W. J. RICHARDS.

AUTOMATIC PRESSURE GOVERNOR.

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983,933.

Patented Feb. 14, 1911.

Fig. 1.

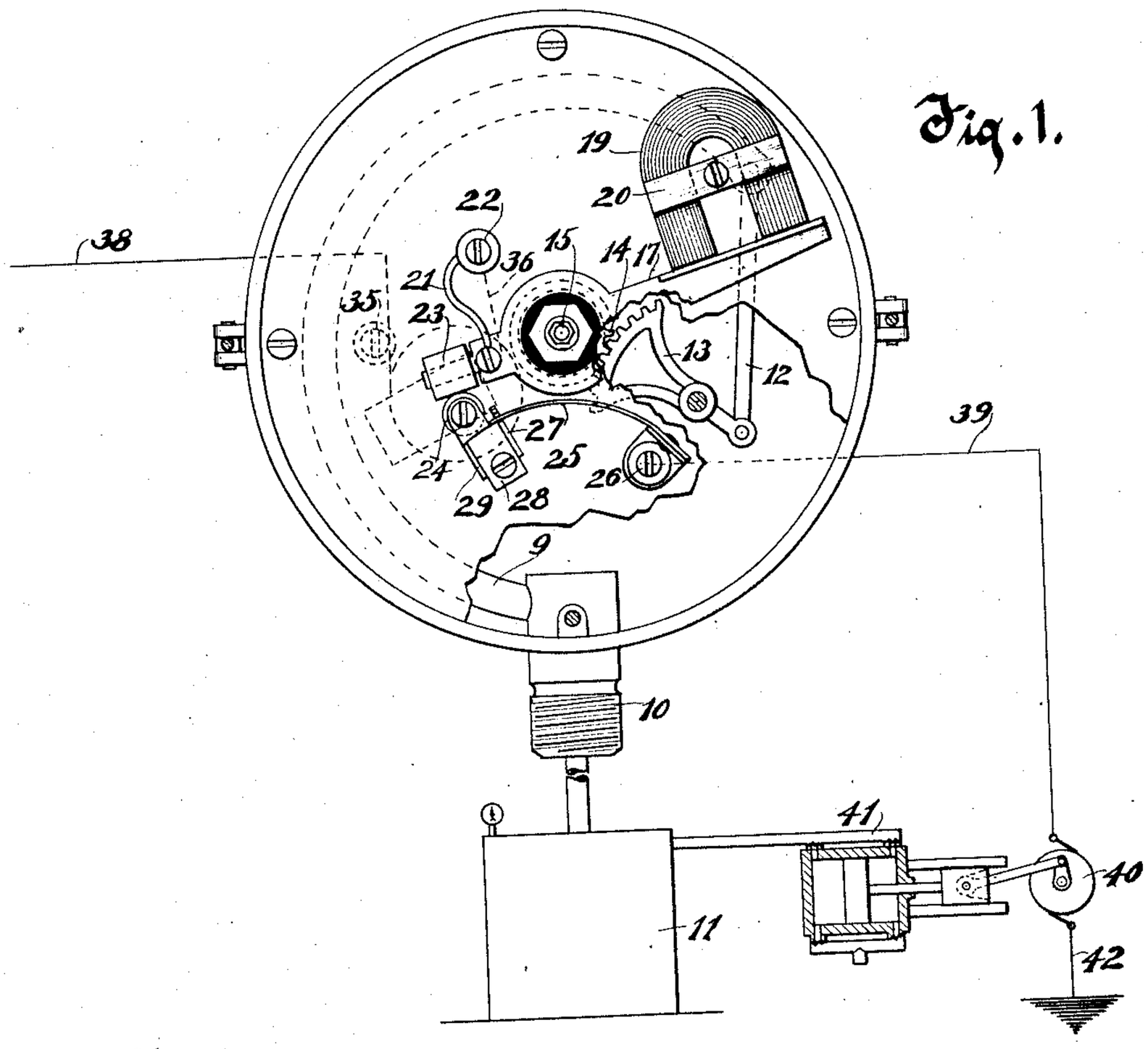
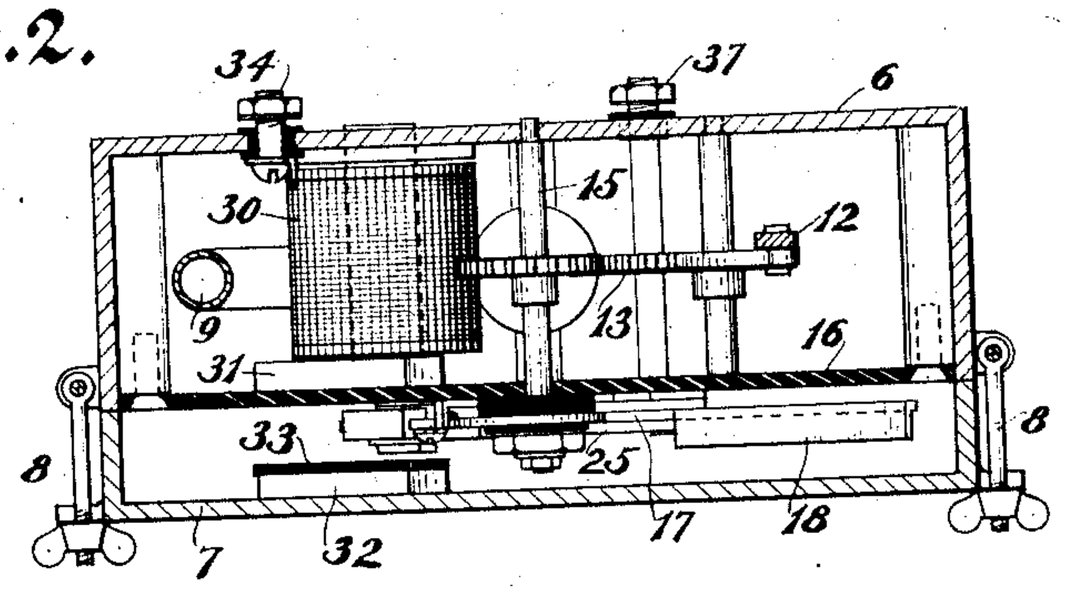


Fig. 2.



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AUTOMATIC PRESSURE-GOVERNOR.

983,933. Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed June 29, 1907. Serial No. 381,506.

To all whom it may concern:

Be it known that I, WALTER J. RICHARDS, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Automatic Pressure-Governors, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide an automatic pressure governor particularly adapted for controlling the operation of a motor compressor to maintain a given range of pressure in a fluid pressure system.

Another object of this invention is to dispense with the necessity for auxiliary or supplemental switches by providing a pressure controlled switch capable of alone carrying for the motor circuit.

Another object of this invention is to provide a pressure actuated switch with a means for producing a quick make and break, comprising a magnet attracting the switch arm for accelerating its closing movement and for retarding its opening movement until the influence of the air pressure has reached such a degree as to overcome the tendency of the magnet and produce a sudden opening movement of the switch.

With the above and other objects in view the invention consists in the automatic pressure governor claimed, its parts and combinations of parts and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the different views; Figure 1 is a front view of an automatic pressure governor constructed in accordance with this invention, with the cover removed and with the insulating disk broken away to disclose parts there behind, the governor being connected with a fluid pressure system and the motor compressor thereof shown in diagram; and, Fig. 2 is a central sectional plan view of said automatic pressure governor.

In these drawings 6 represents a casing which is preferably of iron and of the cylindrical shape as shown, with a removable cover 7 of like material clamped thereto by means of swinging bolts 8. The casing contains a Bourdon tube 9 having a suitable connection 10 for coupling it with the reservoir 11 of a fluid pressure system, usually an air brake system for electric railway cars. The closed movable end of the Bourdon tube is connected by a link 12 with a segmental rack 13 which is pivotally mounted in the casing and meshes with a pinion 14 of a pivot staff 15 also mounted in the casing. A disk 16 of insulating material is secured to the face of the casing in any suitable manner and forms a pivotal support for the rack 13 and the pivotal staff 15, there being a gage hand 17 in front of the insulating disk mounted on the pivotal staff 15 and insulated therefrom. At one end the sheet iron gage hand 17 has an outwardly bent flange 18 forming the armature of a permanent magnet 19 which is adjustably mounted on the insulating disk by means of a cleat 20. The gage hand 17 may however be separate from its armature and of any desirable material and the permanent magnet may be replaced by an electromagnet if desired. The other end of the gage hand 17 is connected by means of a flexible conductor 21 with a binding post 22 on the insulating disk and carries on a reduced extension a cylindrical contact block 23, preferably of carbon, which is adapted to engage a similar contact block 24 carried on the end of a leaf spring 25. The spring 25 is secured at 26 to the insulating disk at one end and has its other end confined between the walls of a notch in an outwardly bent flange 27 of a stop bracket 28, another outwardly bent flange 29 of which forms an additional stop for engaging the spring.

Behind the insulating disk a blow-out magnet 30 has its core connected to the casing at one end and to an elongated pole piece 31 at the other end, which pole piece lies close to the insulating disk and just behind the point of engagement between the contact blocks 23 and 24. A similar pole piece 32 is formed by a lug on the cover 7 directly opposite the pole piece 31 and these pole pieces form the poles of the blow-out magnet, the casing and its cover being relied upon to constitute a magnet frame between them. In the air gap between the poles are located the contacts so that when they break the circuit between them the arc will be disrupted by the blow-out magnet. The insulating disk forms a guard for the pole piece 31 and a plate of insulating material 33 is secured to the pole piece 32 to form a guard therefor.

A binding post 34 on the back of the casing is connected by a wire 35 with one end of the winding of the blow-out magnet and a wire 36 connects binding post 22 with the other end of said winding, there being another binding post 37 on the back of the casing which connects with the bracket 26 of the contact spring. The binding post 34 is adapted to be connected with a wire 38 from the trolley or other source of electrical supply and the binding post 37 is adapted to be connected by a wire 39 with the motor 40 of a compressor 41, the other side of the motor being connected by a wire 42 with the ground.

In operation the pressure within the reservoir 11 of the fluid pressure system causes the Bourdon tube 9 to change its position so as to move the gage hand 17 clockwise or anti-clockwise as the pressure increases or diminishes. As long as the pressure in the reservoir is below a predetermined maximum the gage hand will be in the position shown in Fig. 1, with the armature 18 held against the permanent magnet and the contacts 23 and 24 in engagement with each other, so that the circuit is complete from the trolley wire 38, through the blow-out magnet coil 30, by wires 36 and 21 to the insulated gage hand 17 and through the engaging contact blocks 23 and 24 and the spring 25 to the binding post 37, and through the wire 39 motor 40 and wire 42 to the ground. The motor is therefore caused to operate and drive the compressor and restore pressure in the reservoir 11. As soon as the pressure in the reservoir 11 reaches a predetermined maximum, determined by the strength and position of the permanent magnet 19, the tendency of the Bourdon tube to move the gage hand away from the permanent magnet becomes greater than the attraction of said magnet and consequently the gage hand is quickly moved away from the magnet with a quick separation of contact blocks 23 and 24 which breaks the circuit above traced and deprives the motor of current, so that it remains idle until the pressure in the reservoir has been reduced to a predetermined minimum. As the pressure in the reservoir is reduced by being drawn for use in the air brake or other mechanism the gage hand is caused to swing back toward its original position, but as soon as the armature 18 comes within the field of influence of the permanent magnet 19 the gage hand is quickly thrown by the attraction of the magnet into its closed position, as shown in Fig. 1. The presence of the permanent magnet thereby assures a quick make and break of the motor circuit within a close range of pressure, which however may be varied at will by changing the position of the permanent magnet or by substituting a magnet of different strength. The yielding contact block 24 prevents a separation of the contact blocks when the tendency of the pressure in the Bourdon tube is about equal to the opposing tendency of the permanent magnet, at which time the gage hand is liable to waver slightly. The yielding contact block 24 also assures a perfect engagement between the contacts notwithstanding wear thereof. The blow-out magnet prevents burning of the contact blocks by arcing at the time of their separation and the arc is directed away from the other parts of the switch mechanism. The pole pieces 31 and 32 are protected from the arc by the insulating disk 16 and the insulating plate 33 respectively.

The invention is not restricted to the use of any particular form of pressure switch as a diaphragm or other construction may be substituted for the one shown.

By means of this invention the pressure actuated switch is adapted for controlling the motor circuit alone, without the necessity for auxiliary or supplemental switches and is therefore less expensive and less liable to get out of order, while being more efficient and having a narrower range of pressure than other switch structures for this purpose.

What I claim as my invention is;

1. A pressure governor for fluid pressure systems, comprising an iron casing, a Bourdon tube mounted therein and having connection with the pressure system, a gage hand having operative connection with the Bourdon tube whereby it is caused to move as the result of changes in pressure in the pressure system, an insulating disk in the casing, a switch contact mounted on the gage hand, a second switch contact mounted on the insulating disk and adapted to be engaged and disengaged by the switch contact of the gage hand, a permanent magnet mounted on the insulating disk, an armature therefor carried by the gage hand, said magnet tending to hold the gage hand in position to close the switch contacts, a blow-out magnet having its core connected to the casing, a pole piece on the blow-out magnet beneath the insulating disk and adjacent to the switch contacts, an iron cover for the casing, a boss on the cover constituting the other pole piece for the blow-out magnet and also located adjacent to the switch contacts, and an insulating plate on the boss.

2. A pressure governor, comprising a pressure gage having a gage hand adapted to be moved by variations in pressure, switch contacts engaging and disengaging by the movements of the gage hand, a permanent horse-shoe magnet, and an armature for the magnet carried by the gage hand to close the magnetic circuit between the two poles of the magnet, whereby the magnet is adapted to quickly move the gage hand for engaging the switch contacts when its armature is brought into its field of influence and is

adapted to detain the gage hand until the pressure is sufficient to overcome its influence and thereby effect a quick disengagement of the switch contacts.

3. A pressure governor, comprising an iron casing, an insulating plate extending over the front of the casing, a pressure gage within the casing behind the insulating plate and provided with a gage hand in front of the insulating plate, switch contacts in front of the insulating plate adapted to be brought into and out of engagement by the movements of the gage hand, a horse-shoe magnet secured to the insulating plate, an armature carried by the gage hand for closing the magnetic circuit between the poles of the horse-shoe magnet, a blow-out magnet mounted within the casing behind the insulating plate with a pole piece behind the switch contacts, and an iron cover for the casing having a projecting lug positioned in front of the switch contacts to constitute the other pole-piece of the blow-out magnet.

In testimony whereof, I affix my signature, in presence of two witnesses.

WALTER J. RICHARDS.

Witnesses:

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