Jan. 27, 1970 F. G. SUCKOW 3,491,898

HOUSED DRAFT GEAR

Filed Sept. 13, 1967 2 Sheets-Sheet 1

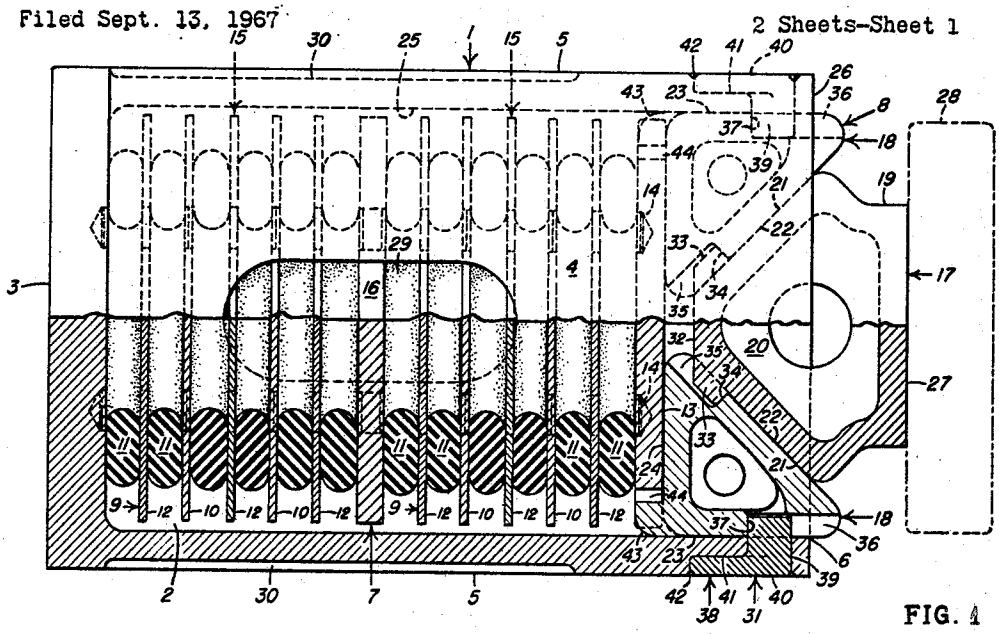

FIG. 1

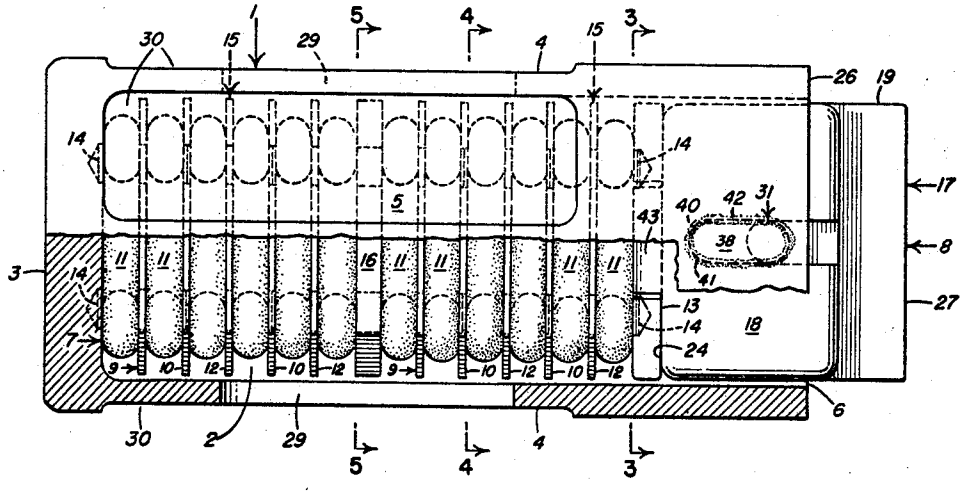

FIG. 2

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HOUSED DRAFT GEAR

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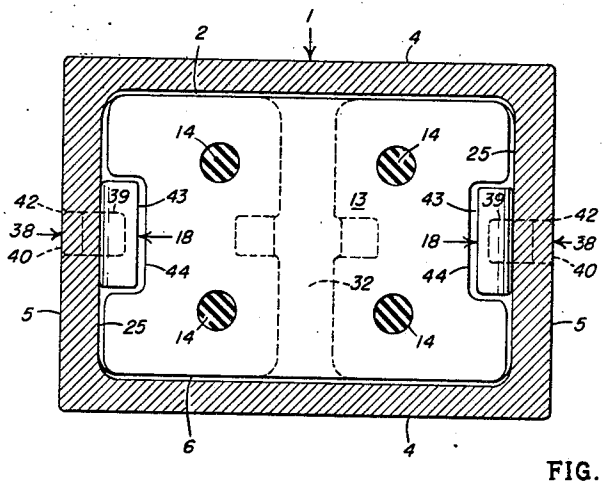

FIG. 3

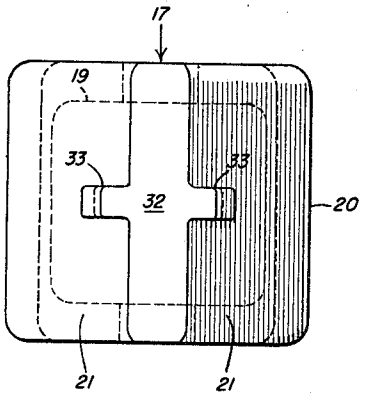

FIG. 6

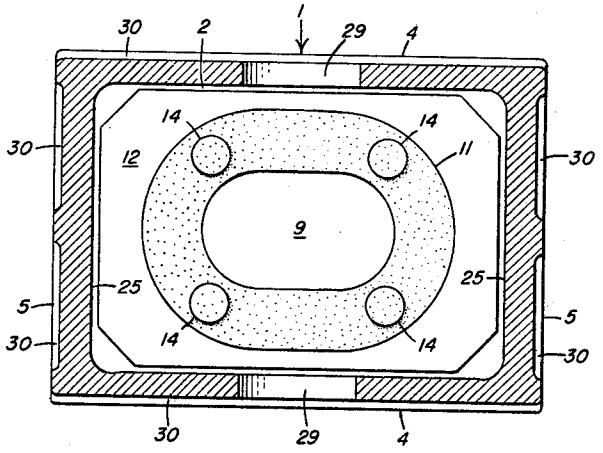

FIG. 4

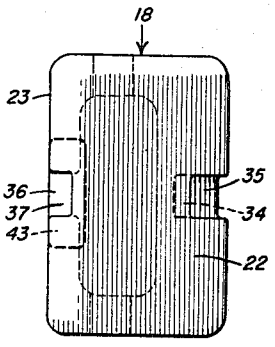

FIG. 7

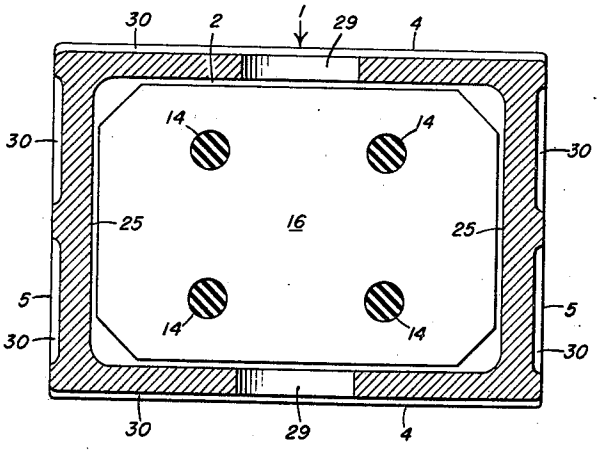

FIG. 5

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HOUSED DRAFT GEAR

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Filed Sept. 13, 1967, Ser. No. 667,431
Int. Cl. B61g 11/08, 9/02, 9/06
U.S. Cl. 213—27 8 Claims

ABSTRACT OF THE DISCLOSURE

A housed draft gear for railway vehicles having friction and "rubber" cushioning units arranged in tandem in an open-fronted cavity of uniform cross-section in a housing and held in assembled relation in the cavity by releasably interlocking a wedge to friction shoes of the friction unit and the friction shoes to the housing.

BACKGROUND OF THE INVENTION

Except for those equipped with cushion underframes or end-of-car cushioning devices, railway freight cars are dependent for cushioning under draft and potentially higher buffing forces upon draft gears fittable in pockets in ends of their centersills. The pockets are now of two standard lengths, 24⅝ and 36 in., the latter having been adopted by the A.A.R. when it was questioned whether a draft gear fittable into the shorter pocket could have sufficient capacity to meet the demands imposed by actual and potential increases in the length and speed of trains and weight and speed of humping of cars in classification yards.

While retaining the shorter pocket as a standard, the A.A.R. in specification M-901-E sharply increased the minimum capacity required for approval of a draft gear fittable into that pocket and, in hopes of making that minimum feasible, increased the maximum travel from 2⅝ to 3¼ in. Subsequently, housed draft gears combining the capacity at initial travel of a friction unit and the high ultimate capacity of a "rubber" unit, such as disclosed in Blattner Patent No. 2,919,819, issued Jan. 5, 1960, have proved able to meet that and other A.A.R. specifications for draft gears for the two standard size pockets. It is with an improvement in housed friction-"rubber" draft gears for standard pockets that the present invention is particularly concerned.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide an improved housed friction-"rubber" draft gear for a standard draft gear pocket which combines simplicity and ruggedness with more than ample capacity to meet applicable A.A.R. specifications. Adaptable for either standard pocket, the improved gear in its shorter pocket form can meet capacity requirements with a travel of only 2½ in.

In the improved draft gear the relatively complex housing of a conventional housed draft gear is replaced by a housing having a front-opening cavity of uniform, preferably rectangular cross-section. The draft gear has a rear, preferably polyurethane "rubber" cushioning unit and a front friction cushioning unit, which with other housed parts, are all insertable into the housing's cavity through the latter's open front end. Preferably ported at the sides only for observation of the "rubber" cushioning unit, the housing can have adequate strength at the rear with a rear wall of less than normal thickness, correspondingly increasing the space available for the "rubber" cushioning unit in the cavity.

The preferred friction unit includes a central wedge serving as a plunger for the draft gear and friction shoes

wedged laterally by the plunger into frictional engagement with the housing. The friction unit is compact and only occupies but a small part of the cavity with both wedge and shoes projecting therefrom for maximizing the space available for the "rubber" cushioning unit. A releasable interlock between the wedge and the shoes and the shoes and the housing, normally holds the several components of the draft gear in assembled relation and permits their ready assembly and disassembly.

The foregoing and other objects and features of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings, in which:

FIGURE DESCRIPTION

FIGURE 1 is a plan view of a preferred embodiment of the housed draft gear of the present invention, with portions broken away and shown in section to more clearly illustrate certain of the details of construction;

FIGURE 2 is a side elevational view of the draft gear of FIGURE 1, again with portions broken away and shown in section to more clearly illustrate certain of the details of construction;

FIGURE 3 is a vertical sectional view taken along lines **3**—**3** of FIGURE 2;

FIGURE 4 is a vertical sectional view taken along lines **4**—**4** of FIGURE 2;

FIGURE 5 is a vertical sectional view taken along lines **5**—**5** of FIGURE 2;

FIGURE 6 is a rear elevational view of the wedge of the friction unit of the draft gear of FIGURE 1; and

FIGURE 7 is a front elevational view of one of the friction shoes of the friction unit.

DETAILED DESCRIPTION

Referring now in detail to the drawings in which like reference characters designate like parts, the improved friction-"rubber" draft gear of the present invention is intended to fit into a draft gear pocket in a centersill of a railway vehicle for cushioning buffing and draft forces between the adjoining coupler (not shown) and the sill and is readily adaptable to fit either the 24⅝ in. or the 36 in. pocket upon which the A.A.R. has now standardized. While that for the longer pocket will have greater travel and capacity, the adaptations of the improved draft gear for both standard pockets will be basically the same. It therefore will suffice for an understanding of the invention to direct the description primarily to the illustrated embodiment in which the improved draft gear has been adapted to fit into a 24⅝ in. pocket and have a travel of about 2½ in.

The improved draft gear is comprised of a housing **1**, which usually will be of box-shape and have therein a longitudinal extending cavity **2** open at the front and closed at the rear by the housing's rear wall **3**. The cavity **2** in cross-section is uniform or the same throughout its length and, if, as preferred, the cross-section is rectangular, will be bounded at the sides by longitudinally extending top and bottom walls **4** and side walls **5** forming the several sides of the housing.

Received, seated or fitted in the cavity **2** and inserted thereinto through the cavity's open front end **6**, are a rear "rubber" cushioning unit **7** and a front friction cushioning unit **8**, which are arranged in tandem and act in series in cushioning the buffing and draft or longitudinal forces between the centersill and the coupler. Acting, as well, as a return spring for returning itself and the friction unit **8** to normal position on release from a longitudinal force, the preferred rear cushioning unit **7** is formed of a plurality of "rubber" springs **9** arranged in tandem longitudinally of the cavity **2** and separated

longitudinally from each other by spacer plates **10**, each spring being formed of a pair of "rubber" pads **11** sandwiching and joined or connected through an intervening spring plate **12**.

The rear unit **7** is contained longitudinally by and acts between the rear wall **3** and a front spring follower or follower block or plate **13**, interposed between and separating or spacing the rear and front units, and both of the follower and the rear wall on their sides facing the rear unit are socketed and the spacer plates **10** are apertured for receiving integral aligning studs **14** on the confronting sides of the pads **11**. While the longitudinal alignment so provided might be adequate, the length of the rear unit, even in the 24⅝ in. pocket version, is such as to render some intermediate guidance desirable. Accordingly, in both versions the rear unit **7** is divided longitudinally into a plurality of sections or mats **15** and adjoining sections are separated or spaced longitudinally from each other by an intermediate follower or follower block or plate **16**. Thicker than the spacer plates **10** and apertured or socketed to receive the aligning studs **14**, the or, depending on the version, each intermediate follower **16**, is adapted if need be, by rubbing against one or another of the sides **4** and **5** of the housing **1**, to limit the lateral movement of the rear unit intermediate its ends relative to the housing, the same guidance function being performed at the front by the correspondingly thick front spring follower **13**.

While the term "rubber" is used herein to differentiate the rear unit **7** from the front unit **8** and the material of which the pads **11** are made is rubber-like in being elastic and flowing under compression, the preferred material is "rubber" only in that general sense and, instead of natural or synthetic rubber, is the elastomer known popularly as "polyurethane rubber." This preference is dictated in the main by the increased capacity derivable from the higher internal energy absorption and greater elasticity at high hardness of polyurethane rubber than natural and synthetic rubber and, among polyurethane rubbers, those having a durometer hardness of around 100 now appear to be the most suitable.

The friction cushioning unit **8**, upon which the improved draft gear depends mainly for adequate capacity at initial or low travel, has as its preferred components a single center wedge **17**, centered transversely on the housing **1**, and a plurality and preferably a pair of side wedges or friction shoes **18**. For the preferred pair of friction shoes **18**, the wedge **17** is generally of arrowhead-shape in plan and rectangular on any cross-section, with a forwardly projecting shank, stem, neck or column **19** at the front and a plural or double wedge, rearwardly tapering head **20** at the rear, the latter having on opposite sides flat, vertically extending, horizontally oblique and rearwardly converging wedging faces **21** on opposite sides of and at equal angles to the longitudinal centerplane of the gear. In their turn, the preferred friction shoes **18** are generally right triangular or trigonal primisms with vertical extending flat sides, of which the inner are wedging surfaces or faces **22** corresponding in obliquity and rearward convergence to and each bearing against or engaging and in surface contact with one of the wedging faces **21** on the center wedge **17**. The other, right angularly related sides of the friction shoes **18** are outer or friction surfaces **23** and rear bearing surfaces **24**, disposed parallel to and bearing against or engaging and in surface contact with, respectively, the planar and parallel inner sides or side surfaces **25** of the side walls **5** laterally bounding the cavity **2** and the front of the front spring follower **13**. Both the wedge **17** and friction shoes **18** preferably normally project forwardly from the front end **6** of the cavity **2** beyond the front end **26** of the housing **1** and in the illustrated embodiment the wedge or, more precisely, combined wedge and plunger or wedge-plunger has a flat front face **27** adapted to bear against the rear of

a conventional front follower block **28**, although, if desired the wedge and block can be integral.

Telescopable into the housing **1** from its normal forwardly projecting position, under buffing and draft forces applied in the usual manner to the limit of travel imposed by contact of the normally forwardly spaced front follower block **28** with the front end **26** of the housing **1**, the friction cushioning unit **8** divides the applied longitudinal force into lateral and longitudinal components by the wedging action of the wedge-plunger **17** on the friction shoes **18** and uses the lateral component for constantly wedging or urging the outer side or friction surfaces **23** of the shoes into frictional engagement with the sides **25** of the cavity **2** on which they slide longitudinally in the course of the gear's travel. At the same time, the friction unit transmits the longitudinal component of the applied force through the rear bearing surfaces **24** of the shoes and the intervening front spring follower **13** to the rubber cushioning unit **7**. As they move, the several parts of the draft gear housed in the housing **1** all move in substantially rectilinear paths, the wedge **17** and friction shoes **18** of the friction unit **8** as a result of the parallelism of the inner sides **25** of the side walls **5** of the housing over at least the areas thereof slidably engaged by the shoes. During such movement, longitudinal movement of the wedge relative to the shoes and lateral movement of the latter relative to the housing is limited to that required to compensate for or take up any wear produced by the friction engendered between the shoes and housing.

The contribution of the function unit to the capacity of the draft gear, derived from the frictional resistance to its longitudinal movement produced between its shoes and the housing, is fairly constant over the range of travel of the gear. On the contrary, the capacity of the rubber cushioning unit **7**, derived from the internal frictional resistance of the pads **11** and the frictional resistance to their lateral flow along the adjoining surfaces of the spacer and spring plates **10** and **12**, rear wall **3** and intermediate and front spring followers **16** and **13**, progressively increases with increase in the compression or telescoping of the draft gear. This increase is greater and the ultimate capacity at full travel higher than with a conventional rubber cushion, if, as preferred, the pads are made of polyurethane rubber.

An important factor in the capacity of the gear also is the greater than usual number of rubber springs **9** it can have in its rubber cushioning unit **7**, within the limited length of the draft gear pocket, because of the compactness of the friction cushioning unit **8** and consequently relative small space normally required therefor in and to a lesser degree the relative thinness of the rear wall **3**. With regard to that thinness, the non-dependence of the gear on a wedging action of the housing on its friction unit and the uniform cross-section of the cavity **2** enabling the housed parts to be inserted thereinto through the cavity's open front end **6**, enable the side walls **4** and **5** of the housing to be uninterrupted or unapertured, save, desirably, for ports **29**, conveniently in the top and bottom walls **4**, for observing the condition of the rubber cushioning unit. This minimum aperturing, by giving the housing more than usual strength despite its relative simplicity, permits reduction not only in the thickness of the rear wall **3** but also in that of the side walls **4** and **5** by weight-reducing depressions **30** formed in their outsides rearwardly of the portion of the housing at the front which is exposed to lateral forces from cushioning unit **8**.

The insertibility of the housed parts of the draft gear into the housing **1** through the open front end **6** of the cavity **2** does not stem solely from the uniform cross-section of the cavity **2** and, instead, depends in part on the way in which the draft gear is held in assembled relation. In the preferred draft gear the several parts are so held by a releasable interlock **31** between the friction unit and

the housing which does not encroach upon the cavity **2** during insertion and removal of the housed parts. In the normal, at rest or expanded condition of the draft gear, with the preferred releasable interlock **31**, the wedge-plunger **17** is locked or interlocked against relative forward movement to the friction shoes **18** and the shoes in turn are locked or interlocked against relative forward movement to the housing **1**.

Centrally blunted at the rear by a flat rear face **32** parallel to its front face **27** and merging at the sides with its wedging faces **21**, the wedge **17** has outstanding from opposite sides and coterminous rearwardly with its rear face, conveniently substantially midway vertically thereof, a pair of lateral extending or outstanding lock or wing lugs **33**. Interrupting the wedging faces **21**, each of the lock lugs **33** fits or is received in and laterally or transversely overlaps and normally engages a front wall or boundary **34** of a rearwardly and inwardly opening slot **35** in and interrupting the confronting wedging surface **22** of the adjoining friction shoe **18**. Permitting rearward but eliminating forward movement of the wedge **17** relative to the friction shoes **18**, after their insertion into the cavity **2**, by the restraint imposed by the side walls **5** on outward movement of the shoes relative to the wedge, the interlock formed by the lugs **33** and slots **35** is readily releasable once these members are removed from the housing **1**.

For releasably locking the shoes to the housing, each shoe has its friction surface **23** interrupted by a conveniently vertically centered, forwardly and outwardly opening slot **36** bounded at the rear by a rear wall **37**. The normal interlock against forward movement of each friction shoe relative to the housing is completed by one of a pair of locking keys **38**, each applied from the outside to one of the side walls **5** of the housing adjacent the front end **26** thereof and having a stem **39** instanding laterally therethrough into and slidably received in and normally engaging or bearing against the rear wall **37** of the slot **36** in the confronting friction surface **23** of the adjoining friction shoe. Each of the preferred keys **38** has a flat base or head **40** integral with and extending rearwardly along the related wall **5** from its stem **38** and conveniently fits or seats in a correspondingly configured recess **41** in the related wall with its base flush with the outside thereof. Insertible into their recesses **41** as the last step in the assembly of the draft gear and at a time when the gear is partly compressed or telescoped by a suitable press (not shown), the keys **38** are themselves releasably locked in place by releasably securing them to the housing, suitably by welding their bases **40** thereto. Thus secured against accidental removal, the keys can be removed whenever disassembly of the draft gear is desired simply by chipping out the welds **42**.

Aside from its interlocking slots **35** and **36**, each friction shoe **18** preferably has a guide lug **43** extending rearwardly beyond its rear bearing surface **24** as a rearward extension of its outer friction surface **23** and fitting or received in an outwardly opening slot **44** in the adjoining side portion of the front spring follower **13** for limiting the relative transverse movement therebetween, as an aid in maintaining the desired longitudinal alignment between the friction and rubber cushioning units.

While identical in the foregoing respects, the preferred adaptations of the improved draft gear for 24⅝ and 36 in. standard pockets will vary in two main respects, one travel, and the other, the number of rubber springs **9** in their rubber cushioning units **7**. In either adaptation, the rubber cushioning unit normally will be precompressed or under initial compression to escape the low gradient at the beginning in the compression-capacity curve of such a unit and, depending on its length this precompression does have a definite bearing on its practical further compression. Thus, although permissively greater and at least up to 3¼ in., the travel of the adaptation of the gear for a 24⅝ pocket ordinarily will be around 2½ in. and at that travel tests have indicated the gear to have a capacity of over 45,000 ft. lbs. at 500,000 lbs. reaction, far in excess of the minimum capacity at that reaction of 36,000 ft. lbs. required by the applicable A.A.R. specification. With the greater length of its rubber cushioning unit, the adaptation for the 36 in. pocket can have more than double the travel of the smaller gear and test indicate that with a full travel of about 7 in. the larger gear will develop as much as 90,000 ft. lbs. capacity at 500,000 lbs. reaction.

From the above description it will be apparent that there has been provided an improved housed friction-rubber draft gear which is readily adaptable to fit either of the present A.A.R. standard draft gear pockets and in either adaptation will more than meet the specifications required for A.A.R. approval.

Having now described my invention, I claim:

1. A housed draft gear comprising a housing, a cavity in and extending longitudinally of said housing and bound laterally by side wall means thereof, said cavity being closed at the rear and opening at the front onto a front end of said housing, rubber and friction cushioning units in tandem in said cavity and insertible thereinto through said open front thereof, said rubber unit being disposed rearwardly and yieldably resisting rearward movement of said friction unit, said friction unit including friction shoe means bidirectionally movable including movement laterally into and out of relatively forced lateral engagement against the side wall means of the housing and movement longitudinally relatively toward and away from said rubber units, plunger means arranged with a first end engaging said shoes and a second end normally projecting forwardly of the housing, said plunger means being wedge shaped at said first end and responsive to an external longitudinal force received at said second end to divide the force between a lateral component wedging said shoe means into said forced relative engagement against the side wall means and a longitudinal component urging said shoe means inward frictionally against said side wall means while compressing the rubber unit, and said cavity being of uniform cross-section over at least the area of said wall means engaged by said friction unit, and means for normally interlocking said friction unit and therethrough said rubber unit in said housing against self removal therefrom including means releasably interlocking the plunger means to the shoe means and the shoe means to the housing.

2. A housed draft gear according to claim **1**, wherein the means releasably interlocking the shoe means to the housing include means removably secured to the side wall means and normally instanding into the cavity, in absence whereof the cavity is unrestricted for free insertion and removal of the friction and rubber units.

3. A housed draft gear according to claim **1**, wherein contact between the plunger means and the shoe means and between the shoe means and the wall means is surface contact, and the shoe means are urged laterally against the wall means solely by the wedging action of the plunger means.

4. A housed draft gear according to claim **2**, wherein the friction shoe means are a pair of friction shoes at opposite sides of the cavity and having angularly related substantially flat outboard friction, rear bearing and forwardly facing rearwardly convergent wedging surfaces, the wall means are opposite longitudinally extending walls of the housing presenting for surface contact with said outboard friction surfaces of said shoes substantially flat and parallel surfaces, and the plunger means is a center wedge-plunger having on opposite sides of a head thereof substantially flat rearwardly convergent wedging faces each in surface contact with a wedging surface of one of the shoes.

5. A housed draft gear according to claim **2**, wherein the rubber unit is formed of a plurality of precompressed rubber pads longitudinally spaces by and under compression flowable laterally along confronting surfaces of plate means.

6. A housed draft gear according to claim 5, wherein the rubber pads are polyurethane rubber pads of about 100 durometer hardness.

7. A housed draft gear according to claim 5, wherein the rubber unit is divided longitudinally into a plurality of sections each formed of a plurality of the pads and plate means, and each section is longitudinally spaced from an adjoining section by an intermediate follower engageable with side wall means of said housing for limiting under compression lateral movement of said unit intermediate ends thereof relative to said last-named wall means.

8. A housed draft gear according to claim 1, wherein the cavity is of uniform cross-section throughout the length thereof.

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DRAYTON E. HOFFMAN, Primary Examiner

U.S. Cl. X.R.

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