No. 744,399. PATENTED NOV. 17, 1903.

J. PLAYER.

LOCOMOTIVE.

APPLICATION FILED AUG. 29, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

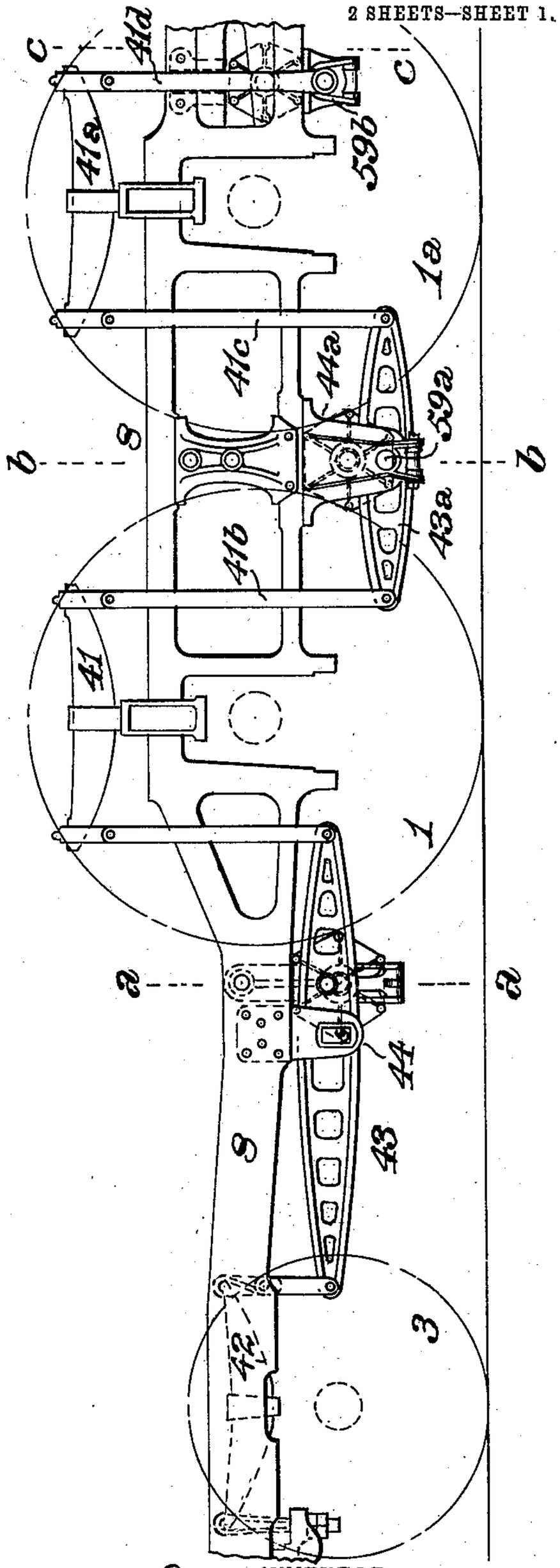

FIG. 4.

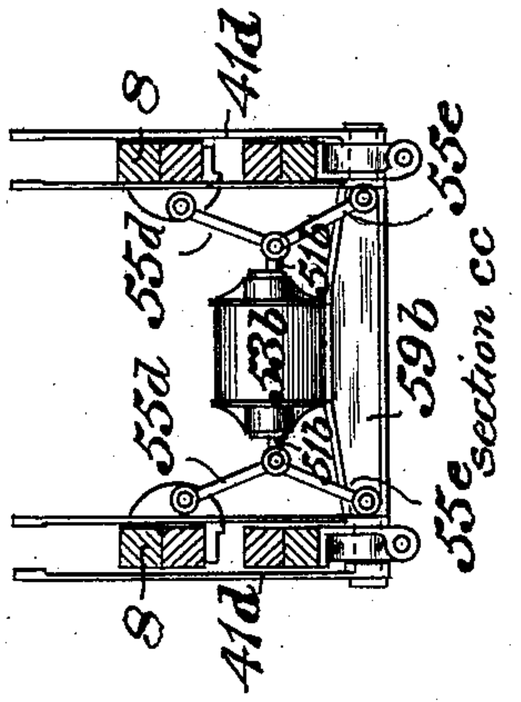

FIG. 3.

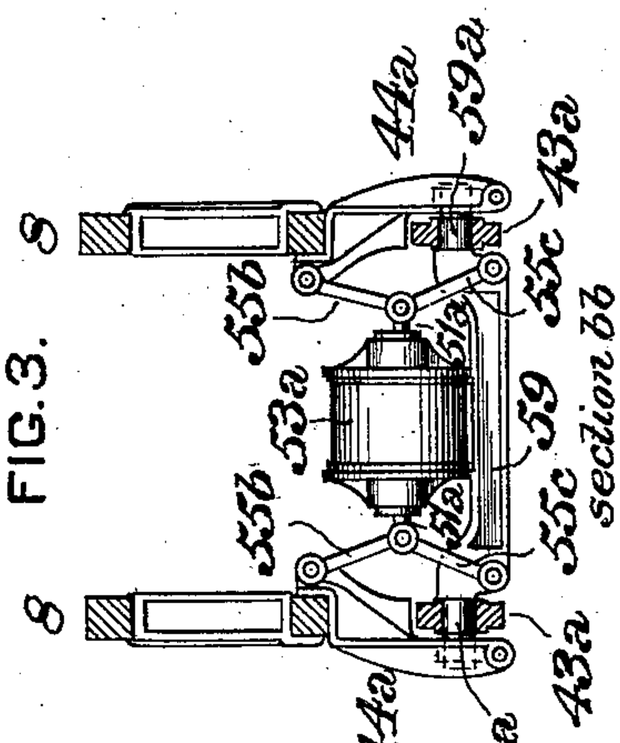

FIG. 2.

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NO MODEL

2 SHEETS—SHEET 2.

FIG. 7.

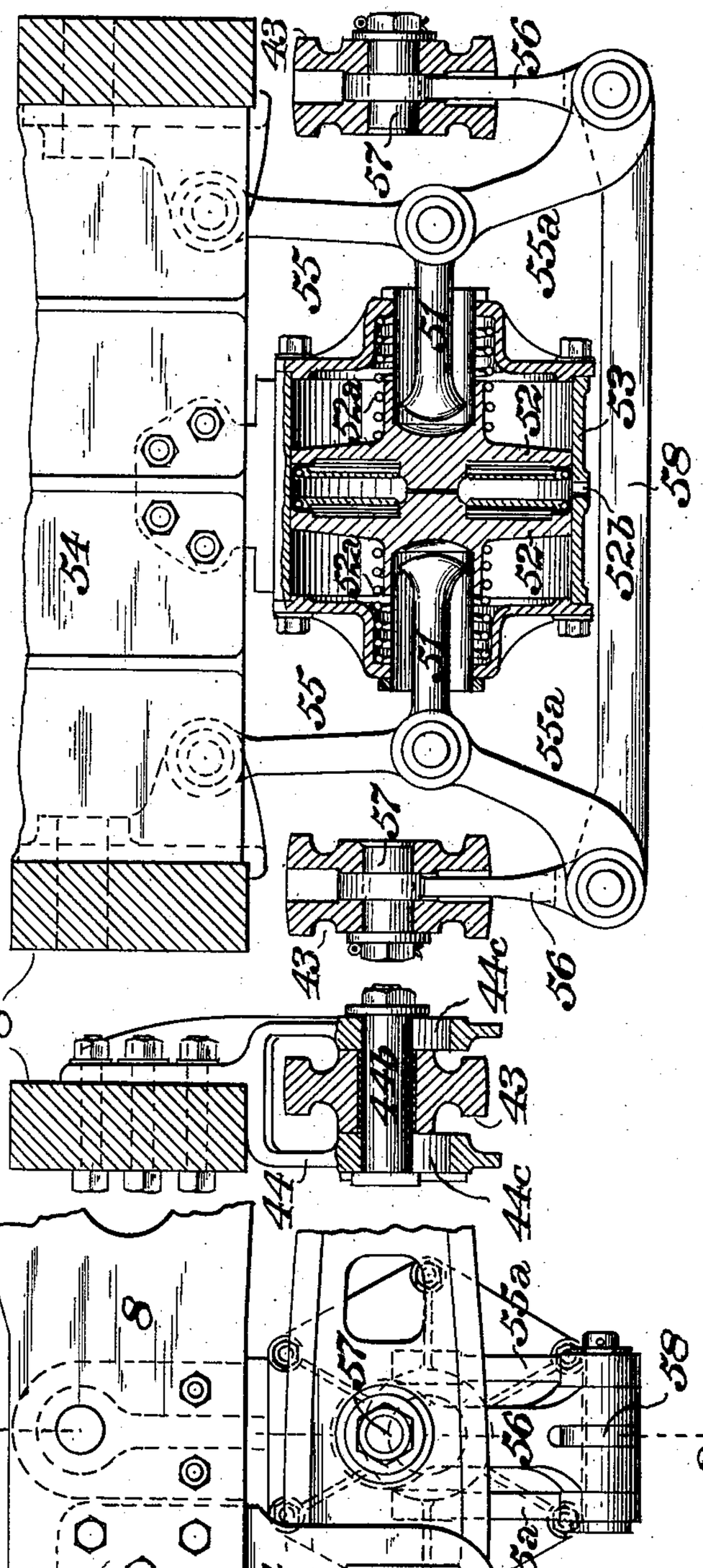

FIG. 6.

FIG. 5.

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No. 744,399. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

JOHN PLAYER, OF DUNKIRK, NEW YORK, ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 744,399, dated November 17, 1903.

Application filed August 29, 1903. Serial No. 171,217. (No model.)

To all whom it may concern:

Be it known that I, JOHN PLAYER, of Dunkirk, in the county of Chautauqua and State of New York, have invented a certain new and useful Improvement in Locomotives, of which improvement the following is a specification.

My invention relates to locomotive-engines of the class in which a portion of the weight is supported upon bearing-wheels, either trailing or leading, or both, which are unconnected to the driving-wheels to which the motive power is applied, such portion of the weight not being therefore available for adhesion except by the provision of special appliances, generically known as "traction-increasers," for temporarily transferring a part of the weight carried by the bearing-wheels to the driving-wheels.

The object of my invention is to provide an appliance of this type which shall be of simplified and inexpensive construction and ready applicability in locomotive constructions which are now standard and which shall have the capability not only of transferring weight from the bearing to the driving wheels, and vice versa, by the shifting of the equalizer-fulcrums, but also of applying additional weight to the driving-wheels by increasing the tension of the driving-springs.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side view in elevation of a portion of the frame and spring arrangement of a locomotive, illustrating an application of my invention; Figs. 2, 3, and 4, transverse sections on the lines *a a*, *b b*, and *c c*, respectively, of Fig. 1; Fig. 5, a side view, on an enlarged scale, of the central portion of the rear equalizer and its connections; Fig. 6, a transverse section on a similar scale on the line *d d* of Fig. 5, and Fig. 7 a transverse section on a similar scale on the lines *a a* of Figs. 1 and 5.

My invention is herein illustrated as applied in a locomotive having two pairs of driving-wheels 1 1ª and a pair of bearing-wheels 3, which are in this case trailing wheels—that is to say, are located in rear of the driving-wheels. A four-wheeled leading truck of any suitable known form, which is not shown, is also designed to be used. The driving-axles rotate in boxes fitted in the ordinary manner in pedestals formed upon the side frame members 8, and the boxes of the trailing axle are fitted in pedestals (not shown) which are secured to the frame members.

The springs 41, through which the weight borne by the axle of the rear driving-wheels 1 is transmitted to said axle, are connected with the springs 42 of the axle of the trailing wheels 3 by double-armed levers or "equalizers" 43, which are fulcrumed in hangers 44, secured to the frame members 8. The springs 41 of the axle of the rear driving-wheels 1 and the springs 41ª of the axle of the front driving-wheels 1ª are coupled at their adjacent ends to the ends of equalizers 43ª, which are fulcrumed as hereinafter described. It will be obvious that the proportions of weight carried by the trailing axle and by the rear driving-axle, respectively, will be in inverse ratio to the lengths of the adjacent lever-arms of the equalizers 43 and would if the equalizers were at all times fulcrumed at the same determined point in their length be invariable.

Means for shifting the fulcrum-points of the equalizers, and thereby varying the relative proportions of weight carried by the driving and trailing wheels, were known in the art prior to my invention and are not, therefore, broadly claimed herein, my present invention consisting in a novel and improved mechanism for effecting this result and for applying additional weight to the driving-wheels by raising the frames and increasing the tension of the driving-springs, the essential elements and operation of which mechanism will now be described.

In the practice of my invention as exemplified in the embodiment thereof herein set forth I provide means for applying additional weight to the drivers when desired by shifting the fulcrums of the rear equalizers and of further applying weight thereto by raising the frames and increasing the tension of the driving-springs uniformly throughout, this being effected by depressing the intermediate equalizers, the forward ends of the forward driving-springs, and the back ends of the rear driving-springs, thus applying a large in-

crease of weight uniformly to all the driving-axles instead of a smaller increase of weight irregularly distributed, as in the case of prior forms of traction-increasers.

Referring to the drawings, the rear equalizers 43 are normally fulcrumed on pins 44^b, fitting freely in vertical slots 44^c in hangers 44, fixed to the frame members 8. A fluid-pressure cylinder 53 is secured to a transverse bar 54, connected at its ends to the frame members, the axis of said cylinder being transverse or at right angles to the equalizers 43 and being in a plane in advance of that in which their fulcrum-pins 44^b are located. The cylinder 53 is fitted with two pistons 52, which are normally held at the inner extremity of their traverse, as shown in Fig. 7, by springs 52^a. Fluid under pressure, as air or steam, is admitted to the space between the pistons 52 by a pipe controlled by a suitable valve conveniently accessible to the engineman, said pipe being connected to an opening or port 52^b in the cylinder, and when moved outwardly by the application of pressure the pistons 52 abut against piston-rods 51, each of which is coupled at its outer end to a toggle-joint mechanism, consisting of two links 55 55^a. The upper links 55 of the toggle-joint mechanism are coupled to the frame members 8, and the lower links 55^a are coupled to the lower ends of links 56, the upper ends of which are in turn coupled to transverse supplemental fulcrum-pins 57, which pass freely through the equalizers 43 in the vertical plane of the cylinder 53. The lower ends of the opposite links 55^a are coupled together by a transverse link 58 in order that both the inward and the outward movements of said links shall be coincident.

Under the above construction when it is desired to apply additional weight to the driving-wheels the outward movement of the pistons 52 is effected by the application of fluid-pressure to their inner sides, whereupon the rear equalizers 43 will be depressed by the toggle-joint mechanism, and their normal fulcrum-pins 44^b being thereby removed from their bearings in the hangers 44 they will be fulcrumed upon the supplemental fulcrum-pins 57, thereby correspondingly decreasing the length of the lever-arms of the rear equalizers which adjoin the rear driving-wheels 1 and imposing additional weight on said driving-wheels. The action of the toggle-joint mechanism upon the equalizers raises the frame members, thus further relieving the load upon the trailing wheels and applying more weight to the driving-wheels than is obtainable by simply changing the fulcrum-point. The rear ends of the springs 41 of the rear driving-wheels are coincidently depressed and additional tension imparted to said springs. Upon the relief of pressure in the cylinder 53 the pistons 52 are moved inwardly and the parts returned to their normal positions.

The intermediate or driving-spring equalizers 43^a and the front ends of the springs 41^a of the front driving-wheels 1^a are coincidently depressed by a fluid-pressure and toggle-joint mechanism, which operates upon the same general principle as that above described. A fluid-pressure cylinder 53^a is bolted to a transverse beam 59, having fulcrum-pins 59^a at its ends, on which pins the driving-spring equalizers 43^a are fitted to vibrate, the beam 59 being carried and guided at its ends in housings 44^a, fixed to the frame members. The cylinder 53^a is fitted with two pistons similarly to the cylinder 53 above described, said pistons when forced outwardly by pressure applied to their inner sides acting upon piston-rods 51^a, each of which is coupled at its outer end to a toggle-joint mechanism, which is substantially similar to that of the rear equalizers and consists of two links 55^b and 55^c. The upper links 55^b are coupled to the lower rails of the frame members 8, and the lower links 55^c are coupled to the transverse beam 59, which carries the equalizers 43^a. The outward movement of the pistons and piston-rods 51^a of the cylinder 53^a, acting through the toggle-joint mechanisms upon the beam 59 and the equalizers 43^a, which it carries, depresses said equalizers, thus applying additional load to the driving-springs 41 41^a through the spring-hangers 41^b and 41^c, and at the same time raises the frame members 8 and correspondingly relieves the weight upon the trailing and leading wheels, thus further increasing the weight upon the driving-wheels. It will of course be understood that the cylinder 53^a is, similarly to the cylinder 53, provided with a suitable valve-controlled fluid-pressure-supply pipe. The cylinder 53^a may, if preferred, be supported similarly to the cylinder 53 and the toggle-joint mechanisms be coupled to the equalizers 43^a by links, as in the case of the rear equalizers 43, before described.

The forward traction-increaser mechanism is substantially similar to the intermediate or that of the driving-spring equalizers last above described, except in the particular that it operates upon the spring-hangers 41^d, which are connected to the forward ends of the front driving-springs 41^a, instead of acting upon the equalizers. A fluid-pressure cylinder 53^b, the capacity of which need be only about one-half of that of the cylinder 53^a, which actuates the equalizers 43^a, is, similarly to the cylinder 53^a, secured to a transverse beam 59^b, said beam being located substantially in the vertical central plane of the front spring-hangers 41^d. The cylinder 53^b is, similarly to the cylinders 53 and 53^a, fitted with two pistons, between which fluid under pressure is admitted through a suitable valve-governed supply-pipe and which act upon piston-rods 51^b, each of which is coupled to a toggle-joint mechanism composed of two links 55^d and 55^e. The upper links 55^d are coupled to the frame members 8 and the lower links 55^e to the transverse beam 59^b, and the

front hangers 41^d of the forward driving-springs 41^a are coupled to the ends of the beam 59^b. It will be obvious that, if desired, the connections of the fluid-pressure cylinder and toggle-joint mechanisms may be made similar to those of the rear equalizers 43 and, conversely, that the rear-equalizer traction-increaser mechanism may be disposed similarly to that of the driving-spring equalizers and front spring-hangers, as above described.

While as shown herein my improvement is adapted to application in a four-coupled locomotive-engine with four-wheeled leading truck and trailing wheels, it is equally applicable to other designs and combinations of wheel arrangement, and the traction-increasing mechanism may be applied at one or more points, as desired. In the case of engines of the "Prairie" type having a two-wheeled leading truck a traction-increaser mechanism similar to that herein shown for the rear equalizers would be applied beneath the cylinders of the engine.

The traction-increaser mechanism herein set forth will readily increase the weight on the driving-wheels from fifteen to twenty-five per cent., as desired, and as applied in actual railroad service an increase of weight of about twenty per cent. is regularly attained.

I claim as my invention and desire to secure by Letters Patent—

1. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to springs through which load is applied to the engine-wheels, and means for actuating the linkage mechanism to depress the springs and thereby impose additional load thereon.

2. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer connected with springs through which load is applied to the engine-wheels, and means for actuating the linkage mechanism to depress the equalizer and thereby impose additional load on the connected springs.

3. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer connected with springs through which load is imparted to the engine-wheels, and means for actuating the linkage mechanism to depress the equalizer and thereby coincidently vary its fulcrum-point and impose additional load on the connected springs.

4. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to springs through which load is applied to the engine-wheels, and a fluid-pressure mechanism by which the linkage mechanism is actuated to depress the springs and thereby impose additional load thereon.

5. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer, and means for actuating said toggle-joint mechanism to vary the position of the equalizer relatively to the frame.

6. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer, and means for actuating said toggle-joint mechanism to vary the position of the fulcrum-point of the equalizer relatively to the frame.

7. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer, and means for actuating said toggle mechanism to depress the equalizer and thereby vary its position relatively to the frame.

8. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer, and means for actuating said toggle-joint mechanism to depress the equalizer and impose additional load upon a spring-hanger connected thereto.

9. A locomotive-engine traction-increaser comprising a toggle-joint mechanism coupled to the engine-frame and to an equalizer, and a fluid-pressure mechanism by which said toggle-joint mechanism is actuated to vary the position of the equalizer relatively to the frame.

10. A locomotive-engine traction-increaser comprising two toggle-joint mechanisms, each coupled to a side frame member of the engine and to an equalizer, and an interposed fluid-pressure mechanism by which said toggle-joint mechanisms are coincidently actuated to vary the position of the equalizers coupled thereto relatively to the side frame members.

11. The combination, in a locomotive-engine, of a frame, wheels, springs through which weight is applied to the wheels, a toggle-joint mechanism coupled to the frame, and coupled, through intermediate connections, to the springs, and means for actuating said toggle-joint mechanism to depress the springs and thereby impose additional load thereon.

12. The combination, in a locomotive-engine, of a frame, wheels, springs through which weight is applied to the wheels, a toggle-joint mechanism coupled to the frame, and coupled, through intermediate connections, to the springs, and a fluid-pressure mechanism by which said toggle-joint mechanism is actuated to depress the springs and thereby impose additional load thereon.

13. The combination, in a locomotive-engine, of a frame, wheels, springs through which weight is applied to the wheels, an equalizer connected, at its opposite ends, to said springs, a toggle-joint mechanism coupled to the frame and to the equalizer, and means for actuating said toggle-joint mechanism to depress the equalizer and the ends of the connected springs.

14. The combination, in a locomotive-engine, of a frame, wheels, springs through which weight is applied to the wheels, an

equalizer connected, at its opposite ends, to said springs, a toggle-joint mechanism coupled to the frame and to the equalizer, and a fluid-pressure mechanism by which said toggle-joint mechanism is actuated to depress the equalizer and the ends of the connected springs.

15. The combination, in a locomotive-engine, of a frame, driving-wheels, bearing-wheels, springs through which weight is applied to the driving and the bearing wheels, an equalizer connected at its opposite ends to said springs and normally fulcrumed on the frame, a supplemental fulcrum-pin fitted in the equalizer, a toggle-joint mechanism coupled to the supplemental fulcrum-pin and to the frame, and means for actuating said toggle-joint mechanism to depress the equalizer and thereby transfer its fulcrum-point to the supplemental fulcrum-pin and coincidently impose additional load on the adjacent connected spring.

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Witnesses:
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A. S. WIRTNER.