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AUTOMATIC PRESSURE CONTROLLING DEVICE FOR BRAKE MECHANISMS.

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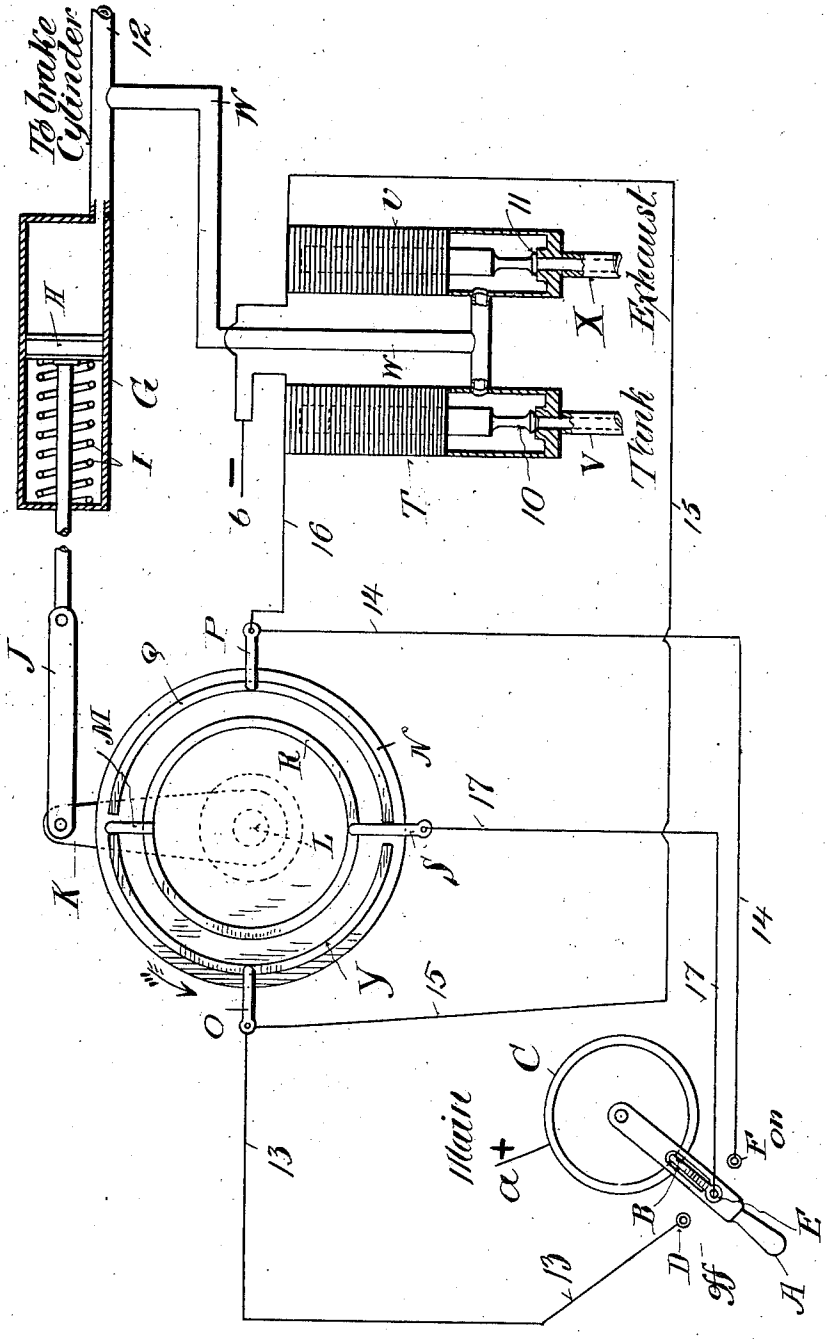

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AUTOMATIC PRESSURE-CONTROLLING DEVICE FOR BRAKE MECHANISMS.

976,925. Specification of Letters Patent. Patented Nov. 29, 1910.

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To all whom it may concern:

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

This invention relates to automatic pressure controlling devices for brake mechanism.

The object of the invention is to provide means for regulating the application of the brake pressure according to the speed of movement of the car.

A further object is to provide means for automatically controlling the application of the brake pressure proportionately to the speed of movement of the car.

A further object is to provide means whereby the maximum pressure permissible to be applied by the brake mechanism is automatically varied in proportion to the speed of the car.

A further object is to provide means controllable conjointly by the pressure itself and by the speed of the car for regulating the application of the pressure to the brake mechanism.

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 drawing and finally pointed out in the appended claims.

The drawing shows partly in diagram and parts in section, an arrangement of automatic pressure controlling mechanism embodying the principles of my invention.

In stopping the motion of a car, or of a train by the application of air brakes it is desirable that the pressure applied shall not increase beyond a certain point as the application of too great an amount of pressure will cause the brake shoes to freeze to the wheels and stop the car or train too suddenly, thereby causing trouble, and frequently disastrous and even fatal accidents. The amount of pressure permissible to be applied depends on the speed of the train or car, the faster the train or car is moving at the instant the brakes are applied, the greater the pressure which it is permissible to apply without danger. In the ordinary form of brake control, the motorman or engineer in order to stop his car or train, manipulates his control handle to admit a fairly heavy pressure to the brake cylinders without knowing the maximum pressure allowable to be applied for the particular speed at which the car or train is moving without danger, the amount of pressure so applied being governed only by the judgment and experience of the motorman or engineer. As the car or train slows down under this application of pressure the motorman or engineer bleeds the pressure out so as to reduce the same. It is among the special purposes of my invention to provide means whereby the motorman or engineer by merely moving his control handle to a certain position effects an application of the maximum degree of pressure permissible without danger according to the speed at which the car or train happens to be moving at the instant of such application, and without depending on his own skill, judgment, discretion or experience, which may be faulty. And I also propose to provide means whereby as the car or train diminishes in speed the brake pressure is proportionately and automatically decreased, thereby enabling the train or car to slow down and stop at all times with great smoothness, and without danger of injury, and within a minimum distance.

In carrying out my invention I provide means controlled conjointly by the pressure medium and the speed at which the car or train is moving, for automatically regulating the supply of pressure to the brake mechanism.

Many specifically different constructions and arrangements of devices and appliances may be devised for carrying my invention into practical operation. While, therefore, I have shown and will now describe one arrangement well suited for the purpose, I do not desire to be limited or restricted, in the broadest scope of my invention as defined in the claims, to the particular or any specific structure arrangement or details.

In the arrangement shown A, designates the motorman's control handle upon which is mounted a contact member B, which is arranged to make contact with a conductor C, in whatever position to which the handle A, may be moved. The conductor C, is shown

in the form of a ring concentric with the axis about which the handle A turns. The conductor C, is connected through wire *a*, to a source of current. The contact member B coöperates with contact points D, E, F, respectively connected up in circuit relation as will be more fully explained hereinafter.

In a small cylinder G, is arranged a piston H, one side of which is exposed to the pressure medium as supplied to the brake mechanism, and the other side of which is acted upon by a spring I, the tension of the latter being normally exerted to move the piston H, toward that end of the cylinder G, which is in communication with the pressure supply connections to the brake mechanism. The piston H is connected by a rod J, to the free end of a rock lever K, pivotally mounted to rock or swing about an axis L. Mounted concentric with the axis of, or in coöperative relation with respect to lever K, is a member N, which, in this instance, is in the form of a rotative disk. This disk is designed to be rotatively displaced to a degree proportionate to the speed at which the car is moving. For this purpose I propose to rotatively actuate said disk from an axle or other convenient running part of the car. Any suitable form of well known speedometer which is driven from a rotating part of the running gear of the car, and which rotatively displaces the disk proportionally to the speed of the car will answer. A speedmeter such for instance and as illustrative of one form of embodiment of operative means, for the purpose, as is shown in the patent to Weston No. 277,179, dated May 8th, 1883, will serve my purposes but I do not wish to be limited or restricted in this respect.

By employing a disk rotatively displaced as above explained, it will be seen that the faster the train or car is traveling the greater will be the degree of rotative displacement of said disk, the arrow indicating the direction of rotative displacement thereof. The disk N has mounted on the face thereof two circular contact strips Q, Y, separated from each other and also a contact ring R. The lever K, carries a contact strip M, arranged to bridge the space between the ring R and one or the other of the strips Q, Y, according to the relative positions of the disk and lever. Bearing against the strip Q, is a brush or contact O, and bearing against strip Y, is a brush or contact P. A similar brush or contact S, bears against contact ring R. Reference signs T, U, designate electro-magnets respectively arranged to operate valves 10, 11. These valves control the supply and exhaust of air to and from the brake cylinder. When the magnet T is energized the valve 10, is moved from its seat thereby admitting the pressure medium from the tank or other source (not shown) through the pipes V, W and 12, to the brake cylinder, (not shown). When the magnet U, is energized the valve 11, is moved from its seat thereby opening the brake cylinder to exhaust through pipes 12, W and X. The pressure connection W, 12, is also in communication with one end of cylinder G, so that the pressure medium is enabled to act against the inner face of the piston H.

The brush contacts O, P, are respectively in electrical connection with contact points D, F, through wire or other connections 13, 14, and also through wire or other connections 15, 16, with one of the terminals of the windings of the electro-magnets U, T, the other terminals of the magnet windings are both connected to the negative or return main *b*. The brush S, is in electrical connection with contact point E, through wire or other connection 17.

The operation is very simple, and is as follows: By placing the control handle A, in position for the contact B, to make contact with contact point D, the circuit just traced is broken while another circuit is completed from the source of current through the positive supply main *a*, to contact C, and thence through strip B, contact D, connection 13, brush O, connection 15, the windings of magnet U, to the negative main *b*. The resulting energization of magnet U, causes valve 11, to be unseated thereby opening the brake cylinder, cylinder G, pipes 12 and *w*, to exhaust, and relieving the brakes of all pressure. If now the control handle is shifted into position for strip B, to make contact with point F, the circuit from the source of energy is completed from main *a* through contact C, strip B, contact F, connection 14, brush P, connection 16, the windings of electro-magnet T, and to the return main *b*. The resulting energization of magnet T, causes valve 10, to be unseated thereby admitting pressure to the brake mechanism. In this way by suitably and properly manipulating the handle A back or forth from D to F or from F to D, that is to and from "on" and "off" positions the application of the brakes and the bleeding of the pressure is accomplished in the present usual way. If, however, it is desired to apply the maximum pressure that can be applied with safety, the motorman places his control handle in position for the strip B, to contact with point E. Thereupon the following circuit is completed from the main *a*, through contact C, strip B, point E, connection 17, brush S, ring R, and strip M. If the car is in motion at this instant, then the disk N will be in rotatively displaced position, in the direction indicated by the arrow, and consequently strip M, will also be in contact with strip Q, consequently the above traced circuit will continue from strip M, to strip Q, brush P, connection 16, magnet T, and thence to return *b*. Therefore

pressure will be supplied and the brakes applied. As the brake pressure builds up behind piston H, said piston is forced outwardly in cylinder G, against the action of spring I, thereby moving rod J, and rocking lever K, in the direction of the arrow. When contact M, in this rotative movement of lever K, reaches the space between the adjacent ends of strips Q, Y, the last traced circuit is broken and the magnet T is deënergized. The distance through which the lever K is moved before the contact M reaches the space between the adjacent ends of strips Q, Y, will of course depend upon the extent to which the disk N has been rotatively displaced, and this, in turn, is dependent upon the speed at which the car is traveling. As the speed of the car begins to diminish under the application of the braking pressure, as above described, the disk N begins its return rotation in a direction opposite that of the arrow and eventually strip M, will contact with strip Y, and then the circuit from strip M, will be completed through strip Y, brush O, connection 15, magnet U, to return *b*, thereby opening the brake mechanism to exhaust. This will reduce the pressure in cylinder G, and the piston H, will begin its travel under the influence of spring I, thereby rocking lever K, in a direction opposite that indicated by the arrow until the strip M again reaches the gap between the adjacent ends of strips Q, Y, thereby opening the circuit. If the car still has any headway the disk N will still be more or less displaced rotatively in the direction indicated by the arrow, and hence the strip M, will again be brought into contact with strip Q, for another application of pressure. This action continues as long as the controller handle remains in its central position, that is, in position for the strip B, to contact with point E, and consequently the pressure supplied to the brake cylinder is maintained proportional to the speed of the car until finally the car comes to rest, when the disk N, and lever K will occupy their normal and relatively neutral or inactive positions with the strip M, in the gap between the adjacent ends of strips Q, Y.

The relative position and extent of movement of arm K, as determined by the strength of spring I, should be so regulated in relation to the rotative displacement of disk N, as to determine the maximum degree of pressure which would be safe to be applied to the brake for the particular speed at which the car is moving at any given instant. Thus the piston H, is balanced between the brake pressure and the spring I, and since this balance is controlled by the brake pressure and since the lever K cooperates with the rotatively displaceable disk N, which latter is controlled by the speed of the car, it will be seen that the desired automatic control of the brake pressure is effected through the conjoint action of the pressure and the speed of the car, and therefore this control is so regulated that not only is the maximum safe pressure always initially applied but also this application as well as the continued application of brake pressure is controlled automatically so as to remain proportional to the speed of the car and all that is required of the motorman is to move his control handle into position for strip B, thereon to make contact with point E.

By the use of a brake pressure controlling apparatus such as above described, a car or train can be operated at a higher speed between stations or stopping points than heretofore, or at a lower headway between succeeding cars or trains, since the slowing down of the car or train in approaching a station or stopping point may commence at a point closer to the station or stopping point than has heretofore been the case or custom in practice. In other words with the use of the apparatus embodying my invention the car or train will be brought to a stop with absolute uniformity and smoothness in the minimum time and distance after the application of the brake mechanism, thereby not only avoiding danger of disaster or injury resulting in a too sudden or powerful application of the brake mechanism, but also greatly reducing the time required in coming to a stop. These are particularly desirable characteristics of a brake control mechanism for use on interurban, subway, elevated or surface street cars where it is desirable with congested traffic to operate the trains or cars as closely as possible together, or with the least interval of space between them, and as rapidly as possible, in order to secure rapid transit of heavy or congested passenger traffic. Moreover, the danger of serious or fatal accident through collision is also largely reduced as a car or train can be stopped by the application of a control mechanism embodying the principles of my invention in the shortest space and in the shortest time.

Many variations and changes in the details of construction and arrangement might readily occur to persons skilled in the art and still fall within the spirit and broad scope of my invention as defined in the claims. But having now set forth the object of my invention, and a construction and arrangement embodying the principles thereof,

What I claim as new and useful and of my own invention and desire to secure by Letters Patent is:

1. In a brake mechanism for cars, the combination with pressure supply controlling devices, of actuating devices therefor, and means controlled conjointly by the pres-

sure supply and the speed of the car for controlling said actuating devices.

2. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of electrical devices for operating the same, and means controlled by the speed of the car for controlling the circuits of said electrical devices.

3. In a brake mechanism for cars, the combination with a pressure supply controlling valve and an independent exhaust controlling valve, of means controlled by the speed of the car for respectively controlling the operation of said valves.

4. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling valves, of means controlled conjointly by the pressure medium and the speed of the car for respectively controlling the operation of said valves.

5. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling valves, of electrical devices for operating said valves, and means controlled by the speed of the car for controlling the circuits of said electrical devices.

6. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling valves, of electrical devices for operating said valves, and means controlled conjointly by the pressure medium and the speed of the car for controlling the circuits of said electrical devices.

7. In a brake mechanism for cars, the combination with respectively independent pressure supply and exhaust controlling valves, of means for operating the same, and means controlled conjointly by the speed of the car and the pressure medium for respectively controlling said operating means.

8. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling valves, of means for operating the same, and means controlled by the conjoint action of the pressure medium and the speed of the car for controlling said operating means.

9. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of means for controlling said devices, said means including coöperating contacts, respectively controlled by the pressure supply and the speed of the car.

10. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices and electrical devices for operating the same, of means for controlling the circuits of said electrical devices, said means including a contact device arranged to be moved proportionately to the speed of the car.

11. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of means for operating the same alternately according to the speed of the car.

12. In a brake mechanism for cars, the combination with respectively independent pressure supply and exhaust controlling devices, of means for operating the same alternately, said operating means being controlled conjointly by the pressure medium and the speed of the car.

13. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, and means for operating the same, of means for controlling said operating means, including a contact arranged to be displaced in proportion to the speed of the car, and a coöperating contact arranged to be displaced in proportion to the pressure applied.

14. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of controlling means therefor, and including coöperating contacts respectively operated in proportion to the speed of the car and in proportion to the pressure applied.

15. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of controlling means therefor including a rotatable disk carrying contacts, said disk arranged to be rotatively moved proportionately to the speed of the car, and a coöperating contact carrying arm, said arm arranged to be rocked by the action of the pressure medium.

16. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of means for controlling the same including a rotatable disk carrying contacts, a lever carrying a coöperating contact, said disk arranged to be rotatively displaced proportionately to the speed of the car, a piston connected to the lever, and acted upon on one side by the pressure supply to the brake mechanism, and yielding means acting upon the other side of said piston.

17. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, of operating devices therefor and means for controlling the operating devices including coöperating devices respectively operated by the pressure supply and the speed of the car, and a control-handle coöperating with said last named devices.

18. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, and electrical devices for controlling the same, of means for controlling the electrical devices including coöperating movable contacts respectively operated by the pressure supply and the speed of the car, and a control handle for completing circuit to said contacts.

19. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, and electrical means for operating the same, of means for manually controlling the circuits of said electrical means, and automatic means, controlled by the speed of the car for controlling said circuits.

20. In a brake mechanism for cars, the combination with pressure supply and exhaust controlling devices, and electrical means for operating the same, of a manually operated handle for controlling the circuits of said electrical means, and relatively movable contacts also controlling said circuits, said movable contacts operated respectively by the speed of the car and the pressure medium.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 7th day of January A. D., 1910.

HAROLD ROWNTREE.

Witnesses:
D. SELOVER,
M. H. MARTIN.