

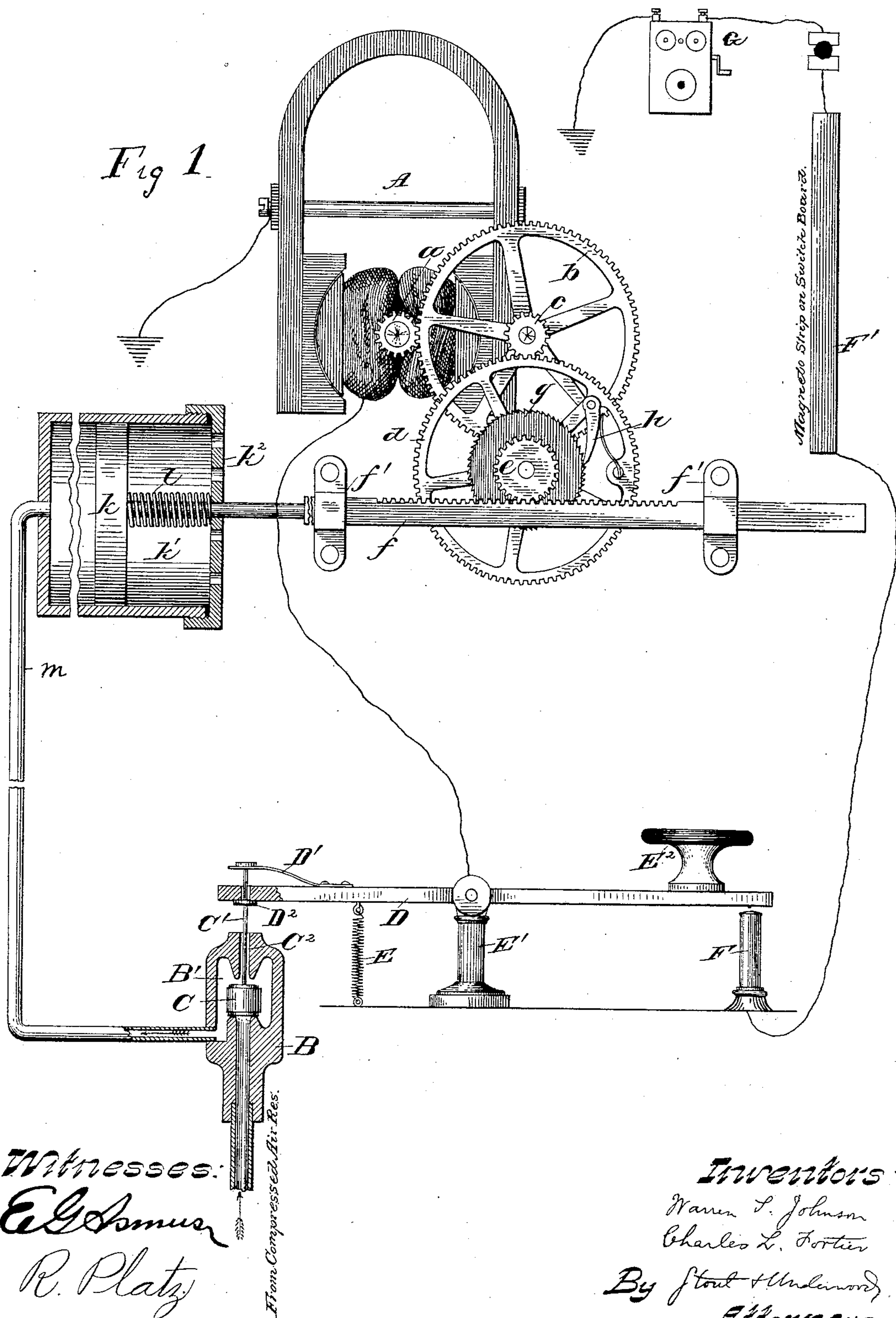
(No Model.)

2 Sheets—Sheet 1.

W. S. JOHNSON & C. L. FORTIER.
SIGNAL SYSTEM FOR TELEPHONE EXCHANGES.

No. 335,934.

Patented Feb. 9, 1886.



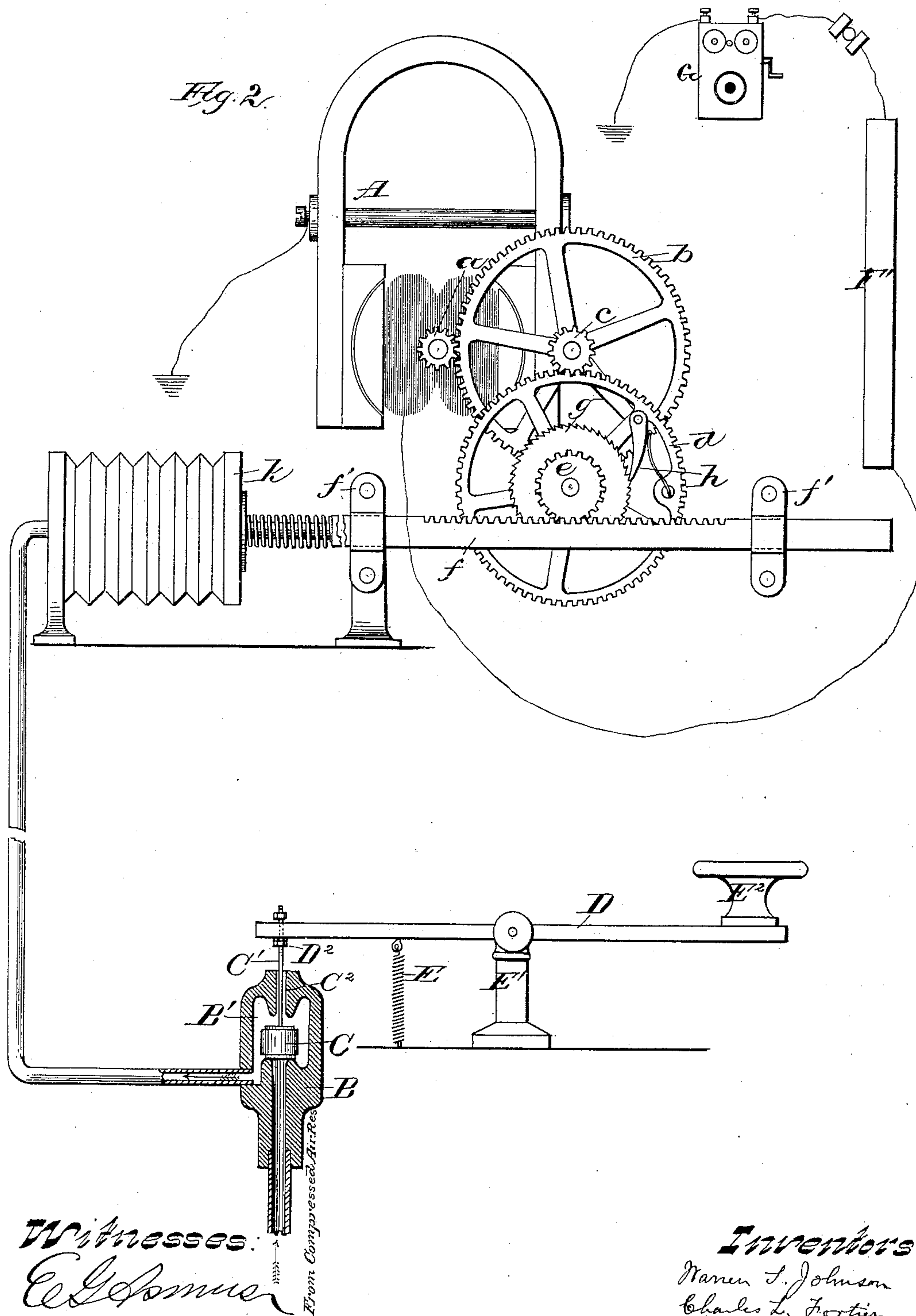
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Witnesses:

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UNITED STATES PATENT OFFICE.

WARREN S. JOHNSON, OF WHITEWATER, AND CHARLES L. FORTIER, OF
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SIGNAL SYSTEM FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 335,934, dated February 9, 1886.

Application filed May 8, 1885. Serial No. 164,738. (No model.)

To all whom it may concern:

Be it known that we, WARREN S. JOHNSON, of Whitewater, in the county of Walworth and State of Wisconsin, and CHARLES L. FORTIER, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Signal Systems for Telephone-Exchanges; and we do hereby declare that the following is
10 a full, clear, and exact description thereof.

Our invention relates particularly to signal systems for telephone-exchanges, and will be described hereinafter.

In the drawings, Figure 1 is a diagrammatic view, partly in elevation and section, representing one form of our invention; and Fig. 2 is a similar view representing modifications in construction.

A is a magneto-electric machine, the armature of which is revolved by a train of gearing consisting of pinions and wheels *a b c d e* and a rack-bar, *f*. A ratchet-wheel, *g*, is keyed on the shaft of wheel *d* and pinion *e*, and a pawl, *h*, that is pivoted to wheel *d*, hangs down against the periphery of wheel *g*, so as to engage with its teeth. The wheel *d* turns loosely on its shaft. The rack-bar *f* slides in suitable bearings, *f' f'*, and terminates at one end in a piston, *k*, the head of which is fitted in cylinder *k'*. The head *k²* of cylinder *k'* is made with perforations through it, which allow the air to pass freely in and out on that side of the piston-head, and a spring, *l*, is interposed between the piston-head and cylinder-head *k²*, which serves to force the piston-head in after the pressure that forces it outward ceases. Cylinder *k'* is connected by a pipe or tube, *m*, with a hollow stand, *B*, that leads to a compressed-air reservoir, and the upper part of this stand is provided with a valve-chamber, *B'*, having two seats for the valve *C*, which latter has a stem, *C'*, that passes up through an opening, *C²*, in the valve-chamber *B'*, through an opening in a key-lever, *D*, and up to a spring, *D'*, to which it is secured. A collar, *D²*, is secured onto the stem *C'* beneath lever *D*, and a spring, *E*, serves to draw this end of the lever *D* down, so as to hold valve *C* tightly closed upon its lower seat, and thus close the
50 outlet of the compressed-air reservoir. The

key-lever *D* is fulcrumed in a stand, *E'*, and on its end opposite that which carries the valve-stem may be provided with a button, *E²*. Beneath this end of the key-lever is a contact-post, *F*, from which a wire leads to a magneto-strip, *F'*, on the switch-board, which in turn may be electrically connected with the subscribers' bells, (one of which is shown at *G*,) when desired. The key-lever is electrically connected to one end of the coil of the armature of the magneto-electric machine *A*, the other end of said coil being connected, as usual, with the core of said armature, and thence to ground. The valve *C* may be suitably faced with leather or rubber to make it
65 air-tight.

The operation of our device is as follows: The parts are arranged in any convenient relations to each other, and when the apparatus is not in action the head of the piston *k* is held by the spring *l* close up against the inlet end of the cylinder *k'*. The valve *C* is held tightly down upon its lower seat by spring *E* and the key-lever. Now, suppose the bell *G* is to be rung. The button *E²* is pressed upon slightly and the valve *C* is lifted from its lower seat up against its upper seat, opening communication from the compressed-air reservoir to cylinder *k'*, and this air, by forcing out the piston *k*, will cause the rack-bar to set the train of gearing *e d c b* in motion and revolve the armature. Now, the button *E²* may be further depressed until contact is made between the key-lever *D* and post *F*, when whatever distant bell is in circuit will be rung. The rings may be intermitted by making and breaking contact between the lever and post without interrupting the flow of compressed air to the cylinder, for the strength of spring *D'* is such that by depressing the button end of lever *D* a certain distance the valve *C* may be lifted from its lower seat to its upper seat, and then the resistance of spring *D'* will become so great that it will require an extra exertion to depress the button end of the key enough to produce contact with post *F*, and therefore while the weight of the hand is sufficient to raise valve *C* an additional pressure will be necessary to complete the circuit. After the bell has been rung, and as soon as
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the button is released, the valve C will drop, closing the reservoir-outlet and opening the exhaust-outlet C², so that the air can escape freely as the spring l forces the piston back.

5 It is obvious that our device may be variously modified without departing from the spirit of our invention; for instance, instead of a cylinder and piston, a bellows-like expandible chamber similar to that shown in Fig. 2 may be used, and, further, a different style of key-lever and connections may be used. Therefore we do not mean to limit ourselves to the exact construction of the parts as shown.

Though we have described a circuit from 15 the magneto-electric machine A through the key-lever to switch-board, we find in practice that the magneto-electric machine and switch-board may be directly connected, and when this is done the spring D' may be dispensed with and the key-lever connected directly 20 with valve-stem C', all as shown in Fig. 2, since the pulsations of air in the expandible chamber occasioned by depressing and releasing the key are usually sufficient to produce short signal rings of the distant bell.

In said Fig. 2 we have designated the outer movable wall of the expandible chamber as k, to correspond with the piston-head shown in Fig. 1, and consequently placed the spring l 30 outside of the same, dispensing with the extra head k², which is unnecessary in this form of device.

Our device is adapted for use with any of the switch-boards as at present constructed.

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

1. In a system for signaling, the combina-

tion, with the central magneto-electric-machine armature, of a train of gearing, a compressed-air reservoir connected therewith, a 40 valve, and a key-lever for operating the valve, as set forth.

2. The combination, with the compressed-air reservoir and its valve, of the cylinder, piston, retracting-spring, intermediate gearing, and the magneto-electric machine, as set forth. 45

3. The combination, with the reservoir, cylinder, and piston, of the stand having double-seated valve-chamber and exhaust-outlet, the 50 valve, key-lever, and its springs and electrical connections, as set forth.

4. In a system for ringing magneto-bells, the combination, with a central magneto-electric-machine armature, of an expandible 55 chamber connected therewith, and a connection for admitting fluid under pressure into the expandible chamber.

5. A chamber adapted for expansion under fluid-pressure, and to contract when the pressure is removed, in combination with a magneto-electric machine and intermediate gearing connecting one of the walls of the expandible chamber with the magneto-electric-machine armature, whereby the expansion of the 65 chamber will cause the armature to revolve, as and for the purpose set forth.

In testimony that we claim the foregoing we have hereunto set our hands, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses. 70

WARREN S. JOHNSON.
CHARLES L. FORTIER.

Witnesses:

S. S. STOUT,
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