(No Model.) 2 Sheets—Sheet 1.

J. W. CLOUD.

FLUID PRESSURE RAILWAY BRAKE MECHANISM.

No. 269,012. Patented Dec. 12, 1882.

Fig: 1.

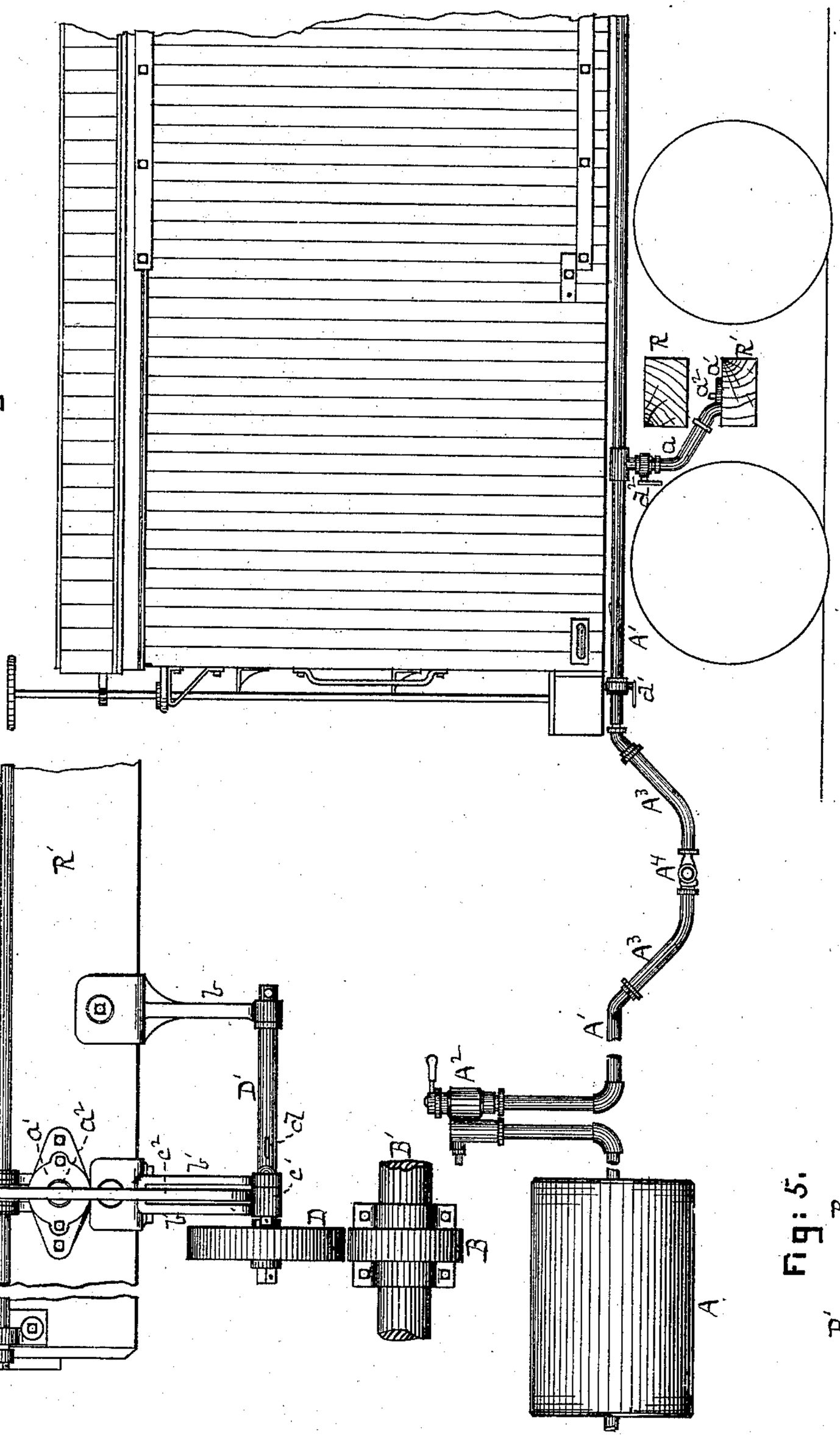
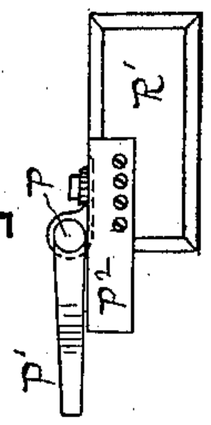


Fig: 4.

Fig: 5.



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(No Model.) 2 Sheets—Sheet 2.

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FLUID PRESSURE RAILWAY BRAKE MECHANISM.

No. 269,012. Patented Dec. 12, 1882.

Fig: 2.

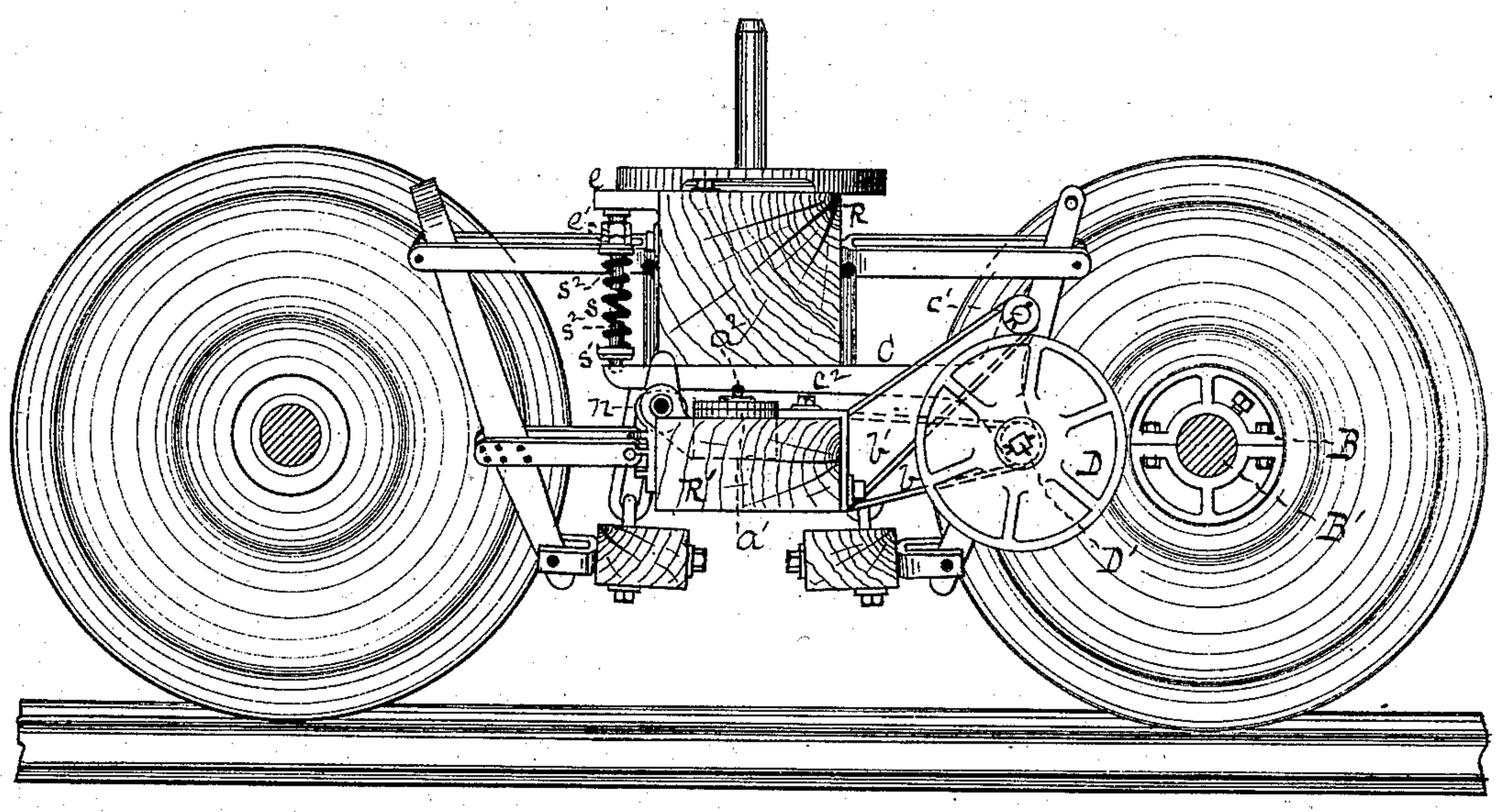
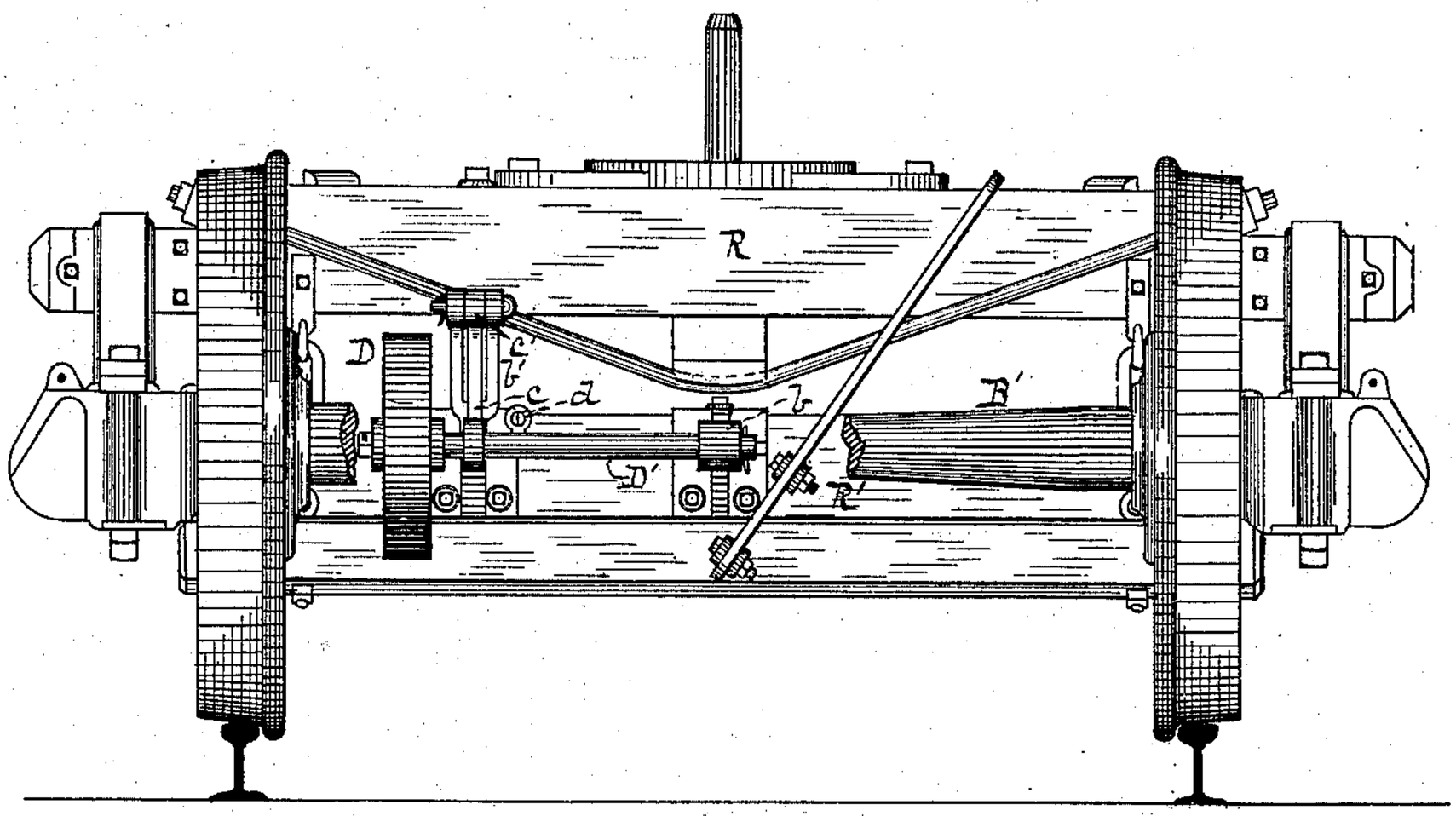


Fig: 3.



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UNITED STATES PATENT OFFICE.

JOHN W. CLOUD, OF ALTOONA, PENNSYLVANIA.

FLUID-PRESSURE RAILWAY-BRAKE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 269,012, dated December 12, 1882.

Application filed October 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. CLOUD, of Altoona, county of Blair, State of Pennsylvania, have invented or discovered a new and useful Improvement in Fluid-Pressure Railway-Brake Mechanism; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, shows in side elevation one end of a freight-car, and in connection therewith such air-brake appliances as are necessary to aid in understanding the present invention. Fig. 2, Sheet 2, is a longitudinal vertical sectional view of a car-truck with my improved apparatus applied thereto. Fig. 3 is a front elevation of the same, but with a portion of the car-axle broken away. Fig. 4, Sheet 1, is a detached plan view of a portion of the apparatus; and Fig. 5 is an end view of the spring-plank, rock-shaft, tilting lever, and stop.

The invention relates, in general terms, to certain improvements in fluid-pressure brake apparatus for railway-cars, and is more particularly designed for freight service, where the presence or absence of a heavy load in the car or variations in the amount of the load varies to a greater or less extent the efficiency of the brake-power as a retarding agency. It is a well-understood fact that the maximum braking effect is reached under the application of an amount or degree of power a little less than that which results in the sliding of the wheels, and that the less the load the less is the power which will slide the wheels. Hence my present invention is devised and my improved apparatus is organized with reference to securing automatically different degrees or amounts of brake-power on the wheels of the different cars in a train, according to the varying loads on such wheels. Hence, as a result of this organization, the brakes will be applied first and with great power to the wheels of the heaviest loaded cars, and the amount or degree of pressure will vary directly as the load, or approximately so; and in speaking of "load" I include the weight of the car-body as well as of the freight therein.

In Fig. 1, A represents a fluid-pressure reservoir such as is commonly employed as a part of a railway power-brake apparatus, and which is usually arranged on the locomotive or tender. It is to be charged and kept charged—say with compressed air—at any desired degree of pressure by any suitable means. The usual air or train pipe, A', extends back through a charging and discharging cock, A^2, along under the several cars of the train, and between cars a junction or union is formed by means of flexible sections A^3 and couplings A^4, all of any known or suitable construction. From the continuous pipe A' a branch, *a*, a portion of which is also flexible, leads to a brake-cylinder, a', located on one of the trucks of the car; or my improved apparatus may be applied to both car-trucks, if so desired. The pipe *a* opens into the cylinder a' below or back of the piston therein, so that the presence of air-pressure admitted through the cock A^2 and kept approximately constant while the train is running will force out the piston-stem a^2, and, in the manner presently to be described, will allow the brake-shoes to clear the wheels.

On one of the axles B' of the car-truck, Figs. 2 to 4, a friction-wheel, B, is rigidly secured, and immediately opposite to this wheel, or in the same working plane, I arrange a pulley-wheel, D, and mount the latter on a brake-shaft, D'. One end of this shaft has its bearings in a bracket, *b*, affixed to the spring-plank R', and at or near its other end it has a bearing in one of the arms, *c*, of a three-armed lever, C. This lever C is pivoted at the extremity of its upper arm, c', to the end of an upwardly-inclined bracket, b', which latter is also secured to the spring-plank R', and the third and longer arm, c^2, of the lever C extends back over and rests in a notch or shoulder of the piston-stem a^2, as also on the face of an eccentric or cam, *n*, as presently to be explained.

The bearing of the shaft D' in the bracket *b* is a little loose, so that the wheel D may have a slight range of motion to and from the wheel B without danger of binding. Hence it will be seen that as the long arm c^2 of the three-armed lever C is raised or lowered it will, moving on the fixed pivot c', cause the pulley-wheel D to clear or engage the friction-wheel B, and when engaged to revolve with it. A lug or eye, *d*, is secured to the brake-shaft D', to which

the usual brake-chain is to be attached. Consequently when the wheel D and shaft D′ are put in motion the brake-chain will be wound up or coiled on the shaft D′ and the brake-shoes drawn to the wheels, with the usual result.

The bolster-beam R, in a truck of the kind here represented, is depressed somewhat, or stands at a lower level in the truck-frame, accordingly as the load is increased. In order, now, to make an increase of the load effective in securing a quicker and more powerful application of the brakes, I interpose a spring, *s*, between the outer end of the lever-arm c^2 and a lug or bracket, *e*, secured to the bolster-beam R. The lower end of the spring *s* rests on a shoe, *s′*, and guide-pins s^2 are added to keep the spring in line.

The resiliency of the spring is regulated with reference to the work to be done by means of compressing and lock nuts *e′*, in the manner well understood in other uses of such springs. With apparatus thus constructed and arranged it will be seen that a portion of the weight of the load will act through the spring *s* on the lever C in such direction as to tend to force the pulley-wheel D into engagement with the friction-wheel B, and that the greater the load the greater will be the force so acting. To counteract this force and keep the wheels D B clear of each other, so that the train may run with brakes "off," I make use of fluid-pressure, applied in the cylinder *a′* throughout the train in the manner already described. This fluid-pressure, constantly acting while brakes are to be kept off, and acting with approximately a constant degree of force, tends to raise the longer arm c^2 of the lever C, compress the spring *s*, and keep the wheels D B clear of each other. While the train is running or is to be kept in running condition the brake-cylinders *a′* are to be kept charged with such degree or amount of fluid-pressure as will overcome the downwardly-acting force of the load transmitted through the spring *s*, and so raise the arm c^2 of the lever and keep the wheels D B clear of each other. Then, when the brakes are to be applied, the engineer, by manipulating the cock A^2, allows a portion of the fluid-pressure to escape from the cylinders *a′*, so as to lower the effective pressure therein until it becomes less in its effect than the downward force of the load acting through the springs *s*. The effect of this preponderance of downwardly-acting force will be to depress the long arm c^2 of the lever C and force the wheels B D into contact, so that the wheel B shall cause the wheel D and its shaft D′ to revolve, and by so doing to wind up the brake-chain attached to the lug or eye *d* and apply the brakes; and from the previous description it will readily be understood that the heavier the load the greater will be the preponderance of such downward pressure and the sooner will it become effective in action, so that the wheels B D will come into engagement sooner and will be forced into closer frictional contact on a heavily-loaded car than on one lightly loaded or on an empty car, and the brake action will correspond—that is, it will act more powerfully on heavily-loaded than on lightly-loaded or empty cars; and such variations of effective brake force, other things being equal, will vary directly as the load. And, still further, as it is within the power of the engineer to release much or little fluid-pressure from the cylinders *a′*, or to recharge them to a greater or less degree, he may thereby adjust, regulate, or vary the preponderance of downward pressure so as to bring the wheels B D more or less tightly into biting or working contact, as a result of which corresponding variations will take place in the force with which the brakes are applied.

It will be understood that the cock A^2 is to be of such construction that it may be used not only to charge and discharge the cylinders *a′*, but also to hold or retain therein any desired or predetermined degree or amount of fluid-pressure without increase or diminution. Cocks *d′* are also to be inserted in the train-pipe at the ends of the car, and also a cock, d^2, for purposes well understood in the operation of fluid-pressure brakes.

In the drawings I have not deemed it necessary to show all the truck appliances—as, for example, the springs which support the bolster R; but the skilled car-builder will understand how to add this and other necessary known appliances. And in this connection it may be stated that, as regards the attachments of the appliances described to the different parts of the truck, it is only necessary that the devices by means of which the wheels B D are caused to engage should be connected with some part of the structure which is subject to a vertical motion under the greater or less car-load, and that the cylinder and fixed bearings of the actuating-lever C, as well as the bearings of the wheel D, should be connected with some part of the structure not subject to material change of vertical position from changes of load. Hence the present invention may be applied to and used on any pattern, style, or construction of car and truck wherein these conditions of use are attainable. Thus, with a truck which does not have a bolster, R, or its mechanical equivalent, the upper end of the spring *s* may have its bearing against any suitable block or shoe attached to the under side of the car-body. Also, as regards the spring *s*, I do not limit myself to any particular kind of spring, provided only it have the capacity of doing the work described under the conditions set forth. It may be made so as to give a variable effect under different degrees of compression; or it may consist of a compound spring the different members of which act simultaneously or come into operation in succession; and variations may be made in the forms, proportions, and structure of the other parts, such as do not materially change the operation described.

In order to provide for throwing the apparatus entirely out of use when necessary, I add a shaft, P, which, supported in suitable bearings, extends out at one or both ends to the side of the car, so as to be within reach of the hand of a brakeman. This shaft, passing under the long arm c^2 of the lever C, has an eccentric or cam, *n*, thereon immediately under the lever, and so set that when its flat or cut-away side is next the lever the latter is free to be actuated, in the manner already described; but where it is desired for any reason to throw the power-brake apparatus out of use, the brakeman or workman, taking hold of a handle, P′, on the end of the shaft P, turns it a half-throw, more or less, so as to bring the full side of the cam or eccentric *n* against the under side of the lever-arm c^2, and so raise it as to cause the wheels B D to stand clear of each other and remain so. The apparatus is then locked, so that the load cannot actuate the brakes at all. To hold the eccentric *n* in the position last described, any suitable stop, P^2, may be added, as to the end of the spring-plank R′, Fig. 5, so that the handle P′ shall engage the same at the proper point of rotation.

It will be observed that with the apparatus in normal working position, if a train pulls in two, or other like accident occurs which breaks the train-pipe A′ at any point, the pressure will escape from the cylinders *a′*, and the brakes then being free to be operated by the downward pressure of the load, they will be applied automatically on all parts of the train. It should also be added that the compressing and lock nuts *e′* afford means for increasing or lessening the tension of the spring *s*, and thereby vary within moderate limits the action of the opposing forces above and below the lever-arm c^2.

A flexible diaphragm with a stem-connection to the lever-arm c^2 may be substituted for the cylinder *a′*, and the actuating force may be an exhausting ejector or pump; but in the latter case the diaphragm should be above instead of below the lever-arm c^2, or should otherwise be so arranged that the fluid-pressure so brought into action shall act on the lever-arm c^2 in like manner and with like effect as already described; also, the forms of the engaging wheels B D may be varied at pleasure—say to the forms of reversed cones or frusta of cones, or to other equivalent known form—provided only they retain the functions described under the conditions of use set forth.

Some of the general principles of the present invention are also embodied in the Patent No. 245,789, granted to me August 16, 1881, and the following claims are to be understood accordingly.

The introduction of my brake mechanism does not interfere with the usual hand-brake mechanism, and the brake-chain, which is attached to and wound up on the shaft D, may connect at its other extremity with the existing lever system for the hand-brakes.

I claim herein as my invention—

1. In a fluid-pressure brake apparatus, the combination of a three-armed or bent lever, C, a movable pulley operated by or from one arm, *c*, a fluid-pressure mechanism actuating another arm, c^2, in one direction, a spring arranged between such arm and the load for actuating it in the opposite direction, and a friction-wheel on the car-axle, substantially as set forth.

2. The combination of the three-armed or bent lever C, the shaft D′, carried at one end by one arm, *c*, of said lever, a bracket, *b′*, carrying said lever by its pivoting point or arm *c′*, a spring, *s*, interposed between the load and the third arm, c^2, and a fluid-pressure mechanism arranged to operate against the weight of the load, substantially as set forth.

3. The combination of a spring arranged between the load and lever-arm c^2, a fluid-pressure mechanism operative in the opposite direction on the same lever-arm, and means for varying such fluid-pressure at pleasure or as the result of accident, or maintaining a constant pressure, substantially as set forth.

4. A spring, *s*, arranged directly between the load and the lever-arm c^2, substantially as set forth.

5. In combination with lever-arm c^2 and spring *s*, a cam or eccentric, *n*, on a shaft, P, as a means for throwing and locking the brakes out of action, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN W. CLOUD.

Witnesses:
JOHN D. BOWMAN,
ROBT. E. MARSHALL.