

(No Model.)

E. BUTLER.  
TELEGRAPH RELAY.

No. 561,653.

Patented June 9, 1896.

Fig. 1.

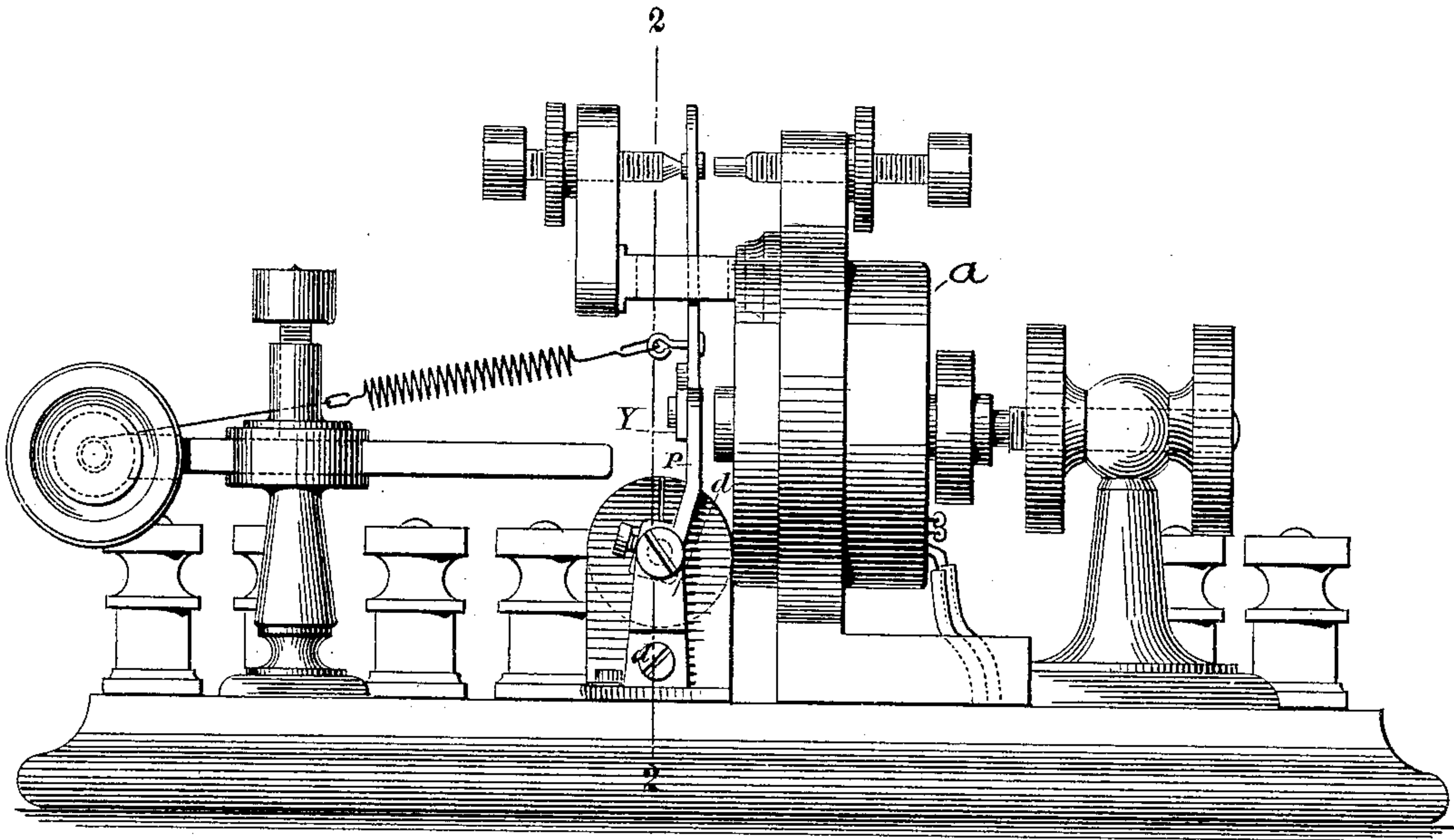


Fig. 2.

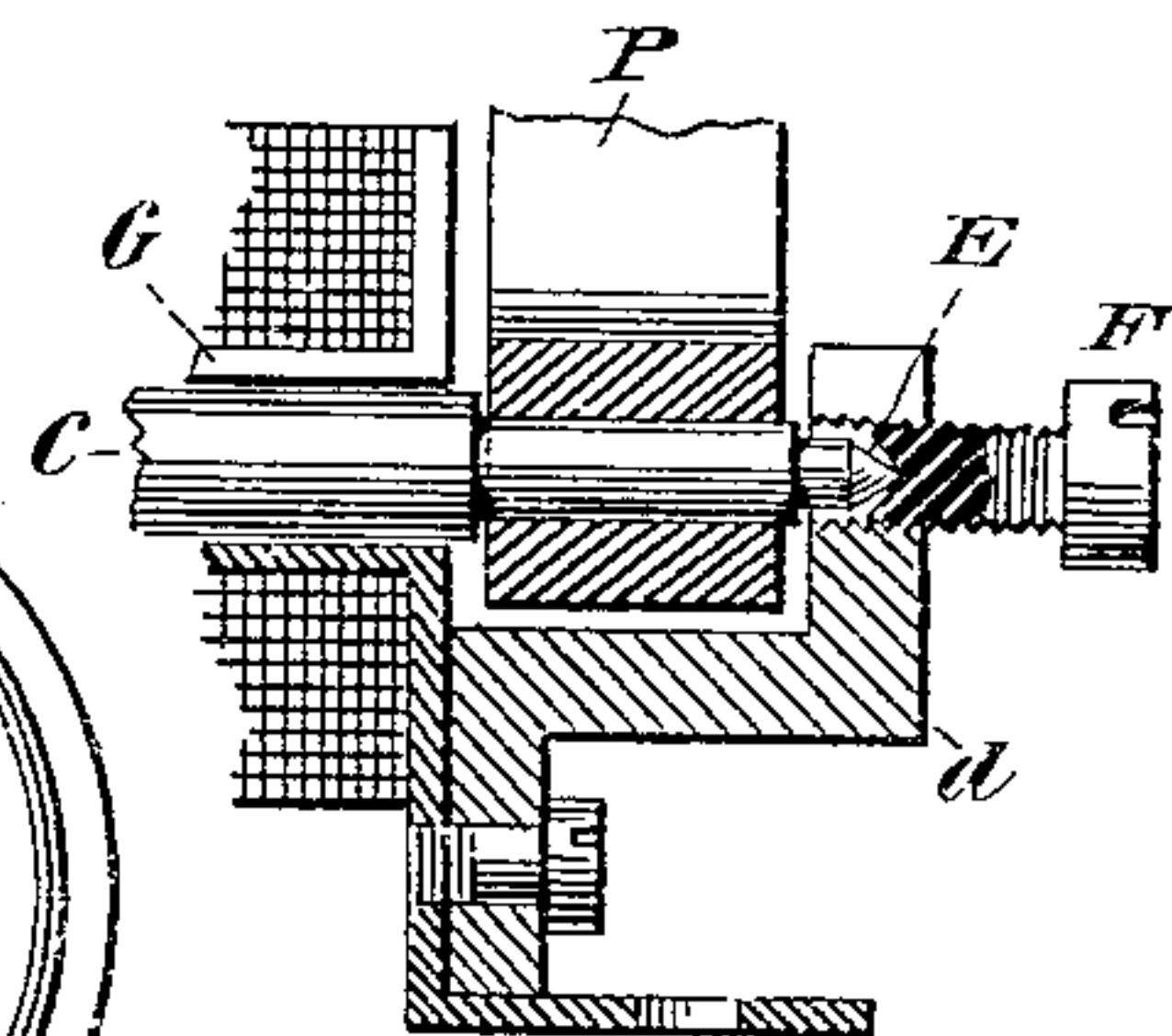
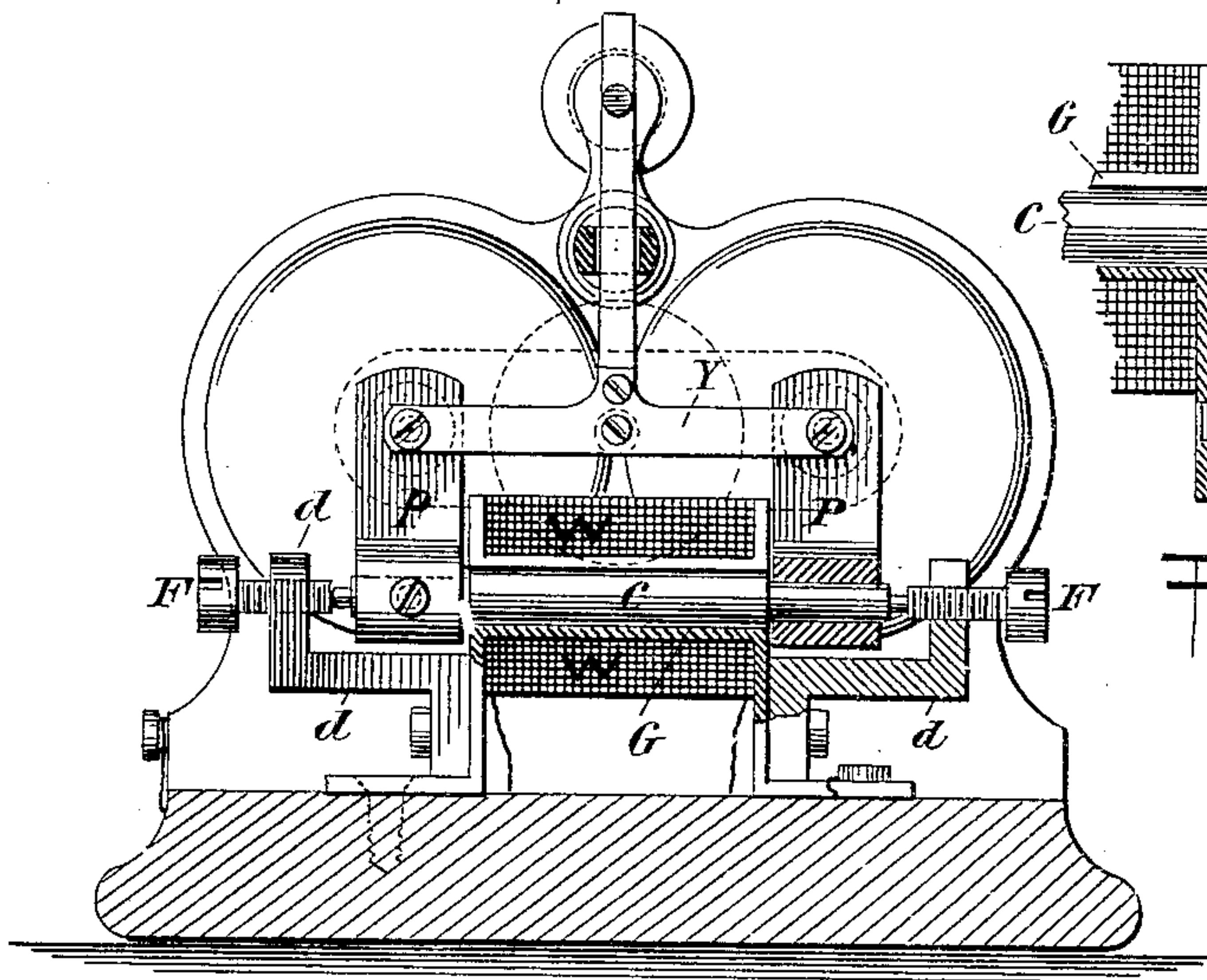
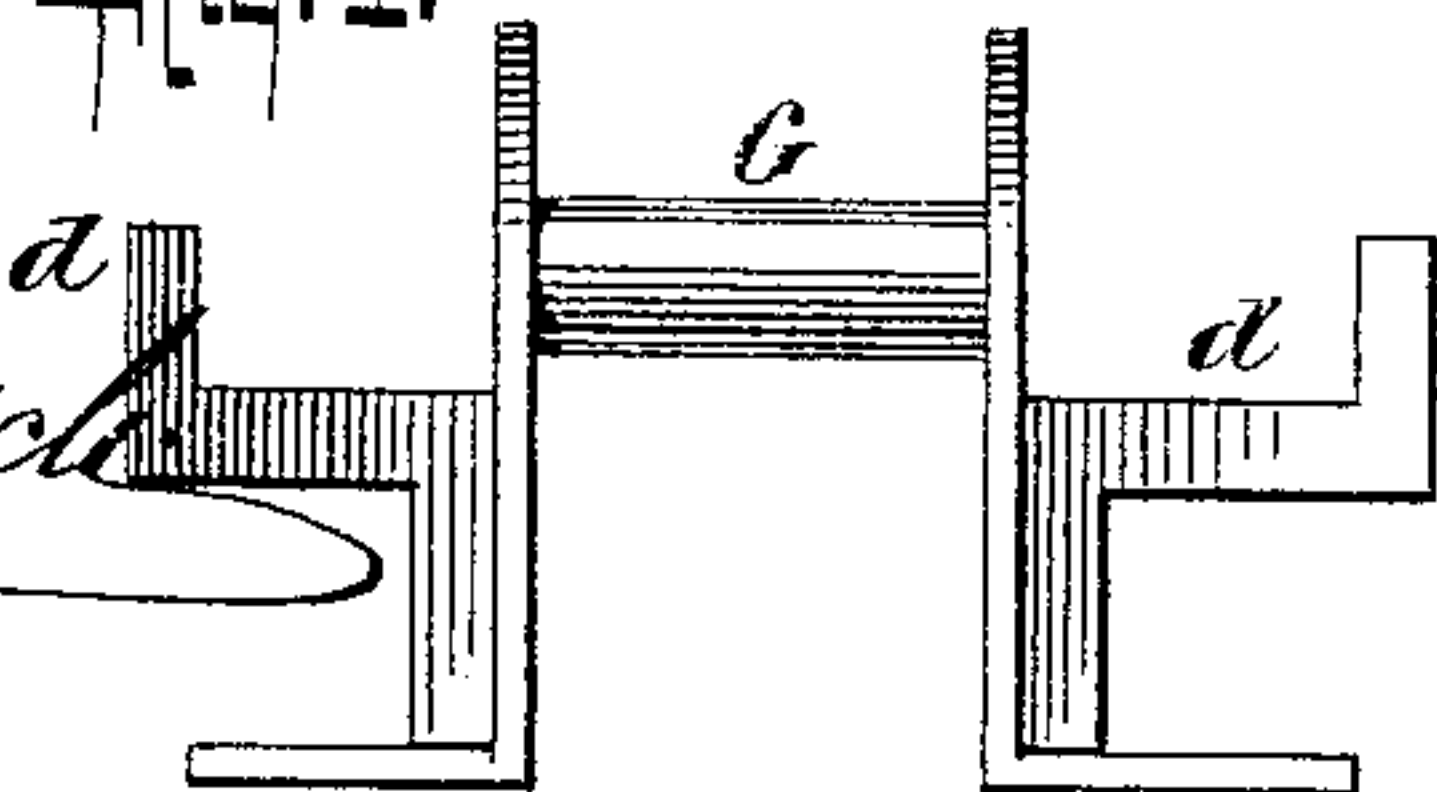


Fig. 3.

Fig. 4.



WITNESSES:

*Gustave Nierich*

*J. G. Ambrey*

*Edwin Butler*  
INVENTOR

BY *Wm. H. Taylor*  
his ATTORNEY.



# UNITED STATES PATENT OFFICE.

EDWIN BUTLER, OF NEW YORK, N. Y.

## TELEGRAPH-RELAY.

SPECIFICATION forming part of Letters Patent No. 561,653, dated June 9, 1896.

Application filed June 15, 1893. Serial No. 477,657. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN BUTLER, a resident of the city, county, and State of New York, (having declared my intention to become a citizen of the United States,) have invented certain new and useful Improvements in Telegraphic Relays, of which the following is a specification.

My invention relates to telegraph-relays, and has for its object to produce a relay in which the armature is an electromagnet unencumbered by carrying the coil and its fixings, and which is energized by the line-current to give to the instrument to which it is attached a keen sensitiveness and an immediate responsive power, which existing instruments do not possess.

It is not necessary to change the form or construction of existing relays in order to make my invention applicable thereto. The attachment of my improved armature as a substitute for the present strip of iron will make existing instruments more sensitive and reliable, and consequently more perfect for telegraphic purposes.

My invention, briefly stated, is to pass the armature-shaft through a solenoid, from which it is mechanically independent, the solenoid being energized by the current of the main magnet with which it is in circuit.

If an armature has to bear and carry the weight of a magnetizing-coil, rapid working and sensitiveness in the moving parts cannot be had. Hence I use a solenoid in preference to an armature burdened by its magnetizing-coil.

In multiple telegraphy, such as duplex and quadruplex, &c., the attachment of my improved armature to a neutral relay will reduce the "time constant" of the instrument, thereby creating an improvement and supplying a long-felt want in the perfecting of the system, it being well known that existing instruments are sluggish in action and show a decidedly perceptible heavy time constant. In other words, they do not respond "promptly," and this defect in the system is overcome by the application of my invention. It is well known that few, if any, of the instruments, with an armature of a strip of iron, will not respond to less than thirty milliam-

peres of current; but by my armature, as hereinafter set forth, all existing instruments with the same attached will respond to three and one-half, or less, milliamperes of current, and therefore will be a great and valuable improvement.

In the accompanying drawings, Figure 1 is a side view of a neutral relay with my improved armature attached. Fig. 2 is a sectional view on line 2 2 of Fig. 1. Fig. 3 is an enlarged section on same plane of one of the supports, which are at each end of the armature-shaft; and Fig. 4 shows the hollow spool or frame upon which is to be wound the solenoid.

A represents the coils of the common form of relay-magnets provided with cores *a*, to which are opposed poles *P* of the armature. These poles are adjustably secured to a shaft *c*, provided with pointed ends *E*, which enter recesses in screws *F*, carried by supports *d*, which are secured to supports *g*, which also carry a spool *G* of non-magnetic material, upon which is wound a solenoid *W*, surrounding but independent of the shaft *c*. To the poles of the armature is secured a T-shaped contact-piece *Y*.

The solenoid-coil *W* is in circuit with the magnet-coils *A*, which for duplex telegraphy are doubly wound, as is the solenoid. The windings of the solenoid are such that when the armature is to be attracted its poles will possess opposite signs to those of the cores of the coils to which they are respectively opposed, and when it is to be repelled its poles will possess similar signs to those of the cores of the coils to which they are respectively opposed.

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

1. In a telegraphic relay the combination of a pair of electromagnet-coils, provided with cores, an armature therefor opposed to both cores, and a solenoid surrounding the shaft of the armature, and being in circuit with the magnet-coils, substantially as described.

2. In a telegraphic relay, the combination of a pair of electromagnet-coils provided with an armature opposed to both cores and a stationary solenoid surrounding the shaft of

said armature, the windings of the solenoid and of the magnet-coils, being in the same circuit substantially as described.

3. In a telegraphic relay the combination  
5 of electromagnet-coils provided with cores, an armature therefor, which consists of a pivoted shaft, pole-pieces adjustably secured thereon, a T-shaped contact-piece secured to the pole-pieces, a spool surrounding the ar-  
10 mature-shaft, and a solenoid wound on the spool, the coils of the solenoid and of the magnets being in the same circuit, substantially as described.

4. In a relay for duplex telegraphy the

combination of doubly-wound electromag- 15  
nets, an armature therefor mounted on a piv-  
oted shaft, a spool surrounding but inde-  
pendent of said shaft, and a doubly-wound  
solenoid on said spool, in the same circuit  
with the magnets and so wound that the poles 20  
of the armature will possess like or opposite  
signs to those of the cores to which they are  
opposed, according to the signal sent over the  
line-wire, substantially as described.

EDWIN BUTLER.

Witnesses:

E. V. GAMBREY,  
O. S. APGAR.