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Bausenbach et al.

[11] **3,857,504**

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[54] **MECHANISM FOR LOCKING REFUSE CONTAINER ON TRUCK PLATFORM**

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[52] **U.S. Cl.**..... **214/517**, 292/DIG. 49, 292/216, 105/366 R

[51] **Int. Cl.**..... **B60p 1/64**

[58] **Field of Search**..... 214/517; 296/35 A; 24/230 AP, 230 AV, 232, 241 PS; 105/366 R; 292/216, DIG. 49

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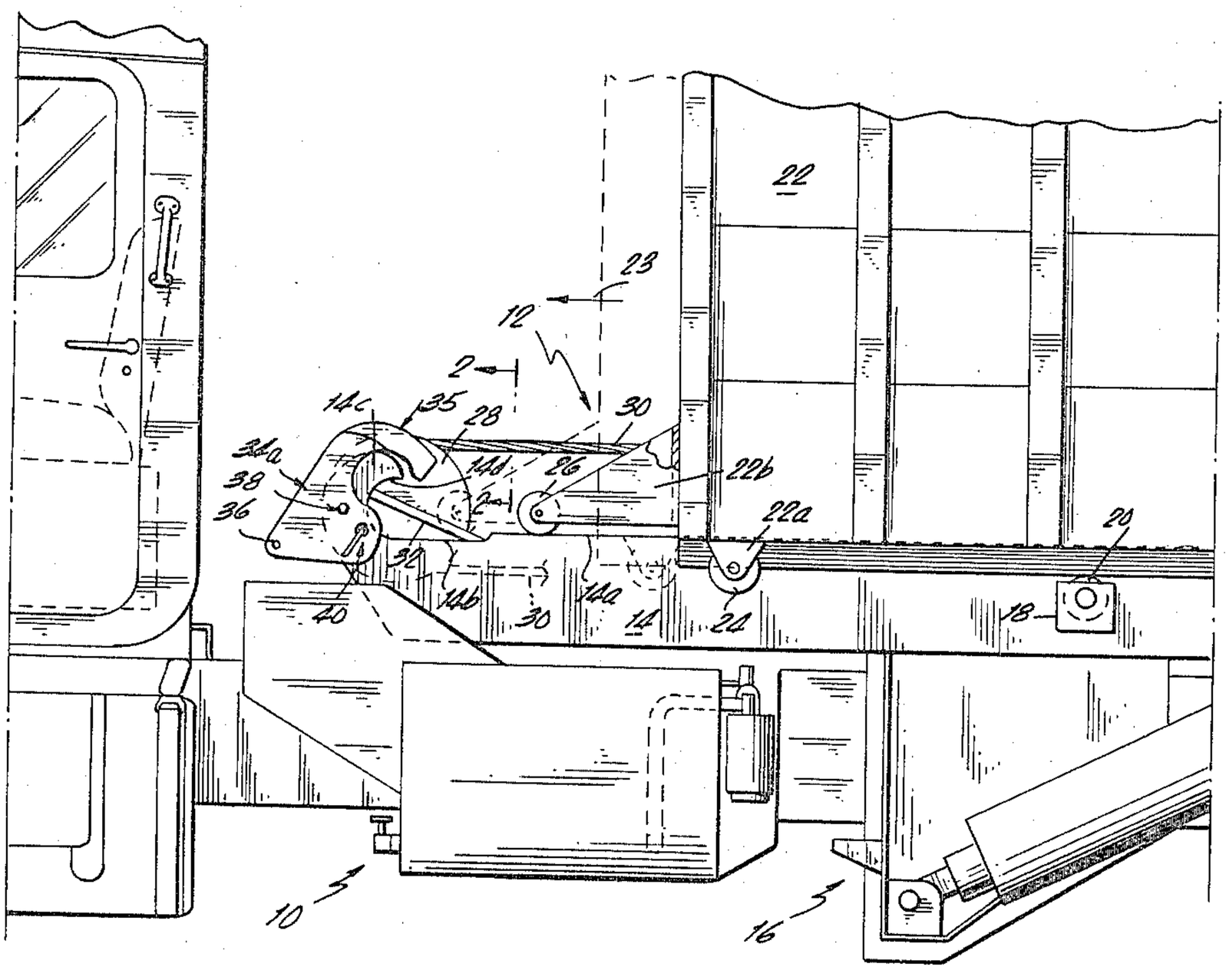
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Attorney, Agent, or Firm—Gottlieb, Rackman, Reisman & Kirsch

[57] **ABSTRACT**

A locking mechanism for securing a refuse container to a truck platform. The forward end of the container has a pair of transversely spaced bottom locking rollers. As the container is pulled forward onto the truck, the locking rollers bear against locking members of the locking mechanism, which are shaped such that the forces of the locking rollers against them cause the locking members to rotate and envelop the locking rollers. A locking pin is then latched to secure the locking members in their closed positions. By the location of the rollers in the locking members, the container is restrained from movement, regardless of the attempted shifting of the container on the truck platform, during movement of the truck along a road. Such attempted shifting tends to hold the locking members in their closed, rather than open, positions. Release of the locking pin allows the locking members to be sprung to their open position, whereupon the container can be removed from the truck platform.

6 Claims, 7 Drawing Figures



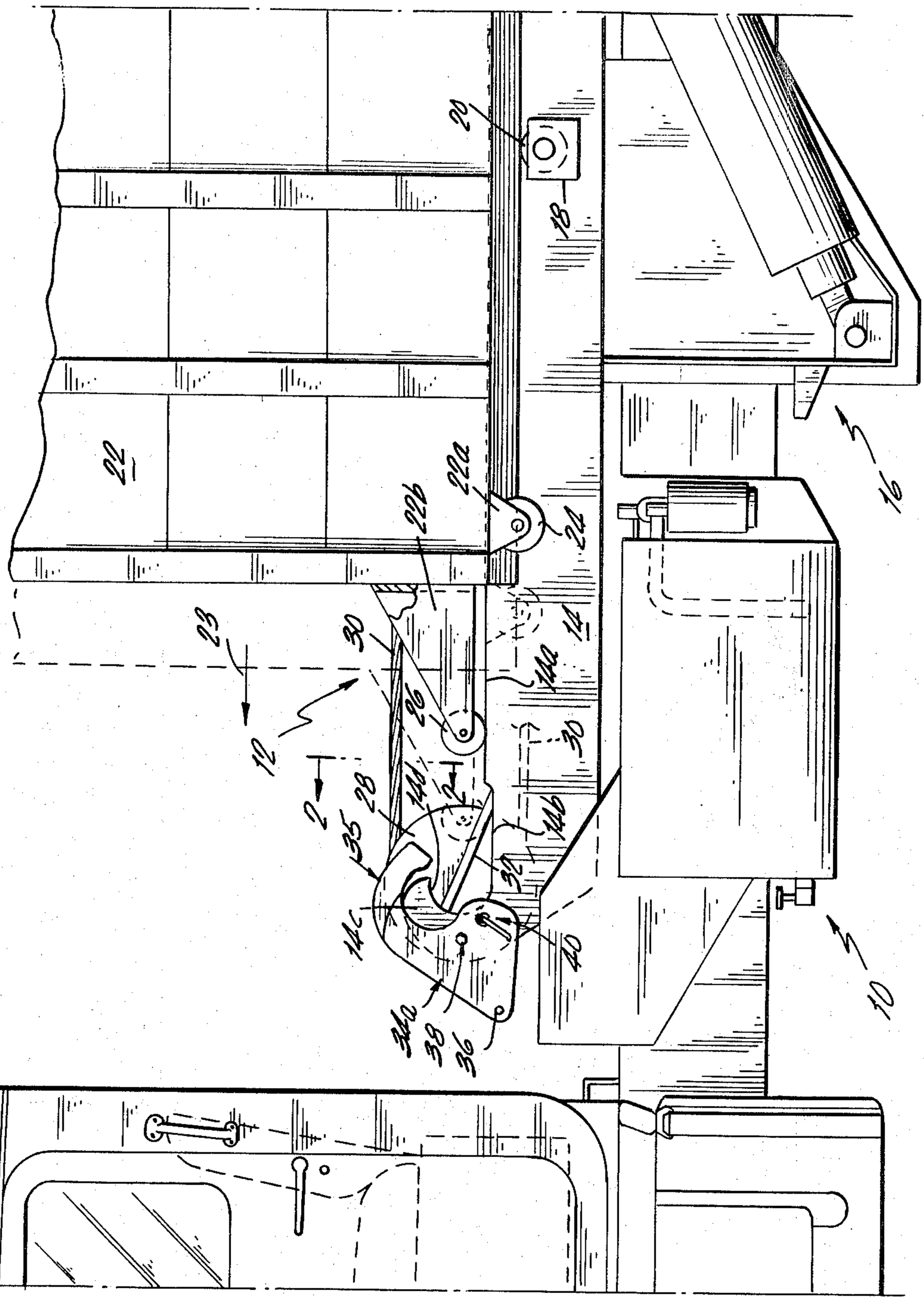

20
18
16
22
22a
22b
24
23
30
14
14a
26
12
30
2
28
35
14b
32
14c
40
34a
38
36
10

FIG. 1

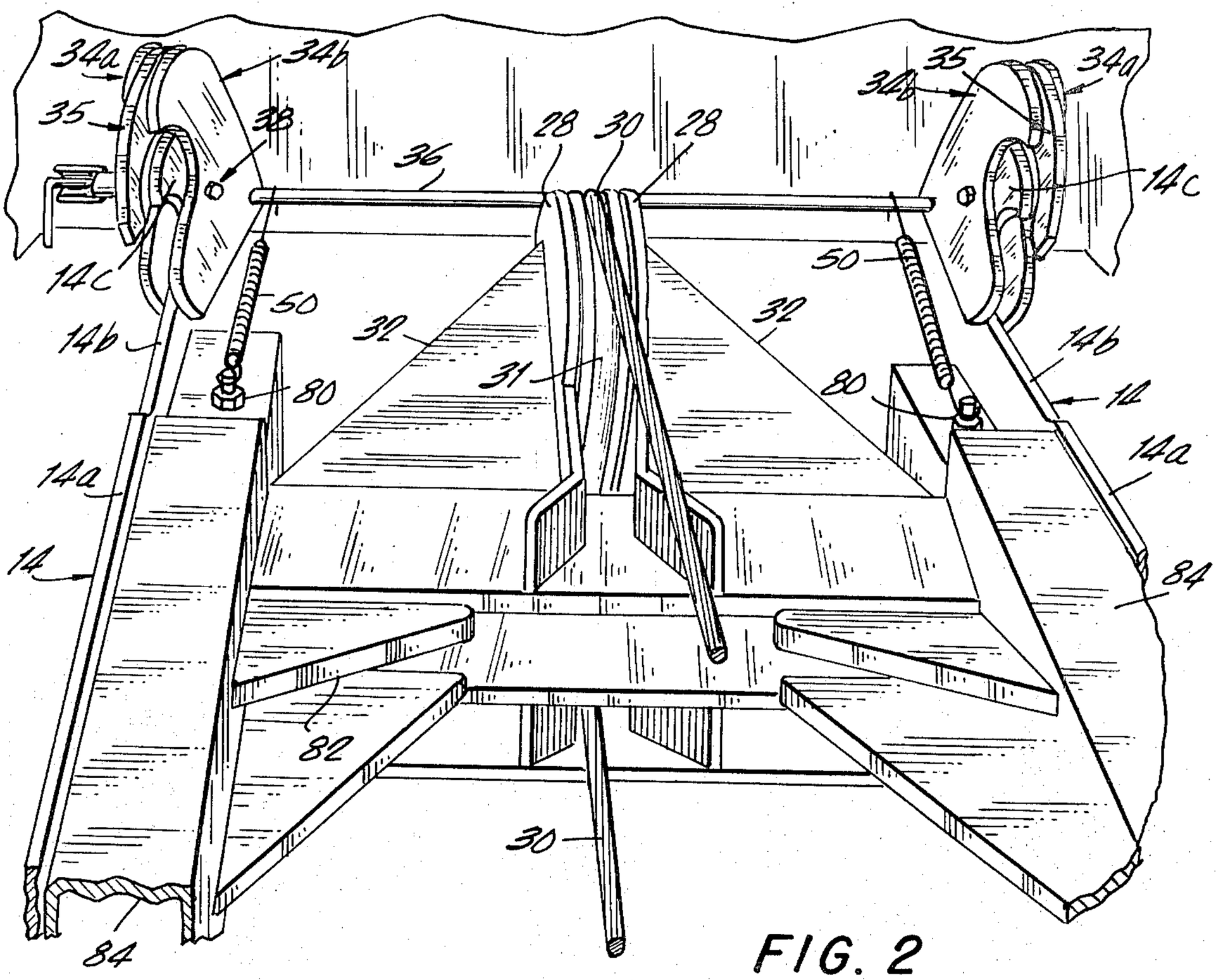

34a
34b
35
38
36
28
30
28
14c
50
14b
32
31
80
14a
14
82
84
30
35
34b
34a
14c
50
32
14b
14
80
14a
84

FIG. 2

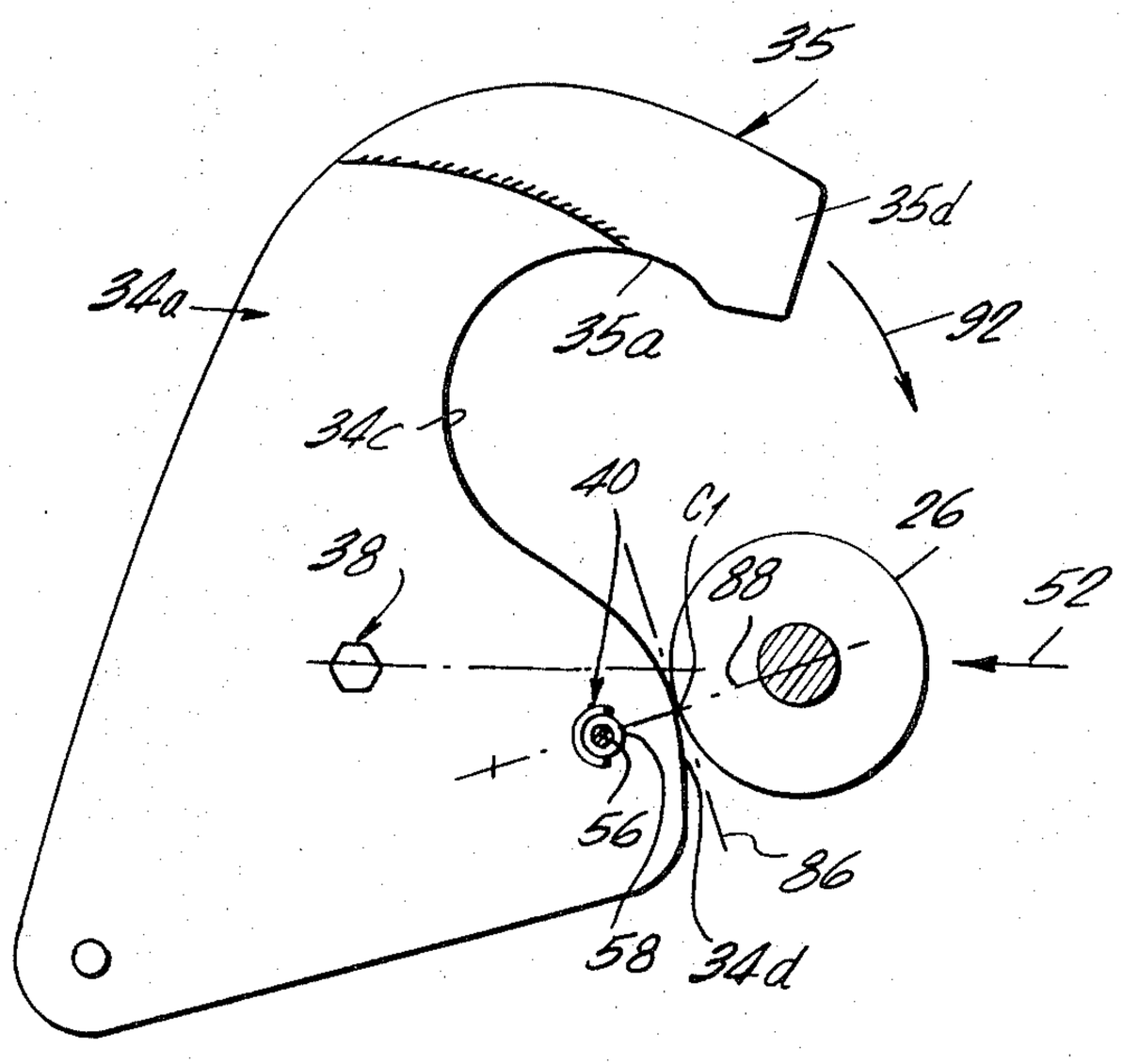

35
35d
34a
35a
92
34c
40
C1
26
38
88
52
56
86
58
34d

FIG. 3

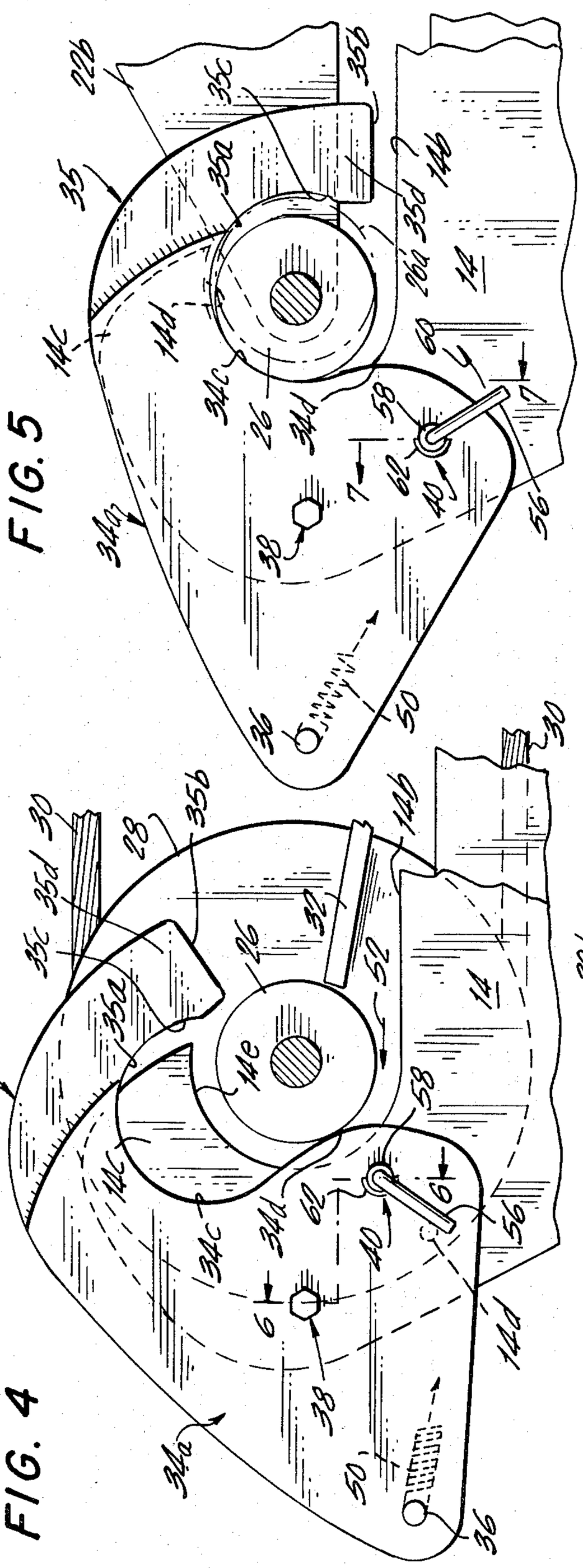


FIG. 5

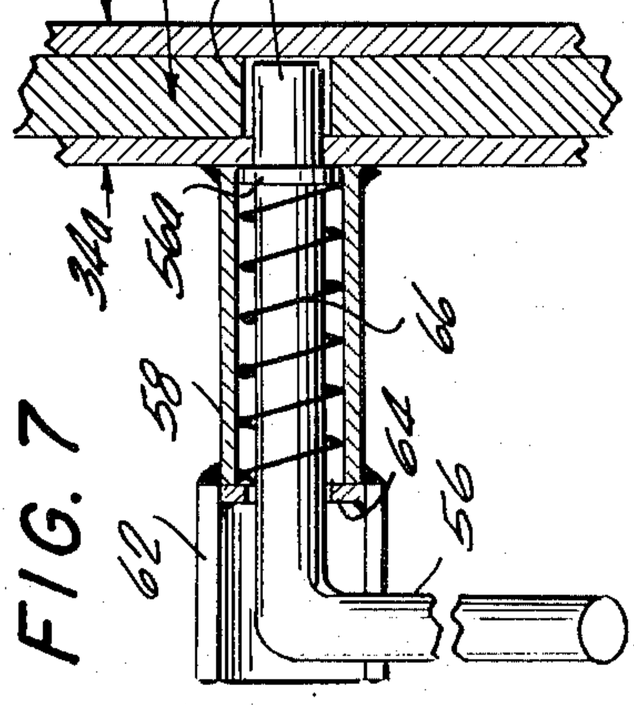


FIG. 7

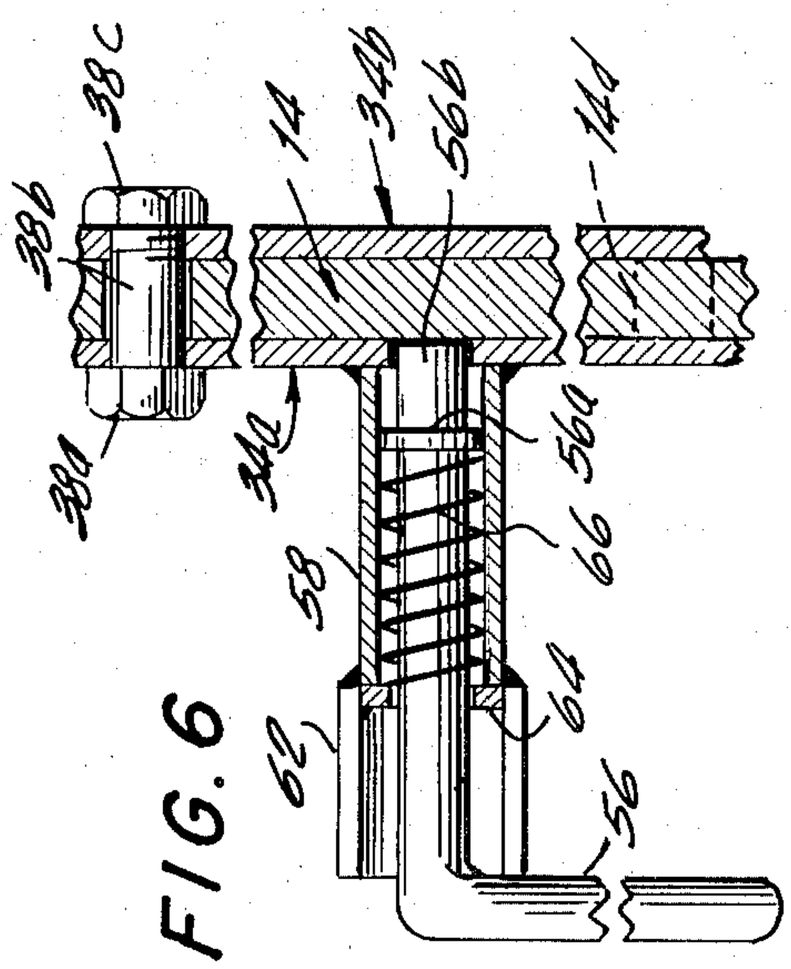


FIG. 6

FIG. 4

MECHANISM FOR LOCKING REFUSE CONTAINER ON TRUCK PLATFORM

This invention relates to locking mechanisms and more particularly to mechanisms for locking refuse and like containers in place on a truck platform.

Large refuse containers are being used more and more often at many locations. The containers are often of extremely large capacity; for example, a large refuse container may measure over twenty feet in length and may hold up to 45 cubic yards of debris. Such containers are often used at construction sites. Rather than fill smaller refuse cans and empty them many times each day, a single large container, weighing many tons, may be transported to the construction site, left there and filled over a number of days, and then carted away for emptying at a refuse disposal site, while an empty container replaces it.

Another application in which such containers are finding increasing use is in connection with refuse compactors. A large container may be brought by truck to the site of a stationary compactor and the refuse operated upon by the compactor may be packed into the container, after which it is carted away for emptying.

A typical large refuse container includes rollers mounted on its underside so that it can be pushed or pulled short distances once it is brought to a particular site. The truck used to transport these containers is usually of the hoist type with a normally horizontal platform which can be tilted under hydraulic control so that is slopes downward toward the back of the truck. The platform typically includes a motor-powered winch, including a cable that is wound about the winch drum.

To pick up a container from a particular site, the platform of the truck is tilted, and the cable is played out by the winch and is attached to the end of the container closest to the rear of the truck. The cable is then drawn in and the container is pulled up onto the sloping platform, the container riding on its rollers. After the container is on the platform, the platform is leveled to the horizontal position so that the container will also be in a horizontal position as it is transported by the truck to another location. To release the container at a refuse disposal site, the platform is again tilted so that it slopes downward and rearward, and the cable is played out so that the container rolls down the platform to the ground. The cable is then detached from the container.

One of the problems with this type of arrangement is that it is difficult to secure the container on the truck against shifting when the truck is moving. For example, when the truck is travelling up-hill or down-hill, the container will have a tendency to roll either off the back of the truck or forward toward the cab, and this tendency is especially dangerous when the container is full and thus quite heavy. Rearward movement of the container may be prevented by keeping the winch cable taut. However, very large and sudden forces can be applied to the cable, the pulley around which it passes and the supporting winch structure, during travel of the truck, especially if the ride is over unimproved roads. As for forward movement of the container, it cannot be prevented by the cable which simply goes slack if the container moves forward, for example, when the truck comes to a sudden halt.

In the past, often the containers were clamped to the truck so that they were held in place. However, such procedures are subject to operator errors and are time-consuming, making them undesirable. The bother of continuously clamping and unclamping such containers often caused the truck operator to simply fail to do so, thereby relying only on the winch cable.

It is a general object of the invention to provide a locking mechanism for rapidly, easily, automatically and in an almost fool-proof manner locking a container in place on a truck to prevent movement of it in either direction, without requiring use of the winch for this purpose.

It is another object of the invention to provide such a mechanism wherein attempted shifting of the container tends to keep the locking mechanism in its closed or locked position.

Briefly, in accordance with the principles of the invention, at each side of the truck platform, toward that end which is adjacent to the cab and which is raised when a container is loaded or removed from the truck, there is provided a container stop. Mounted for pivotal movement on each stop is a yoke with a projecting tang. When a container is being loaded onto the truck, the two yokes are spring-biased to an open position. In such a position, two rollers at the front of the container, one on each side, strike respective yokes as the container is pulled forward by the cable. The yokes are shaped so that further movement of the container forces them to rotate. The yokes rotate until they enclose the rollers to prevent movement of the container in either direction. A locking pin locks the yokes in place. The container is rigidly held in place by virtue of its rollers being captured by the yokes.

It is a feature of the invention to provide two rotating yokes fixed to respective stops on each side of a truck platform at the end adjacent to the cab, each yoke being biased to an open position but being forced to a closed position in which it locks the container in place when the container strikes it as the container is pulled forward by a cable.

Further objects, features and advantages of the invention will become apparent upon consideration of the following detailed description in conjunction with the drawing in which:

FIG. 1 depicts a fragmentary side view of a truck showing a container as it is being moved forward on the truck platform;

FIG. 2 is a view through the line 2—2 of FIG. 1 looking toward the cab of the truck from the rear of the platform and shows the two yokes of the locking mechanism in perspective view;

FIG. 3 depicts the manner in which a container roller bears against a yoke when it first strikes it, as the container is pulled forward onto the truck platform;

FIG. 4 is a view similar to FIG. 3 but shows the yoke after it has been rotated slightly under the force of the container roller moving forward and the container being pulled further onto the truck platform;

FIG. 5 shows the yoke in its closed position after the container has been pulled to its maximum forward position,

FIG. 6 is a sectional view through the line 6—6 FIG. 4; and

FIG. 7 is a sectional view through the line 7—7 of FIG. 5, both FIGS. 6 and 7 showing the latching pin.

FIG. 1 depicts a lift truck 10 having a platform 12. A conventional hydraulic mechanism 16 operates to tilt the platform so that it slopes downward to the right. Since lift mechanisms of this type are well known, lift mechanism 16 is not shown in detail in the drawing.

The platform includes two elongated side channels 84, as seen most clearly in FIG. 2, along the outer edges of which are skids 14. The upper surface 14 *b* of the forward end of each skid is slightly depressed relative to the upper surface 14 *a* along the major length of the skid, such upper surface being slightly elevated with respect to the channels. The platform is composed of several frame members such as 32 and 82, which join to the channels 84. At the forward end of the platform are two structural guides 28 which carry a pulley 31. A winch cable 30 passes around the pulley. The free end of the cable is extended to a container to which it can be attached in a conventional manner. The lower reach of the cable is extended to a conventional motor-driven winch which can be driven in either direction to either draw in the cable thereby pulling the container toward the forward end of the platform adjacent to the truck cab or to play out the cable so that the container can slide down the platform if the platform is in its tilted position. Construction of the platform, for the most part, is of conventional design.

The platform carries a plurality of rollers 20 mounted in supporting units 18, as shown in FIG. 1, for allowing a refuse container 22 to slide over them to move in either direction along the platform. The container itself is provided with a plurality of brackets 22*a*, only one of which is shown in FIG. 1, which support rollers 24. These rollers support the container when it is removed from the platform and placed on the ground. At the forward end of the container, there are provided brackets 22*b*, each of which carries a locking roller 26. The rollers 26 are located at the sides of the container and each rides along a respective one of the platform skids 14, seen most clearly in FIG. 1. As the container moves to the left in the direction of arrow 23 in FIG. 1 (as shown in phantom), each of rollers 26 moves past its respective skid surface 14*a*, moves above skid surface 14*b*, but does not rest upon it. Instead, the container is supported solely by rollers 20 in the platform.

Each skid 14 terminates in a curved C-shaped stop 14*c*, as seen most clearly in FIGS. 1, 4 and 5. Each curved stop includes an inner curved edge 14*d* which is configured to generally conform to the shape of the respective one of rollers 26. When one of the rollers 26 is adjacent to edge 14*d* of a stop 14*c*, the stop will positively stop forward and upward movement of the roller.

A locking mechanism cooperates with each C-shaped stop 14*c*. The locking mechanism includes a yoke and each yoke is made up of a pair of yoke ears 34*a*, 34*b* to which is welded a projecting tang 35. The tang is welded to the inner surfaces of each of the yoke ears 34*a* , 34*b*. The inner surface 35*a* of the projecting tang, seen most clearly in FIGS. 3–5, is curved and is a smooth extension of curved inner edges 34*c* of the two yoke ears 34*a*, *34b*, which carry it, and terminates in an enlarged head 35*d*.

The two yoke ears 34*a*, 34*b* on the sides of each stop 14*c* are pivoted for rotation on the stop by pivot assemblies 38. Each pivot assembly includes a bolt 38*b* with a head 38*a* and nut 38*c*, the bolt passing through the yoke ears and the stop.

A connecting rod 36 extends across the width of the platform and is fixed to the lower end of each of the four yoke ears as seen most clearly in FIGS. 1 and 2. A spring 50 is attached at each side of the platform and has one of its ends secured to the rod 36 and the other secured to a mounting stud 80 on the platform. The springs tend to pull rod 36 in toward the rear of the platform and thus tend to rotate the two yokes in the counter-clockwise, "opening" direction of FIG. 1. One of the yoke ears 34*a* further carries a locking pin assembly 40 which will be described in detail below, and an adjacent stop 14*c* includes a bore 14*d* therein, the purpose of which will also be described below with reference to the locking pin assembly.

Referring now to the operation of the locking mechanism, and first its "locking" movement, the truck platform is tilted and the free end of cable 30 is hooked to the refuse container. The winch reels the cable in, and the container is pulled along the platform toward the cab and each of rollers 26 (with the container) moves in the direction of arrow 52 (see FIG. 3). Each roller first makes contact at c_1 with camming edges 34*d* of the two yoke ears 34*a*, 34*b*, on the same side of the platform as the roller, along a line 86 which is tangent to both the roller and edge 34*d*. The force which is applied to the yoke is along a line 88 which is perpendicular to the tangent line 86. Since the line 88 passes below pivot point 38, the torque applied to the yoke is in the clockwise direction indicated by arrow 92. Consequently, the yoke rotates around pivot 38, in the "closing" direction of arrow 92.

The position of the locking element after roller 26 on the container has moved slightly further in the direction of arrow 52 and the locking element has rotated slightly in the clockwise direction against the bias force of springs 50, is seen in FIG. 4. Edge 34*d* of each yoke ear has shifted slightly downward but because the edge is curved the roller 26 still causes continued clockwise torque to be applied to the locking element. Thus the roller continues to move to the left in FIG. 4, and the locking element continues to move in the clockwise or closing direction. Eventually, each roller 26 moves to its maximum rearward position toward the truck cab, where it is blocked by a respective stop 14*c*, and at this time the locking element is in its furthestmost clockwise position as shown in FIG. 5. At this time, the cable motor may be turned off since further movement of the container is not possible. The shut-off of the motor may be automatic via a position-sensing switch, or manual.

The upper surface 14*b* of each skid, adjacent the truck cab, is slightly lower than the upper surface 14*a* of the skid along most of its other length because with this depression in the skid, end 35*b* of the tang head 35*d* further downward then might otherwise be possible. With the locking element in the position shown in FIG. 5, upward and leftward movement of roller 26 is prevented by stop 14*c*, and rightward movement of roller 26 is prevented by undercut edge 35*a* of the tang. Downward movement, of course, is not possible because the container rests upon the truck platform. The overall locking enclosure for roller 26 -- on each side of the platform -- is provided by edges 34*c* of two yoke ears and edge 35*a* of the tang which they carry, said edges 34*c*, 35*a*, defining approximately 3/4 of a circle and enveloping the complimentary roller periphery. These edges 34*c*, 35*a* have a radius slightly larger than

the radius of the roller **26.** As seen in FIG. **5,** only limited movement, within the order of an inch to the left or the right, is permitted by the roller **26** within the circular locking enclosure. The skid surface **14***b* completes the circular enclosure. The tang **35** fits between the roller **26** and the forward wall of the container.

The locking pin assembly **40,** located on one side of the platform, includes a sleeve **58** which terminates in a semi-cylindrical lip **62** (see FIG. **6**). An L-shaped pin **56** is situated in the bores of the lip **62** and the sleeve **58.** A stop **56***a* is mounted on the interior end of pin **56** and a restriction **64** is formed at the outer end of sleeve **58.** A compression spring **66** surrounds pin **56** between restriction **64** and stop **56***a*. The spring biases the L-shaped pin toward the yoke such that end **56***b* of the pin protrudes through a bore in the outer yoke ear **34***a* and bears against the side of skid **14.** While the locking members **34, 35** are in any position between those shown in FIGS. **3** and **5,** end **56***b* bears against skid **14** (and its extension, stop **14***c*) and no locking function is effected.

Stop **14***c* is provided with a bore **14***e* positioned such that when the locking element is in the "locked" position of FIG. **5,** the end **56***b* of the L-shaped pin is in line with bore **14***e*. At this time if the L-shaped pin **56** has been moved in the counter-clockwise direction, as shown by arrow **60** in FIG. **5,** the pin will clear the ledge of lip **62,** and the pin is free to move to the right in FIG. **7** with end **56***b* of the pin moving into bore **14***e* of stop **14***c*. Once the pin is in this position, the locking element, i.e., the yoke, cannot rotate in the counter-clockwise or "opening" direction in FIG. **5** and roller **26** remains locked in place. Hence, once the pin **56** is cleared of the lip **62,** it will automatically snap or "lock" into place, when the locking members are in the locked position.

In order to release the container, pin **56** is pulled to the side, away from the platform, and rotated so that the outermost bend of the pin bears against the ledge of the lip **62.** With the locking pin disengaged, the cable motor is operated, if necessary, to pull the container to the left in FIG. **5** so that edge **35***a* of the tang will be able to clear the roller. It will be appreciated that if the container rollers **26** are bearing against the edges **34***c*, as shown in FIG. **5,** no such cable motor operation is needed to permit the locking elements to spring open. If, on the other hand, the container rollers **26** are bearing against the opposed edges **35***a*, the slightly inwardly-protruding extension **35***c* of tang **35***d* would not clear the periphery of the rollers **26,** upon the counterclockwise rotation of the locking elements. Hence, the cable motor is operated to bring the container rollers to their leftward most position at the very end of the platform, as seen in FIG. **5,** if required. The locking elements can then move under the force of the springs **50** to their open positions. Thereafter the cable may be played out, while the platform is tilted, so that the container slides down the platform.

It will now be evident that the shifting action of the container, while in transit on a truck platform, will have no tendency to open the locking mechanisms, but rather will tend to keep them in locked positions. Movement of the roller **26** toward the truck cab or upward, will be effectively resisted by stop **14***c*, thereby having no effect on the locking mechanisms. Movement of the roller **26** away from the truck cab, to the position **26***a* shown in phantom in FIG. **5,** will cause the roller periphery to engage the tang inner radius **35***a*, undercut at inner surface **35***c* of tang head **35***d*, to tend to retain the tang, and thus the yoke in place. The tang cannot, with the roller bearing against it, move to the unlocked position because the periphery of the roller nests in the inner radius **35***a*, the tang head's inner surface not being able to clear the roller periphery at this time.

It is thus apparent that a container can be rapidly secured to a truck platform because the pulling of the container toward the cab automatically moves the locking elements to the closed positions, and if previously set, the locking pin automatically locks the locking elements in place. The locking and unlocking procedures are very simple and the mechanisms are of little complexity.

Although the invention has been described with reference to a particular embodiment, it is to be understood that this embodiment is merely illustrative of the application of the principles of the invention. Numerous modifications may be made therein and other arrangements may be devised without departing from the spirit and scope of the invention.

What is claimed is:

1. For use with the combination of a container and a truck having an elongated platform with means for pulling the container along the platform on the truck,

the improvement comprising:

a locking member carried by the container,

a locking mechanism including a locking element, the element having an inner susrface defining a cavity adapted to engage the locking member when the container is on the platform and the locking member is adjacent to the locking mechanism,

a pivot mounted on the platform substantially in the plane of movement of said locking member,

means mounting the locking element on the platform for movement about said pivot between an open, disengaged position disposed away from the locking member and a closed, engaged position partially enveloping the locking member,

means biasing the locking element to its open position,

the cavity-defining surface of the locking element having an arcuate camming segment shaped so that (1) contact with the locking member of the container, when the locking element is in its open position and when the container is pulled to the end of said platform, forces the locking element to move in only one direction from its open to its closed position against the force of the biasing means, and (2) forward or rearward movement of the container along the platform does not substantially tend to force said locking element to move from its closed to its open position,

a major portion of the cavity-defining surface of the locking element being circular in shape and serving to partially envelop said locking member when the locking element is in its closed position, the locking element terminating in a head which protrudes between said locking member and said container when the locking element is in its closed position to engage said locking member,

and means releasably latching said locking element in its closed position after it is forced to move to its closed position by contact with the locking member of the container.

2. A locking mechanism as set forth in claim 1 further including a stop fixed to the platform in alignment with the container locking member, the stop preventing movement of the locking member past the locking mechanism.

3. A locking mechanism as set forth in claim 2 wherein the locking member is a roller mounted on a forward portion of the container, and the stop is C-shaped to conform to the shape of the roller.

4. A locking mechanism as set forth in claim 3 wherein the locking element is mounted for rotation on the stop about said pivot.

5. A locking mechanism as set forth in claim 4 wherein the inner surface of the stop is coincident with at least the camming segment of the inner surface of the locking element, in the closed position.

6. A locking mechanism as set forth in claim 4 wherein the locking element comprises a pair of ears, each disposed on a different side of the stop, and a projecting tang fixed to the ends of both ears.

* * * * *