

[54] **MOBILE REFUSE COLLECTION TRUCK**

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[51] **Int. Cl.** **B66c 1/47**

[58] **Field of Search** **214/518, 769, 770, 147 G, 214/15 R, 142; 64/27 F, 27 C, 27 CF; 403/146, 149, 147, 145, 157, 159**

[56] References Cited

UNITED STATES PATENTS

1,647,821	11/1927	Vann	403/146
3,362,671	1/1968	Johnson	403/146

3,401,804	9/1968	Link	214/15 R
3,493,135	2/1970	Novotny	214/147 G
3,730,367	5/1973	Heffington	214/147 G

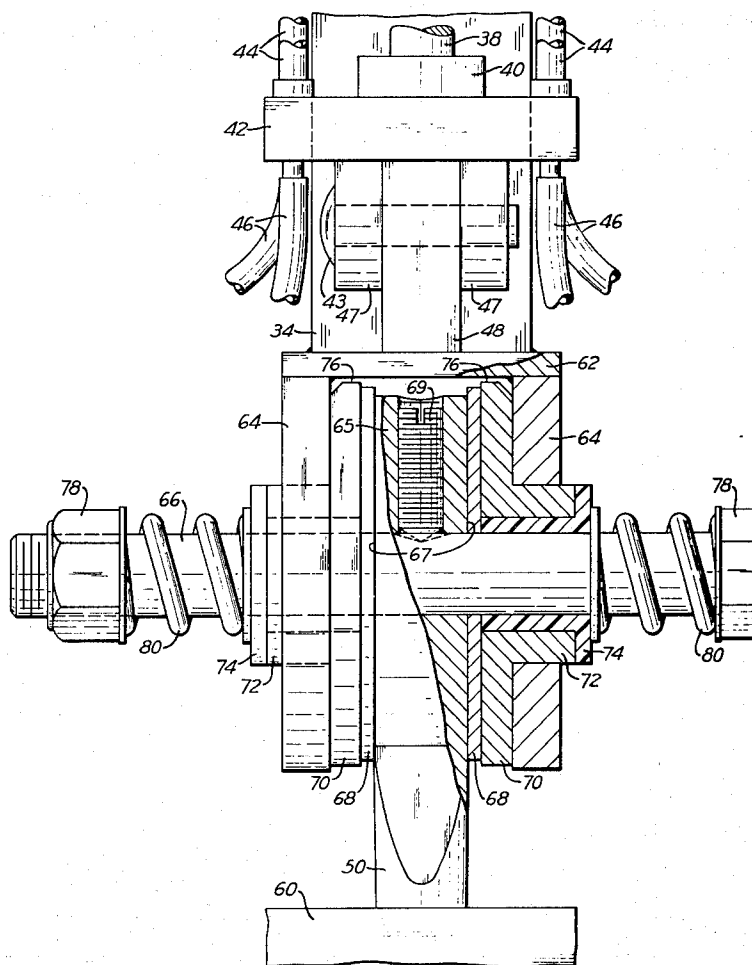
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[57] **ABSTRACT**

A mobile refuse collection truck has a cage suspended from an arm pivotally mounted at the end of a boom to pick up refuse and transfer it to the truck. Uncontrolled swinging of the cage is prevented by a friction pivotal connection of the arm at the end of the boom in which wear plates are urged against the arm to cause resistance to pivoting of the arm. Means are provided for adjusting the force at which the wear plates are urged against the arm to control the resistance to pivoting.

3 Claims, 2 Drawing Figures



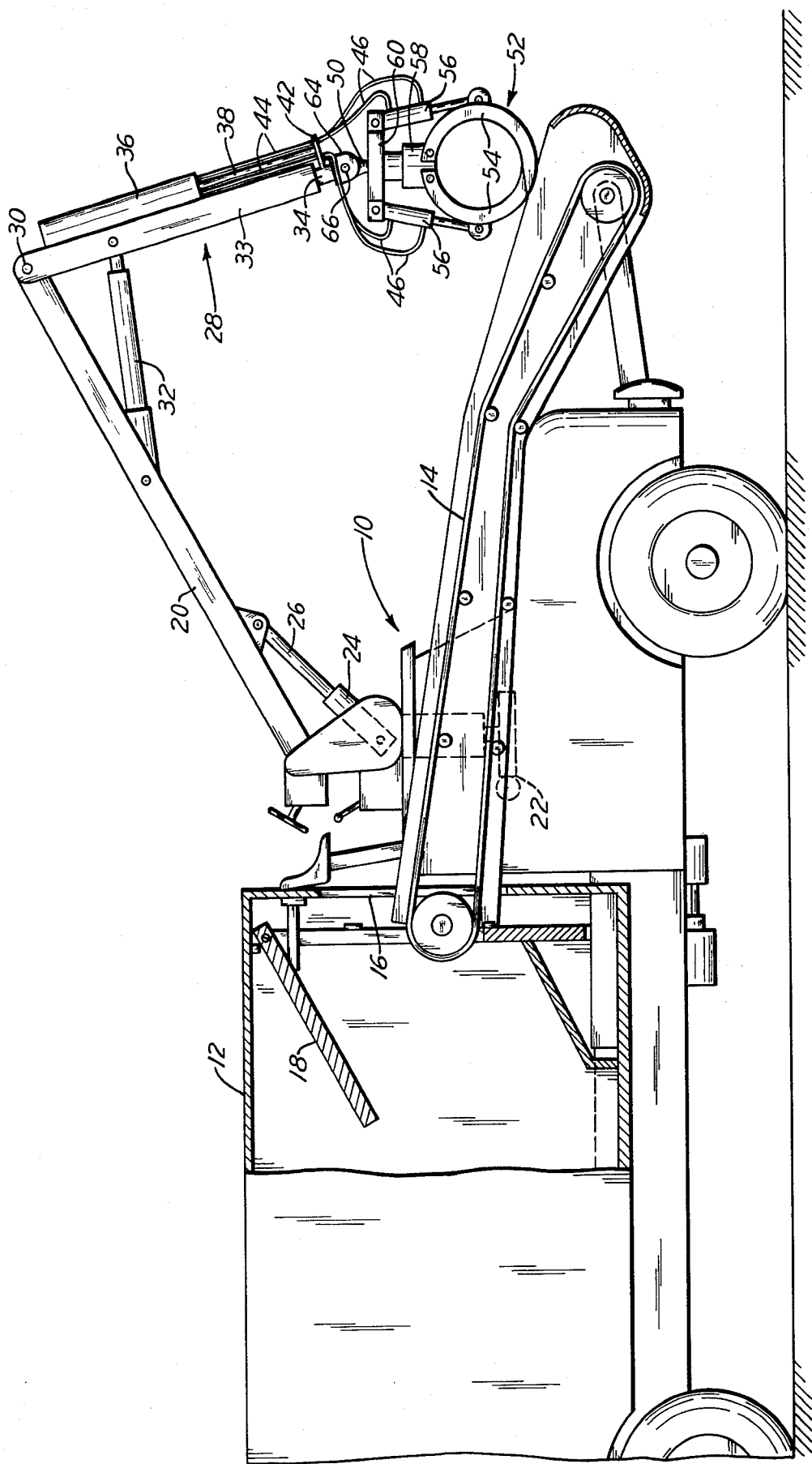


Fig. 1

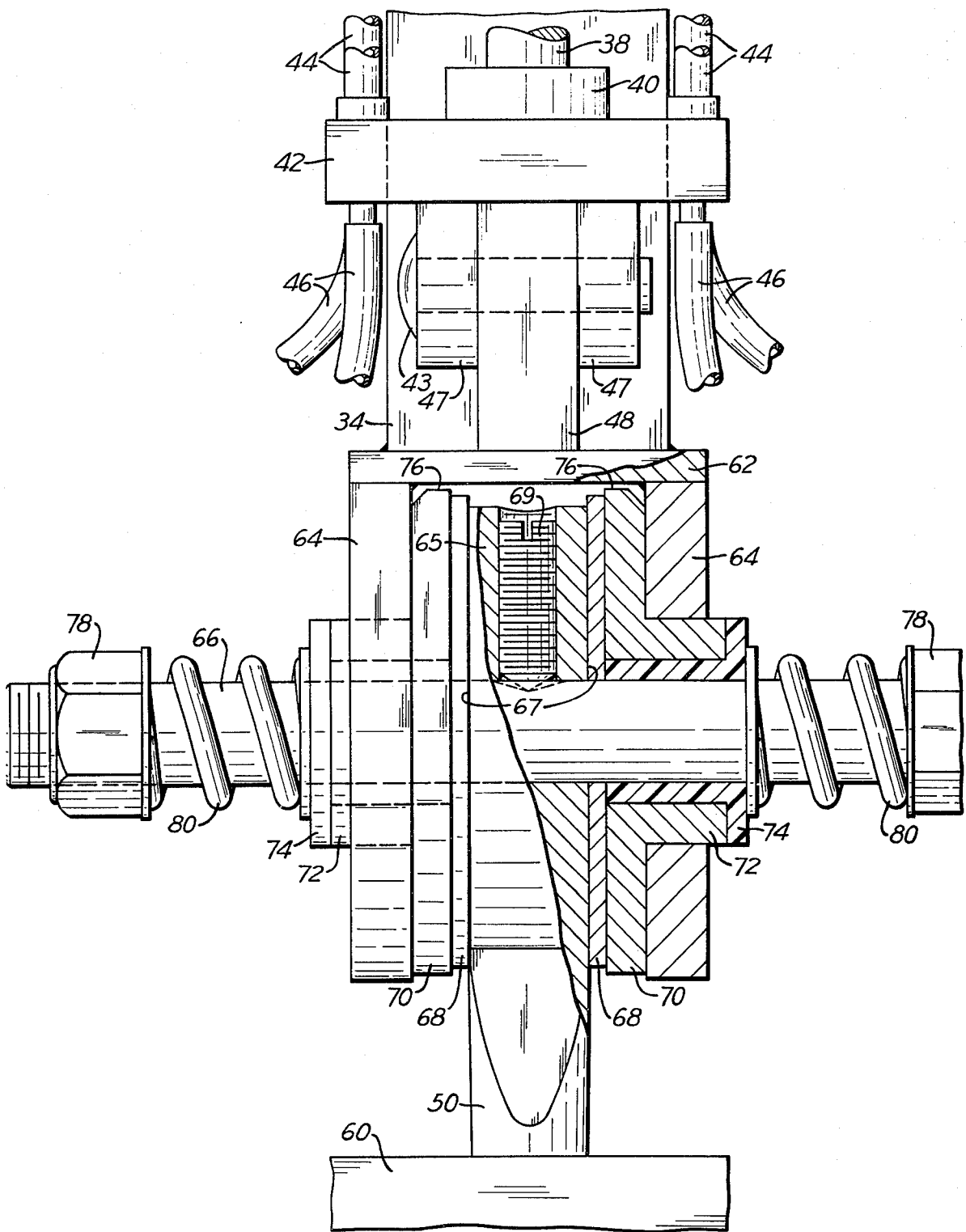


Fig. 2

MOBILE REFUSE COLLECTION TRUCK

This invention relates to a mobile refuse collection truck and more particularly to an improved mounting of a cage of a refuse collection truck on the end of the boom used to lift the refuse and transport it to the truck.

The collection and disposal of refuse has become a difficult and costly operation for municipalities. In addition to the increasing scarcity of places for disposal of the refuse, labor for collection is both a continuing problem of finding reliable men and an important part of the cost of the operation. Ordinarily on a refuse truck there are two or three collectors in addition to the driver of the truck. After the truck is full, the collectors usually accompany the truck driver to the disposal area; consequently, the collectors are unproductive during a substantial part of the work day.

Mobile refuse collection vehicles operated by a single operator have been invented and used for the collection of refuse in an effort to reduce labor costs. One such collection vehicle that is in commercial use is described in U.S. Pat. No. 3,730,367 of Heffington. Other patents disclosing similar self-loading vehicles are U.S. Pat. Nos. 3,080,988 of Redman and 3,547,287 of Cunningham and German Pat. No. 1,004,551. In the apparatus described in U.S. Pat. No. 3,730,367, a truck equipped with the usual compacting equipment has an articulated boom operated by the truck driver. On the end of the boom is a cage equipped with movable jaws for opening and closing the cage to pick up the refuse. Suitable controls are provided for operation by the truck driver to lift the refuse in the cage and drop it on a conveyor belt which transports the refuse into the compactor. In the commercial vehicle, the boom is long enough to permit the truck driver to make a single trip down a street in a residential area and pick up refuse placed near the curbing on both sides of the street.

The cage used to pick up the refuse is pivotally mounted on the end of the boom to permit the edge of the jaws of the cage to lie along the surface of the ground as the cage is closed to pick up the refuse that has been left at the collection area. The heretofore available free-swinging pivotal mounting of the cage while advantageous in facilitating positioning the edge of the jaws along the ground has caused considerable spilling of the refuse and also damage to vehicles parked along the curb near the collection point.

It is an object of this invention to provide a mobile refuse collecting truck in which the cage may be readily and substantially automatically positioned along the surface of the ground and yet will not swing freely as the refuse is lifted and transported to the collecting vehicle.

This invention resides in a mobile refuse collection truck in which an arm is pivotally connected at its upper end to the outer end of the boom for limited rotation about the axis of a substantially horizontal shaft. A cage mounted at the lower end of the arm for rotation about a vertical axis has jaws that can be opened and closed to pick up refuse at a collection point. The pivotal connection at the upper end of the arm has metal wear plates bearing against vertical faces of the arm and pressure plates resiliently urged against the wear plates to permit a wide range of rotation of the arm about the shaft but to offer sufficient resistance to such rotation to overcome inertia of the cage during

transporting of refuse to the vehicle and prevent free swinging of the cage.

Referring to the drawings:

FIG. 1 is a diagrammatic view of a mobile refuse collection truck utilizing this invention.

FIG. 2 is a view, partially in section, of the pivotal connection of the cage arm from which the cage is suspended that eliminates free swinging of the cage.

Referring to FIG. 1, the mobile refuse collection truck indicated generally by reference numeral 10 is shown with a compactor body 12 mounted on a truck chassis. The collection truck 10 is provided with a conveyor 14 equipped with suitable driving means to move the upper surface of the conveyor to the rear of the truck and discharge refuse deposited on the conveyor into the compactor body 12. An opening 16 in the forward end of the compactor body 12, through which refuse is delivered by conveyor 14, is adapted to be closed by a swinging gate 18 during the compacting operation.

Mounted on the forward part of collection truck 10 for rotation about a vertical axis is a primary boom 20. Suitable driving means indicated by reference numeral 22 are provided for rotation of the boom 20 about the vertical axis. Boom 20 is pivotally mounted at its rear end for movement about a horizontal axis to permit raising and lowering of the boom. A hydraulic cylinder 24 with a piston 26 connected at its forward end to the boom is provided for controlling the elevation of primary boom 20. A secondary boom indicated generally by reference numeral 28 pivots about an axis 30 at the forward end of primary boom 20. A hydraulic cylinder and piston arrangement 32 connected at one end to primary boom 20 and at the other end to secondary boom 28 provides control of the position of secondary boom 28 relative to primary boom 20.

In the particular embodiment illustrated in the drawings, secondary boom 28 consists of an outer conduit 33 in which an inner conduit 34 fits slidably for telescoping to vary the length of secondary boom 28. In the particular embodiment illustrated in the drawings, conduits 33 and 34 happen to be conduits of square cross section and for that reason they are referred to as conduits. It is only necessary that they be telescoping members to permit extension or retraction of the secondary boom and it is not necessary that they be conduits. Mounted on the upper surface of the outer conduit 33 is a hydraulic cylinder assembly 36. A piston 38 operated by the hydraulic cylinder assembly 36 is secured at its lower end, as is best shown in FIG. 2, by means of a boss 40 to a connecting member 42. A plurality of telescoping hydraulic fluid conduits 44 extend from hydraulic assembly 36 to the connecting member 42 and are there provided with suitable connections to a plurality of flexible conduits 46 for the purposes hereinafter described.

Extending from connecting member 42 are a pair of spaced-apart, parallel lugs 47. They extend on either side of a post 48 connected to and extending upwardly from the upper surface of conduit 34. A pin 43 through the post 48 and lugs 47 secures the connecting member to inner conduit 34. This arrangement provides support for the end of piston 38 and telescoping conduits 44, as well as a connection between the hydraulic assembly and conduit 34 to permit extension of the secondary boom 28 by the hydraulic assembly 36.

An arm 50 mounted to pivot about a horizontal shaft at the lower end of secondary boom 28 supports a cage indicated generally by numeral 52 consisting of a pair of pivotally mounted jaws 54. Jaws 54 can be opened and closed by hydraulic cylinders 56 actuated by a hydraulic fluid supplied to the cylinders through flexible lines 46.

Arm 50 supports a two-directional hydraulic motor 58 adapted to rotate a collar 60 about arm 50. Hydraulic cylinders 56 are pivotally supported from collar 60. The structure for supporting the cage 52 at the lower end of arm 50 is disclosed in detail in U.S. Pat. No. 3,730,367 and is not a part of this invention.

Referring to FIG. 2 of the drawings, the base 62 of a channel secured to the outer end of conduit 34 has a pair of parallel, spaced-apart flanges 64 extending perpendicularly from the face of base 62 opposite conduit 34. Each of flanges 64 has a hole in it through which a shaft 66 extends. Arm 50 is enlarged at its upper end to form a disc 65 encircling shaft 66 secured to the shaft by means of a set screw 69. Disc 65 has faces 67 perpendicular to shaft 66. Rotatably mounted on the shaft on each side of arm 50 and adapted to bear against the faces 67 are a pair of wear plates 68. Wear plates 68 are preferably constructed of a relatively soft metal, such as brass. Slidable axially along shaft 66 and positioned adjacent the face of each of wear plates 68 opposite the faces 67 are pressure plates 70. Pressure plates 70 have a hub 72 extending outwardly therefrom through the openings in the flanges 64. Each of pressure plates 70 has a central opening therethrough enough larger than the shaft 66 to receive a bushing 74 serving as a bearing in which shaft 66 is journaled. In the embodiment of the invention shown in FIG. 2, bushing 74 is constructed of nylon to provide a bearing which does not need to be lubricated. The ends 76 of pressure plates 70 adjacent base plate 62 are flat; hence, pressure plates 70 do not rotate about or with shaft 66. Shaft 66 is threaded at each of its ends to receive a nut 78 which by compression of helical spring 80 between the nut and the outer surface of the bushing 74 allows adjustment of the pressure exerted by the pressure plates against the wear plates 68 to control the force required to rotate arm 50.

The apparatus disclosed in the drawings is provided with suitable controls as described in U.S. Pat. No. 3,730,367 for rotation of the boom about the vertical axis. Operation of the hydraulic cylinders 24 and 32, the hydraulic cylinder assembly 36, the motor 58 for rotation of collar 60 around the arm 50, and hydraulic cylinders 56 for operation of the jaws 54 of the cage are controlled from the cab of the collection vehicle. The particular hydraulic control system utilized for operating the boom to position the cage 52 at the desired location and to operate the cage to pick up refuse can be the same as in U.S. Pat. No. 3,730,367, and is not a part of this invention.

In the operation of the mobile refuse collector, the refuse to be collected is normally placed in bags or bundles adjacent the street. The driver of the collector 10 stops adjacent the refuse to be collected and operates the primary boom 20 and secondary boom 28 to position the cage 52 above the refuse. Motor 58 is operated to orient the longitudinal axis of the cage for most effective scooping of the refuse in position for collection. If the ground on which the refuse to be collected is placed slopes, the cage is rotated by operation of motor

58 to place the longitudinal axis of the cage substantially perpendicular to the shaft 66. On lowering the cage, with the jaws open, engagement of the cage with the ground will cause rotation of arm 50 about the axis of shaft 66 to make the longitudinal axis of the cage substantially parallel to the surface of the ground and thereby allow the open edge of the jaws to move along or only slightly above the surface of the ground for clean pick up of the refuse. If the cage should be in an inclined position during loading of the cage, the weight of the cage and refuse will be adequate to cause a relatively slow and controlled rotation of arm 50 to a vertical position with virtually no swinging of the arm past a vertical position as the cage is lifted from the ground. That position facilitates dumping refuse from the cage into the conveyor.

The jaws of the cage are then closed and the cage lifted and rotated to a position above the conveyor 14 on the collector vehicle preferably with the longitudinal axis of the cage and conveyor in the same vertical plane. As the cage is transferred to a position above the carrier, the friction between the wear plates 68 and the faces 67 of the arm 50 is adequate to prevent swinging of the cage about the shaft 66. That friction allows the primary boom 20 and secondary boom 28 to be moved rapidly to a position above the conveyor, and the cage then rotated by motor 58 about the arm 50 as an axis to line up the cage above the conveyor and permit the refuse to be dumped on the conveyor with a minimum of spilling. Thus, the friction pivot arrangement does not prevent rotation of arm 50 when desired for orientation of the cage, but does prevent wild swinging resulting from inertial forces as the boom is operated to transport the cage to the desired location.

I claim:

1. In a mobile refuse collection truck having a boom mounted on and operated from the truck, an arm pivotally mounted at the outer end of the boom, a cage suspended from the outer end of the arm constructed and arranged to pick up refuse, the improvement comprising a pair of spaced flanges extending from the outer end of the boom, each of said flanges having a hole therethrough perpendicular to the boom, a shaft extending through the holes in the flanges, said arm having a disc at its upper end encircling the shaft between the flanges, means securing the disc to the shaft, a wear plate rotatable on the shaft on each side of the disc, a pressure plate slidable axially on the shaft between the wear plate and the flange, a hub extending outwardly from the pressure plate through and beyond the flange, a bushing between the pressure plate and the shaft and covering the outer end of the hub pressure plate, a helical spring encircling the shaft and bearing against the end of the bushing, and a threaded nut engaging threads on the shaft for adjustment of the force exerted by the spring to urge the pressure plate against the wear plate whereby the arm can be rotated but friction between the wear plate and the disc prevents uncontrolled swinging of the arm.

2. In a mobile refuse collector having a boom mounted on and operated from a refuse truck, and a cage suspended from the outer end of the boom, said cage having pivotally mounted jaws adapted to move between an open position for loading the cage and a closed position for transporting refuse in the cage from a pick-up location to the truck, the improved means for suspending the cage comprising a pair of spaced apart

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flanges at the end of the boom remote from the truck, each of said flanges having an opening therein through which a substantially horizontal shaft extends, an arm mounted on the shaft between the flanges and extending downwardly therefrom to suspend the cage, said arm having a substantially flat face surrounding and perpendicular to the shaft, a pressure plate mounted on the shaft between the flat face and a flange, said pressure plate being freely slidable on the shaft in an axial direction, a wear plate axially slidable upon the shaft between the pressure plate and the face of the arm, and a compressed spring means adapted to urge the pres-

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sure plate against the wear plate whereby friction between the flat face of the arm and the wear plate resists but permits rotation of the arm.

3. The apparatus as set forth in claim 2 in which a bushing encircles the shaft through the opening in at least one of the flanges, said bushing having a flange extending therefrom over at least a portion of the outer surface of the pressure plate and the compressed spring engages the bushing to urge the pressure plate against the wear plate.

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