

[54] GRIPPING DEVICE

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[51] Int. Cl.B25b 1/20

[58] Field of Search260/130, 131, 132; 81/57.17,
81/64; 53/198

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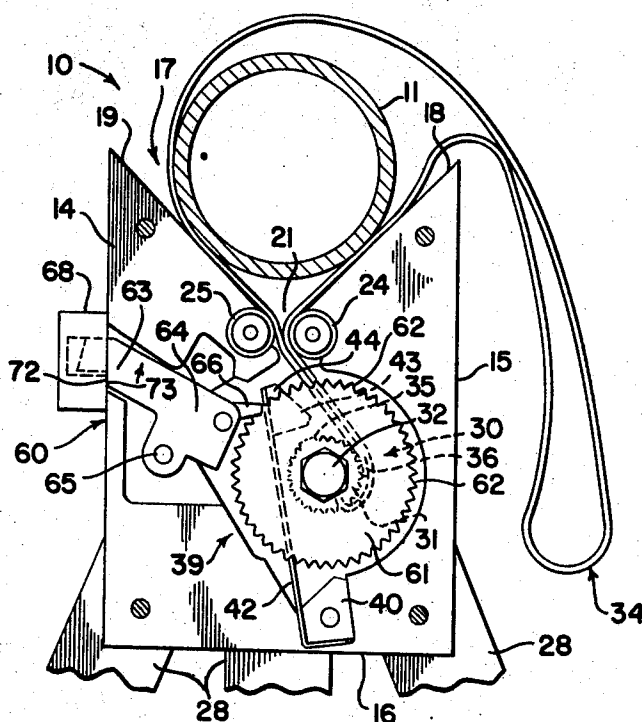
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[57]

ABSTRACT

A vise-like apparatus for securing a workpiece with a flexible, elongated, extensible binding member is disclosed as having a body which includes a pair of opposed side faces and a work supporting cradle, an opening in the body, and means providing a binding member having one portion secured within the body and having another portion in communication with the opening for securing the workpiece. Guide means are disposed adjacent the opening for guiding the binding member through the opening. The guide means include a pair of guide rollers disposed beneath and adjacent to the opening. The supply means for the binding member includes a spool secured between the side faces of the body. In one embodiment, one end of the binding member is secured to the spool while the other end is capable of being extended from the spool through the opening to envelop a workpiece and be reinserted into the opening for reengagement with that portion of the binding member remaining on the spool. In an alternative embodiment, the binding member is secured to the spool so that two free ends are exposed. Adhering means, such as adhesives or fastening tape, are secured to the respective ends of the binding member for rapid connection of the ends after disposition about the workpiece. Torquing means are provided to tension the binding member about the workpiece. Locking means are provided to prevent inadvertent loosening of the band from the workpiece. Release means are provided for releasing the locking means when the operator desires to free the workpiece.

17 Claims, 9 Drawing Figures



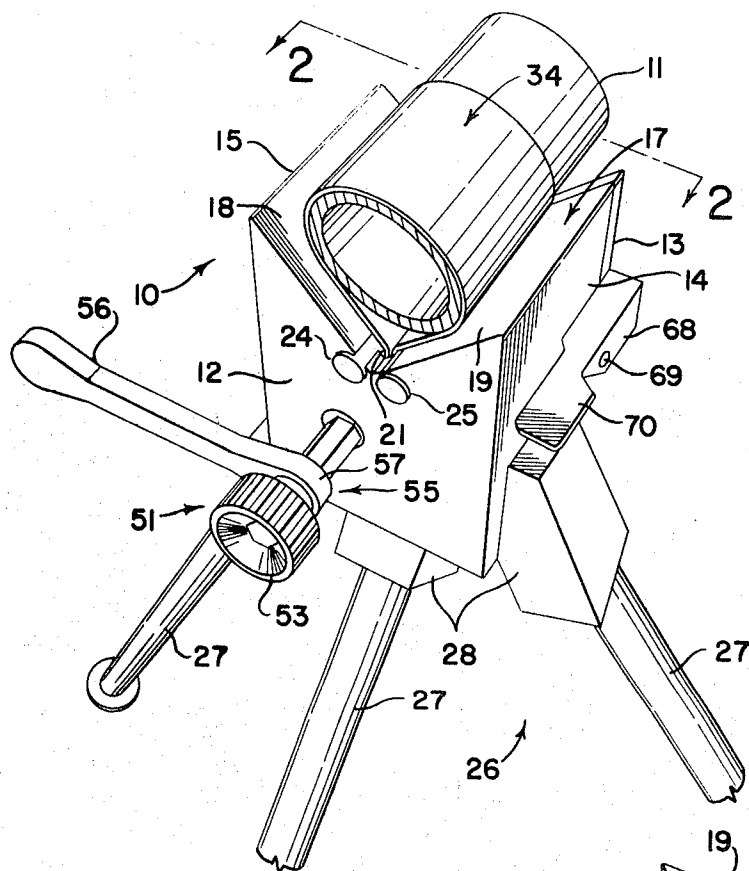


FIG. 1

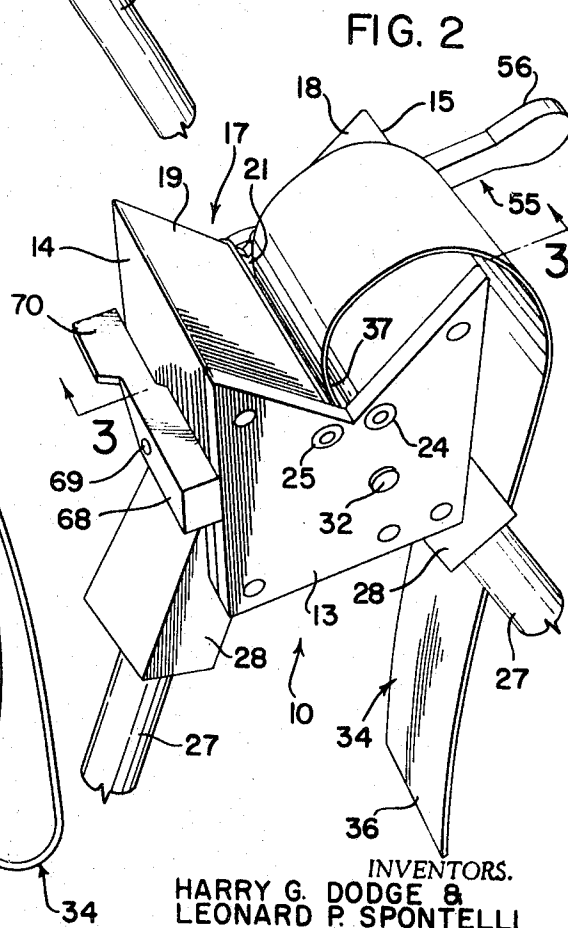


FIG. 2

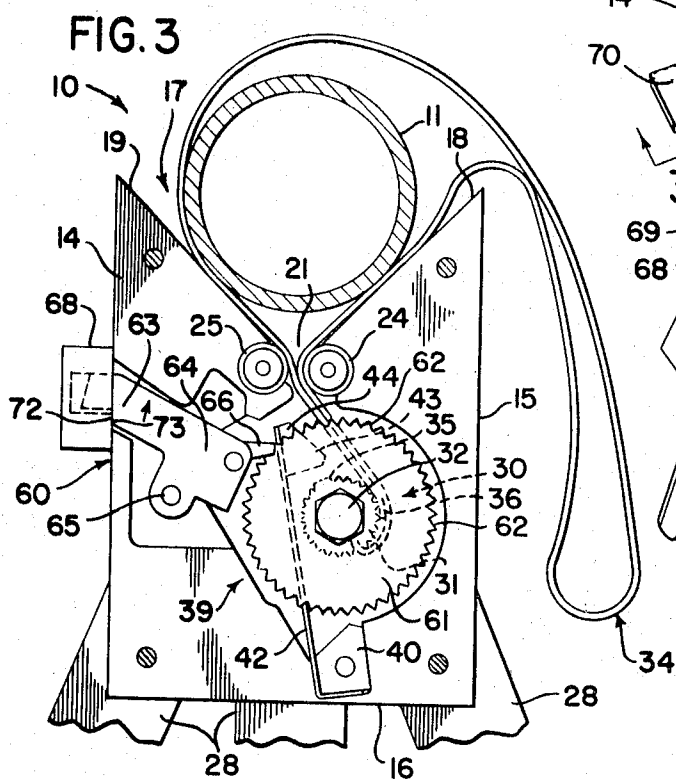


FIG. 3

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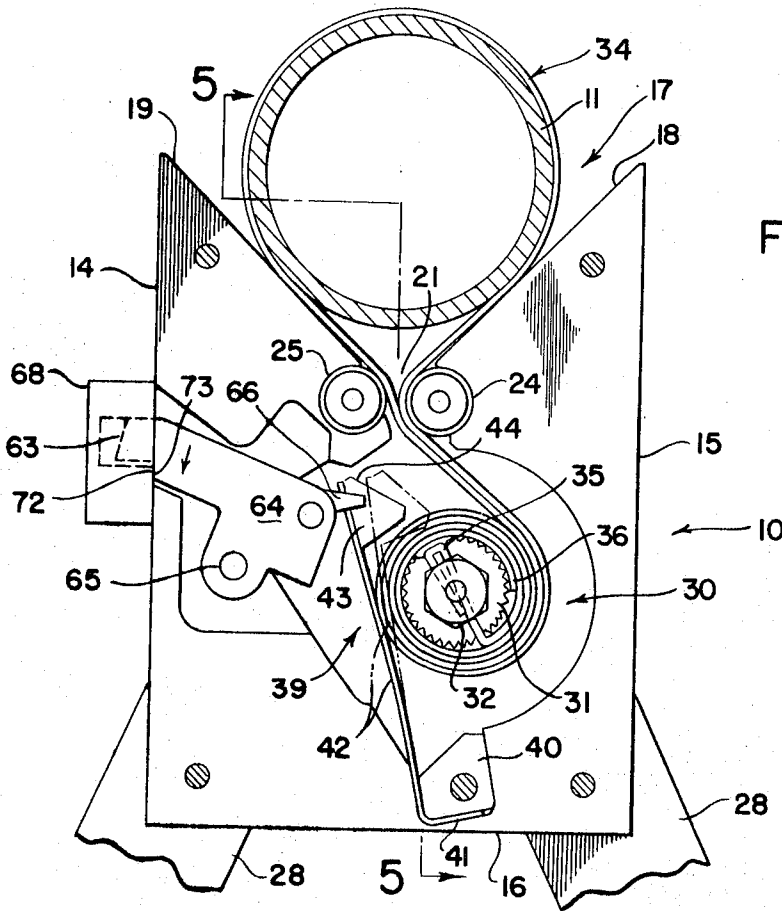


FIG. 4

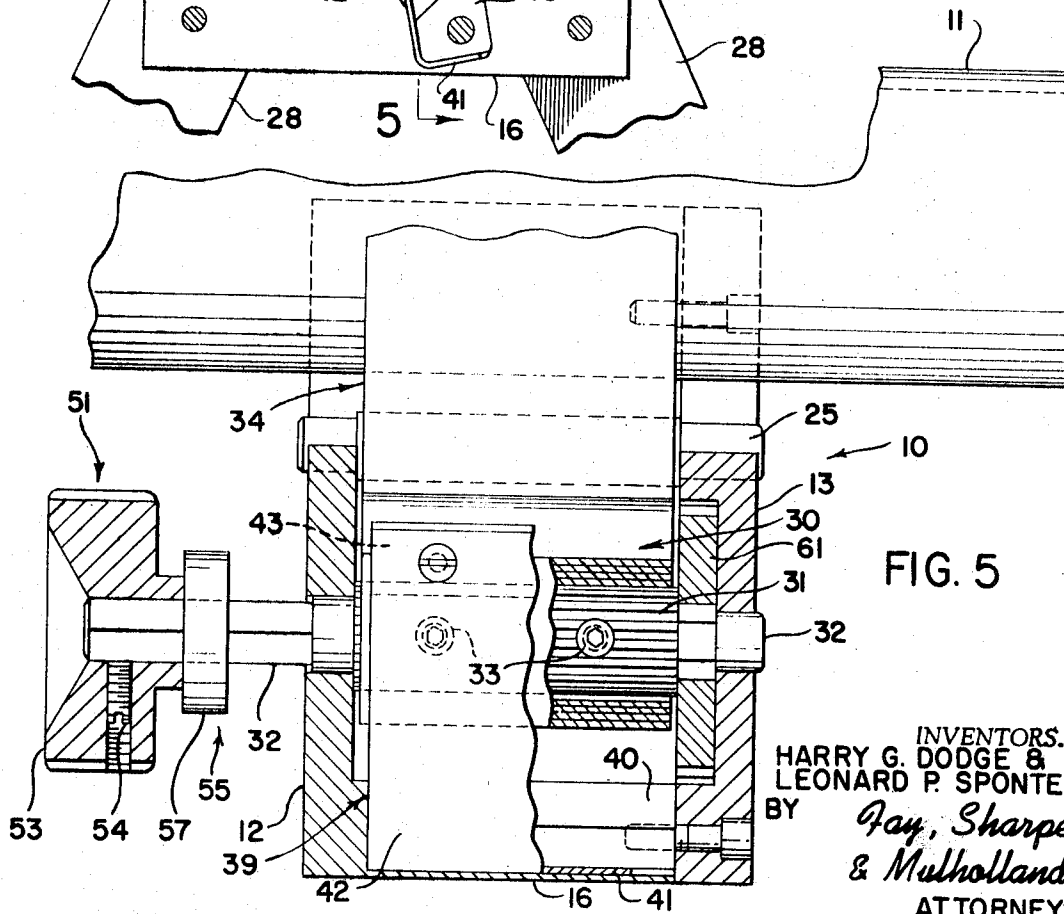


FIG. 5

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FIG. 7

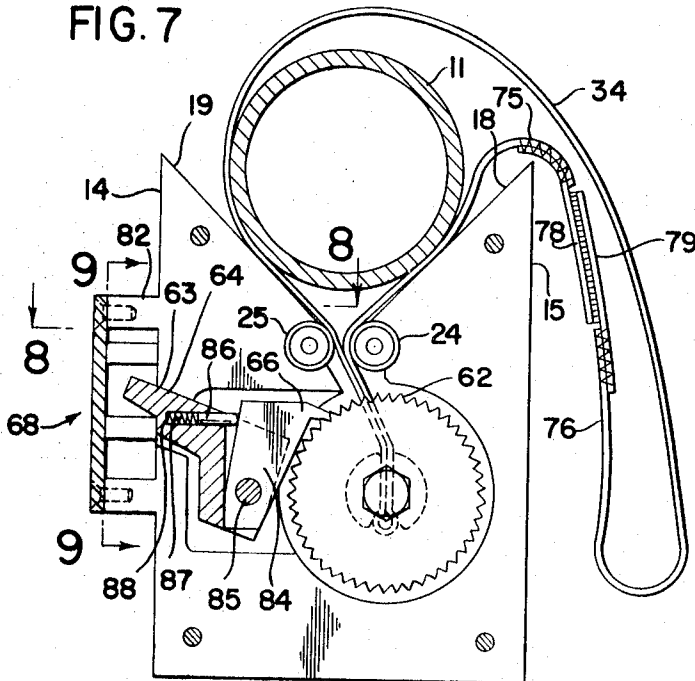


FIG. 6

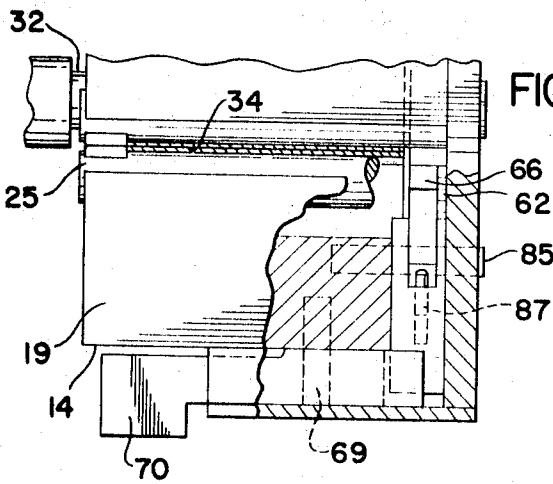
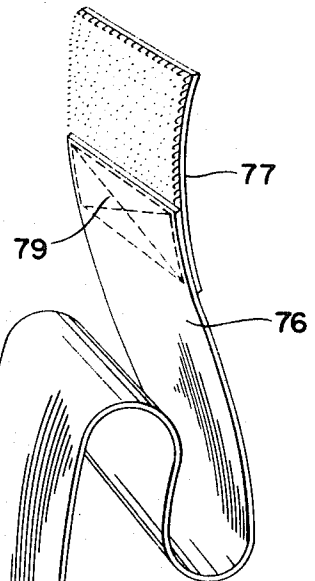


FIG. 8

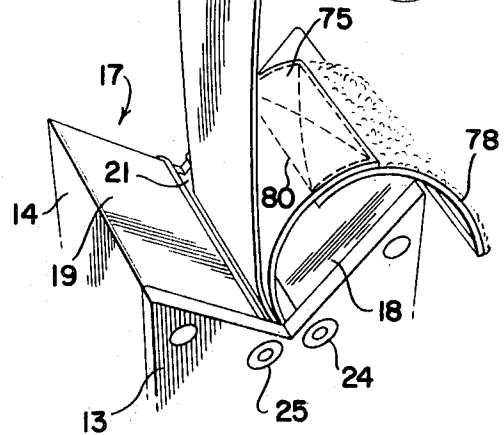
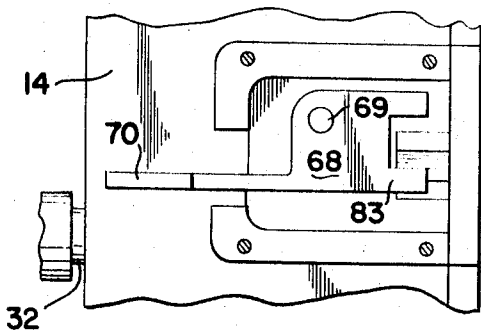


FIG. 9



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GRIPPING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to structures adapted to secure a workpiece. More particularly, this invention relates to a gripping device for engaging either cylindrical or irregularly shaped objects. Still more particularly, this invention relates to a vise for engaging either cylindrical or irregularly shaped workpieces where the surface of the workpiece must be free from defects which may be caused by the gripping device.

One of the challenges which has long faced the prior art relating to gripping devices has been to provide an effective, convenient and inexpensive structure capable of gripping cylindrical and irregularly shaped objects. One of the most familiar vise-like gripping structures includes a pair of opposed planar surfaces capable of engaging an object upon the rotation of a screw mechanism. The planar surfaces of such a structure are often serrated to enhance their gripping capabilities. When the jaws of such a structure are serrated, a risk is encountered that the workpiece will be marred. Thus, when it is desired to maintain the surface integrity of the workpiece, other safeguards must be utilized, such as covering the workpiece. Each solution thus represents a compromise which is not altogether desirable.

In particular, such planar vise-like structures are particularly inappropriate for engaging cylindrical or irregularly shaped objects. The primary reason for the difficulty is the low degree of surface contact between the structure and the object. Thus, a variety of mechanisms have been developed for gripping such objects. Such mechanisms have sometimes included flexible gripping surfaces capable of assuming the contour of the held object. Included among such devices are pipe vises which include a chain-like member engaged with a sprocket so that when the chain surrounds the workpiece, actuation of the sprocket causes a tensioning of the chain about the workpiece. Examples of such structures may be seen in the patent to Dillon, U.S. Pat. No. 1,253,568, entitled "Pipe Vise"; the patent to Deringer et al; U.S. Pat. No. 1,911,815, entitled "Strap Wrench"; the patent to Borowski, U.S. Pat. No. 2,058,949, entitled "Gripping Device", and the patent to Peterson et al., U.S. Pat. No. 2,903,930.

Those devices have not proved entirely satisfactory for gripping tubing whose surface must not be marked, or glass tubing which is both difficult to grip and susceptible to breakage, or for tubing having an outside diameter which is relatively small. In high pressure, small diameter tubing, for example, it is necessary to maintain surface integrity to avoid weakening the pressure bearing capabilities of the structure. In general, such gripping devices assume rather extensive masses which are likely to mar the outer surface of the tubing. In addition, such chain-like structures are susceptible to permitting inadvertent rotation of the held object because of the relatively small area of surface contact between the cylindrical workpiece and the gripping chain. For this reason especially, the chain structures are inappropriate for gripping glass tubing.

Moreover, when the gripping devices of the prior art use an elongated gripping member, often it is without the capability of providing a free end. When the gripping member has no free end, a workpiece must be inserted through a loop-like portion of the gripping member. Those structures thus impose severe constraints upon the freedom of movement by the operator about the structure. Moreover, those types of devices have been severely limited with respect to their size capability and their ability to handle adequately a wide variety of shapes and workpieces.

SUMMARY OF THE INVENTION

Directed primarily to the efficient, inexpensive and convenient solution to the deficiencies and shortcomings promulgated by the prior art solutions to the aforementioned problems, a gripping device according to the invention includes means for supporting an object in a rigid, nonrotatable

relationship. The workpiece supporting means includes a body which comprises at least a pair of opposed side faces and a work supporting cradle.

In one embodiment, the cradle is defined by a pair of inclined surfaces in a generally V-shaped configuration. An opening is provided in the workpiece supporting means, the opening being located at the intersection of a pair of inclined surfaces.

Means are included for providing a flexible, elongated, extensible binding member. In one embodiment, the binding member has one end secured to a spool rotatably disposed between the side faces of the body. The free end of the extensible member may be passed through the opening so that an intermediate portion of the binding member is in communication with the opening. The free end of the binding member is capable of being passed about the workpiece and reinserted into the opening to be reengaged by the spool. Guide means are disposed adjacent the opening for guiding the binding member as it is withdrawn from the spool and as it is inserted toward reengagement with the spool.

In an alternative embodiment, the binding member is secured to the spool so that both ends are free and capable of being positioned near the workpiece. Each end of the binding member includes adhering means, such as adhesives or fastening tape. After one end of the binding member is passed about the workpiece, it may be quickly secured as by adhesion to the other free end of the member. Thereafter, the binding member may be tightened about the workpiece.

Torquing means are connected to the shaft of the spool to tension the binding member about the workpiece. The torquing means include a knob-like handle connected to the shaft for the initial rapid tensioning of the binding member and further include a ratchet type crank mechanism also connected to the shaft for achieving the final tensioning of the binding member.

Locking means are provided to prevent inadvertent rotation of the spool and thus to inhibit loosening of the binding member. The locking means include a locking disc having a plurality of gear-like teeth disposed about its circumference and a locking member having a detent capable of engagement with the teeth of the locking disc. Means for engaging and releasing the detent from the locking disc are also provided.

In operation, a free end of the binding member is extracted somewhat from the spool so that an intermediate portion of the binding member rests on one of the faces of the work supporting cradle. A workpiece is positioned in such a manner that a portion of the binding member may be wrapped about the workpiece and an end may be either reinserted into an opening in the body of the apparatus or secured to the other free end of the binding member. Positioning means may be provided to guide a free end of the binding means into reengagement with the spool. Thus, after a free end of the binding member has been reengaged in the spool or secured to the other free end, rotation of the torquing means causes a reduction in the unspooled length of the binding member and thus tensions the binding member about the workpiece. Actuation of the ratchet member causes extreme tautness of the overall combination.

Accordingly, an object of this invention is to provide a vise-like structure capable of gripping cylindrical and irregularly shaped objects.

It is a further object of this invention to provide a gripping structure capable of securing circular and irregularly shaped objects without marring the surface thereof.

It is a further object of this invention to provide a gripping structure capable of gripping workpieces having a wide variety of sizes and exterior configurations.

It is a further object of this invention to provide a vise-like structure including an extensible band capable of enveloping a workpiece, and further including means for tightening the extensible band about the workpiece.

Further objects and aims of this invention will be apparent upon a perusal of the accompanying drawings and a review of the detailed specification which follows:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the apparatus according to the invention showing the binding member tightly engaging a workpiece;

FIG. 2 is a view of the apparatus taken along line 2—2 of FIG. 1;

FIG. 3 is an elevational view of the apparatus with the rear cover plate removed, as taken along line 3—3 of FIG. 2;

FIG. 4 is a view similar to FIG. 3 in which the locking disc has been removed so that the detail of the spool and binding member may be seen;

FIG. 5 is a view taken along line 5—5 of FIG. 4;

FIG. 6 is a partial view of the apparatus showing an alternate form for quickly securing the binding member;

FIG. 7 is a view similar to FIG. 3 showing the mechanism used for the alternative embodiment;

FIG. 8 is a partial sectional view taken along line 8—8 of FIG. 7, and

FIG. 9 is a partial view of the alternative apparatus taken along line 9—9 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, workpiece supporting means, shown generally at 10, are depicted supporting a workpiece 11, in this case a length of generally cylindrical tubing. It may be understood, however, that workpiece 11 may be any configuration including polygonal and irregularly shaped objects, and made from any material including glass.

Workpiece supporting means 10 include a body defined by a pair of opposed side faces 12 and 13 and a pair of opposed lateral faces 14 and 15. The side faces and the lateral faces form a hollow body structure which is generally rectangular in cross section. If desired, the base of the box-like structure formed from the side faces and lateral faces may be covered with a base plate 16, as best seen in FIG. 5. It should be understood that the body structure may take a wide variety of forms, including custom built structures, as long as the principle of the invention may be embodied therein.

The body portion is preferably made from a metal, such as stainless steel and the component parts assembled and secured in a manner known to the art. Where sufficient strength to accommodate the invention and the workpiece are available in nonmetallic materials, these materials may likewise be used in this invention.

As illustrated in FIG. 1, the body may be supported by a tripod arrangement, shown generally at 26. The tripod structure 26 includes a plurality of legs 27, each terminating in a transition piece 28 suitably secured to the body structure, as by machine bolts. While tripod structure provides the apparatus with a high degree of mobility and flexibility, permanent installations of the body structure are also contemplated. In those instances, the tripod arrangement may be eliminated.

Workpiece supporting means 10 further include a work supporting cradle 17 defined by a pair of inclined surfaces 18 and 19 arranged in a generally V-shaped configuration. Surfaces 18 and 19 are depicted as generally planar in nature, which lend themselves readily to utilization with workpieces of varying shapes and diameters. However, for particularized application, it may be understood that the work supporting cradle 17 may include surfaces 18 and 19 of different shapes, such as an arcuate configuration, for holding pieces 11 of predetermined diameter.

Workpiece supporting means 10 further includes opening 21 disposed therein. As illustrated, opening 21 comprises a slot located at the intersection of the inclined surfaces 18 and 19. Guide means 23 are illustrated as a pair of guide rollers 24 and 25 connected in a journaled relationship to side faces 12 and 13. Guide rollers 24 and 25 are disposed beneath but adjacent to slot 21.

Band supply means shown generally at 30, and best seen in FIGS. 3, 4 and 5, are shown as comprising a serrated spool 31 secured as by set screws 33 on a shaft 32 rotatably secured

between the opposed side faces 12 and 13. Although shaft 32 is illustrated as having its ends journaled in the side faces 12 and 13, other more sophisticated bearing arrangements, such as roller bearings, are also contemplated.

A flexible, elongated, extensible binding member 34 is shown as having one of its ends 35 secured to the spool 32. As seen in FIG. 4, end portion 35 is passed through an opening in the spool and looped into a second opening in the spool to secure end portion 35 against complete removal from the spool in the event the entire length of the extensible member 34 is withdrawn to envelop a workpiece.

However, other means, such as by riveting, use of adhesives and the like, may be used for securing end 35 of binding member 34 to the spool.

As used herein, the term "extensible" as applied to binding member 34 means "capable of being extended" and refers primarily to the ability of the binding member 34 to unroll from spool 31 when the free end of the member 34 is pulled by the operator. Thus, in a preferred embodiment, member 34 is rigid in its lengthwise direction. However, a binding member 34 having an elastomeric quality in its lengthwise direction may also be used as long as the member is capable of assuming the desired degree of tautness about the workpiece.

Material which may be used for member 34 includes, by way of example, leather, fabric, plastic and the like, and may further include an inner coating of a desirable nonslipping material, such as cured rubber. In the alternative, the surface traverses the member 34 which contacts the workpiece may be relatively rough to enhance its gripping capability.

As best seen in FIG. 2, when the apparatus 1 is available for use, the free end 36 of binding member 34 may rest loosely adjacent the structure. An intermediate portion 37 of binding member 34, during its rest state, traverse opening 21.

When it is desired to use the apparatus for securing the workpiece 11, the apparatus 10, as shown in the state depicted in FIG. 2, is utilized. After the workpiece 11 is placed upon the work supporting cradle 17 and positioned thereon, an intermediate portion 37 of binding member 34 is located between the workpiece 11 and the inclined surface 18, as best seen in FIG. 3. Free end 36 is looped about workpiece 11 and passed intermediate workpiece 11 and inclined surface 19. The free end 36 is inserted into opening 21 between the adjacent roller 24 and the intermediate portion of the extensible binding member 25.

Positioning means 39 are provided to aid in guiding free end 36 of the binding member 34 into reengagement with the spool 35.

Positioning means 39 include a retaining member 40 securing an L-shaped base portion 41 of segment 42 to which is attached a positioning nub 43 having a camming surface 44. By the spring-like action of segment 42, nub 43 is tensioned against spool 31 and the binding member 34 wrapped thereon. In this position, the camming surface 44 is also conveniently located so that upon insertion of the free end 36 of the binding member 34 through the slot 21, the free end tends to engage the camming portion 44 and to be directed in such a manner that the free end will be reengaged by the spool 31 and the binding members 34 wrapped thereon.

The gripping action of the spool 31 and the binding member 34 is somewhat like the well known backlash action of a fishing reel. In this instance, it has been found sufficient to rewind the free end upon the spool to achieve the desired gripping action.

Tensioning means are also provided for tightening the free end of the binding member in the spool structure. The tensioning means comprise clutch-type torquing means 51 connected to the shaft 32 of spool 31 for rotation of the spool to tension binding member 34 about workpiece 11.

Torquing means 51 includes a knob-like handle 53 secured to shaft 32 as by a set screw 54. Once the free end 37 of the binding member 34 is secured in the spool winding, rotation of handle 53 will cause rapid rotation of the spool to take up the larger amount of slack between the binding member 34 and

workpiece 11 as shown in exaggerated fashion in FIG. 3. The action of handle 53 with shaft 32 and spool 31 is direct.

A ratchet type crank mechanism shown generally at 55 comprising crank 56 and a clutch-type ratchet mechanism 57 is also provided for the final tensioning of the binding member 54. Because of the clutch action of the ratchet mechanism 57, rotation of knob 53 does not cause rotation of the crank 56. When binding member 34 is secured about the workpiece, counterclockwise rotation of the crank 56 causes the ratchet mechanism 57 to engage to further tension the binding member about the workpiece.

In order to prevent inadvertent rotation of the spool 31 which would tend to release the tension of binding member 34 about the workpiece 11, locking means shown generally at 60 are provided. Locking means 60 include a locking disc 61 having a plurality of gear-like teeth 62 disposed about its outer circumference. The locking disc is fixedly secured to shaft 32 for rotation therewith. As seen in FIG. 5, locking disc 61 may be located in a recess in side face 13, although appropriate sizing of the structures may permit the disc 61 to be within the body cavity.

A locking member 64 is pivotally rotated about pin 65 and includes a detent 66 for engagement with one of the teeth 62 on the locking disc 61. Pin 65 may be fixedly secured to face 13 of the apparatus.

Release means 68 are pivotally secured on face 14 about pin 69. Release means 68 include a handle-like portion 70 in engagement with an end portion 63 of locking member 64, as shown. In operation, when it is desired to tension band member 34 about a workpiece 11, the handle-like portion 70 of release means 68 is depressed to raise the extended end portion 63 of locking means 60. That engagement causes rotation of the locking member 64 about pin 65 so that the detent 66 engages one of the teeth 62 of the locking disc 61. As the knob 53 or the ratchet 56 is actuated, causing rotation of the shaft 32, adjacent and successive teeth 62 are engaged by the detent. It may be easily understood that the overall arrangement is one in which the positioning of the detent with respect to the teeth 62 prevents reverse rotation of the shaft 31 and the locking disc 61.

When the binding member is in tension, large forces are exerted by member 61 via teeth 62 engaged with detent 66. To compensate for the presence of such forces, lateral face 14 may be provided with a surface 72 engaging a complementary surface 73 of locking member 64.

When it is desired to release a workpiece 11 from the vise-like engagement, handle-like portion 70 is grasped by the operator and lifted upwardly to cause rotation of the member about release means 68 about pin 69. That rotation causes a depression of the extended portion 63 of locking member 64 and thus causes its rotation about pin 65 in such a manner that detent 66 is released from its engagement with teeth 62 of locking disc 61.

Thereafter, counterclockwise rotation of knob 53 causes the binding member 34 to be released from its taut relationship with workpiece 11.

An alternative embodiment is shown in FIGS. 6 through 9 in which binding member 34 is secured to spool 31 so that, when ready for use, two of its ends 75 and 76 are free and positioned for ready connection to each other adjacent the lateral surface 15. Adhering means 77, secured to free end 76, and adhering means 78, secured to free end 75, are provided for quickly attaching one end of the binding member to the other after the workpiece has been enveloped. This arrangement also provides a quick release of the extensible member when the operator wishes to free the workpiece.

Adhering means 77 and 78 may be any one of a known variety of adhering materials or configurations, such as adhesives, fastening tape or nylon fastening tape of the hook and pile type, such as is sold under the trademark Velcro by the Velcro Corporation. Adhering means 77 and 78 are secured to the free ends 76 and 75 of the binding member by means well known to the art, such as by stitching 79 and 80. Other

means, such as riveting or integral formation therewith, may also be used.

As may be best seen in FIG. 7, when workpiece 11 is suitably positioned, adhering means 77 is readily attached to adhering means 78 for initial and final tensioning of the arrangement as hereinbefore described. One of the advantages of this arrangement is that it avoids the need to reengage a free end of the binding member 34 in the spool and may thus eliminate positioning means 39 as hereinbefore described.

The operation of the modified apparatus shown in FIGS. 6 through 9 is essentially that as hereinbefore described. In FIG. 7, release means 68 is rotatable about pin 69 (shown in FIG. 9) within exterior housing 82 secured to or integral with lateral face 14. Release means 68 includes a leg 83 in contact with extended portion 63 of locking member 64. Detent 66 forms a portion of rigid member 84 pivotally secured about pin 85 to member 64. A biasing member 86, tensioned by spring 87, is included in cavity 88 in member 64 for spring biasing detent 66 into relative engagement with detent 62 on the locking disc 61.

This modification relaxes the tension of the locking means during the initial, rapid take-up of the slack in the binding member 34, while yet preventing its inadvertent release after final tensioning has been achieved.

This modification is particularly suited for use in the initial tensioning of the arrangement shown in FIG. 7 since it is not desired to place large lateral stresses on the adhering coupling between members 78 and 79 on the opposed ends of the binding member 34. Once the coupling between members 78 and 79 has been rotated upon spool 31, greater lateral stresses may be applied for the final tightening of the binding member 34 about workpiece 11.

Another advantage of the apparatus according to the modification is that it eliminates the desirability for the inclusion of positioning means 39 within the cavity of workpiece supporting means 10.

The invention claimed is:

1. An apparatus comprising, in combination:

- a work piece supporting means for supporting a work piece,
- an opening in said work piece supporting means,
- band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said work piece, said means further including a spool rotatably mounted beneath said opening,
- guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said work piece,
- a length of said binding member disposed about said spool, one end of said binding member being secured to said spool, an intermediate portion of said binding member being located in said opening, and said free end of said binding member being capable of passing about said work piece to be thereafter inserted into said opening for re-engagement with said spool.

2. The apparatus as defined in claim 1 further including torquing means connected to the shaft of said spool for rotation of said spool to tension said binding member about said workpiece after the free end of said binding member has been reengaged by said spool.

3. An apparatus comprising, in combination:

- workpiece supporting means for supporting a workpiece comprising a body which includes at least a pair of opposed side faces and a work supporting cradle defined by a pair of inclined surfaces in a generally V-shaped configuration, said pair of inclined surfaces being secured to said pair of opposed side faces,
- an opening in said workpiece supporting means comprising a slot located at the intersection of said pair of side faces,

- c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said workpiece, said means further including tensioning means for securing the binding member, and
- d. guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said workpiece, said guide means include a pair of guide rollers disposed beneath and adjacent to said slot, said guide rollers being secured between said side faces in a rotatable relationship.
- 4. An apparatus comprising, in combination:
 - a. workpiece supporting means for supporting a workpiece comprising a body which includes at least a pair of opposed side faces and a work supporting cradle,
 - b. an opening in said workpiece supporting means,
 - c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said workpiece, said means further including tensioning means for securing the binding member comprising a spool rotatably secured between said side faces, a length of said binding member disposed about said spool, one end of said binding member being secured to said spool, an intermediate portion of said binding member being located in said opening, and said free end of said binding member being capable of passing about said workpiece to be thereafter inserted into said opening for reengagement with said spool,
 - d. guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said workpiece, and
 - e. torquing means connected to the shaft of said spool for rotation of said spool to tension said binding member about said workpiece after the free end of said binding member has been reengaged by said spool, a knob-like handle connected to said shaft for the initial tensioning of said binding member, and a ratchet type crank connected to said shaft for the final tensioning of said binding member.
- 5. An apparatus comprising, in combination:
 - a. workpiece supporting means for supporting a workpiece comprising a body which includes at least a pair of opposed side faces and a work supporting cradle,
 - b. an opening in said workpiece supporting means,
 - c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said workpiece, said means further including tensioning means for securing the binding member comprising a spool rotatably secured between said side faces, a length of said binding member disposed about said spool, one end of said binding member being secured to said spool, an intermediate portion of said binding member being located in said opening, and said free end of said binding member being capable of passing about said workpiece to be thereafter inserted into said opening for reengagement with said spool,
 - d. guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said workpiece,
 - e. torquing means connected to the shaft of said spool for rotation of said spool to tension said binding member about said workpiece after the free end of said binding member has been reengaged by said spool, and
 - f. locking means comprising a locking disc having a plurality of gear-like teeth disposed about its circumference, said locking disk being connected to said shaft of said spool, a locking member having a detent in engagement with any one of said teeth on said locking disc, said locking

- member being connected to one of said faces in such a manner that rotation of said spool in a direction which tends to loosen said binding member is prevented, and release means connected to said locking member for releasing the engagement of said detent with said locking disc.
- 6. An apparatus comprising, in combination:
 - a. workpiece supporting means for supporting a workpiece comprising a body which includes at least a pair of opposed side faces and a work supporting cradle,
 - b. an opening in said workpiece supporting means,
 - c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said workpiece, said means further including tensioning means for securing the binding member comprising a spool rotatably secured between said side faces, a length of said binding member disposed about said spool, one end of said binding member being secured to said spool, an intermediate portion of said binding member being located in said opening, and said free end of said binding member being capable of passing about said workpiece to be thereafter inserted into said opening for reengagement with said spool,
 - d. guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said workpiece,
 - e. torquing means connected to the shaft of said spool for rotation of said spool to tension said binding member about said workpiece after the free end of said binding member has been reengaged by said spool, and
 - f. positioning means located in said body for guiding said free end of said binding member into reengagement with said spool.
- 7. The apparatus as defined in claim 6 wherein said positioning means includes a member having an elongated portion, and an L-shaped base portion at one end of said elongated portion, and a nub, said nub further including a camming surface, said member being positioned in said body so that said camming surface directs the free end of said binding member into engagement with said spool.
- 8. The apparatus as defined in claim 1 wherein a pair of free ends of the binding member are secured to each other about the workpiece.
- 9. The apparatus according to claim 8 wherein each of said free ends of said binding member further includes adhering means for securing the respective free ends for the tensioning of said binding member about said workpiece.
- 10. The apparatus as defined in claim 9 wherein said adhering means comprise fastening tape of the hook and pile type.
- 11. The apparatus comprising, in combination:
 - a. Workpiece supporting means for supporting a workpiece, said workpiece supporting means including a body comprising at least a pair of opposed side faces and a work supporting cradle, said work supporting cradle being defined by a pair of inclined surfaces in a generally V-shaped configuration, said pair of inclined surfaces being secured to said pair of opposed side faces,
 - b. an opening in said workpiece supporting means, said opening being located at the intersection of said pair of side faces,
 - c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and an intermediate portion in communication with said opening for securing said workpiece, said band supply means further including tensioning means for securing said secured portion of said binding member, said band supply means including a spool rotatably secured between said side faces, a length of said binding member being disposed about said spool, one portion of said binding member being secured to said spool, and one free end of said binding member being capable of passing about said

- workpiece and being secured with another portion of said binding member,
- d. guide means disposed adjacent said opening for guiding an intermediate portion of said binding member as said binding member is withdrawn from said spool and retracted into said opening for reengagement with said spool,
- e. torquing means connected to the shaft of said spool for rotation of said spool to tension said binding member about said workpiece, and
- f. locking means for preventing the inadvertent release of the tension of said binding member about said workpiece, said locking means comprising:
- f-1. a locking disc having a plurality of gearlike teeth disposed about its circumference, said locking disc being fixedly secured to said shaft of said spool,
- f-2. a locking member having a detent in engagement with one of said teeth on said locking disc, said locking member being connected to one of said side faces in such a manner that rotation of said spool in a direction which tends to loosen said binding member is prevented, and
- f-3. release means connected to said locking member for releasing the engagement of said detent with said locking disc.
12. An apparatus comprising, in combination:
- a. workpiece supporting means for supporting a workpiece,
- b. an opening in said workpiece supporting means,
- c. band supply means for providing a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member being in communication with said opening for securing said workpiece, said means further including tensioning means for securing the binding member wherein a pair of free ends of the binding member may be secured to each other about the workpiece,
- d. guide means disposed adjacent said opening for guiding said intermediate portion of said binding member as said member is tightened about said workpiece, and
- e. positioning means located in said body for guiding a free end of said binding member into reengagement with said spool.
13. An apparatus comprising, in combination:

- a. workpiece supporting means for supporting a workpiece including a cradle defined by at least a pair of inclined surfaces in a generally V-shaped configuration,
- b. opening means in said workpiece supporting means generally at the intersection of said pair of surfaces,
- c. a flexible, elongated, extensible binding member having a secured portion and at least one free end, an intermediate portion of said binding member passing through said opening means for securing said workpiece,
- d. tensioning means for securing the binding member including a rotatable spool means mounted generally parallel to said pair of surfaces with the secured portion of said binding member attached to said spool means, the free end of said binding member being adapted to pass back through said opening means for positioning between the secured portion and the spool means,
- e. torquing means connected to the spool means for rotating said spool means to tension said binding member after the free end has been positioned between the secured portion and the spool means, and
- f. locking means associated with said spool means for selectively preventing undesired rotation of said spool means.
14. The apparatus as defined in claim 13 including positioning means between said spool means and said opening means for guiding said free end in position between said spool means and said secured portion.
15. The apparatus as defined in claim 14 wherein said locking means comprise a locking disc having a plurality of gear-like teeth disposed about its circumference, said locking disc being connected with said spool means,
- a. detent in engagement with said locking disc to prevent rotation of said locking disc in a direction which tends to loosen said locking member, and
- release means for releasing the detent from engagement with said locking disc.
16. The apparatus as defined in claim 13 wherein a pair of free ends of the binding member may be secured to each other about the workpiece.
17. The apparatus according to claim 16 wherein each of said free ends of said binding member further includes adhering means for securing the respective free ends for the tensioning of said binding member about said workpiece.

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