

(No Model.)

F. B. BADT.
ELECTROMAGNETIC SENTINEL.

No. 571,739.

Patented Nov. 24, 1896.

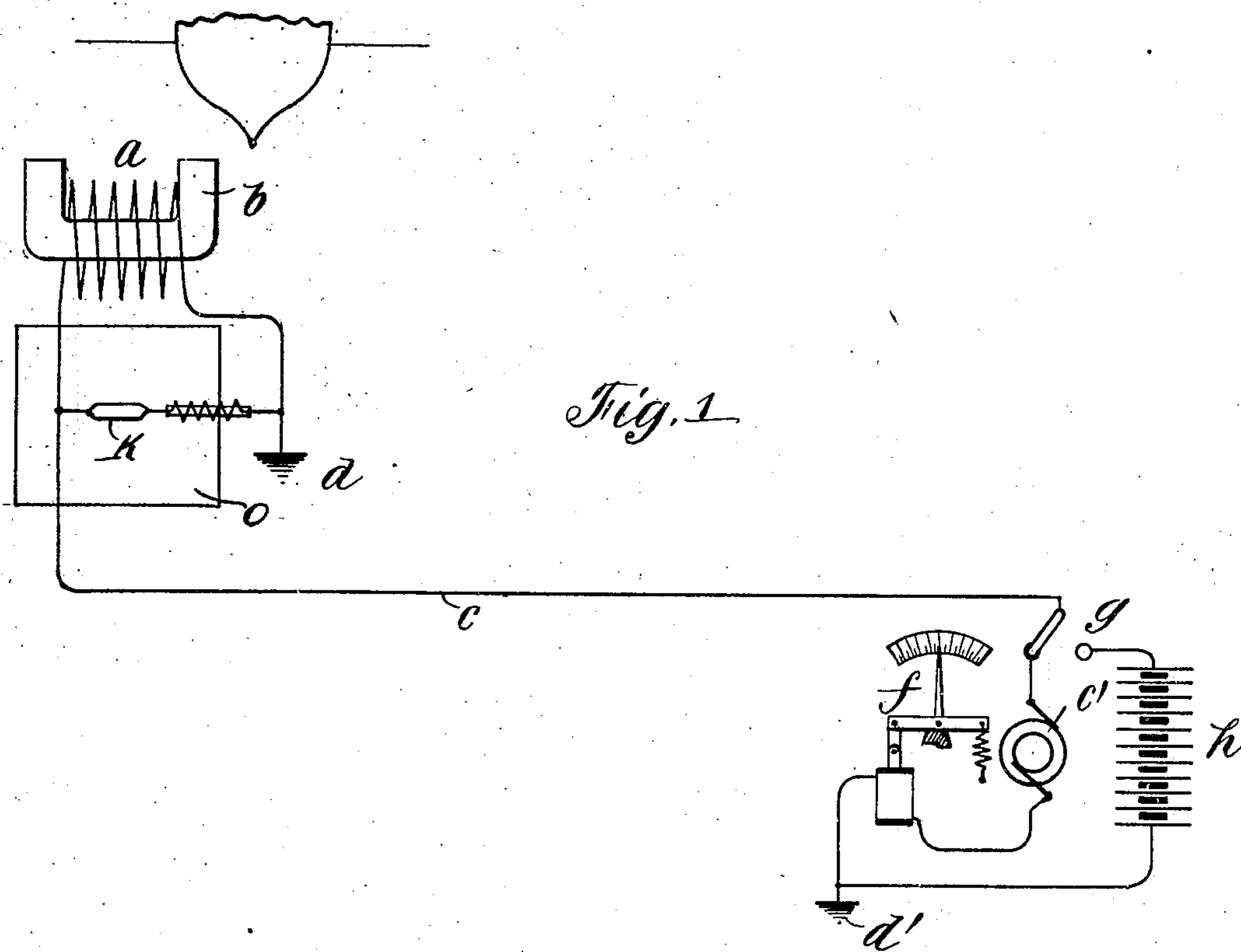


Fig. 1.

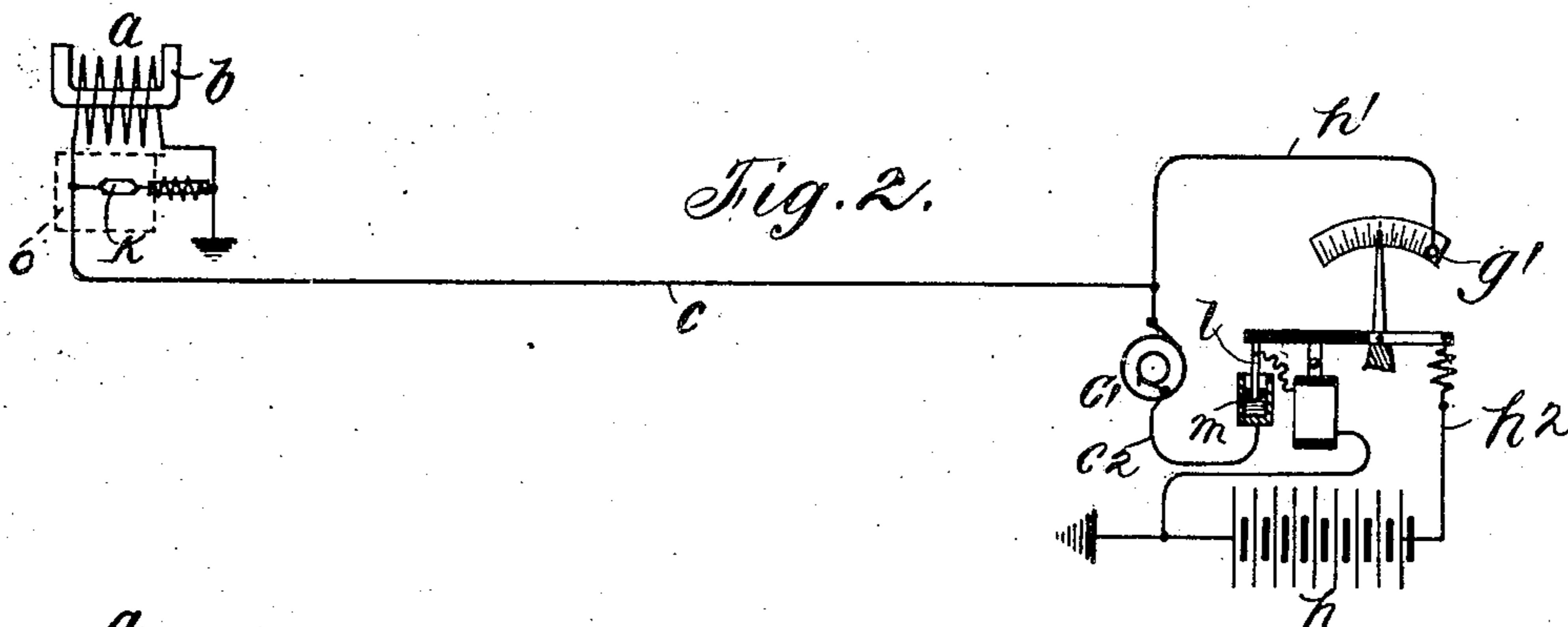


Fig. 2.

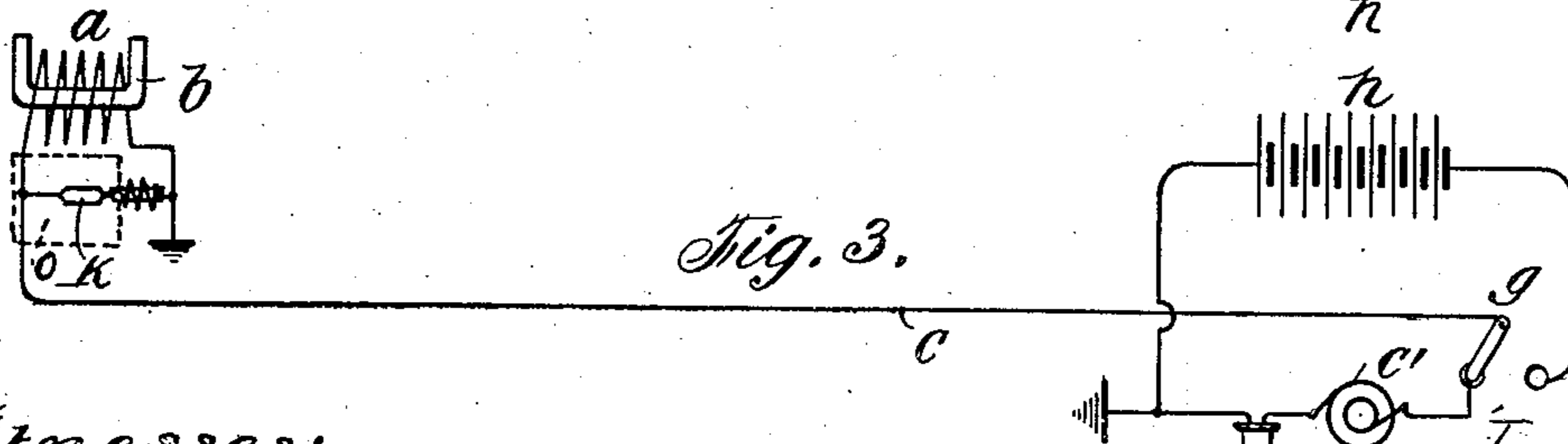


Fig. 3.

Witnesses:

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FRANCIS B. BADT, OF CHICAGO, ILLINOIS.

ELECTROMAGNETIC SENTINEL.

SPECIFICATION forming part of Letters Patent No. 571,739, dated November 24, 1896.

Application filed February 15, 1896. Serial No. 579,443. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS B. BADT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have
5 invented a certain new and useful Improvement in Electromagnetic Sentinels, (Case No. 9,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming
10 a part of this specification.

My invention relates to an electromagnetic sentinel for detecting the approach of a mass of magnetic material, and more particularly armor-clad war-ships.

15 The special object of my invention is to provide a device readily stationed in commanding positions that will automatically give warning of the presence of battle-ships in that vicinity, and thereby enable a submerged
20 mine or torpedo to be exploded by a switch operated either by hand or automatic means at the moment the hostile vessel is above such explosive.

The best method heretofore employed for
25 coast protection by means of explosive mines has been to sink them in the waterway desired to be protected, but preferably in a narrow channel, and from two observatories upon
30 shore connected by telephone and telegraph by means of range-finders the officers on duty follow the movements of any hostile vessel. When the instruments indicate the said vessel is directly above the hidden mine by means of a switch operated either automa-
35 tically or by hand, controlling a source of powerful electric current, the mine is exploded. This method, however, is subject to the objection of the high cost of such protection, as two observatories and sets of instruments
40 and two or more operators of such instruments are necessitated. The apparatus above described is also somewhat unreliable, as it is quite easily disordered and thereby liable to be rendered inoperative and can be used
45 to follow the movements of but one vessel at a time. At night or during the prevalence of fog, storms, or any other condition tending to obstruct the vision its usefulness is greatly limited or altogether impaired. On
50 the contrary, the device of my present application is automatic in its action and gives

its warnings by night as well as by day. It is simple and direct in its operation and requires but a single observatory, set of instruments, and attendant, or it may be so constructed as to automatically explode the mine
55 in addition to signaling the vessel's presence.

The device about to be described consists of an induction-coil the core of which is an open magnetic circuit, the terminals of the coil being connected with a source of alternating or interrupted current, and suitable indicating devices situated within an observatory upon shore. The induction-coil of the device may be secured to a mine or torpedo which is provided with a fuse which can be connected with
60 the source of a powerful electric current by a switch operated at the observatory.

Referring to the drawings accompanying this application, Figure 1 is a diagrammatic
70 view of the device attached to a mine provided with a hand-switch for the explosion of the mine. Fig. 2 is a similar view showing an arrangement for the automatic explosion of the mine. Fig. 3 is a diagrammatic view
75 of the device in which a telephone is substituted for the indicating device.

Like letters refer to like parts in the several figures.

The induction-coil *a*, with its core *b*, constituting an open magnetic circuit, is attached
80 to the submerged mine and is electrically connected with the instruments in the observatory upon shore by the insulated wire *c*, ground connections being made at *d* and *d'*.
85 Within the observatory is a source of interrupted or alternating current *c'*, which constantly flows through the induction-coil when the apparatus is in operation. There is also provided at the observatory in this circuit a
90 suitable current-measuring instrument *f*, adapted to give warning whenever a variation in the current occurs. A powerful source of electric current *h*, adapted to explode the mine by means of fuse *k*, which offers a high
95 inductive resistance, is arranged to be cut into circuit therewith by means of the switch *g* under the control of the officer on duty, or may be operated automatically by the indicator device, as illustrated in Fig. 2, showing
100 the circuit *h' h''*, adapted to be closed at contact *g'* by the arm of the indicator, while the

circuit c^2 is at the same time opened by raising the contact l from the mercury in the dash-pot m .

It is evident that with such a device situated in the course of any modern war vessel heavily protected by iron or steel armor the approach thereof within the path of the open magnetic circuit of the coil will increase the self-induction of the said coil and less current will flow through the circuit. The indicating device at the observatory will denote to the officer on duty such decrease in current by appropriate means, whose attention being directed to the vessel the said officer can at the proper moment close the fuse-circuit and explode the mine o . In case an automatic device be similarly employed, as mentioned above, the arm of the indicator will be deflected until in contact with point g' and the explosion will result.

For some purposes an all metallic circuit might be found desirable, which change could, of course, be made at a slight additional cost. In Fig. 3 a telephone n has been introduced into circuit for the detection of current variation in place of other indicating device, which would be denoted to the officer by the change in tone caused thereby in the instrument.

A slight modification of the device, as illustrated in Fig. 2, is easily applicable to the self-propelling type of torpedo, being so constructed as to explode the same when within effective distance of any hostile ironclad, and thereby doing away with the necessity of actual contact of the torpedo with the vessel's hull, which would serve to render the torpedo more effective.

The means for locating the coil with open magnetic circuit so that the ironclad ship or other moving magnetic mass shall come within

its field constitutes no part of my invention, and I do not think it necessary to describe it.

While the particular object of my invention is, as I have already said, its application to coast defense with the view of determining the proximity of ironclads to submarine mines, it is obvious that there are other applications of the invention, and I do not wish to limit myself to this precise object.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a signal device, the combination with a coil having its core in open magnetic circuit, of a source of alternating or interrupted current passing through the said coil, and an indicator provided within the circuit of the said coil adapted to indicate any current variation therethrough, substantially as described.

2. In a device for the detection of approaching iron or steel clad vessels, the combination with a submerged mine or torpedo o , of a coil a , attached to the same, whose core b is an open magnetic circuit, a source of alternating or interrupted current c' flowing through the said coil, a current-indicating device f adapted to give warning when any change in current through the said coil takes place, a source of high potential electric current adapted to explode the said mine or torpedo, and means for switching the said current into circuit therewith; substantially as described.

In witness whereof I hereunto subscribe my name this 12th day of February, A. D. 1896.

FRANCIS B. BADT.

Witnesses:

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JOHN W. SINCLAIR.