May 23, 1939. D. F. SPROUL 2,159,457

DRAFT GEAR

Filed Jan. 14, 1937 3 Sheets-Sheet 1

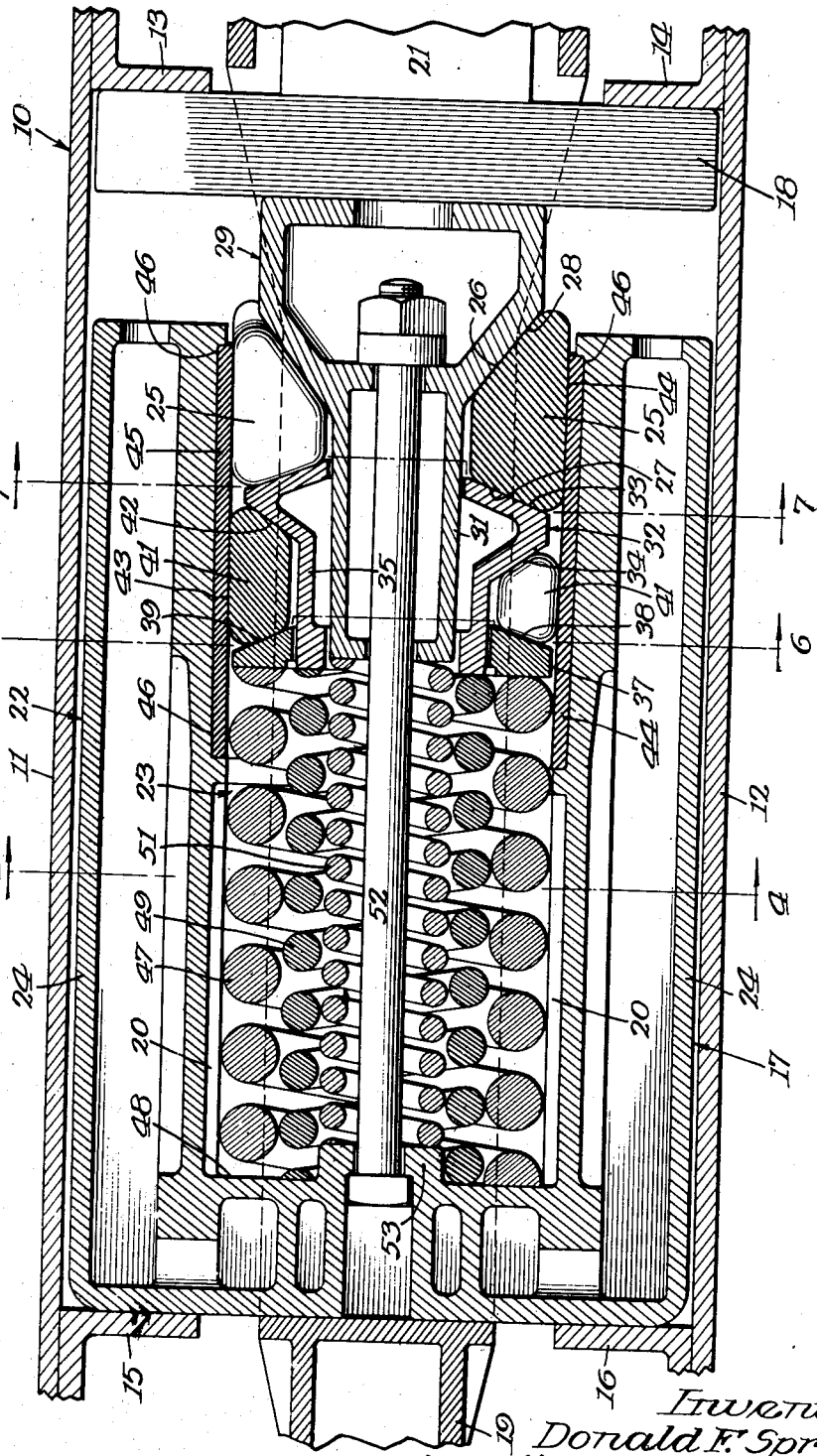

Fig. 1

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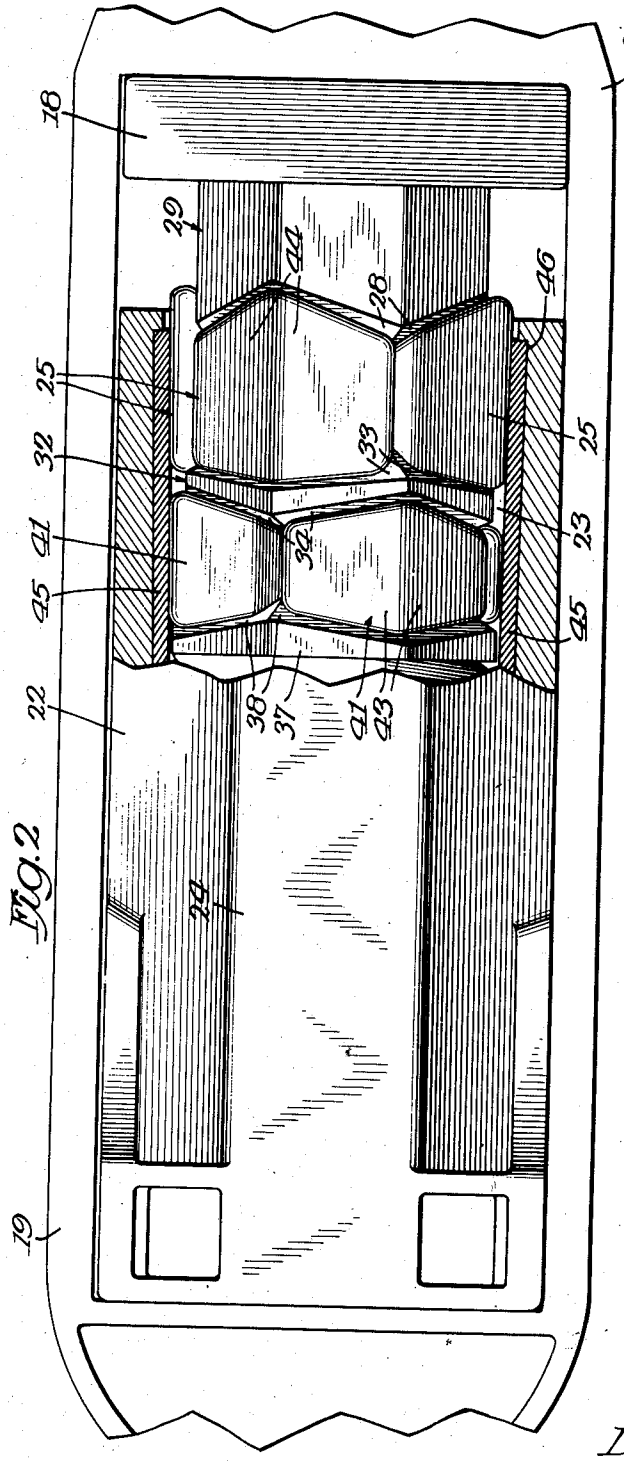

Fig. 2

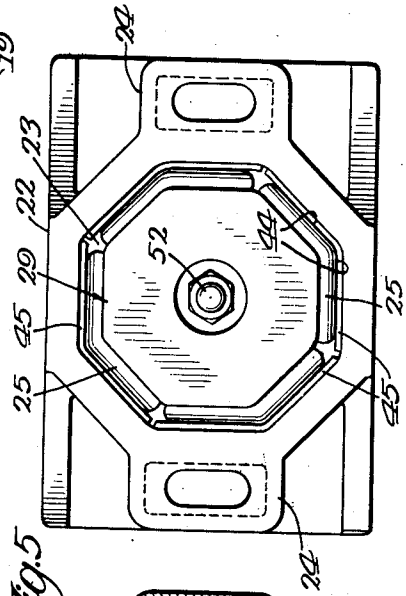

Fig. 5

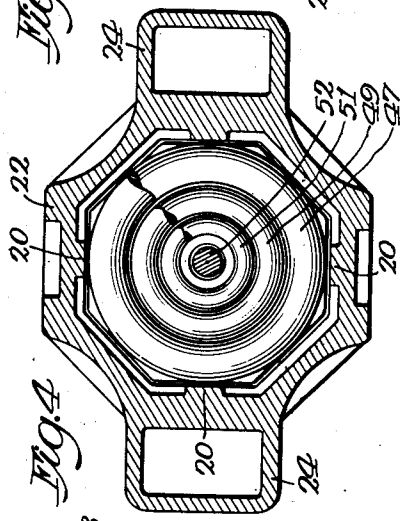

Fig. 4

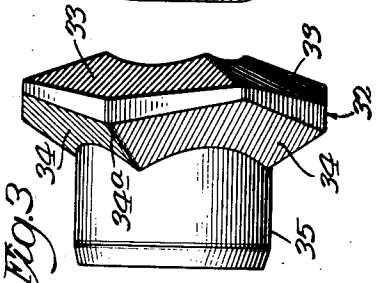

Fig. 3

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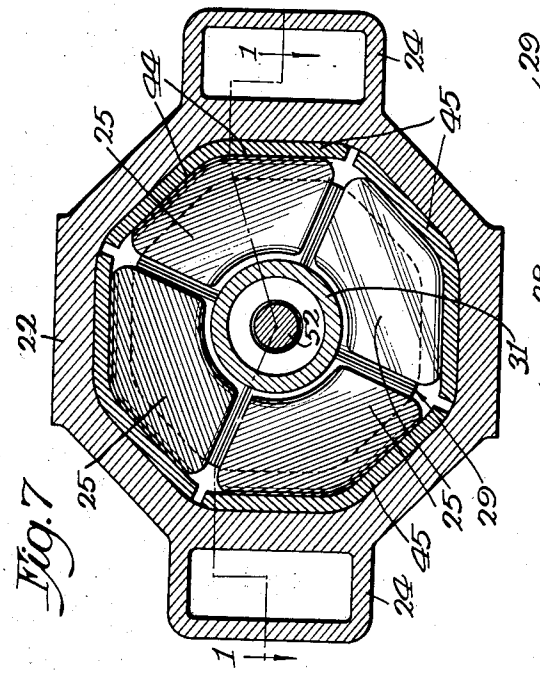

Fig. 7

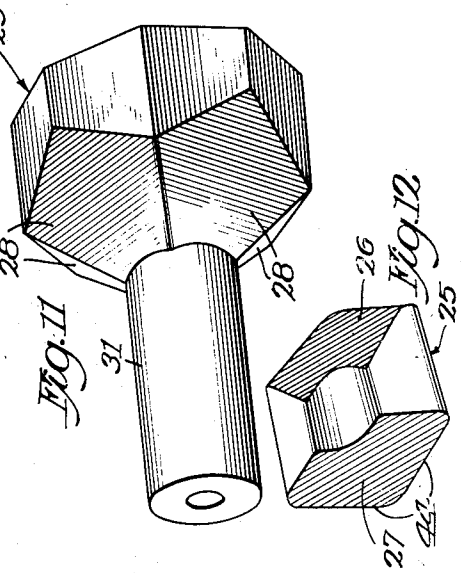

Fig. 11

Fig. 12

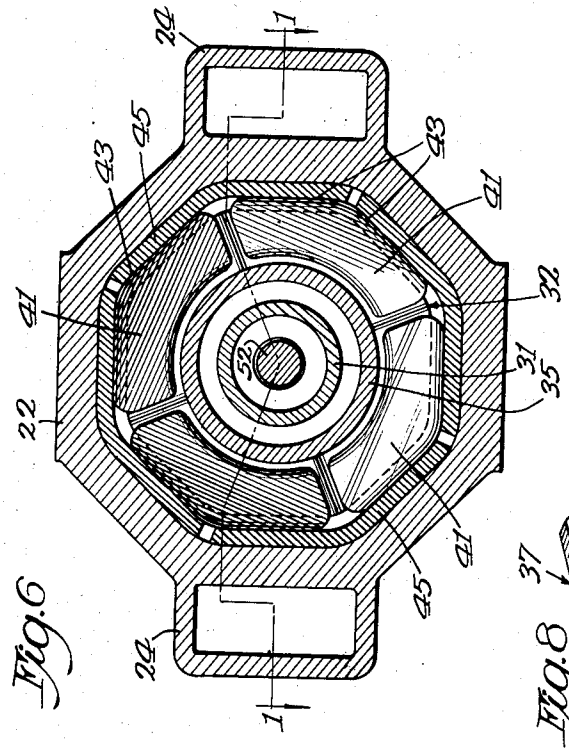

Fig. 6

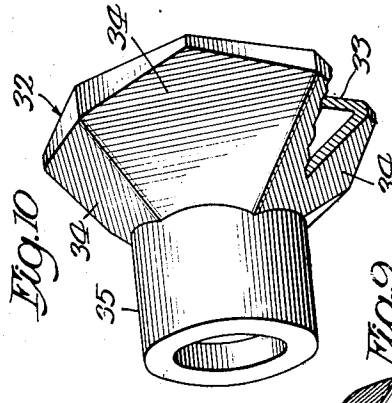

Fig. 10

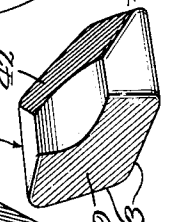

Fig. 9

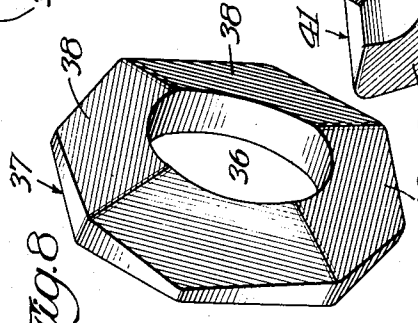

Fig. 8

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2,159,457

UNITED STATES PATENT OFFICE

2,159,457

DRAFT GEAR

Donald F. Sproul, Chicago, Ill., assignor to Cardwell-Westinghouse Company, a corporation of Delaware

Application January 14, 1937, Serial No. 120,566

14 Claims. (Cl. 213—32)

This invention relates to draft gears and more particularly to the friction type of gear.

One of the objects of the invention is the provision of a new and improved gear having novel wedging mechanism.

A further object of the invention is the provision of a new and improved draft gear having a novel arrangement of friction surfaces for the friction and wedging mechanism.

Another object of the invention is the provision of a draft gear having a new and improved arrangement of friction surfaces and wedging mechanism together with novel means for positively relieving the wedge members upon release of the gear.

A further object of the invention is the provision of means for holding the wedging mechanism in perfect alignment and for preventing skewing of any of its parts.

A still further object of the invention is the provision of a new and improved draft gear that is comparatively inexpensive to manufacture, efficient in use, positive in release after compression, and that is simple and rugged in construction.

Other and further objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings in which:—

Fig. 1 is a horizontal section on a portion of a railway car showing the invention in position thereon, the wedge mechanism being taken on the lines 1—1 of Fig. 6 and 1—1 of Fig. 7;

Fig. 2 is a side elevation of the gear with parts broken away and parts in section;

Fig. 3 is a side elevation of one of the wedge members;

Fig. 4 is a section on line 4—4 of Fig. 1;

Fig. 5 is an elevation of the forward end of the gear;

Fig. 6 is a section on line 6—6 of Fig. 1;

Fig. 7 is a section on line 7—7 of Fig. 1;

Fig. 8 is a perspective view of the spring follower;

Fig. 9 is a perspective view of one of the friction shoes;

Fig. 10 is a perspective view of the inner wedge member;

Fig. 11 is a perspective view of the outer wedge member; and

Fig. 12 is a perspective view of one of the friction blocks.

Referring now to the drawings, the reference character 10 designates the underframing of a railway car having the center sills 11 and 12, which are provided with the draft lugs 13 and 14 and the buff lugs 15 and 16. The gear, which is designated generally by the reference character 17, is positioned between the center sills and between the buff and draft lugs in the usual manner. If desired, a follower 18, inserted between the draft lugs and the gear, may be employed. The gear is embraced by a draft yoke 19 as is usual in such constructions. The draft yoke is connected to the coupler 21 in any suitable manner. Since the details of the draft yoke, coupler butt and the arrangement of the lugs on the center sills are of the usual or well-known construction, it is not thought necessary to further illustrate or describe the same.

The draft gear comprises a casing 22, which is open at one end, and has a chamber 23 arranged axially thereof. The casing is angular in cross-section and in the form shown, is an octagon. Suitable reinforcing ribs and members are provided on the exterior for strengthening the structure. In the form shown, a boxlike reinforcing member 24 is provided at each side of the gear. This structure is hollow and extends the full length of the gear casing, as shown in Fig. 1 of the drawings. By means of this arrangement, the strength of the casing is materially increased without very materially increasing the weight of the gear. The interior chamber 23 of the gear has an angular wall and in the form shown, the walls form an octagon as shown in Figs. 4 and 7. Internal ribs 20 on the casing may be employed for positioning the springs, if desired. These ribs will also strengthen the casing.

The wedging and friction mechanism for the gear is mounted in what, for convenience of description, will be termed the outer end thereof, as shown in Figs. 1 and 2. It comprises a plurality of friction blocks 25, see Figs. 1 and 12, each of which has an outer flat wedging face 26 and an inner flat wedging face 27 arranged opposite to the wedging face 26. The wedging face 26 of each block is adapted to engage a corresponding wedging face 28 on an outer wedge or thrust member 29. In the form of the construction selected to illustrate one embodiment of the invention, four wedges 25 are used and the wedge member 29 is provided with four inclined faces 28 for cooperating with the wedging surfaces 26 of the four wedges 25, respectively.

The wedging member 29 is provided with an axial extension 31 which extends axially inwardly through an inner wedge member 32, Figs. 1 and 10. The wedge member 32 is provided on its

outer surface with four wedge faces **33**, Fig. 3, which are adapted to be engaged by corresponding wedge faces **27** of the friction blocks **25**. The inner wedge member **32** is also provided with a plurality of wedging faces **34** which face inwardly and laterally. Any two adjacent faces **34** of the wedge member **32** form a dihedral angle, the apex **34***a* of which is in a plane bisecting the opposite face **33**. In other words, in the form shown, these wedge faces **34** are angularly spaced 45° from the wedge faces **33** as clearly shown in Figs. 2 and 3. By means of this arrangement, the overall length of the gear wedging mechanism is materially shortened without decreasing the area of the surfaces of the friction faces. It will be seen from an inspection of Figs. 2 and 3 that if the wedge faces **34** were directly opposite the wedge faces **33**, the former would not have their present area. The member **32** is provided with an axial projection **35** which extends forwardly through an axial opening **36** in a spring follower **37**. The spring follower **37** is provided with a plurality of friction surfaces **38** which are adapted to be engaged by corresponding wedge surfaces **39** of a plurality of friction shoes **41**. Each of the friction shoes **41** is provided with a plane wedge surface **42**, Fig. 9, which is adapted in turn to engage the corresponding wedge face **34** on the inner wedge member **32**.

In the form of the construction shown, there are four of the friction shoes **41** and the wedge faces **39** and **42** of these shoes engage the four wedging faces **38** and **34**, respectively, of the spring follower **37** and the wedge member **32**. The outer surfaces of each of the friction shoes **41** and the outer surfaces of each of the friction blocks **25** are angular as shown at **43** and **44**, respectively, Figs. 1, 9 and 12. The surfaces **43** and **44** correspond to the angles formed by two adjacent sides of the inner periphery of the draft gear housing **22**. In other words, the angular surfaces **43** and **44** of the shoes and blocks, each form a dihedral angle and each frictionally engages two adjacent faces of the walls of the casing, Fig. 2. By means of this arrangement, the shoes and friction blocks are prevented from skewing. This is an important feature of the invention in that it insures smooth operation of the parts during both compression and release. Furthermore, since the radial pressure is substantially the same all around the casing, the latter is not so likely to become distorted as where the wedges are on two opposite sides only. Preferably, it tapers slightly toward the closed end whereby the wedges are more readily set up and the release is more prompt.

Interposed between the friction shoes and the wall of the casing are wear plates or friction elements **45** which are secured in position in any suitable manner as by engaging in a suitable recess **46** as shown more clearly in Fig. 1 of the drawings. Each of these plates is angular and in the construction shown, each forms a dihedral angle of 135° to correspond with the angles formed by the inner walls of the casing.

Suitable means are provided for resiliently resisting the inward movement of the wedging and friction mechanism. As shown, a plurality of springs, concentrically arranged, are employed for this purpose. The outer spring **47** seats against the end wall **48** of the casing and at its opposite end is seated against the spring seat **37**, see Fig. 1. The intermediate spring **49** is seated at one end against the bottom of the casing and its other end is seated against the inner end of the projection **35** of the wedge member **32** while the inner spring **51** is seated at one end against the bottom of the casing and its other end is seated against the extension **31** of the wedge member **29**. It will thus be seen that after the gear is compressed, the springs **51** and **49** will positively release the wedging members.

A bolt **52**, extending through the hollow outer wedge member **29**, its projection **31** and through a depressed portion **53** and seated in said hollow wedge member and in said depression, may be employed, if desired, to retain the springs under initial pressure and also to hold the parts in assembled relation.

In the operation of the device, when the gear is compressed, the wedge or thrust member engages the friction blocks, forcing them forwardly against the pressure of the springs. This resistance to the forward movement of these blocks will cause the outer wedge element to force the blocks radially outwardly into frictional contact with the wear plates. The friction shoes will likewise be forced into frictional contact with these angular wear plates by the inner wedge member. Upon release, the inner spring **51**, acting directly on the extension **31** of the outer wedge member **29**, will positively release this member from its wedging action. Likewise, the inner wedge member **32** will be positively released, thus insuring a prompt release of the gear and insuring against sticking of the parts.

It will be noted that the wedging faces of both the blocks and shoes will tend to force those members radially outwardly into frictional contact with the angular friction faces of the casing. This arrangement will force the blocks and shoes into those angles when the gear is compressed thereby insuring against even the possibility of skewing of either the blocks or shoes.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled in the art and that changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. In a draft gear, a casing having interior angular friction walls, angular friction plates for said walls, a set of friction blocks each having an angular friction face for engaging the angular face of a corresponding wear plate, a set of friction shoes having friction faces arranged at an angle to each other engaging said wear plates, said shoes being partially rotated relative to said blocks, an inner wedge member having wedge faces engaging said shoes and blocks, said member having a hollow axial projection, an outer wedge member said outer wedge member having an extension extending into said projection, a plurality of springs engaging respectively said projection and extension, a spring follower engaging said shoes, and a spring engaging said follower.

2. In a draft gear, a casing having a plurality of friction planar faces on its inner surface, friction shoes each having two faces for engaging two adjacent friction faces on said casing, a plurality of friction wedge blocks each having two friction faces engaging two adjacent faces of said casing, a wedging member between said shoes and blocks having wedging faces engaged by faces on said shoes and blocks, the wedging faces of one side of said wedging member being spaced

circumferentially from those of the other side thereof, whereby said blocks, wedge members and shoes will occupy a minimum of length in said casing, a thrust member, and spring means for independently resisting inward movement of said thrust member, shoes and blocks and for returning the parts to normal position after release of said gear.

3. In a draft gear, a casing having an inner octagon bearing surface, a set of friction shoes and a set of friction blocks each having two friction surfaces engaging two adjacent surfaces of said octagon, a wedge member between said sets, a thrust member engaging said blocks, said wedge member having a friction surface on one side for engaging a friction surface on a corresponding block and a surface on its other side for engaging a single friction surface on an adjacent shoe, the last-named friction surfaces on said shoes and blocks being spaced angularly, said wedge member and thrust member having inwardly extending projections, means including a spring for each projection for resisting the inward movement of said wedge and thrust members, and spring means engaging the shoes for returning the parts to inoperative position after release.

4. In a draft gear, a casing having an octagon inner surface, four friction plates each angular in cross section engaging two of said surfaces, four friction shoes each having two adjacent friction faces engaging the two friction faces of an adjacent friction plate, four friction blocks each having two adjacent friction faces engaging a face on each of two adjacent friction plates, a wedge member between said blocks and shoes, and means including springs and a wedge element for resisting inward movement of said shoes and blocks when said gear is compressed and for restoring the parts to normal position after release, one of said springs engaging said wedge member, one engaging said friction blocks, and another independently resisting the inward movement of said shoes.

5. In a draft gear, a wedge element comprising a body portion having a head and a cylindrical extension, said head having a plurality of wedging faces on one side and a plurality of wedging faces on the other side, the wedging faces on one side being spaced angularly from those on the opposite side whereby a maximum amount of wedging surface is obtained in a minimum of axial length of said element.

6. In a draft gear, a casing polygonal in cross-section and having a plurality of friction faces, a set of friction shoes each having a plurality of friction surfaces engaging the friction faces of said casing, a set of friction blocks each having a plurality of friction surfaces engaging a plurality of friction faces of said casing, a wedge member having inner and outer wedge faces, the outer faces engaging corresponding wedging faces on said friction blocks and the inner faces engaging corresponding wedging faces on said friction shoes, a thrust member having a wedging face for each block, a spring seat for engaging said shoes, and spring members for independently engaging said thrust and wedge members, said shoes, and said spring seat, respectively, for restoring the parts to normal position after release.

7. A friction block for use in a draft gear comprising a body portion provided with an axial extension having its outer surface provided with two friction faces forming a dihedral angle and having a planar wedging face on each end thereof, said wedging faces converging inwardly.

8. In a draft gear, a casing having a plurality of plane friction surfaces, a plurality of wedge blocks, each block having a plurality of plane friction surfaces for engaging a plurality of the friction surfaces of said casing, each block having an inner and an outer plane wedge face, an outer wedge member having a wedge face for each block for forcing said blocks inwardly on the compression of the gear, an inner wedge member having an outer wedging face for each inner plane wedge face on said blocks, a like number of inner wedging faces angularly spaced 45° from the outer wedging faces, respectively, a friction shoe for each inner wedging face, and means including friction elements and a plurality of springs for resisting the compression of said gear.

9. In a draft gear, a casing having interior angularly arranged friction faces, angular wear plates secured to said faces, sets of friction blocks and shoes, each block and shoe having two faces engaging said angular wear plates, a wedging member between said blocks and shoes, said member having wedging faces engaging the adjacent faces of said shoes and blocks, the wedging faces engaging said shoes being spaced circumferentially from those engaging said blocks, a thrust member engaging said blocks for forcing the same radially outwardly of, and longitudinally inwardly of, said casing, and three concentrically arranged springs for positively and independently moving said thrust member, wedging member and shoes to normally released position after compression.

10. In a draft gear, a casing having an interior polyhedral friction surface, inner and outer wedge members, friction blocks each having two friction faces arranged at an angle engaging two angularly arranged faces on said casing, each of said friction blocks having only two wedging faces each engaging a separate wedge member, said inner and outer wedge members having concentric, inwardly extending projections terminating substantially the same distance from the adjacent end of the gear, a plurality of friction shoes engaging said casing and inner wedging member, a spring seat engaging said shoes and extending about the inner end of said projections, and springs engaging the end of said casing opposite the wedge members and having their inner ends respectively engaging said seat and projections for individually resisting the inward movement of said seat and wedging members.

11. In a draft gear, a casing having a plurality of angular friction surfaces, friction shoes engaging said surfaces, friction block members engaging said surfaces, a wedge member between said shoes and block members, each block member engaging friction surfaces on said casing that are engaged by two adjacent shoes whereby the length of the block members and shoe assembly is a minimum, a thrust member having wedging faces engaging said block members, a spring seat having wedging faces engaging said shoes, and resilient elements engaging said thrust member, wedge member and spring seat, respectively, for returning the same to normal position after compression of said gear, said resilient elements being located at one end of said casing and being of substantially the same length.

12. In a draft gear, a casing, a plurality of contiguous plane friction surfaces arranged at an angle to each other within said casing, a plu-

rality of friction blocks within said casing, each of said blocks having a pair of plane friction surfaces for frictionally engaging two of said contiguous friction surfaces, an outer thrust member having a wedging engagement with said blocks, an inner wedging member having a wedging engagement with said blocks, shoes frictionally engaging said casing and having a wedging engagement with said wedging member, a follower engaging said shoes, said thrust and wedging members having extensions extending through an opening in said follower, and three concentric springs engaging said follower and said thrust and wedge members, respectively.

13. In a draft gear, a casing polygonal in cross-section, a plurality of sets of friction members frictionally engaging the angular interior walls of said casing, a thrust element having wedging faces for engaging one set of said members for forcing the same longitudinally and laterally of said casing when said gear is compressed, a second set of friction members, a wedging element between said two sets of friction members, said elements having extensions, a spring seat surrounding said elements, and three springs of substantially the same length engaging said seat and extensions, respectively, for resisting the inward movement of said elements and members and for restoring the parts to normal position after release.

14. In a draft gear, a casing, a plurality of contiguous friction surfaces arranged at an angle to each other within said casing, a set of friction shoes within said casing, each of said shoes having a pair of friction surfaces for frictionally engaging two of said contiguous friction surfaces, angular friction plates secured to the inner walls of said casing against which said shoes engage, a thrust member engaging said shoes for forcing the same radially outward when the gear is compressed, a second set of friction shoes engaging said plates, each shoe of said second set engaging two of said contiguous surfaces, said last-named surfaces being engaged by two shoes of the first-named set, a wedge member between said sets of shoes and having wedging faces engaging corresponding wedging faces on said shoes, a spring engaging said thrust member for resisting its inward movement and for releasing the same upon release of the gear, a second spring for engaging said wedge member resisting its inward movement longitudinally of the gear, and a third spring for resisting the inward movement of said second set of shoes longitudinally of the gear.

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