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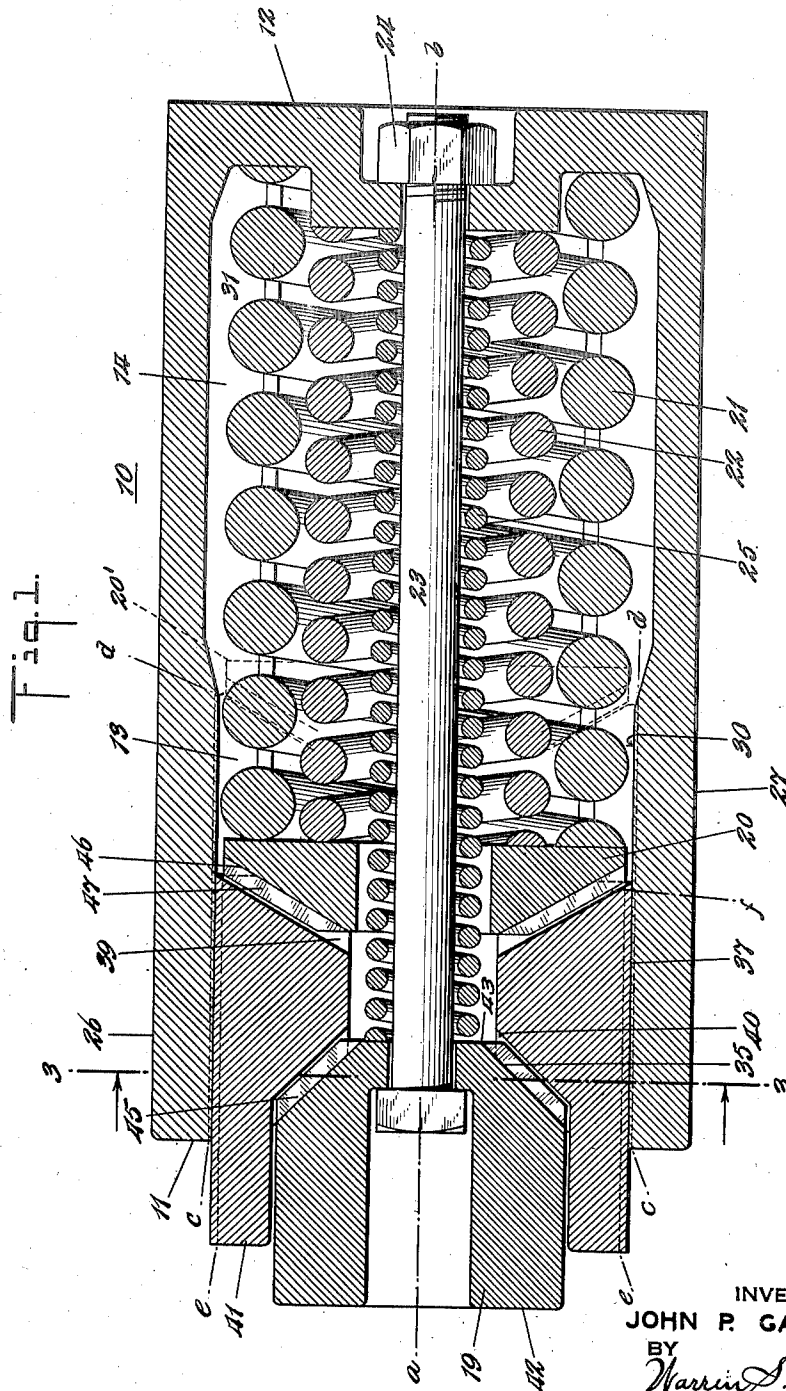
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2,238,220

RECONDITIONABLE DRAFT GEAR

Filed Sept. 29, 1938

2 Sheets-Sheet 1



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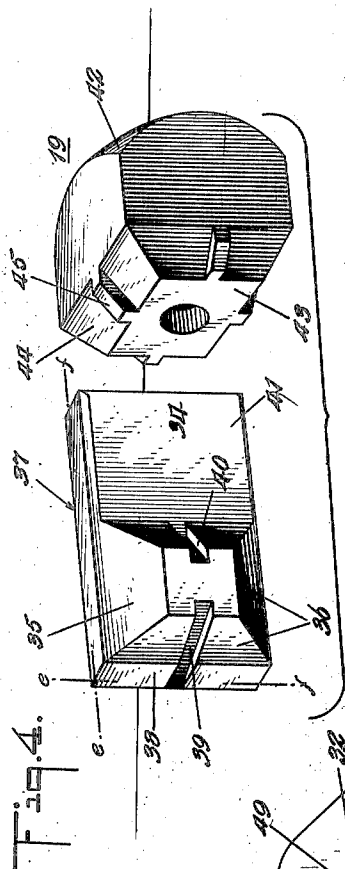
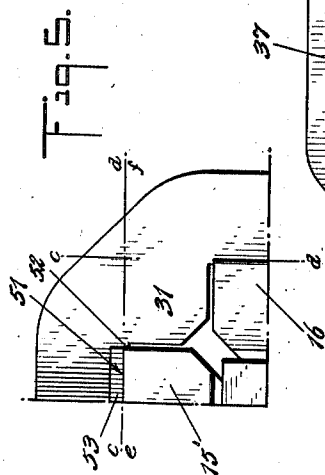
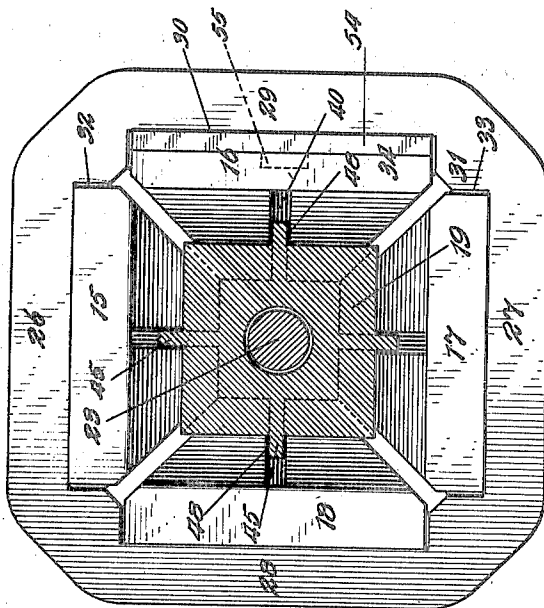
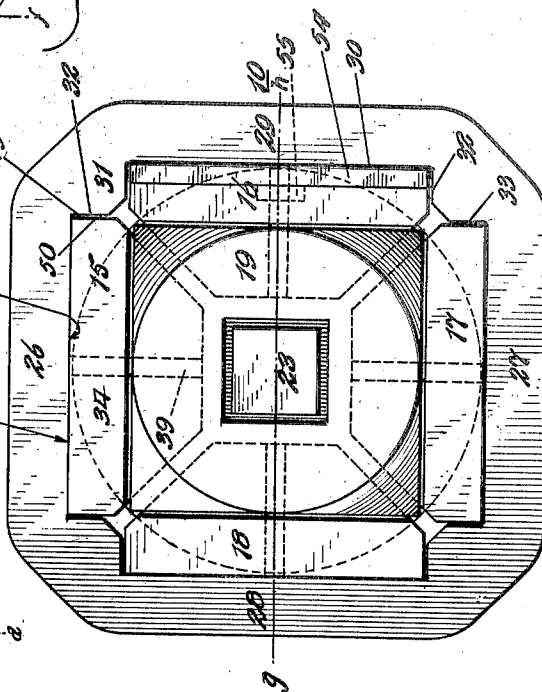
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RECONDITIONABLE DRAFT GEAR

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5 Claims. (Cl. 213—31)

The invention relates in general to a reconditionable draft gear and specifically relates to a draft gear of the type in which four identical and thus replaceable shoes are disposed about the axis of a containing casing in mutually balanced relation and in which the shoes are forced outwardly into engagement with flat friction surfaces on the casing by means of spring pressed followers or spreaders having inclined surfaces engaging the shoes.

During use of such draft gears, their friction surfaces, particularly the interengaging surfaces between the shoes and the casing, wear away in time and the parts are usually so constructed that the worn shoes adjust themselves automatically to the worn surfaces of the casing as these interengaging surfaces wear away. In accordance with present known practices when these shoes have worn away about a quarter of an inch, the life of the gear is finished even though the casing element, followers and springs are still capable of continued use. Attempts to replace the worn shoes with new unworn wedges have not proven successful because the new shoes would not fit the worn surfaces of the casing with which they must have frictional engagement in order to function as with the original shoes.

The primary object of this invention is to provide an improved form of reconditionable draft gear, and, incidental thereto, another object is to provide a simple form of draft gear having the advantages of similar forms of conventional draft gears but designed so that shoes which have worn away to their limit of continued usefulness can be replaced in the old assembly by new, unworn shoes to form a new assembly of component parts with the old worn casings and in which the new assembly thus reconstructed can function with the same efficiency as did the initially formed assembly.

Broadly, this aspect of the invention is attained by causing the interengaging surfaces between each shoe and the casing to wear away without forming shoulders on either surface and to wear away on the casing an area defined by the width of the shoe face of the shoes, old or new engaging the area, so that irrespective as to whether the shoe for the time being in use is worn or unworn, they will all have the same width and thus engage flatwise against the surface formed on the casing irrespective as to whether the engagement is with the initially formed friction surface of the casing or a new surface worn therein by the sliding thereon of

the present or of a former shoe. Differently expressed, the invention features the providing of restraining means or, more specifically, unidirectional guiding means which permit a freedom in the requisite longitudinal movement of the shoes but prevent any movement of the shoes in directions transversely of this permissible movement.

Featuring economy in initial manufacturing costs, another object of the invention is to provide a form of mechanism containing casing which can be formed of the least amount of material capable of withstanding the uses to which such devices are placed, and, at the same time, to dispose the metal forming the same in such way as to be capable of transmitting there-through excessive loads thereon as when the cars carrying the same are forcefully brought in contact, and to minimize in the total amount of material used to transmit any such abnormal loads.

Broadly, this aspect of the invention is attained by thickening the corners of the casing and in the parts not therein necessary to form the shoe engaging friction surfaces so as to form rugged columns for transmitting strain longitudinally through the casing from end to end.

Still another object of the invention is to provide a simple form of draft gear, the component parts of which are of simple, easily manufactured design and in which old, partly worn shoes may be readily replaced by unskilled labor without regard to the shoes being replaced exactly in the position from which they were previously withdrawn.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of draft gear embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings:

Fig. 1 is a view in vertical axial section taken longitudinally through a draft gear constituting a preferred embodiment of the invention and showing the parts in their normally distended position;

Fig. 2 is a view in end elevation of the structure shown in Fig. 1 looking at the same from the left hand side of the showing;

Fig. 3 is a view partly in end elevation of the showing in Fig. 1 similar to the showing in Fig. 2

and with the shoe follower shown in vertical transverse section taken along the line 3—3 of Fig. 1;

Fig. 4 is a composite view showing in perspective one of the side shoes and the shoe follower; and

Fig. 5 is a detail view of the upper right corner of Fig. 2 showing the position of two shoes in their new position after the friction surface on the casing has been partly worn away and also showing a wear plate in position.

In the drawings and referring first to the showing in Fig. 1, there is disclosed a draft gear of somewhat conventional form in that it includes a one-piece cast steel mechanism containing casing 10 opened at one end 11 and closed at the opposite end by a rear wall 12. The hollow interior of the casing forms a mechanism containing compartment comprising at its open end a friction chamber 13 and at the opposite or closed end a spring chamber 14. Mounted in the front end of the casing and in the friction chamber are four shoes marked clockwise in Figs. 2 and 3, 15, 16, 17 and 18, of identical construction so as to be replaceable one for the other in case the device is disassembled. At the front end of the casing is mounted a shoe follower or spreader 19 and at the inner side of the shoes is located a spring follower or spreader 20, the latter being held firmly against the shoes by a pair of large concentric resistance springs 21 and 22. A tie bolt 23 extends axially of the casing and thus along the normal line of thrust indicated by the line *a—b* and which bolt extends into the follower 19 through the rear wall 12 and secured in place by a bolt nut 24 engaging against the rear wall. A relatively long, small diametered release spring 25 closely encircles the bolt and bears at one end against the rear wall 12 and at the other end against the follower 19 in a tendency to project the latter outwardly of the casing when the follower 19 is released from whatever pressure may have displaced the follower 19 towards the right of the position shown in Fig. 1.

It is understood that the structure thus far described resembles somewhat conventional forms of draft gears now in general use and has been employed herein to illustrate the invention applied to a simple conventional form of draft gear.

The casing 10 is of somewhat box-like form and includes a top wall 26, a bottom wall 27 and upstanding side walls 28 and 29. The forward end of the casing in the area embraced by the friction chamber is substantially square in cross section as shown in Figs. 2 and 3 with the inner side or face of each wall forming a flat, longitudinally extending friction surface 30 equidistantly spaced from the axis *a—b* and initially having the same all over dimensions. Projecting into the friction chamber from what would otherwise be the corners of the square formed by the four friction surfaces 30 is a rib 31. These ribs project integrally from the casing at the corner formed by the adjacent walls and extending from the open end 11 to the closed end and merge perpendicularly into the rear wall 12. These four ribs form four reinforcing posts or rugged parallel pillars for transmitting strains on the open end of the casing through the top, bottom and side walls of the casing to the rear wall where such transmitted strains are taken up by the center sill lugs forming no part of the present disclosure. The ribs are frusto-triangular in cross section and are defined by side edges 32

and 33 extending perpendicular to each other and to their associated friction surfaces 30.

The term "posts" as herein used is intended to include not only the ribs 31 but also the greater section of material extending from end to end of the casing and including all the material located in the four corners and between succeeding sides 26—29 in those portions which have the friction surfaces 30, or, differently expressed the posts include all of the material in the corners between planes forming prolongations of the surfaces 32 and 33 in Fig. 2. It will be noted that these posts, either considering the ribs 31 alone, or the ribs with the balance of the corners are of uniform cross section throughout their lengths. Considering the sides 26—29 in the portions thereof between these posts, the cross sectional area of material at the front end is of greater cross section of material than at the rear end as shown in Fig. 1 in order to provide the requisite wear to the friction surfaces.

While the illustrated showing discloses a casing featuring these ribs 31 as reinforcing elements in a preferred form of casing, their presence is not necessary to shoe replacement features of this disclosure and for this purpose the surfaces 30 may join edge to edge to form the friction chamber as a true square in cross section.

The disclosure features a form of casing which is liable to wear away in parts thereof but any such wear is so governed in its location that these ribs are not worn but retain their initial mass of material and thus the initial structural design of the casing as a whole to resist buffing strains is retained.

The four shoes 15 to 18 are of identical construction so that one may be replaced for the other. Referring particularly to the showing of one of these shoes in detail at the left of Fig. 4, the shoes each comprise a long, rectangular solid cast iron block 34 from one side of which and at one end thereof integrally projects a frusto-pyramidal wedge element 35 having four inclined faces 36. The outer long flat face 37 of the shoes constitutes a friction face designed to engage and to move longitudinally along any of the casing friction surfaces 30. There is particularly featured in this disclosure the providing of the block 34 of maximum possible thickness and in this way provide for the longest possible life of the shoe before it is worn down too far for further use. In actual practice there is very little wear on the wedge element 35, most of the wear occurring on its flat face 37 in so far as the shoe is concerned. The outer side face 38 of the element 35 and the adjacent narrow spring abutting end 39 of the block 34 is provided with a transverse narrow long inclined groove 39 contained centrally therein. The opposite side face of the element 35 is provided with a relatively shorter narrow inclined groove 40 terminating at the inner face of the block. These grooves 39 and 40 are contained in the central longitudinal plane of the block 34 and when the shoes are located in the casing as shown in Figs. 2 and 3 these grooves and the associated centering ribs hereinafter described are located in a vertical and a horizontal plane intersecting along the axis *a—b*. The shoes are located in the friction chamber as indicated in Fig. 1 with the flat end 41 of the shoes projecting exteriorly of the casing and coacting to form a four-sided box as indicated in Fig. 2 to receive the follower or spreader 19.

Referring particularly to the showing at the right of Fig. 4, the follower 19 is a solid block rectangular in transverse cross section as shown in Fig. 3 and provided on its outer face with a spherical nose 42 and on its inner face with a frusto pyramidal nose 43 having four identical inclined wedge faces 44 with an inclination of approximately 45° to the axis *a-b* and in flat-wise abutting relation to the corresponding faces 36 of the four shoes as shown to the left end of Fig. 1.

Each of the wedge faces 44 is provided centrally thereof with a short centering rib 45 engaging in the short wedge grooves 40 as particularly shown in Fig. 1. The rounded face 42 permits the follower 19 to receive and transmit blows received thereon which may not be exactly along the normal line of thrust *a-b*. There is provided a small but sufficient clearance between the wedge follower and the shoe ends 41 to permit the requisite degree of twist of the follower to avoid jamming of the parts even under excessive load.

The spring follower or rear spreader 20 is a flat circular plate against which the springs 21 and 22 bear. The side of the spreader 20 which faces the shoes resembles the nose 43 in that it is provided with four identical wedge faces 46 and each face is provided with a long rib 47 engaging in the associated long groove 39 in the rear face of the companion shoe.

Let it be assumed that the device as illustrated in Figs. 1 to 4 inclusive is a completed draft gear as initially constructed and installed in position on a car. It is understood that the resistance springs 21 and 22 are under compression and bear on the spring follower 20 in a tendency to force the same to the left of the showing in Fig. 1; that the spring follower 20 acts more or less equally against the four shoes 15-18 to force the same radially and outwardly into engagement with their respective friction surfaces 30 on the casing and that these shoes in turn react against the follower 19 which supplements the outwardly directed pressure on the shoes. The spring follower 19 is held from further outward movement by its engagement with the head of the tie bolt and otherwise the device is intended to function as is generally true of such forms of draft gears.

It is the intent to form this draft gear without machining. The forged or cast component parts are initially assembled as indicated in Fig. 1 without treatment of any kind. It is suggested, however, that the parts of the shoes and followers which contain the grooves and ribs be dipped, coated or sprayed with a rust preventive coating such as red lead but in this case care is exercised to make sure that the interengaging friction surfaces 30 and 37 be free of any coating.

The invention concerns itself not so much with the operation when the draft gear is new as it does with the continued intended operation under those conditions which develop after the draft gear has been in use for a time to develop wear in the friction surfaces. In devices of this character the greatest wear occurs along the friction surfaces 30-37 between the shoes and the casing, both of these surfaces being gradually worn down. Let it be assumed for further discussion that the initial friction surface indicated by 37 is worn down to the line *c-d* in Figs. 1 and 5 so that *c-d* represents a new flat surface parallel to the original flat surface 37. Of course, as the casing surface wears away also, the shoe surface 37 wears away and let it be assumed in the instant case that the initial surface 37 has

worn back to the line *e-f* of Figs. 1 and 4 so that *e-f* represents a new flat surface parallel to the initial unworn surface 37. In Fig. 5 it may be assumed that the right hand shoe 16 is a replaced, new, unworn shoe which has been substituted for the original shoe and that the upper shoe 15¹ is original shoe 15 which has worn down to the line *e-f*. In this case, of course, the juncture plane between the two new friction faces is indicated by the single line *c, e-d, f*.

Initially when inwardly directed pressure is placed on the shoe follower 19 as when the cars are forcefully brought together, the shoes and follower 20 will shift to the right from the position shown in Fig. 1, to bring the rear edges of the follower 20 to about the position indicated by the dotted rear end 20¹ shown in Fig. 1. It will be noted that this point of maximum rearward travel brings the shoes rearwardly of the friction surfaces 30 defining the inner face of the friction chamber. However, as the initial surfaces 30-37 wear away towards the new surfaces such as the surfaces indicated by the *c-d* and *e-f* lines, the springs will gradually shift the rear follower and the shoes forwardly, that is, slightly to the left of the showing in Fig. 1 so as to maintain the newly formed surfaces at *c-d* and *e-f* in their mutual pressing relation. Except for this slow and minute creeping of the shoes relative to the follower, there will not ordinarily be any material movement between the followers and the shoes during the normal operation of the draft gear and for this reason no particular care need be exercised in insuring against wear or any refined accuracy in fit between the guiding ribs and the grooves in which they are contained.

However, an entirely different situation exists in so far as the friction surfaces 30-37 are concerned. As these surfaces wear away, the shoes and casing will, of course, continue to maintain flat, contacting and mutually lapping surfaces. The cross sectional dimensions of the ribs 45 and 47 are designed relatively to the cross sectional dimensions of the grooves in which they fit so that there will be no binding between the parts along these lines but whatever clearance may be provided between the ribs and the side of the groove as shown at 48 is less than the clearance 49 between the side edges 32 or 33 of the ribs 31 and the adjacent side 50 of the block 34. It is a particular feature of this disclosure that these blocks 34 will at no time ever touch these ribs even though the blocks have the slight degree of lateral movement permitted by the clearance 48 between the shoes and the spreaders. As the distance between the mid-plane of each tongue and groove connection, 45 and 39 or 40, and the adjacent edge 50 (see Figs. 2 and 3) of each shoe is less than the corresponding distance between this mid-plane and the adjacent edge 32 or 33 of the rib 31 it follows that the clearance 49 is maintained and the edges of the blocks spaced at all times from the pillar forming ribs. In actual practice the clearance at 48 is kept down to a minimum as it is the intent of this disclosure to eliminate side play of the blocks 34 on the friction surfaces 30. As these blocks are centered with reference to the friction surfaces on the casing by virtue of the tongue and groove construction provided by the grooves 39 and 40 snugly containing the ribs 45, it follows that as these surfaces 30 wear away they will form a flat chan-

nel 51 as shown in Fig. 5 having the width of the shoe which forms the channel.

It is understood that the spreaders act conventionally on the shoes in forcing the same outwardly each into engagement with its associated friction surfaces 30, but in this case the shoes cannot move laterally, that is, shoe 15 in Fig. 2 cannot move parallel to the line marked 37. Considering the pressure situation in connection with any pair of opposing shoes, such as 16—18, it is appreciated that all of the lines of pressure between shoe 16 and wall 29 and between shoe 18 and wall 28 and perpendicular to their interengaging surfaces may be considered as combined into a single foci line permanently coinciding with the line $g-h$ intersecting the axis $a-b$ and perpendicular to said associated pair of vertical parallel friction surfaces 30—37.

It is particularly noted that the channel 51 is outlined on opposite longitudinal sides by walls 52 which are perpendicular to the worn surface and, of course, the bottom of the channel is flat and is of equal depth throughout its area. It is vitally important that these channels be formed to exactly correspond to the faces of the shoes irrespective as to whether the shoe face is worn from long use or is a fresh unworn, new shoe.

Any worn shoe can be replaced by a new shoe as above suggested and the new shoe will slide in the shallow channel 51 in exactly the same way as did the gradually wearing away shoe which it replaced. It is suggested that when the channel 51 wears to a certain depth a long flat wear plate 53 can be fitted in the channel and secured in place by spot welding or otherwise and in this way the initial friction surface 37 is restored. As the channel is formed of equal depth throughout and with its side walls 52 straight, the wear plate 53 may be simply a flat steel plate of the requisite width to fit between the side walls 52 and having a length equal to the length of the friction chamber or at least equal to the stroke of the associated shoe. It is also suggested that the worn face 37 of the blocks 34 be renewed by positioning on the worn surface such as the surface $e-f$ a wear plate 54 as shown in connection with shoe 16 interlocked in the block 34 by means of a lug 55 in spaced relation to the outlining edge. It is thus possible by replacing worn shoes and filling up channels in the casing which may have become worn to reconstruct a new draft gear assembly using the original casing, followers and springs, if these parts are still capable of functioning. It is preferable and more economical to apply the wear plates after the channels have been worn in service than to apply them to the casing when new as the operation of the shoes will locate the positions where the wear plates are to be located.

By means of a device of this character it is possible to keep renewing worn shoes with new, unworn shoes and to replace worn wear plates with new unworn wear plates practically for an indefinite time. It is simply then necessary for the railroads or the manufacturer to keep on hand a stock of wear plates and shoes and from time to time dismantle the draft gears for inspection and replace any worn parts and this may be done by unskilled labor because any new shoe or any partly worn wedge can indiscriminately replace any other shoe with the assurance that the replaced shoe will fit the friction surface of the barrel irrespective as to whether such surface be a previously worn surface or channel in the casing or a new or partially worn wear

plate. As the width of any shoe is the width of any groove or channel which may be formed in the casing, the interengaging friction faces will be identical. The broad flat friction surfaces prevent any tendency of the shoes or followers from rotating about the axis $a-b$ so that throughout the life of the construction, be it an old or new assembly, corresponding parts are at all times in the position in which the parts were located when the draft gear was initially constructed.

While there have been shown, described and pointed out in the annexed claims, certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. A one-piece hollow casing forming part of a draft gear provided at one end with a rear wall and provided adjacent its front end with a shoe containing friction chamber outlined in part by a plurality of flat longitudinally extending friction surfaces, said casing also including an equal number of thickened portions forming integral reinforcing posts merging at their rear end into the rear wall, one disposed between each adjacent pair of said friction surfaces, projecting inwardly into the chamber and coacting therewith to outline the longitudinal sides of the chamber, and constituting a plurality of parallel pillars for transmitting through the casing and into the rear wall blows received on the end thereof.

2. A housing for a draft gear including a rear wall having its rear face fashioned to engage the draft sill lugs or the draft gear follower, a plurality of rugged parallel, spaced apart, strain transmitting posts projecting integrally and forwardly of the rear wall and disposed symmetrically about an axis of thrust, the forward ends of said posts being in the same transverse plane and exposed to receive the buffing transmitted through the posts to the rear wall.

3. A hollow draft gear casing provided with a strain receiving end and with a plurality of friction faces forming a friction chamber at said end and a wall at the opposite end providing means for engaging and transmitting strains to the draft sill lugs or to the draft gear follower, said casing provided with a plurality of parallel, spaced apart, longitudinally extending strain transmitting posts extending the full length of the casing having approximately the same cross sectional area of material at its ends and having a cross sectional area of material intermediate its ends at all parts between the ends not less than the cross sectional area at its ends, the section of material of the balance of the casing between the posts being less than that at the posts.

4. A draft gear including a rear wall, four side walls projecting integrally and forwardly therefrom and connected to each other in order to form four rugged strain transmitting corners, equidistantly spaced from the axis of the casing, said corners being of uniform cross sectional area of material from end to end of the casing, and said side walls having a greater cross sectional area of material in the foreportion than on the portion adjacent the rear wall and said foreportion forming shoe receiving portions.

5. In a draft gear, a hollow member of approximate prismatic external form open at one end and having a rear wall closing the other end,

said wall provided on its inner face with a boss intruding into the interior of the hollow member and adapted to engage a cushioning member, the inner perimeter of said hollow member provided with two opposing sets of longitudinally extending recesses and at least one wall of each recess forming a friction surface and the portion 5 of the wall forming the hollow member in the part thereof between adjacent recesses, each forming a solid column of material extending from the open front end and merging into the rear wall to form four rugged strain transmitting corners to the hollow member.

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