

D. B. GRANDY.
Duplex Telegraph.

2 Sheets—Sheet 1.

No. 230,001.

Patented July 13, 1880.

Fig:1.

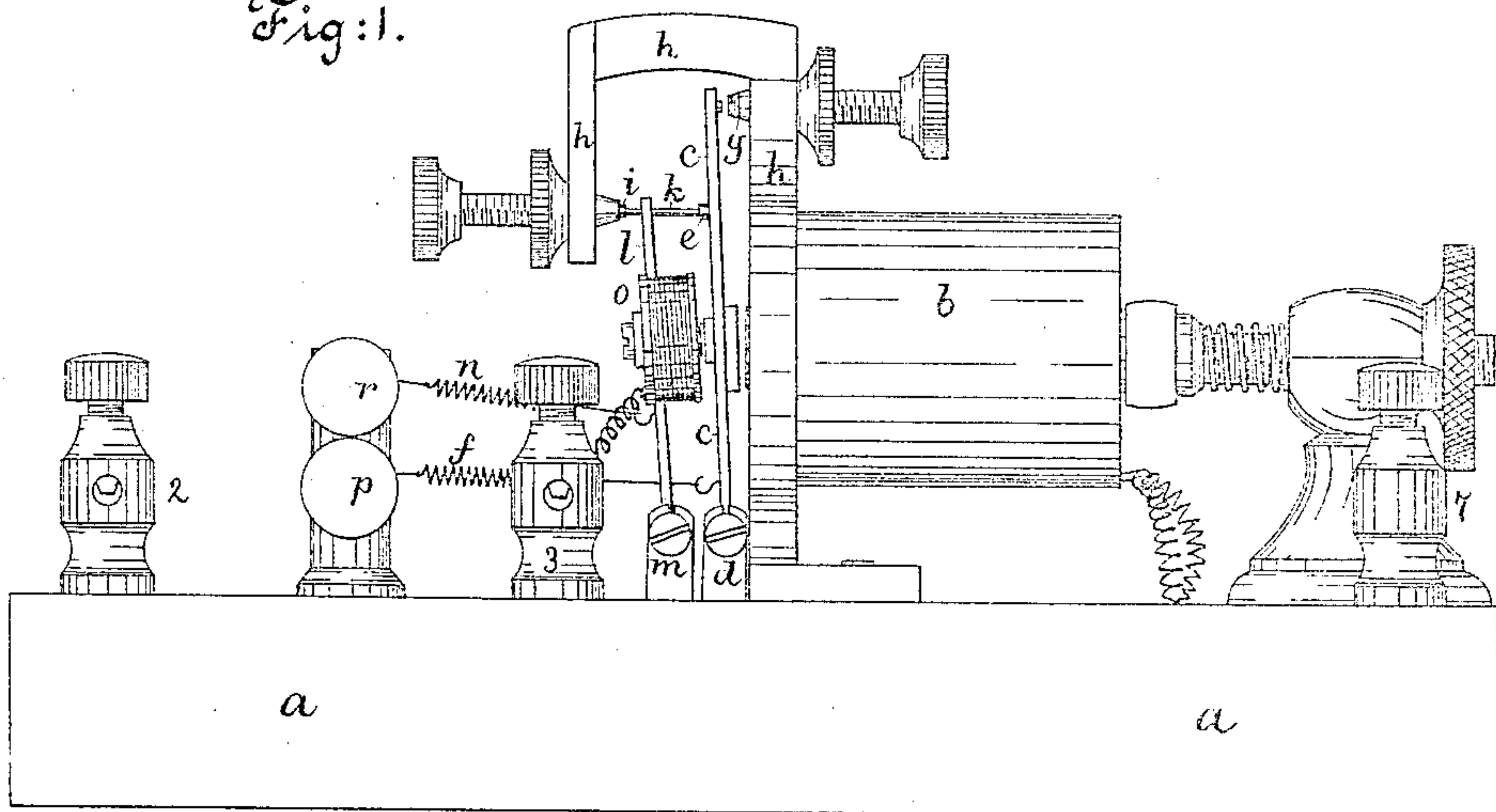


Fig:2.

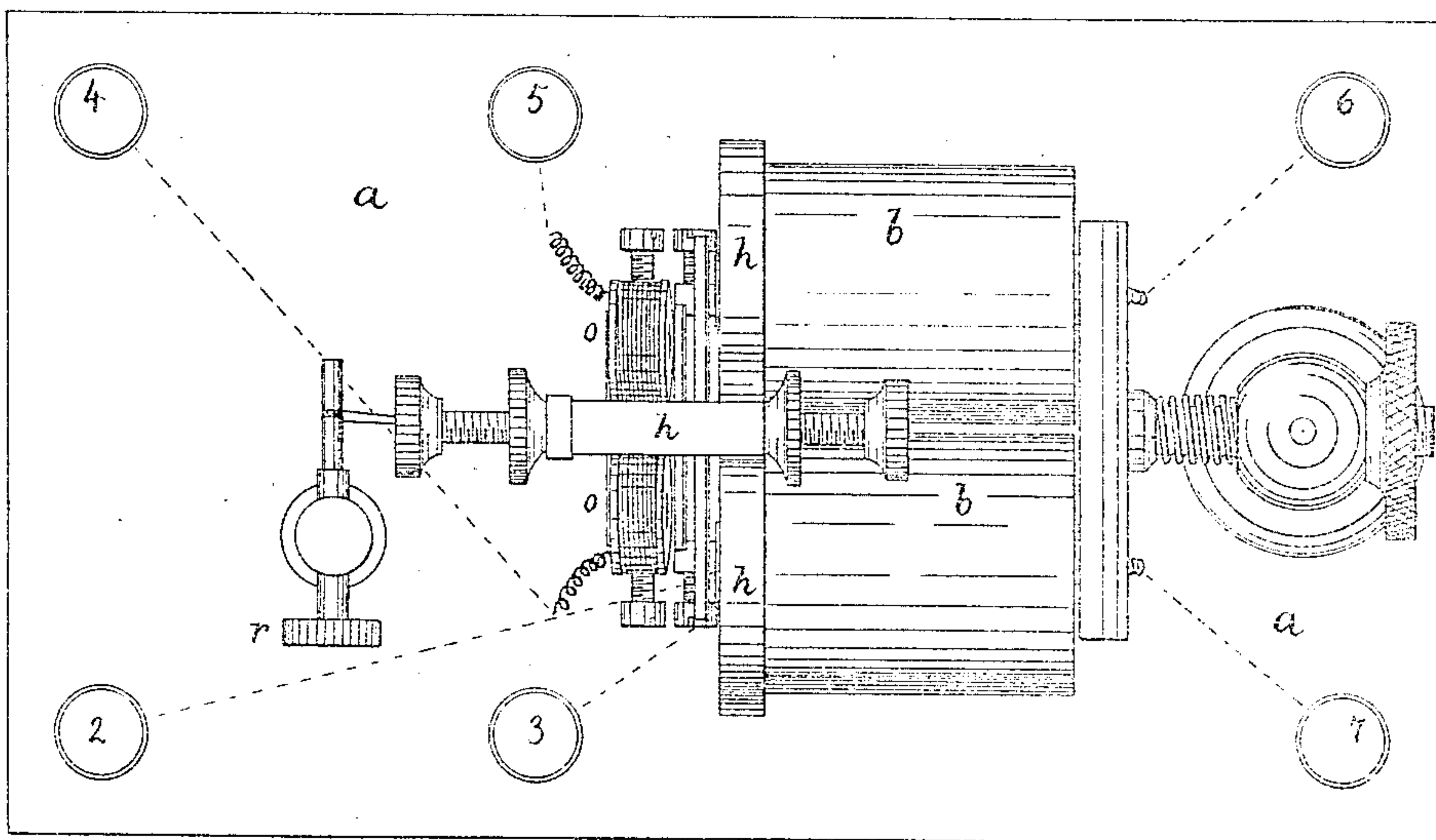


Fig:3.

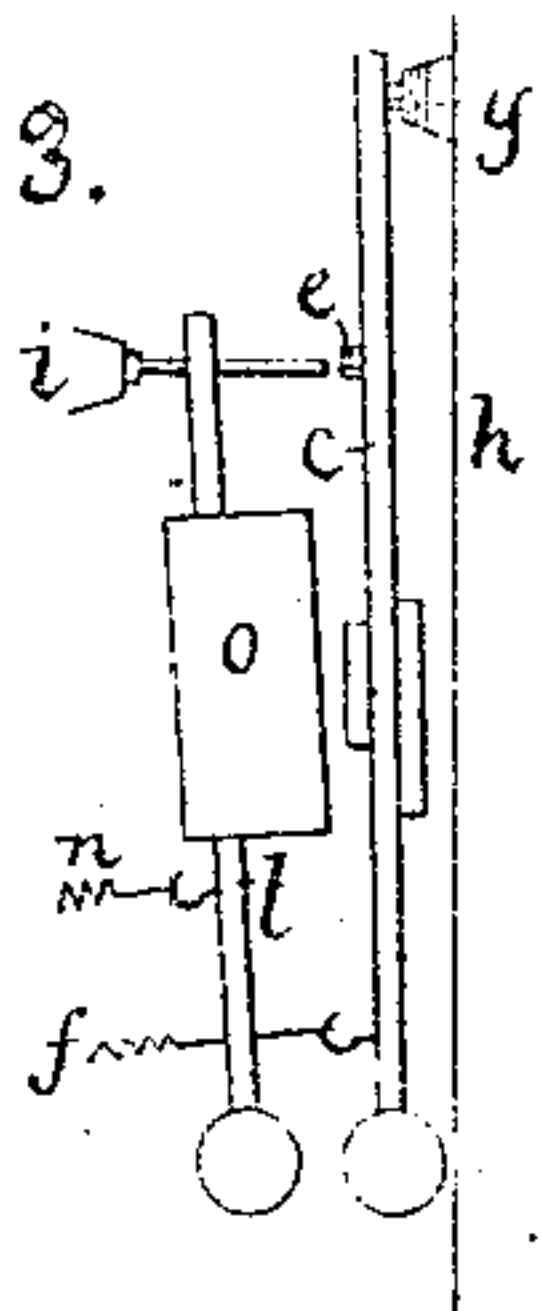
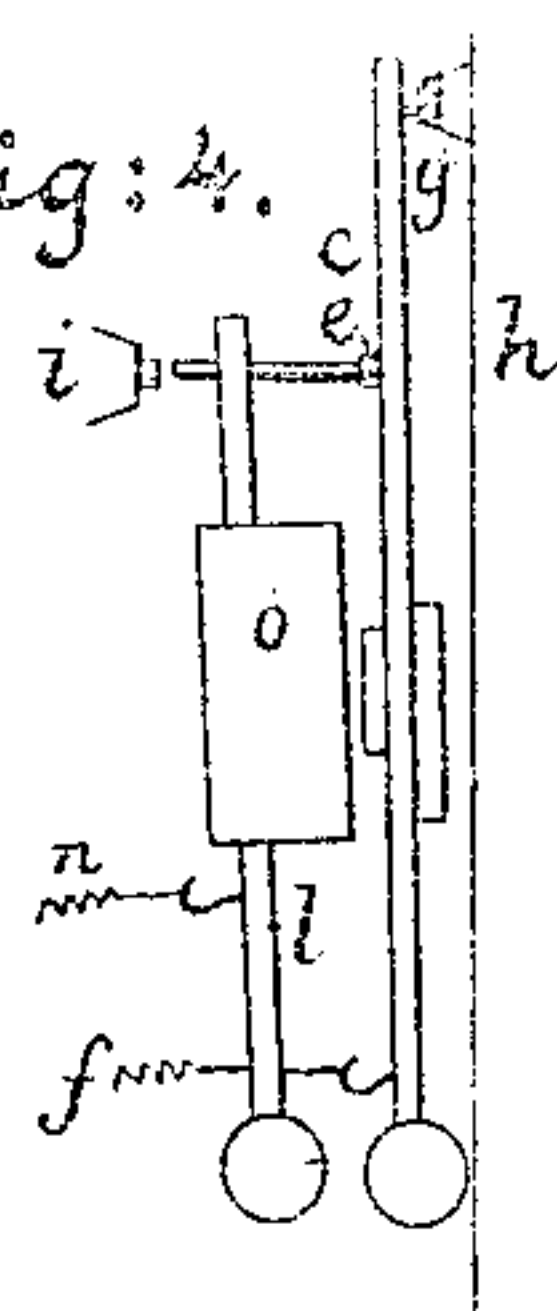


Fig:4.



Witnesses.
Jos. P. Seivernmore.
L. F. Connor.

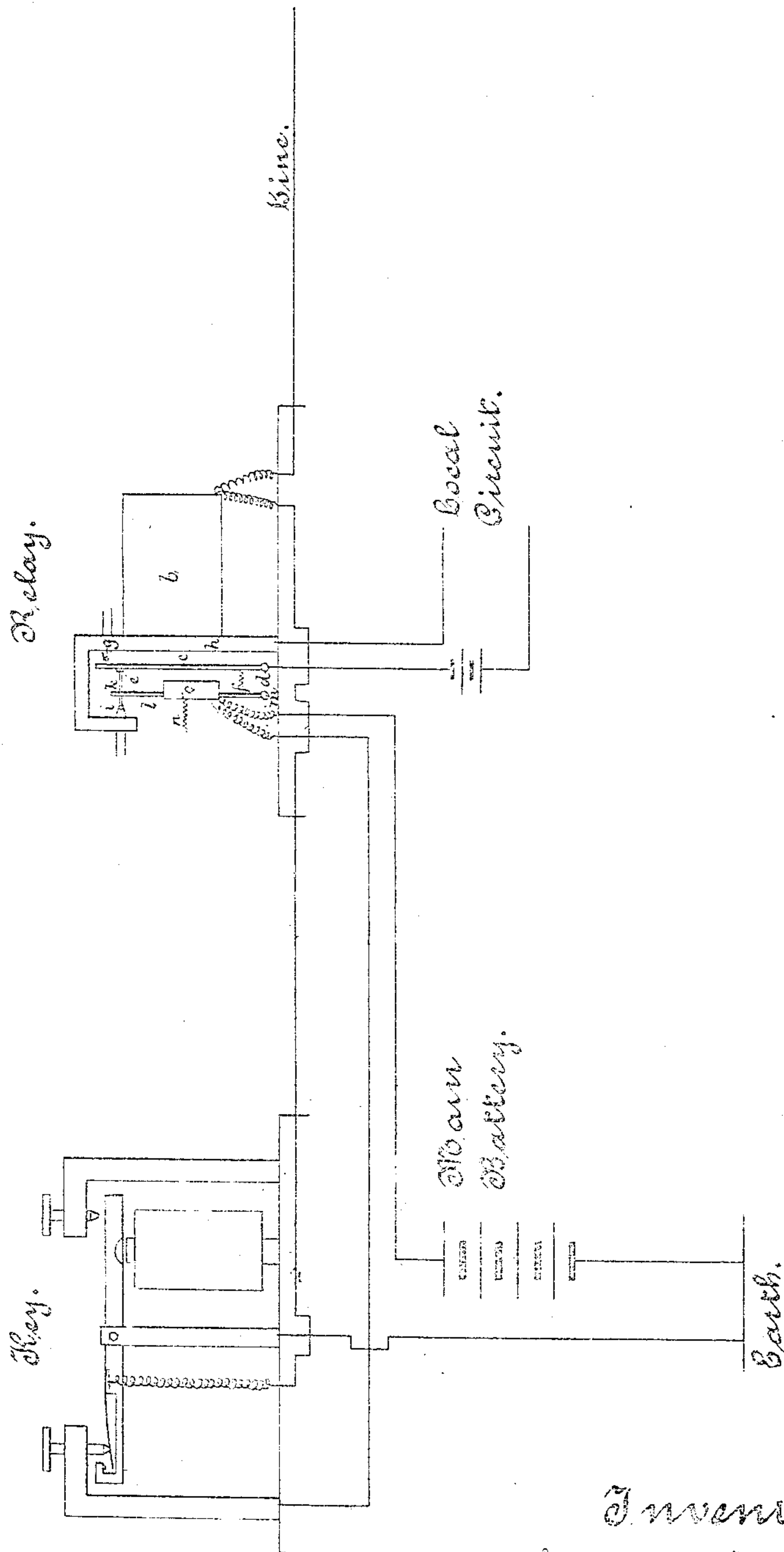
Inventor.
Daniel B. Grandy
by Louis J. Gregory, Atty.

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Fig. 5.



Witnesses.
Jos. P. Livermore
L. J. Connor

Inventor.
Daniel B. Grandy
by Lewis H. Gregory
Atty

UNITED STATES PATENT OFFICE.

DANIEL B. GRANDY, OF BOSTON, MASS., ASSIGNOR TO NATHANIEL F. POTTER, TRUSTEE FOR HIMSELF, SAID GRANDY, FRANK MAURAN, CHAS. G. McKNIGHT, AND GEORGE CHATTERTON, OF PROVIDENCE, R. I.

DUPLEX TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 230,001, dated July 13, 1880.

Application filed December 4, 1879.

To all whom it may concern:

Be it known that I, DANIEL B. GRANDY, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Duplex Telegraphs, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to a duplex telegraph in which I render the relay insensible to signals sent from its own end of the line by means of a movable auxiliary electro-magnet which acts on the main relay-armature, or a second armature mounted upon the same carrying-lever in the opposite direction to the main magnet, thereby acting as a detent to prevent the main armature from approaching its magnet to give a signal when acted upon by the battery at its own end of the line.

In the present embodiment of my invention the main armature is carried on a lever pivoted in front of its electro-magnet, and is provided with a retracting-spring, as usual, while the auxiliary magnet is carried by a similar lever, pivoted just in front of the one carrying the main armature, and is acted upon by a second retracting-spring, the coils of the said auxiliary magnet being placed in circuit between the main battery and transmitting-key, (shown as a continuity-key, or one by which the line is put to earth at the same moment that the battery is taken off.)

If the main battery at the same end of the line, which I shall denominate, for convenience, the "home" battery, is off—that is, with its circuit broken—the auxiliary magnet is inoperative, remaining held back by its retracting-spring, and the armature responds to impulses from the "distant" battery, as in a simple relay.

When the home battery is put on, the main armature and auxiliary magnet, being, as it were, bound together by the attractive force of the latter, form a compound armature held back by the strength of both retracting-springs and drawn forward by the influence of the home battery on the relay-magnet, which is not enough to overcome both springs until aided by the battery of distant station, which is thus enabled to give a signal.

If desired, the coils of the auxiliary magnet

may be in a local-battery circuit operated simultaneously with the main battery by means of a double-pointed transmitter or key.

Figure 1 is a side view of a relay embodying my invention; Fig. 2, a top view thereof; Figs. 3 and 4, details showing different positions of the armature and auxiliary magnet; and Fig. 5, a general view, showing the battery, instruments, and connections at one station.

The block *a*, sustaining the main electro-magnet *b* and working parts, is provided with the usual binding-screws for connecting the different wires. The main armature is carried on a lever, *c*, pivoted at *d*, and provided with a contact-point, *e*, and retracting-spring *f*. The stop-point *g*, held in the frame *h*, is tipped with insulating material, whereby, when the armature is up to its magnet or closed, the circuit is broken between the lever *c* and framework *h*, to give a signal on the local repeater and sounder, as usual.

When the armature is open its contact-point is connected with the stop-point *i* and framework *h* by the pin *k* in the arm *l*, pivoted at *m*, provided with a retracting-spring, *n*, and carrying the auxiliary electro-magnet, *o*, adapted to act on an armature carried by the lever *c*, so that when the current is passing through its coils its attractive influence binds the levers *c l* together, thus adding the retracting force of the spring *n* and preventing the now compound armature *c l* from moving up under the influence of the home battery on the main relay-magnet. When in this position an impulse from the distant station, co-operating with the current of the home battery, will attract the armature and overcome the springs *f* and *n*, and draw it up, as shown in Fig. 4.

It will be seen that the auxiliary magnet is merely a means of automatically attaching the retracting-spring *n* to the main armature when the home battery is on, and may consequently have any power greater than that of the spring *n*, which should about balance the force of the home battery in the magnet *b*, thus always leaving the force of the spring *f* the effective force to be overcome by the distant battery in all conditions of the home battery. The power

of the springs *f n* is adjusted by the capstans *p r*, as usual.

The circuit of the usual local sounding-instrument is through the binding-screws 2 3, frame-work *h*, pin *k*, and lever *c*, and may be broken at either end of the pin *k* to give a signal.

When the home battery is off the auxiliary magnet is inoperative, and the instrument works as a simple relay, contact being made and broken at *e*, as in Fig. 3; but when the home battery is on the levers *c* and *l* move together, and contact is made and broken at *i*.

The main-battery circuit passes from binding-screw 4, through the coils of the auxiliary magnet and binding-screw 5, to the key, and thence to binding-screw 6, through the coils of the main magnet *b*, to binding-screw 7, connected with the main line.

If necessary, I may employ the usual condensers to obviate the effects of static discharge.

I claim—

1. In a multiple-transmission telegraph, the combination, with the main relay-magnet and its armature, of a movable auxiliary electro-magnet adapted to act on an armature carried by the main armature-lever in an opposite direction to the main magnet, substantially as and for the purpose described.

2. In a multiple transmission telegraph, a

main relay-magnet and its armature, combined with a movable auxiliary magnet adapted to attract the main armature-lever and prevent it from being moved up to the poles of the relay-magnet to give a signal when acted upon by the home battery alone, the said auxiliary magnet being so adjusted as to its movement that when the force of the distant battery is added the said auxiliary magnet moves with the main relay-armature to the poles of the relay to give a signal, substantially as described.

3. In a multiple-transmission telegraph, the combination, with the main electro-magnet and its armature and retracting-spring, of an auxiliary electro-magnet, a carrying-lever pivoted and provided with a retracting-spring capable of being adjusted to balance the attractive influence of the home battery, the said auxiliary magnet applying by its attractive force its retracting-spring when the home battery is in circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL B. GRANDY.

Witnesses:

G. W. GREGORY,
N. E. WHITNEY.