fig. 3, however, the movement of the transmitter and the opening and closing of the primary circuit are effected manually.

In Fig. 8 we have illustrated the circuit connections diagrammatically, one side of the telephone-line k being connected with the spring f', normally resting against contact f^3, which is connected through the bell k' and generator k^2 to the opposite side k^3 of the line. The contact f^2, against which the spring f' rests when the telephone is removed from its hook, is connected with the receiver l and the secondary m of the induction-coil. The primary m' of the induction-coil is connected through the battery m^2 with screw c' of the transmitter, the opposite side of the primary m' being connected with the spring e.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a stationary block of carbon, of a diaphragm supported in front of the same and secured by its edges, a ring of plush or other yielding substance mounted between the diaphragm and the stationary block of carbon, and offering no substantial resistance to the movement of the diaphragm, a space being thus left between the surface of the carbon block and the diaphragm, granular carbon interposed between the diaphragm and the carbon block; whereby the ring of plush holds the granular carbon in position without affecting the vibration of the diaphragm; substantially as described.

2. The combination with the casing a^2, of the cap a, the diaphragm b, clamped between said cap a and said casing a^2, carbon plate b' mounted upon said diaphragm b, the ring b^2 of plush or similar material, the block of insulating material c supported by casing a^2, the screw c' engaging threads in said block,

the carbon block c^3 mounted upon the end of screw c', and the granular material interposed between the surface of the carbon plate b' and the carbon block c^3; substantially as described.

3. The combination with a microphone transmitter, of a rotatable shaft upon which said transmitter is mounted, a hook for the telephone receiver provided at one end of said shaft, a handle for rotating said shaft provided at the other end, and contact points forming the terminals of the local transmitter circuit, adapted to be controlled by the rotation of said shaft; substantially as described.

4. The combination with a microphone transmitter of a rotatable shaft, upon which said transmitter is mounted, a telephone hook provided upon said shaft upon one end, upon which the receiver is adapted to normally rest, a spring for automatically rotating the shaft when the receiver is removed from the hook, a handle for returning the shaft to its original position, and contact points controlled by the rotation of said shaft for opening and closing the local circuit of the transmitter; substantially as described.

5. The combination with a microphone transmitter, of a rotatable shaft upon which said transmitter is mounted, a hook for the telephone receiver provided upon the said shaft, and contact points forming the terminals of the local transmitter circuit adapted to be controlled by the rotation of said shaft; substantially as described.

6. The combination with a microphone transmitter, of a rotatable shaft upon which said transmitter is mounted, a hook for the telephone receiver provided upon said shaft, contact points forming the terminals of the local transmitter circuit adapted to be controlled by the rotation of said shaft, contact points forming the terminals of the main telephone line, and means for controlling said last mentioned contact points by the placing of the telephone upon or removing the same from its hook; substantially as described.

In witness whereof we hereunto subscribe our names this 26th day of March, A. D. 1895.

ALFRED STROMBERG.
ANDROV CARLSON.

Witnesses:
W. CLYDE JONES,
DE WITT TANNER.