(No Model.) 2 Sheets—Sheet 1.

W. DUNBAR.

AUTOMATIC PRESSURE REGULATOR FOR AIR BRAKES.

No. 316,017. Patented Apr. 21, 1885.

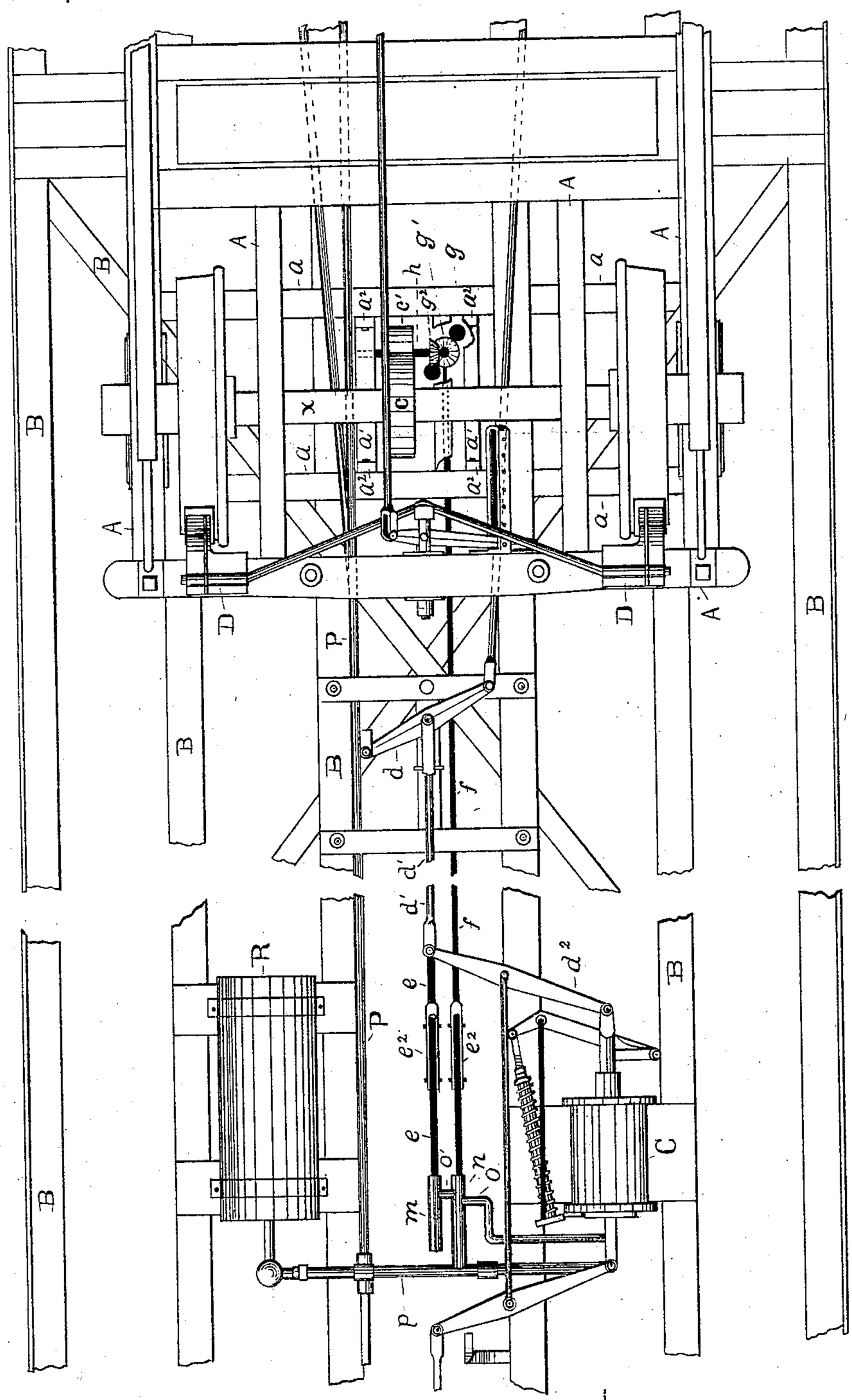

FIG. 1

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INVENTOR:

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(No Model.) 2 Sheets—Sheet 2.

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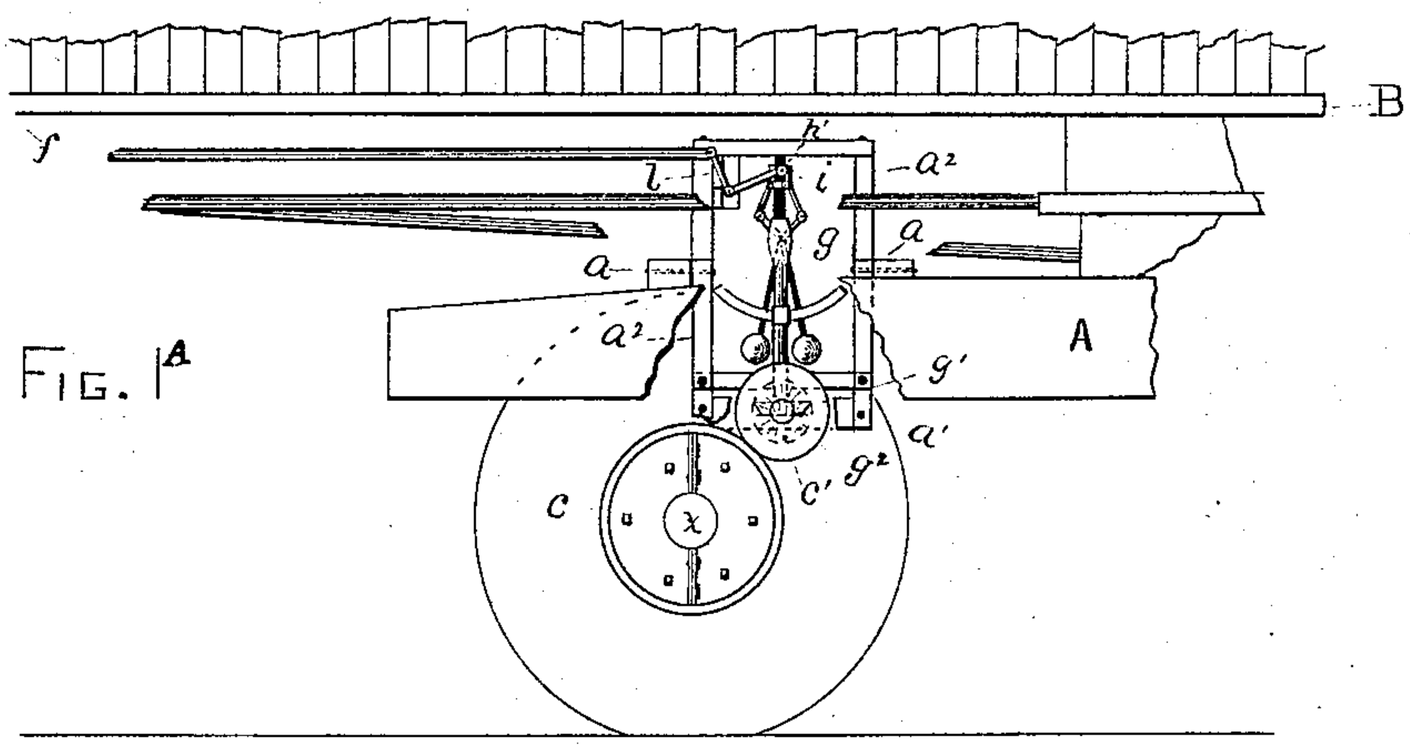

FIG. 1A

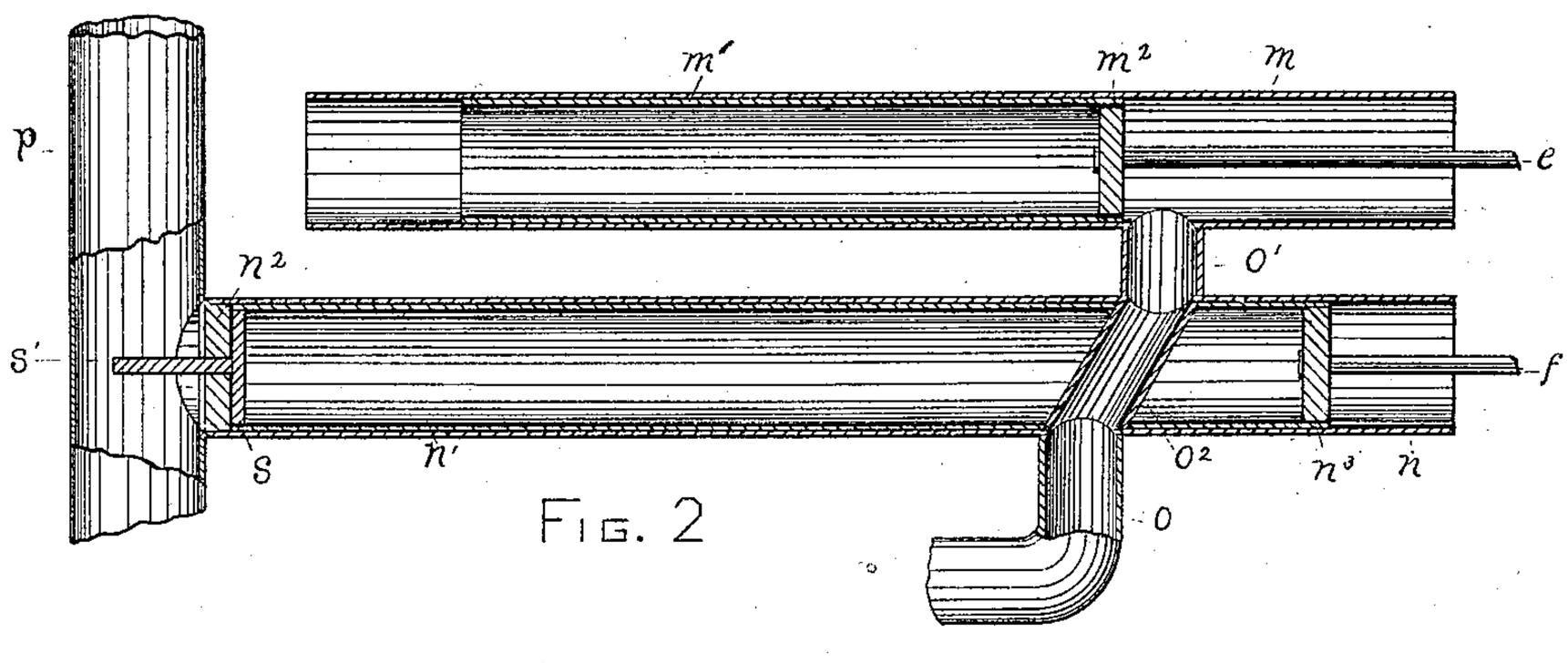

FIG. 2

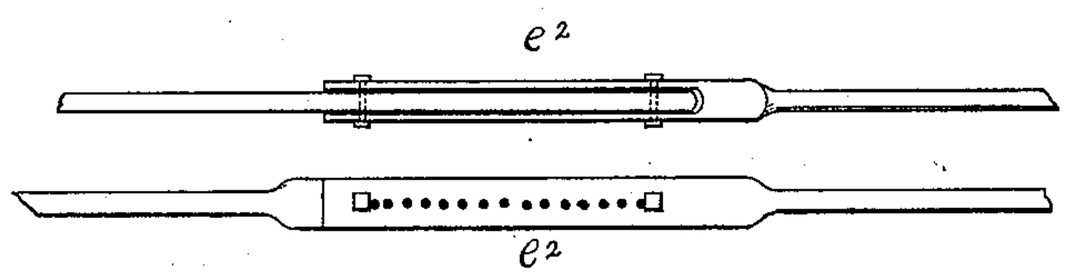

FIG. 3

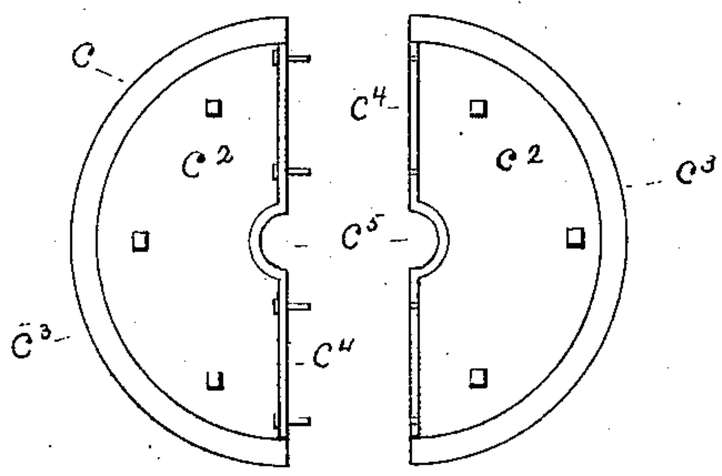

FIG. 4

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UNITED STATES PATENT OFFICE.

WARREN DUNBAR, OF MINNEAPOLIS, MINNESOTA.

AUTOMATIC PRESSURE-REGULATOR FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 316,017, dated April 21, 1885.

Application filed July 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, WARREN DUNBAR, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a certain new and useful Improvement in Automatic Pressure-Regulators for Air-Brakes, of which the following is a specification.

My invention relates to mechanism for the regulation of the brake-pressure in car-brakes operated by the force of compressed air, as in the well-known Westinghouse air-brakes, or others operating in a similar manner; and the object of my invention is to provide suitable mechanism as an attachment to such air-brake apparatus to operate automatically, first, in reducing the brake-pressure applied to the moving wheels when such pressure is so great as to lock the wheels and cause them to slip on the rails, and by such diminution of the pressure prevent the locking and sliding of the wheels; and, second, in allowing a sufficient pressure to hold the train when standing on a grade. These objects are attained by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 of Sheet 1 is a bottom view of a portion of the car frame and truck fitted with the Westinghouse automatic brake apparatus and the devices of my improvement. Fig. 1ª of Sheet 2 is an elevation of a portion of the car-truck and my improvements. Figs. 2, 3, and 4 are details respectively of the telescoping-tubes, rod-couplings, and friction-wheel.

A is a portion of the longitudinal timbers of a car-truck, and B a portion of the timbers of the car-bottom upon or from which are supported the air-brake apparatus and my attachments.

P is the main brake-pipe for supplying compressed air to the auxiliary reservoir R of the Westinghouse or similar air-brake apparatus.

p is the branch pipe making the connection between the reservoir R and the brake-cylinder C.

d' is the brake-rod connecting the brake-lever *d* with the lever d^2 pivoted to the piston cross-head.

a a are transverse timbers secured on the main truck-timbers A, and to the timbers *a a* are secured vertical and cross timbers *a'* and a^2 for supporting parts of the improvements.

c is a friction-wheel of about twelve inches diameter for imparting motion to the mechanism of the improvement, and is fastened on the axle *x* of the inside pair of car-wheels.

In order that it can be readily attached to the axle, the wheel *c* is made of two parts, as shown in Fig. 4. Two semicircular wooden pieces, c^3, have semicircular metal plates c^2 fastened on each of their sides by bolts extending through from side to side. The metal plates are of less circumference than the wood, so that the wood may project for a frictional surface, and the plates are provided with flanges at their diameters with perforations, through which they may be bolted together, and at the centers are semicircular recesses c^5 for fitting over the car-axles, which recesses should be of slightly less diameter than the car-axle in order that the wheel *c* may be firmly clamped to the axle and the halves firmly bolted together.

c' is a wooden friction-wheel of about six inches diameter set with its perimeter in contact with that of the wheel *c*, from which it receives motion. The contact-surfaces of the two wheels may be clothed with leather, rubber, or other suitable material for furnishing a frictional surface.

h is a shaft carrying the wheel *c'*, and has suitable bearings provided for it in the frame *a'*.

g^2 is a miter-wheel on the end of the shaft *h* at about the middle of the truck, and meshes with a second miter-wheel, *g'*, on a vertical shaft or spindle, *h'*, for which spindle suitable bearings are provided in the frame *a'*.

g is an ordinary governor having balls of about fifteen pounds aggregate weight, and is on the spindle *h'*.

i is a slide on the spindle *h'*, to which the extended arms of the governor are connected by toggle-joints. When the governor-arms are at rest, the slide *i* is pushed upward, and the inclination of the arms when revolving draws the slide downward.

l is a bell-crank or other suitable angular lever pivoted to the frame *a' a²*, and has one arm connected to the slide *i*, and the other connected with the rod *f*, by which means the vertical movement of the slide *i* is changed to

a horizontal movement of the rod *f*. Thus, when the governor is at rest, the slide *i* will be pushed upward, thrusting the rod *f* outward, and, when the governor is rotating, the slide will be drawn downward and withdraw the rod. The rod *f* connects the lever *l* with the sliding tube *n'*. It may be supported in horizontal position by stirrups at proper intervals from the car-bottom.

n n' are concentric sliding tubes, preferably made of brass. The outer tube, *n*, it is desirable to have about twelve inches long by one and a fourth inch diameter, and the sliding inner tube, *n'*, about an inch shorter. The inner end of the tube *n'* has a solid head, *s*, provided with a projecting tongue or slide, *s'*, rounded at the end, and of about an inch length and width by an eighth inch thick. The outer end of the tube *n'* has also a solid head, n^3, for connecting to the rod *f*.

o^2 is a short tube of about three-fourths inch diameter, extending transversely through and secured within the tube *n'*, with its ends flush with the surface of the latter tube. Two holes are cut into the tube *n* at points coincident with the ends of the tube o^2. Thus an air-tight channel is made through the tubes *n n'*. The channel o^2 may be run in a diagonal direction, as shown, to avoid unnecessary weakening of the tube *n*. *m m'* are also concentric sliding tubes, somewhat shorter than the tubes *n n'*. The outer tube, *m*, has both its ends open, while the inner, *m'*, has a solid head, m^2, at one end for connection with the rod *e*. *o'* is a short tube connected to the tube *n* over the outlet of the channel o^2, and has its other end connected to and opening into the tube *m*. The end of the rod *f* is attached to the head n^3 of tube *n'*, and the rod *e* to the head m^2 of tube *m'*. The end of the tube *n* is attached to the pipe *p* in line with the rod *f*. A rubber or other suitable packing, n^2, is provided in the end of the tube *n* next to the pipe *p*, and an incision transverse to the pipe *p* and of proper size to admit the slide *s'* is made in the packing n^2 and pipe *p*, so as to permit the slide to pass in and out of the pipe *p* without permitting the escape of air.

o is a pipe connecting the pipe *p* near the cylinder C with the tube o^2, by which means air is allowed to escape from the cylinder and pipe *p* through the tubes o^2, *o'*, and *m*. When the tube *n'* slides inward, the slide *s'* partially closes the pipe *p*, and at the same time brings the channel o^2 in communication with the pipes *o* and *o'*, thus allowing the escape of air from the pipe between the partial cut-off *s'* and the cylinder C, thereby reducing the air-pressure in the cylinder and consequently reducing the brake-pressure.

As a means of adjusting the rods *e* and *f* to proper length there is provided the coupling e^2. (Shown in detail in Fig. 3.) One portion has extended jaws with suitable perforations, and the other a flattened end with similar perforations, whereby, by means of bolts, the two sections can be secured together when adjusted to the desired length.

The operation of the described mechanism is as follows: When the cars are in motion, the governor *g* is kept in rotation, and the arm of the lever *l* connected to the slide *i* is drawn downward, drawing back the rod *f* and the tube *n'*, to which the rod is secured, thus withdrawing the slide *s'* from the pipe *p*, and at the same time breaking the communication between the channels *o o' o²*. This condition is maintained unaltered until the brake-pressure is so great as to stop the revolution of the car-wheels, and when the wheels cease to revolve the rotation of the governor also ceases, and thereby the slide *i* is forced upward and the rod *f* thrust forward, which pushes the slide *s'* into the pipe *p* and simultaneously opens the channel for escape of air through the tubes *o o' o²*.

As soon as the brake-pressure is sufficiently diminished to unlock the wheels, the governor is again put in revolution and the tube *n'* is drawn back. By these means a brake-pressure is maintained at a degree less than that which would occasion the locking of the wheels.

If the train is standing on a grade it is necessary to provide a sufficient brake-pressure to hold the train stationary. In such case the governor *g* not being in revolution and the air-supply to the cylinder being partly cut off by the slide *s'* and by the escape of air through the open channel *o o' o²*, the brakes are partially relaxed. This relaxation of the brakes draws the brake-rod *d'* and the rod *e* in the direction of the brakes, and the rod *e* slides the tube *m'* outward over the outlet of the escape-tube *o'*, thus preventing the further escape of air, and the air-passage about the slide *s'* admits sufficient air to the cylinder to furnish the required brake-pressure for holding the cars stationary.

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

1. An air-brake pressure-regulator combining telescopically-sliding tubes for operating a cut-off slide in the air-supply pipe and controlling an air-escape channel between said slide and the brake-cylinder, and a governor arranged to be actuated by the rotation of the car-axle, substantially as set forth.

2. The combination, with an air-brake for railways, of a governor operated by a car-axle by means of friction-wheels and suitable gearing, and actuating cut-off devices for regulating the air supply to the cylinder, substantially as and for the purpose set forth.

3. The friction-wheels *c* and *c'*, gear-wheels *g' g²*, and governor *g*, when combined with a car-axle and a pressure-regulator, as and for the purpose set forth.

4. The combination, with the cylinder air-supply pipe, of concentric sliding tubes operating a cut-off slide in said pipe, and controlling a channel for the escape of air between

said cut-off and the brake-cylinder, substantially as and for the purpose set forth.

5. The combination of fixed tubes *m* and *n* and sliding tubes *m' n'*, having solid heads m^2, n^3, and *s*, slide *s'*, and packing n^2, with pipes *p*, *o*, o^2, and *o'*, substantially as set forth.

6. The combination, with sliding tubes for the purpose set forth, of connecting-rods *e* and *f*, having couplings e^2, the lever *l*, slide *i*, and governor *g*, constructed and operated substantially as and for the purpose set forth.

WARREN DUNBAR.

Witnesses:
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PATRICK H. GUNCKEL.