(No Model.) 3 Sheets—Sheet 1.

H. F. PARSONS.

RAILWAY SWITCH AND SIGNAL.

No. 396,419. Patented Jan. 22, 1889.

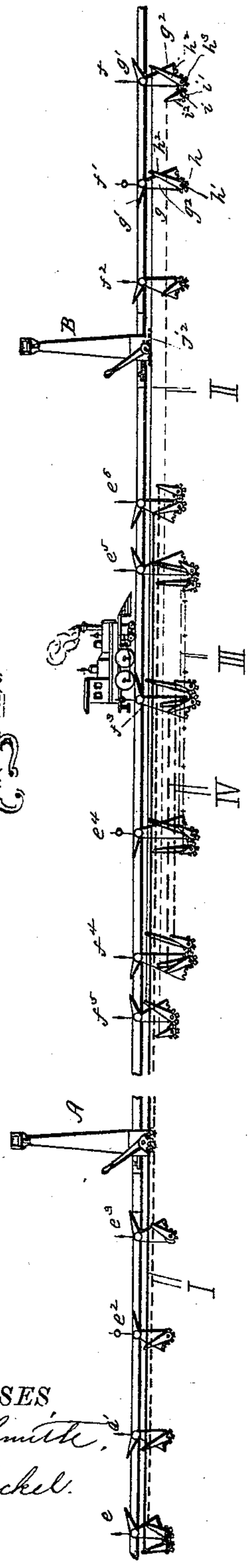

Fig. 1.

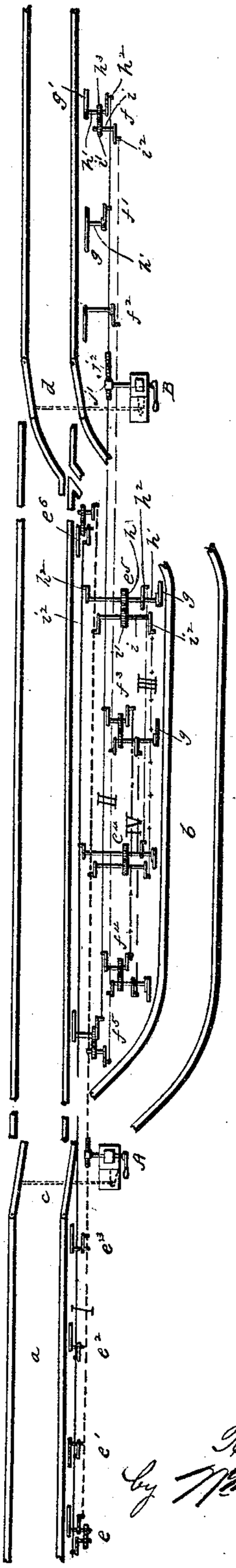

Fig. 2.

WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

H. F. PARSONS.

RAILWAY SWITCH AND SIGNAL.

No. 396,419. Patented Jan. 22, 1889.

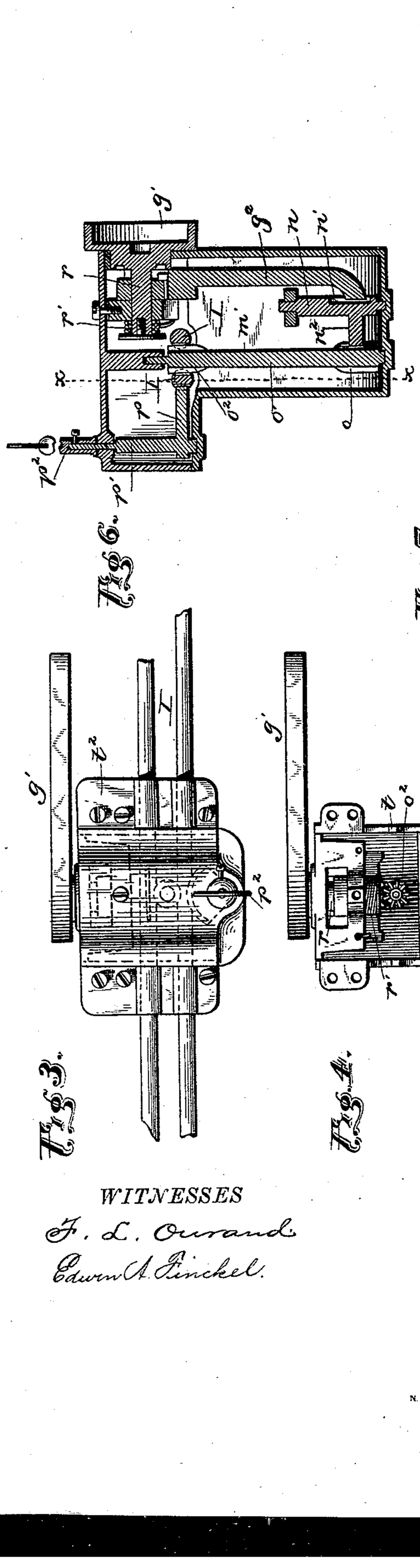

Fig. 6.

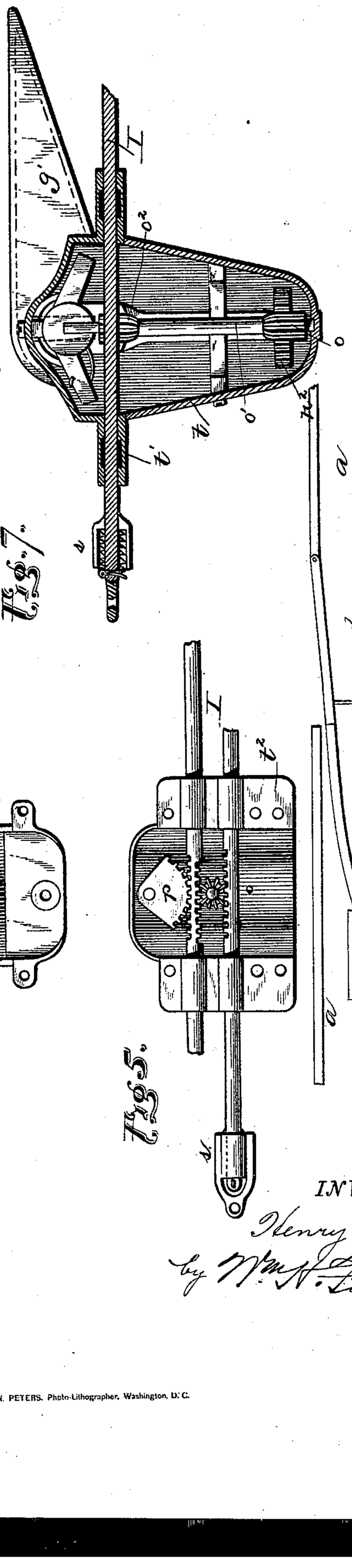

Fig. 7.

Fig. 3.

Fig. 4.

Fig. 5.

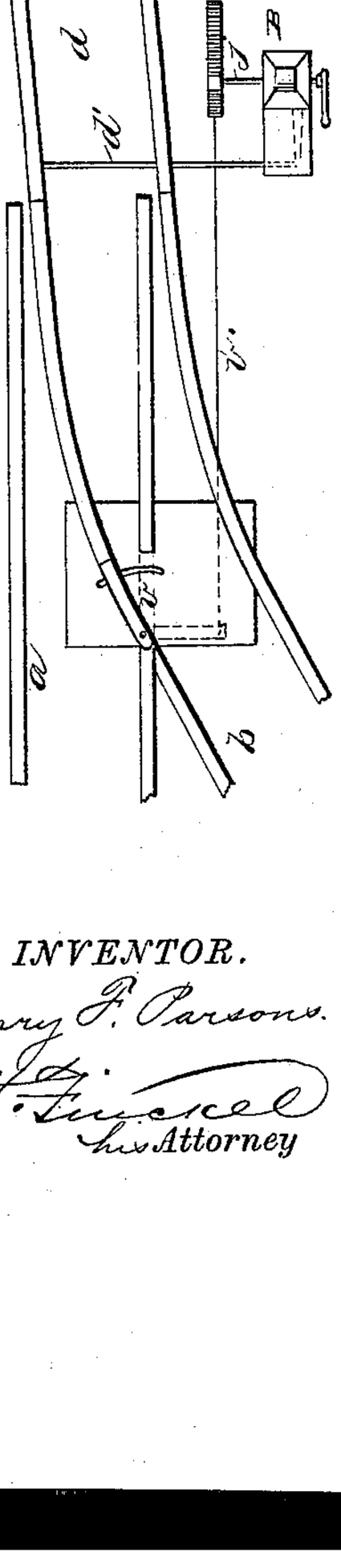

Fig. 2.

Fig. 1.

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(No Model.) 3 Sheets—Sheet 3.

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RAILWAY SWITCH AND SIGNAL.

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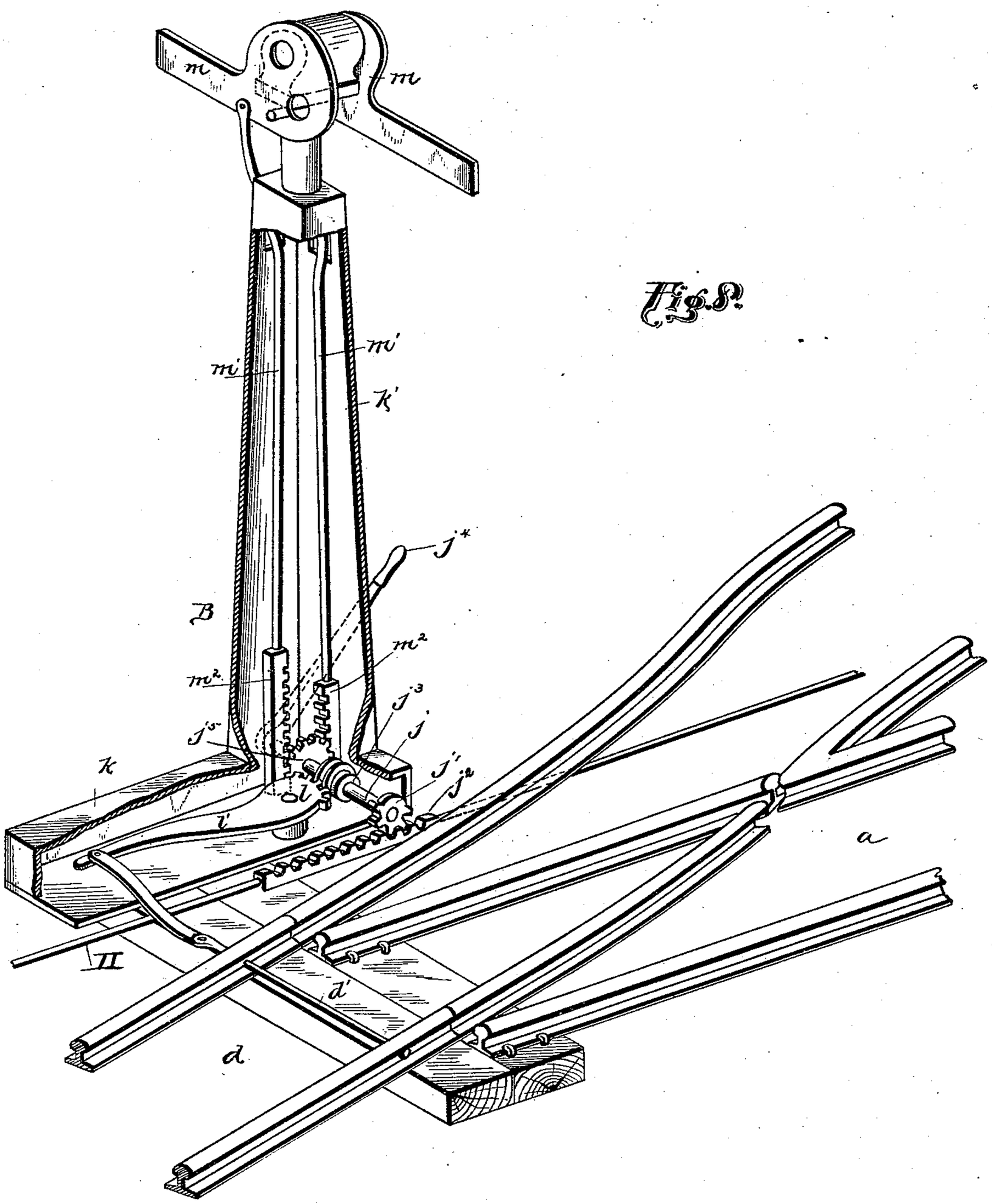
Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY F. PARSONS, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PARSONS BLOCK, SWITCH AND FROG COMPANY, OF SAME PLACE.

RAILWAY SWITCH AND SIGNAL.

SPECIFICATION forming part of Letters Patent No. 396,419, dated January 22, 1889.

Application filed April 23, 1888. Serial No. 271,508. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. PARSONS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Railway Switches and Signals, of which the following is a full, clear, and exact description.

The invention of railway-switch, and signals therefor, forming the subject of this case, is designed for use in connection with or as an adjunct to the inventions set forth in my concurrent specifications, entitled "automatic block signaling system and apparatus for railways," No. 271,510, and "continuous rail-frog for railways," No. 271,509; but the three inventions are equally capable of separate use, and also of use in conjunction with substitutes. Nevertheless, I deem a system composed of or including the essential features of the three inventions to possess very superior advantages over kindred appliances in common use.

The present invention relates to that class of switches and signals which are operated by or from the locomotive and automatically, and it is designed more especially as a specific expression of the principle set forth in the application of A. Ingram Parsons, deceased, (Henry F. Parsons, the present inventor, administrator,) for Letters Patent for railway-switch, filed March 11, 1886, Serial No. 194,876, and allowed January 9, 1888.

The invention here consists in the levers and their appurtenances, and combinations thereof, for operating the switches at both ends of a siding or the switches elsewhere in a railway-track.

For the sake of exactness I will describe my invention as applied to a siding, though it may be used wherever applicable, as is clear.

In the accompanying drawings illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a diagram showing the parts as if in side elevation, and Fig. 2 is also a diagram showing the parts as in plan, these two views being designed to be read without regard to proportions and without strict adherence to mere structural details. Fig. 3 is a plan view of the lever; Fig. 4, a plan view of the same with the cap removed. Fig. 5 is a plan view of the inside of cap and its attached parts seen from beneath. Fig. 6 is a vertical cross-section of the lever. Fig. 7 is a vertical longitudinal section taken in the plane of line x x of Fig. 6. Fig. 8 is a perspective view of one of the signal-towers and switch-stands, the casing being partly broken away; Fig. 9, a detail diagram of frog.

Following the principle of the system of the A. I. Parsons invention referred to, I employ series of oppositely-moving levers, which are actuated in alternation one by another, so that the use of one series will put another into position to be used, and the use of the latter will restore the first-named to position for use. In the diagrams I have shown four series of levers thus combined into two systems, and these systems are employed in connection with a single-track main line, a, with an interposed siding, b, having switches c and d at the two ends.

One series, which I will designate by the Roman numeral I, includes the levers e, e', e^2, e^3, e^4, e^5, and e^6, the switch c, and the signal-tower and switch-stand A—that is to say, this series includes a switch and switch-operating devices (and connected signals) extending from one approach of the siding to the other end of such siding to operate the switch at the said approach of the siding, and to indicate at the far end of the siding what is going on at the approach thereof.

Another series, designated by the Roman numeral II, includes the levers f, f', f^2, f^3, f^4, and f^5, the switch d, and the signal-tower and switch-stand B—that is to say, this series does and indicates from and at the far end of the siding such things as are done and indicated at the end operated by series I.

A third series, designated by the Roman numeral III, includes the levers e^4 and e^5 and connections for operating the switch c and the other members of series I from the siding rather than from the main track.

A fourth series, designated by the Roman numeral IV, includes the levers f^3 and f^4 and

connections for operating the switch *d* and the other members of series II from the siding rather than from the main track.

Each system is provided with two series of levers working in alternation or reversal. When one lever of a series is actuated, all the levers in that series follow it, while all the levers in the other series are operated reversely. Following the diagrams and for simplicity's sake, when all of the levers of one series are moved down, all the levers of the other series in that system are moved up, and hence in position to be operated to reverse the result of the down movement of the first series.

In the diagrams the locomotive has come on the siding from the left, and this has been accomplished by putting down lever e^2, which sets the switch *c* to the siding. The switch *c* may be reset for the main track by this locomotive by running down the lever e^5, or the switch *c* may be left set for the siding, as indicated in the diagrams. This leaves the levers *e* and e^3 free to be operated to set the switch for the main track by a train on the main track going in the same direction, and should the switch *d* be set for the siding it may be set for the main track by this last-named train advancing on lever f^5. This train, by backing on lever f', can reset the switch *d* for the siding, so as to let the locomotive on the siding go on the main track toward the right. Ordinarily this would not be done, but the locomotive would have to operate the switch by running down lever f^3. This example of one series of operations within the capabilities of my invention will suffice to illustrate them. It is enough to say that a train on a siding may operate the switches behind and before it independently of the train on the main line, and so also a train on the main line may operate the switches before and behind it quite independently of the train or locomotive on the siding.

As will appear presently, the switch-operating levers are connected with and operate signals so as to give visible evidence ahead and in rear of what conditions the switches are in.

Although there are two systems of levers, each having two series, yet there are practically but four operations performed—namely, the opening and closing of each switch independently; but these operations are permutable to the extent already mentioned, so as to give a train on a siding entire control of the switches and signals for its own purposes, and at the same time not interfere with but rather promote the same facilities for a train on the main track. Moreover, these four series of levers are operable by hand from the switch-stands A and B, as is obvious.

Various connecting mediums may be employed for gearing the series of each system and for the combinations of the systems. I will describe but two, which embody the principle of my invention.

Referring to the diagrams, each lever is composed of a sort of jointed bell-crank, *g*, one end, g', of which extends out alongside the rail of the track, and is hereinafter referred to as the exposed end, and the other end, g^2, extends down and is provided with a toothed segment which meshes with a toothed segment or wheel, *h*, on a horizontal shaft, h', which shaft has an upright arm, h^2, fast to it. By the vibration of the bell-crank the shaft h' is rocked, and its arm h^2 given a back-and-forth movement. This is the form and construction of all intermediate levers. The end levers of each series have the same construction, and also a second rock-shaft, *i*, arranged alongside of and parallel with shaft h', which is provided with a toothed segment or wheel, i', geared to a similar segment or wheel, h^3, on the shaft h', and derives motion from it. The shaft *i* also is provided with an upright arm, i^2.

The levers of the two systems are connected in series by rods joined to the arms h^2 and i^2, and I have endeavored to make plain the two rods belonging to each series by using in series I a heavy solid line and a heavy broken line, in series II a light or fine solid line and a similar broken line, in series III a broken line of long and short dashes and a broken line of long dashes and interposed short crossed dashes, and in series IV a broken line of long dashes and a broken line of long dashes and intervening dots. I have designated these rods by their series numerals.

In the diagrams I have passed the lines which connect with arms h^2 and i^2 through the ends of said arms. The arms h^2 and i^2 obviously move in opposite directions under the action of the bell-crank.

The end levers of each series—as, for example, the levers *e* and e^6 or the levers *f* and f^5—each have two shafts geared together and provided with arms moving in opposite directions. The arms of the levers that move in one direction are connected by one of the rods of the series to which those levers belong, and the arms that move in the other direction are connected by the other rod of the same series. In other words, the end levers of each series are connected to and by both rods of that series.

It is proper to say that the depending arm of the bell-crank is not rigid therewith; but, as will presently appear, the arms g' and g^2 are loosely connected, but the arm g' is normally held in the position of use shown by a spring and connected with the arm g^2 by a clutch, so that should the arm g' be struck in the wrong direction it would simply turn over, and then when released would return to its normal position without affecting the arm g^2.

The lever e^4, as already stated, connects series I and III, and this is done by extending

the shafts h' and i and providing each with two arms. The same construction is used in the case of lever e^5, which also connects these two series. The same construction is also employed in the levers f^3 and f^4, which connect series II and IV. Each of the levers is provided with a visual signal geared to move with it to indicate its position and condition. One way of so gearing the signal will be described presently. One of the rods of series I is geared to the switch-stand A, and one of the rods of series II is geared to switch-stand B.

Each combined switch-stand and signal-tower is composed of a horizontal shaft, j, arranged in bearings in a suitable water-tight box, k. This shaft is provided with a gear-wheel or segment, j', which engages a toothed rack, j^2, on the rod II, and hence the shaft receives a rocking motion by the reciprocation of this rod. A worm, j^3, is provided on this shaft j, which meshes with a segmental worm-gear, l, on a horizontal lever, l'. Obviously the rocking of the shaft imparts a vibratory movement to the lever, and this lever being connected to the switch-bar d', Fig. 8, moves the switch to set the siding or main track, as desired. The shaft j is further provided with a switch-lever, j^4, by which it may be manually operated when desired.

The usual switch signals or targets, m, are arranged upon a tower, k', rising from the casing k, and they are operated by rods m', terminating in toothed rack-bars m^2 m^2, which are geared to a pinion, j^5, on the shaft j, so that the signals are changed simultaneously with and automatically by the operation of the switch.

In the form of lever shown in Figs. 3 to 7 of the drawings the horizontal shaft is replaced by a vertical shaft, n, having cogs n', which are engaged by a toothed segment on arm g^2. A toothed segment, n^2, extends horizontally from the shaft n and engages a pinion, o, on a second vertical shaft, o', and this last-named shaft has a second pinion, o^2, which engages toothed racks on the lever-connecting rods, (here designated I for convenience,) as though belonging to that system of levers. One of the rods I is provided with a second toothed rack, which engages a toothed segment, p, on a shaft, p', which carries the signal p^2. Thus the operation of each individual lever positively actuates its signal as well as all those in its system. The arm g' is provided with a shaft, r, one end of which receives a spring, r', which is connected at one end to some fixed support and at the other to the lever-arm g', which it normally pulls down. The arm g' may be reversed by changing the direction of resistance of the spring, so that any lever may be arranged in any of the pivotal positions shown in the diagrams. The arm g^2 of the form of lever shown in Figs. 3 to 7 has a loose connection with the arm g', as already stated.

The rods for connecting the levers are united by couplings s, which expand and contract under the temperature of the atmosphere to which they are exposed, so as always to keep taut the rods. Each of these couplings may be composed of a yoke having an internal yielding agent, such as a spring applied to one section of rod and hooked to the other. Any other form of compensating connection may be used. The casing t of the levers is made water and frost tight, so as to insure the working condition of the levers. To protect the bearings t' for the rods in this casing, they are packed with asbestus or similar refractory or durable non-absorbent. Asbestus is particularly useful, inasmuch as it is a natural lubricant and unaffected by the weather. The bearings for the rods are made in a cap, t^2, for the casing, (see Fig. 5,) which is removably bolted to the body of the casing. Instead of making the shaft n with cogs and a toothed segment, it might be provided with a toothed wheel engaging both the arm g^2 and the pinion o, and in this case the shaft n would be arranged equidistant between them.

When the levers shown in Figs. 3 to 7 are used in the locations and for the purposes of levers f^4, e^4, f^3, and e^5 of Figs. 1 and 2, their rods might be connected to work in system and series, as before, by suitable rigid cross-links, instead of the rock-shafts shown in said Figs. 1 and 2.

The rods connecting the systems of levers in practice will be cased in.

Particular attention is directed to the fact that there are no parts of my apparatus exposed to the weather, excepting the targets, signals, and exposed levers; also, to the fact that the levers of Figs. 3 to 7 are of one kind only and interchangeable, so that there are no special levers for any particular work or location; but any one may be substituted for the other, all being alike. Now, it will be observed that by the gearing employed to connect the switches with their stands and the levers with these switch-stands and signals, the parts are automatically locked against accidental displacement. The rods hold the levers positively in the positions they may be given.

The frog v, covered by the application, Serial No. 271,509, referred to, may be introduced into this system and coupled with and operated from one of the levers, as therein indicated; or it may be provided with a special rod, v', extending to one or both of the switch-stands and geared to a special wheel on it or them to be operated by its or their operation, substantially as indicated in Fig. 9.

Among the advantages of this invention I mention the fact that it overcomes the liability of a train getting stuck at the meeting of the siding and main track. In the apparatus commonly in use, it has been usual to send a man ahead to set the switch, and for this purpose, in order not to consume too much time,

the train is stopped near the switch; but in this practice the train has to be started from a dead-stop and at so short a distance that, particularly if heavy, it cannot get sufficient headway to make the curve, thereby sticking and oftentimes being unable to move in either direction. In my apparatus, as is obvious, the train need not be stopped at all to set the switch, and hence it can make the siding under full headway, the switch having been operated automatically in advance from the moving train on the main track, if necessary, a quarter or half of a mile distant.

What I claim is—

1. A main track, a siding, and switches at each end of the siding, combined with switch-operating mechanism, comprising two systems, each having two series of permutable reversing-levers and connecting mediums for coupling in pairs the series of each system, substantially as described.

2. In a railway switch and signal mechanism, the rails and bar of the switch, combined with a suitable number of the reversing so-called "levers" of this specification, each lever comprising the exposed arm adapted to be operated by or from a passing train or locomotive, a toothed arm connected to said exposed arm, a rotary shaft operated from said toothed arm, a rotary signal, rods connecting the several levers together and to the switch, and gearing interposed in each lever between its rotary shaft, rods, and signal, substantially as described.

3. The main track, an interposed siding, switches at each end of said siding, and switch-stands for said switches, combined with the levers e, e', e^2, e^3, e^4, e^5, and e^6 and the levers f, f', f^2, f^3, f^4, and f^5, connected in two systems of two series each, which systems are operable from the main track and also from the siding to set the switches to the siding and to the main track, substantially as described.

4. A combined switch-stand and signal-tower comprising a suitable casing, a shaft and means to rock it, a gear-wheel on said shaft, semaphores or targets, and toothed rack-bars meshing with said wheel and connected with the said targets, in combination with the switch and switch-bar, substantially as described.

5. A combined switch-stand and signal-tower comprising a suitable casing, a rotary or rocking worm-shaft, a horizontal lever geared to said worm-shaft and coupled to the switch-bar, a pinion, semaphores or targets, and toothed rack-bars geared to said pinion and engaging the said targets, substantially as described.

6. The so-called "lever" of this specification, comprising an exposed arm adapted to be operated by or from a passing train or locomotive, a toothed arm connected to said exposed arm, a rotary shaft operated from said toothed arm, and gearing which is interposed between the parts operated by said lever and said rotary shaft, substantially as described.

7. In a railway-switch, the combination of a pair of oppositely-movable rods with a series of "levers," herein so called, each consisting of an exposed arm to be operated by a passing locomotive or train, a toothed arm connected to said exposed arm, a rotary shaft geared with said toothed arm, and a rotary shaft which in turn is geared to the rods, substantially as described.

8. The so-called "levers" of this specification, combined with the water-tight casing and a separable cap therefor containing in packed bearings the rods for connecting the levers in series, substantially as described.

9. A combined switch and signals therefor, composed of a main track, an interposed siding, switches at each end of said siding, and switch-stands, and signals for said switches, combined with the levers e, e', e^2, e^3, e^4, e^5, and e^6 and the levers f, f', f^2, f^3, f^4, and f^5, each provided with a co-operating signal and connected in two systems of two series each, which systems are operable from the main track and also from the siding to set the switches and signals, substantially as described.

10. The combination, with automatic switch-operating mechanism, comprising a suitable number of the so-called "levers" of this specification and the combined switch-stand and signal-tower, substantially such as described, of the frog v and connections between them, substantially as described.

11. The so-called "lever" of this specification, comprising an exposed arm adapted to be operated by or from a passing train or locomotive, a toothed arm connected to said exposed arm, and a rotary shaft operated from said toothed arm, combined with a signal and rods for connecting a series of such levers and gearing interposed between the said rotary shaft and the rods and signal, substantially as described.

In testimony whereof I have hereunto set my hand this 21st day of April, A. D. 1888.

HENRY F. PARSONS.

Witnesses:
JAS. MCG. SMITH,
ROBT. L. REDFIELD.

Correction in Letters Patent No. 396,419.

It is hereby certified that in Letters Patent No. 396,419, granted January 22, 1889 upon the application of Henry F. Parsons, of New York, N. Y., for an improvement in "Railway Switches and Signals," an error appears in the printed specification requiring correction as follows: In line 47, page 3, the parenthesis enclosing the clause "here designated I for convenience," should be stricken out, and that the said Letters Patent should be read with this correction therein to make the same conform to the record of the case in Patent Office.

Signed, countersigned, and sealed this 5th day of February, A. D. 1889.

[SEAL.]

D. L. HAWKINS,
Assistant Secretary of the Interior.

Countersigned:

BENTON J. HALL,
Commissioner of Patents.