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Dike

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[54] **GRAPPLE**

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[52] **U.S. Cl.** **294/118;** 294/106

[51] **Int. Cl.** **B66c 1/30**

[58] **Field of Search** ..... 294/81 R, 106, 107, 108, 294/109, 110 R, 111, 112, 118, 119, 117; 214/147 G

[56] **References Cited**

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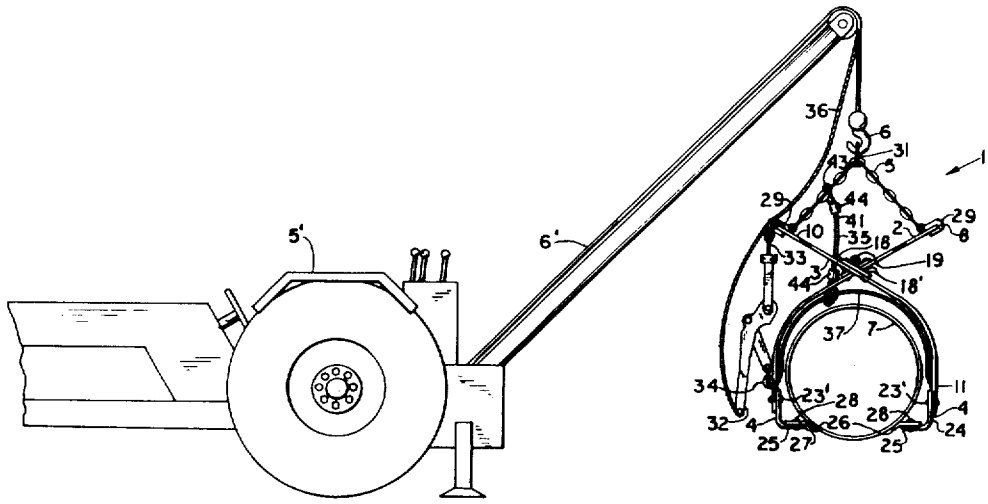
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Assistant Examiner—Johnny D. Cherry
Attorney, Agent, or Firm—Fishburn, Gold & Litman

[57] **ABSTRACT**

A grapple for the lifting and maneuvering of elongate members such as sections of large pipe or like objects. The grapple is comprised of a pair of arms with a common centrally located pivot forming tong-like members. A flexible member is connected to the upper end of each arm and is adapted for attachment to lifting means for raising and lowering of the grapple and effecting closing of lower disposed ends of the arms. The lower end of each arm has an elongated jaw with each jaw opening toward the other jaw and moveable into engagement with a substantial length of a pipe upon lifting of the grapple. A leverage device is connected to one of the jaws and the other arm for facilitating removal of the grapple from the pipe by spreading the jaws apart. A safety device is provided to prevent the jaws from opening and releasing the pipe from therebetween in the event that the flexible member or an upper portion of one of the arms breaks.

7 Claims, 7 Drawing Figures



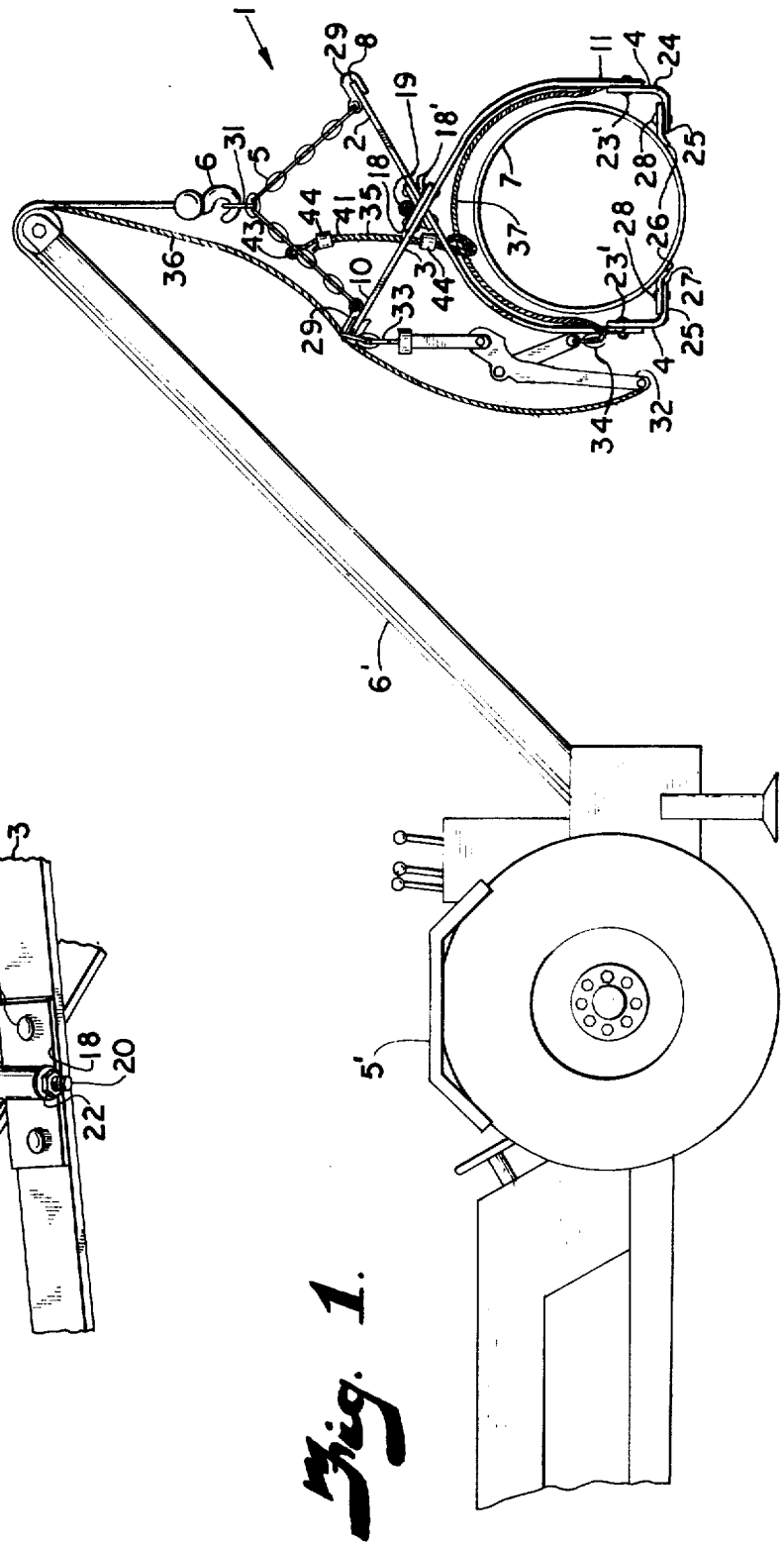

1
29
8
19
18'
2
31
6
5
18
44
41
35
43
36
10
3
33
44
29
11
4
24
23'
28
25
7
37
28
26
23'
27
25
4
32
34
6'
5'

Fig. 1.

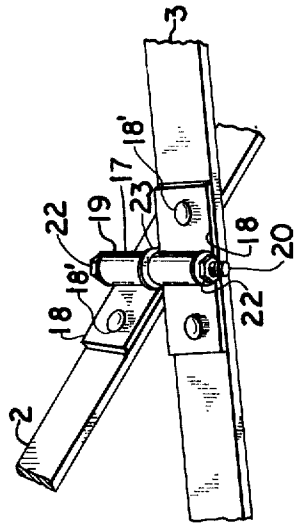

3
18'
17
23
19
22
18'
18
18
20
22
2

Fig. 5.

Fig. 2.

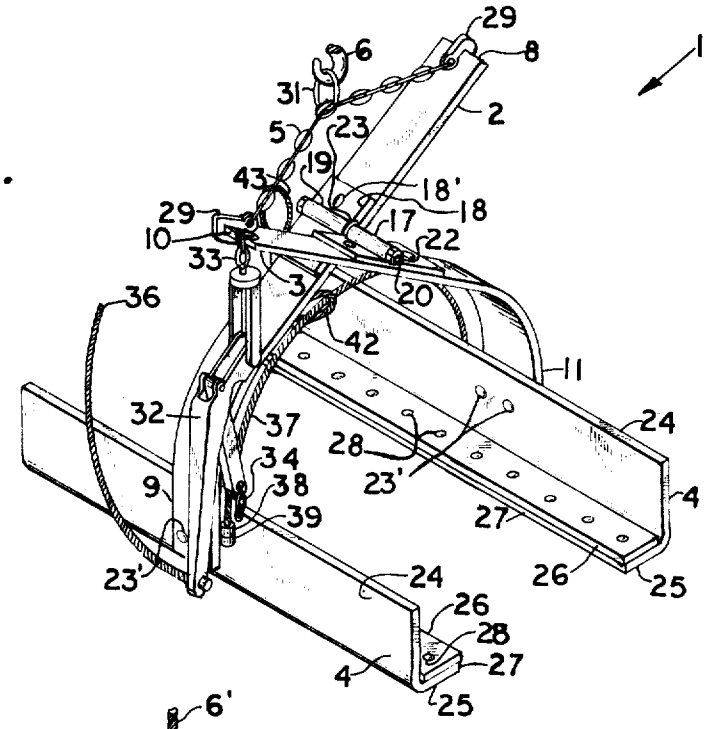


Fig. 3.

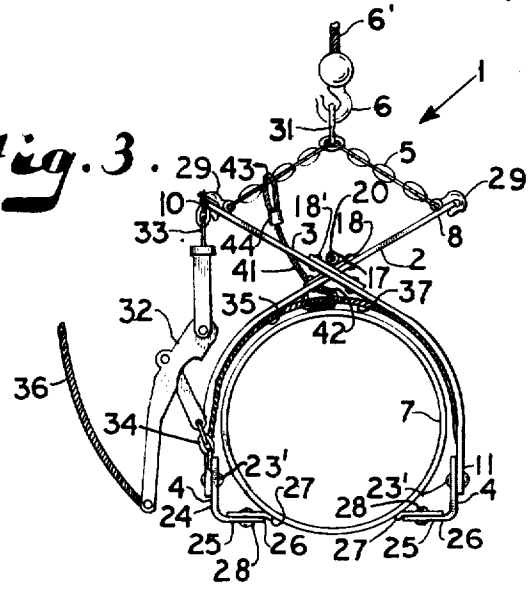


Fig. 4.

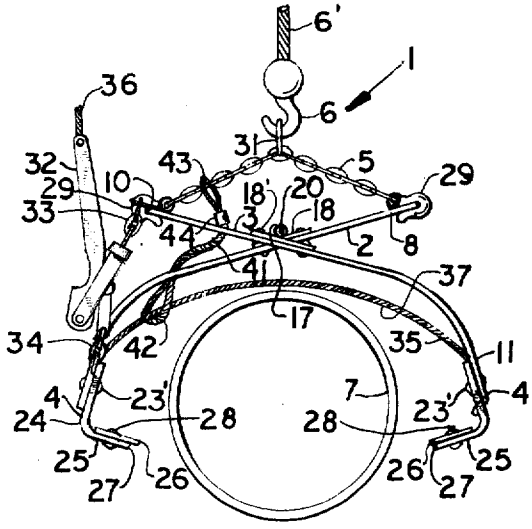


Fig. 6.

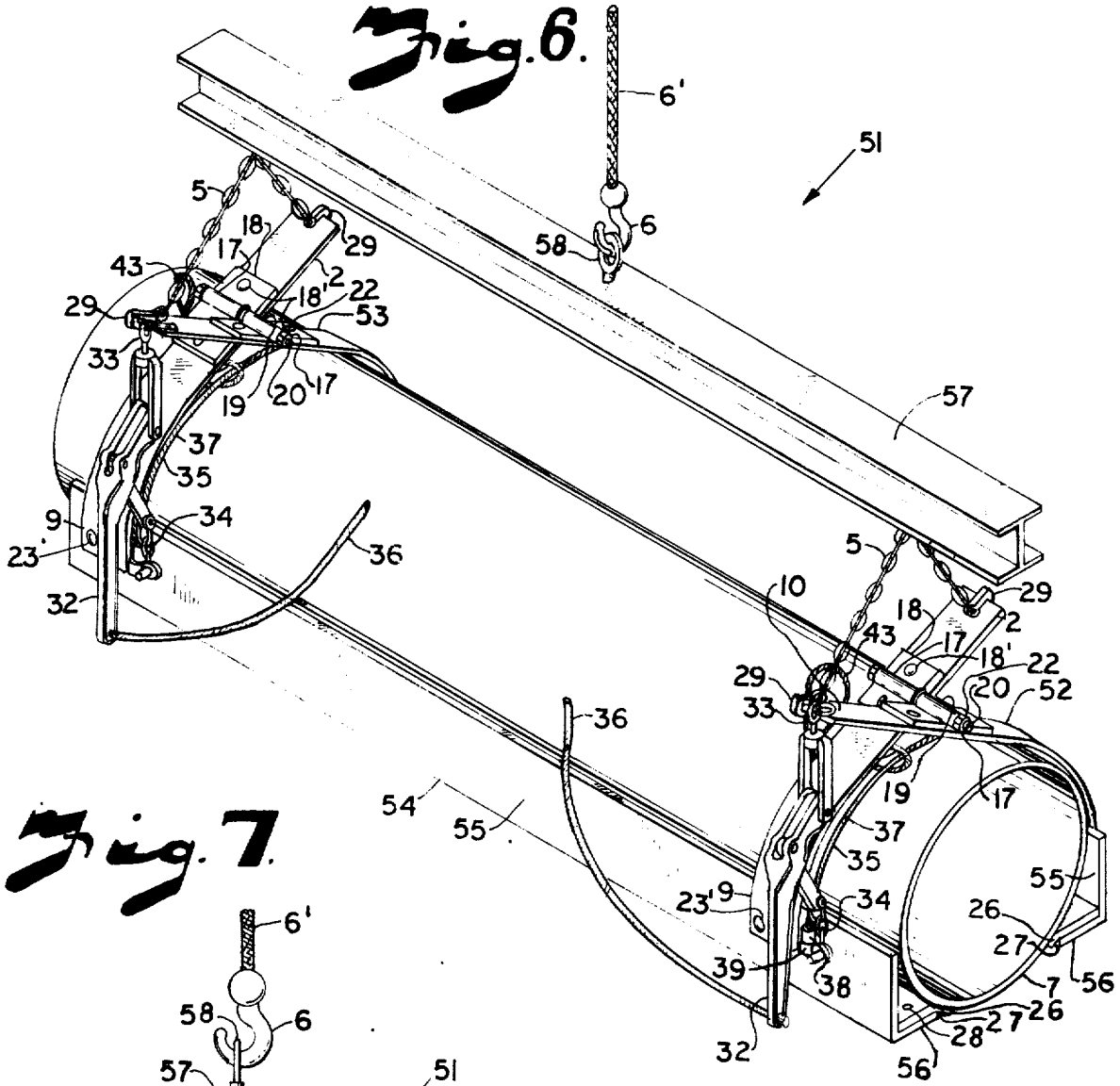
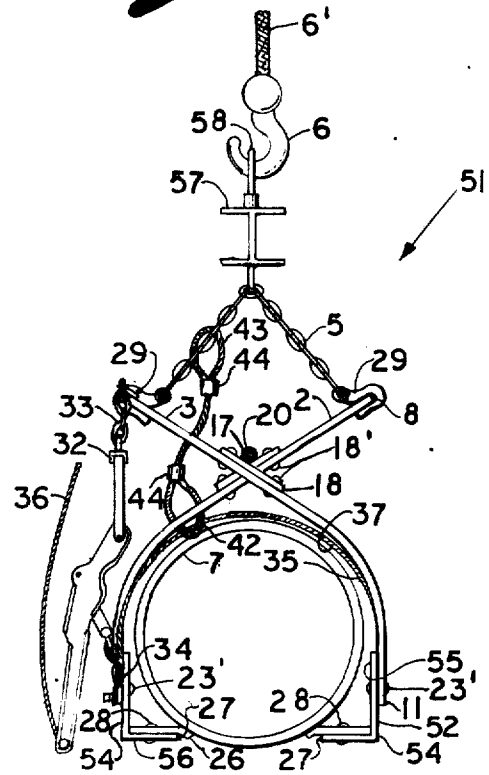

6'
51
5
18
17
29
43
2
58
6
29
18'
22
53
33
19
20
17
57
37
35
9
34
23'
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32
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10
29
18
2
43
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18'
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52
36
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37
35
55
23'
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56
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Fig. 7.


6'
58
6
57
51
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18'
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23'
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23'
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GRAPPLE

The principal objects of the present invention are: to provide a pipe grapple which is adapted for handling of elongate members such as large pipe in elongate lengths with the grapple having a pair of opposed elongate jaws for engagement with a substantial length of such members; to provide such a grapple which is capable of handling a large variation of pipe sizes without structural changes or adjustments; to provide such a grapple which is easily removeable from the pipe; to provide such a grapple which will reduce or eliminate marring of a pipe handled thereby; to provide such a grapple with a safety device that will prevent the jaws from opening in the event that certain portions of the grapple should break; and to provide such a grapple which is simple in construction, positive in operation and well adapted for its intended use.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is an elevational view of a lifting device with a pipe grapple connected thereto for use.

FIG. 2 is a perspective view of a pipe grapple.

FIG. 3 is an end elevational view of the grapple having a pipe grasped between the jaws thereof.

FIG. 4 is an end elevational view of the pipe grapple shown in a released condition from the pipe.

FIG. 5 is an enlarged framentary perspective view of the pivotal connection of the crossed arms of the pipe grapple.

FIG. 6 is a perspective view of a modified form of a pipe grapple.

FIG. 7 is an end elevational view of the modified form of the pipe grapple shown with a pipe grasped between the jaws thereof.

Referring more in detail to the drawings:

As required, detailed embodiments of the present invention are disclosed herein, however, it is to be understood that the disclosed embodiments are merely exemplary of the invention which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriate detailed structure.

The reference numeral **1** designates generally a grapple for use with pipe or like objects. The grapple **1** is comprised of a pair of crossed and pivoted arms **2** and **3** with each arm **2** and **3** being provided with an elongate jaw member **4** facing one another and positioned adjacent the lower end of each arm **2** and **3**. A flexible member **5** is secured to and extends between upper disposed ends of each arm **2** and **3** and is adapted for connection with a lifting device **5'** including a lifting cable **6'** with a hook **6** or like member for raising and lowering the grapple **1** and the pipe **7** grasped between the jaws **4**. Lifting of the grapple **1** with the hook **6** urges the jaws **4** to move toward one another and clamp the pipe **7** therebetween.

The arms **2** and **3** in the illustrated structure are arcuate below intermediate portions thereof with the arm **2** having an upper end **8** and lower end **9** and the arm **3** having an upper end **10** and lower end **11**. As shown the arms **2** and **3** are relatively thin and flat transversely

of the length thereof and preferably are made of a resilient material such as spring steel to be rigid and yet have some flexibility under loading conditions to reduce and absorb shock.

As described above, the arms **2** and **3** are crossed forming a generally X-shape with the arms being crossed at a position generally intermediate the respective ends thereof. A pivot **17** is provided for the arms **2** and **3** so that same may freely pivotally move about the pivot. In the illustrated structure, the pivot **17** includes plate members **18** each secured to a respective arm **2** and **3** as with rivets **18'**. Bearing members **19** are secured, such as by welding, to a respective plate **18** and have axially aligned bores (not shown) therethrough. A pivot pin or bearing shaft **20** extends through the bearings **19** with the arms being pivotal thereon with the pivot pin **20** having head portions **22** at opposite ends thereof to retain the same within the bearings **19**. The bearings **19** can be secured to the plates **18** in any suitable manner and as illustrated are welded thereto. Preferably, the adjacent edges of the arms **2** and **3** are slightly spaced from one another to prevent binding therebetween such as by having the bearings **19** extending just past the respective edges of the arms or as illustrated by having a spacer **23** positioned therebetween.

Each of the arms **2** and **3** is provided with a jaw **4** which are in opposed relation and secured to the respective lower ends **9** and **11** of the arms **2** and **3**. As illustrated, the jaws **4** are secured to the arms **2** and **3** in any suitable manner, such as with rivets **23'**, with the respective arm being generally centally located between the ends of the respective jaw **4**. The jaws **4** can be of any suitable form and as shown are angle members having a generally upstanding flange **24** which is secured to the respective arm and a generally horizontally disposed flange **25** which is generally normal to and extends from the respective upstanding flange **24** toward the opposite arm. The jaws **4** open toward one another and are in generally parallel relation and have a substantial length for grasping a substantial length of the pipe **7**. A resilient or cushion member **26** is secured to the upwardly facing surface of the respective flanges **25** and extends slightly past the free edge **27** thereof. The cushions **26** may be secured to the flange **25** in any suitable manner and as illustrated, a plurality of rivets **28** are used for the securing. The cushions **26** provide a resilient engagement between the jaws **4** and the pipe **7** preventing marring of a pipe and also providing increased friction therebetween preventing relative longitudinal movement between the jaws **4** and the pipe **7**.

The flexible member **5** in the illustrated structure is a chain having opposite ends thereof secured to the brackets **14** such as by having a hook **29** connected to the chain **5** and secured to the respective upper end **8** or **10**, such as by welding. In the illustrated structure a connector **31** such as an eye is secured to the chain **5** intermediate the ends thereof and is adapted to be connected to the hook **6** for lifting of the grapple **1**.

Means are provided for facilitating opening movement of the jaws **4** to release the grapple **1** from engagement with the pipes **7**. As illustrated, a leverage device **32**, such as a toggle type clamp, has flexible portions **33** and **34** secured to opposite ends thereof and to the upper end of one of the arms as for example, the upper end **10** of the arm **3** and the other jaw **4** or arm **2**. Operation of the leverage device **32** effects shorten-

ing of the distance between the upper end **10** and the lower end **9** and thereby causes the jaws **4** to move apart and release the pipe **7** from therebetween. An opening cable **36** is attached to the leverage device and extends to the lifting device for a purpose later described.

In the illustrated structure, a safety device **35** is provided to prevent the jaws **4** from opening in the event that certain portions of the grapple **1** should break so that the pipe **7** is retained between the jaws **4.** In the illustrated form, the safety device **35** includes a flexible member **37** such as wire rope having opposite ends thereof suitably secured to the arms **2** and **3** or the jaws **4.** Preferably, eye members **38** are secured to the upstanding flanges **24** receiving the end portions of the flexible members **37** therethrough with the ends of the flexible members **37** having suitable devices **39** such as connectors secured thereto and preventing withdrawal of the flexible member through the eyes **38.** The flexible member **37** extends to just below the pivot **17** and is positioned adjacent the arms **2** and **3.** A connecting link **41,** which preferably is flexible, such as wire rope has opposite ends thereof connected to the flexible member **37** and the chain **5.** As illustrated, the end **42** is in the form of a loop and receives the flexible member **37** therethrough and the end **43** is a loop which extends through one of the links of the chain **5.** Connectors **44** are secured to the link **41** forming the loops on the ends **42** and **43.** If the chain **5** should break or one of the arms **2** and **3** should break above the pivot **17,** the flexible link **41** and the flexible member **37** would become tensioned and prevent the jaws from moving to an open position.

The present invention is more fully understood by a description of the operation thereof. In use, the grapple **1** is connected to the hook **6** by having same connected to the connector eye **31.** The lifting device **5'** raises the grapple **1** and maneuvers same into a position wherein the jaws **4** are on opposite sides of the pipe **7** and are generally parallel to the longitudinal axis thereof. After the grapple **1** is positioned with the jaws **4** on opposite sides of the pipe **7,** the grapple **1** is lowered and when the jaws **4** engage the pipe **7,** the tension in the chain **5** is released whereby the jaws **4** move to an open position and downwardly over the pipe **7** on opposite sides of the pipe **7** until they are below the center thereof. It is to be noted that the opening cable **36** can be tensioned to operate the leverage device **32** and move the jaws **4** to their open position. The tension is released to allow the jaws **4** to clamp the pipe **7** therebetween. The grapple **1** is then raised inducing tension in the chain **5** and urging the jaws **4** to move into engagement with opposite sides of the pipe **7** so that the cushions **26** are in engagement with the pipe **7.** Further upward movement urges the jaws **4** to clamp the pipe **7** therebetween so that same may be raised and maneuvered by the lifting device **5'.** It is to be noted that the jaws **4** are elongate and engage a substantial length of the pipe **7** to distribute the load over the substantial length and that the jaws **4** are such as to accomodate various sizes of pipe without adjustment. Upon moving the pipe **7** to the location of use, same is lowered whereby tension in the chain **5** is released so that the jaws **4** can be moved to an open position. The leverage device **32** can be used if necessary to move the jaws **4** to the open position so that the grapple **1** can be removed from the pipe **7.** It is to be noted that the grapple **1** can be operated from the lifting device **5'** by one person without his having to leave the lifting device.

FIG. **6** and FIG. **7** illustrate a modified form of the present invention which is similar in construction and operation to the form shown in FIGS. **1, 2,** and **3** wherein like numbers designate like or similar parts or structure.

The reference numeral **51** designates generally the modified form of grapple which has a spaced apart pair of arms **2** and **3** with each pair of arms forming grapple portions **52** and **53** similar to the grapple **1.** The arms **2** and **3** are pivoted about a respective pivot **17** and have a chain **5** secured to the upper ends **8** and **10** with each chain having a connector eye **31.** Jaws **54** are secured to the lower ends **9** and **11** of each of the arms and extend between each of the grapple portions **52** and **53.** The use of the spaced apart grapple portions **52** and **53** permits the jaws **54** to be longer than the jaws **4** and engage a length of pipe **7** over a length greater than that engaged by the jaws **4.** As illustrated the jaws **54** are similar to the jaws **4** having cushions **26** secured thereto and being comprised of an upstanding flange **55** and generally horizontally disposed flange **56** similar to the flange **24** and **25** respectively. Each of the grapple portions are provided with a leverage device **32** and a safety device **35.**

The grapple **51** has a spreader bar or beam **57** extending between and having the connector eyes **31** secured thereto with the beam **57** having an eye member **58** secured thereto for connection with the hook **6.** The beam **57** allows simultaneously lifting of the grapple portions **52** and **53** by the lifting device. Operation of the modified grapple **51** is similar to operation of the grapple **1** as described above.

It is to be understood that while I have illustrated and described certain forms of my invention, it is not to be limited to the specific forms or arrangements of parts herein described and shown.

What I claim and desire to secure by letters Patent is:

1. A grapple for use with a crane for lifting elongate objects such as pipe, said grapple comprising;

a. at least one pair of crossed arms with each arm having an upper and lower end;

b. pivot means operably connected to said arms intermediate the upper and lower ends thereof and permitting pivoting movement of said arms;

c. a pair of elongate angle jaw members in generally parallel and opposed relation with each jaw member being secured to a respective arm adjacent the lower end thereof, said jaw members being movable toward and away from one another in response to movement of said arms and being engageable with a substantial length of an object positioned between said jaw members when said jaws move toward one another;

d. a flexible member extending between and connected to the upper ends of said arms for connection to a lifting device whereby lifting of said arms effects movement of said jaw members toward one another for clamping engagement with opposite sides of the object;

e. leverage means operably connected to each of said arms for shortening the distance between the upper end of one arm and the lower end of the other arm to effect movement of said jaw members away from one another;

f. a safety means operably connected to said arms and said flexible member selectively preventing said jaw members from moving away from one another if one of said flexible members and said arms should break.

2. A grapple for use with an elevating mechanism for lifting elongate objects such as pipe, said grapple comprising:

a. a pair of crossed arms, said arms each having upper and lower ends;

b. pivot means connecting said arms intermediate the ends thereof;

c. an elongate jaw member secured to each of said arms adjacent the lower ends thereof, said elongate jaw members being in generally parallel relation and adapted to engage a substantial length of an object to be lifted;

d. flexible means extending between and connected to the upper ends of said arms for connection to a lifting device whereby lifting of said arms effects movement of said jaw members toward one another for clamping engagement with opposite sides of the object;

e. a safety device including a first flexible member having opposite ends each secured to one of opposed jaw members and lower end of said arms and having a length greater than the spacing between said jaw members, and including a second member connected to said first flexible member and said means connecting the upper end of the arms, said second member having a length such as to induce tension in said first flexible member and maintain said jaw members in engagement with said object if one of said means connecting the upper end of the arms and said arms should break.

3. The grapple as set forth in claim **2** wherein:

a. said jaw members including angle members having flanges with one flange being generally upstanding and secured to a respective arm, the other flange being generally horizontally disposed and extending from said one flange toward the other jaw member, said other flange having object engaging surfaces adapted to engage said object.

4. The grapple as set forth in claim **3** including:

a. an elongate beam having a connector secured thereto and adapted to engagement with a lifting device;

b. a plurality of said pairs of arms in spaced apart relation along said beam with each said jaw member being secured to an arm of each pair and having a said flexible means secured to and extending between the upper ends of the arms of each tongs;

c. connecters securing said flexible means to said beam in spaced apart relation.

5. The grapple as set forth in claim **3** including:

a. leverage means operatively connected to each of said arms for shortening the distance between the upper end of one arm and the lower end of the other arm for moving said arms about said pivot means to an open position of said jaw members.

6. The grapple as set forth in claim **3** including:

a. cushion members overlying and secured to an object engaging surface of each of said other flanges for providing resilient engagement between said other flanges and said object.

7. The grapple as set forth in claim **6** wherein:

a. said arms being made of flat spring steel positioned in side-by-side relation;

b. said flexible means including an elongate flexible member and having a connecter secured thereto intermediate said upper ends for engagement with portions of a lifting device;

c. said pivot means including a bearing member on at least one of said arms and receiving therethrough a pivot pin with means retaining same through said bearing.

* * * * *