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F. N. BECKER

1,934,583

CONTAINER HANDLING MECHANISM

Filed March 8, 1932

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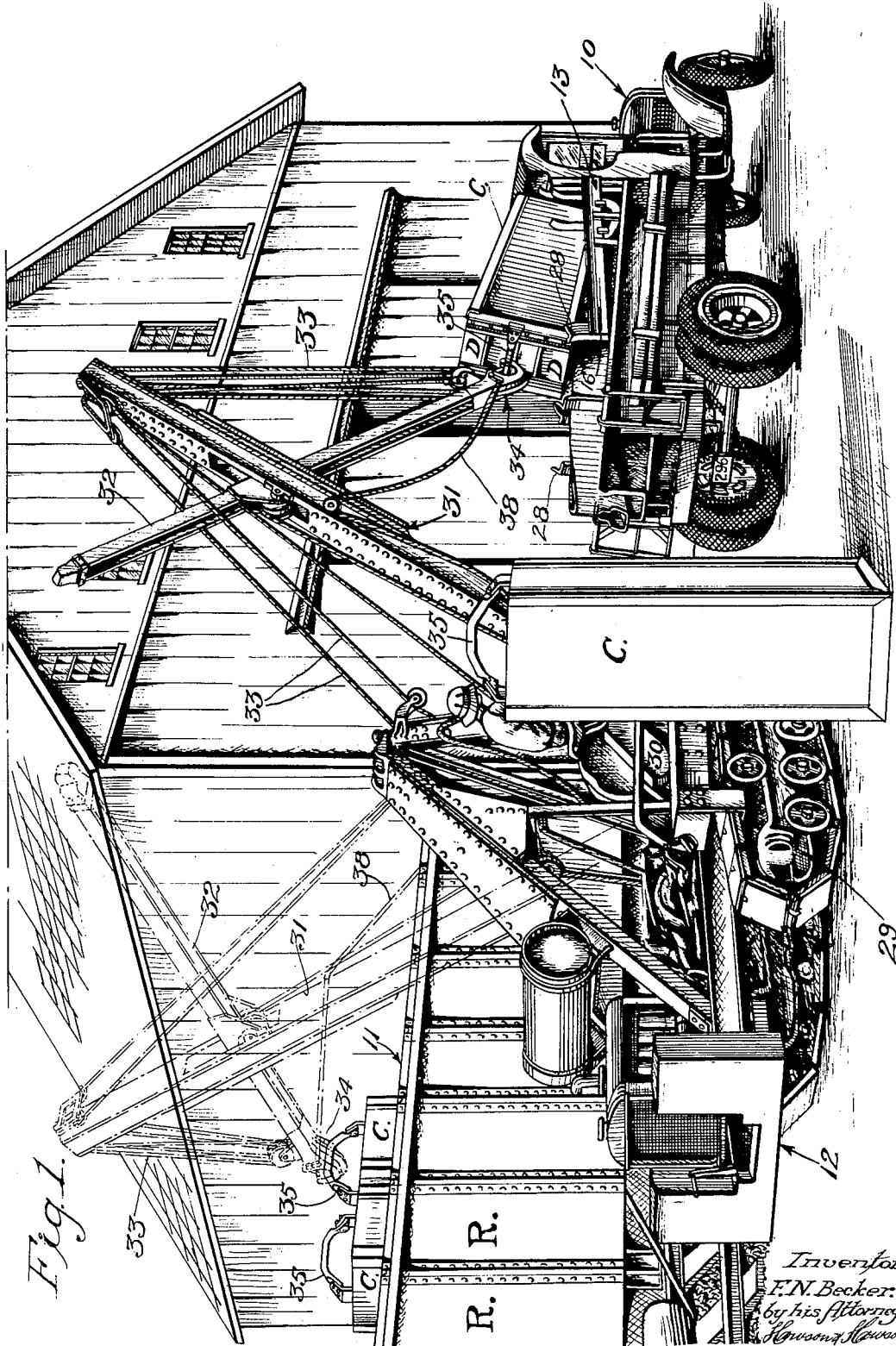


Fig. 1.

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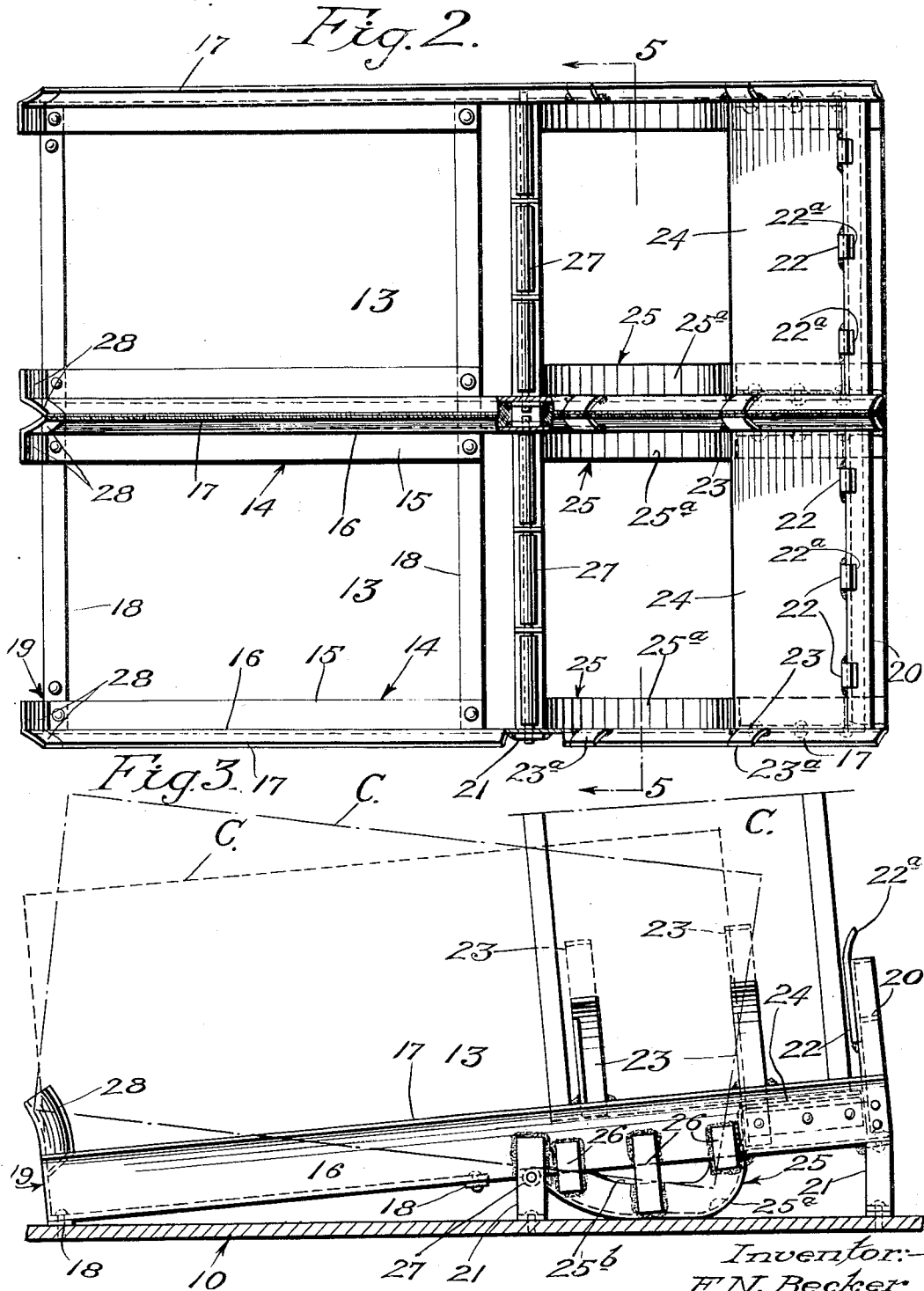
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CONTAINER HANDLING MECHANISM

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3 Sheets-Sheet 2



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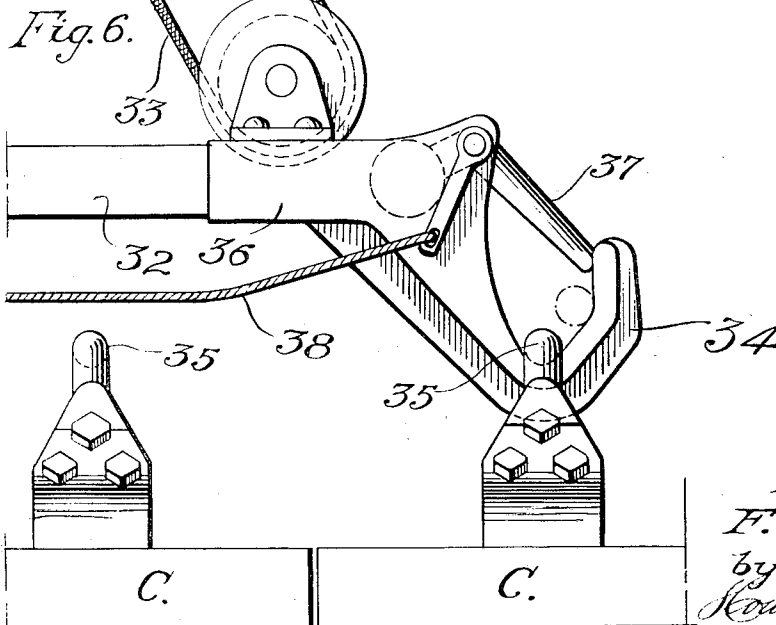
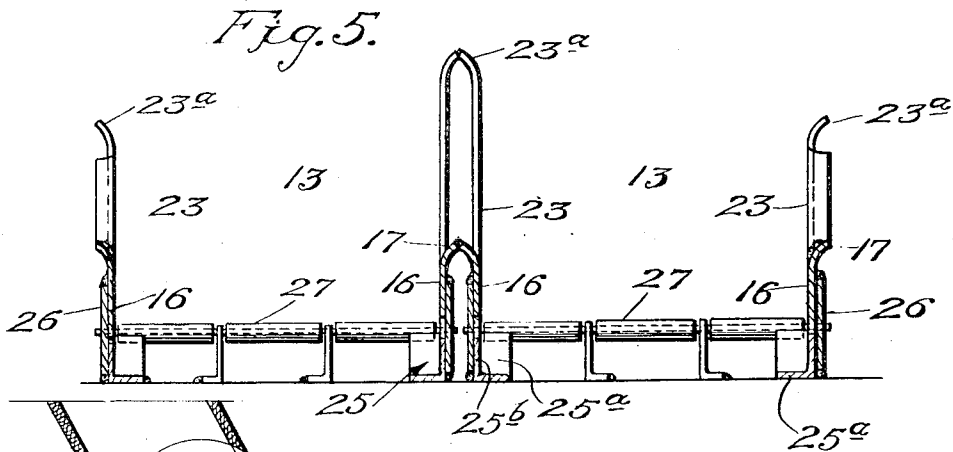
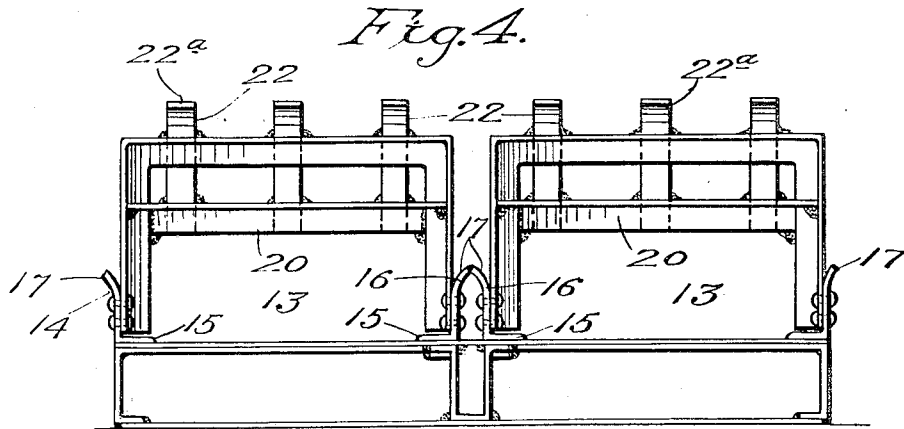
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CONTAINER HANDLING MECHANISM

Filed March 8, 1932

3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

1,934,583

## CONTAINER HANDLING MECHANISM

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Application March 8, 1932. Serial No. 597,582

21 Claims. (Cl. 214-38)

This invention relates to container-handling mechanism and more particularly to an apparatus for handling heavy containers such as those referred to in the prior application of Donald Markle, Serial No 535,967, filed May 3, 1931, for Method of shipping coal and apparatus therefor, in transferring the same from railway cars to an automotive or other dirigible vehicle.

In the application above mentioned, a system of handling coal, or a similar substance, is described wherein the coal is placed in containers each having a door and a bail at one end and each receiving a ton, or two tons thereof at the mines. The containers are sealed and placed in a fiat car, delivered to the railway yard and at this yard are transferred to a motor truck or other vehicle for delivery to the consumer.

During filling and transportation the containers are vertically arranged to allow convenient access in filling and in order that they may not occupy too great a space in the railway cars and may be conveniently positioned for engagement by hoisting apparatus for transferring them from the car to the motor truck.

During transportation in the motor truck they are horizontally disposed in order that the contents thereof may be readily removed, and are preferably positioned with their ends having the doors toward one side or end of the truck and at a slight inclination downwardly to such side or end so that their contents will shift therefrom upon opening of the door.

In practical application of this invention, it has been discovered that it is extremely difficult to manipulate the containers both in removing the same from the cars and in placing them in position upon the truck.

Hoists of ordinary construction including flexibly supported hoisting hooks are unsatisfactory due both to the facts that they are difficult to hold against rotation as regards the supporting hook and require the services of a man in placing this hook in engagement with the bail of the container and to the fact that they are extremely difficult to "spot" over the truck and to manipulate in lowering the container from a vertical to a horizontal position. Furthermore, where such hoists have fixed travel it is nearly impossible to place the truck so that the container may be accurately positioned, and even in event it is accurately positioned while vertically disposed, in shifting the container from its vertical to its horizontal position the container is moved rearwardly or to one side of the truck for a distance equal to its depth, thus requiring

that the truck body be either made over-size in width or depth in order to accommodate the container. Accordingly, important objects of the present invention are first, the provision of a handling apparatus for the containers having means to engage the container bail and elevate the container to deposit it upon a truck, which may be manipulated and controlled by a single operator; second, the provision of apparatus of this character which will control the movement of the container during shifting thereof from the vertical to the horizontal position; and third, the provision of mechanism to be mounted upon the truck or other vehicle for co-action with and reception of the container which is so constructed that the rotation point about which the container moves during its transfer from a vertical to a horizontal position is transferred from a corner edge of the container bottom to a point more nearly at the opposite edge thereof, with the result that the space lost in transfer of the container from its horizontal to its vertical position is materially reduced.

A further object of the invention is to produce an apparatus of the character last described which includes means for shifting the container automatically as it is moved from its vertical to its horizontal position so that the lost space is still further reduced.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a perspective view illustrating container apparatus constructed in accordance with my invention, the car-to-vehicle transfer mechanism being illustrated in solid lines in the act of completing the placement of a container in the cradle upon a truck and in dotted lines in the act of removing a container from a railway car;

Fig. 2 is a plan view of the cradle, portions being broken away;

Fig. 3 is a side elevation thereof, a container being illustrated in solid lines in the initial position occupied when applied to the cradle, in construction lines in a position where it is substantially seated in the cradle and in dotted lines in its completely seated position.

Fig. 4 is a rear elevation of the cradle;

Fig. 5 is a section on line 5-5 of Fig. 2; and

Fig. 6 is a side elevation showing the hook mechanism employed in the car-to-vehicle transfer mechanism.

Referring now more particularly to the draw-

ings, the numeral 10 generally designates a vehicle for transportation of the containers from the railroad yard to the customer; 11, a railway car for transportation of the containers from the mines to the yards and 12 a transfer apparatus for transferring the containers C from the cars 11 to the vehicle 10.

In accordance with the present invention, I equip the vehicle bed 10 with a cradle 13 for the reception of the containers C, this cradle being at present shown as formed in two duplicated sections each adapted for the reception of one of the containers. It will be obvious that any desired number of sections may be provided and since these sections are formed in duplicate a description of one thereof will be here given.

Each section is of a length greater than the length of containers C and of less length than the combined lengths of an end and side thereof and comprises side members 14 formed of angle iron, one flange 15 being horizontally disposed and inwardly directed, and the other flange 16 thereof vertically disposed and preferably having its upper end outwardly flared as indicated at 17. The side members 14 are connected by transversely-extending tie bars 18 at the under surfaces of the horizontal flanges 15 and at their rear ends are connected by end member 20. The frame work thus provided is supported by a series of brackets 21 of decreasing height so that one end of the container is higher than the other and the end members 19 and 20 associated with these ends will be hereinafter referred to as the lower end member and the higher end member respectively. The higher end member is made of considerable height and has at its upper end extension guides 22 the upper ends of which flare outwardly at 22-a. Similarly, the sides formed by flanges 16 are, adjacent this end member, vertically extended by means of strips 23 forming guides and having their upper ends outwardly flared at 23-a.

In advance of the upper end member a distance slightly less than one-half the horizontal depth of the container C, the flanges 15 of the side members 14 are cut away and a substantial continuation or downward deflection thereof provided by means of curved guide plates 25 each comprising a cambered length of angle iron having its horizontal flange 25-a inwardly directed and the vertical flanges 25-b connected to the side member 14 by welding plates 26 to said vertical flanges 25-b of the guide plates 25 and 16 of the side members 14 respectively. A plate 24 connects the flanges 15 of the side member between the rear ends of guide plates 25 and the rear end member, said plate constituting a support to initially receive the container C as hereinafter described. At the forward end of the cut-away section of the horizontal flanges a transverse pivot element supports rollers 27 for a purpose presently to appear. The end member 19 comprises upstanding angle iron guide members 28 the upper terminals of which are bent to cause one flange thereof to flare outwardly and forwardly and the other flange thereof to flare outwardly and to one side, thus producing directing cams, the purpose of which will presently become obvious.

In use of this apparatus the container C is placed upon the plate 24 with one wall thereof immediately adjacent the upper or rear end wall 20 of the section, positioning of the container being assisted by guides 22 and 23 at this end of the section. Referring to Fig. 3 wherein the lower end of a container is shown in conjunction

with an outside view of the apparatus, it will be noted that when the container is so positioned the forward edge of plate 24, which will hereinafter be referred to as a tipping pivot, engages the container more nearly the rear face thereof so that the preponderance of weight of the container is disposed in advance of the pivot and its elevating support for the container is now relieved the container will tend to rotate about the pivot toward a horizontal position. The overbalance of the container provided is preferably such that there is little tendency of the container to slip from the pivot until it has been tilted through a very considerable angle and when it does so slip it will fall upon the horizontal flanges 25-a of the guide member 25 and be supported thereby, at this time having its forward lower corner located but a short distance above these flanges. It will be noted that those portions of the horizontal flanges 25-a immediately in advance of the pivot are arranged in contact with the bed of truck 10 so that they will support the shock of the container C falling thereagainst. A slight further tipping of the container will cause the side of the container to come in engagement with the rollers 27 which will act as a pivot upon which the container may rotate and, further, as an antifriction means upon which the container may slide rearwardly whenever it is free to do so. When it approximates a horizontal position, the end of the container which has been lowered and which contains the door will come into contact with the cams 28 and these cams will serve both to wedge the container rearwardly over the antifriction means 27 and to transversely align the upper end of the container in event of any slight displacement thereof.

With the proportionate construction illustrated in the drawings, the space lost as a result of the tipping is considerably less than one-half of the width of the base of the container and the member 13 thus provides both a means for transferring the container from a vertical to a horizontal position and a means for shifting it longitudinally during the transfer.

The car-to-vehicle transfer mechanism 12 comprises a traveling body 29 preferably of the caterpillar tractor type supporting through a turntable 30 a mast 31 adjustable as to its vertical angle and having a boom 32 which may be elongated or shortened, and raised or lowered through suitable control mechanisms generally designated by cables 33. At the end, this boom is provided with a hook element 34 adapted to engage the bail 35 of the container C, said hook element embodying a support 36 rigid to the boom and adapted to actually bear the major portion of the weight of the container during transfer operations and a movable retaining element 37 controlled by a lanyard 38 so that it may be positioned to either permit engagement of the boom with the bail or release of the boom therefrom. The boom being rigid and being shiftable either pivotally or in the direction of its longitudinal axis upon the mast may be readily positioned by a single operator, stationed so that he may observe the boom end and the container and at the same time manipulate the controls, to first engage the hook with the bail of the container mounted in the car, then elevate the container by the boom until it clears the car, then swing the container until the same overlies the cradle 13 and may be lowered into position upon the tipping pivot 24, following which further lower-

ing of the boom will result in tipping of the container in the manner heretofore described.

Attention is directed to the fact that the boom being rigid and connected to the bail through the hook 34 may be employed to assist in maintaining the base of the container in engagement with the tipping pivot so that actual shifting of the container which must take place by the cams 28 will be very slight. It will also be obvious that in employing apparatus of this character the truck, or other vehicle, mounting the cradle 13 may be shifted into the transfer apparatus 12 at any desired angle so long as it is disposed in approximate radial relation to the axis of the turntable of the mast for it is not material that the container be accurately spotted by reason of the provision of the diverging guides 22 and 23.

The bails 35 of the containers C are rigid to the containers and are, preferably, made with a central section of such shape that the container tends to centralize itself upon the hook when supported thereby. The doored end of the container C is preferably provided with a pair of doors D so that without regard to which side of the container is disposed uppermost an opening may be provided adjacent what is the lowermost wall of the container when it is disposed in the cradle. The hook element 34 should be of such depth that the boom 32 may be horizontally disposed over the bail of one container C while the hook is being engaged with the bail of a second container.

Since the construction hereinbefore set forth is, obviously, capable of a certain range of change and modification without in any manner departing from the spirit of my invention, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, and means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position.

2. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a stationary cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, and a guide at said end of the cradle projecting above said support and co-acting with the base of a vertically entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle.

3. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, a guide at said end of the cradle projecting above said support

and co-acting with the base of an entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle, and means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position.

4. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, and means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the pivot.

5. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the pivot, and means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position.

6. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the pivot, and a roller at the bottom of said cradle adjacent said support and against which the side of the container engages after a predetermined movement toward horizontal position.

7. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the pivot, means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position, and a roller at the bottom of said cradle in advance of said pivot and against which the side of the container engages after a predetermined movement toward horizontal position.

8. In container-handling mechanism for transferring heavy containers from vertical to horizontal

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tal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, and a roller at the bottom of said cradle in advance of said pivot and against which the side of the container engages after a predetermined movement toward horizontal position.

9. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position, and a roller at the bottom of said cradle in advance of said pivot and against which the side of the container engages after a predetermined movement toward horizontal position.

10. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, a guide at said end of the cradle projecting above said support and co-acting with the base of an entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle, and a roller at the bottom of said cradle in advance of said pivot and against which the side of the container engages after a predetermined movement toward horizontal position.

11. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, a guide at said end of the cradle projecting above said support and co-acting with the base of an entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle, means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position, and a roller at the bottom of said cradle adjacent said pivot and against which the side of the container engages after a predetermined movement toward horizontal position.

12. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle,

a guide at said end of the cradle projecting above said support and co-acting with the base of an entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle, and means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the support.

13. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a cradle to receive the container when in horizontal position, said cradle having at one end thereof a support to receive the container and comprising a pivot about which the container may swing with its upper end moving in the direction of length of the cradle, a guide at said end of the cradle projecting above said support and co-acting with the base of an entering container to guide the same into such engagement with the support that the center of gravity of the container lies in a transverse vertical plane between the pivot and the opposite end of the cradle, means at the opposite end of the cradle to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position, and means for supporting a container while placing the same upon said support operable to exert longitudinal pressure on the container during its rotation about the support.

14. Apparatus for handling heavy bailed containers in transferring the same from railway cars in which the containers are vertically disposed to dirigible vehicles in which the containers are to be horizontally disposed, said apparatus comprising a rotatable mast, a boom adjustable as to the length and swingable about a horizontal pivot on the mast, means for controlling the oscillation and extension of said boom, grasping means including a bail-engaging part rigidly secured to one end of the boom and a horizontal support upon the vehicle to which the container may be transferred by said boom, said support comprising a pivot about which the container may rotate under control of the boom, said grasping means being constructed and arranged to maintain engagement with the bail of the container permitting the application of pressure to the container to maintain the same in engagement with the support.

15. Apparatus for handling heavy bailed containers in transferring the same from railway cars in which the containers are vertically disposed to dirigible vehicles in which the containers are to be horizontally disposed, said apparatus comprising a rotatable mast, a boom adjustable as to length and swingable about a horizontal pivot on the mast, means for controlling the oscillation and extension of said boom, grasping means including a bail-engaging part rigidly secured to one end of the boom, a horizontal support upon the vehicle to which the container may be transferred by said boom, said support comprising a pivot about which the container may rotate under control of the boom, said grasping means being constructed and arranged to maintain engagement with the bail of the container permitting the application of pressure to the container to maintain the same in engagement with the support, and a guide associated with said pivot guiding the container into engagement with the pivot at a point such that

the center of gravity of the container is disposed at one side of the pivot.

16. The method of transferring heavy containers from vertical to horizontal position consisting in supporting the container when vertical from its bottom surface by a support disposed above the general plane in which the lower side of the container is to be disposed when horizontal and controlling rotation of the container about the support as a pivot from vertical to horizontal position while applying pressure in a direction longitudinal to the container to maintain its engagement with the support.

17. The method of handling heavy containers in transferring the same from vertical to horizontal position, consisting in supporting the same when vertical from its bottom surface by a support disposed above the general plane in which the lower side of the container is to be disposed when horizontal and located to one side of the center of gravity of the container and controlling rotation of the container about the support as a pivot from vertical to horizontal position while applying pressure in a direction longitudinal to the container to maintain its engagement with the support.

18. In apparatus of the character described, a stationary support about which a container may be rotated, means for guidingly supporting the container to deliver it upon the support comprising a part for controlling rotation of the container about the support from vertical to horizontal position while exerting longitudinal pressure upon the container to maintain it in engagement with the support.

19. In container-handling mechanism for

transferring heavy containers from vertical to horizontal position, a stationary bed to receive the container when in horizontal position, said bed having at one end thereof a support to receive the container when vertical and act as a pivot about which the container may swing with its upper end moving longitudinally of the bed, and means for controlling rotation of the container about the pivot including means for exerting longitudinal pressure upon the container to maintain it in engagement with the support.

20. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a bed to receive the container when in horizontal position, said bed having a support to receive the container and comprising a pivot about which the container may swing, and means on the bed to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position.

21. In container-handling mechanism for transferring heavy containers from vertical to horizontal position, a bed to receive the container when in horizontal position, said bed having a support to receive the container and comprising a pivot about which the container may swing, means on the bed to engage the upper end of the container and shift the container longitudinally during the final portion of its movement to horizontal position, and means for controlling rotation of the container about the pivot including means for exerting longitudinal pressure upon the container to maintain it in engagement with the support.

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