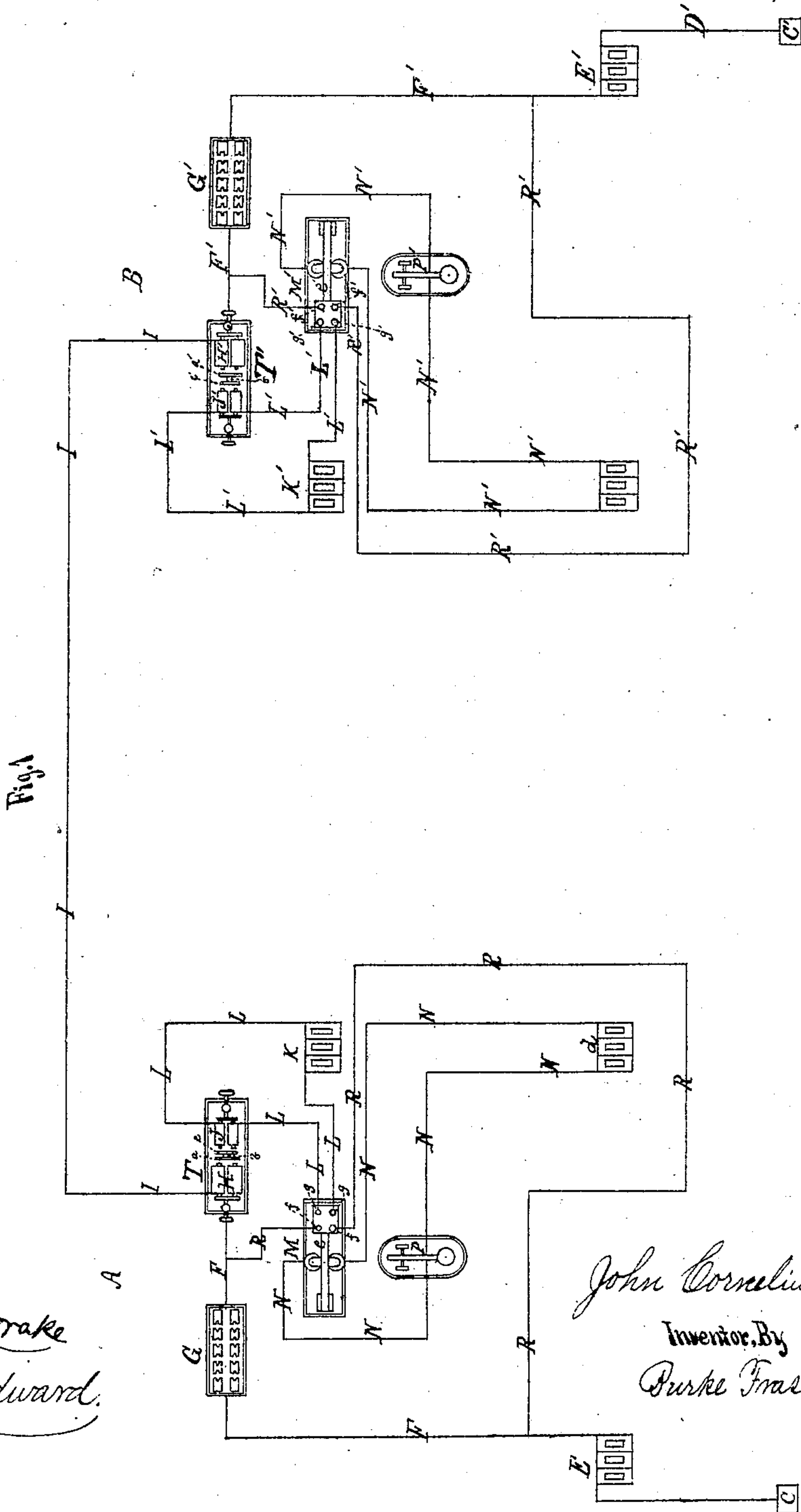


J. C. WILSON.
Duplex Telegraphs.

No. 136,400.

Patented March 4, 1873.



Witnesses.
J. R. Drake
C. N. Woodward.

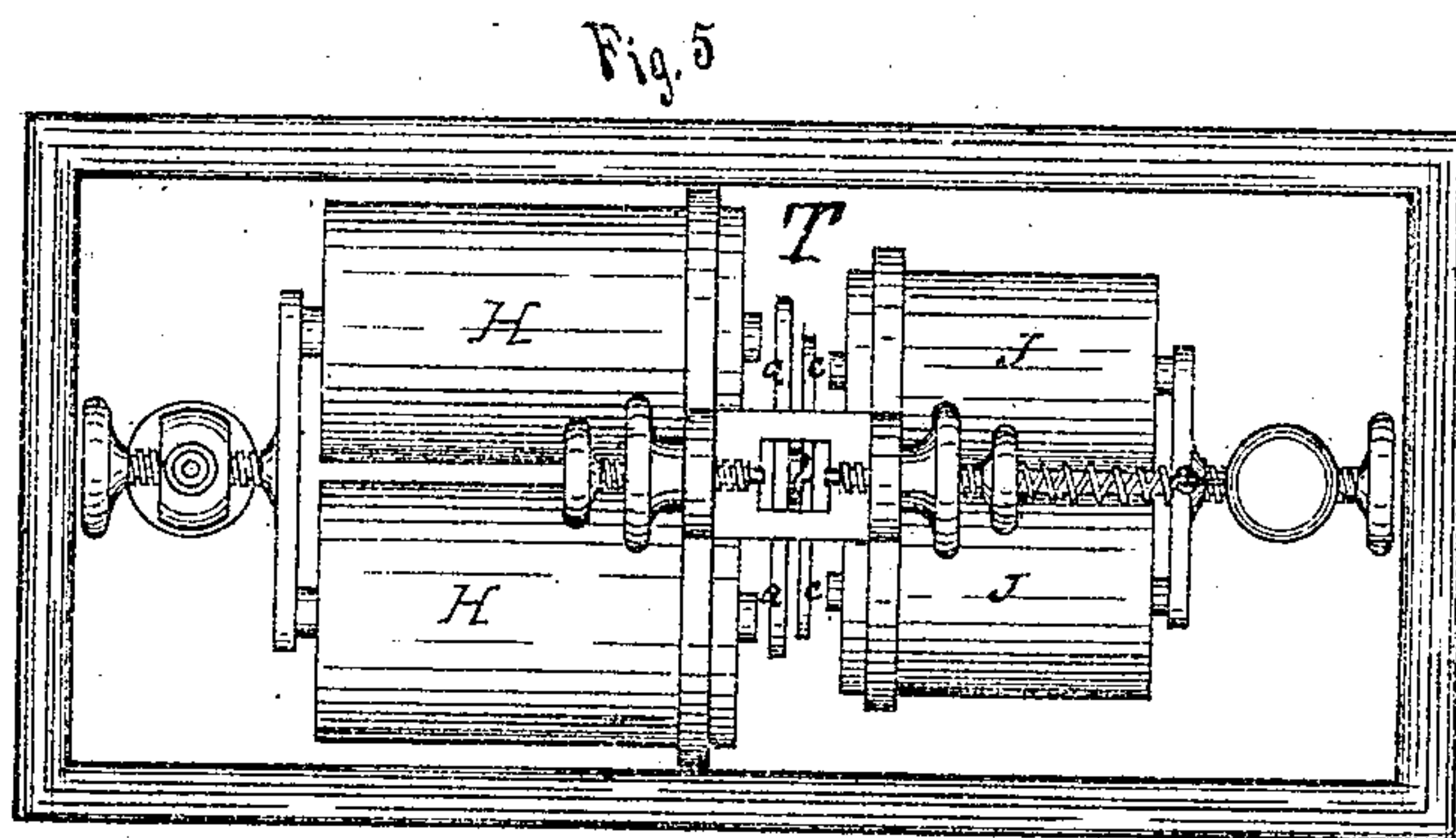
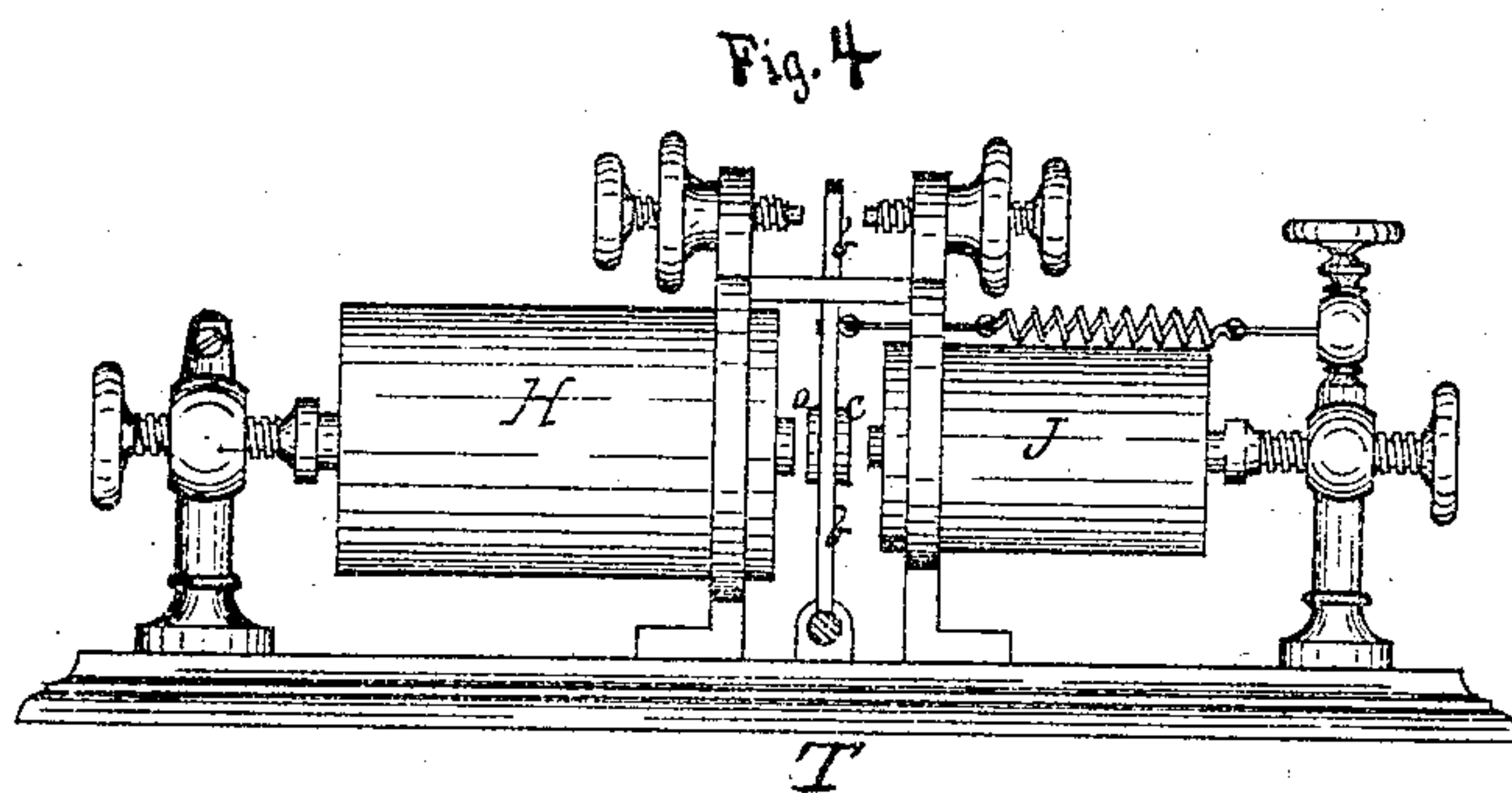
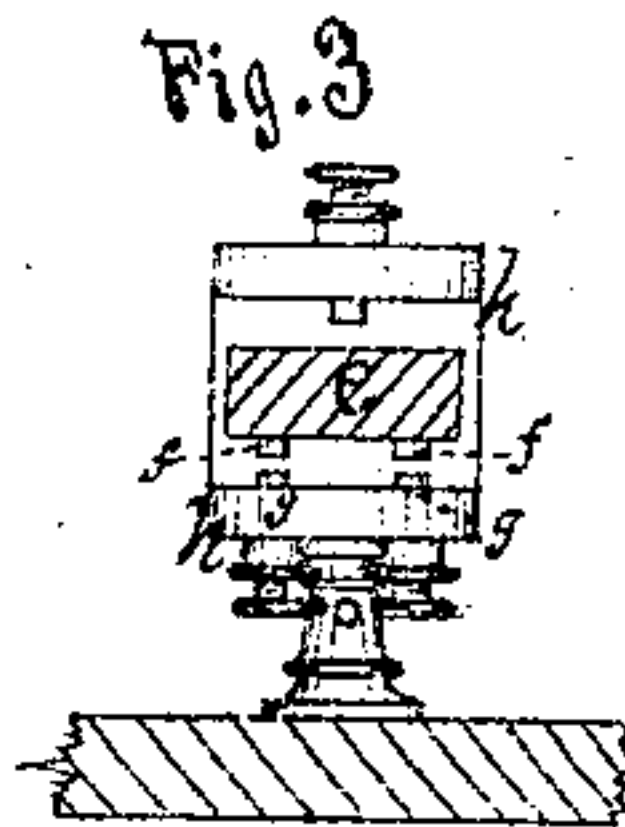
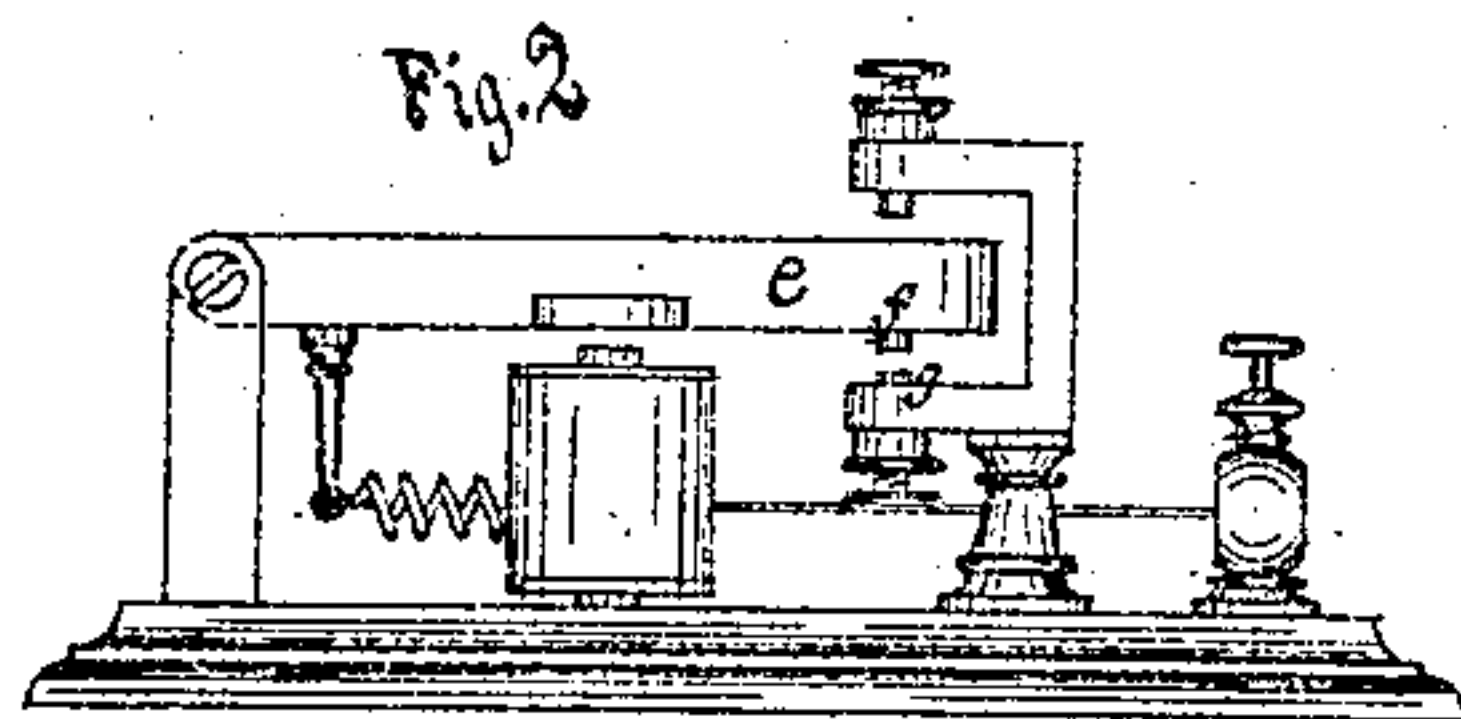
John Cornelius Wilson
Inventor, By
Burke Fraser & Co
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2 Sheets--Sheet 2.

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UNITED STATES PATENT OFFICE.

JOHN C. WILSON, OF BUFFALO, NEW YORK.

IMPROVEMENT IN DUPLEX TELEGRAPHS.

Specification forming part of Letters Patent No. 136,400, dated March 4, 1873.

To all whom it may concern:

Be it known that I, JOHN CORNELIUS WILSON, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Duplex Telegraphs, of which the following is a specification:

Nature of the Invention.

This invention relates to that class of telegraph apparatus and circuits whereby messages can be simultaneously transmitted over one wire in opposite directions, commonly called "duplex telegraphs," and more particularly to that class of duplex telegraphs in which a local equating-battery is used instead of a split main battery to neutralize the effect of the outgoing main current on the relay of the sending office. It consists in arranging the resistances in a circuit between the main battery and the relay, so that it always affords a ground connection for the battery at the other end whenever the key at its own end is open, the writing being accomplished by a key which closes a shunt-circuit around the rheostat to the relay, thus cutting the resistance in and out of circuit, and throwing an increased strength of current on the line, and, in this method of writing in duplex instruments, by throwing in and out of circuit the resistance; and, further, it consists in the novel construction of a key (which may be a finger-key or a relay-key, marked by a local battery) for closing both the main and equating circuits simultaneously through the duplex relay; and, also, in the combination of the foregoing with the other devices, as more fully hereinafter described and claimed.

In the drawing, Figure 1 is a view showing the instruments and their connections, batteries, &c., at each end of a circuit. Fig. 2 is a side elevation of the transmitter. Fig. 3 is a front cross-section of part of the transmitter, showing the four points, &c.; Figs. 4 and 5, an elevation and plan of the relay-magnet.

For the purpose of showing the circuits two stations are shown in Fig. 1, A and B, each of which is a duplicate of the other; but in the description of the devices A only is used. T is the duplex set of magnets, shown in detail in Figs. 4 and 5, consisting of the two sets of magnets H and J, between which is placed the

lever *b*, equally acted on by each through the medium of the armatures *a* and *c* attached to it. Of these, H is in a circuit from the main battery onto the line, and J in a circuit from the local equating-battery K. These two circuits are simultaneously operated by a key or transmitter, M, which is shown here as a relay-key, in a circuit, N N N N, from a local battery, *d*, and operated by an ordinary key, *p*; but this key may be arranged to be operated by hand instead of by an electro-magnet. This key or transmitter has a lever, *e*, (see Figs. 2 and 3,) in which are two platina contact-stops, *f f*, insulated from each other, while in the anvil are two corresponding stops, *g g*, insulated from each other, upon which *f f* rest when the key is depressed. These stops are connected, by wires, with the batteries and magnets, so that one, *f g*, forms part of the circuit to H, and the other, *f g*, to J. The magnets H and J and their batteries (main E and local K) are so adjusted to each other that when the circuit is closed the magnetic effect developed in the core of each magnet shall be the same, thus exerting the same effect on the common armature-lever, but in opposite directions, so that practically there is no influence exerted by either thereon. If at any time this equilibrium is found not to exist, or is lost, it can be practically formed or regained (especially where the difference is slight) by moving one set of magnets nearer to or further from the lever, as a less magnetic effect at a little distance will equal a greater further off. The magnets being thus equalized, they will remain inactive when the circuits at their own end are closed through them; but the current from the other end, passing only through H, will destroy the equilibrium and attract *a b*, giving the signal-seat by sound, or operating as a relay to a local sounder, as may be thought most desirable. Another or shunt circuit from the main battery is formed to the line-magnet H, shown at F F, in which is placed the resistance or rheostat G. This leaves a ground-circuit through the main battery always closed, so that the instruments are always in a closed circuit. These resistances are so adjusted that practically the effect of the battery on the line is *nil* when the circuits through the keys are broken. When the keys are open the main circuit is as follows: A and B represent the two ends of

the line or stations. The main circuit starts from the ground C at station A, up through ground-wire D to battery E; thence, by wire F, through rheostat G, and on into the relay-magnet H; and thence, by main-line wire I, through a similar relay-magnet, H', at the other station, B, passing, by similar wires and instruments, as above described, to its main battery, and thence to the ground C. This completes the main circuit, the united force of the currents from batteries E E passing through the instruments at each station.

The operation is as follows: Suppose key P to close transmitter-circuit N, transmitter-magnets close lever *c* of the transmitter, which makes the circuit complete through R and transmitter-points *f f*, and the increased force of the current is felt the entire length of the main circuit F I, and, at the same time, the magnet J is charged through points *g g* of the transmitter, and wires L, and local quantity-battery K, these magnets being so adjusted that they act with equal force on armature-lever *b*, so that, although signals are transmitted to the line, no effect is produced on the armature-lever of relay H by cutting rheostat G in and out of line or circuit; but the signals are felt at B station and on relay-armature *b'*. The instruments and connections and their adjustments at B being duplicates of those at A, the same effect is had or felt on armature *b'* at B whether local transmitter-circuit there is closed or not, and receives signals from A, and vice versa, thus making a perfect double transmission, circuit, and signals.

I have found that by this arrangement of circuits and resistances practically there is no static or inductive discharge on the line, and that, as a consequence, condensers may be dispensed with, thus saving in the construction the cost of an element which has latterly been considered essential to successful duplex telegraphing.

Having thus described my invention, I claim—

1. The herein-described arrangement of circuits and resistances in a duplex telegraph, so that the signals are given by cutting the resistance in and out of the main line, substantially as and for the purpose described.

2. The resistance G, combined with the main-line magnet and circuit and main-line circuit, substantially as and for the purpose described.

3. The combination, with the duplex sets of magnet T, of the main battery, resistance, transmitter-key, and the circuits F F and R R, so that the circuit R R shunts the main-battery current around the resistance, substantially as and for the purpose described.

4. The transmitter-key M, having the points *f f g g* arranged to simultaneously close the main and local equating-circuits, substantially as and for the purpose described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

J. C. WILSON.

Witnesses:

J. R. DRAKE,
C. N. WOODWARD.