Dec. 23, 1969 J. T. SMITH 3,485,385

IMPACT ABSORBING APPARATUS

Filed Oct. 3, 1966

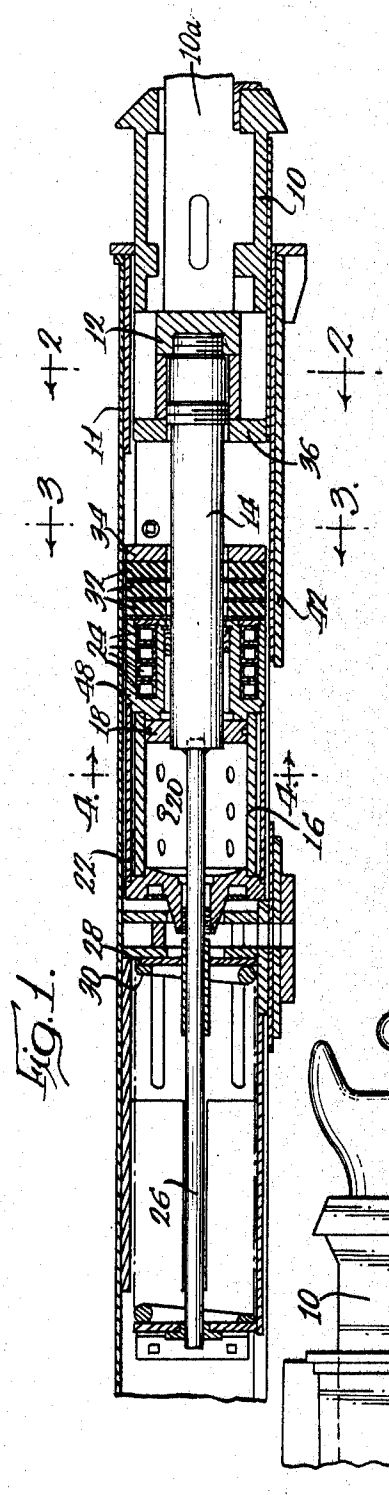

Fig. 1.

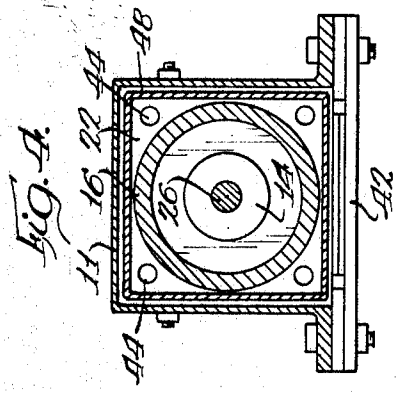

Fig. 4.

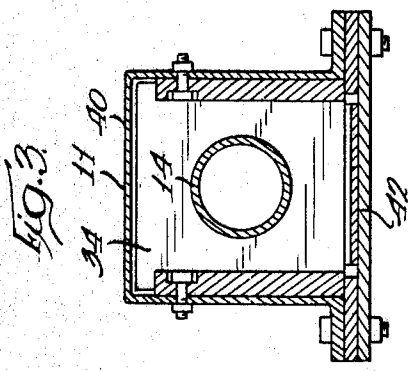

Fig. 3.

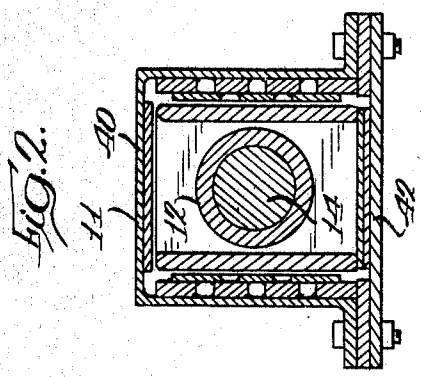

Fig. 2.

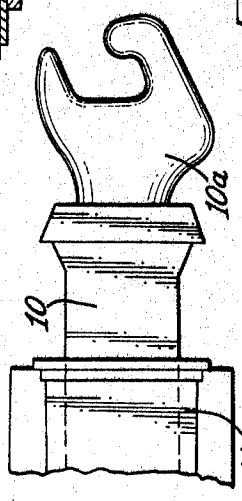

Fig. 5.

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IMPACT ABSORBING APPARATUS

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Int. Cl. B61g 9/14, 9/16
U.S. Cl. 213—43 5 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to an impact absorbing apparatus for railway rolling stock. The hydraulic cushioning mechanism disclosed includes both cushioning mechanism and elastomer means which cushions the final travel between a slidable member adapted to be connected to a coupler and the cushioning mechanism to terminate movement therebetween without metal to metal contact.

The present invention relates to an impact absorbing apparatus and particularly to an improved impact absorbing apparatus for railway rolling stock.

In the coupling of railway rolling stock, there is a problem in protecting the load or lading against damage from impacts given to a fully or partially loaded freight car. The character of the lading itself usually dictates the best manner in which it should be secured in a freight car. Some of the securing techniques provide for a controlled and limited movement of the load within the car to absorb the coupling or similar impact without damage to the load.

A draft gear connected to the coupler absorbs a part of the shock, but its effectiveness is limited by the severe limitation on the movement of the coupler relative to the remainder of the car. This movement is approximately 2¾ inches so as to minimize the amount of slack in a train that should be taken up on starting and absorbed on stopping.

In a conventional draft gear it has been the practice to use cushioning or friction springs for withstanding forces such as impact applied to a coupler. It has also been attempted by more modern-day draft gear designers to construct a hydraulic draft gear and interrelate it with a railroad car to afford the desired energy dissipation. However, such practices have not afforded complete cushioning.

In such systems there is frequently a metal to metal contact at the limit of buff movement. The present invention prevents such contact, and the consequential banging, jarring and possible damage, by insertion of an elastomer in the impact absorbing device. The elastomer is normally in an uncompressed condition. Before the end of permitted movement the elastomer is contacted and cushions the final travel of the device.

It is, therefore, an object of this invention to provide a unique hydraulic draft gear for an impact absorbing apparatus which resists buff action.

It is a further object of this invention to provide a slidable member with an elastomer to cushion the final travel of an impact absorbing apparatus.

It is a further object of this invention to provide an impact absorbing apparatus which is capable of mounting in a standard coupler and unite said coupler with an impact absorbing apparatus in a novel way so that buff movement of said coupler effects operation of the impact absorbing apparatus and terminates such movement without metal to metal contact.

Other objects and features of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawings which illustrate a single embodiment thereof and in which

FIG. 1 is a vertical sectional view of a draft gear of the invention;

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 1; and

FIG. 5 is a partial view of the right end of the mechanism shown in FIG. 1 with a conventional coupler member.

In accordance with the features of this invention there is provided a railroad draft gear comprising a casting **10** to which a conventional E-type coupler **10***a* is adapted to be connected. Casting **10** is slidably mounted in a housing **11** and connected through a fitting **12** to a piston rod **14**. Mounted within the housing **11** is a hydraulic cylinder **16** in which a piston **18** is movable.

The piston **18** expels hydraulic fluid through the openings **20** into a reservoir **22** surrounding the cylinder and the differential volume displacement is taken up by a series of neoprene accumulators **24**. This type of mechanism is disclosed in an application of James T. Smith entitled "Impact Absorbing Apparatus" Ser. No. 395,390, filed Sept. 10, 1964, now Patent No. 3,332, 364.

A rod **26** extends from the opposite end of the cylinder and has a plate **28** secured to it to compress a spring **30** upon the impact or buff movement. The spring **30** coacts with the hydraulic mechanism.

A group of urethane cushions **32** are interposed between a metallic plate **34** and an outer metallic end **48** of the cylinder **16**. End plate **36** is mounted on the piston rod **14** for slidable movement therewith.

The housing **11** is mounted on a base **42** attached to a center sill of a railroad car (not shown). Surrounding the hydraulic cylinder **16** is the cylinder end member **48** through which hydraulic fluid passes by means of ports **44** to the neoprene accumulators **24**.

In impact absorbing apparatus such as this there is a substantial amount of contact between metal parts at the conclusion of buff movement. Thus, the inner end of the casting **10** would bang against the end of the cylinder **16** when complete buff travel had been accomplished. This results in substantial jarring and also in potential damage to the parts.

In operation the urethane cushions **32** interposed between the plate **34** and the outer end of the cylinder **16** are normally in an uncompressed condition and about an inch and an eighth from the end of the permitted movement of the piston rod **14**. The end **36** of the casting **10** contacts the plate **34** and compresses the urethane cushions **32** thus absorbing the impact and gradually taking over then from the hydraulic cushioning afforded by the cylinder **16** to the mechanical cushioning afforded by the elastomers or urethane cushions **32**.

In normal position the spring **30** holds the plate **28** in the extreme left position. Should the car receive an impact from the right, the casting **10**, piston rod **14**, rod **26**, plate **28** and the end plate **36** will be moved to the left. The end plate **36** in moving to the left engages the elastomers **32** through the plate **34** thereby increasing the resistance to piston travel leftwardly and results in a greater absorption of the impact. This is subsequent to compression of the spring **30** and compression of the neoprene accumulators through the cylinder end member **48**. The elastomers thus absorb the energy of the final leftward movement of the device. The hydraulic fluid is expelled through the openings **20** by the piston **18** and passes the reservoir **22** through the ports **44** of the cylinder end member **48** to compress the donut-like rings **24** against the pressure of the air therein.

After the impact has been absorbed, the system returns to normal, the spring **30** expands moving the rod **26** and piston rod **14** to the right. As this occurs the piston **18** moves to the right, hydraulic fluid re-enters the hydraulic cylinder **16** relieving the pressure on the neoprene accumulators **24**. The neoprene accumulators **24** expand to their normal position expelling fluid from the reservoir **22** through the openings **20** and into the hydraulic cylinder **16**.

A similar impact absorbing apparatus would be located on the left side of the railroad car in order to absorb impact from the left.

While I have shown and described a preferred embodiment of my invention, it will be apparent that numerous variations and modifications thereof my be made without departing from the underlying principles of the invention. I therefore desire, by the following claims, to include within the scope of the invention all such variations and modifications by which substantially the results of my invention may be obtained through the use of substantially the same or equivalent means.

I claim:

1. In an impact absorbing apparatus a coupler, a cylinder housing, a metallic cylinder end member, a slidable member mounted within said cylinder housing and attached to said coupler, and extending through said cylinder end member, spring means biasing said slidable member in a first position, a metallic end plate mounted on said slidable member, and elastomer means mounted within said housing between said end plate and the cylinder end member whereby on impact said coupler drives said spring from said first position to a second position intermediate said first position and the maximum extent of longitudinal travel of said slidable member, said elastomer means being contacted by said end plate at said second position, whereby said elastomer means absorbs the terminal impact and prevents metal to metal contact between the end plate and the cylinder end member.

2. An impact absorbing apparatus in accordance with claim **1** wherein said elastomer means are urethane cushions.

3. An impact absorbing apparatus in accordance with claim **1** wherein said slidable member operates hydraulic means which coacts with said spring means to cushion buff movement.

4. An impact absorbing apparatus in accordance with claim **1** wherein said housing has hydraulic means including a piston operated by said slidable member such that from the first position said hydraulic means opposes movement of said piston, accumulator means, said piston being mounted within a tubular hydraulic cylinder having openings disposed longitudinally of said piston whereby longitudinal movement of said slidable member causes movement of said piston to displace hydraulic fluid which thereupon acts on said accumulator means.

5. An impact absorbing apparatus in accordance with claim **4** wherein said accumulator means are hollow neoprene rings.

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DRAYTON E. HOFFMAN, Primary Examiner

U.S. Cl. X.R.

213—8