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M. B. BRIGGS

2,196,436

STABILIZER

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Fig. 1.

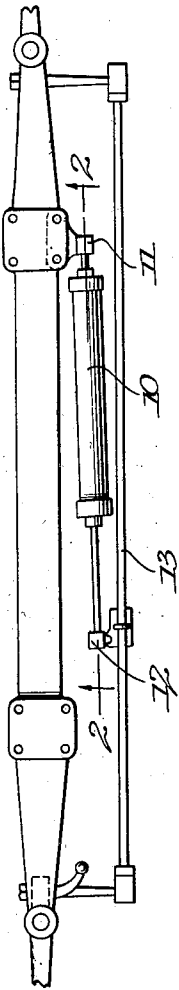
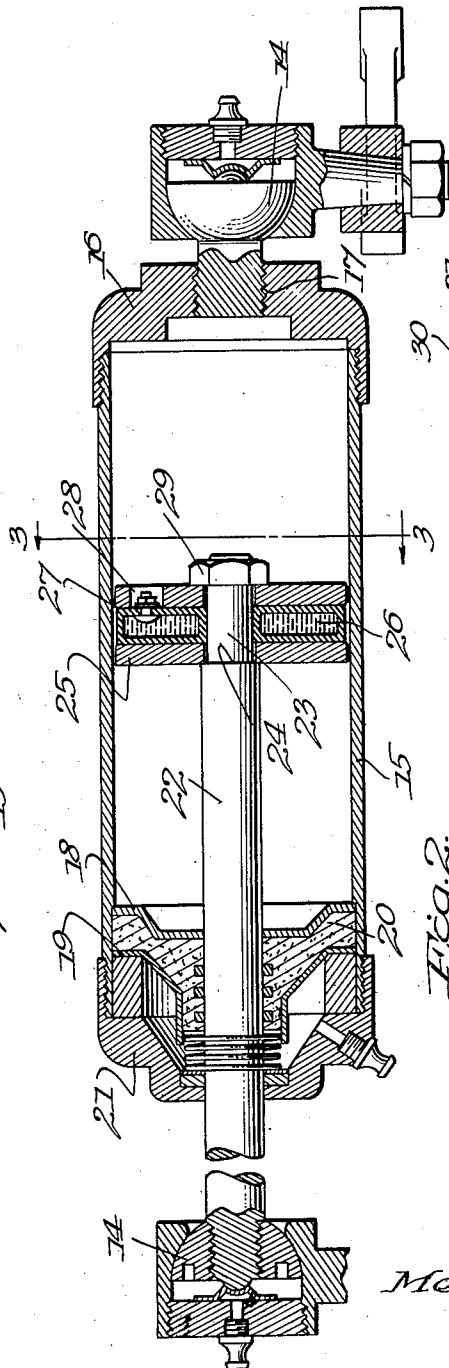


Fig. 2.

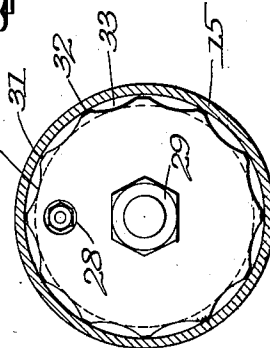


Fig. 3.

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STABILIZER

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16 Claims. (Cl. 280—90)

The present invention relates to stabilizers adapted to be associated with the steering mechanism of motor vehicles and is an improvement upon the construction shown in the patent to MacLellan, 2,058,384, October 20, 1936.

It is a particular object of this invention to provide a stabilizer unit which is universally operable and is particularly advantageous in localities which are subject to extremely low temperatures. That is to say, the stabilizer of this invention is provided with means whereby in the presence of greatly reduced or abnormally low temperatures, the high viscosity of the operating fluid will not interfere with the normal operation of the steering mechanism.

A further object of the invention is to provide a stabilizer structure which is simple and sturdy in construction and instantaneously operative in the presence of road shocks, and which is capable of automatically adjusting itself to conditions of extreme variation of temperature.

In the accompanying drawing, I have illustrated one embodiment of the invention but it is to be understood, that various changes and modifications may be made without departing from the spirit of the invention.

Referring to the drawing,

Figure 1 is a plan view showing the stabilizer mounted between the axle and tie rod on a conventional rigid axle front wheel suspension.

Figure 2 is a sectional view taken on line 2—2 of Figure 1, and

Figure 3 is a sectional view taken on line 3—3 of Figure 2 and showing an end view of the piston.

Referring to Figure 1, the stabilizer 10 is secured at one end 11 to the front axle of a vehicle and at its opposite end 12 to the tie rod 13 of the steering mechanism. Preferably, the connections at each end of the stabilizer afford universal movement as shown at 14 in Figure 2.

The stabilizer comprises a cylinder 15 adapted to contain the operating liquid such as oil, and is closed at one end by the cap 16 into which one connection 14 is secured as by threading, as shown at 17. The other end of the cylinder comprises a packing consisting of the metal plates 18 and 19 having a packing material 20 disposed between them. At this end of the cylinder, a cap 21 is also employed and cooperates with the plate 18 and the packing in general to support and guide the stem or piston rod 22, to which the other connection 14 is secured.

At its inner end, the piston rod 22 has a reduced diameter as shown at 23 forming a shoulder 24. Disposed upon the reduced end 23 are a pair of

plates or discs 25 which are slidable upon the reduced end and may be held against rotation or allowed to be free for rotation. Disposed between the plates is a flexible and resilient closed hollow ring-like member or sack 26 which is mounted to have a sliding movement thereon as well as rotation. This ring member 26 is adapted to contain a suitable liquid having a relatively low freezing point, for example, a brine is selected having a freezing point in accordance with the particular type of hydraulic fluid used in cylinder 15. The brine is filled into the ring member 26 through an inlet port 27 having detachable means 28 for sealing the same. The piston assembly comprising the plates or discs 25 and the expansible member 26 is held in position on the reduced end 23 by means of the shoulder 24 and a suitable lock nut structure 29 threaded upon the said reduced end of the piston rod.

One of the discs 25 is provided with a suitable opening in which the filling and sealing means for the expansible member 26 projects and is housed. Each disc 25 is provided at its periphery with a plurality of scalloped portions or recesses 30 which form a plurality of passages for permitting the operating fluid in the cylinder to pass around the periphery of the piston as the latter reciprocates in the normal operation of the steering mechanism. Also, these scalloped portions are so constructed that the extended portions 31 are in such close proximity to the wall of the cylinder 15 as shown at 32 as to form guides for the piston.

In the operation of the stabilizer, and under normal conditions, movement of the tie rod 13 will cause the piston to reciprocate and fluid will pass through the openings 33 defined by the scalloped portions 30 and the cylinder wall. When a sudden road shock is encountered, such as would tend to divert the vehicle suddenly from its course and wrest control from the driver, a pressure is built up upon the face of one disc 25 or the other. This pressure will act to compress the expansible and resilient member containing the brine or other liquid between the discs, and the sack will expand so as to engage the cylinder wall and arrest flow of fluid from one side of the piston to the other. This action is instantaneous and momentary and is repeated in case of a succession of shocks whereby at all times, the steering mechanism is maintained under control of the driver and the vehicle will not be diverted from its intended path.

As will be appreciated, the stabilizer of this invention is universally applicable. However, in

certain localities, the temperatures frequently are such as to impart a very high viscosity to the operating liquid in the cylinder 15. When the fluid has such a high viscosity, there are possibilities that slight or negligible shocks would tend to render the stabilizer operative in the manner above described. To eliminate this circumstance, which might interfere with normal steering operations, the liquid in the sack 26 is selected to have a freezing point in accordance with the nature of the liquid used in the cylinder such that the brine in the sack 26 will freeze under conditions where the operating liquid in the cylinder 15 is so viscous as to create a condition of interference with normal steering operations due to the presence of the stabilizer. When the liquid freezes, the sack and discs form, in effect, a solid integral piston member and the openings 33 are sufficient to afford ready passage of the liquid from one side of the piston to the other so that there is no opportunity of interference with normal steering operations. Under these circumstances, the unit is still operative as a stabilizer, since because of the high viscosity of the operating liquid, any shocks creating forces of a magnitude to normally wrest control from the driver and divert the vehicle will be arrested.

In other localities unusually high temperatures are encountered such that the hydraulic fluid in the cylinder 15 has a very low viscosity. At the same time the brine solution in sack 26 will have an increased volume. This volume expansion of the brine because of the relatively high temperature will cause the periphery of the sack 26 to expand and partially obstruct the flow passage through the scallops 33. This reduces the free area of the flow passage and increases its resistance. When the fluid flows through the passage under these conditions the increased resistance offered by the restricted flow passage will minimize the loss of sensitivity caused by a lowering of the viscosity of the hydraulic fluid under the influence of the relatively high temperature.

In further explanation of the operation of the stabilizer of this invention, when a vehicle encounters such obstacles as ruts, mudholes, soft shoulders, etc., or a blowout occurs, the tie rod undergoes a sharp or sudden acceleration in one direction or the other. Were the stabilizer not present, the vehicle would be diverted because the driver would lose control. Under such conditions with this stabilizer present, the increase in velocity of the tie rod is counteracted by the resistance offered to reciprocation of the piston by the liquid in the cylinder. In other words, the velocity of the piston is increased creating an increased resistance to flow of the operating fluid through the openings 33 and causing a pressure to be built up on one or the other of the discs 25 as the case may be to produce the stabilizing result. In the case of normal temperature ranges, the sack is expanded as described. When the piston assembly is a solid element, as at low temperatures, the pressure induced by a shock coupled with the high viscosity of the operating fluid causes such increase in resistance as to again perform a stabilizing result. Under relatively high temperature conditions the expansion of the brine solution supplies a compensating effect such that there is no loss of efficiency in the functioning of the stabilizing unit.

The above exemplification of the invention is illustrative only and many modifications will

appear to those skilled in the art which are comprehended within the following claims.

I claim:

1. A stabilizer of the type described adapted to be mounted in operative relation to the steering mechanism of a vehicle, said stabilizer including a cylinder adapted to contain a hydraulic fluid, and a piston to reciprocate therein, said piston comprising a resilient fluid containing sack between two discs slidably mounted on a piston rod, said sack being expansible in response to an unusual rate of reciprocation of the piston in the cylinder, and said fluid contained within the sack having a predetermined freezing temperature.

2. A stabilizer of the type described, having a cylinder containing a hydraulic fluid, and a piston to reciprocate therein, said piston comprising a resilient fluid containing sack disposed between a plurality of discs slidably mounted on the piston rod, said discs having scalloped peripheries.

3. A stabilizer of the type described having a cylinder containing a hydraulic fluid, and a piston adapted to reciprocate therein, said piston comprising an expansible sack between two discs slidably mounted between fixed shoulders on the piston rod, said discs having scalloped peripheries to provide a guiding surface to contact the cylinder wall.

4. A stabilizer of the type described adapted to be mounted between a relatively fixed part of a motor vehicle and a movable element of the steering mechanism, comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted to reciprocate in the cylinder due to the relative movement between the said part and element, said piston including a resilient sack positioned between two discs all slidably mounted on the piston rod, said sack containing a fluid responsive to a relatively high temperature to compensate for a change in viscosity of the hydraulic fluid.

5. A stabilizer of the type described adapted to be mounted between a relatively fixed part of a motor vehicle and a movable element of the steering mechanism, comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted to reciprocate in the cylinder due to the relative movement between the said part and element, said piston including a resilient fluid filled sack between two disks all slidably mounted on the piston rod, said disks having scalloped peripheries to form a flow passage around the piston, said fluid in said sack being responsive to extreme temperature variations, and said sack being responsive through said fluid to the velocity of reciprocation of the piston.

6. A stabilizer of the type described adapted to be mounted between a relatively fixed part of a motor vehicle and a movable element of the steering mechanism, comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted to reciprocate in the cylinder due to the relative movement between the said part and element, said piston including a resilient fluid filled sack between two disks all slidably mounted on the piston rod, said disks having scalloped peripheries to form a flow passage around the piston, said fluid in said sack being volumetrically responsive to extreme temperature changes, and said sack being responsive through said fluid to the velocity of reciprocation of the piston.

7. A stabilizer of the type described adapted to

be mounted between a relatively fixed part of a motor vehicle and a movable element of the steering mechanism, comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted to reciprocate in the cylinder due to the relative movement between the said part and element, said piston including a resilient fluid filled sack between two disks all slidably mounted on the piston rod, said disks having scalloped peripheries to form a flow passage around the piston, said fluid in said sack being responsive to extreme temperature variations, said fluid in said sack being adapted to become a solid at a predetermined temperature, said sack being responsive through said fluid to the velocity of reciprocation of the piston.

8. A stabilizer of the type described adapted to be mounted between a relatively fixed part of a motor vehicle and a movable element of the steering mechanism, comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted to reciprocate in the cylinder due to the relative movement between the said part and element, said piston including a resilient fluid filled sack between two disks all slidably mounted on the piston rod, said disks having scalloped peripheries to form a flow passage around the piston, said fluid in said sack being responsive to extreme temperature variations, said fluid in said sack comprising a brine solution, and said sack being responsive through said fluid to the velocity of reciprocation of the piston.

9. A stabilizer device of the type described comprising a cylinder adapted to contain a hydraulic fluid, and a piston adapted normally to reciprocate in said cylinder, passage means for permitting a flow of the said fluid in said cylinder from one side of said piston to the other side of said piston upon a gradual movement of said piston and expansible means on said piston immediately expansible by increased hydraulic pressure built up in said cylinder when said piston is moved suddenly in either direction, said expansible means being so positioned that by its expansion it substantially completely prevents flow of said fluid through said passage means.

10. A stabilizer device of the type described in claim 9 wherein the said passage means is formed in the said piston.

11. A stabilizer device of the type described in claim 9 wherein the said passage means is formed in the periphery of said piston.

12. A stabilizer device of the type described in claim 9 wherein the said passage means is formed in the said piston and the piston comprises members relatively movable with respect to each other and a piston rod and said members are so mounted with respect to said expansible means that movement of one of said members towards the other of said members will cause expansion of said expansible means.

13. A stabilizer device of the type described in claim 9 wherein the said passage means is formed in the said piston and the piston comprises members relatively movable with respect to each other and a piston rod and said expansible means is mounted between said members.

14. A stabilizer device of the type described in claim 9 wherein the said passage means is formed by peripheral grooves on said piston, said piston comprising members relatively movable with respect to each other and a piston rod, and said members are so mounted with respect to said expansible means that movement of one of said members towards the other of said members will cause expansion of said expansible means.

15. A stabilizer of the type described in claim 9 wherein said expansible means is expansible in response to an increased temperature to partially close said passage means and thus compensate for the decreased viscosity of said fluid.

16. A stabilizer device of the type described in claim 9 wherein said expansible means are formed of a material which will, at abnormally low temperature, resist expansion caused by said increased pressure and will thus act to prevent the closing of said passage means and thus compensate for the increased viscosity of said fluid.

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