(No Model.) 4 Sheets—Sheet 1.

H. JOHNSON.

RAILWAY SIGNAL.

No. 294,880. Patented Mar. 11, 1884.

Fig 2.

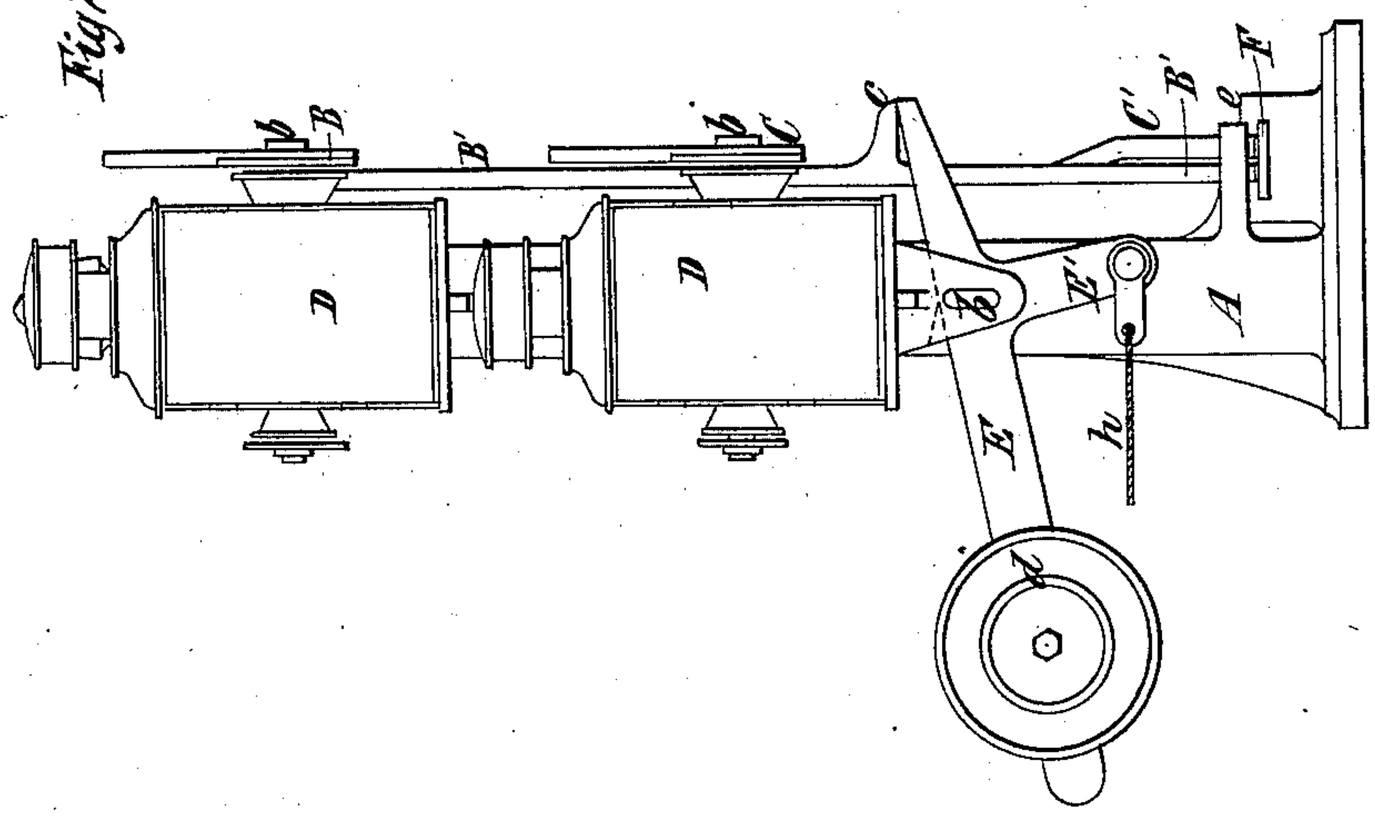


Fig 1

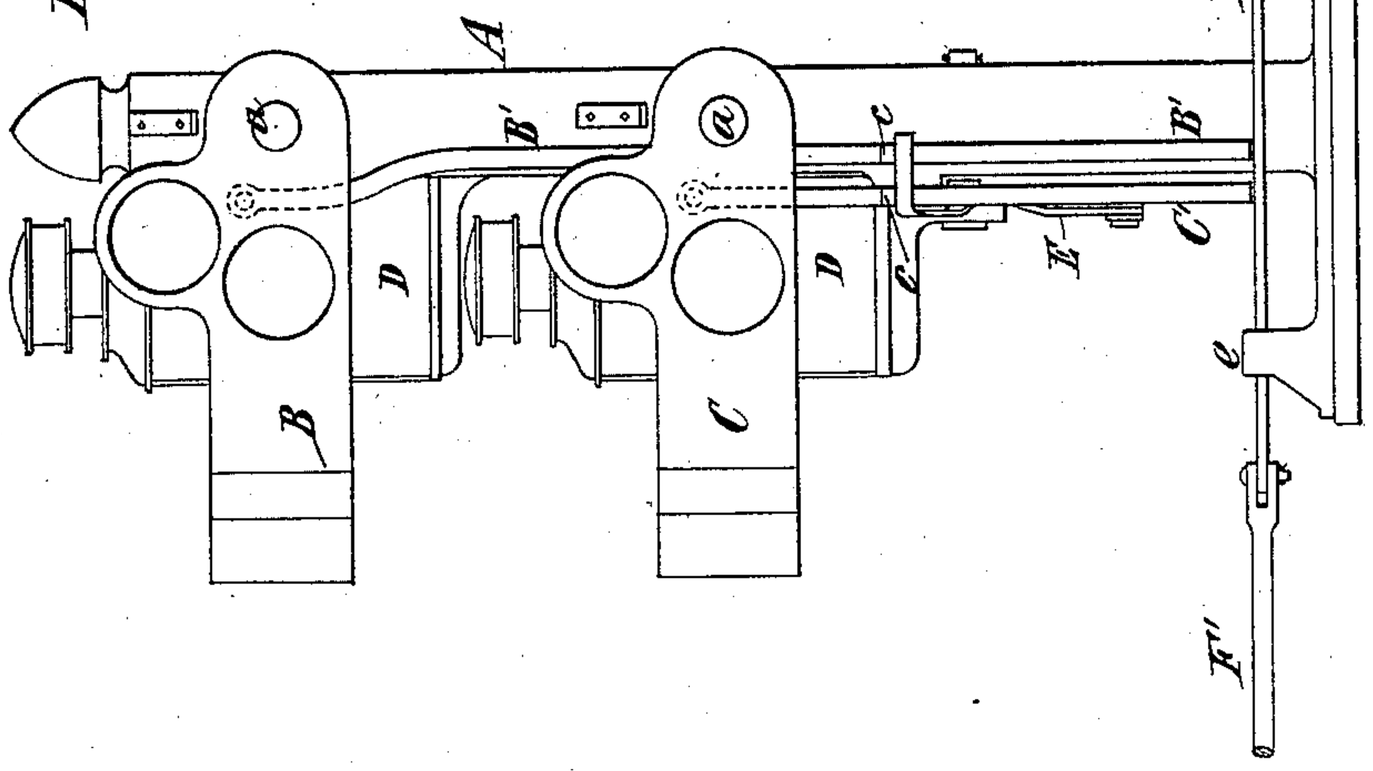
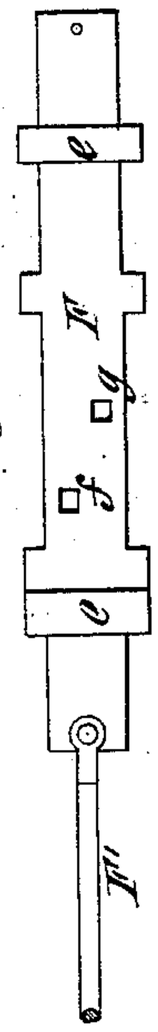


Fig 3.



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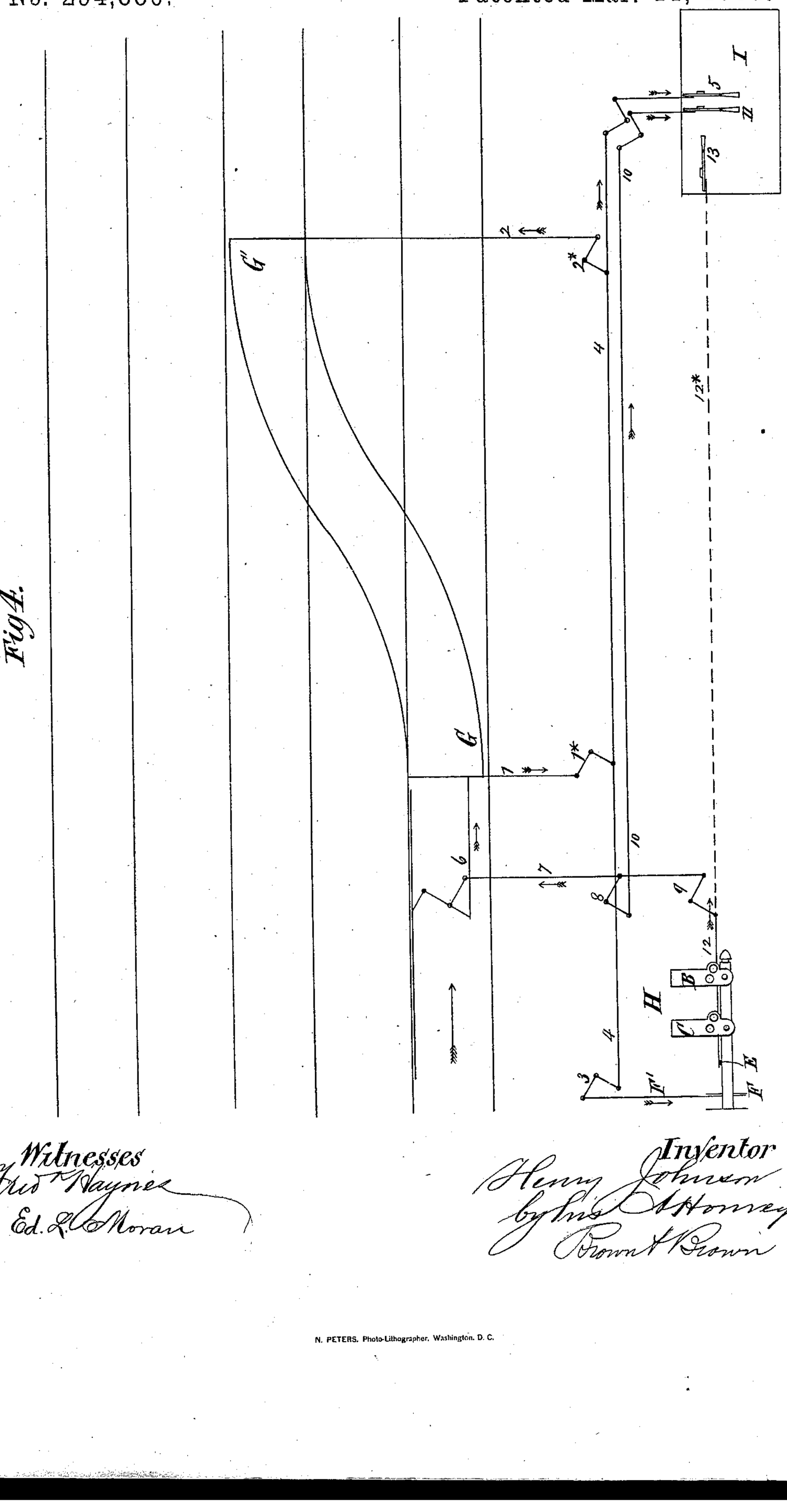

Fig 4.

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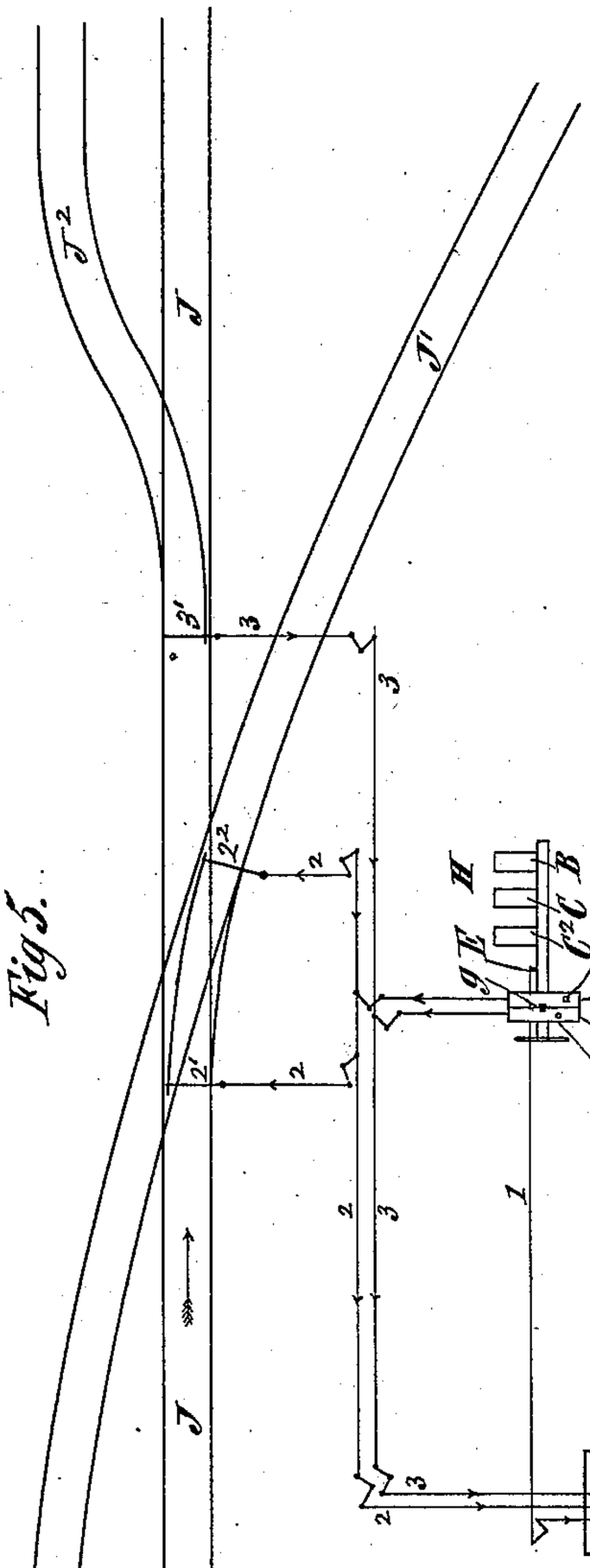

Fig 5.

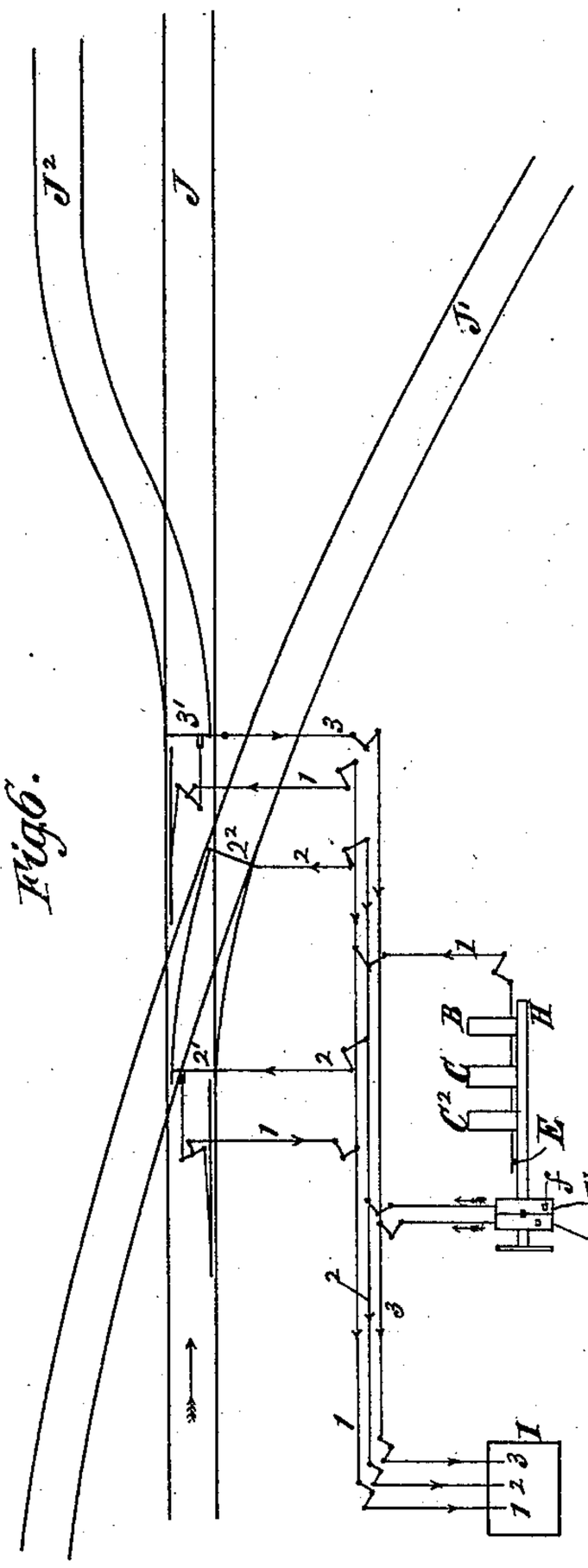

Fig 6.

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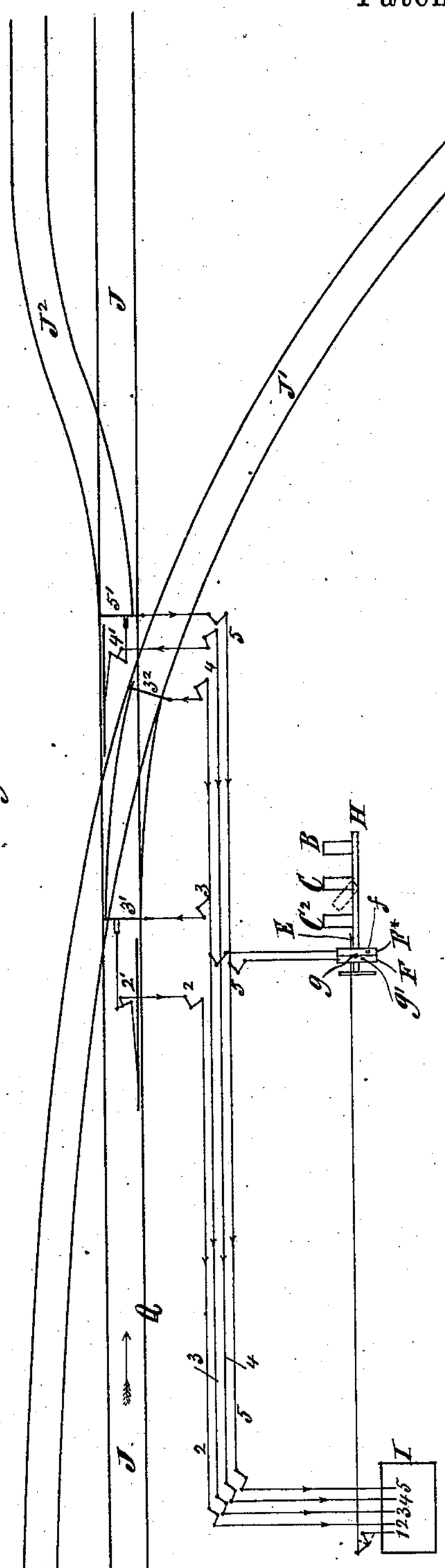

Fig. 1.

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UNITED STATES PATENT OFFICE.

HENRY JOHNSON, OF ECCLES, COUNTY OF LANCASTER, ENGLAND.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 294,880, dated March 11, 1884.

Application filed August 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY JOHNSON, of Eccles, in the county of Lancaster, England, have invented a new and useful Improvement in Railway-Signals, of which the following is a specification.

My invention relates to signal apparatus in which the movements of one, two, or more semaphore-arms or other visual signals are controlled by the position of the switch or switches to which such signal or signals have reference.

The invention is applicable to a single switch and its signaling-instrument, or to a number of switches and their several signaling-instruments, all connected so as to form an interlocking system of switches and signals.

The invention consists in the combination, with a semaphore-arm or other visual signal and a switch or switches, of a rod depending from said arm or signal, and through which it is held in the "danger" position, a stop-plate arranged below the rod and preventing the downward movement of the same when the switch or switches is or are in the position of "danger" and connections between said switch or switches and plate, so that upon the movement of the switch or switches to an operative position the plate will be withdrawn from beneath the rod, thus enabling the rod and signal to descend and place the signal in the "safety" position. After the signal has been lowered to a "safety" position, it blocks the stop-plate, and hence the switch cannot be again moved until the rod has been raised and has thereby returned the signal to a "danger" position.

The invention also consists in the combination, with two or more semaphore-arms or other visual signals and a switch or switches controlling two or more tracks, of rods depending from the signals, and through which they are held in "danger" position, devices whereby the signals and rods are held in an elevated or "danger" position, one or more stop-plates arranged below said rods, connected with the switch or switches, so as to be moved therewith, and so constructed that in whichever position the switch or switches may be moved said plate or plates will be withdrawn from below one or other of said rods, and means for releasing the signals and rods from the devices which hold them elevated, whereupon one rod and signal will fall to a "safety" position, while the other rod or rods will be arrested by striking said stop-plate.

In the accompanying drawings, Figures 1 and 2 are respectively a face and side view of a signal-instrument embodying my improvement. Fig. 3 is a plan of the stop-plate and its bearings. Fig. 4 is a diagram illustrating a portion of a track and an interlocking system of switches connected with a signaling-instrument; and Figs. 5, 6, and 7 are other diagrams illustrating the invention.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to Figs. 1, 2, and 3, A designates a post; and B C designate, respectively, upper and lower visual signals, here shown as consisting of semaphore-arms, pivoted at *a*, and from which depend rods B′ C′, through which the signals are held in elevated or "danger" positions, as shown in Fig. 1. Behind the signal-arms are arranged lanterns D, which are supported by the post A.

In connection with the signals B C and their depending rods B′ C′, I employ means for holding them in the "danger" position shown. Either a spring or weight might be employed for the purpose. As here shown, I employ a lever, E, fulcrumed at *b*, and one end of which engages with lugs or projections *c* on the rods, while a weight, *d*, is applied to its other end.

Below the rods B′ C′ is arranged a stop-plate, F, adapted to slide in bearings *e*, and adapted to be connected by a rod, F′, with a switch; hence the plate will be connected as well with the lever or other means employed to operate the switch. The lower ends of the rods B′ C′ are out of line, and in the plate F are holes or apertures *f g*, through which the rod B′ or C′ may descend, according to which aperture is opposite a rod. When the switch is moved in one direction—say to open the main line, which may correspond with the upper signal, B—the aperture *f* is brought opposite the end of the rod B′, and the latter may then be lowered to set the said signal at "safety." When the switch is moved to open the "cross-over," the aperture *g* will be opposite the rod C′, and the latter may therefore be moved down through the aperture to set the lower signal at

"safety." When one signal is set at "safety," the other or others are all set at "danger," because the imperforate parts of the stop-plate F are opposite the rod or rods of said other signal or signals.

In lieu of having the apertures *f g*, the plate F may be otherwise constructed, so that when the switch is moved it will not prevent the downward movement of one of the rods B′ or C′, and in this sense it is necessary to withdraw the plate from below the rod to enable the latter to be moved downward.

In lieu of employing a sliding stop-plate, I may use a pivoted plate to which an oscillating motion is given.

Upon the lever E is a downwardly-projecting arm, E′, to which a wire, rod, or other connection, *h*, is attached. By a pull upon the connection *h*, the lever E is drawn down so that the rods B′ C′ may descend; but if the connection consists of a pipe or rod of sufficient stiffness to transmit a push or thrust the weight on the lever E would not be absolutely necessary; but such weight is usually employed.

Referring now to the diagram Fig. 4, G G′ designate two switches to be controlled, and H designates the signal-instrument for indicating their position, here shown as laid horizontally to enable it to be clearly shown. The two switch-rods 1 2 are connected with bell-crank levers 1* 2*, and the rod F′, which moves the stop-plate F of the signal-instrument, is connected with a third bell-crank lever, 3. The bell-crank levers 1*, 2*, and 3 are all connected to and actuated by a rod, 4, which is operated by a lever, 5, in the switch-cabin I.

6 designates a facing-point lock mechanism at the switch G, operated by a rod, 7, which is connected with bell-crank levers 8 and 9; and the bell-crank lever 8 is connected by a rod, 10, with a lever, 11, in the switch-cabin, while the bell-crank lever 9 is connected by a rod, 12, with the weighted lever E of the signaling-instrument; hence it will be seen that the lever 5 effects the operation of the switches and the stop-plate of the signal-instrument, while the lever 11 effects the operation of the facing-point lock and the lever E of the signal-instrument. I may employ the lever 11, however, to shift the facing-point lock only, and in such case the bell-crank lever 9 would be dispensed with, and the rod 12 would be extended, as indicated by the dotted line 12*, to and operated by a third lever, 13, in the switch-cabin I. When the levers 5 and 11 are in their normal position, the switches stand for the straight tracks, the facing-point lock is out, and the signals B C are set at "danger," the upper of the two signals, B, being for trains proceeding on the straight track, and the lower signal, C, being for trains proceeding on the crossing. To give the signal for a train to take the straight track, the lever 11 is pulled, which puts in the bolt of the switch-lock and lifts the balanced lever E of the signal-instrument. The signal-arm B will then fall to a "safety" position, the rod B′ passing through the aperture *f* in the stop-plate F. If it is desired to give the signal for taking the crossing, the lever 11 is moved back to its normal position, and the lever 5 is operated to shift the switches and move the stop-plate F of the signal-instrument. The lever 11 being again operated, the balanced lever E will be raised and the signal C will fall to a "safety" position, the rod C′ falling through the aperture *g* in the stop-plate. To return the switches to their former position, the lever 11 and then the lever 5 are operated reversely.

Figs. 5, 6, and 7 illustrate plans of a junction, where a main track, J, diverges to two other tracks, J′ J², and in which three switches are employed, and one signaling apparatus to signal all three tracks. These figures illustrate three different methods of applying and using my signal, the method adopted at any given point being decided by local circumstances and the variety of traffic.

Referring first to Fig. 5, H designates the signaling apparatus, which has three signals, B C C², and two stop-plates, F F*. The lever and connections 1 in the switch-cabin I will work the balance-lever E of the signal apparatus and control the three signals. The lever and connections 2 will work the two switches 2′ and 2² and the stop-plate F, and the lever and connections 3 will work the switch 3′ and the stop-plate F*. To give the signal B for trains to pass on the track J′, the lever 2 must be pulled over to set the switches 2′ 2², so that they may be right for the track J′, and this movement will also move the stop-plate F so that the hole *f* will be directly below the rod of signal B. If the lever 1 is now pulled, the balance-lever E will be reversed, and the rod attached to the signal B will be released, and, falling through the hole *f*, will allow the signal B to drop and show an "all-clear" signal for the track J′. The switches 2′ 2² cannot now be reversed, because the rod of signal B, being in the hole *f*, locks the stop-plate F. To give the signal C for trains to proceed on the track J, the levers 2 3 must be in their normal position, which will leave the switches 2′ 3′ set for the straight track J and will leave the stop-plates F F* in such a position that the hole *g* will be immediately below the rod of the signal C. If lever 1 is now pulled, the balance-lever E will be reversed, the rod of the signal C will be released and will fall through the hole or slot *g*, thereby lowering the signal C and showing an "all-clear" signal for the track J. The switches 2′ 3′ cannot now be moved, as both plates F F* are held in position by the rod of the signal C engaging with the hole or slot *g*. In a similar manner, to give the signal C², the switch 2′ must be in its normal position and the switch 3′ reversed. Then when lever 1 is pulled, reversing balance-lever E, signal C² will fall to the "all-clear" position, the plate F* being in

position to allow the rod of signal C^2 to pass through the hole or slot g'.

Where it is desired to have facing-point locks for each switch, as in Fig. 6, and it is not considered necessary to have a lever solely for the purpose of releasing the signals, and one lever is required for each facing-point lock, four levers would be required to work the combination. In Fig. 6 only three levers are used. In this case, also, the signaling apparatus H has three signals, B C C^2, corresponding to the tracks J′ J J^2, and two stop-plates, F F*. The lever and connections 1 will work the two facing-point locks and the balance-lever E of the signaling apparatus. The lever and connections 2 will work switches 2′ 2^2 and stop-plate F*, and lever and connections 3 will work the switch 3′ and stop-plate F.

To give the signal for a train to proceed by track J′, the lever 2 is pulled to set switches 2′ 2^2 in proper position for the track J′ and to move the plate F*, so that the opening *f* will be opposite the rod of the signal B. Then pull the lever 1, which will reverse the position of the facing-point lock, securely locking switches 2′ 2^2, and by the same movement reversing the balance-lever E, and thus releasing the rod of the signal B and allowing it to fall through the slot or hole *f* and bring the signal-arm B to the "all-clear" position. The switches 2′ 2^2 cannot now be moved, as they are held in position not only by the facing-point locks, but by the rod of the signal B, which engages with the hole or slot *f*, and so locks the stop-plate F* against movement. To give signals C or C^2, similar movements must be gone through with, as before described, lever 1 being always the last to be pulled, and the signals being all held to the "danger" position until each and every switch is in proper position for the signal to be given.

The signal-instrument H (shown in Fig. 7) has three signals, B C C^2, corresponding to the tracks J′ J J^2, and two stop-plates, F F*, and five levers are employed in the switch-cabin I. The switches 3′ 3^2 5′ may or may not be interlocked; but the following description applies to an interlocking apparatus. The lever and connections 1 operate the balance-lever E of the apparatus. The lever and connections 2 work the switch-lock 2′. The lever and connections 3 work the two switches 3′ 3^2 and the stop-plate F*. The lever and connections 4 work the switch-lock 4′, and the lever and connections 5 work the switch 5′ and the stop-plate F.

The normal positions of the switches, locks, and signals are as follows: Switches are set for the main or straight track J with the facing-point locks out and the signals at "danger." Supposing, for example, that a train is on the main track J at the point marked Q and going in the direction indicated by the arrow, and that it is desired to give a signal for the train to proceed on the track J′, the lever 3 will first be pulled over to set the two switches 3′ and 3^2 for the track J′, and at the same time moving the plate F*, so that the hole or slot *f* therein will be below the rod of the signal B. The facing-point-lock lever 2 is then pulled over, which will lock the switches in position, and, finally, the lever 1 is pulled to reverse the balance-lever E, allowing the rod of the signal B to descend through the hole or slot *f*, and so give the "all-clear" signal for the track J′. Before any of the signals can be given, the lever 1 must first be reversed to put it into its normal position, thus putting signal-arm B to "danger." Then the levers 2 and 3 must be reversed in the order named. To give the signal for a train to proceed on the straight track J, the levers 2 and 4, which work the locks 2′ 4′, are first pulled to lock the switches 3′ and 5′ in position, which in this case is normal. The lever 1 is then pulled, which reverses the balance-lever E and permits the rod of the signal C to fall, as it is directly over the slot or hole *g* in the plates F F*, and thus brings the signal C to a "danger" position. To lower signal C^2, the levers, or such of them as conflict—in this case 1 and 4—must be first returned to their normal position. The lever 5 is pulled to set the switch 5′ for the track J^2 and moves the plate F in position to bring the slot or hole *g′* below the rod of the signal C^2. The levers 2 and 4 are then operated so that the facing-point locks are in their "safety" or locked position, and the lever 1 is finally pulled to reverse the balance-lever E and allow the rod of signal C^2 to fall through the hole or slot *g′*, and said signal to descend, so as to show an "all-clear" signal.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a semaphore-arm or other visual signal and a switch or switches, of a rod depending from the said signal, and through which it is held in the "danger" position, a stop-plate arranged below the rod and preventing the downward movement of the same when the switch or switches is or are in the "danger" position, and connections between the switch or switches and plate, so that upon the movement of the switch or switches to a "safety" position the plate will be withdrawn from beneath the rod, thus enabling the rod and its signal to descend and place the signal in the "safety" position, substantially as described.

2. The combination, with two or more semaphore-arms or other visual signals and a switch or switches controlling two or more tracks, of rods depending from the signals, devices whereby the signals and rods are held in an elevated or "danger" position, one or more stop-plates arranged below said rods, connected with the switch or switches, so as to be moved therewith, and so constructed that to whichever operative position the switch or switches may be moved the said plate or plates will be withdrawn from below one or the other of said rods, and a lever or other

means for releasing said rods from the devices which hold them elevated, whereupon one rod and signal will fall to the "safety" position, while the other rod or rods will be arrested by said stop plate or plates, substantially as described.

3. The combination of the post or support A, one or more signals, B or C, and a rod or rods, B′ or C′, the weighted lever E, and one or more stop-plates, F, all constructed and adapted for operation substantially as herein described.

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