

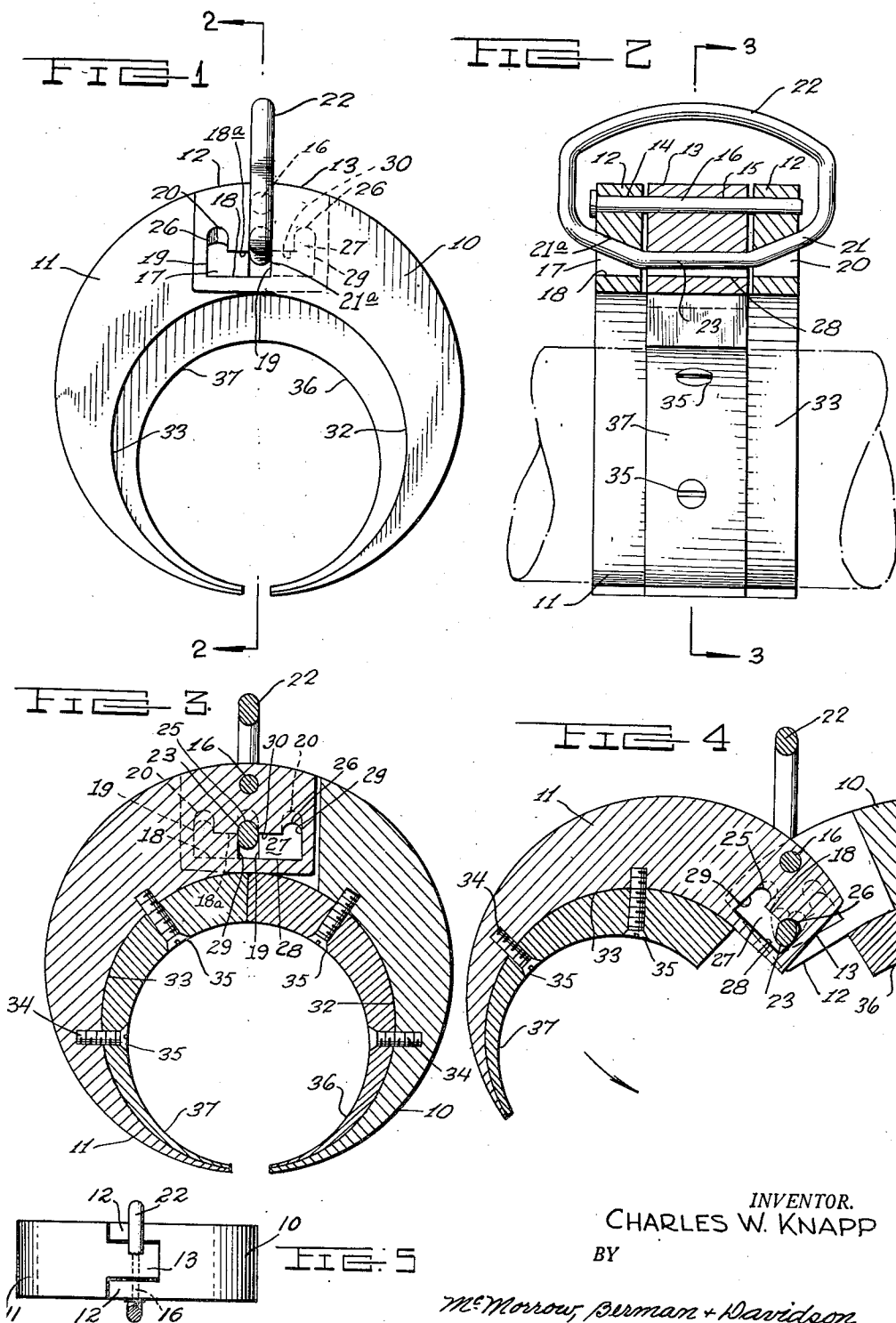
July 1, 1952

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2,602,001

SELF-LOCKING GRAPPLING UNIT

Filed Feb. 21, 1950



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UNITED STATES PATENT OFFICE

2,602,001

SELF-LOCKING GRAPPLING UNIT

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Application February 21, 1950, Serial No. 145,344

2 Claims. (Cl. 294—106)

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This invention relates to load-lifting equipment, and more particularly to grappling rings or hooks for grappling piping, rods and other material of particular cross-section that has to be shifted bodily from one location to another.

The conventional grappling hooks are constructed to open and close over piping and the like in a loose manner that does not assure as tight a hold thereon as is desirable. This is due to the fact that the jaws of the hook are made of a size that will accommodate itself, more or less roughly, to various sizes, but not to a specific one. This has proven in practice to be a great source of danger both to the workmen or individuals in the vicinity and the material or property directly or indirectly concerned, especially where the handled material is of round or circular cross-section. This invention has been developed with the idea of avoiding this feature of danger, yet without lessening the ease with which the device can be operated. It consists of an enclosing grappling unit made in plural, symmetrical half-sections hinged together enabling them to open up like jaws, and when closed, forming a complete ring within which a sectional insert is provided to closely fit and self-lock on the object or material to be shifted, and thereby hold the latter securely. The grip of the unit is non-slipping, while its construction is free from complicated mechanisms.

It is therefore an object of this invention to provide a new and improved grappling unit that will avoid one or more of the disadvantages and limitations previously existing in the art.

Another object of the invention is to provide a new and improved grappling unit that will be self-locking when placed on the object or material to be lifted by it.

Still another object of the hereindescribed invention is to provide a new and improved grappling unit for piping and objects having rounded or circular cross-sections.

An additional object of this invention is to provide a new and improved grappling ring or hook unit for lifting material of relatively small, standard cross-section that will be simple in construction and also avoid the requirement of extraneous linkage, cables and other structural elements in its lifting and operating requirements for its adequate use.

A further object of the invention is to provide a new and improved grappling ring or hook unit or assembly that can contain and cooperatively employ auxiliary holding members made to fit and fasten to the particular articles to be handled.

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Additional objects will be more or less realized as the invention is described in detail.

For a better comprehension of the invention, its objects, principles and manner of operation, reference is made to the accompanying drawings. The drawings illustrate a preferred form of the invention, while the details of the construction and operation shown therein, are outlined in the following description. The scope of the invention is emphasized in the appended claims.

Referring to the drawings:

Figure 1 is an elevation of a grappling ring embodying this invention, the view being taken looking along its transverse axis, while it is in closed and locked position;

Figure 2 is a sectional transverse elevation on line 2—2 of Figure 1;

Figure 3 is a sectional view along the line 3—3 of Figure 2; and

Figure 4 is a sectional detail of half-crescent member in open position.

Figure 5 is a top plan view, on a reduced scale, of the grappling ring of Figure 1.

Similar parts are designated by the same reference numerals in all the figures.

In Figure 1, a self-locking grappling ring unit is illustrated. It comprises a pair of half-crescent members 10 and 11 arranged in face to face relation, the member 10 having on one end a bifurcated lug 12 into which extends a single lug 13 on the complementary end of the member 11. A means connects the lugs 12 and 13 together for swinging movement about an axis transverse of the members 10 and 11, said means embodying a pin 16 which extends through holes 14 formed in the forks of the bifurcated lug 12 and a hole 15 formed in the lug 13. The forks of the bifurcated lug 12 are each provided with a closed slot 17 extending transversely there-through and spaced from the connecting means or pin 16. The slot 17 of each of the forks of the bifurcated lug 12 extends from a point adjacent the free end and terminates at a point substantially centrally thereof and includes a base wall 18, a pair of side walls 19 extending perpendicular with respect to the base wall 18, and a top wall 18a parallel to the base wall 18, the portion of the top wall 18a inwardly of each of the adjacent side walls 19 being provided with an arcuate shaped groove 20 tapering from the outer face to the inner face of the fork. The slots 17 in the forks of the bifurcated lug 12 are in alignment with each other.

The single lug 13 of the member 11 is also provided with a closed slot 27 extending trans-

versely therethrough and spaced from the connecting means or pin 16. The slot 27 extends from a point adjacent the free end of the lug 13 and terminates at a point substantially centrally thereof and includes a base wall 28, a pair of side walls 29 extending perpendicular with respect to the base wall 28, and a top wall 30, the portion of the top wall 30 inwardly of each of the side walls 29 being provided with arcuate shaped grooves 25 and 26 extending from one face to the other face of the lug 13. The arcuate shaped groove 25 of the closed slot 27 of the lug 13 is in alignment with the arcuate shaped grooves 20 of the closed slots 17 of the forks of the bifurcated lug 12 at the central points thereof.

A pull loop 22 is connected to the bifurcated lug 12 and single lug 13. The loop 22 has a portion which includes a pair of straight parts 21 and 21a arranged in end to end relation and at an angle with respect to each other and a third straight part 23 extending between the parts 21 and 21a adjacent to and connected to the facing ends of the latter named parts. The parts 21 and 21a extend through and are receivable in the arcuate shaped grooves 20 of the closed slots 17 of the forks of the bifurcated lug 12 at the central point thereof with the third part 23 extending through and receivable within the arcuate shaped groove 25 of the closed slot 27 in the single lug 13. Part 23 of the loop 22 is unlocked by shifting the loop 22 so that the parts 21 and 21a are moved out of the arcuate shaped grooves 20, 20 and toward the base wall 18 of the closed slots 17. When the loop 22 is so positioned, each half crescent member 10 and 11 will be free to move, and the members can be swung open through a large arc.

The inner, circularly curved lines 32 and 33 of the half-crescent members 10 and 11, respectively, together form a circle with its diameter less than that made by the exterior peripheries of the members, and their common center is further away from the lugs, the lug 13 being single and the lug 12 bifurcated, as shown in the drawings, than the center of the peripheries mentioned. The circles are therefore practically tangent within each other. The surfaces of the inner members forming circles 32 and 33 are faced smooth, and several screw-threaded holes 34 tapped into them for screws 35 that secure the auxiliary crescent inserts 36 and 37 to the surface of the inner surface 32, 33. These inserts 36 and 37 have their inner and outer peripheries of circular contour that also contact the circles of the crescent members from the inside. The inserts are separable into a symmetrical pair and have their interior circle or surfaces sized to conform with that of the particular round bar, casing, piping, etc., that the unit is intended to grab and lift. Each set of inserts is intended to be fitted for the particular lifting work to be done. It may be readily changed by utilizing the screws 35. The exterior diameter of the inserts used is the same, so as to fit against the inner circular surfaces 32 and 33 of the members 10 and 11, but the inner holding circular surfaces of the inserts can be varied to suit the diameter of sections of the material to be picked up or shifted. This enables the material lifted to be held securely. To make use of the complete unit of members and inserts requires a slackening of the tightness of the link and cable raising it so that the loop 22 may be easily changed about in the slots 17 and 27 to

suit. When loose, the half-crescent members and their attached half-crescent inserts are swung open like jaws and placed over the next article of load. They are then closed around it by swinging the members and inserts back over it. When the loop 22 is in the outer tower portions of the slot after so closing, the pulling up of the cable and loop will lock the load tightly therein and permit it to be transferred without danger of its slipping out. The part 23 of the loop, when at the bottom of the slot 27 permits the half-crescent members to be swung on its axis either individually or together. When in the position indicated in Figure 2, the angular parts 21 and 21a of the loop 22 are positioned in the arcuate shaped grooves 20 of the closed slots 17 of the forks of the bifurcated lug 12 so as to butt against the angular wall surfaces of the grooves 20 and prevent its being swung thereon. This is therefore called the locking position, and is reached when the parts 21 and 21a are pulled up high into the grooves 20 of the closed slots 17 of the forks of the bifurcated lug 12.

It can be noted that the device is simple in construction and of a form that permits facile manufacture. It is adaptable to various sizes of load sections and therefore can be made to hold them securely and eliminate the danger of accidents by reason of slipping. The parts are symmetrical and provide balance and ease of handling. The locking action is automatic and avoids the necessity of special mechanical parts and operations to take care of this phase. At the same time, the unlocking is performed just as easily and only when the load is rested on some surface where there is no danger of its falling out. The members are arranged to cooperate with each other in this locking and at the same time align the link properly.

While but one form of the invention is shown in the drawings and described herein, it is not intended to limit this application for patent to this particular construction, as it is appreciated that other forms employing the same principles could be developed and made that come within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. A grappling unit comprising a pair of half crescent members arranged in face to face relation, a bifurcated lug on one end of one of said members, a single lug on the complementary end of the other of said members and extending between and into said bifurcated lug, means connecting said lugs together for swinging movement about an axis transverse of said members, each of the forks of the bifurcated lug being provided with a closed slot extending transversely therethrough and spaced from said connecting means, each slot extending from a point adjacent the free end of each fork and terminating at a point substantially centrally thereof and including a base wall, a pair of side walls extending perpendicular with respect to the base wall, and a top wall parallel to the base wall, the portion of the top wall inwardly of each of the adjacent side walls being provided with an arcuate shaped groove tapering from the outer face to the inner face of the fork, the slots being in alignment with each other, said single lug being provided with a closed slot extending transversely therethrough and spaced from said connecting means, the closed slot in said single lug extending from a point adjacent the free end and terminating at a point substantially centrally thereof and including a base

wall, a pair of side walls extending perpendicular with respect to the base wall, and a top wall parallel to the base wall, the portion of the top wall inwardly of each of the adjacent side walls being provided with an arcuate shaped groove extending from one face to the other face of the single lug, the arcuate shaped groove of the closed slot in the single lug at the central point thereof being in alignment with the arcuate shaped grooves of the closed slots of the forks of the bifurcated lug at the central points thereof, and a closed loop having a portion including a pair of straight parts arranged in end to end relation and at an angle with respect to each other and a third straight part extending between said pair of parts adjacent to and connected to the facing ends of the latter, the pair of parts of said portion extending through and receivably in the arcuate shaped grooves of the closed slots of the forks of the bifurcated lug at the central point thereof with the third part of said portion extending through and receivable in the arcuate shaped groove of the closed slot in the single lug at the central point thereof.

2. A grappling unit comprising a pair of half crescent members arranged in face to face relation, a bifurcated lug on one end of one of said members, a single lug on the complementary end of the other of said members and extending between and into said bifurcated lug, means connecting said lugs together for swinging movement about an axis transverse of said members, each of the forks of the bifurcated lug being provided with a closed slot extending transversely therethrough and spaced from said connecting means, each slot extending from a point adjacent the free end of each fork and terminating at a point substantially centrally thereof and including a base wall, a pair of side walls extending perpendicular with respect to the base wall, and a top wall parallel to the base wall, the portion of the top wall inwardly of each of the adjacent side walls being provided with an arcuate shaped groove tapering from the outer face to the inner face of the fork, the slots being in alignment with

each other, said single lug being provided with a closed slot extending transversely therethrough and spaced from said connecting means, the closed slot in said single lug extending from a point adjacent the free end and terminating at a point substantially centrally thereof and including a base wall, a pair of side walls extending perpendicular with respect to the base wall, and a top wall parallel to the base wall, the portion of the top wall inwardly of each of the adjacent side walls being provided with an arcuate shaped groove extending from one face to the other face of the single lug, the arcuate shaped groove of the closed slot in the single lug at the central point thereof being in alignment with the arcuate shaped grooves of the closed slots of the forks of the bifurcated lug at the central points thereof, a closed loop having a portion including a pair of straight parts arranged in end to end relation and at an angle with respect to each other and a third straight part extending between said pair of parts adjacent to and connected to the facing ends of the latter, the pair of parts of said portion extending through and receivable in the arcuate shaped grooves of the closed slots of the forks of the bifurcated lug at the central point thereof with the third part of said portion extending through and receivable in the arcuate shaped groove of the closed slot in the single lug at the central point thereof, and auxiliary half crescent shaped inserts positioned between said members and detachably secured to the latter.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
100,330	Rogers	Mar. 1, 1870
182,047	Wyckoff et al.	Sept. 12, 1876
1,658,075	Butt	Feb. 7, 1928
2,378,570	Mitchell	June 19, 1945