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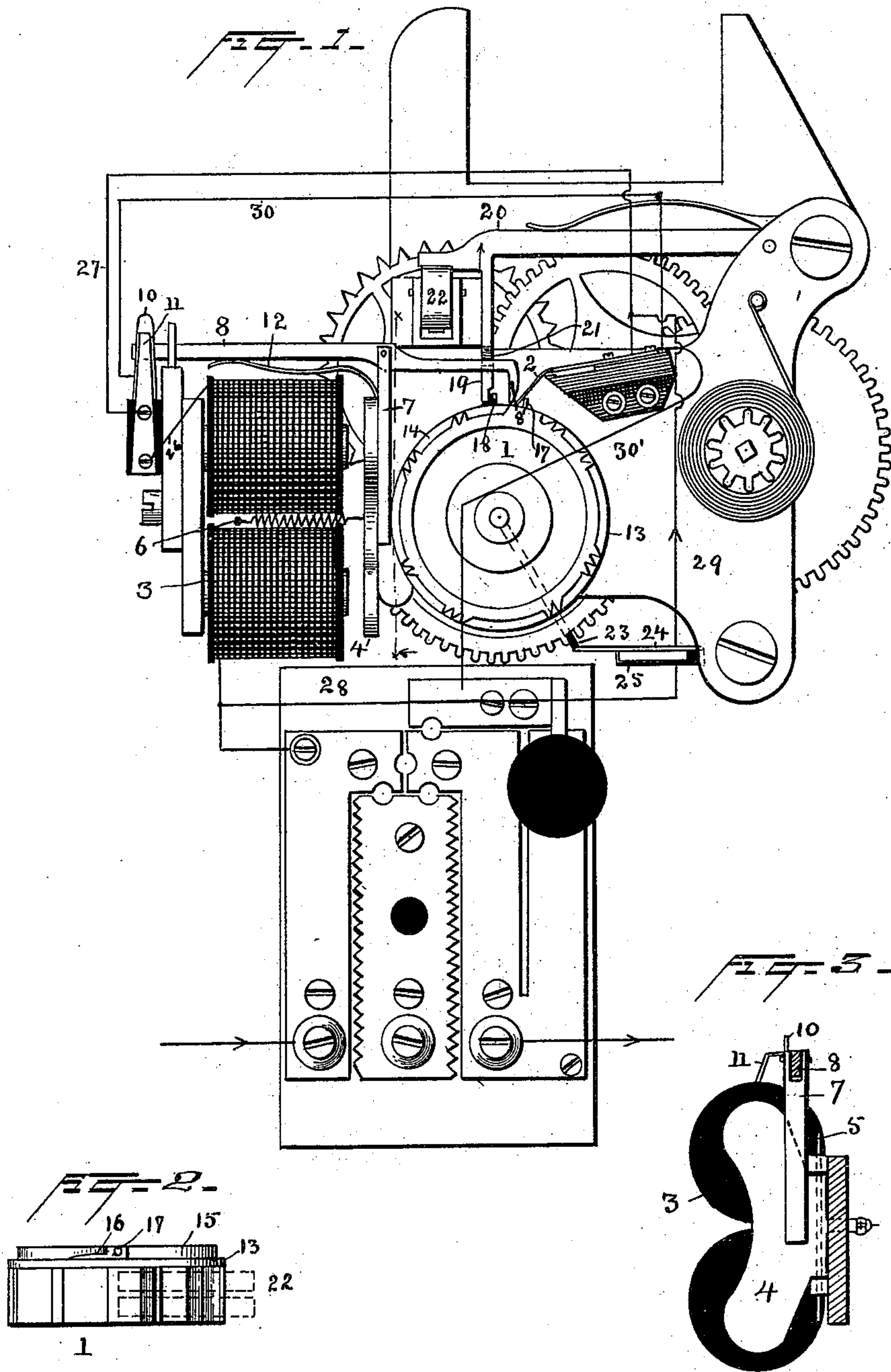
3 Sheets—Sheet 1.

W. H. KIRNAN.

SUCCESSIVE NON-INTERFERING SIGNAL BOX.

No. 551,123.

Patented Dec. 10, 1895.



Witnesses
Morris A. Clark
[Signature]

Inventor
Wm. H. Kirnan,
By his Attorneys
Lyell & Seely.

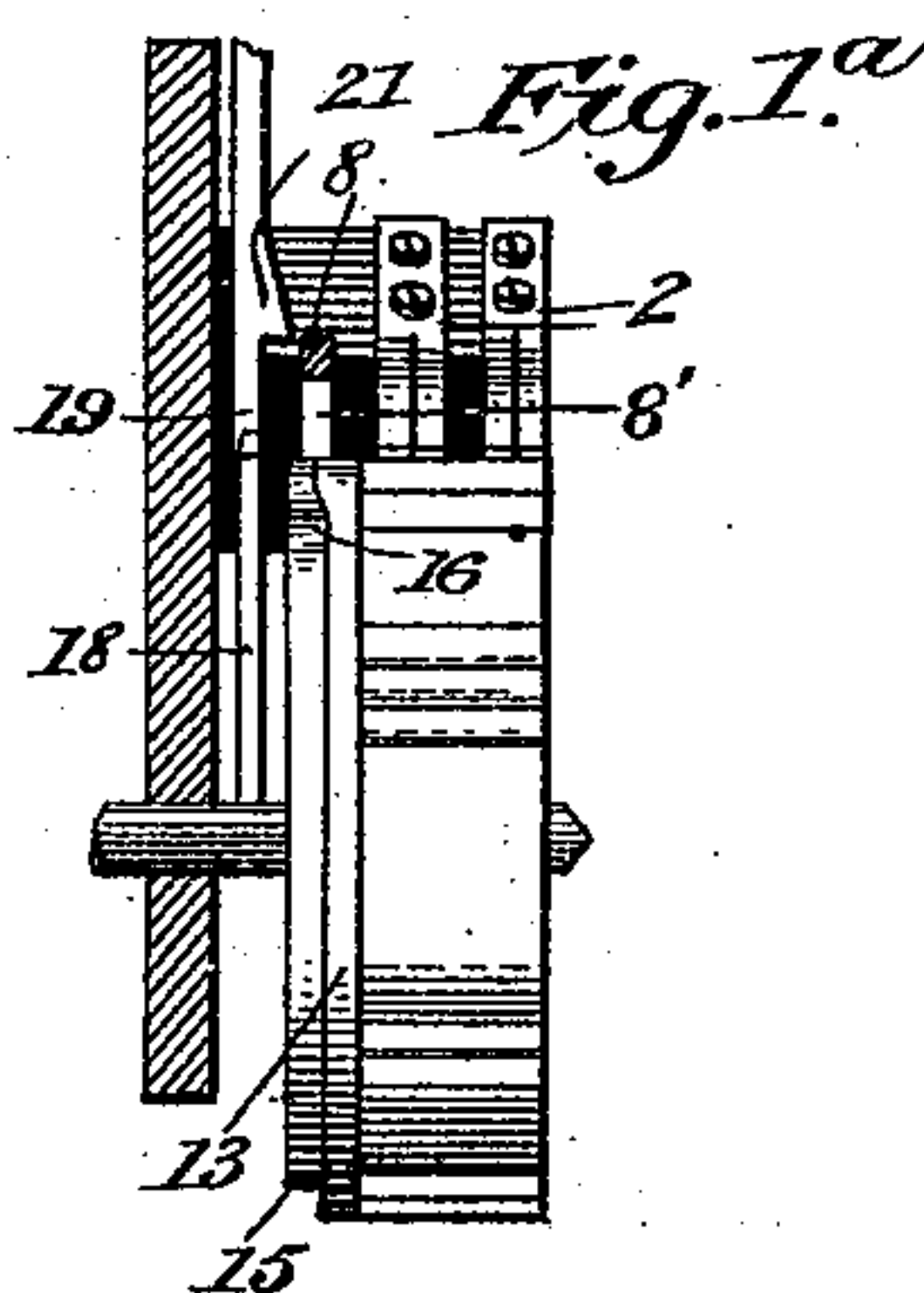
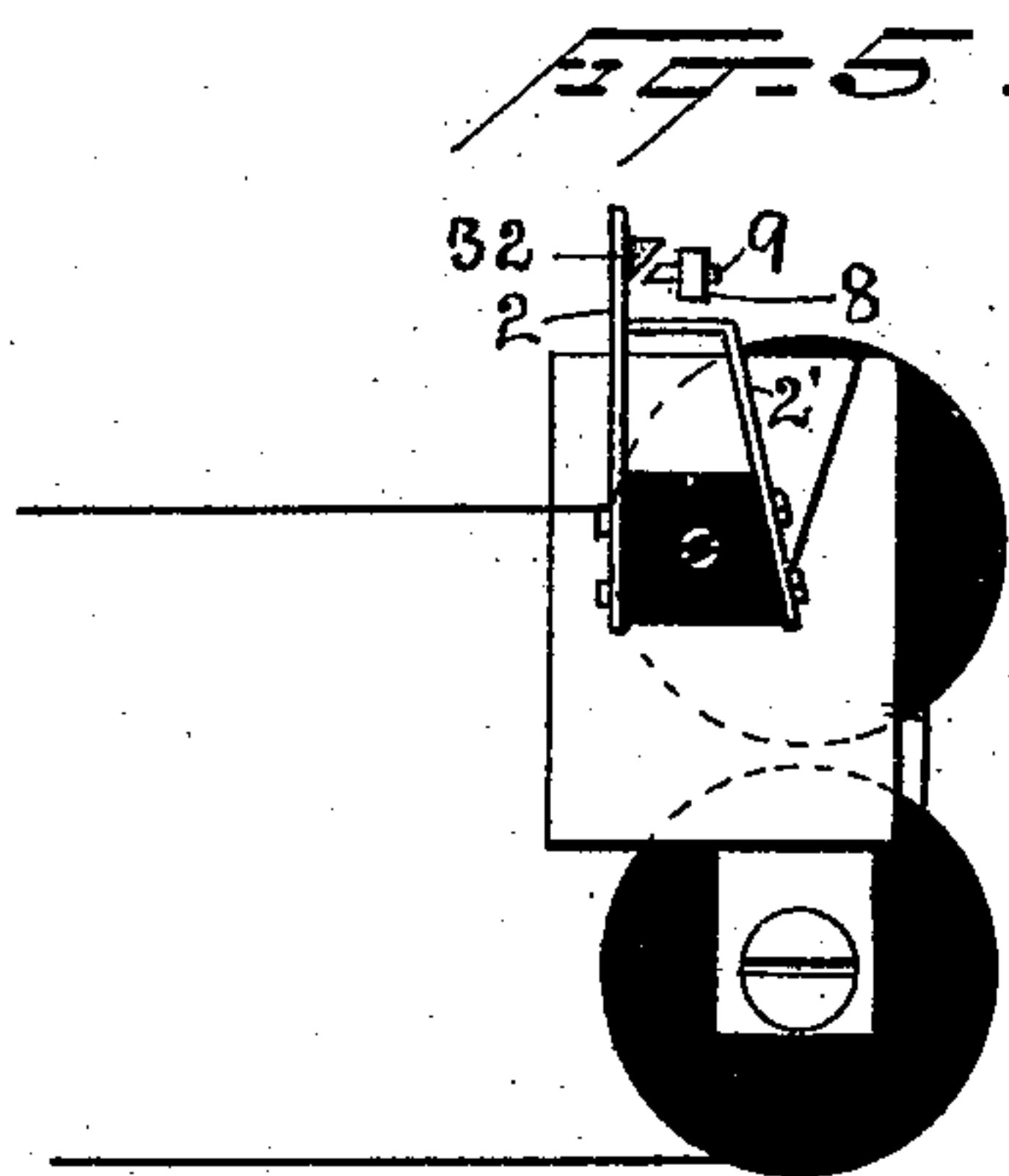
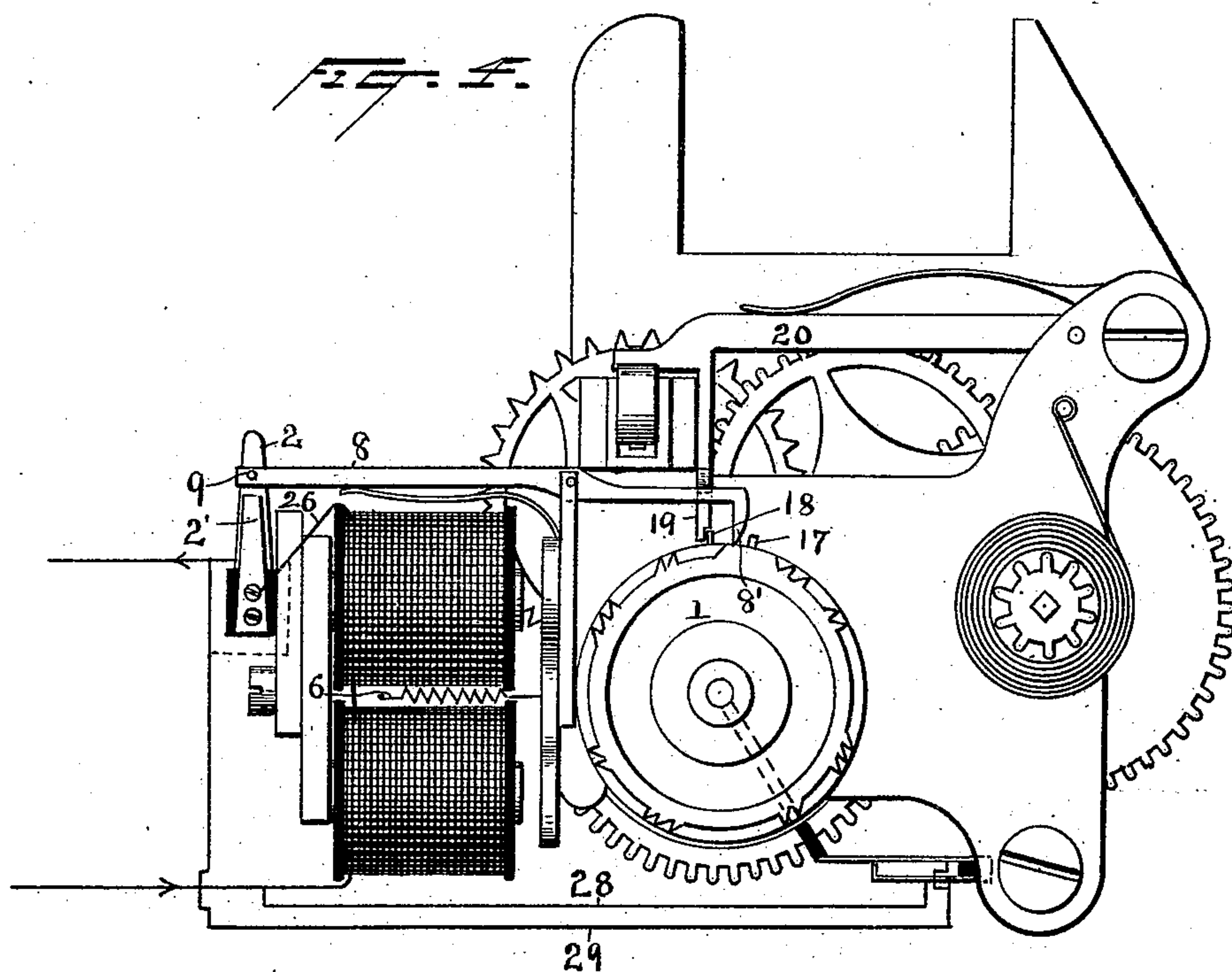
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3 Sheets—Sheet 2

W. H. KIRNAN.
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Witnesses
Louis A. Clark
[Signature]

Inventor
Wm. H. Kirnan.
By his Attorneys
Dyer & Seely.

(No Model.)

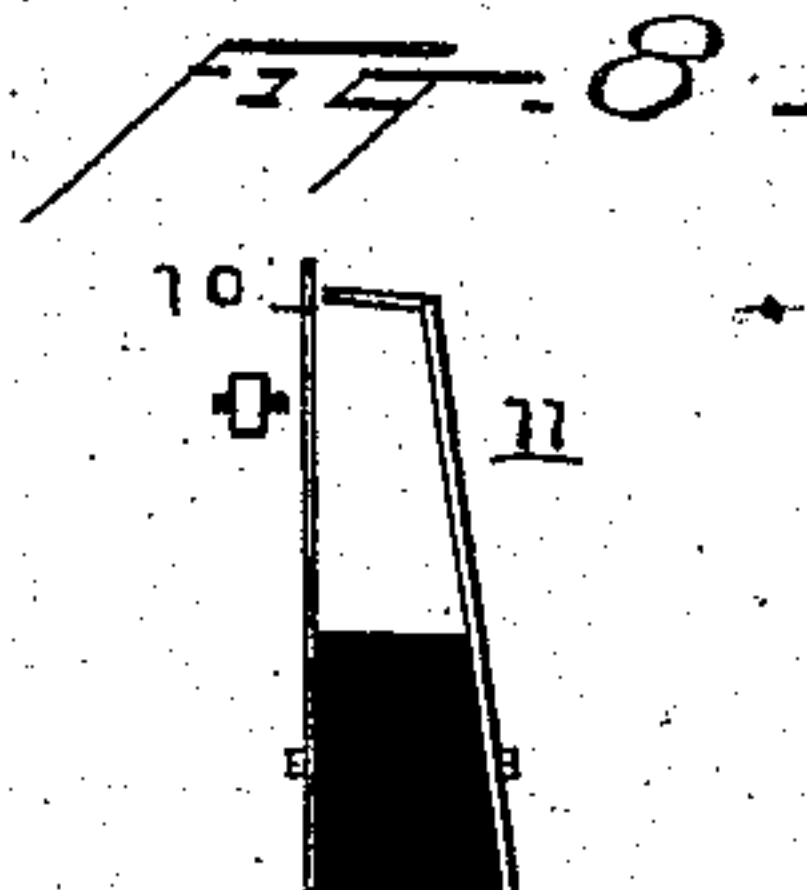
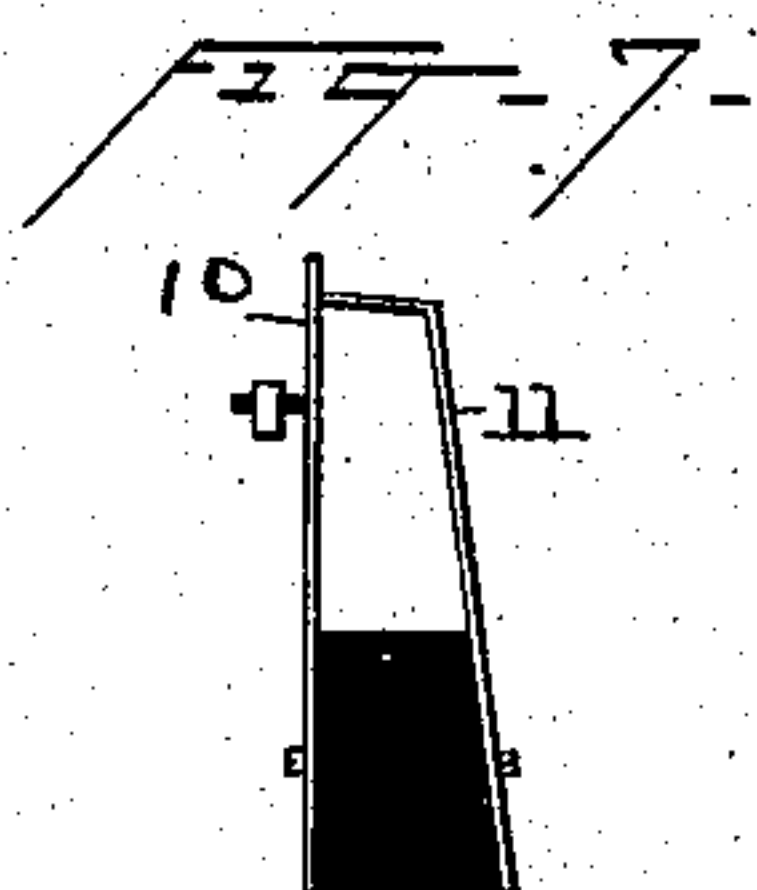
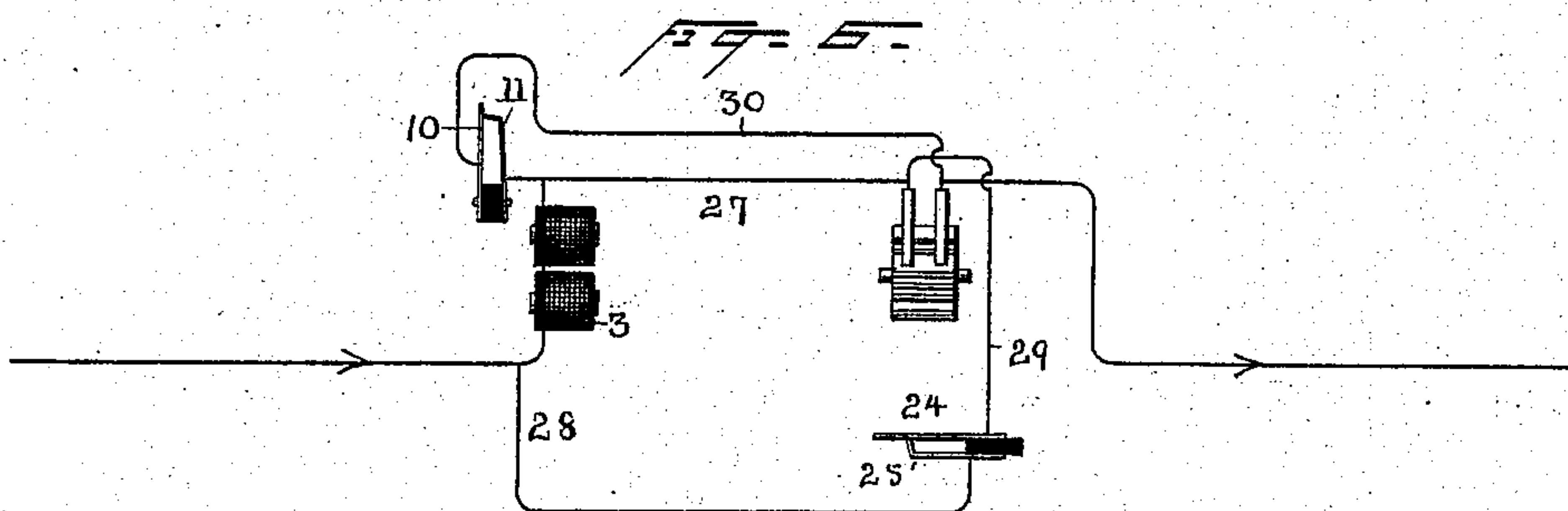
3 Sheets—Sheet 3.

W. H. KIRNAN.

SUCCESSIVE NON-INTERFERING SIGNAL BOX.

No. 551,123.

Patented Dec. 10, 1895.



Witnesses

Thomas A. Clark,
N. F. Oberly

Inventor

W. H. Kinnear
By his Attorneys
Dyer & Seely

UNITED STATES PATENT OFFICE.

WILLIAM H. KIRNAN, OF BROOKLYN, ASSIGNOR TO THE GAMEWELL FIRE-ALARM TELEGRAPH COMPANY, OF NEW YORK, N. Y.

SUCCESSIVE NON-INTERFERING SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 551,123, dated December 10, 1895.

Application filed August 18, 1890. Serial No. 362,259. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. KIRNAN, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented a certain new and useful Improvement in Successive Non-Interference Signal-Boxes, of which the following is a specification.

The object of my invention is to prevent interference between two or more signal-transmitters arranged in series on a single line and to remove the resistance of the magnets from the line at all idle boxes or transmitters.

The several features of construction and the combinations which constitute my improvement will be set forth in the claims annexed to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a front view of a transmitter, showing also the circuit connections for the same. Fig. 1^a is a detail view on line *xx* of Fig. 1, looking in the direction opposite to that of the arrow, showing the relative position of the circuit-springs, the detents, &c. Fig. 2 is a detail view of the circuit-breaking wheel. Fig. 3 is a view on the line *xx*, looking in the direction of the arrow, Fig. 1. Fig. 4 is a view similar to Fig. 1 of a slightly-modified form, and Fig. 5 is a detail view of the circuit-controller used in this second form of apparatus. Fig. 6 is a diagram showing the circuits through one of the signal-boxes, the shunt-circuits being closed. Figs. 7 and 8 are views of the circuit-controller in the circuit around the brushes of the signal-wheel, Fig. 7 showing the springs in contact and Fig. 8 showing the same out of contact.

Any well-known or suitable form of motor may be used to drive the circuit making and breaking wheel. As is well understood, this wheel is provided with circuit making and breaking teeth or other devices so arranged as to give a predetermined number of impulses representing the box-number, or any other desired information, and so arranged as to hold the circuit open during transmission of a signal except for the brief instant required for a tooth to pass under the two circuit springs or contacts 2.

3 is a non-interference magnet in the signaling-circuit, and 4 is an armature therefor,

pivoted at 5 and having a retracting-spring 6 below the pivot. To the armature is secured an arm 7, to the upper end of which is pivoted a circuit-controlling and detent lever 8, the forward end of which is hooked, and which is adapted to ride over the circuit-wheel, as hereinafter described, and under certain circumstances to stop the mechanism by engaging with a detent-pin on the circuit-wheel. The other end of said lever 8 is provided with an insulating-pin 9, (see Fig. 4,) which in the normal position of the apparatus bears against a spring 10, holding the same in contact with the spring 11. As the lever moves, these springs are allowed to separate.

12 is a spring which tends to hold this end of the lever 8 in its highest position.

It will be seen that the armature is continuously within the magnetic field—that is, it is sufficiently near its magnet to be attracted, if not held back mechanically at every closure of the circuit, when the short circuit of its magnet is open.

The circuit-controlling wheel, in addition to the circuit making and breaking teeth, is provided with a rim 13, the face 14 of which is substantially vertical from the body of the wheel to the top of the circuit-making teeth, and which forms a trap for holding the lever 8 when the circuit is open at the home box. At the rear of the rim is a circular flange 15, having at a suitable point a cam-face 16, which begins at the level of the flange and gradually rises to the level of the top of the rim. At the highest point of the cam is a detent-pin 17, heretofore referred to as co-operating with the hooked end of lever 8.

Carried by the axis of the circuit-wheel or by some other moving part of the transmitter is a detent-pin 18, which preferably extends a short distance above the circuit-wheel and is adapted to engage with the detent-arm 19 on the lever 20 just before the pin 17 reaches its detent-hook. On the arm 19 is a projection 21 so arranged that in one position of the apparatus the end of lever 8 rests under said projection.

22 is a pivoted lever, by means of which the transmitter is pulled or started in a well-known manner.

23 is a pin of insulating material, or a pin

insulated from the rest of the apparatus, which is moved by or in harmony with the circuit-wheel. This pin, when the transmitter is at rest, bears on a spring 24, holding the same against spring 25. When the transmitter is released, pin 23 leaves spring 24 before the circuit-wheel has turned a distance equal to that between the two detent devices above described.

The circuit connections are as follows: The line leading to the box is connected to one side of the lightning-arrester and from said side to magnet 3, from the magnet by wires 26 and 27 to one spring 2 (the front one) to the other spring 2, to the second side of the lightning-arrester, and thence on to the next box or back to the central station. While the transmitter is at rest, the magnet 3 is short-circuited, as follows: by wire 28 to spring 25, to spring 24, to wire 29, which is connected to the other side of the magnet. At the same time the circuit-controlling springs 2 are short-circuited, as follows: from wire 26 to spring 11, to spring 10, to wire 30 and 30', and to the line leading from the transmitter.

The operation of the apparatus above described will now be set forth: When all of the transmitters are at rest, the detent 18 will bear against the detent-arm 19, and the hook 8' of lever 8 will rest on the rim of the circuit-wheel, as shown in Fig. 1, and the two short circuits will be closed. If, now, the starting-lever 22 of any transmitter be pulled, the rear end thereof will bear against and raise lever 20 and arm 19. This releases the detent-pin 18, and the motor is allowed to turn the circuit-wheel. The pin 23 immediately leaves spring 24, allowing it to separate from spring 25, breaking the magnet short circuit. This occurs before the springs 2 leave the comparatively broad tooth on which they normally rest, and the magnet is thereby energized, attracting its armature, turning it on the pivot 5 and carrying with it the lever 8, moving it in a plane at right angles to the paper and carrying the hooked end out of line with the detent-pin 17 on the rim and to the front of said rim. At the same time the spring 12 tilts said lever, bringing the hook down onto the surface of the circuit-wheel between the teeth. The lever 8 and the armature are then held from being moved back by retracting-spring 6 by the vertical face of the rim or trap, which has heretofore been referred to. As the circuit-wheel revolves, the end of the hook rides up onto each tooth as it passes, and would be carried across the rim and allowed to drop over to the rear thereof onto the flange 15 were it not for the fact that the circuit-making springs close the circuit before the hook reaches the top of a tooth, and said hook leaves the tooth before the circuit-making springs leave the same tooth. This enables the magnet to hold its armature while the hook is raised above the vertical side of the rim, as will be evident.

The purpose of holding the hooked end of le-

ver 8 forward, as just described, is to carry the other end away from the spring 10, thereby breaking the short circuit around the signaling-circuit controller, whereby the main line, which leads to a suitable receiver, is made and broken as the circuit-wheel revolves.

When the circuit-wheel has made a complete revolution, the springs 2 and the hook 8' ride up onto the long tooth and the pin 23 re-establishes the short circuit around the magnet. This de-energizes the magnet and allows the retracting-spring 6 to operate, carrying the lever 8 to its original position, re-establishing the short circuit around the circuit-springs 2, and immediately thereafter the detent-pin 18 strikes the detent-arm 19 and stops the transmitter in the position from which it started, again setting the signal.

Let it now be supposed that during the transmission of a signal, as just set forth, a person should start a second transmitter. The first effect would be to raise the detent-arm 19, allowing the motor to start; but the circuit will be open or will be at once opened by the transmitter first set in operation, allowing the retracting-spring 6 of the second transmitter to carry the hook 8' back to the rear of the rim onto flange 15. This holds the short circuit around springs 2 closed so that the revolution of the circuit-wheel at the second transmitter does not make and break the line-circuit to interfere with the signal already being transmitted. As the circuit-wheel at the second transmitter reaches the end of a revolution, the cam 16 rides under the hook, raising the same, and at the same time raising the detent-arm 19 and lever 20 by means of the projection 21, carrying arm 19 above the end of detent-pin 18, so that said pin cannot serve to stop the motor. The circuit-wheel continues to revolve until the hook 8' strikes the second detent-pin 17, when the transmitter will come to rest, the arm 19 resting on the end of pin 18 and the magnet short circuit being open. As soon as the first transmitter completes its signal and leaves the circuit closed, the magnet 3 at the second transmitter will be energized and its armature attracted, releasing the motor and allowing said transmitter to send in its signal. In this manner neither signal is mutilated by the other, and neither signal is lost.

In Fig. 4 the adjustment and arrangement of apparatus are the same as in Fig. 1; but the signal-circuit controlling-springs 22', instead of co-operating with the circuit-wheel, are placed in such position that they are connected and disconnected by the movements of the pivoted lever 8, which lever carries an insulating-pin 9, having a beveled end which rubs against a corresponding bevel 32, carried by one of the circuit-springs. These springs are normally in contact and complete the main-line circuit. The wire 29 of the magnet short circuit may be connected to the line as shown, or to wire 26, as indicated by

dotted line. With this form of circuit-controller a separate short circuit for the springs is unnecessary, since when the arm 8 is moved by the retracting-spring 6 it is carried away from the spring 2 and cannot affect the same.

On the other hand, when the hook 8' rides over the teeth of the circuit-wheel during its revolution the tilting movement of the lever 8 will break and make the circuit between springs 2 2' and transmit the signal. The circuit is broken and made in the following manner: When the apparatus is at rest, the hook 8' is in its highest position and the opposite end of lever 8 is down. This is the condition illustrated in Fig. 5, and it will be seen that spring 2 is in contact with 2', closing the circuit. As 8' passes off of the tooth on which it rests and falls onto the body of the circuit-wheel, the pin 9 is raised, bringing the pin 9 against the beveled extension on spring 2, pressing it back and breaking the circuit. This occurs every time a tooth passes under 8'. It is thought unnecessary to further describe the operation of this modified form.

It will be evident that the circuit-controllers, detents, &c., may be varied in form to some extent without departing from the spirit of my invention.

Without limiting myself, therefore, to all the details shown and described, what I claim as my invention is—

1. The combination, in a signal transmitter, of a circuit controller, a normally wound motor therefor, a releasing device for the motor, a magnet in the signal circuit at the transmitter, a normal short circuit for the magnet, and a circuit breaker operated by the first movement of the transmitter, substantially as described.

2. The combination, in a signal transmitter, of a circuit controller, a motor therefor, a releasing device for the motor, a magnet in the signal circuit at the transmitter, a normal short circuit for the magnet, and a normal short circuit for the circuit controller, and a device for breaking the short circuits when the transmitter starts, substantially as described.

3. The combination in a signal transmitter of a circuit controller, a motor therefor, a detent normally holding the transmitter at rest, a second detent and detent pin or stop, a magnet in the signal circuit of the transmitter, an armature for the magnet connected to and moving the second detent, a short circuit for

the circuit controller held closed by said detent, the detent stop being normally out of line with its detent, and means for bringing the second detent and stop into engagement at the close of a revolution of the transmitter, substantially as described.

4. The combination, in a signal system, of a circuit, transmitters therein, each transmitter consisting of a circuit controller, a motor therefor, a detent for the motor, a short circuit and means for maintaining the same closed for rendering the circuit controller inoperative during the operation of any other transmitter on the line, and means consisting of a detent lever carried by an armature which is continuously in the field of its magnet, said magnet being in the transmitter circuit for releasing the motor and rendering the circuit controller operative at the close of one revolution and at the close of the signal being sent from the first transmitter, substantially as described.

5. The combination, in a signal transmitter, of the circuit wheel having circuit breaking teeth, a rim extending to the top of the teeth, a flange at the rear of the rim, a cam face on said rim beginning at the surface of the flange and terminating on a level with the rim, and a detent adjacent to the highest part of the cam, substantially as described.

6. The combination, in a signal transmitter, of a circuit controller, a motor therefor, a normally operative detent, a starting device for raising the detent lever, a second detent brought into operation by an abnormal use of the transmitter, and means operated by the motor of the transmitter for moving the first detent lever out of the path of its detent, substantially as described.

7. The combination, in a signal transmitter, with a circuit controller, a motor, a stop and detent lever therefor, a pull or starting lever for moving said lever from the stop of a second detent and detent lever, the latter engaging with the first detent lever to move it out of range of its detent, and a cam co-operating with the second detent lever, substantially as described.

This specification signed and witnessed this 4th day of August, 1890.

W. H. KIRNAN.

Witnesses:

D. H. DRISCOLL,
W. PELZER.