S. L. LONG.

SELF TRAILING TRUCK.

APPLICATION FILED MAR. 10, 1917.

1,288,432.

Patented Dec. 17, 1918.

4 SHEETS—SHEET 1.

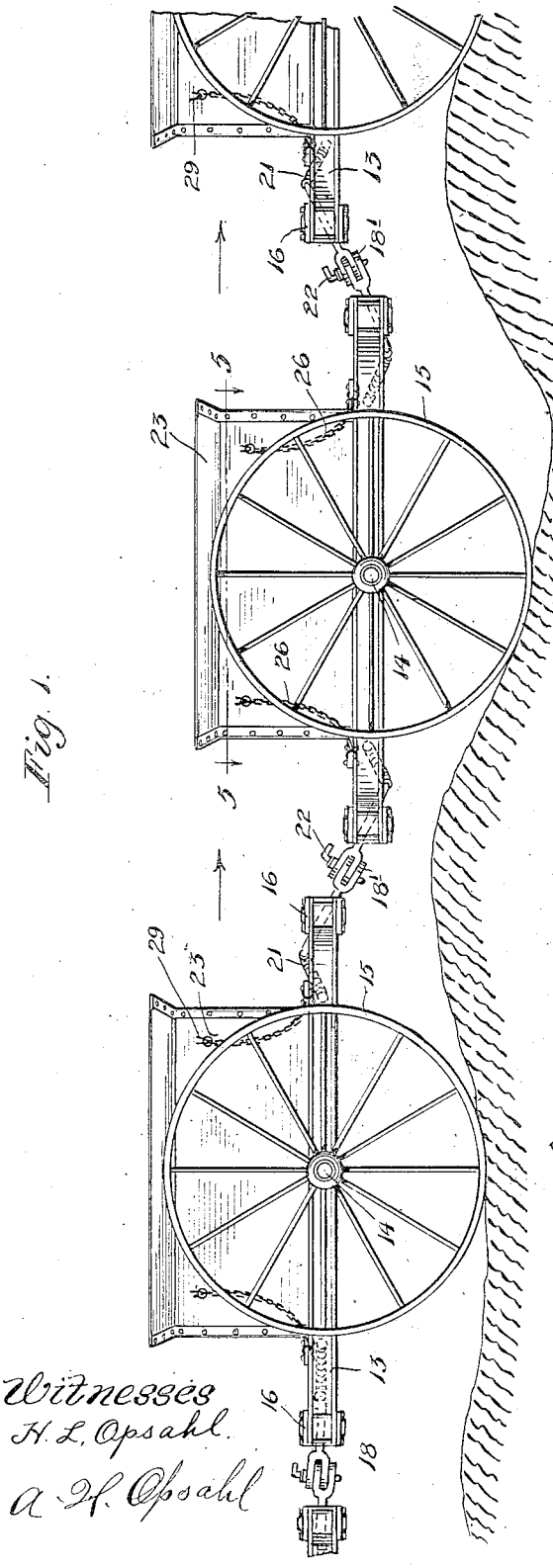


Fig. 1.

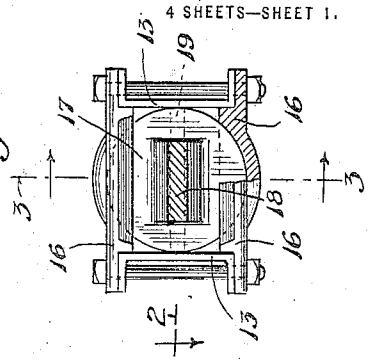


Fig. 4.

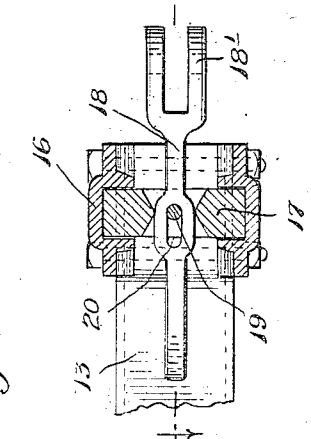


Fig. 3.

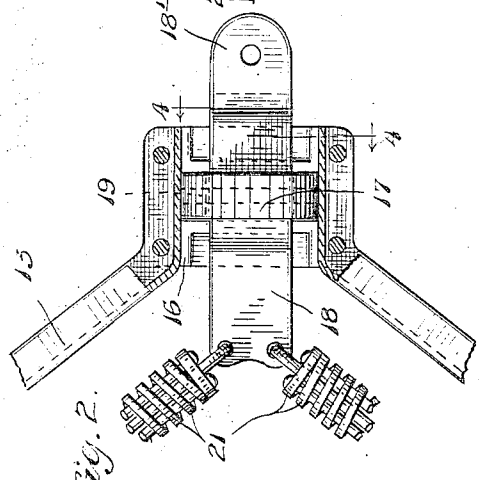


Fig. 2.

Witnesses
H. L. Opsahl.
A. H. Opsahl

Inventor
S. L. Long
By his Attorneys
Williamson & Merchant

PHOTO-LITHO. by SACKETT & WILHELMS CORP. N.Y.

S. L. LONG.

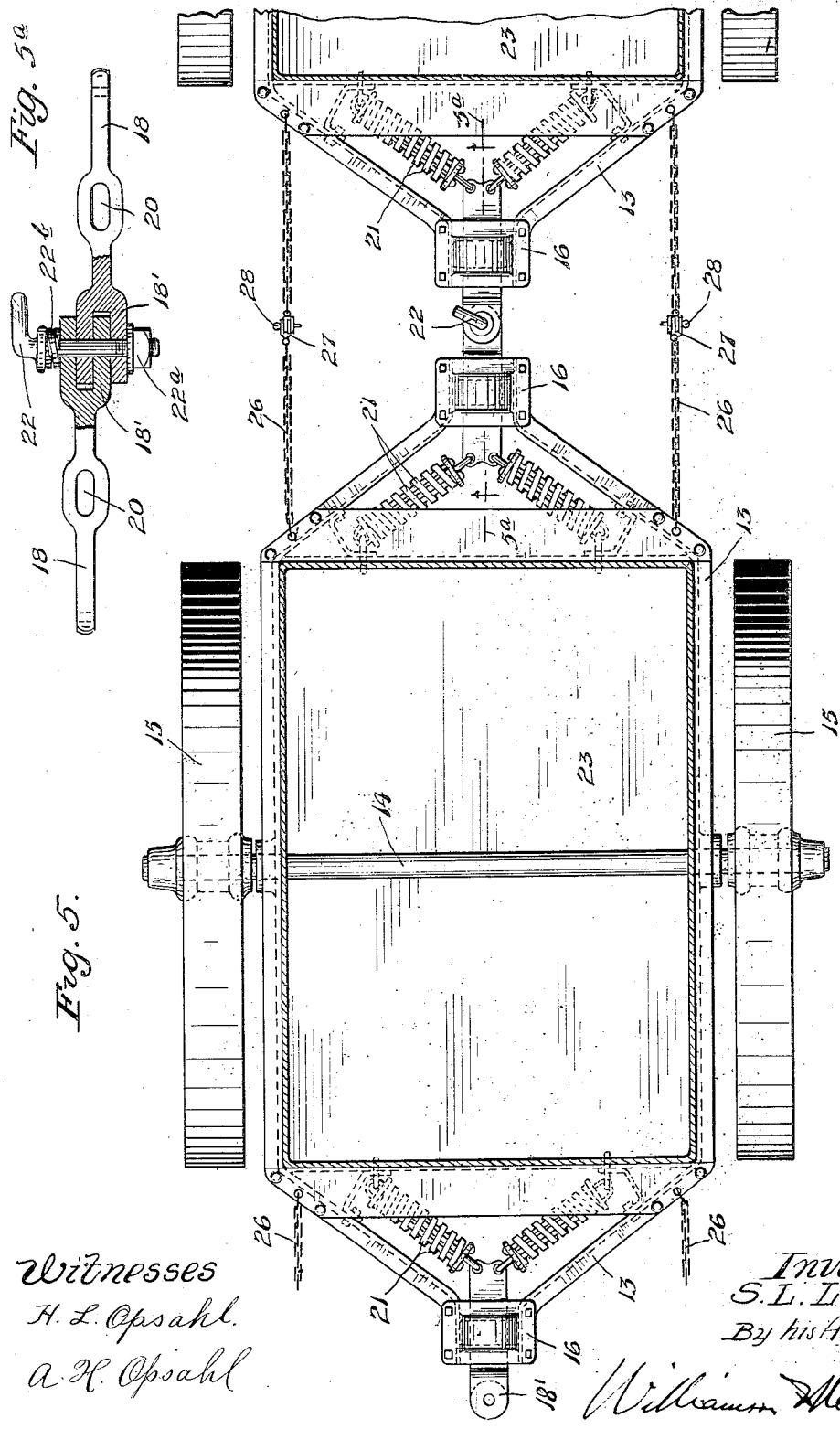
SELF TRAILING TRUCK.

APPLICATION FILED MAR. 10, 1917.

1,288,432.

Patented Dec. 17, 1918.

4 SHEETS—SHEET 2.



Witnesses

H. L. Opsahl.

A. K. Opsahl

Inventor

S. L. Long

By his Attorneys

Williamson & Merchant

S. L. LONG.

SELF TRAILING TRUCK.

APPLICATION FILED MAR. 10, 1917.

1,288,432.

Patented Dec. 17, 1918.

4 SHEETS—SHEET 3.

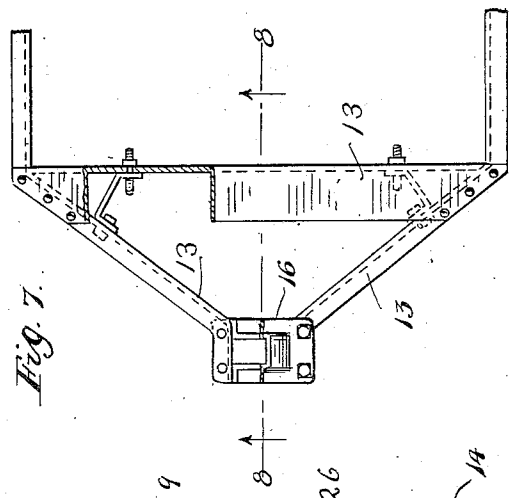


Fig. 7.

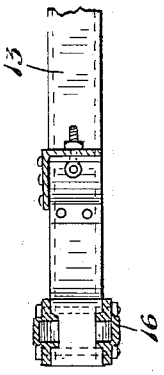


Fig. 8.

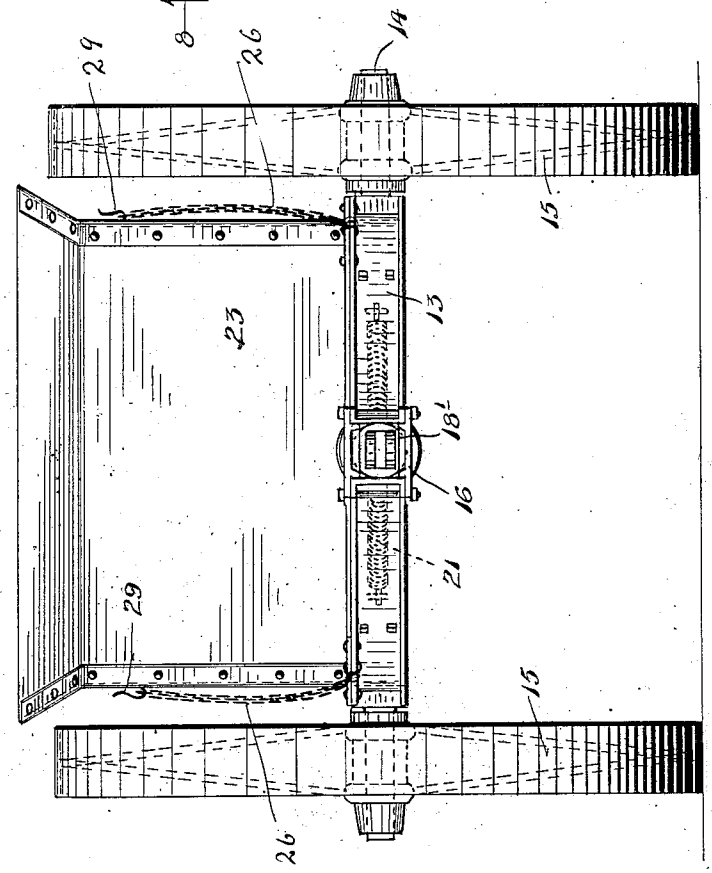


Fig. 6.

Witnesses.
H. L. Opsahl.
A. H. Opsahl

Inventor
S. L. Long
By his Attorneys
William D. Merchant

S. L. LONG.

SELF TRAILING TRUCK.

APPLICATION FILED MAR. 10, 1917.

1,288,432.

Patented Dec. 17, 1918.

4 SHEETS—SHEET 4.

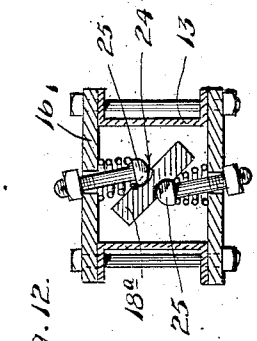


Fig. 12.

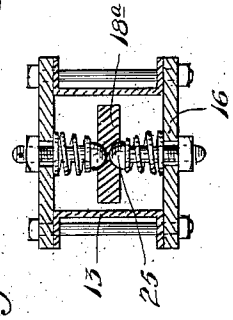


Fig. 11.

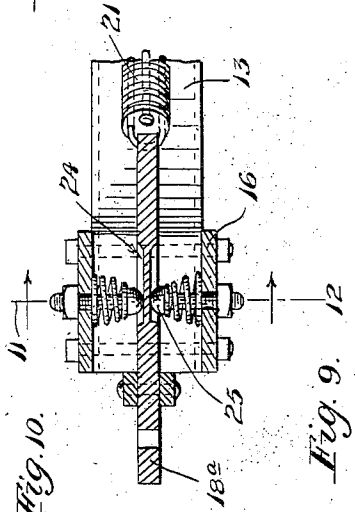


Fig. 10.

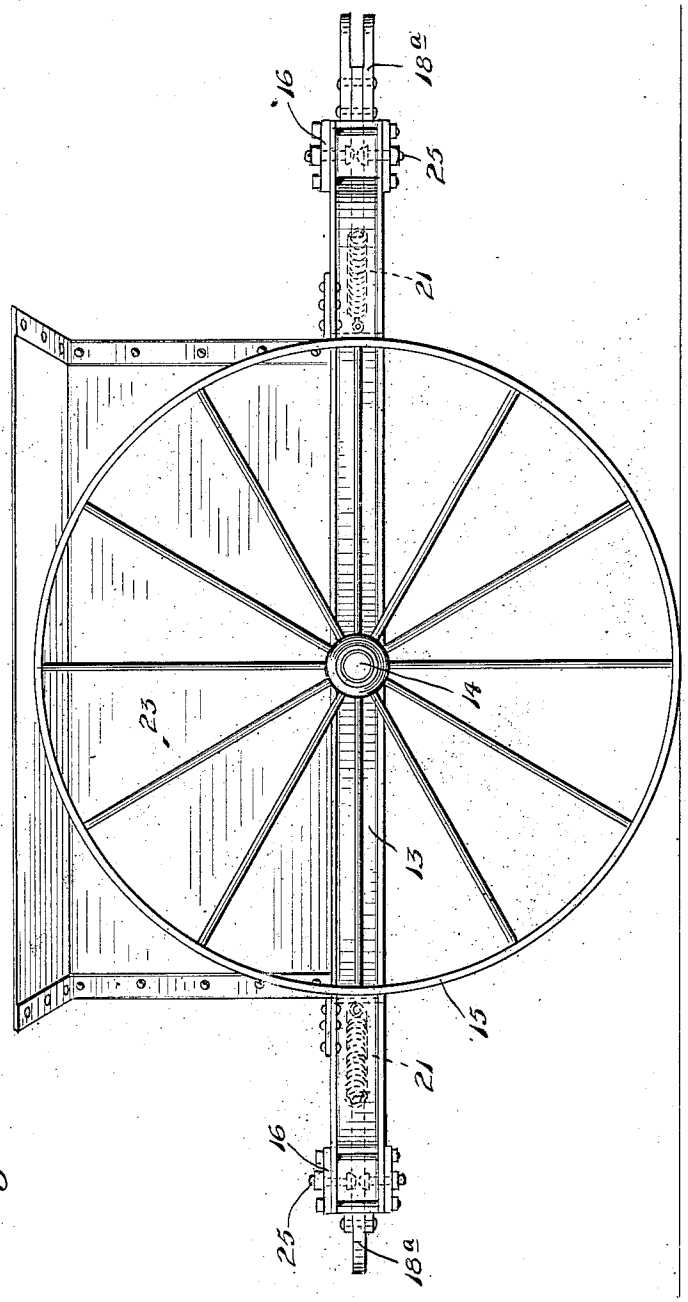


Fig. 9.

Witnesses
H. L. Opsahl.
A. H. Opsahl

Inventor
S. L. Long
By his Attorneys
Williamson & Merchant

UNITED STATES PATENT OFFICE.

SIDNEY L. LONG, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO A. W. BENSON MANUFACTURING COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

SELF-TRAILING TRUCK.

1,288,432. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed March 10, 1917. Serial No. 153,871.

To all whom it may concern:

Be it known that I, SIDNEY L. LONG, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Self-Trailing Trucks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to trailing trucks which, when connected in a train, will follow the same track whether the travel be on a straight line or on a curve, or tortuous line of travel.

Various different types of trailing trucks have hitherto been provided. Some thereof have had four wheels, but usually they have had three wheels, two thereof being large laterally spaced axially alined main wheels and a centrally located caster wheel. The four-wheeled trucks are relatively expensive and heavy and do not trail as well as the three-wheeled trucks, and on the other hand, in the above noted three-wheeled trucks, the caster wheels, in soft ground, plow up the earth, make the trucks hard running, that is, the draft heavy, and moreover, do not run in the same tracks as the main wheels, so that in running on rut-formed roads, will not follow the ruts, but must run over the relatively rough crown of the road.

I have reduced the draft of a train of trailing trucks to a minimum, provided a train of trucks that will trail each other perfectly and even turn substantially square corners, and obtain other advantages, such as a reduction in cost of manufacture, by providing a train of two-wheeled trucks with yieldingly centered draw-bars arranged not only to produce the proper trailing action, but to keep the truck bodies properly alined.

A train of these improved trucks illustrating the preferred embodiment of my invention, is shown in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings;

Figure 1 is a side elevation showing a train of improved trucks;

Fig. 2 is a plan view of one of the yielding drawbars, some parts being sectioned on the line 2—2 of Fig. 3;

Fig. 3 is a vertical section on the line 3—3 of Fig. 4, some parts being shown in full and some parts being broken away;

Fig. 4 is a transverse section taken approximately on the line 4—4 of Fig. 2;

Fig. 5 is a plan view showing one of the trucks on a larger scale than in Fig. 1, and showing also part of the drawbar and coupling of another car, some parts being sectioned on the line 5—5 of Fig. 1; Fig. 5^a is a detail partly in section and partly in side elevation showing two coupled drawbars;

Fig. 6 is an end elevation of the truck shown in Fig. 5;

Fig. 7 is a plan view with some parts sectioned and some parts broken away, showing the truck frame and draft yoke of the truck;

Fig. 8 is a section on the line 8—8 of Fig. 7;

Fig. 9 is a side elevation of one of the trucks;

Fig. 10 is a view corresponding to Fig. 3, but illustrating modified construction; and

Figs. 11 and 12 are transverse sections taken on the line 11—12 of Fig. 10, but illustrating different positions of the draw bar.

Describing first the construction illustrated in Figs. 1 to 9, inclusive, each truck comprises a truck frame 13 having a central axle 14 with laterally spaced truck wheels 15 journaled on the ends thereof. The truck frame 13 is preferably made of commercial iron, or steel, such as channel beams, suitably connected and braced, and at front and rear ends, bent to form draft yokes, the ends of the side bars of the said frames being brought close together and bolted or otherwise rigidly secured to hollow anchor heads 16. In this preferred arrangement, drawbar anchors 17 in the form of disk-like hubs, are swiveled in the said heads 16, for rotary, or limited rotary movements on axes that are longitudinally central of the truck. Extended through angular openings in the anchor hubs 17 are short drawbars 18 that are capable of vertical oscillatory movements, and preferably also have limited end-

wise movements in the said hubs, the connections between the same being conveniently made by transverse anchor pins 19 secured to the said hubs and extended through longitudinal slots 20 in said bars.

The inner ends of the drawbars 18 are connected to the inner ends of diverging springs 21, the outer ends of which are anchored to the truck frames 13. These springs 13 exert a force normally pulling the drawbars as far inward as permitted by the anchor pins 19, and furthermore, tend to hold the said drawbars in, or parallel to the plane of the truck frame. The said drawbars are not permitted much, if any, lateral oscillation.

In the construction illustrated in Figs. 1 to 8, inclusive, the drawbars 18, at their outer ends, have forked heads 18′, which, when interlapped, are adapted to be pivotally coupled together by coupling bolts 22 (see particularly Figs. 1, 5 and 5ª). These draw-bolts, at their lower ends, have nuts 22ª, and at their upper ends are provided with shoulders between which and the upper prong of the adjacent coupler head 18′, a short coiled spring 22ᵇ is interposed. When this nut-equipped bolt is tightened against the spring 22ᵇ, the connected coupling bars of the two connected trucks will be capable of pivotal movement under, however, considerable frictional resistance against movement. The amount of this friction may be varied, by variably tightening the nut on the bolt, and it serves to prevent undue lateral vibratory or pivotal movements of the connected drawbars. This is important, especially in running down hill.

It should be further stated that the two coupled drawbars, when coupled, while capable of lateral pivotal movements, will have little, if any, vertical movement, one in respect to the other. Moreover, it should be noted that the coupling pins 22 (see Figs. 1 and 5) are located midway between the axes of the connected trucks. This is important and is one of the features that makes the two-wheeled trucks self-trailing in traveling tortuous paths or curved corners. Also, this arrangement makes a train of connected trucks self-trailing when drawn in either direction, to-wit, either forward or backward, the terms "forward" and "backward" being used for convenience only.

The trucks may, of course, vary a great deal in character, both as to size and design. In the drawings, trucks suitable for carrying sand or gravel, for example, are illustrated, and hence, are provided with box-like bottoms 23, which would have suitable drop bottoms, not shown, nor necessary for the purposes of this case to consider.

In traveling a circle, for example, the coupling pins 22, which are the pivotal connections between the trucks, being midway between the axles of the truck wheels, will, as is evident, keep the axles pointed toward the center of the circle being traveled, and hence, as is obvious, the corresponding wheels of the several trucks must travel precisely the same paths. The same principle applies when the train is traveling either on a straight line, or in a tortuous line of travel. In turning so-called square corners, the trucks do not, of course, make their turn at an abrupt angle, but they will approach such angle so closely that the train of trucks will very abruptly turn on a rectangular corner.

In traveling a smooth road, the truck frames and the drawbars will, by the springs 21, be held horizontal and in alinement, but in traveling a hilly road, such as illustrated in Fig. 1, for example, the said springs will yield and permit the drawbars to assume angular positions while holding the truck frames approximately horizontal. The loads on the trucks being balanced on the wheels, no great force is required to maintain them in a horizontal position or to restore them to horizontal position, in case they be temporarily tilted. The swivel connection between the drawbars and the frames also permits the truck wheels to adapt themselves to lateral irregularities in the road and the springs 21 tend to restore the said drawbars to their normal rotary positions.

Obviously, the above described arrangement reduces the number of wheels absolutely required for a train of trucks, to a minimum. It also not only permits, but makes desirable, the use of large wheels which, as it well know, will run more easily over rough roads than small wheels. The large wheels, moreover, permit the load to be carried low down, and in many instances, even below the axles of the wheels, which latter construction reduces the tendency of the trucks to tilt.

Trains of trailing trucks of the character above described are highly serviceable for numerous purposes. Not only are they well adapted for use in hauling sand and gravel, but they are especially well adapted for transport and army service. By the use of a traction engine, a very large number of these trailing trucks may be drawn over all kinds of roads.

It should be further noted that where the drawbars are mounted for limited endwise movement and yieldingly drawn inward by the springs, there is provided a cushioning or yielding action which, when draft force is suddenly applied to the train, cushions and distributes the strain throughout the train.

In the modified construction of the drawbar shown in Figs. 10, 11 and 12, the said drawbar 18, at its intermediate portion, has upper and lower longitudinal grooves or de-

pressions 24 that are engaged by the rounded heads of spring pressed bolts 25 working through the top and bottom plates of the anchor heads. In this arrangement also, the drawbars are permitted vertical oscillatory movements, limited endwise movement, and limited axial rotary movements.

Figs. 10 and 11 show the drawbar in normal or neutral position and Fig. 12 shows the same as rotated from normal position.

In traveling down a steep hill with a train of heavily loaded trucks, and where brakes are applied to the trucks, there may be a tendency for the train to buckle on the pivotal connection between the drawbars. To prevent this, I provide links for connecting the adjacent ends of trucks on opposite sides of the drawbars. These links are preferably in the form of chains 26. Attached at one end to the side end portions of the truck frames and having at their free ends, interlocking perforated coupling heads 27 adapted to be connected by bolts or keys 28, as shown in Fig. 5.

In Fig. 6, these chains, being out of use, their free ends are shown as coupled to hanger hooks 29 on the sides of the truck box 23.

From the above description, it will be understood that this invention relates particularly to trains of trailing trucks, made up of quite a large number of trucks, to-wit, three or more. When one trailing truck is connected to an automobile, for instance, there is no difficult problem in maintaining the balance of a two-wheel trailer truck.

When, however, a large number of two-wheel, trailing trucks are connected, other and many difficulties are encountered. In running on undulating roads, the one truck will necessarily frequently be lower than the two trucks to which it is connected, and this requires vertically yielding coupling devices. If these vertically yielding coupling devices are not made resilient—that is, if spring elements of some form are not provided, which tend to keep the coupling devices vertically in normal or intermediate positions—then the two-wheel trucks will topple over endwise, and an oscillatory lashing action in a vertical direction will be set up which will make the train uncontrollable.

Hence, it will be understood that both the vertically yielding action, and the springs, or a resilient means tending to keep the coupling devices vertically in intermediate positions, are of the utmost importance. The vertically yielding action permits the trucks to run on undulating roads and the springs, or resilient means, exerts sufficient force to keep the truck bodies in approximate balance on the respective truck wheels, and if at any time the truck bodies are thrown slightly from true balance on their wheels, the springs will restore the same good balance in again running on level roads.

In this way, the truck bodies are kept in approximate balance on their wheels, that is, are prevented from rocking forward or rearward so as to throw the center of gravity of the load very materially from the vertical line of the axis of the wheels.

What I claim is:

1. A train of connected two-wheeled trucks, said trucks, at opposite ends, having projecting drawbars connected to the respective truck bodies so as to steer the same, but capable of vertical angular movements in respect to the truck bodies, and yieldingly held normally in vertical intermediate positions, so as to thereby hold the truck bodies in substantial balance on the truck wheels, said drawbars, approximately midway between the wheel axes of the connected trucks, being pivotally connected by coupling devices that permit relative horizontal angular movement of the pivotally connected drawbars, to produce the trailing action, but hold the said connected drawbars for common vertical angular movements.

2. A train of connected two-wheel trucks, said trucks, at opposite ends, having vertically yielding draw-bars pivotally connected intermediate of said trucks for common vertical angular movement, but having relatively pivotal lateral movement to produce the trailing action of the trucks, and springs yieldingly holding said draw-bars vertically in intermediate positions, the vertical yielding action of said draw-bars permitting the trucks to run on undulating roads, and said springs holding the truck bodies in approximate balance on the respective truck wheels.

3. A train of connected two-wheel trucks, said trucks, at opposite ends, having vertically yielding draw-bars, pivotally connected for common vertical angular movement, but having relatively pivotal lateral movement to produce the trailing action of the trucks, said draw-bars further being mounted for limited rotation on their longitudinal axis, and springs yieldingly holding said draw-bars vertically and rotatively in normal intermediate positions, the yielding actions of said draw-bars permitting the trucks to run on undulating roads, and said springs holding the truck bodies in approximate balance on the respective truck wheels.

4. A train of connected two-wheel trucks, said trucks, at their opposite ends, having vertically yielding draw-bars pivotally connected intermediate of said trucks for common vertical angular movements, but having relatively pivotal lateral movement to produce the trailing action of the trucks, said draw-bars further having limited axial movement and limited rotary movement on

their axis, and springs yieldingly holding said draw-bars in normal positions, the yielding actions of said draw-bars permitting the trucks to run on undulating roads, and said springs holding the truck bodies in approximate balance on the respective truck wheels.

5. A trailing truck, having two laterally spaced wheels, carrying its entire load, and provided with front and rear coupling devices approximately equidistant from the axis of said wheels, said coupling devices having a vertical yielding action and being resiliently held normally in vertically intermediate positions, said coupling devices further having a resilient limited rotary movement.

6. A trailing truck, having two laterally spaced wheels, carrying its entire load, and provided with front and rear coupling devices approximately equidistant from the axis of said wheels, said coupling devices having a vertical yielding action and being resiliently held normally in vertically intermediate positions, said coupling devices further having a resilient limited rotary movement, and a resilient limited axial movement.

7. A truck having two wheels carrying its entire load and provided at front and rear with swiveled anchor hubs, draw bars intermediately fulcrumed in said anchor hubs for limited vertical oscillatory movements in respect thereto and for limiting rotary movements therewith, and for limited endwise movements therethrough and springs yieldingly drawing said drawbars inward and normally holding the same vertically centered, the said drawbars at their projecting ends, having coupling devices located transversely centrally of the truck and equidistant from the axis of said wheels.

8. A trailing truck, having two laterally spaced wheels, carrying its entire load, and provided with front and rear coupling devices approximately equidistant from the axis of said wheels, said coupling devices having a vertical yielding action and being resiliently held normally in vertically intermediate positions, and adjustable frictional means applied to said coupling devices and yieldingly holding the same against lateral pivotal movements.

In testimony whereof I affix my signature in presence of two witnesses.

SIDNEY L. LONG.

Witnesses:
CLARA DEMAREST
BERNICE G. WHEELER.