Sept. 26, 1967 A. L. CLAY 3,343,231

MECHANICAL HOLDING DEVICE

Filed Dec. 31, 1964 2 Sheets-Sheet 1

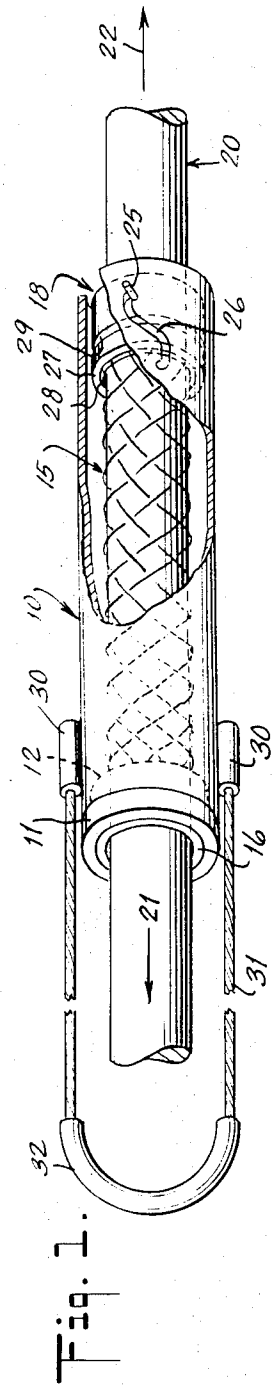


Fig. 1.

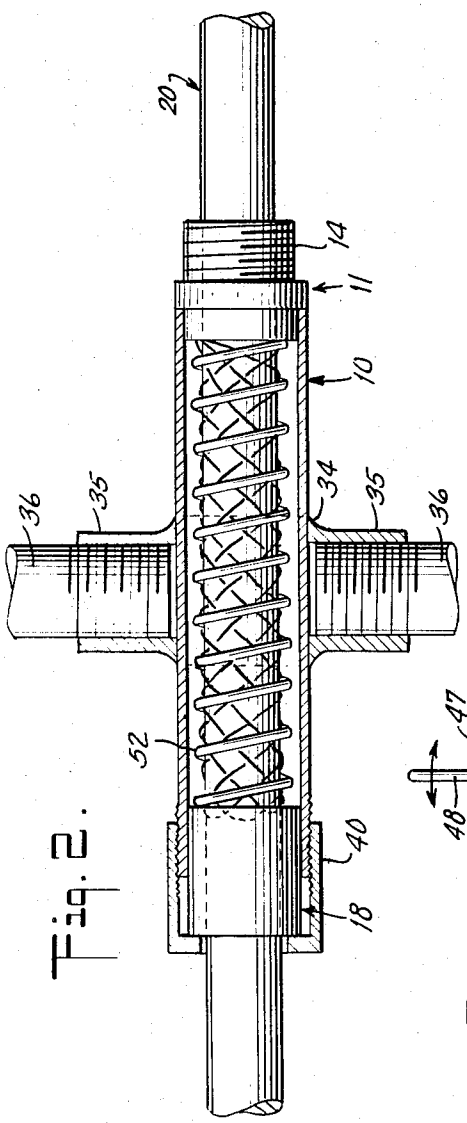


Fig. 2.

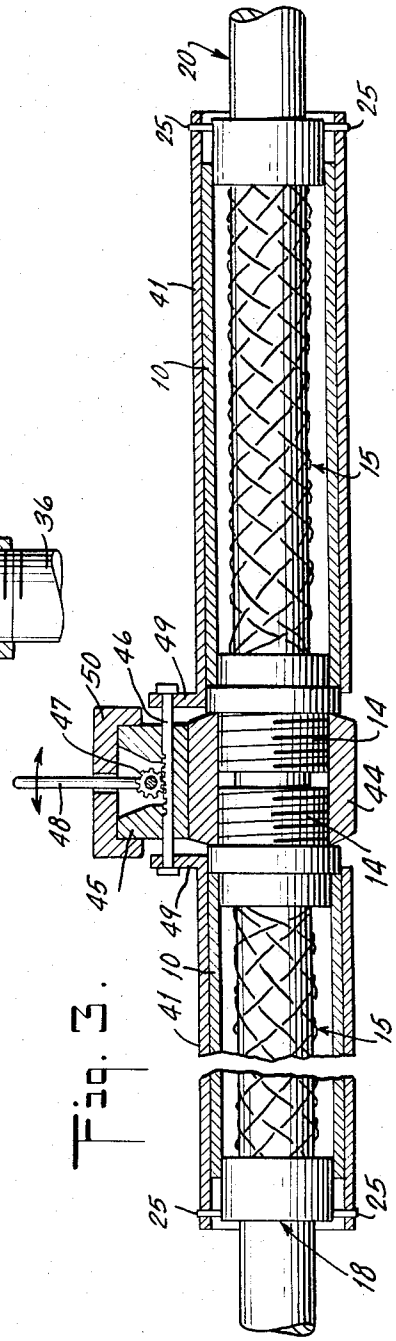


Fig. 3.

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Sept. 26, 1967 A. L. CLAY 3,343,231

MECHANICAL HOLDING DEVICE

Filed Dec. 31, 1964 2 Sheets-Sheet 2

Fig. 4.

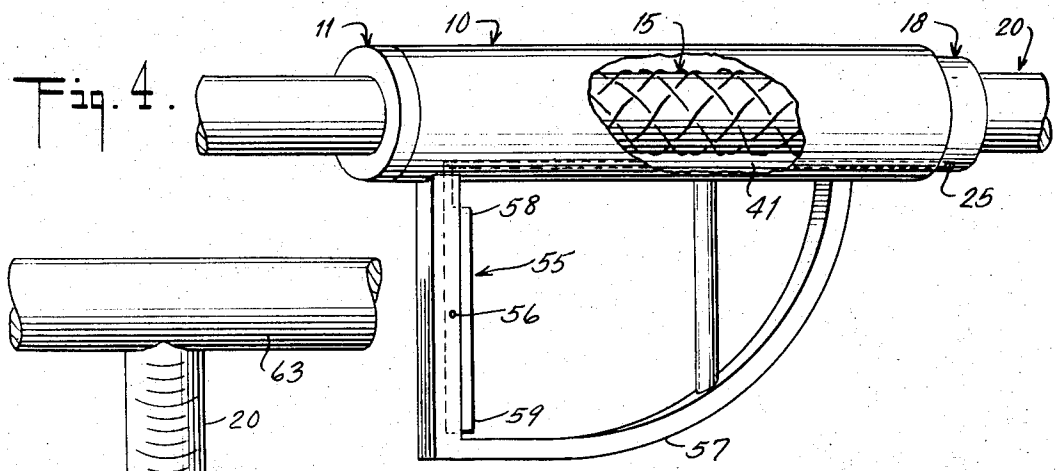


Fig. 5.

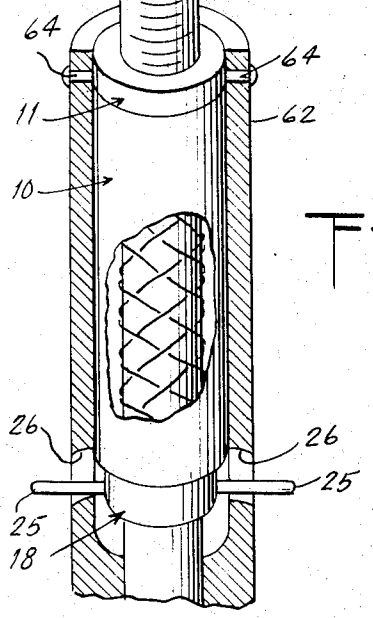
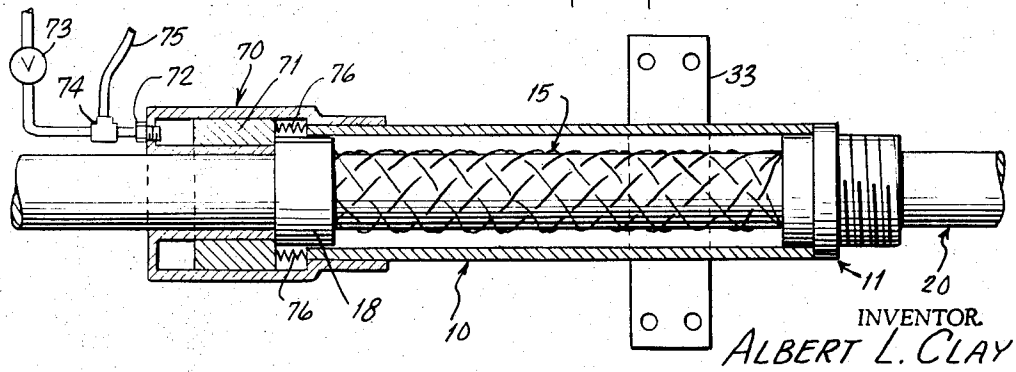


Fig. 6.



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3,343,231

MECHANICAL HOLDING DEVICE

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Filed Dec. 31, 1964, Ser. No. 422,848
15 Claims. (Cl. 24—123)

This invention relates to holding devices and has for its principal object the provision of an improved holding device which is capable of detachably gripping a rod, cable, tube, rope or other elongated member to serve as a support for the gripped member, or to be supported by the gripped member, thereby enabling other objects or a person to be supported on the gripped member through the device. Thus the device may be usefully employed in numerous types of support applications, such as in the marine field for rope and cable adjustment, and for securing the various types of devices employed in this field, for mechanical feeders, either in pairs or in tandem, for rope climbing, tent rope tighteners, gymnastic adjustable bars, adjustable lamp and lighting fixtures, splicing, construction, etc.

In accordance with the invention the holding device thereof is essentially composed of a sleeve which serves both as a cover, guide and control device for a gripping member contained therein and composed of a plurality of strands of wire or other suitable material interwoven into tubular form so that it may be radially contracted and expanded by longitudinally exerted forces thereon to grip and release, respectively, an elongated object extending therethrough. The gripping member is secured at one end to the sleeve and at its other end is provided with a member for controlling its gripping and releasing actions on the elongated object.

A better understanding of the device of this invention, as well as its advantages and features of novelty, will be obtained from the following description, when read in connection with the accompanying drawings, in which similar reference characters have been applied to substantially similar parts throughout the several views, and in which

FIG. 1 is a perspective view, partially in section, of a device embodying the invention and indicating certain additional features which may be utilized in combination with the essential features constituting such device in accordance with the invention;

FIG. 2 is a partial vertical sectional view of a modified form of the invention;

FIG. 3 is a vertical sectional view of a double unit capable of providing directional control;

FIG. 4 is a side elevational perspective view, partly in section, of a trigger type of device embodying the invention;

FIG. 5 is a detailed, elevational perspective view, partly in section, illustrating how the invention may be utilized in gymnastic equipment; and

FIG. 6 is a vertical sectional view of an air controlled device embodying the invention.

Referring to FIG. 1 of the drawings, the numeral **10** indicates generally the outer cover or sleeve of the device which may be constituted of a plain length of open tubing made of any suitable material appropriate for the particular intended use of the device. Thus, the sleeve **10** may be made of plastic, wood or metal, and the like. The tube may have integrally formed therewith, or attached thereto, supporting devices such as grip anchoring means, brackets, etc., as will hereinafter become more clear. The sleeve **10** has an interior diameter which is appropriate for the purposes for which the device is to be used and which is dependent on the construction of the gripping member provided in the device for such purposes.

Fixedly fastened to one end of the sleeve **10** is a rigid annular ring **11** for securing the gripping member to the sleeve. The ring **11** is made of metal or any other suitable material and may have a reduced inner portion **12** which fits snugly within the sleeve and which provides an outer flanged portion that seats on the end of the sleeve. As shown in FIG. 1 of the drawings, such outer flanged portion may be made flush with the outer wall of the sleeve, or it may be made to project outwardly therefrom. The ring **11** may be rigidly secured to the sleeve by press fitting, screws, pins, or in any other suitable manner known. The ring **11** may be provided with an attachment means such as the screw thread projection **14** shown illustrated in FIG. 2 or with any other form of means enabling attachment of the sleeve **11** to the other objects and devices. The attachment means **14** may be constructed to be a rigid one, or to be a flexible one capable of permitting the device to align itself with the load should the direction of the latter vary.

The ring **11** has attached thereto in any suitable manner one end of the gripping member **15** located within the sleeve **10**. The body of the gripping member **15** is of a construction well known in the art and examples of which are shown in the Kellems Patents Nos. 2,017,625 and 2,681,781. The gripping member **15** may be composed of a plurality of wires interlaced or interwoven, or preshaped, to form an open resilient tubular mesh-like structure adapted to be placed in surrounding gripping relation with an article or object inserted into the device. One end of the gripping member **15** may be attached to the ring **11** by threading the wire strands through holes in such ring in the manner disclosed in said Kellems Patent 2,681,781, or as shown in FIG. 1 herein, the ring **11** may be constituted of an outer ring provided with the reduced portion **12**, and an inner ring **16** between which is secured in any suitable fashion, as by press fitting, the end of the gripping member **15**.

At the other end of the gripping member **15**, the wire strands thereof may be terminated in any manner known to the art to provide for the passage of the object to be gripped through such gripping member. Preferably the wire strands at such other end are permanently secured in any known manner to an annular guide member generally designated **18**, as for example, in the manner described with respect to the ring **11**. The guide member **18** is slidable within the end of sleeve **10** to permit of free longitudinal movement of such free other end of the gripping member and cooperates with the sleeve **10** to guide such movements of such free end of the gripping member. The guide member **18** may be wholly contained within the sleeve **10** throughout the range of its movements, as shown in FIG. 1, or may project out the end of such sleeve as shown in FIG. 2 of the drawings.

It is believed advisable at this time to point out, that the basic parts constituting the device of this invention are the guide sleeve **10**, the gripping member **15** contained within such sleeve, the means (ring **11**) for fixedly securing one end of the gripping member **15** to the sleeve, and the annular guide member **18** fixedly secured to the other free end of the gripping member, and slidably cooperating with the sleeve **10** to guide the movements of such free end of the gripping member. In the use of the device, compression of the gripping member **15**, either by forcing an object **20** therethrough in the direction of the arrow **21**, or by moving the guide member **18** in the same direction, will cause the latter to expand in a radial direction, thereby enabling the object to be more readily moved through the device. When the inserting force is withdrawn from the object, or the guide member **18** released, the natural spring action of the gripping member **15** will cause it to tend to return to its elongated condition and to contract in a radial direc-

tion to cause the wire strands thereof to grip the exterior surface of the object **20**. The load on the object acting in the direction of the arrow **22** due to the weight of the object or an endwise pull or force acting thereon, or the load on the device acting in the direction of the arrow **21** will further cause the gripping member **15** to reduce its cross-sectional area and thereby cause the wire strands thereof to tighten their grip upon the exterior surface of the object and more firmly lock the object and the device together. During these applying and loading operations the free end of the gripping member **15** will move relative to the sleeve **10** and will be guided in these movements by the annular guide member **18**, the latter also during the applying operation facilitating the insertion of the object through the device. The normal internal diameters of the annular guide member **18** and the gripping member **15** should be such as to accommodate objects having cross-sectional areas within a given range. The diameter of the gripping member **15** relative to the interior diameter of the sleeve **10** should be such that the sleeve **10** will permit the gripping member to readily accommodate objects within the desired given range, but will control or restrict the maximum radial expansion of the gripping member beyond such range and thereby tend to rigidify or stiffen such member between the ring **10** and guide member **18** so as to further facilitate the insertion and movements of an object through such gripping member **15**. When it is desired to disengage the device from the object all that is necessary to do is to force the annular guide member **18** inwardly with sufficient force to overcome any load conditions that may be acting on either the device or the object, or after such load conditions have been removed, and such as to cause the free end of the gripping member **15** to move longitudinally toward its fixed end and thereby cause it to expand radially, whereupon the wire strands will release their grip on the object.

Means may be provided to facilitate the movements of the guide member **18** relative to the sleeve **10** in the application or removal of the device from an object. Such means may simply constitute a pair of diametrically opposed transverse pins **25** projecting radially outwardly in opposite directions from the guide member **18** and through longitudinally extending slots **26** provided on opposite sides of the sleeve **10**. The pins **25** should project out sufficiently to enable them to be actuated either manually or by other means to move the free end of the gripping member in a longitudinal direction. The pin and slot connection also provide further guide means to maintain the gripping member **15** properly aligned within the sleeve **10** even though twisting forces are utilized in applying the device to the object, or removing it therefrom. By providing the slots **26** with a cam-like configuration as shown in FIG. 1 of the drawings, such slots and the pins **25** can be further utilized to lock the guide member **18**, and consequently the movable or free end of the gripping member, in an advanced, or retracted position, thereby locking the gripping member **15** in either a gripping, or nongripping condition, respectively. Thus, the device can be locked in nongripping condition while it is being applied to or removed from an object, and when it is properly applied and secured to the object, locked in gripping relation thereon until the pins **25** are again positively actuated to release such grip. When the pins **25** and slots **26** are so constructed, it is preferred, as is shown in FIG. 1 of the drawings, to construct the guide member **18** so that the portion thereof to which the free end of the gripping member **15** is secured is swivelly connected to the portion thereof provided with the pins **25**. Thus as shown, the inner end of the guide member **18** may be constructed of two concentric rings **27** and **28** between which the free end of the gripping member **15** is secured, and which are connected by swivelling means **29** to the body portion of such guide member on which are provided the pins **25**. As a result of this construction, even though the body portion of the guide member **18** is caused to rotate by the cam slots **26** in the longitudinal movements of such member, such rotational movement will not be imparted to the free end of gripping member **15** because of the swivel connection therebetween, and the resistance of the wire structure to such rotational movement.

As previously mentioned, the sleeve **10** may be provided with supporting devices which may be of a nature to support the device so as to enable it to carry loads on the object **20**, or of a nature to enable the device and consequently the object **20** to carry loads applied to such sleeve **10**. Thus as shown in FIG. 1 of the drawings, the supporting device may be constituted of a pair of anchoring members **30** affixed in any suitable fashion to the sleeve **10** and to which are connected the ends of a strand or rope **31** provided with a bent sleeve or tube **32** and forming a draft loop or bale. The advantage of this method of support is that the flexibleness of the attachment enables the device to align itself readily with the direction of force of a load on the object **20** should such direction vary. A rigid type of support for the device to carry loads applied to the object **20** is illustrated by the mounting bracket **33** shown in FIG. 6 of the drawings and provided with suitable openings through which screws or other fastening means may be inserted to secure the bracket to a supporting member. A supporting device for enabling the sleeve **10** to carry loads is shown in FIG. 2 of the drawings in the form of a collar **34** fixedly secured to the sleeve and provided with two or more threaded sockets **35** to which may be secured rods **36** such as are employed for example in construction framework.

FIG. 2 of the drawings, also shows a device embodying the invention in which guide member **18** projects out from the end of the sleeve. This type of construction provides several advantages. It may be utilized for example, with external means to control, either locally or remotely, the degree of expansion and gripping action of the gripping member **15**. For example, as shown in such figure, by providing a flanged nut **40** in threaded engagement with the end of the sleeve **10**, and adjusting the same, the degree of longitudinal extension of the gripping member **15** can be controlled and consequently the gripping action of the same. By advancing the nut **40** on the sleeve, the guide member **18** will be forced inwardly and cause the gripping member **15** to contract longitudinally so that it cannot exert a gripping action on the object **20**. Thus, the device may be freely moved in either direction on the object. When the threaded nut is unscrewed on the sleeve **10**, the gripping member will be enabled to extend itself to a condition in which the wire mesh thereof will exert a gripping action on the object. It will be understood that instead of securing a control member **40** by an external thread to the sleeve **10**, such a member may be secured thereto by an internal nut, in which case the member may be in the nature of a bushing, the inner end of which will engage the outer end of the guide member **18** within the sleeve **10**. In such as construction the guide member **18** is wholly contained within the sleeve as shown in FIG. 1 of the drawings.

As shown in FIG. 3 of the drawings, the projecting type of guide member **18** also enables ready control of the device from a remote source, a feature which is of advantage when the device is employed in a situation where it is not readily accessible to direct manual control. In the construction of FIG. 3, this is accomplished by connecting to the guide member **18**, an end of a tripping sleeve **41** slidably mounted on the sleeve **10** and connected at its other end to a lever assembly for actuating the same. The lever assembly illustrated is constructed to control the operations of two similar devices provided with a tripping sleeve **41** and disposed in oppositely opposed relation on an object **20** so as to provide positive holding of the latter whether the load is applied thereon in one direc-

tion or the other. The two devices are secured together in such opposed relation by connecting the threaded projections **14** thereof with a suitable double nut **44** having affixed thereto a block **45** in which is slidably mounted a rack **46** and pivotally mounted a pinion **47** actuatable by a lever **48**. The ends of the rack **46** engage with lugs **49** provided on the adjacent ends of the sleeves **41**. It will be understood that when the lever **48** is in its neutral position, the position illustrated, the two united devices may function to positively hold the object **20** regardless of the direction of the load applied thereto. Thus if the direction of the load forces on the object **20** are to the right as viewed in FIG. 3, the right hand device will exert a holding action, while when the direction of the load forces on the object **20** are reversed and to the left as viewed in such figure, the left hand device will provide the holding action. By actuating the lever **48** to the left or right, as viewed in FIG. 3, the tripping sleeve **41** associated with the right or left device, respectively, will be actuated to move its associated guide member **18** inwardly within its associated sleeve **10** to render its associated gripping member **15** incapable of gripping the object **20**. This permits the combined device, or the object **20**, to be moved in either direction relative to each other. The lever **48** may be locked in neutral position by means of a cap **50** provided with a central aperture through which the lever extends and which is fitted on the block **45**.

It will be readily understood that instead of a tripping sleeve **41**, rods or wires may be used to actuate the guide member **18** from a remote position. This can also be accomplished with the wholly contained guide member **18** shown in FIG. 1 by connecting such tripping sleeve, rods or wires to the pins **25** provided thereon. Obviously such tripping means may be manually operated from the remote place rather than providing mechanical means for this purpose, as will be readily apparent to those skilled in this art.

In the constructions of FIGS. 1 and 3, the natural spring action of the gripping member **15** is relied upon to extend such member so as to enable it initially to grip the object upon release of the forces tending to contract such member during the application thereof to an object. As is shown in FIG. 2 of the drawings, this extension of the gripping member **15** may be made more positive by providing a compression spring **52** on such member within the sleeve **10** and of a length to seat on the fixed ring **11** and the guide member **18**. With the system so spring loaded, any release of forces tending to contract the gripping member **15** will immediately enable the spring **52** to return the guide member **18** to its retracted position with the gripping member fully extended for gripping the object. The use of such a spring is of advantage in those cases where the limitation of grip length may require added longitudinal force to get increased radial compression, where the form or surface finish of the object is such that it is difficult to grip, or where the inherent resiliency of the gripping member **15** is insufficient either because of its construction, or because of the type of filaments embodied in its weave, to enable it to extend to gripping position on release of the forces tending to contract it longitudinally. A spring system such as shown in FIG. 2 is also of advantage in a construction such as shown in FIG. 3 in which the springs would automatically return the guide members **18** to retracted position when the lever **48** is returned to neutral position.

The embodiment shown in FIG. 4 illustrates how the invention may be adapted to a hand or foot operated device useful in climbing rods or ropes. Two of these devices could be used for climbing either one rope or two ropes side by side. As indicated, this device includes the basic features of the invention, i.e., a sleeve **10**, and a gripping member **15** anchored at one end to the sleeve **10** by the fitting **11** and guided in its movements at its other free end by the guide member **18**. The guide member **18** is provided with a projecting pin **25** to one end of which is connected a tripping rod **41** that extends through the device in the space between the sleeve **10** and the gripping member **15**. The other end of the tripping rod **41** is connected to an actuating member **55**, pivotally mounted at **56** intermediate its ends on a frame **57** secured to the sleeve **10**. The construction of the frame shown makes it suitable as a stirrup or foot assembly for rope climbing, but it may have other forms which would make it more suitable as a hand grip. It will be understood that if force is applied to the upper end **58** of the actuating member **55**, the guide member **18** will be advanced to contract the gripping member **15** and thereby cause it to release its grip on the stationary object **20** and enable the device to move freely on the latter. On the other hand if force is applied to the lower end **59** of the actuating member **55**, the guide member will be retracted to forcibly extend the gripping member **15** and provide a gripping action. It will also be understood that by shifting the pivot **56** to one end **59** or the other end **58** of the actuating member **55** the latter will be transformed into a means of operating solely as a releasing mechanism or as a locking mechanism, respectively.

FIG. 5 of the drawings shows the device of the invention adapted for use in gymnastic parallel bar equipment. As indicated in FIG. 5, the standards **62** for supporting the parallel bars **63** are each provided in the upper end thereof with a device of the invention having the securing means **11** thereof disposed at the top and the object **20**, which in this case is the rod supporting one end of a bar **63**, extending vertically down through the device. The rod **20** may be provided with scale markings as shown to indicate height. Either the securing means **11** or the guide sleeve **10** may be fixedly attached in any suitable manner, as by rivets **64**, to the standard **62**. It will also be apparent that sleeve **10** may be dispensed with and that the portion of standard **62** enclosing the gripping member **15** be utilized as the guide sleeve of the device. The guide member **18** is provided with oppositely disposed pins **25** which extend through elongated slots **26** provided in the standard **62**. It is believed to be apparent that by raising the pins **25** and consequently the guide member **18**, the gripping action of the member **15** on the rod **20** will be removed thereby permitting such rod to be adjusted as to height. When the adjustment is completed and pins **25** released, the member **15** is again permitting to exert a gripping action on the rod **20** to hold it in the adjusted position. By providing a spring, such as the spring **52** in FIG. 2, in the device in each standard, the grip of the devices on the rods **20** supporting the parallel bars **63** will be greatly improved.

The device of the invention illustrated in FIG. 6 of the drawings, utilizes an air cylinder for remote control of the movements of the guide member **18** and consequently of the gripping action of the member **15**. Mounted on the sleeve **10** is an air clamp composed of a tubular casing **70** providing a cylinder chamber of annular cross section and within which is mounted an annular piston **71** in engagement with the outer peripheral edge portion of the guide member **18**. Provided on the outer end of the casing **70** is an air inlet **72** which is connected to a source of air supply through a supply valve **73**. The supply valve **73** is operable in any suitable manner from a remote place to inject a charge of compressed air into the air clamp to advance the piston **71** and consequently the guide member **18** to contract the gripping member **15** longitudinally and thereby cause it to disengage from the object **20** being gripped. When the supply air is shut off release valve **74** opens so that the air pressure in the air clamp dissipates and the piston retracts under the spring action of the gripping member **15**, through the guide member **18**. This retraction of the piston **71** may be made more positive by providing springs **76**, in the casing **70** on the non-pressure side of the air clamp, by injecting a charge of compressed air into such side of the air clamp as is well

known in the art, or by the use of a spring **52** in the manner disclosed in FIG. 2 of the drawings.

While there has herein been described and illustrated in the accompanying drawings, various embodiments in which the invention may be practiced, it will be apparent to those skilled in the art that various other embodiments and changes may be made without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping member adapted to embrace an object to be gripped located within said tubular member, said tubular member being longer than said gripping member and wholly enclosing the same, a first ring through which the object may be inserted, secured to one end of said tubular member and to one end of said gripping member and securing the latter in fixed relation to said tubular member end, the other end of said gripping member being freely movable longitudinally relative to said tubular member, guide means through which the object may be inserted secured to the other end of said gripping member and projecting beyond the latter, to provide an integral portion projecting beyond the exterior of said tubular member and operable by a force applied to such integral exterior portion beyond the exterior of said tubular member to shift said guide means relative to said tubular member said second ring slidably engaging the other end of said tubular member to enable said other end of the gripping member to be directly supported by said other end of said tubular member within the range of movements thereof in the gripping and nongripping operations of said gripping member, and means connected to said tubular member at a place spaced from said guide means and projecting beyond the exterior of said tubular member for securing said device and the gripped object to another device.

2. A device according to claim **1**, in which said securing means is fixedly connected to said tubular member for connecting said device in fixed relation to said other device, said securing means being ring-like and being provided with a connecting element cooperable with a connecting element on said other device to effect said fixed relation of such two devices.

3. A device according to claim **2**, in which said ring-like securing means comprises an annular member projecting longitudinally from said one end of said tubular member, said annular member being provided with a thread cooperable with the connecting element on said other device and said annular member permitting the passage of the object therethrough when connected to said other device.

4. A device according to claim **2**, in which said ring-like securing means is located on said tubular member intermediate said first and second rings and projects outwardly from the exterior of said tubular member.

5. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping member adapted to embrace an object to be gripped located within said tubular member, said tubular member being longer than said gripping member and wholly enclosing the same, a first ring through which the object may be inserted, secured to one end of said tubular member and to one end of said gripping member and securing the latter in fixed relation to said tubular member end, said first ring being composed of an outer ring member having an inner reduced portion located within said one end of said tubular member and an outer enlarged portion seated on said one end of said tubular member, and said first ring being additionally composed of an inner ring member located within said outer ring member, said outer ring member encircling said one end of said gripping member, and said inner ring member being located within said one end of said gripping member, and said inner and outer ring members and said one end of said gripping member being secured together, the other end of said gripping member being freely movable longitudinally relative to said tubular member, a second ring through which the object may be inserted secured to the other end of said gripping member and projecting beyond the latter, said second ring slidably engaging the other end of said tubular member to enable said other end of the gripping member to be directly supported by said other end of said tubular member within the range of movements thereof in the gripping and nongripping operations of said gripping member, and means connected to said tubular member for securing said device and the gripped object to another device.

6. A device according to claim **5**, in which said securing means comprises an annular threaded member axially aligned with and projecting outwardly from said outer enlarged portion of said outer ring member.

7. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping member adapted to embrace an object to be gripped located within said tubular member, said tubular member being longer than said gripping member and wholly enclosing the same, a first ring through which the object may be inserted, secured to one end of said tubular member and to one end of said gripping member and securing the latter in fixed relation to said tubular member end, the other end of said gripping member being freely movable longitudinally relative to said tubular member, a second ring through which the object may be inserted secured to the other end of said gripping member and projecting beyond the latter, said second ring slidably engaging the other end of said tubular member to enable said other end of the gripping member to be directly supported by said other end of said tubular member within the range of movements thereof in the gripping and nongripping operations of said gripping member, means mounted on the exterior of said tubular member and operable under an applied force to compress said gripping member to control the gripping action of the latter on an object, said operable means comprising means movable relative to said tubular member under such force and coupled to said second ring so as to force the latter when so moved inwardly of said tubular member against the tension of said gripping member, and means connected to said tubular member for securing said device and the gripped object to another device.

8. A device according to claim **7**, in which said operable means comprises an operable member mounted on said tubular member at a place remote from said second ring and connected to said movable means, said operable member being actuatable to move said movable means relative to said tubular member.

9. A device according to claim **7**, including a second device according to claim **7** arranged in aligned, opposed relation to said device of claim **7** with said other ends of said devices constituting the outer ends of the composite device, another centrally located device connected to the securing means of both of said devices of claim **7** and connecting the same together to form the composite device, and including operable means such as defined in claim **7** mounted on both the tubular members of the composite device, said centrally located device being connected to both operable means and operable to compress alternately the two gripping members of the composite device.

10. A device according to claim **8**, in which said movable means comprises a movable member extending in parallelism to the longitudinal axis of said tubular member, said operable member being connected to one end of said movable member and operable to shift the latter longitudinally to force said second ring inwardly against the tension of said gripping member.

11. A device according to claim **7**, in which said movable means comprises hydraulic means connected to said second ring, said operable means further including means for supplying hydraulic fluid to said hydraulic means to force said second ring inwardly against the tension of said

gripping member, and means operative to control the supply of fluid to said hydraulic means.

12. A device according to claim 11, including means for positively retracting said hydraulic means from an advanced position.

13. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping means adapted to embrace an object to be gripped contained in said tubular member, means for fixedly connecting one end of said gripping means to said tubular member leaving the other end thereof free for longitudinal movement within said tubular member, an annular guide means slidably mounted in said tubular member and connected to the free end of said gripping means, said guide means cooperating with said tubular member to guide the longitudinal movements of the free end of said gripping means in the gripping and nongripping operations of such gripping means, and operable under an applied force to compress said gripping means to release the gripping action of the latter on a gripped object, and means carried by said device and movable relative to said tubular member to force said guide means inwardly of said tubular member against the tension of said gripping means, said carried means comprising a threaded member, threadedly engaged with said tubular member, and engageable with the outer end of said guide means.

14. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping member adapted to embrace an object to be gripped located within said tubular member, said tubular member being longer than said gripping member and wholly enclosing the same, a first ring through which the object may be inserted, secured to one end of said tubular member and to one end of said gripping member and securing the latter in fixed relation to said tubular member end, the other end of said gripping member being freely movable longitudinally relative to said tubular member, a second ring through which the object may be inserted secured to the other end of said gripping member and projecting beyond the latter, said second ring slidably engaging the other end of said tubular member to enable said other end of the gripping member to be directly supported by said other end of said tubular member within the range of movements thereof in the gripping and nongripping operations of said gripping member, a pin connected to said second ring, and a slot provided in said tubular member and through which said pin extends, said slot being provided with a cam profile such that it coacts with said pin to lock said second ring in the positions thereof corresponding to the gripping and nongripping conditions of said gripping member, and means connected to said tubular member for securing said device and the gripped object to another device.

15. A mechanical holding device comprising a tubular member, an elongated expansible and contractible tubular gripping member adapted to embrace an obejct to be gripped located within said tubular member, said tubular member being longer than said gripping member and wholly enclosing the same, a first ring through which the object may be inserted, secured to one end of said tubular member and to one end of said gripping member and securing the latter in fixed relation to said tubular member end, the other end of said gripping member being freely movable longitudinally relative to said tubular member, a second ring through which the object may be inserted secured to the other end of said gripping member and projecting beyond the latter, said second ring slidably engaging the other end of said tubular member to enable said other end of the gripping member to be directly supported by said other end of said tubular member within the range of movements thereof in the gripping and nongripping operations of said gripping member, said first ring extending longitudinally of the device and projecting beyond said one end of said tubular member, the projecting portion of said first ring being threaded to enable another device to be coupled thereto.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,343,231 September 26, 1967

Albert L. Clay

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 23, for "latter," read -- latter --; line 28, for "member" read -- member, --; same line 28, for "second ring" read -- guide means --; line 54, for "and second rings" read -- ring and said guide means --.

Signed and sealed this 29th day of October 1968.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents