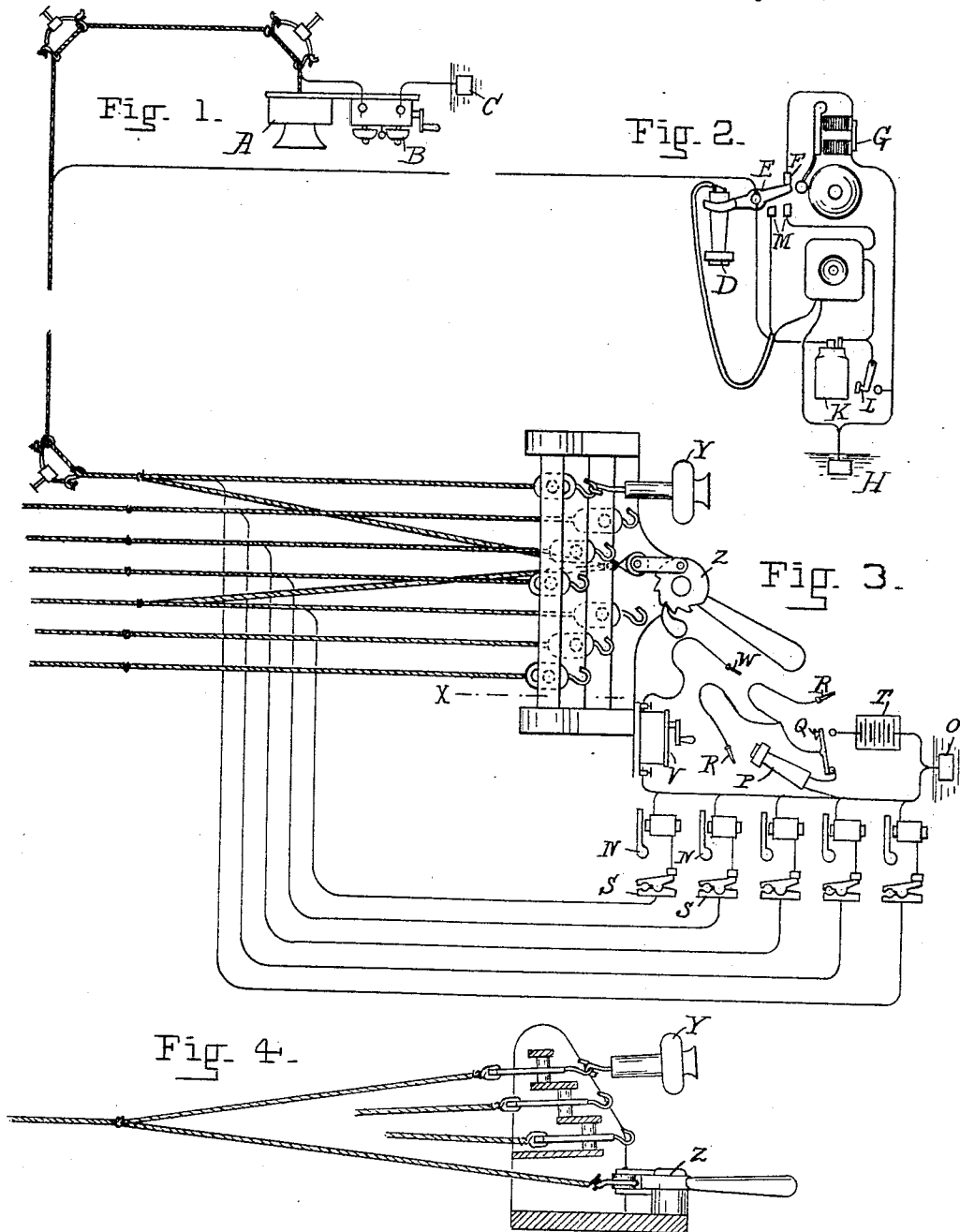


(No Model.)

G. F. SHAVER.
TELEPHONY.

No. 479,227.

Patented July 19, 1892.



Witnesses:

L. W. Babb
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by Thomas Ewing, Jr.
his attorney.

UNITED STATES PATENT OFFICE.

GEORGE FREDERICK SHAVER, OF YONKERS, NEW YORK.

TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 479,227, dated July 19, 1892.

Application filed April 8, 1892. Serial No. 428,317. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FREDERICK SHAVER, a citizen of the United States of America, residing at Yonkers, county of Westchester, State of New York, have invented certain new and useful Improvements in Telephony, of which the following is a specification.

My invention is an improvement in the art of telephony and in an apparatus for practicing the art; and it consists, broadly, in duplex transmission of sound telephonically over one wire by means of mechanical and electrical vibrations and in a suitable circuit and exchange apparatus therefor.

In the accompanying drawings, Figure 1 is a diagram of the mechanical-telephone connections and call. Fig. 2 is a diagram of the electrical-telephone connections and call, the parts herein shown being located at the subscribers' stations. Fig. 3 is a diagram of the central-office apparatus; and Fig. 4 is a cross-section of the devices at the central office for connecting up the mechanical-telephone subscribers' stations, taken on line X, Fig. 3.

The preferred form of mechanical-telephone transmitter and receiver is described in United States Patents Nos. 392,233 and 444,464. The preferred apparatus for connecting mechanical-telephone subscribers' stations is described in the United States Patents Nos. 444,462 and 414,170, and the preferred wire to connect the subscribers' stations with the central office is described in United States Patent No. 339,635.

In Fig. 1 the line is shown as branching, one branch leading to the mechanical-telephone subscriber's station and the other branch, which is ordinary conducting-wire, leading to the magnetic-telephone subscriber's station. (Shown in Fig. 2.)

In Fig. 1, A is the mechanical-telephone transmitter and receiver, and B is a magneto call-bell, which is in a plain wire line grounded at C.

Fig. 2 shows the instruments and circuits at a magnetic-telephone subscriber's station. The receiver E when not in use is hung upon a hook E, which when sustaining the receiver closes a circuit at a contact F through an ordinary tap-bell G, grounded at H. One pole of a battery K is connected with a button L,

through which it can be grounded at H. The other pole of this battery is connected with the hook E and through it is connected with the line for all positions of the apparatus. When the receiver is in place, this same pole of the battery is connected with the contact F, and when the receiver is lifted off the hook it is connected with a pair of contacts M below the hook and through the right-hand contact is brought into a circuit with the primary coil of the transmitter. Through the left-hand contact when the hook E is down the receiver is connected to line. The receiver is grounded at H through the secondary coil of the transmitter.

The instruments in Figs. 1 and 2 may be located together or with different subscribers, and instead of being in multiple the two stations may be in series with each other—as, for example, by removing the ground connection C and connecting the wire that leads from the magneto B to this ground connection with the line-wire of Fig. 2, and instead of having a magneto call and bell at one station and an ordinary tap-bell and push-button at the other the same call mechanism can be used at the two stations, a magnetic-telephone subscriber calling and being called by, say, one ring and a mechanical-telephone subscriber being called by, say, two rings.

At the central-exchange office is an annunciator N, normally grounded at O. To grounding wire is attached a branch in which is a telephone-receiver P, (no magnetic transmitter being shown at the central office.) From this telephone a wire is led to a key Q, to which are connected two plugs R R for connecting up two magnetic-telephone subscribers' stations by inserting them in the spring-jacks S S between the lines and the annunciators. When one of the plugs is inserted in one of these spring-jacks, the tap-bell at the corresponding magnetic-telephone subscriber's station can be rung by depressing the key Q, thus throwing in the battery T. Also connected with the grounding wire above mentioned is a branch in which is inserted a magneto-call V and on one end of which is also a plug W, which can be inserted in any one of the spring-jacks. Thus a mechanical-telephone subscriber can be called. When

any one of the plugs is inserted in any one of the spring-jacks S, the connection between it and the ground is thereby broken.

The mechanical-telephone transmitter and receiver Y can be connected to any line by a hook, as shown, and any lines can be connected for the transmission of mechanical vibrations from one to the other by hooking together branch wires through a stretcher Z, as shown.

The wire which I prefer to use to connect the subscribers with the central stations is a cable consisting of strands of conducting-wire that are wound around, inclose, or are im-
 15 pacted upon a fibrous core, the core being preferably saturated with a water-repellant viscid material. Such a cable is described in United States Patent No. 339,635, as above stated.

20 Without binding myself to the precise details shown, what I claim, and desire to secure by Letters Patent, is—

1. The method of transmitting two distinct sounds over a single conductor simultaneously, as herein described, by causing electrical undulations similar in form to the vibrations of the air accompanying one of said sounds and mechanical vibrations similar in form to the vibrations of the air accompanying the
 25 other of said sounds, substantially as described.

30 2. A duplex telephone-exchange system com-

prising mechanical-telephone subscribers' stations, magnetic-telephone subscribers' stations, a central station, lines connecting the central station with the subscribers' stations, there being at least one mechanical and one magnetic telephone subscriber's station on each line, means for connecting any pair of lines for transmission of mechanical vibrations, and means for connecting any pair of
 35 lines for transmission of electrical currents, substantially as described.

3. A duplex telephone-exchange system comprising mechanical-telephone subscribers' stations, magnetic-telephone subscribers' stations, a central station, lines connecting the central station with the subscribers' stations, there being at least one mechanical and one magnetic telephone subscriber's station on each line, means for connecting any pair of
 45 lines for transmission of vibrations mechanically, means for connecting any pair of lines for transmission of vibrations electrically, and an annunciator connected with said lines, substantially as described.

55 Subscribed by me, in New York city, this 7th day of April, 1892.

GEORGE FREDERICK SHAVER.

In presence of—

S. W. BALCH,
 J. LEE KITTS.