(No Model.)

2 Sheets—Sheet 1.

W. S. WOOTTON.

ROAD ENGINE.

No. 387,612. Patented Aug. 7, 1888.

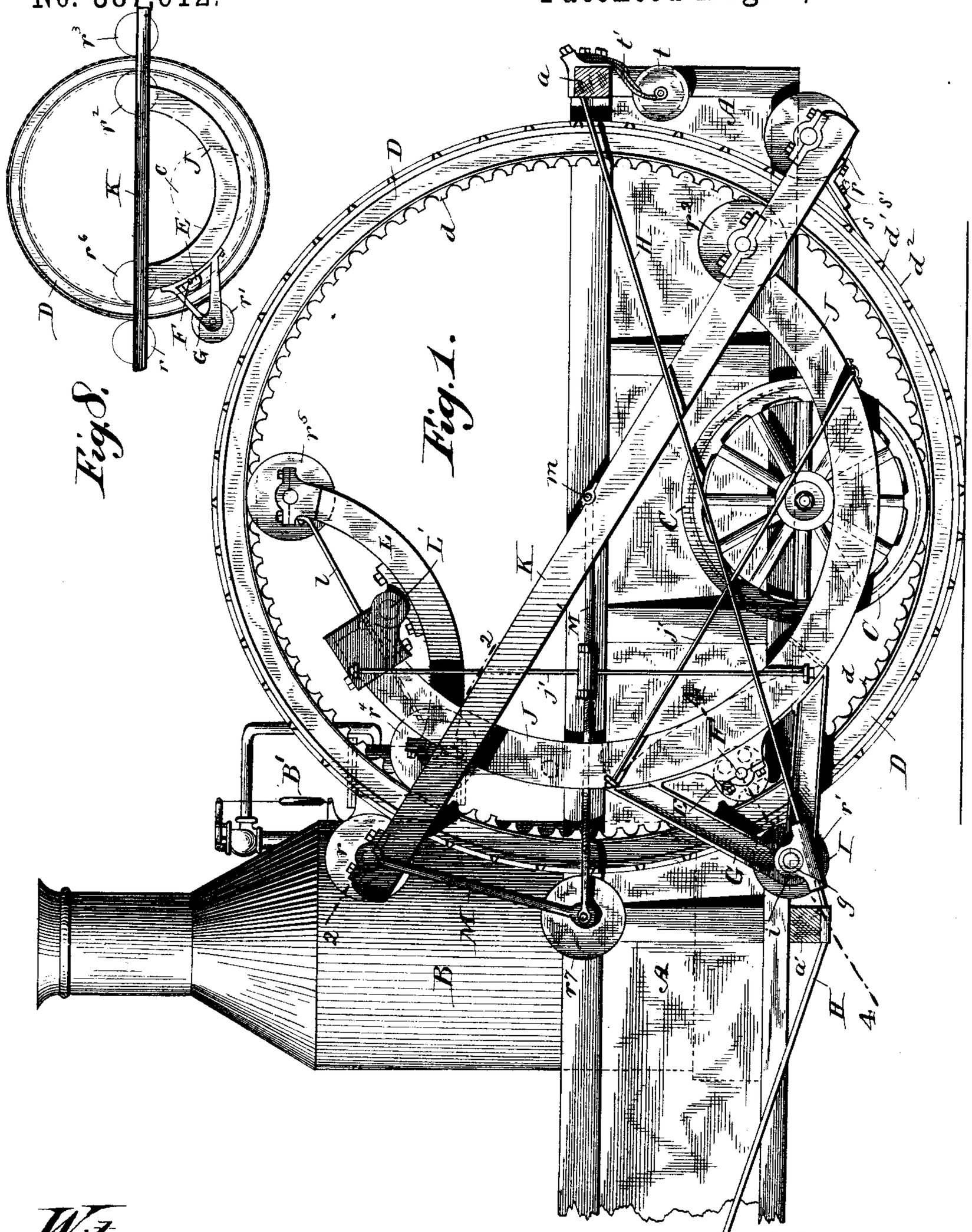

Fig. 2.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

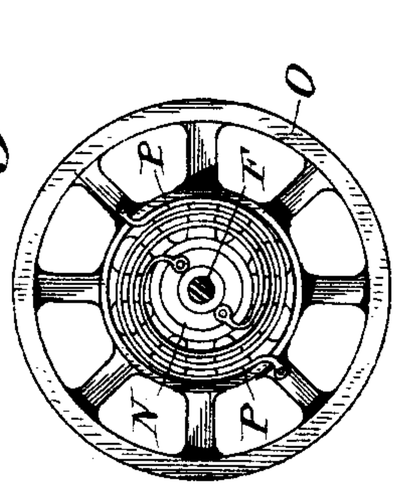


Fig. 6.

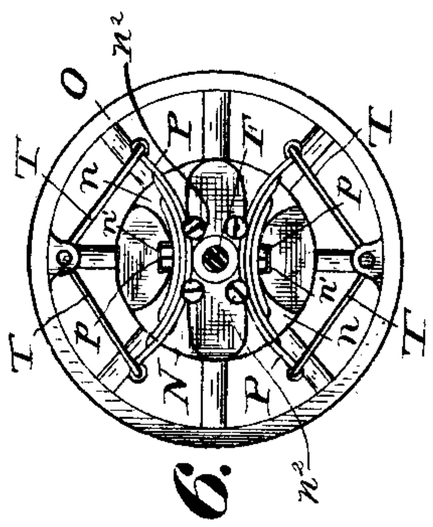


Fig. 7.

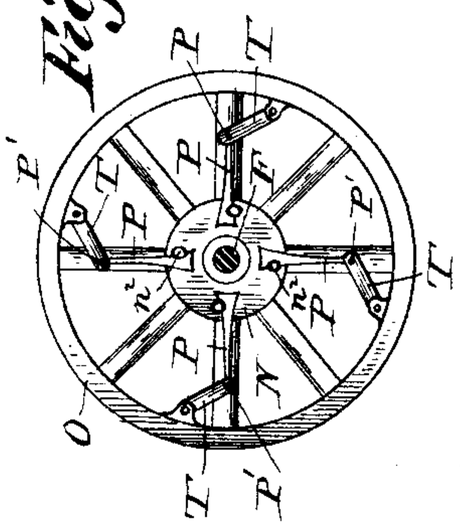


Fig. 2.

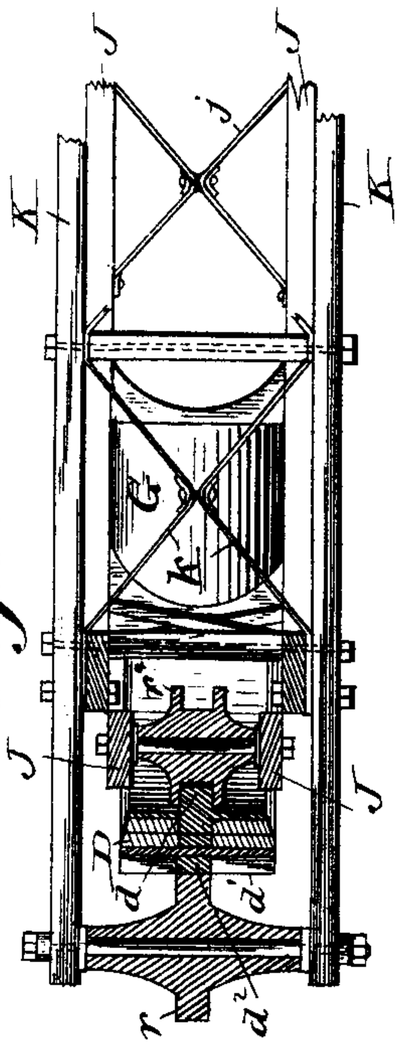


Fig. 3.

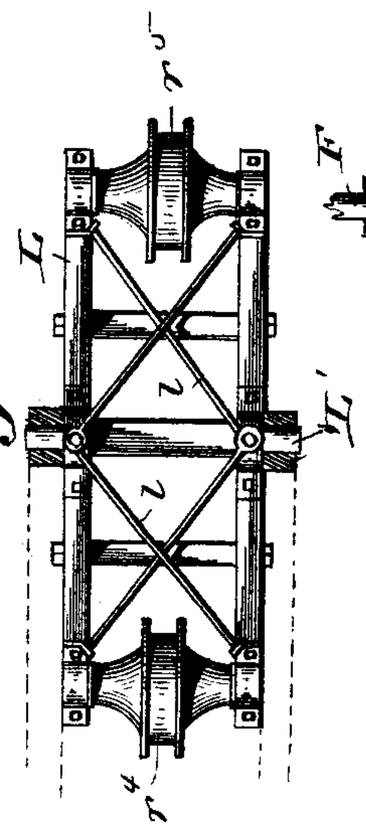
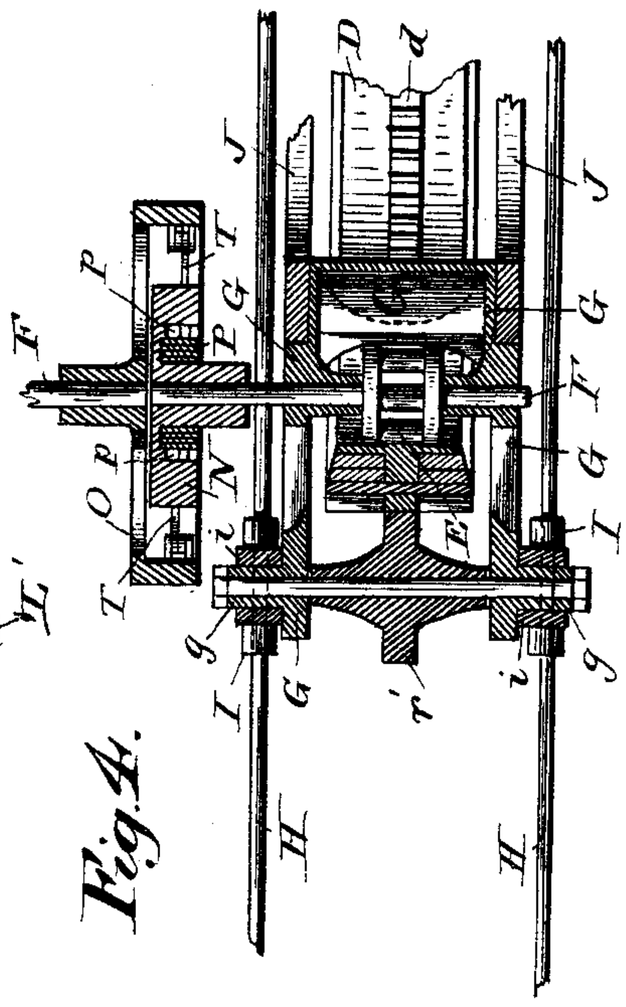


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM S. WOOTTON, OF SCOTTSBURG, VIRGINIA.

ROAD-ENGINE.

SPECIFICATION forming part of Letters Patent No. 387,612, dated August 7, 1888.

Application filed December 19, 1887. Serial No. 258,357. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. WOOTTON, residing at Scottsburg, in the county of Halifax and State of Virginia, have invented certain new and useful Improvements in Road-Engines, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which the invention appertains to make and use the same.

It is desirable in road-engines, as in other vehicles, that the body should be elastically supported upon the ground-wheels, in order to prevent repeated and abrupt shocks and jars, which are disagreeable to persons riding on the engine and injurious to the frame and machinery thereof. Such an elastic support, however, entails a movement, especially in vertical planes, of the engine-frame and driving machinery relative to the driving-wheels, which latter are of necessity connected with said machinery.

One feature of my invention consists in applying a spring-connection, which I term a "balanced-spring connection," between the driving ground-wheels and the driving mechanism, which permits a movement of such mechanism bodily in directions crosswise of the axis or driving-shaft of said wheels without interfering with the transmission of power from the engine to the driving ground-wheels. My invention also consists in the application at said point of what I term a "spring-and-link connection."

Another feature of my invention consists in the devices for supporting a centerless driving ground-wheel of a road-engine with a view to minimize the friction, to resist the tendency which a large and relatively light wheel will have to depart, under certain strains, from the shape of a true circle, and at the same time to transmit the propelling force as directly as possible from the engine to the ground.

In order to enable my invention to be more clearly understood, I have shown in the accompanying drawings a means for carrying the same into effect.

In said drawings, Figure 1 is a side elevation of so much of a road-engine as is necessary to illustrate my invention embodied therein. Fig. 2 is a sectional view of a portion of one of the driving-wheels on line 2 2, Fig. 1. Fig. 3 is a top view of the equalizing-frame which I prefer to employ in supporting the driving-wheels. Fig. 4 is a sectional view on line 4 4, Fig. 1, of a portion of one of the driving-wheels. Fig. 5 is an elevation of a portion of the driving mechanism, illustrating my balanced-spring connection. Figs. 6 and 7 are similar views illustrating two forms of the spring-and-link connection. Fig. 8 is a diagram illustrating another arrangement of the rollers which engage the driving-wheel.

Referring to the drawings, A indicates the main frame or body of the engine, which carries the boiler B and engine or engines B'. The latter may be of relatively small power, but will be capable of a high rate of speed. The body will be supported at one end by a suitable steering wheel or wheels, and at the other end by wheels C, between the axle of which and the body A, I preferably interpose a vehicle spring or springs of any usual or preferred character.

The wheels C run upon the inner periphery of driving ground-wheels D. As the two wheels D (two being the number which will ordinarily be employed) are similar in construction and in their means of connection with the body and with the engine, a description of one with its said connecting means will suffice for both. The wheels are provided with a peripheral gear, *d*, which, in order to obtain the greatest power, should be as near to the tire as possible. With the gear *d* meshes a driving lantern-pinion, E, mounted upon a shaft, F, through which power is applied to the pinion. The shaft F is carried by a frame, G, pivoted to a fixed point at *g*. The support for pivot *g* is furnished by the main frame of the engine in any suitable manner.

In the construction shown brace-rods H—one on each side of the wheel D—are secured to a rear cross-piece, *a*, of the body, to an intermediate cross-piece, *a'*, and at their forward ends to another suitable fastening of any desired character. The rods H are encircled by sleeves I, provided with perforated lugs *i*, in which latter the pivot *g* is mounted. This pivot is formed by lateral trunnions formed on or secured rigidly to the frame G.

I will now describe the means which I have devised for supporting the ground driving-wheel D. The wheel is of the character termed "centerless"—that is to say, which has no cen-

tral hub or axle. It is therefore held in position by the side of the body, and applies its propelling force thereto by its periphery.

J is a frame consisting of two parts arranged side by side, as shown in Figs. 2 and 4, each made in the form of a segment of a circle, and connected by the frame G, to which they are rigidly attached, and also preferably by cross-braces *j*, as indicated in Fig. 2. It is also desirable to brace this segmental frame by means of ties *j'*, which shall resist any tendency to depart from its true shape. Rollers for receiving the propelling force of the driving-wheel (both in a forward and backward direction) are carried by the frame J, in the construction shown, through the medium of rigid bars K and an equalizing-frame, L, pivotally supported on the said frame. The rollers are shown at r r^2 r^3 r^4 r^5, and have their axes parallel with the mathematical axis of the driving-wheel bearing against the inner and outer periphery of the same. The bars K are cross-braced, as shown at *k*, Fig. 2, and the frame L is braced, as shown at *l*. It will thus be seen that when the engine is advancing the driving-wheel D propels the body by the pressure of its outer forward periphery upon the roller r and of its inner rear periphery upon the roller r^2. As these rollers are substantially diametrically opposite each other, the driving-wheel is subjected to little or no collapsing force, which would tend to flex it out of a true circle. Additional security in maintaining the wheel D in proper shape and position is afforded by the equalizing-frame L. The oscillation of the latter upon its pivot L' enables its rollers r^4 r^5 to bear with equal pressure upon the driving-wheel, and by yielding to each other to operate with the least possible friction.

It will be understood that the bars K may be so arranged that the rollers r r^2 r^3 will bear upon the driving-wheel in the line of its horizontal diameter, as shown in Fig. 8. The equalizing-frame L may also occupy other positions, or more than one of such frames may be employed.

When the engine is moving backward, the principal propelling force will be applied to the roller r^3 and to the rollers r^4 r^5. In the construction shown in Fig. 8 an additional roller, r^6, upon the rigid portion of the frame, will receive a large part of such force.

The propelling force applied by the driving-wheel D, whichever be the direction of movement of the same, is transmitted by the roller-supporting frame, comprising the parts K, J, and G, to the body through the pivot *g*.

The pinion E in operation exerts a considerable radial pressure, tending to force the driving-wheel forward out of engagement with it. I apply a direct opposition to this force by mounting in the frame G, preferably on the line of the pivot *g*, a roller, r', adapted to rotate freely on its bearings and bear against the outer periphery of the driving-wheel. This roller, also, in the arrangement of the rollers r and r^2, (shown in Fig. 1,) will receive and transmit to the body a large part of the forward-propelling force of the driving-wheel.

It is desirable to provide the tire of the driving-wheel with the usual cross-ribs, *d'*, in order that these may not interfere with the smooth running of the rollers r, r', and r^3. I also provide said tire with a peripheral rib, d^2, in line with said rollers, and of at least as great height as the cross-ribs. I also combine with the driving-wheel and its external bearing-rollers a scraper, *s*, adapted to clear so much of the external periphery of the driving-wheel as is necessary to furnish a smooth track for the rollers. The scraper will be adjustable by a nut, *s'*, and consists of or is carried by a spring, which is necessary to maintain its constant engagement with the wheel during the movements which the latter will necessarily have within certain limits in the roller-supporting frame.

If, in addition to the bearing-points afforded by rollers r r' when arranged as shown in Fig. 1, a bearing-point for the driving-wheel be desired on the line of its horizontal diameter, I employ a roller, r^7, carried by an oscillating frame, M. The latter may be conveniently hung from the axis of the roller r, and is adjustable forward and backward to give the roller r^7 just the degree of bearing desired by means of an extensible or contractible rod, M', secured to the frame M and to a point, *m*, upon the main roller-supporting frame. The strain of the rod M' is transmitted by the frame K J G to the pivot *g* and thence to the body A. The rollers bearing on the inner periphery of the driving-wheel are flanged, as shown, in order to bear equally upon both sides of the gear *d* and to retain the wheel in a substantially vertical plane. It will be seen that in any situation in which the body is tipped or lifted relative to either of the wheels D, or either of said wheels be left unsupported by the ground, there would be a relative movement between the body and wheel upon the pivot *g*. To limit this, I provide a stop. This stop consists, in the construction shown, of an anti friction roller, *l*, carried by a spring, *l'*, secured to the cross-bar *a*. After a limited movement of the character referred to the wheel D will come in contact with the roller *l* and the movement be arrested.

I will now describe the connection between the driving-pinion E and the driving mechanism carried by the body. The driving-shaft F is divided, and upon the portion which carries the pinion E is secured a disk, N, while upon the portion which is connected with the driving mechanism is secured a disk, O. By the term "disk" I intend not only circular parts or wheels, as shown, but also plates of any shape, or radial arms secured to the sections of the shaft.

In Fig. 5 is shown the balanced spring-connection hereinbefore referred to, in which two or more springs, P, have their ends secured diametrically opposite each other to both of

said disks. This forms a spring-connection between the parts of the shaft which allows them to move out of line with each other and which is accurately balanced, so that when the springs are under high tension they will have no tendency of themselves to disturb the alignment of the parts of the shaft.

In Figs. 6 and 7 is shown what I term the "spring and link" connection for the divided shaft. This connection may take many forms without departing from my invention. In Fig. 6 the springs are formed in several leaves connected at their middle by bolts *p*. One of the disks is provided with curved seats *n*, in which the springs fit. The heads of the nuts *p*, resting in corresponding small recesses, *n'*, will keep the springs from shifting in their seats, and set-screws *n²* hold them from lateral displacement. The springs are pivoted at their ends by bolts P', or other suitable means, to links T, which latter at their other ends are hinged to the other disk. It will be seen that this construction permits of a vertical movement within certain limits (and, in fact, of movement in any direction transverse to the driving-shaft) of the body and driving mechanism relative to the driving-pinion and its ground-wheel. A similar result is attained by the construction shown in Fig. 7, in which form the springs are normally straight and the links each at a separate point to their disk.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a road-engine, the combination, with the driving ground-wheels, of a divided driving-shaft, the separate parts of the shaft being connected, respectively, with the driving mechanism and with said wheels, and two or more springs arranged oppositely to and balancing each other about the shaft and connecting the separate portions thereof with each other, substantially as set forth.

2. The combination, with the divided driving-shaft and disks carried by the respective portions thereof, of a plurality of springs and corresponding links secured, respectively, to and connecting with each other the said disks, whereby a movement of the parts of said shaft out of line with each other may be permitted without interrupting their driving-connection.

3. The combination, with the divided driving-shaft and disks carried thereby, one of which is provided with seats or recesses, of a plurality of springs mounted in said recesses, and links pivoted to the springs and to the other disk, substantially as set forth.

4. The combination, with the divided driving-shaft and disks carried by the respective portions thereof, of a plurality of springs secured to one of said disks, and corresponding links pivoted to the said springs and situated at an angle thereto and pivoted at their other ends to the other disk.

5. The combination, with the centerless ground-wheel and its driving-pinion, of a frame connected with the body of the engine, and a roller mounted on said frame and bearing against the periphery of the wheel in the line of its horizontal diameter, for receiving the horizontal propelling force of said wheel.

6. The combination, with the centerless ground-wheel and its driving-pinion, of a frame connected with the body of the engine, and rollers mounted on said frame both within and without the wheel, and bearing upon both its inner and outer periphery for receiving its propelling force.

7. The combination, with the centerless ground-wheel and its driving-pinion, of a frame connected with the body of the engine, and a roller mounted on said frame and bearing against the periphery thereof opposite to and adapted to resist the radial pressure of said pinion.

8. The combination, with the centerless ground-wheel and its driving-pinion, of a frame adapted to hold and support said ground-wheel and having a bearing for the journal of said pinion, and a roller bearing upon the periphery of the ground-wheel, said roller and frame being pivoted to the body of the engine on the same axial line.

9. The combination, with the centerless ground-wheel and its driving-pinion, of a frame connected with the body of the engine, a roller mounted thereon and bearing against the periphery of the wheel, an equalizing-frame pivoted to the first frame, and rollers carried by the equalizing-frame on opposite sides of its pivot and bearing against the periphery of the ground-wheel.

10. The combination, with the centerless ground-wheel and its driving-pinion, of a frame carrying the pinion, rollers mounted on the frame and bearing against the periphery of the wheel, turning on said frame by which the latter is pivotally connected with the body of the engine, and a roller mounted on the frame opposite to said pinion for resisting its radial pressure.

11. The combination, with the centerless wheel and the rollers bearing against its outer periphery, of the scraper *s*, engaging said outer face for clearing the track for said rollers.

12. The combination, with the centerless wheel and a supporting-frame therefor pivoted to the main frame of the engine, of a roller carried by the main frame and situated upon the opposite side of the wheel from said pivot, for limiting the relative movement of the main frame and said wheel about said pivot.

In testimony whereof I have affixed my signature in the presence of two witnesses.

WILLIAM S. WOOTTON.

Witnesses:
H. N. LOW,
JULIUS SOLGER.