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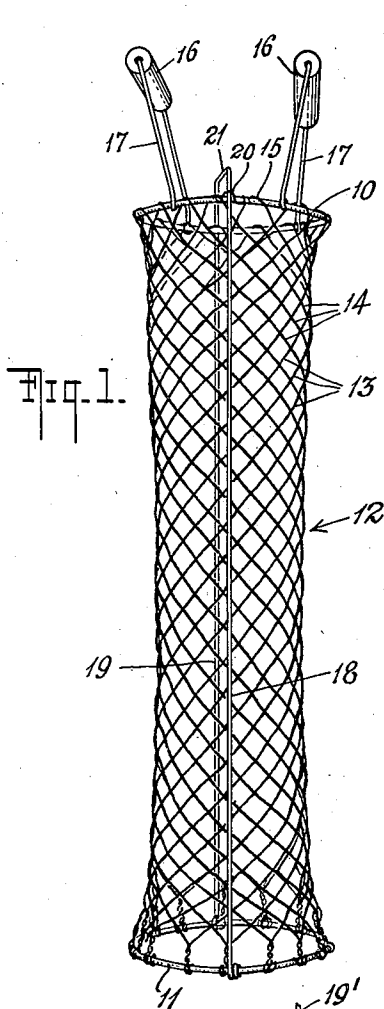
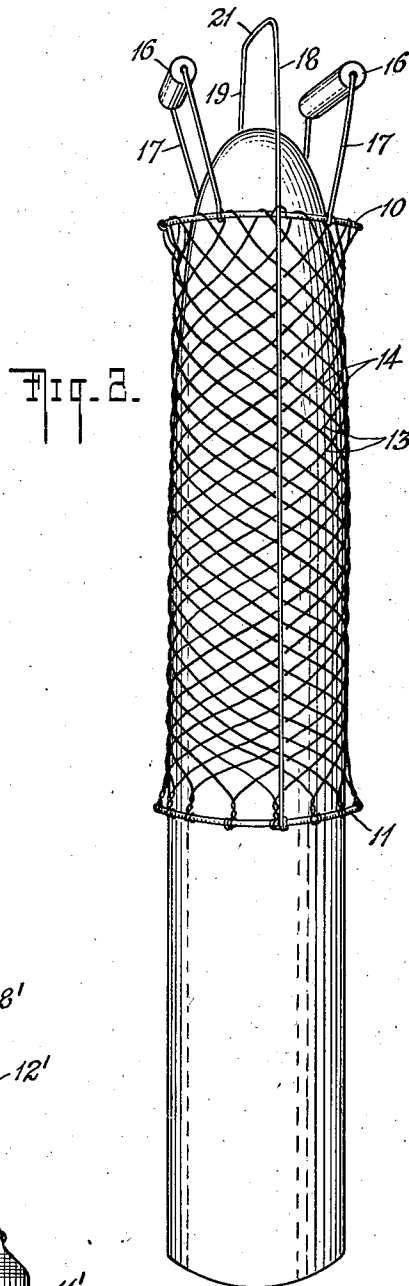
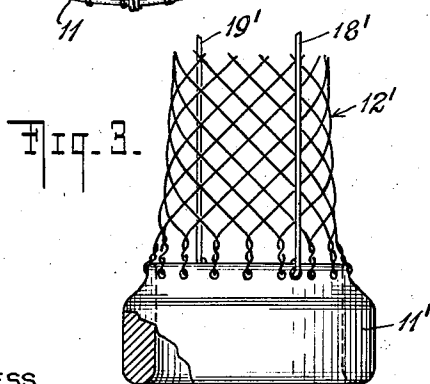
D. L. KELLEMS

2,268,598

LIFTING AND/OR HOLDING DEVICE

Filed July 15, 1940

3 Sheets-Sheet 1



WITNESS

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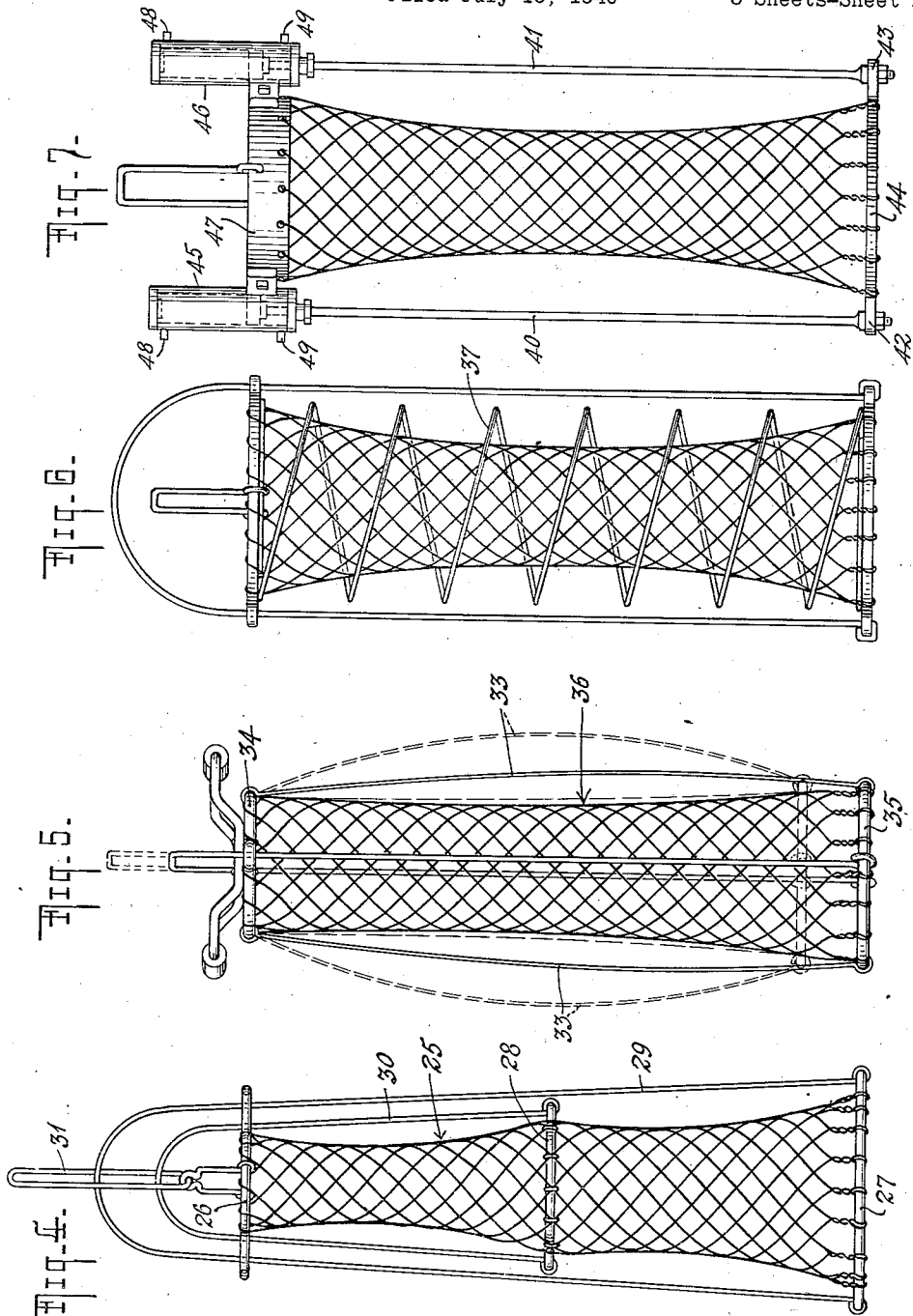
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 8.

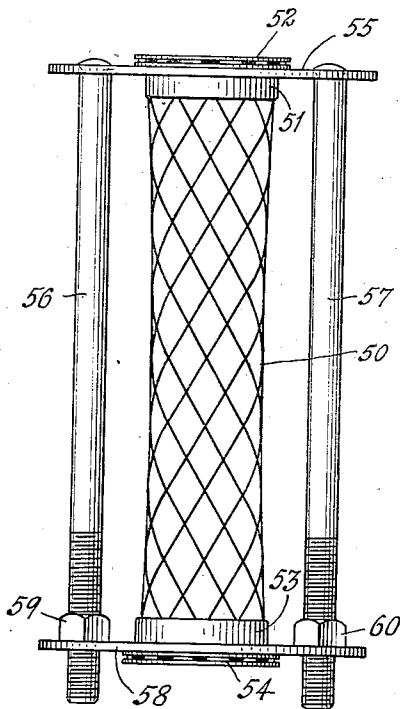


Fig. 10.

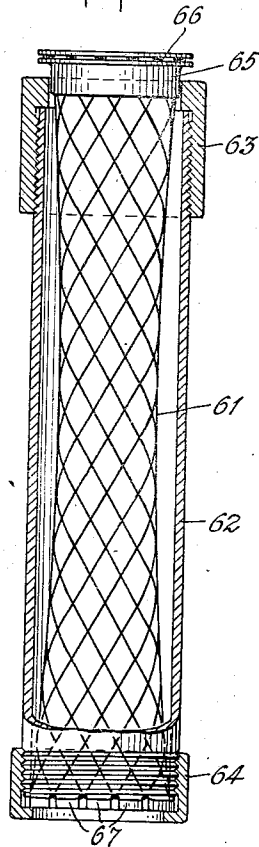


Fig. 9.

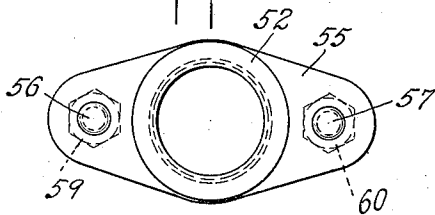
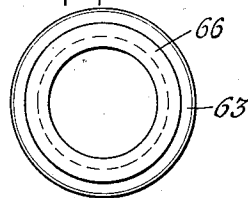


Fig. 11.



WITNESS

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2,268,598

LIFTING AND/OR HOLDING DEVICE

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Application July 15, 1940, Serial No. 345,468
In Great Britain June 20, 1940

26 Claims. (Cl. 294—86)

This invention relates to a device having use in the lifting of objects from a place of rest and in the carrying of the lifted objects to a place of discharge and has for an object to provide a lifting device which can be placed readily over and upon the object to be lifted, which will grip the object so as to inseparably hold it either under the action of the lifting force or some positive control means and which can be disengaged readily from the object when the latter has been borne to the place for discharge.

With the above and other objects in view the present invention provides a lifting device which broadly speaking, is composed of a tubular basket or meshed tube open at both ends to enable it to be placed upon an object and constructed by winding a series of strands so that they spiral in opposite directions around the longitudinal central line of the basket or tube, the strands being arranged in open meshed fashion to enable the basket or tube to be considerably varied in a radial direction by endwise compression or expansion thereof to accommodate objects having widely varying shapes and sizes. In accordance with one of the features of the invention, the open meshed basket or tube has connected to its upper end one or more grips or handles which are attached to the basket or tube in such manner as to facilitate the insertion of the device upon the object and which may be of such form as to enable the device to be manually grasped or connected to a machine or crane to lift the device and with it the enclosed article. In accordance with another feature of the invention, release means are connected to the lower end of the basket or tube to enable the device to be either manually or automatically operated to strip it from the object after the latter has been carried to the place desired. A further feature of the invention is the provision of means to cause an initial gripping action of the basket or tube on the object to be gripped and to assure a positive grip on the object while the latter is being lifted from its place of rest and carried to its place of discharge.

Other features and advantages of the invention will become apparent after a perusal of the following description read in connection with the accompanying drawings in which there are illustrated preferred embodiments of the invention and in which Fig. 1 is a front elevation of a lifting device made in accordance with the invention showing the relationship of the several parts of which it is composed when the device is not gripping an object; Fig. 2 is a similar view illustrat-

ing the manner in which the lifting device will be employed to lift and carry an elongated object such as, for example, a shell for large guns; Fig. 3 is a front elevational view of the lower part only of a modified form of the device; Figs. 4 to 8 inclusive are front elevational views illustrating other forms in which the invention may be embodied; Fig. 9 is a top plan view of the embodiment illustrated in Fig. 8; Fig. 10 is a front elevational view, partly in section, of still another embodiment of the invention and Fig. 11 is a top plan view of the construction illustrated in Fig. 10.

In the embodiment of the invention illustrated in Figs. 1 and 2 of the drawings, the reference character 10 indicates a ring which forms the top or upper end of the body of the lifting device. A lower or bottom ring is indicated by the numeral 11. Intermediate the spaced rings 10 and 11 is formed an open meshed tubular structure generally designated by the reference numeral 12 and composed of a plurality of wire strands folded intermediate their ends about the upper ring 10 and extending in spiral fashion towards the ring 11, the sections 13 of the wire strands being interwoven or braided with the sections 14 of the strands and spiralling about the central longitudinal axis of the structure in a direction opposite to that of the wire sections 14, as can be clearly seen from Figs. 1 and 2 of the drawings. The open mesh structure so formed may be considerably varied in diameter by endwise compression and expansion thereof so that when expanded radially by endwise compression it may be readily placed over and upon the portion of the article to be lifted and when the compression force is removed it will automatically contract radially to frictionally engage the outer surfaces of the portion of the object which it encloses. When an endwise pull or force is thereupon exerted tending to extend the open meshed structure, the strands of the latter will tighten upon the exterior surface of the object and thereby secure a firm frictional grip. The greater the endwise force or pull acting upon the open meshed structure the greater will be the gripping action of the latter upon the object. As has been explained the loops 15 formed intermediate the ends of the strands are woven around the upper ring 10, the latter thereby being woven into the fabric construction to form an integral part thereof. The ends of the strand sections 13 and 14 may be "dead-ended" by twisting two oppositely spiralling wires together and permanently securing such twisted ends to the ring 11 in any

suitable fashion as by soldering or by passing them through spaced apertures in the ring 11 and then fixing them to the ring 11. Both of the rings 10 and 11 are made of relatively stiff wire and have a diameter greater than the diameter of the open meshed structure to increase the rigidity of the open meshed structure and to facilitate the gripping action of such structure, as will hereinafter become more apparent.

Secured to the upper ring 10 are a pair of spaced grips or handles each composed of a cylindrically shaped handle member 16 composed of wood or any suitable material and through which extends a relatively stiff wire 17 whose ends are connected at spaced points to the ring 10 and are secured thereto in any suitable fashion. The spaced points of attachment of the two wires 17 provide for equal distribution of any force exerted on the handles and consequently an equal distribution of such forces upon the open meshed structure.

The device also includes a release mechanism consisting of a rod bent to form two arms 18 and 19 which extend lengthwise of the open meshed structure exteriorly thereof and are secured at their lower ends to opposite sides of the bottom ring 11. The two arms or sections 18 and 19 of the rod extend through loops 20 formed in the upper end of the open meshed tube 12, such loops 20 functioning as guide and restraining members. The upper ends of the arms 18 and 19 are connected by a bridge portion 21 which is engaged by the operator or a suitable device to exert an upward pull on the arms 18 and 19. It will be evident that when the operator or user desires to release the lifting device from the object that by pulling upwardly on the handle portion 21 of the release mechanism, the upward force exerted through the two rods 18 and 19 will cause the lower ring 11 to be lifted thereby reducing the longitudinal dimension of the tubular member 12 and causing an increase in the diameter of the open meshed structure of such member. The grip of the open meshed structure 12 on the object is thus broken and the lifting device may be stripped readily from the object by the operator.

From the foregoing, it will be apparent that in the use of this device the bottom end of the tubular structure 12 or ring 11 is inserted over the object to be lifted and is forced down on such object by the operator pushing down on the two handles 16, 16. The force exerted by the operator on the upper ring 10 through the handles 16, 16 will serve to compress the open meshed structure and therefore enlarge the interior diameter of the structure to an extent where it will readily slip over the object. When the lifting device is properly positioned on the object the operator by pulling upwardly away from the object or lifting the device will cause the open meshed structure to elongate thereby reducing the diameter of the tubular structure and causing the strands thereof to come into gripping relation with the exterior surface of the portion of the object enclosed thereby. Preferably the normal diameter or cross-sectional area of the open meshed structure is less than the diameter or cross-sectional area of the object to be lifted so that when the device is placed on the object it will have a longitudinal length less than that of normal, as will be evident from a comparison of Figs. 1 and 2, so that the wire structure will by such insertion be placed under

an initial tension causing it to apply a gripping action on the object as soon as it is in place thereon. Any further outward longitudinal pressure exerted by the operator due to lifting or merely exerting an outward force on the handles 16, 16 will only serve to bind the open meshed structure more closely against the exterior of the object. In this manner a firm gripping and anchorage of the lifting device is obtained on the object and the latter may be safely carried to any place desired. The effectiveness of the device is enhanced by the fact that the bottom ring 11 is of a diameter greater than the diameter of the body portion of the open meshed structure 12. This feature of construction not only holds the weave of the structure to shape but imparts to it a rigidity which enables the device to be forced down over the object without any danger of the open meshed structure bending along its longitudinal axis or collapsing during the application of such force, while at the same time enabling such structure to expand radially to receive the object. The fact that the ring 11 has a greater diameter than the body of the open meshed structure 12 also causes an initial tension to be placed on the portion of the open meshed structure adjacent to such ring. Thus when the structure is expanded radially due to its being forced on the object the portion of such structure adjacent the ring 11 is placed under a greater spring tension than it would normally have without the ring and such increased tension aids in initiating the gripping action of the device upon the object and prevents any substantial slipping of the device as it is lifted. Like the bottom ring 11, the top ring 10 also aids in imparting rigidity to the device. It also enables the top of the object being lifted to extend above the handles where desirable and under certain conditions allows the lifted object to be removed by pushing it out through the top of the device. Normally, however, the lifting device is removed from the object by pulling up on the cross portion 21 of the release mechanism thereby causing the open meshed structure 12, through the arms 18 and 19 and ring 11, to be increased in diameter sufficiently to release its gripping action on the exterior surfaces of the object, as has been previously explained.

It will be evident from the foregoing description that the invention provides a simple effective lifting construction which is durable and can be produced at low cost. The device is well adapted for either manual or mechanical use. In the latter case the handles of the device can be constructed so that they can be engaged readily by hooks or chains from a machine or crane. It will be evident also that other changes and modifications of the above described construction may be made without departing from the spirit and scope of the invention. For example, the release mechanism may be of any form suitable for the particular operations in which the device is to be employed and the parts thereof can be made either rigid or flexible and of any suitable material. The top and bottom rings 10 and 11, respectively, can be made of any shape and either or both can be omitted as the situation demands.

Instead of making the bottom ring 11 from a rigid piece of wire, it may be formed from one or more heavy rings so as to give it substantial weight, as is illustrated in Fig. 3 of the drawings. The advantages of this construction are

that the heaviness or weight of the bottom ring 11' initiates the gripping action of the open meshed structure when the latter is positioned on the object thereby making it unnecessary for a proper functioning of the device to depend wholly on the spring action of the woven wires in the meshed structure 12 and thereafter functions to prevent any slippage whatsoever due to forces tending to separate the lifting member from the object. This is important when the lifting device is to be used for pulling embedded objects from their anchorage, as for example, the removal of piles from a river bed. A weighted ring 11' also makes it possible to employ a woven structure of shorter length, to increase the range of diameters that can be gripped by the woven structure by approximately from 50 to 75 percent and to fabricate the structure 12' of cord or other material not having a spring action. The use of a relatively soft material such as cord is of material advantage as it enables the lifting device to be used for gripping fragile or scratchable objects which otherwise would be marked or broken if gripped with an open meshed structure made of wire material. In this connection advantageous results are also attained if any of the meshed structures disclosed are made of rubber coated wire, or cord or other suitable material as the frictional hold on the object by such material will be such as to prevent any possible separation of the lifting device from the object until released therefrom.

It is also within the contemplation of the invention to make the top ring 10 also from a heavy weighted piece of cast metal in the same manner as is the bottom ring 11' illustrated in Fig. 3 of the drawings. A heavy top ring is illustrated by way of example by the top ring 47 illustrated in Fig. 7 of the drawings. The advantage of a weighted top ring is that when the lifting device is placed on an object as, for instance, by means of a crane, the weight of the ring, as the crane is lowered, causes the woven structure to become expanded automatically so that the device will slip down into position over the object without being forced. In such a construction, if the woven structure is made of wire material, the weighted top ring should only be made sufficiently heavy to cause by its own weight an expansion in the diameter of the woven structure. Whether the top ring of the device is weighted or whether the bottom ring thereof is weighted, as in the embodiment illustrated in Fig. 3, the device may be provided with a release mechanism similar to that illustrated in connection with the device illustrated in Figs. 1 and 2 of the drawings, the lower portions 18' and 19' of such mechanism only being shown in Fig. 3 to illustrate one way in which these parts may be connected to the weighted bottom ring 11'. In the operation of the release mechanism the weighted ring also produces advantageous results as it makes possible a more ready and positive control of the lifting device when used in connection with lifting machines. Like the woven structure 12, the wires in the woven structure 12' are "dead-ended" in the bottom ring 11'. It will of course be understood, that in any of the modifications illustrated, the strands of the meshed structure may be "dead-ended" at the top ring or at both the top and bottom rings. In the latter case, however, the length of each strand will be only slightly greater than the length of the woven or meshed structure. Furthermore by weaving the strands

around rings intermediate the length of the meshed structure or by weaving rings of different diameters into the meshed structure at intervals along the latter, a stepped structure can be constructed which will be able to grip objects having a wide range of diameters.

A stepped lifting device suitable for gripping objects having widely varying cross-sectional areas is illustrated in Fig. 4 of the drawings, wherein the reference character 25 designates the open meshed tube which in this form of the invention is woven on an upper ring 26 materially smaller in diameter than the bottom ring 27 and an intermediate ring 28 having a diameter greater than the ring 26 but smaller than the ring 27. The ring 28 thus divides the open meshed tube into two sections, the lower one of which below the ring 28, is adapted to grip objects having diameters ranging from the normal diameter of such portion of the tube to the widest effective diameter which such section will have when subjected to longitudinal compressive stresses or to the interior diameter of ring 27. Objects of smaller diameter than the range capable of being lifted by the lower section can be inserted further up in the device into the upper section of the open mesh tube where they will be gripped by the portion of the woven structure above the ring 28. To enable the objects gripped to be released from either section of the open mesh tube two releasing mechanism are provided, one indicated by the numeral 29 and connected to the bottom ring 27 for releasing objects gripped by the lower section of the tube, and the other designated 30 and connected to the intermediate ring 28 for releasing objects gripped by the upper section of the tube. Like the previously described embodiments of the invention, a handle 31 is provided for enabling the device to be lifted. The handle 31 illustrates the type of handle which may be incorporated in the device when the latter is to be placed on a hook or chain of a lifting machine such as a crane.

Instead of using a weighted bottom ring to initiate the gripping action of the device, means may be provided to cause the woven structure or tube to be elongated and thereby contracted about the object prior to the application of any endwise pull or lifting force on the upper part of the tube. Such a means may take the form illustrated in Figs. 5, 6 and 7 of the drawings or of any other nature which will cause a separation as between the upper and lower rings. In the embodiment illustrated in Fig. 5 of the drawings, there are provided a plurality of bowed springs 33, 33 which are connected at their upper ends to the top ring 34 and at their lower ends to the bottom ring 35. The springs 33, 33 are adapted to normally hold the tube 36 at its normal length and to yieldingly resist any forces tending to move the rings 34 and 35 together, as when the device is being inserted on an object. As the woven tube is contracted the springs 33, 33 bow outwardly as is indicated in dotted lines in Fig. 5 and are placed under increased tension, which added tension causes an immediate gripping of the woven tube on the object as soon as the pressure forcing the device on the object has ceased.

The coiled spring 37 shown on the embodiment illustrated in Fig. 6 of the drawings, functions in a manner similar to the springs 33, 33 except that instead of bowing out, as in the case of the latter, its coils will be caused to become compressed.

In the embodiment shown in Fig. 7 of the draw-

ings, the separation of the top and bottom rings is accomplished by hydraulically operated means, comprising a pair of piston rods 40 and 41, the lower ends of which are secured to flanges 42 and 43, respectively, provided on the bottom ring 44. The upper ends or piston heads of the rods 40 and 41 are contained in a pair of cylinders 45 and 46 respectively, carried by the upper ring 47. The cylinders 45 and 46 may be connected by the outlets 48, 49 to a fluid source capable of controlling the supply of air or water into one end of the cylinders or the other in a manner well known to the art and thereby controlling the positions of the piston heads of the rods 40 and 41 in the cylinders 45 and 46. Thus in operation the pistons may be retracted to cause a contraction of the woven tube sufficient to enable it to be readily placed over an object and after the device is in proper position on the object such pistons may be advanced to cause the woven tube to tightly grip the object. When the object has been moved to the place of discharge the piston can again be retracted to release the device from the object and discharge the same therefrom. It will be noted that in this embodiment of the invention the means for establishing the grip of the device on the object also functions to release the device from the object. In all of the forms of the invention illustrated in Figs. 5, 6 and 7 of the drawings, there is an advantage that the weighted ring does not have and that is whereas the weighted ring only functions satisfactorily when the device is used in vertical directions, these forms of the invention enable the device to be used with equal effectiveness in any direction, horizontally or obliquely as well as vertically.

Instead of causing a positive contraction and expansion of the woven structure of the device by means of powered mechanical means as in the construction illustrated in Fig. 7 of the drawings, the same results can be secured manually by suitable manually operable means as is illustrated in Figs. 8 to 11 of the drawings. In the construction illustrated in Figs. 8 and 9, the woven structure 50 extends at its upper end between a pair of concentrically disposed flanged cylindrical members or collars 51 and 52 and at its lower end between a pair of concentrically disposed flanged cylindrical members or collars 53 and 54. The collars 51 and 52 form the upper ring of the device and are so dimensioned that the wire structure is tightly wedged therebetween, the upper ends of the strands of the wire structure 50 being bent outwardly and clamped between the outwardly extending flanges of the collars 51 and 52. The collars 53 and 54 form the bottom ring of the device and like the collars 51 and 52 are dimensioned to tightly wedge the wire structure therebetween, the lower or bottom ends of the strands of the wire structure 50 being bent outwardly and clamped between the outwardly extending flanges of such collars 53 and 54. Provided on the exterior surfaces of the collar 51 is a flange member 55 having depending therefrom two rods 56 and 57 which extend at their lower ends through apertures in a flange member 58 provided on the collar 53. The rods 56 and 57 are provided with nuts 59 and 60, respectively, by which the distance between the flange members 55 and 58 may be varied. It will be evident that as the distances between the flange members 55 and 58 are varied the longitudinal dimensions of the wire structure 50 will be varied to vary the radial dimensions of such structure. Thus by turning the nuts 59 and 60

so that they are advanced toward the threaded ends of the rods 56 and 57, after the device has been placed over an object, the wire structure or woven tube 50 will be conditioned to tightly grip the object while by turning the nuts so that they retreat from the threaded ends of such rods the wire structure will be permitted to increase in diameter to release the object or permit it to be inserted. These same results can be accomplished by other means such as is illustrated for example in the construction shown in Figs. 10 and 11.

In the construction shown in Figs. 10 and 11, the wire structure 61 is contained within a tubular housing 62 which is threaded at both ends to receive the flanged nuts 63 and 64. The wire structure 61 at its upper end extends between a pair of concentrically disposed flanged cylindrical members or collars 65 and 66. Like the collars 51 and 52 in the construction shown in Fig. 8, the collars 65 and 66 are dimensioned to tightly wedge the wire structure therebetween, the ends of the strands of such wire structure being bent outwardly and clamped between the outwardly extending flanges of such collars 65 and 66. The wire strands of which the structure 61 is constituted are folded intermediate their ends about the binding posts 67 provided in the lower end of the housing 62. The folded ends of the wire strands may be soldered or otherwise secured in position on the binding posts 67 and are preferably enclosed by the flanged nut 64 for the purpose of protection and appearance and to securely fasten such ends of the wire threads by wedging them against the threads of the tubular housing 62. The flange of the nut 63 has an interior diameter less than the exterior diameter of the flange of the collar 65 and is adapted to engage the under surface of the latter when the nut 63 is turned so as to be advanced toward the flange of the collar 65. By further unscrewing the nut 63 the latter through collar 65 will cause the woven structure 61 to be elongated and consequently contracted radially to tightly grip an object. Per contra, by screwing the nut 63 onto the housing 62 the wire structure will be permitted to increase in diameter to enable the release of an object or the insertion thereof into the woven wire structure. Both the constructions illustrated in Figs. 8 to 11 may be provided with handles or other means whereby they may be lifted as are the structures illustrated in Figs. 1 to 7 of the drawings.

It will be evident from the foregoing description of the various constructions illustrated in the drawings, that the invention, broadly speaking, is composed of a tubular structure consisting of a plurality of filaments or strands arranged so as to enable the structure to be considerably varied in a radial direction by endwise compression or expansion thereof, relatively rigid means at both ends of such tubular structure capable of permitting the insertion of objects into the tubular structure and of equally distributing forces acting on such means to the open meshed structure and means coacting with such means for positively varying the distance between such relatively rigid means, either manually or by power, to cause expansion or contraction of the tubular structure. The filaments or strands of the expandible and contractible structure may be made of wire which is either round or rectangular in cross-section or ribbon-like, or may be made of a non-resilient or non-metallic material such as cord or rope or may be made of wire or

a non-metallic material which is coated and/or impregnated with rubber or other suitable material having a high coefficient of friction or other properties of advantage in the use to which the structure is to be put. The filaments need not be interwoven as has been explained, but may be arranged in oppositely spiralled, concentric layers, the drawings representing such a structure as well as a woven structure. Furthermore, while the invention has been described in connection with a lifting device, it is obvious that there are many other uses to which the invention is applicable. It is also obvious that many other changes and alterations than those illustrated may be made in the specific constructions of the invention without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means connected to the object-receiving end of said structure adapted to resist changes in the cross-sectional dimensions of such structure and surrounding the opening at such end of the structure so as not to interfere with the insertion of an object therein, a device connected to the other end of the structure providing a means whereby the tubular structure may be held, and release mechanism associated with said object-receiving end of the structure and adapted to be manipulated to cause said tubular structure to release its grip on an object.

2. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, a bottom ring connected to the object-receiving end of said structure adapted to resist changes in the cross-sectional dimensions of such structure and surrounding the opening at such end of the structure so as not to interfere with the insertion of an object therein, a device connected to the other end of the structure providing a means whereby the tubular structure may be held, and release mechanism associated with said object-receiving end of the structure and adapted to be manipulated to cause said tubular structure to release its grip on an object.

3. The combination defined in claim 2 in which said bottom ring is made of relatively rigid material and defines an area greater than the cross-sectional area of the space defined by the body portion of said tubular structure.

4. The combination defined in claim 2 in which said bottom ring is made of relatively rigid material and in which said release mechanism is connected to said ring.

5. The combination defined in claim 2 in which said release mechanism is composed of a plurality of elongated members, connected at their lower ends to said bottom ring and extending lengthwise of the tubular structure to a point adjacent to the other end thereof, and means connecting the upper ends of said members together.

6. The combination defined in claim 2 in which said release mechanism includes elongated means connected to said bottom ring and extending lengthwise of the tubular structure to a point above the other end thereof and guide means associated with said tubular structure and controlling said elongated means.

7. The combination of an expansible and con-

tractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, the strands of said structure extending continuously from one end of the structure to the other end thereof and returning to form a series of loops arranged circumferentially about the common axis of the structure, a ring extending through the loops formed by said strands, a device connected to an end of the structure providing a means whereby the tubular structure may be held and release mechanism associated with the opposite end of the structure and adapted to be manipulated to cause said tubular structure to release its grip on an object.

8. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, a bottom ring connected to the object-receiving end of said structure and surrounding the object-receiving opening thereof so as not to interfere with the insertion of an object therein, said ring being relatively heavy so as to initiate the gripping action of the tubular structure on an object inserted therein, and release mechanism connected to said weighted ring and adapted to be manipulated to cause said tubular structure to release its grip on an object.

9. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, a plurality of relatively rigid rings connected in spaced relation to said structure, a device connected to one end of said structure providing a means whereby the tubular structure may be held and release mechanism associated with said structure in the neighborhood of one of said rings and adapted to be manipulated to cause said tubular structure to release its grip on an object.

10. The combination defined in claim 9 in which said spaced rings are connected to opposite ends of said tubular structure and said device is connected to one of said rings and said release mechanism is connected to the other of said rings.

11. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure having a holding end and an object-receiving end, a device connected to the holding end of said structure providing a means whereby longitudinal forces may be exerted on said structure to cause gripping action on an object, means associated with said structure adapted to initiate the gripping action of the tubular structure on an object inserted therein and release mechanism associated with the object-receiving end of said structure and adapted to be manipulated to cause said tubular structure to release its grip on an object.

12. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure having a holding end and an object-receiving end, a device connected to the holding end of said structure providing a means whereby longitudinal forces may be exerted on said structure to cause the latter to contract and grip an object inserted therein, resilient means intermediate the ends of said structure adapted to yieldingly resist a shortening in the normal longitudinal length of said structure and to initiate

the gripping action of the structure on an object inserted therein and release mechanism associated with the object-receiving end of said structure and adapted to be manipulated against the tension of said resilient means to cause said tubular structure to release its grip on an object.

13. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure having a holding end and an object-receiving end, means connecting the opposite ends of said structure and operable to cause a lengthwise tension on said structure and thereby cause said structure to grip an object inserted therein, and release mechanism associated with the object-receiving end of said structure and adapted to be manipulated to cause said tubular structure to release its grip on an object.

14. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure having a holding end and an object-receiving end, rigid means associated with each end of said unit, rigid means extending longitudinally of said unit and connected with the rigid means at each end of said unit, both of said rigid means being adjustable relative to each other to cause a lengthwise tension on said unit and thereby move the strands of said unit into gripping relation with an object inserted therein and to cause a contraction of said unit to release its grip upon an object inserted therein.

15. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means connected to the object-receiving end of said structure adapted to resist changes in the cross-sectional dimensions of said end of the structure and formed to permit the insertion of an object into said structure, means connected to the other end of said structure adapted to resist changes in the cross-sectional dimensions of such end of the structure, and means extending lengthwise of said structure and connected to said first and second mentioned means, said last mentioned means being operable to vary the distance between said first and second mentioned means.

16. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, relatively rigid means associated with each end of said unit formed to permit the insertion of an object into said structure and means connected with said rigid means and adapted to co-act therewith to positively vary the distance between said rigid means.

17. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, relatively rigid means associated with each end of said unit formed to permit the insertion of an object into said structure, a rigid member fixedly connected to one of said rigid means and extending lengthwise of the woven structure and an adjustable member mounted on said rigid member and variable relative thereto, said adjustable member co-acting with said other rigid means to vary the distance between both of said rigid means.

18. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, a rigid member connected to one end of said structure and extending towards the other end thereof, rigid means associated with the other end of said structure and an adjustable member mounted on said rigid member and adapted to co-act with said rigid means to vary the length of said tubular structure.

19. The combination of an expansible and contractile unit having a tubular configuration throughout its entire length and composed of a plurality of strands arranged about a common axis, means connected to one end of said unit adapted to resist changes in the cross-sectional dimensions of said end of the unit and formed to permit the insertion of an object into the same, means connected to the other end of said tubular unit adapted to resist changes in the cross-sectional dimensions at such end of the unit, and means connected to at least one of said previously mentioned means and operable through the latter to vary the distance between said first and second-mentioned means.

20. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis, means supporting one end of said unit, means connected to the other end of said unit adapted to resist changes in the cross-sectional dimensions of such and of the unit and formed to permit the insertion of an object into the same, and means connected to said second-mentioned means and operable through the latter to vary the distance between said first and second-mentioned means.

21. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means connected to a portion of said unit and operable to exert a longitudinal force on said unit, means spaced from said first-mentioned means and connected to another portion of said unit, and means extending longitudinally of the unit and connected to said first and second-mentioned means, said last-mentioned means being operable to vary the distance between said first and second-mentioned means.

22. A holder having, in combination, an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means connected to one end of said unit and adapted to be utilized to support the holder, means connected to a portion of said unit spaced from said first-mentioned means and operable to exert a longitudinal force on said unit and means connected to said second-mentioned means and operable through the latter to vary the distance between said first and second-mentioned means.

23. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, rigid means connected to a portion of said unit, adjustable means connected to said rigid means and to said unit at a portion thereof spaced from the place of connection of said rigid means, said adjustable means being movable relative to said unit and to said rigid means and coacting during such movement with the latter to cause a deformation of said unit.

24. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means extending longitudinally of said unit for exerting a longitudinal force capable of varying the length of said unit and means connecting said longitudinally extending means to spaced portions of said unit and being operable through said longitudinally extending means to exert an equally distributed longitudinal force on said unit.

25. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means connected to a portion of said unit and extending longitudinally of the unit, means connected to a longitudinally spaced portion of said unit and to said longitudinally extending means, said last-mentioned means being movable rela-

tive to said longitudinally extending means and adapted to coact with the latter to exert a longitudinal force on said unit capable of varying the dimensions in a longitudinal direction.

26. The combination of an expansible and contractile unit composed of a plurality of strands arranged about a common axis to form a tubular structure adapted to receive an object to be held, means fixedly secured to a portion of said unit and extending longitudinally thereof and means spaced from such portion of said unit and connecting another longitudinally spaced portion of said unit to said longitudinally extending means, said last-mentioned means being adapted to permit movement of said other portion of the unit relative to said longitudinally extending means, and said longitudinally extending means being operable to vary the length of the unit between the said mentioned portions thereof.

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