(No Model.) 3 Sheets—Sheet 1.

# J. S. SAVAGE, Jr.

## DANGER SIGNAL FOR RAILWAY CROSSINGS.

No. 495,913. Patented Apr. 18, 1893.

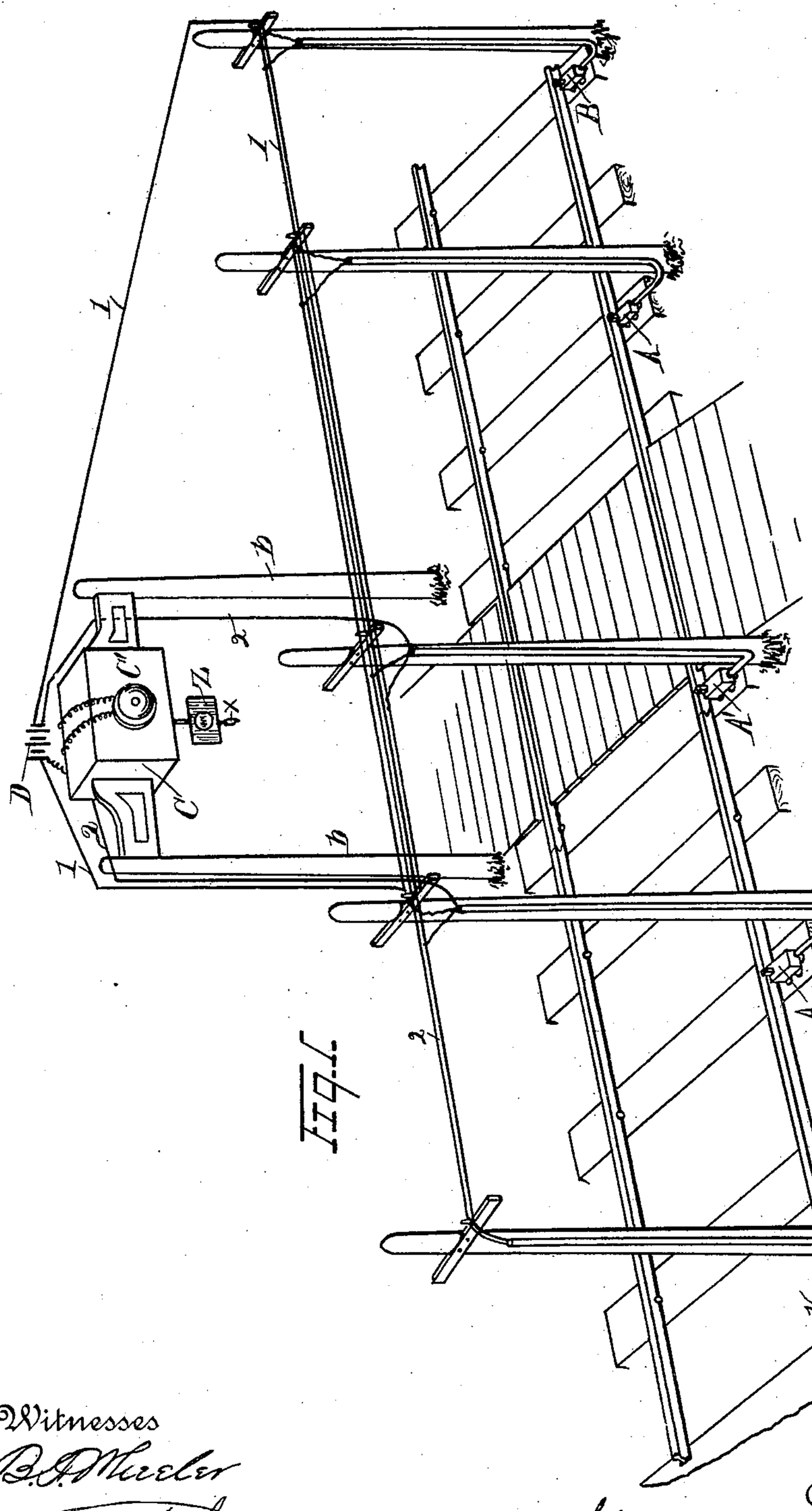

Fig. 1.

Witnesses
B. D. Wheeler
E. D. Wheeler

Inventor
J. S. Savage Jr
By his Attorney Roscoe B. Wheeler

(No Model.) 3 Sheets—Sheet 2.

# J. S. SAVAGE, Jr.

## DANGER SIGNAL FOR RAILWAY CROSSINGS.

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Fig. 2.

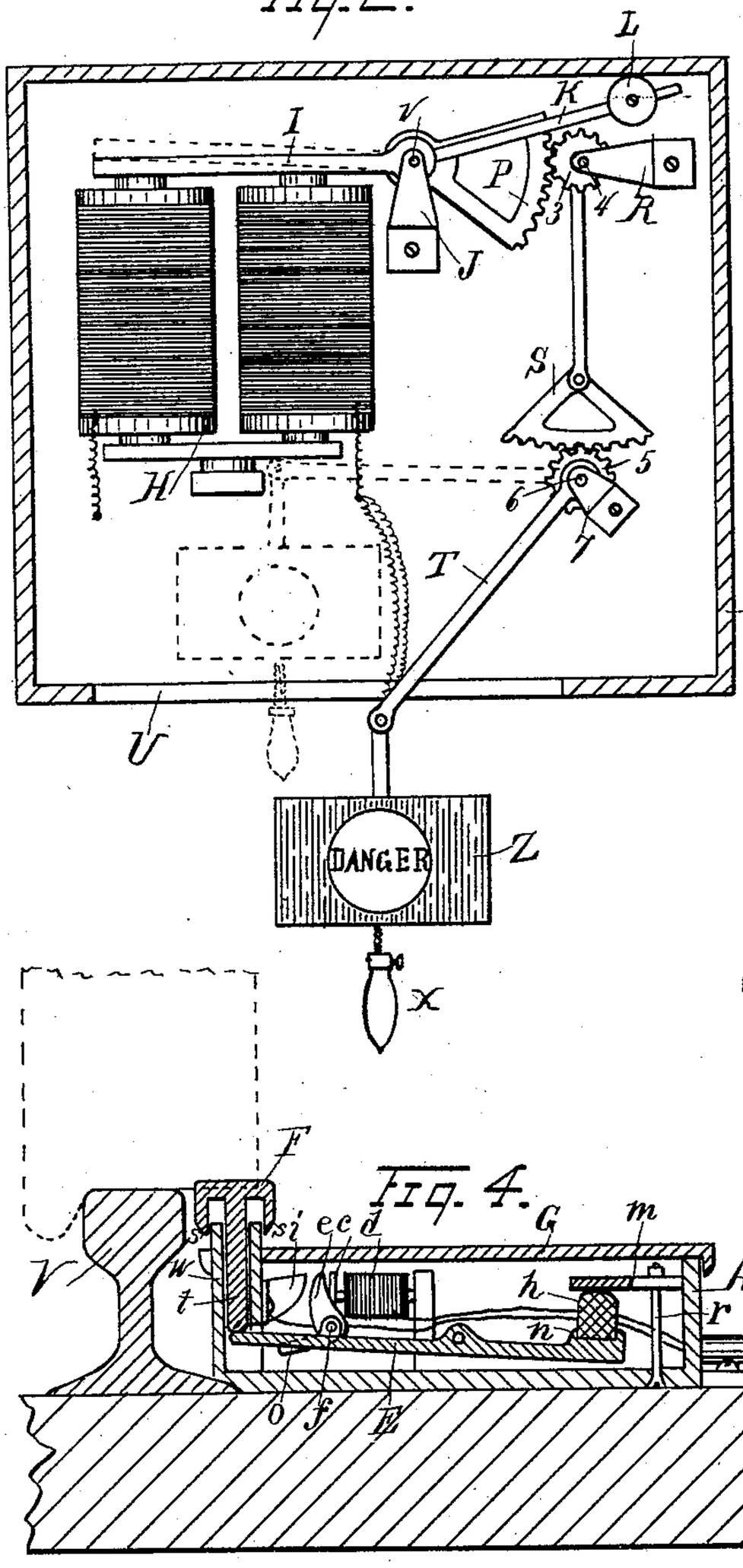


Fig. 3.

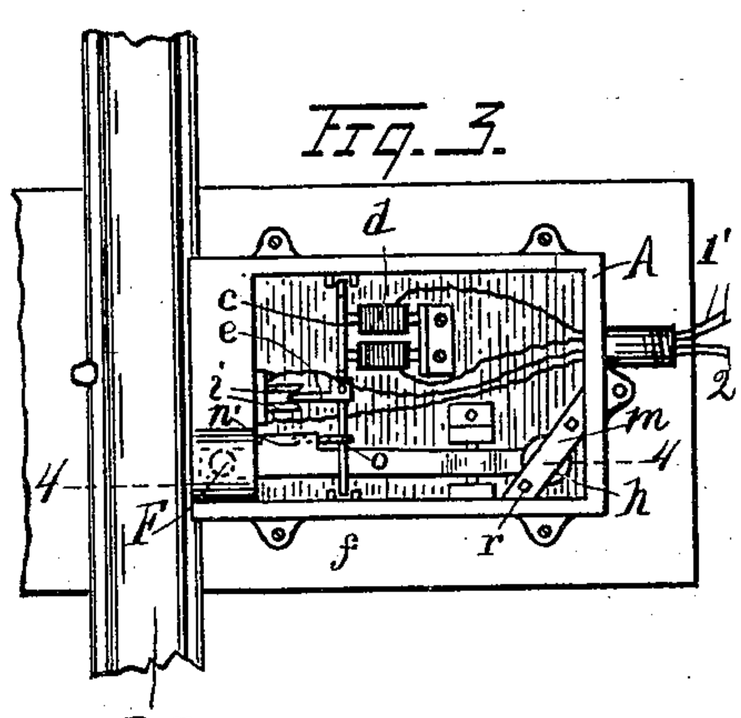


Fig. 5

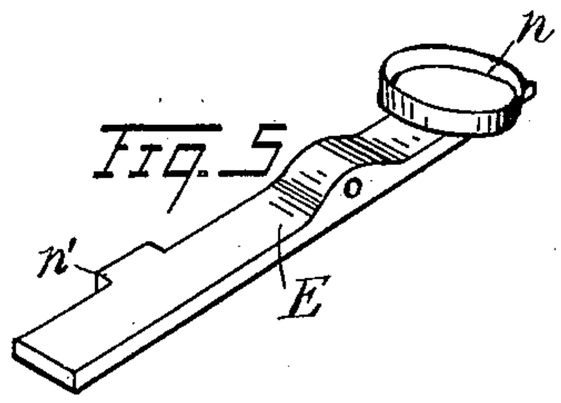


Fig. 6

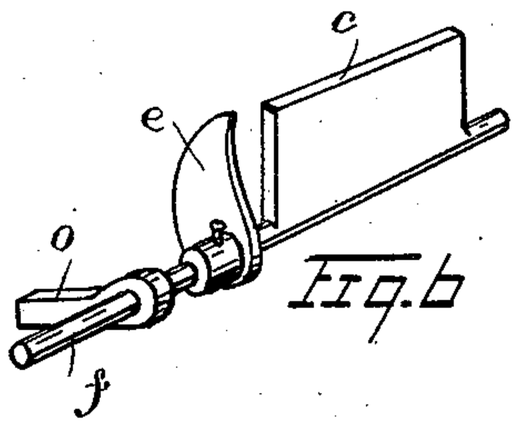


Fig. 4.




Witnesses
R. J. Wheeler
C. A. Wheeler

Inventor
J. S. Savage Jr

By his Attorneys Rosser & Wheeler

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## DANGER SIGNAL FOR RAILWAY CROSSINGS.

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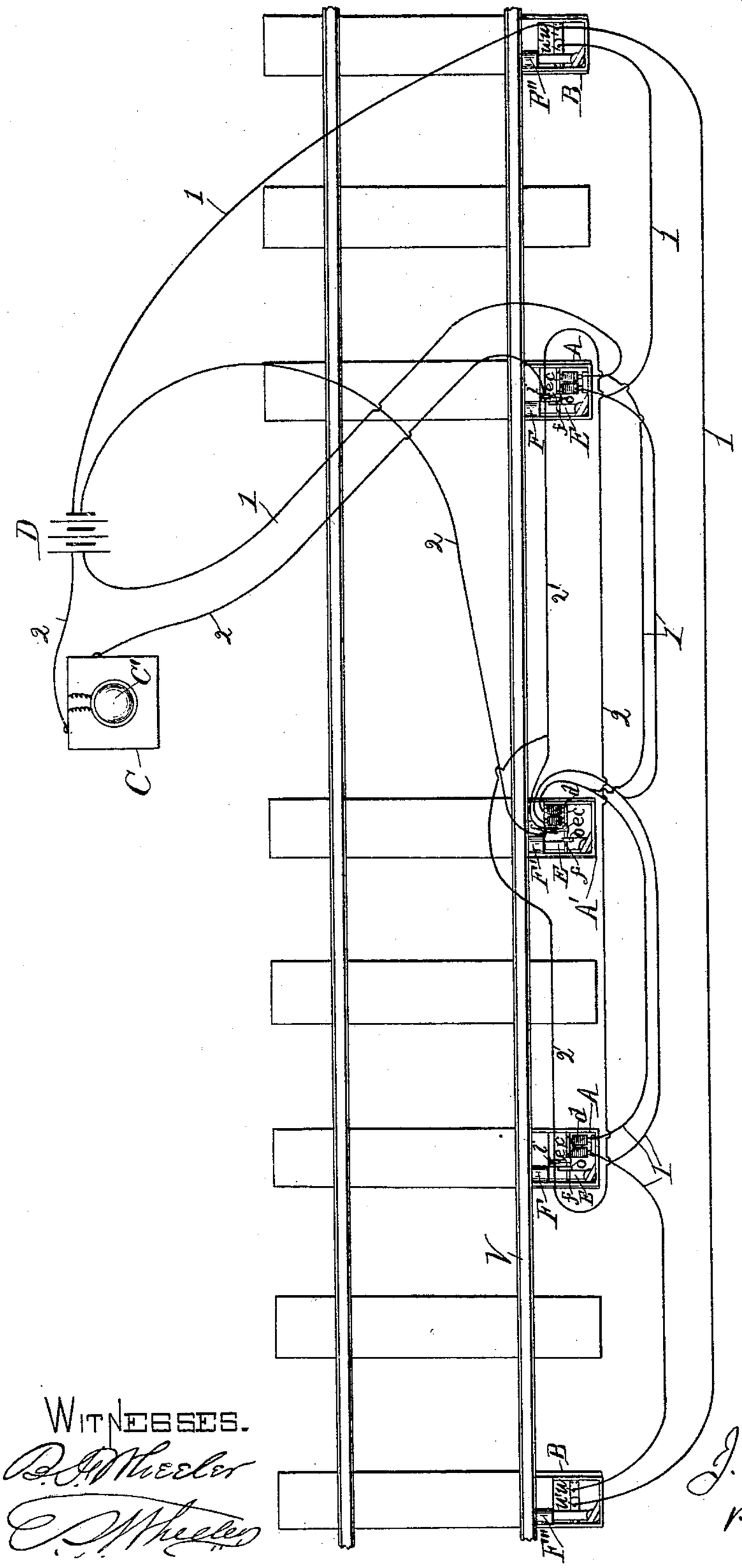


Fig. 1.

WITNESSES.
D. A. Wheeler
C. F. Wheeler

INVENTOR.
J. S. Savage, Jr.
By Ramon Byrkett
atty

# UNITED STATES PATENT OFFICE.

JAMES S. SAVAGE, JR., OF DETROIT, MICHIGAN, ASSIGNOR OF TWENTY-SEVEN ONE-HUNDREDTHS TO GEORGE FARNSWORTH, OF SAME PLACE.

## DANGER-SIGNAL FOR RAILWAY-CROSSINGS.

SPECIFICATION forming part of Letters Patent No. 495,913, dated April 18, 1893.

Application filed June 4, 1891. Renewed March 27, 1893. Serial No. 467,878. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES S. SAVAGE, Jr., a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Danger-Signals for Railway-Crossings; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in electric danger signals for railway crossings; and it consists in a certain construction and arrangement of parts, as hereinafter fully set forth, the essential features of which being pointed out particularly in the claims.

The object of the invention is to provide simple and effective means to give warning of the approach of trains at railway crossings, in which the device is equally operative with the train going in either direction, and in which the passing train removes the danger signal, and sets the device so as to be again operated by the next train passing over the track. This object is attained by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a general perspective view of my improved signal. Fig. 2 is a vertical section through the case containing the signal operating mechanism, said mechanism being shown in elevation. Fig. 3 is a plan view of one of the boxes, with the cover removed, in which is located mechanism employed to open and close the electric circuit, whereby the signal is operated. Fig. 4 is an enlarged section on dotted line 4—4 of Fig. 3, the cover of the box being in place. Fig. 5 is an enlarged perspective view of the operative lever of the box mechanism. Fig. 6 is an enlarged perspective of a detail of said mechanism. Fig. 7 is a diagram view showing the relative positions of the operative parts, and the circuit wires connecting the electrically actuated mechanism with the battery.

Referring to the letters and figures of reference, A, A′, and B, designate a series of boxes adapted to be secured to the ties of the track, and which are located a suitable distance on each side of a crossing, as shown in Fig. 1. In these boxes is located mechanism adapted to be electrically and mechanically actuated to operate the crossing signal.

C designates the signal box or housing, which is suspended over the crossing on suitable supports *b*, and contains the danger signal and its operative mechanism, which mechanism is in electrical connection with the boxes A, A′.

D designates the battery, which may be located at any desired point, and is connected by a system of wires with the mechanism of the boxes A, A′ and B, and the signal operating mechanism in the housing C.

Located within each of the boxes A is an electro-magnet *d* that is in electrical connection with the battery D. The armature *c* of said magnet is mounted on a rock-shaft *f* that is journaled in the sides of the box. Mounted on said shaft is a moving contact *e* adapted to enter between the open contact-plates *i* secured to the end of said box, and which are also in electrical connection with said battery, and close the circuit through said plates *i*, as shown in Fig. 3.

E designates a lever fulcrumed within the box A. One end of said lever is provided with a cup or seat *n*, shown in Fig. 5, adapted to receive a rubber cushion or suitable spring *h*, which bears against the under face of the cross-piece *m*, secured above it by the bolts *r*. Upon the opposite end of said lever rests the lower end of the stem *t* of the tread-plate F, said stem being supported in a way *w* formed in the end of the box, in which it reciprocates vertically. The overhanging flanges *s* of the plate F embrace the outer faces of said way, as shown in Fig. 4, and support the stem *t* of said plate in its operation. From this description, it will be seen, that, when the tread-plate F is depressed, the stem *t* thereof will force downward that end of the lever E on which it bears, compressing the spring or rubber *h* between its opposite end and the cross-piece *m*, whereby, when the plate F is re-

leased, the expanding force of said spring will return said parts to their normal positions. Projecting horizontally from the lever E, is a shoulder $n'$, shown in Fig. 5, which is adapted to engage an arm $o$, projecting from the shaft $f$ to which it is rigidly secured, by which construction, as the lever E is depressed, said arm is actuated to rock the shaft $f$ and throw the plate $e$ into contact with the plates $i$, and close the circuit through said plates, as shown in Fig. 3. It will now be apparent, that, when the plate $e$ is in contact with the plates $i$, by energizing the magnet $d$, its armature $c$ will be attracted, and rock the shaft $f$ so as to withdraw the plate $e$ from contact with the plates $i$, and break or open the circuit through said plates, as shown in Fig. 4.

The mechanism within the centrally located box A', is substantially the same as that within the boxes A, the difference being merely a difference in position, the magnet in the box A' being located on the opposite side of the armature, and the arm $o$ projecting in the opposite direction from the shaft $f$, to that of said parts in the boxes A, as shown in Fig. 7, whereby, when the lever E in said box A' is depressed, the shaft $f$ will be actuated to withdraw the plate $e$ from contact with the plates $i$, and when the magnet is energized the armature will be actuated to throw the plate $e$ into contact with said plates, the operation being just the reverse of that of the mechanism of the boxes A, for purposes hereinafter described.

In the outer boxes B, at each end of the system, are located the spring contact or circuit closing plates $u$, $u'$, (see Fig. 7,) said plates being located in the circuit with the magnets $d$ of the boxes A, A', formed by the system of wires $l$, as clearly shown in Fig. 7. The normal condition of said circuit is open, and it is closed by contact of the plates $u$ $u'$ in either of the boxes B, which contact is effected by means of a tread-plate F'', operating a spring-return lever, similar to that in the boxes A. G in Fig. 4 designates a cover that fits tightly over said boxes and excludes dust and moisture therefrom.

Within the signal box or housing C, shown in Fig. 2, is an electro-magnet H, the armature I of which is pivoted at $v$ to the stud J, and is provided with a rearwardly extending integral arm K, carrying an adjustable weight L, said armature having also attached thereto a segment rack P, adapted to engage a pinion 3 on a shaft 4 journaled in the bracket R. Coupled to said shaft or pinion is a pendulum-rack S, adapted to engage the pinion 5 on the shaft 6 journaled in the bracket 7. Secured to the shaft 6 is a vibrating arm T, to the free end of which is pivoted a swinging danger signal Z. This signal may be illuminated, or provided with an electric light $x$ depending therefrom, or both, as desired. From this arrangement of mechanism it will be evident, that, when the magnet H is energized, by passing an electric current therethrough, the armature I will be attracted with sufficient force to overcome the weight L, and move the rack P so as to rotate the pinion 3 and swing the pendulum-rack S to the left, rotating the pinion 5 and swinging the arm T downward, whereby the signal and light are displayed through the opening U in the case C, as shown in Figs. 1 and 2; and when the current is cut-off, the weight L will raise the armature I and operate the mechanism to withdraw the signal from sight within the case D, as shown by dotted lines in Fig. 2. The light $x$ is placed in the same circuit with the magnet H, so that it illuminates only when the signal is displayed. Also located in said circuit is an electric alarm-bell C', secured to the case C, whereby said bell is caused to ring continuously while the signal is exposed, or the signal circuit is closed.

The signal operating mechanism is in electrical connection with the battery, and the open contact plates $i$ of the boxes A, A', through the system of wires 2, as shown in Fig. 7, forming a circuit independent of that through the magnets $d$, and contact-plates $u$ $u'$, of the boxes A, A', and B, respectively.

The boxes A, A' and B, are arranged in their relative positions, as shown in Figs. 1 and 7, and are secured to the ends of the ties on the outside of the rail V of the track. The boxes A and B are located on each side of the crossing, the boxes A at such distance therefrom as to give timely notice of the approach of trains, the box A' being located directly at the crossing. The tread-plates of said boxes are placed adjacent to the rail V, and extend slightly above the face thereof, as shown in Fig. 4, so that they will be depressed by the tread of the car-wheel (shown by dotted lines in said figure) when passing over the track, whereby the various mechanical and electrical operations are performed, through the medium of which the signal is displayed and withdrawn.

The diagram of Fig. 7 shows the normal positions of the parts, the plates $e$ and $i$ in the central box A' being in contact, and said corresponding plates in the boxes A being out of contact, in which position the arrangement is such that said parts will be actuated, to display the signal, by a train approaching the crossing from either direction. As the train approaches the wheels will strike and depress the tread-plate F of the box A, operating the mechanism therein to throw the plate $e$ into contact with the plates $i$, thereby closing the circuit through said plates, the central box A', and the signal case C, energizing the magnet H and actuating the mechanism in said case to display the danger signal therefrom, also ringing the bell C', and if at night, lighting the electric light $x$. The signal and light, being pivotally dependent from the vibrating arm T, will swing to-and-fro, and in case a flag is employed for the signal, will keep said

flag continually waving, making a signal that may be readily seen at a great distance, which in connection with the ringing of the bell, will give ample notice of the approach of a train. When the train reaches the crossing the wheels will depress the tread-plate F′ of the box A′, and actuate the mechanism therein to withdraw the plate *e* from contact with the plates *i*, which acts as a cut-off to open the circuit through the magnet H of the signal mechanism, the light and bell, when the armature I will be released, and the weight L will raise said armature and operate the signal mechanism to withdraw the signal within the case C, at the same time extinguishing the light and silencing the bell. When the train after having passed the crossing, going in either direction, reaches the outermost box B, the tread-plate F″ thereof will be depressed, making a contact between the plates *u u′*, and forming a circuit through the magnets *d* of the boxes A and A′, energizing said magnets and throwing the plate *e* in the box A′ into contact with the plates *i* therein, and breaking the contact between said plates in the boxes A, as before set forth, whereby the system is set so as to be again operated, to display the signal, by a train following in the same direction, or by one coming from an opposite direction; and is equally efficient in operation, in case the train runs only to the crossing, and backs away, or returns in the direction from which it came, and making an automatic danger signal for railway crossings, that is simple, reliable, and perfect in its operation.

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

1. In an electric danger signal, the combination with an alarm circuit having located therein the alarm or signal operating mechanism and a series of stationary open-contacts, of an auxiliary circuit having circuit closers at its extremities, a series of interposed electro-magnets having armatures mounted on rock-shafts said shafts carrying movable contacts, and mechanism for mechanically actuating said movable contacts in connection with said magnets to alternately open and close the circuit between the stationary contacts of the alarm circuit.

2. In an automatic danger signal, the combination of an electro-magnet having a pivoted armature, a weighted arm and rack attached to said armature, the pinion engaging with said rack, the pendulum-rack and pinion engaging therewith, and the vibrating arm carrying the swinging signal at its free end.

3. In a signal operating device, the combination of the adjacent contact-plates, the rock-shaft, said shaft having an arm extending therefrom at right-angle thereto, the movable contact mounted on said shaft and adapted to enter between said contact-plates, the armature secured to the rock-shaft and extending laterally therefrom, the lever engaging the arm of the rock-shaft, the tread for depressing said lever, whereby the shaft is moved in one direction by the passing train to carry the contact into engagement with said contact-plates, the magnet for attracting said armature to rock the shaft and withdraw said contact thereon from between said plates, for the purpose specified.

4. In an electric-signal device, the combination with the signal circuit having a series of adjacent contact-plates therein, the signal operating mechanism, the vibrating arm, the signal depending therefrom and actuated thereby, of an auxiliary circuit having circuit closers at its ends, and a series of interposed electro-magnets, the series of rock-shafts, the movable contact on said shafts adapted to enter between said contact-plates, the armatures of said magnets, said armatures mounted on said shafts and adapted to actuate them when attracted by the magnets to withdraw said contacts thereon from between said contact-plates, and means actuated by the passing train for rotating said shafts to carry the contacts thereon between said contact-plates, substantially as specified.

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

JAMES S. SAVAGE, JR.

Witnesses:
E. S. WHEELER,
O. B. BAENZIGER.