Nov. 23, 1954 G. A. WESTRA 2,695,168

SUPPLEMENTAL SPRING

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Fig. 1

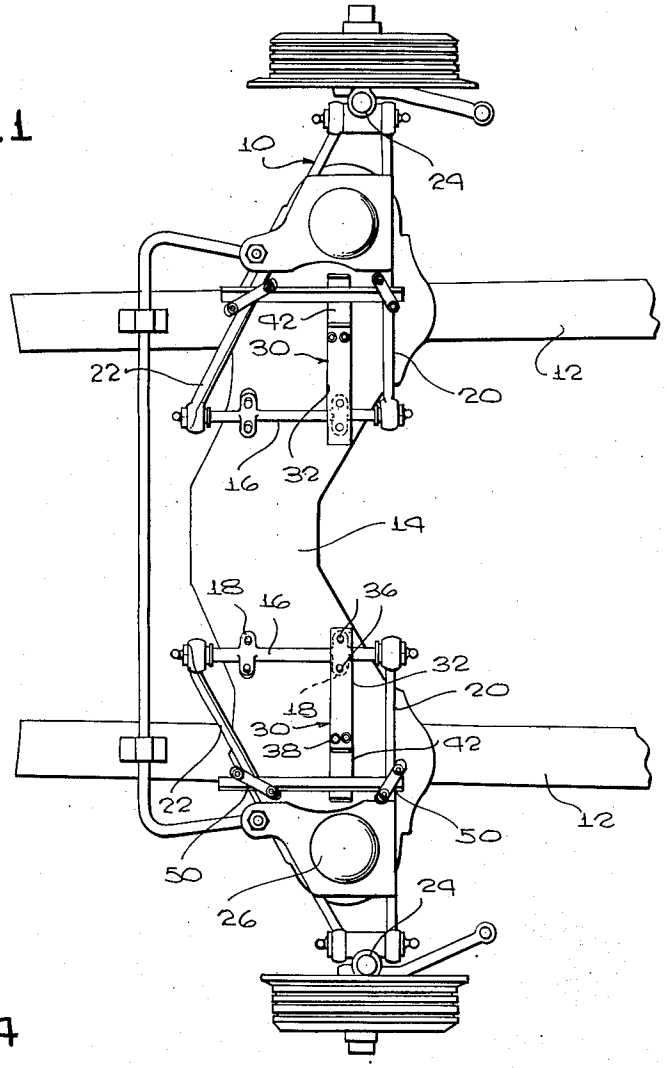
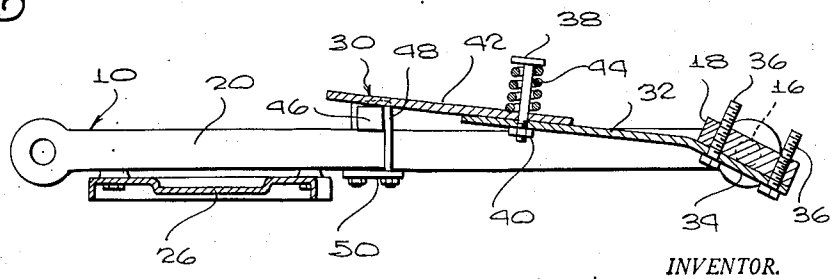


Fig. 4



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Fig. 2

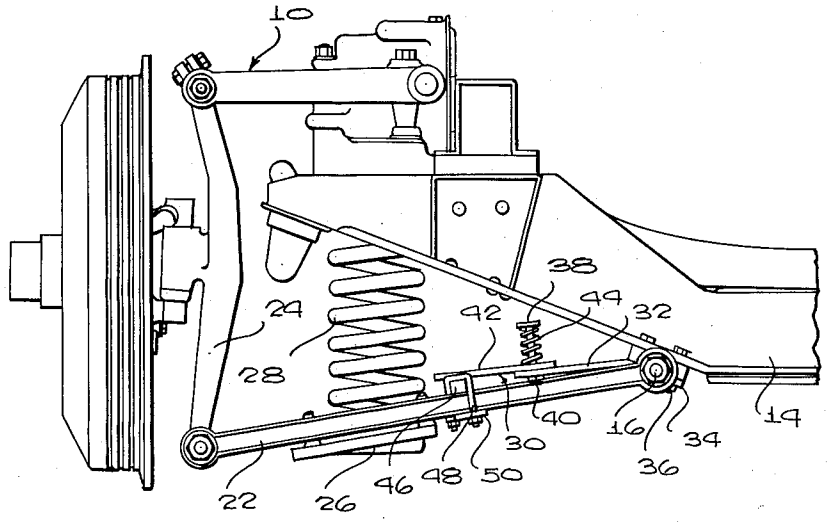
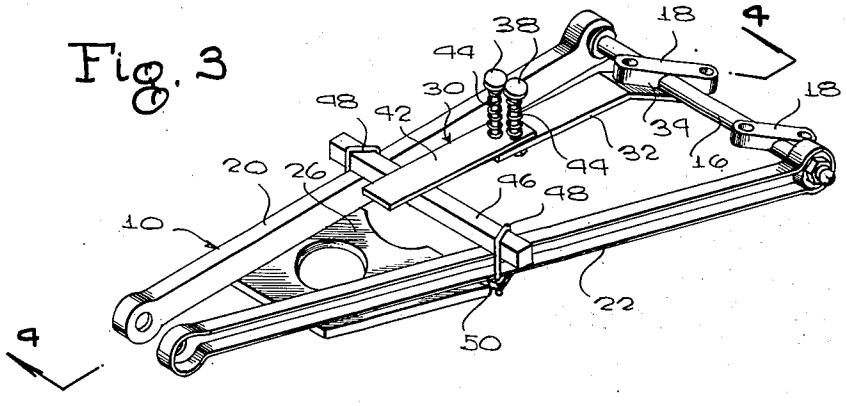


Fig. 3



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SUPPLEMENTAL SPRING

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4 Claims. (Cl. 267—16)

This invention relates to improved supplemental or auxiliary spring means for association with the coil springs of vehicle wheel suspensions of the knee-action type.

While wheel suspensions of the knee-action type have many desirable characteristics, it is also true that when said assemblies are placed under heavy load, they drop downwardly to an undesirable extent, transmitting heavy pressures to the coil springs embodied therein.

It is desirable, in view of the above, to provide supplementary means especially for automobile front wheel suspensions of the knee-action type, that will be effective to transmit an upward pressure against the portion of the front end assembly disposed between the coil springs, the pressure exerted being such as to act in opposition to heavy loads imposed thereupon, thus to normally hold the suspensions in a desirably elevated condition.

The main object of the invention illustrated and described herein is to provide a means that will so act, and to this end, I provide a supplemental spring formed as a generally flat bar of springable material, one end of which is connected to the inner cross shaft of the front end assembly, with the other end resting upon a cross bar that extends between the control arms of the suspension, thereby disposed in a position in which it will exert a continuous, yielding pressure downwardly against the suspension in the vicinity of the inner cross shaft, thus to relieve the coil springs of some of the load imposed thereon and maintain the vehicle at a desired height.

Another object of importance is to provide supplemental spring means which will be attachable to conventional knee-action wheel suspensions, without requiring substantial modification or redesign of such suspensions.

Another important object is to provide means of the character referred to so designed as to permit the spring tension thereof to be adjusted, thereby to elevate a vehicle to selected heights.

Yet another object is to provide such means which can be mounted in proper position with maximum speed and facility.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a bottom plan view of an automobile front wheel suspension of the knee-action type equipped in accordance with the present invention;

Figure 2 is an enlarged front elevational view of one side of the assembly;

Figure 3 is an enlarged perspective view of a supplemental spring according to the present invention, shown mounted upon the lower control arms; and

Figure 4 is a longitudinal sectional view taken substantially on line 4—4 of Figure 3.

The reference numeral **10** has been applied generally in the drawings to designate an automobile front wheel suspension assembly of the knee-action type. The vehicle is provided, in this connection, with the conventional side sills or longitudinal frame members **12**, to which are bolted or otherwise rigidly secured the opposite end portions of a cross member **14**.

Secured to the underside of each end portion of the cross member **14** is the lower inner cross shaft **16**, said cross shaft having mounting brackets **18** through which extend bolts or equivalent fastening elements, that secure

the cross shaft in place upon the cross member **14** associated therewith.

The lower control arms of the knee-action assembly have been designated by the reference numerals **20, 22** respectively, said lower control arms being pivotally connected, at one end, to the opposite ends of the lower inner cross shaft **16**.

Each knee-action suspension includes the wheel support member **24**, said wheel support member being pivotally connected to the outer, convergent ends of the control arms **20, 22**.

Bolted or otherwise rigidly secured to the outer end portions of the control arms **20, 22**, and extending between said control arms, is the conventional spring saddle **26**, in which is seated the lower end of a coil spring **28**, the upper end of which is in engagement with the outer end of the cross member **14**.

All this is conventional construction and does not, per se, constitute part of the present invention.

In accordance with the present invention, I provide a supplemental spring designated generally by the reference numeral **30** formed as a bar, said bar being extended longitudinally of the respective control arms **20, 22**, at a location between said control arms. The bar can, if desired, be formed from a single piece of material, and would be so formed, when the invention is applied to certain makes of automobiles. However, automobiles and other motor vehicles differ in weight, and it is accordingly considered within the spirit of the invention to form the bar as a multiple leaf unit, rather than a single unit.

In the illustrated embodiment of the invention, the supplemental spring comprises a pair of bar members, one of which constitutes an inner bar member **32**. The inner bar member **32**, at one end, is inclined downwardly, as at **34**, the end **34** of the inner bar member **32** being apertured, for extension therethrough of the fastening bolts **36**, which bolts also extend through the mounting bracket **18** of the inner cross shaft **16**. Thus, the bolts **36**, though ordinarily used for connecting the mounting bracket **18** to the cross member **14**, also serve to fixedly connect the inner bar member **32** to the inner cross member.

A pair of tension adjusting bolts **38** are included in the invention, said tension adjusting bolts extending through transversely aligned apertures formed in the outer end of the inner bar member **32**. Nuts **40** are threadable upon the bolts **38**, said bolts being also passed through openings formed in the inner end of an outer bar member **42**. The inner end of the outer bar member, and the outer end of the inner bar member, overlap as best shown in Figures 2 and 4.

Circumposed about the respective bolts **38** are springs **44**, said springs being interposed between the heads of the bolts, and the overlapped ends of the bar members **32, 42**. The springs **44** exert a continuous, yielding pressure in the direction of said overlapped ends, thus yieldably and resiliently connecting the bar members.

A cross bar has been designated by the reference numeral **46**, and is of rectangular cross section, the opposite ends of said cross bar resting upon the intermediate portions of the respective control arms **20, 22**. The cross bar **46** is fixedly connected to the respective control arms, by U clamps **48**, the lower ends of which are threaded to receive associated nuts, the nuts threaded on the legs of the U clamps being in engagement with a clamp plate **50**.

By reason of this arrangement, it is seen that the cross bar **46** is adjustable longitudinally of the control arms **20, 22**, the clamping means described being adapted to fixedly secure the cross bar to the control arms, in selected positions of adjustment longitudinally of the control arms.

The outer end of the outer bar member **42** rests upon the mid-length portion of the crossbar **46**.

Obviously, adjustment of the cross bar **46** longitudinally of the control arms is effective to vary the tension of the spring bar **30**, said bar comprising the cooperating bar members **32, 42**. Additionally, the tension of the stabilizer bar can be adjusted by means of the springs **44**.

The construction illustrated and described is such as

to cause a continuous, yielding pressure to be exerted downwardly against the cross bar **46** by the outer end of the bar member **42**. The pressure is translated into a continuous, yielding pressure exerted upwardly against the cross member **14** by the inner end of the bar member **32**, at the location of the inner cross shaft **16**.

By reason of this arrangement, it is seen that when the front end assembly is placed under a heavy load, the spring bar provided at each side of said assembly will serve to resist the downward pressure exerted against the assembly by said load, and will tend to hold the assembly in an elevated position. Further, the arrangement is such as to take some of the load off the springs **28**, thereby to add materially to the life of the coil springs.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. In combination, a knee-action vehicle wheel suspension comprising a relatively stationary cross shaft, at least one lower control arm having an end pivoted on an end of said cross shaft to swing on the axis of said cross shaft, a cross bar fixed on said control arm at a point spaced therealong from said cross shaft, said cross bar extending laterally from said control arm, a support to which said cross shaft is secured, a main spring acting between said support and a part of said control arm at the side of said cross bar remote from said cross shaft, and an auxiliary spring having an end fixed to said cross shaft and another end bearing upon said cross bar and resisting movement of said control arm toward said support.

2. In combination, a knee-action vehicle wheel suspension comprising a relatively stationary cross shaft, at least one lower control arm having an end pivoted on an end of said cross shaft to swing on the axis of said cross shaft, a cross bar fixed on said control arm at a point spaced therealong from said cross shaft, said cross bar extending laterally from said control arm, a support to which said cross shaft is secured, a main spring acting between said support and a part of said control arm at the side of said cross bar remote from said cross shaft, and an auxiliary spring having an end fixed to said cross shaft and another end bearing upon said cross bar and resisting movement of said control arm toward said

support, said auxiliary spring comprising an inner spring leaf fixed at one end to said cross shaft and having an outer end, an outer spring leaf having an inner end portion overlying the outer end of the inner spring leaf, said outer spring leaf having an outer end portion bearing upon said cross bar, and bolt and spring means flexibly connecting the inner and outer spring leaves together.

3. In combination, a knee-action vehicle wheel suspension comprising a support, a cross shaft fixed to said support, a pair of laterally spaced lower control arms pivoted on opposite ends of said cross shaft to swing on the axis of said cross shaft, a main spring seat connecting and spacing said control arms at the ends thereof remote from said cross shaft, a cross bar secured to said control arms and extending therebetween at a point between said main spring seat and said cross shaft, a main spring acting between said spring seat and said support, and auxiliary leaf spring means having an inner end fixed to said cross shaft at a point between said control arms and having an outer end bearing upon said cross bar at a point between said control arms.

4. In combination, a knee-action vehicle wheel suspension comprising a support, a cross shaft fixed to said support, a pair of laterally spaced lower control arms pivoted on opposite ends of said cross shaft to swing on the axis of said cross shaft, a main spring seat connecting and spacing said control arms at the ends thereof remote from said cross shaft, a cross bar secured to said control arms and extending therebetween at a point between said main spring seat and said cross shaft, a main spring acting between said spring seat and said support, and auxiliary leaf spring means having an inner end fixed to said cross shaft at a point between said control arms and having an outer end bearing upon said cross bar at a point between said control arms, and adjustable means securing said cross bar to said control arms, said adjustable means being movable along the control arms in opposite directions to vary the point of bearing of said leaf spring means on said cross bar.

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