Sept. 29, 1959 J. A. ANDREWS ET AL 2,906,415

DRAFT GEAR

Filed Dec. 28, 1956 3 Sheets-Sheet 1

Fig. 1.

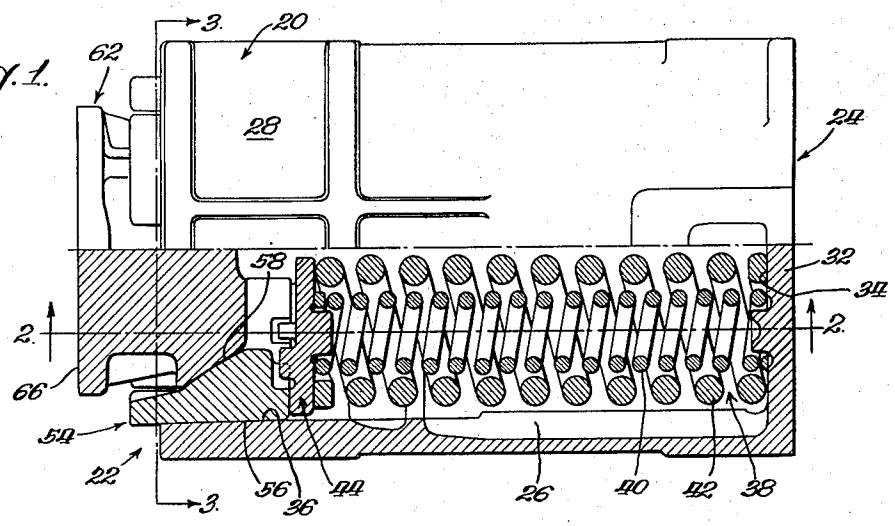
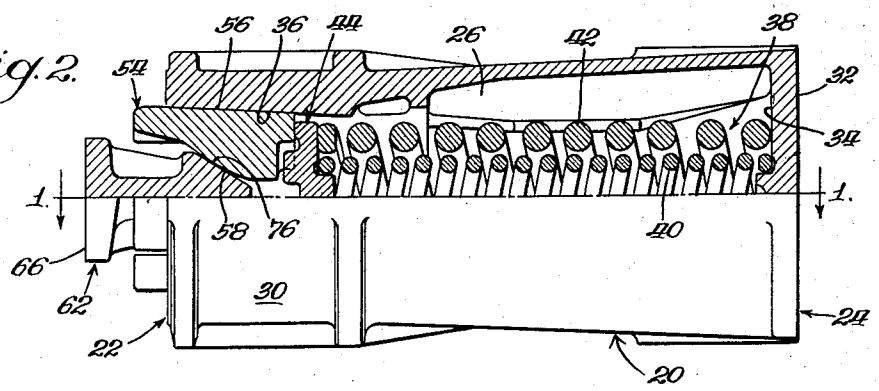


Fig. 2.



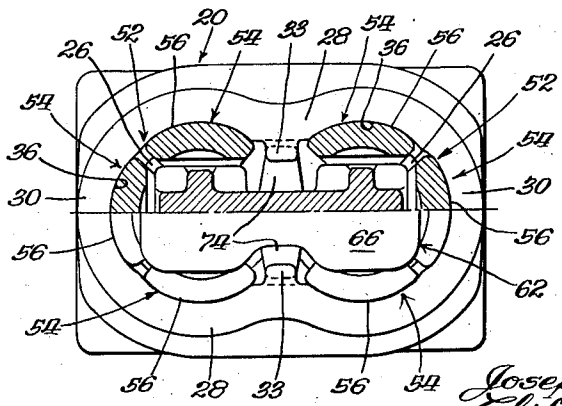


Fig. 3.

INVENTORS.
Joseph A. Andrews
Clifford D. Morley
By: Walter L. Schlegel, Jr. Atty.

Witness:
Richard W. Carpenter

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Fig. 6.

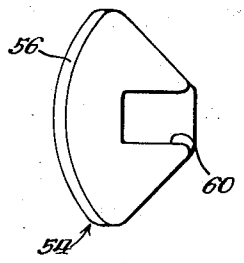


Fig. 4.

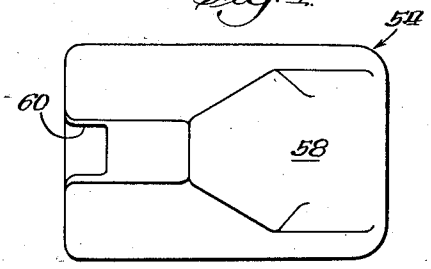


Fig. 7.

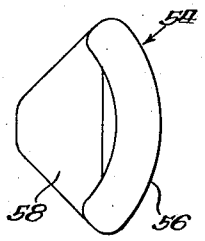


Fig. 8.

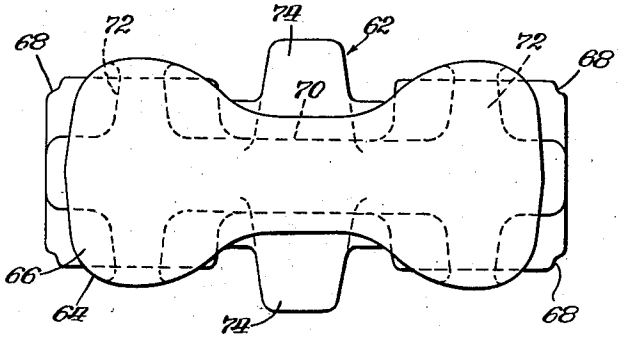


Fig. 5.

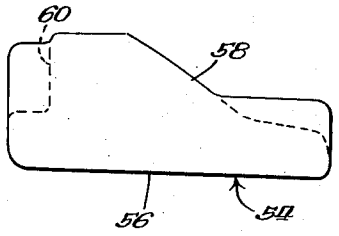


Fig. 9.

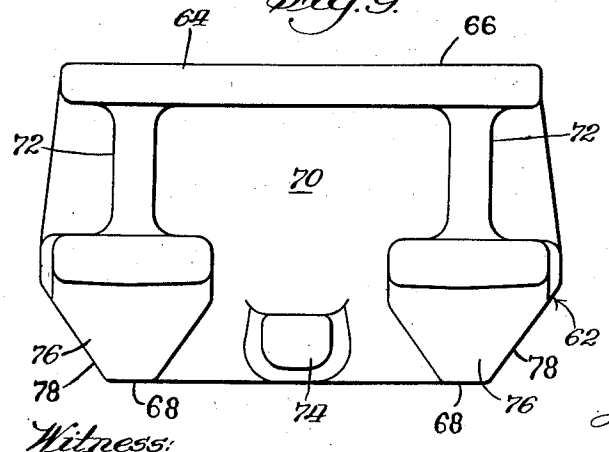
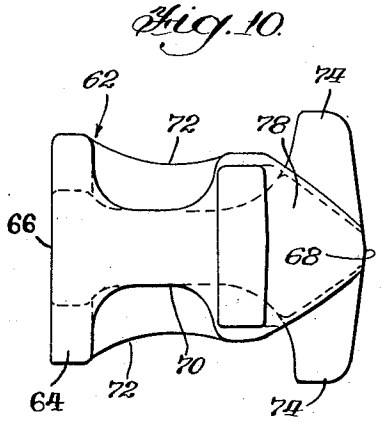


Fig. 10.



Witness:
Richard W. Carpenter

INVENTORS.
Joseph A. Andrews
Clifford D. Morley
By: Walter J. Schlegel, Jr. Atty.

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Fig. 14.

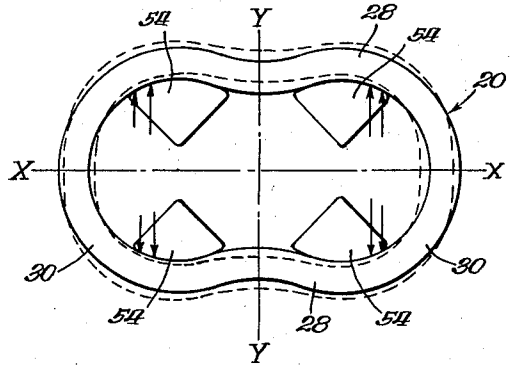


Fig. 11.

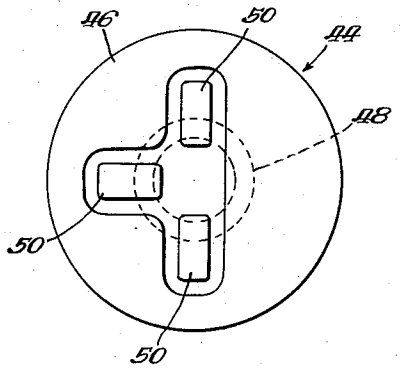


Fig. 15.

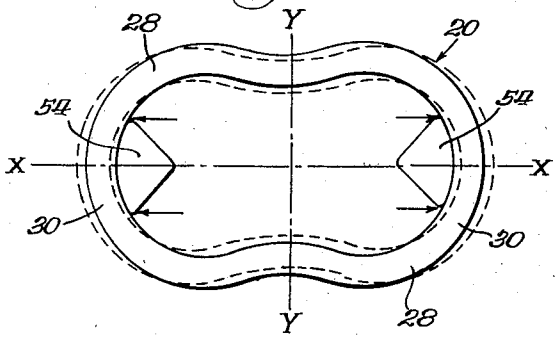


Fig. 12.

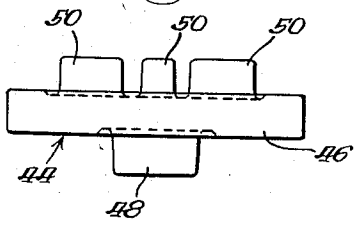


Fig. 16.

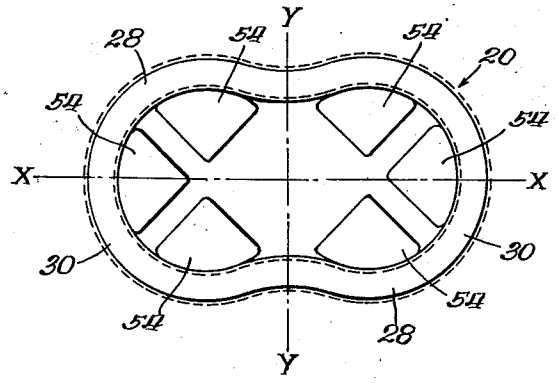
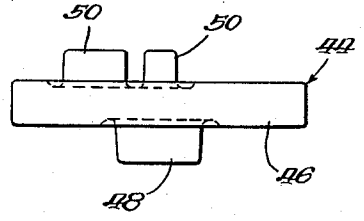


Fig. 13.



Witness:
Richard W. Carpenter

INVENTORS.
Joseph A. Andrews
Clifford D. Morley
By: Walter L. Schlegel Jr. Atty.

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2,906,415

DRAFT GEAR

Joseph A. Andrews, Park Forest, Ill., and Clifford D. Morley, Munster, Ind., assignors to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

Application December 28, 1956, Serial No. 631,113

5 Claims. (Cl. 213—24)

This invention relates to draft gears of the type associated with railway car couplers for frictionally absorbing draft and buffing shocks to which the couplers are subjected.

The invention comprehends an arrangement including a plurality of friction shoes resiliently mounted in a housing and urged into frictional engagement with inner friction surfaces of the housing by a wedge member as the draft and buffing forces are imposed upon the draft gear.

Inasmuch as a function of a draft gear of this type is to develop frictional resistance to draft and buffing forces exerted thereupon, it is highly essential to the successful and efficient operation of a draft gear that maximum areas of frictional engagement or contact between mating elements be insured at all times and that load pressures be uniformly distributed upon all coacting friction surfaces.

Various types and shapes of friction draft gears have been designed in an attempt to increase available areas of friction surfaces between mating parts, one such gear being the twin barrelled type draft gear which, in effect, is a double gear or pair of gears having a common housing and wedge. An example of this type of gear is disclosed in Patent No. 2,646,894, issued to R. C. Pierce on July 23, 1953. In the twin gear, separate sets of friction shoes are supported on separate sets of spring means in parallel relationship with each other in generally cylindrical adjacent chambers of a common housing and are urged into frictional engagement with inner friction surfaces of the housing by a common wedge means. This arrangement is desirable not only from the standpoint of providing greater areas of friction surfaces than is possible in conventional gears, but also from the standpoint of safety, for if one section of the gear fails to function, the other section can absorb the load to a limited extent.

A serious problem in connection with the design and operation of twin type gears, however, is that of maintaining uniform load pressure distribution upon coacting friction surfaces. This problem is largely due to the normal elastic deformation of the housing occurring during the application of the load pressure thereupon. As the load force is applied through the wedge means and friction shoes to the side walls of the housing, the housing tends to deform with the side walls deflecting convexly outward and the end walls deflect convexly inward with the result that the friction shoes become misaligned relative to the friction surfaces of the housing and/or the wedge surfaces of the wedge follower member. Such misalignment prevents proper full face engagement between related surfaces and causes unequal and/or non-uniform distribution of load forces upon the parts.

It is, therefore, a primary object of this invention to provide a draft gear arrangement having increased areas of friction surfaces which afford greater potential frictional resistance than is offered by conventional gears.

Another object of the invention is the provision of an

arrangement wherein the forces exerted on the housing are substantially equalized in all directions.

Another object of the invention is the provision of a draft gear arrangement affording uniform distribution of pressure upon the housing.

A further object of the invention is the provision of a draft gear arrangement having maximum bearing areas between mating friction elements.

A still further object of the invention is the provision of a draft gear arrangement of the twin-barrelled type having separate sets of friction shoes mounted on separate spring means and actuated by a common wedge means.

Another object of the invention is the provision of a draft gear arrangement wherein the forces exerted by the friction shoes on the housing are adapted to uniformly compensate for the elastic deformation of the housing.

A more specific object of the invention is the provision of a draft gear having twin sets of three arcuate friction shoes each engageable with separate arcuate friction surfaces of the housing.

These and other objects of the invention will be apparent from an examination of the following description and drawings, wherein:

Figure 1 is a fragmentary top plan view of a draft gear arrangement embodying features of our invention, with portions of the structure being shown in a section taken on line 1—1 of Figure 2;

Figure 2 is a side elevational view of the structure illustrated in Figure 1, with portions thereof shown in a section taken on line 2—2 of Figure 1;

Figure 3 is an end elevational view of the structure illustrated in Figure 1, with portions thereof shown in a section taken on 3—3 of Figure 1;

Figures 4 through 7 are front, side, bottom, and top detail views, respectively, of a friction shoe used in the arrangement illustrated in Figure 1;

Figures 8 through 10 are top, side, and end detail views, respectively, of a wedge member used in the arrangement illustrated in Figure 1;

Figures 11 through 13 are top, side, and end detail views, respectively, of a spring cap used in the arrangement illustrated in Figure 1, and

Figures 14 through 16 are diagrammatic sketches illustrating the effect of the application of forces to the housing by the friction shoes.

Referring now to the drawings for a better understanding of the invention, it will be seen that the draft gear includes a case or housing, indicated generally at **20**, having an open forward end **22** and a closed rearward end **24**.

As best seen in Figure 3, the housing is twin-barrelled in shape and presents a pair of somewhat cylindrically shaped longitudinally extending parallel chambers **26** formed by integral side and end walls **28** and **30**, respectively, which are interconnected at the closed end **24** of the housing by a base wall **32**. The side walls **28** may be provided with centrally disposed inwardly extending retaining lugs **33**, the function of which is hereinafter described. The base wall **32** presents on its inner surface a pair of spring seats **34** which are disposed approximately centrally of the respective chambers **26**. As best seen in Figures 1 and 2, the housing presents adjacent its forward or open end **22** partly arcuate friction surfaces **36** in the respective chambers **26**. Although the forward ends of the side and end walls **28** and **30**, respectively, of the housing are preferably inclined outwardly from the longitudinal axis of the housing, the surfaces **36** are still cylindrical in character.

Separate pairs of spring sets **38**, each preferably comprising a pair of inner and outer coil springs **40** and **42**, respectively, are disposed in the housing chambers **26** and extend longitudinally of the housing in substantial

parallel relation to each other. It will be understood, however, that the invention is not limited to any particular type of spring means and, if desired, rubber springs can be substituted for the coil springs.

Seated on the forward ends of the respective spring sets **38** are a pair of spring caps indicated generally at **44**. As best seen in Figures 11 through 13, each spring cap comprising a generally arcuate base or plate **46** presenting on the rearward side thereof a preferably annular boss or flange **48** in telescopic engagement with the related spring set **38**. The forward or outer side of the spring cap plate **46** may be provided with three spaced bosses or lugs **50** which are preferably rectangular in shape and disposed with two of the bosses having their longitudinal center lines in a common diametral plane normal to the longitudinal center line of the third lug.

Referring now to Figure 3 of the drawings, it will be seen that separate groups or sets **52** of friction shoes, each group comprising three shoes **54**, are mounted on the spring caps **44** in the respective chambers **26** of the housing. As best seen in Figures 4 through 7, each friction shoe **54** is somewhat triangular or pie-shaped, as seen in plan, and presents an outer arcuate friction surface **56** and an inner wedge surface **58** which is preferably crowned in both longitudinal and transverse directions. The bottom of each shoe is provided with a generally rectangular recess **60** adapted to receive and mount on the related spring cap lug **50**.

The shoes of each group disposed in each chamber **26** of the housing are positioned adjacent each other so as to occupy approximately three quadrants of the housing. Two of the shoes are disposed in oppositely facing directions with their respective friction surfaces engaging the portions of the housing friction surface presented by the side walls **28** and with their radial center lines lying in a common diametral plane, while the third shoe is disposed with its friction surface engaging that portion of the housing friction surface **36** presented by the end wall **30** and with its radial center line extending normal to the radial center lines of the other shoes.

A wedge member indicated generally at **62** is disposed partially within both chambers **26** of the housing and mounted on the respective groups **52** of friction shoes **54**. As best seen in Figures 8 through 10, the wedge member comprises a plate or base **64** presenting a flat outer surface **66**. Preferably formed integrally with the inner side of the base **64** are a pair of wedge elements **68** spaced from each other longitudinally of the wedge member and connected to the base and to each other by integral longitudinally and transversely extending webs **70** and **72**, respectively. A pair of outwardly extending lugs **74** may be formed integrally with the longitudinal web **70** and disposed centrally thereof for engagement with housing lugs **33** to retain the gear in assembled condition. Each wedge element is substantially in the form of an inverted truncated pyramid and presents side and end preferably crowned wedge surfaces **76** and **78**, respectively, adapted to seat on and engage the respective wedge surfaces **58** of the related friction shoes **54**.

To describe the operation of the device, it will be understood that as buffing or draft forces are imposed upon the gear, the wedge **62** is urged against both groups **52** of friction shoes **54** and the force is transmitted through the engagement of the related wedge surfaces of the wedge member and friction shoes to the respective friction surfaces **36** of the housing whereby the frictional resistance therein developed serves to damp or cushion the movements of the related parts of the coupling mechanism.

As seen in Figure 14, in a conventional four-shoe draft gear arrangement wherein pairs of oppositely facing shoes are engageable with opposed side walls of a housing, the draft and buffing forces applied by the wedge means to the shoes are transmitted by the shoes to the side walls of the housing along lines extending generally normal to the long or major transverse axis X—X of the housing and generally parallel to the short or minor transverse axis Y—Y of the housing. As the force is transmitted to the side walls by the friction shoes, the side walls tend to deflect convexly outward and the end walls convexly inward, as indicated by the dotted lines in Figure 14, thereby causing the shoes to rotate relative to the housing wall and wedge member and become misaligned therewith. This misalignment is highly undesirable for two reasons. First, it decreases the area of contact or engagement between friction surfaces of the shoes and housing, thereby greatly reducing the frictional resistance developed by the gear; secondly, it results in uneven or nonuniform exertion of pressure upon certain portions of the housing which causes a weakening of the structure and/or malfunctioning of the gear.

Referring to Figure 15, it will be seen that in a draft gear arrangement having only two shoes disposed adjacent opposite end walls of the housing, the elastic deflection of the end and side walls of the housing caused by the application of pressure is exactly opposite in direction to the deflection caused by pressure applied to the side walls as above described.

Now, referring to Figure 16, it will be seen that by the disposition of the shoes in our novel draft gear arrangement, the forces exerted by the side shoes and end shoes upon the side and end walls, respectively, serve to compensate each other for the elastic deflection of the housing. In this arrangement, although the housing still expands, the expansion is uniform and constant throughout and maximum bearing areas are maintained between mating elements so that the pressure is uniformly distributed upon the housing, and maximum frictional resistance between coacting elements is developed by the gear.

We claim:

1. In a draft gear arrangement, the combination of: a twin chambered housing comprising spaced side and end walls interconnected by a base wall, said housing being closed at one end by said base wall and open at the other and presenting arcuate inner friction surfaces adjacent its open end, independent spring means disposed in said housing against said base wall, spring caps mounted on the respective spring means, sets of three friction shoes each mounted on the respective spring caps in interlocking engagement therewith, each of said shoes being generally pie-shaped and presenting an arcuate outer friction surface and an inner wedge surface, the shoes of each set being disposed adjacent each other in a separate chamber of the housing to form three quadrants of a circle with the friction surfaces of two of the shoes engaging friction surfaces presented by the side walls of the housing and the friction surface of the third shoe engaging the friction surface presented by one end wall of the housing, and a wedge member having surfaces engageable with the wedge surfaces of the respective shoes.

2. In a draft gear arrangement, the combination of: a housing comprising spaced side and end walls interconnected by a base wall closing one end of the housing, said side and end walls presenting adjacent the other end of the housing separate arcuate inner friction surfaces, independent spring means disposed in the housing and seated against the base wall, a pair of spring caps seated on the respective spring means, independent groups of friction shoes mounted on the respective spring caps in interlocking engagement therewith, each of said groups comprising a plurality of pie-shaped friction shoes presenting arcuate outer friction surfaces and inner wedge surfaces, said friction shoes being disposed with certain of said shoes in engagement with the friction surfaces presented by the end walls of the housing, certain other of said shoes in engagement with the friction surfaces presented by the side walls of the housing, and a wedge member having wedge surfaces engageable with the wedge surfaces of the respective shoes.

3. In a draft gear arrangement, the combination of: a

housing closed at one end and presenting at the other end a pair of separate inner arcuate friction surfaces spaced from each other, independent parallel spring means disposed in the housing and seated against the closed end of the housing, independent spring caps mounted on the respective spring means, separate groups of friction shoes mounted on the respective spring caps, said shoes being generally pie-shaped and presenting arcuate outer friction surfaces and inner wedge surfaces, said shoes being disposed to engage the friction surfaces of the housing, certain of said shoes being operable to exert pressure upon the housing in directions normal to the line of direction of pressure exerted by other of the shoes upon the housing, and wedge means mounted on and engageable with the wedge surfaces of the friction shoes.

4. In a draft gear arrangement, the combination of: a housing closed at one end and presenting adjacent the other end separate friction surfaces, independent parallel spring means disposed within the housing and seated on the closed end thereof, spring caps mounted on the respective spring means in telescopic engagement therewith, friction shoes mounted on the respective spring caps in interlocking engagement therewith, said friction shoes presenting outer friction surfaces and inner wedge surfaces, said shoes being disposed to engage the friction surfaces of the housing, certain of said shoes being operable to exert pressure upon the housing in a direction normal to the direction of pressure exerted by the other of said shoes, and wedge means engageable with said shoes.

5. In a draft gear arrangement, the combination of: a

housing closed at one end and defining a pair of parallel communicating generally cylindrical chambers, arcuate friction surfaces presented by the respective chambers, independent spring means disposed in the respective chambers and seated against the closed end of the housing, independent spring caps engaging related spring means, each of said spring caps comprising at least three bosses disposed with two of the bosses having their longitudinal center lines in a common diametral plane normal to the third boss, independent groups of friction shoes mounted on respective spring caps and in interlocking engagement with said bosses, each of said groups comprising at least three generally pie-shaped shoes disposed adjacent each other and presenting arculate friction surfaces engageable with the friction surface of the related chamber, the shoes of each group being positioned with the radial center plane of each shoe at approximately right angles to the radial center plane of an adjacent shoe of the group, and wedge means engageable with the shoes.

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