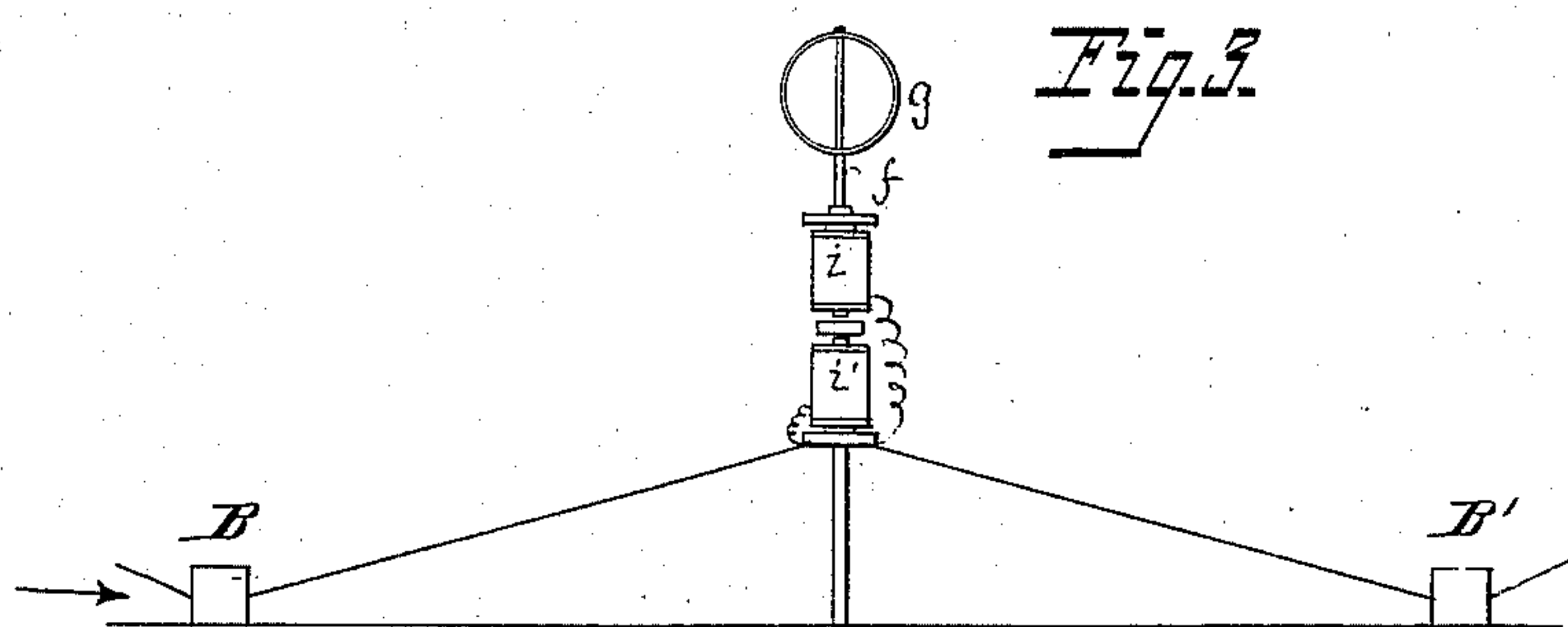
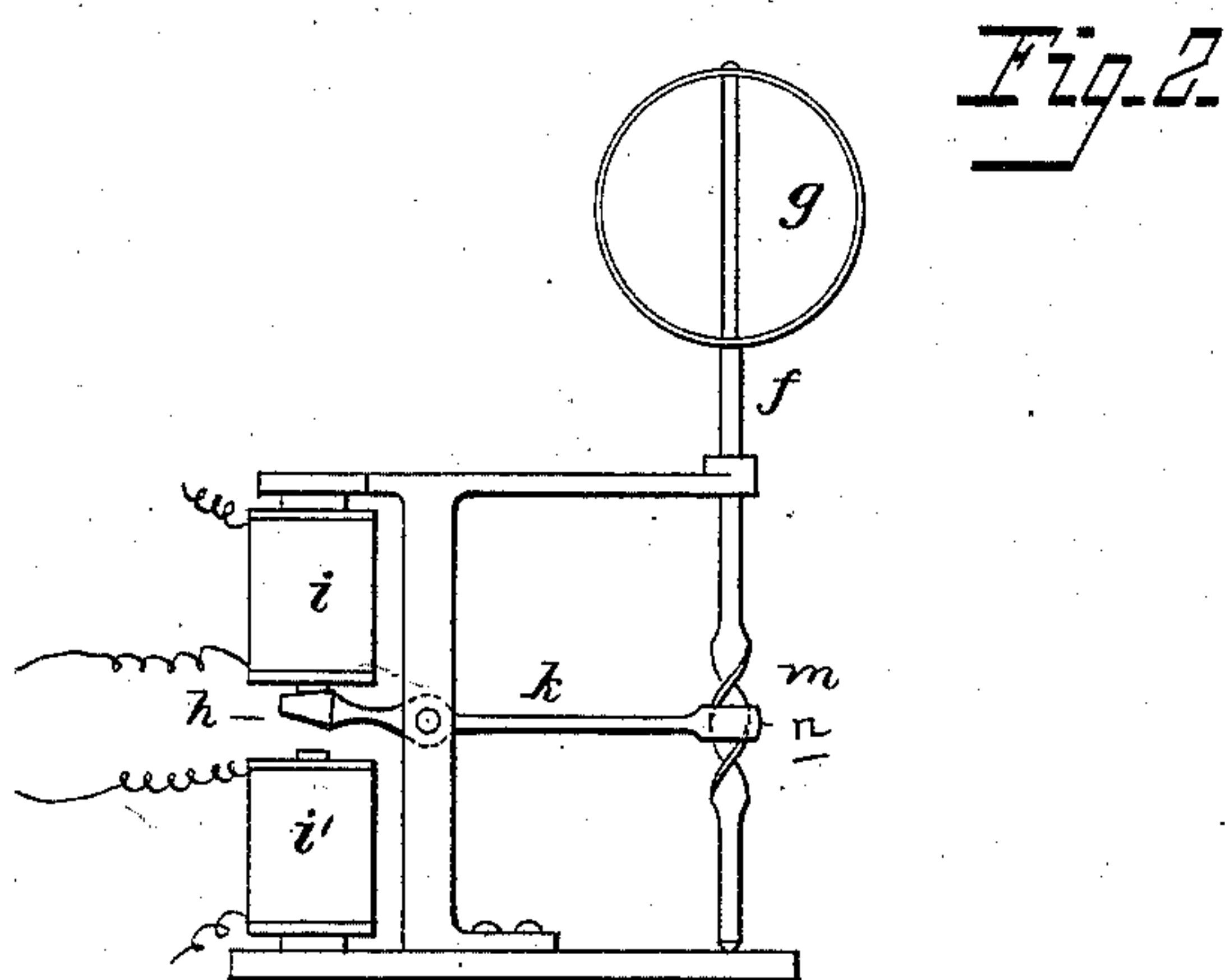
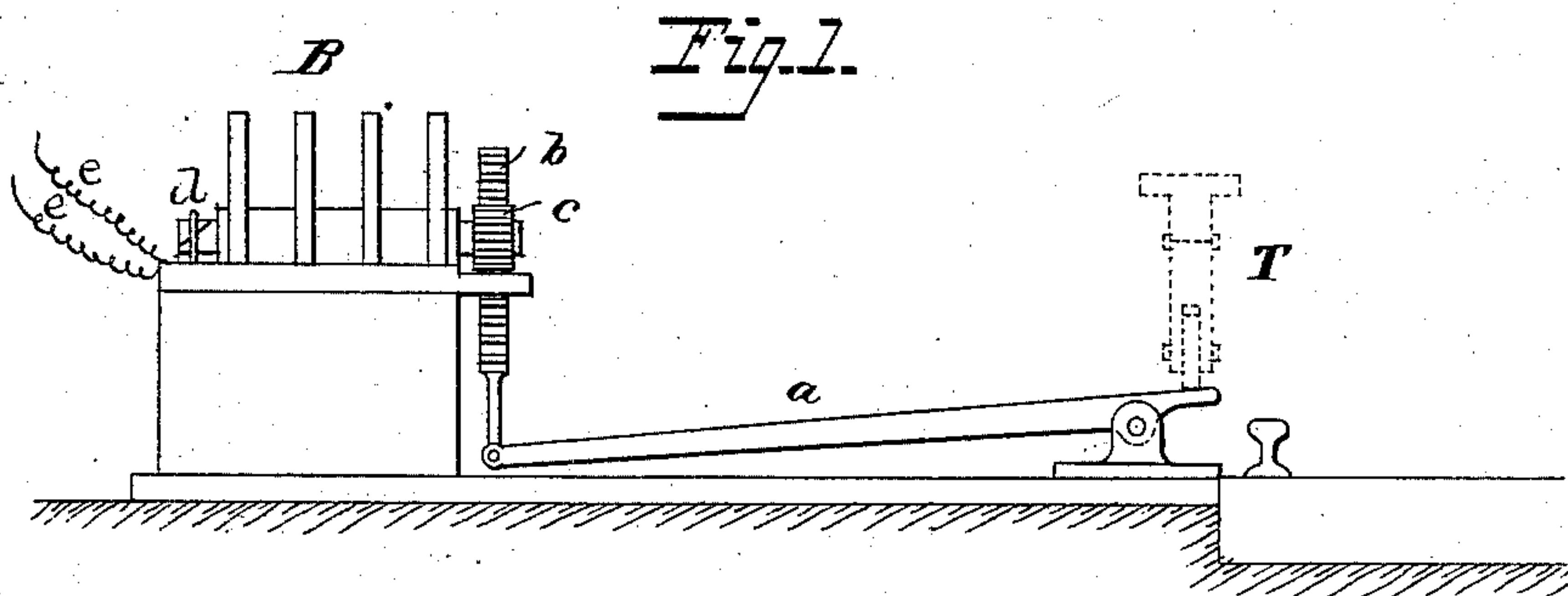


(No Model.)

J. GRAY.  
RAILROAD SIGNAL.

No. 270,305.

Patented Jan. 9, 1883.



*Attest:*

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*his Attorney*



# UNITED STATES PATENT OFFICE.

JOSHUA GRAY, OF MEDFORD, MASSACHUSETTS.

## RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 270,305, dated January 9, 1883.

Application filed July 1, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOSHUA GRAY, of Medford, Middlesex county, State of Massachusetts, have invented certain Improvements in Railroad-Signals, of which the following is a specification.

My invention relates to that class of railway-signals in which an electric current is made the medium of setting a visual signal at a distant point ahead of or behind the train; and my invention consists in such a combination and construction of devices as will insure a positive action of the signal appliances and prevent failures in the transmission of the operating-currents.

In the drawings, Figure 1 is a transverse section of a railway-track and generator illustrating my invention. Fig. 2 is a detached view of a signal device; and Fig. 3 is a diagram illustrating the arrangement on part of a track of signaling and current-generating appliances showing my improvements.

Heretofore it has been proposed to display and set visual signal devices and operate bells or alarms by means of currents derived from galvanic batteries, or by electrical impulses resulting from the movement of the armature of a magnet. The use of galvanic batteries has proved objectionable from their uncertain action, from the liability of the jars to become broken and of the liquid to evaporate or freeze, and from the danger of the batteries running down, owing to neglect or accident. For these reasons it has been proposed to substitute magneto-currents for battery-currents, using magneto-generators, which are not liable to the above objections; but heretofore such generators have been used to transmit electrical impulses of successively-different polarities, which serve the purpose of attracting and repelling successively the armature of a magnet in the signal device, and serve therefore to vibrate bell-hammers and sound alarms by mechanism operated directly by the current, but are unsuitable for any purpose where a direct and continuous operation is required.

I use the magneto-current to avoid the objections incident to the employment of galvanic batteries; but instead of transmitting the electric impulses of alternate polarities I employ means whereby the current is straight-

ened, so that when transmitted to an electro-magnet upon the signal device it will operate continuously upon the armature with one effect.

I may employ magneto-generators of different kinds, it only being essential that the same be so constructed as to transmit a current of one polarity, and with such generators I use devices of any suitable character whereby a passing train is caused to set the apparatus in operation and insure the transmission of the current to the signal device.

The devices between the generator and the track may be such as will wind up a train of wheels when the railway-train passes in one direction and release it so as to permit it to run down and rotate the armature of the generator; or they may be such as to operate the armature directly. I have shown the latter in the drawings, where a lever, *a*, pivoted beside the track, is connected to a rack-bar, *b*, gearing with a pinion, *c*, upon a shaft and carrying the armature of a Siemens magneto-generator, *B*, so that a tappet, *T*, carried by the engine, striking the short arm of the lever *a*, will throw the latter up, revolving the armature as it ascends, and also as it descends after the tappet leaves it. A commutator, *d*, of usual construction, straightens the currents so that a current of one polarity is transmitted along wires *e e* to the electro-magnet of the distant signals. Such signal may be of any suitable construction, so as to be operated by the current thus produced. I have shown a staff, *f*, suitably supported and carrying a target, *g*, and armature *h*, arranged between two electro-magnets, *i i'*, and supported by a lever, *k*, carrying a nut, *n*, which slides upon a screw, *m*, on the shaft *f*, so that the latter is turned to display the target when the armature descends, and is turned a quarter-turn to set or conceal the target when the armature is drawn to the upper magnet. This signal is used with two generators, *B B'*, at widely-separated points on the track on opposite sides of the signal, the parts being so set that as a train passes the generator *B* in the direction of the arrow the current generated will excite the lower magnet, drawing down the armature and displaying the signal to indicate danger. As the train passes the generator *B'* the current gen-



erated will excite the upper magnet, lift the armature, and set the signal to "safety," ready to be displayed to "danger" upon the passing of the following train. This arrangement is for a double-track road, and will be varied as circumstances require. For a crossing but one generator may be employed with each signal, with mechanical devices to set the latter as the train passes.

It will be apparent that while a single impulse or succession of single impulses might fail to sufficiently excite the magnet upon the signal device a continuous current would furnish such a superabundance of power as would insure positive and proper action in every instance, thus securing that absolute certainty without which no railway-signal is effective, and which has heretofore only been attained by the use of mechanical connections. The continuous magneto-current has, however, the advantage of the mechanical connections that it can be conducted to any required distance regardless of the character of the intervening objects.

The tappet T may be so constructed that it will spring back without acting upon the lever *a* when the train is backing, thus operating only in one direction.

I do not claim the combination of an alarm-signal and operating-magnet and a rotary magneto-machine and appliances for operating it from a train, said magneto-machine being constructed to produce a prolonged current of alternate polarity; but

I claim—

1. In a railway-signal, a signal device having a target, electro-magnet, and appliances constructed to move the target under the action of a continuous current of one polarity, and a continuous current magneto-generator, and connections whereby to transmit such continuous current, combined with a railway and with mechanism, substantially as set forth, whereby the generator is operated from a passing train, as specified.

2. The combination of a railway-track, a continuous current magneto-generator arranged beside the track, and mechanism constructed to be operated from a passing train to rotate the armature of the generator, and a signal device having a target and an electro-magnet electrically connected with the generator, substantially as set forth.

3. The combination, in a railway-signal, of a railway-track, a continuous current magneto-generator, and a signal device provided with a magnet electrically connected to be excited by said current, and with a target and appliances arranged between the target and armature of the magnet, whereby the target is caused to be set or displayed on the movement of the said armature, substantially as set forth.

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

JOSHUA GRAY.

Witnesses:

WILLIAM H. DIEHL,  
JOSEPH B. BRAMAN.