E. J. WALTERS & W. P. SYMONS.

HYDRAULIC WEIGHING SCALE.

APPLICATION FILED AUG. 15, 1913.

1,098,197.

Patented May 26, 1914.

Fig. 1.

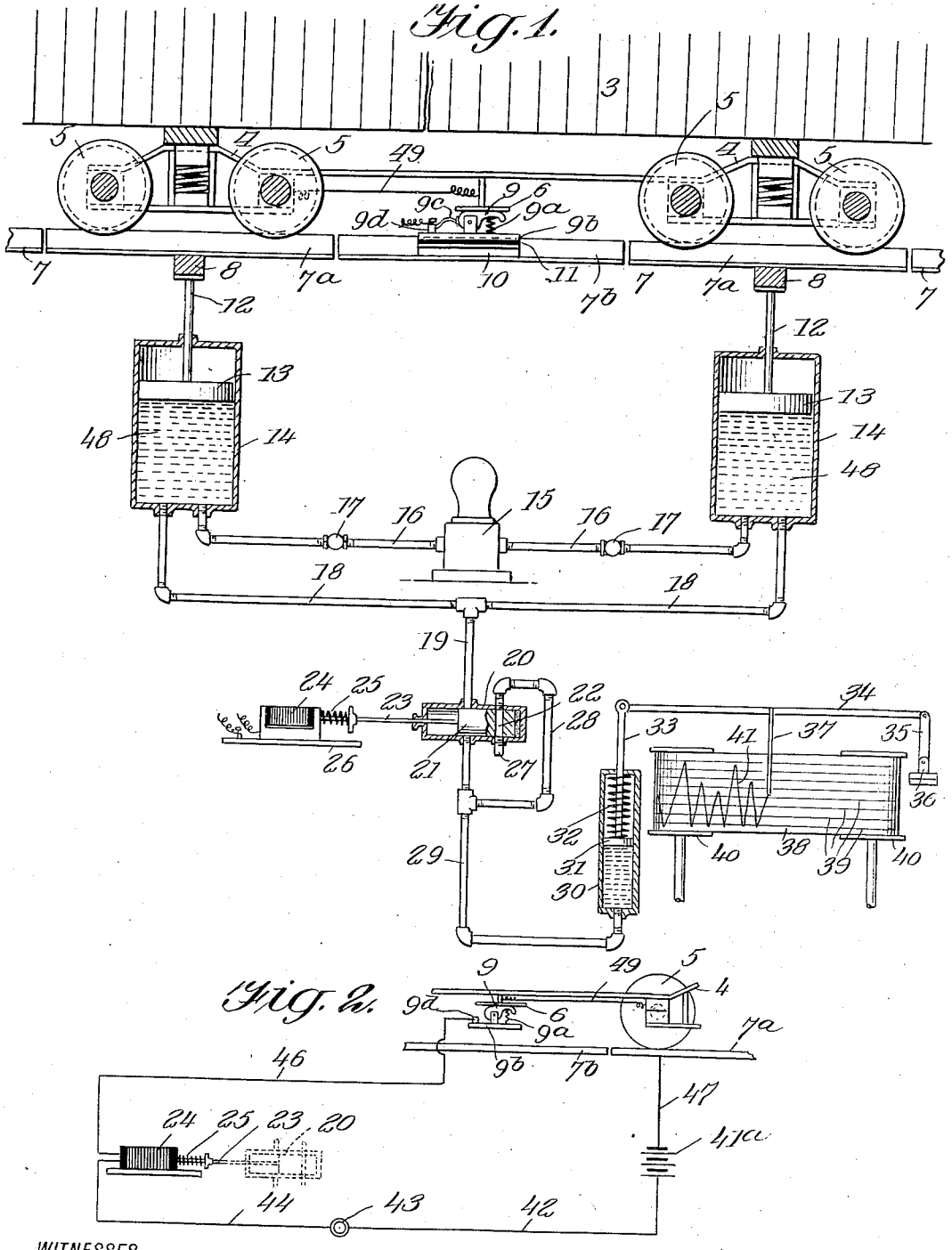


Fig. 2.

WITNESSES

J. E. Wade

Walton Harrison

INVENTORS

EDWARD J. WALTERS

WILLIAM P. SYMONS

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD J. WALTERS, OF GROVELAND, AND WILLIAM P. SYMONS, OF ARLINGTON, CALIFORNIA.

HYDRAULIC WEIGHING-SCALE.

1,098,197. Specification of Letters Patent. Patented May 26, 1914.

Application filed August 15, 1913. Serial No. 784,873.

To all whom it may concern:

Be it known that we, EDWARD J. WALTERS, a subject of the King of England, and WILLIAM P. SYMONS, a citizen of the United States, and residents, respectively, of Groveland, in the county of Tuolumne and State of California, and Arlington, in the county of Riverside and State of California, have made certain new and useful Improvements in Hydraulic Weighing-Scales, of which the following is a specification.

Our invention relates to hydraulic weighing scales, and more particularly to such scales as used for weighing heavy articles in motion, such for instance as the cars of a railway train, the purpose of our invention being to increase the general efficiency of such hydraulic weighing scale.

Reference is made to the accompanying drawing forming a part of this specification, and in which like letters indicate like parts.

Figure 1 is a view partly in side elevation and partly in section of our improved weighing scale complete. Fig. 2 is a diagram of the wiring employed for completing an electric circuit forming a part of our device.

The body of a car, say a freight car, is shown at 3, and the trucks thereof at 4 and the car wheels at 5. A strip 6 of metal is carried upon the underside of the car and serves as a contact member, as hereinafter described. Track rails are shown at 7^b and are stationary. At 7^a are short rails carried by girders or cross ties 8, these rails and the girders supporting them being free to move up and down within reasonable limits. A contact brush is shown at 9 and engaging it is a spiral spring 9^a. The brush 9 is pivotally mounted over a base plate 9^b. Connected with the brush 9 is an insulated wire 9^c which leads to a binding post 9^d, the latter being mounted upon the base plate 9^b. A supporting block 10 carries the base plate 9^b, which is separated therefrom by a strip 11 of insulating material. Connected with the girders 8 are piston rods 12, and secured to the latter are pistons 13 which are slidably located in cylinders 14. A pump is shown at 15, and pipes 16 provided with check valves 17 lead from this pump to the cylinders 14. Connected with these cylinders are pipes 18, the latter being also connected to a pipe 19 which leads to a valve casing 20. Slidably mounted within this valve casing is a plunger 21, which is provided with a cross passage 22. Connected with the plunger 21 is a plunger rod 23 made of soft iron, and thus serving as an armature.

A solenoid is shown at 24 and the adjacent end of the plunger 23, serving as an armature as just stated, is adapted to be drawn into this solenoid. A spring 25 is employed for the purpose of retracting the plunger rod 23 into its normal position—that forcing it to the right according to Fig. 1.

Mounted upon the valve casing 20 is a discharge nipple 27. Communicating with the valve casing 20 is a pipe 28, this pipe being connected with another pipe 29 which communicates with the valve casing 20 and is also connected to a pressure cylinder 30. Slidably mounted within this cylinder is a piston 31, and engaging this piston is a spring 32 which also engages the adjacent end of the pressure cylinder 30. A sliding rod 33 is secured rigidly to the piston 31 and controllable by motions of the same. This sliding rod 33 is pivotally connected to one end of a lever 34, the opposite end of this lever being pivotally connected to a link 35. This link is pivotally connected to a stationary lug 36.

A marker 37 or indicating arm is mounted upon the lever 34, and adjacent to this marker is an indicating chart 38. This chart has, in this instance, the form of a traveling band of paper or the like, which is provided with parallel lines 39 and is partially wound upon spools 40, the latter being adapted to be rotated. The arrangement of the parts is such that when the marker 37 is moved in a direction lateral to the path of travel of the chart 38, a graphic line 41 made by the marker upon the chart serves as a record of the degree of movement of the marker 37.

A battery is shown at 41^a. A wire 42 leads from this battery to a resistance 43 which may be an incandescent lamp. From this resistance a wire 44 leads to the solenoid 24. From the latter a wire 46 leads to the binding post 9^d, which is in metallic connection with the contact brush 9. A wire 47 leads from the battery 41^a to the rails 7^a. The contact strip 6 is connected with the

car wheels 5 by a wire 49. A quantity of water 48 partially fills the cylinder 14, and the various pipes connected therewith.

When a car is in the position indicated in Fig. 1 so that the contact strip 6, carried by the car, engages the contact brush 9 a metallic path is formed from the contact brush 9 to the rail 7ª, as indicated in Fig. 2.

The parts are so proportioned and arranged that when a car rests upon the rails 7ª, the two bodies of water 48 in the cylinders 14 are placed under pressure, this pressure being communicated to the interior of the pipes 18 and 19. The engagement of the contact strip 6 with the brush 9 completes an electric circuit which may be traced as follows: battery 41ª, wire 42, resistance 43, wire 44, solenoid 24, wire 46, contact brush 9, contact strip 6, wire 48, car wheels 5, rails 7ª and wire 47, back to battery 41ª. This circuit energizes the solenoid 24, and by causing it to attract the plunger rod 43, serving as an armature, the valve plunger 21 is moved into its extreme position to the left according to Fig. 1. The cross passage 22 of the valve plunger is thus moved out of registry with the adjacent portion of the pipe 28, and the nipple 27, and is moved into registry with the pipes 19, and 29. The liquid is thus admitted under pressure into the pipe 29 and into the pressure cylinder 30 where it moves the piston 31, and as this motion causes the swinging of the lever 34 and consequent movement of the marker 37, a graphic indication 41 is registered upon the chart 38, this indication representing the weight of the car.

As the car moves off the scale, the disengagement of the contact strip 6 from the brush 9 opens the circuit above traced, and as the solenoid 24 is no longer energized, the effect of the spring 25 upon the rod 23 is to restore the valve plunger 21 to its normal position as indicated in Fig. 1. This places the passage 22 in communication with the pipe 28 and out of direct communication with the pipes 19 and 29. The water within the pressure cylinder 30 now retrogrades through the pipe 29 and passes through the pipe 29, passage 22 and nipple 27 to make its escape. The pump 15 is connected with any convenient water supply and is actuated from time to time for the purpose of restoring into the cylinders 14 such volumes of water as are lost by making their escape, as just described. In practice, the pump 15 is merely operated as often as necessary to enable the rails 7ª to be maintained at a suitable level to receive the cars. The capacity of the pressure cylinder 30 being comparatively small, very little water is wasted, and the pump 15 need not therefore be operated except at rare intervals.

The pressure of the water within the pressure cylinder 30 is controlled by Pascal's law and is therefore proportionate to the area of the piston 31. This piston being of small area, the hydraulic pressure against it may, in the aggregate, be very small, just sufficient to work the indicating apparatus, and yet be strictly proportionate to the aggregate weight of the car.

The operation of our device is as follows: The parts being arranged and assembled as described, the cars of a train are drawn successively and slowly over the rails 7ª. As the weight of each car is recorded upon the chart 38, as above described, the operation of our device is, for the most part, automatic. The electric circuit through the solenoid 24 is not completed until the contact strip 6 is in engagement with the brush 9 and this occurs only during a moment while the car wheels 5 are moving upon the short movable rails 7ª. The circuit is thus both opened and closed during a very brief interval. Any other suitable liquid, such as oil, may be employed instead of water.

We do not limit ourselves to the precise construction shown, as variations may be made therein without departing from the spirit of our invention, the scope of which is commensurate with our claims.

We claim:—

1. A weighing scale for movable cars comprising rails, supporting members therefor, pistons connected with said supporting members, cylinders encircling said pistons and containing a liquid upon which said pistons rest, piping connected with said cylinders, a valve communicating with said piping, an indicating apparatus including a pressure cylinder, a hydraulic connection from said valve to said pressure cylinder, a rod movable in the general direction of its length for opening and closing said valve, said rod being of magnetic material, a solenoid for attracting said rod in order to move the latter in the general direction of its length, an electric circuit connected with said solenoid for energizing the same, said circuit being normally open, and means controllable by movements of the car for closing said electric circuit.

2. A weighing scale comprising mechanism controllable by weight of the article to be weighed for producing hydraulic pressure, hydraulically operated indicating mechanism, a valve connected with said hydraulically operated indicating mechanism and with said mechanism for subjecting said indicating mechanism to said hydraulic pressure and for relieving said indicating mechanism from said hydraulic pressure, an electrically operated member for controlling said valve, an electric circuit for energizing said electrically operated member, said electric circuit being normally open, and means

controllable by movement of the article to be weighed for closing said electric circuit.

3. In a weighing scale, the combination of hydraulic cylinders, pistons mounted therein, means for causing the weight of an article to rest upon said pistons in order to produce hydraulic pressure upon a liquid therein, a hydraulic valve, connections from said cylinders to said valve, hydraulically operated indicating mechanism, connections therefrom to said valve, magnetic mechanism connected with said valve for actuating the same, an electric circuit connected with said magnetic mechanism and normally open, and means controllable by weight of the article to be weighed for closing said electric circuit.

4. In a weighing scale, the combination of an indicating device, a pressure cylinder provided with means for actuating said indicating device, a hydraulic valve, a pipe extending from said hydraulic valve to said pressure cylinder for the purpose of admitting a liquid under pressure into said pressure cylinder, mechanism connected with said pipe and coacting with said valve for discharging said liquid from said cylinder after said liquid has been once used in said pressure cylinder, means controllable by movements of the body to be weighed for actuating said valve, and mechanism controllable by the weight of the article to be weighed for exerting hydraulic pressure through said valve and said pressure cylinder and connections therefor.

5. A weighing scale comprising hydraulic mechanism, to receive the weight of the article to be weighed, indicating mechanism connected with said hydraulic mechanism and controllable by hydraulic pressure exerted by the article to be weighed, a valve located between said hydraulic mechanism and said indicating mechanism for opening and closing communication between said hydraulic mechanism and said indicating mechanism, a solenoid for actuating said valve, and means controllable by movements of the article to be weighed for rendering said electric circuit active or inactive.

6. In a weighing scale for movable cars, the combination of hydraulic weighing mechanism, a valve for throwing the same into and out of action, a solenoid connected with said valve for actuating the same, movable rails connected with said hydraulic mechanism for actuating the latter, a contact opened and closed by movements of a car over said movable rails, and an electric circuit including said contact and said solenoid.

EDWARD J. WALTERS.
WILLIAM P. SYMONS.

Witnesses to the signature of Edward J. Walters:

CHAS. WILSON,
L. W. ALLUM.

Witnesses to the signature of William P. Symons:

A. E. MYERS,
R. L. BASKERVILLE.