C. H. POND.

Telegraph Relay-Instrument.

No. 69,585. Patented Oct. 8, 1867.

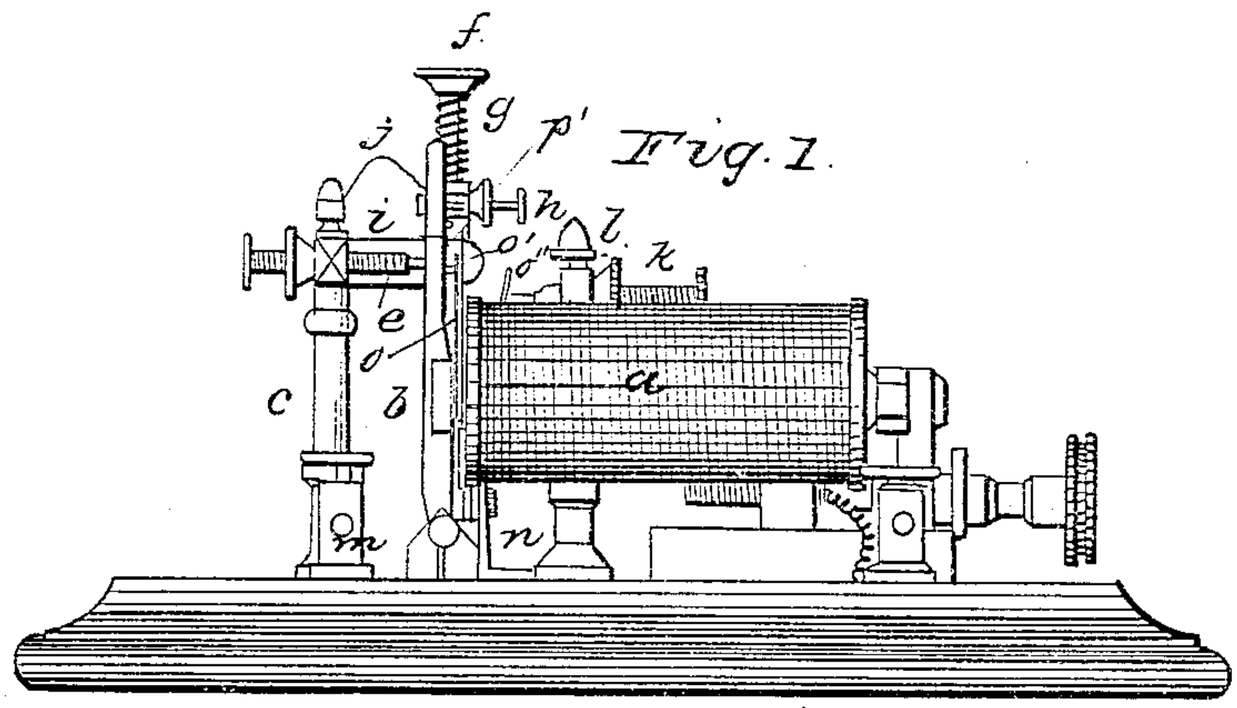


Fig. 1.

Fig. 2.

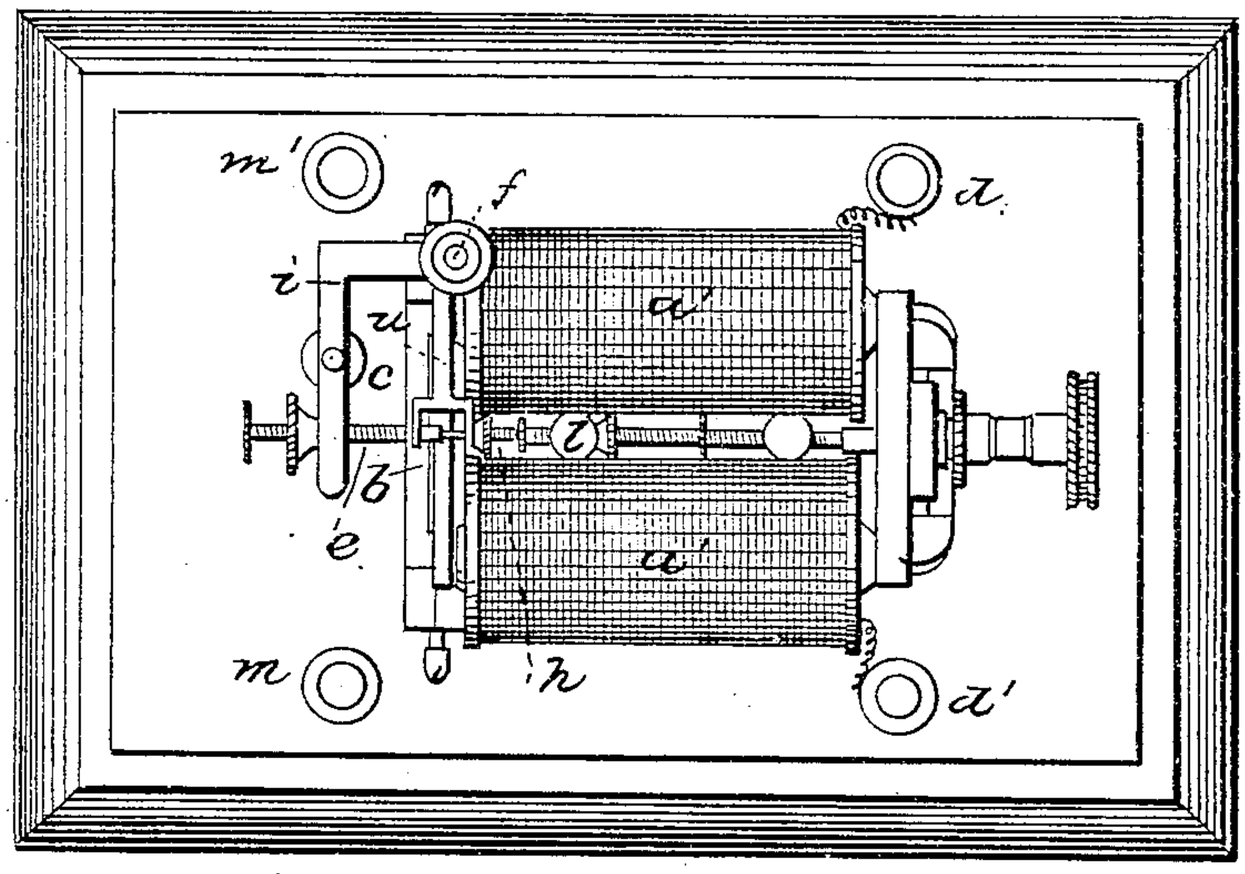


Fig. 3.

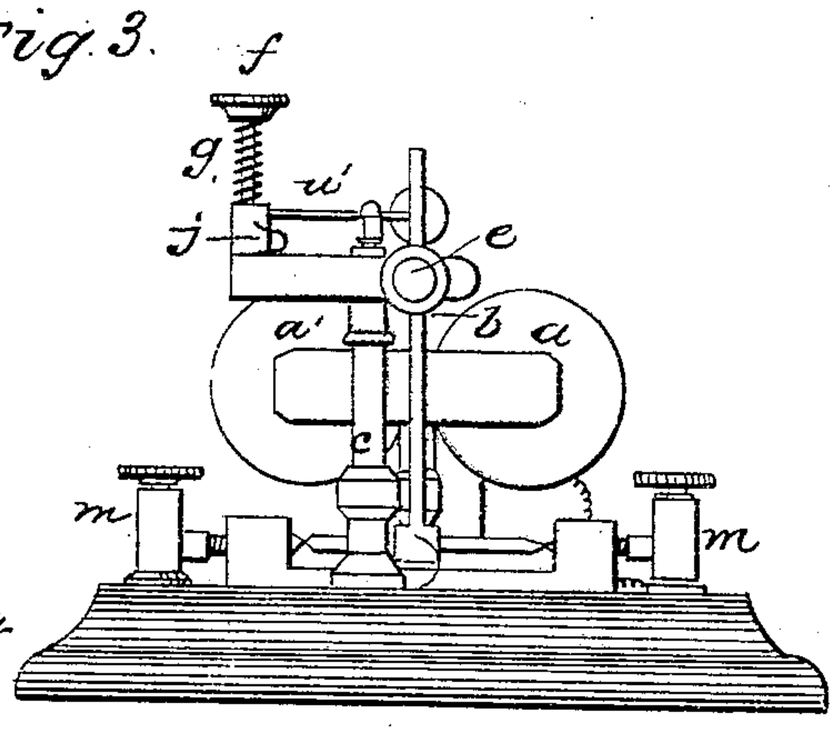
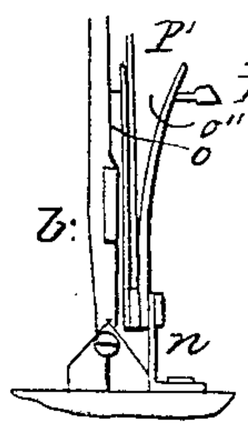


Fig. 4.



Witnesses

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C. H. POND, OF OBERLIN, OHIO.

Letters Patent No. 69,585, *dated October* 8, 1867.

IMPROVEMENT IN TELEGRAPH APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, C. H. POND, of Oberlin, in the county of Lorain, and State of Ohio, have invented certain new and useful Improvements in Telegraph Apparatus; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side view of the apparatus.

Figure 2 is a top view of the same.

Figure 3 is an end view.

Figure 4 is a detached section.

Like letters of reference refer to like parts in the different views.

My improvement in telegraph instruments is designed to obviate the difficulties in practical telegraphing arising from the changes or variations of the electric current in damp or wet weather, or when the lines are not in perfect insulation, which greatly impedes the transmission of business. For instance, if the current one moment becomes strong, residual magnetisim is strong in proportion, and there must be a corresponding tensity of spring power to repel the armature from the poles of the electro-magnet the instant the current is broken, or the residual magnetism developed by the strong current will hold the armature to the poles, and there will be no stroke. Should the next impulse of the current be exceedingly weak, residual magnetism will also be exceedingly weak, and there must be a loose tension spring, or the magnetism developed by the weak current will not be sufficient to overcome the spring resistance, and in this case also there will be no stroke. Thus in practical telegraphy these changes are constantly taking place when the line and weather are not in a favorable condition for working, and the utmost skill is required to keep the instruments in adjustment. Frequently these variations are so violent and rapid that the relays now in use cannot be kept adjusted, and business is obstructed for hours. With a self-adjusting instrument these diffculties are obviated, and business can be transmitted at all times, regardless of weather or imperfect insulation, and at a more rapid rate.

a and *a'* are electro-magnets; *b* is the armature lever; *c* is a post holding the local connections *f*, *g*, *h*, and *i*; also the screw *e*; *d d'* are leading posts for the electro-magnet connections; *e* is a screw to shorten the backward stroke of the armature lever; *f* is a check-nut to depress the spring *g*, and graduate the friction of the jointed arm *u u'*; *h* is a screw to vary the play of lever *b* in the forked arm *u'*; *k* is a screw to press *o''*, and thus increase the tension of springs *o* and *o'*; *m* and *m'* are binding posts for local connections; *n* is a stem to which springs *o o'* and *o''* are attached; *l* is a post to hold screw *k*.

The local connections are as follows, (see fig. 2:) *m'* is connected with post *c*, frame *i*, arm *u u'*, and screw connection *h*; *m* is connected with lever *b*. When lever *b* is in contact with screw *h*, the local connection is complete. *o'*, fig. 4, represents a second or double local connection, and is connected with *m'*, the same as connection *h*.

When in operation it works as follows: A current passes through the electro-magnets *a a'*. The magnets *a* and *a'* are now attracting the armature lever *f*, which brings point *p* against screw *h*, and thus closes local circuit. The local circuit now passes in at post *m*, up lever *b*, over point *p* to screw *h*, thence over the arm *u'*, down wire connection *j* to frame *i*, down post *c*, and out at post *m'*. When the main current is broken, and *a* and *a''* cease acting, spring *o* repels the lever *b*, and separates point *p* from screw *h*, and then breaks the local circuit. With a heavy circuit passing over magnets *a* and *a'*, the magnetism is stronger and will attract the armature lever *b* more forcibly, which will overcome spring *o* and bring point *p* and screw *h* in contact, thereby closing the local circuit, and then will move arm *u'* along with it, until the point *p'* strikes spring *o'* and is stopped by the spring resistance of leaf *o'*. Now the local circuit can pass over point *p* and screw *h*, or point *p'* and spring connection *o'*, which connection is the same as that of the jointed fork *u'*, but is used only in strong currents, passing through magnets *a* and *a'*, as the spring *o* is sufficient to repel the armature lever in all ordinary currents. The fork *u* and *u'*, having a light tension, will bound off and break the local connection at point *p* and screw *h*, under the influence of a heavy current; hence the double connection is used, and is secured by spring *o'* and point *p* on the lever; for when the main current is not sufficient to overcome spring *o*, it is not sufficient to cause the jointed fork *u* and *u'* to rebound, and when it is strong enough to overcome spring

o, local connection is made by point *p'* and spring *o'*, which has sufficient tension to stop the forward movement of the armature lever. Thus one or both connections for the local circuit will always be in adjustment for any circuit. The space in fork *u'* in which lever *b* acts being small, and carried along with the lever, and it only, the armature lever has only a slight distance to travel before closing the local circuit, but the fork being hinged, the armature lever is permitted to move forward until the spring power offered by *o* and *o'* is sufficient to overcome the magnetism of *a* and *a'* and stop it. And hence the instant the magnets *a* and *a'* cease acting wholly or partially, the spring power will repel the lever in proportion, so that any part of the main current can be controlled or broken. The resistance springs will always take advantage of the loss of power of the magnets *a* and *a'*, and having but a small play in the hinged fork *u'*, the local circuit is broken the same as though the entire main current ceased acting. If the connection point *h* for the local circuit were permanent, instead of being hinged, the armature lever could not have the benefit of the various spring tensions, but would be limited to a uniform resistance, the same as the common instruments now in use. Instead of stopping the forward movement of the armature lever *b* with a fixed point, as in common relays, it is stopped, as has been shown, by a spring power, which is always equal to the power of the electric current.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A hinged or jointed self-adjusting connection for completing, working, or governing the local circuit, constructed substantially in the manner described.

2. The hinged and self-adjusting leaved spring *o o'* for regulating the movement of the armature lever, when arranged substantially as described.

3. A double local connection by means of a three-leaved spring *o'*, to be brought into action under the influence of a strong current.

4. The reacting spring *o*, in combination with armature lever *b*, helices *a a'*, and adjusting-screws *e k*, substantially as and for the purpose set forth.

5. The jointed fork *u'*, spring *g*, connecting-screw *h*, in combination with the armature and reacting springs *o o*, substantially as and for the purpose set forth.

C. H. POND.

Witnesses:

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