

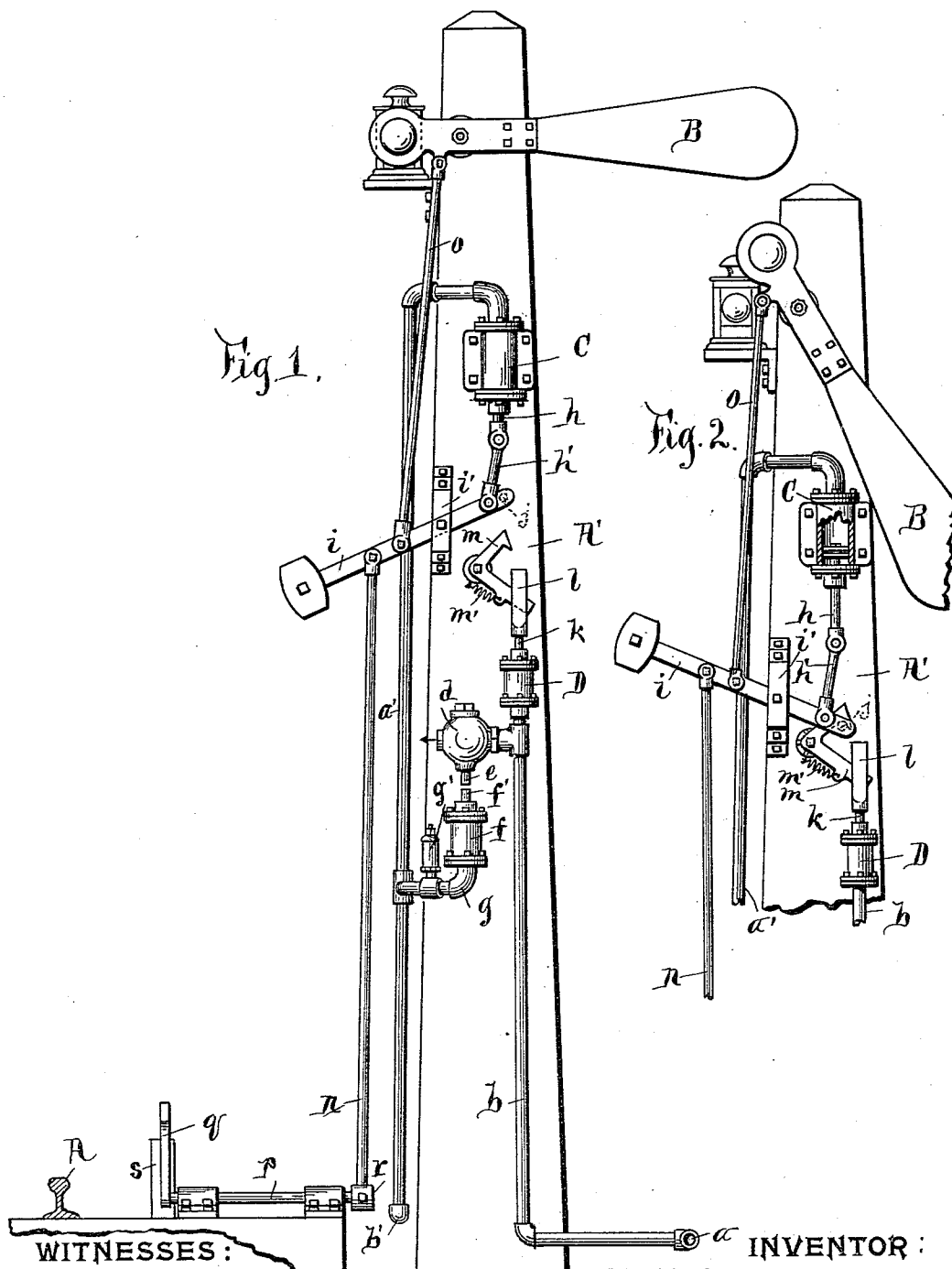
(No Model.)

5 Sheets—Sheet 1.

C. H. SHERWOOD.
RAILROAD BLOCK SIGNAL.

No. 559,954.

Patented May 12, 1896.



WITNESSES:

H. A. Carhart

J. J. Laess

INVENTOR:

Charles H. Sherwood

By E. Laess

his ATTORNEY

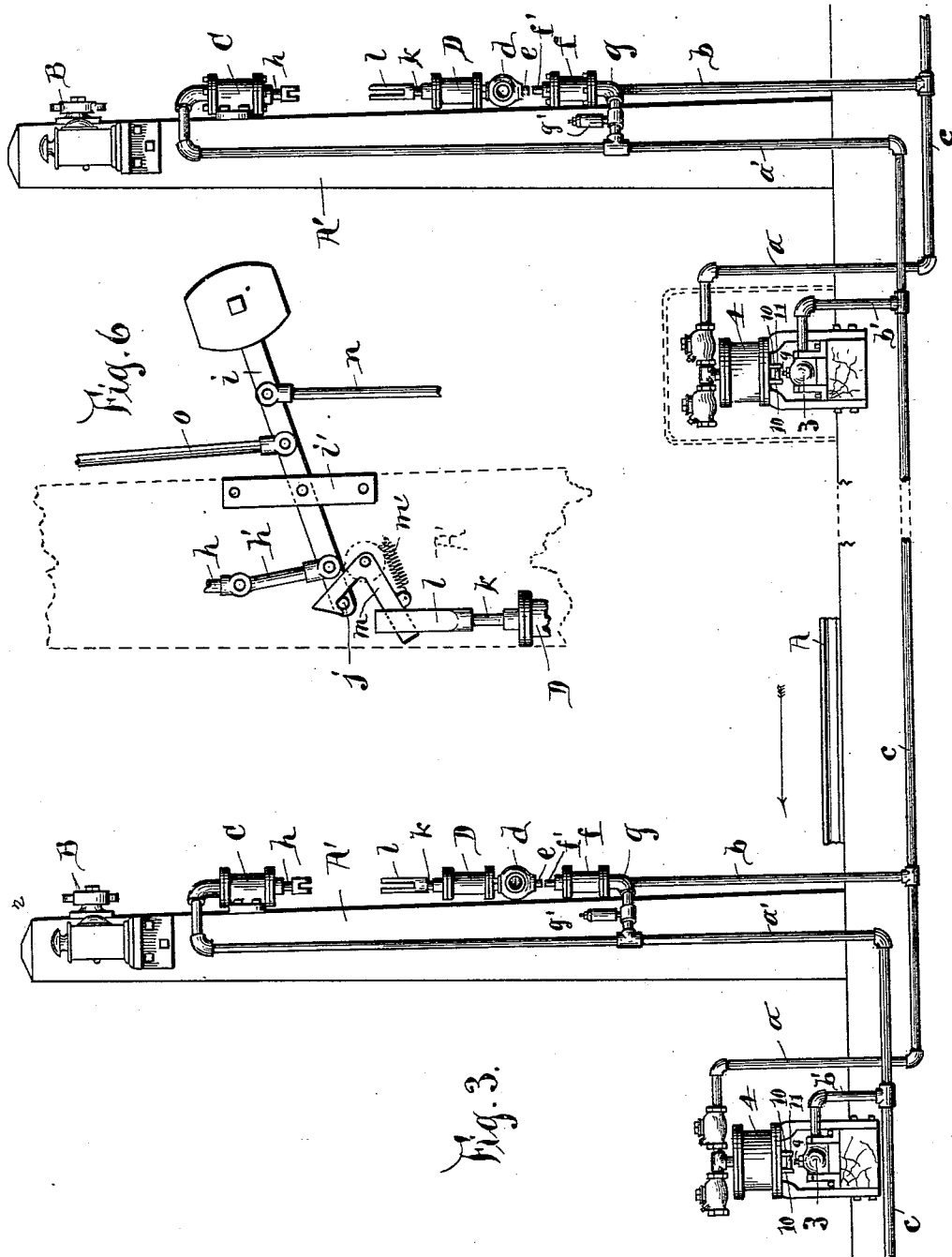
(No Model.)

5 Sheets—Sheet 2.

C. H. SHERWOOD.
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5 Sheets—Sheet 3.

C. H. SHERWOOD.
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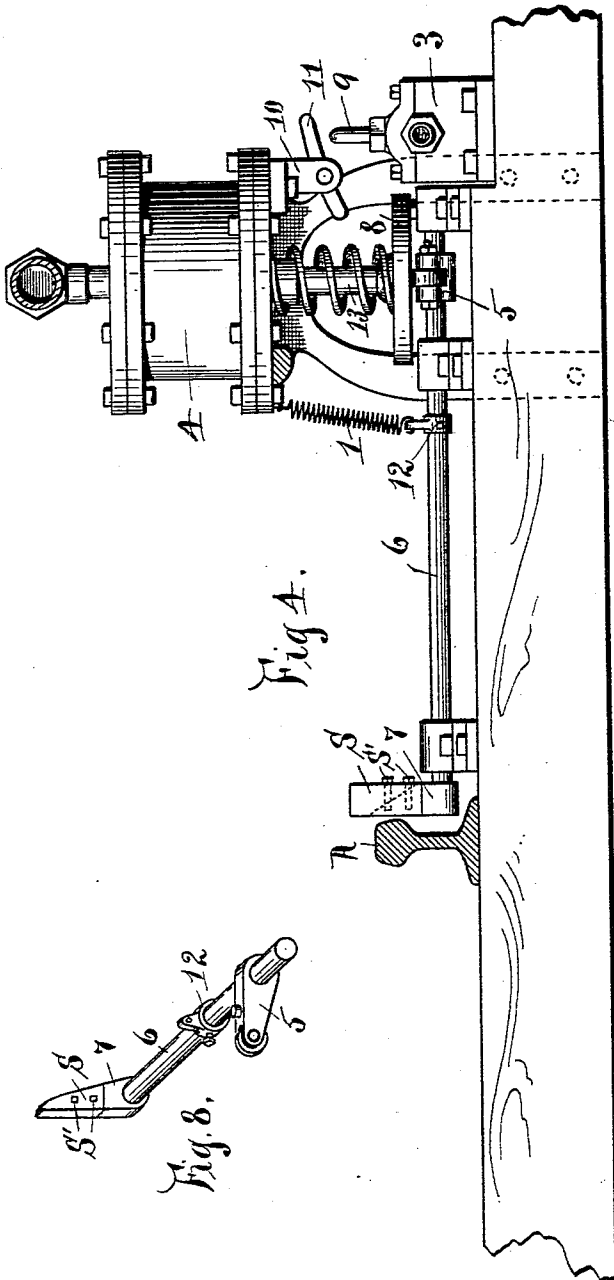


Fig. 4.

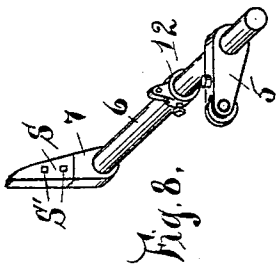


Fig. 8.

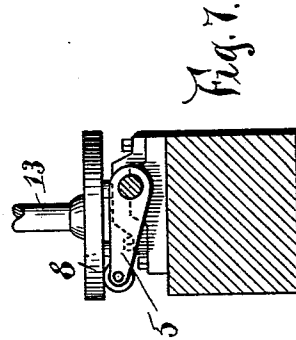


Fig. 7.

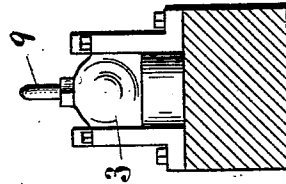


Fig. 11.

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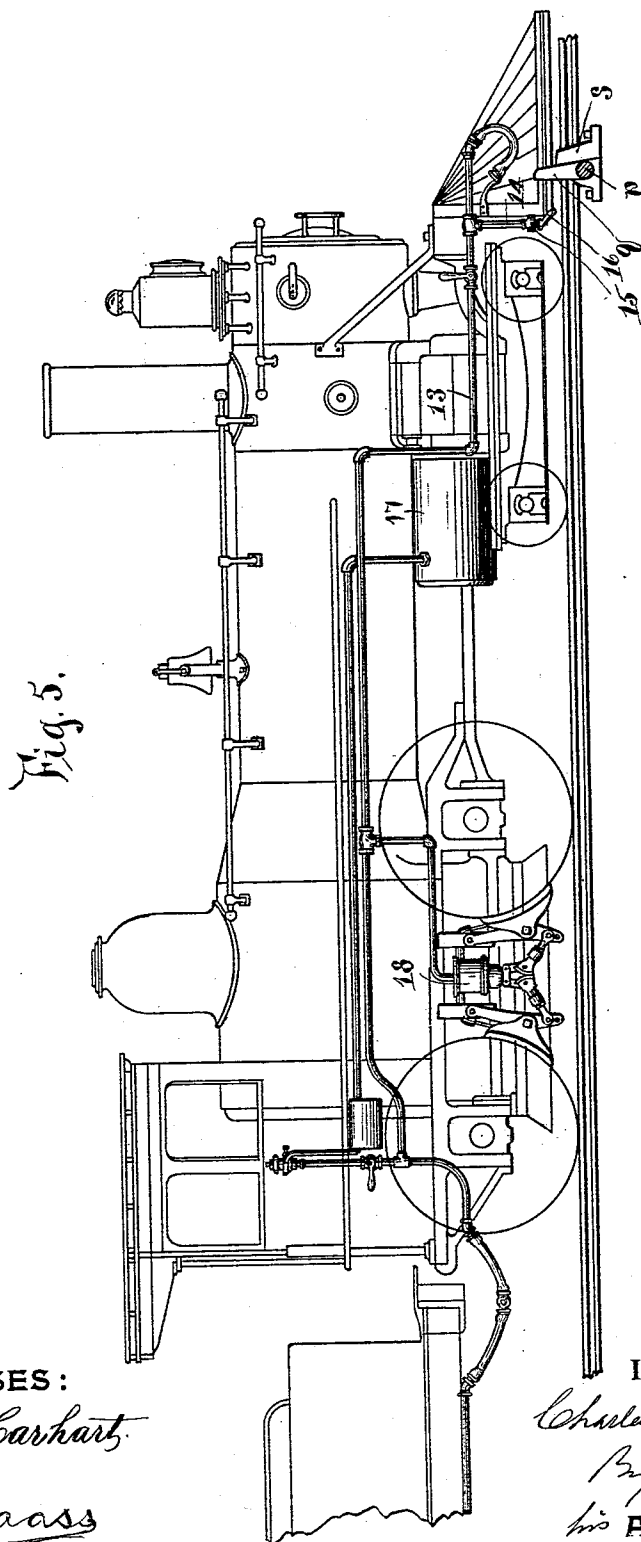
(No Model.)

5 Sheets—Sheet 4.

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Fig. 12.

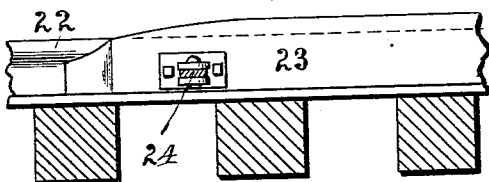
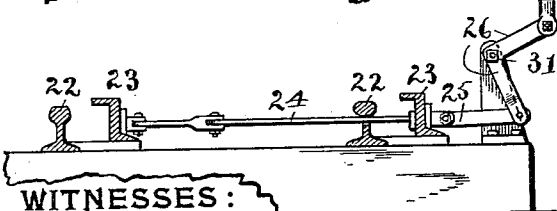
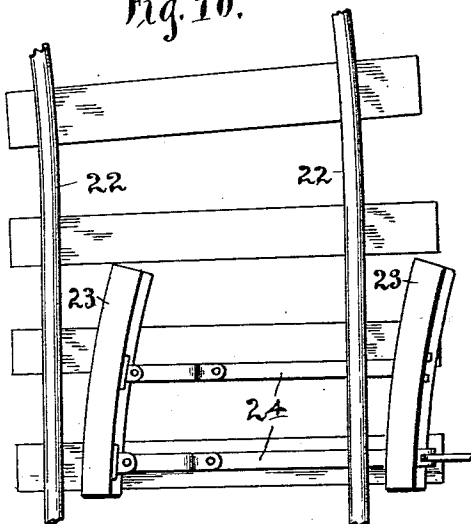


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES H. SHERWOOD, OF UTICA, NEW YORK, ASSIGNOR OF ONE-HALF TO
HENRY C. LYMAN, OF SHERBURNE, NEW YORK.

RAILROAD BLOCK-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 559,954, dated May 12, 1896.

Application filed August 12, 1895. Serial No. 559,019. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SHERWOOD, of Utica, in the county of Oneida, in the State of New York, have invented new and useful
5 Improvements in Railroad Block-Signals, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of rail-
10 way block-signal systems in which the semaphores are operated automatically by air-pressure derived from pumps operated by a passing train or engine.

The invention has special reference to the
15 system shown and described in my Patent No. 530,311, dated December 4, 1894, in which pumps are disposed along the track—one at each semaphore—and operated by suitable track instruments, an air-cylinder at each
20 semaphore and relief-valve thereat, and pipes connecting said pumps, cylinders, and valves, by which arrangement the semaphore-arm is made to move to indicate "safety" or "danger."

The object of my present invention is to
25 produce a more complete and reliable working system, and at the same time simple in construction and efficient in its operation; and to that end the invention consists, essentially, in providing a pump at each semaphore
30 to be operated by a suitable track instrument, a relief-valve operated by said pump, a locking air-cylinder and an unlocking air-cylinder at each semaphore, a locking mechanism
35 between the piston-rods of said cylinders, a relief-valve and relief-cylinder near the unlocking-cylinder, and pipes connecting all of said cylinders, valves, and pumps; and the
40 invention also consists in the detail construction of the combined pump and relief-valve and in other details, all as hereinafter more fully described.

In the annexed drawings, Figure 1 is a side
45 view of a semaphore embodying my improvements, showing the semaphore-arm set to indicate "danger" and mechanism combined therewith to automatically operate the air-brakes of a locomotive or train. Fig. 2 is a
50 similar view of a portion of the semaphore, showing the semaphore-arm set to indicate "safety." Fig. 3 is a side view of a plurality

of said semaphores, showing the pipe connections between the cylinders, valves, and pumps. Fig. 4 is an enlarged side view of the
55 combined pump and relief-valve and showing the track instrument which operates the pump. Fig. 5 represents a side elevation of a locomotive equipped with an air-brake system and showing the mechanism for automatically operating the same. Fig. 6 is an
60 enlarged detail view of the inner side of the weighted lever and catch, showing the locking-pin. Fig. 7 is a detail view showing the annular plate secured to the piston-rod of the pump and the lever of the track instrument,
65 which raises the same. Fig. 8 is a perspective view of the track instrument. Fig. 9 is a side view of a combined semaphore and derailling-switch. Fig. 10 is a plan view of said switch. Fig. 11 is a detail view of the relief-
70 valve, and Fig. 12 is a side view of sections of the main and switch rails.

Similar letters and numerals of reference indicate corresponding parts.

A represents the railway-track along which
75 are disposed in the usual manner the semaphore posts or poles A' A', forming the blocks. At each or near each semaphore is located the combined pump 4 and relief-valve 3, and on
80 each post are secured a locking air-cylinder C and an unlocking air-cylinder D, having their piston-rods *h* and *k* approximately axially in line. On the upper end of the piston-rod *k*
85 is secured a vertically-slotted post *l*, in which slot slides a catch *m*, pivoted to the post A', which catch is held in its normal position by a spring *m'*.

On the lower end of the piston-rod *h* is
90 hung an oscillatory arm *h'*, to which is pivotally connected one end of a weighted lever *i*, fulcrumed on a bracket or support *i'*, secured to the post A', which end of the lever
95 is provided with a locking-pin *j*, adapted to engage the aforesaid catch *m*. From the opposite end portion of the lever and extending
upward to the corresponding end portion of the semaphore-arm B is a rod *o*.

From the pump 4 at each semaphore extends a pipe *a*, which connects with the pipe
100 *c*, leading to the pipe *a'* at the next semaphore to the rear, which enters the top of the cylinder C thereat, and extending from the pipe *c*

to the relief-valve 3 at the pump to the rear is a pipe *b'*, and from said pipe *c* at each semaphore to bottom of the adjacent cylinder D extends a pipe *b*.

- 5 Directly below the cylinder D the pipe *b* is provided with a relief-valve *d*, having its stem *e* extending downward, and from the pipe *a'* extends upward a short pipe *g*, on the end of which is supported a relief-cylinder *f*,
10 having its piston-rod *f'* axially in line with the valve-stem *e*.

- The combined pump 4 and relief-valve 3 is constructed as follows: To the bottom of the pump are secured ears 10, to which is loosely
15 pivoted a finger 11, and directly below said finger is the relief-valve, having its stem 9 in line with the outer end portion of said finger. In the upward movement of the pump-piston the annular plate 8, secured to the lower end
20 of the piston-rod 13, pushes up the inner end of the finger 11, whereby the outer end of said finger pushes down the stem 9 of the valve 3 to relieve the pressure in the adjacent cylinder C, as hereinafter more fully explained.
25 The upward movement of the annular plate 8 is produced by means of the track instrument, consisting of the lever 5 beneath said plate, a rock-shaft 6, extending to the railway track, and an arm 7, secured to the outer end
30 of said shaft and in such a position in relation to the track as to be depressed by the wheels of a passing train.

- I preferably provide the arm 7 with a shoe S, secured thereon by means of bolts S' S', for
35 the purpose of affording safety to a train passing in case the arm becomes caught in its upright position and fails to operate, in which case the shoe would be knocked off by the breaking of the bolts shown in Figs. 4 and
40 8 of the drawings. Said arm operates only in one direction, and is held in its normal position by means of a spring 1, secured at one end to the pump 4 and at the opposite end to a collar 12, secured to the rock-shaft 6.

- 45 The operation of my improved system is as follows: When a train approaches a semaphore and the block ahead of the same is clear, the semaphore-arm B is held down to indicate "safety" by the rod *o*, lever *i* having
50 the pin *j* on inner end, the catch *m* engaging said pin and held in engagement by the spring *m'*, which mechanism is shown in Fig. 1 of the drawings.

- In order to more clearly explain the operation of my improved system, I will refer to the semaphores as Nos. 1 and 2. As a train passes semaphore No. 1 with its arm B set to "safety," the wheels of said train continually depress the arm 7, which turns the rock-shaft 6, thereby throwing up the lever 5, secured to the inner end of said shaft, which lever bears against the under side of the annular plate 8 and by its upward movement pushes up said plate, carrying with it the piston-rod 13 of the pump 4, whereby the air is
65 forced through the pipes *a* and *b* into the bottom of the cylinder D, pushing up its pis-

ton-rod *k* with the slotted post *l*, which raises the catch *m* and releases the pin *j* on the lever *i*. In the upward movement of the annular plate 8 it strikes the under side of the inner end of the finger 11, thereby throwing down the outer end, which pushes down the stem 9 of the relief-valve 3 and opens the same, thereby releasing thereat the air from the top of the cylinder C through pipes *a'* and *b'*. By releasing the air from the top of the cylinder C the weighted end of the lever *i* is allowed to drop by gravity by the piston-rod *h* of said cylinder being allowed to ascend, the piston-rod and said lever being connected, as aforesaid, by the oscillatory arm *h'*. In this downward movement of the weighted end of the lever *i* the corresponding end of the semaphore-arm B is drawn down by means of the rod *o*, thereby throwing the outer end of said arm up to indicate "danger," as shown in Fig. 1 of the drawings. As the train passes semaphore No. 2, set at "safety," the wheels of the train depress the track instrument thereat, which operates pump No. 2 in the manner before described. By the operation of this pump, the air is forced through pipes *a* and *b* into the bottom of the cylinder D at No. 2, forcing up its piston and piston-rod *k* and thereby releasing the catch *m*, releasing the weighted lever *i*, as at semaphore No. 1. The air is also forced from pipe *a* through pipe *c* back and through pipe *a'* at No. 1 into the top of cylinder C thereat, thereby forcing down its piston and piston-rod *h* and by means of the oscillatory arm *h'* throwing up the weighted end of the lever *i* and by means of the rod *o* throwing down the semaphore-arm B to indicate "safety."

In proximity to the relief-valve *d* in the pipe *b* the pipe *a* is provided with a short pipe *g*, which extends upward, upon the end of which is provided a relief-cylinder *f*, having its piston-rod *f'* axially in line with the valve-stem *e*. When the air is forced through the pipe *a'* to the top of the cylinder C, as aforesaid, it is thereby forced through the pipe *g* into the bottom of the cylinder *f*, thereby forcing up its piston and piston-rod *f'*, which pushes up the valve-stem *e*, opening the relief-valve *d*, which allows the air to escape from the pipe *b* and bottom of the cylinder D, thereby allowing its piston-rod to drop with its slotted post *l*, which allows the catch *m* to return to its normal position in order to engage to pin *j* on the lever *i* in its descent, as aforesaid. The pipe *g* is preferably provided with a pop-valve *g'* to relieve any excess pressure there may be.

By the operation of the pump No. 2 the relief-valve 3 thereat is operated, as in No. 1, to relieve the top of the adjacent cylinder C, in order to allow its piston-rod to rise and by means of the oscillatory arm *h'*, weighted lever *i*, and rod *o* set the semaphore-arm B to "danger."

The same arrangement of cylinders, pipes, valves, and mechanism is provided at sema-

phores Nos. 3, 4, 5, and so on, of the railway. Consequently the same action will take place throughout the entire system at each semaphore as a train passes.

5 It will be thus observed that the semaphore-arm at No. 1 will remain at "danger" until the train passes pump No. 2, &c.

When the semaphore-arm B is set at "danger," it indicates that there is a train in the 10 block ahead, and to prevent a train from running onto said block, and possibly an accident, I provide a novel means for automatically operating the air-brakes of a passing train or locomotive at each semaphore, which consists 15 of the following mechanism: To within a suitable distance of the track and extending toward the semaphore is a rock-shaft *p*, having a lever *q* secured on its outer end and an arm *r* on its inner end. Extending upward from 20 said arm and connected to the weighted lever *i* is a rod *n*. When the semaphore-arm B is set at "danger," the lever *i* forces down the rod *n*, which turns down the arm *r*, thereby rocking the shaft *p* and throwing the lever *q* 25 up to a vertical position and against a stop *s*, as shown in Fig. 1 of the drawings. At the right side of a locomotive, near the pilot thereof, and extending down from the main train-line 13 of air-pipe is a pipe 14, having a relief-valve 15 on its lower end provided with 30 a horizontal arm 16. Said arm is placed in such a position as to strike the lever *q* in its vertical position to open said valve and relieve the air retained in the train-line 13, thereby causing an action between the auxiliary reservoir 17 and brake-cylinder 18, whereby the brakes are set, thereby stopping the train.

In some cases I prefer to employ a derailing-switch at the semaphore in place of the 40 brake-operating device, as shown in Fig. 10 of the drawings, which switch is constructed as follows: Near the main-track rails 22 are provided derailing-switch rails 23, pivoted at one end and having their free ends formed so 45 as to lie on top of the main-track rail and said ends and intermediate portions thereof connected by cross-bars 24 24, said bars passing through longitudinal slots formed in the inside main-track rail 22. The end cross-bar 24 extends beyond the inside switch-rail 50 23 and has pivoted to the end thereof an arm 25, connected at its opposite end to one of the arms 26 of a bell-crank lever 31. To the other arm of said lever is pivoted the lower 55 end of the rod *n*, extending to the semaphore mechanism, as shown in Fig. 10 of the drawings. By this mechanism the switch-rails are caused to lie on the main-track rails when the semaphore-arm B is set to "danger," whereby the passing train is derailed to 60 prevent collision with the train in the block ahead.

What I claim as my invention is—

1. In a railroad block-signal system, the 65 combination of the semaphores each provided with a locking air-cylinder and an unlocking air-cylinder, a track instrument at or near

each semaphore to be actuated by the passing train, an air-pump at each semaphore and operated by said track instrument, air-con- 70 ducting pipes extending from each pump to the adjacent unlocking-cylinder and to the locking-cylinder at the next semaphore to the rear, a relief-valve operated by each pump and communicating with the adjacent lock- 75 ing-cylinder, and suitable mechanism between the piston-rods of said cylinders as described and shown.

2. In a railroad block-signal system, the combination of the semaphores, each provided 80 with a locking air-cylinder and an unlocking air-cylinder, a track instrument at or near each semaphore to be actuated by the passing train, an air-pump at each track instrument and operated thereby, air-conducting pipes 85 extending from each pump to the adjacent unlocking-cylinder and to the locking-cylinder at the next semaphore to the rear, a relief-valve operated by each pump and communicating with the adjacent locking-cyl- 90 nder, a relief-valve communicating with the unlocking-cylinder and a relief-cylinder having its piston-rod axially in line with the stem of said valve and communicating with the pipe leading to the adjacent locking-cyl- 95 nder and suitable mechanism between the piston-rods of said cylinders as described and shown.

3. In a railroad block-signal system, the semaphores each provided with a locking air- 100 cylinder and an unlocking air-cylinder arranged in a vertical position and having their piston-rods approximately axially in line, a pump at each semaphore operated by a pass- 105 ing train, a relief-valve operated by said pump, suitable connections between the piston-rod of the locking-cylinder and semaphore-arm, a catch operated by the unlocking-cylinder, a suitable pipe connection between the cylinders, pumps and relief-valves, all 110 combined to operate as described.

4. In a railroad block-signal system, the combination of the semaphores each provided 115 with a locking air-cylinder arranged with its piston-rod extending downward, a weighted lever pivoted to the semaphore-post, suitable connections between said piston-rod and lever, an unlocking air-cylinder below the aforesaid cylinder and arranged with its piston-rod extending upward, a catch operated 120 by the latter piston-rod, a pump at each semaphore, a track instrument operating each pump and actuated by a passing train, a relief-valve operated by each pump and pipe connecting said cylinders, pumps and 125 valves as described and shown.

5. In a railroad block-signal system, the combination with the semaphore-post A' of the locking air-cylinder C secured thereon 130 with its piston-rod *h* extending downward, an oscillatory arm *h'* hung from said piston-rod, a weighted lever *i* provided with a locking-pin *j* fulcrumed on a bracket or support *i'* secured to the post A' and having its inner

end pivoted to the lower end of the arm *h'*, a rod *o* extending from the outer end of said lever to the corresponding end of the semaphore-arm B, an unlocking air-cylinder D secured to the semaphore-post below the aforesaid cylinder C and having its piston-rod *k* extending upward, a vertically-slotted post *l* secured on the end of the piston-rod *k*, a catch *m* pivoted to the semaphore-post A' and operated by the post *l* and moving in the slot thereof and adapted to engage the aforesaid pin *j* holding said catch down in its normal position, a pump 4 located at each semaphore, having its piston-rod 13 provided on its lower end with an annular plate 8 and operated by the lever 5 beneath the same secured to the inner end of the rock-shaft 6 moved by the arm 7 secured to the outer end of said shaft and operated by the passing train, a relief-valve 3 having its stem 9 extending upward, a finger 11 pivoted to the pump 4 and operated by the annular plate 8 to push down the valve-stem 9 for the purpose described, pipes connecting each pump with the adjacent unlocking-cylinder D and locking-cylinder C at the next semaphore to the rear, and a pipe connecting each relief-valve 3 with the pipes leading to the adjacent locking-cylinder C, a pipe *g* extending from the pipe *a'* and provided on its end with a relief-cylinder *f* having its piston-rod *f'* extending upward, a relief-valve *d* provided in the pipe *b* leading to the lower end of cylinder D and having its stem axially in line with the piston-rod *f'* and a pop-valve *g'* in the pipe *g* as described and shown.

6. In a railroad block-signal system, the combination of a locking-cylinder and an unlocking air-cylinder located at each semaphore, suitable connections between their piston-rods and the semaphore-arm, said piston-rods being operated by air-pressure to set said arm to indicate "danger" or "safety" as set forth and shown.

7. The combination with an air-pump operated by a track instrument actuated by a passing train, of a relief-valve operated by said pump for the purpose set forth.

8. The combination with the pump 4 hav-

ing an annular plate 8 secured to the lower end of its piston-rod 13 of a rock-shaft 6 extending from the railroad-track to the pump and having a lever 5 secured to its inner end bearing against the under side of said plate, an arm 7 secured to the opposite end of said shaft and in such position in relation to the track as to be depressed by the wheels of a passing train, a spring 1 secured at one end to a collar 12 secured to said shaft and at the opposite end to the pump to hold said arm in its normal position, a relief-valve 3 at said pump having the stem 9 in a vertical position, a finger 11 pivoted to said pump and actuated by the upward movement of the plate 8 to depress said valve-stem for the purpose described and shown.

9. The combination of the rock-shaft 6 provided with the arm 7 on one end to be operated by the passing train or engine, and a lever 5 on the opposite end of said shaft, an air-pump 4 operated by said lever and a relief-valve 3 operated by said pump as described and shown.

10. In a railroad block-signal system the combination with a locking air-cylinder and an unlocking air-cylinder located at each semaphore, suitable mechanism connecting their piston-rods and the semaphore-arm, said piston-rods being operated by air-pressure to set said arm to indicate "danger" or "safety," of mechanism for automatically operating the air-brakes of a train or locomotive, consisting of a rock-shaft *p*, a lever *q* on the one end thereof in a vertical position when the semaphore-arm indicates "danger," to come in contact with an arm at the pilot of the locomotive to operate a relief-valve 15 to relieve the air from the main-train line of pipe 13 and suitable connections between the rock-shaft *p* and the semaphore mechanism as described and shown.

In testimony whereof I have hereunto signed my name this 1st day of April, 1895.

CHARLES H. SHERWOOD. [L.S.]

Witnesses:

J. J. LAASS,

A. M. BENEDICT.