No. 777,555. PATENTED DEC. 13, 1904.

H. W. SOUDER.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED JULY 28, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

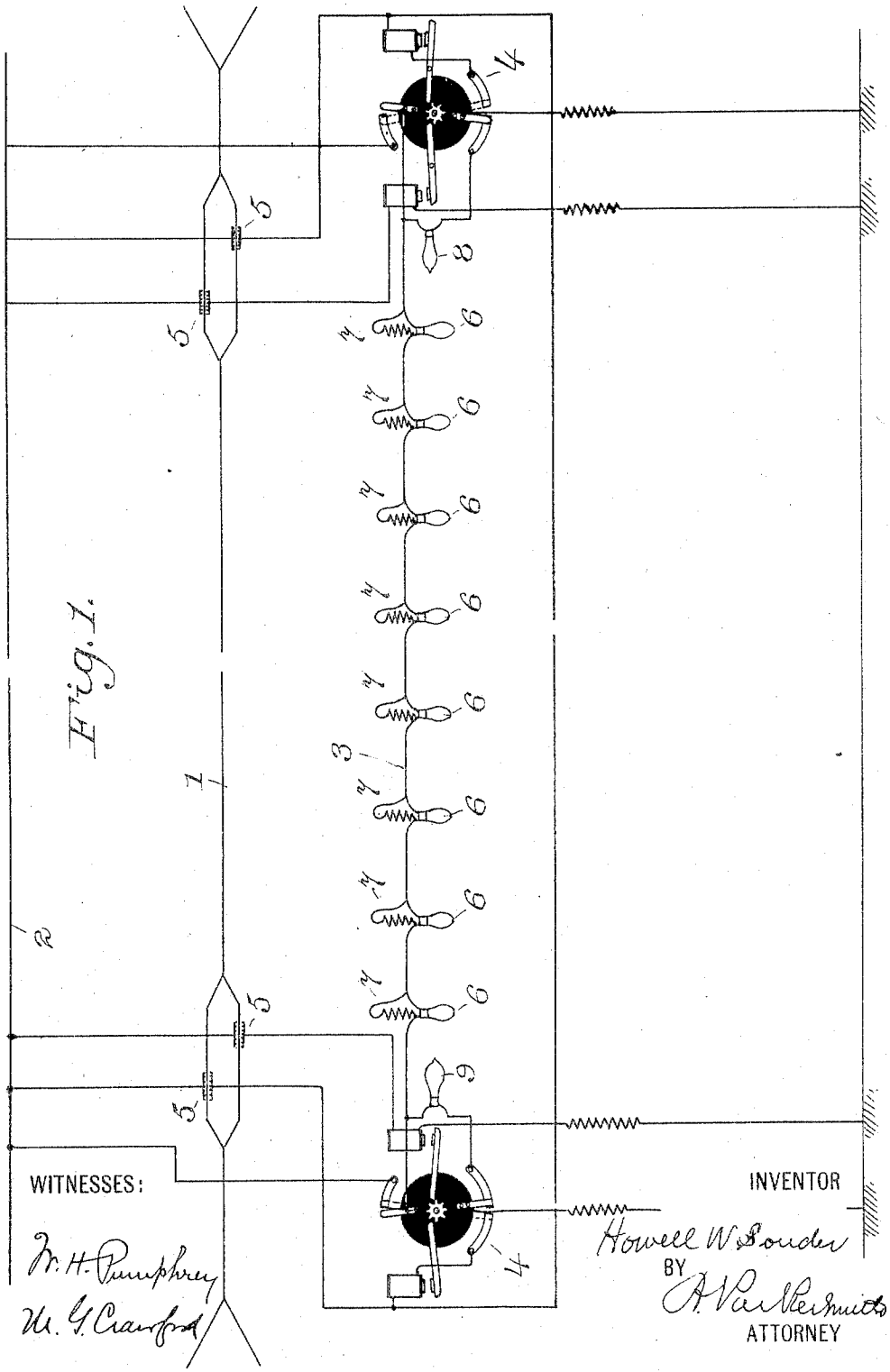


Fig. 1.

WITNESSES:

M. H. Pumphrey

M. G. Crawford

INVENTOR

Howell W. Souder

BY

A. Parker Smith

ATTORNEY

No. 777,555. PATENTED DEC. 13, 1904.

H. W. SOUDER.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED JULY 28, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

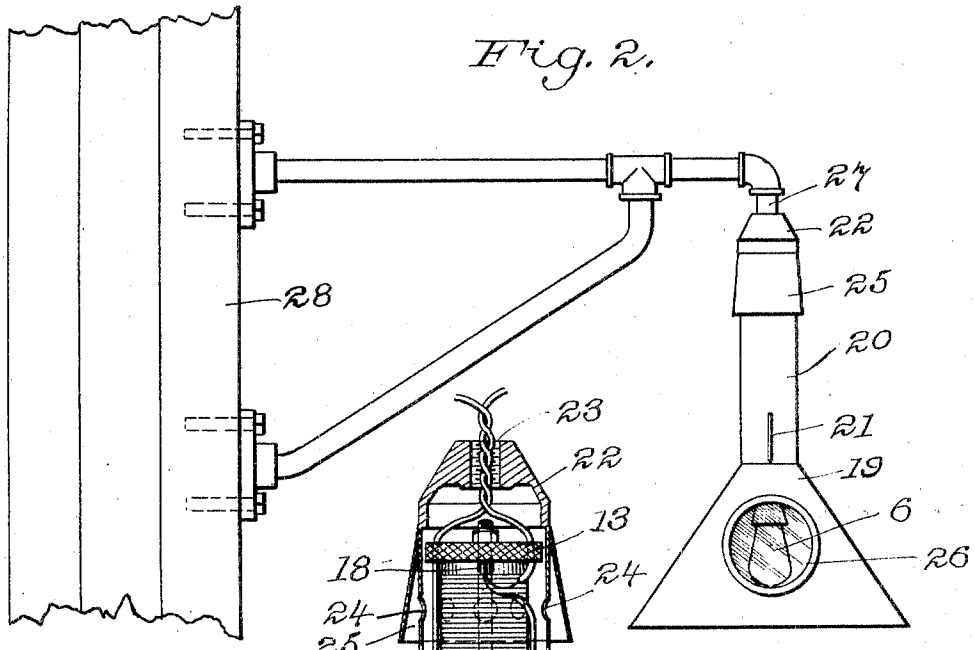
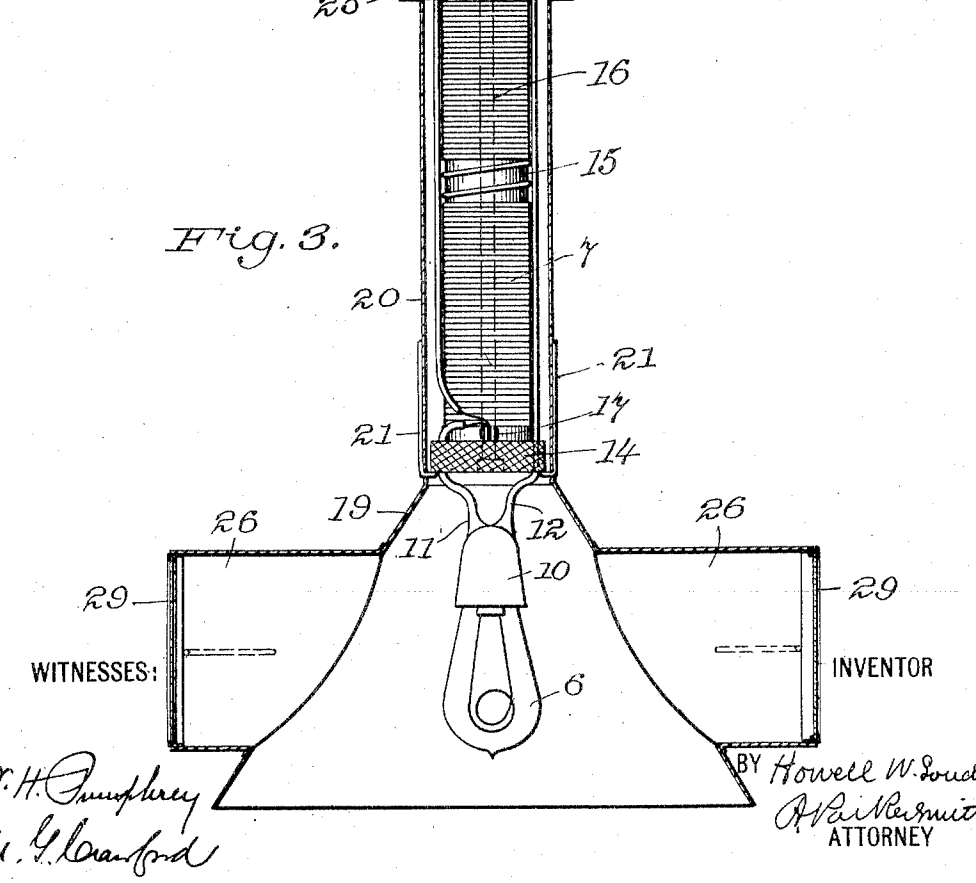


Fig. 3.



WITNESSES:

W. H. Dumphrey

M. G. Crawford

INVENTOR

BY Howell W. Souder

A. Vail Reesmith

ATTORNEY

No. 777,555. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

HOWELL W. SOUDER, OF TAMAQUA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO W. D. ZEHNER, OF LANSFORD, PENNSYLVANIA.

ELECTRIC SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 777,555, dated December 13, 1904.

Application filed July 28, 1903. Serial No. 167,317. (No model.)

To all whom it may concern:

Be it known that I, HOWELL W. SOUDER, a citizen of the United States of America, and a resident of Tamaqua, county of Schuylkill, State of Pennsylvania, have invented certain new and useful Improvements in Electric Signaling Systems, of which the following is a specification.

My invention relates in general to electric signaling systems; and more specifically it consists of certain improvements on the system for block-signaling for electric trolley-roads described in my pending application, Serial No. 128,280, filed October 22, 1902.

In the system generally described in my said prior application I have discovered that a certain specific relation between the signal-lamps and the resistances in shunt therewith as to their electrical resistance and of the total resistance of the lamps in circuit to the difference of potential between the terminals of the supply-circuit produces the best results. Broadly stated, the proportions which give the best results I find to be a ratio of about one to four between the resistance of each particular lamp and the dead resistance which is in shunt therewith and a potential in the supply-circuit for any set of lamps which exceeds the total voltage of the lamps in series by an amount approximately equal to the voltage of one of said lamps.

The preferred form of my apparatus is illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a general diagrammatic view of the lamps and connections for one block of the signaling system. Fig. 2 is an enlarged side elevation of one of the lamps and supporting-bracket therefor. Fig. 3 is a central section on a plane at right angles to the plane of Fig. 2, showing the lamp, the resistance, the spool, and the combination-casing for the two.

Throughout the drawings like reference-figures indicate like parts.

1 represents the trolley-wire; 2, the feed-wire; 3, the signal-wire extending along the block. 4 4 are the circuit-controlling devices, and 5 5 the contact-making devices which cooperate with the trolley-wheel. The said parts being the same as those fully described in my aforesaid pending application, no further description is believed to be necessary.

As shown in Fig. 1, I have arranged eight lamps 6 6, &c., along the signal-wire in series, and each is provided with a resistance 7 7, permanently connected in shunt with its companion lamp. I have also provided at the end of each block in the ground connection a lamp without a resistance, that marked 8 being at the right-hand end of the block and that marked 9 at the left-hand end. The lamps 6 may be given a distinctive color, as green, and the lamps 8 and 9 a different color, as red, all as described and operating in the manner set forth in my before-mentioned prior application. It will be seen that of these ten lamps nine are thrown into connection with the supply-circuit whenever a car enters a block at either end, and in the system represented the potential of the supply-circuit is assumed to be five hundred and fifty volts, and each of the lamps in such case will be of fifty-five volts or fifty-five ohms resistance. Each of the resistances 7 7 would then be so designed as to produce a dead resistance of two hundred and twenty ohms. The result produced by this proportioning of parts is that the leakage of current through the resistances 7 7 during the normal operation of the lamps is just about the amount which would be consumed by another lamp if ten fifty-five-volt lamps were connected in series without any resistance—that is to say, the difference of potential in that part of the circuit between the feed-wire connection at the left hand and the lamp 8, for instance, being four hundred and ninety-five volts and the total of the eight lamps marked 6 being four hundred and forty volts the leakage through the resistances 7 7 will just about consume the missing fifty-five volts and all the lamps be kept at their normal brilliancy during the normal operation of the

system. The same is true when the right-hand connection with the feed-wire is thrown into action. If one of the lamps 6 breaks, its companion resistance 7 will still permit sufficient current to pass through it to operate the remaining lamps at a reasonable degree of incandescence, so that the efficiency of the system is not impaired, although there is a sufficient decrease in the brilliancy of the remaining lamps to indicate that one of the lamps is broken and to call the attention of the repairman to the fact.

If the resistances 7 are reduced much below the proportion mentioned, so much current leaks through them that the brilliancy of the signal-lamps is considerably reduced and there is a waste of current. If, on the other hand, the resistances are increased much above the proportion mentioned, the breakage of one lamp will cut down the current-supply to the others so markedly that the efficiency of the system is materially affected. I have found after a large number of experiments that the proportion of one to four between the resistance of the lamp and the dead resistance and the omission of one lamp, so that the total voltage of the series is less than the potential of the supply-circuit by an amount equal to the voltage of one lamp, gives the best results.

The particular arrangement of lamp and resistance and casing therefor is fully shown in Fig. 3. The lamp 6 is preferably mounted in a waterproof socket 10, which is supported by the lead-wires 11 12. These pass through perforations in the end pieces 13 and 14 of the resistance-spool 15. The spool is made of some insulating material, as porcelain, and the end pieces of some insulating material, as hard fiber, and the parts are held together by the central longitudinal bolt 16. Upon this spool is wound the resistance-coil 7, of fine wire, of German silver or other material, the extremities being held by clamps 17 and 18 at either end of the spool. As shown, these clamps consist of metal bands encircling the spool and having their ends held together by small screws. The lead-wires 11 and 12 are led between the opposing faces of these clamps, as are also the ends of the resistance-coil 7, so that the effect is to bridge the coil across the terminals of the lamp 6. The lamp is thus suspended from the resistance-spool, the latter fitting up into the longitudinal extension 20 of the tapering lap-reflector 19 and held in this position by any suitable retaining means, such as the spring-clips 21 21, which are mounted on the exterior of the extension 20 and have their inwardly-bent lower ends projecting through openings in said extension and under the lower spool end piece 14. The upper end of the extension 20 is closed by a plug 22, having a central threaded opening 23, out through which the lead-wires pass. The supporting gas-pipe bracket 27 is screwed into this threaded opening and the lead-wires pass out through this gas-pipe. The gas-pipe bracket may be of course fastened to any suitable post 28. The upper end of the cylindrical extension 20 is provided with certain circumferential openings 24 24 for purposes of ventilation, and these are protected from the rain, &c., by a flaring cap 25. The parts 19, 20, 25, and 22 are preferably soldered together, although they may be fastened in any convenient manner. As shown, the lamp-reflector 19 has longitudinal extensions 26 26, in which are mounted colored-glass plates 29 29 for signaling purposes.

The method of operation of my invention is evident from the foregoing. When a car enters one end of the block, the lamps 6 will all be caused to glow, throwing a white light downward for the purpose of illuminating the track and a colored light horizontally for signaling purposes. The colored lamp 8 or 9 without a resistance located at the far end of the block will also be caused to glow.

In repairing or replacing the resistances the spool may be drawn down out of its casing by springing back the clips 21 21, when the clamps 17 and 18 can be gotten at and, if necessary, the spool taken apart and a new coil slipped on.

It is evident, of course, that various changes could be made in the details of the arrangement of the construction shown without departing from the spirit and scope of my invention. A different number of signal-lamps might be used so long as their total voltage was properly arranged with reference to the potential of the supply-circuit and apparatus might be employed having certain of the features of novelty above described without necessarily embodying others of such features.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In an electrical signaling system, the combination of a plurality of electric lamps connected in series, a like number of resistances of considerably higher resistance than the lamp, each lamp having a resistance permanently connected in shunt around it, and a current-supply circuit for said lamps, the potential of which exceeds the total voltage of the lamps in series by an amount approximately equal to the voltage of one of said lamps.

2. In an electrical signaling system, the combination of a plurality of electric lamps connected in series, a like number of resistances permanently connected one in shunt about each lamp, each resistance being of approximately four times the resistance of its companion lamp, and a current-supply circuit for said lamps, the potential of which exceeds the

total voltage of the lamps in series by an amount approximately equal to the voltage of one of said lamps.

3. In an electrical signaling system, the combination of a plurality of electric lamps connected in series, a like number of resistances permanently connected one in shunt about each lamp, each resistance being of approximately four times the resistance of its companion lamp.

Signed at Lansford this 21st day of July, 1903.

HOWELL W. SOUDER.

Witnesses:
C. A. FRITZ,
H. B. EDGAR.