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54 **Longitudinal steering linkage for truck with interaxle yokes.**

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Description

This invention relates to railway vehicles having trucks which are equipped with wheelsets which are pivotally mounted to the truck. The wheelsets are guided to a radial alignment during travel of the railway vehicle along circular curved track.

Railway trucks having steerable axles to achieve radial alignment are well-known in the art. Various mechanisms have been provided to steer the axles to a radial alignment.

In some trucks equipped for radial alignment of the wheelsets each wheelset is mounted in a steering yoke. The yokes are interconnected. Typically these mechanisms make use of the yaw motion of the car body relative to the truck centre line to create the steering motions. In such trucks, forces are created in a lateral direction on the outboard yoke and reacted through a reference link and lateral link to the truck side frame. In experience it has been found that the mechanical advantage of this system demanded the production of relatively large forces in order to generate the required steering motions and maintain them against the influences of wheel/rail forces, particularly those acting at the flange of the wheels when flange rail contact occurs and also the oscillatory forces generated during hunting. The stiffness, which can be designed into these type of components making up the mechanical linkage, is usually such that steering accuracy is inadequate and stability against hunting oscillations is unsatisfactory. An example of such a structure is disclosed in EP-A-0165752.

A new linkage has been developed to overcome these deficiencies. According to the new linkage steering motions are created without utilization of the truck frame for any pivotal connections.

The steering mechanism of this invention may be mounted on an existing truck having axles mounted in interconnected yokes. The mechanism is offset laterally from the centre line of the truck. It is advantageous to offset the mechanism as far as practical.

According to the invention there is provided a steering mechanism for use on a railway vehicle having a car body mounted on at least two trucks, at least one of said trucks having inboard and outboard wheelsets, each said wheelset having a yoke attached thereto, the two said yokes having a pivotal interconnection, characterized by said wheelsets supporting said truck and adapted for relative pivotal movement with respect to said truck about a generally vertical axis and by a steering mechanism for guiding said wheelsets to a radial alignment when said vehicle is travelling on circular curved track, comprising a steering link connected to said car body remote from the longitudinal centre line of said car body, a steering lever pivotally

connected to said steering link, and linkage mechanism interconnecting said steering lever and said inboard and outboard yokes whereby longitudinal movement of the connection between said steering link and said car body with respect to said truck when said truck rotates with respect to said body causes relative longitudinal movement of said linkage mechanism which guides said wheelsets to a radial alignment and maintains such alignment against the influences of wheel/rail forces.

The linkage mechanism inter-connects the steering lever and the inboard and outboard yokes whereby relative longitudinal movement of the car body/steering link connection point with respect to the truck when moving from tangent track to circular track causes relative and opposite pivotal movement of the inboard and outboard yokes whereby the wheelsets assume a radial configuration when on curved track.

A more complete understanding of the invention may be had by reference to the attached drawings and description which illustrate preferred embodiments of the invention and in which:

Figure 1 illustrates in side view, a truck or bogie, incorporating a preferred embodiment of the steering mechanism of this invention, and Figures 2 and 3 show plan views of the truck or bogie.

When a railroad vehicle moves from tangent track to circular curved track there is relative rotation between the car body and the trucks supporting the car body typically at either end of the railroad vehicle. In view of the relative rotation of the truck and car body, a point remote from the centre line of the car body will appear to move in the longitudinal direction with reference to the truck as well as having slight motion in the lateral direction. The longitudinal component of such motion is directly related to the radius of curvature and is used in this invention as the steering input to guide the wheelsets to a radial configuration.

Generally speaking, the mechanism may be mounted on typical wheelset yokes and is offset laterally from the centre line of the truck as far as practical. A bracket may be attached to the outboard yoke which bracket carries the lower pivot for a vertical steering lever which is thereby connected to it. At a point on the steering lever, intermediate between its upper and lower ends, a steering rod is connected to the bracket by means of a pivotal connection and this steering rod is similarly attached to the inboard yoke through a bracket carrying a pivot connection. The top of the steering lever is connected to a longitudinal steering link through a pivot connection and the other end of that link is connected to the car body.

As the car body swivels relative to the truck the steering link is moved fore and aft relative to points

on the truck, thus pivoting the steering lever and forcing the yokes apart or together. Because the yokes are pinned together at the centre of the truck, the action of the steering mechanism is to cause the wheelset/yoke assemblies to rotate relative to one another into a steered alignment. Correct proportioning of the lever ratio ensures that true radial alignment is achieved on circular curves.

Figure 1 is a sectional view on line I-I of Figure 2 and illustrates a truck generally at 10 having a steering mechanism according to this invention installed thereon. The truck comprises an outboard wheelset 12 and an inboard wheelset 14. Each wheelset, as will be understood by those familiar with railroad art, comprises an axle and a pair of flanged conical wheels fixed thereto such that the axle and wheels turn at the same radial speed. Such conical wheelsets if permitted appropriate freedom will move to a radial configuration when travelling on curved tracks.

However, as also well understood by those familiar with this art, such single wheelsets are unstable and will continue to hunt when travelling on either tangent track or on curved track.

In the truck 10 as illustrated in Figure 1 the wheelsets are mounted in yokes. The outboard yoke is indicated at 16 and the inboard yoke at 18. The truck frame is indicated generally at 20.

A bracket 30 is attached to outboard yoke 16. The bracket 30 comprises a pivotal connection 32 at a convenient portion of the bracket. A substantially vertical steering lever 34 is pivotally connected to bracket 30 at pivotal connection 32. The steering lever 34 has a pivotal connection 36 at its upper end. A steering link 40 is pivotally connected to steering lever 34 at the pivotal connection 36. The steering link 40 is connection 36. The steering link 40 is attached to the car body, which is not illustrated, at connection 42.

The bracket 30, steering lever 34 and steering link 40 are all located laterally as remote as possible from the centre line of the vehicle. The location of the steering mechanism is dictated by the configuration of the truck frame, the yokes and the configuration of bracket 30. The advantage of having the mechanism remote as far as possible from the centre line is that larger motions are available for more accurate steering inputs.

The steering lever 34 has a pivotal connection 44 which is intermediate the pivotal connections 32 and 36. A steering rod 46 is pivotally connected to the steering lever 34 at pivotal connection 44. The steering rod 46 is pivotally connected to a bracket 48 at pivotal connection 50. Bracket 48 is affixed to the inboard steering yoke 18.

The outboard steering yoke 16 and the inboard steering yoke 18 are pivotally connected to each other at 17 for relative pivotal movement.

With respect to the Figure it may be appreciated that the connection 42 will move longitudinally as the truck pivots with respect to the car body. Assuming that the connection 42 moves to the left in the Figure, the steering lever 34 will be caused to pivot about the pivotal connection 32. This in turn causes the steering rod 46 to be drawn to the left with respect to the pivotal connection 32. Thus, on this side of the truck the two wheels illustrated of wheelsets 12 and 14 respectively will be moved towards each other and thus accomplish a turn with the centre of curvature in front of the sheet. Similarly movement in the other direction will cause the wheels illustrated in the drawing to move further apart accomplishing a turn in the direction with the radius of curvature behind the sheet.

It will be understood by those skilled in the art that the mechanism may be duplicated on either side of the truck to provide a redundant steering mechanism.

Claims

1. A steering mechanism for use on a railway vehicle having a car body mounted on at least two trucks, at least one of said trucks having inboard and outboard wheelsets, each said wheelset having a yoke attached thereto, the two said yokes having a pivotal interconnection, characterized by said wheelsets (12, 14) supporting said truck and adapted for relative pivotal movement with respect to said truck about a generally vertical axis and by a steering mechanism for guiding said wheelsets to a radial alignment when said vehicle is travelling on circular curved track, comprising a steering link (40) connected to said car body remote from the longitudinal centre line of said car body, a steering lever (34) pivotally connected to said steering link (40), and linkage mechanism (30, 46, 48) interconnecting said steering lever (34) and said inboard (18) and outboard (16) yokes whereby longitudinal movement of the connection (42) between said steering link (40) and said car body with respect to said truck when said truck rotates with respect to said body causes relative longitudinal movement of said linkage mechanism (30, 46, 48) which guides said wheelsets (16, 18) to a radial alignment and maintains such alignment against the influences of wheel/rail forces.
2. A steering mechanism according to Claim 1, characterized in that said steering mechanism comprises a steering lever (34) pivotally connected to said steering link (40), a pivotal connection between said steering lever and said

outboard wheelset, said steering lever (34) having a further pivotal connection (44) intermediate said pivotal connection between said steering lever and said steering link and the pivotal connection between said steering lever and said outboard yoke,

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a steering rod (46) pivotally linked to said steering lever (34) at said further pivotal connection, said steering rod pivotally linked to said inboard yoke.

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3. A steering mechanism according to Claim 2, characterized in that said steering lever (34) is connected to said outboard wheelset (12) by means of a bracket (30) affixed to said yoke (16), said bracket having a pivotal connection to said steering lever (34).

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4. A steering mechanism according to Claim 3, characterized in that said steering rod (46) is connected to said inboard yoke (18) by means of a bracket (48) fixed to said yoke said bracket having a pivotal connection (50) to said steering rod (46).

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5. A steering mechanism according to Claim 1, having redundant mechanisms on either side of a pivotal connection between said truck and said car body.

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6. A railway vehicle, characterized by a steering mechanism according to any preceding claim.

Patentansprüche

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1. Lenkwerk zum Einsatz bei einem Schienenfahrzeug mit einem auf mindestens zwei Drehgestellen befestigten Wagenkasten, wobei mindestens eines der besagten Drehgestelle innenliegende und außenliegende Radsätze hat und jeder der besagten Radsätze ein an ihm befestigtes Joch hat, wobei die beiden besagten Joche miteinander drehbar verbunden sind, dadurch gekennzeichnet, daß die besagten Radsätze (12, 14) besagtes Drehgestell stützen und für eine relative Drehbewegung in bezug auf besagtes Drehgestell um eine im allgemeinen vertikale Achse geeignet sind, und daß ein Lenkwerk die besagten Radsätze so führt, daß sie radial zu einander ausgerichtet sind, wenn besagtes Fahrzeug auf einer kreisbogenförmigen Spur fährt, wobei das Lenkwerk aus folgendem besteht: einem mit besagtem Wagenkasten von der Längsmittellinie des besagten Wagenkastens entfernt verbundenen Lenkverbindungsglied (40), einem mit besagtem Lenkverbindungsglied (40) über einen drehbar verbundenen Lenkhebel (34) und ei-

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nem Gestänge (30, 46, 48), das den besagten Lenkhebel (34) und das besagten innenliegenden (18) und außenliegenden (16) Joche miteinander verbindet, wodurch beim Drehen des besagten Drehgestells in bezug auf den besagten Wagenkasten eine Längsbewegung der Verbindung (42) zwischen dem besagten Lenkverbindungsglied (40) und dem besagten Wagenkasten in bezug auf besagtes Drehgestell eine Relativbewegung in Längsrichtung des besagten Gestänges (30, 46, 48) hervorruft, durch die die besagten Radsätze (16, 18) so geführt werden, daß sie radial zueinander ausgerichtet sind.

2. Lenkwerk nach Anspruch 1, dadurch gekennzeichnet, daß besagtes Lenkwerk aus einem mit besagtem Lenkverbindungsglied (40) über einen drehbar verbundenen Lenkhebel (34) besteht sowie aus einer Drehverbindung zwischen besagtem Lenkhebel und besagtem außenliegenden Radsatz, wobei der besagte Lenkhebel (34) eine weitere Drehverbindung (44) aufweist, die zwischen der besagten Drehverbindung zwischen besagtem Lenkhebel und besagtem Lenkverbindungsglied einerseits und der Drehverbindung zwischen besagtem Lenkhebel und besagtem außenliegenden Joch andererseits liegt, und aus einer Lenkstange (46), die an der besagten weiteren Drehverbindung drehbar mit besagtem Lenkhebel (34) verbunden ist, wobei die besagte Lenkstange drehbar mit dem besagten innenliegenden Joch verbunden ist.

3. Lenkwerk nach Anspruch 2, dadurch gekennzeichnet, daß der besagte Lenkhebel (34) mittels eines am besagten Joch (16) befestigten Halters (30) mit besagtem außenliegenden Radsatz (12) verbunden ist, wobei der besagte Halter eine Drehverbindung mit dem besagten Lenkhebel (34) aufweist.

4. Lenkwerk nach Anspruch 3, dadurch gekennzeichnet, daß die besagte Lenkstange (46) mittels eines am besagten Joch befestigten Halters (48) mit dem besagten innenliegenden Joch (18) verbunden ist, wobei der besagte Halter eine Drehverbindung (50) mit der besagten Lenkstange (46) aufweist.

5. Lenkwerk nach Anspruch 1 mit Ersatzvorrichtungen auf beiden Seiten einer Drehverbindung zwischen besagtem Drehgestell und besagtem Wagenkasten.

6. Schienenfahrzeug, gekennzeichnet durch ein Lenkwerk nach einem der vorhergehenden An-

sprüche.

Revendications

1. Mécanisme de guidage à utiliser sur un véhicule ferroviaire comportant une caisse montée sur au moins deux bogies, au moins un des bogies comportant un essieu intérieur et un essieu extérieur, chaque essieu étant pourvu d'un étrier qui y est attaché, les deux étriers étant reliés par une articulation, caractérisé en ce que les essieux (12, 14) supportent le bogie et sont à même de pivoter chacun par rapport au bogie autour d'un axe généralement vertical et en ce qu'un mécanisme de guidage est prévu pour guider les essieux vers un alignement radial lorsque le véhicule parcourt une voie courbe circulaire, comprenant une biellette de guidage (40) reliée à la caisse à distance de l'axe longitudinal central de celle-ci, un levier de guidage (34) articulé à la biellette de guidage (40), et un mécanisme de liaison (30, 46, 48) reliant le levier de guidage (34) et les étriers intérieur (18) et extérieur (16), de sorte qu'un déplacement longitudinal de la liaison (42) entre la biellette de guidage (40) et la caisse par rapport au bogie, lorsque le bogie pivote par rapport à cette caisse, entraîne un déplacement longitudinal relatif du mécanisme de liaison (30, 46, 48) qui guide les essieux (16, 18) vers un alignement radial. 5
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2. Mécanisme de guidage suivant la revendication 1, caractérisé en ce qu'il comprend :
un levier de guidage (34) articulé à la biellette de guidage (40), une articulation entre le levier de guidage et l'essieu extérieur, le levier de guidage (34) présentant une autre articulation (44) située entre l'articulation reliant le levier de guidage et la biellette de guidage et l'articulation reliant le levier de guidage et l'étrier extérieur, 35
une bielle de guidage (46) articulée au levier de guidage (34), à ladite autre articulation, la bielle de guidage étant articulée à l'étrier intérieur. 40
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3. Mécanisme de guidage suivant la revendication 2, caractérisé en ce que le levier de guidage (34) est relié à l'essieu extérieur (12) au moyen d'une chape (30) fixée à l'étrier (16), la chape étant articulée au levier de guidage (34). 50
4. Mécanisme de guidage suivant la revendication 3, caractérisé en ce que la bielle de guidage (46) est reliée à l'étrier intérieur (18) au moyen d'une chape (48) fixée à l'étrier, la chape étant articulée en (50) à la bielle de 55

guidage (46).

5. Mécanisme de guidage suivant la revendication 1, comportant des mécanismes redondants de part et d'autre d'une articulation entre le bogie et la caisse.
6. Véhicule ferroviaire, caractérisé par un mécanisme de guidage suivant l'une quelconque des revendications précédentes.

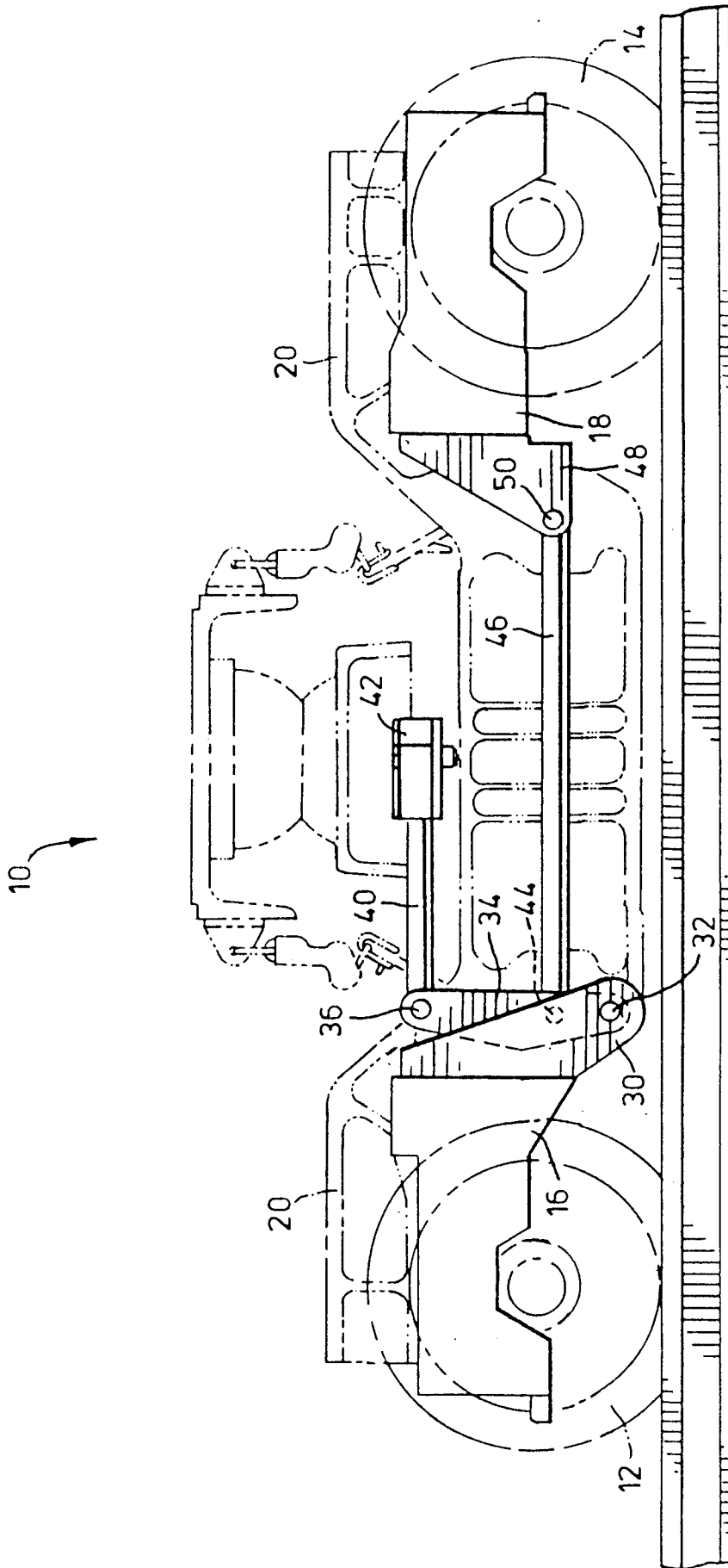


FIG. 1

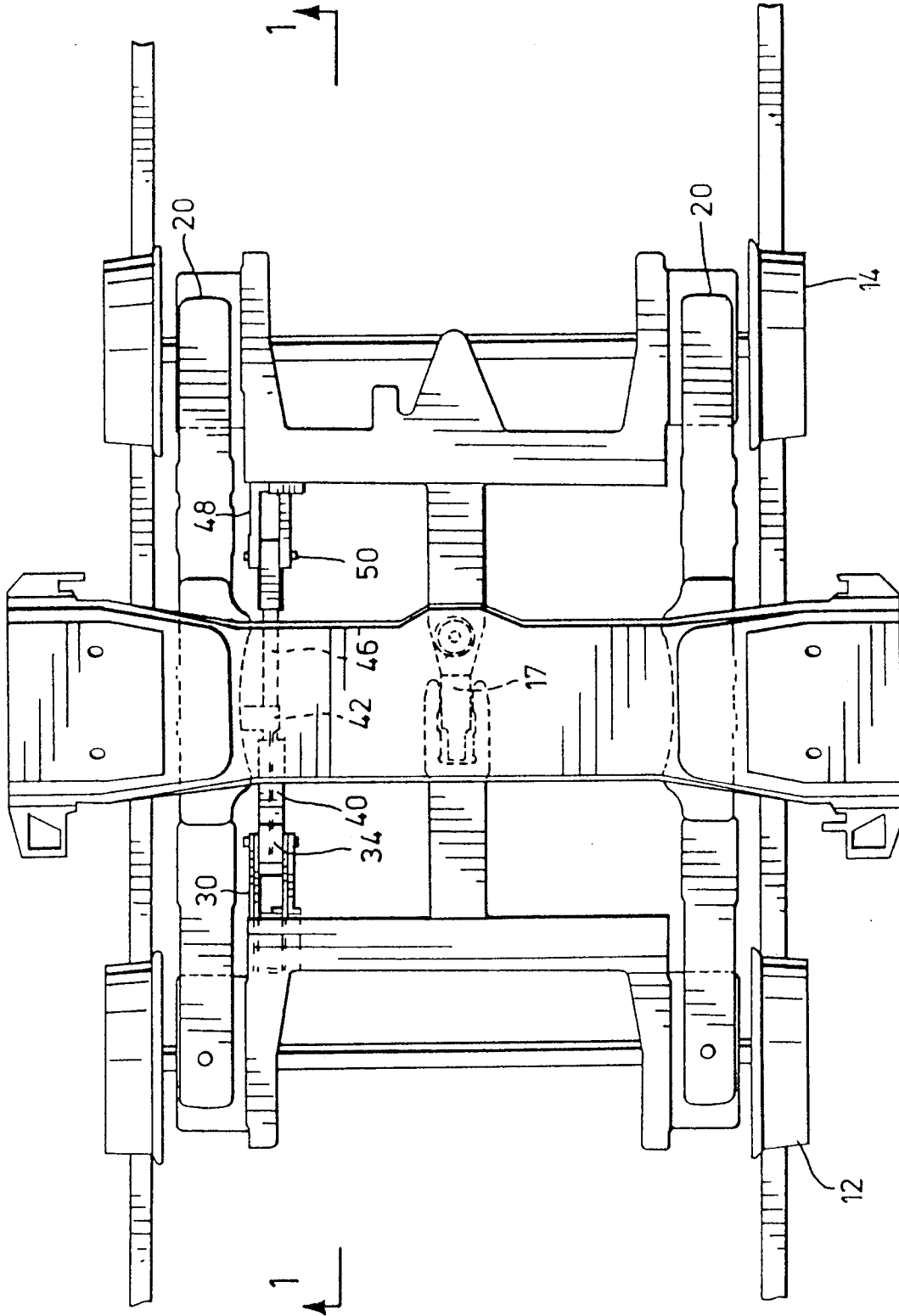


FIG. 2

