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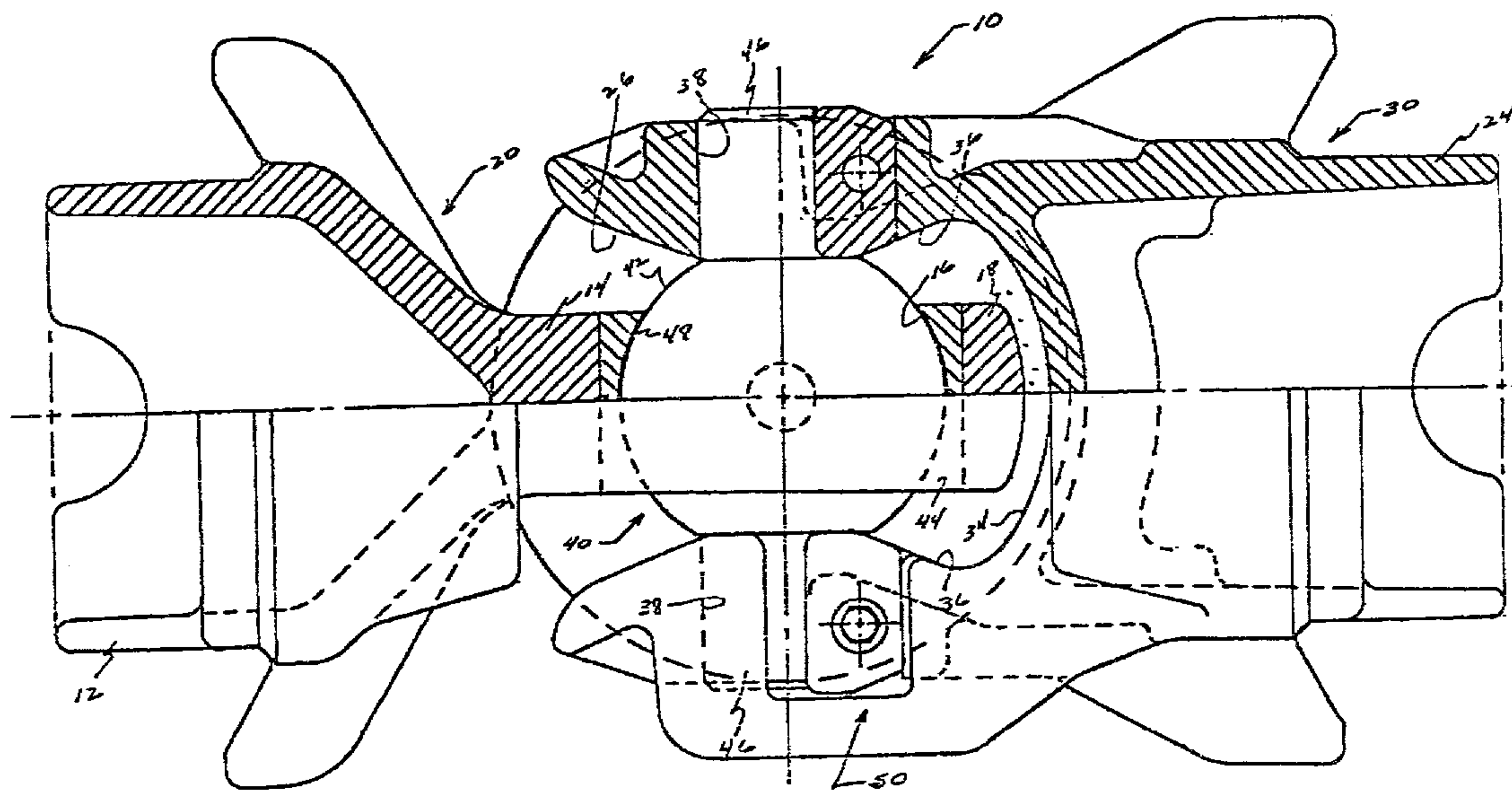
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(54) **ATTELAGE ARTICULE SEMI-PERMANENT POUR MATERIEL  
FERROVIAIRE**

(54) **ARTICULATED COUPLING APPARATUS FOR CONNECTING  
ADJACENT ENDS OF A PAIR OF RAILWAY CARS  
TOGETHER IN A SEMIPERMANENT MANNER**



(57) The present invention provide an articulated coupling apparatus which connects one end of one railway car to an adjacent end of a second railway car in a semipermanent manner. Such coupling apparatus includes a male connection member, a female connection member, a bearing assembly, and a device for securing such bearing assembly to the coupling apparatus.

ABSTRACT OF THE DISCLOSURE

The present invention provides an articulated coupling apparatus which connects one end of one railway car to an adjacent end of a second railway car in a semipermanent manner. Such coupling apparatus includes a male connection member, a female connection member, a bearing assembly, and a device for securing such bearing assembly to the coupling apparatus.

ARTICULATED COUPLING APPARATUS FOR CONNECTING ADJACENT  
ENDS OF A PAIR OF RAILWAY CARS TOGETHER IN A SEMI-  
PERMANENT MANNER

This invention relates to railway car coupling devices and, more particularly, this invention relates to an articulated-type coupling device which connects one end of a first railway car to an adjacent end of a second railway car, in a semipermanent manner.

10 Prior to the present invention, it is known to use standard couplers, approved by the Association of American Railroads (AAR) to connect adjacent ends of a pair of railway cars. For example, in this application, such couplers are designed to facilitate both the connecting and disconnecting of individual railway cars. These couplers enable such cars to be readily combined to make up a train consist, or to be individually separated for loading and unloading purposes as necessary.

20 In more recent times, such railroad industry has discovered that the interconnecting of several railway cars to form a generally semipermanent unit has a number of advantages. Particularly, railroad cars adapted for use in "piggyback" service have been joined in this manner to advantage. These units do not require the use of the standard coupler, except between units. The reason such standard couplers are not required is because these units are only broken periodically. Normally, this occurs when maintenance

of an individual component must be carried out. Obviously, considerable cost-savings are achieved by this arrangement.

With the use of these semipermanent coupling arrangements and with the higher loads being carried by modern railway trains, it is of the utmost importance that a close-buttoned relationship be maintained between the coupler draft components. Such close-buttoned relationship is required to reduce the effects of the impact forces which are encountered under buff conditions of train operations.

10        One prior type of articulated coupling device used is taught in U.S. Patent No. 4,258,628. This particular device includes a male connection member secured to one end of a first railway car body, and a female connection member secured to an adjacent end of a second railway car body. The female connection member is rotatably-engaged in a center plate bowl of a bolster of a railroad car truck in a manner well known. The outer end of the male connection member is disposed for movement in a cavity formed in the outer end of such female connection member. Both the male and female connection members are joined by a pin member. This pin member is positioned in a vertical direction and disposed in  
20        aligned apertures formed in each of the male and female connection members. The aperture formed in the male connection member for receiving the pin member must be somewhat larger than the pin member itself to allow certain required movements.

The outer end surface of the outer end of the male connection member includes a convex configuration which abuts against a



complimentary concave surface formed on a front face of a follower member. In this coupling device, the follower member is carried within the rear portion of the cavity formed in the other end portion of the female connection member. The exposed outer surface of a resilient element is engaged by a vertically-disposed wedge element. Such wedge element is provided to urge the follower member and the male connection member forward. In this manner, the rear surface portion of the aperture formed in the male connection member is maintained substantially in contact with the pin member at all times.

Such contact is necessary in these coupling devices, because most of the articulated connecting parts are cast members. In order to reduce the cost of this coupling device, the cast members receive very little, if any, finish-machining to provide the necessary or desired dimensional control.

Other prior art articulated coupling devices are taught in U.S. Patent No. 3,716,146 and Canadian Patent No. 1,231,078.

The present invention provides an improved articulable coupling apparatus. Such coupling apparatus being used for connecting, in a substantially semipermanent manner, at least one end of a first railway car to an adjacent end of a second railway car. In a presently preferred arrangement, such articulable coupling apparatus includes a male connection member. A first end of such male connection member is secured to a center sill member adjacent one end of one of

such first and such second railway cars. The second end of the male connection member includes an aperture formed there-through. A longitudinal axis of such aperture lies in a substantially horizontal plane. The outer end surface of the second end of such male connection member includes a convex configuration in both a horizontal plane and a vertical plane. A female connection member is provided which, at a first end thereof, is secured to a center sill member on an adjacent end of an opposite one of such first and such second railway cars. The second end of this female connection member includes a substantially open top cavity formed therein. Such open top cavity received the second end of the male connection member therein. In this manner, the second end of the female connection member is provided with a bottom wall, a back wall, and a pair of substantially parallel upstanding side walls. The bottom wall carries a center plate member. Such center plate member is positionable for rotation within the bolster center bowl of a railway truck. Each of such pair of upstanding side walls has an axially-opposed, cutout portion formed therein which includes both a generally rectangular portion and a generally spherical portion. The coupling apparatus further includes a bearing assembly engageable in such aperture formed in the second end of the male connection member and the spherical portion in each of the upstanding side walls

cutout portion formed in the second end of the female connection member. In addition, a means is provided for securing such bearing assembly into the spherical portion of the cutout portion of such second end of the female connection member.

It is therefore, one of the primary objects of the present invention to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together which requires fewer components.

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Another object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together in which a minimum number of components must move relative to one another during operation.

Still another object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together which is relatively simple to assemble and disassemble.

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An additional object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together which can be more easily maintained in proper working order.

Yet another object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together which



required a minimum amount of machining of the components.

Another object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together, which generally will be lighter in weight than present coupling devices.

Still yet another object of the present invention is to provide an articuable coupling apparatus for connecting adjacent ends of a pair of railway cars together which will be cost-effective.

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In addition to the above-described objects and advantages of the articuable coupling apparatus, various other objects and advantages of the present invention will become apparent to those persons skilled in the art, from the following more detailed description of the invention, particularly when such description is taken in conjunction with the attached drawing figures.

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FIG. 1 is a side elevation view, partially in cross-section, which illustrates one presently preferred embodiment of an articuable coupling apparatus constructed according to the present invention;

FIG. 2 is a top view, partially in cross-section of the articuable coupling apparatus illustrated in FIG. 1;

FIG. 3 is a side elevation view which illustrates an alternative embodiment of an articuable coupling apparatus constructed according to the present invention; and



FIG. 4 is a top view, partially in cross-section, of the articuable coupling apparatus illustrated in FIG. 3.

Prior to proceeding to the more detailed description of the invention, it should be noted that in each of the several views illustrated, identical components which have identical functions have been identified with identical reference numerals.

10 Now refer more particularly to FIGS. 1 and 2. Illustrated therein is one presently preferred embodiment of an articulated coupling apparatus, generally designated 10, that is constructed in accordance with the present invention. This coupling apparatus 10 can be retrofitted to existing railway cars, if desired, and is capable of connecting together, in a substantially semipermanent manner, at least one end of a first railway car (not shown) to an adjacent end of a second railway car (not shown).

20 Such apparatus 10 includes a male connection member, generally designated 20, a female connection member, generally designated 30, a bearing assembly, generally designated 40, and a means, generally designated 50, for securing the bearing assembly 40 to such coupling apparatus 10 in a semipermanent fashion.

The male connection member 20, at a first end 12 thereof, is engaged with and connected to one end of a center sill member (not shown) disposed substantially

along a longitudinal centerline of one of such first and such second railway cars.

Prior to being secured in place such first end 12 is positioned within the center sill portion for a predetermined distance which will generally be about 6 to 10 inches, and about 8 inches being preferred and typical. Because such first end 12 must fit within the center sill portion of the railway car, its outer dimensions are substantially controlled by the inner dimensions of such center sill portion. The second end 14 is generally an elongated rectangular-shaped element. The outermost end 18 of such second end 14 of the male connection member 20 has a convex shape in a plane which extends in both a vertical and a horizontal direction. In addition, the bottom wall portion 22 of such second end 14 of the male connection member 20 is tapered upwardly. Such tapered portion has a taper of at least about 10 degrees. The purpose of this tapered portion of such bottom wall 22 of the male connection member 20 is to allow flexing in a horizontal plane when the cars are moving over hilly terrain.

Disposed within such second end 14 of the male connection member 20 is an aperture 16, the purpose of which will become clear as the description proceeds.

The aperture 16 includes a predetermined size and a predetermined shape. Such aperture 16 is formed through a

predetermined portion of the second end 14 of such male connection member 20. This aperture 16 has a longitudinal axis that is disposed transverse to a longitudinal axis of such male connection member 20 and lies in a substantially horizontal plane.

10 The female connection member 30 includes a first end 24 which is configured in a manner that will enable it to be engaged with and connected to an adjacent end of a center sill member (not shown) disposed substantially along a longitudinal centerline of an opposite one of such first and such second railway cars (not shown).

20 A cavity 26 is formed in a second end of the female connection member 30. This cavity 26 received therein a portion of each of the second end 14 of such male connection member 20 and such aperture 16 formed through such second end 14. This cavity 28 is formed by a substantially horizontally-disposed bottom wall portion 32, a substantially vertically-disposed back wall portion 34 connected along a bottom edge thereof to a rear edge of such bottom wall portion 32, and a pair of vertically-disposed side wall portions 36 connected along a bottom edge thereof to the bottom wall portion 32 and along a rear edge thereof to such back wall portion 34. An inner surface of each of such bottom wall portion 32 and such rear wall portion 34 and such pair of side wall portions 36 define



a predetermined size and a predetermined shape of the cavity 26 which is open adjacent a top and front surface thereof.

An opening 38 is formed through a predetermined portion of each of the pair of side wall portions 36. The openings 38 are positioned in axial alignment from one another. Each opening 38 at least includes a slot-like portion adjacent an upper surface of a respective side wall portion 36. Such opening 38 has a predetermined configuration.

10 The coupling apparatus 10 includes a bearing assembly 40. Such bearing assembly 40 includes a substantially spherical member 42. At least a predetermined portion of such spherical member 42 is positioned within such aperture 16 formed through the second end 14 of the male connection member 20. Such spherical member 42 has a predetermined diameter.

20 A race assembly 44, having a substantially spherical inner surface, is positioned around such predetermined portion of the spherical member 42. Such race assembly 44 is positioned within the aperture 16 to enable movement of such male connection member 20 in relation to such female connection member 30 in both a vertical and a horizontal direction over a predetermined range. Such race assembly 44 includes an outer surface which is substantially identical to such size and such shape of such aperture 16 formed through the second end 14 of the male connection member 20.

A first securing means, generally designated 60, is engageable with such race assembly 44 and such second end 14 for securing this race assembly 44 and the spherical member 42 to such second end 14 of such male connection member 20.

10 A pair of shaft members 46 extend outwardly a predetermined length from axially-opposed surfaces of such spherical member 42. One of such pair of shaft members 46 being engaged in a respective one of such opening 38 formed through such pair of side wall portions 36 of such cavity 26. At least a portion of each of such pair of shaft members 46 having a substantially identical configuration as at least a portion of such predetermined configuration of such opening 38.

20 A second securing means, generally designated 50, is engageable with at least one of such pair of shaft members 46 and a portion of such opening 38 for securing such bearing assembly 40 to such female connection member 30 and thereby securing the male connection member 20 to such female connection member 30 to form the coupling apparatus 10 of the invention.

In one form of the invention, such substantially spherical inner surface of the race assembly 44 will have a substantially identical radius as the radius of such spherical member 42.

In the most preferred embodiment of the invention,

such spherical inner surface of such race assembly 44 will be slightly larger than the radius of such spherical member 42. In this case, such coupling apparatus 10 further includes a lubricating liner 48 disposed intermediate such inner surface of the race assembly 44 and the spherical member 42.

10 It is presently preferred that such lubricating liner 48 will be formed in at least two pieces. It is also preferred that such lubricating liner 48 be bonded to such inner surface of the race assembly 44. Such bonding preferably being accomplished by an adhesive material.

According to the present invention, the bottom wall portion 32 of such cavity 26 further includes a center plate member 52 which matingly-engages a center bowl (not shown) of a bolster portion (not shown) of a railway car truck (not shown). Such center plate member 52 includes a vertically-disposed hole 54 adjacent a bottom surface 56 thereof. Such hole 54 is located substantially in the center of such center plate member 52.

20 Additionally, the coupling apparatus 10 further includes a vertically-disposed pin member (not shown) which is engageable in such hole 54 and a vertically-disposed hole (not shown) in such center bowl of such bolster.

In the presently preferred embodiment of this invention, the second end 14 of such male connection



member 20 has a predetermined configuration adjacent an outermost end 18 thereof. This predetermined configuration is a substantially convex shape in each of a vertically-disposed and a horizontally-disposed plane.

In addition, it is preferred that the vertically-disposed back wall portion 34 of such cavity 26 has a predetermined configuration. This predetermined configuration is a substantially concave shape in at least one of a vertical and a horizontal plane.

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In this embodiment of the invention, it is also preferred that the predetermined shape of the aperture is formed through such second end 14 of such male connection member 20 is substantially round. Additionally, this aperture 16 includes a beveled portion 28 adjacent at least one predetermined outer surface thereof.

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In this case, the race assembly 44 includes a complementary beveled ledge portion 62 which abuttingly-engages such beveled portion 28 adjacent such at least one predetermined outer surface of such aperture 16 formed through such second end 14 of male connection member 20.

Furthermore, it is preferred that race assembly 44 be formed in at least two pieces, which are substantially identical.

It is likewise preferred that such spherical member 42 and such pair of shaft members 46 be formed as a single piece.

The first securing means 60 engageable with each of

such race assembly 44 and such second end 14 of the male connection member 20 can be a weldment or a plate member (not shown) bolted to such second end 14.

10 In the preferred embodiment of this invention, such pair of vertically-disposed side wall portions 36 include a tapered portion adjacent the front surface of such cavity 26 and adjacent such vertically-disposed back wall portion 34 of such cavity 26 to enable the second end 14 of such male connection member 20 to rotate about such spherical member 42 in a horizontal direction.

Finally, the predetermined configuration of such opening 38 formed through such pair of vertically-disposed side wall portions 36 at least includes a generally round portion engageable with a portion of a respective one of such pair of shaft members 46.

20 While a number of embodiments of the articulated coupling apparatus have been described in detail above, it should be obvious to persons skilled in the art that various other modifications and adaptations of the invention can be made without departing from the spirit and scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An articuable-type coupling apparatus which can be retrofitted to existing railway cars and is capable of connecting together, in a substantially semipermanent manner, at least one predetermined end of a first railway car to an adjacent predetermined end of a second railway car, said articuable-type coupling apparatus comprising:

- (a) a male connection member in which a first end thereof is configured to be engaged with and connected to one predetermined end of a center sill member disposed substantially along a longitudinal centerline of one of such first and such second railway cars.;
- (b) an aperture, having a predetermined size and a predetermined shape, formed through a predetermined portion of a second end of said male connection member, said aperture has a longitudinal axis that is disposed transverse to a longitudinal axis of said male connection member and is in a substantially horizontal plane;
- (c) a female connection member in which a first end thereof is configured to be engaged with and connected to an adjacent predetermined end of a center sill member disposed substantially along a longitudinal centerline of an opposite one of such first and such second railway cars;



- (d) a cavity formed in a second end of said female connection member, which receives therein at least a portion of each of said second end of said male connection member and said aperture formed through said predetermined portion of said second end, said cavity having a substantially horizontally-disposed bottom wall portion, a substantially vertically-disposed back wall portion connected along a bottom edge thereof to a rear edge of said bottom wall portion, and a pair of vertically-disposed side wall portions connected along a bottom edge thereof to said bottom wall portion and along a rear edge thereof to said back wall portion, an inner surface of each of said bottom wall portion and said rear wall portion and said pair of side wall portions define a predetermined size and a predetermined shape of said cavity which is open adjacent a top and front surface thereof;
- (e) an opening formed through a predetermined portion of each of said pair of side wall portions, each opening at least includes a slot-like portion adjacent an upper surface of a respective side wall portion, said each opening having a predetermined configuration;

(f) a bearing assembly, said bearing assembly includes:

- (i) a substantially spherical member, at least a predetermined portion of which is positioned within said aperture formed through said second end of said male connection member, said spherical member having a predetermined diameter,
- (ii) a race assembly having a substantially spherical inner surface positioned around said predetermined portion of said spherical member to enable movement of said male connection member in relation to said female connection member in both a vertical and a horizontal direction over a predetermined range, said race assembly having an outer surface which is substantially identical to said predetermined size and said predetermined shape of said aperture formed through said second end of said male connection member,
- (iii) a first securing means engageable with each of said race assembly and said second end of said male connection member for securing said race assembly and said spherical member to said second end; and
- (iv) a pair of shaft members extending outwardly a predetermined length from axially-opposed

surfaces of said spherical member, one of said pair of shaft members being engaged in a respective one of said opening formed through said pair of side wall portions of said cavity in said second end of said female connection member, at least a portion of each of said pair of shaft members having a substantially identical configuration as at least a portion of said predetermined configuration of said opening; and

- (g) a second securing means engageable with at least one of said pair of shaft members and a portion of said opening formed through said side wall portions for securing said bearing assembly to said female connection member and thereby securing said male connection member to said female connection member to form said articlable-type coupling apparatus.

2. An articlable-type coupling apparatus, according to claim 1, wherein said substantially spherical inner surface of said race assembly has a substantially identical radius as a radius of said spherical member.

3. An articlable-type coupling apparatus, according to claim 1, wherein said substantially spherical inner surface of said race assembly is slightly larger than a radius of said



spherical member, and said coupling apparatus further includes a lubricating liner disposed intermediate said inner surface of said race assembly and said spherical member.

4. An articuable-type coupling apparatus, according to claim 3, wherein said lubricating liner is formed in at least two pieces.

5. An articuable-type coupling apparatus, according to claim 4, wherein said lubricating liner is bonded to said inner surface of said race assembly.

6. An articuable-type coupling apparatus, according to claim 1, wherein said bottom wall portion of said cavity formed in said second end of said female connection member further includes a center plate member which matingly-engages a center bowl of a bolster portion of a railway car truck.

7. An articuable-type coupling apparatus, according to claim 6, wherein said center plate member includes a vertically-disposed hole adjacent a bottom surface thereof and substantially in a center thereof.

8. An articuable-type coupling apparatus, according to claim 7, wherein said coupling apparatus further includes a vertically-disposed pin member engageable in said hole in said center plate member and a vertically-disposed hole in such center bowl of such bolster.

9. An articlable-type coupling apparatus, according to claim 1, wherein said second end of said male connection member has a predetermined configuration adjacent an outermost end thereof.

10. An articlable-type coupling apparatus, according to claim 9, wherein said predetermined configuration of said outermost end of said second end of said male connection member has a substantially convex shape in each of a vertically-disposed and a horizontally-disposed plane.

11. An articlable-type coupling apparatus, according to claim 10, wherein said vertically-disposed back wall portion of said cavity formed in said second end of said female connection member has a predetermined configuration.

12. An articlable-type coupling apparatus, according to claim 11, wherein said predetermined configuration of said vertically-disposed back wall portion of said cavity is a substantially concave shape in at least one of a vertical plane and a horizontal plane.

13. An articlable-type coupling apparatus, according to claim 12, wherein said predetermined configuration of said vertically-disposed back wall portion of said cavity has a substantially concave shape in each of a vertical plane and a horizontal plane.

14. An articuable-type coupling apparatus, according to claim 1, wherein said predetermined shape of said aperture formed through said predetermined portion of said second end of said male connection member is substantially round.

15. An articuable-type coupling apparatus, according to claim 14, wherein said aperture formed through said predetermined portion of said second end of said male connection member includes a beveled portion adjacent at least one predetermined outer surface thereof.

16. An articuable-type coupling apparatus, according to claim 15, wherein said race assembly includes a complementary beveled ledge portion which abuttingly-engages said beveled portion adjacent said at least one predetermined outer surface of said aperture formed through said predetermined portion of said second end of said male connection member.

17. An articuable-type coupling apparatus, according to claim 1, wherein said at least two members forming said race assembly are substantially identical.

18. An articuable-type coupling apparatus, according to claim 1, wherein said spherical member and said pair of shaft members forming a portion of said bearing assembly are formed as a single piece.



19. An articuable-type coupling apparatus, according to claim 1, wherein said first securing means engageable with said each of said race assembly and said second end of said male connection member is a weldment.

20. An articuable-type coupling apparatus, according to claim 1, wherein each of said pair of vertically-disposed side wall portions includes a tapered portion adjacent said front surface of said cavity and adjacent said vertically-disposed back wall portion of said cavity to enable said second end of said male connection member to rotate about said spherical member in a horizontal direction.

21. An articuable-type coupling apparatus, according to claim 1, wherein said predetermined configuration of said opening formed through said each opening in said pair of vertically-disposed side wall portions at least includes a generally round portion engageable with a portion of a respective one of said pair of shaft members.

BLAKE, CASSELS & GRAYDON  
PATENT AGENTS OF THE APPLICANT

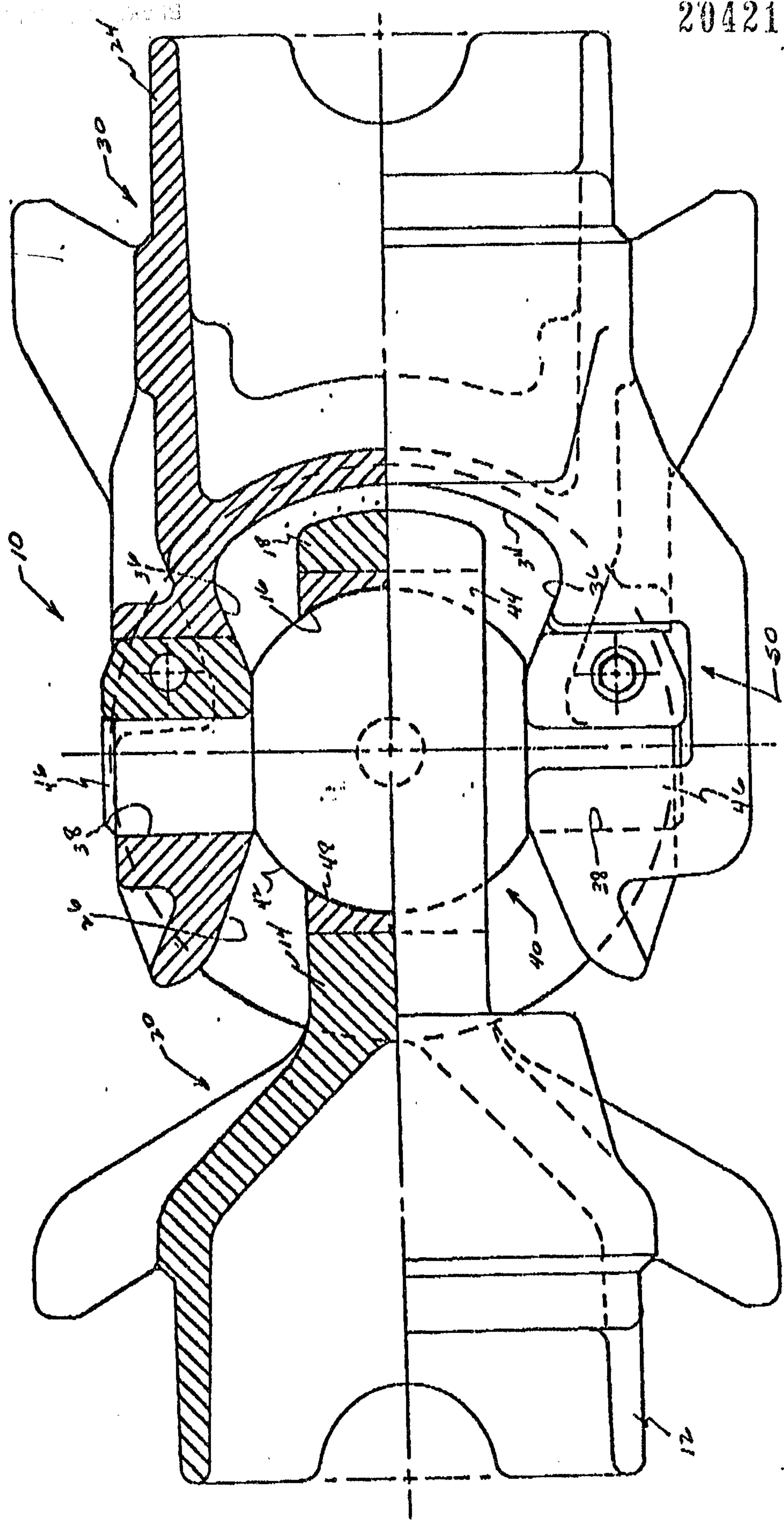


FIG. -1

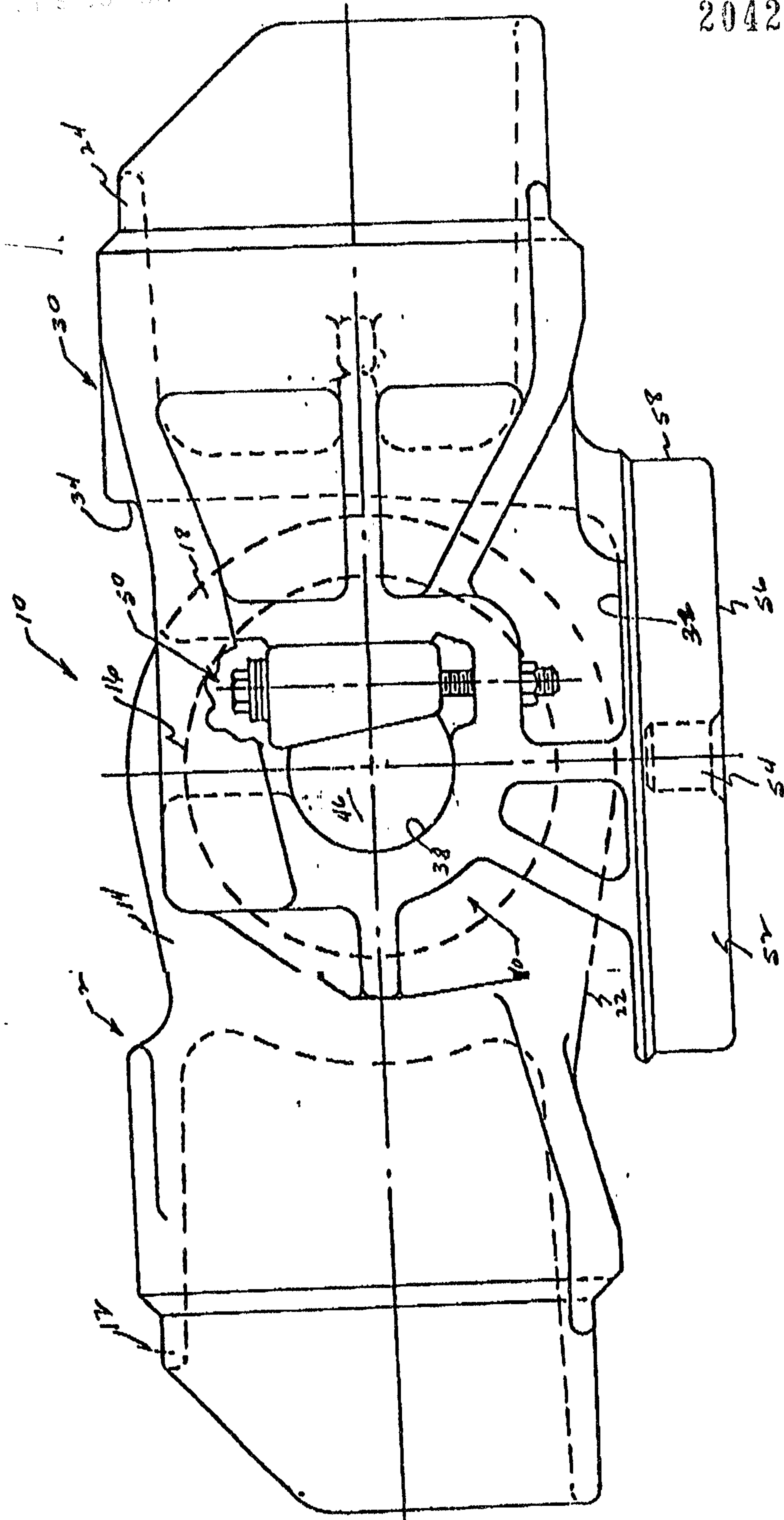


FIG.-2



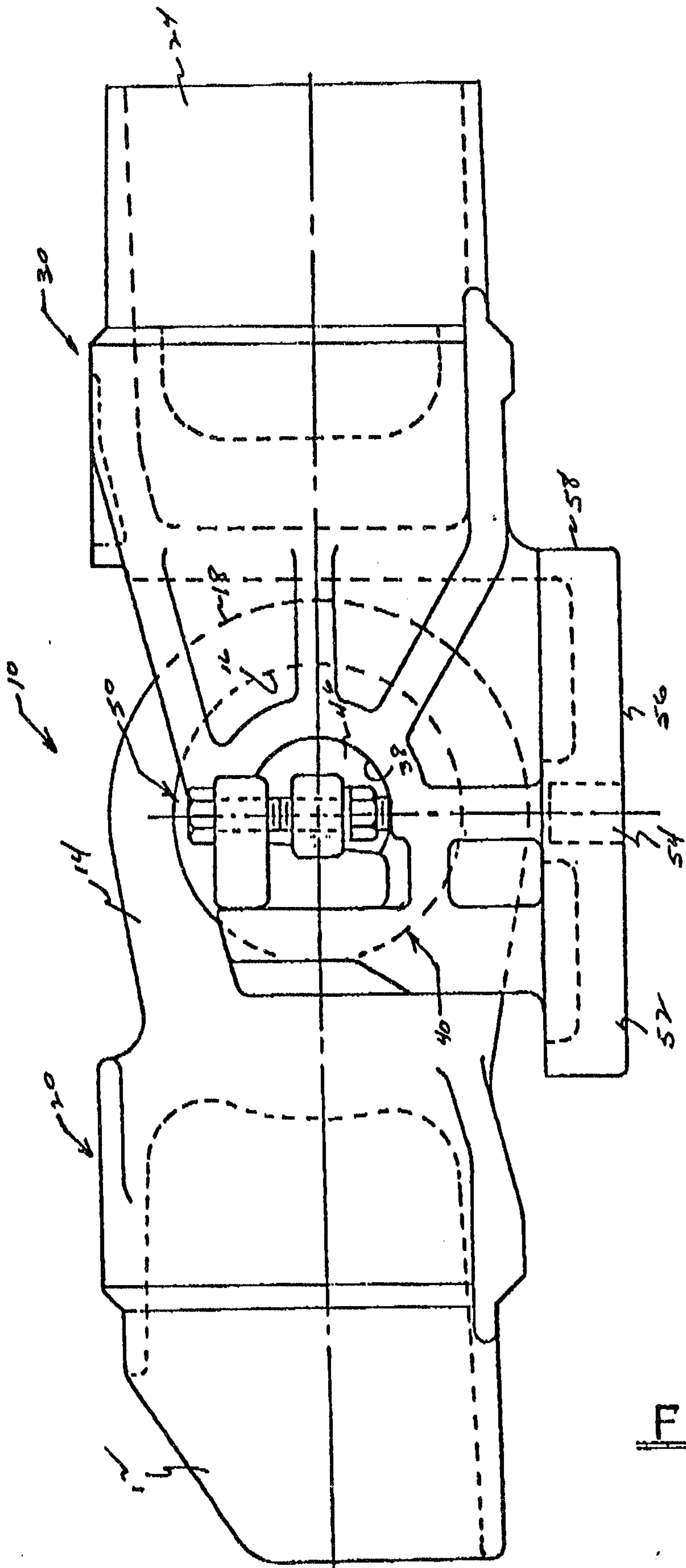
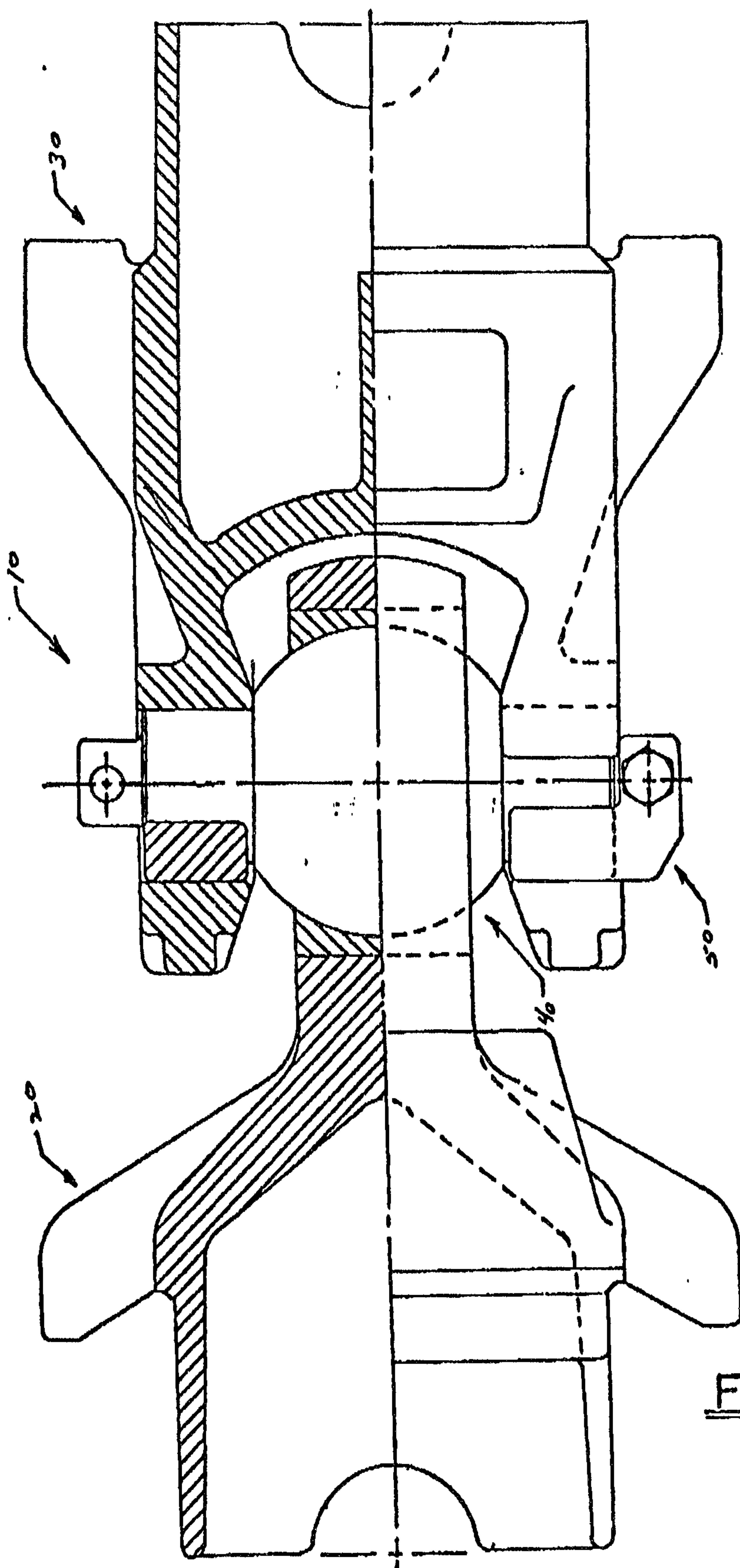


FIG. 3

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