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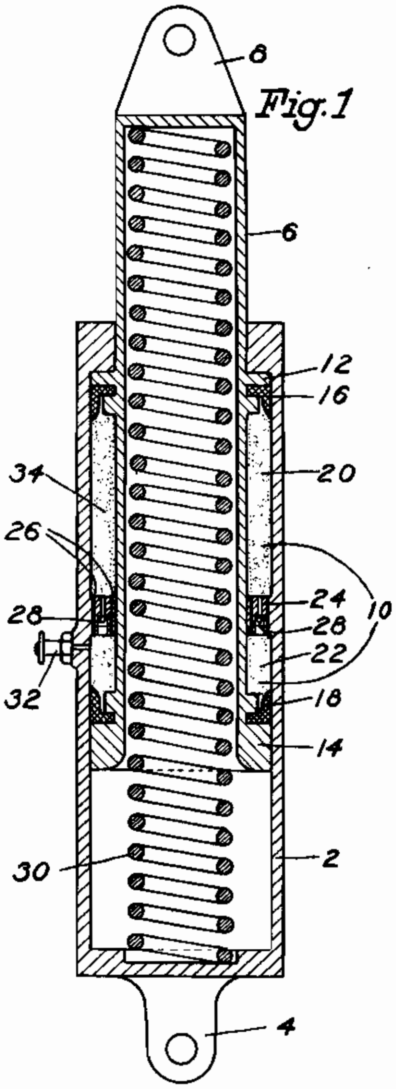

Fig. 1

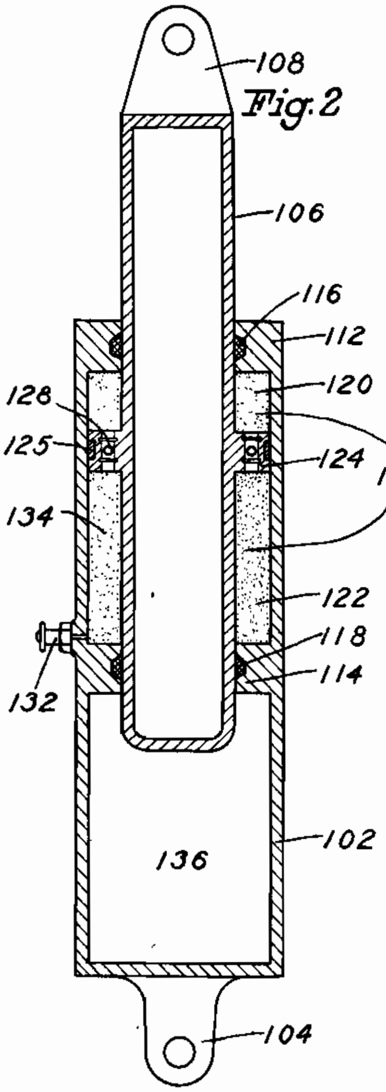

Fig. 2

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SHOCK ABSORBER FOR AIRCRAFT CHASSIS

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This invention relates to telescopic shock absorbers of the type generally used in vehicles. Particularly, it relates to a grease-damped shock absorber having particular utility in aircraft chassis.

The new device comprises a development from the telescopic shock absorbers used in aircraft construction wherein use is made of steel springs or compressed air for absorbing shocks, and in which a liquid, usually oil, is used to damp the relative movement of the telescoping parts. Usually, damping is achieved by forcing the liquid from one compartment to another through throttle openings, thus to absorb a substantial portion of the impact energy.

An object of this invention is to provide a shock absorber which utilizes a viscous non-drop damping medium, such as, grease, which does not require elaborate and expensive packing between the relative moving parts, as usually is required in oil damped shock absorbers.

Another object of the invention is to prevent leakage and losses through the packings and to provide a shock absorber wherein relatively coarse packing may be used.

A further objective is to provide a shock absorber capable of utilizing any one of the many special greases now used for lubricating bearings and the like, the viscosity of which remains substantially constant throughout the entire range of working temperatures.

The use of grease as a damping agent, however, is not without attendant difficulties not found where oil or other similar fluids are used. After one shock causes telescoping action between the working parts of an oil damped shock absorber, the oil, being liquid, rapidly flows back into the chamber from which it was first forced, so that it is immediately available for absorbing a next, rapidly following shock.

When shock absorbers are built into the retractible landing gear of an airplane, they generally assume a horizontal position when the gear is retracted, and a vertical position when the gear is extended prior to landing. If oil is used as a damping medium, there is always sufficient time for it to flow into a position of readiness as the gear is extended without positive displacement or control means. It is an object of this invention to provide positive displacement and control of the grease therein and to take advantage of the inherent sluggishness of grease, which would be fatally defective if substituted for oil in the shock absorbers heretofore known.

Ready understanding of the invention may be had from the following specification and drawings, in which:

Fig. 1 is a cross section of one embodiment of the invention; and

Fig. 2 is a view similar to Fig. 1, but showing a second embodiment.

Fig. 1 shows a telescopic shock absorber according to the invention, comprising a cylinder member **2** having an eyelet **4** by which it may be anchored to the landing gear of an airplane in the usual manner.

Hollow piston member **6**, which also has an anchoring eyelet **8** at its outer end, is slidable axially in cylinder **2** in accordance with the relative movement of the respective parts of the landing gear between which the shock absorber is anchored.

A grease compartment, indicated by the bracket **10**, is formed between the inner wall of cylinder **2** and the outer wall of piston **8**, and is delimited by flanges **12** and **14** on piston **6**, which are packed as shown at **16** and **18**.

Grease compartment **10** is divided into two sections **20** and **22** by flange **24** extending inwardly from the inner wall of cylinder **2**, which acts as a baffle. A plurality of bleeder passages **26** extend through flange **24** to connect the sections **20** and **22** of the grease compartment. Check valves **28** are provided in some of the bleeder passages so that grease will flow more readily from section **20** to section **22** than it will from section **22** back into section **26**.

A coil spring **30** is engaged between the end of cylinder **4** and the end of piston **6** to absorb the initial impact of shocks. The assembly is completed by the valve **32** for injecting grease **34** into the grease chamber.

It should be noted that the total capacity of the chamber **10** is always the same, regardless of the position of piston **6** in the cylinder. The contrast in damping is effected through the check valves **28** on one side of some of the bleeder passages **26**. When piston **6** telescopes into cylinder **2**, resistance to movement is provided by the compression of spring **30**, and some damping is effected by transit of the grease through bleeder passages **26**, all of which are substantially open.

The shock of sudden return of the parts to the position shown in Fig. 1 is prevented by check valves **28** which close some of the bleeder passages **26**. Spring **30** provides positive return of the piston to a position of readiness for the next ensuing shock.

Since the grease compartment **10** formed of sections 20 and 22 is always of uniform size, substantially uniform damping movement of the piston 6 into cylinder 2, regardless of the initial relative positions always occurs. Uniformity of damping prevails in the return movements of the piston and cylinder, so that rapid succession of impacts can neither build up nor deplete the damping effects of the mechanism.

In Fig. 2 a second embodiment of the invention is shown. As in Fig. 1, the device includes a cylinder member 102 having an anchoring eyelet 104 and a piston 106 also having an eyelet 108. Grease chamber 110 is delimited by flanges 112 and 114 which extend inwardly from the cylinder 102 and carry packing 116 and 118, respectively, in packing grooves.

Grease chamber 110 is divided into two sections 120 and 122 by flange 124, which is carried by piston 106. Flange 124 is provided with packing 125 in a packing groove, and throttle openings 128 connect sections 120 and 122 of grease chamber 110.

As in Fig. 1, a valve member is provided in the wall of cylinder 102 for injecting grease 134 into the grease chamber. However, in the device of Fig. 2 the shock of impact is absorbed by air compressed in chamber 136.

Movement of the piston-carried flange 124, which corresponds to the baffle 24 of Fig. 1, in the grease chamber provides damping, which may be increased by decreasing the size of throttle openings 128. It is to be understood that some or all of throttle openings 128 may be provided with check valves so that less damping is effected by movement of the piston 106 in an air compressing direction into chamber 136, at which time the valves are open, than in return movement of the piston from the chamber when the valves are closed.

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