(No Model.) 4 Sheets—Sheet 1.

E. A. WINTERHALDER.

RAILWAY SIGNALING APPARATUS.

No. 513,376. Patented Jan. 23, 1894.

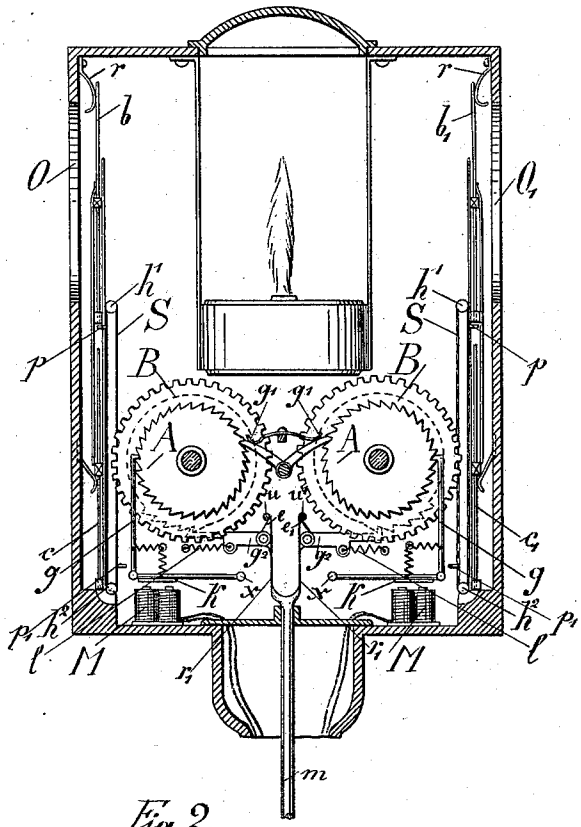

Fig. 2.

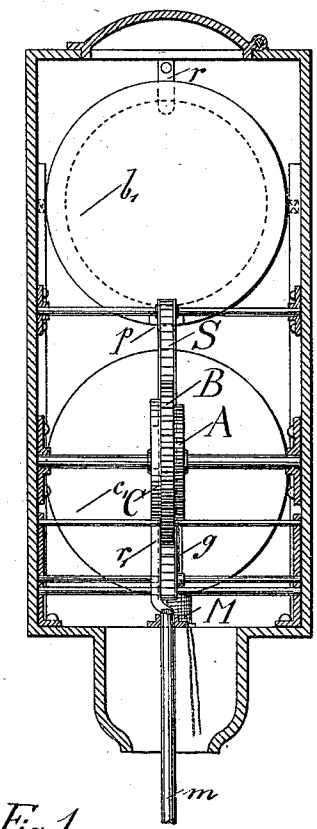

Fig. 1.

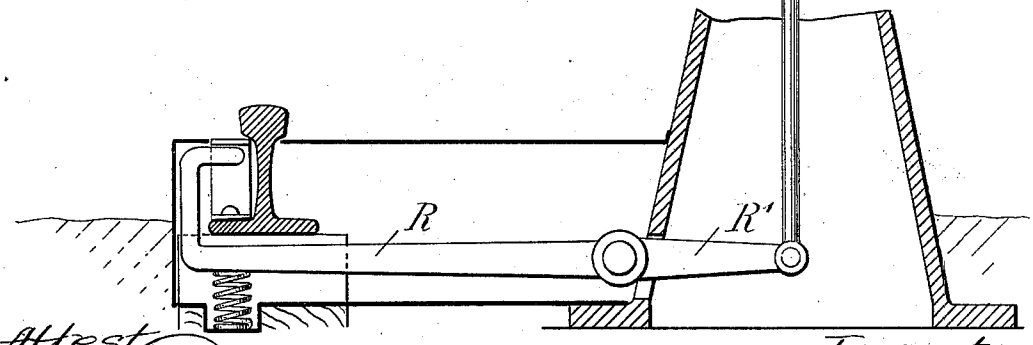

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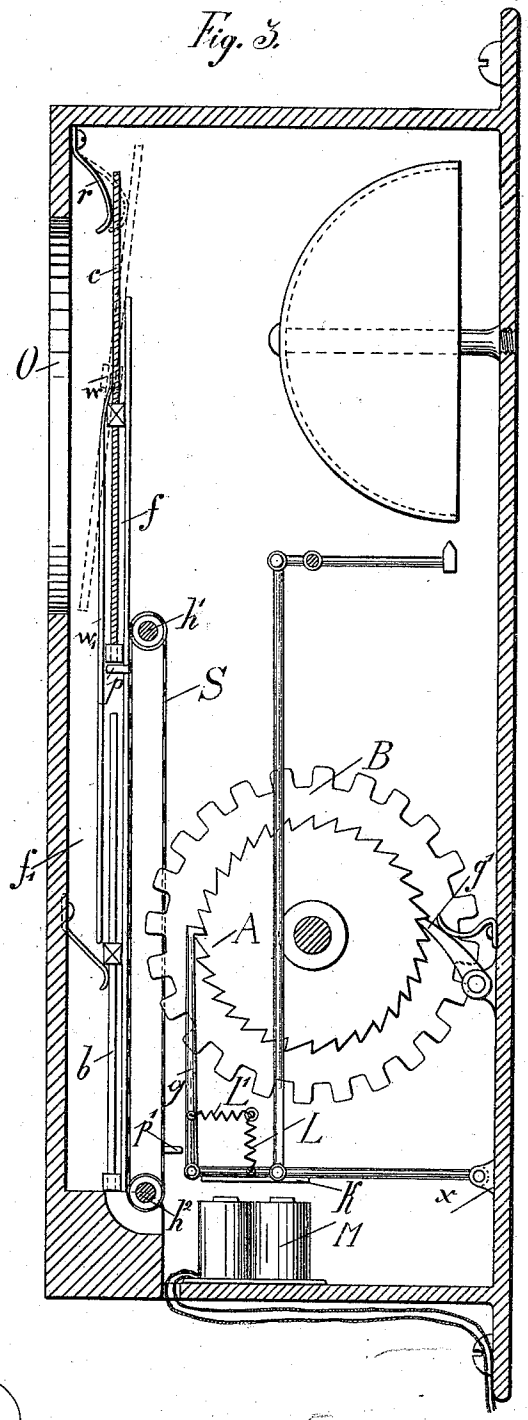
Fig. 3.



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E. A. WINTERHALDER.

RAILWAY SIGNALING APPARATUS.

No. 513,376. Patented Jan. 23, 1894.

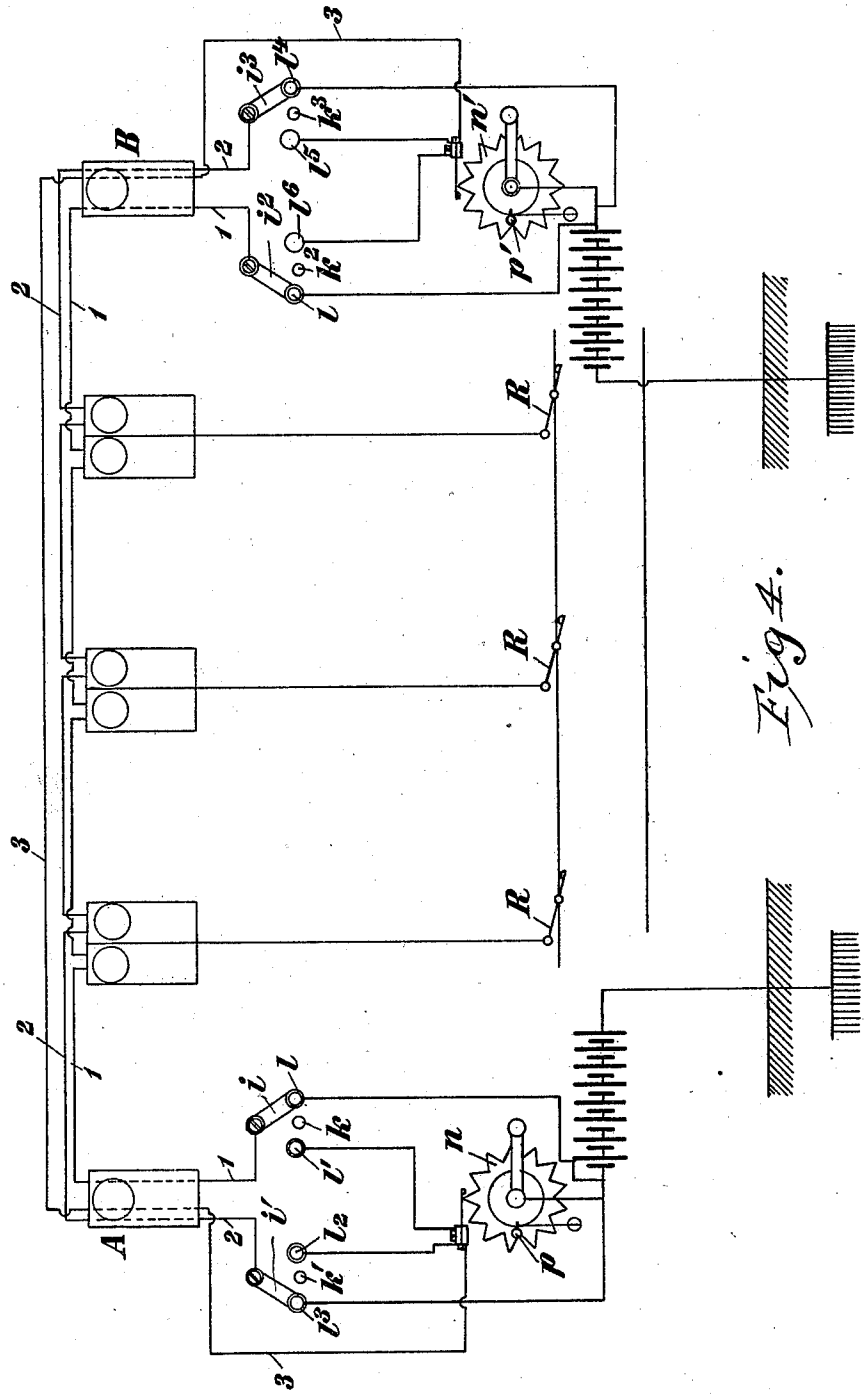

Fig. 4.

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RAILWAY SIGNALING APPARATUS.

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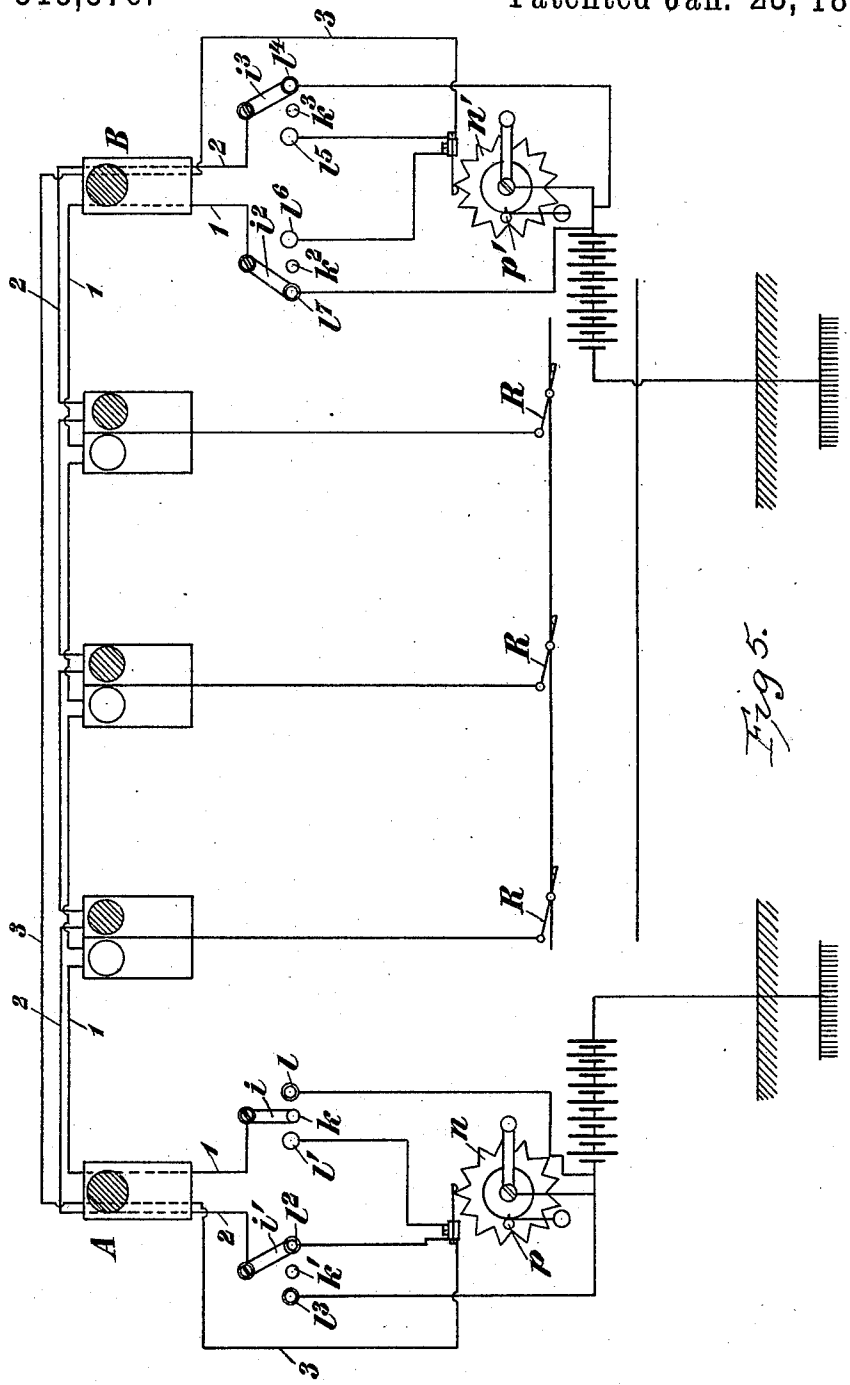

Fig. 5.

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UNITED STATES PATENT OFFICE.

EDUARD ALBERT WINTERHALDER, OF KAPPEL, GERMANY.

RAILWAY SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 513,376, dated January 23, 1894.

Application filed December 3, 1892. Serial No. 454,016. (No model.) Patented in Austria-Hungary October 21, 1892, No. 54,157 and No. 79,778; in England October 25, 1892, No. 19,107; in Belgium November 5, 1892, No. 101,998; in France November 7, 1892, No. 225,454, and in Italy November 9, 1892, No. 32,976/468.

To all whom it may concern:

Be it known that I, EDUARD ALBERT WINTERHALDER, of Kappel, Schwarzwald, Germany, have invented a new and useful Railway Signaling Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has been patented to me in Austria-Hungary under date of October 21, 1892, No. 54,157 and No. 79,778; in Great Britain October 25, 1892, No. 19,107; in France November 7, 1892, No. 225,454; in Belgium November 5, 1892, No. 101,998, and in Italy November 9, 1892, No. 32,976/468.

This invention relates to an electric signaling apparatus for railways, and is intended for use on single track roads for the purpose of receiving and sending signals and for signaling and protecting trains.

I will describe my invention with reference to the accompanying drawings in which—

Figure 1 is a vertical longitudinal section; Fig. 2 a vertical cross section of the upper part of Fig. 1; Fig. 3 a vertical cross section of a modification of the apparatus drawn to a larger scale, and Fig. 4 a diagram showing the arrangement and connections for a complete line with the parts in positions assumed when at rest. Fig. 5, is a similar view illustrating the departure of the train from station A.

The apparatus consists, as shown by Figs. 1 and 2, of an oblong rectangular casing supported upon a column or post, and provided in each of its sides facing the direction of the line, with a window or opening. The necessary signals are given by means of transparent colored disks, as for example, red and green glasses, *b c* and *b′ c′*. These disks are capable of being raised so as to cover the window opening, and are illuminated by means of a suitable lamp so as to be visible at night. They are arranged in pairs on each side of the apparatus and are lifted in turn by symmetrically arranged electrically operated mechanism consisting of an electro-magnet M, and its armature or keeper K, on an L-shaped lever *g*, pivoted at *x*. The upper end of the lever is shaped to act as a click to engage with and rotate the ratchet wheel A one tooth for each energization of the electro-magnet. A pawl *g′* is arranged upon the opposite side to prevent any possible backward motion of the ratchet wheel. There are two of these sets of electrically operated mechanism, as shown by Fig. 2; one for each window or opening. A battery or other suitable source of current is included in the same circuit with the electro-magnets, so that upon the closing of this circuit, the magnet is energized and its keeper is attracted. When the circuit is opened spiral springs L L′ restore the lever *g* and the keeper to their normal position.

On the axis of each ratchet wheel there is fixed a chain wheel B on which the endless chain S gears. This chain passes over the two rollers *h′* and *h″* and vertically parallel with those sides of the casing in which the windows are formed. On it, at opposite points, it is furnished with a catch *p p′*, by means of which the transparent disks *b b′* or *c c′* may be lifted in front of the window O O′.

The details of the arrangements for lifting and lowering the colored transparent disks are shown on a larger scale by Fig. 3. The disk *c* is before the window, and in order to replace it by the other disk, the latter is simply lifted behind it whereby it is displaced and falls into the lower part of the casing. In order to effect this, each disk is mounted in a ring which has on its opposite sides the projections *w* which slide in grooves formed by the lateral strips *w′*, which occupy only about the central portion of the casing so as to allow the projections *w* to pass over the tops of the strips at the highest point, and under them at the lowest. The upper parts of the strips are thin and curved inward to prevent the return of the projections after they have once passed the tops. At the upper end of the casing there is a curved spring *r* which is put into tension by contact with the glass near the top of its travel. When it is desired to replace the disk *c* by *b*, the electric circuit is repeatedly closed and broken. The disk *c* is thereby lifted until its projections are free from the restraint of the guide strips *w′* whereupon the spring *r* tilts the upper end of the disk as shown by the dotted

lines, and it immediately passes into the groove f' formed by the space between the strip w' and the side of the casing and to the bottom of the apparatus where it is pushed into its former position by the spring r'. The groove in which the projections w slide in their upward course, is completed by the strips f, which extend from the bottom of the casing to a point higher than the tops of the strips w'. The circuits of the electro-magnets are independent of each other and they are so arranged that signals given from the station A, Fig. 4, are visible only from the direction of the station B, and those given from B are visible only from the direction of A.

In the intermediate apparatus on the line, the signals are pulled down by the lever R R', Fig. 1. The tread of this lever is arranged to come below the flanges of the locomotive and rolling stock wheels. The end R', is pivoted to the vertical connecting rod m, the upper end of which has fixed upon it the elastic springs e e', to which the horizontal arms g'' are connected, and inclined surfaces which bear against the points u and u' respectively. When the outer end of the lever R is depressed by the passage of the wheels of a passing train, the connecting rod m is forced upward once for each flange. At each upward motion, the action of the inclined planes and the points u u' compel the springs e e' to close together and thus give a lateral motion to the arms g''. The arms are restored, on the reversal of the motion, by the springs l. The arms g'' carry clicks which engage with two ratchet wheels C, fixed upon the axes of the chain wheels, but these wheels C have only a limited number of teeth, preferably about five. Thus, no matter what the number of wheels may be in the passing train, the ratchet wheel C can move only through a distance corresponding to the number of teeth. As the withdrawal of the signal is necessary in the case of both of the disks, the opposite diameters of each of the wheels C is provided with the fixed number of teeth, five for example. The number of teeth is such that the motion of the chain will lift the lower disk sufficiently to displace the upper one, without coming into the front of the opening. Consequently, after the action of the lever R, both disks are down.

The modification of the apparatus represented by Fig. 3 is intended for use in terminal stations only, or in stations at the end of a section. In this case the removal of the signal disks from the opening, is effected electrically, and the keeper of the electro-magnet may be connected with the hammer of a gong so as to give an audible signal. In other respects the apparatus may be identical with that already described, but signals having to be shown in one direction only, it is single and not duplicated.

If it is desired to dispatch a train from the terminal station A, (see Fig. 5) the system 1, is cut out by shifting the switch lever i onto the button k and the system 2 cut in by shifting switch lever i' onto contact point l^2. The circuit breaker n is then operated causing an interrupted or pulsating current to travel from the battery X through the circuit breaker and switch lever i' over the wire 2 through the signal boxes at A and all the intermediate boxes facing station B, thereby causing the electrically controlled mechanism therein to lift the red disks to cover the openings facing toward station B. From the wire 2 at B the circuit passes through switch lever i^3 to a return wire or to the ground as desired. As soon as the signal has been sent the switch levers i and i' are shifted back upon the buttons l and l^3 which is their normal position and to which they must be returned after every signal. If the stretch from station B is clear, the signalman there shifts switch lever i^3 onto the button k^3 and the switch lever i^2 onto the contact point l^6 and operates the circuit breaker n' to throw a current over the wire 1 thus bringing up the green lights at his own station and all the intermediate stations and signaling "line clear." As the train departs from the station A and while journeying toward B, the red disks facing B serve to protect the train, since, so long as they remain visible, no train is sent out from B; but as fast as the train passes each intermediate station the red and green disks are both lowered to a position of rest by the mechanism operated by the car wheels as previously described. When the train reaches the station B, it will be seen that all the signal disks, both red and green, will have been lowered except those at the two terminal stations, which are controlled electrically only. In order to lower these the switches i^2 i^3 are shifted onto the points or buttons k^2 k^3, and the operation of the circuit breaker n' will cause the current from the battery to travel out over the wire 3, through the two terminal stations thus lowering the disks thereat simultaneously so that all the disks are brought into normal position.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In apparatus for block signaling on single line railways, two symmetically arranged electrically operated mechanisms driving two endless chains intermittently for the purpose of exhibiting colored disks, in combination with a mechanical device operated by the wheels of a passing train to remove the disks out of sight, substantially as described.

2. In an apparatus for block signaling on single line railways having terminal and intermediate stations, the single casings located at the terminal stations, the double boxes located at the intermediate stations, red and green disks located in said casings, mechanism having electrical connections with the

terminal stations for lifting said disks, mechanical means operated by the wheels of the train for lowering the disks at the intermediate stations, and electrical connections for lowering the disks at the terminal stations independently of the intermediate disks, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

EDUARD ALBERT WINTERHALDER.

Witnesses:
CORMEL WELTE,
JOH. GÜNTERT.