(No Model.) 3 Sheets—Sheet 1.

F. H. CLARKE.

ELECTRIC SIGNAL.

No. 491,874. Patented Feb. 14, 1893.

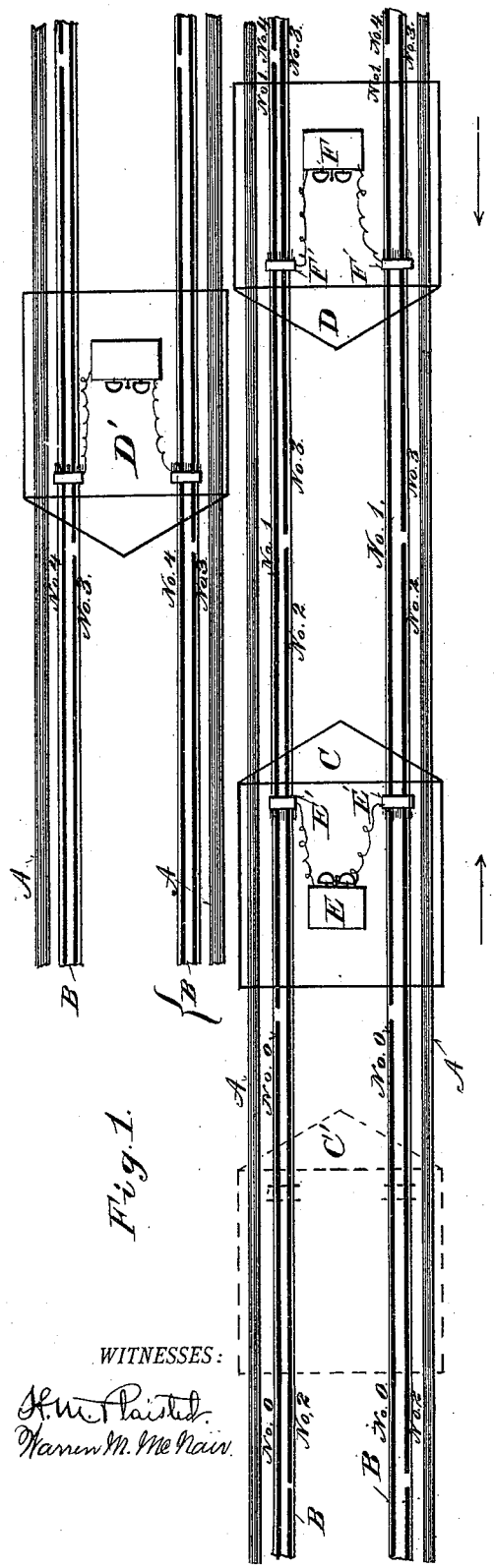

Fig. 1.

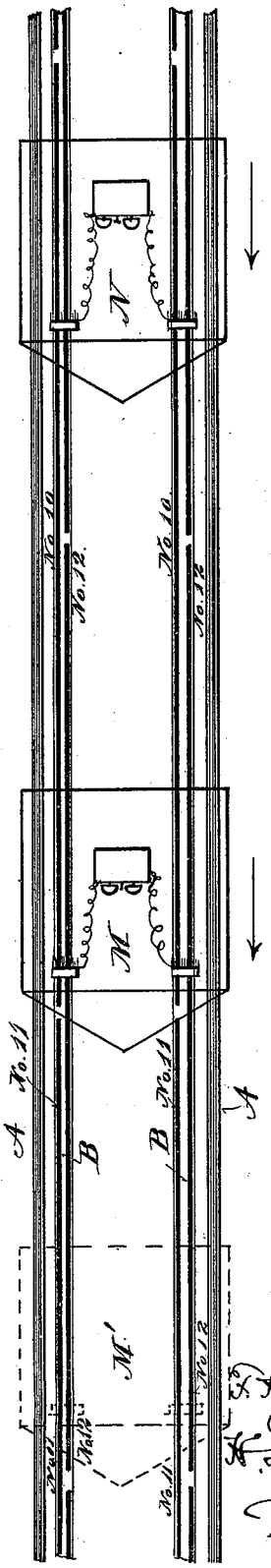

Fig. 2.

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F. H. CLARKE.

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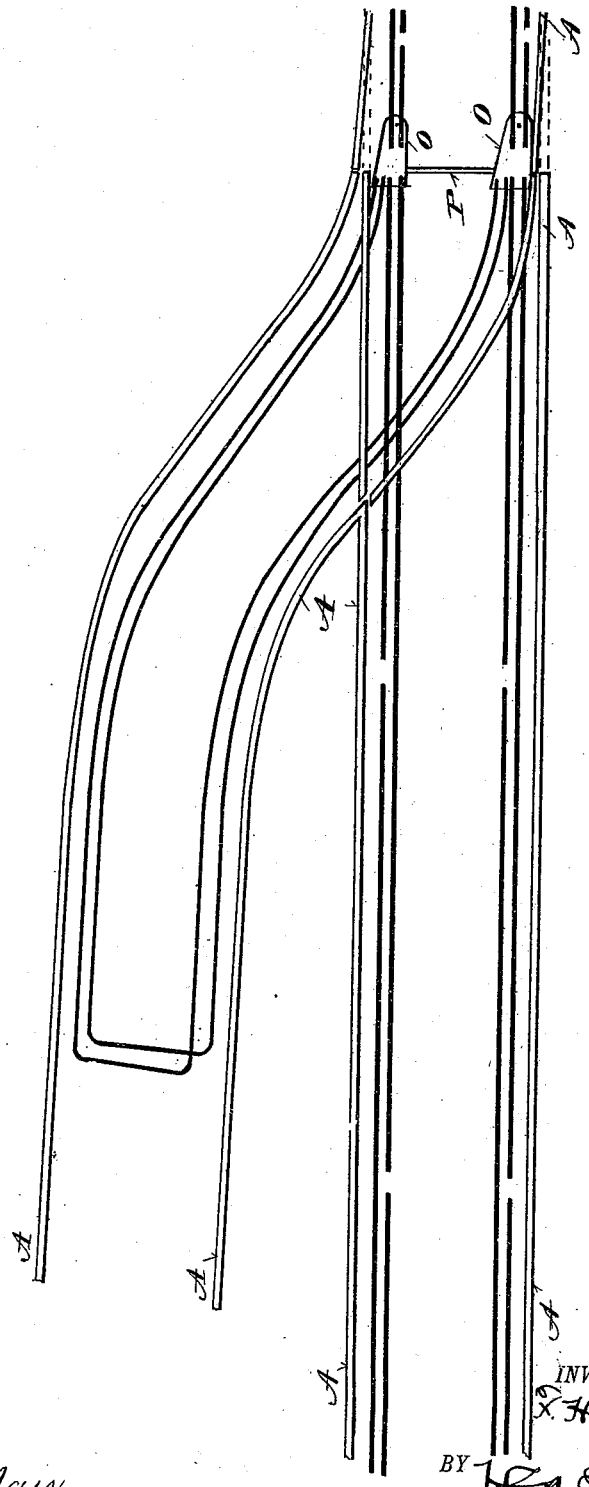

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

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ELECTRIC SIGNAL.

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Fig. 5.

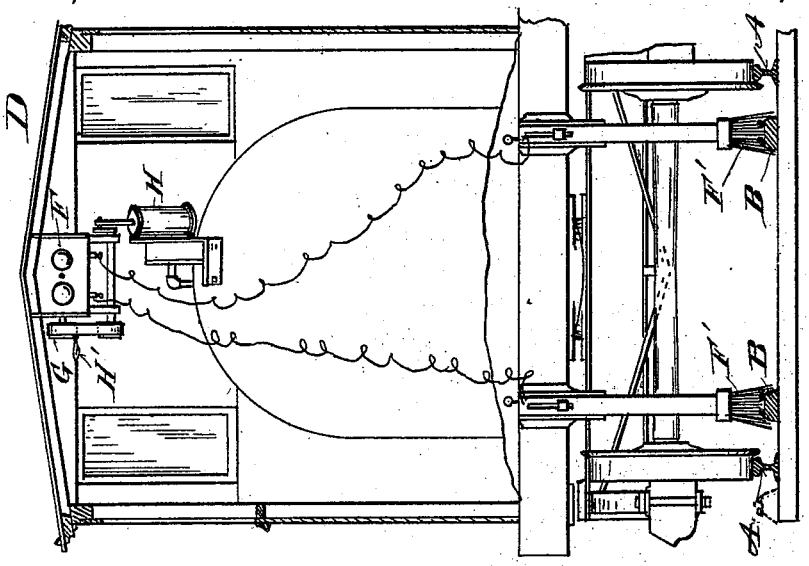
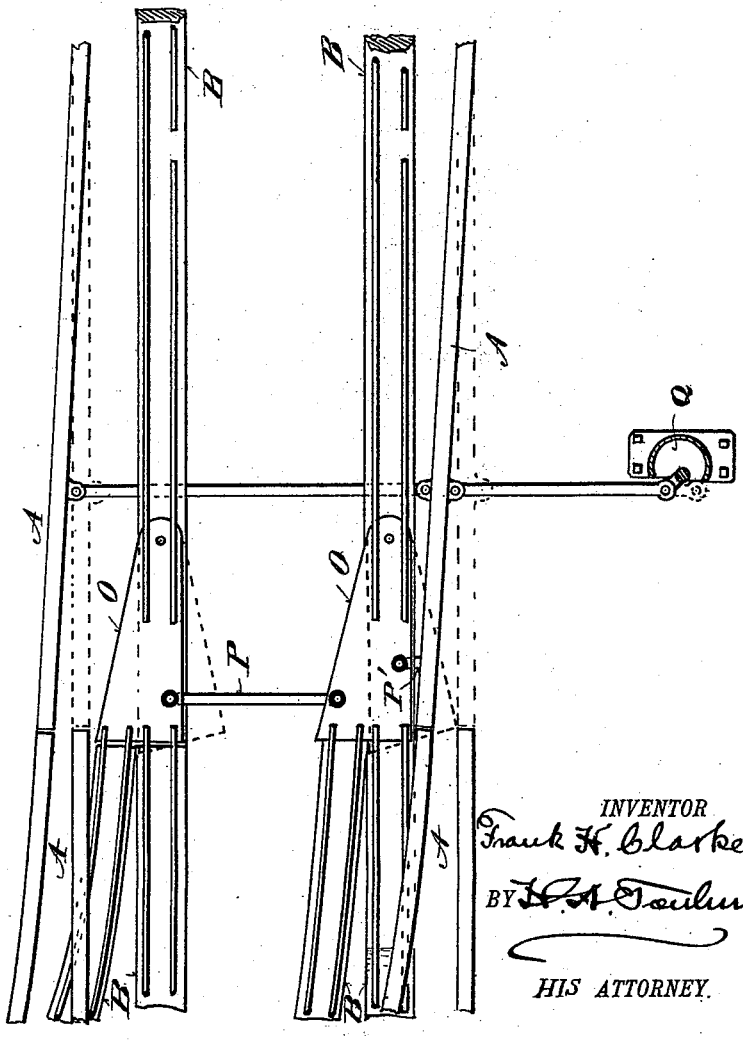


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 491,874, dated February 14, 1893.

Application filed October 24, 1892. Serial No. 449,813. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. CLARKE, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Electric Signals, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in electric signals, being especially adapted to rail road signaling, and it consists essentially of electrical generators carried by the engines or trains and producing electric currents, preferably constantly alternating, together with a series of electrical conductors adjacent to the railway bed and forming a system of overlapping blocks, so that should one train enter upon a given stretch of track already occupied by another train, that fact will be audibly announced in both trains, or as many as may enter or be upon such stretch,—the announcement being made in either or both directions—forward or rearward;—further peculiarities of construction and operation will be hereinafter pointed out and claimed.

In the accompanying drawings on which like reference letters and numerals indicate corresponding parts: Figure 1, represents a plan view of a portion of a railroad track, and this system applied thereto, approaching trains being indicated thereon by diagrams; Fig. 2, a similar view illustrating the operation of this system when the trains are moving in the same direction; Fig. 3, a plan view of a portion of the main line and of a side track, illustrating the construction for signaling in connection with the latter; Fig. 4, an enlarged plan view of the switch in Fig. 3, showing the construction; and Fig. 5, a cross section of the track, the electrical conductors, a generator carried by an engine, and its connections with the said conductors.

The letters A, A designate the rails of a railroad.

The letter B designates a strip of wood, or other insulating material, parallel to, and either along the inner or outer side of each rail. Along each insulating strip or base, is laid a double line of wires or other electrical conductors. Each line is formed in sections or lengths of suitable distance, the ends of the sections being adjacent to, but not meeting, each other. On the same strip, one of the lines breaks joint, or alternates with the other line, as shown in Figs. 1 to 3 inclusive. That is to say, the matching ends or break in one line, is about midway of the length or section of its companion line on the same strip, whereby from every break or joint, of either line, the section of the other line extends substantially half its length in both directions. As before intimated, a double line is laid at each side of the track either on the outside, or along the inside of each rail, as shown in the figures. The breaks of the double line on one strip, correspond or match with the breaks of the double line on the other strip. Thus a section on one side of the track, pairs with a section on the other side of the track, and constitutes what will be termed a block; and as each strip has a double line of overlapping conductors, a continuous series of overlapping blocks is thus formed.

To illustrate the use of this arrangement and construction, diagram figures, 1 to 3 inclusive, are shown. Referring to these figures, the letter C designates a train or locomotive, approaching another train or locomotive D on the same track. Each train carries an electric generator, E and F respectively, having connecting wires to a pair of contact-devices or brushes E′ F′ respectively, of wire bristles, adapted to be brought in electrical contact with conductors upon the strips B, as indicated in Fig. 5. The generator is of any suitable form for producing a current of electricity, and may be operated by hand or by machinery. In Fig. 5 the pulley G of the generator is driven by an oscillating engine H, taking the steam from the boiler; if desired, the generator may be driven by the use of a handle H′, but it is preferred that it should be constantly operated, as will presently appear. By operating one or both of such generators, a current of electricity is sent to the brushes and into the electrical conductors along the track. Referring to Fig. 1, the two trains shown approaching each other, C and D, are in connection with the same pair of sections or block No. 1, and the current of electricity will pass through the

brushes of each generator and complete a circuit, thereby causing an electric bell in the engine cab, to sound. The generators are not described in detail, since they form no part of this invention and any ordinary kind may be employed. The alarm in both engines is given when the circuit is completed, as just described. If the blocks are a mile long, for instance, the moment one engine enters a block another engine is already on, an alarm is rung in each engine, thus notifying each engineer that another train is within a mile of him. This notification comes through block No. 1; the currents of electricity pass out of the brushes E′, into block No. 2, on which engine C is located, and out of brushes F′ into block No. 3 which is in connection with the generator of engine D. Block No. 2, overlaps No. 1, in one direction, and extends a suitable distance in the other direction overlapping block No. 0. Any engine following engine C, as C′ indicated by dotted lines, will complete a circuit with engine C by means of block No. 2, when in the positions shown. If engine C were in the position of C′ with regard to engine D, no alarm would be sounded in either C or D; but one would be sounded when both came within the same block. Either alternating or continuous currents of electricity are used in signaling approaching trains. When one train or engine follows another, however, as shown in Fig. 2, it is necessary that the currents be alternating in order that the circuits may be completed. Thus while either kind of current may be used when the engines are approaching each other, alternating currents are preferred in this invention. With an alternating current, engine M will be notified of the approach of engine N, when the latter, reaches the same block, No. 10, for instance, on which engine M is running. When M. passes to block 11, the circuit is broken between the two generators and remains so until engine N reaches block No. 12, when it will again be completed if M is still in contact with block 12, as shown by the dotted position, M′. Referring to Fig. 1 again, the engine D′, is shown on block No. 4 which extends up to block No. 1, and overlaps with block No. 3 which is charged with electricity from engine D, which protects it from the rear. Thus no alarm is given between D or D′ in their present positions; but as soon as D′ moves upon block No. 3 it completes the circuit and the alarm is given in both. Thus it will be seen that wherever an engine with its generator is located on the track, it is in contact, through its contact-devices or brushes, with two blocks, which notify it of the approach of another train from either direction; and that such other train cannot approach in either direction nearer than the terminus of the adjacent blocks, without giving the alarm in both engines. Whether both trains are running in the same direction or are approaching each other, an alternating current produced by the constantly operating generators, will produce an electric current in the electric conductors both in front and in rear, and when both engines arrive in the same block the alarm is given. If one be stationary, and the other be moving, the alarm is given. If both be stationary, the constantly operating generators will maintain the alarm.

In order to protect a train from running into a switch set for a side track, the arrangement illustrated by Figs. 3 and 4, is employed. This consists in a double loop of wires running out along side the track to form part of the corresponding block or blocks at the switch. Ordinarily this side track block is out of the circuit; that is, when the main track is unbroken. When the switch is shifted for the side track, however, the currents will flow up along the loops. This is accomplished by means of a construction shown in Fig. 4, consisting of a common plate of copper, or other electrical conductor O, for each side of the track, connected by a link P, insulated, and both operated by an insulated connection P′ with the switch rails, from the switch stand Q. By the usual operation of the switch from the main track to the side track and vice versa, the pivoted plates O are operated from their dotted positions to their full line positions and vice versa. When in the position shown by dotted lines, these plates connect the double line of conductors for the main track; when in the position shown by full lines, however, these plates are swung over into contact with the conductors of the side track, as shown in Fig. 4, so as to bring these loops into the blocks of the main line and thus notify a train approaching the switch, that the switch is open. If a train be on the side track and passing off to the main track, the alarm will also be sounded, if another train be within a half a block of the switch in either direction on the main track. It is not necessary that the conductors for the side track extend down far along said track, except for the additional safety to both trains in notifying them of the presence of each other before the train on the side track enters the main track. As before mentioned, these blocks may be of any convenient length, according to circumstances; broad claim is made, however, to overlapping blocks of whatever length and arrangement, together with either alternating or continuous currents of electricity. In carrying out this invention, it is not intended to limit the same to the particular forms and arrangements herein shown and described, the same being but one way in which the end sought is attained. Either a chemical or a mechanical electric generator may of course be used. When an alternating current is employed then the preferred generator is that mechanical generator known as the Siemens.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In electric signals for railroads, the combination with a double set of electrical conductors located in parallel lines and overlapping each other in each set, and corresponding with each other, to form a double series of overlapping pairs of conductors to constitute overlapping blocks, and an audible signal, of generators producing alternating currents, carried by the trains, and electrical connections from each generator to each set of conductors, respectively, said signal being in the circuit so formed, whereby signals are sounded and a circuit is completed from one set to the other, when the generators of two trains are in electrical connection with the same block.

2. In electric signals for railroads, the combination with a pair of insulated electric conductors mounted at one side of the track, of another pair of said conductors at the other side, matching with the first pair and insulated therefrom, and so on successively, whereby a double series of overlapping blocks is formed, of generators producing an alternating current of electricity, carried by trains, and electrical connections and contacts between said generators and each double line of conductors, respectively, and an audible signal in each train, each in the circuit so formed.

3. In electric signals for railroads, the combination with a double set of overlapping electric conductors forming blocks, of an auxiliary line of conductors forming a loop extending out into a side track, and means to electrically connect and disconnect such side track loop with the conductors of the main line.

4. In electric signals for railroads, the combination with overlapping electric conductors forming a double line at each side of the track and constituting blocks; of a double loop of electric conductors extending out along a side track, the ends of the loops being adjacent to each set of conductors on the main line, respectively, and an electric switch consisting of a movable plate for each set of the main-line conductors, and adapted to be brought into and out of electric engagement with the ends of the side track loops by the operation of the switch in setting the switch-rails for the side track and main line, respectively.

5. The hereindescribed system of automatic signaling, the same consisting of electrical generators carried by some part of trains, electrical connections and contact pieces proceeding from the respective generators, audible signals also carried by the trains and in the generator circuits, and electric conductors adjacent to the railway bed with which said contact pieces are in electrical engagement, such line conductors consisting of a double set of lengths or sections, the lengths or sections of one set overlapping those of the same set, and the lengths or sections of each set terminating opposite to the corresponding lengths or sections of the other set, whereby electrical communication may be established between a plurality of trains occupying at the same time corresponding lengths of the opposite sets and overlapping adjacent lengths.

6. The hereindescribed system of automatic signaling, the same consisting of alternating-current electrical generators carried by some part of trains, electrical connections and contact pieces proceeding from such generators, audible signals also carried by the trains and in the generator circuits, and electrical conductors adjacent to the road bed and composed of lengths or sections arranged in pairs at either side, the lengths or sections of one pair overlapping those of another pair, and the lengths or sections of the same pairs terminating opposite to one another, whereby an audible signal will be sounded in a plurality of trains moving in the same direction and occupying the same section of the respective sets.

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

FRANK H. CLARKE.

Witnesses:
H. M. PLAISTED,
OLIVER H. MILLER.