(No Model.)

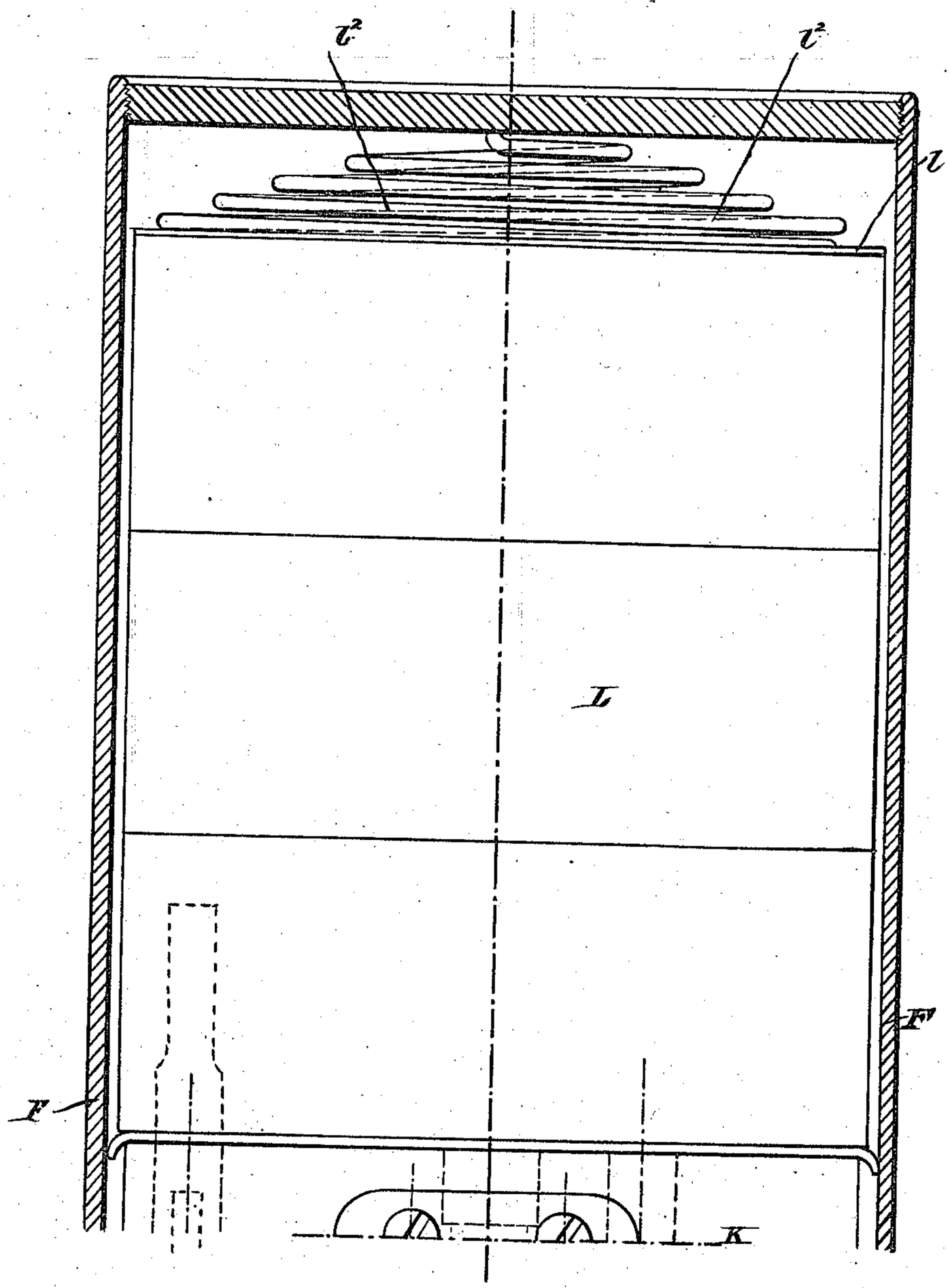
4 Sheets—Sheet 1.

J. P. GIBBINS.

TESTING AND FIRING APPARATUS FOR SUBMARINE MINES.

No. 330,226. Patented Nov. 10, 1885.

FIG. 1.



Attest
Victor A. Lewis
Geo. L. Wheelock

Inventor
Joseph Pannell Gibbins
By Knight Bros.
his Attys

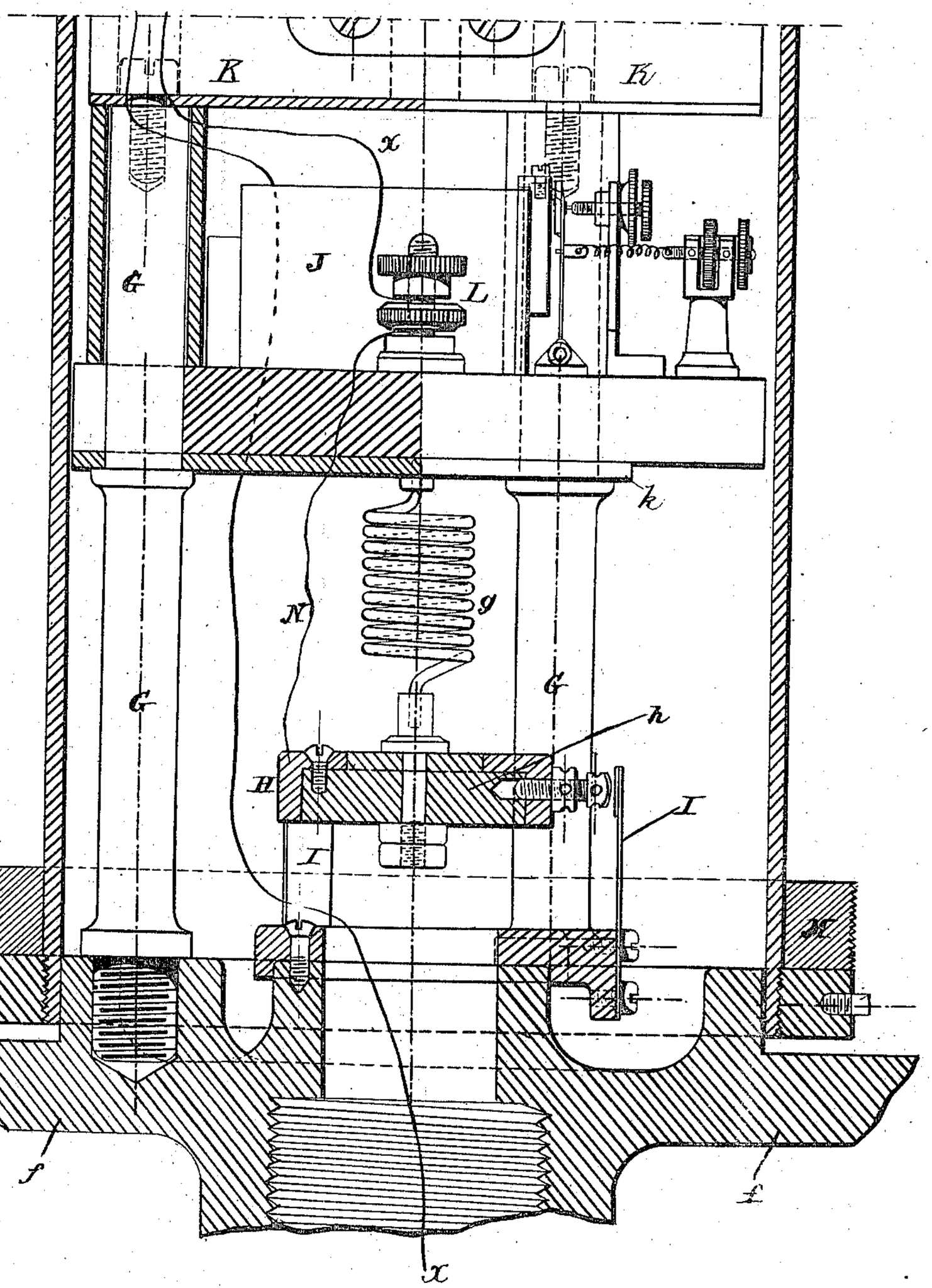
(No Model.) 4 Sheets—Sheet 2.

J. P. GIBBINS.

TESTING AND FIRING APPARATUS FOR SUBMARINE MINES.

No. 330,226. Patented Nov. 10, 1885.

FIG. 1 cont'd



Attest
Victor A. Lewis
Geo. L. Wheelock

Inventor
Joseph Pannell Gibbins
By Knight Bros.
his Attys

(No Model.)

4 Sheets—Sheet 3.

J. P. GIBBINS.

TESTING AND FIRING APPARATUS FOR SUBMARINE MINES.

No. 330,226. Patented Nov. 10, 1885.

FIG. 2.

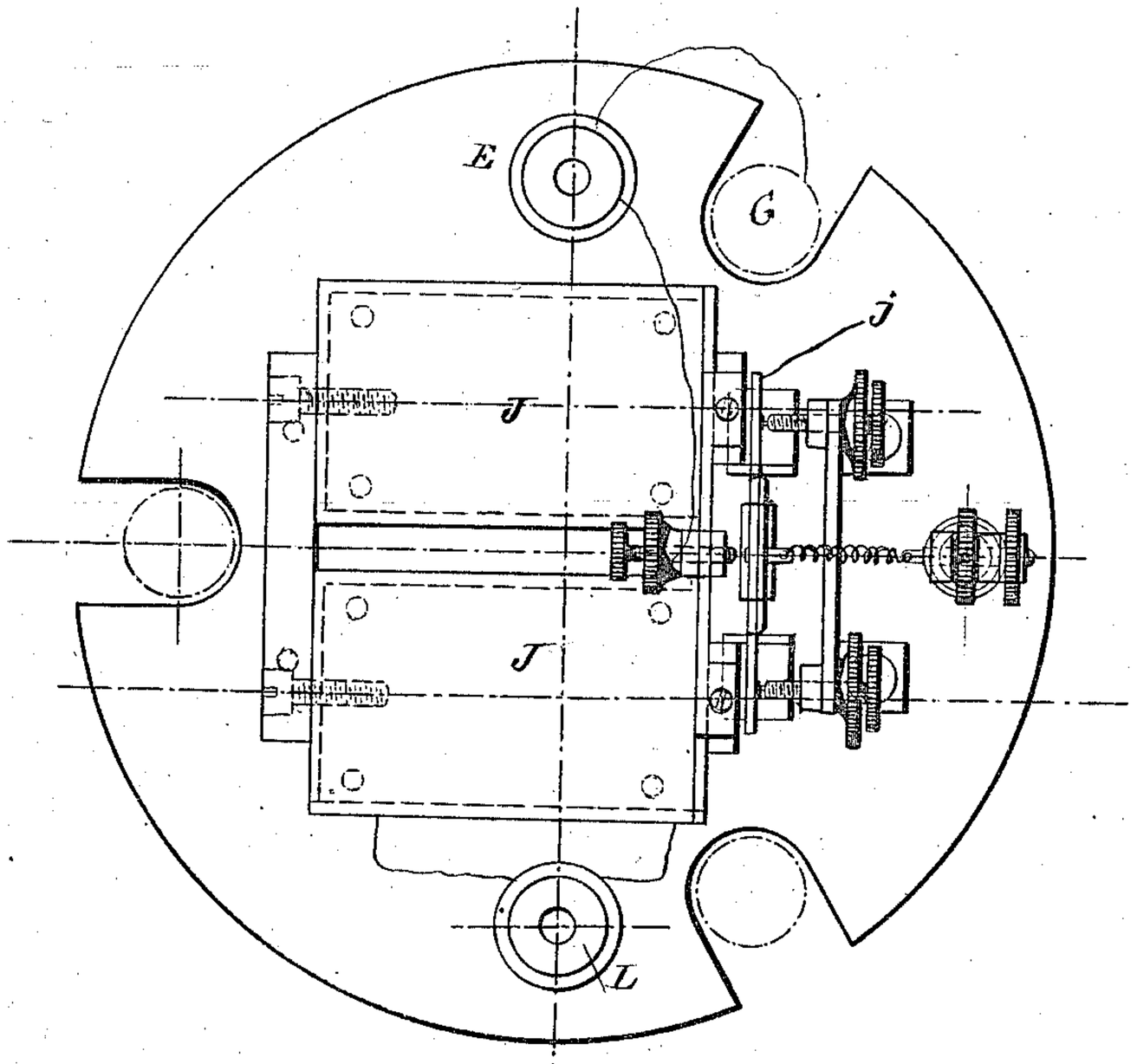
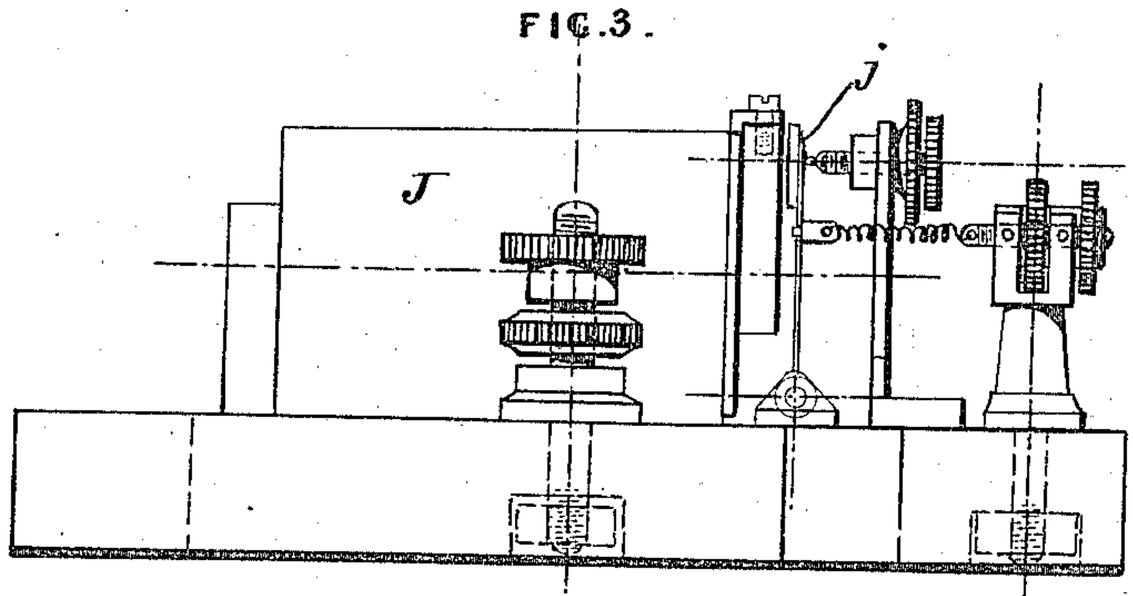


FIG. 3.



Attest
Victor A. Lewis
Geo. L. Wheelock.

Inventor
Joseph Pannell Gibbins.
By Knight Bros
Hus Attys

(No Model.)

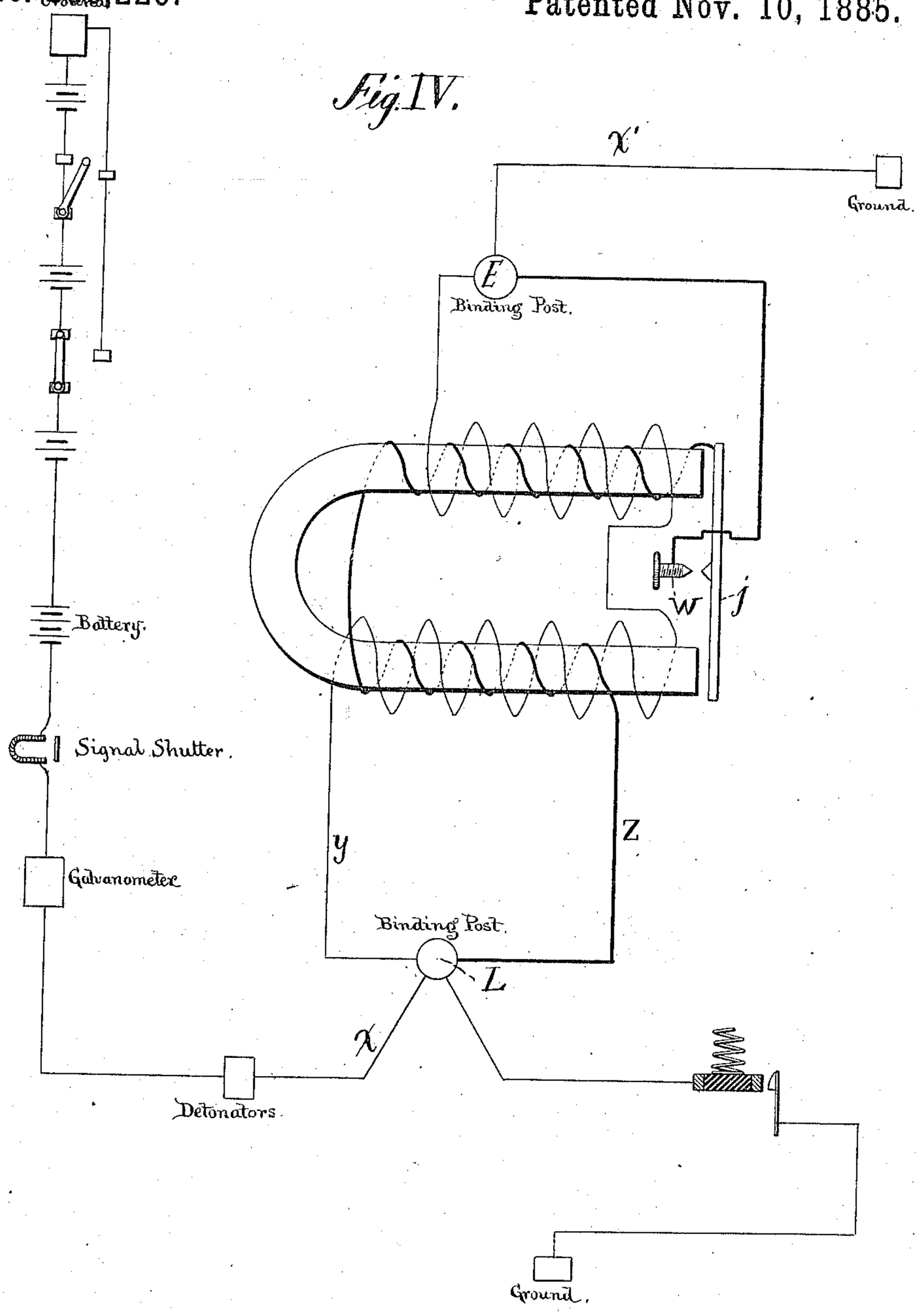
4 Sheets—Sheet 4.

J. P. GIBBINS.

TESTING AND FIRING APPARATUS FOR SUBMARINE MINES.

No. 330,226. Patented Nov. 10, 1885.

Fig. IV.



Attest:
Geo. T. Smallwood.
W. Hopkins

Inventor:
Joseph P. Gibbins
By Knight Bros.
attys.

UNITED STATES PATENT OFFICE.

JOSEPH PANNELL GIBBINS, OF 4 OSBORNE TERRACE, COOMBE FARM LANE, WESTCOMBE PARK, COUNTY OF KENT, ASSIGNOR TO LATIMER CLARK, MUIRHEAD & COMPANY, (LIMITED,) OF 23 REGENCY STREET, WESTMINSTER, ENGLAND.

TESTING AND FIRING APPARATUS FOR SUBMARINE MINES.

SPECIFICATION forming part of Letters Patent No. 330,226, dated November 10, 1885.

Application filed January 8, 1885. Serial No. 152,428. (No model.) Patented in England September 2, 1884, No. 11,886, and in France December 24, 1884, No. 166,105.

To all whom it may concern:

Be it known that I, JOSEPH PANNEL GIBBINS, submarine mining and electrical engineer, a subject of the Queen of Great Britain and Ireland, and residing at 4 Osborne Terrace, Coombe Farm Lane, Westcombe Park, in the county of Kent, England, have invented certain Improvements in Testing and Firing Apparatus for Submarine Mines, (patented in Great Britain September 2, 1884, No. 11,886,) of which the following is a specification.

My invention relates to improvements in testing and firing apparatus for submarine mines, as hereinafter described.

Figure 1 is a vertical section of apparatus constructed according to my invention. Figs. 2 and 3 show the relay in plan and elevation. Fig. 4 is a diagrammatic view of the circuits.

The circuit-closer is arranged so that the mine can be at pleasure changed from an electro-contact mine to an observation-mine, or vice versa—that is to say, may be arranged to explode automatically on receiving an external shock, or to be fired from the shore when desired

The said circuit-closer consists of a base of malleable cast-iron, *f*, for attachment to the shell or case, which is preferably of the construction described in the specification of an application for a patent in my name filed June 18, 1885. Pillars G G G are mounted on the base *f*, the said pillars carrying a metal table, *k*, from which depends a helical metallic spring, *g*, and a conducting-disk, H. This disk is insulated by a block of ebonite, *h*, from the helical spring *g*. Contact-springs (preferably three) I I I are supported on the cast-iron base so near to contact with the insulated disk H that the contact-screws on the disk strike the said springs and close the circuit whenever the mine receives a blow. Above the relay (hereinafter described) is a wooden platform, K, (supported on the three pillars G G G,) supporting a second disk, K′, which carries the detonators for firing the mine and the priming-charge of gun-cotton or other explosive, L, which is kept firmly pressed down by a disk, *l*, and spiral *l*² at top.

The whole of this apparatus is inclosed in a drawn-steel envelope, F, hermetically closed at top, and provided with a flange and screw-collar, M, and with a leather washer, to make the whole air-tight.

The whole apparatus, when used with a case of the description before mentioned, is passed up into the central cylinder in the box supported in the case, and is secured to the lower hemisphere of the case by bolts and nuts, or otherwise.

A relay of peculiar construction is inserted in the inner cylinder or envelope, F, the office of which relay is to enable the operator on shore to test the electrical condition of the mine. This relay, which is shown separately in elevation and plan in Figs. 2 and 3, consists of an electro-magnet, J, and an armature, *j*. The core of the electro-magnet is wound with fine wire, so as to have a high resistance of, say, for example, about two thousand ohms, and also with a thick wire coil having a low resistance, say, for example, about four ohms. When the mine is placed in position, a small signaling-current is kept constantly passing through the detonating-fuses, and thence through the fine-wire coil of the relay to earth; and by reason of the great resistance of the circuit the detonators are not exploded, the armature is not attracted, and the condition of the detonators may be tested electrically, or signals may be sent through the circuit without danger. This current also passes through an electro-magnetic signaling-shutter on shore; but the current, besides being too feeble to fire the mine, is also too feeble to drop this shutter.

The circuits of the relay are shown in Fig. 4. The current comes from battery on shore through the fuses of the detonators and wire *x* to binding-post L. To binding-post L are connected the ends of high-resistance coil *y* and low-resistance coil *z*, the first surrounding the cores of the electro-magnet, and then connected to binding-post E, the second surrounding said coils, then connecting with pivot of armature *j*, and so by contact-button W with binding-post E. Binding-post E

is connected by wire *x'* to pillars G, and so to ground.

It will be seen that the circuit of low resistance and the contact-piece on the relay are so arranged that when a testing-current of greater strength than that normally in line is sent through the fine-wire coil the armature is attracted and completes the circuit, so that the current passes not only through the fine-wire coil circuit, but is also shunted through the circuit of low resistance, the result being that the resistance of the circuit is reduced by, say, two thousand ohms, and the galvanometer on shore shows the completion of this short circuit by its greatly-increased deflection, thus proving that the whole circuit is in good electrical condition and ready for firing.

If it be desired to fire the mine, a battery of excessive strength is put in circuit, the current from which first closes the contact through the fine-wire coil, attracts the armature, and closes the circuit through the thick-wire coil and explodes the mine. If at any time, therefore, the mine is struck by a passing vessel, the contact-disk H is thrown into vibration, and momentarily touching the contact-springs I it completes a short shunt-circuit by means of the wire N between the contact-springs and the earth, and this current thus short-circuited is sufficiently strong to drop the shutter on shore and thus indicate that the mine has been struck, and the operator can then fire the mine, as before described.

The apparatus has been described as an observation-mine to be fired by the signaler on shore, but he can at will convert it into an electro contact mine to fire instantaneously on being struck by short-circuiting the firing-key.

I claim—

1. In a submarine mine, in combination with fixed contacts, a weighted movable contact suspended by a helical spring in proximity to said fixed contacts, and a circuit including both contacts, the detonators, and the source of electricity, substantially as and for the purpose set forth.

2. In a submarine mine, in combination with a series of fixed contacts having earth-connection, a heavy movable contact in circuit with the detonators and the source of electricity, a helical spring suspending said movable contact between the fixed contacts and insulated from said movable contact, substantially as and for the purpose set forth.

3. In a submarine mine, in combination with a suitable source of electricity and means for varying the current sent therefrom to line, a testing device consisting of an electro-magnet wound with a helix of high resistance, contacts adapted to be operated by said magnet on the varying of the current sent to line, and a low-resistance shunt in circuit with such contacts, the two ends of both high and low resistance circuits being respectively connected with the source of electricity and earth, substantially as and for the purpose set forth.

4. In a submarine mine, in combination with a coil of high resistance in closed circuit with the source of electricity, a galvanometer, the detonators, and an electro-magnet, a coil of low resistance, also in circuit with the source of electricity, galvanometer, and detonators, and with a make and break controlled by the magnet in the high-resistance circuit, substantially as set forth.

5. In a submarine mine, the combination of a coil of high resistance in closed circuit with the source of electricity, a galvanometer, the detonators, and an electro-magnet with a low-resistance shunt-circuit controlled by the said electro-magnet, and a short circuit around said magnet and shunt having a make and break adapted to be operated by a shock imparted to the mine, substantially as set forth.

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

JOSEPH PANNELL GIBBINS.

Witnesses:

CHAS. MILLS,

CHAS. JAS. JONES,

Both of 47 *Lincoln's Inn Fields*