DRAFT GEAR FOR AUTOMATIC COUPLERS OF RAILWAY ROLLING STOCK

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This invention relates to draft gear devices for absorbing shocks when vehicles strike each other and also when trains are stretched out or compressed.

It is known that draft gears of various design are being employed for this end, in which the force of the shock is taken up by the friction developed by the gear elements rubbing against each other.

Attempts have been made to solve this problem by using hydraulic devices based on the principle of forcing the liquid through small orifices from one chamber of the device to another one.

The device was restored to its original length after removal of the load with the aid of an additional spring or by means of compressed air or an inert gas contained in a special chamber of the device.

Such a draft gear design, which is more efficient than that of a friction draft gear, facilitates reduction of the forces arising from shocks, but require, however, thorough machining of cylinders and plungers and also reliable, packing devices are required as a result of the high pressures of the liquid and gas being compressed.

The aim of this invention is the creation of a hydraulic draft gear which, while ensuring a high efficiency, will permit obtaining a sufficient resistance upon static pressure to do away with gas chambers and their packing, and obtain a low pressure of the liquid at the packing elements, in order to ensure absolute airtightness of the gear.

Using the proposed gear on railway rolling stock will provide the following advantages:

(a) Increase the speed of handling wagons in hump yards and during shunting work in general, due to its better shock absorbing ability, which will permit wagons striking each other at speeds up to 10–12 kilometres per hour without any danger of damaging the wagons or their contents, instead of a speed of 5 to 6 kilometres per hour as is the case when the existing types of draft gear are being employed;

(b) Reduce the magnitude of the greatest longitudinal dynamic stresses when wagons strike each other during shunting, upon starting heavy trains or applying brakes to moving trains;

(c) Increase the safety of train operation;

(d) Increase the service life of the rolling stock;

(e) Protect the goods being transported against any damage.

In connection with the purposes and advantages outlined above and in contradistinction to gear types hereof employed the invention is based on the use of an annular spring filled inside with a liquid that upon spring compression is pressed out through an orifice into the space surrounding the spring, as well as on some other parts of the design described and claimed herein.

It is clear that in realization of the invention described herein alterations may be made within the limits of the claims and without departing from the idea of the invention, for example, the introduction into the liquid flow orifice of a safety valve for limiting the maximum pressure of the liquid inside the spring, the resistance of the gear, etc. Other distinguishing features of the invention will be covered in the description with reference to the appended drawing.

FIG. 1 is a top plan view of a draft gear constructed in accordance with this invention;

FIG. 2 is an end elevational view with parts broken away and in section; and,

FIG. 3 is a side elevational view with parts broken away and in section.

The draft gear consists of housing 1 containing an annular spring that consists of a set of internal rings 2 and external rings 3 and 4, plate 5 fixed to cylinder 6, and bolts 7 that slidably secure plate 5 to housing 1.

The internal space of the annular spring is filled with a liquid.

To make the draft gear airtight a diaphragm is secured between cylinder 6 and external cylinder 9, the latter being secured to housing 1 by means of screws 10, diaphragm 8 overlapping the gap between the housing and internal cylinder 6.

When the draft gear is compressed the annular spring will also be compressed and will force the liquid out of the internal spring space.

From the internal annular spring space the liquid is forced through a small diameter orifice 11 and the ducts 12 in plate 12 of housing 1 and will flow into the space between the annular spring and housing 1, and will expand elastic diaphragms 13 into the recess 13' in the housing 1, as shown in dotted lines in FIG. 2. The latter are secured to housing 1 by means of frame 14 and rivets 15.

The energy expended in compressing the draft gear is absorbed by the resistance to the liquid flowing through the small-diameter orifice and by compression of the annular spring.

The elasticity of the annular spring returns the draft gear to its original position.

Due to the spring rings being in an oil bath binding of the rings is excluded, and functioning of the draft gear is characterized by high stability and prolonged service life.

As a high pressure of the liquid is developed only inside the annular spring there is no need for packing designed for high pressures.

In the proposed draft gear the liquid entering the space between the annular spring and the housing of the gear will have an insignificant pressure only sufficient to expand diaphragm 13.

While testing such draft gears the efficiency of taking up shocks exceeded 10,000 kg.m. with a standard magnitude of the gear travel, against 3500 kg.m. for ordinary annular draft gears based on taking up the shocks by friction.

The recoil of the draft gear constitutes in this instance about 10 percent instead of 40 percent for a purely annular draft gear, this also being a great advantage.

Although this invention has been described together with the preferred manner realization it should be understood that there may be alterations and variations without any deviation from the ideas and scope of the invention.

Such alterations and variations will not be considered to pass beyond the scope of the invention and the claims therefor.

What we claim is:

1. A draft gear for automatic couplers of railway rolling stock, said draft gear comprising a hollow housing, a closure on one end of said housing with the opposite end open, a cylinder slidably received in the open end of said housing, a plate fixed to the outer end of said cylinder and closing the same, means for limiting outward movement of said cylinder with respect to said housing, a diaphragm fixed to said cylinder and housing to provide a fluid tight seal, an annular spring compris-
ing a plurality of axially spaced external and internal interengaging rings disposed in said housing and cylinder with one end of said spring engaging said plate, said rings, closure and plate providing a chamber, said housing having an internal recess opening toward said external rings, an expansible diaphragm closing said recess, said closure having an orifice communicating with the space within said internal rings, said closure having ducts communicating with said orifice and the space between said flexible diaphragm and said external rings and hydraulic fluid filling said chamber whereby upon movement of said plate toward said closure and axial collapse of said spring fluid will be forced through said orifice and ducts to expand said expansible diaphragm into said recess to absorb shock.

2. A draft gear for automatic couplers of railways rolling stock, said shaft gear comprising a hollow housing, said housing having an internal recess opening toward said external rings, an expansible diaphragm closing said recess, said closure having an orifice communicating with the space within said internal rings, said closure having ducts communicating with said orifice and said recess and hydraulic fluid filling said chamber whereby upon movement of said plate toward said closure and axial collapse of said spring fluid will be forced through said orifice and ducts into said recess.

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