

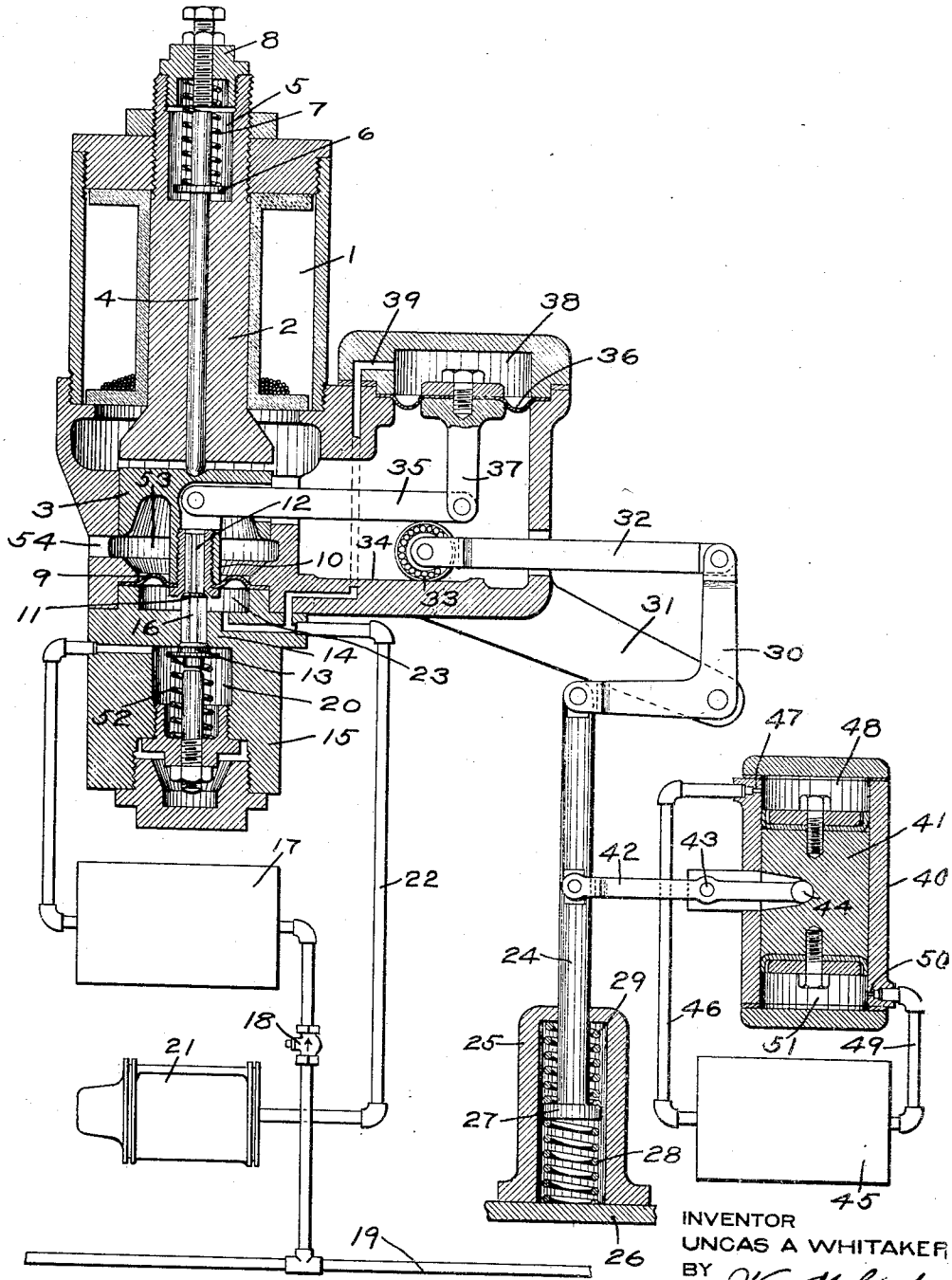
June 28, 1932.

U. A. WHITAKER

1,865,068

VARIABLE LOAD BRAKE

Filed Oct. 21, 1927



UNITED STATES PATENT OFFICE

UNCAS A. WHITAKER, OF WILMERDING, PENNSYLVANIA, ASSIGNOR TO THE WEST-
INGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORA-
TION OF PENNSYLVANIA

VARIABLE LOAD BRAKE

Application filed October 21, 1927. Serial No. 227,631.

This invention relates to electro-pneumatic brakes, and has for its principal object to provide an electro-pneumatic brake having means for regulating the braking pressure in proportion to the load on the car.

In the accompanying drawing, the single figure is a diagrammatic sectional view of a combined electro-pneumatic and variable load brake apparatus embodying my invention.

The electro-pneumatic brake portion may comprise an electro-magnet 1 having a core 2, adjacent to the pole of which is mounted an armature 3. A rod 4 extends through a central bore in the core 2 and one end of the rod engages the armature 3. The opposite end of the rod extends into a chamber 5, provided in the upper end of the core 2, and within said chamber, the rod is provided with a collar 6, which is engaged by a coil spring 7. A cap member 8, screwed into the upper end of the core 2, provides an abutment for the spring 7.

Disposed adjacent to and in axial alinement with the armature 3 is a flexible diaphragm 9, and secured to said diaphragm is a stem 10 which is carried by the armature 3. A valve 11 seats on a valve seat provided at the lower end of the stem 10 and is provided with a stem 12 which extends into a central bore of the stem 10. In axial alinement with valve 11 is a valve 13 having a seat in a partition wall 14 of casing 15, and is provided with a stem 16 which extends through a bore in said wall and engages the valve 11.

A source of fluid under pressure, such as reservoir 17, which may be charged through a check valve 18 from the usual brake pipe 19, is connected to a valve chamber 20 which contains the valve 13. The brake cylinder 21 is connected through pipe 22 with the diaphragm chamber 23.

The variable load brake mechanism comprises a plunger 24, one end of which extends into a casing 25 which is carried by the spring plank of the car truck, as indicated by the reference numeral 26. The end of the plunger 24 is provided with a head 27 subject on one side to the pressure of a coil spring 28 and on the other side to the pressure of a coil spring 29.

A bell crank lever 30 is pivotally mounted on an arm 31 carried by the casing 15 and one arm of the bell crank lever is pivotally connected to the upper end of the plunger 24, while pivotally connected to the end of the other arm is a bar 32.

Mounted on the end of the bar 32 is a roller 33 which engages at one side a face 34 in the casing 15 and on the opposite side a fulcrum lever 35. Said fulcrum lever is pivotally connected at one end to the armature 3. A flexible diaphragm 36 is provided in the casing 15 and secured to said diaphragm is a stem 37, the outer end of which is pivotally connected to the lever 35.

The chamber 38 at one side of the diaphragm 36 is connected to brake cylinder pipe 22 through a passage 39.

For maintaining the plunger 24 in its position of adjustment according to the load on the car against movement due to vibratory movement of the car body relative to the car truck, a cylinder 40 is provided which contains a double ended piston 41. A lever 42 fulcrumed on a pivot pin 43 is pivotally connected at one end to the plunger 24 and is provided at the other end with a rounded end portion 44 which engages in a socket provided in the piston 41.

A reservoir 45 containing a suitable liquid is connected through a pipe 46, and a restricted port 47 with the piston chamber 48 at one side of piston 41, and is connected through a pipe 49 and a restricted port 50 with the piston chamber 51 at the opposite side of the piston.

In operation, the spring 7 of the electro-pneumatic brake portion acts through the rod 4 against the armature 3 and tends to move the armature away from the magnet core 2. If the magnet 1 be sufficiently energized, the pressure of spring 7 will be overcome by the force of the magnetic pull of the magnet on the armature 3, so that said armature will be moved to a position permitting the valve 13 to be seated by the spring 52 and moving the stem 10 and diaphragm 9, so that the valve 11 is unseated. The brake cylinder 21 is then open to the exhaust through pipe 22, chamber 23, and past the open valve 11 to chamber

53, which is open to the atmosphere through port 54.

If it is desired to effect an application of the brakes, the current flow through the magnet 1 is reduced a certain amount, dependent on the degree of brake cylinder pressure desired. The magnetic pull of the magnet is thus reduced, permitting the spring 7 to exert its pressure through the rod 4 so as to move the armature 3 away from the magnet. By this movement the seat in the stem 10 is first brought into engagement with the valve 11 so as to cut off the exhaust from the brake cylinder, and then further movement causes the valve 13 to be unseated. Fluid under pressure is then supplied from reservoir 17 and valve chamber 20 to the brake cylinder.

When the brake cylinder pressure acting in chamber 23 has been increased to sufficient degree, the diaphragm 9 will be deflected upwardly against the pressure of spring 7 until the valve 11 is permitted to seat, but not sufficiently to permit the valve 13 to be unseated.

The above operation, however, is modified by the action of the variable load mechanism in the following manner:

The plunger 24 being supported by the car truck and the casing 15 being carried by the car body, when the car body is depressed by a load, the movement of the car body relatively to the car truck causes a clockwise movement of the bell crank lever 30 and a corresponding movement of the bar 32 toward the right. When the load on the car is decreased, a counter-clockwise movement of the bell crank lever is caused and a corresponding movement of the bar 32 toward the left is effected. The fulcrum roller 33 is thus positioned according to the load on the car and when the brakes are applied, fluid at brake cylinder pressure is supplied through passage 39 to diaphragm chamber 38 and acts through the diaphragm 36 and the stem 37 on the lever 35. The pressure exerted on the lever 35 acts on the armature 3 and tends to move same upwardly against the resistance of spring 7, in the same way that brake cylinder pressure in diaphragm chamber 23 acts on diaphragm 9.

For a given reduction in current flow through the magnet 1 in effecting an application of the brakes, the brake cylinder pressure obtained will be less as the load is decreased and the roller 33 is moved toward the left, since as the roller 33 moves toward the left, the effect of the brake cylinder pressure on diaphragm 36 as transmitted to the armature 3 is increased, so that the armature 3 is moved upwardly to close the supply valve 13 when the brake cylinder pressure has been increased to a degree less than would be the case were the variable load mechanism not effective. In a similar manner, as the load on the car is increased, the roller 33 is moved toward the right and the effect of the brake cylinder pressure on the diaphragm 36 as

transmitted through the lever 35 is correspondingly reduced, so that a higher brake cylinder pressure is obtained for a given reduction in current flow through the magnet 1.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claims.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a brake cylinder, of electro-responsive means, a valve operated by said means for supplying fluid under pressure to the brake cylinder, and a movable abutment operated by brake cylinder pressure for closing said valve, of a second movable abutment subject to brake cylinder pressure, mechanism operated by said abutment for operating said valve, and means for controlling the operation of said mechanism according to the load on the car.

2. The combination with a brake cylinder, of an electro-magnet, an armature controlled by said magnet, valve means operated by said armature for supplying fluid under pressure to the brake cylinder, a movable abutment subject to brake cylinder pressure, a fulcrum lever operatively connecting said movable abutment to said armature, and means for adjusting the fulcrum point of said lever according to the load on the car.

3. The combination with a brake cylinder, of an electro-magnet, an armature controlled by said magnet, valve means operated by said armature for supplying fluid under pressure to the brake cylinder, a movable abutment subject to brake cylinder pressure, a fulcrum lever operatively connecting said movable abutment to said armature, a movable fulcrum member for said lever, and means operated according to the load on the car for moving said member.

4. The combination with a brake cylinder, of electrically controlled means for controlling the supply of fluid under pressure to the brake cylinder and operated to control the degree of fluid pressure supplied to the brake cylinder according to the degree of pressure impressed thereon, and means for varying the degree of pressure impressed on said electrically controlled means according to the load on the car.

In testimony whereof I have hereunto set my hand.

UNCAS A. WHITAKER.