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(54) **Couplers**

(57) An automatic coupler for a vehicle is described. An automatic coupler portion (23) is moveable about a substantially vertical axis (27) between a use position and a stored position in which a draw hook (24) is exposed for use. An arm (30) is moveable about a substantially vertical axis (32) relative to the automatic coupler between a first position in which the arm (30) retains the automatic coupler portion (23) in the use position and a second position in which the arm (30) retains the automatic coupler portion (23) in the stored

position. Automatic coupler portion (23) comprises an abutment surface (40) which operatively acts on an end surface (60) of the arm (30) distant from the first end to prevent rotation of the automatic coupler portion (23) when the arm (30) is in its first position. A finger (35) at the end of the arm (30) distant from the first end co-operates with a recess in a side of the automatic coupler portion (23) to prevent rotation of the automatic coupler portion (23) when the arm (30) is in its second position.

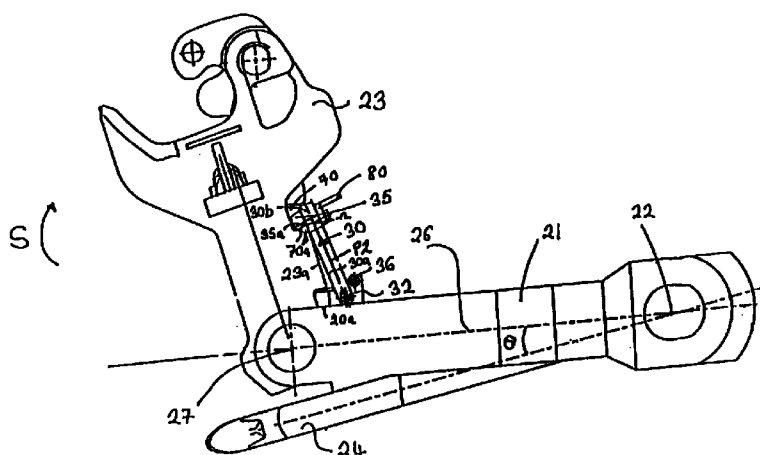


Figure 4.a

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Description

Field of the Invention

[0001] The present invention relates to couplers, in particular to couplers for railway vehicles and especially to automatic couplers.

Background to the Invention

[0002] Various types of automatic coupling devices for railway vehicles are known, which are used to join together adjacent vehicles of a train, of which the buckeye-type is one of the most well known. Often, automatic couplers are the sole means of joining one vehicle to the next, but it is also known to provide automatic couplers which also include a conventional draw hook. The hook is used where the adjacent vehicle also has a hook rather than an automatic coupler and the hooks of the two vehicles are then joined by means of a connecting shackle. The hook may also find use in the event that the automatic coupler fails. A conventional design of automatic coupler including a draw hook is illustrated in Figures 1 and 2. Figure 1 is a plan view of a known automatic coupler and Figure 2 is a side elevation of the coupler of Figure 1.

[0003] Referring to Figures 1 and 2, the conventional automatic coupler 1 includes a draw bar 2 and an automatic coupler portion 3. In the illustrated automatic coupler, the coupler portion is a buckeye type coupler. This type of coupler is well known in the art and will not be described in detail. The buckeye coupler includes knuckles 4 which engage corresponding knuckles of a second coupler when the two couplers are urged together. A latching mechanism retains the couplers in the engaged position. At a first end of the draw bar 2 is a vertical through bore 5 and the automatic coupler is attached to the vehicle by means of a pin, shaft or the like which passes through the bore 5. This arrangement allows the automatic coupler 1 at least some movement in a horizontal plane about the axis of the bore 5, for example, to accommodate relative movement of the coupled vehicles.

[0004] At the second end of the draw bar 2, a hook 6 is provided, which may also be used for coupling vehicles by means of a conventional coupling shackle. In the normal use position of the automatic coupler, the automatic coupler portion 3 at least partially surrounds the hook 6 so that the hook cannot be used.

[0005] In order to allow use of the hook 6, for example when an adjacent vehicle does not have an automatic coupler, or when the automatic coupler fails, the automatic coupler portion 3 is mounted on the draw bar 2 by means of a hinge arrangement. This allows the automatic coupler portion 3 to swing through an arc of about 90° (anticlockwise in Figure 2) about the horizontal axis of the hinge, so that the hook 6 is revealed and the automatic coupler portion 3 hangs below the hook 6.

In the coupler illustrated in Figures 1 and 2, the hinge is provided by means of a bore 7 in the draw bar 2 through which passes a pin 8. The automatic coupler portion includes forks 9 which are mounted on the pin 8, allowing the automatic coupler portion 3 to rotate about the pin 8. A removable pin 10 passes through the forks 9 and rests in the hook 6 in order to retain the automatic coupler portion 3 in its raised position.

[0006] The automatic coupler of Figures 1 and 2 is problematic in that the automatic coupler portion may have a weight of the order of 90kg and it is therefore difficult for one person to raise the automatic coupler portion from its lowered (stored) position, hold it in its raised (use) position and at the same time to insert the retaining pin to retain the automatic coupler in its raised position.

[0007] Coupling devices are also known in which the automatic coupler portion is moveable in a horizontal plane between use and stored positions. Examples of such couplers are described in GB 659,597 and GB 839,227. In the coupler of GB 659,597 there is no locking mechanism as such to retain the automatic coupler portion in its stored position. Rather, a guard in the form of a steel plate is provided which, in the use position of the automatic coupler portion serves to obstruct access to the draw hook and which, in the stored position, interferes with the coupling shackle to prevent movement of the automatic coupler portion towards the use position.

[0008] GB 839,227 provides a locking mechanism comprising a pin passing through corresponding bores in the automatic coupler portion and in the adjacent draw bar part, in order to retain the automatic coupler portion in the respective stored and use positions.

[0009] Accordingly, the present invention seeks to provide an automatic coupler having an improved locking mechanism for retaining the automatic coupler portion in its respective stored and use positions, which is effective in use, simple and reliable in construction and which overcomes the above described problems.

Summary of the Invention

[0010] According to one aspect of the present invention there is provided an automatic coupler for a vehicle comprising a draw bar portion engageable with the vehicle and operatively moveable about a substantially vertical axis; an automatic coupler portion attached to the draw bar portion, and a draw hook; the automatic coupler portion being moveable about a substantially vertical axis between a use position and a stored position in which the draw hook is exposed for use; an arm mounted on a side of the automatic coupler, the arm being moveable relative to the automatic coupler between a first position in which the arm retains the automatic coupler portion in the use position and a second position in which the arm retains the automatic coupler portion in the stored position.

[0011] Preferably, the arm is attached by means of

a hinge at a first end to the automatic coupler such that the arm is moveable between the first and second positions about the hinge. The hinge has a substantially vertical axis. In this context "vertical" relates to the normal use position of the automatic coupler when fitted to a vehicle. In a particularly desirable arrangement, the hinge provides play between the arm and the automatic coupler such that the arm has limited movement in a direction generally perpendicular to the substantially vertical axis of the hinge.

[0012] Preferably, the arm is mounted on a side of the draw bar portion. In this way, it is easily accessible in use and in the preferred constructions noted below, the free end of the arm can interact with the automatic coupler portion to retain it in its respective first and second positions.

[0013] Preferably, the arm is provided with biasing means operative to urge the arm into engagement with the automatic coupler in the respective first and second positions.

[0014] Preferably, the biasing means is operative to urge the arm towards the automatic coupler.

[0015] Preferably, the arm lies substantially parallel with respect to the major axis of the draw bar portion in the first position. In this way, an advantage is that the arm is not subject to the shearing forces which can be a problem with pin-in-bore type locking arrangements.

[0016] Preferably, the automatic coupler comprises an abutment surface which surface operatively acts on an end surface of the arm distant from the first end to retain the automatic coupler portion in its use position.

[0017] Preferably, the abutment surface is provided on a side of the automatic coupler portion.

[0018] In a particularly preferred embodiment of the invention, a recess is formed in a side of the automatic coupler, which recess co-operates with an end portion of the arm distant from said first end to retain the automatic coupler portion in its stored position. The end portion of the arm is most preferably provided with a finger so sized and shaped so as to co-operate with the recess.

[0019] Preferably, each of the finger and the recess comprise an engaging surface, the engaging surface of the finger engaging the engaging surface of the recess in the manner of a pawl to prevent movement of the automatic coupler portion towards the use position.

[0020] Preferably, the recess is formed in a side of the automatic coupler portion.

[0021] In a second aspect of the invention there is provided an automatic coupler for a vehicle comprising: a draw bar portion engageable with the vehicle and operatively moveable about a substantially vertical axis; an automatic coupler portion attached to the draw bar portion, and a draw hook; the automatic coupler portion being moveable about a substantially vertical axis between a use position and a stored position in which the draw hook is exposed for use; and locking means acting on a side of said coupler and operative to retain

said automatic coupler portion in said respective use and stored positions.

[0022] In another aspect of the invention there is provided a railway vehicle including a coupler according to the first or second aspect of the invention.

[0023] By means of the present invention, when it is desired to use the draw hook to couple adjacent vehicles, the automatic coupler portion may be released from its use position by a simple movement of the arm and moved through a horizontal plane to expose the draw hook. The automatic coupler portion is then retained by the same arm in its stored position. Again, the automatic coupler portion may be released from its stored position by a simple movement of the arm.

Brief Description of the Drawings

[0024] For a better understanding of the invention, and to show how the same may be carried into effect, reference will be made, by way of example only, to the following drawings, in which:

Figure 1 is a plan view of a conventional automatic coupler;

Figure 2 is a side elevation of the automatic coupler of Figure 1;

Figure 3 is a plan view of an automatic coupler according to the invention;

Figure 4a is a plan view of the automatic coupler of Figure 3 in which the draw hook is exposed for use and Figure 4b is an enlarged view of the arm and recess;

Figure 5a is a side view of the automatic coupler of Figure 3 and Figure 5b is a cross-sectional view along line A-A of Figure 5a;

Figure 6 is a plan view of an automatic coupler having an alternative embodiment of the arm of Figure 3;

Figure 7 is a side view of the automatic coupler of Figure 6 in which the draw hook is exposed for use;

Figure 8 is a schematic plan view showing adjacent vehicles joined by means of automatic coupler portions of automatic couplers according to the invention; and

Figure 9 is a schematic plan view showing adjacent vehicles joined by means of draw hooks, one of the vehicles including an automatic coupler according to the invention.

Detailed Description of the Drawings

[0025] Referring now to Figures 3 to 9, the automatic coupler 20 according to the invention comprises a draw bar 21 which is attachable to a vehicle at its first end by means of a through bore 22. A pin or shaft (not illustrated) passes through the bore 22 to attach the draw bar 21 to the vehicle. The draw bar 21 (and hence the coupler 20) is able to move about the axis of the bore 22 in a substantially horizontal plane. The draw bar may be attached to the vehicle by other suitable means provided that it may move about a substantially vertical axis, to allow proper articulation of the coupled vehicles.

[0026] At a second end of the draw bar 21 is provided an automatic coupling portion 23. The automatic coupling portion 23 may be of any known type and in the embodiment illustrated is of the buckeye type. The coupler 20 further includes a draw hook 24 which is disposed at one side of the draw bar 21, projecting at an angle θ with respect to the draw bar 21. The angle θ need only be sufficient to allow a coupling shackle 60 (see Figure 9) to pass over the hook without interference from the draw bar 21. The angle θ is preferably less than 40° , especially less than 30° , most preferably less than 20° , for example 10° .

[0027] The automatic coupler portion 23 is mounted on the draw bar 21 so that it may move in a horizontal plane, that is, about a vertical axis in the embodiment illustrated. In the illustrated embodiment the second end of the draw bar 21 includes forks and a pin each fork having co-axial bore to receive a hinge-pin 27 having a substantially vertical axis 27. The automatic coupler portion 23 includes an end region having a substantially vertical through bore of corresponding size to the bores of the forks. The end region sits in the forks 25 of the draw bar 21 and the hinge-pin 27 passes through the bores of the forks and the bore of the automatic coupler portion 23. Thus, the automatic coupler portion 23 is able to swing about the hinge-pin 27 (Figures 4, 7 and 9). Clearly, any other suitable linkage which allows the automatic coupler portion 21 to move in a horizontal plane, in particular, about a vertical axis, may be used.

[0028] As illustrated in Figures 3, 5 and 6, the automatic coupler 20 is in its use position, that is, its configuration for coupling adjacent vehicles by means of the automatic coupler portion 23. Thus, the automatic coupler portion 23 is substantially aligned with the major axis 26 of the draw bar (and generally with the vehicle). In the use position, the automatic coupler portion 23 shields the draw hook 24. In the present invention it is not necessary that the automatic coupler portion covers or partially covers or surrounds the draw hook (although it may do so). It may be desirable that (as in the illustrated construction) the automatic coupler portion in its use position impedes access to the draw hook for attachment of the shackle 60. That is, the automatic coupler portion 23 prevents the draw hook 24 from being used in conjunction with a shackle 60 to couple

adjacent vehicles since the automatic coupler portion 23 stands in the path which the shackle 60 would adopt in use.

[0029] When it is desired to use the draw hook 24 to couple adjacent vehicles, the automatic coupler portion 23 is moved about vertical axis 27 to the stored position to expose the draw hook 24, as is illustrated in Figures 4, 7 and 9. A shackle 60 may then be placed over the draw hook 24 and over the draw hook 61 of the adjacent vehicle. Because the draw bar 21 may move about the axis of the bore 22, the draw bar 21 may move so that the draw hooks 24, 61 are in alignment.

[0030] In the design of the present invention a locking mechanism is provided on the automatic coupler to retain the automatic coupler portion 23 in the respective stored and use positions. The locking mechanism of the present invention is advantageous in that it can be manufactured and assembled easily, is reliable in use and allows extremely simple locking and unlocking of the automatic coupler portion in its use and stored positions.

[0031] The locking mechanism comprises an arm 30 which is mounted on a side of the draw bar 21, as shown in Figures 3 and 4. As shown in the side view of Figure 5a, the arm of the invention is generally rectangular having a length and width of generally the same order of magnitude. Any shape of arm is however acceptable, providing that the arm is able to retain the automatic coupler in its respective stored and use positions. The arm is preferably made from metal preferably as a casting. Whilst it is preferred that the arm 30 is mounted on draw bar 21, the arm 30 may alternatively be mounted on a side of the automatic coupler portion 23, as shown in Figures 5 and 6.

[0032] Arm 30 is attached to the side of draw bar 21 at one of its ends by means of a hinge 32. Arm 30 is moveable relative to the automatic coupler 20 about the substantially vertical axis of hinge 32. Arm 30 is moveable between a first position in which arm 30 retains the automatic coupler portion 23 in the use position and a second position in which arm 30 retains the automatic coupler portion 23 in the stored position in which draw hook 24 is exposed for use.

[0033] In its first position when retaining automatic coupler portion 23 in the stored position, arm 30 lies substantially parallel with respect to the major axis 26 of draw bar 24. More particularly inner face 30a of the arm 30 abuts side surface 20a of the automatic coupler 20. A biasing means is provided in the form of springs 36. The springs 36 have arms 36a, 36b at their respective ends which arms 36a, 36b act on arm 30, urging arm 30 to take up its substantially parallel position with respect to the major axis 26 of the draw bar 24, that is, counter-clockwise as shown in Figures 3 and 4 and clockwise as shown in Figures 6 and 7, about hinge axis 32.

[0034] As shown in Figures 3 and 4, an abutment surface 40 is provided on a side of the automatic coupler portion which contacts an end surface 60 of arm 30.

In an alternative embodiment as illustrated in Figures 6 and 7, the abutment surface 40' may be provided on a side of draw bar 24, when arm 30 is mounted on a side of the automatic coupler portion 23. When the automatic coupler portion is retained in its use position, movement towards the stored position is prevented by the abutting of surfaces 40 (40') and 60.

[0035] In order to allow movement of the automatic coupler portion 23 from the use position about substantially vertical axis 27 to the stored position, arm 30 is moved about the substantially vertical axis of hinge 32 so that end surface 60 of arm 30 is freed from contacting abutment surface 40 (40'). For ease, arm 30 may be provided with means such as a handle 80 to facilitate movement of arm 30 by the operator against the force of springs 36.

[0036] The retention of automatic coupler portion 23 in the stored position will now be described. After release of the arm 30 from its first position it is held at a convenient point between its first and second positions. Automatic coupler portion 23 is then moved towards its stored position, as shown by the anticlockwise arrows S of Figures 4 and 7. If desired, end portion 30b of arm 30 may be allowed to slide along the surface of the automatic coupler portion 23 (Figs 3 and 4) or draw bar 21 (Figs 6 and 7). Movement of the automatic coupler portion 23 continues until the automatic coupler portion 23 reaches its stored position.

[0037] A recess 70 is provided in the automatic coupler portion (Figures 3 and 4). As the automatic coupler portion 23 reaches its stored position, recess 70 comes into proximity with end portion 30b of arm 30.

[0038] In the alternative construction of Figures 6 and 7, a corresponding recess 70' is formed in the side of the draw bar 21. As the automatic coupler portion 23 reaches its stored position, end portion 30b of arm 30 may be brought into proximity with recess 70'.

[0039] Thus, by movement of arm 30 and automatic coupler portion 23 about their respective substantially vertical axes 27, 32, the recess 70 (70') is able to co-operate with end portion 30b of arm 30 to retain the automatic coupler portion 23 in the stored position.

[0040] It can be envisaged that the end portion of arm 30 may co-operate directly with recess 70. However, it is preferred that, as in the illustrated embodiment, arm 30 is provided with a depending finger 35 or a like projection that is sized and shaped to co-operate with recess 70 in order to retain the automatic coupler in its stored position. In this case, the automatic coupler portion 23 (Figs 3 and 4) or draw bar 21 (Figs 6 and 7) may be provided with a further recess to accommodate the finger 35 when the arm 30 is in its first position.

[0041] Each of the finger 35 and the recess 70 (70') comprises an engaging surface 35a, 70a which co-operate to retain the automatic coupler portion 23 in the stored position.

[0042] It is possible that when the automatic coupler portion 23 is at rest in its stored position, the sur-

faces 35a and 70a are not in contact. However, any movement of the automatic coupler portion 23 towards its use position will bring the engaging surfaces 35a, 70a into contact, thereby preventing any further movement in that direction.

[0043] In a particularly preferred arrangement of the invention, and as may be best seen from Figures 3 and 4, the surfaces 35a and 70a are formed at an acute angle to enable the arm 30 with finger 35 to act in the manner of a pawl to retain the automatic coupler portion 23 in the stored position. In particular, the angle β formed between the surface 70a and the adjacent surface 23a of the automatic coupler portion is an acute angle, and, the angle Ω formed between the surface 35a and the adjacent inner surface 30a of the arm 30 is an acute angle. In this way, it is possible to ensure that the finger 35 cannot slide out of the recess 70 as the automatic coupler portion 23 tends to move towards the use position.

[0044] In order to release the automatic coupler portion 23 from the stored position it is necessary only to move the arm 30 about hinge axis 32 so that the finger 35 moves out of recess 70. The automatic coupler portion 23 is then free to move to the use position, and the arm 30 will again adopt its first position to retain the automatic coupler portion 23 in its use position.

[0045] In order to facilitate release of the automatic coupler portion 23 from its respective use and stored positions and, more especially, to facilitate movement of arm 30 from its respective first and second positions, the hinge 32 may desirably be constructed to allow some play between the arm 30 and automatic coupler 20. This play allows limited movement of the arm 30 in directions generally perpendicular to the axis of the hinge 32. Specifically, in order to facilitate movement of the arm 30 to and from its first position, the play allows slight movement of the arm 30 in the direction of arrow P1 and to facilitate movement of the arm 30 from its second position, the play allows slight movement of the arm in the direction of arrow P2.

Claims

1. An automatic coupler for a vehicle comprising:

- a draw bar portion engageable with the vehicle and operatively moveable about a substantially vertical axis;
- an automatic coupler portion attached to the draw bar portion, and a draw hook;
- the automatic coupler portion being moveable about a substantially vertical axis between a use position and a stored position in which the draw hook is exposed for use; and
- an arm mounted on a side of the automatic coupler, the arm being moveable relative to the automatic coupler between a first position in which the arm retains the automatic coupler

portion in the use position and a second position in which the arm retains the automatic coupler portion in the stored position.

2. An automatic coupler as claimed in claim 1 wherein the arm is attached by means of a hinge at a first end to the automatic coupler such that the arm is moveable between the first and second positions about a substantially vertical axis. 5
3. An automatic coupler as claimed in claim 1 or 2 wherein the hinge provides play between the arm and the automatic coupler such that the arm has limited movement in a direction generally perpendicular to the substantially vertical axis of the hinge. 10 15
4. An automatic coupler as claimed in any preceding claim wherein the arm is mounted on a side of the draw bar portion. 20
5. An automatic coupler as claimed in any preceding claim wherein the arm is provided with biasing means operative to urge the arm into engagement with the automatic coupler in the respective first and second positions. 25
6. An automatic coupler as claimed in claim 4 in which the biasing means is operative to urge the arm towards the automatic coupler. 30
7. An automatic coupler according to any preceding claim in which the arm lies substantially parallel with respect to the major axis of the draw bar portion in the first position. 35
8. An automatic coupler as claimed in claims 2-7 wherein the automatic coupler comprise an abutment surface which surface operatively acts on an end surface of the arm distant from the first end to retain the automatic coupler portion in its use position. 40
9. An automatic coupler as claimed in claim 8 wherein the abutment surface is provided on a side of the automatic coupler portion. 45
10. An automatic coupler as claimed in any of claims 2-9 wherein a recess is formed in a side of the automatic coupler, which recess co-operates with an end portion of the arm distant from said first end to retain the automatic coupler portion in its stored position. 50
11. An automatic coupler as claimed in claim 10 wherein the end portion of the arm is provided with a finger so sized and shaped so as to co-operate with the recess. 55

12. An automatic coupler as claimed in claim 11 wherein each of the finger and the recess comprise an engaging surface, the engaging surface of the finger engaging the engaging surface of the recess in the manner of a pawl to prevent movement of the automatic coupler portion towards the use position.

13. An automatic coupler as claimed in claim 10, 11 or 12 wherein the recess is formed in a side of the automatic coupler portion.

14. An automatic coupler for a vehicle comprising:

a draw bar portion engageable with the vehicle and operatively moveable about a substantially vertical axis;
 an automatic coupler portion attached to the draw bar portion, and a draw book;
 the automatic coupler portion being moveable about a substantially vertical axis between a use position and a stored position in which the draw hook is exposed for use; and
 locking means acting on a side of said coupler and operative to retain said automatic coupler portion in said respective use and stored positions.

15. A railway vehicle including an automatic coupler as claimed in any of claims 1 to 14.

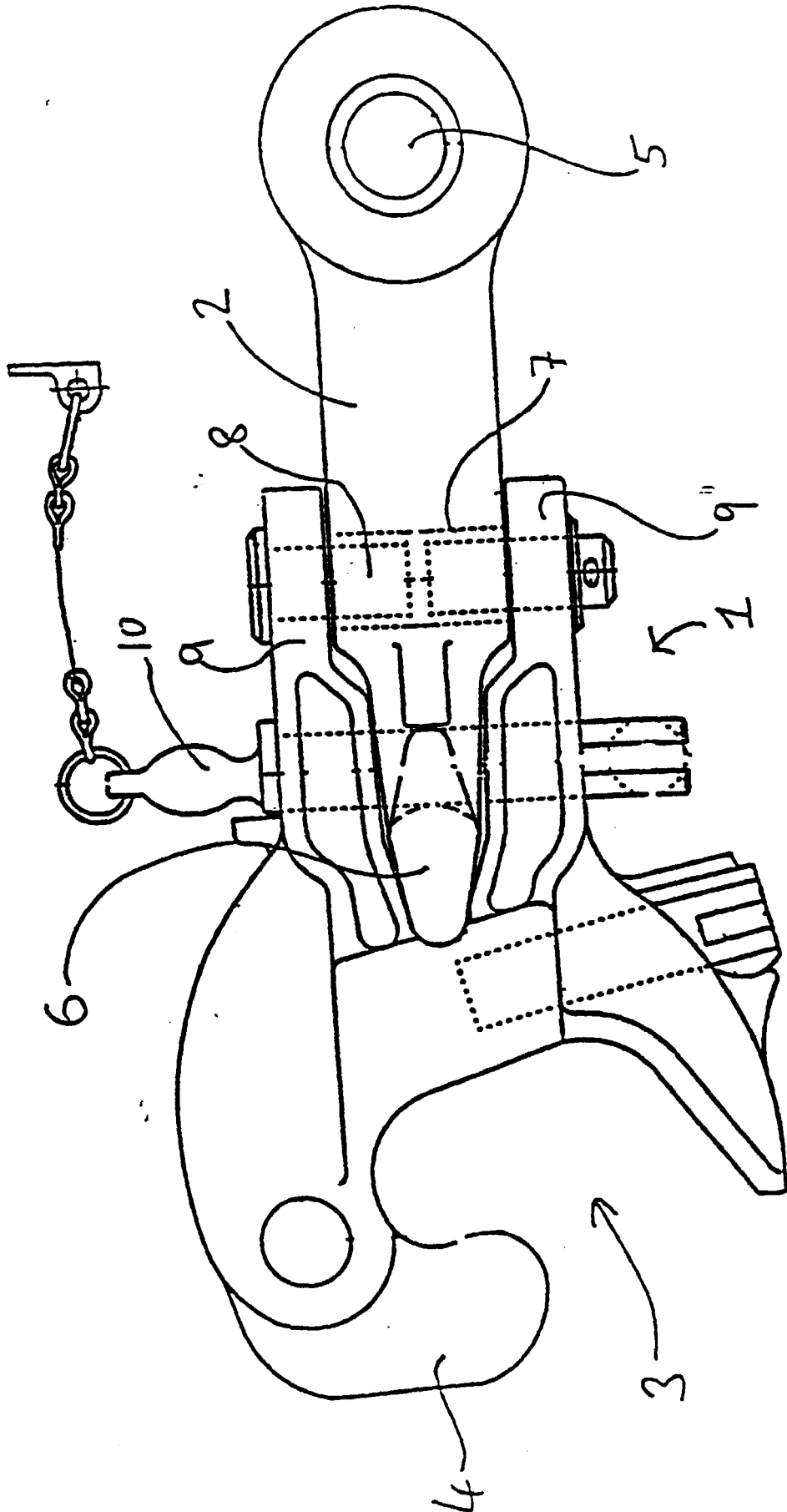


Figure 1

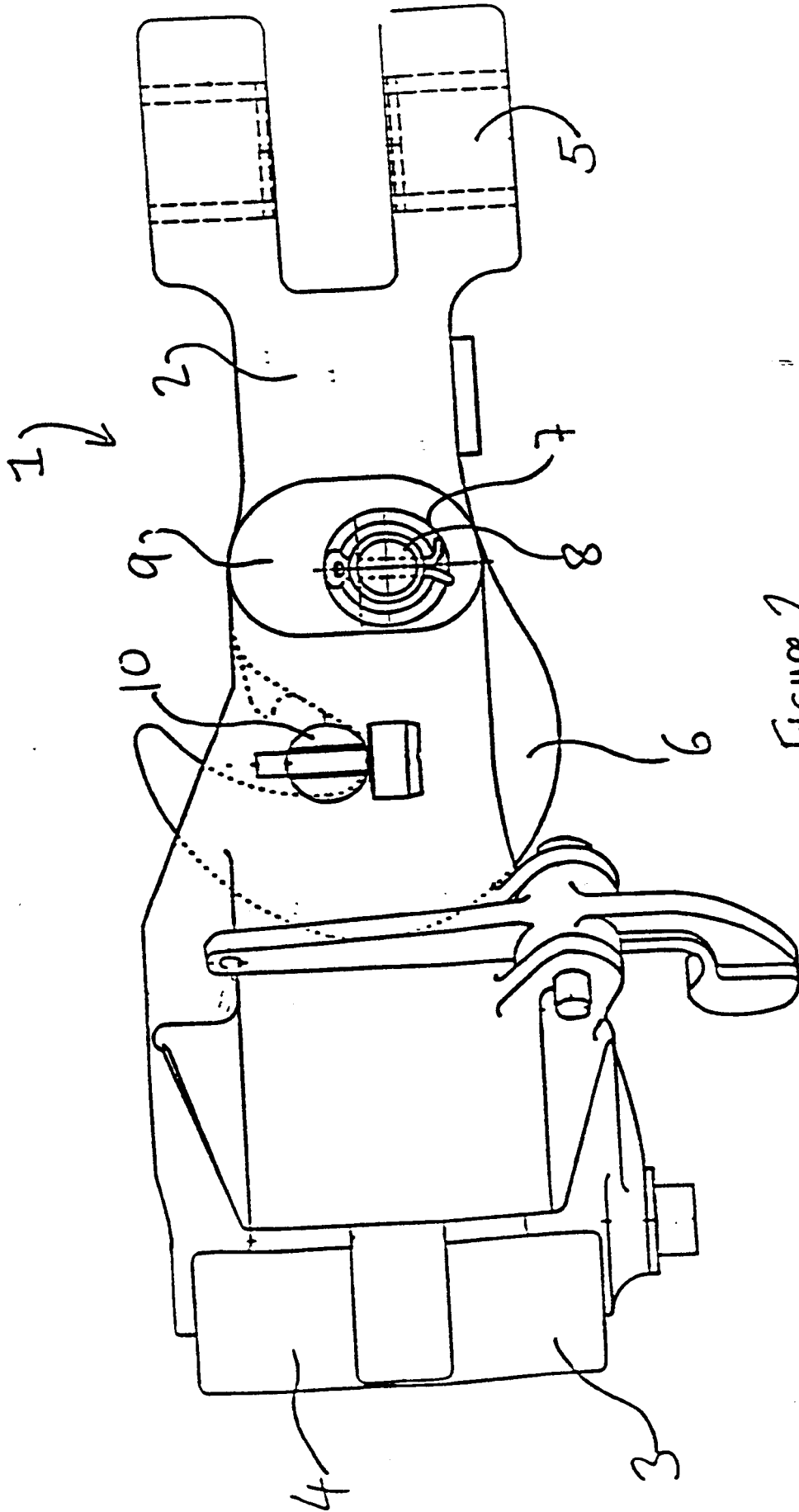


Figure 2

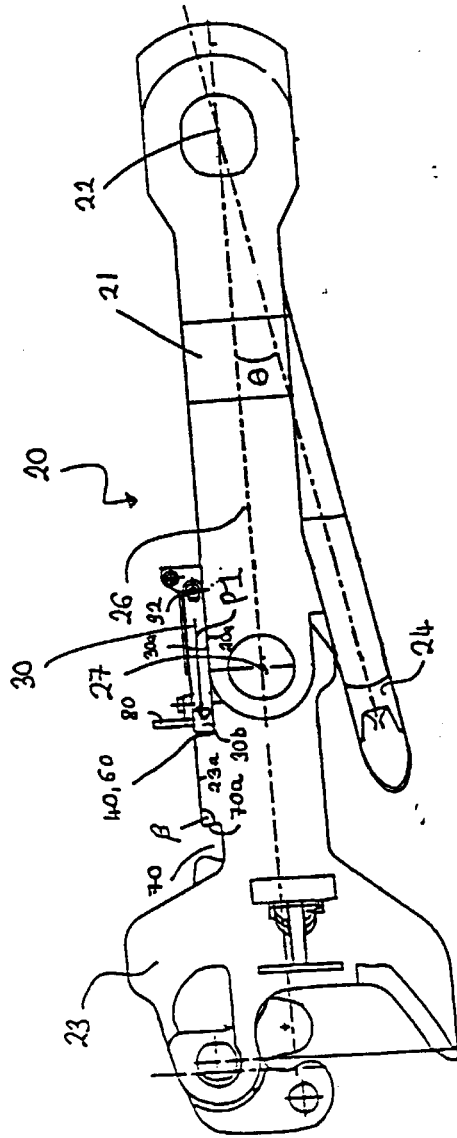


Figure 3

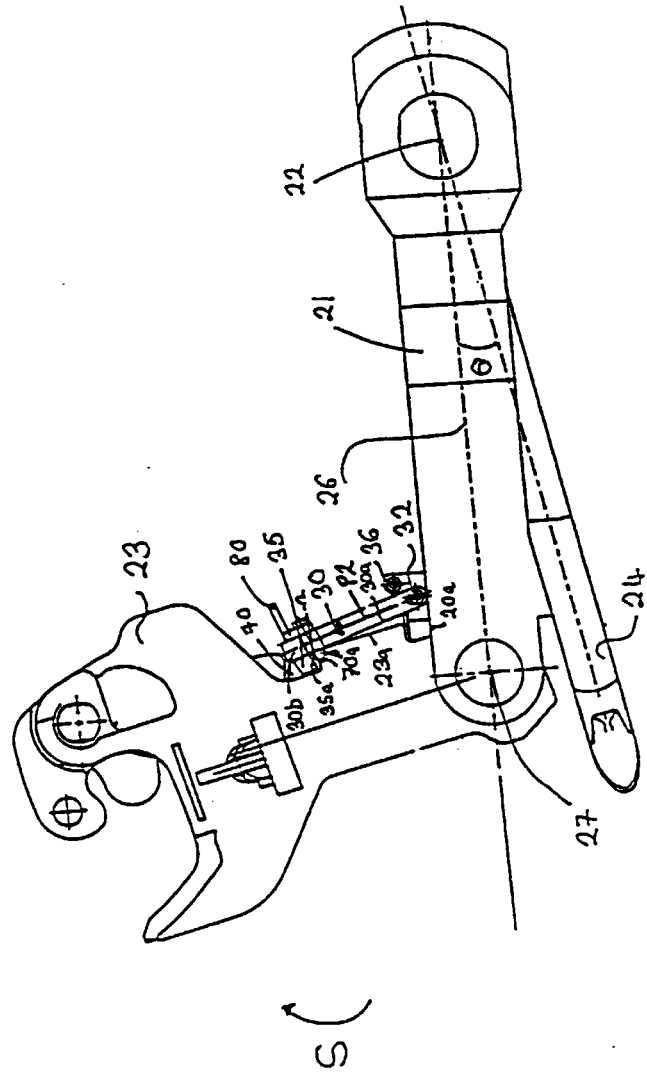


Figure 4.a

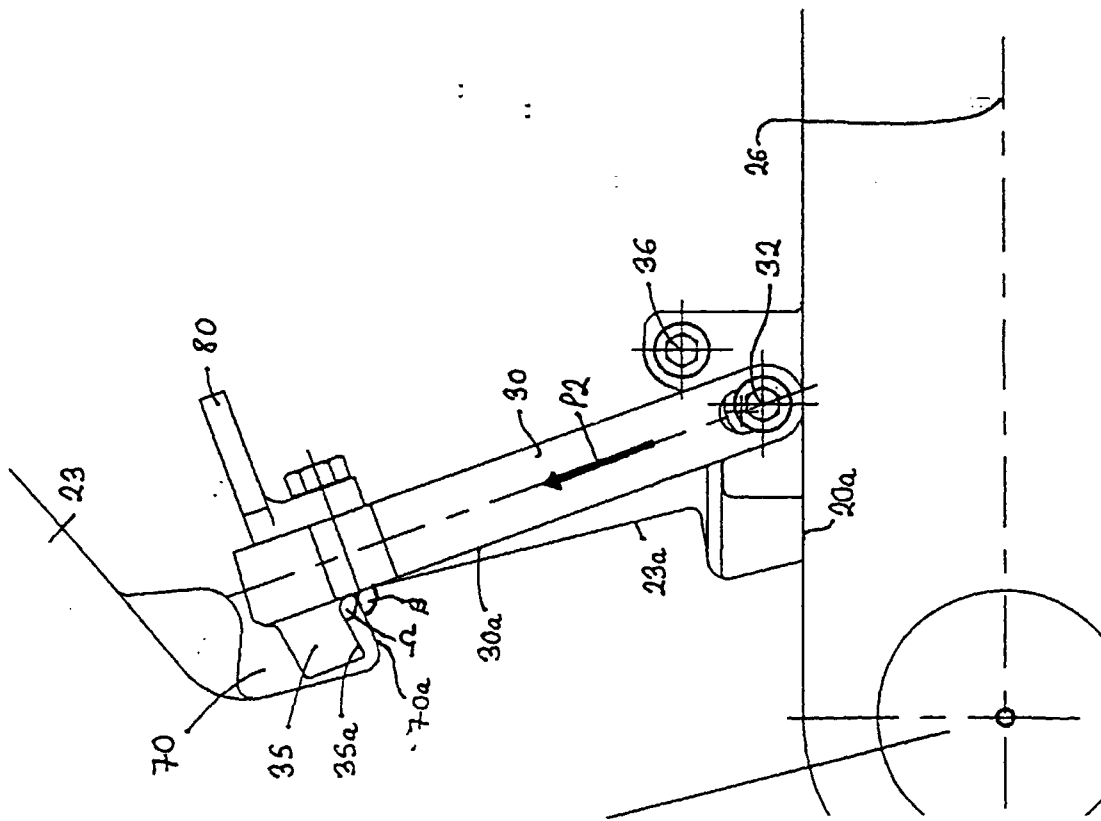
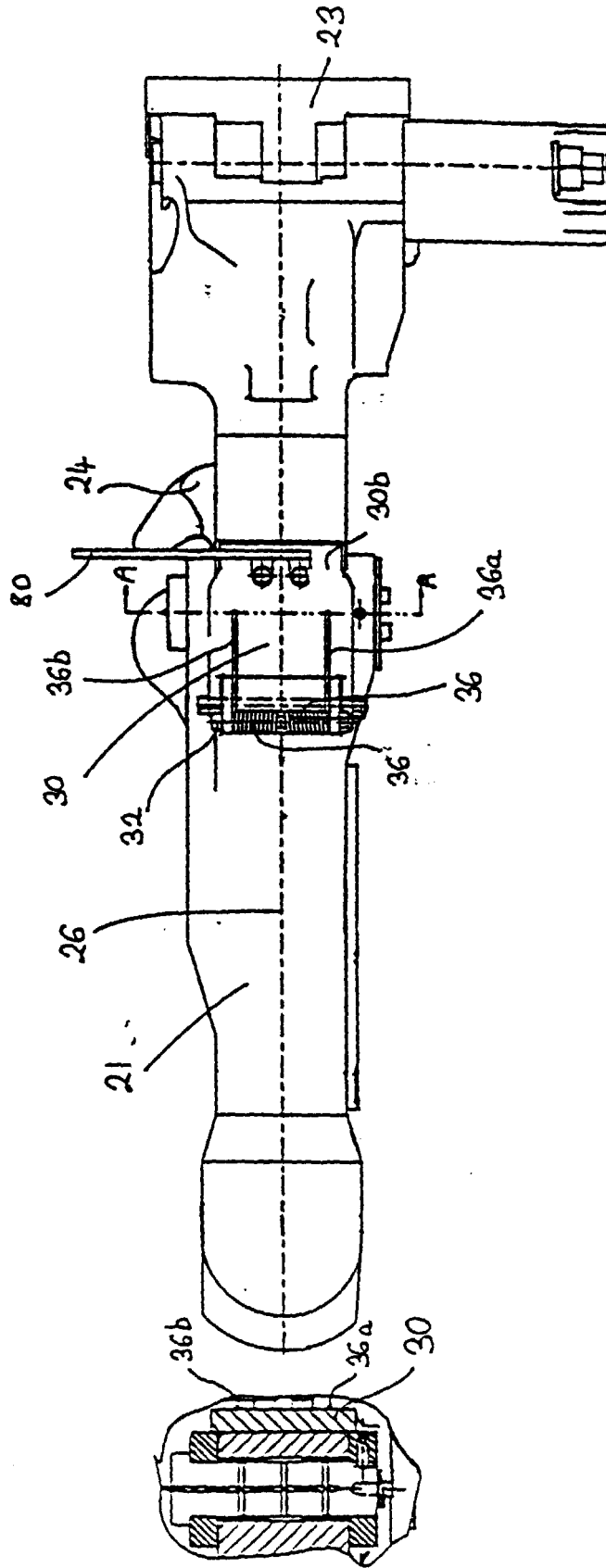


Figure 4.b



(a)

Figure 5

(b)

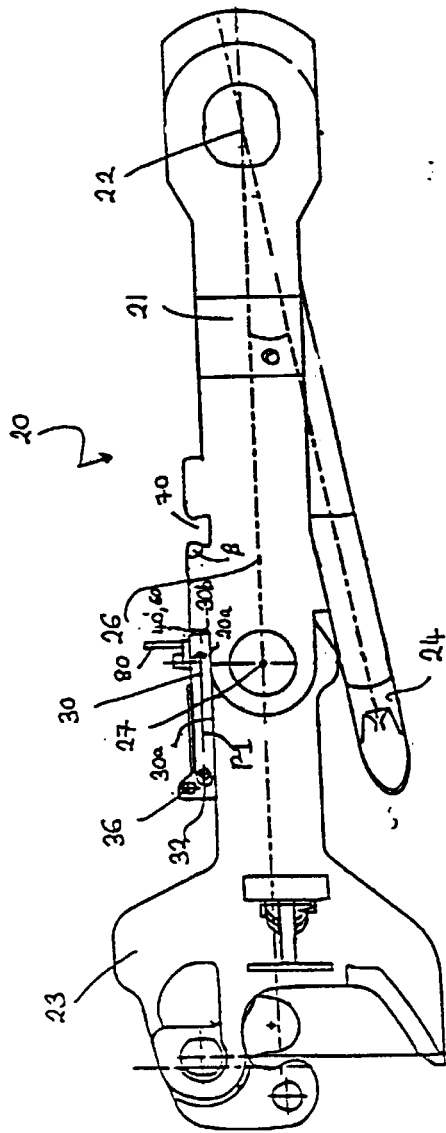


Figure 6

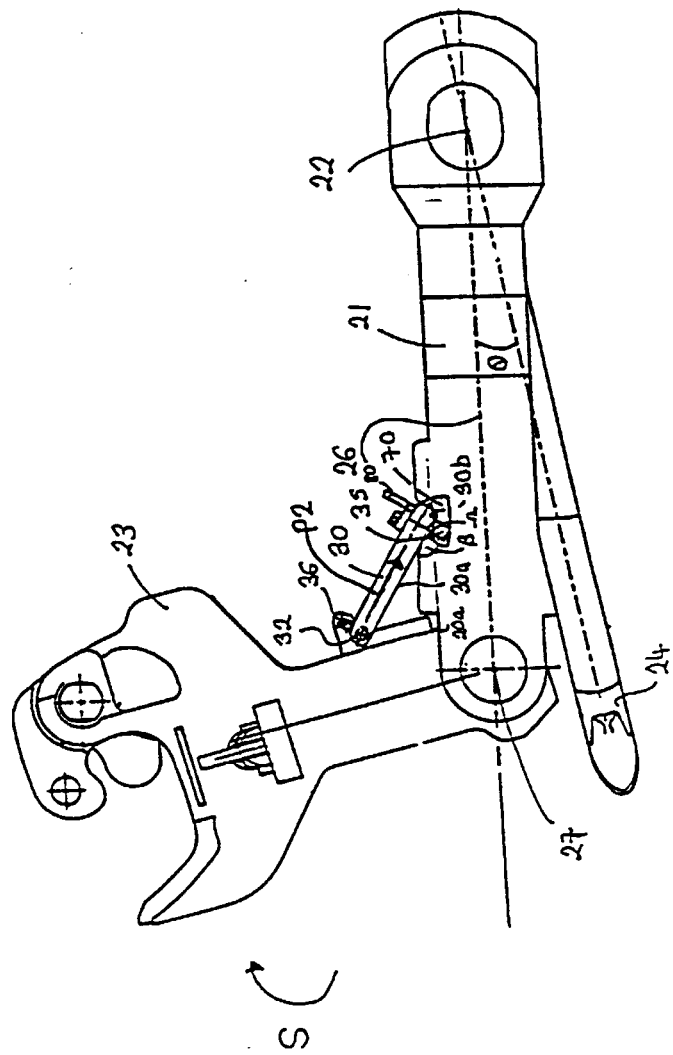


Figure 7

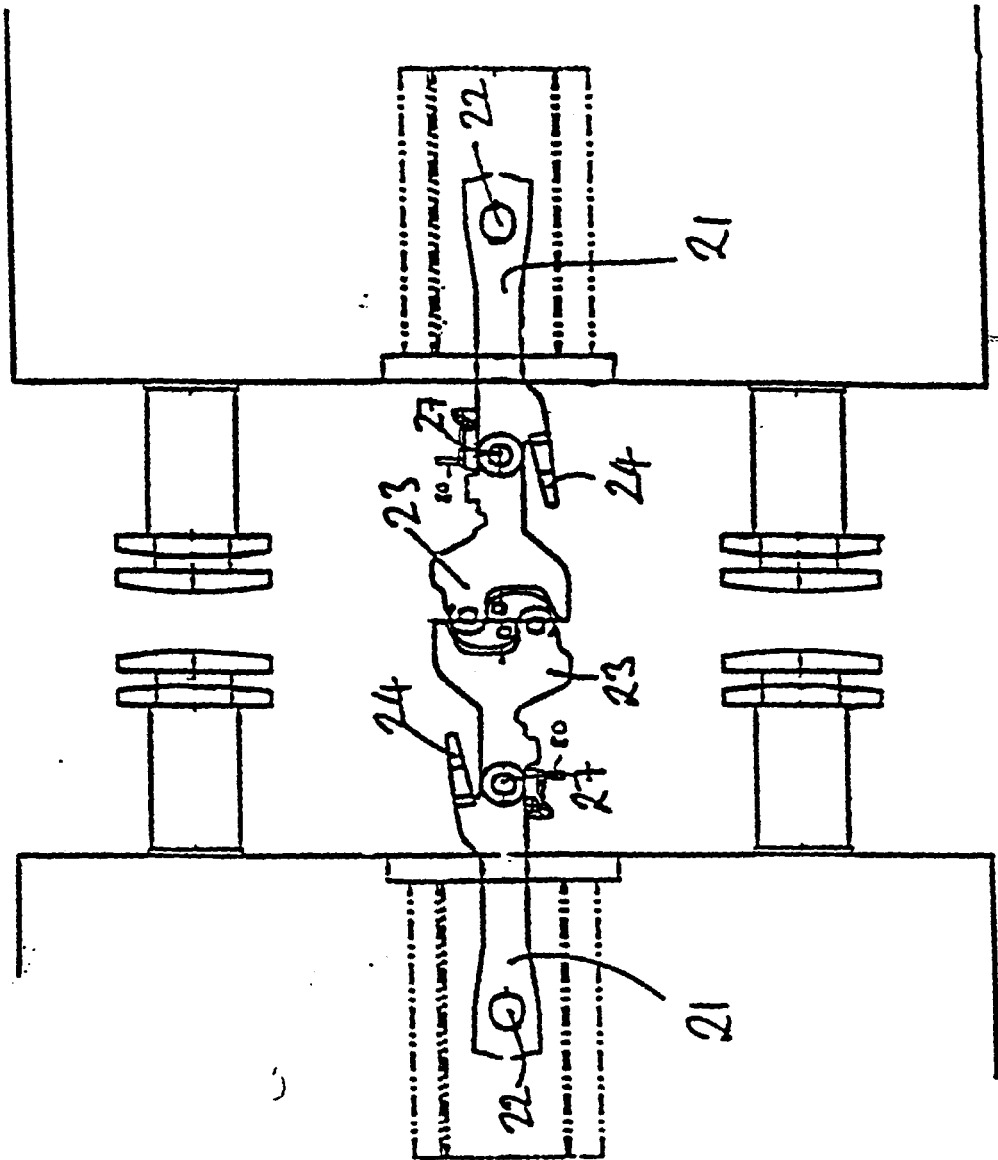


Figure 8

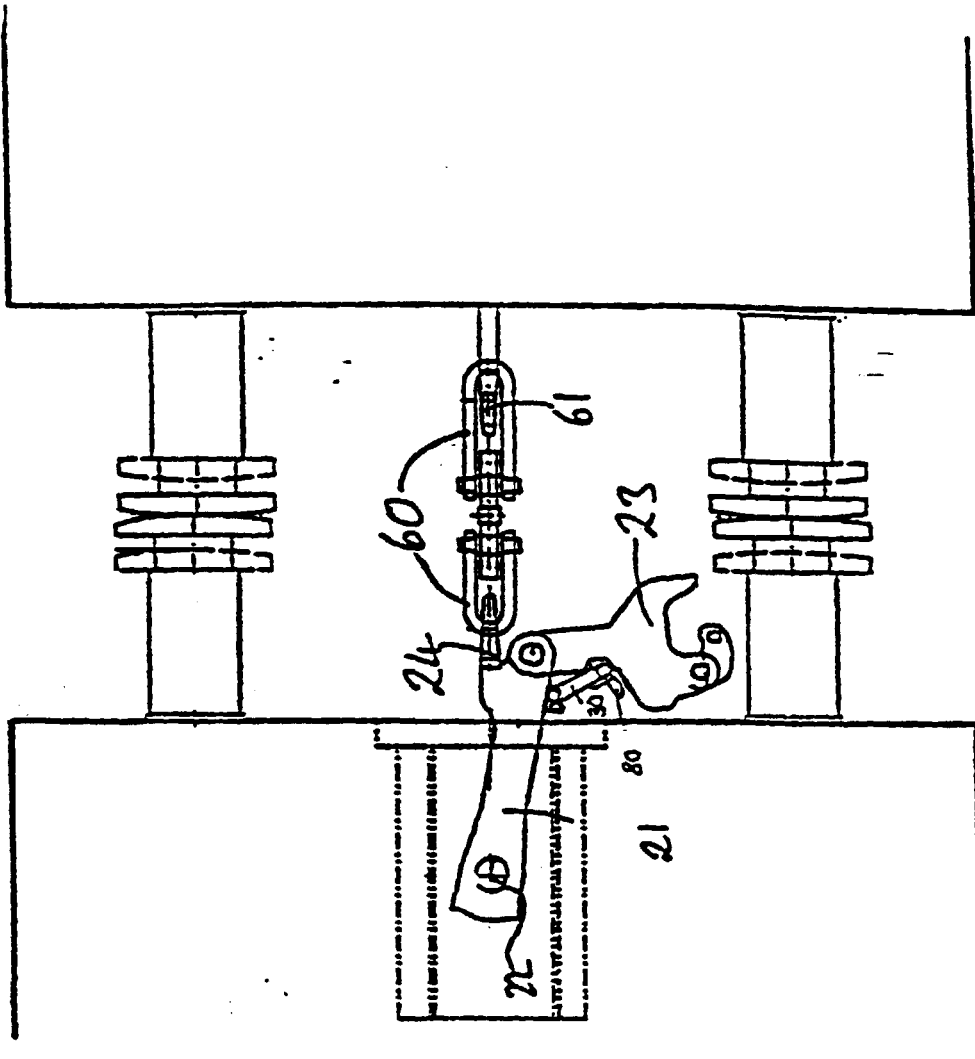


Figure 9