(No Model.) 2 Sheets—Sheet 1.

G. F. SHAVER.

MECHANICAL TELEPHONE EXCHANGE.

No. 298,243. Patented May 6, 1884.

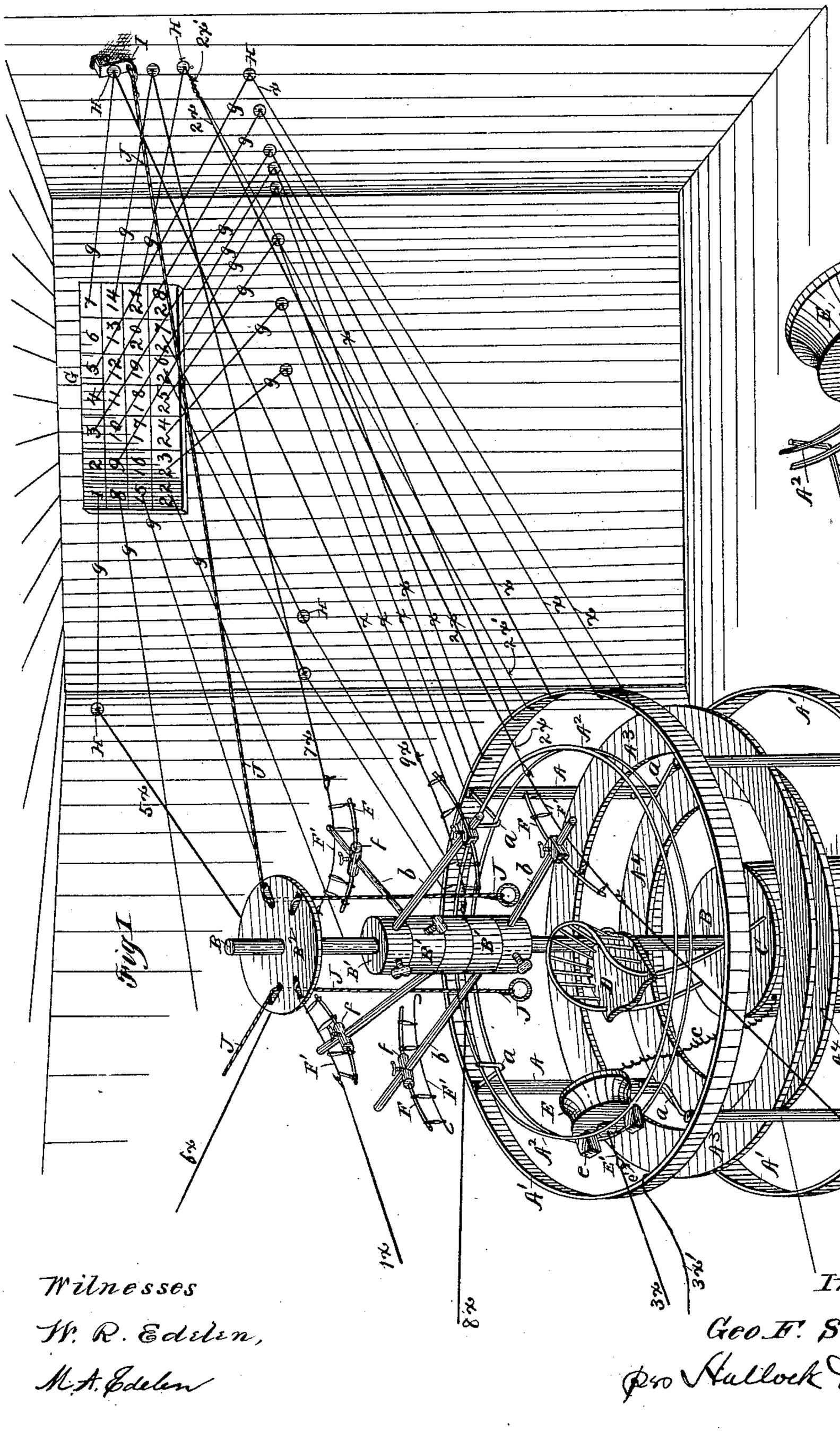

Fig. 1.

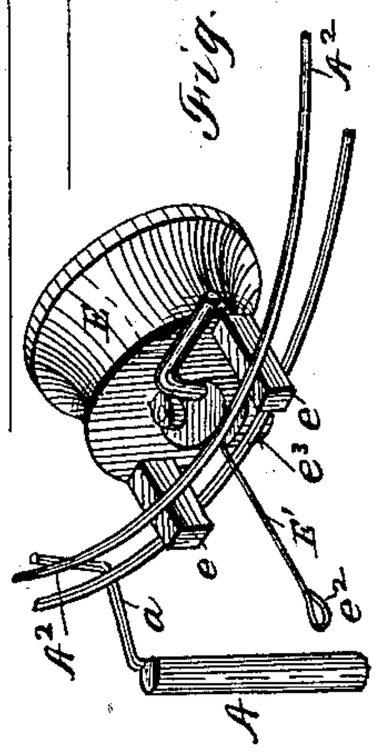

Fig. 3.

Witnesses
W. R. Edelen,
M. A. Edelen

Inventor
Geo. F. Shaver
per Hallock & Hallock
Att's

(No Model.) 2 Sheets—Sheet 2.

G. F. SHAVER.

MECHANICAL TELEPHONE EXCHANGE.

No. 298,243. Patented May 6, 1884.

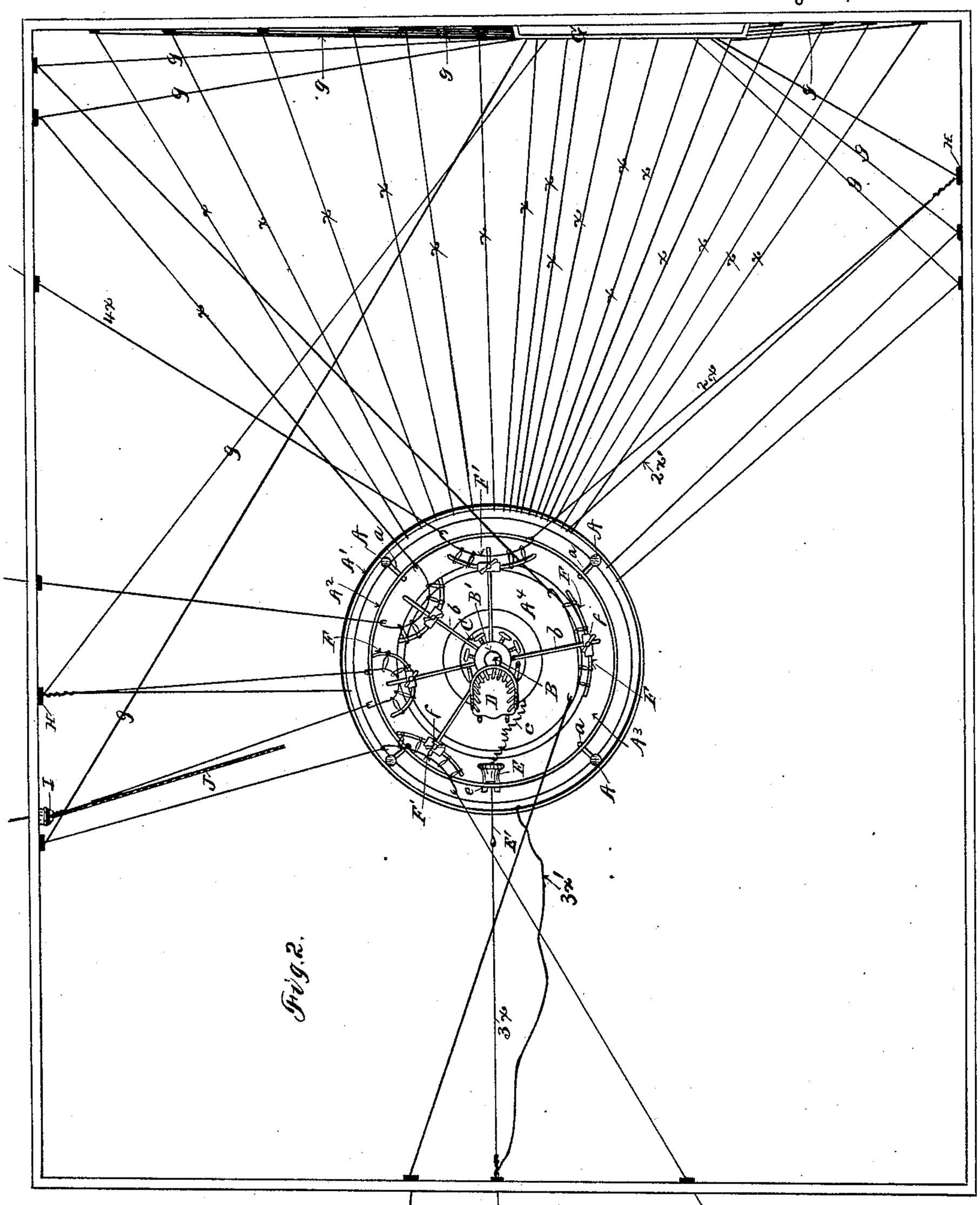

Fig. 2.

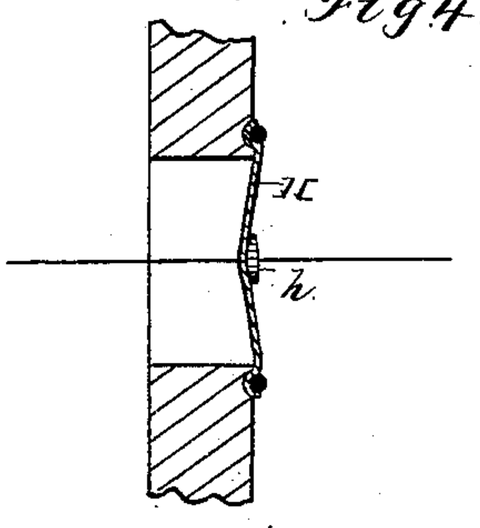

Fig. 4.

Witnesses

W R Edelen

M A. Edelen

Inventor

Geo F. Shaver

per Hallock & Hallock

Attys

UNITED STATES PATENT OFFICE.

GEORGE F. SHAVER, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE CONSOLIDATED TELEPHONE COMPANY, OF NEW JERSEY.

MECHANICAL TELEPHONE EXCHANGE.

SPECIFICATION forming part of Letters Patent No. 298,243, dated May 6, 1884.

Application filed November 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. SHAVER, a citizen of the United States, residing at Erie, in the county of Erie, and State of Pennsylvania, have invented certain new and useful Improvements in Mechanical Telephone Exchanges; 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.

This invention relates to mechanical telephone exchanges; and it consists in providing certain new and useful improvements in the apparatus necessary for establishing communication, when desired, between the various converging lines; also, in providing improved means for signaling to and from the central office or exchange and the several patrons; also, in several minor details relating to the adjustment of the wires, &c., which will be fully explained hereinafter.

The accompanying drawings illustrate my invention, as follows:

Figure 1 is a perspective view of my device. Fig. 2 is a top or plan view. Figs. 3 and 4 are details of construction, and will be referred to in proper connection.

x x x x, &c., are the several converging wires, and, as will be seen, they may leave the office in any direction desired. At the point where they pass through the wall of the building or room there is fixed a stout canvas diaphragm, H. (This diaphragm may be of other material than canvas.) The wire passes through this diaphragm, and on the inside of the diaphragm there is fixed on the wire a button or washer, which is adjusted in place after the wire is drawn taut on the outside, and thus prevents the wire from sagging outside the room. The wire inside the room will sag, except when in connection for communication with some other line, at which times they are drawn taut and relieve the canvas diaphragm from the strain of the outer wire.

At a conveniently central place in the office I erect a post, B, on which are placed swinging arms or brackets B′ *b*, which carry angle-hangers F, in which is a short section of wire, F′, provided with hooked ends. These arms can be swung around the post B to any position desired, and brought into position so that any two of the lines *x* can be connected with the section of wire in the hanger F. The hangers F are connected with clips *f*, which slide on the arms *b*, and these are provided with set-screws, so they can be fastened at any point. After the connection of the lines is made through one of the hangers it can be moved on the arm until the wires are drawn taut and then clamped there by this screw. There may be as many arms on the post as desired, and in this way various through lines of communication can be made at the same time, as is illustrated, the drawings showing 2*x* and 4*x* communicating, and 8*x* and 9*x*, and 1*x* and 5*x*, &c. This use of a centrally-located post and one or more angle-hangers thereon is shown in a former patent to me, dated October 17, 1882; but the precise construction here shown is new, and I have connected with it many conveniences which render its operation more perfect.

Around the central post I construct a frame, A A′ A^2 A^3 A^4, of which A^2 is a rack for holding a telephone, E, and A^3 A^4 are foot-boards for the opearator's convenience. A chair, D, and a central stand, C, are pivoted upon the post B, and can be turned around upon it, so that the operator can face in any direction, and by using his feet on the foot-board A^4 he can push himself quickly around. The stand C contains a battery, the object of which will be explained hereinafter. The wires *x*, when not in connection, hang with their hooked ends over the ring A′ of the frame. The drawing is not perfectly exact in showing these wires when thus hooked onto the frame A′ as straight, for they will be, in fact, sagged. The point where each wire is connected with this ring A′ will be designated, so as to enable the operator to recognize one wire from the other; or else the wires will be marked in some other way. When communication is desired between any two wires, they are taken from the ring A′ and connected together through one of the hangers F, as before described.

The means provided for communicating,

both by signal and by words, from the patrons to the exchange and from the exchange to the patrons, are as follows: Each wire *x* is provided with a branch wire, *g*, which runs to an annunciator, G. This may be any of the well-known magneto or electric annunciators, such as are commonly used in electric-telephone exchanges. Each patron is provided with a magneto-bell apparatus, by which means, or by some similar means, he is able to signal the exchange through the branch wire *g* and the annunciator. The next step is to call the person who signaled and ask who he wishes to be put in connection with. This is effected by the telephone E, which is placed on the rack A^2, at the point where the end wire of that person is, and connected therewith, so as to communicate with him. The construction of this part of the device is as follows: The telephone E has two lugs, *e e*, on its back, which lie or sit in between the bars of the rack A^2. This telephone may be taken and placed at any point in the circuit desired. On its back is a short wire connected with its diaphragm, and provided with a loop, e^2, into which the hook e' on the wires *x* can engage. When connection is made, the wire is brought taut. This is done by a cam, e^3, on the back of the telephone, (see Fig. 3,) or by some other method of wedging the telephone out from the rack A^2.

When the operator has found who the person wishes to call up, he uncouples the telephone and couples the two wires *x* together, through one of the angle-hangers F, when the person who first called the office can call and communicate with the person he desired to reach.

In order to avoid the trouble of disconnecting the telephone while the two persons are conversing, an auxiliary wire, *x'*, may be provided. (See $2x$ and $2x'$ at the upper right-hand corner of Fig. 1.) This auxiliary wire is spliced onto the main wire *x*, and to it the telephone would be connected and would not have to be disconnected while the main wires are connected, as are $2x$ and $4x$. Another advantage of this arrangement is that while the two persons are conversing the operator may keep in communication with them, so as to ascertain when they are through. These auxiliary wires are not essential, but I believe they will be found exceedingly convenient and desirable.

In the stand C is a battery and an automatic circuit-breaker, and a wire, *c*, runs up for convenient use by the operator. By this the operator can ring the magneto-bell of any patron to call him by connecting the said wire *c* with the proper wire *x*, or with the telephone, as it is shown, when it is connected with the wire *x*.

The ropes J, which run over sheaves in a block, B^2, and connect with a lever, I, are for the purpose of drawing the wires taut. This is an alternative device, and is only shown at one point fully. As I have said above, the wires are drawn taut after being connected by moving the clips *f* on the arms *b;* but, if desired, the ropes or cords J and levers I may also be used. The diaphragm H is on the lever I, and by the movement of the lever the outer wire is drawn in a little, and when the engagement of the wires *x* is made with the wire F' in the angle-hanger the lever is allowed to fall back, and thus the inner wires are drawn taut.

It is not essential that the construction be as here shown in every particular. Circumstances will necessitate slight changes and modifications. For instance, when the circumstances are such that all the lines enter on one or two sides of the room, the central frame may consist of a single bar-like frame, and not be circular; or it may be angular or semicircular. In other words, its form will depend wholly on the surroundings. There may be more than one post B, or it might even be a horizontal bar or shaft lying parallel with a frame, and the arms be arranged to slide on it from point to point. The really essential feature is that the wires or lines are secured within the office by the diaphragms H, or some device performing the same function—as, for instance, three or four guy-wires, making a sort of skeleton diaphragm—and are thus prevented from sagging on the outside, while their loose ends (the wires *x*) may be tightened or loosened at pleasure. In the patent to me above referred to this result was attained by the use of a telephone on the end of each wire, the diaphragm of which served the same office as a wire-retainer as the diaphragm and button, or the series of short guys or any other flexible fastening which will retain the outer wire taut and permit the inner wire to draw on it, when desired; but so many telephones are expensive and unnecessary for that purpose only, while a flexible fastening such as above named will perform the same office just as acceptably, and in some respects more so. While I have spoken of these flexible fastenings as being in the office and have shown them as on the wall, they might be in some cases outside of the office; but such a position would generally be very awkward.

The diaphragms H may be made of such a material—say of drum-head leather—as to make them capable of sounding signals or other loud noises, like thumping on the telephone at the opposite end of the line, and a delicately-poised indicator or some other mechanism might be set in motion by the vibrations of these diaphragms H, and thus the annunciator might be dispensed with.

Fig. 4 shows the construction of the diaphragms H, as above described, and the button or catch *h* on the wire. It is not essential that the diaphragm be flexible, but it is better to be so.

What I claim as new is—

1. In a mechanical telephone exchange, the combination, with the acoustic lines, of an elec-

tric annunciator and branch wires *g*, for affording electric communication between the same, substantially as and for the purposes mentioned.

2. In a mechanical telephone exchange, the ends of the lines *x*, provided with auxiliary or branch lines *x'*, substantially as shown, whereby the operator may keep in acoustic communication with two lines when they are in communication through the office.

3. In a mechanical telephone exchange, the combination, substantially as shown, of the following elements: acoustic lines converging to an exchange-frame, to which they connect detachably, angle-hangers adjustably arranged in proximity to said frame, and, finally, means, substantially as shown, for connecting said acoustic lines one with another through said angle-hanger.

4. In a mechanical telephone exchange, the combination, substantially as shown, of the following elements: acoustic lines converging to a centrally-located circular exchange-frame, to which they are detachably connected, angle-hangers adjustably arranged upon a centrally-located support, and, finally, means, substantially as shown, for connecting said acoustic lines one with another through said angle-hangers.

5. In a mechanical telephone exchange, the combination, substantially as shown, of the following elements: acoustic lines converging to a frame to which they connect, a telephone-supporting rack arranged substantially as shown with relation to said supported wires, and, finally, a traveling telephone adapted to be supported by said rack and connected with said wires at pleasure, substantially as set forth.

6. In a mechanical telephone exchange, the combination, with the acoustic lines, of a post, B, arms B' *b*, and angle-hangers F, with clips *f*, supported on said arms, substantially as shown.

7. In a mechanical telephone exchange, the combination, with the converging acoustic lines and a telephone-supporting rack, of a telephone, E, having connected therewith a line-stretching device, which bears upon said rack and pushes the telephone away from it, substantially as and for the purposes mentioned.

8. In a mechanical telephone exchange, substantially as shown, an exchange rack or frame with wire-sustaining rail A', telephone-support A^2, and a traveling telephone supported thereon, in combination with the post B, having arms B' *b*, and the adjustable angle-line hangers F, mounted on said arms.

9. In a mechanical telephone exchange, the combination, substantially as shown, of the circular wire-supporting frame, circular telephone-supporting rack, central post, B, with arms supporting angle-hangers, the stand C, and chair D.

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

GEORGE F. SHAVER.

Witnesses:
JNO. K. HALLOCK,
W. S. BROWN.