

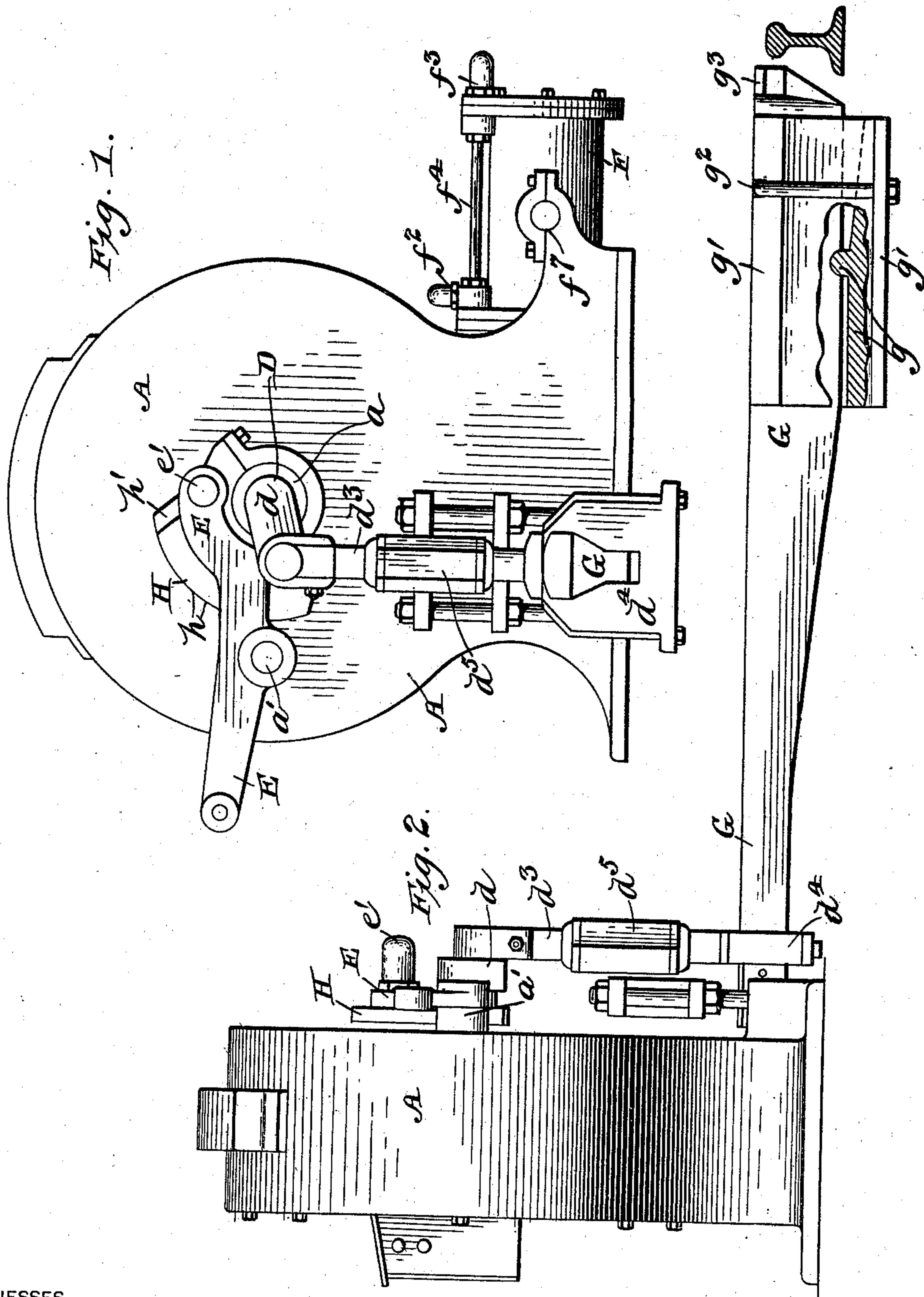
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3 Sheets—Sheet 1.

F. C. STEVENS & J. DONOVAN.
RAILWAY BLOCK SIGNAL.

No. 558,858.

Patented Apr. 21, 1896.



WITNESSES

A. Leverance.
A. S. Hockman.

INVENTORS:

Frank C. Stevens
James Donovan
By their Attys
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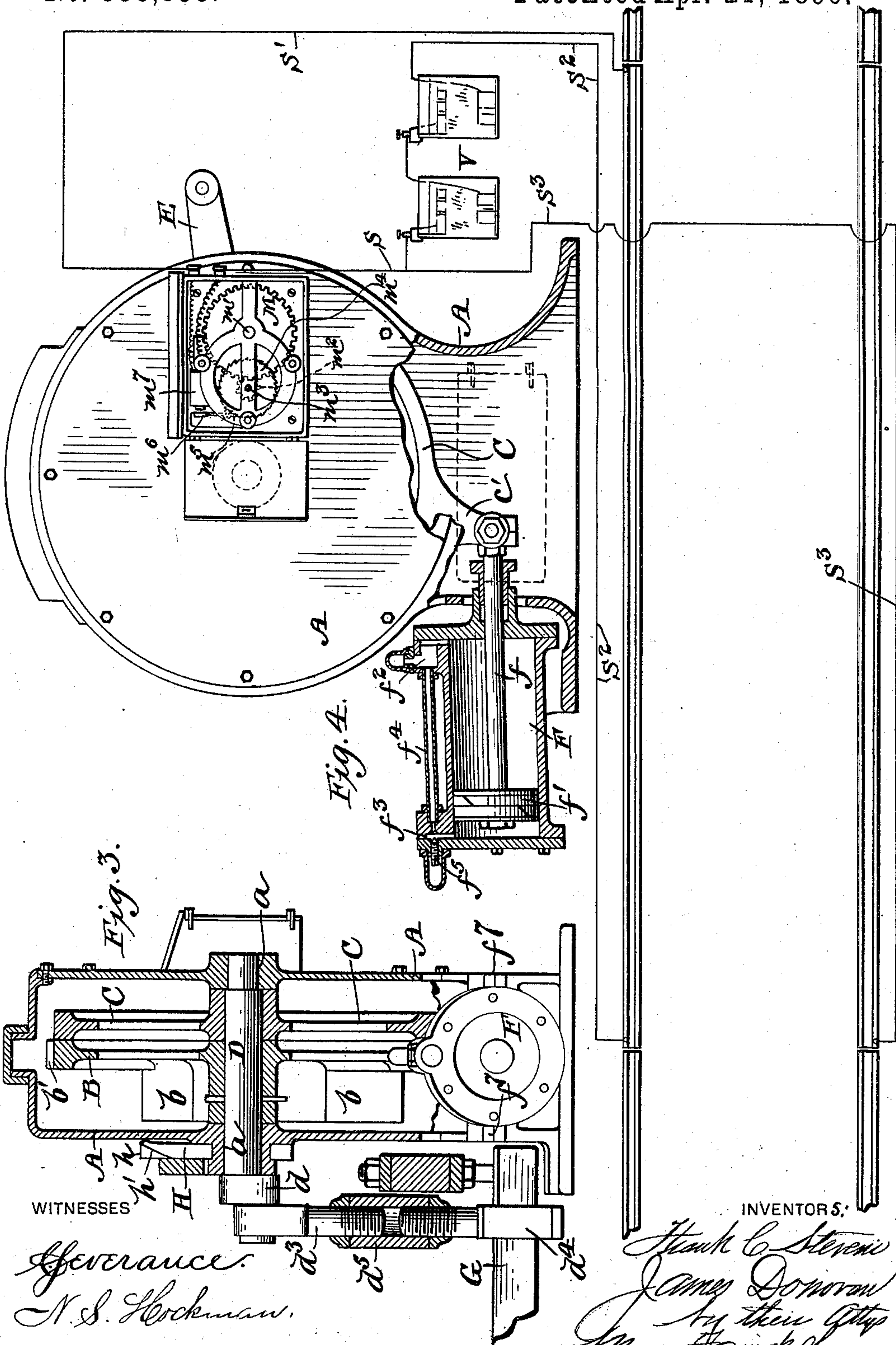
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3 Sheets—Sheet 2.

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RAILWAY BLOCK SIGNAL.

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Witnesses:
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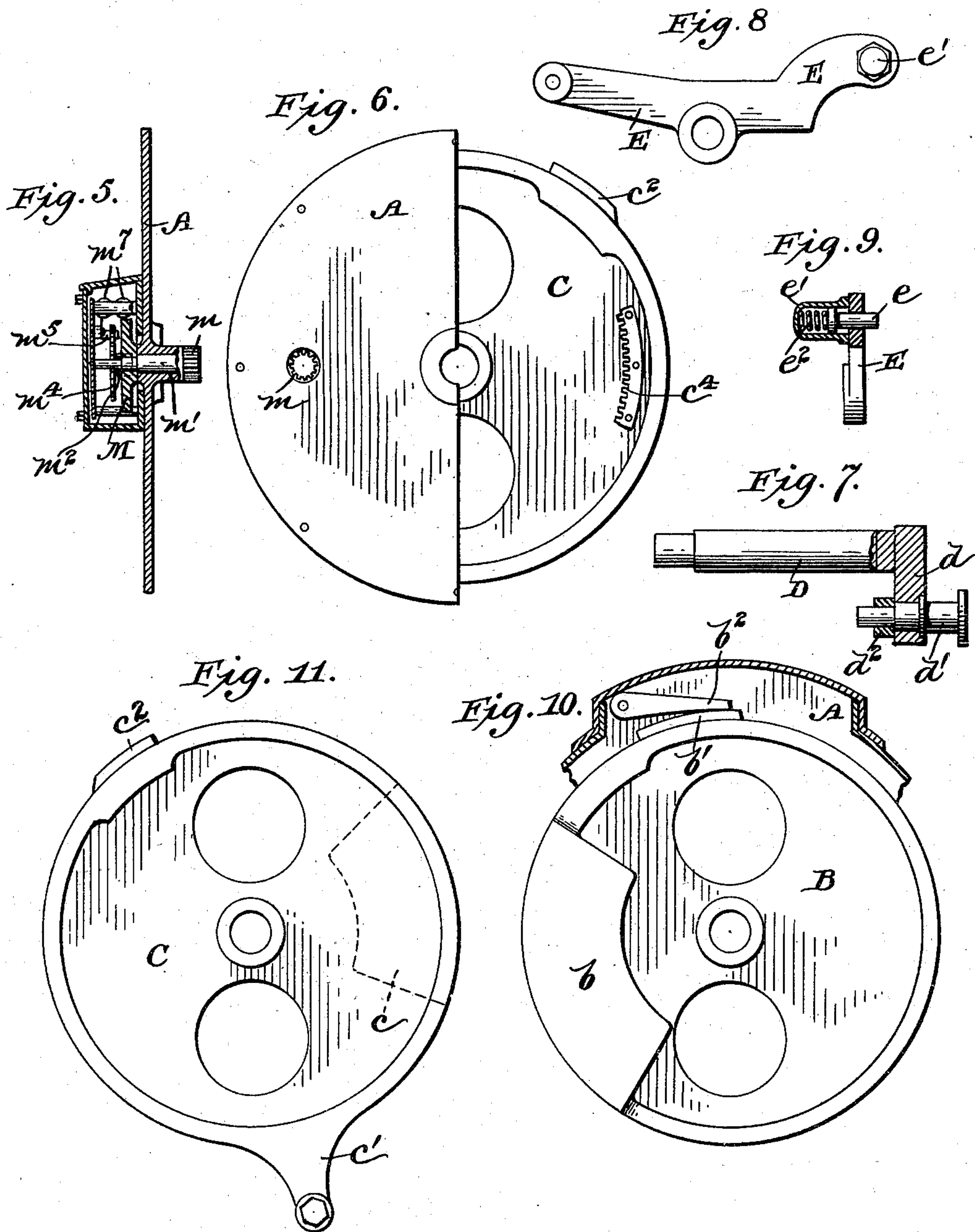
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WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK C. STEVENS AND JAMES DONOVAN, OF LOWELL, MASSACHUSETTS.

RAILWAY BLOCK-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 558,858, dated April 21, 1896.

Application filed August 20, 1895. Serial No. 559,902. (No model.)

To all whom it may concern:

Be it known that we, FRANK C. STEVENS and JAMES DONOVAN, citizens of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Railway Block-Signals; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in railway-signal-operating devices for use with block systems; and the invention consists of the combination with signal-setting devices adapted to be actuated by the passing train, an electric lock adapted to release said devices when the train passes from the block, and means for retarding the action of said devices for a predetermined time after being released by said lock.

It also consists of certain other novel constructions, combinations, and arrangements of parts, all of which will be hereinafter more particularly set forth and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 represents a side elevation of the devices embodying our invention. Fig. 2 represents an end elevation of the same, showing the operating-lever placed in proximity to a rail. Fig. 3 represents a central vertical section through said devices. Fig. 4 represents a side elevation, partly in section, taken on the side opposite from that shown in Fig. 1 and showing the electric lock and its connections with the rails. Fig. 5 represents a detail central vertical section through the lock mechanism. Fig. 6 represents a detail side elevation of the auxiliary weighted wheel and a portion of the casing. Fig. 7 represents a detail top plan view of the crank-shaft. Fig. 8 represents a detail side elevation of the signal-lever-supporting plate. Fig. 9 represents a detail central vertical section through the end of said signal-lever and its spring-pin. Fig. 10 represents a detail side elevation of the main weighted wheel, and Fig. 11 represents a detail side elevation of the auxiliary weighted wheel.

A in the drawings represents the casing for containing the said signal-operating devices; B, the main weighted operating-wheel; C, the

auxiliary weighted operating-wheel; D, the crank-shaft carrying said wheels; E, the semaphore-operating lever, and F the liquid-cylinder.

The casing A is preferably circular in form and is provided with journal-boxes *a a*, in which the crank-shaft D is journaled. The crank portion *d* of said shaft is provided with a headed pin *d'*, on the rear projecting portion of which is mounted an antifriction-roller *d''*, which is adapted to engage the under side of the pivoted lever E when said crank-shaft is rotated and thus elevate the inner end of said lever and set the semaphore, which is connected to the outer end, at "danger." The said lever E is pivoted at the point *a'* on the casing A in any suitable manner. A vertical pitman *d'''* connects the said pin *d'* with a pivoted lever G through the agency of an apertured plate *d''''* and is provided with a turn-buckle *d'''''*, by which it may be adjusted. This plate is rigidly attached to the lower end of the pitman *d'''* and is provided with a vertical aperture, in which the end of the lever G has vertical play. The said lever G is pivotally mounted on a bead *g*, formed in the bottom of a chair *g'*, and is limited in its vertical movements by a yoke *g''*. The forward end of the said lever is provided with a toe *g'''*, which extends in proximity to one of the rails, so as to be depressed by the treads of the wheels of a passing train.

The wheel B is keyed or otherwise suitably connected to the shaft D, so as to revolve therewith, and is weighted, as at *b*, and provided upon its periphery with a projection *b'*, which is adapted to be engaged by a pawl *b''*, pivoted in the top of the casing A. When the shaft D is revolved by the depression of the lever G, the weight *b* is lifted by the revolution of said wheel D until the pawl *b''* falls behind the projection *b'*, which prevents the weight again descending when the pressure on said lever G is removed. This removal of the pressure occurs after the passage of the train, the inner end of the lever dropping in the aperture in the plate *d''''* without moving the rod *d'''*.

It is desirable to have the semaphore remain fully up to "danger" until the crank *d* has returned to its lowermost position and not gradually descend as said crank descends.

To accomplish this object, the shaft D is provided with a plate H, bolted thereto and having a segmental portion h and a beveled pin-guide h' , and the inner end of the lever E is provided with a headed pin e , whose head is mounted in a casing e' , a spiral spring e^2 in said casing bearing against the head of said pin and pressing it normally outward.

When the lever E is elevated by the crank-shaft, the pin e travels first up the guide h' and then about the periphery of the segmental portion, and thus said lever E is supported independently of the support afforded by the crank-shaft. When the crank-shaft revolves backward after being released from the pawl b^2 , which action will be hereinafter described, the segmental portion supports the pin e until the crank portion of said shaft reaches its lowest point, when the pin will slide down the guide h' and be pushed into its casing against the action of the spiral spring, thus allowing the semaphore to drop to "safety."

The wheel C is loosely mounted upon the shaft D beside the wheel B and is provided with a weight c , a peripheral projection c' , and a trip c^2 for releasing or raising the pawl b^2 from in front of the projection b' . The projection c' is connected to the piston-rod f of the fluid-cylinder F. This cylinder is provided with the usual piston f' and is pivotally mounted on the frame by means of trunnions f^7 , so that it may assume different angles. This action is necessary because of the rigid connection of the piston with the wheel C.

Valve-chambers $f^2 f^3$ are formed in the side of said cylinder and communicate with the same. These chambers communicate with each other through a pipe f^4 , and the chamber f^3 is provided with an adjustable screw-valve f^5 , whereby the flow of the liquid from one to the other side of the piston can be regulated at will.

It will be seen from the foregoing that the movement of the wheel C in either direction is regulated by this fluid-cylinder, as the liquid cannot pass from one side of the piston to the other immediately because of the valve f^5 , which governs said flow. The wheel C is also provided with a segmental rack c^4 , which normally engages a spur-gear m , mounted on the main shaft m' of the electric lock, and thus locks said wheel from turning. Said lock comprises a gear M, mounted on said shaft m' and meshing with a spur-gear m^2 on a short shaft m^3 . This latter shaft also carries a ratchet-wheel m^4 , which is adapted to be engaged by a pawl m^5 , mounted on the armature m^6 of the relay m^7 . Said relay is connected to wires S S' S², forming a closed circuit with one rail T of the block. A battery V is introduced in said circuit, and a normally dead wire S³ connects the wire S with the opposite rail of the same block.

It will be seen from the foregoing that the wheel C is normally free to rotate because

the pawl is held out of engagement with the wheel m^4 by the relay connected to the closed circuit. When the train enters the block, the battery is short-circuited through the wire S³, and the car-trucks and the relay releases the pawl, which engages the ratchet-wheel m^4 and holds it stationary. When the train passes from the block, the relay is again actuated by the closed circuit and releases the ratchet-wheel m^4 , and thus allows the wheel C to revolve by means of its weight c descending. The said wheel is caused to revolve very slowly by the resistance offered to such revolution by the liquid in the cylinder F, which is forced from one side of the piston to the other by such movement. As said wheel approaches the end of its travel the trip c^2 raises the pawl b^2 , as before described, and the superior weight on the wheel B causes both wheels to revolve in the opposite direction, the wheel C being revolved by its projection c^2 engaging the projection b' . The back movement of said wheels is also against the resistance of the liquid in the cylinder F, said liquid being forced in an opposite direction by said movement. When the wheel B has reached the end of its backward revolution, the rack c^4 is again engaging the spur-gear of the lock, and said wheel is thus held in position for the next train.

It will be seen from the foregoing that some time elapses after the train leaves the block before the wheel B returns to its normal position and allows the semaphore to drop to "safety," and this time may be varied at will.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel fast thereon, a locking-pawl for said wheel, a wheel weighted in a less degree than the before-mentioned wheel and loose on said shaft and adapted to lift said pawl, devices connected to the crank-shaft whereby it is actuated by a passing train, and an electric lock for the loosely-mounted wheel which is adapted to release the same when the train passes from the block and thus release the other weighted wheel and allow the semaphore to return to "safety," substantially as described.

2. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel fast thereon and provided with a radial projection, a locking-pawl adapted to engage said projection, a wheel weighted in a less degree than the before-mentioned wheel, and provided with a projection for disengaging the locking-pawl from the before-mentioned wheel whereby the projection of said latter wheel is engaged by the projection of the former wheel and

said latter wheel thereby reset, means connecting the crank-shaft with a semaphore, devices connected to the crank-shaft whereby it is operated by a passing train, and an electric lock for one of the weighted wheels for releasing the same when the train passes from the block and allowing the semaphore to return to "safety," substantially as described.

3. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel passed thereon, a locking-pawl for said wheel, a wheel weighted in a less degree than the before-mentioned wheel and loose on said shaft and adapted to lift said pawl, means for connecting the crank-shaft with the semaphore, a pivoted lever adapted to be operated by the wheels of a passing train, and a pitman connecting said lever to said crank-shaft, and an electric lock for the loosely-mounted wheel which is adapted to release the same when the train passes from the block, substantially as described.

4. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel fast thereon, a locking-pawl for said wheel, a wheel weighted in a less degree than the before-mentioned wheel and loose on said shaft and adapted to lift said pawl, means connecting the crank-shaft with the semaphore, devices connected to the crank-shaft whereby it is actuated by a passing train, an electric lock for the loosely-mounted wheel, and a liquid-cylinder retarding the action of said wheels in both directions for a predetermined time after being released from said lock, substantially as described.

5. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel fast thereon, a locking-pawl for said wheel, a wheel weighted in a less degree than the before-mentioned wheel and loose on said shaft and adapted to lift said pawl, a pivoted lever connected to the semaphore and adapted to be operated by the crank-shaft, means for holding said pivoted lever in its elevated position independently of said crank-shaft, and an electric lock for the loosely-mounted wheel which is adapted to release the same when the train passes from the block, substantially as described.

6. In a railway block-signal, the combination of signal-setting devices adapted to be positively actuated by a passing train to set the semaphore at "danger" and comprising a crank-shaft, a weighted wheel fast thereon, a locking-pawl for said wheel, a wheel weighted in a less degree than the before-mentioned wheel and loose on said shaft and adapted to lift said pawl, means for connecting the crank-shaft with a semaphore, a pivoted lever adapted to be operated by the wheel of a passing train, a pitman connecting said lever to the crank-shaft, and a liquid-cylinder having connection with the loosely-mounted wheel whereby said wheels are retarded in their movements in either direction for a predetermined time after they are released by the lock, substantially as described.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

FRANK C. STEVENS.
JAMES DONOVAN.

Witnesses:

J. H. SENETT,
R. T. SMITH.