PUBLISHED
MAY 25, 1943.
BY A. P. C.

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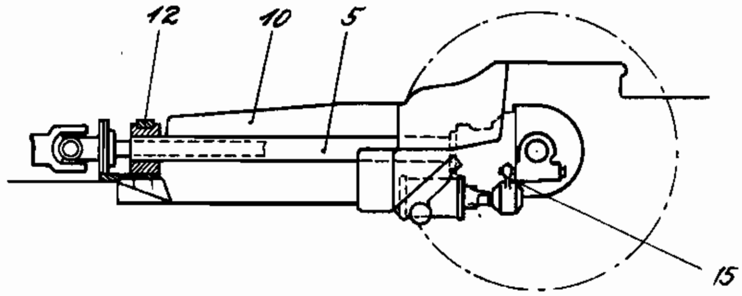
REAR AXLE FOR MOTOR VEHICLES
Filed Dec. 23, 1939

Serial No.
310,799

Fig. 1



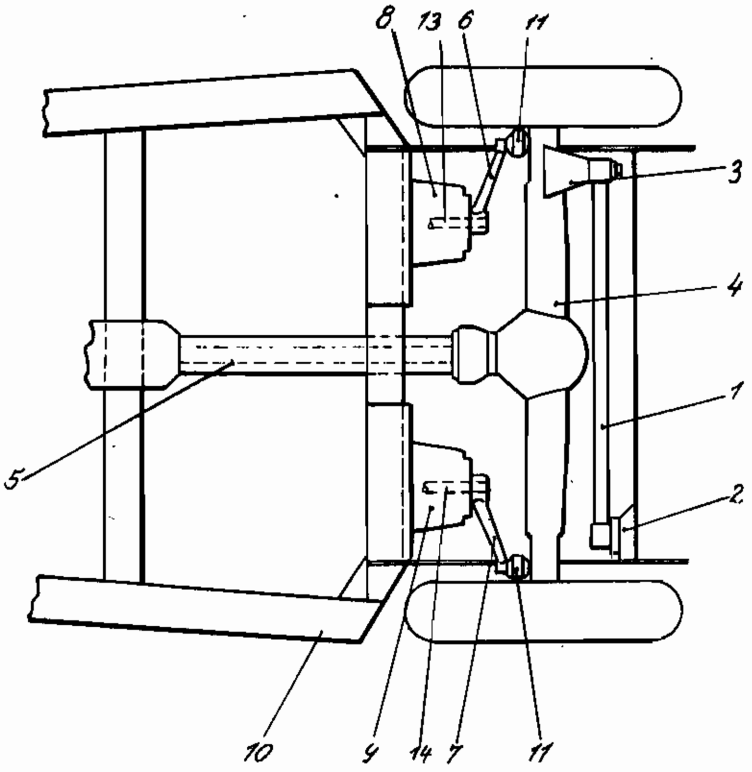


Fig. 2

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Published May 25, 1943

Serial No. 310,799

ALIEN PROPERTY CUSTODIAN

REAR AXLE FOR MOTOR VEHICLES

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Application filed December 23, 1939

The invention relates to means connecting rigid drive axles of motor vehicles with the frame, with the object to effect the transmission of the longitudinal thrust forces in such a manner, that this is done by the insertion of plastic yielding supports whereby on the one hand the transmission of the noises produced by the rear axle to the frame, which, as is known, are very disagreeably felt within the passenger room owing to the vibrations transmitted to the vehicle body and on the other hand a transmission of shocks to the frame are reliably avoided.

It is known with rigid rear axles of motor vehicles suspended by means of levers and swinging links on two torsion bar springs, to connect the drive axle with the frame in such a manner that two thrust rods engage on the upper side at the middle of the axle with a ball joint, these thrust rods being so secured to the rear transverse member of the frame in spaced relation and rockable in the longitudinal direction, that in this manner is formed a triangular connection between the frame and the axle. This connection serves as well for the transmission of the longitudinal thrust produced by the drive torque and the brake torque as for the transmission of the transverse thrust produced by the centrifugal force. Further it is known with rigid rear axles of motor vehicles suspended by coil springs to take up the longitudinal thrust forces by a rigid center thrust tube connected with the rear axle casing and to transmit the transverse thrust forces to the axle by a prop arranged transversely to the direction of travel and connected at the one hand with the frame and on the other with the axle. Besides that it has already been proposed to connect the thrust transmitting elements which are intended to serve for connecting the chassis frame with the axle by the insertion of a yielding material.

In contrast to the foregoing it is the object of the invention to conect rigid drive axles of motor vehicles with the frame in such a manner, that the transmission of the longitudinal thrust forces may be effected by means of plastic yielding supports. This may be done on the one hand by a clear separation in transmitting the longitudinal thrust forces caused by the brake torque and the drive torque and the transverse thrust force originated by the centrifugal force. For this purpose a prop for supporting the centrifugal forces arranged transversely to the direction of travel and connected on the one hand with the frame and on the other with the drive axle is provided which serves to transmit the transverse thrust force to the axle. The further connection of the rear axle with the chassis frame is obtained by means of a center thrust tube which is on the one hand rigidly connected with the rear axle casing and on the other hand hinged on the frame, whereat the chassis frame is suspended by torsion bar sprung levers engaging with the frame and swinging transversely to the direction of travel, to which links swinging transversely to the direction of travel are mounted, said links extending vertically to the longitudinal direction of the vehicle and connecting the axle with these levers and thus indirectly with the chassis.

It is therefore the object of the invention in case a so-called centrifugal force prop for taking up the transverse forces is mounted to make use of the above described mode of suspension of the chassis frame on the drive axle and the utilization of a center thrust tube rigidly connected to the drive axle and hingedly connected to the chassis frame. The combination of these different characteristics known per se for the combined arrangement according to the invention involves considerable and essential advantages compared with the arrangements already known.

By the axle suspension according to the invention it is possible to transmit part of the longitudinal thrust forces produced by the brake torque and the drive torque from the vehicle body through the levers of the spring system to the rear axle. A complete transmission of the occurring longitudinal thrust forces through this axle suspension however would not be convenient in so far as this would require a strengthening of the force transmitting members such as of the joints and of the levers and thus necessarily an increase of the unsprung masses. By the combined arrangement according to the invention whereat a center thrust tube is provided, it is possible to make a division in the transmission of the total longitudinal thrust force, so that the single transmitting members, such as the two levers and the center thrust tube still have to transmit only a fraction of the total longitudinal thrust force. In this manner it is now possible to provide for elastic, i. e. particularly plastic connecting points of these force transmitting members with the frame or with the axle and to so avoid effectively a transmission of the axle and drive noises otherwise usually from the chassis frame to the vehicle body, which is felt e. g. as a disagreeable sounding. According to the invention a yielding support e. g. a rubber a cushion is used for the transmission of the support reactions of the cen-

ter thrust tube to the chassis and a yielding journal support for the connection of the two levers of each of the two link pairs of the axle suspension. Besides that the center thrust tube is made as long as possible, so that the bearing pressure is still further reduced and thus a safe transmission of force is assured.

By the arrangement of a centrifugal force prop for taking up the transverse forces occurring when negotiating curves, as provided by the combined arrangement according to the invention furthermore it is avoided that any transverse thrust forces are transmitted through the connection of the center thrust tube with the chassis frame. This circumstance makes it likewise possible to provide for a plastic support of the center thrust tube at the frame as well as for the elastic connection of the two levers of each of the two link pairs of the axle suspension as in this manner these constructional members become fully free of stressing by transverse forces. By the axle suspension used in the combined arrangement according to the invention whereat part of the longitudinal thrust forces can be transmitted by this suspension it is only possible to provide a center thrust tube for the yieldable transmission of the longitudinal thrust forces for being an advantageous force transmitting element between chassis frame and drive axle, corresponding to all service conditions, as by the possibility of transmitting forces through the axle suspension, i. e. in a relatively large lateral distance from the center thrust tube, maximum stability in the transmission of longitudinal thrust forces is obtained, a fact, which is realised to this extent with other arrangements only by providing a triangular support of the frame against the drive axle.

As consequently at the different force transmitting points exists an uniform force action, which is effective as pressure stress at the journal supports of the axle suspension and with a correponding construction of the support for the center thrust tube likewise at the chassis frame, the yielding intermediate materlal such as rubber is loaded only in the direction of its maximum resistance, which of course means besides maximum life above all the possibility of using a special plastic material for the force transmitting members.

A further advantage of the provision of a plastic yielding material at the supporting point for the center thrust tube rendered possible by the combined arrangement according to the invention on the one hand and the connection of the two levers on the other hand resides in a certain compensation of the shocks caused when starting, forced accelerating and braking partly very disagreeably felt in the passenger room, which is of particular advantage with regard to the diminished wear of these force transmitting members.

By the combined arrangement as proposed by the invention the force transmission is so clearly divided, that each force transmitting point may be made yielding i. e. particularly plastic, even the force transmitting connecting points of the axle at thc frame of the vehicle body without the existence of drawbacks, which otherwise occur with continuous stressing of rubber as force transmitting member.

In the combined arrangement according to the invention preferably also the centrifugal force prop arranged transversely to the direction of travel is yieldingly connected as well with the frame as with the drive axle.

One form of embodiment of this invention is shown in the accompanying drawing.

Fig. 1 is a side elevation and

Fig. 2 is a top view of the connection of a rigid drive axle of motor vehicles with the frame according to the invention.

In the arrangement according to the invention the centrifugal forces are transmitted by a prop 1 for supporting the centrifugal forces arranged transversely to the direction of travel and connected on the one hand through the bearing 3 with the rigid axle 4 and on the other hand through the bearing 2 with the frame 10. The transmission of the longitudinal thrust forces is effected at three points viz. through the center thrust tube (5), which on the one hand is rigidly connected with the rear axle (4) and on the other hand hingedly connected with the frame (10) and through the levers 6 and 7, serving for the suspension of the chassis frame 10 at the drive axle 4 and swinging transversely to the direction of travel. Said levers 6 and 7 are supported by torsion bar springs 13 and 14 in the bearings 8 and 9 and engaged with the links 15 swinging transversely to the direction of travel and arranged vertically to the longitudinal direction of the vehicle, connecting the axle 4 with the levers 6 and 7. By the distribution in three branches of the longitudinal thrust force obtained by the arrangement according to the invention it is possible to use as support a plastic rubber cushion 12 for the transmission of the support reactions of the center thrust tube 5 to the chassis frame 10, as to provide the connection of the two levers of each of the two link pairs of the axle suspension through a yielding journal support 11. The centrifugal force prop 1 is likewise yieldingly connected as well with the frame as with the axle.

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