No. 775,271. PATENTED NOV. 15, 1904.

J. H. GRAHAM.

CAR TRUCK.

APPLICATION FILED JULY 30, 1902.

NO MODEL.

Fig. 1.

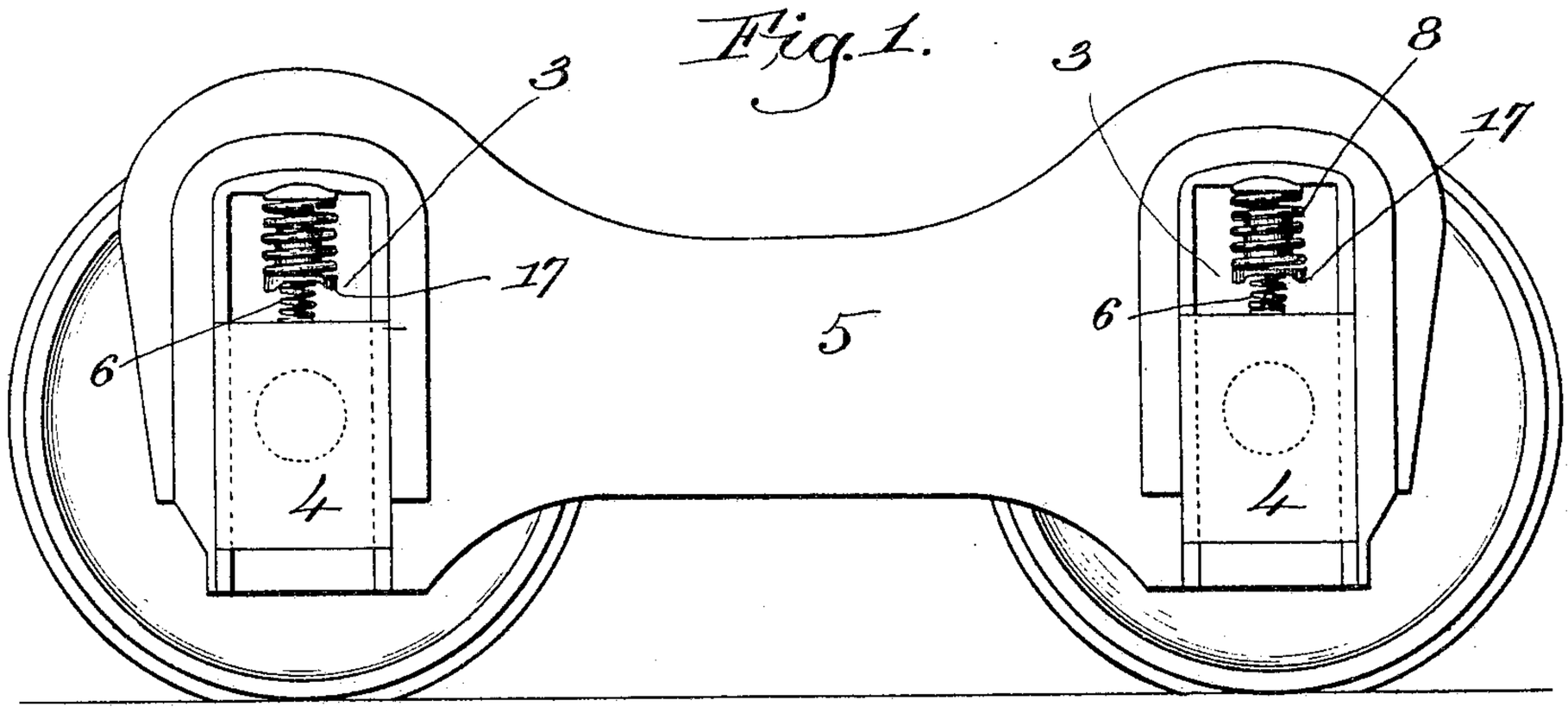


Fig. 2.

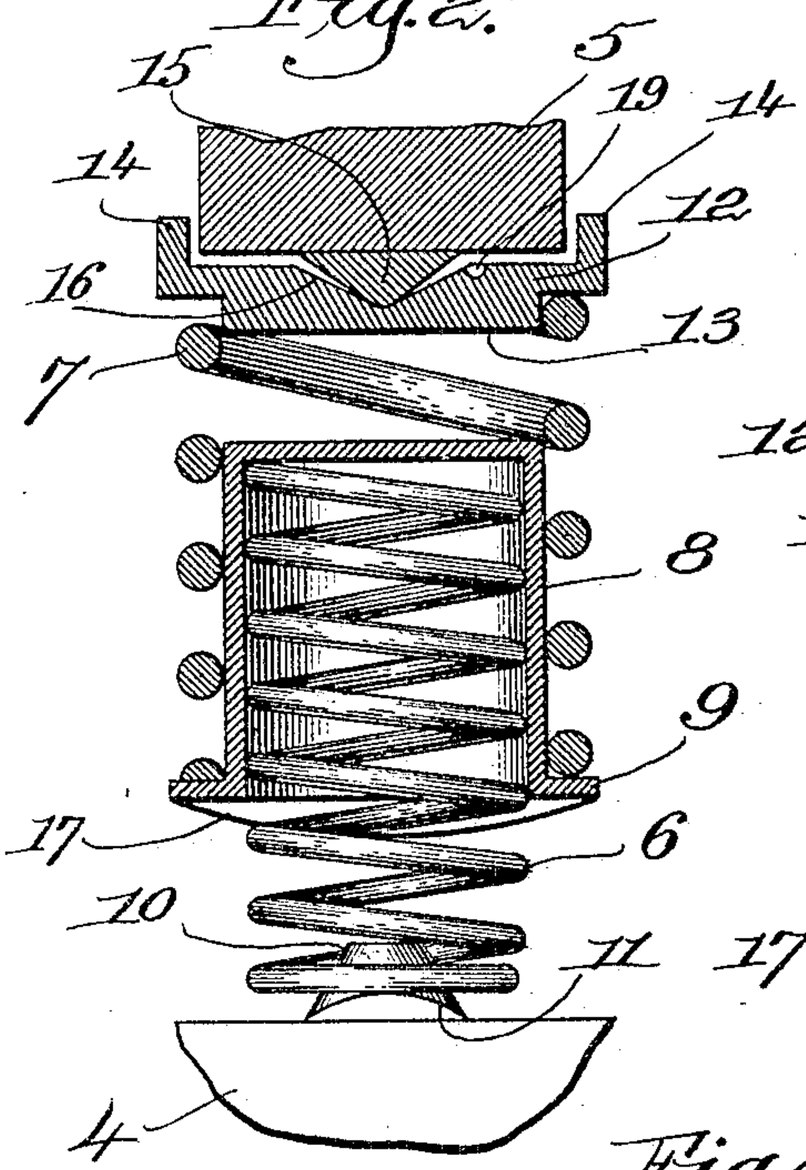


Fig. 3.

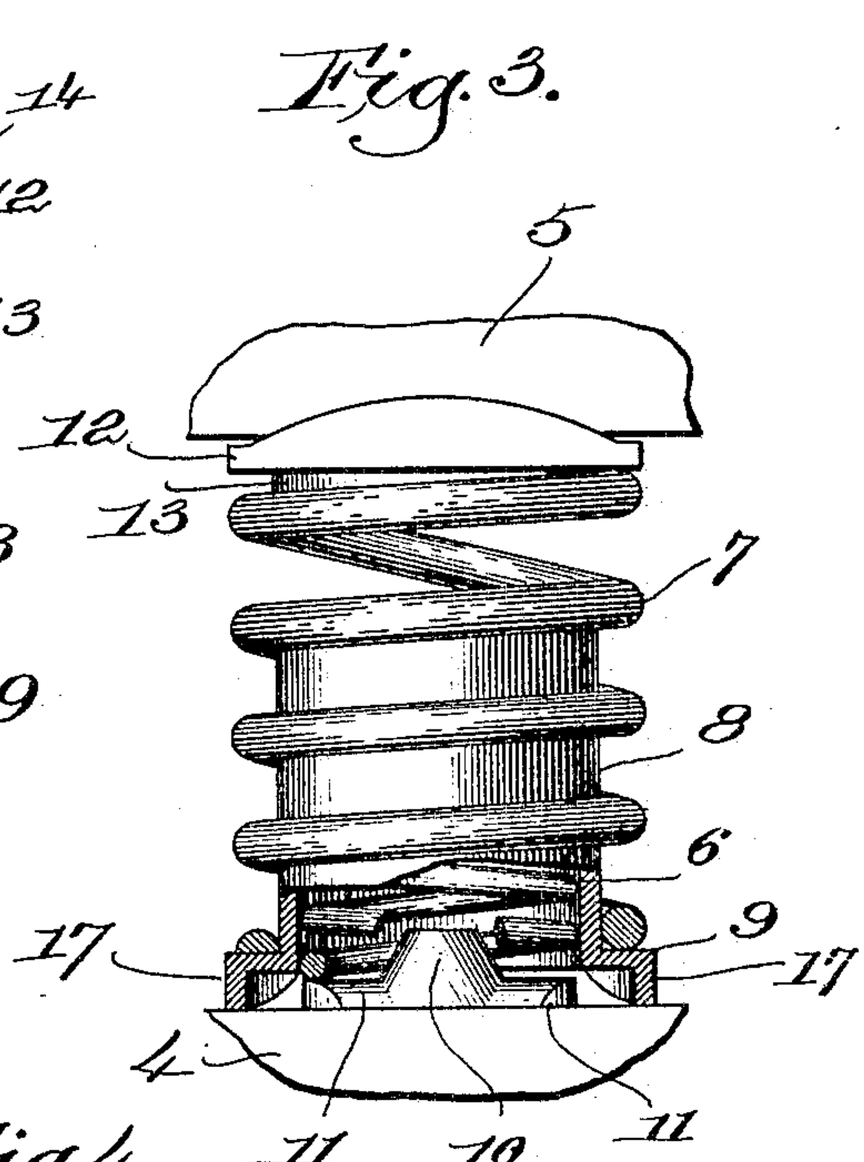
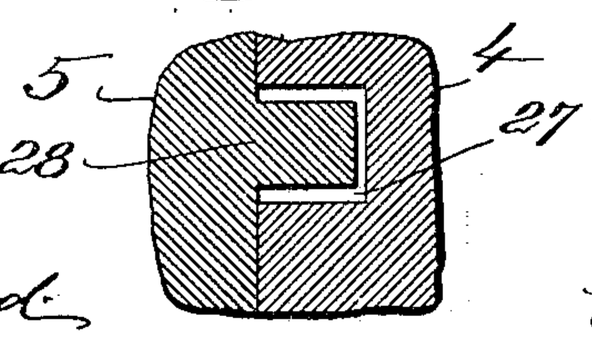


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN H. GRAHAM, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO LEVER SUSPENSION BRAKE COMPANY, A CORPORATION OF MAINE.

CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 775,271, dated November 15, 1904.

Application filed July 30, 1902. Serial No. 117,686. (No model.)

To all whom it may concern:

Be it known that I, JOHN HECTOR GRAHAM, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Car-Trucks, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to car-trucks, and especially to the car-springs forming a part thereof, the object of the invention being to provide a novel form of spring which is equally efficient in yieldingly sustaining either heavy or light loads.

The springs which are commonly employed in car-trucks must be of sufficient strength to sustain the maximum load which the car is adapted to carry without being compressed sufficiently to lose their elasticity.

An ordinary freight-car has a capacity of something like eighty thousand pounds, and the weight of the car itself is something like thirty thousand to forty thousand pounds.

Each car-spring therefore must be capable of sustaining its proportion of the one hundred and ten thousand to one hundred and twenty thousand pounds without being compressed to such an extent as to lose its elasticity. A spring which is of the requisite strength to properly yieldingly sustain the car when carrying its maximum load will not be affected at all by the weight of an empty car, and as a consequence when a car is unloaded or is empty the car-springs are substantially rigid and do not, therefore, give the body the yielding motion for which they are designed.

To cure the above objections and to provide a spring which will yieldingly support the empty car-body as well as a car loaded to its maximum capacity, I have provided what I have termed a "differential" spring, which comprises a plurality of springs of different tensions or carrying capacities. The springs are preferably arranged in series and are supported one upon the other, the spring of least carrying capacity resting upon the spring-supporting member and that of greatest carrying capacity supporting the truck-frame. The weakest spring has such a tension as to be partially compressed by the weight of an empty car, while the strongest spring has such a tension as to be affected only when the car is loaded to its maximum capacity. The springs are supported one upon the other in such a way that normally the weight of the car is transmitted from the truck-frame through each of the springs in turn to the spring-supporting member, and means are provided whereby when the weight on the car is sufficient to compress the weakest spring a certain definite amount the said spring practically ceases to form a link in the direct connection between the truck-frame and the spring-supporting member and the weight will be transmitted directly through the remaining springs of the series.

Referring to the drawings, Figure 1 is a side elevation of a car-truck embodying my improvement. Fig. 2 is an enlarged sectional view of one form of my improved spring, taken on the line X X, Fig. 1. Fig. 3 is a side elevation of the spring partially compressed, parts of the device being taken away to better show the construction; and Fig. 4 is a detail hereinafter described.

My improved car-spring can be applied to any ordinary form of car-truck; but for convenience I have herein illustrated the same as used in connection with what is commonly known as the "box-girder" type of truck. The said box-girder type of truck is provided with suitable ways 3, in which are slidingly fitted the usual axle-boxes 4, and suitable springs are usually supported on the axle-boxes and in turn support the box-girder 5. These springs as commonly constructed are in the form of single springs which are made strong enough to sustain the maximum load which the car is adapted to carry; but, as stated before, such springs are too stiff to be compressed to any appreciable degree by the weight of an empty car or one which is very lightly loaded, and as a result all the jar and vibrations of the car-wheels are transmitted through the springs to the body of an empty car.

My improvement consists in employing a

differential spring, one form of which is illustrated in the drawings.

As stated above, my invention is applicable to any type of truck, and as in some types the springs are supported on other portions than the axle-box I will refer to that part of the truck on which the spring is supported as a "spring-supporting member" and will refer to the portion of the truck which is in turn yieldingly supported on the springs as the "truck-frame." This embodiment of my invention comprises the primary spring 6, which rests upon the spring-supporting member, shown in this embodiment of my invention as an axle-box 4, and the secondary spring 7, which is supported by the primary spring and which in turn supports the truck-frame. The upper end of the primary spring is received in a suitable cup member 8, which has at its lower end the flange 9, upon which the secondary spring 7 is supported.

The primary spring has a less carrying capacity than the secondary spring 7, and for the best results I prefer to make the primary spring of such a strength that it will be partially compressed by the weight of the empty car and will therefore operate to yieldingly sustain the car when empty, while the secondary spring 7 is of such a strength that it will only be partially compressed when the car is loaded and it will be strong enough to support the maximum load which the car is adapted to carry.

It will now be apparent that should a constantly-increasing pressure be applied to the truck-frame 5 the result would be, first, a compression of the spring of least carrying capacity, or the primary spring 6, such compression taking place until the flange 9 is brought into contact with the spring-supporting member 4, as seen in Fig. 3, when further pressure upon the truck-frame would result in the compression of the secondary spring 7, and the force of such further pressure would be transmitted to the spring-supporting member 4 solely through the secondary spring. In practice, therefore, the weight of an empty car will be yieldingly sustained by the primary spring 6, and the secondary spring 7 will be compressed or not, according to the amount of the load being carried.

The character of shocks or jars which each of the springs of my differential spring absorbs is different. The quick, rapid vibrations, due to small quick upward thrusts of the wheels, are taken largely in the spring of least carrying capacity, while the slower swaying movements of the car are taken partially by the secondary spring of greater carrying capacity. By placing the smaller spring, or that of less carrying capacity, directly on the spring-supporting member and superposing the other springs of greater carrying capacity on the first-named spring I provide a construction in which the small quick upward thrusts of the wheel are absorbed in the bottom spring of the series and are not transmitted to the other springs. This I regard as an important result, as it relieves the upper springs from any of the wear and tear due to such rapid shocks or thrusts. In this type of truck the axle-boxes usually have guide-ribs on their sides, which coöperate with suitable grooves in the sides of the ways 3.

In order that the car may run smoothly in traversing a curve, it is essential that there be some lateral play between the axle-boxes and the truck-frame, and I have therefore made the grooves 27 in the axle-box slightly wider than the ribs 28 on the truck-frame, which play therein, as seen in Fig. 4.

In order that the springs may accommodate themselves to the lateral play between the axle-boxes and truck-frame, I preferably form the axle-boxes in such a way as to permit the springs to have a rocking support thereon and also employ a rocking engagement between the truck-frame and the upper end of the spring.

Referring to Fig. 2, it will be seen that the spring-supporting members 4 are provided with suitable bosses 10, over which the primary spring sits, and at the opposite sides of said bosses are the rounding bearing portions 11, on which the said spring rests. A cap 12 is supported on the upper end of the secondary spring, the said cap having the depending boss 13, which sits into the spring, as seen in Fig. 2. The upper side of the cap has the usual side flanges 14, between which the yoke portions of the truck-frame sit, as usual.

15 designates a suitable rocker, upon the upper side of which the yoke portion of the box-girder 5 rests, the said rocker having a rounded bearing-surface which is received in a rounded seat 16.

The lower side of the flange 9 is provided with the rounding bearing portions 17 on opposite sides thereof, which engage the top of the spring-supporting member 4 when the primary spring has been compressed to its full extent, as seen in Fig. 3, thus establishing a rocking movement between the spring and the spring-supporting member regardless of the degree to which the spring has been compressed. This construction, while permitting of the requisite relative lateral movement of the axles and truck-frame, allows the spring to accommodate itself to such movement without becoming distorted.

I preferably provide the cap 12 with a suitable oil-groove 19, which when filled with oil will supply the requisite lubricant to the bearing-surface 16.

The operation of my improved device will be obvious from the foregoing description, from which it will be seen that when the car is empty or carrying a light load the spring will be in the position shown in Fig. 2 and the vibrations and jar will be taken up by the

primary spring, while when the car is fully loaded the said primary spring will be compressed until the flange 9 strikes the spring-supporting member, when the secondary spring 7 will be brought into play and will yieldingly support the car-body. My improved spring therefore is one which operates to yieldingly sustain the car-body regardless of the weight of the load being carried.

While I have herein illustrated a differential spring having only two members, yet my invention would not be departed from if more than two springs were employed, and I would consider as within my invention a differential car-spring having any number of springs of different carrying capacities. I also desire to state that my improved spring is applicable to any type of car-truck and that the particular manner illustrated of arranging the springs of different carrying capacities one on the other may be varied without departing from the invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is —

1. In a car-truck, a truck-frame and a differential spring to support said truck-frame, said differential spring comprising a plurality of springs of different carrying capacities supported one on the other and arranged in the order of their relative carrying capacities, said spring also having a rocking engagement with the truck-frame to permit transverse movement of the latter.

2. In a car-truck, a spring-supporting means provided with a rounded bearing-surface, a spring resting on said bearing-surface, a cap on the upper end of the spring, and a truck-frame resting on said cap and having a rocking engagement therewith.

3. In a car-truck, a spring-supporting member, a differential spring supported thereby, said spring comprising a plurality of springs of different carrying capacities, the spring of greater carrying capacity being supported on the spring or springs of lesser carrying capacity, said differential spring having a rocking engagement with both the spring-supporting member and the truck-frame.

4. In a car-truck, a spring-supporting member, a spring of lesser carrying capacity supported thereby and having a rocking engagement therewith, an inverted-cup-shaped member placed over the top of said spring, said member having at its lower end a rounded bearing-surface a spring of greater carrying capacity supported by the said member, and a truck-frame sustained by and having a rocking engagement with said last-named spring.

5. In a car-truck, a truck-frame having ways to receive an axle-box, an axle-box in said ways, a spring supported on the axle-box, a cap on said spring and a rocker carried by said cap on which the truck-frame rests, said rocker being fixed with relation to the truck-frame and having a rocking engagement with the cap.

6. In a car-truck, a truck-frame having ways to receive an axle-box, an axle-box in said ways, a spring supported on the axle-box, a cap on said spring and a rocker carried by said cap on which the truck-frame rests, said spring having a rocking engagement with the axle-box.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. GRAHAM.

Witnesses:
LOUIS C. SMITH,
JOHN C. EDWARDS.