

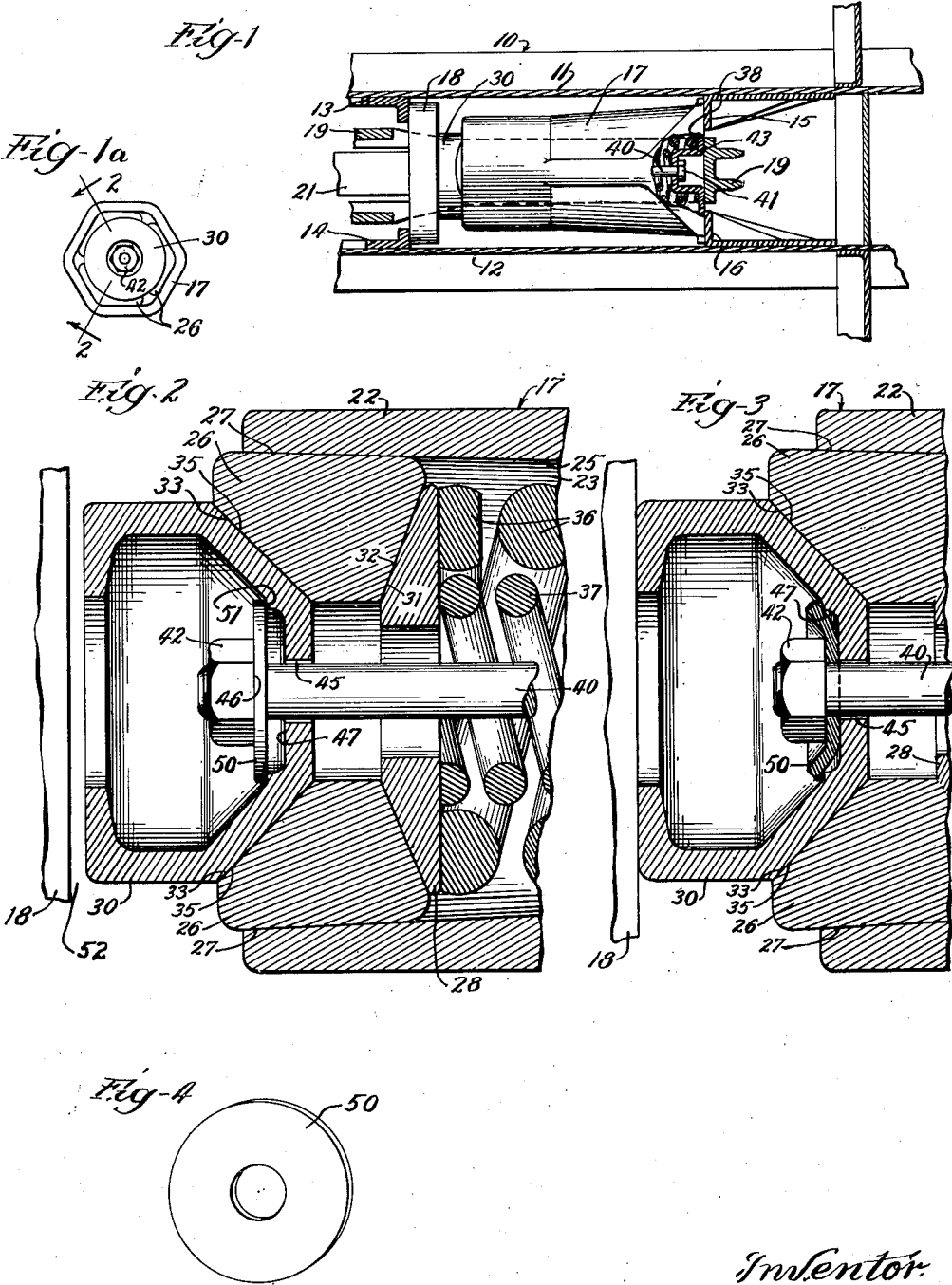
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DRAFT GEAR CONSTRUCTION

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DRAFT GEAR CONSTRUCTION

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1 Claim. (Cl. 213—32)

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The invention relates to compressible devices for use in contractable working spaces to absorb shock forces, and is directed primarily to the problem of contracting the device as required for installation in such confined spaces. For the purpose of disclosure I shall describe my invention as embodied in a draft gear that is intended to function in the usual draft gear pocket in a railway car structure.

A draft gear assembly includes yielding means or springs that tends to move end members of the assembly away from each other, thereby to expand the device longitudinally. To keep the parts of the device in assembled relation prior to installation, and to permit the device to be installed or removed as a unit, suitable means is included in the assembly to limit such separation movement of the two ends of the assembly. Commonly the restraining means comprises a bolt with a head to engage one end of the assembly and a nut threaded onto the other end of the bolt to engage the other end of the assembly.

The maximum length of the draft gear permitted by the restraining means under normal operating conditions must be greater than the maximum expanded length of the contractable pocket in which it is installed, because continuous pressure on the ends of the pocket is required in service. On the other hand, the draft gear cannot be placed in the draft gear pocket unless it is contracted to less than the pocket length. To make the installation of the draft gear a simple task, the draft gear must be supplied to the installation workmen in sufficiently contracted state to fit easily into the draft gear pocket, and yet must be readily releasable from such undue contraction for normal operation in the pocket.

One expedient heretofore suggested for initially maintaining the draft gear relatively contracted comprises a frangible retaining means that serves its preliminary purpose and is then broken by operating forces after the draft gear is installed. For example, such a frangible means may be a pin or rivet that is soon sheared by operating forces. One disadvantage of such a shear pin is the care and time necessary to bring the proper holes into registration and then to install the shear pin. A further disadvantage is that when the pin has served its purpose the severed parts of the pin are released to the interior of the draft gear and may interfere with the proper functioning of the draft gear.

Another expedient that has been suggested is the use of a body of suitable material that is

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readily malleable or deformable in response to the impacts that characterize normal operation of a draft gear. For example, such a body may be a heavy lead washer which is pounded out of its original shape by the operating impact forces and, when so pounded out of shape, permits the draft gear to expand into pressure contact with the functional walls of the opposite ends of the draft gear pocket. Such a deformable body is subject to crumbling and may break into loose parts to interfere with the functioning of the draft gear.

The object of the present invention is to solve this problem by providing pliable means to act under bending stress to resist the expansion of the draft gear prior to installation, but to yield to such bending stress in response to normal operating forces engendered in the draft gear under service conditions. It is contemplated that the initial or temporary retaining means will have sufficient strength to withstand static spring-engendered forces tending to expand the draft gear during storage, shipment and handling, but will be sufficiently pliable to yield by bending when substantially higher forces are encountered.

One advantage of employing a pliable or bendable temporary retaining means as distinguished from a frangible retaining means, or any retaining means deformable otherwise than by bending, is that no loose fragments or parts are released when the draft gear goes into normal operation. It may be further noted that it is less difficult for a manufacturer to produce in quantity retaining means of uniform bending resistance than to produce retaining means of uniform shear resistance or uniform resistance to other kinds of deformation. It has been found that the properties of a satisfactory pliable means are not at all critical, there being a wide permissible latitude with ordinary stock materials falling within that latitude. Also important is the fact that a pliable retaining means, as compared to a frangible shear pin or a deformable washer of lead, is less likely to fail suddenly and prematurely.

In the preferred practice of my invention a further object is to provide such a temporary retaining means that will have a later function in the normal operation of the draft gear. Thus in the preferred practice of the invention it is contemplated that such a pliable means in the form of a washer will serve its usual preliminary purpose until it is bent by initial operation of the draft gear, and may thereafter serve as a positive non-yielding spacer cooperative with the conventional retaining means. The conventional re-

taining means with such spacer subsequently limits the expansion of the draft gear when the latter is removed from the car pocket for service, repair or replacement.

A further object of the invention is to provide a yielding restraining means of the character described to be used with conventional restraining bolts, thereby to minimize the failure of such bolts in service.

Other objects and advantages of the invention will be apparent in the detailed description to follow, taken with the accompanying drawings.

In the drawings, which are to be considered as merely illustrative:

Fig. 1 is a horizontal section through a draft gear pocket showing therein a draft gear, parts of the draft gear being broken away;

Fig. 1a is an end elevation of the draft gear, the same end as that shown in Fig. 2;

Fig. 2 is an enlarged longitudinal sectional view of one end of a draft gear as initially contracted for insertion in a draft gear pocket;

Fig. 3 is a similar view showing the draft gear after the pliable retaining means is bent by operating forces; and

Fig. 4 is a perspective view of the pliable retaining means.

In the drawings, numeral 10 generally designates the underframing of a railway car having center sills 11 and 12 provided with draft lugs 13, 14, and buff lugs 15, 16. The rectangular space defined by the two sills and the four lugs constitutes the pocket in which the draft gear, generally designated 17, is to be mounted for normal operation. Usually a follower 18 is inserted between the draft lugs and the draft gear, and the working space in which the gear is to function is reduced correspondingly. The draft gear is embraced by a draft yoke 19 in the conventional manner, and the draft yoke is connected to the coupler 21 in a well known manner.

The particular draft gear 17 shown in the drawings is of a well known type, but it is to be understood that my invention is applicable to various types known to the art.

The draft gear 17 has a housing 22 forming an inner chamber 23, with an inner tapering friction surface 25 for cooperation with a plurality of wedge blocks 26. The wedge blocks 26 have friction faces 27 in contact with the tapering friction surface 25 to resist frictionally the contraction of the draft gear, and are normally under pressure between a spring follower 28 and a wedge member 30. Each of the wedge blocks 26 has a face 31 in contact with the corresponding face 32 of the spring follower 28, and each of the wedge blocks also has a wedging face 33 in contact with a corresponding wedging face 35 of the wedge member 30.

The wedge member 30 is moved longitudinally inward in response to contraction of the draft gear by draft and buff forces, and the wedging faces 33 and 35 are of sufficiently low angles relative to the axis of the draft gear to cause the wedge blocks 26 to exert relatively great pressure against the surrounding friction surface 25 of the draft gear housing. Heavy helical springs 36 and 37, acting in compression between the spring follower 28 and an end wall 38 at the opposite end of the draft gear, provide the desired yielding resistance to inward movement of the wedge member 30 and also provide the force for restoring or expanding the draft gear.

The drawings show a conventional restraining means to limit the expansion of the draft gear,

this restraining means comprising a central bolt 40 with a head 41 at one end and a nut 42 on the other end. The head 41 is in a hollow boss 43 formed in the previously mentioned end wall 38, and provides an inwardly facing stop surface in abutment with an outwardly facing stop surface of the end wall 38, the end wall being suitably apertured to receive the bolt.

The other end of the bolt 40 extends through a suitable bore 45 in the wedge member 30, and the inner face 46 of the nut 42 constitutes an inwardly facing stop surface, while the surface 47 of the wedge member 30 surrounding the bore 45 constitutes what may be termed an outwardly facing stop surface. All the structure described to this point is conventional.

The temporary retaining means employed in the preferred practice of my invention comprises a suitably pliable washer 50 that is interposed between the two stop surfaces 46 and 47. In the present specific arrangement the washer 50 is initially flat and initially engages portions of the wedge member 30 outwardly from the stop surface 47 for the purpose of maintaining an initial or temporary spacing between the stop surface 46 and the stop surface 47 sufficient to serve the purpose of contracting the draft gear to slightly less than the length of the available space in the draft gear pocket. As shown in Fig. 2, the washer 50 may fit against an annular shoulder 51 formed in the wedge member 30 outward from the stop surface 47.

The additional temporary contraction of the draft gear provided by the bridging of the interior of the wedge member 30 by the washer 50 is sufficient to permit the draft gear to be freely moved into the draft gear pocket, as indicated by the clearance space 52 in Fig. 2. It will be noted that the washer 50 is under bending stress inasmuch as the nut 42 presses against the central portion of the washer in one axial direction, and the annular shoulder 51 resists such central thrust by pressing against the outer margin of the washer in the opposite axial direction. Thus, as viewed in side elevation in Fig. 2, the washer 50 constitutes a bridging element having a central portion resisting one thrust and two diametrical outer portions receiving opposite balancing thrusts. The strength of the washer is sufficient to withstand the static pressure of the two springs 36 and 37, especially since the described frictional arrangement reduces the force applied to the washer 50 under static conditions.

When the draft gear is placed in service it is subject to repeated forces in draft and buff that cause the draft gear to be alternately compressed and released. The releasing action is characteristically sufficiently abrupt to permit the two springs 36 and 37 to expand the draft gear longitudinally with relatively high acceleration. The moving parts attain substantial momentum, and during such expansion movement the frictional resistance of the wedge blocks 26 is negligible. As a result the bending stress applied to the washer 50 by shock action under operating conditions is far greater than the bending stress applied to the washer under static conditions prior to installation of the draft gear. Soon after installation of the draft gear, therefore, the washer 50 bends or collapses to the configuration shown in Fig. 3, thereby permitting the draft gear to expand into the desired pressure contact with the follower 18 constituting one end of the draft gear pocket, and the buff lugs 15, 16, constituting the other end of the pocket.

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To permit the normal longitudinal expansion of the draft gear represented in Fig. 3 the two stop surfaces 46 and 47 must be free to approach each other to a given minimum spacing, and, of course, the thickness of the washer 50 must not exceed the spacing. In Fig. 3 the thickness of the washer happens to be substantially the desired operating spacing between the two stop surfaces. Obviously the washer may be thinner than the required minimum spacing between the two stop surfaces. In any event, the collapsed washer will serve as a non-yielding spacer between the two stop surfaces when the draft gear is subsequently removed from the car. In other words, the collapsed washer will in effect cooperate with the bolt 40 and the nut 42 as the normal retaining means to limit the expansion of the draft gear when the latter is free from any surrounding impediments.

In the initial application of the invention the bolt 40 is $\frac{1}{8}$ " diameter, while the washer 50 is $\frac{1}{8}$ " thick, $1\frac{1}{2}$ " outside diameter and $\frac{1}{2}$ " inside diameter. Under test the bolt begins to lengthen as the tensile load reaches 6800 pounds, and breaks when the load is approximately 8000 pounds. The washer, which is made of mild steel, starts to bend or dish under an applied pressure of 3600 pounds, and dishes or collapses fully under an applied steady pressure of 5200 pounds. The static load applied to the washer by the two springs 36 and 37 prior to the installation of the draft gear is on the order of 2500 pounds.

One feature of the invention apparent from these figures is that the design and strength of the washer is not critical, since there is a liberal range of strength values for the washer that will serve for the present purpose.

The utility of the yielding washer in minimizing failure on the part of the restraining bolt on which the washer is mounted is based on two facts. In the first place, there is no difficulty at all about providing a draft gear with such a washer in which the range of yield of the washer is ample to permit the draft gear to expand fully against the ends of the pocket. When the washer permits such complete expansion overstretching of

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the bolt in subsequent service is precluded. In the second place, while the washer collapses nevertheless it yields with a certain cushioning effect that protects the bolt from excessive shock in tension while the draft gear is being expanded to fill the pocket.

My description of a preferred practice of my invention in specific detail for the purpose of disclosure will suggest to those skilled in the art various changes and substitutions within the scope of my appended claim.

I claim as my invention:

In a draft gear including end members yieldingly urged apart, but limited in the extent of their separation by a bolt headed at both ends, the combination therewith of means for changing the effective length of said bolt between said heads after the gear is in operation, said means comprising an outwardly facing pocket in one of said end members and through which the bolt extends, and a deformable, non-crumbling washer mounted on the bolt and interposed between the adjacent head of the bolt and the pocket in said end member and covering said pocket, said pocket and washer being of substantially greater diameter than the adjacent head of said bolt, whereby dynamic forces created during operation of the gear tending to separate said end members will cause the washer to be dished inwardly and rest against the bottom of said pocket to thereby increase the effective length of said bolt between said heads.

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