

July 28, 1953

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DRAFT GEAR

2,646,894

Filed Dec. 27, 1949

4 Sheets-Sheet 1

FIG. 1.

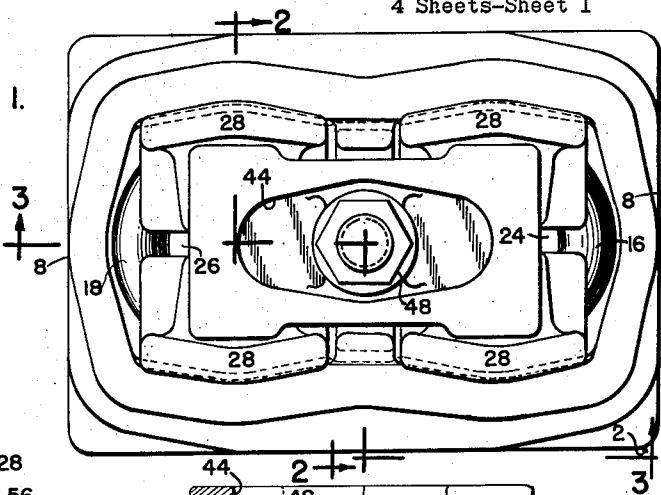


FIG. 2.

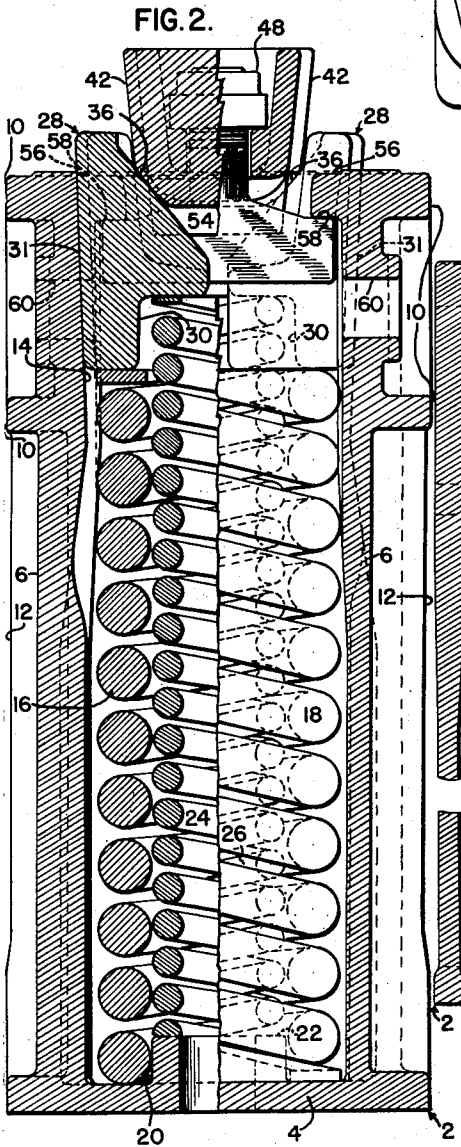
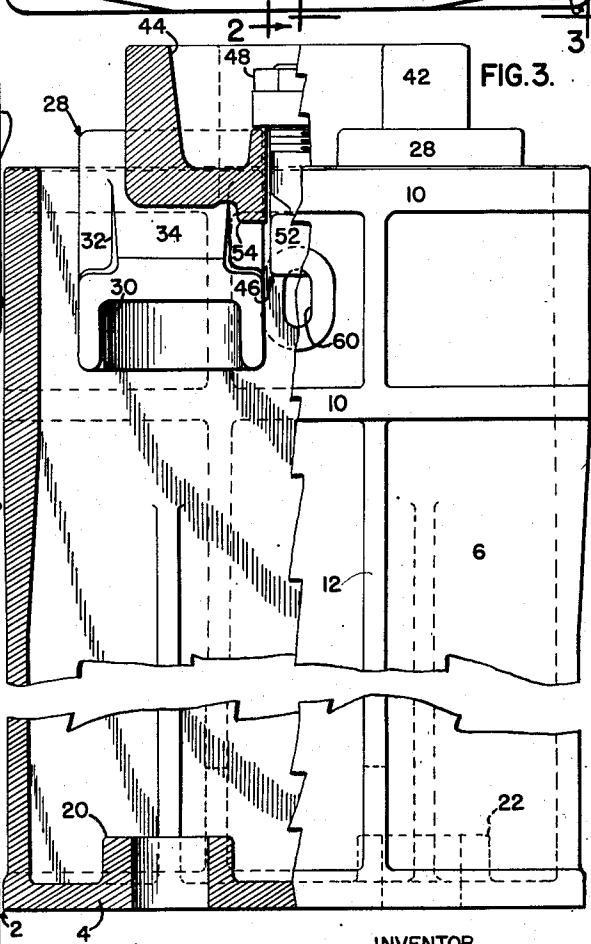


FIG. 3.



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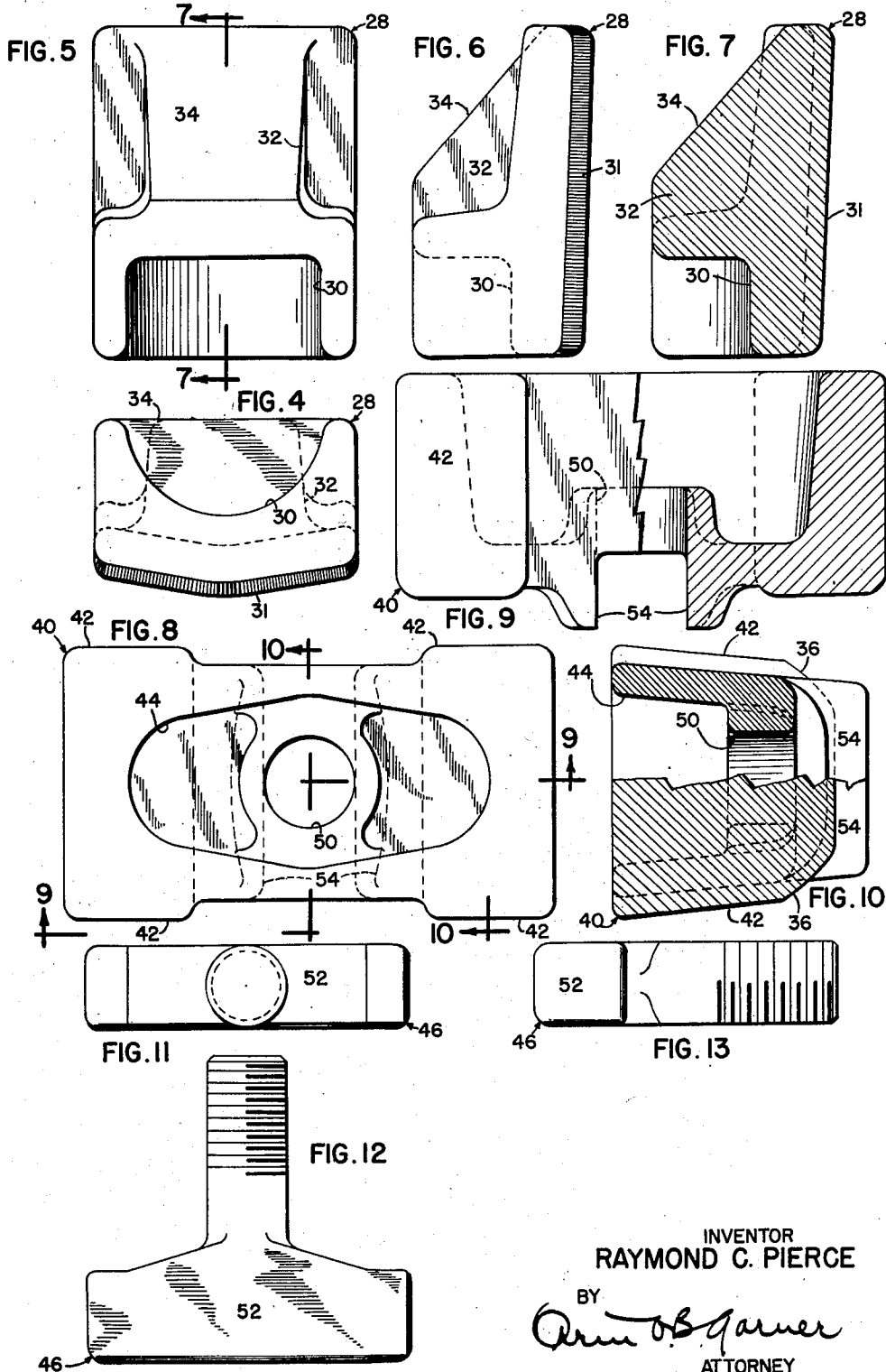
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4 Sheets-Sheet 2



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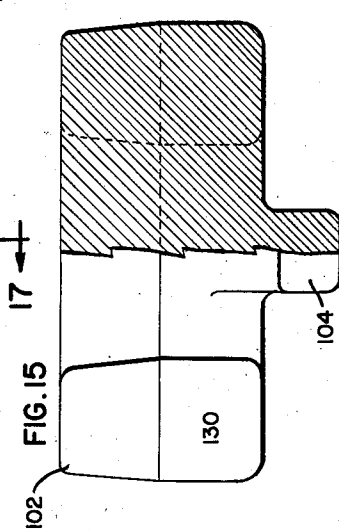
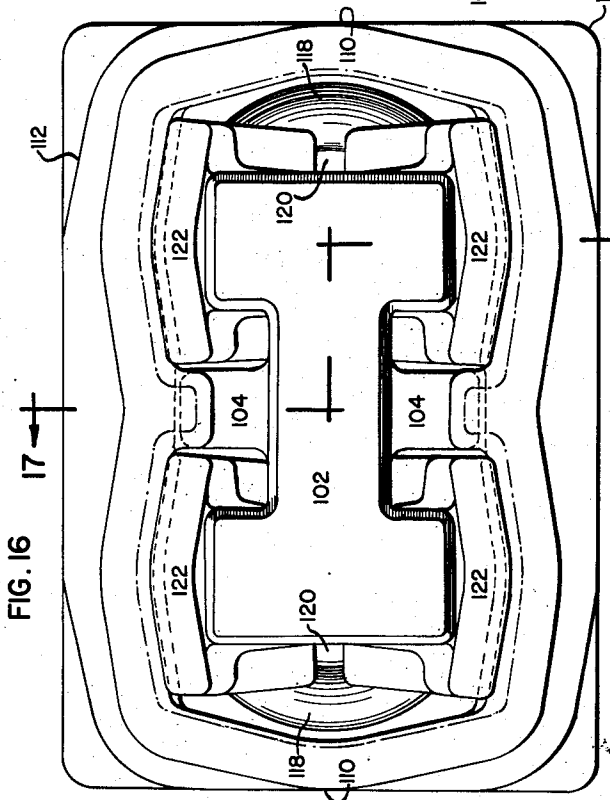
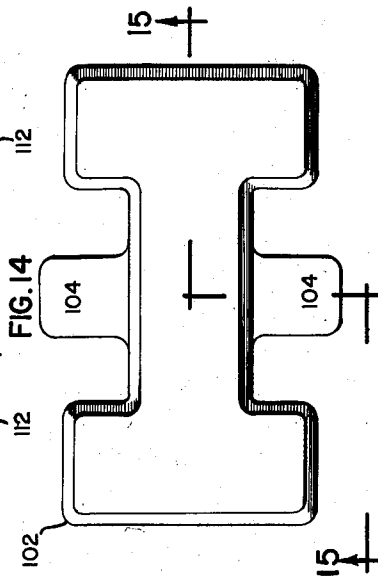
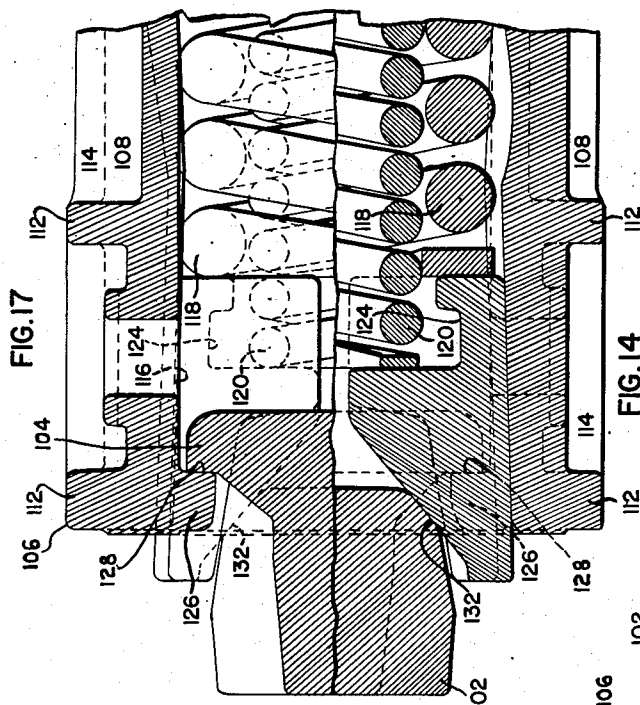
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4 Sheets-Sheet 3



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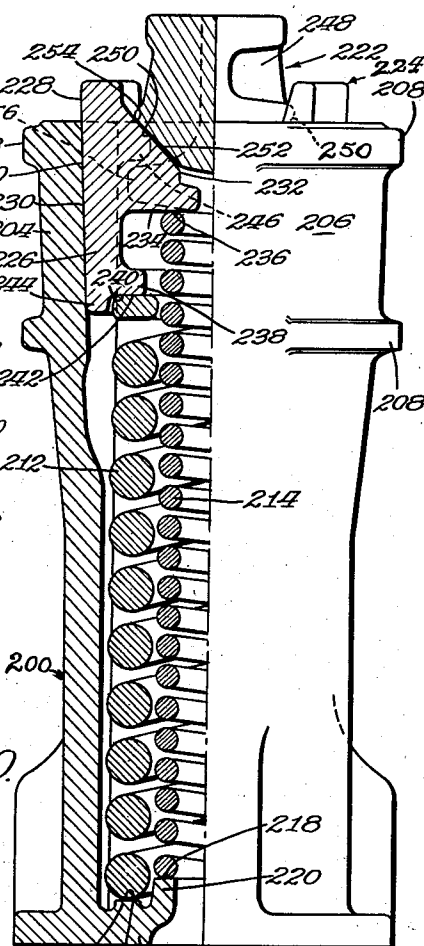
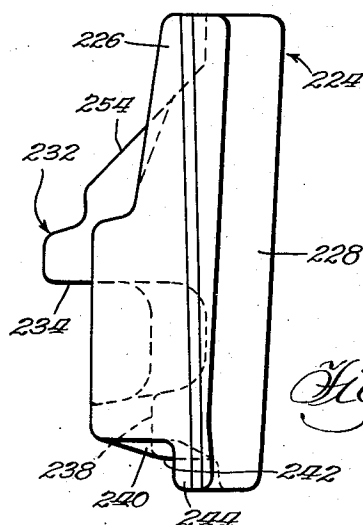
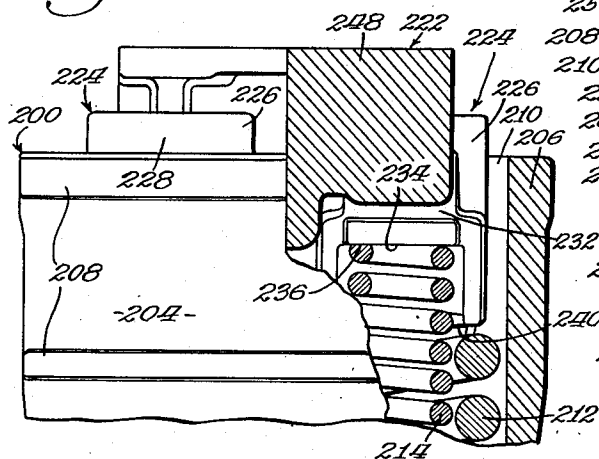
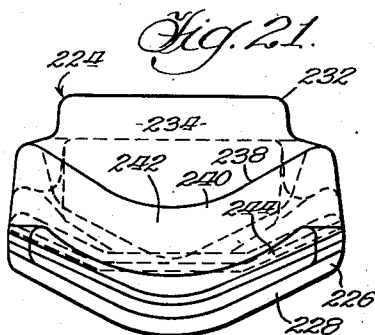
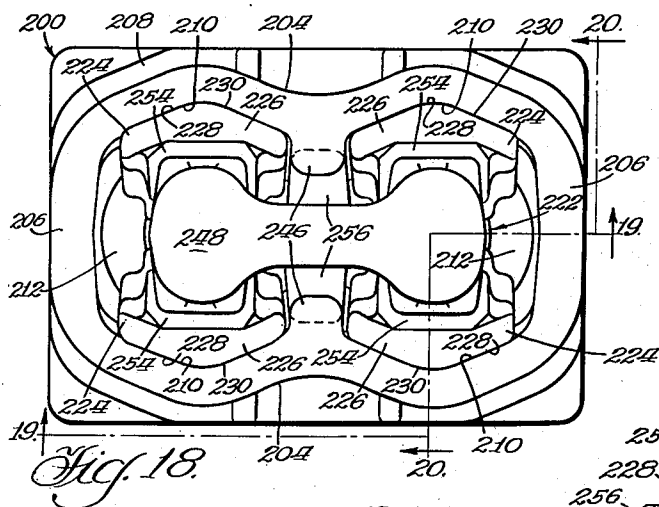
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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DRAFT GEAR

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Application December 27, 1949, Serial No. 135,111

11 Claims. (Cl. 213—34)

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This invention relates to shock absorbing mechanisms for railway cars of the form commonly designated draft gears.

This application is a continuation-in-part of my application Serial No. 690,397, filed August 14, 1946, for Draft Gear.

The general object of the invention is to design a novel draft gear capable of efficiently absorbing impacts imposed thereon in service and which is particularly free from "sticking."

The invention comprehends a draft gear comprising a housing designed to provide more space for springs than ordinarily available in draft gears previously made in which the springs are entirely encased within the housing, the increased space accommodating springs of higher initial or higher final capacity, or both, depending on spring design.

A further object of the invention is to provide a novel housing having an open end adapted to receive a friction clutch therein, the housing having spaced side walls interconnected at their extremities by end walls, the side walls being W-shaped in cross section to provide an exceptionally strong, comparatively light weight structure capable of resisting bursting forces imposed thereagainst by the friction clutch during closure of the draft gear, the configuration of the side walls also affording V-shaped surfaces for guidable engagement by the shoes of the friction clutch.

A more specific object of the invention is to provide a draft gear comprising a housing with two sets of independent springs in parallel therein, each set preferably including an outer and an inner spring, and each set supporting a pair of shoes, all of these shoes having wedge engagement with a single follower wedge, the wedge being adapted to urge the shoes into frictional engagement with the housing against the compression of the springs as draft and buffing forces are imposed on the gear.

Another object of the invention is to provide a four-shoe draft gear wherein the shoes are arranged in a compact manner and wherein the wedge is interlocked with the housing.

Another object of the invention is to provide a draft gear of the type described embodying spring means of increased capacity capable of absorbing impacts of a magnitude beyond the limit of present gears.

A further object of the invention is to provide flanges on the friction shoes for guiding and positioning the inner and outer springs of the associated set of springs.

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A still further object of the invention is to provide a draft gear that comprises relatively few different parts, is easily assembled and dismantled, simple in design, easy to manufacture, efficient in use, and capable of accepting blows delivered angularly thereto without misalignment of the parts.

Another object of the invention is to provide a novel draft gear embodying a novel retaining bolt having portions engaging inwardly projecting means formed on opposite sides of the housing at the open end thereof.

A different object of the invention is to design a draft gear comprising four substantially identical friction shoes of small and simple shape which may be easily manufactured and hardened without warping.

These and other objects of the invention will be apparent from the specification and the drawings, wherein:

Figure 1 is an end view of a draft gear embodying one form of the invention;

Figure 2 is a sectional view of the gear taken in the transverse vertical plane substantially as indicated by line 2—2 of Figure 1, the bolt being shown partly in elevation to more clearly show its association with the housing.

Figure 3 is a sectional view taken in the plane substantially indicated by line 3—3 of Figure 1 with the springs removed;

Figure 4 is an inner end view of one of the shoes;

Figure 5 is a side elevational view of the shoe, the view being taken from the inner face thereof;

Figure 6 is an edge view of the shoe taken from the right as seen in Figure 5;

Figure 7 is a sectional view of the shoe taken on the transverse plane as generally indicated by line 7—7 of Figure 5;

Figure 8 is an outer face view of the follower wedge shown in Figures 1—3;

Figure 9 is a view of the follower wedge taken substantially on the planes indicated by the line 9—9 of Figure 8;

Figure 10 is a sectional view of the follower wedge taken in the transverse vertical planes substantially as indicated by line 10—10 of Figure 8;

Figure 11 is an end view of the retaining bolt;

Figure 12 is a side elevational view of the retaining bolt;

Figure 13 is an edge view of the retaining bolt;

Figures 14—17 illustrate another modification of the invention, Figure 14 being an outer face view

of the follower, Figure 15 being a view of the follower wedge taken substantially in the planes indicated by line 15—15 of Figure 14, Figure 16 being an end view of the modified form of draft gear, and Figure 17 being a fragmentary sectional view taken substantially in the planes indicated by the line 17—17 of Figure 16, only a portion of the housing and springs being shown inasmuch as the remainder of the structure is similar to that shown in the first embodiment; and

Figures 18—22 illustrate a further modification of the invention. Figure 18 is an end view of the gear, Figure 19 a fragmentary sectional view taken substantially on the line 19—19 of Figure 18, Figure 20 a sectional view taken substantially on the line 20—20 of Figure 18, Figure 21 an inner end view of the friction shoe incorporated in this modification, and Figure 22 is an edge view of the shoe shown in Figure 21.

Describing the invention in detail and referring first to the embodiment shown in Figures 1—13 inclusive, the housing is of substantially rectangular form having a base wall or web 4 closing the inner end of the housing, W-shaped side walls 6, 6, and end walls 8, 8 formed integral with the base wall 4, the end walls interconnecting corresponding extremities of the side walls 6, 6. The forward end of the housing is open and is reinforced by a plurality of circumferential or peripheral ribs 10, 10 (Figure 3), said ribs extending laterally of the side walls up to about the middle portions of the end walls and tapering at the ends into the end walls. The housing is additionally reinforced by a plurality of longitudinal ribs 12, 12 formed on the side walls 6, 6. The inner surfaces of the side walls at the open end of the housing taper outwardly as at 14 (Figure 2).

Two large outer compression springs 16 and 18 are positioned in parallel within the housing and seated at their inner ends on the base wall 4 (Figure 2) and retained in position by hollow bosses 20 and 22, respectively, formed on the inner surface of web 4. Auxiliary or inner compression springs 24 and 26 are fitted into springs 16 and 18, respectively, and are seated at their inner ends against the inner faces of the bosses 20 and 22 (Figure 2).

Substantially identical oppositely arranged shoes 28, 28 are disposed within the open end of the housing in pairs, one pair adjacent each end wall 8. One pair of shoes is seated upon a set of springs 16 and 24 and the other pair is seated upon the other set of springs 18 and 26. The sets of springs and the respective pairs of shoes are disposed at opposite sides of the long axis of the draft gear. The inner springs 24 and 26 extend into recesses 30, 30 formed on the inner ends of the shoes 28, 28. The arrangement of the shoes around the housing is best seen in Figure 1 wherein it may be observed that the shoes are compactly arranged and that each shoe has a V-shaped outer friction surface 31 (Figure 4) fitted to a surface of complementary shape within the housing and formed on the associated side wall 6.

The detailed structure of each shoe is shown in Figures 4—7 inclusive and comprises in general a solid body of metal having a V-shaped friction wall provided on its outer side with the before-mentioned friction face 31. The friction wall is formed on its inner side with an integral portion 32 of reduced width and generally triangular in side elevation. The portion 32 is

formed with a generally flat diagonal face 34 facing inwardly of the friction wall. The inner end of portion 32 provides a seat for an associated inner coil spring and the inner edge of the friction wall provides a seat for the associated outer coil spring.

The diagonal surfaces 34, 34 on the shoes have wedge engagement with spherical wedge surfaces 36, 36 (Figure 10) formed on opposite sides of a follower wedge member 40 (Figure 8). The follower wedge member 40 as illustrated is H-shaped in plan and generally trapezoidal in cross section, the opposite sides 42, 42 thereof converging inwardly as shown in Figure 10, said sides 42, 42 merging at their lower ends with more sharply inclined surfaces 36, 36. It will be understood that while the gear shown has one wedge member seated upon two pairs of shoes, it may easily be provided with two wedge members, each of which may be seated upon a pair of shoes.

A cavity 44 is formed in the outer face of the follower wedge member within which may be received the projecting end of a retaining lug bolt 46 with its associated nut 48, said bolt extending through a central opening 50 (Figure 8) in the wedge. The bolt has a rectangular head 52 embraced between generally parallel depending lugs 54, 54 (Figure 9) formed on the inner end of the follower wedge member, these lugs preventing the bolt from turning.

The opposite ends of the bolt head 52 define lugs 58 extending behind inwardly oppositely projecting lugs 56, 56 formed on the inner surfaces of the side walls 6, 6 (Figure 2) at the open end of the housing.

Aligned openings 60, 60 are provided in the side walls 6, 6 immediately below the lugs 56, 56 for reception of a tool, such as a bar, suitable for holding the bolt in position at the open end of the housing until assembly thereof with the wedge member may be effected, the assembly including extending the bolt through the opening 50 and threading the nut 48 on the projecting end of the bolt to secure the bolt to the wedge member.

To assemble the gear, all four springs are inserted into the housing through the open end thereof and compressed. The bolt is next inserted into the open end of the housing and turned to engage the head 52 behind the lugs 56, 56. The springs are expanded against the bolt head. The shoes are then disposed in the housing on top of the respective springs and the follower wedge member is sleeved over the bolt 46 and wedged between the shoes. The gear is then compressed by moving the friction clutch, comprising the wedge member and the shoes, inwardly of the housing until the bolt extends through the opening 50 in the wedge member into the cavity 44. A rod or other tool may be inserted through openings 60, 60 to hold the bolt at the open end of the housing. The nut 48 is threaded on the projecting end of the bolt, completing the assembly of the gear. The rod or tool may then be removed and the gear allowed to expand.

Referring now to Figures 14—17 illustrating a modification of the invention, the parts are similar to those described with the exception that the wedge follower member 102 is provided with integral lugs 104, 104 at opposite sides thereof which substitute for the bolt. The gear comprises a substantially rectangular housing 106 having side walls 108, 108 and end walls 110, 110 and a transverse base wall at its inner

end. The open end of the housing is reinforced by a plurality of circumferential ribs 112, 112. Longitudinal ribs 114, 114 are formed on the side walls 108, 108 to additionally reinforce the housing. The side walls are W-shaped in cross section as in the previous embodiment. The inner surfaces of the side walls 108, 108 at the open end of the housing taper outwardly as at 116 (Figure 17). Two sets of springs are positioned in parallel within the housing, one set adjacent each end wall at opposite sides of the longitudinal axis of the housing and each set including an outer compression spring 118 and an inner compression spring 120 arranged as previously described.

Four substantially identical oppositely arranged shoes 122, 122, which are the same as shoes 28 previously described, are positioned in pairs within the open end of the housing, each pair of shoes being seated upon a set of springs at diametrically opposite sides thereof. The inner compression springs 120 are seated within recesses 124, 124 formed at the inner ends of the shoes and the outer springs seat against the inner edges of the shoes.

The follower wedge member 102 seats on the shoes in wedging engagement therewith, as in the previous modification, and the shoes engage the side walls 108, 108 along V-shaped surfaces.

Inwardly projecting lugs 126, 126 are formed integral with the side walls of the housing at the open end thereof, the lugs 126, 126 affording an interlock for the lugs 104, 104 therebehind, as best seen in Figure 17.

To assemble this modification the springs are inserted into the housing and the pairs of shoes are seated on respective sets of springs. In the assembly of the housing the shoes and the springs are then placed in a suitable jig to compress the shoes and the springs inwardly of the housing. The follower wedge member is then inserted into the open end of the housing and moved laterally of the housing to a position across all of the shoes, whereupon the lugs 104, 104 are disposed behind the lugs 126, 126. The pressure on the shoes is then relieved and the shoes move outwardly of the housing whereupon the lugs 104, 104 are caused to engage with the lugs 126, 126 as at 128, 128 (Figure 17) and simultaneously the shoes seat against diagonal wedge surfaces 130, 130 (Figure 15) on the follower wedge member as at 132 (Figure 17). It will be noted that the lugs 104, 104 extend between the shoes and are maintained in position behind lugs 126, 126 by said shoes.

Referring now to the embodiment illustrated in Figures 18-22, the draft gear comprises a combination friction shell and spring cage in the form of a casing or housing 200 of substantially rectangular cross section having a friction shell portion at the forward end and a spring cage portion at the rear end thereof. The housing is closed at the rear end by a transverse wall 202. The housing also comprises W-shaped spaced side walls 204, 204 and spaced end walls 206, 206 interconnected with the side walls as seen in Figure 18. The friction shell section of the casing is reinforced by flanges 208, 208 on the side walls, said flanges extending and tapering away on the end walls. The side walls 204, 204 at the friction shell portion are W-shaped in cross section and each provides a V-shaped internal friction surface 210 adjacent each end wall. It will be noted that the side walls converge toward each other approximately centrally between the end

walls 206, 206. This construction affords great strength without excessively thickening the walls of the casing.

A pair of independent sets of springs is positioned within the casing at opposite sides of the longitudinal axis thereof, each set of springs comprising an outer coil 212 and an inner coil 214 seated at their inner ends as at 216 and 218, respectively, on bosses 219 and 220 formed on wall 202.

The springs support a friction clutch generally designated 222 which is mounted within the friction shell within the open end thereof. The friction clutch is similar to that shown in previous embodiments and comprises four friction shoes arranged in two pairs and disposed within the friction shell adjacent the open end thereof.

Each shoe, generally indicated 224, comprises a main or friction wall 226 V-shaped in cross section and having a V-shaped friction face 228 on its external side, the surface 228 having complementary engagement as at 230 with the related surface 210 as seen in Figures 18 and 20. The shoe is provided on its inner face intermediate its ends with a generally triangular-shaped wedge portion 232 formed integral with the friction wall. The portion 232 affords on its inner end a generally flat spring seating surface 234 for seating the shoe against the related inner coil 214 as at 236. Each shoe is also provided on its inner side adjacent its inner end with a flange 238 formed integral with the wall 226. The flange 238 serves to position the associated spring 214 within the shoe. The inner face 240 of the flange 238 is slightly curved transversely of the flange, the flange projecting angularly from the main wall 226. The face 240 is afforded a seat at its crest as at 242 against the outer end of the associated outer spring 212 as best seen in Figures 20 and 22. The inner end of the main wall 226 forms a flange 244 which extends inwardly of flange 238 and surrounds the end coil of the associated outer spring to position the same with respect to the shoe. It will be noted that in released position of the gear the flange 244 of each shoe is spaced radially outward of the outer periphery of the associated outer spring whereupon the shoe when moved into and out of the housing along the tapered surface 210 is slidable on flange 238 against the associated outer spring transversely of the outer spring. This arrangement of guiding the outer ends of the springs has been found to be singularly successful in test application. Proper alignment between the shoes and springs is maintained and the tendency for the springs to shift laterally to one side of the casing is entirely eliminated. The guiding arrangement also positively assures uniform efficient operation of the gear throughout its life.

As may be readily seen in Figure 18, the shoes are arranged in parallel at the open end of the friction shell at opposite sides of inwardly extending lugs 246, 246 formed on the side walls 204, 204 at the inwardly converging apices thereof. A single wedge member 248 is superposed on all of the shoes, the wedge member 248 being similar to that shown in the previous embodiments. The wedge member comprises a body portion elongated transversely of the end walls 206, 206 of the housing and extending across the axis of the gear. The wedge member is provided at opposite ends thereof with inwardly converging flat wedge member surfaces 250 in engagement as at 252 with surfaces 254 on the outer

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side of the portion 232 of the respective shoes. It will be noted that surface 254 on each shoe is developed from two angularly related faces which converge to provide an initial slight convexity on the surface 254, the surface 254 being flattened by deformation resulting from seating-in of the related surface 252 on the wedge member after a few compression blows on the gear. The wedge member is provided at its inner end with interlocking lugs 256 extending from opposite sides of the wedge member intermediate the ends thereof, said lugs extending between the pairs of shoes behind the lugs 246, 246 on the casing. It will be readily apparent that the lugs 256, 256 interlock with the lugs 246, 246 and maintain the draft gear in assembled relationship. The assembly and disassembly of this embodiment is the same as that of Figures 14-17.

It will be noted that in all three of these embodiments the wedge member is in wedge engagement at opposite ends with respective pairs of shoes and that the wedge member is capable of canting within the housing in its movement inwardly or outwardly of the housing whereby one pair of shoes is capable of movement at a faster rate than the other pair of shoes. This feature positively prevents "sticking" of the parts of the friction clutch with each other and with the housing such as commonly occurs in draft gears at present in use.

I claim:

1. In a draft gear, a wedge follower consisting of a substantially solid body of metal, and having a relatively flat top base, downwardly converging sides, said sides converging more sharply towards each other and having spherical outer faces adjacent the bottom portion of said wedge follower, vertical central slots in said sides, a substantially flat bottom base, and lugs integrally formed on said bottom base centrally thereof and projecting outwardly of said follower at opposite sides thereof directly beneath said slots.

2. In a draft gear, a wedge follower substantially H-shaped in plan and consisting of substantially a solid body of metal and having a flat top base recessed centrally thereof, a central vertical opening, downwardly converging sides, said sides converging more sharply toward each other and having spherical outer surfaces adjacent the bottom portion of said wedge follower, a substantially flat bottom base, and transverse vertical depending lugs on said bottom base spaced at opposite sides of said vertical opening.

3. A draft gear comprising a housing, sets of spaced springs mounted in parallel therein, each set of springs comprising an outer and an inner spring, friction means mounted within the open end of said housing and supported upon said springs, a retaining lug bolt connected to said friction means and having a head substantially rectangular in form positioned between said outer springs, and retaining lugs on said housing at the open end thereof engaging the opposite ends of said bolt head.

4. In a draft gear, a housing having an open end, independent spring means mounted side by side, shoes on each of said spring means, a wedge follower superposed on all of said shoes and in wedge engagement therewith, inwardly projecting lugs on said housing at the open end thereof, and integral lugs on said wedge follower formed and arranged for abutment against said first-mentioned lugs for limiting outward movement of said wedge follower relative to said housing.

5. In a friction draft gear, in combination, a

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housing, a plurality of springs in parallel therein, friction means mounted in the open end of said housing, a retaining lug bolt with a head secured to said friction means, and lugs on said housing adapted to engage said head for holding said friction means in assembly with said housing.

6. In a friction absorbing device, a friction casing having an open end and comprising a spring seat, spaced side walls and spaced end walls, independent spring means seated within said housing adjacent each end wall, a pair of friction shoes seated on each of said spring means at the open end of said housing, one of the shoes of each pair engaging one of said side walls and the other shoe of each pair engaging the other of said side walls, wedge means in wedge engagement with all of said shoes, and interlocking means on said wedge means and said side walls between the pairs of shoes and cooperable to limit the expansion of said device and for holding said device in assembled relation.

7. In a friction absorbing device, a casing open at one end and comprising a spring seat, spaced side walls and spaced end walls, a set of coil springs seated in said housing adjacent each end wall, friction means in said casing at the open end thereof comprising a pair of friction shoes on each set of springs and in engagement with said side walls, an element extending lengthwise transversely of said end walls and having a portion at one end wedged between one pair of shoes and having a portion at the opposite end wedged between the other pair of shoes, interlocking means on said element intermediate said portions fitted between said pairs of shoes for guiding engagement therewith, and means on said housing engageable with said interlocking means for limiting the expansion of said device and maintaining the same in assembled relation.

8. A draft gear friction shoe comprising a friction wall presenting a friction surface on its outer side, a wedge portion on the inner side of the wall presenting a wedge surface on one end and a spring seat on its other end, a flange on the inner side of said wall spaced from said wedge portion longitudinally of the wall and affording a guide for spring means adapted to seat on said spring seat, a spring seat surface on said flange on a side thereof remote from said first-mentioned spring seat, and a spring positioning flange formed as a continuation of said wall and projecting beyond said spring seating surface toward the inner end of the shoe.

9. In a draft gear, a housing having an open end, spring means within the housing, a friction clutch within the open end of the housing in frictional engagement therewith, said clutch comprising a plurality of shoes, each shoe including a seat intermediate its ends bearing on certain of the spring means and another seat at its inner end seated on other of said spring means, and a flange on each shoe extending inwardly of said last-mentioned seat around the associated spring means between the same and said housing.

10. In a draft gear, a casing open at one end having spaced side walls and spaced end walls, a base wall interconnecting said walls and closing the other end of the casing, said side walls at the open end of the casing being W-shaped in edge view and presenting a pair of opposed V-shaped friction surfaces adjacent each end wall and diverging away from each other, a pair of friction shoes between each pair of opposed

surfaces and in engagement therewith, the central portions of said side walls at said open end of the casing converging toward each other and comprising stop lugs at their apices extending into the casing toward each other, a wedge member elongated transversely of said end walls and being of thinnest cross section centrally thereof and extending loosely between the lugs and having oppositely projecting lugs centrally at the inner end thereof, said lugs on the wedge extending between said pairs of shoes behind the first-mentioned lugs, said wedge member extending at each end between the shoes of each pair and being widened at each end and having wedge surfaces at opposite sides converging inwardly of the housing and in complementary engagement with adjacent shoes, and independent spring means reacting between each pair of shoes and said base wall.

11. A wedge member comprising an elongated body having a narrowed intermediate portion and widened end portions, wedge means at the end portions and comprising a pair of wedge surfaces

disposed at opposite sides of said member and converging toward the inner side thereof, the wedge surfaces on the same side of said member being substantially coplanar, said intermediate portion comprising oppositely extending stop lugs located at the inner side of said member and spaced a substantial distance from either of said wedge means.

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