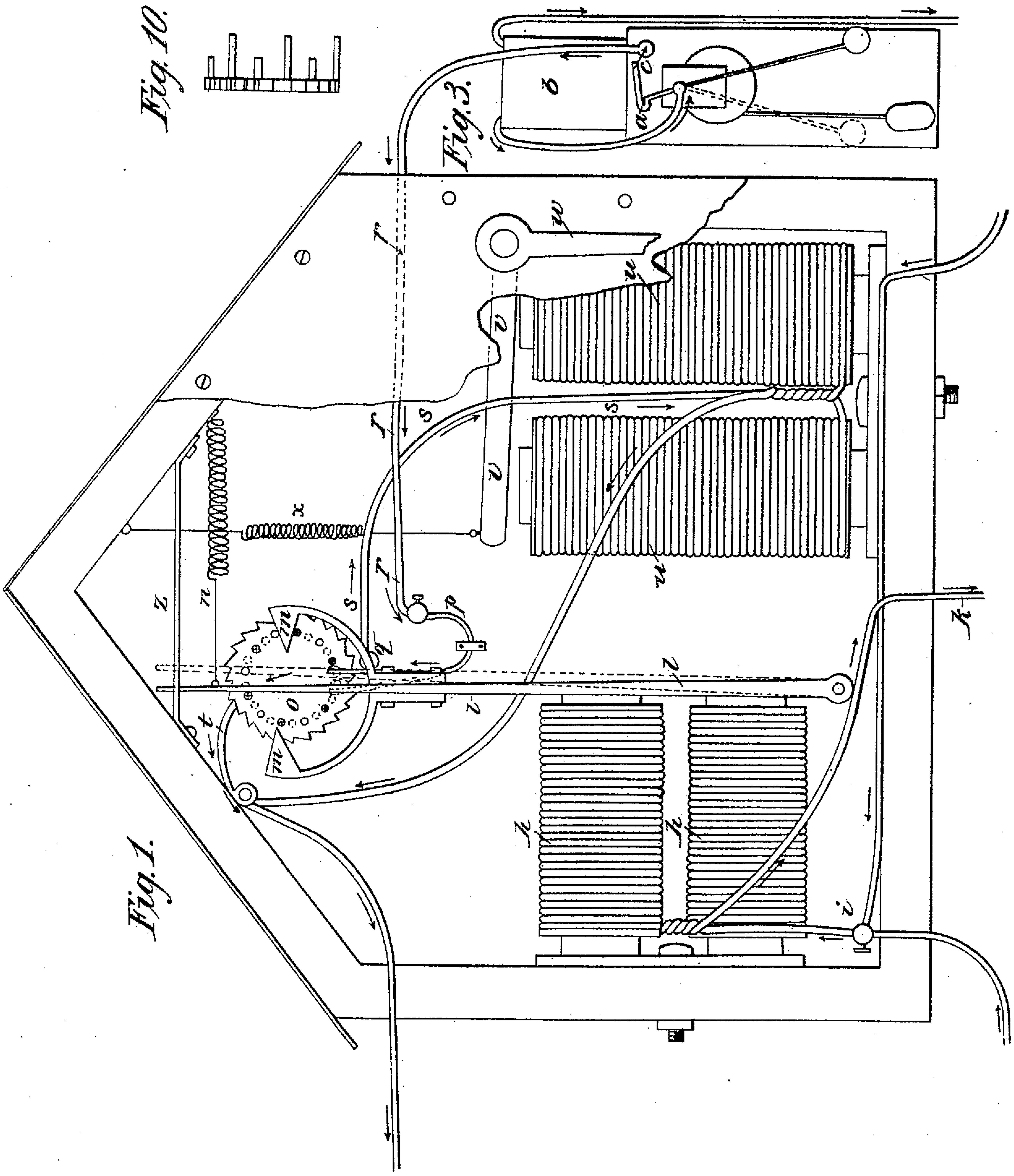
3 Sheets—Sheet 1.

E. O. POHL.

Railway Alarm.

No. 22,610.

Patented Jan. 11, 1859.



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Railway Alarm.

No. 22,610.

3 Sheets—Sheet 2.

Patented Jan. 11, 1859.

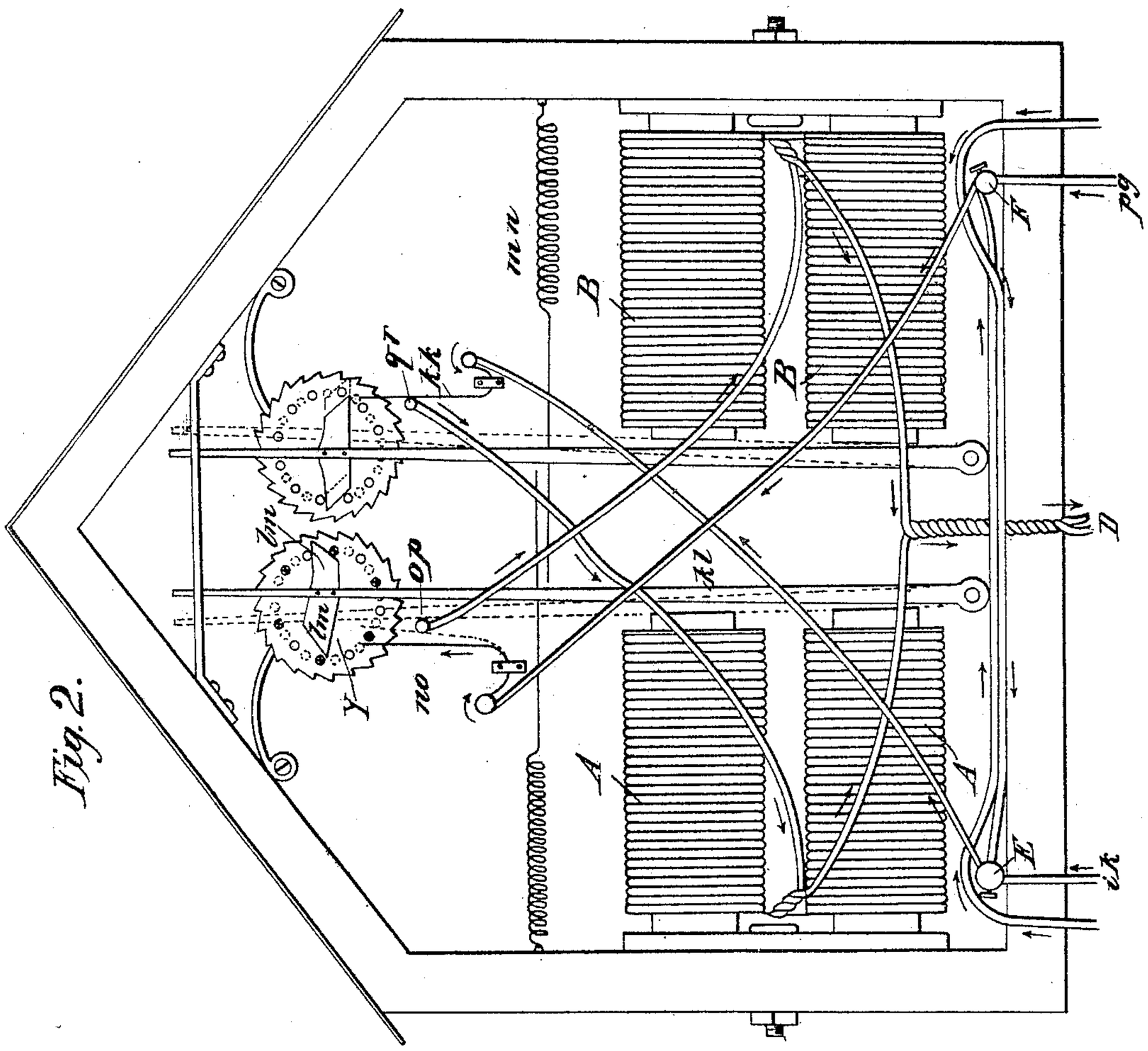

Fig. 2.

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3 Sheets—Sheet 3.

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Railway Alarm.

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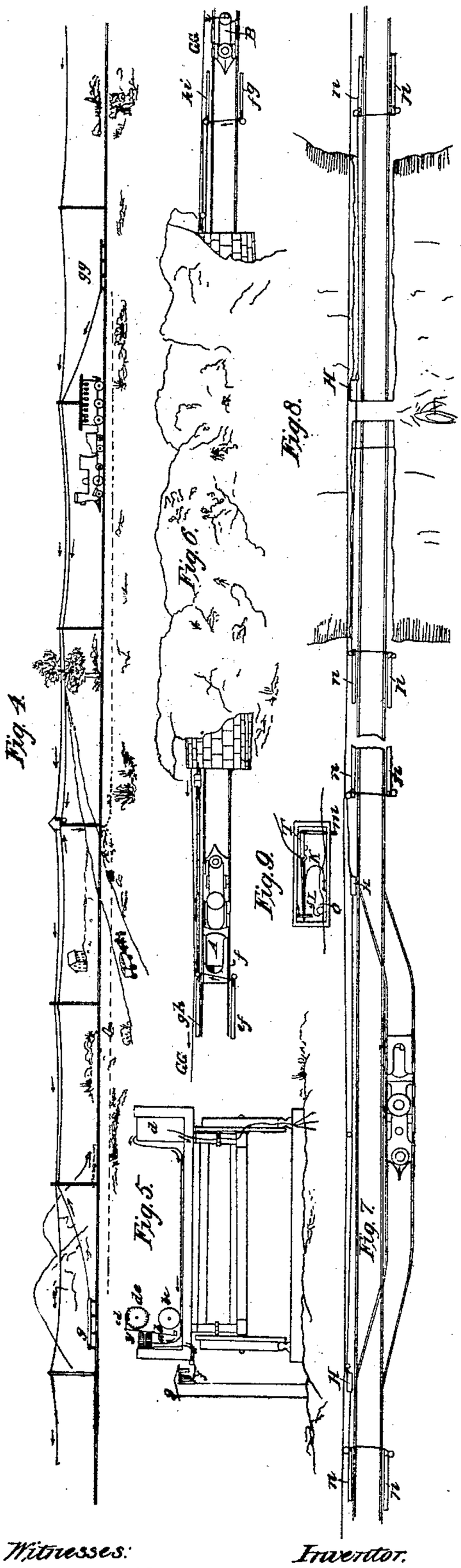

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UNITED STATES PATENT OFFICE.

ERNST OTTO POHL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED METHOD OF ENABLING MOVING RAILROAD-TRAINS TO TELEGRAPH THEIR OWN PASSINGS AT CERTAIN STATIONS.

Specification forming part of Letters Patent No. **22,610**, dated January 11, 1859.

To all whom it may concern:

Be it known that I, ERNST OTTO POHL, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Self-Acting Electro-Magnetic Railway Alarm-Telegraph; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure I is a view of the alarm apparatus used at crossings, &c., on railroads. Fig. II is a view of the apparatus used at curves, tunnels, &c. Fig. III is a view of a clock placed in the chief station, with a telegraphic wire drawn through its pendulum. Fig. IV is a view of the telegraph along the line of the road, showing the manner in which the alarm apparatus at the crossings, &c., are operated by passing trains. Fig. V is a sectional view of a railway-car, showing the position of the electro-magnetic battery and alarm apparatus carried therein, and a post supporting and protecting a metallic plate which forms the connection with the telegraph-wire and with the apparatus illustrated in Figs. I, II, and IX. Fig. VI is a top view of a tunnel with the stationary touching-plates, and through them the apparatus illustrated in Fig. II, being operated by a passing locomotive. Fig. VII is a view of the connecting apparatus illustrated in detail at Fig. IX arranged at a switch. Fig. VIII is a view of the same at a draw-bridge. Fig. IX is a detail view hereinafter explained; and Fig. X is a side view of a ratchet-wheel, shown in front view at *o*, Fig. I.

The object of my invention is to enable the operatives and employés at the main and other stations on the road and on moving trains to know the whereabouts of trains on the road between certain points, whether the same be approaching any station or train or going away from it, to apprize the engineers, &c., of trains of the situation and condition of each tunnel, bridge, switch, or draw, by an electro-magnetic apparatus acting reliably of itself, without the necessity of human intervention, and to provide for the passengers of each train a certain means of knowing their position on the route, so that they may be put to no inconvenience by the indistinct announcements of stations, or through ignorance of the language or other obvious causes. The mode in which I propose to secure these ends I will proceed to describe, as follows:

My invention is arranged and operates as follows: The length of the road being supplied with a telegraphic wire, as shown in Fig. IV of the drawings, this wire has its end drawn through the pendulum of a clock at the main station, and the circuit of the battery at this station is connected and disconnected by the movement of the pendulum of this clock. The pendulum has at *a* a hinge. *b* is the battery, and *c* the point at which the electric current is connected and disconnected.

Each train carries an electric battery, *d*, Fig. V, the negative pole of which is conducted through the electro-magnets in the different alarm apparatus placed in each of the cars of the train, and finally into the earth. The current of the other pole is conducted through the electro-magnet *e*, and thence into the metallic-wire broom *f*.

At each and every crossing, &c., of the road an alarm apparatus is placed, such as is represented by Fig. I in the drawings, and on both sides of this alarm apparatus, and at any desired distance therefrom, are placed metallic plates *g* and *g g*, Fig. IV, and *g*, Fig. V. These plates are protected from rain, snow, &c., in the manner shown at *g*, Fig. V. These metallic plates are connected by means of the telegraph-wire with the electro-magnet *h h* in the alarm apparatus shown in Fig. I, whose positive pole is divided at *i* into two parts and connected with the said wires. The magnetic pole *k*, Fig. I, passes into the earth. Therefore at the moment the metallic-wire broom of the positive pole of the battery on the train touches the metallic plate at *g*, as shown at Fig. V in the drawings, the electric current of the battery on the train passes through the electro-magnet *h h*, Fig. I, and thence into the earth, and closes the circuit, and the lever *l l*, Fig. I, will be attracted by the electro-magnet *h h*. Said electro-magnet attracts the lever *l l*, which has two inclined pawls, *m m*, thereto, one of which connects itself with a pin in the ratchet-wheel *o*, Fig. I, and causes the latter to turn one tooth. At the moment the wire broom *f*, Fig. V, has passed the first metallic plate, *g g*, Fig. IV, its electric chain or current, as above described, is disconnected, and the attractive power of the electro-magnet *h h* is rendered in-

operative on the lever *l l*, and the spring *n* will draw the lever *l l* into its former position, and by this means the other inclined pawl connects itself with a pin on the opposite side of the ratchet-wheel *o* in such a manner as to cause it to turn another tooth. This ratchet-wheel *o* (see side view, Fig. X) has alternately around the periphery thereof long and short pins, set parallel with the axis of the wheel. The long pins alone come in contact with the spring *p*, Fig. I, which changes the current of the main electric wire. Whenever there is no train between the touching-plates *g* and *g g*, Fig. IV, on either side of the crossing, the spring *p* is disconnected from the touching-point *q*, (see dotted line, Fig. I,) and the main electric current (see *r r*, Fig. I) takes its course through the spring *p*, the ratchet-wheel *o*, catch *t*, &c. On a train's arrival at any touching-plate the current of the battery on the train passes through the broom *f* and the touching-plate at *g* into the electro-magnet *h h*, which will therefore attract the lever *l l*, whose inclined pawls cause the ratchet-wheel *o* to turn, as already described, and thus the pin in the ratchet-wheel *o*, which obstructed the spring *p*, Fig. I, permits the spring *p* to resume its natural position and to connect the main current at the point *q*. The train having passed the touching-plate *g g*, Fig. IV, the main electric current takes its course through *r r* and the spring *p*, Fig. I, when the circuit is made by the brush *f*, Fig. V, touching the touching-plate *g;* but the spring *p* having now no connection with the ratchet-wheel *o*, the main electric current pursues its course through the wire *s s*, electro-magnet *u u*, Fig. I, &c. As the pendulum *c* of the clock, Fig. III, disconnects and reconnects the main electric current the electro-magnet *u u*, Fig. I, will at the same time alternately attract and release the lever *v v*, Fig. I, which, by means of a hammer or otherwise, will act on a bell or other alarm apparatus during the entire period of time in which the train is moving between the two metallic plates *g* and *g g*, (illustrated at Fig. IV.) A spring, *x*, Fig. I, draws the lever *v v* from the electro-magnet *u u* whenever the main electric current is disconnected at the point *c*, Fig. III. The moment contact is had with the second metallic plate, *g*, Fig. IV, on the arrival of the train from the first plate, *g g*, the electro-magnet *h h*, Fig. I, again attracts the lever *l l*, the inclined pawls again operate on the pins in the ratchet-wheel, causing the latter to turn. The spring *p*, Fig. I, follows the motion of the ratchet-wheel *o* from the point *q*, and the main current now again takes its direct course through the wire *r r*, spring *p*, ratchet-wheel *o*, catch *t*, &c., (in Fig. I,) and the alarm ceases. The space to which the lever *l l* is confined is designated at *z*, and also by dotted lines in Fig. I. At each and every contact of the metallic wire broom *f*, Fig. V, with any of the metallic touching-plates *g*, Fig. V, the current of the battery on the train is connected. The electro-magnet *e*, Fig. V, on the train attracts the lever *y*. By means of its hook or catch *c d* this lever draws the ratchet-wheel *d e* (one face of which is used as a noting-plate or dial) one tooth backward, and on this dial-plate are indicated the different stations, crossings, tunnels, draw-bridges, &c. The hook or catch *c d* serves as an indicator to the dial-plate on the ratchet-wheel, and thus the engineer will be informed of the whereabouts of the train he is running, of the condition of the switches, draw-bridges, &c., which he is approaching, and also of the approach of the trains from the opposite direction, as shown hereinafter. A similar apparatus placed in each passenger-car will also indicate to the passengers the whereabouts of the train and of the various points on the railway.

Fig. II, the apparatus for curves, tunnels, &c., has also two electro-magnets, A A and B B, the negative poles D of which pass into the earth, the positive poles diverging at E and F in opposite directions to their respective metallic plates. The main electric wire G G, Fig. VI, does not pass through this apparatus, but it passes by on the side of it. Both of the electro-magnets in Fig. II are operated by the batteries on the trains in the same manner as is the apparatus shown at *h h*, Fig. I, and previously described. The wires, however, take an opposite course to those of the first-described apparatus, as shown in the drawings. Fig. VI is an illustration of the manner in which this apparatus is operated by passing trains, A being the railroad-train, B the train coming toward train A, and *e f*, *f g*, *g h*, *h i* being metallic touching-plates identical in construction with that shown at *g*, Fig. V, the electro-magnet A A, Fig. II, being connected with the metallic plates *e f* and *f g*, Fig. VI, and the electro-magnet B B, Fig. II, with the plates *g h* and *h i*, Fig. VI. In Fig. VI of the drawings the train A is represented as having passed the metallic plate *e f*. Consequently the metallic-wire broom (illustrated at *f*, Fig. V) attached to the positive pole of its battery has touched the plate *e f*, and its electric current has passed into the apparatus marked Fig. II at *i k*. The current proceeds from *i k* through the spring *k k* into the electro-magnet A A, and thence into the earth, closing the electric current. Influenced by the current, the electro-magnet A A now attracts the lever *k l*, which has two inclined pawls or planes, *l m l m*, one of which connects itself with the pins of the ratchet-wheel Y, (which ratchet-wheel Y is identical in construction with the one at *o*, Fig. I, and in Fig. X,) and causes wheel Y to turn one tooth. At the moment the wire-broom pole of the battery on the train in Fig. VI (marked A) has passed its touching-plate *e f* its electric current is disconnected and the attractive power of the electro-magnet A A, Fig. II, is rendered inoperative on the lever *k l*, and the spring *m n* will now draw the lever *k l* into its former position. By this means the other inclined pawl, *l m*, of the lever

k l will, by pushing a pin on the opposite side, cause the ratchet-wheel Y to turn another tooth. By the movement of the ratchet-wheel the spring *n o* is forced from its connecting-point *o p* by means of a pin on the ratchet-wheel. Suppose the train B, Fig. VI, now arrives at the touching-plate *h i* and touches it with the wire broom provided on its positive pole. Then the electric current of its battery would enter the apparatus, Fig. II, at *p q*, thence up to *n o;* but it would be unable to pass from *n o* to *o p*, as the connection would have been broken already by the train A's sending its electric current and operating the electro-magnet A A, &c., Fig. II, in the manner already described. The same action would take place in reverse order in case of the train B arriving first at its metallic touching-plate *h i*, Fig. VI, as in that case the electric current of the battery on said train would have proceeded into the electro-magnet B B, Fig. II, and have cut off the electric current of train A at the points *q r* and *k k*.

It will be perceived that the train arriving last at any one of the touching-plates will, in consequence of the other train having anticipated it by arriving first at its touching-plate, receive no answer from the alarm upon touching the touching-plate on it, as the bell or other alarm apparatus on the train will give no alarm. Thus the engineer is informed that the train coming in an opposite direction is already between him and the opposite touching-plate and has disconnected the electric current, and he is thus enabled to switch off or reverse his engine and avoid the collision which would otherwise ensue. Train A, Fig. VI, passing on and arriving at the second touching-plate, *f g*, connects the positive pole of its battery *y* therewith, and by means of the electro-magnet A A, Fig. II, again attracts the lever *k l*, the pawl of which, *l m*, comes in contact with a pin of the ratchet-wheel Y, causing the latter to turn one tooth. At the moment the positive pole (the wire broom) of the train A's battery has passed the metallic touching-plate *f g* the spring *m n* draws the lever *k l* into its former position, the inclined pawl *l m* of which lever *k l* connects itself with the opposite pin on the ratchet-wheel and causes the latter to turn another tooth. By the movement of the ratchet-wheel the spring *n o* will slip from the pin on the latter (which obstructed it) and unite with the touching-point *o p*, thus reuniting the electric current for the passage of the train B and subsequent use.

At draw-bridges and switches are placed boxes, of the position and internal construction of which H, Figs. VII and VIII, and the detail view or Fig. IX are sketches. These boxes contain a lever, I, and a spring, *k*, which prevent the connection of the one end of the lever I, Fig. IX, with the electric wire L whenever the draw-bridge is not closed or the switch in its proper position for travel.

The telegraph-wire divides at *o* into two parts, and is connected with the touching-plates *n n*, placed at any desired distance on the sides thereof. The draw-bridge or switch has on the side thereof a lock, which will close with the rails. In placing the draw-bridge or switch in a proper position for travel a part of it will force back one end of the lever at M, Fig. IX, and the other end thereof touches or unites with the telegraph-wire at L, Fig. IX, and closes the circuit or electric current of the battery of the train approaching with the earth. When the latter has arrived from either direction at either of the touching-plates *n*, Figs. VII and VIII, the bell or alarm apparatus on the train will give notice and guarantee the safety of proceeding with the train. On the contrary, if the switch or draw-bridge is not in its proper position, the electric current will be disconnected at the lever I and the electric wire L, as heretofore described. Consequently the alarm-apparatus on the train will not sound the alarm, and the engineer will be thus notified of the disarrangement of the draw-bridge or switch, and will understand that he is not to proceed.

I confine my claim to the particular apparatus described in this specification and illustrated in the accompanying drawings; and

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

The use of a self-acting electro-magnetic railway alarm-telegraph, acting reliably of itself without the necessity of human intervention, and arranged and operating in the manner and for the purposes substantially as above described.

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