No. 890,931. PATENTED JUNE 16, 1908.

H. ROWNTREE.

AIR BRAKE CONTROL MECHANISM.

APPLICATION FILED MAR. 30, 1907.

2 SHEETS—SHEET 1.

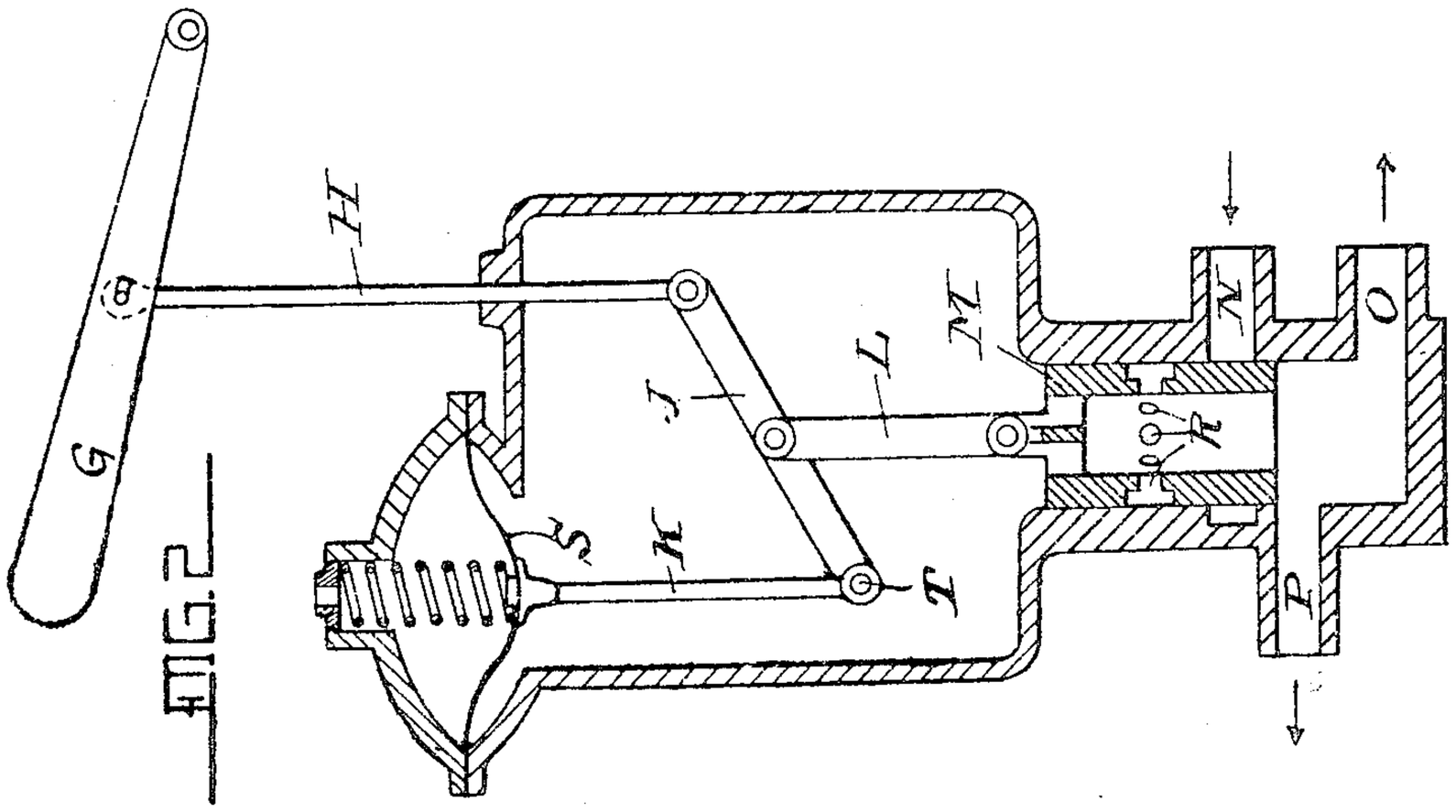

FIG. 2

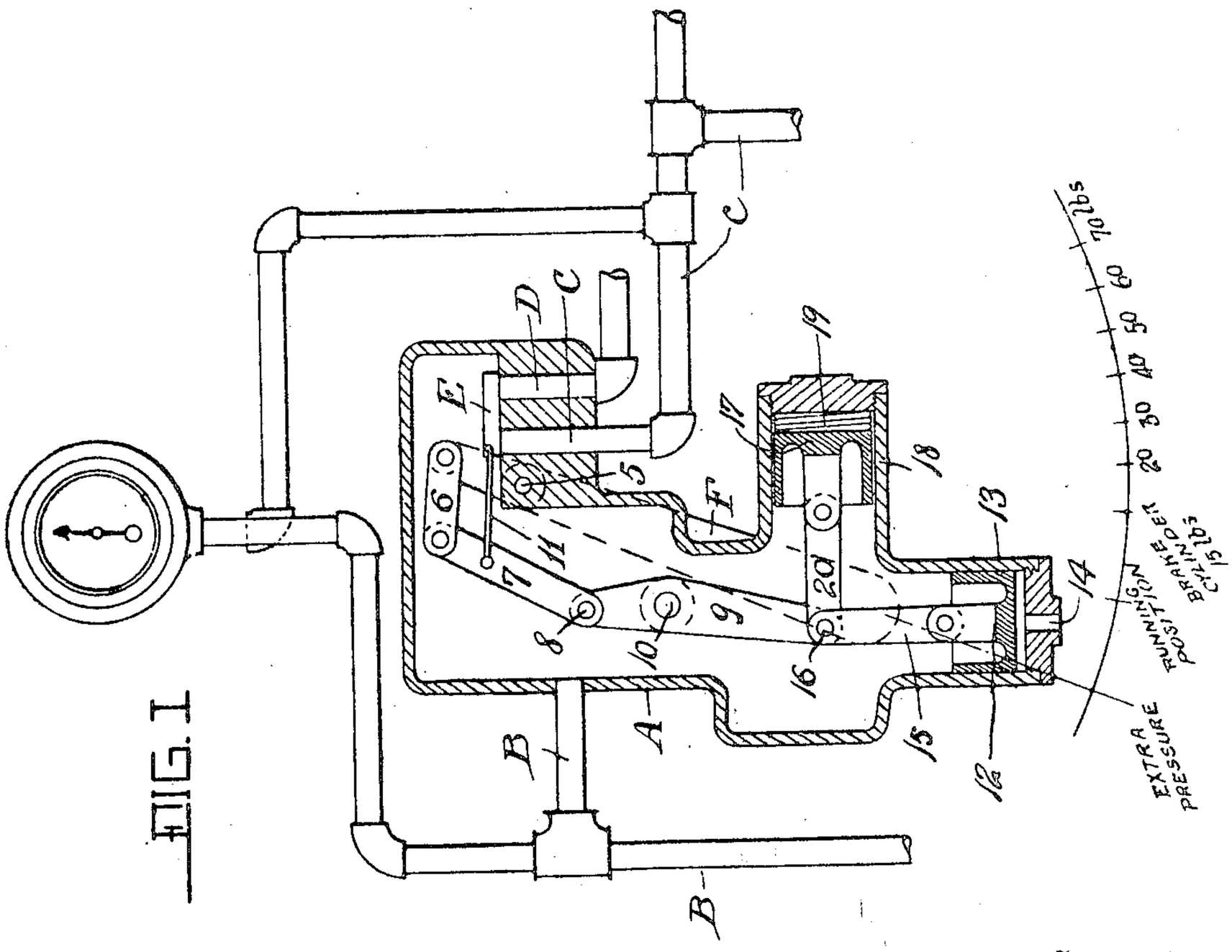

FIG. 1

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2 SHEETS—SHEET 2.

FIG. 4

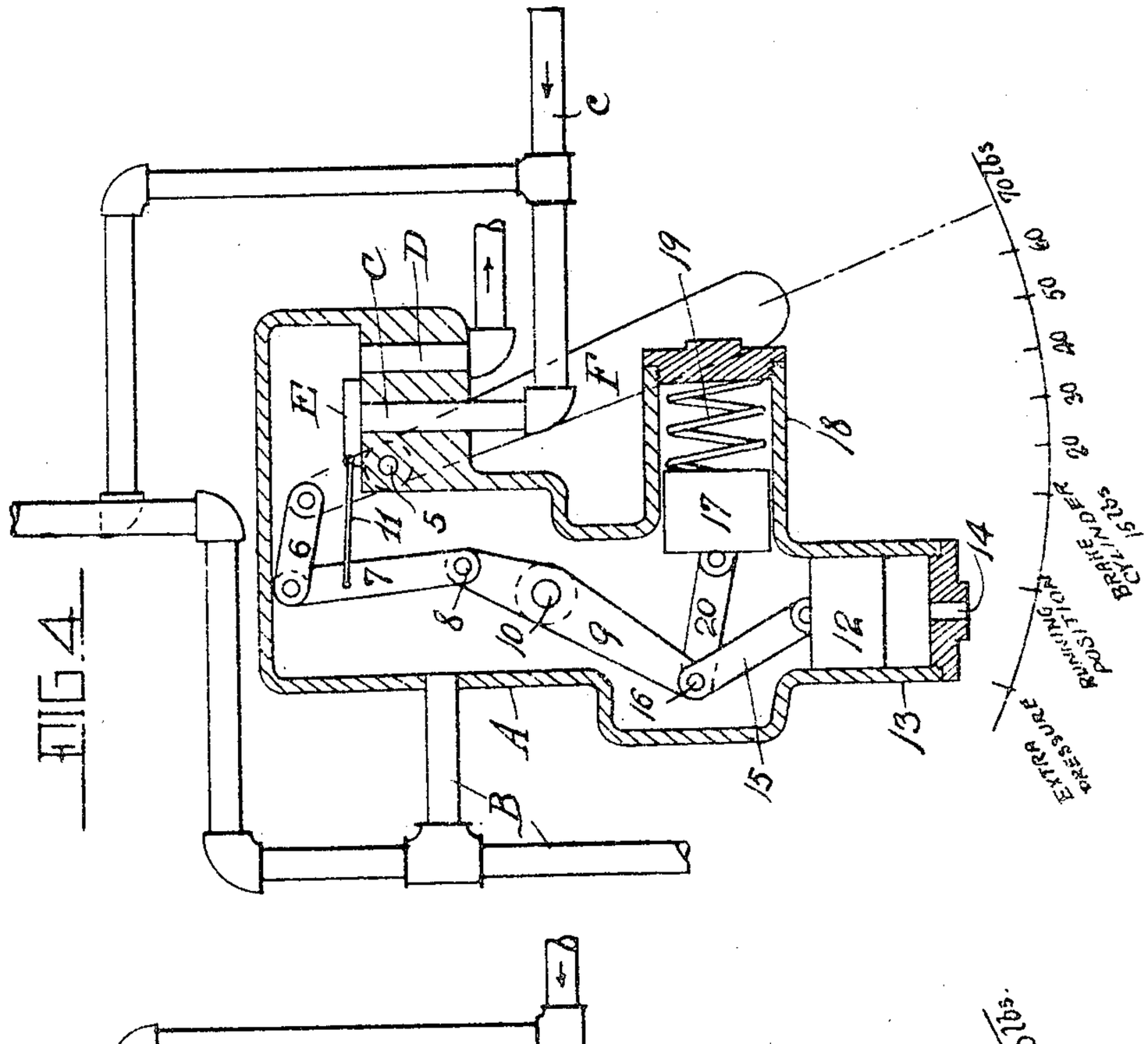
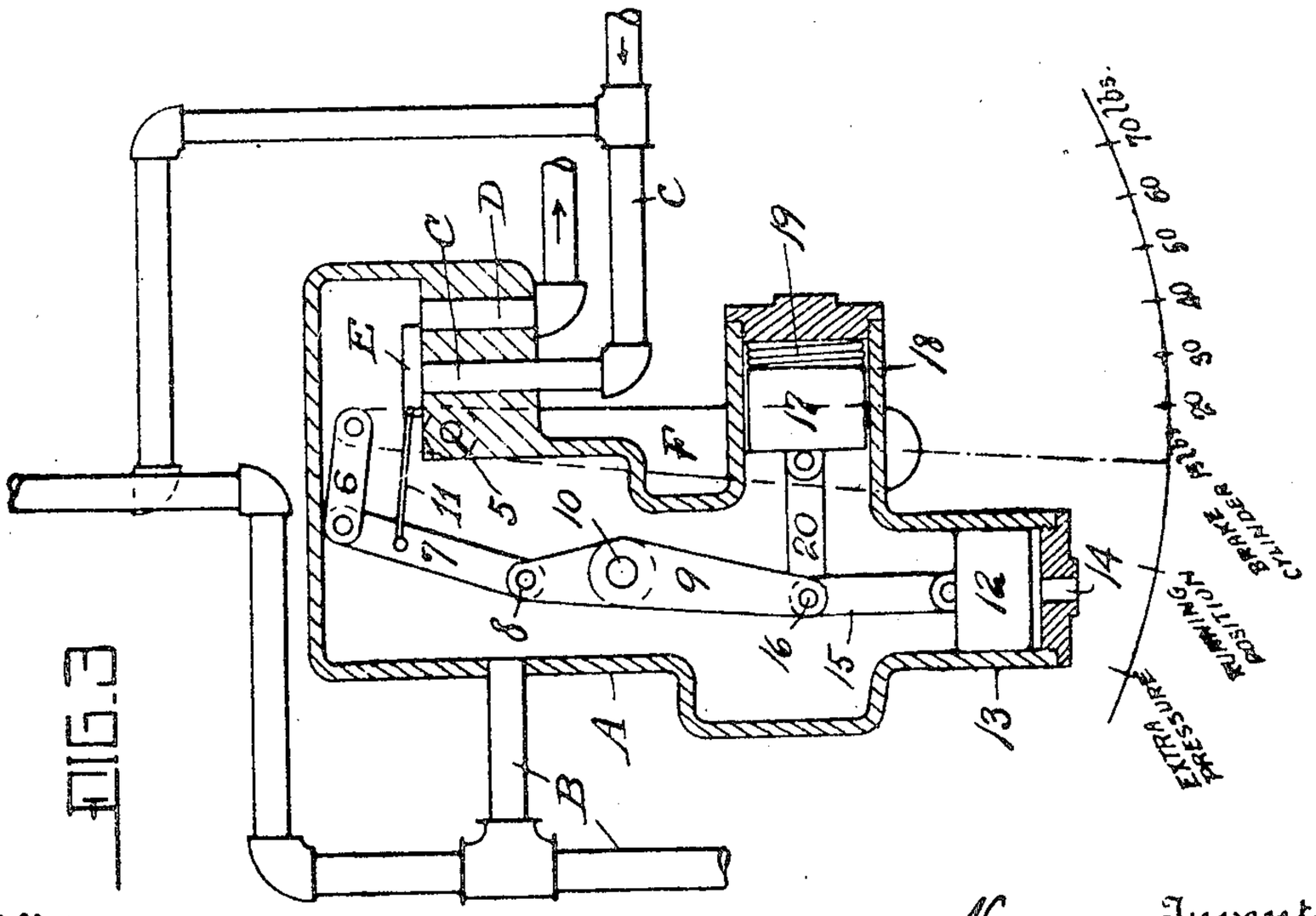


FIG. 3



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AIR-BRAKE-CONTROL MECHANISM.

No. 890,931. Specification of Letters Patent. Patented June 16, 1908.

Application filed March 30, 1907. Serial No. 365,552.

To all whom it may concern:

Be it known that I, HAROLD ROWNTREE, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have made a certain new and useful Invention in Air-Brake-Control Mechanism, of which the following is a specification.

This invention relates to air brake control mechanism and particularly to the engineer's control valve mechanism by which the supply of pressure to the brake cylinders is controlled.

The object of the invention is to provide an air brake control mechanism wherein the position of the control valve operating handle determines and controls in exact relation the train pipe pressure irrespective of leaks, wherever they may occur, and regardless of variations in the main tank pressure.

A further object is to provide means by the conjoint action of which the pressure maintained in the train pipe always bears a definite relation with reference to the position occupied by the contral valve operating handle, thereby enabling the engineer to always know by reference to the position of his control valve operating handle, the exact degree of train pipe pressure.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative 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.

In the accompanying drawings,—Figure 1 is a view in section of a construction of control mechanism embodying the principles of my invention. Fig. 2 is a similar view showing a modified arrangement embraced within the spirit and scope of my invention. Figs. 3 and 4, are views similar to Fig. 1 showing the parts in different positions under different operating conditions.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

In carrying out my invention in its broadest scope, I propose to provide means arranged to oppose the train pipe pressure and to utilize the conjoint action of such pressure and the opposing means to effect the desired valve control.

In another aspect, or statement of the principles of my invention, I propose to provide a movable fulcrum for the valve control devices, the movement of such fulcrum being controlled conjointly by the train pipe pressure and an opposing pressure, whereby a definite relation is maintained between the position occupied by the valve operating handle or to which the handle may be moved, and the train pipe pressure, regardless of the length of time such handle may occupy such position and regardless of whether such handle is moved to a position which will increase or will decrease the previous pressure, or whether or not leakage occurs at any point in the system.

These broad principles of operation may be carried out in many specifically different constructions and arrangement of devices. While, therefore, I have shown various forms, constructions and arrangements of devices, for accomplishing the objects and purposes of my invention, and will presently describe the same in detail, I desire it to be understood that in its broadest scope my invention is not to be limited or restricted to the exact details shown and herein described.

In the drawings reference sign A, designates the valve casing, B, the train pipe, C, the pressure or train pipe supply port, D, the exhaust port, E, the valve for controlling said ports and F, the valve operating handle. This handle is pivotally mounted as at 5, and, instead of being directly connected to the valve E, said handle is connected by means of a pivoted link 6, to one end of a rocking arm 7, the other end of said arm being pivotally connected as at 8, to one end of lever 9, pivotally mounted as at 10, intermediate its ends. A rod 11, connects the valve E to the arm 7, at a point intermediate the ends of the latter. If the lever 9 afforded merely a fixed support about which the arm 7 rocks on the pivot 8, then the valve E, would occupy whatever position to which it may be moved by the rocking of the control handle, and consequently the system would be subject to the variation in the train pipe pressure due to leaks, and the resulting pressure would depend on the length of time the handle was maintained in one position, and no definite relation between the position of the valve operating handle and the train pipe pressure could be maintained. Therefore, in accordance with my invention, I propose to employ the conjoint action of the train pipe

pressure, and an opposing force to effect such a shifting of the fulcrum about which the arm 7, rocks that the desired relation of the position of the valve operating handle and the train pipe pressure is maintained whether leaks occur or not, and regardless of the length of time the control handle remains in its position and whatever may be the variation in the main tank pressure. In one form of apparatus embodying this idea I employ a piston 12, arranged to operate in a cylinder 13, which said piston fits tightly, and which cylinder is open to the atmosphere at one end as at 14, and to the train pipe pressure at the other end, whereby said piston is always subjected to the train pipe pressure. This piston 12, is connected through a pivoted link 15, to the end of lever 9, on the opposite side of the pivot 10, of said lever from the fulcrum of arm 7, the point of pivotal connection of said link and lever being indicated at 16. The opposing pressure, that is, the pressure which I employ in opposition to the train pipe pressure, and by the conjoint action of which in connection with the train pipe pressure, I secure the objects and accomplish the purposes above noted, is also applied to the lever 9, at the point 16, and preferably in a line at right angles to the direction of movement of the piston 12. This opposing force or pressure may be in many different forms. Instead of employing main tank pressure for this purpose, although such pressure is well adapted to the same, I prefer to employ a spring pressure for the reason that thereby I avoid the variation and uncertainties of action of the apparatus resulting from variations in the main tank pressure. Where a spring is employed it may be arranged in many specifically different ways. In the form shown, to which, however, my invention is not to be limited or restricted, I arrange a loose piston 17 in a cylinder 18, the looseness of said piston within the cylinder enabling the train pipe pressure to equalize on opposite sides thereof, and I interpose a spring 19, between the outer face of said piston and the end wall of said cylinder. The inner face of the piston is connected by means of a pivoted link 20 to the lever 9, at the point 16.

It will be observed that the train pipe pressure is opposed by the tension of spring 19, and consequently when the train pipe pressure increases, it tends to move the piston 12, downwardly and thereby also moves the piston 17 outwardly and to further compress the spring 19. The more this spring is compressed, the greater will be its resistance to further compression, and the further piston 12, moves downwardly, the greater the leverage the spring actuated piston 17 has over the pressure actuated piston 12, and therefore, an increase or decrease in the train pipe pressure will not cause the lever 9, to move to one limit or the other, of its movement, but will only cause sufficient movement to balance the action on lever 9, of the pressure actuated piston and the spring actuated piston. A further increase or decrease of train pipe pressure will cause a new position of lever 9, to be taken up, so that there will be a definite position of lever 9, for every definite degree of train pipe pressure. When the train pipe pressure is at its maximum, then the piston 12 is held in the limit of its movement in the cylinder 13, and consequently the lever and hence also the fulcrum point 8, of the arm 7 are held in their extreme fixed position and relation. This is the position of the parts shown in Fig. 1, wherein the valve operating handle F, is shown standing in its position of "extra pressure" meaning, thereby, that an extra degree of pressure is being supplied to the drain pipe.

It should be understood that the wording on the quadrant of the control handle, as indicated in the drawing, is adapted especially for the use of a controlling mechanism in connection with an indirect air brake system, and the "extra pressure" position of the control handle may be utilized for the purpose of charging the auxiliary tanks with additional pressure. I do not desire, however, to be limited or restricted in this respect, as the "extra pressure" position of the control handle, or rather the pressure condition resulting from such position may be utilized for any other desired or convenient purpose.

While I have described my improved control mechanism in connection with air brake mechanism, I desire it to be understood that such control mechanism is not to be limited or confined to such use, but is equally well adapted for any other purpose where it is desired to control the resulting pressure by the position of the control handle, that is, where the pressure condition bears a definite relation with respect to the position of the control handle, regardless of the time it may occupy such position, and regardless of leaks in the system. It is also obvious that a control mechanism embodying the principles of my invention is equally well adapted for use in connection with the control of direct pressure systems of air brake devices as with indirect systems, and therefore, while the quadrant, as shown in the drawing, is marked for use on the indirect system, whereby "extra pressure", means extra pressure in the auxiliary tank, "running position" means no pressure on the brakes, "brake cylinder 15 lbs.", means that the corresponding position of the control handle will maintain a sufficient pressure in the train pipe to cause a brake cylinder pressure of 15 pounds to be applied, and so on, still it is obvious that the quadrant may be otherwise suitably marked where the control mechanism is employed in connection with a direct system, or for any other purpose

where a pressure is required which is constant for each position of the control handle, such pressure varying with the position of the handle. If, however, the train pipe pressure is reduced to a point below the power or force exerted by the spring 19, or other opposing medium then, and in exact proportion or relation to the differences of such pressures or forces, the point 16, is varied, thereby rocking lever 9, to a greater or less degree, and hence correspondingly varying or shifting the fulcrum point 8, of arm 7, and thereby effecting control of the valve E so that the position occupied by the valve operating handle will bear a fixed and definite relation to the train pipe pressure, and hence also to the brake applying pressure, or otherwise the latter is inversely proportional to the former. In this connection I desire it to be understood that while a train pipe pressure controlling mechanism embodying the principles of my invention is well adapted for use in connection with a wide variety of different arrangements of brake cylinder pressure controlling mechanisms, in practice I prefer to employ said train pipe pressure controlling mechanism in connection with a brake cylinder pressure controlling mechanism wherein the pressure supplied to the brake cylinder is always in inverse proportional relation with respect to the train pipe pressure. Such a brake cylinder pressure controlling mechanism is shown, described and claimed in my pending application Serial No. 365,551, filed March 30, 1907. In this case, therefore, the position of the control handle F, always bears a definite relation to the pressure in the brake cylinder by establishing a corresponding or condition of train pipe pressure, and irrespective of leakage at any point in the system.

In the operation of the device the rocking movement of lever 9 always tends to move the valve to lap or closed position with reference to both ports C, D. Thus, suppose with the ports occupying the relative positions shown in Fig. 1, which is the position of extra pressure, as indicated, it is desired to reduce the pressure in the train pipe so as to produce a pressure in the brake cylinders of, say, fifteen pounds. In such case the operating handle F, is moved to the position indicated in the Fig. 3, thereby rocking arm 7, in a direction to shift the valve E, to uncover exhaust port D. Therefore the train pipe pressure is instantly reduced and hence enabling the opposing spring 19, to rock lever 9, thereby shifting the fulcrum 8, of arm 7, in a direction tending to return or restore the valve E, to closed position with reference to exhaust port D. This closing movement of the valve will continue, without however affecting the position of the operating handle, until the valve E occupies such position as will effect the desired condition of train pipe pressure to cause to be supplied fifteen pounds of pressure to the brake cylinder. Now suppose it is desired to attain a pressure of seventy pounds in the brake cylinders. In such case the operating handle F, is moved to the proper point corresponding to that pressure, as indicated in Fig. 4. This movement of the handle operating through link 6, arm 7, and rod 11, effects a movement of valve E, to open the exhaust port D, the arm 7 rocking about its fulcrum point 8. As the pressure in the casing A, that is, the train pipe pressure begins to fall, the piston 12 is raised through the increasing preponderance of the force opposing the train pipe pressure afforded by spring 19, or other medium employed for such purpose, thereby rocking lever 9, and hence shifting or moving the fulcrum 8, of arm 7, so as to tend to again close the exhaust port D. This closing tendency is maintained until the valve E attains such position as will maintain the train pipe pressure at such point as to cause seventy pounds pressure in the brake cylinder. In this manner a definite relation is always maintained between the position occupied by the valve operating handle and the train pipe pressure, and hence, also of the brake cylinder pressure irrespective of the length of time the handle occupies any particular position to which it may be moved, irrespective of variations of main tank pressure and irrespective of any leakage that may occur at any point in the train pipe. Of course the position to which the operating handle may be moved to secure any desired train pipe pressure may be indicated by a quadrant, or otherwise, as may be desired, and as indicated in the drawings. In case a quadrant is used it may be of the usual construction such as is employed in connection with control mechanisms, the handle being held in each of its positions of adjustment.

In Fig. 2, I have shown a modified arrangement for accomplishing my objects and purposes, and which is included within the broad scope and purview of my invention, and wherein the pressure valve is connected so as to operate on a direct system. In this form of apparatus the operating handle G, is suitably connected by a rod connection H, or otherwise, to one end of rocking lever J. To the other end of said lever J, is pivotally connected a rod K, which forms a connection with a diaphragm S, arranged to be acted upon by the train pipe pressure. Intermediate its ends the lever J, is pivotally connected by means of a rod L, to a piston valve M, arranged to control the pressure supply port N, the brake cylinder pressure controlling port O, and the exhaust port P. The valve M, is hollow and is provided with the openings R, therethrough at a point to coöperate with the pressure supply port N, when said valve is moved into the proper position. In this position of the parts shown

the brake cylinder pressure controlling port O, is opened to exhaust. This condition obtains where there is no pressure in the brake cylinder. Now suppose it is desired to supply the brake cylinder with a certain degree of pressure. The handle G, is rocked to the required position corresponding, in accordance with the principles of my invention, to the required pressure to be developed in the brake cylinder. This movement of the handle G, rocks lever J, about the point T, as a fulcrum, thereby shifting the valve M, into position to close the exhaust port B, and to open the pressure supply port N through the valve to the brake cylinder pressure controlling port O, and also to the diaphragm S. This diaphragm thereupon acts to move the fulcrum T, of lever J, and consequently, also, the valve M, into such relative position as to cause the brake cylinder pressure to attain the desired degree as indicated by the position of the handle G. In this manner, as in the case of the construction disclosed in Figs. 1, 3 and 4 a definite relation is always maintained between the position occupied by the valve operating handle and the brake cylinder pressure, irrespective of the length of time the handle occupies any particular position to which it may be moved, and irrespective of any leakage that may occur at any point in the system in connection with which the apparatus is employed.

From the foregoing descripton it will be seen that the desired relation is established between the position occupied by the valve operating handle and the degree of pressure maintained in the brake cylinder, regardless of whether such handle is moved to increase or decrease the previous pressure, and regardless of leaks.

It will be seen that the effect produced upon the valve by the movement of the operating handle to any position is controlled and automatically counteracted by the conjoint action of the train pipe pressure and an independent opposing force and medium, which conjoint action, in the performance of its function, is always proportional and in definite relation to the degree of pressure in the brake cylinder corresponding to the position of the control handle, and that if air leaks into or out of the system the valve automatically adjusts itself without any movement of the operating handle to compensate for the variation due to such leak thereby maintaining the brake pressure uniform and constant and in true correspondence and relation with the position of the handle.

It will also be seen that an engineer's control valve embodying in its construction the principles of my invention is applicable alike to direct as to indirect or exhaust systems.

Having now set forth the object and nature of my invention and various constructions embodying the principles thereof, and having explained such constructions, and the purposes, function and mode of operation thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent is:—

1. In a pressure controlling mechanism, a valve, an operating handle, intermediate devices connecting said handle and valve, and means controlled conjointly by the pressure controlled by said valve and an independent force for automatically shifting said connecting devices whereby said pressure and the position of the operating handle always bear a definite relation.

2. In a pressure controlling mechanism, a valve, a control handle, pivoted connections between said handle and valve, and means actuated by the conjoint action of the pressure controlled by the valve and an independent force for controlling said pivoted connections whereby the resulting pressure bears a definite relation to the position of the control handle.

3. In a pressure controlling mechanism, a valve, a control handle connections between said valve and handle, and means also connected to said valve and operated conjointly by the pressure medium controlled by said valve and an independent opposing force for automatically varying the position of the valve.

4. In a pressure controlling mechanism, a valve, an operating handle connected thereto, and means connected to said handle connecting means, and controlled conjointly by the pressure and an independent force for maintaining a definite relation between such pressure and the position of the handle.

5. In a pressure controlling mechanism, a valve, an operating handle connected thereto, and means connected to said handle connecting means, and controlled conjointly by the pressure medium and a spring, for maintaining a definite relation between such pressure and the position of the handle.

6. In a pressure controlling mechanism, a valve, an operating handle therefor, a movable fulcrum coöperating with said handle to control the movements of said valve, and means actuated by the pressure medium and an independent opposing medium for automatically shifting said fulcrum.

7. In a pressure controlling mechanism, a valve, an operating handle therefor, connections between said handle and valve, a movable fulcrum for said connections, and means operated conjointly by the pressure medium and an independent force for controlling the position of said fulcrum, whereby the pressure always bears a definite relation with reference to the position of the control handle.

8. In a pressure controlling mechanism, a valve, an operating handle therefor, and means also connected to the valve operated by the conjoint action of the air pressure

controlled by said valve and an independent opposing pressure, for regulating the position of the valve.

9. In a pressure controlling mechanism, a valve, an operating handle therefor, a rocking arm interposed in the connection between the operating handle and the valve, and means operated by the conjoint action of the pressure controlled by the valve and an opposing spring for automatically shifting the fulcrum of said arm, whereby the position of said handle always determines the pressure controlled by the valve.

10. In a pressure controlling mechanism, a valve, an operating handle, a rocking arm interposed in the connection between the operating handle and the valve, and means controlled by the conjoint action of the air pressure and an independent opposing force, for rocking said arm.

11. In a pressure controlling mechanism, a valve, an operating handle and means controlled by the conjoint action of the air pressure and an independent opposing force tending to restore said valve when moved by said handle.

12. In a pressure controlling mechanism, a valve, an operating handle, and means controlled by the conjoint action of the air pressure and an independent opposing spring tending to restore the valve to closed position when moved by said handle.

13. In a pressure controlling mechanism, a valve, an operating handle, connections between said handle and valve, and arranged to be acted upon by the pressure controlled by said valve, and independent means also arranged to act upon said connections in opposition to said pressure.

14. In a pressure controlling mechanism, a valve, an operating handle, connections between said handle and valve, and arranged to be acted upon by the pressure controlled by said valve, and a spring also arranged to act upon said connections in opposition to said pressure.

15. In a pressure controlling mechanism, a valve, an operating handle, a rocking arm, to which said handle is connected, a rod connecting said arm and valve and means controlled by the conjoint action of the air pressure and an opposing force for automatically rocking said arm.

16. In a control mechanism for air brake systems, a valve, and means for controlling said valve solely through the conjoint action of a control handle, the train pipe pressure, and an independent force arranged to oppose such pressure.

17. In a control mechanism for air brake systems, a valve, an operating handle, a pivoted lever, an arm pivotally connected to one end of said lever, connections between said lever and the valve and handle respectively, and means actuated solely by the pressure controlled by said valve and an independent force for automatically rocking said lever.

18. In a pressure controlling mechanism, a valve, an operating handle, a pivoted lever, an arm pivotally connected to one end of said lever and having connections with said handle and valve respectively, and means for rocking said lever under the control of the pressure and an opposing force.

19. In a control mechanism for air brake systems, a valve, an operating handle, a pivoted lever, an arm pivotally connected to one end of said lever, and having connections with said handle and valve respectively, a piston operated on by the train pipe pressure, and connected to the other end of said lever, and a spring arranged to oppose the action of the train pipe pressure.

20. In a pressure controlling mechanism, a valve casing having cylinders arranged in angular relation with respect to each other, pistons for said cylinders, one of said pistons being acted upon by the pressure in said casing, a spring acting upon the other of said pistons, a control valve, an operating handle therefor and connections between said pistons and valve for automatically controlling the latter.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 28th day of March A. D., 1907.

HAROLD ROWNTREE.

Witnesses:
JOSEPH KLEIN,
S. E. DARBY.