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(54) **A fork lift carriage assembly having side shift adjustable forks.**

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Description

This invention relates generally to load carrying apparatus and more particularly to a fork lift carriage assembly having side shift adjustable forks.

Material handling vehicles such as fork lift trucks are used to pick up and deliver loads between stations. The fork lift truck typically has a mast which supports a carriage assembly that can be raised along the mast. The carriage normally carries a pair of forks which are maneuverable beneath the load prior to lifting the load.

For a variety of well-known reasons, it is desirable to be able to displace the forks laterally along the carriage in relation to the centerline of the carriage and hence the truck. For example, as the truck approaches the load the forks may not be properly aligned with the load to be maneuvered under it. Rather than maneuvering the entire truck, it may be preferable to reposition the forks along the carriage. Under certain loading conditions, it may be necessary that the pair of forks be on the same side of the centerline of the carriage.

In one type of carriage and fork arrangement, the carriage is fixed on the mast against latural displacement. The forks are releasably secured by pins in notches on the top edge of the carriage and can be laterally displaced along the carriage by removing the pins and manually positioning them into other notches. One problem is that the forks, being heavy and cumbersome, may require significant manual exertion in repositioning them along the carriage.

In another type of carriage and fork arrangement, the forks can be hydraulically laterally displaced in relation to the centerline. Typically, the carriage includes a main carriage which is fixed on the mast against a lateral displacement and a sub-carriage which is movable laterally along the main carriage. The forks are mounted on the sub-carriage and hydraulic cylinders are connected to the sub-carriage to shift it laterally along the main carriage. One problem with this arrangement is that the sub-carriage cannot be shifted laterally so as to position both forks on one side of the centerline. Furthermore, the member which is shiftable to laterally displace the forks, i.e., the sub-carriage, is a member that supports the forks and hence the load being carried by the forks. Consequently, for a given load carrying capacity, this sub-carriage must be of a heavyweight construction. This adds to the overall weight of the mast assembly, which reduces the actual carrying capacity of the lift truck. Also, because of the sub-carriage, the forks and hence the load are positioned further away from the front wheels of the truck, which undesirably increases the load movement constant.

Furthermore, the cylinder rods of the cylinders are rigidly connected to the members that are shifted to laterally displace the forks. Should, for example, an undue side impact load act on the carriage or forks, this can be transmitted to the rods and bend or otherwise damage them.

DE—A—2726147 discloses a fork lift carriage assembly comprising a carriage with upper and lower horizontal rails, and a pair of vertical side members; two forks which are movable horizontally to and fro across the carriage on the rails; and two cylinder means each of which acts between a respective one of the side members and the respective one of the forks which is nearer to the other of the side members, for moving that fork across the carriage. Such an assembly is hereinafter referred to as of the kind described. However the forks are always movable to the same extent in the same or opposite directions and cannot be moved to the same side of the centerline of the carriage.

US—A—2270664 discloses a fork lift carriage assembly in which the two forks are adjustable along the cylinder of a common double acting cylinder means. In this construction the forks cannot both be moved apart to the fully out position.

In accordance with the invention, a fork lift carriage assembly of the kind described is characterised in that each of the cylinder means is operable independently of the other cylinder means and is provided with means for coupling that cylinder means to the respective fork selectively at one of two locations offset from one another in the direction of fork movement, whereby the full stroke of the cylinder means may either cause the respective fork to move between a position adjacent to one side member of the carriage and a centerline of the carriage or between a position spaced from the one side member of the carriage and a position beyond the centerline of the carriage

The problem of manually shifting the forks or hydraulically shifting the forks with a heavy sub-carriage that does not simultaneously position both forks on one side of the centerline are solved by the coupling means of the present invention which permit hydraulic shifting of both forks to such one side. Since the forks are supported on the rails which carry the load, the coupling means can be of a lightweight construction.

The invention will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic perspective of a mast and carriage assembly;

Fig. 2 is a front view, partially broken away, of the carriage of Figure 1;

Fig. 3 is an exploded rear view of a portion of the carriage of Fig. 2;

Fig. 4 is a view taken along lines IV—IV of Fig. 3; and

Fig. 5 is a view taken along lines V—V of Fig. 4.

Fig. 1 shows a fork lift carriage assembly 10 including a carriage 12 that is vertically movable along a mast 14 and a pair of forks 16, 18 which are supported on the carriage 12. The carriage 12 has a pair of roller brackets 20, 22 which support carriage rollers (not shown) that roll along the mast 14 in a conventional manner for moving the

carriage 12 between spaced apart elevated positions on the mast 14. Carriage 12 also includes upper horizontal rails 14, lower horizontal rails 26, a side vertical member 28 and a side vertical member 30. Fork 16 is slidably supported on upper rails 24 and lower rails 26, while fork 18 also is slidably supported on upper rails 24 and lower rails 26.

A cylinder means 32 is used to shift the fork 18 laterally and a cylinder means 34 is used to shift the fork 16 laterally along the rails 24 and rails 26. Cylinder means 32 includes an outer jacket 36 which is fixed to the vertical member 28 and a movable cylinder rod 38. Cylinder means 34 includes an outer jacket 40 that is fixed to the vertical member 30 and a movable cylinder rod 42.

A means 44 couples the cylinder means 32, particularly the rod 38, to the fork 18 to permit the fork 18 to be positioned on either side of the centerline (see Fig. 2) of the carriage 12. A means 46 couples the cylinder means 34, particularly the rod 42, to the fork 16 to permit the fork 16 to be positioned at either side of the centerline. As will be shown, the cylinder means 32 and cylinder means 44 can be independently actuated to position the fork 16 and the fork 18 at a variety of lateral positions along the carriage 12, including positioning both forks 16, 18 simultaneously on one side or the other side of the centerline.

With reference to Figs. 2—4, the coupling means 44 includes an upper L-shaped track 48 and a lower L-shaped track 50 which are fixed to the rear of the fork 18. The upper track 48 has a single slot 52. A bar 54 has a pair of spaced-apart notches 56, 58 at its upper surface and is slidable along the tracks 48, 50 to align either notch 56 or notch 58 with the slot 52. As one example, notch 56 and notch 58 can be spaced-apart by 12 inches. A lock pin 60 is removably retained in either notch 56 or notch 58 and slot 52. When pin 60 is removed, the bar 54 can slide relative to the fixed tracks 48, 50, and hence relative to the fork 18, whereas when the pin 60 is inserted as shown, the bar 54, tracks 48, 50 and hence the fork 18 will move together.

The rod 38 of the cylinder means 32 is connected to the bar 54 by a pin 62 which is supported on a bearing 63. A shearable retaining ring 64, which is a snap ring, holds the pin 62 in the position shown. The retaining ring 64 can be, for example, an elastomeric, e.g. rubber O-ring. Thus, when the cylinder means 32 is hydraulically actuated, the rod 38 will move the bar 54. Also, should any undue load such as an undue side impact load act on the fork 18 and carriage 12, the retaining ring 64 will pop off, allowing the rod 38 to be decoupled from the fork 18 and prevent damage to the rod.

As shown in Fig. 5, the pin 60 is T-shaped and has an internal bore 66. A small, spring biased ball 68 is supported in the bore 66 to be biased against a surface 70 of notch 56 (or notch 58) of the bar 54 to help retain the pin 60 in the position shown. The ball 68 will move against this bias into the bore 66 when removing the pin 60 from the position shown.

While not shown in detail, the coupling means 46 is substantially the same as the coupling means 44, as can be appreciated from Figs. 2—4. The corresponding structure of the coupling means 44 and coupling means 46 is shown by the similar reference numerals, so that, for example, bar 54 of means 44 and bar 54′ of means 46 are similar components.

Industrial Applicability

The fork lift carriage assembly 10 can be connected to a conventional fork lift truck in a well-known manner to pick up and deliver loads between various stations.

Assume that the coupling means 44 and coupling means 46 are in the positions shown in solid lines in Fig. 3. That is, the pin 60 is in the notch 56 and slot 52, while the pin 60′ is in the notch 56′ and the slot 52′. Also, rod 38 is fully retracted within jacket 36 of cylinder means 32 and rod 42 is fully retracted within jacket 40 of cylinder means 34.

In this position, fork 16 and fork 18 are adjacent one another at the centerline of the carriage 12, which is termed a full-in position. As indicated in Fig. 2, by actuating the cylinder means 32, fork 18 can be moved from the full-in position at the centerline to a position adjacent the vertical member 30, which is termed a full-out position, as shown in phantom lines. Similarly, cylinder means 34 can be actuated to move the fork 16 from the full-in position at the centerline to a full-out position adjacent the vertical member 28. With this connection of the coupling means 44 and coupling means 46, neither fork 16 or fork 18 can be moved across the centerline, as can be appreciated from Fig. 2, since the rod 38 and rod 42 are fully retracted in jacket 36 and jacket 40.

To be able to move fork 18 across the centerline, the carriage 12 is moved to the lower most position on the mast 14 with the fork 16 and fork 18 being adjacent the ground. Then, the pin 60 is manually removed from the notch 56 and slot 52. Next, with reference to Fig. 3, the cylinder means 32 is actuated to hydraulically move the rod 38 from the full line position shown to the phantom line position. As a result, the bar 54 also will be moved or slid along the tracks 48, 50 in relation to the fork 18 to align the notch 58 with the slot 52. Then, the pin 60 is placed in the notch 58 and slot 52. Note from Fig. 3 that the fork 18 as well as the fork 16 are still adjacent the centerline of the carriage 12 at the full-in position.

Thereafter, the lift truck operator can hydraulically actuate the cylinder means 34 to move the fork 16 from the full-in position to the full-out position adjacent the vertical member 28. Also, the cylinder means 32 can be independently hydraulically actuated to retract the partially extended rod 38 which will now move the fork 18 across the centerline a distance equal to the distance between notch 52 and notch 58, that is, a distance of 12 inches in the example, past the full-

in position. Thus, in this condition, both fork 16 and fork 18 are simultaneously positioned on one side of the centerline of the carriage 12. While the fork 18 can be moved to a position up to 12 inches across the centerline, it can also be seen that if the rod 38 is extended the full stroke from the jacket 36, the fork 18 can be moved not to the full-out position, but to 12 inches from the vertical member 30.

In a similar manner, cylinder means 34 and coupling means 46 can be maneuvered so as to place the pin 60' in the notch 58' and slot 52'. In this condition, the fork 16 can be moved between a position 12 inches across the centerline of the carriage 12 and a position 12 inches from the vertical member 28. Also, as can be seen, both fork 16 and fork 18 can be simultaneously positioned on the other side of the centerline of the carriage 12.

As can also be appreciated, the fork 16 and fork 18 can be shifted laterally along the carriage 12 between any number of positions other than those specifically described above. These positions depend on the relative position of the pair of cylinder means 32, 34, particularly rods 38, 42, to the forks 18, 16, as provided by the pair of coupling means 44, 46, and the amount of extending rods, 38, 42.

In summary, the present invention provides coupling means 44 and coupling means 46 which enable the forks 16, 18 to be shifted laterally along the carriage 12 to any number of positions including particularly, positions in which both forks are simultaneously on one side or the other side of the centerline. Also, this positioning on the respective sides of the centerline is accomplished hydraulically be merely actuating the cylinder means 32 and cylinder means 34 once the notches 56, 58 and/or 56', 58' are hydraulically aligned with the corresponding slot 52 and/or 52'.

Furthermore, the coupling means 44 and coupling means 46 do not support the load that is picked up or carried by the forks 16, 18. Rather, this load is carried through the forks to the rails 24 and rails 26 on which the forks are supported. Consequently, the coupling means 44 and coupling means 46 can be relatively lightweight. Still furthermore, only a simple pin connection by means of releasable pin 60 and pin 60' is required to be able to slide bar 54 and bar 54' on the tracks 48' 50 and tracks 48', 50' in relation to the forks.

Also, should the forks 16, 18 and/or carriage 12 be subjected to, for example, excessive side impact loads, retaining ring 64 and retaining ring 64' will pop off, permitting rods 38, 42 to be decoupled from forks 18, 16 and preventing, for example, bending of the rods.

Claims

1. A fork lift carriage assembly (10) comprising a carriage (12) with upper and lower horizontal rails (24, 26) and a pair of vertical side members (28, 30), two forks (16, 18) which are movable horizontally to and fro across the carriage on the rails and two cylinder means (32, 34) each of which acts between a respective one of the side members and the respective one of the forks which is nearer to the other of the side members for moving that fork across the carriage; characterised in that each of the cylinder means is operable independently of the other cylinder means and is provided with means (44, 46) for coupling that cylinder means to the respective fork selectively at one of two locations offset from one another in the direction of fork movement, whereby the full stroke of the cylinder means may either cause the respective fork to move between a position adjacent to one side member of the carriage and a centreline of the carriage or between a position spaced from the one side member of the carriage and a position beyond the centreline of the carriage.

2. An assembly according to claim 1, wherein each of the cylinder means (32, 34) comprises a jacket (36, 40) which is connected to a respective one of the side members, and a rod (28, 42) which is coupled by the means (44, 46) to the respective fork (16, 18).

3. An assembly according to claim 1 or claim 2, wherein each of the coupling means (44, 46) comprises track means (48, 50) extending in the direction of fork movement; a bar (54) slidably engaged with the track means; and means (52, 56, 58, 60) for locating the bar selectively in one of two positions relatively to the track means and corresponding to the two offset locations.

4. An assembly according to claim 3, wherein the locating means comprises a slot (52) in the track means; a pair of spaced apart notches (56, 58) in the bar each of which notches can be brought into alignment with the slot; and a pin (60) for engagement in the slot and an aligned one of the notches.

5. An assembly according to claim 4, wherein the pin (60) is provided with a spring biased ball (68) and each notch (56, 58) is provided with a detent surface (70), the ball and detent surface cooperating to hold the pin in one of the notches.

6. An assembly according to any of claims 3 to 5, and to claim 2, wherein, in each coupling means (44, 46) the track means (48, 50) is fixed to the respective fork (16, 18) and the respective cylinder rod (38, 40) is connected to the respective bar (54) by a pin (62) on which the cylinder rod is held by a retaining ring (64) which is arranged to fail under excessive loading.

7. An assembly according to claim 6, wherein the retaining ring is a snap ring (64).

8. An assembly according to claim 7, wherein the snap ring is an elastomeric O-ring (64).

Revendications

1. Ensemble de levage mobile à fourches (10), comprenant un chariot (12) portant des rails horizontaux supérieur et inférieur (24, 26) et deux éléments latéraux verticaux (28, 30), deux fourches (16, 18) qui sont déplaçables sur les rails dans une direction horizontale et selon un move-

ment de va-et-vient transversal au chariot et deux organes à vérin (32, 34) dont chacun agit entre un élément latéral respectif et celle des fourches qui est la plus proche de l'autre élément latéral pour déplacer cette fourche en travers du chariot; caractérisé en ce que chacun des organes à vérin peut être actionné indépendamment de l'autre organe à vérin et est équipé d'un moyen (44, 46) pour assujettir cet organe à vérin à la fourche qui lui est associée , sélectivement en l'un ou l'autre de deux emplacements décalés l'un par rapport à l'autre dans la direction du movement de la fourche, si bien que la course compète de l'organe à vérin peut provoquer un déplacement de la fourche associée, soit entre un point adjacent à l'un des éléments latéraux du chariot et une ligne médiane du chariot, soit entre un point distant de l'un des éléments latéraux du chariot et un point situé au-delà de la ligne médiane du chariot.

2. Ensemble selon la revendication 1, dans lequel chacun des organes à vérin (32, 34) comprend un cylindre (36, 40) qui est relié à un élément latéral respectif, et une tige (28, 42) qui est assujettie par le moyen (44, 46) à la fourche associée (16, 18).

3. Ensemble selon la revendication 1 ou la revendication 2, dans lequel chacun des moyens d'assujettissement (44, 46) comprend des moyens définissant une piste (48, 50), qui s'étendent das la direction du mouvement de la fourche; une barre (54) placée en contact glissant avec les moyens définissant une piste; et des moyens (52, 56, 58, 60) pour sélectivement positionner la barre par rapport aux moyens définissant une piste, dans l'une ou l'autre de deux positions correspondant aux deux emplacements décalés.

4. Ensemble selon la revendication 3, dans lequel les moyens de positionnement comprennent une fente (52) formée dans le moyens définissant une piste; deux encoches (56, 58) espacées l'une de l'autre et ménagées dans la barre, chacune de ces encoches pouvant être amenée en alignement avec la fente; et un goujon (60) destiné à s'engager dans la fente et dans l'encoche qui est alignée avec celle-ci.

5. Ensemble selon la revendication 4, dans lequel le goujon (60) est pourvu d'une bille (68) chargée élastiquement et chaque encoche (56, 58) présente une surface d'arrêt (70), la bille et la surface d'arrêt coopérant pour retenir le goujon dans l'une des encoches.

6. Ensemble selon l'une quelconque des revendications 3 à 5, et selon la revendication 2, dans lequel, dans chaque moyen d'assujettissement (44, 46), les moyens définissant une piste (48, 50) sont fixés à la fourche associée (16, 18) et la tige de vérin correspondante (38, 40) est reliée à la barre associée (54) par un goujon (62) sur lequel la tige de vérin est maintenue par une bague de retenue (64) qui est conçue de telle façon à céder sous une charge excessive.

7. Ensemble selon la revendication 6, dans lequel la bague de retenue est une bague à ressort (64).

8. Ensemble selon la revendication 7, dans lequel la bague à ressort est une bague torique en un élastomère (64).

Patentansprüche

1. Gabelhubschlittenanordung (10), die folgendes aufweist: einen Schlitten (12) mit oberen und unteren Horizontalschienen (24, 26) und ein Paar von Vertikalseitengliedern (28, 30) sowie zwei Gabeln (16, 18), die horizontal hin und her über den Schlitten auf Schienen bewegbar sind und mit zwei Zylindermitteln (32, 34) der jedes zwischen einem entsprechenden der Seitenglieder und der entsprechenden einen Gabel von den Gabeln, die näher zum anderen der Seitenglieder liegt, um die Gabel über den Schlitten zu bewegen, dadurch gekennzeichnet, daß jedes der Zylindermittel unabhängig von den anderen Zylindermitteln betätigbar ist und mit Mitteln (44, 46) zum Kuppeln dieser Zylindermittel mit der entsprechenden Gabel ausgestattet ist, und zwar selektiv an einer von zwei voneinander versetzten Stellen in Richtung der Gabelbewegung, wordurch der volle Hub der Zylindermittel entweder bewirken kann, daß sich die entsprechende Gabel zwischen einer Position benachbart zu dem einen Seitenglied des Schlittens und einer Mittellinie des Schlittens oder zwischen einer Position mit Abstand gegenüber dem einen Seitenglied des Schlittens und einer position über die Mittellinie des Schlittens hinaus bewegt.

2. Anordnung nach Anspruch 1, wobei jedes der Zylindermittel (32, 34) einen Mantel (36, 40) aufweist, der mit einem entspechenden der Seitenglieder verbunden ist, und mit einer Stange (28, 42), die durch die Mittel (44, 46) mit der entspechenden Gabel (16, 18) gekuppelt ist.

3. Anordung nach Anspruch 1 oder 2, wobei jedes der Kupplungsmittel (44, 46) folgendes aufweist: Führungsmittel (48, 50), die sich in Richtung der Gabelbewegung erstrecken, eine Stange (54) gleitend in Eingriff mit den Führungsmitteln, und Mittel (52, 56, 58, 60) zur Anordnung der Stange selektiv in einer von zwei Positionen bezüglich der Führungsmittel und entsprechend den zwei versetzten Stellen.

4. Anordnung nach Anspruch 3, wobei die Anordnungsmittel einen Schlitz (52) in den Führungsmitteln aufweisen, ein Paar von mit Abstand angeordneten Nuten (56, 58) in der Stange, wobei jede der Nuten in Ausrichtung mit dem Schlitz gebracht werden kann, und mit einem Stift (60) zum Eingriff in den Schlitz und der ausgerichteten Nut von den Nuten.

5. Anordnung nach Anspruch 4, wobei der Stift (60) mit einer federvorgespannten Kugel (68) ausgestattet ist, wobei jede Nut (56, 58) mit einer Rastoberfläche (70) ausgestattet ist, wobei die Kugel und Rastoberfläche zusammenarbeiten, um den Stift in einer der Nuten zu halten.

6. Anordnung nach einem der Anspruche 3 bis 5 und Anspruch 2, wobei in jedem der Kupplungsmittel (44, 46) die Fürungsmittel (48, 50) an der

entsprechenden Gabel (16, 18) befestigt sind und die entsprechende Zylinderstange (38, 40) ist mit der entsprechenden Stange (54) durch einen Stift (62) verbunden, auf dem die Zylinderstange durch einen Haltering (64) gehalten ist, der derart ausgebildet ist, daß er bei übermäßiger Belastung ausfällt.

7. Anordnung nach Anspruch 6, wobei der Haltering ein Schnappring (64) ist.

8. Anordnung nach Anspruch 7, wobei der Schnappring ein elastomerer O-Ring (64) ist.

FIG.1.

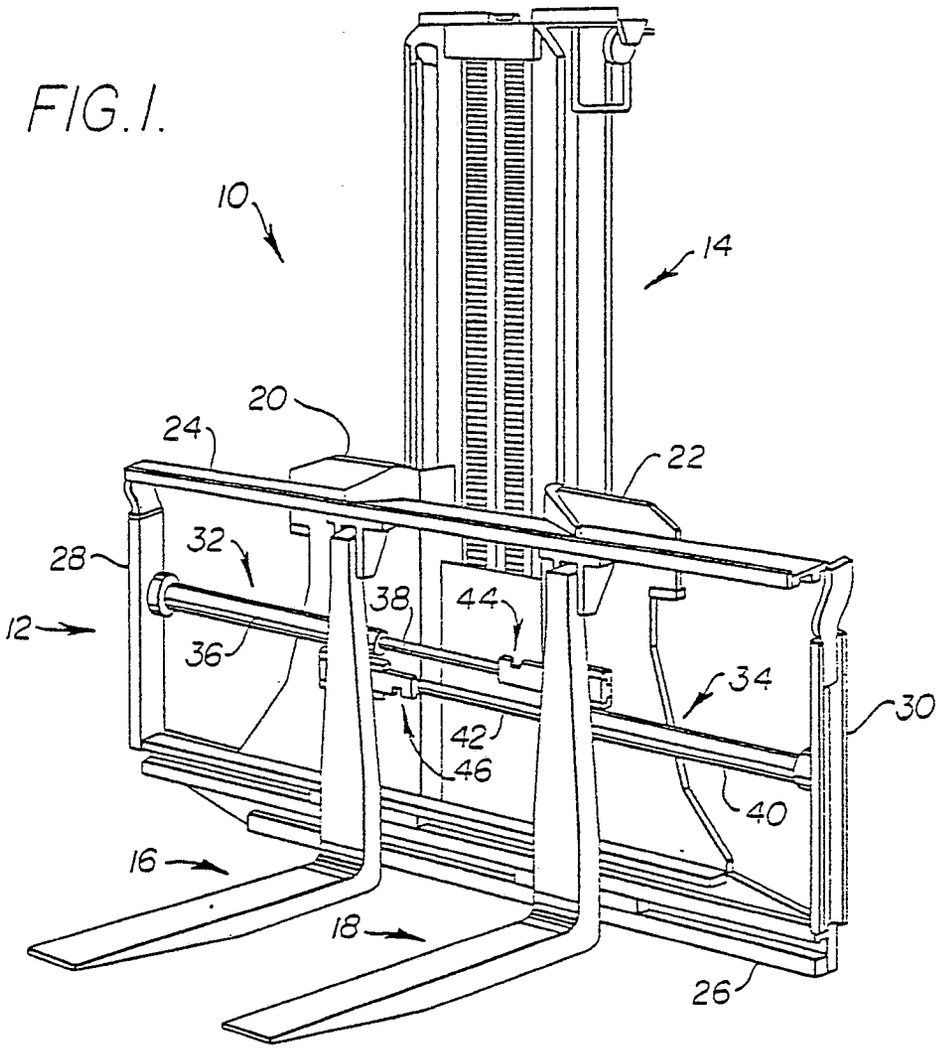
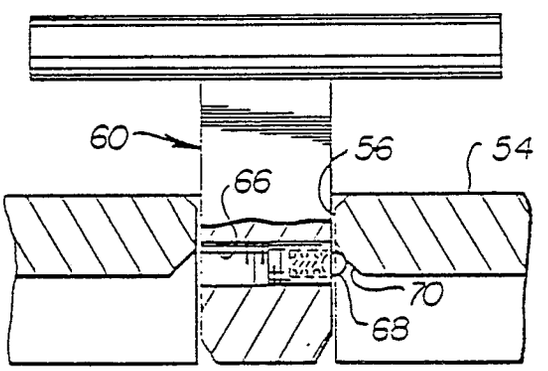

10
14
20
24
22
28
32
38
44
12
36
34
30
42
46
40
16
18
26

FIG.5.


60
56
54
66
70
68

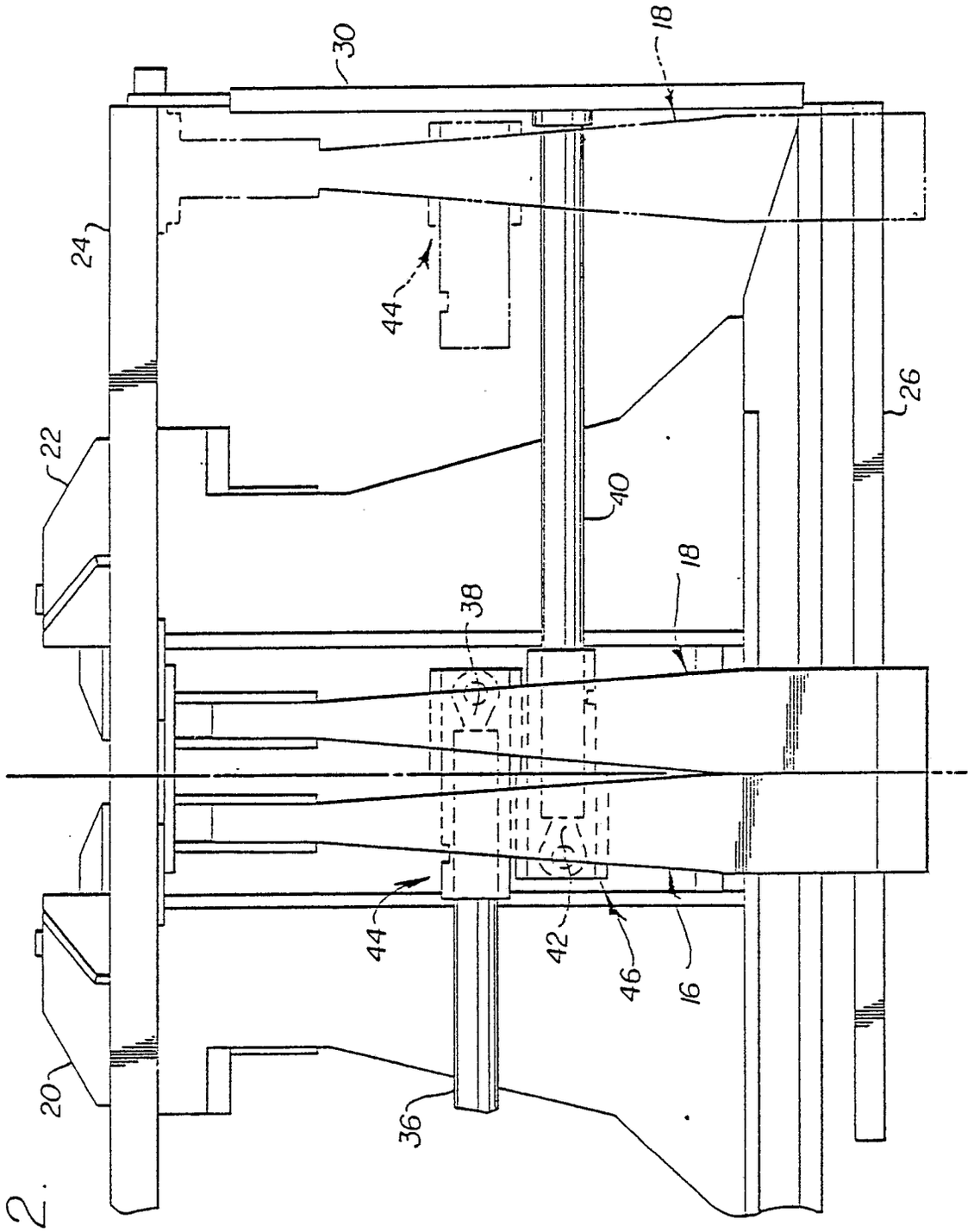


FIG. 2.

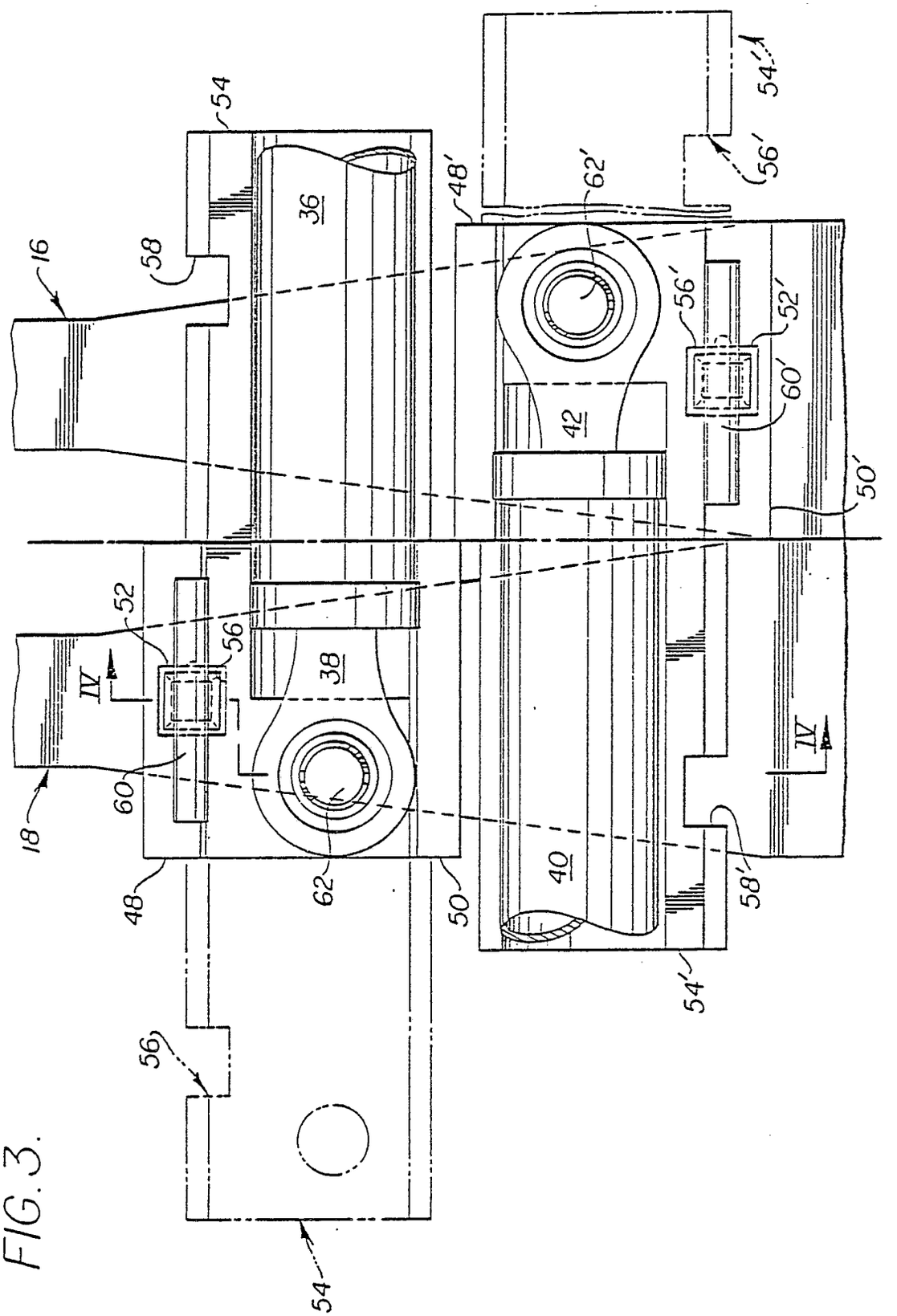

54
36
16
58
48'
62'
54'
56'
56'
52'
60'
42
50'
52
56
IV
38
60
18
48
62
50
40
58'
54'
IV
56
54

FIG. 3.

FIG.4.