

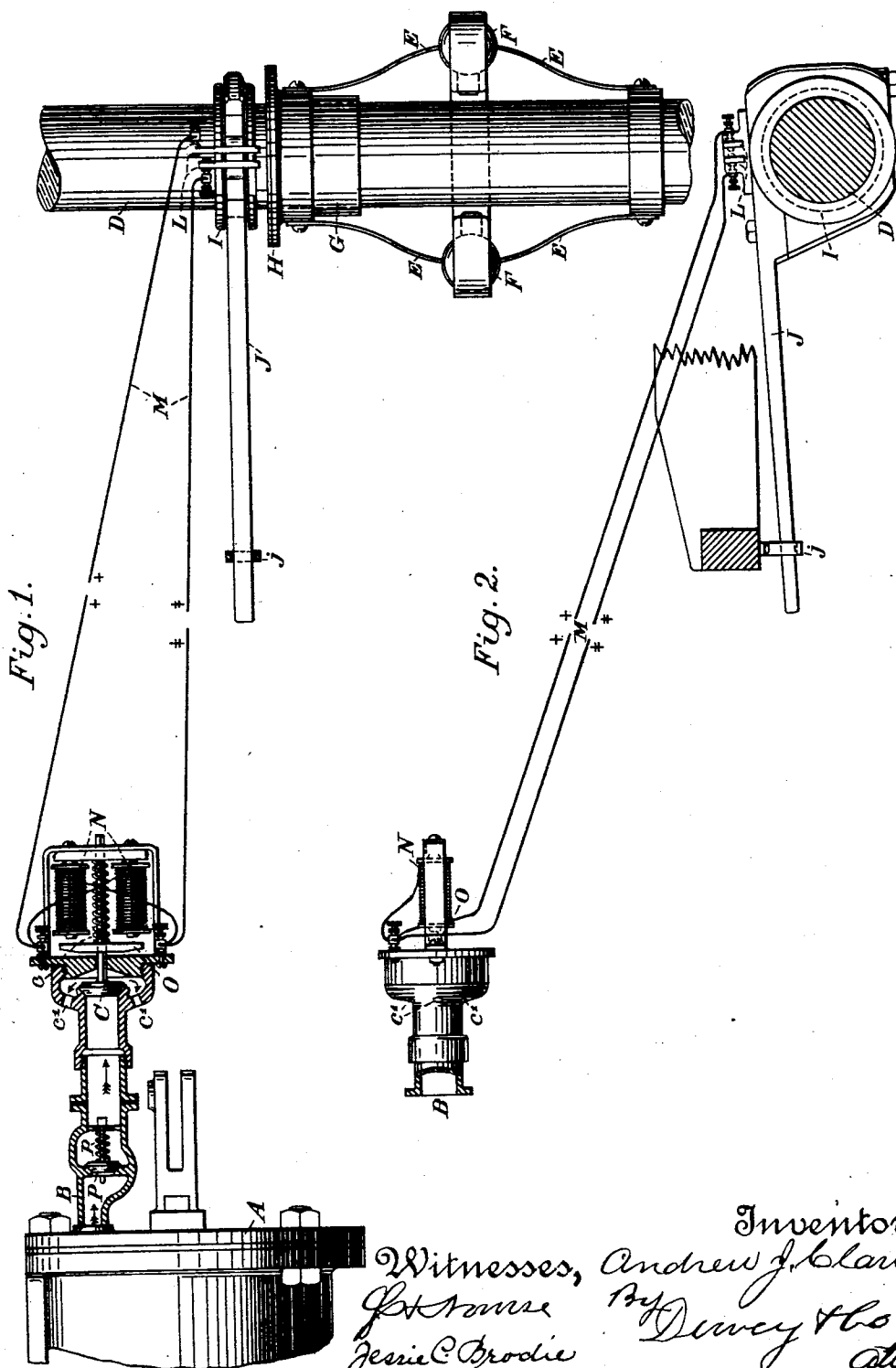
(No Model.)

A. J. CLARK.

AUTOMATIC GOVERNOR FOR AIR BRAKE CYLINDER PRESSURE.

No. 587,643.

Patented Aug. 3, 1897.



Inventor,
Andrew J. Clark
Witnesses,
Jesse C. Brodie
Derby & Co.
Attys.

UNITED STATES PATENT OFFICE.

ANDREW J. CLARK, OF OAKLAND, CALIFORNIA.

AUTOMATIC GOVERNOR FOR AIR-BRAKE-CYLINDER PRESSURE.

SPECIFICATION forming part of Letters Patent No. 587,643, dated August 3, 1897.

Application filed November 19, 1896. Serial No. 612,662. (No model.)

To all whom it may concern:

Be it known that I, ANDREW JOSEPH CLARK, a citizen of the United States, residing at Oakland, county of Alameda, State of California, have invented an Automatic Governor for Air-Brake-Cylinder Pressure; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a means for automatically regulating the pressure in railway air-brake cylinders, the object being to prevent the wheels of railway-cars from sliding.

In operating railway-trains one of the largest items of expensive repairs is that of replacing car-wheels that have been slid by undue pressure of the brakes, causing a flat spot upon them. The unequal loading of cars and the varying adhesion of wheel and rail with a constant braking power, together with in many cases a lack of skill upon the part of the locomotive-engineer and also of conditions beyond his control, are the most frequent causes of wheels being slid. There also appears to be a necessity for a braking power greater than that now in use to quickly check the speed of rapidly-moving trains, but this is not attained by means of increasing the leverage or air-pressure in brake-cylinders, because in doing so the number of slid flat wheels would be greatly increased. The pressure safely applied to the wheels of a train running at a high rate of speed would cause the wheels to slide when running slowly. To overcome these obstacles, I have invented an automatically-operating mechanism for so regulating the pressure in the air-brake cylinder that the brakes will be set up with only that degree of pressure required and which will not therefore involve the sliding of the wheels.

My invention consists, broadly, in a governor mechanism of any suitable kind dependent for its operation upon the rotation of the rotating parts of the car-truck, such as the axles or the wheels thereof, a relief-valve in the air-brake cylinder, and suitable means by which the movements of the governing mechanism occasioned by the rotation of the car axles or wheels are electrically transmitted to operate the relief-valve and thus regulate the air-pressure in the brake-

cylinder to set up the brakes with only that degree of pressure required.

The best form of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view showing the axle with its governor mechanism in plan, the controlling-valves in section, and the air-brake cylinder in elevation. In this view the axle is supposed to be rotating, whereby the electric connection is broken and the valve C closed. Fig. 2 is a cross-section of the axle and an elevation of the valve-casing of valve C.

A represents the air-brake cylinder, by which the brakes are applied to the wheels in the usual manner of these devices. It is unnecessary herein to show any of the other parts of an air-brake apparatus, as they form no part of my invention, which can be understood by simply designating the air-brake cylinder A. Into this air-brake cylinder I enter a pipe B, in which is a valve C, controlled by a spring c, which holds said valve normally closed. To control this valve, I employ a governor mechanism of any suitable character and which is dependent for its operation upon the rotation of the rotating parts of the car-truck, such as the wheels or the car-axles, as here shown. By the rotation of the said parts the valve will be left closed and will be opened to permit the escape of the air from the air-brake cylinder and the relief of the pressure therein as this rotation ceases, thereby regulating the pressure as required by the braking necessities of the case. The air escapes from pipe B through the ports c'. In the present instance, and as showing what I deem the best form of my invention, I have shown these power-transmitting connections as being electrical, and I have also shown as the best form of governor and its mode of operation a device which is carried by the car-axle.

D is the car-axle. Upon this are fitted the spring-arms E, which carry the weights F of a well-known form of governor mechanism. At one end the spring-arms carry a collar G, adapted to slide upon the axle, said collar having upon its face a ring H of conducting material which forms a circuit-closer. Mounted upon a grooved collar I, securely fastened to the axle, is an arm J, one end of which is

freely connected, as by means of a staple *j*, with the truck-frame, thereby permitting the necessary freedom of movement. This arm carries the normally-separated poles *L* of an electric circuit *M*, said circuit thence extending to and including electromagnets *N*, having an armature *O* secured upon the valve-stem of the valve *C*.

It will now be seen that when the car-axle is stationary, as when the wheels are sliding, the weighted spring-arms will keep the sliding collar *G* to a position in which its circuit-closer ring *H* will come in contact with the normally-separated poles or electrodes *L* of the circuit, and said circuit will thereby be completed, so that the magnets being energized will attract the armature, and will thus open the valve *C*; but when the axle is rotating the spring-arms by the centrifugal action of their weights will remove the circuit-closer ring *H* from the poles of the circuit, and thereby will break said circuit, so that the valve *C* will close. The effect of this is as follows: When the brakes are applied to the wheels of a car, the governor mechanism keeps the electric circuit broken so long as the wheel and axle are revolving; but as soon as they stop, as when the wheel slides, the governor mechanism closes the circuit and through the electromagnets and the armature draws the valve from its seat, allowing some of the surplus air-pressure in the brake-cylinder to escape, thus partially relieving the brakes and letting the wheels again revolve and causing the governor to act and break the electric circuit, so that the valve immediately closes again. There will be a governor mechanism for each axle of each pair of wheels of each vehicle. Thus the maximum pressure upon the brakes is permitted, and yet the wheels will not slide.

Upon the wheels of different cars in a train a greater or less amount of braking power can be applied, according as they may or may not be heavily loaded. At present the brakes are applied with the same pressure to each car, whether heavily loaded or not, and may cause some of the wheels to slide, making a flat spot, while upon another car greater force could be used without danger of sliding wheels. The retarding effect of sliding wheels is not as great as if permitted to revolve under a retarding force.

The source of electrical energy may be from generators placed under each vehicle or placed upon the locomotive and connected by suitable conductors to the governor mechanisms and valves in such a manner that the braking power will be controlled upon each vehicle independently.

At a point in the pipe *B* between the valve *C* and the air-brake cylinder is placed a valve *P*, controlled by a spring *p*, adapted to resist any given amount of pressure desired which is not controlled by the governor mechanism—say, for example, twenty pounds—so that in such case a twenty-pound pressure will be

retained in the air-brake cylinder under all circumstances. This retained pressure will be sufficient to enable the brakes to be set up to the wheels to cause them to come to a standstill.

It is obvious that my whole device may be placed under the control of the engineer for the purpose of enabling him to throw it out of action when circumstances occur which require that its automatic action be dispensed with—as, for example, where he wishes to throw the brakes on with their full power regardless of the wheels sliding. This can be done simply by placing the electric circuits under his control to enable him to break them electrically at will.

My device is adapted for a high-speed brake, reducing the pressure, so as to have it always at the maximum, as the speed of the train is lessened.

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

1. An automatic governor for the pressure of railway air-brake cylinders, consisting of a governor mechanism, dependent for its operation upon the rotation of the rotating parts of the car-truck, a relief-valve in connection with the air-brake cylinder and an electric circuit by which the governor mechanism operates the relief-valve, to regulate the pressure in the brake-cylinder, whereby the brakes are set up to the wheels with that degree of pressure required.

2. An automatic governor for the pressure of railway air-brake cylinders, consisting of a governor mechanism dependent for its operation upon the rotation of the rotating parts of the car-truck, an electric circuit adapted to be made and broken by the governor mechanism, and a relief-valve for the air-brake cylinder adapted to be operated by the electric circuit, to regulate the pressure in the brake-cylinder, whereby the brakes are set up to the wheels with that degree of pressure required.

3. An automatic governor for the pressure of railway air-brake cylinders consisting of a governor mechanism dependent for its operation upon the rotation of the rotating parts of the car-truck, an electric circuit having poles normally in electrical connection whereby the circuit is complete, but adapted to be thrown out of such connection, and the circuit broken by the movement of the governor mechanism, a relief-valve in connection with the air-brake cylinder and electrical devices in connection with said valve and in the electric circuit whereby the valve is controlled to regulate the pressure in the brake-cylinder whereby the brakes are set up to the wheels with that degree of pressure required.

4. An automatic governor for the pressure of railway air-brake cylinders, consisting of a centrifugal governor mechanism carried and operated by the axle and having a circuit-closer, an electric circuit having normally—

separated poles adapted to be electrically connected by the circuit-closer when the governor mechanism is operated by the rotation of the axle, a relief-valve in connection with the air-brake cylinder and electrical devices in connection with said valve and in the electric circuit whereby the valve is controlled to regulate the pressure in the brake-cylinder whereby the brakes are set up to the wheel with that degree of pressure required.

5. An automatic governor for the pressure of railway air-brake cylinders, consisting of a centrifugal governor mechanism carried and operated by the axle and having a circuit-closer, an electric circuit having normally-separated poles adapted to be electrically connected by the circuit-closer when the governor mechanism is operated by the rotation of the axle, a relief-valve in connection with the air-brake cylinder and electrical devices in connection with said valve and in the electric circuit whereby the valve is controlled to regulate the pressure in the brake-cylinder where-

by the brakes are set up to the wheel with that degree of pressure required, said electrical devices consisting of the electromagnet and the armature on the spring-controlled stem of the relief-valve.

6. An automatic governor for the pressure of railway air-brake cylinders, consisting of a governor mechanism dependent for its operation upon the rotation of the rotating parts of the car-truck, a relief-valve in connection with the air-brake cylinder, and means by which the relief-valve is electrically operated by the governor mechanism, to regulate the pressure in the air-brake cylinder, and a spring-controlled valve interposed between the relief-valve and the air-brake cylinder whereby a desired pressure is retained in brake-cylinder.

In witness whereof I have hereunto set my hand.

ANDREW J. CLARK.

Witnesses:

S. H. NOURSE,
JESSIE C. BRODIE.