April 27, 1965 F. D. MOSS 3,180,512

DRUM HANDLING ATTACHMENT FOR LIFT TRUCKS

Filed July 9, 1962 2 Sheets-Sheet 1

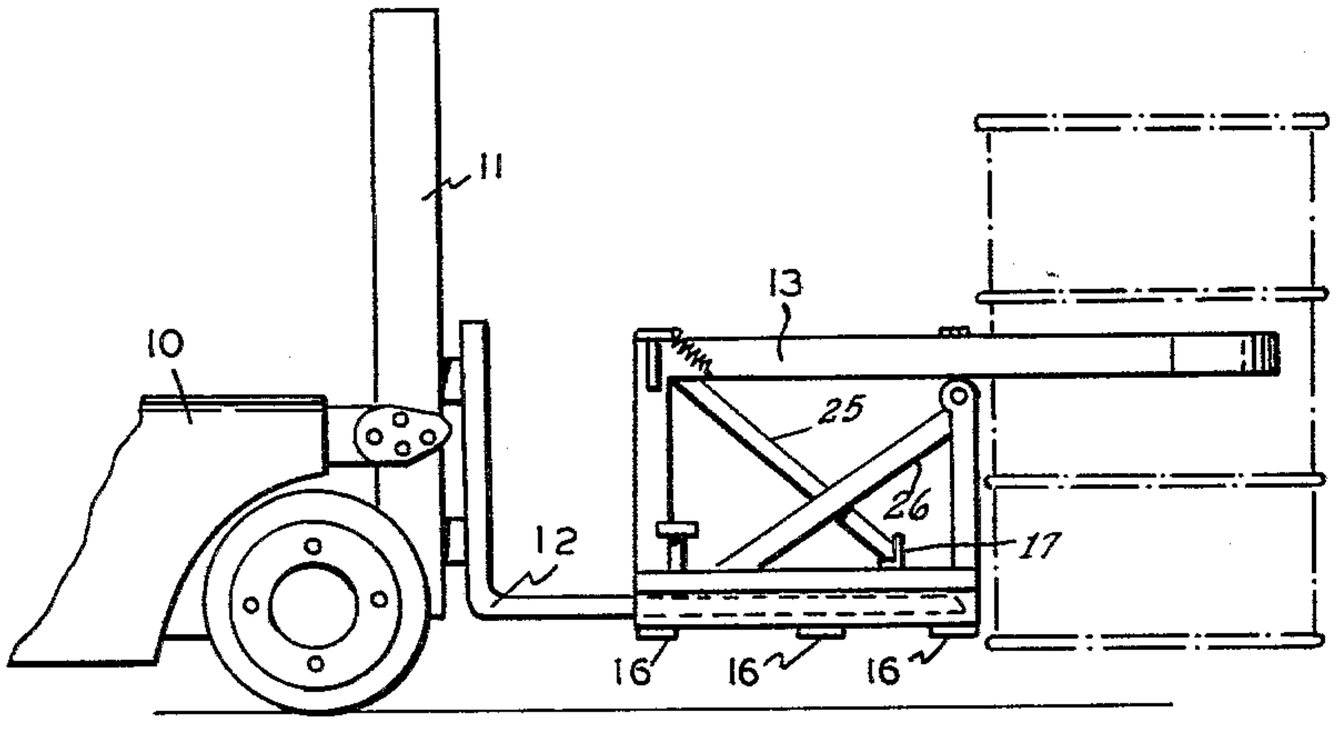

FIG.1

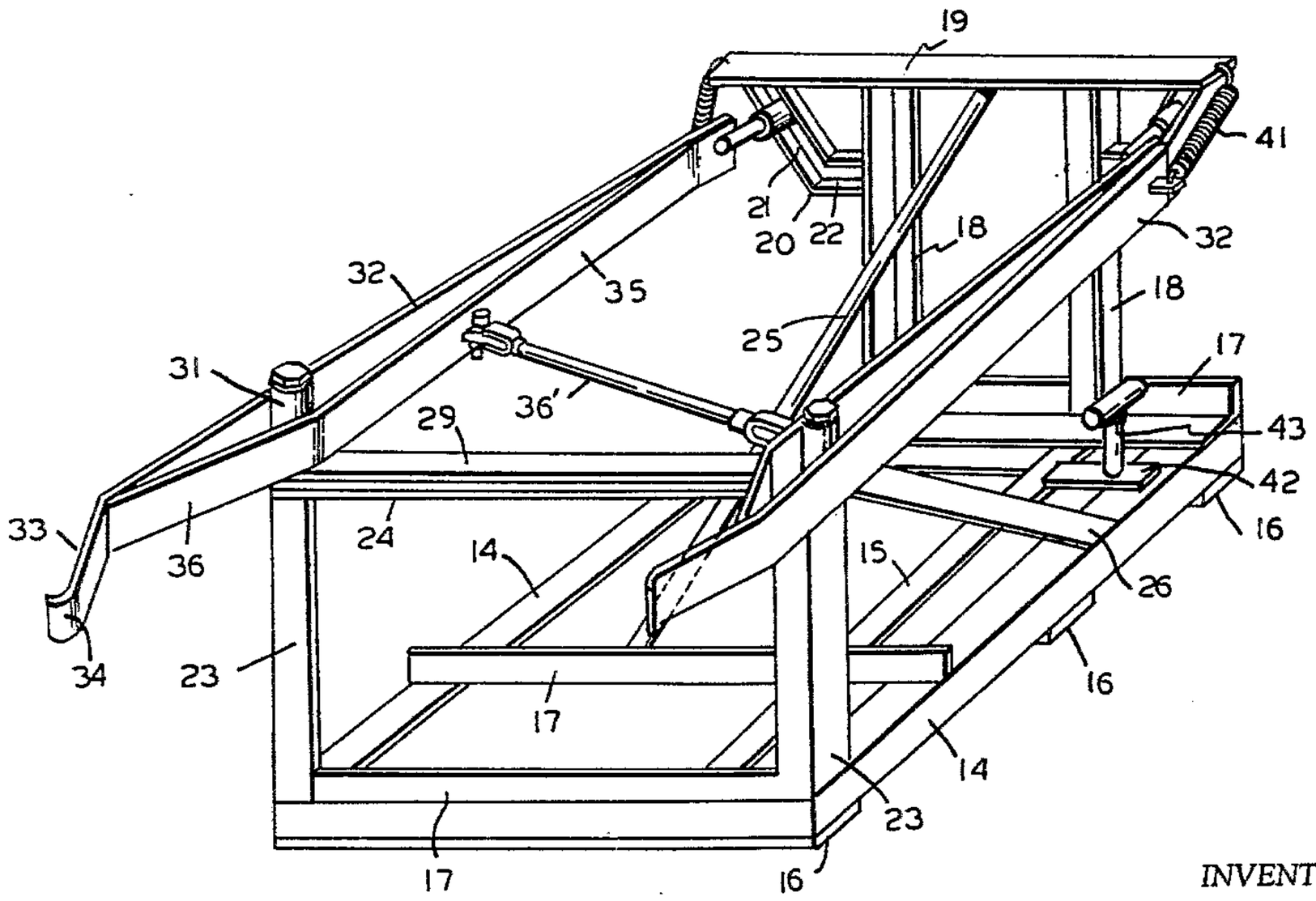

FIG.2

INVENTOR
FRED D. MOSS

BY Harry S. Dumas

ATTORNEY

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DRUM HANDLING ATTACHMENT FOR LIFT TRUCKS

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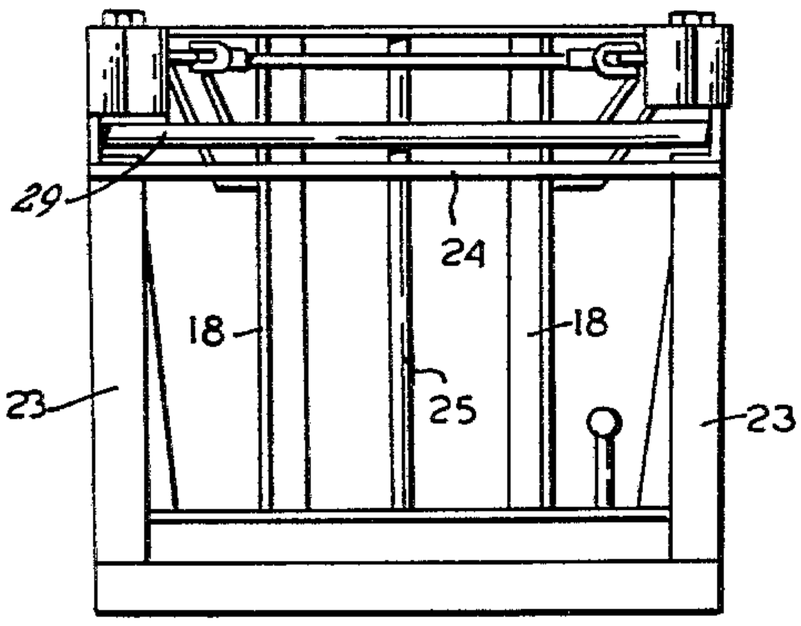

FIG.3

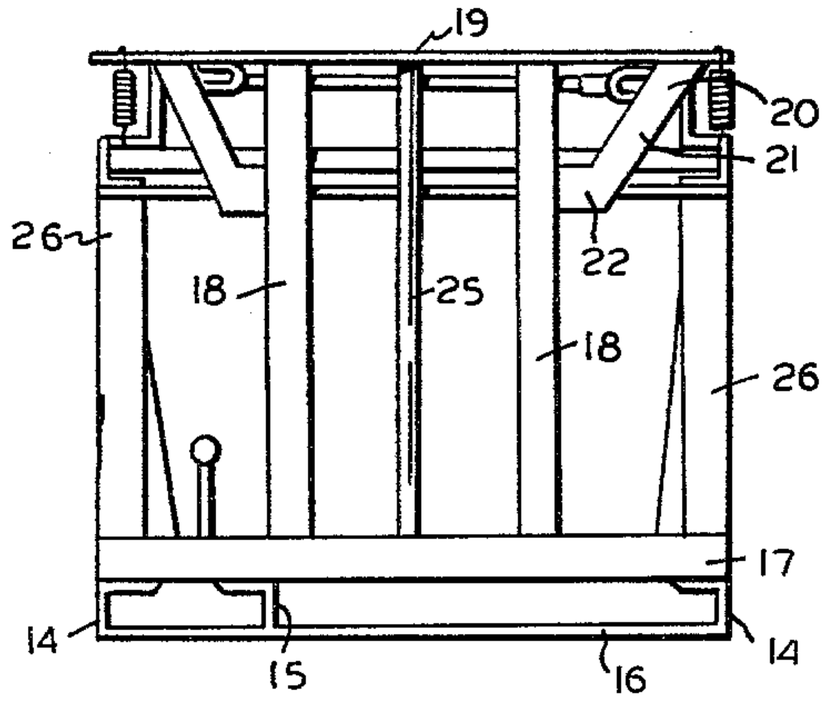

FIG.4

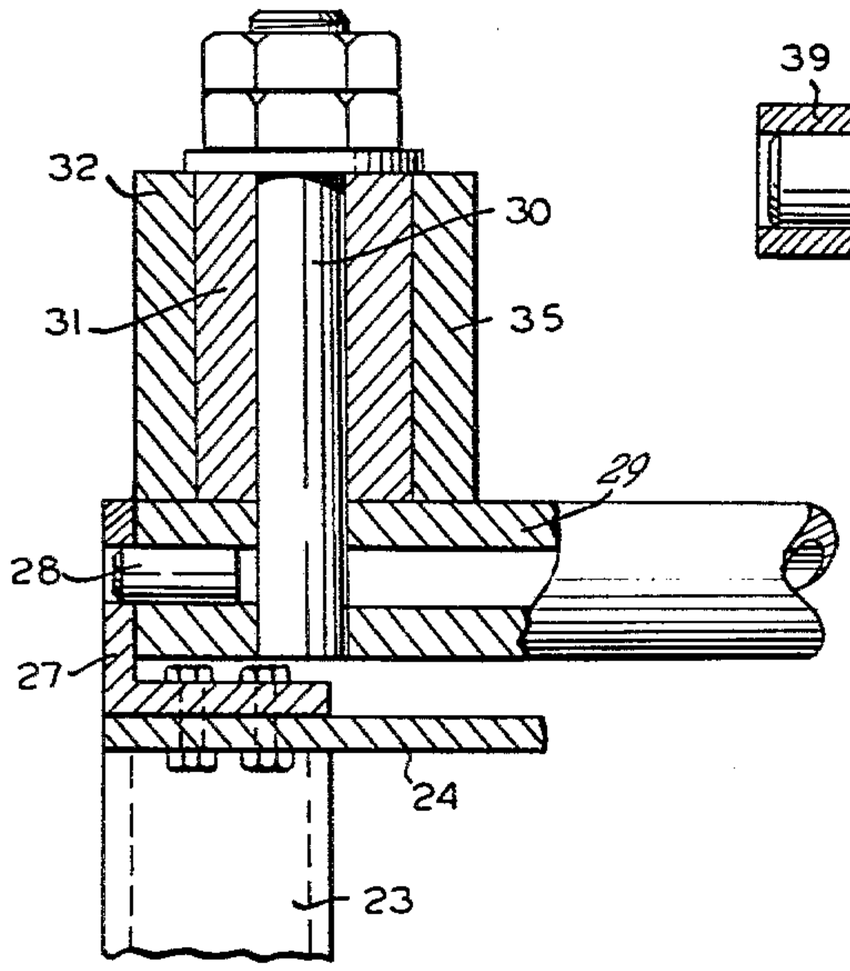

FIG.5

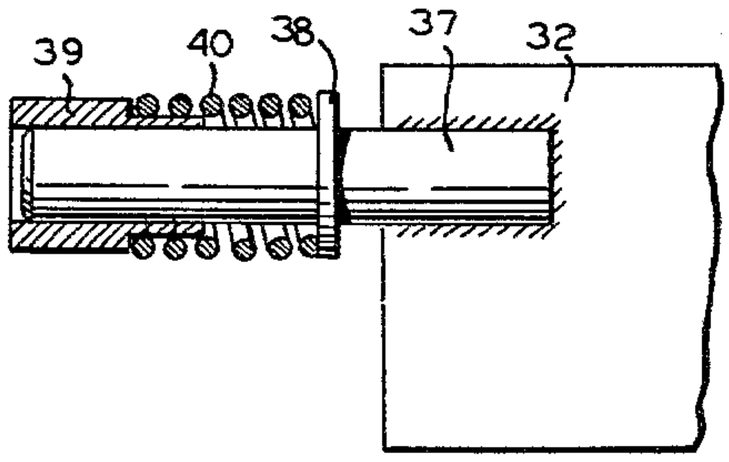

FIG.6

INVENTOR
FRED D. MOSS

BY Harry S. Bennett

ATTORNEY

United States Patent Office

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3,180,512
DRUM HANDLING ATTACHMENT FOR LIFT TRUCKS

Fred D. Moss, 119 S. Montrose, Fort Valley, Ga.

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4 Claims. (Cl. 214—620)

The present invention relates to a mechanism affording an economical, efficient and safe means for handling containers such as barrels and drums and which is adapted to be engaged by the prongs or tines of a fork carried by the vertically moving or tilting mast of conventional mobile fork lift trucks.

A primary object of the invention is to provide an attachment for fork lift trucks which may be readily engaged by the fork lift truck and which upon forward movement of the truck against a drum to be lifted automatically grips the drum upon vertical or tilting movement of the fork lift mast without necessitating the operator to leave his seat, and further releases the drum when the movement of the mast is reversed.

A further object is to provide an attachment for fork lift trucks which will automatically grip a drum, lift, transport and release the same with a minimum elevation of the fork lift mast, thus allowing the device to be used in low clearance areas.

A further object is to provide an attachment for fork lift trucks adapted to grip automatically a drum at a point above its center of gravity while the attachment and the lifting forks barely clear the supporting floor.

A still further object is to provide a drum lifting attachment with interlocking gripping elements so proportioned and arranged that the entire action and movement of the elements during operation can be observed by the operator thus insuring safety and efficiency.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, in which,

FIG. 1 shows a side view of a preferred form of the drum handling attachment of the present invention mounted on a fragmentarily shown conventional fork lift truck.

FIG. 2 is a perspective view of the drum handling attachment looking toward the front corner thereof.

FIG. 3 is a front elevation.

FIG. 4 is a rear elevation.

FIG. 5 is a detail view partly in section of the vertical and horizontal pivots supporting the drum gripping elements.

FIG. 6 is a detail partly in section of a cam follower.

Referring more particularly to FIG. 1 of the drawings it will be noted that there is fragmentarily shown in diagrammatic manner the front end portion of a fork lift truck **10** which has a mast **11** of conventional construction which is tiltable forward and back and which is adapted to raise and lower a pair of forks **12** on which the handling attachment **13** of the present invention is mountable.

The handling attachment **13** in the present embodiment comprises primarily a skeletonlike supporting frame made of metal, preferably steel, adapted to pivotally support a pair of levers having portions acting as drum gripping elements.

The bottom portion of the supporting frame consists of two angle bar members **14** arranged with a depending side wall on the outside and a third angle bar member **15** parallel to and spaced from one of the members **14** a distance slightly greater than the width of a fork of the lift truck. The bottom edges of the members **14** and **15** are secured together by flat bars **16**, one at each end and the third at approximately the middle point.

The top surfaces of the members **14** and **15** are firmly secured together by laterally disposed angle bars **17**, one

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at each end of the longitudinal members **14** and one forward of the center thereof.

The rear portion of the supporting frame is formed by the two vertical posts **18** secured to the rear lateral member **17** at some distance from its ends and which carry at their tops a flat rear top member **19** having a length approximately that of the width of the bottom portion of the supporting frame.

Attached to each end of the rear top member **19** and also to the sides of the adjacent rear vertical parts **18** is a cam member **20** formed of channel bar and which also acts as braces to stiffen the supporting frame. These cam members **20** are formed with a portion **21** disposed at a 45° angle to the rear top member **19** and a smaller portion **22** parallel to said member **19** for purposes which will be described later.

The front portion of the supporting frame comprises two vertical front parts **23** attached to the front ends of the longitudinal members **14** of the bottom portion and have their tops secured together by a front top member **24**.

To provide rigidity to the supporting frame a diagonal tubular strut **25** is secured to the middle of the rear top member **19** and the intermediately positioned lateral bar member **17** and diagonal strut **26** are secured to each of the front vertical posts **23** and the bottom longitudinal members **14**.

At each end of the front top member **24** (see FIG. 5) is mounted a bracket **27** apertured to receive and firmly hold a stub shaft **28** on which in turn is mounted for rotation a hollow tubular shaft **29** formed with a diametrically disposed bore near each end which receives and firmly holds a pintle **30** which is encircled by a rotatable sleeve **31** held in place by nuts and a washer.

The pair of levers heretofore mentioned as being carried by the supporting frame are formed of an outer member **32** having its rear end near the rear portion of the supporting frame and extending longitudinally to a point in front of the supporting frame where a portion **33** is bent inwardly at a slight angle and terminates with an outwardly flaring portion **34**, and an inner member **35** which extends longitudinally to a point in front of the supporting frame where a portion **36** is bent outwardly at a slight angle and terminates at the apex of the bend in the outer member **32**. The ends of the inner member **35** are firmly secured to the outer member **32** and the point of bend in the outer member is located far enough in front of the supporting frame so that a line connecting the apex of one member **32** with the apex of the opposite member **32** will constitute a diameter of a cylindrical object being handled.

The levers are mounted on the suporting frame by firmly attaching the facing surfaces of the outer member **32** and the inner member **35** to the rotatable sleeve **31** which then acts as a fulcrum for the levers and allows them to move in both a vertical plane using the stub shaft **28** as a pivot and in a horizontal plane using the pintle **30** as a pivot. A connecting rod **36'** is pivotally connected at one end to the inner member **35** of one lever at a point to the rear of the fulcrum and pivotally connected at the other end to the inner member **35** of the opposite lever at a point in front of the fulcrum so as to force the pair of levers to act in unison when moving in a horizontal plane.

Firmly attached to the rear of the outer member **32** of each lever is a rearwardly extending cylindrical pin **37** each provided with a shoulder **38**. Mounted for rotation at the rear end of each pin **37** is a cylindrical cam follower **39** adapted to fit and engage the channel of cam **20** and is biased for rearward movement by a compression spring **40** positioned between the shoulder **38** and the cam follower **39**.

Attached to the rear ends of the outer member **32** of each lever is one end of a tension spring **41**, the other end of which is secured to the adjacent ends of the rear top member **19**. These springs tend to force the cam follower **39** to seek the outer and upper reaches of the cam **20** and the forward portions of the levers to move toward each other.

To prevent accidental disengagement of the lifting forks and the handling attachment due to sudden stops or during the releasing of a drum, an apertured and threaded plate **42** is secured to longitudinal bottom members **14** and **15**. A screw clamp **43** engages the threads and upon manipulation effectively secures the supporting frame to one of the forks.

In the operation of the device, the fork lift truck is moved to face the rear end of the drum lifting attachment with the forks in approximate alignment with the lengthwise members of the attachment.

On further forward movement of the truck, the forks enter the space formed by the horizontal walls of the longitudinal members **14** and **15** and the lateral members **16** (see FIG. 4). The vertical walls of one member **14** and of the member **15** co-operate to act as guideways for one fork and thus accurately align the attachment with the forks as they are moved forward into complete engagement.

In order to prevent accidental or inadvertent disengagement of the forks and the attachment due to sudden stops or the withdrawal of the attachment from a drum, the clamp **43** carried by the attachment is screwed down against the top surface of one of the forks.

The attachment is now ready to handle drums and it will be noted that the tension springs tend to separate the rear ends of the levers and force the cam followers **39** on the rear ends of the levers to seek the outer and top portions of the cam **20** and at the same time to bring the front ends of the lever into their closest position. The operator then aligns the levers with a drum to be handled and upon forward movement the flaring portions **34** co-operate with the surface of the drum to pry or cam the forward ends of the levers apart and to force the cam followers to seek the inward reaches and lower reaches of the cam **20**. At the same time the front ends of the levers are raised slightly and to prevent an undesirable amount of raising the cam **20** is formed with a horizontal portion which allows the front ends of the levers to open to the fullest extent but limits the upward movement of the front ends of the levers. When the drum is properly positioned with respect to the gripping elements of the levers, each lever has a two point contact with the cylindrical surface of the drum which makes it unnecessary for the gripping elements to fit closely to the drum and enables the device to handle expeditiously drums of various diameters and deformed drums.

The tension springs then tend to force the gripping elements of the levers together and make firm contact with the drum.

The operator then raises or tilts the forks and the gripping elements either by friction or by contacting the conventional circumferential ribs of a drum and lift the drum.

The weight of the drum raises and the rear ends of the levers and the cams **20** force the front ends of the levers to grip the drum more tightly. Drums can readily be released by relieving the gripping elements of the load carried by them and backing the attachment away from the drum.

It will be understood that whereas in the foregoing specification and accompanying drawings I have illustrated what I now consider to be a preferred form of the invention, the invention is not limited to such specific design but includes all modifications thereof which fall within the scope of the appended claims.

I claim:

1. A drum handling attachment for a fork lift truck comprising a supporting frame having bottom, rear and front portions, longitudinal members in said bottom portion acting as guide-ways adapted to receive and guide a tine of the fork lift, a shaft mounted for rotation on the front portion of said supporting frame, radially projecting pintles one fixed to each end of said rotary shaft, cam members one mounted on each side of said rear portion of the supporting frame, a pair of levers mounted for rotation one on each of said pintles and each having a forwardly projecting portion formed to act as drum gripping elements and a rearwardly projecting portion, cam followers one mounted on each rearwardly projecting portion of said levers adapted to engage said cams, and a connecting rod pivotally connected at one end to the rear portion of one of said levers and pivotally connected at the opposite end to the forward portion of the other of said levers.

2. A drum handling attachment for a fork lift truck comprising a supporting frame adapted to be engaged by and supported by the forks of a lift truck, a pair of levers one pivotally mounted on each side of said supporting frame at the front portion thereof for movement both in a horizontal and in a vertical plane, a drum gripping element formed in the portion of each said levers extending forwardly of said pivotal support, cam followers one carried by the rear portion of each said levers and cams carried by said supporting frame adapted to be engaged by said cam followers to control the vertical and horizontal movement of said levers, and a connecting rod pivotally connected at one end to the rear portion of one of said levers and pivotally connected at the opposite end to the forward portion of the other of said levers.

3. A drum handling attachment for a fork lift truck consisting of a supporting frame having a bottom portion, a rear portion and a front portion, said bottom portion comprising parallel longitudinal members adapted to receive and guide a fork of the lift truck, a pair of levers one pivotally mounted for vertical and horizontal movement on each side of said front portion, a cam follower carried by the rear end of each said levers, cams carried by said rear portion adapted each to engage one of said cam followers, a connecting rod pivotally connected to one of said levers at a point to the rear of the pivotal mounting and pivotally connected to the other lever at a point forward of its pivotal mounting.

4. In a drum lifting attachment for a fork lift truck, a supporting frame adapted to be engaged by the forks of a lift truck, a pair of levers each pivotally mounted on the front of said supporting frame for both vertical and horizontal movement and each having forwardly extending portions formed to act as drum lifting elements, a cam follower mounted on the rear end of each lever, a pair of cams carried by the rear portion of said supporting stand each adapted to be engaged by one of said cam followers, a tension spring connecting the rear end of each of said levers with said supporting frame acting to force said drum gripping elements toward each other and a connecting rod pivotally connected to one of said levers forward of its pivot point and to the other of said levers rearwardly of its pivot point.

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HUGO O. SCHULZ, *Primary Examiner.*
MORRIS TEMIN, *Examiner.*