No. 814,963.

PATENTED MAR. 13, 1906.

G. W. JOHNSTON.

BLOCK SIGNAL TRAIN CONTROLLING APPARATUS.

APPLICATION FILED JULY 11, 1905.

2 SHEETS—SHEET 1.

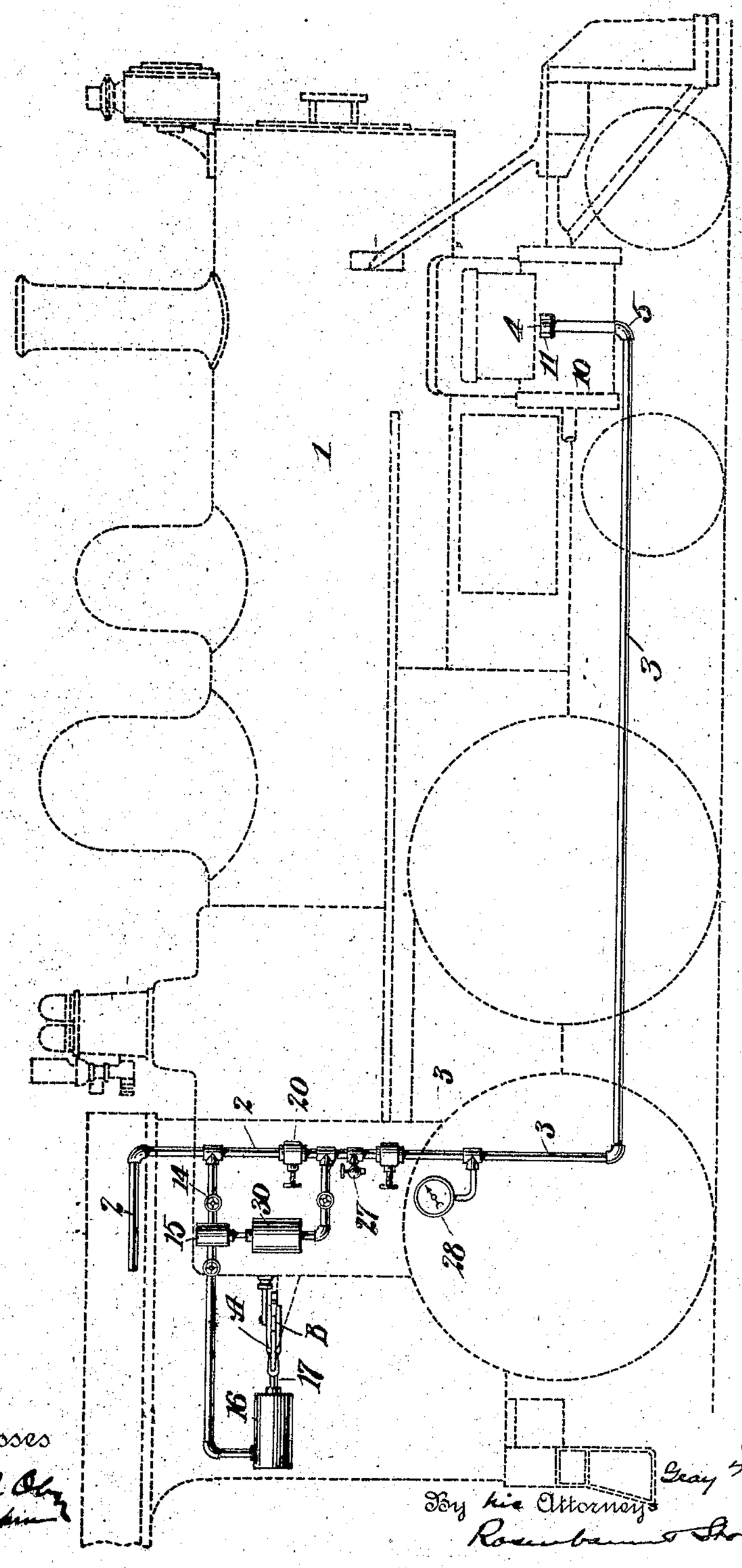

Fig. 1.

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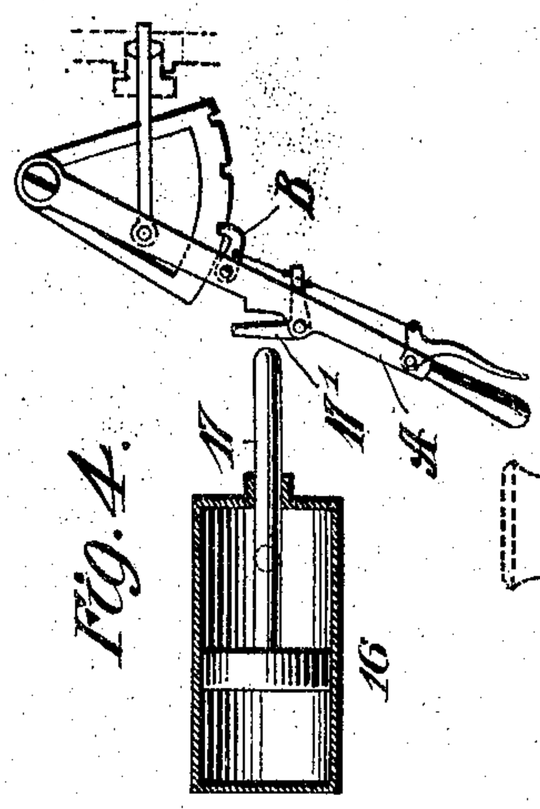

FIG. 4.

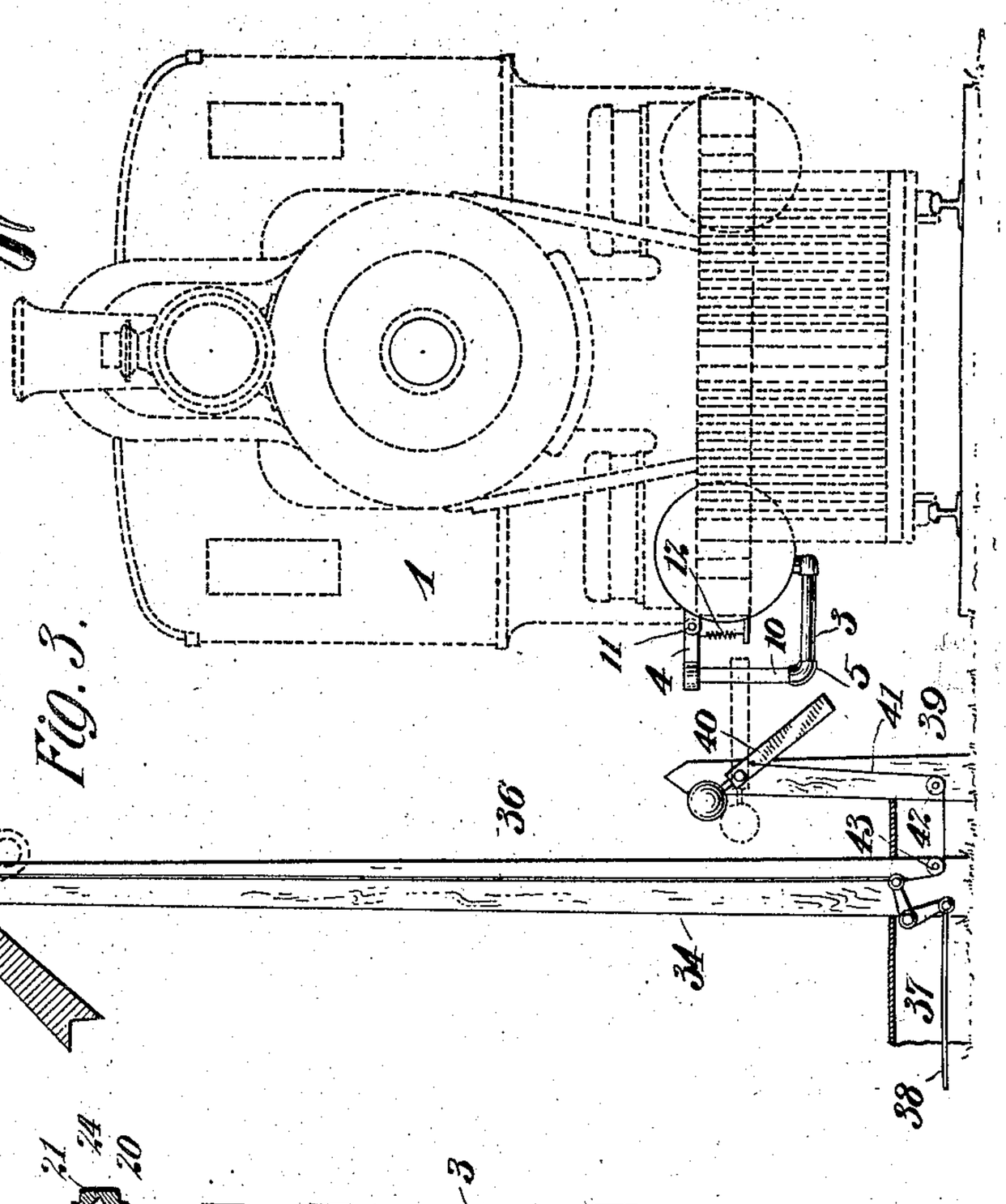

FIG. 3.

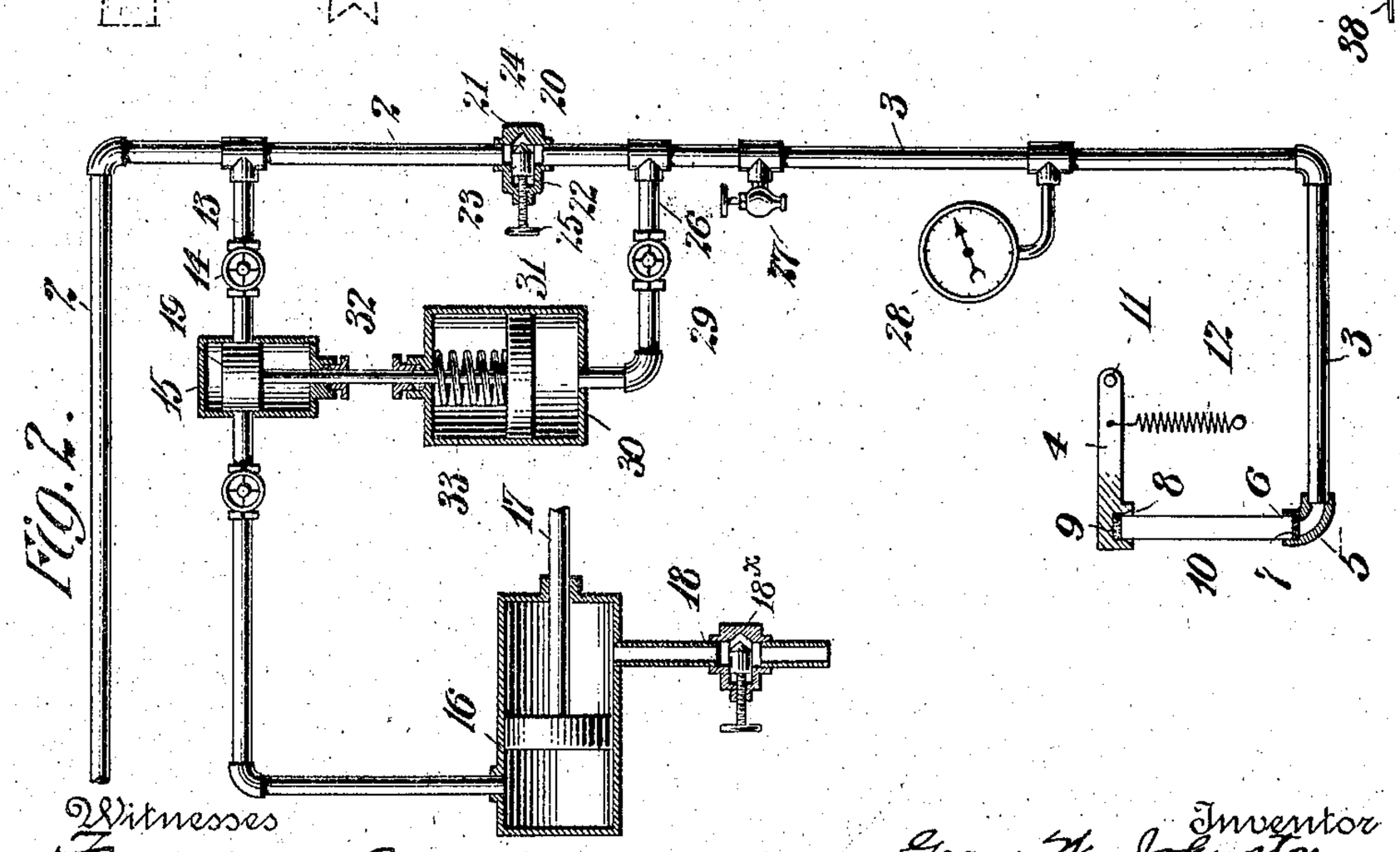

FIG. 2.

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UNITED STATES PATENT OFFICE.

GRAY W. JOHNSTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

BLOCK-SIGNAL TRAIN-CONTROLLING APPARATUS.

No. 814,963. Specification of Letters Patent. Patented March 13, 1906.

Application filed July 11, 1905. Serial No. 269,256.

To all whom it may concern.

Be it known that I, GRAY W. JOHNSTON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Block-Signal Train-Controlling Apparatus, of which the following is a full, clear, and exact description.

My invention relates to a block-signal safety device for locomotives. It has been proposed to provide various attachments operable from a semaphore-signal system for automatically closing the throttle and setting the air-brakes of a locomotive which disregards the visual signal. So far as I am aware none of these devices have come into use, partly because they have not been sufficiently simple and direct in action and partly because they have not generally been adapted for application to the usual standard American locomotives.

The object of my invention is to provide a simple, convenient, and efficient apparatus which avoids the foregoing defects and which shall be easy to construct and simple of application to standard forms of locomotives as purchased from the manufacturing companies.

With these and other objects in view my invention consists in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Figure 1 is a side elevation showing a skeleton outline of a locomotive with an apparatus embodying my invention applied thereto. Fig. 2 is a view showing some of the operating parts and the pipe connections therefor. Fig. 3 is a front elevation showing a semaphore-signal embodying certain features of my invention. Fig. 4 is a top plan view of the throttle-valve of an engine having my pneumatic closing means applied thereto.

It will be understood that by the ordinary block-signal system the railroad-track is divided into sections and at the end of each section are placed semaphore-signals to indicate "stop" and "caution" signals to an approaching engineer. During storms and fogs it is sometimes difficult to observe these visual signals, and since a collision might result from running by any one of them it is highly desirable to provide an automatic means for stopping the locomotive in case the home or stop signal is overrun. In my invention I make a connection directly to the stop-signal for initially closing the throttle and subsequently applying the air-brakes of the train.

Referring to the drawings, and to the various views and reference-signs appearing thereon, of which like parts are designated by the same reference-sign wherever they occur, 1 designates a locomotive of any approved or standard type, and 2 indicates a connection from the train-pipe of the usual air-brake system. The pipe 2 extends through a portion of the locomotive-cab and has applied thereto certain valves and connections which will be later more particularly described. I shall term this pipe the "main" pipe in my system.

At some convenient point upon the locomotive, and conveniently upon one of the cylinders or its valve-box, I form laterally-projecting supports 3 4, of which 3 is a pipe connection leading from the pipe 2 within the engine-cab, while 4 is shown in the form of a spring-pressed pivoted arm. In Fig. 2 I have illustrated the details of a convenient form of this part of my invention in which a pipe-coupling 5 is recessed at 6 and contains a perforated packing-washer 7. The arm 4 is similarly recessed at 8 and contains a packing-washer 9, which may be a plain unperforated leather or rubber disk, if desired. The arm 4 is pivoted at the point 11 and has attached to it a spring 12, which exerts a pressure to normally draw the arm 4 downward. Between the recesses 6 and 8 of the arms 3 and 4 I place a short section of glass tubing 10, similar to the ordinary gage-glass of a steam-boiler, and this tube is clamped in air-tight relation between the washers 7 and 9 by the pressure of the spring 12.

In Figs. 1 and 2 I have shown a practicable form of apparatus by which the throttle is first closed and the pressure subsequently let out of the train-pipe to set the air-brakes. 13 designates a pipe branching laterally from the main pipe 2 and containing valves 14 and 15, the pipe finally terminating at the inlet-port of a pneumatic cylinder 16, having a piston-rod 17. 18 indicates a port at the forward end of the pneumatic cylinder 16, which communicates with the atmosphere. In the practical use of my invention I provide a needle or similar valve $18^{\times}$ within the outlet 18, so that the speed of application of the brakes may be accurately controlled and regulated. The piston 17 has any suitable connection with the throttle-valve—such, for example,

as shown in Fig. 4, in which 17′ indicates a bell-crank lever upon the throttle-lever A, having a connection to the usual detent or dog B, so that a forward motion of the piston 17 is effective to rock the bell-crank 17′ and release the dog B and thereafter to press the throttle-lever A to its inner position. The valve 14 may be of the ordinary gate or globe form, while the valve 15 is preferably a piston-valve having a piston 19, which closes over the ports of the valve and cuts off communication between the train-pipe and cylinder 16. At a point conveniently accessible within the engine-cab I provide a valve 20 in the pipe 2, which I shall term the "charging-valve," and this valve constitutes the dividing-point between the section 2 and the section 3 of the main pipe above described. This valve may be of any convenient form; but I prefer to employ a valve which will permit a slight and adjustable leakage of air therethrough, and for this purpose I provide a valve having a casing 21, recessed at 22 and having a conical headed piston or plug 23 therein, which may be screwed down to cooperate with a similarly-coned recess 24 within the casing 21. 25 indicates a handle by which the plug or piston 23 may be screwed toward and from the recess 24, so that an adjustable orifice is made through which air can pass from the train-pipe 2 into the section 3 of the main pipe.

The section 3 of the main pipe beyond the valve 20 is provided with a branch 26, a relief-cock 27, and a pressure-gage 28 and finally terminates in communication with the glass tube 10, as above described. The branch pipe 26 has a valve 29 therein generally similar to the valve 14 above described and is placed in communication with the head end of a pneumatic cylinder 30, having a piston 31 and a piston-rod connection 32 with the piston-valve 19 above described.

33 indicates a spiral spring which normally bears upon the piston 31 and tends to depress the same to its lowermost position and open the piston-valve 19. In practical use it is desirable to have the cylinder 33 of substantially larger diameter than the piston-valve 15.

34 indicates an ordinary pole for a semaphore-signal, such as is placed along the roadbed of a railway, and 35 indicates the home or stop signal thereon, which is actuated by a rod 36 and bell-crank 37, which has connection with an operating-rod 38, controlled from any suitable means.

39 indicates a second section having a second post, which should be disposed somewhat nearer the track than the post 34 and has thereon a weighted arm 40, adapted to normally swing up into a horizontal position, as shown in dotted lines in Fig. 3.

41 indicates a connection which may be a flexible cord to the arm 40, which runs over pulleys 42 43 and has connection with the bell-crank 37 or its connected rod 36.

The operation is as follows: Under normal conditions the semaphore 35 is dropped before an approaching train, being so moved positively by the bell-crank 37, which swings upward for the purpose. At the same time the bell-crank 37 is effective to tension the cord 41 and depress the arm 40 into the full-line position of Fig. 3. If for any reason it should happen that the semaphore was not so depressed to safety position, the cord 41 will not be tensioned and the arm 40 will remain in its raised or horizontal position by virtue of its counterweight. In this position it lies directly in the path of the destructible tube 10 of the approaching locomotive. In the meantime pressure has been applied to the sections 2 3 of the main pipe in a manner which will now be particularly described. The pipe 2 is always in direct communication with the train-pipe and has the same pneumatic pressure as such pipe. When the device is not in operation, the valve 20 is closed and there is zero gage-pressure in the section 3. Under these circumstances the spring 33 is effective to depress the piston 31 and the piston-valve 19 is opened. It is therefore essential that the valve 14 be closed under these conditions to prevent the air-pressure from operating the pneumatic cylinder 16 to close the throttle. When it is desired to throw the device into operative relation, the valve 20 is opened, and pressure from the train-pipe passes into the section 3 and into the head end of the cylinder 30 and into the destructible tube 10. This pressure is allowed to rise to the full amount by observing the pressure-gage 28, and when this occurs the valve-stem 25 is manipulated to nearly close the valve 20, only permitting a very slight flow of air therethrough to supply the slight leakage in section 3 and prevent a drop of pressure therein. The effect of pressure in the cylinder 30 is to raise the piston 31 and close the piston-valve 19, and thereafter the valve 14 may be opened without establishing communication from the train-pipe to the throttle-operating cylinder 16. The apparatus is now in condition for operation, and should it happen that arm 40 was thrown upward the destructible tube 10 would be broken and the pressure in the section 3 would quickly drop to atmospheric amount. Inasmuch as the valve 20 is now substantially closed this drop does not relieve pressure in section 2 and set the air-brakes, but merely permits the piston 31 to descend under its impelling-spring 33, thereby opening the piston-valve 19. By this means communication is established from the train-pipe directly into throttle-operating cylinder 16, which at once presses forward its piston-rod 17 and closes the throttle in a manner which has already been described. As the piston

moves forward in the cylinder it eventually uncovers the outlet-port 18, whereupon a direct communication is established from the train-pipe to the atmosphere, thereby setting the air-brakes for an emergency stop and arresting the movement of the train.

Should it be desired to set the air-brakes without automatically closing the throttle, the throttle-operating mechanism may be cut off by closing both valves 14 and 29. When the safety apparatus is not in use, the relief-cock 27 may be opened to relieve the pressure in section 3.

What I claim is—

1. A block-signal safety device for locomotives, comprising a main pipe having two sections, one of which is placed in communication with the usual train-pipe, a destructible tube in communication with the second section of said main pipe, a semaphore connection arranged to move into and out of the path of said tube, and connections from said main pipe for initially closing the throttle of the engine and subsequently applying the air-brakes.

2. A block-signal safety device for locomotives, comprising a main pipe having two sections one in communication with the usual train-pipe of the engine, a destructible member, a semaphore connection arranged to move into and out of the path of said destructible member, branch pipe connections from each of said main pipe sections leading to pneumatic valves, and means operated by said pneumatic valves for closing the throttle of the engine and subsequently releasing the pressure in the train-pipe.

3. A block-signal safety device for locomotives, comprising a main pipe having two sections one of which is in communication with the usual train-pipe, a destructible member in communication with said second section, a movable arm in the path of said destructible member, a throttle-closing cylinder, a branch leading from the first section of the main pipe to said throttle-closing cylinder, a valve in said pipe, and a piston having communication with the second section of said main pipe for opening said valve.

4. A block-signal safety device for locomotives, comprising a main pipe having two sections one of which is in communication with the train-pipe of the locomotive, a destructible member in communication with said second section, a valve having a minutely-adjustable opening between said sections, and pneumatic means operated by a difference of pressure between said sections for initially closing the throttle of the engine and subsequently releasing the pressure in the train-pipe.

5. A block-signal safety device for locomotives, comprising a train-pipe having two sections, one of which is in constant communication with the train-pipe of the locomotive, a destructible member in communication with said second section, a movable arm arranged to be interposed in the path of said destructible member, a minutely-adjustable valve between said sections, a pneumatic cylinder having a spring-pressed piston in communication with said second section, a valve operated by said piston and lying in a branch connection from said first section, and a pneumatic cylinder operable from said last-named branch connection for initially closing the throttle-valve of the engine and subsequently releasing the pressure in the train-pipe.

6. A block-signal safety device for locomotives, comprising a main pipe having two sections one of which is in constant communication with the train-pipe of the locomotive, a destructible member in communication with said second section, said destructible member including a glass tube supported between adjustable packing rings or washers, a valve between said first and second sections, a pneumatic cylinder for operating the throttle, and having an inlet-port in communication with the first section of said main pipe, and an outlet-port in communication with the atmosphere, a valve in said communication between the main pipe and the throttle-operating cylinder, and a pneumatic cylinder for opening said valve, said pneumatic cylinder having a communication with the second section of said main pipe.

7. A block-signal safety device for locomotives, comprising a train-pipe having two sections one of which is in constant communication with the train-pipe of the locomotive, a destructible member in communication with the said second section, a movable arm arranged to be interposed in the path of said destructible member, a charging-valve for admitting a charge of compressed air into said second section, and means operable by the release of the pressure charge in said second section for initially closing the throttle, and finally applying the air-brakes.

In witness whereof I subscribe my signature in the presence of two witnesses.

GRAY W. JOHNSTON.

Witnesses:

WM. M. STOCKBRIDGE,

E. L. BOWERS.