

(No Model.)

2 Sheets—Sheet 1.

L. H. McCULLOUGH.

NON-INTERFERING FIRE TELEGRAPH SYSTEM AND APPARATUS.

No. 316,475.

Patented Apr. 28, 1885.

Fig. 1.

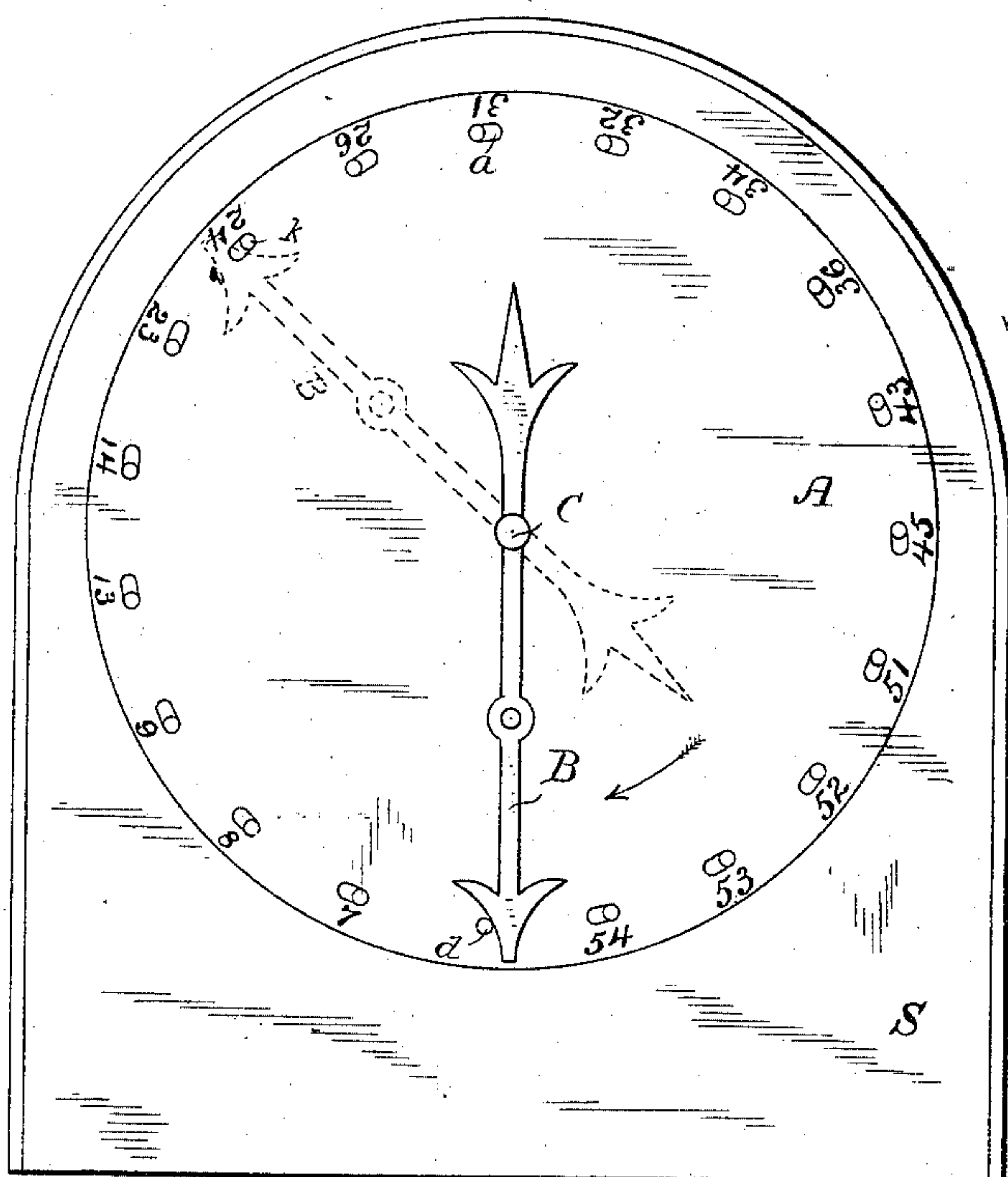


Fig. 2.

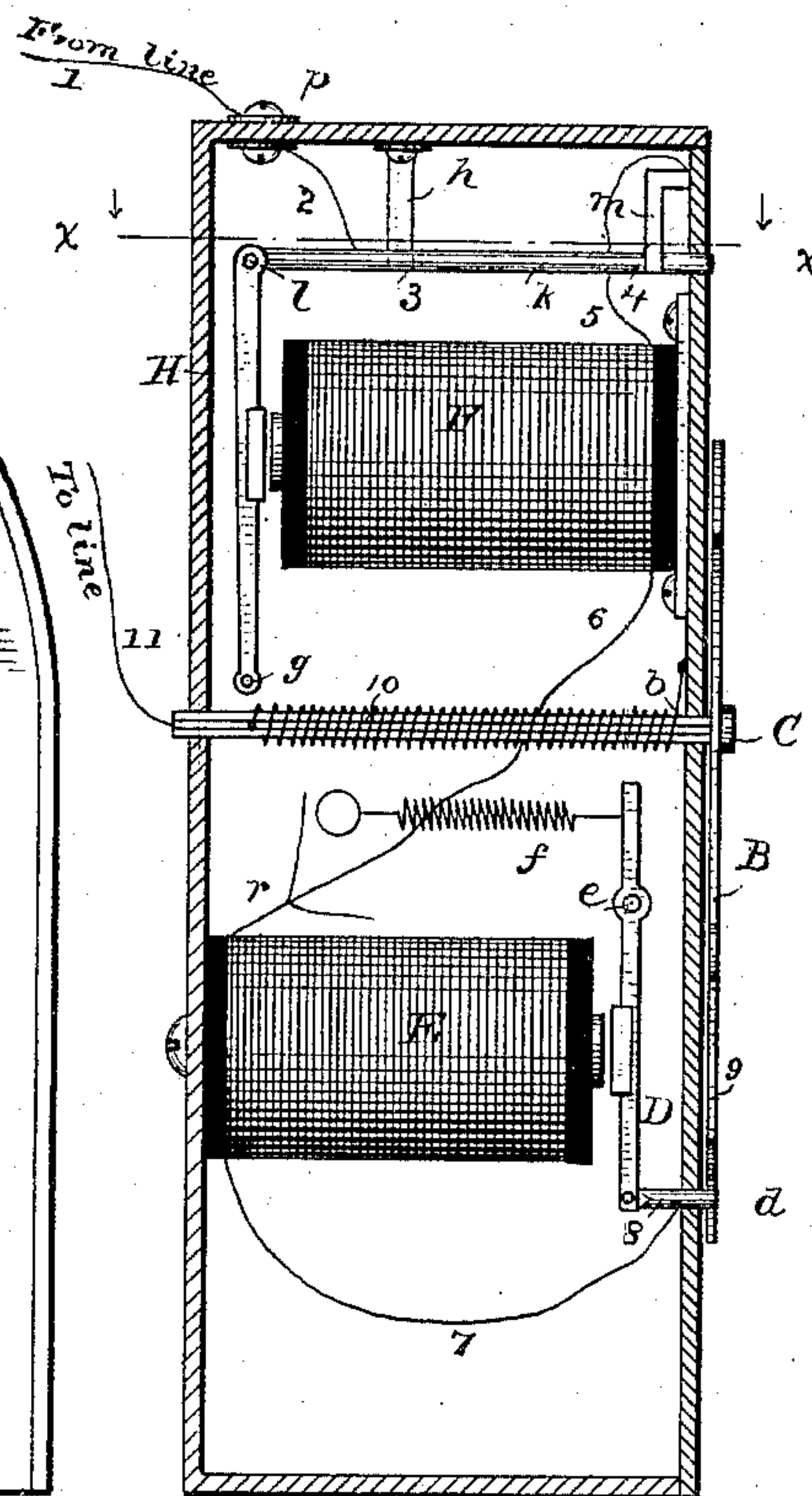
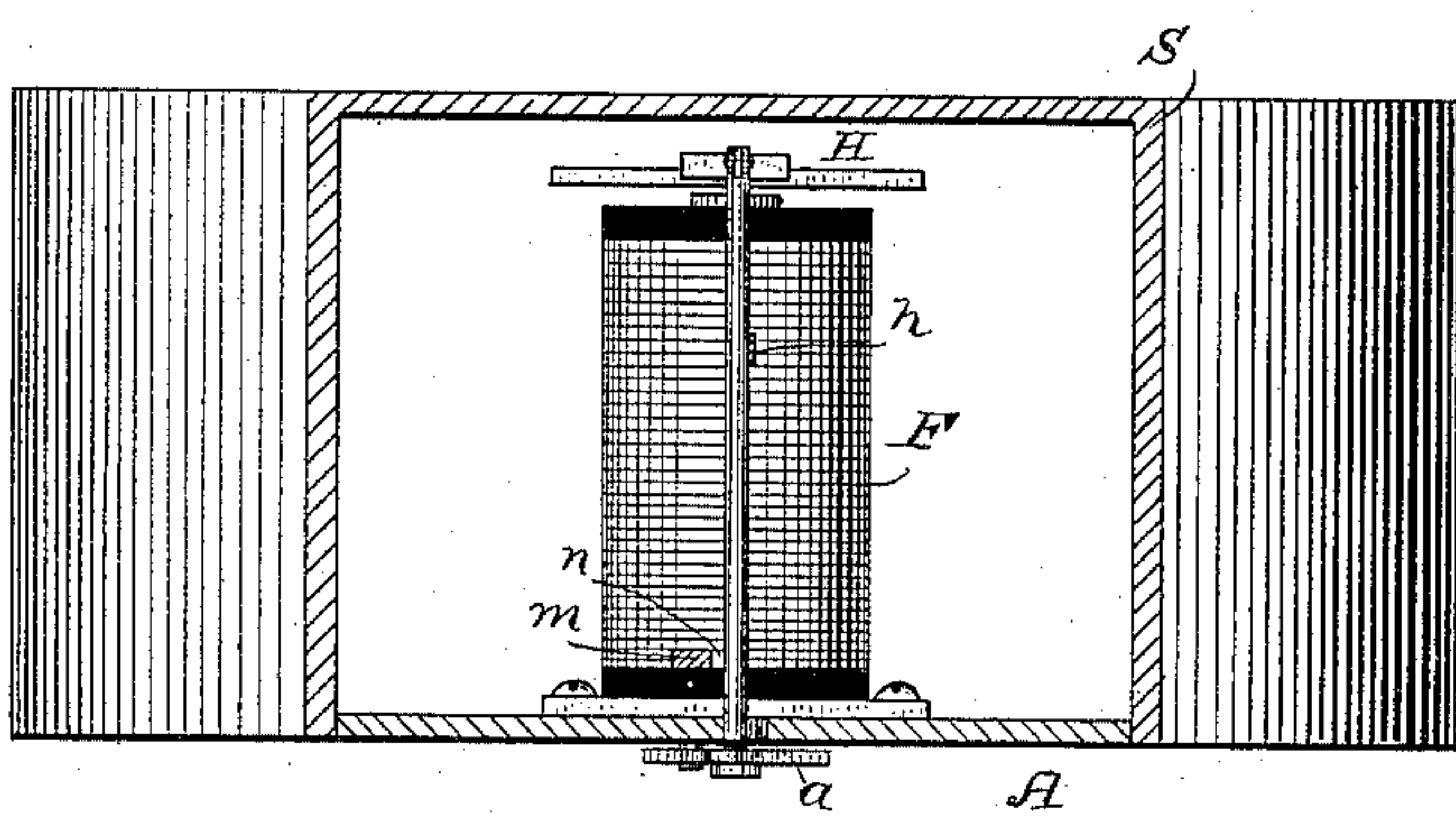


Fig. 3.



Witnesses  
Jas. T. Howenstein Jr.  
*[Signature]*

Inventor  
Lewis H. McCullough,

By His Attorney,

*George H. Stockbridge*

(No Model.)

2 Sheets—Sheet 2.

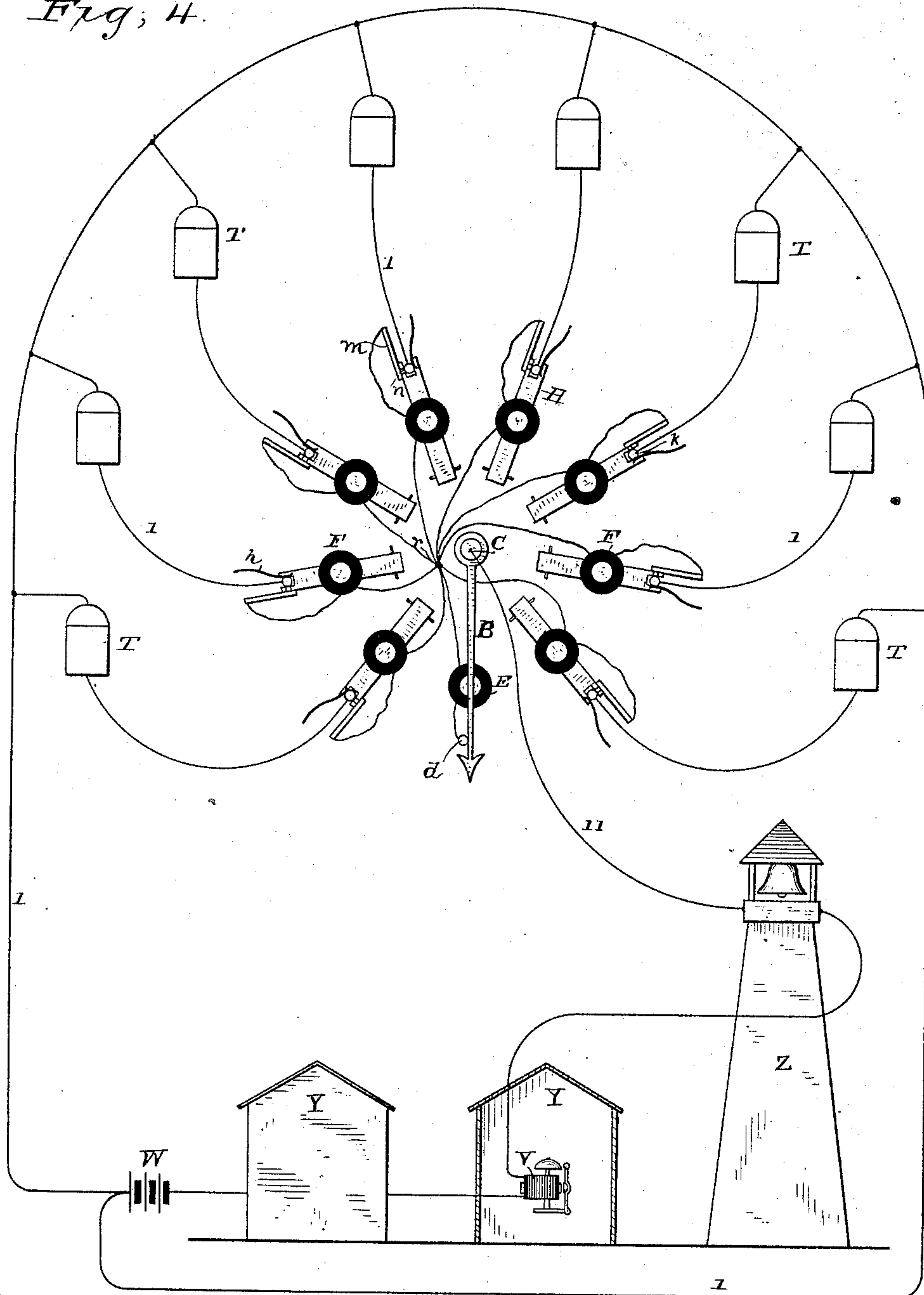
L. H. McCULLOUGH.

NON-INTERFERING FIRE TELEGRAPH SYSTEM AND APPARATUS.

No. 316,475.

Patented Apr. 28, 1885.

Fig. 4.



Witnesses

Jas. T. Howenstein Jr.  
*[Signature]*

Inventor

Lewis H. McCullough

By His Attorney,

*George H. Stockbridge*



# UNITED STATES PATENT OFFICE.

LEWIS H. McCULLOUGH, OF RICHMOND, INDIANA, ASSIGNOR TO THE RICHMOND FIRE ALARM COMPANY, OF SAME PLACE.

NON-INTERFERING FIRE-TELEGRAPH SYSTEM AND APPARATUS.

SPECIFICATION forming part of Letters Patent No. 316,475, dated April 28, 1885.

Application filed August 5, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS H. McCULLOUGH, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Non-Interfering Fire-Telegraph Systems and Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to means for obviating the possibility of sending in false or confused signals in fire-alarm telegraphy, and I accomplish that result partly by means of my arrangement of circuits and partly by means of my improved apparatus.

I have carefully examined all or nearly all the so-called "non-interfering" fire-telegraph boxes and systems now in use or proposed for use, and I have never yet found one which accomplished the result aimed at. In every case it would either happen that two boxes pulled or rung in at the same time would both operate, and so produce a false or confused signal, or else there would be one or more moments of time after one was rung in and before it had ceased to operate when a second box could also be operated and produce a like false or confused signal. It is just this possibility which renders all or most existing "non-interfering" systems, so called, inoperative for the purpose designed, since the possibility, though perhaps remote, may be realized at just the most dangerous crisis. The most ordinary fire may become dangerous by reason of the confused operation of the systems mentioned.

I have devised a system which is absolutely non-interfering, and which by being so removes the last existing danger of false or confused signals in fire-telegraphy. Moreover, although I intend to use in my system the multiple signal-box, for which I file an application for Letters Patent of an even date herewith, yet I may use any signal-box, and with slight changes I can convert the ordinary fire-telegraph system now in use into an absolutely non-interfering system.

In the drawings which accompany and form

a part of this specification, Figure 1 is a front elevation of a dial and dial-box which I use in connection with my non-interfering system. Fig. 2 is a vertical section through the dial and the box. Fig. 3 is a plan view of a section through line *xx* in Fig. 2, and Fig. 4 is a view illustrating my arrangement of circuits.

In Figs. 2 and 3 the comparative size of the magnets is exaggerated for the sake of clearness, and for the same reason the number of box-magnets is reduced in Fig. 4, as compared with the number of armatures shown in Fig. 1.

Referring to Figs. 1, 2, and 3, A is a dial having arranged about its edge numerals, as 7, 9, 13, &c., representing the numbers of fire-alarm signal-boxes. Opposite each numeral is an oblong slot whose longitudinal diameter is substantially at right angles to that radius of the dial which passes through the center of the slot. A hand or pointer, B, which normally tends to move in the direction of the arrow under the influence of the spring *b*, is mounted on the shaft C of the dial, and held from turning by the stop *d*, as shown. The stop *d* is attached to the armature D, pivoted at *e* behind the dial, and is held out so as to engage with the pointer B by the spring *f*. The armature D is operated by the electro-magnet E, attached to the back of the dial-box. In the same circuit with the electro-magnet E is a second electro-magnet, F, which is attached to the front part of the dial-box. Its armature-lever H is pivoted at *g*, and has no retractile spring, but is kept in any position in which it is placed (normally away from the core of the magnet F) by the force of the spring *h*, pressing the extension *k* of the armature-lever H against one end of a slot, *a*, in the dial front. The extension *k* is loosely pivoted to the armature-lever H at *l*, and is located at right angles to the armature-lever. In pressing the extension *k* against one end of the slot *a* the spring *h* also presses it against the platinum point *n* on the conducting-arm *m*, attached to the dial-box. (See Figs. 2 and 3.) The shaft C is connected through engine-houses (see Fig. 4) or bell-towers, or both, to one pole of a battery, W. The other pole is connected through a signal-box with the binding-post *p*



on the dial-box. The circuit within the box is from binding-post *p* by wire 2 to extension *k*, to platinum point *n* and arm *m*, by wire 5 to electro-magnet F, by wire 6 to electro-magnet E, by wire 7 to stop *d*, to pointer B and shaft C.

There are as many binding-posts *p* and magnets F as there are signal-boxes in the system, and the number of signal-boxes will usually correspond to the number of slots in the dial less one, though the dial may be constructed to have several more slots than there are signal boxes to provide for future needs or contingencies. The magnet E, which actuates the stop *d*, is common to all the circuits, the wire from every magnet F being joined to the wire *b*, which runs to the magnet E at some convenient point, as *r*. The spring *b* is made stronger than the spring *h*, for a reason that will be presently explained. The dial and its connected apparatus are located at a central station at which there are always one or more persons in attendance. The signal-boxes are placed, as usual, in different parts of a city or village, and each connected with one of the magnets F and with the magnet E. The circuit is an open metallic circuit running through gong and bell magnets in engine-houses and bell-towers.

The operation of the parts is as follows: On the ringing in of an alarm from any box, say 24, the magnet F connected with that box is operated, and also the magnet E, which is common to all the box-circuits. This causes the stop *d* to be removed from the path of the pointer B, and also causes the end of the extension *k* to be pushed out into that path. The pointer B on being released travels in the direction of the arrow until it strikes against the end of extension *k*, which, in obedience to the superior power of the spring *b*, moves to the opposite end of the slot *a*, thereby breaking the circuit of magnets F and E at *n k*, and cutting out of the circuit all magnets except the gong and bell magnets. The circuit is now from one pole of the battery through the signal-box to binding-post *p*, to extension *k*, to pointer B, to shaft C, and back to battery through the gong and bell magnets in the towers and engine-houses. The first stroke of 24 is made on the gongs and bells when the circuit is first completed through magnets F and E. The remaining strokes are made after those magnets have been cut out. The extension *k* will be held in its forward position by the force of the spring *h*, pushing it against the end of the pointer B. After the signal has been sent in, the extension *k* will be restored by hand.

It will be observed that both the original and the secondary circuits pass through the pointer B. As soon, therefore, as the pointer B has left the stop *d* there is no circuit for any box except one that has already been operated. Moreover, in case two boxes should be operated at the same time, the pointer B would be mechanically obstructed from pass-

ing to the extension *k* which was farthest around the dial until the nearest extension *k* had been pushed back after receipt of its box-signal. The magnets F and E being operated simultaneously, the end of extension *k* will always be out in position to engage the pointer B as soon as it comes along.

The successive numerals in Fig. 2 indicate successive portions of the electric circuit.

The box S will usually be made of wood. The dial is shown as forming part of the front of the box. It may be formed separately and attached to the box by suitable means.

It will be seen that the signal-boxes T are connected in two directions with one pole of the battery, a feature which my present system has in common with another for which I filed application for Letters Patent on the 31st day of July, 1884, office number 139,271, and by virtue of which no box is cut out unless the circuit is broken on both sides thereof. I do not here claim the broad features of the system there disclosed.

The system which I have described as a system of fire-telegraphy might easily be employed as a secret telephone system, in which every subscriber out of a given series except the one first calling should be automatically shut out from communicating through the central office.

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

1. In combination with two metallic conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole, two or more circuit-closers in multiple-arc relation between the said conductors, and receiving apparatus at one or more stations for receiving the signal when any one of the circuit-closers is operated, substantially as set forth.

2. The combination, with two electric circuit-conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole, of two or more circuit-closers in multiple-arc relation between the said conductors, apparatus at one or more stations for receiving the signal when any one of the circuit-closers is operated, and apparatus at a central station, actuated by the operation of any circuit-closer, whereby every other circuit-closer is cut out of the circuit, substantially as set forth.

3. The combination, with two electric circuit-conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole through one or more gong or bell magnets to a hand at a central station, of a series of conductors, including signal-boxes running from the hand to the first-named conductor, and apparatus at a central station whereby, on the operation of any signal-box, the hand will be released and form a new circuit to the exclusion of the rest of the series.

4. The combination, with two electric cir-



5 cuit-conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole through receiving apparatus located at one or more stations to a hand at a central station, of a series of conductors including circuit-closers running from the hand to the first-named conductor, and apparatus at a central station whereby on the operation of any circuit-closer the hand will be released and form a new circuit to the exclusion of the rest of the series, substantially as set forth.

15 5. The combination, with two metallic conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole, of two or more signal-boxes in multiple-arc relation between the said conductors, and one or more gong or bell magnets for receiving the box-signals, substantially as set forth.

20 6. The combination, with two electric circuit-conductors, one running from one pole of a generator back to the same pole, and the other running out from the opposite pole, of two or more signal-boxes in multiple-arc relation between the said conductors, one or more gong or bell magnets for receiving the box-signals, and apparatus at a central station, actuated by the operation of any signal-box, whereby every other box is cut out of the signal-circuit, substantially as set forth.

30 7. In combination with a conductor running from one pole of an electric generator through gong or bell magnets, a series of conductors including signal-boxes branching from the said conductor and connected in two directions with the opposite pole of the generator, substantially as set forth.

40 8. In combination with a conductor running from one pole of an electric generator back to the same pole again, a series of conductors running from the said conductor to the opposite pole of the generator, each of the series including a signal-box, and all including common bell or gong magnets, substantially as set forth.

45 9. In combination with a conductor running from one pole of an electric generator back to the same pole again, a conductor running from the opposite pole through gong or bell magnets to a traveling conducting hand or pointer in a central office, and a series of conductors, including signal-boxes running from the conducting-stop of the said hand or pointer to the first-named conductor, substantially as set forth.

55 10. In combination with a conductor run-

ning from one pole of an electric generator back to the same pole again, a conductor running from the opposite pole through gong or bell magnets to a traveling conducting hand or pointer in a central office, a series of conductors including signal-boxes running from the conducting-stop of the said hand or pointer to the first-named conductor through a common releasing-magnet and through a series of magnets, each adapted, when operated, to move its armature-lever out into the path of the conducting hand or pointer, substantially as specified.

70 11. In combination with a conductor running from one pole of an electric generator back to the same pole again, a conductor running from the opposite pole through gong or bell magnets to a traveling conducting hand or pointer in a central office, a series of conductors, including signal-boxes, running from the conducting-stop of the said hand or pointer to the first-named conductor through a common releasing-magnet and through a series of magnets and their respective armature-levers, each magnet being adapted, when operated, to move its armature-lever out into the path of the hand or pointer, and means connected with the hand or pointer for breaking the original circuit and forming a new one when it comes in contact with any armature-lever, whereby on the operation of any signal-box its circuit is first completed through its own magnet and the common releasing-magnet, and afterward those magnets are cut out, together with all the other box-magnets, substantially as specified.

90 12. In combination with a series of open metallic circuits, including signal-boxes and suitable receiving apparatus, an apparatus located at a central station composed of the following parts: a traveling conducting hand or pointer, a stop for holding the same normally at rest, a releasing-magnet for the said stop, common to all the box-circuits, and a series of magnets, each in the circuit of a different signal-box, and adapted on the closure of the circuit to throw its armature-lever into the path of the hand or pointer, substantially as set forth.

105 In testimony whereof I affix my signature in presence of two witnesses.

LEWIS H. McCULLOUGH.

Witnesses:

WM. M. STOCKBRIDGE,  
WARREN C. STONE.

Correction in Letters Patent No. 316,475.

It is hereby certified that in Letters Patent No. 316,475, granted April 28, 1885, upon the application of Lewis H. McCullough, of Richmond, Indiana, for an improvement in "Non-Interfering Fire Telegraph Systems and Apparatus," an error appears in the printed specification, requiring the following correction, viz: In line 17, page 2, the reference letter "b" should be erased and the numeral 6 inserted; and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 5th day of May, A. D. 1885.

[SEAL.]

H. L. MULDROW,  
*Acting Secretary of the Interior.*

Countersigned:

M. V. MONTGOMERY,  
*Commissioner of Patents.*