Nov. 5, 1968 S. MILLS 3,409,156

COIL LIFTER

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FIG. 1.

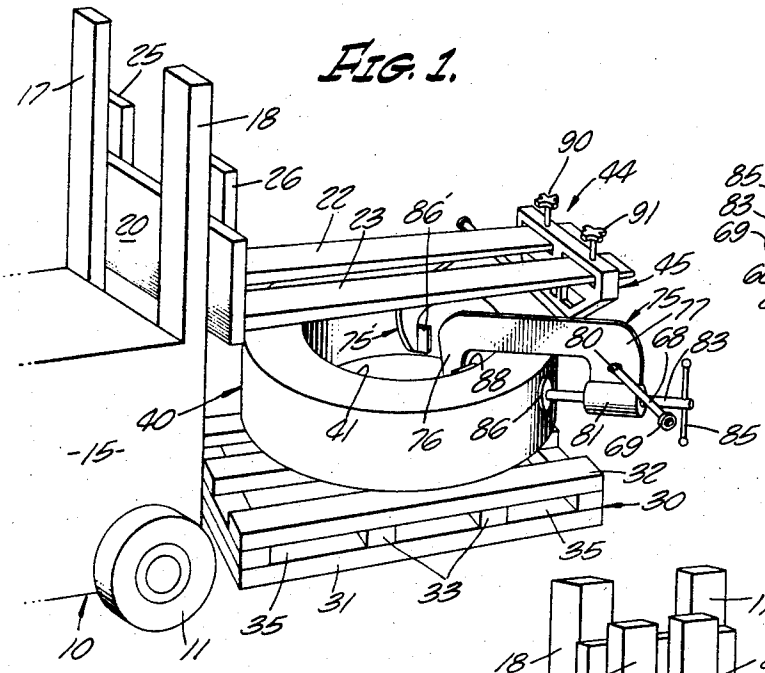


FIG. 4.

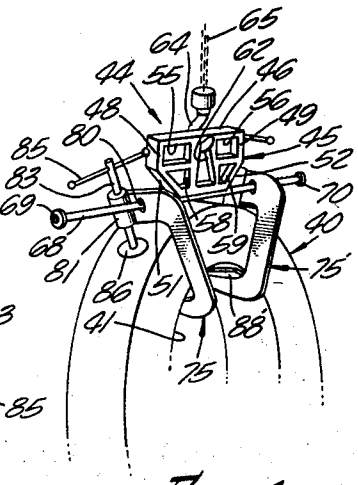


FIG. 2.

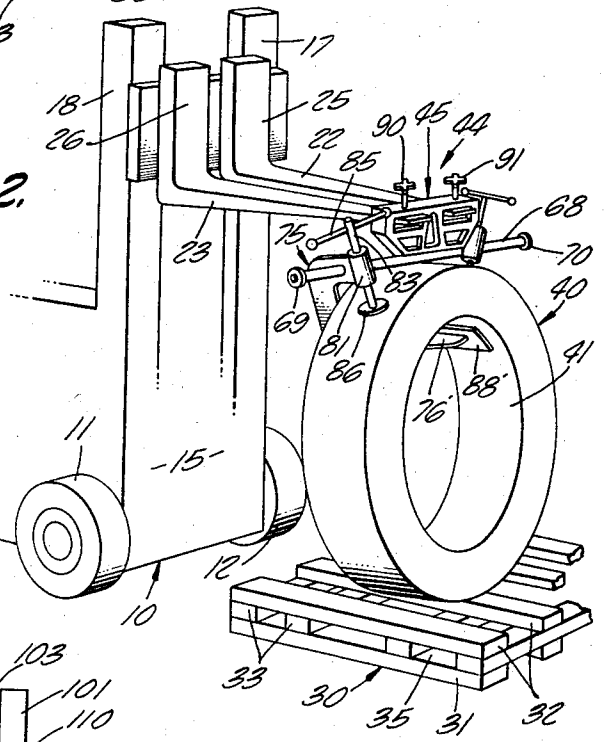
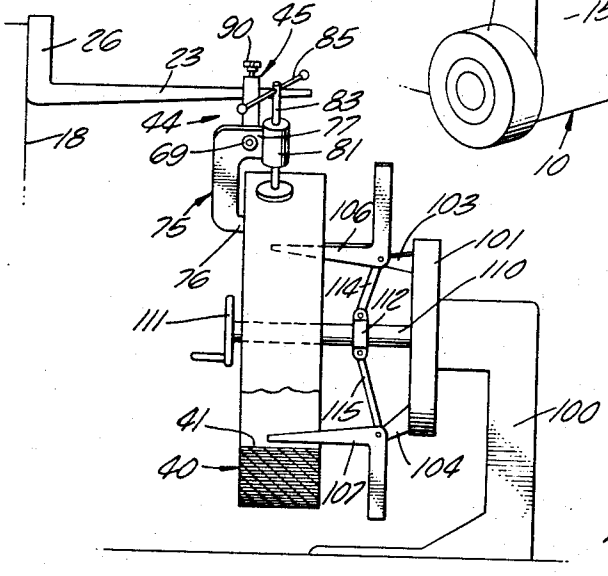


FIG. 3.



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COIL LIFTER

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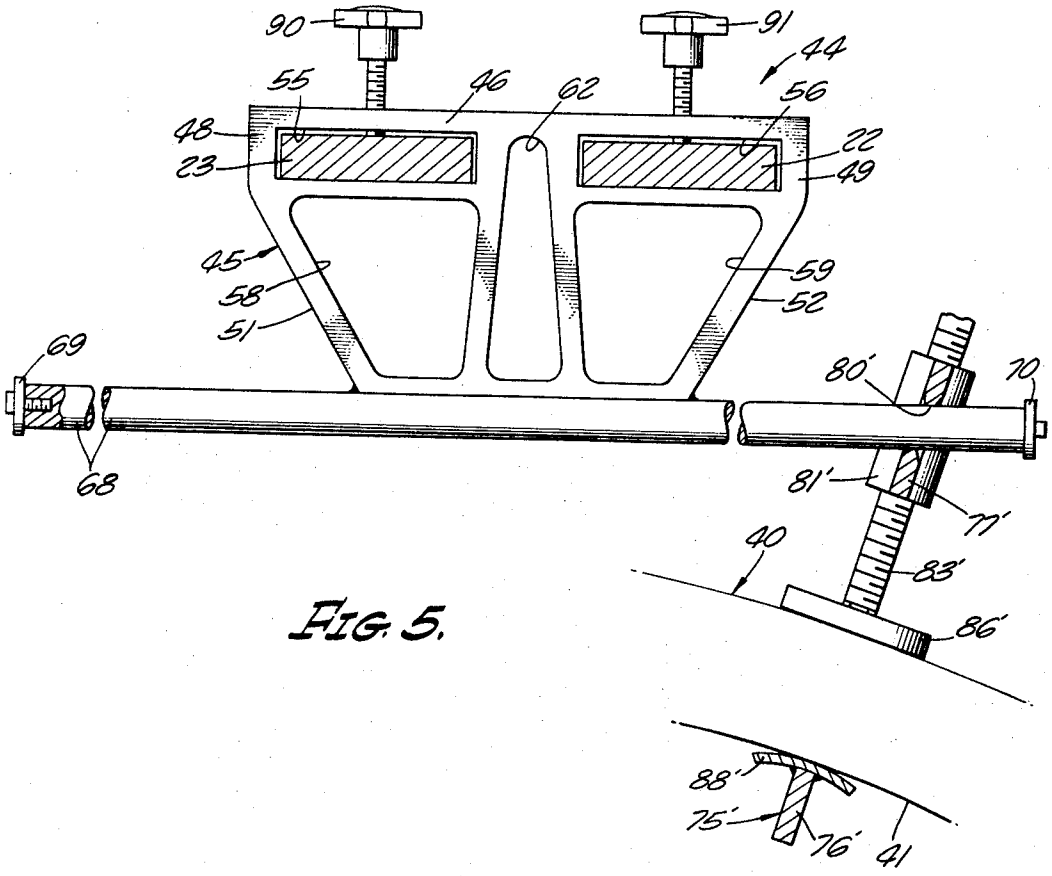


FIG. 5.

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COIL LIFTER

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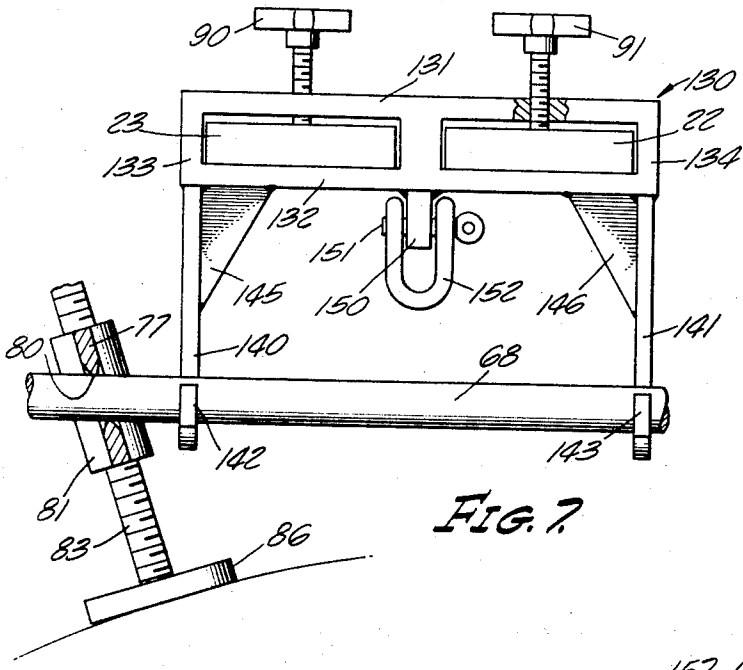


FIG. 7.

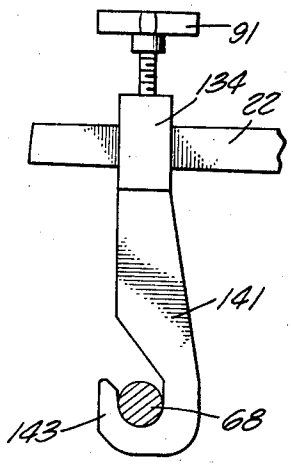
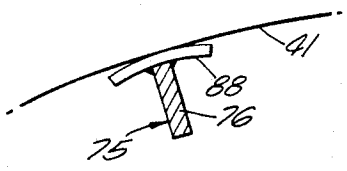


FIG. 8.



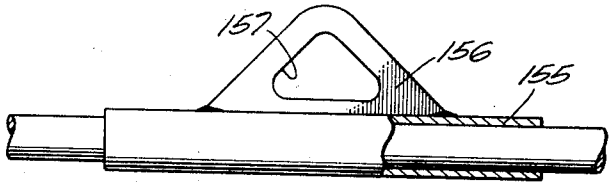


FIG. 10.

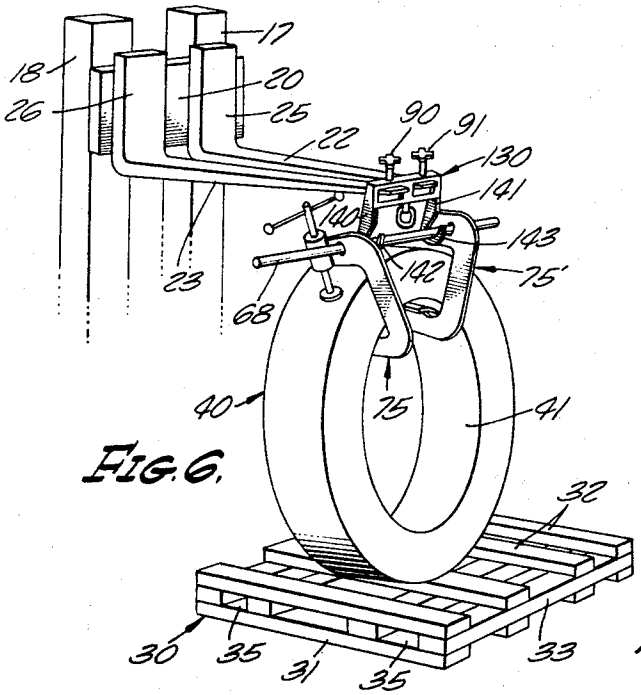


FIG. 6.

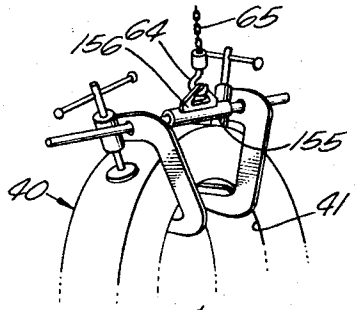


FIG. 9.

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United States Patent Office 3,409,156 Patented Nov. 5, 1968

3,409,156

COIL LIFTER

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Filed Oct. 5, 1966, Ser. No. 584,454
10 Claims. (Cl. 214—620)

ABSTRACT OF THE DISCLOSURE

The invention is an improved device for lifting coils or rolls of strip material, such as metal, having a relatively large center opening. The device comprises a pair of C clamps which clamp to the coil in spaced relationship. The clamps are carried by a member in such a way that the coil and the clamps can swing about a horizontal axis when the clamps and coil are lifted. The member to which the clamps are attached has a position such that the said horizontal axis about which the coil swings when lifted is in a position so that merely by lifting the coil by means of a fork lift or the like, it swings from a position in which its axis is vertical to a position in which its axis is horizontal and in which it can be maneuvered and then mounted on a mandrel. The said member is configurated to directly receive the forks of a fork lift.

This invention relates to apparatus or equipment particularly adapted for handling and transporting heavy objects of the type which ordinarily are cylindrical having a center opening. More particularly, the invention is especially adapted for the handling and transportation of coils or rolls of strip material such as metal. The invention will be described in an exemplary form herein as adapted for use with coils of strip material, such articles normally being relatively heavy and unwieldy.

The coils as referred to present problems in handling, transportation, and storage. These problems include those of attaching or securing lifting and handling means to the coil, and the problem of transferring the coil from a position in which its axis is vertical to a position in which its axis is horizontal or at some other angle. Because of the configuration of the article, i.e., the coil and its weight, completely satisfactory solutions to the problem stated have not been available, and it is the primary object of this invention to provide simplified, economic, inexpensive, but yet extremely effective solutions to the problems stated. The invention provides these solutions in the form of simplified but effective means, and techniques for grabbing or securing to the coil, lifting it, changing its position and transporting the coil.

Coils of the type referred to may be stored on fork lift pallets with their axes vertical. For utilization of the strip metal an individual coil must be lifted from its storage position and moved into a position wherein its axis is horizontal for mounting on a rotatable mandrel so that the coil can be unwound and desired lengths of strip metal removed. Accordingly, it is necessary that the apparatus or equipment have means for grabbing or securing to the coil while its axis is vertical; then lifting it and reorienting it so that the coil axis is horizontal; transporting it and placing it on the rotatable mandrel.

In the exemplary form of the invention the apparatus is constructed adapting it to be engaged by the prongs or forks of a fork lift truck so that the fork lift is adaptable for lifting the coil from its storage position; reorienting its axis while being lifted and transporting the coil for mounting on the rotatable mandrel. In the preferred form of the invention, the lift apparatus comprises means for grabbing or securing the coil on the side of it opposite or away from the fork lift truck. The lift apparatus comprises a frame having openings to receive the prongs of

the fork lift and the grab or grabs which secure to the coil are pivotally or rotatably attached to the said frame so that upon lifting or elevating by the fork lift, the grabs holding the coil are free to rotate so that the coil is orientated into a position in which its axis is horizontal. It can then be readily transported by the fork lift to the rotatable mandrel for installation thereon.

In the light of the foregoing, a further object of the invention is to provide an improved coil lift embodying a supporting frame having coil grabs or securing means rotatably or pivotally attached thereto to allow reorientation of a coil or the like, held by the grab means while the coil is being lifted, from a position in which the coil axis is vertical, to a position in which the coil axis is horizontal.

Another object is to provide lift means as in the foregoing object wherein the grab means comprises a pair of clamps pivotally attached to the supporting frame allowing rotation thereof when the frame is lifted by a fork lift or the like.

Another object is to provide a coil lift means as in the foregoing object wherein the said frame is configurated to receive the prongs of the fork lift and/or to be transported, suspended by a chain fall from an overhead carrier.

Another object is to provide a lift means as in the foregoing wherein the frame is provided with a sleeve having a transverse relatively rotatable bar passing therethrough and the same clamps having openings receiving the said bar so that the clamps are rotatable thereabout.

Further objects and additional advantages of the invention will become apparent from the following detailed description and annexed drawings wherein:

FIGURE 1 is a perspective view of a preferred form of the invention associated with a fork lift truck;

FIGURE 2 is a view of the form of the invention of FIGURE 1 showing the coil in lifted position;

FIGURE 3 is a view showing mounting of a coil held by the lift means of the invention on a rotatable mandrel;

FIGURE 4 is a view of the lift means of the invention holding a coil and suspended from an overhead carrier;

FIGURE 5 is a detail view of the frame of the coil lift of FIGURES 1 to 4;

FIGURE 6 is a perspective view of a modified form of lift means and modified lifting technique;

FIGURE 7 is a partial detail view of modified form of lifting frame;

FIGURE 8 is a side view of the frame of FIGURE 7;

FIGURE 9 is a view of a modified form of coil lift particularly adapted for transportation suspended from an overhead carrier;

FIGURE 10 is a detail view of a slightly modified form of carrier frame.

Referring now more in detail to FIGURES 1 to 5 of the drawings, numeral **10** designates a conventional fork lift truck having wheels as shown at **11** and **12**. The truck has a body or frame **15** and uprights **17** and **18**. The uprights are part of a conventional elevator structure providing a guide means for a vertically moveable lift or elevator **20**, which is moveable upwardly and downwardly by power means, forming part of the fork lift. Attached to the member **20** are the forks or prongs of the fork lift as designated at **22** and **23**. The forks having upright portions **25** and **26** attached to the member **20**.

Numeral **30** designates a conventional wooden fork lift pallet having a base **31**; upper transverse members **32** and spacer members such as shown at **33** providing spaces as shown at **35** adapted to receive the forks of a fork lift when it is desired to lift and transport a load on the pallet, carrying the pallet with the load.

Numeral **40** designates a coil of metal strip material

having center opening **41**. In FIGURE 1 the coil is resting on the pallet **30** with its axis in a vertical position.

The coil lift apparatus or unit is designated generally at **44**; it comprises a frame as shown at **45** having a configuration as shown in the drawings. In the exemplary form of the frame **45** it has an upper transverse member **46**, a lower transverse member **47**, straight side portions **48** and **49**, and tapered lower side portions **51** and **52**. Formed in the frame are upper openings **55** and **56** and lower triangular openings **58** and **59**. Between the openings is an intermediate opening **62** which is triangular with an apex at the top. This opening is adapted to receive the hook **64** of an overhead suspending and carrying means having a chain **65** attached to the hook **64**.

At the lower part of the frame **45** there is rigidly secured a transverse rod or bar **68** having washer stops **69** and **70** at its ends.

A pair of C clamps is rotatably supported or carried on the bar **68**. One of these clamps is designated generally at **75**. It is of C clamp configurtion having a bight portion and leg parts **76** and **77**, the leg part **77** having an opening **80** therein which is received on the bar **68**. The leg part **77** has a bushing **81** at the end and threadedly received therin is a stem **83** having a rotating bar **85** at its end. At the other end of the stem **83** is a shoe **86** adapted to engage the exterior of the coil **40**. At the end of the leg **76** is a shoe **88** adapted to engage the inside circumference of the coil **40**. The C clamp **75'** is like the clamp **75** and is similarly rotatably mounted on the bar **68** on the other side of the frame **45**. Thus the parts are relatively oriented as shown in FIGURE 1.

FIGURE 1 illustrates the preferred technique for grabbing a coil and lifting it. The forks **22** and **23** of the fork lift are extended over the coil with the forks **22** and **23** extending through the openings **55** and **56** in the frame **45**. Numerals **90** and **91** designate manually adjustable screws extending through the top transverse member **46** of frame **45** for firmly attaching the frame **45** to the forks of the fork lift with the frame in a position as shown in FIGURE 1. In this position the C clamps **75** and **75'** are substantially horizontal extending inwardly from the frame **45** so as to secure to or grab the coil **40** in two positions along radii on the side away from the fork lift **15**. After securement as shown in FIGURE 1, the elevator of the fork lift is raised so that the coil **40** is lifted and reoriented from a position in which its axis is vertical to a position in which its axis is horizontal as shown in FIGURE 2; during this movement the coil bodily rotates from the position of FIGURE 1 to that of FIGURE 2, the C clamps rotating about the axis formed by the bar **68**. It can be seen, therefore, that the movement is extremely stable and efficient, and that the grabs, i.e., the C clamps which are symmetrically positioned simply automatically rotate during the lifting operation. At the end of the lifting operation the coil is held suspended directly below the frame **45**.

The fork lift truck can then be moved to any desired location such as to the position of a rotatable mandrel upon which the coil **40** may be mounted for unwinding desired lengths of strip material. Such a mandrel is shown in FIGURE 3, being mounted on a pedestal having an upright **100** supporting vertically oriented disc **101**. Extending from the disc **101** are support arms **103** and **104** to which are pivoted bell crank support levers **106** and **107**. Centrally mounted on the disc **101** is an extending stem **110** having a manually operable hand wheel **111** at its end. On this stem is a bushing or sleeve **112** which is attached to the bell crank levers **106** and **107** by links **114** and **115**. The fork lift carrying the coil **40** is moved up to the mandrel and the coil is positioned so that arms of the bell crank levers **106** and **107** extend into its central opening as shown. By then turning the hand wheel **111** the bushing **112** and the bell crank levers are moved or adjusted so that the arms of the bell crank levers firmly engage inside circumferential surfaces of the coil **40** to support it in a rotatable position on the mandrel. In this

position it can be conveniently rotated for unwinding and removing pieces of strip metal therefrom.

FIGURES 7, 8, and 9 show a modified form of coil lift or grab apparatus and technique for lifting. The coil lift apparatus includes a frame as designated at **130**. As may be seen in FIGURE 7 this frame is generally rectangular having a top member **131**, a bottom member **132** and side members **133** and **134**. At the upper part the frame has rectangular openings **136** and **137** to receive the forks **22** and **23** of the fork lift. The adjusting and clamping screws **90** and **91** are like those of the previous embodiment. Depending from the frame member **132** are a pair of hook members as designated at **140** and **141** having hook ends **142** and **143**. These hook members are braced to the frame member **132** by webs **145** and **146**.

The transverse bar **68** is held in the hooks **142** and **143**. The C clamps **75** and **75'** are like those of the first embodiment.

Extending downwardly from the intermediate part of the member **132** is a lug **150** and attached to it by a transverse pin **151** is a U-shackle **152** to which attachment may be made.

FIGURE 6 shows another technique for lifting and transporting the coil **40**. FIGURE 6 shows the coil being lifted by the fork lift from a position in which it was resting on the pallet **30** with its axis vertical. The technique of FIGURE 6 is one wherein the coil is grabbed or secured to at the side nearest to the fork lift. When the lift is initially secured to the coil, with the coil in the horizontal position, the C clamps extend forwardly from the frame **130** so that when the coil is lifted as shown in FIGURE 6 the C clamps are on the side of the coil away from the lift truck. The C clamps are rotatable about the bar **68** as in the first embodiment, which bar is separable from the frame **30** merely by being lifted out of the hooks **142** and **143**. Utilizing this form of the invention the coil may be secured to, lifted and transported as in the previous embodiments.

FIGURES 9 and 10 show a slightly modified form of coil lift means adapted for lifting and movement and transportation by a chain hoist. The chain of the chain hoist is designated at **65** having a hook **64** at its end. The lift comprises simply a sleeve **155** through which the bar **68** passes, the bar **68** passing through the openings in the C clamps as previously described. Sleeve **155** has a triangular piece **156** secured to it having a triangular opening **157** into which the hook **64** may be hooked. This provides very simplified but effective means for holding the grabs which secure to the coil for lifting, reorienting, and transporting the coil by means of a chain hoist, which may of course be carried on an overhead carrier movable on a trolley.

From the foregoing those skilled in the art will observe that the invention as described herein achieves and realizes all of the objects and advantages as set forth in the foregoing as well as having many additional advantages that are apparent from the detailed description. As set forth in the introduction, the invention is of an extremely simplified, inexpensive and economical nature, but yet very effective for its purpose. The device is extremely rugged, being capable of use with extremely heavy objects and is such as not to require maintenance, and is further not readily subject to deterioration.

What is claimed is:

1. An apparatus for lifting and transporting relatively heavy circular objects of the type having a center opening, said apparatus comprising clamping means for clamping the object along at least one radius thereof between the center opening and the outside thereof, a member attached to the clamping means whereby to allow rotation of the clamping means and the said object relative to the member about a horizontal axis, said member being adapted for attachment to lifting equipment for lifting the member, clamping means, and object, the clamping means and object having such positional relationship to the said

member that upon elevating of the said member the object swings about said axis and is reoriented from a position in which the axis of the opening is vertical to a position in which the axis is horizontal, the clamping means rotating relatively to the said member, the point of attachment of the member to the clamping means remaining the same, the said member being configurated to directly receive the forks of a fork lift.

2. Apparatus as in claim 1 wherein the clamping means comprises a C clamp having a bight and legs, the said member having pivotal attachment to the C clamp at one of said legs.

3. Apparatus as in claim 1 wherein the clamping means have relationship to the said member such that when the clamping means are secured to an object to be lifted with the axis of its opening vertical, the said member is in a position spaced outwardly from the center of the object adjacent the periphery of the object.

4. Apparatus as in claim 3 wherein the clamping means comprises a C clamp which is in a position extending inwardly toward the center of the object from the said member when clamped in position for lifting the object.

5. An apparatus as in claim 1 wherein said clamping means comprises a pair of C clamps each having a bight and legs, one leg of each C clamp having pivotal attachment to the said member in spaced relationship from each other whereby to clamp the said object along radii spaced from each other.

6. An apparatus as in claim 1 wherein said member has an opening adapted to receive the hook of a chain hoist.

7. An apparatus as in claim 1 wherein said member includes a transverse bar, the clamping means comprising a C clamp having a bight and legs and having an opening in one of said legs having said bar passing therethrough.

8. An apparatus as in claim 7 wherein said clamping means comprises a pair of C clamps each having a bight and legs, one leg of each clamp having an opening having said bar passing through the openings.

9. An apparatus as in claim 1 wherein said member comprises depending hooks having a bar carried transversely therein.

10. An apparatus as in claim 1 wherein said member comprises a sleeve, a bar passing transversely through said sleeve, the said clamping means comprising a C clamp having a bight and legs, one of the legs having an opening therein having said bar passing therethrough.

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