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Stratienko et al.

[11] **3,827,407**

[45] **Aug. 6, 1974**

[54] TUG/BARGE LATCHING MECHANISM

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[73] Assignee: **Philadelphia Gear Corporation,** King of Prussia, Pa.

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[52] **U.S. Cl.** ..... **114/235 A,** 280/482

[51] **Int. Cl.** **B63b 21/00**

[58] **Field of Search** ..... 114/235 R, 235 A, 77 R, 114/77 A; 213/85, 96, 97, 182, 184; 280/504, 482, 511, 479; 24/221 R, 221 A; 403/348, 349

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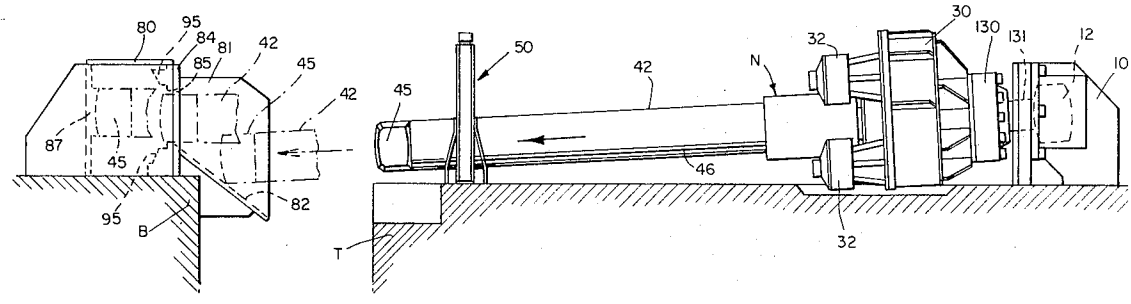
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Primary Examiner—Trygve M. Blix
Assistant Examiner—Sherman D. Basinger
Attorney, Agent, or Firm—Paul & Paul

[57] **ABSTRACT**

A self-latching self-releasing mechanism for coupling and releasably locking a marine tug to a barge includes, in a preferred form, a non-powered latching mechanism of the keeper type mounted at the aft end of the barge and a power-driven latch coupling mechanism mounted on the fore end of the tug. The power-driven latch coupling mechanism includes a latch bar mounted at the forward end of an elongated tubular nut adapted to be driven forwardly and rearwardly in the axial direction of the tubular nut by a power-driven screw shaft. Provision is made for rotating the tubular nut, and hence the latch bar, through 90°, to effect latching and unlatching. The rearward end of the screw shaft is supported for rotation in the housing of the power drive which in turn is supported for universal movement on a stub mounted in a self-aligning spherical bearing in a support housing mounted on the tug. Axial or translational thrust forces are transmitted through the screw shaft and its power drive housing to the support housing. The power drive and its housing move axially with any axial movement of the screw, and hence are not subjected to the axial thrust forces. Self-latching and self-releasing of the latching mechanism is accomplished and controlled by the direction of rotation of the tubular nut on the screw shaft.

12 Claims, 9 Drawing Figures



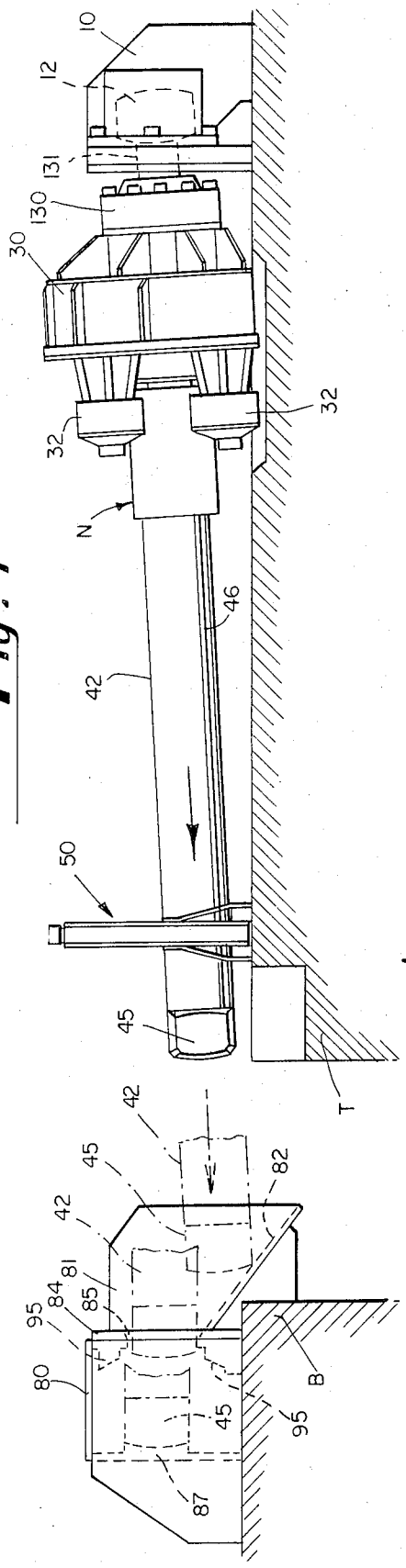

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Fig. 1

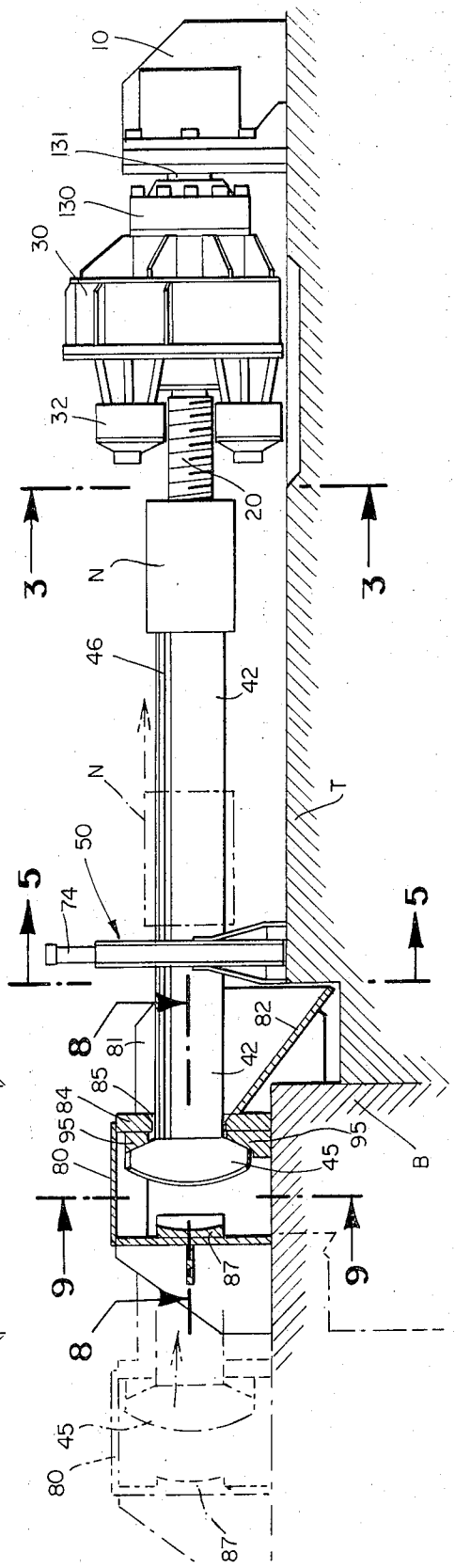
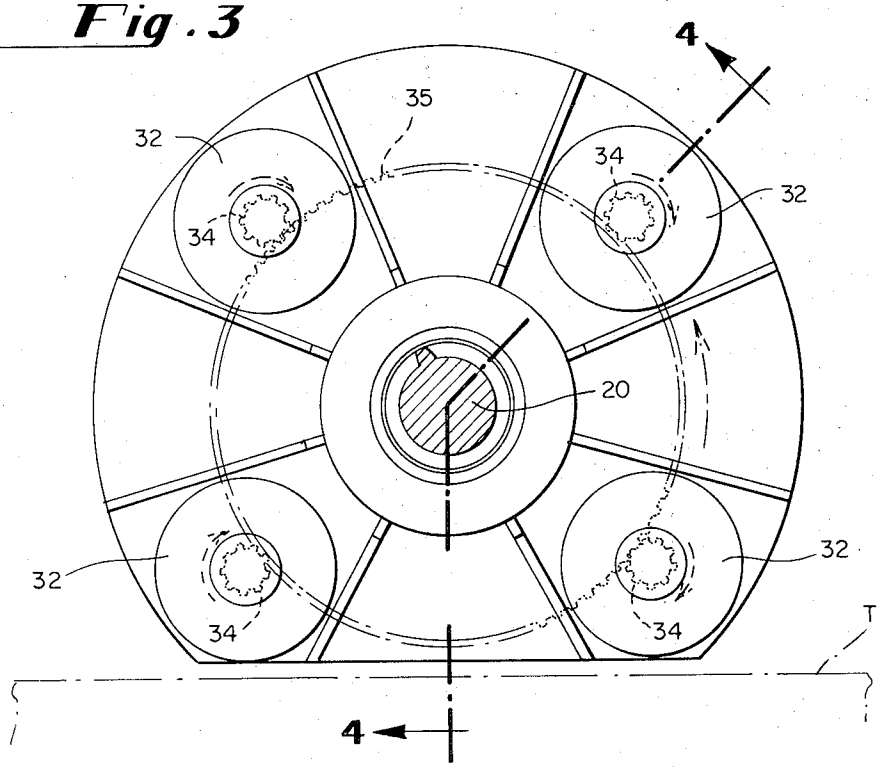

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Fig. 2

Fig. 3



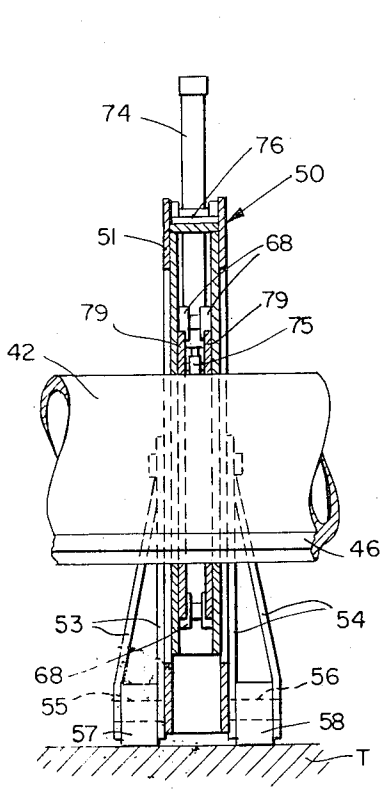


Fig. 6

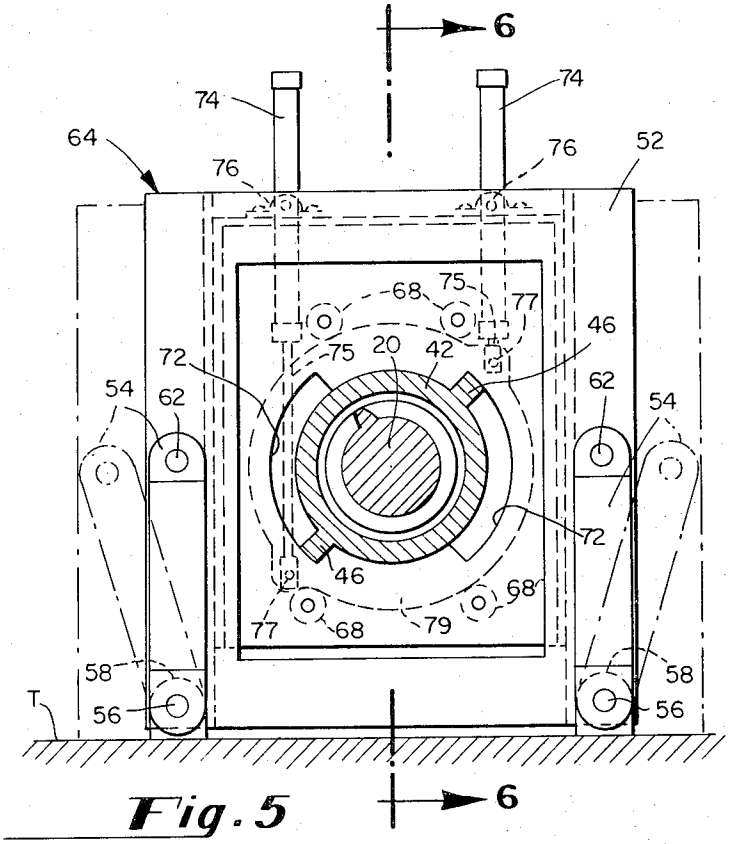


Fig. 5

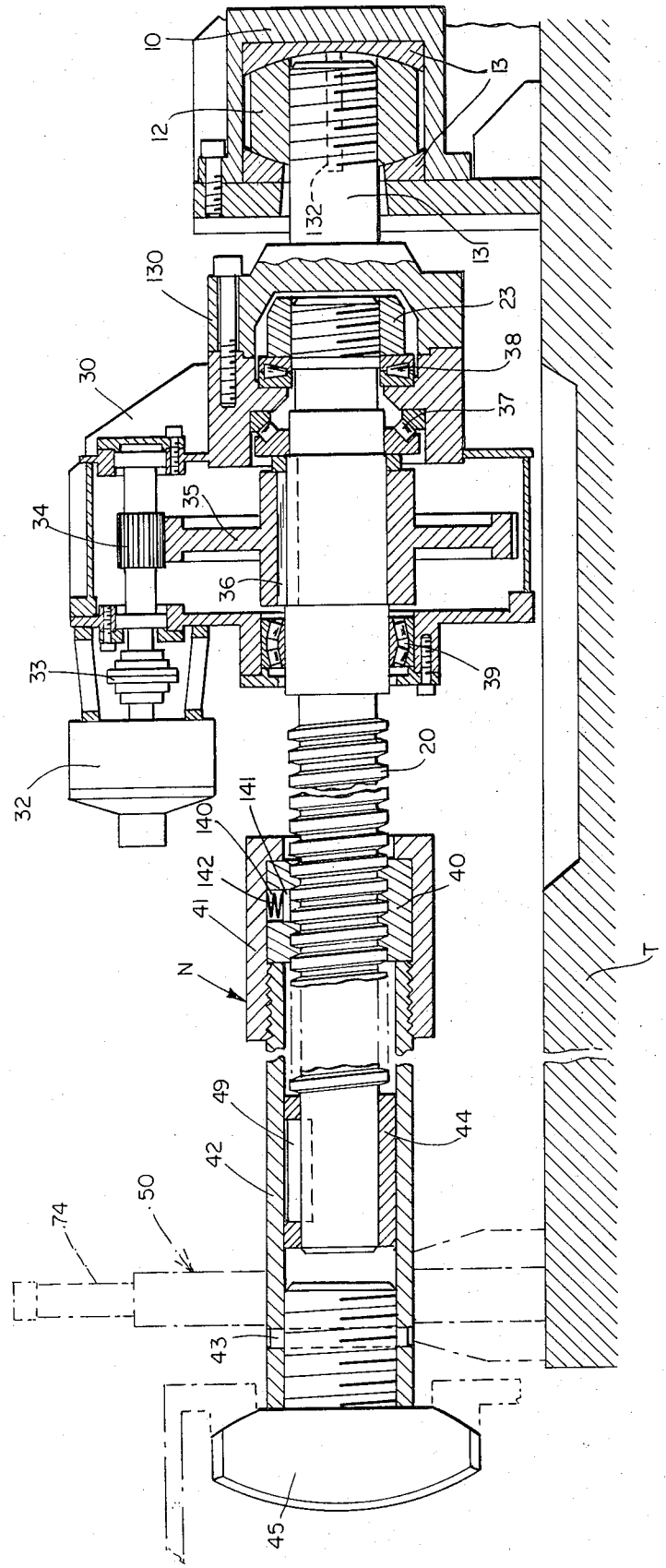

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Fig. 4

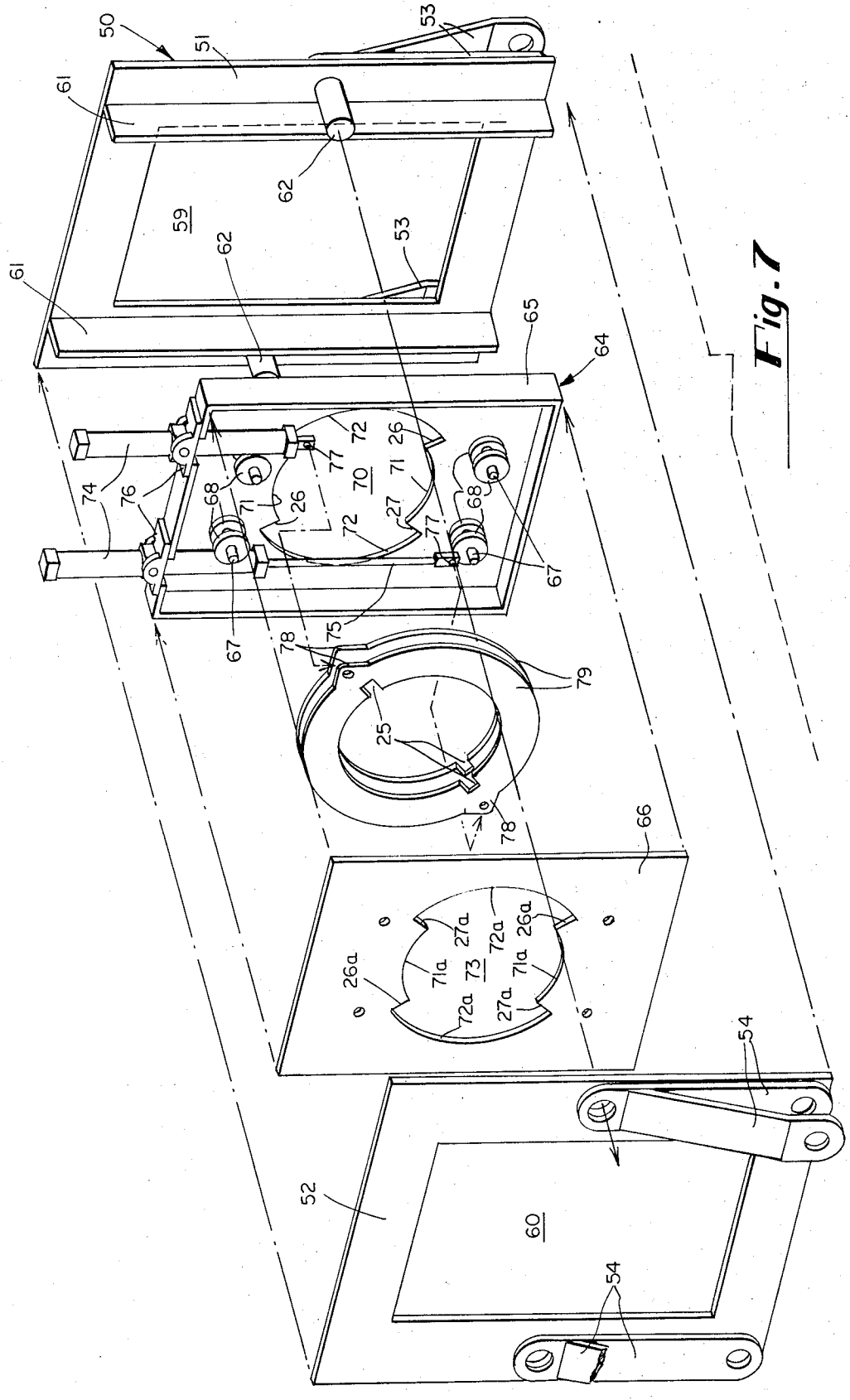

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Fig. 7

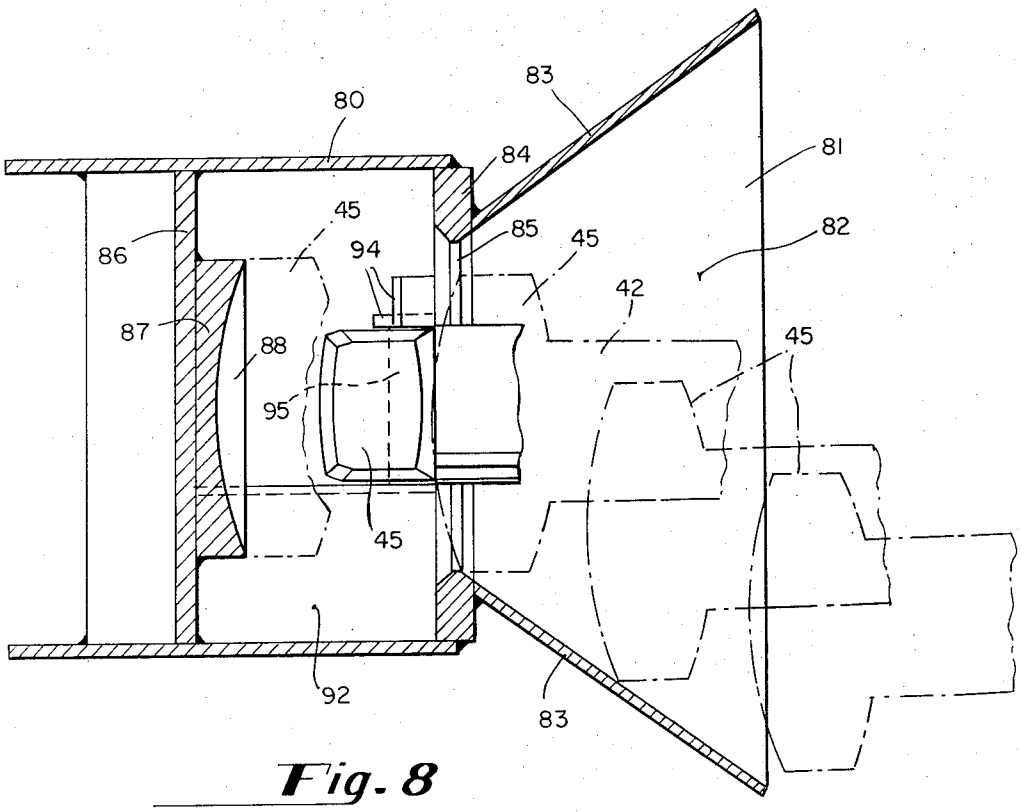

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Fig. 8

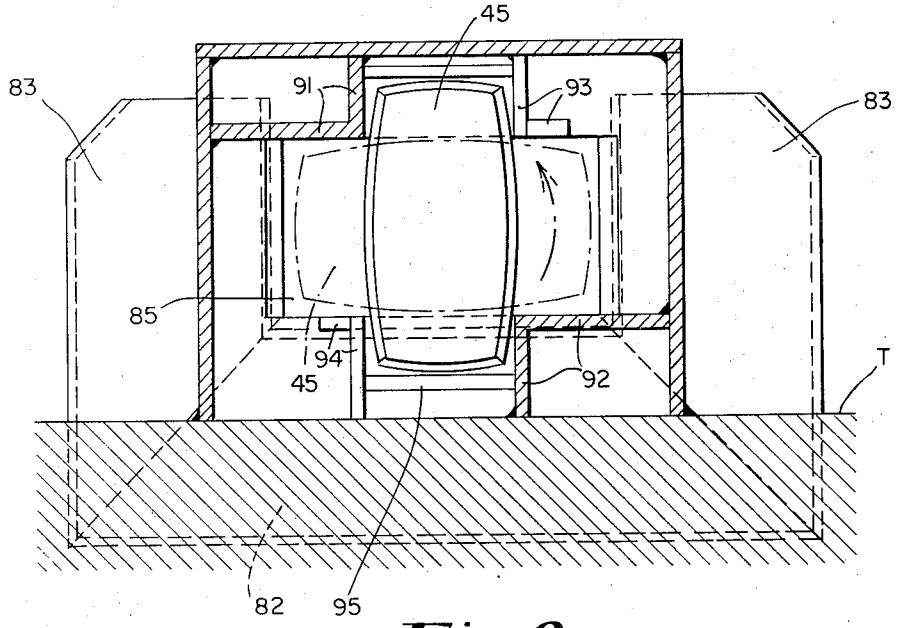

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Fig. 9

TUG/BARGE LATCHING MECHANISM

BACKGROUND OF THE INVENTION

This invention relates to mechanisms for coupling a marine tug to a barge.

More particularly, the invention relates to mechanisms for coupling together and locking releasably a tug and a barge in tandem arrangement, as distinguished from the alongside arrangement which is frequently used in harbor work.

The invention relates particularly to tug/barge coupling means where the aft end of the barge is provided with a recess or notch for receiving the prow or fore part of a tug which is to be releasably latched to the barge for pulling or pushing the barge which in most instances will be much larger than the tug.

SUMMARY OF THE INVENTION

A principal object of the invention is to provide a self-latching, self-releasing coupling mechanism for connecting a tug and barge together, with all of the power-driven components being located on the tug.

A further object is to provide a latching mechanism of the foregoing type in which the tug and barge, when latched together, are effectively integrated, with no freedom of relative motion between the tug and the barge.

A further object is to provide a power-driven, self-latching, self-releasing coupling mechanism for a tug and a barge for effecting a rigid connection therebetween, but with provision for aligning the component parts of the mechanism located on the tug with that located on the barge.

The foregoing, as well as other objects of the invention, are accomplished, in accordance with a preferred form of the invention, by providing a non-powered latch keeper mechanism on the barge and by providing on the tug a power-driven latch coupling mechanism which includes a latch bar mounted at the forward end of a tubular nut adapted to be moved in the forward and rearward axial directions of the nut by rotation of a screw driven by a power drive assembly. Self-latching and self-releasing of the latching mechanism is controlled by the direction of rotation of the tubular nut on the power-driven screw shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic elevational illustration of a marine tug/barge coupling and latching mechanism, according to one embodiment of the present invention, the barge and tug being shown in unlatched positions, with the barge on the left and the tug on the right.

FIG. 2 is a schematic elevational illustration similar to that of FIG. 1 but showing the barge and tug in latched positions.

FIG. 3 is an end view in section, looking along the line 3—3 of FIG. 2.

FIG. 4 is an elevational view, in section, of the coupling mechanism on the tug, as seen looking along the bent line 4—4 of FIG. 3.

FIG. 5 is an end view of a support frame for the tubular nut, mounted on the tug, as seen looking down along the line 5—5 of FIG. 2.

FIG. 6 is a view looking along the line 6—6 of FIG. 5.

FIG. 7 is a perspective exploded illustration of the tubular-nut support frame mechanism on the tug.

FIG. 8 is a plan view, in section, of the latch keeper housing on the barge.

FIG. 9 is an end view, in section, of the latch keeper housing on the barge.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Illustrated schematically, at the left-hand side of FIG. 1, is the aft end of a barge B having mounted thereon a non-powered keeper-type latch mechanism. Illustrated schematically at the right-hand portion of FIG. 1, is the fore end of a tug T having mounted thereon a power-drive form of latch coupling mechanism adapted to co-operate with the keeper mechanism on the barge B to automatically couple and uncouple the tug and barge vessels. The coupling mechanism on the Tug T will be described first.

Referring to FIGS. 2, 3 and 4, as well as FIG. 1, a latch bar 45, having a width greater than its height and preferably of generally rectangular cross section, and having convex faces, is screwed or otherwise fitted into the forward end of a tube 42 and keyed thereto as by key 43.

Tube 42, together with a collar 41 and a captive nut 40, form a tubular nut N. So far as operation is concerned, tubular nut N could be a single integral piece, but, for assembly reasons, tube 42 is internally threaded at its rearward end and screwed into a collar 41, with a nut 40 being captive within collar 41 and tube 42. Tube 42 is provided with a pair of exterior keys 46 which are at 180° spacing and which extend longitudinally along the exterior surface of the tube. These keys 46 are seen in section in FIG. 5.

The tubular nut N (40, 41, 42) is threaded on a elongated externally threaded shaft or screw 20. The forward end of screw shaft 20 is of reduced diameter and non-threaded, and keyed thereto, as by key 49, is a sleeve bushing 44, which supports the forward end of screw 20 within the tube 42 of the tubular nut N.

Screw 20 extends rearwardly from tube 42 through the forward portion of a power drive housing 30 and into a rearward portion 130 which is secured, as by bolts, to the forward portion. The rearward portion 130 is secured, as by welding, to a stub shaft 131 which is screwed into a square nut 12 having spherical forward and rearward faces for universal movement in a ball type socket 13 mounted in a support housing 10 on the tug T. A key 132 locks the stub shaft 131 against rotation in the square nut 12, thereby preventing rotational movement of power-drive housing 30 in response to torque forces imposed in the housing 30.

Supported in housing 30 is a power drive which comprises a plurality of electric drive motors 32 (four being shown in FIG. 3) which are connected through suitable couplings 33 to pinions 34 which are engaged at spaced-apart positions with the peripheral teeth of a bull gear 35 mounted on and keyed to screw shaft 20, as by key 36. If desired, a positive brake (not shown) may be applied to one or more of the pinion shafts to lock the screw shaft 20 against rotation when it is not being driven by the power drive.

Screw shaft 20 is adapted for rotation in housing 30 on a roller bearing assembly 39 located forwardly of the bull gear 35, and by a pair of thrust bearing assemblies 37 and 38 located rearwardly of bull gear 35 and

retained by a retaining nut **23** screwed on the end of screw shaft **20.**

Reference is now made to FIG. 7 which is an exploded perspective view of a support-and-guide mechanism in a housing **50** which, as seen in FIGS. **1, 2,** and **4–6,** is mounted on the fore deck of tug T and through which the tube **42** passes for supporting the forward end of the tube while allowing for limited movement of the tube in all radial directions relative to the longitudinal axis of the tube.

Support-and-guide housing **50** includes a rearward frame member **51** and a forward frame member **52.** Each of these frame members **51** and **52** is provided with two pairs of support legs **53** and **54,** respectively, and secured, as by pins **55** and **56,** to pedestal blocks **57** and **58** secured, as by welding, to the deck of tug T. Each of the frame members **51** and **52** is provided with a large aperture, identified as **59** and **60** respectfully, through which tube **42** passes. These apertures are illustrated as vertically rectangular, but need not be. For example, they could be vertically oval. The rearward frame member **51** includes a pair of vertical side rails **61** which function as guide rails for a slide frame **64.** A pair of support pins **62** extend forwardly from the rearward frame member **51** and pass through holes **63** in the forward frame member **52** for supporting the forward frame **52** thereon. Any suitable means may be used for securing the forward frame on the pins **62.**

Within the housing **50** of the support-and-guide mechanism, between the rearward frame member **51** and the forward frame member **52,** is a slide frame **64** which is slidable up and down on side rails **61** within the housing **50.** The slide frame **64** comprises a rectangular box member **65** and a face plate **66,** which is supported on the box member **65** as by four pins **67.** These four pins **67** also support four pairs of rollers **68,** which support and guide a pair of annular disc **79** for rotary movement within the slide frame **64.**

The rearward wall of box member **65** of slide frame **64** has therein a generally circular aperture **70** whose peripheral edges are defined by two pairs of opposing arcuate surfaces **71** and **72** which lie on circles of different diameters. The one pair of opposing arcuate surfaces **71** lie on a small-diameter circle which corresponds to the outside diameter of tube **42** exclusive of its keys **46.** The other pair of opposing arcuate surfaces **72** lie on a larger-diameter circle which corresponds to the overall diameter of tube **42** including the keys **46.** At the junction of the arcuate surfaces **71** and **72** are radial surfaces **26** and **27** which function as stops for keys **46,** as will become clear.

An aperture **73,** identically shaped and sized as aperture **70,** is provided in the face plate **66** of the slide frame **64** and the corresponding pairs of arcuate surfaces in face plate **66,** and the corresponding key stop surfaces, are given similar reference numerals, followed by the suffix *a,* as indicated in FIG. **7.**

Provided in one form of the invention, but not essential to the shaft-mounted screw-shaft drive form of latching mechanism, is a pair of fluid cylinders **74,** which may be hydraulic or pneumatic, and which are supported for pivotal movement in pivot brackets **76** in the upper edge surface of **65,** seen in FIG. **7.** The pistons **75** of the cylinders **74** are extendible and retractable in generally vertical directions, but the pivotal mountings **76** allow for the piston heads **77** to move along arcuate paths corresponding to the arcuate surfaces **72.** The piston heads **77** are pinned to ears **78** of a pair of annular discs **79,** seen in FIG. **7.** Discs **79** have circular apertures having a diameter equal to the diameter of the smaller-diameter arcuate surfaces **71** of slide frame **64.** As previously indicated, this diameter (**71**) corresponds to the outside diameter of tube **42** exclusive of keys **46.** The circular edge of the opening in discs **79** is provided with a pair of opposing recesses or notches **25,** at 180° spacing, through which pass keys **46** of tube **42.** The outer circular edges of disc **79** are supported and guided for rotational movement by four sets of rollers **68** mounted on pins **67** in slide frame **64,** as indicated in FIG. **5** and as seen in section in FIG. **6.**

Referring now to FIGS. **1, 2, 8** and **9,** mounted on the barge B, at the aft end thereof, is a non-powered latch keeper housing **80** having a rearwardly-extending open-ended section **81** which projects beyond the rear end of the barge B. Section **81** has an inclined ramp **82** which extends rearwardly downwardly, and the side walls **83** of section **81** are divergent rearwardly, as seen in FIGS. **8** and **9.**

Between latch keeper housing **80** and its rearwardly extending section **81** is a wall **84** having a central aperture **85** therein and a pair of abutment blocks **95** above and below the aperture. The shape and size of aperture **85** corresponds to the shape and size of latch bar **45** when in one of its two positions. In the illustrated embodiment, aperture **85** is wider than it is high, and is of such shape and size as to allow latch bar **45** to pass therethrough only when the latch bar **45** is in the horizontal or unlatching position, as illustrated in FIG. **1** and as shown in phantom in FIGS. **8** and **9.**

The forward wall **86** of housing **80** is provided with an abutment plate **87** having a concave recess **88** for receiving the convex face of latch bar **45.** The upper portion of one side of housing **80,** the left side as viewed in FIG. **9,** and the lower portion of the other side of housing **80,** the right side as viewed in FIG. **9,** are provided with abutment stop members **91** and **92** which extend the full length of housing **80** and which stop counterclockwise rotation, as viewed in FIG. **9,** of latch bar **45** beyond its vertical or latching position.

Provided at the rearward portion only of housing **80,** at the upper right and lower left portions as viewed in FIG. **9,** are abutment stop members **93** and **94** which extend for only a portion of the full length of housing **80.** These short stop members **93** and **94,** in combination with the abutment stop members **91** and **92,** prevent rotation of the vertical latch bar **45** in either direction, when the latch bar **45** is at the rearward end of the housing **80.** In this position, the latch bar **45** is latched and locked. Counterclockwise rotation of latch bar **45** is allowed, as viewed in FIG. **9,** only after the latch bar **45** has been moved fowardly toward the recessed abutment plate **86** beyond the forward ends of the short-length stop members **93** and **94.**

OPERATION

To latch the tug T to the barge B, tug T is maneuvered into a position immediately rearward of barge B. In some instances, barge B will be especially designed and built for a tug connection and will have a notch or slot in its rearward end portion for receiving the bow or forward portion of tug T.

When tug T has been maneuvered into a position in alignment with barge B, which is the position indicated

in FIG. 1, drive motors 32 of the shaft-mounted drive are energized to drive pinions 34 and bull gear 35 rotationally, thereby driving rotationally the screw shaft 20 in a direction to move the tubular nut N forwardly on the screw toward the barge B.

In the operation of the latching mechanism now being described, it will be assumed that the piston cylinders 74 have not been provided. These cylinders are optional; they are not essential, as will become clear.

As illustrated, to move the tubular nut N forwardly, i.e., toward the barge B, the screw 20 is rotated counterclockwise, as viewed looking from the tug T toward the barge B. As viewed in FIGS. 5, 7 and 9, this rotation of screw 20 is clockwise. When screw 20 is first so driven, due to the frictional resistance between the threads of the nut 40 and the screw 20, the tubular nut N will roate with the screw 20 through 90° until the keys 46 abut against the stops 26, 26*a*, in slide 64. Rotation of the tubular nut N then stops. The arrangement is such that when the keys 46 of tube 42 meet the stop surfaces 26, 26*a*, the latch bar 45 will have been turned to the horizontal position, illustrated in FIG. 1 and seen in phantom in FIG. 8. Thereafter, as rotation of screw 20 continues, the nut N moves forwardly toward the barge B, with the latch bar 45 remaining in the horizontal position.

If, when latch bar 45 reaches the barge B, the latch bar is lower than the deck surfaces of the barge B, the ramp surface 82 will cam the latch bar 45 upwardly, and the resulting upward movement of tube 42 will cause slide frame 64 to slide upwardly in housing 50.

If, when the latch bar 45 reaches the barge B, the latch bar is to the left or to the right of center, the latch bar 45 will be cammed toward center by the forwardly convergent side walls 83, as indicated in plan view in phantom in FIG. 8. The resulting lateral movement of tube 42 will cause housing 50 to move laterally on its legs 53, 54, as is indicated in phantom in FIG. 5.

In the movements of latch bar 45 and tube 42, vertically and laterally, referred to above, the rear end of the screw shaft 20, the power-drive housing 30, and the stub shaft 131, move universally, being supported in the universal joint 12, 13 in housing 10.

As forward movement of latch bar 45 in the horizontal position continues, the latch bar 45 passes through aperture 85 in the rearward wall 84 of housing 80 and enters into the latch keeper housing. The forward drive is continued until the convex forward face of the latch bar 45 abuts against the concave recess 88 of abutment plate 87. The direction of the reversible motors 32 is then reversed and the screw shaft 20 is now driven in the opposite or clockwise direction, as viewed looking from the tug T toward the barge B (counter-clockwise as viewed in FIGS. 5, 7 and 9). When the direction of rotation of screw 20 is reversed, as just indicated, the frictional resistance between the convex face of the latch bar 45 and the concave surface of recess 88 may prevent the latch bar 45 from rotating, thereby causing rearward movement of the nut N on screw 20, but as soon as the latch bar 45 leaves the surface of recess 88, the tubular nut N rotates with the screw 20, due to the frictional resistance between the threads of the nut 40 and the screw 20. This rotation, counterclockwise as viewed in FIG. 5, continues for 90°, until the keys 46 encounter and are stopped by the stop surfaces 27, 27*a*. This 90° rotation of the tubular nut N rotates the latch bar 45 through 90°, counterclockwise as viewed in FIG. 9, from the horizontal to the vertical position shown in solid line in FIG. 9. Continued rotation of screw shaft 20 then causes the vertically-positioned latch bar 45 to move rearwardly within the latch keeper housing 80 until the latch bar 45 abuts against the abutment blocks 95, as illustrated in FIG. 2. The latch bar 45 is now in the fully latched position, and continued rotation of screw 20 in a direction tending to withdraw the latch bar 45 from the keeper housing 80 has the effect of drawing the tug T toward the heavier barge B until the tug T abuts tightly against the barge B, as illustrated schematically in FIG. 2.

Thereafter, the tug and barge operate as an integral unit, at least so far as thrust forces are concerned.

To unlatch the latching mechanism and decouple the tug T from the barge B, the screw shaft 20 is first driven, by its motor drive, in a direction to cause the tubular nut N and latch bar 45 to move forwardly from the latched position shown in FIG. 2. When the screw shaft 20 is first so driven (clockwise as viewed in FIG. 9) the abutment stop members 93 and 94 prevent rotation of the latch bar 45 and, accordingly, the tubular nut N will move forwardly on the screw, moving the latch bar 45 away from the blocks 95. As soon as the latch bar 45 is clear of the short-length abutment stop members 93, 94, the latch bar, due to frictional resistance between the threads of the nut 40 and the screw 20, will rotate with the screw shaft 20, and forward movement will temporarily cease. However, such rotation of the latch bar 45 will continue only through 90° until the keys 46 of the tube 42 reach and abut against the radial stop surfaces 26, 26*a* of the slide 64. Since this will occur after the latch bar has rotated through 90°, the position of the latch bar 45 is changed from the vertical to the horizontal position. Thereafter, with further rotational movement of the tubular nut N and the latch bar 45 prevented, the tubular nut N and the latch bar 45 will move forwardly toward the recess 88 in plate 87 of the forward wall 86 of housing 80. Continued drive of the screw shaft 20 in the forward direction, after the latch bar 45 has been seated in the recess 88 of the plate 87, will drive the tug T rearwardly away from the barge B, thereby decoupling the two vessels.

It will be seen from the foregoing description that the operation of latching and unlatching depends upon frictional resistance between the tubular nut N and the screw shaft 20 to rotate the tubular nut N and hence the latch bar 45 through 90° to effect the necessary change in the position of the latch bar.

In some cases, it may be necessary to increase the frictional resistance between the nut N and the screw shaft 20, so as to assure angular movement of the nut 40 in response to initial rotational movement of the screw shaft. This may be accomplished in a number of ways, one of which is illustrated in FIG. 4. As there illustrated, nut 40 is provided with a recess 140 having therein a brake shoe 141 which is pressed against one or more threads (two being illustrated) of the screw shaft 20, as by a compression spring 142.

In accordance with a modification of the present invention, a positive drive is provided for assuring the necessary rotation of the tubular nut N and of the latch bar 45 through 90°. This assurance is provided through a pair of fluid cylinders 74 pivotally mounted in pivot brackets 76 on the upper edge of the support-and-guide

unit **64.** As has already been indicated, pistons **75** of the cylinders **74** have heads **77** which are pinned to the opposite ears **78** of a pair of discs **79.** It will be seen, by driving the fluid cylinders **74,** as by hydraulic or pneumatic means, to extend the one piston **75** while withdrawing the other piston **75,** that the pair of discs **79** will be driven rotationally on the support rollers **68** in one direction or the other, according to the drive of the pistons **75.**

By the means described, either with or without the employment of the fluid cylinders and pistons **74, 75,** the tug T and the barge B are automatically latched and automatically released by power drive mechanism located on the tug T. No raising and lowering of the coupling shaft is required. No manual adjustments or operations are required. The capability of ramp surface **82** to cam the latch bar **45** upwardly to the necessary latching position, accommodates to different levels of the tug deck relative to the barge deck. Movement of the latch bar **45** upwardly and downwardly is made possible by the support of the tubular nut N in the slide guide **64** of the support-and-guide housing **50.** The capability of the convergent side walls **83** of the section **81** to cam the latch bar **45** toward the center axis, accommodates to misalignments in the axial or tandem directions. Lateral movement of latch bar **45** is made possible by the support of support-and-guide housing **50** on the legs **53, 54** for lateral movement in either direction. Movement of latch bar **45** in universal directions is made possible by the fact that the rear end of the screw shaft **20** is mounted in housing **30** which is supported by stub shaft **131** for universal movement in the universal joint in housing **10.**

It is to be noted that none of the thrust forces (pull or push) are imposed on the power drive housing **30.** Housing **30** merely rides along with any small axial movement of the screw shaft **20.** All of the axial thrust forces are taken by the support housing **10.** This is an important feature of the power drive disclosed in the present application.

The invention has been described as particularly suited for latching a tug to a barge. In such case, the power drive is located on the tug. However, the latching mechanism described may also be used for latching other forms of units, wherein at least one of the units is mobile.

In some installations, two or more substantially identical latching mechanisms of the type described herein may be used in parallel.

What is claimed is:

1. Apparatus for releasably coupling and latching together first and second units at least one of which is mobile, said coupling-and-latching apparatus comprising:

A. A first powered mechanism mounted on a first mobile unit, said first mechanism including:
   a. a screw shaft;
   b. a reversible power drive for said screw shaft;
   c. a nut engaged with said screw shaft;
   d. means responsive to initial rotation of said screw shaft in either direction for allowing limited angular movement in said same direction of said nut and thereafter preventing rotational movement thereof in said same direction thereby to effect axial movement of said nut on said screw shaft in one direction or the other according to the direction of rotation of said screw shaft;
   e. a latch bar on said nut and adapted to be moved angularly in response to initial rotation of said screw shaft in either direction and thereafter to be moved axially forwardly or rearwardly on said screw shaft to effect self-latching and self-unlatching of said coupling-and- latching apparatus;

B. a second non-powered mechanism on a second unit, said second mechanism including:
   a. a latch-bar keeper mechanism fixed mounted on said second unit and adapted to be engaged by said latch bar for latching said bar, and for unlatching said bar, according to the angular position of said bar and to subsequent axial movement of said nut on said screw shaft.

2. Apparatus according to claim **1** wherein said second mechanism includes:
   a. at least one rotational stop for said latch bar preventing rotational movement of said latch bar in one direction beyond a selected angular latching position;
   b. additional rotational stop for preventing rotational movement of said latch bar in either direction when said latch bar is in angular latching position and also in axial latching position.

3. Apparatus according to claim **2** wherein said latch-bar keeper mechanism includes a housing having an aperture therein of a shape and size to allow passage therethrough of said latch bar when said latch bar is in angular unlatching position.

4. Apparatus according to claim **3** wherein said second mechanism includes guide means for guiding said latch bar into said housing aperture.

5. Apparatus according to claim **4** wherein:
   a. said nut has an elongated tube portion;
   b. said tube is provided with rotational stop means;
   c. a support housing is provided on said first mobile unit through which said elongated tube portion of said nut passes;
   d. said tube support housing is constructed to allow limited movement of said tube within said support housing in all radial directions;
   e. said tube support housing is constructed to cooperate with said tube stop means to allow limited angular movement of said tube portion about its center axis.

6. Apparatus according to claim **5** wherein said tube stop means comprises external key means.

7. Apparatus according to claim **6** wherein:
   a. said tube support housing is mounted for limited movement in lateral directions;
   b. said tube support housing includes a vertical slide having an aperture through which said keyed tube portion passes;
   c. said slide includes keyway means allowing rotation of said keyed tube portion about its own axis through an angle of less than 180°.

8. Apparatus for releasably coupling and latching together first and second units at least one of which is mobile, said coupling-and-latching apparatus comprising:

A. a first powered mechanism mounted on a first mobile unit, said first mechanism including:
   a. an elongated member having a portion extendible in its axial direction, the extendible portion

being also rotatable angularly about its own axis;

b. support means supporting the rearward end of said member on said first mobile unit for limited universal movement in the radial directions;

c. a reversible power drive to extend and retract said extendible portion;

d. means for rotating said extendible portion angularly through an angle of less than 180°;

e. a latch bar mounted at the forward end of said extendible portion and adapted to be moved angularly in either one direction through an angle of less than 180° and to be moved axially forwardly and rearwardly;

B. a second non-powered mechanism on said second unit, said second mechanism including:

a. a latch-bar keeper mechanism fixed mounted on said second unit and adapted to be engaged by said latch bar for latching said bar, and for unlatching said bar, according to the angular position of said bar and to subsequent axial movement of said extendible portion.

9. Apparatus according to claim **8** wherein:

a. said second mechanism includes at least one rotational stop for said latch bar preventing rotational movement of said latch bar in one direction beyond a selected angular latching position.

10. Apparatus according to claim **9** wherein:

a. said second mechanism includes an additional rotational stop for preventing rotational movement of said latch bar in either direction when said latch bar is in angular latching position and also in axial latching position.

11. Apparatus according to claim **10** wherein said latch-bar keeper mechanism includes a housing having an aperture therein of a shape and size to allow passage therethrough of said latch bar only when said latch bar is in angular unlatching position.

12. Apparatus according to claim **11** wherein said second mechanism includes guide means for guiding said latch bar into said housing aperture.

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