June 16, 1942. H. E. VAN DORN 2,286,590

DRAFT GEAR FOR RAILWAY CARS

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Fig. 1.

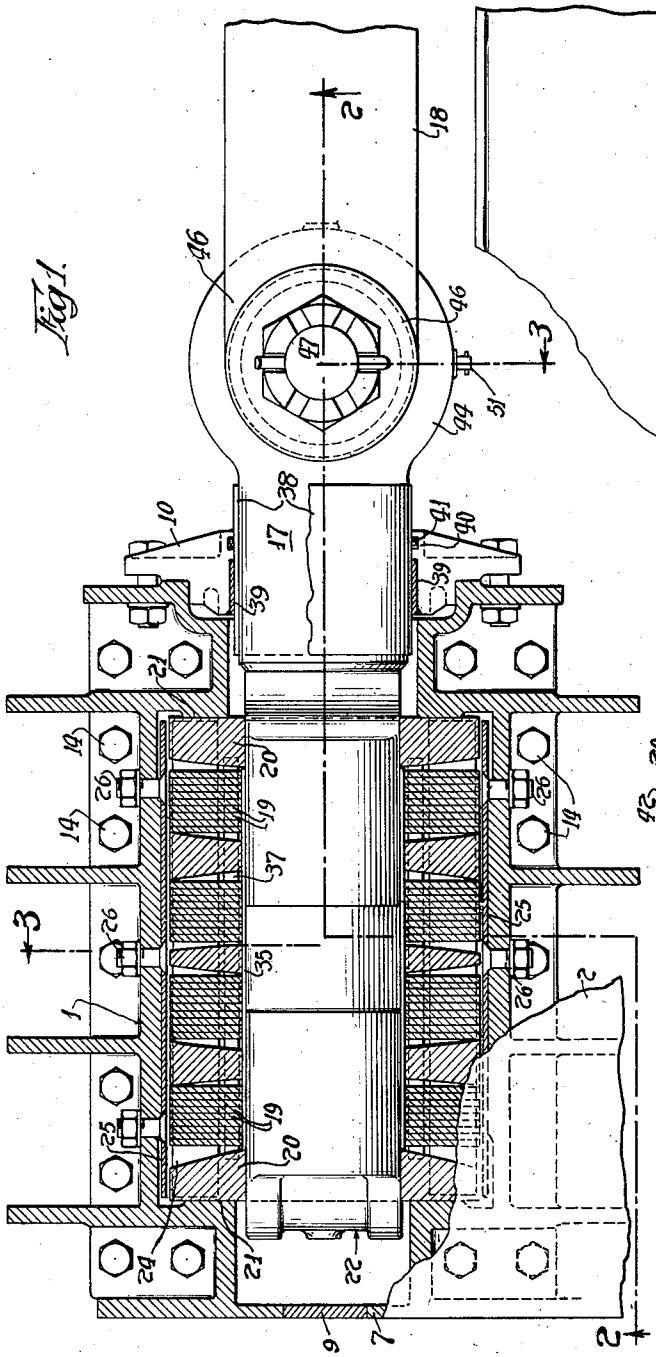
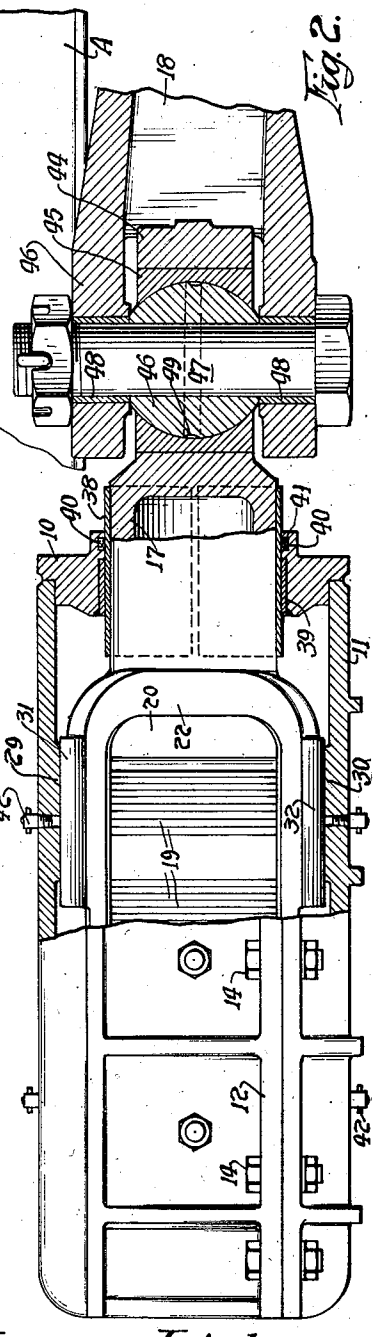


Fig. 2.



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Fig. 3

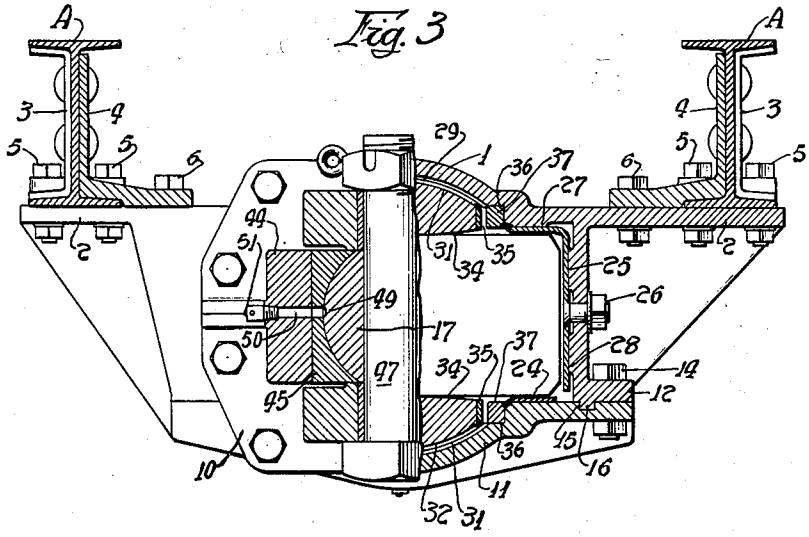
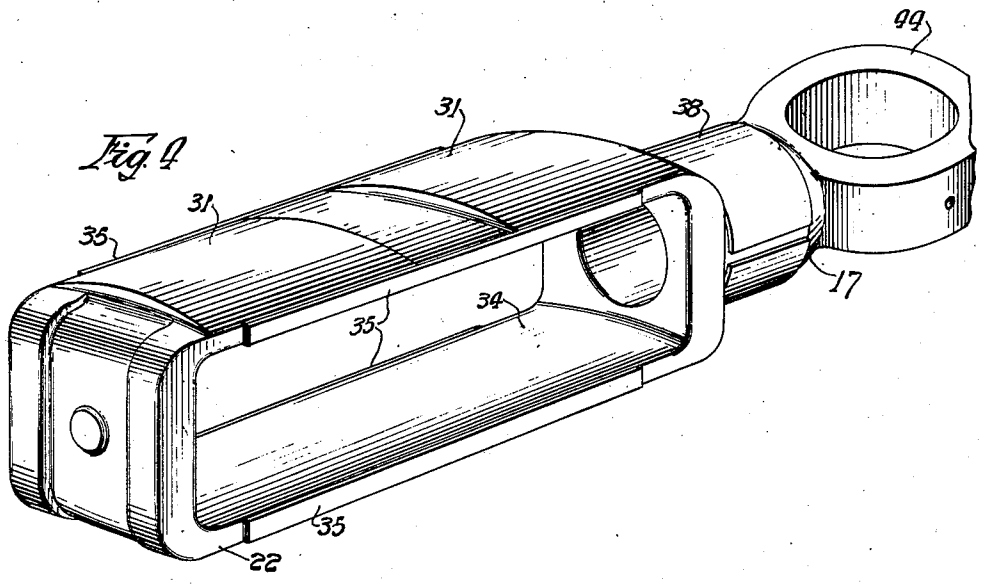


Fig. 4



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DRAFT GEAR FOR RAILWAY CARS

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12 Claims. (Cl. 213—7)

In the usual draft riggings for railway cars, the members constituting the cushioning connection between the drawbar and the car are so constructed and assembled that they rattle and are otherwise objectionably noisy in use, this defect being increased by the fact that cinders and dirt can enter between moving parts. A further consequence of the structural characteristics of these old apparatuses is that they wear out rapidly.

The object of the present invention is to produce a simple and novel draft gear which, while it can be manufactured at a reasonable cost, is free from the afore-mentioned objections, being smoothly operating, noiseless and possessing an indefinite useful life.

In accordance with my invention, I house the cushioning means in a sealed casing and so shape and fit the parts together that there will be no rattling in service; connection with the drawbar proper being effected through a suitable stem passing through a dust-proof bearing. All wearing surfaces subjected to heavy duty are formed of manganese steel or other hard, wear-resisting material so that no undesirable looseness can be created over even a long period of wear. Because of the sealed casing, it is possible effectively to lubricate the cooperating, relatively movable surfaces between the cushioning elements and the casing, as well as between the draft member and the casing. Since the necessary close fit of the various parts cannot be obtained without the employment of machined surfaces, and since machining operations add to the cost, I have so constructed the parts of the draft gear that the machining is simple and can be quickly and easily done.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is partly a top plan view and partly a section of a draft gear embodying the present invention, only a rear end fragment of the drawbar proper being shown. Fig. 2 is a view partly in side elevation and partly in longitudinal section, through the devices shown in Fig. 1, or it may be regarded as a view taken on line 2—2 of Fig. 1; Fig. 3 is a section taken on the staggered line 3—3 of Fig. 1; and Fig. 4 is a perspective view of the stem member which engages with the spring cushion in the casing and protrudes from the casing for connection with the drawbar.

Referring to the drawings, 1 represents a box-like casing or housing open at the bottom and having at the top wide, laterally-projecting flanges 2 adapted to underlie and engage with any usual or suitable center sills A of a railway car. In the arrangement shown, the car sills are in the form of I beams and, in order to strengthen the structure, there is placed on the outer side of each of the beams, in engagement with the flanges and vertical web of the latter, a steel plate 3 of channel shape, while on the inner side of each beam is located an L-shaped casting 4, one member of which rests against the web of the beam while the other member rests on the bottom flange and extends beyond the latter so as to overlie a part of the corresponding flange 2 of the housing. The vertical elements of the members 3 and 4 are riveted to the webs of the I beams; while suitable bolts 5 extend through the lower flanges of the channel-shaped member 3 and the horizontal elements of the members 4, through the bottom flanges of the I beams and through the flanges 2 on the housing. The horizontal element of each of the members 4 is also secured directly to the underlying flange 2 by means of bolts 6.

The rear end of the housing is closed by a wall 7 but, initially, is provided with a central hole 8 which if afterwards sealed up by means of a plug 9. The front end of the housing is open, but is adapted to be closed by means of a head 10 composed of two parts meeting in a horizontal plane. The open bottom of the housing is closed by a suitable bottom plate 11 which underlies and rests against the outwardly-directed, narrow flanges 12 along the lower edges of the side wall of the housing. The bottom plate is secured to the flanges 12 by means of bolts 14. In order to relieve the bolts 14 from side thrusts, the top plate may have therein longitudinal grooves 15 positioned under the flanges 12; the flanges being provided with ribs 16 that fit into these grooves.

The flanges 2 may be located somewhat below the top of the housing, so that the housing proper may extend partly into the space between the center sills. In other words, the axis of the draft rigging need not be very far below the plane of the bottoms of the center sills.

Draft and buffing stresses are transmitted to the housing through a stem or shank 17 that extends through the head 10; the part of the stem within the housing cooperating with any

usual or suitable spring cushion, while the part projecting beyond the housing is connected to the rear end of the drawbar shank 18 in such a manner that the drawbar may swing up and down and from side to side. In the arrangement shown, the spring cushion is of the type wherein groups of flat spring plates 19 alternate with rigid followers and spacers which are provided with concave and convex faces so disposed that when the assembly is compressed, the spring plates are bowed. The housing is therefore so shaped that the front and rear followers 20 normally bear against transverse stop faces 21 forming an integral part of the housing casting. The elements of the spring cushion are generally rectangular in shape, the lesser dimension being vertical and the longer one being horizontal. The cushion assembly is embraced by a yoke 22 constituting the inner end of the stem 17. Since the longitudinal members of the yoke must lie above and below the elements of the cushion, the chamber in the housing must be deeper along the longitudinal center than at the sides. I so shape the deeper central portion of the housing that it forms a bearing for the yoke, permitting it to turn about its longitudinal axis, and so shape the side portions of the housing that they serve as supports and guides for the ends of the elements of the cushion.

Since there is normally a great amount of wear between the ends of the elements of a cushion of the type illustrated, and the walls of the housing with which it comes in contact, I provide means for avoiding such wear while insuring that the elements of the spring cushion will be held against any substantial movements in their planes; thereby insuring that the elements of the cushion will be, in effect, a sliding fit, without causing excessive wear to take place. In the arrangement shown, two narrow wear plates 24 of manganese steel overlie and are welded to the flat upper faces of the bottom plate upon which the ends of the cushioning elements must rest. Furthermore, L-shaped plates 25 of similar material are fitted against the inner surfaces of the side walls of the housing and against the under faces of the top wall of the housing adjacent to the sides. The L-shaped plates 25 are conveniently held in place by means of bolts 26 passing through the vertical sections of the plates and through the side walls of the housing. The greatest amount of wear will take place in the plates 25 and, by bolting them in position, they can be removed and be replaced by others if necessary. It will thus be seen that the elements of the spring cushion rest on hardened steel wearing plates and, if they move sidewise or up, they also engage similar wearing plates. Consequently, the walls of the housing itself are not subjected to the destructive action of the cushioning elements during buffing and pulling movements of the drawbar, and the housing may accordingly be said to be practically indestructible.

It is necessary that the surfaces against which the wearing plates lie be flat, and this can be accomplished only by machining. It is a simple matter to machine the upper face of the bottom plate, but access to the inner surfaces of the body of the housing is not so easy. In order to facilitate the machining of the flat faces on the inner side of the body of the housing, I form the casting in such a manner that the portions thereof that must come into contact with the wearing plates are in the form of projections or pads the faces of which can be readily machined because there is a free space beyond each edge of each of the pads that permits the tool to move freely as far as it need go. Two of these pads, for engagement with one of the L-shaped wearing plates 25, are shown in Fig. 3 at 27 and 28, respectively.

The longitudinal central portions of the top and bottom walls of the housing are roughly parts of the surface of a cylinder having its axis at the longitudinal axis of the housing. As best shown in Fig. 2, the top wall of the housing has short, downwardly-projecting pads 29, while the bottom plate has short, upwardly-projecting pads 30. Only these pads need be machined to finish them to a truly cylindrical surface; such an operation being simple and easy.

The yoke 22 has on the top and on the bottom pads 31 and 32, respectively, machined so as to fit against the machined faces of the pads 29 and 30, thereby causing the yoke to be supported in such a manner that it is free to turn and also to move lengthwise, while held against movements in other directions that would cause rattling noises. Actually, the yoke cannot turn through any considerable angle about the axis of the device because of the presence of the cushioning elements. However, since some turning or rocking movement of the yoke is desirable, and it is also desirable to prevent the striking of blows by the yoke upon the edges of the cushioning elements, upon rocking, I make the inner face 34 of each longitudinal member of the yoke convex so that when the yoke rocks toward either side, the longitudinal members have, in effect, a rolling movement on the top and bottom of the cushioning elements. In order that the yoke shall not rock too far and bind against the upper and lower edges of the cushion, it is necessary to provide some other means for limiting the turning movements of the yoke. This is best accomplished by permitting an edge of the yoke to strike against some part of the housing at each end of the limit of its desired angular movement. Here, again, provision must be made to avoid objectionable wear. In the arrangement shown, there is welded to each side edge of each longitudinal member of the yoke a wearing strip 35 of manganese steel and, in a long trough-like recess 36 in the adjacent portion of the housing is welded a long bar-like wearing member 37; two of these bar-like elements being carried by the top wall of the housing and two others by the bottom plate 11. When the yoke rocks, one wearing plate on each side may strike the corresponding bar of wearing material and, because contact is made only between very hard pieces of steel, no appreciable wear takes place.

The stem member does not depend for its support entirely on the supporting bearings in the housing for the yoke, but it has a substantial bearing in the front head or cover 10. The short cylindrical section of the stem is surrounded by what is in effect a thin sleeve 38 of manganese steel or the like. Within the central bore of the head or end 10 is a bushing 39, also of a hard steel alloy. The sleeve and bushing are machined so that one is a good fit for the other. Furthermore, the bushing 39 does not extend throughout the whole thickness of the head, thus leaving an unbushed section in which there is an annular groove 40 containing a gasket 41 of felt or other suitable material that presses against the sleeve 38 and seals the joint between

the stem and the housing in a manner that the stuffing box forms the seal around a piston rod in an engine or the like.

The hole 8 in the rear end of the housing remains open while the machining is being done and only then is the sealing plug 9 inserted. At any rate, at the time all of the parts that have been described are assembled, the housing or casing is sealed so that, not only can no dirt enter, but lubricating material, for example, cannot escape therefrom. I therefore provide the housing, at the top and bottom, with suitable fittings 42 through which lubricating material may be inserted. By introducing a little lubricating material into the housing now and then, the operation of the apparatus will always be quiet.

As heretofore stated, the connection with the drawbar is through the front end of the stem. The front end of the stem, just beyond the cylindrical portion, is made in the form of a ring 44 that lies in a horizontal plane in that the opening therethrough is in the vertical direction while that through the yoke is in the horizontal direction. Into this ring there is pressed a divided ball race 45 loosely embracing a ball 46, the diameter of the ball being greater than the vertical height of the ball race, and the ball being flattened at the top and at the bottom. The drawbar shank 18 has a forked rear end 46, one member of the fork underlying the ring 44 and the other overlying it. A heavy bolt 47 extends vertically through the members of the fork and through the ball. In order to minimize wear, the openings in the members of the jaw, through which the bolt passes, are preferably provided with bushings 48 of hard alloy steel. The parts are preferably so proportioned that, upon sufficiently tightening the nut on the bolt, the ball is clamped between the two members of the jaw and is therefore held in fixed relation to the latter. Thus, all relative movements between the stem and the drawbar are the result of a movement of the ball within the ball race; there being no relative movement between the ball and the bolt which might result in wear tending to weaken the bolt.

The bearing surfaces between the relatively movable parts of the connection between the stem 17 and the drawbar may conveniently be lubricated by providing the ball with a peripheral groove 49, forming a lubricating passage 50 through the ring 44 and one of the members of the ball race, in registration with this groove, and fixing in the outer end of this passage a fitting 51 through which a lubricant may be supplied.

It will be understood that, in assembling the parts of the draft gear, the bottom and front end of the housing are left open, thus permitting the assembled cushion unit contained in the yoke portion of the stem member to be inserted from below. The bottom plate is then secured in place and the two halves of the front end or head are added. Heretofore I have referred to the bushing 39 in this head: obviously this bushing must be made in halves, one-half being welded to each half of the head. The sleeve 38 and the bushing 39 serve not only to prevent wear under ordinary turning and sliding movements, but they also offer great resistance to wear due to forces tending to tilt the stem laterally in any direction; such forces being encountered when the pull of the drawbar is in any direction except axially of the stationary housing, namely, when two coupled cars are rounding a curve or when the pull of the drawbar is more or less in the upward or downward direction as frequently happens.

When the pull or thrust of the drawbar is at an angle to the axis of the stem element of the draft gear, there is a tendency to swing or tilt the stem member toward one side or the other or up and down, as the case may be. My improved construction possesses the advantage of minimizing the objectionable effect of such pulls or thrusts because the placing of the anchor bolt for the drawbar close to the draft gear housing puts the drawbar on the short end of a lever.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. A dirt-proof housing adapted to be fixed to a car underframe, a stem extending into the housing, a sealing means in the joint between the stem and the housing to exclude dirt while permitting the stem to move lengthwise, a cushion in said housing operatively connected to the stem, a drawbar, and a universal joint connecting the drawbar and the stem close to the housing.

2. A draft gear housing open at the front end and closed on all other sides, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, and a two-part head closing the front end of the housing and containing an opening through which the cylindrical section of the stem extends and in which it fits, the housing and the yoke having cooperating bearing surfaces forming parts of the surface of a cylinder whose axis is an extension of that of said cylindrical section, and a drawbar connected to said stem for angular movements relative thereto.

3. A dirt-proof housing adapted to be fixed to a car underframe, a stem extending into the housing, a sealing means in the joint between the stem and the housing to exclude dirt while permitting the stem to move lengthwise, a cushion in said housing operatively connected to the stem, the outer end of the stem being in the form of a ring lying near the housing, a ball race and ball in said ring, a drawbar having a jaw straddling the ring and engaging the ball at diametrically opposite points, and a bolt passing through the jaw and the ball.

4. A dirt-proof housing adapted to be fixed to a car underframe, a stem extending into the housing, a sealing means in the joint between the stem and the housing to exclude dirt while permitting the stem to move lengthwise, a cushion in said housing operatively connected to the stem, wearing plates of hard steel lying below and supporting the cushion and welded to the housing, and a drawbar connected to the outer end of the stem.

5. A draft gear housing open at the front and closed on all other sides, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, a head closing the front end of the housing and containing an opening through which the cylindrical section of the stem

extends, hard steel wearing plates welded to the housing below and supporting the cushion, and a drawbar connected to the outer end of the stem.

6. A draft gear housing comprising a body member composed of top and side walls and a wall forming the rear end, a bottom plate bolted to the body member, a detachable head forming the front wall of the housing, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, said head having an opening through which the cylindrical section of the stem extends and in which it fits, the housing and the yoke having cooperating bearing surfaces forming parts of the surface of a cylinder whose axis is an extension of that of said cylindrical section, and a draw bar connected to the outer end of the stem.

7. A draft gear housing comprising a body member composed of top and side walls and a wall forming the rear end, a bottom plate bolted to the body member, a detachable head forming the front wall of the housing, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, said head having an opening through which the cylindrical section of the stem extends and in which it fits, the housing and the yoke having cooperating bearing surfaces forming parts of the surface of a cylinder whose axis is an extension of that of said cylindrical section, hard steel wearing plates lining the housing above and below and along the sides of the cushion, and a drawbar connected to the outer end of the stem.

8. A draft gear housing comprising a body member composed of top and side walls and a wall forming the rear end, a bottom plate bolted to the body member, a detachable head forming the front wall of the housing, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, said head having an opening through which the cylindrical section of the stem extends and in which it fits, the housing and the yoke having cooperating bearing surfaces forming parts of the surface of a cylinder whose axis is an extension of that of said cylindrical section, means to lubricate the said bearing surfaces, and a drawbar connected to the outer end of the stem.

9. A draft gear housing comprising a body member composed of top and side walls and a wall forming the rear end, a bottom plate bolted to the body member, a detachable head forming the front wall of the housing, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, said head having an opening through which the cylindrical section of the stem extends and in which it fits, the housing and the yoke having cooperating bearing surfaces forming parts of the surface of a cylinder whose axis is an extension of that of said cylindrical section, long, narrow, hard steel wearing plates on top of and welded to the said bottom plate underneath those portions of the cushion projecting from the sides of the yoke, long L-shaped wearing plates of hard steel lying in the angles between the top wall and the side walls of the housing and bolted to the housing, and a drawbar connected to the outer end of the stem.

10. A stem member for a draft gear consisting of a short cylindrical section lying between and connecting a yoke and a ring arranged in planes at right angles to each other.

11. A draft gear housing open at the front and closed on all other sides, a cushion in the housing, a stem comprising an element engaging the cushion to compress the same when moved lengthwise in either direction, and a short cylindrical section, a head closing the front end of the housing and containing an opening through which the cylindrical section of the stem extends, a sleeve of hard steel surrounding and welded to said cylindrical section, a bushing of hard steel surrounding said sleeve and fixed in said opening in the head, said bushing extending only part way through said head, a gasket of compressible material fixed in said opening beyond one end of the bushing and surrounding and bearing against said sleeve, and a drawbar connected to the outer end of the stem.

12. A draft gear housing opening at the front and closed on all other sides, a cushion in the housing, a stem comprising a yoke embracing the cushion and a short cylindrical section smaller in diameter than the largest transverse dimension of the yoke, the yoke being shaped so that it may rock through a small angle about its long axis relatively to the cushion, a head closing the front end of the housing and containing an opening through which the cylindrical section of the stem extends and in which it may turn, hard steel wearing plates welded to the housing below and supporting the cushion, cooperating longitudinal wearing plates of hard steel welded to the opposite sides of the yoke and to adjacent portions of the housing for engagement with one another near the limits of the rocking movements of the yoke, and a drawbar connected to said stem for angular movements relative thereto.

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