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SPRINGING, SPECIALLY OF MOTOR CARS
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Fig.1.

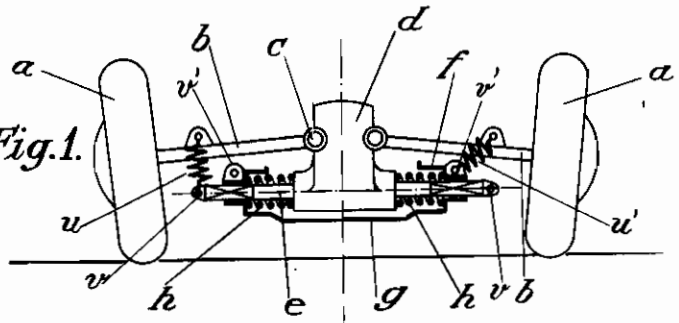


Fig.2.

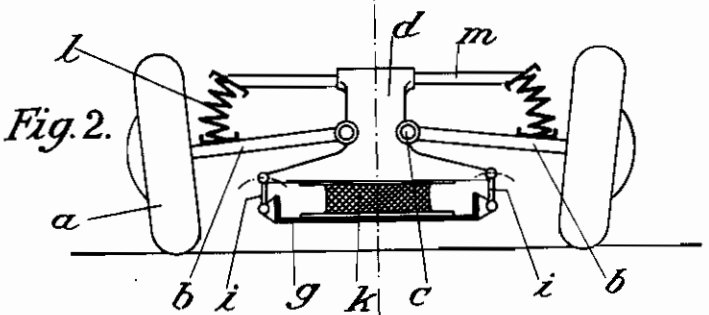
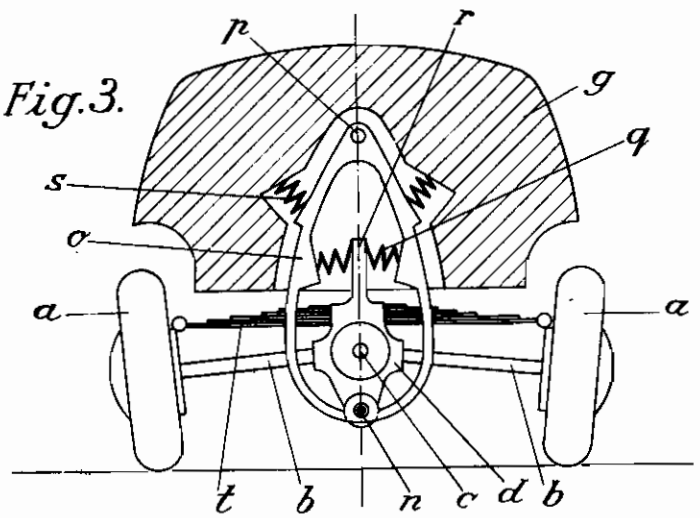


Fig.3.



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ALIEN PROPERTY CUSTODIAN

SPRINGING, SPECIALLY OF MOTOR CARS

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The invention relates to an improvement of the springing, specially of motor cars, of the kind with which the wheels are guided by means of track-altering springing half axles, specially the so called pendulum half axles, with respect to the frame. (With "frame" or "vehicle framework" herewith besides the vehicle frame proper also every other construction aggregate may be meant, which fills the duties of the frame, i. e. for instance also a self-contained car body or the like).

With such swinging half axles, specially pendulum half axles, with the springing of the wheels transverse forces arise at the contact point of the wheels with the road, which are transmitted by the joints by which the swinging half axles are connected with the frame onto the latter. If one of the wheels is sprung, the forces arising herewith are attempting to impart to the frame besides an upward motion also a motion transverse to the riding direction, in direction to the opposite wheel, the swinging half axle of the opposite wheel trying to tilt together with same over the contact point of the wheel with the road. By the transverse shocks caused by these transverse motions additional stresses on the frame and swinging phenomena may occur, which may under circumstances cause very disturbing effects.

By the invention these drawbacks are removed or at least lessened, the axle aggregate comprising the swinging half axles of the two wheels of the pair of wheels being able to yield with respect to the frame, transverse to the riding direction by an amount, corresponding to the track alteration of the wheels at the springing, wholly or at least partially. By these means it is possible that with the transverse shocks only a transverse motion of the axle aggregate occurs, while the frame or the vehicle framework may remain in its central position or will be influenced only slightly by the shocks.

Preferably the supporting piece, for instance a differential gear carrying the swinging half axles is yieldingly so connected with the frame, that when yielding with respect to the frame, it executes or is able to execute substantially only a transverse displacement without a rotating motion around a longitudinal axis. Additional rotating accelerations of the supporting piece are avoided herewith.

In realisation of the idea of the invention the supporting piece may be journaled on guides transverse to the riding direction or the supporting piece may be guided by means of a bow-guidance, for instance by means of a joint-square, displaceably at the frame.

If the supporting piece carrying the swinging half axles is connected swingingly with the frame, the jointing of the supporting piece onto the frame ensues preferably by means of a turning joint, arranged below the swinging half axle joints around which turning joint the supporting piece, i. e. for instance the differential gear case may swing for a lateral yielding of the axle aggregate.

The jointing to a turning joint arranged below the swinging axle joint, has the advantage that the axle aggregate takes a stabile position with respect to the frame, as the weight of the car body tries to bring the turning joint always back to its lower central position, so that the springs serving for taking back the supporting piece between it and the frame may be dimensioned comparatively weakly, or under circumstances may be entirely omitted. Furthermore by arranging a lower joint the track alteration of the wheels with respect to the frame is practically diminished.

The springing taking up the transverse motions of the axle aggregate with respect to the frame is preferably so formed that it has an increasing springing hardness at the yielding, transverse to the riding direction. The swinging half axles may be sprung either against the frame or preferably against the supporting piece. In the previous case it is necessary that with the arrangement of the springs the transverse variability between the swinging half axles and the frame is taken into consideration. Unguided spiral springs may under circumstances allow such a transverse variability without taking special additional measures.

In the drawing three types of the invention given by way of example are shown.

In Fig. 1 the swinging half axles *b* carrying the wheels *a* are jointed to a supporting piece *d*, for instance to the differential gear casing, by means of lateral joints c. This supporting piece *d* provided with transverse pins *e* serving as guides or with similarly acting sliding projections, by means of which the supporting piece is journaled transversely slidable in corresponding guidances *f* of the frame *g*. By means of springs *h* the supporting piece *e* is held in its central position with respect to the frame. At the occurring of transverse forces the supporting piece *d* may yield to the one or other side, opposite to effect of the springs *h*.

The swinging half axles *b* may be sprung

against the frame *g* or against the supporting piecc *d*, which is preferable with respect to the transverse variability of the axle aggregate. The springing may ensue by means of unguided spiral springs or for instance by metal or rubber springs in the joints c stressed by torsion. With the type according to Fig. 1 for instance tension springs *u* are shown which may be connected at the one side the half axles *b* and at the other side either at *v* to the supporting piece *d* (left hand side of Fig. 1) or at *v'* to the frame, as shown at *u'* at the right hand side of Fig. 1.

In the example according to Fig. 2 the supporting piece *d* is guided at the frame *g* by the two guiding pieces or links *i* in the way of a joint-square in such a manner that the supporting piece is displaced in a bow around the lower joints of the guiding pieces or links *i*, but in parallel to itself. For replacing the supporting piece into its central position serves a rubber block *k*, which preferably is adhesively connected as well to the frame as to the supporting piece *d* and is stressed at the transverse displacement of the supporting piece *d* substantially for shearing. At the same time the rubber block is stressed also for pressure in such a manner that with increasing lateral displacement of the supporting piece *d* a constant increasing of pressure occurs. The rubber bumper *k* acts in this way as progressive swinging, so that with strong transverse shocks a comparatively strong replacing power is produced. Simultaneously the rubber bumper acts dampingly on the transverse motions. For springing the swinging half axles in vertical direction, serve the unguided spiral springs *l* which are supported against the projections *m* of the supporting piece *d*.

With the type given by way of example in Fig. 3 the supporting piece *d* formed as differential gear is journaled swingingly around a joint *n* which is placed below the joint *c* of the swinging half axles, arranged for instance in the central longitudinal plane. In this case the joint *n* connects the supporting piece *d* with the bow-shaped guiding link member o which is connected swingingly to the frame or to the vehicle framework by means of an elevated joint *p*. The supporting piece *d* is held in its central position by the springs *q* leaning at the one side against a projection *r* of the supporting piece *d* and at the other side the bow-shaped guiding member o. For the supporting of the latter against the frame furthermore serve the springs *s* which are preferably made hard in order to prevent an exceeding oscillation of the guiding member o. In vertical direction the swinging half axles are furthermore sprung by means of a transverse laminated spring *t*, secured in the supporting piece *d*.

With transverse shocks occurring at the wheel, the axle aggregate may yield with respect to the frame in transverse direction by the fact that on the one side the guiding link member o swings around the upper joint *p* and on the other side the supporting piece *d* swings around the lower joint *n*. The motion of the supporting piece *d* may be herewith a purely transverse displacement.

Under circumstances the guiding link member o may also be omitted which would correspond to a rigid fastening of it to the frame. Eventually the interposition of rubber bumpers between the guiding member o and the frame *h* would suffice. The yielding in transverse direction however would be as a rule comparatively small in this case.

Generally it is not necessary that the yielding in transverse direction between the axle aggregate and the frame corresponds to the maximal track alteration. In most cases it will be sufficient if a fractional part of the track alteration will be compensated by lateral yielding. If for instance the maximal track alteration for either swinging half axle amounts to 10 cm altogether, from the lowest to the highest springing of the wheel, in general a yielding of 2 to 3 cm between axle aggregate and frame transverse to the riding direction will be sufficient, as normally for the unevenness of the ground only a corresponding fractional part of the spring lift will be claimed.

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