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RUNNING GEAR FOR MOTOR VEHICLES.

(Application filed Nov. 21, 1901.)

(No Model.)

Fig. 1.

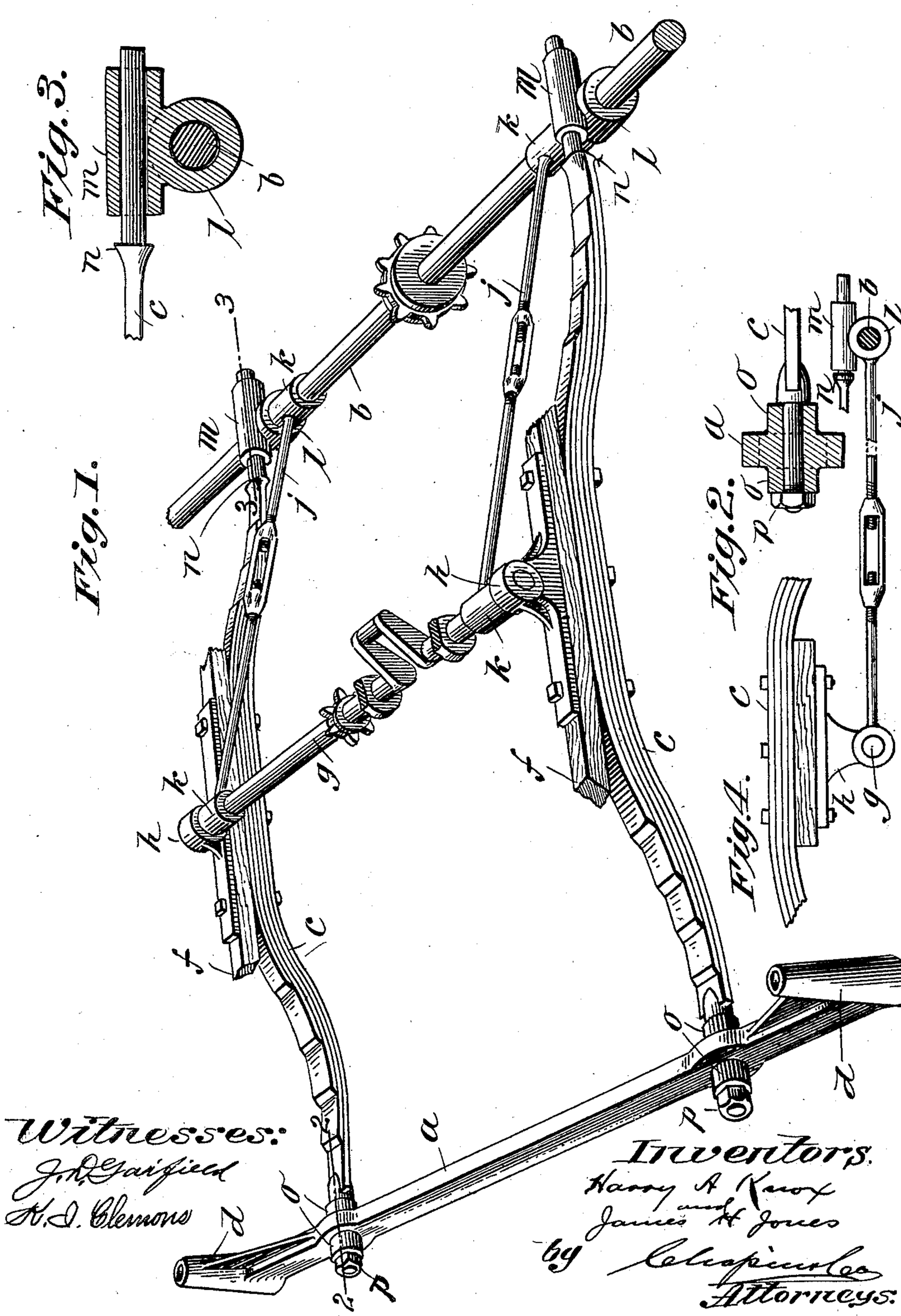

Fig. 2.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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RUNNING-GEAR FOR MOTOR-VEHICLES.

SPECIFICATION forming part of Letters Patent No. 697,945, dated April 15, 1902.

Application filed November 21, 1901. Serial No. 83,118. (No model.)

To all whom it may concern:

Be it known that we, HARRY A. KNOX and JAMES H. JONES, citizens of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Running-Gear for Motor-Vehicles, of which the following is a specification.

This invention relates to motor-vehicle construction, and has special reference to the running-gear thereof, the object of the invention being to simplify the construction of the running-gear frame and produce one in which the front and rear axles are united by springs which constitute also the reaches and in the provision of means whereby the increase in the length of said springs under flexure will not result in any increased strain on a driving connection extending from the driving-axle to the motor, a further object of the invention being to provide means whereby when one wheel of the vehicle is raised no torsional strain will be put upon said springs; and having these ends in view the invention consists in the construction described in the following specification and clearly pointed out in the claims.

In the drawings forming part of this application, Figure 1 is a perspective view of a running-gear for motor-vehicles embodying our invention. Fig. 2 is a section on line 2 2, Fig. 1, through one end of one of the springs. Fig. 3 is a similar view through the opposite end of one of the springs. Fig. 4 shows a modification of the construction shown in Fig. 1.

Referring to the drawings, *a* indicates the front axle of a motor-vehicle running-gear; *b*, the rear axle; *c c*, springs extending from one axle to the other and attached or having a bearing on said axles near the ends of the latter, the springs and axles forming a substantially rectangular structure, as shown.

The front axle *a* is provided with vertical sockets *d* for the reception of the pintles on which the wheels swivel for steering the vehicle in the usual manner. The springs *c c* are arched between the axles, and the body of the vehicle is supported on the crown of the springs, and it may be assumed that it is supported on the longitudinal bars *f*, portions of which are shown in Fig. 1 of the drawings. On these bars *f* the main driving-shaft *g* is located in suitable bearings *h*. This driving-shaft has been shown in the drawings as a crank-shaft to which a motor may be directly connected. It may, however, be a counter-shaft receiving motion from a motor through proper driving connections. This shaft is connected with that axle of the frame which constitutes the driving-axle by a suitable driving connection. In the drawings a chain-and-sprocket connection is indicated.

To maintain the crank-shaft and the driving-shaft in parallelism, two rigid arms *j* extend from the crank-shaft to the driving-shaft, there being a sleeve *k* on each end of these arms through which the said shafts extend, to the end that when any flexure of the springs occurs these sleeves may oscillate freely on said shafts. By means of these arms *j* the shafts *b* and *g* will always maintain their parallel relations, and the distance between their axes will be unvarying. Said arms are preferably located one near each spring and held in their respective positions by any suitable means. The result of thus connecting these two shafts renders necessary the provision of some means for providing for the increase of the longitudinal dimension of the springs resulting from their flexure. This is provided for by mounting upon the rear axle a suitable bearing *l* for the latter near each end thereof and upon said bearings another bearing *m* at right angles to the shaft *b* for the reception of the rear end of each of the springs *c*, these latter being provided with cylindrical ends which may both slide endwise in said bearings *m* and rotate therein.

Fig. 3 of the drawings shows in sectional elevation the construction of the bearings and the relation of the cylindrical ends of the springs thereto. A shoulder *n* may be provided whereby the endwise movement of the springs may be limited and constituting a stop against the flexure of the springs beyond a certain point. The opposite ends of the spring—viz., those connected in the case with the front axle *a*—are also provided with cylindrical portions like those on the rear ends of said springs, and they are supported

in bearings *o*, which are located transversely to the axis of said axle *a* and in alinement with the bearings for the opposite ends of the springs. The forward ends of the springs, however, unlike the rear ends thereof, have no endwise movement, but they may oscillate in their bearings, and to this end the ends of the springs project far enough beyond the end of their bearings to permit the application of a nut *p* thereto, whereby the end of the springs may be drawn through the bearing to bring the shoulder *q* up against the inner end thereof sufficiently close to prevent rattling, but without preventing the free rotary movement of the spring in the bearing. The arms *j*, extending from the crank-shaft to the driving-axle, are preferably made adjustable by means of turnbuckles *r*.

The herein-described running-gear frame possesses the advantage of being of light weight and very simple, though of strong construction and adapted to carry all of the weight of the body and the propelling mechanism of a vehicle midway, or substantially so, of the ends of two long springs, whereby great ease of action is attained and all jolting movement neutralized. By means of the swivel-support for each end of the springs any one wheel may be raised sufficiently to pass over an ordinary obstruction in the road without raising any of the other wheels and without resulting in any torsional strain on the frame of the springs.

In those constructions wherein the sprocket on the driving-shaft and the driving-axle are located outside of the spring and on one side only of the vehicle there would be no necessity for more than one of the arms *j*, and where the arm on the opposite side of the frame is done away with the rear end of the spring on that side unprovided with the arm *j* is made similar to the opposite end thereof and has a rotative movement relative to the driving-axle, but no endwise movement. That end only of the spring which lies close to the driving-sprocket has this endwise movement as well as a rotative movement.

If it were a question in this construction of providing an easy-riding body only, it might be possible to do away with the sliding movement of the ends of the springs relative to the axle. This construction, however, is essential to the maintenance of normal tension on the driving-chain. Therefore when the driving-sprockets are located near the end of a driving-axle and near the end of its driving-shaft, thus bringing the chain practically alongside of one of the springs, it is only necessary to provide for the endwise movement of that spring near which the chain is located and to locate the arm *j* sufficiently near the sprocket to rigidly maintain the driving-axle and its driving-shaft in their normal relative position regardless of the flexure of the spring. The rotative movement of the ends of the springs in the bearings in the axle is, however, essential to relieve the springs from any torsional strain they would otherwise be subjected to by inequalities in the road, and preferably each end of each spring should be capable of this rotative movement. An operative construction, however, would be produced if the ends of the springs supported on one axle were rigidly secured thereto and their opposite ends were free to move in their bearings, as described. Furthermore, the endwise movement of both springs might be done away with if the driving-shaft were hung in the same horizontal plane as the driving-axle, as shown in Fig. 4, for if thus constructed the driving-shaft, under the flexure of the springs, would swing substantially through an arc of which the driving-axle is the center, and therefore the movements of the spring would not affect the tension of a drive-chain extending between said driving-shaft and a driving-axle to any appreciable extent.

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

1. A running-gear for motor-vehicles consisting of a pair of axles, two springs constituting the reaches of said gear, supports on said axles for the ends of the springs, and a rigid arm secured by one end to one of the springs near the center of the latter and extending to one of said axles and having a pivotal connection therewith.

2. A running-gear for motor-vehicles consisting of a front and a rear axle, two springs, supports for the opposite ends of said springs, respectively, on said axles, one end of one of said springs having both a rotative and a sliding movement in its support.

3. A running-gear for motor-vehicles consisting of a front and a rear axle, two springs, supports for their opposite ends respectively on said front and said rear axles, and both ends of each spring having a rotative movement in their supports.

4. A running-gear for motor-vehicles consisting of a front and a rear axle, two springs, supports for their opposite ends respectively on said front and said rear axles, both ends of each spring having a rotative movement in their supports on the axles, and one end of each spring having in addition a sliding movement therein.

5. A running-gear for motor-vehicles consisting of a front and rear axle, two springs, supports for the opposite ends of said springs, respectively, on said axles, one end of one of said springs having both a rotative and a sliding movement relative to one of said axles.

6. A running-gear for motor-vehicles consisting of a front and a rear axle, two springs, supports for their opposite ends respectively on said front and said rear axles, both ends of each spring having a rotative movement in their supports on the axles, and one end of one spring having in addition a sliding movement therein.

7. A running-gear for motor-vehicles consisting of a front and a rear axle, two springs,

supports for their opposite ends, respectively, on said front and rear axle, said springs constituting the reaches of the gear, the ends of said springs on the front axle having a rotative movement relative thereto.

8. A running-gear for motor-vehicles consisting of a pair of axles, two springs, constituting reaches, extending between the axles, a driving-shaft for the driving-axle secured to said springs, parallel with said driving-axle, a rigid connection between the latter and said shaft, and a yielding connection between said axle and said springs, whereby the flexure of the latter may take place without varying the distance between the said shaft and the axle driven thereby.

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