Jan. 9, 1968 J. J. McCARTHY 3,362,050

CONCENTRIC TUBE RELEASABLE CLASP

Filed April 15, 1966 2 Sheets-Sheet 1

Fig. 1

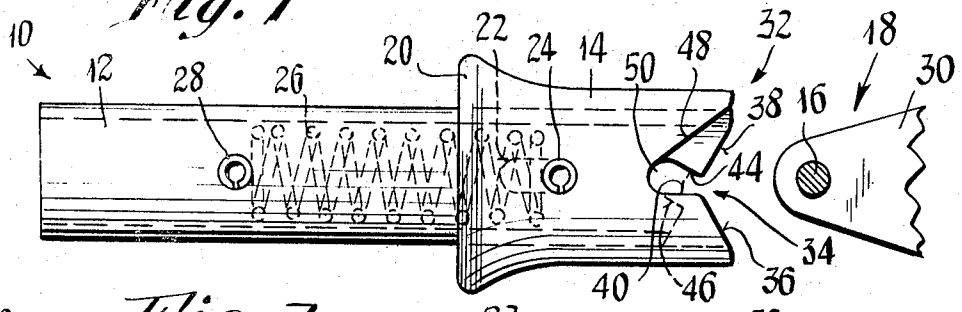


Fig. 3

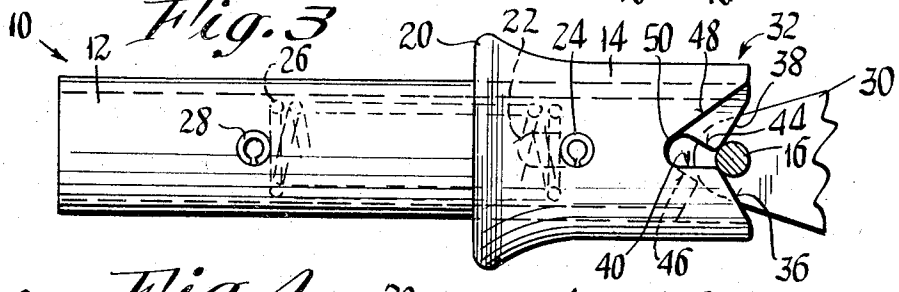


Fig. 4

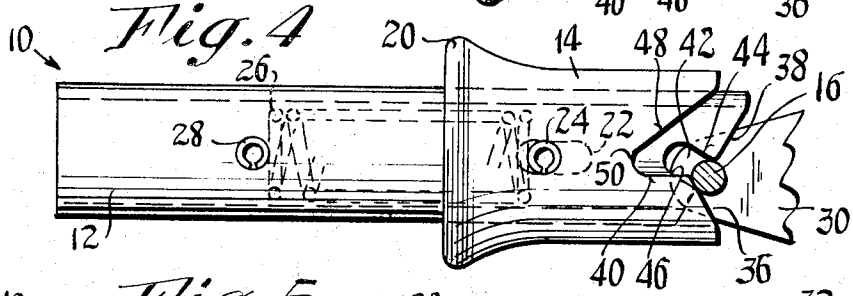


Fig. 5

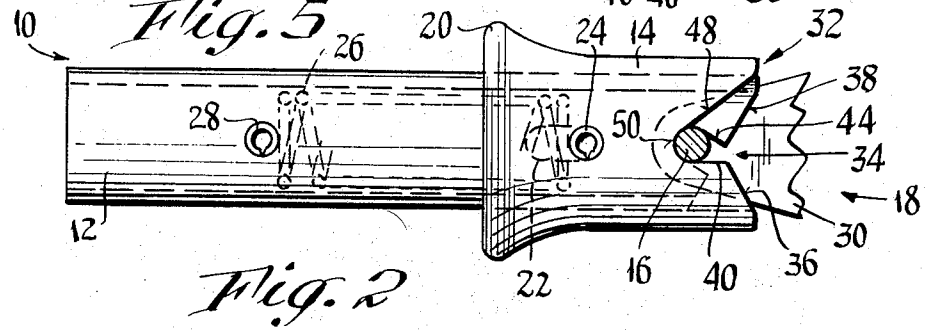
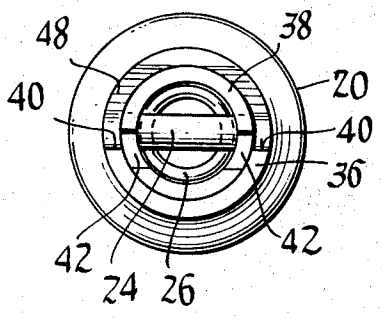


Fig. 2



INVENTOR.
John J. McCarthy
BY
W. Gibbon Edmonds
AGENT

Jan. 9, 1968 J. J. McCARTHY 3,362,050

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Filed April 15, 1966 2 Sheets-Sheet 2

Fig. 6

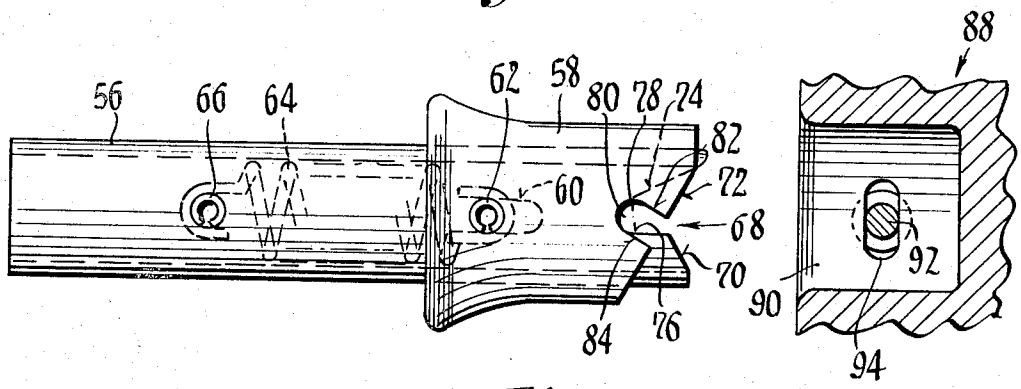


Fig. 7

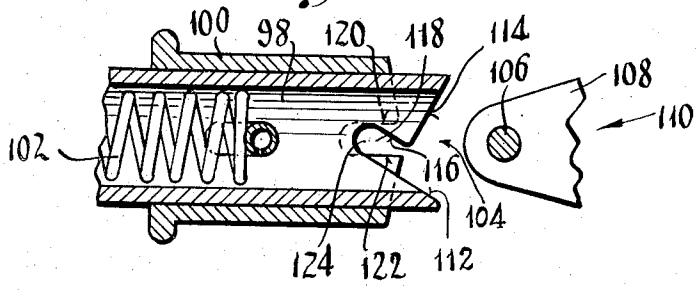
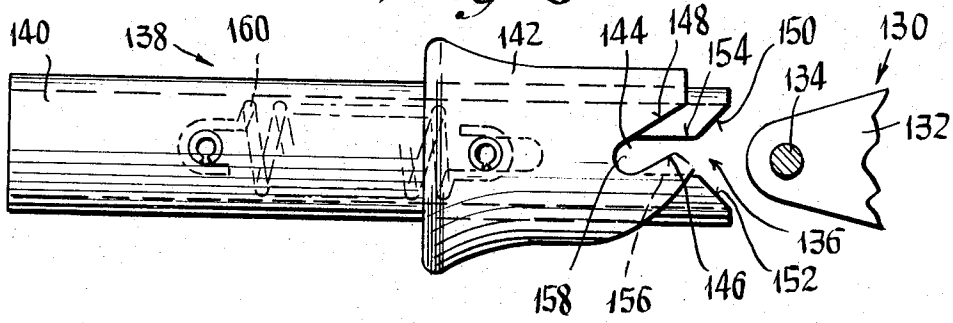


Fig. 8



INVENTOR.
John J. McCarthy
BY
H. Gilbert Lehmann
AGENT

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3,362,050

CONCENTRIC TUBE RELEASABLE CLASP

John J. McCarthy, Weston, Conn., assignor to Norco, Inc., Ridgefield, Conn., a corporation of Connecticut

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9 Claims. (Cl. 24—230)

This invention relates to releasable clasps, and more particularly to clasps having tubular parts.

Objects of the invention are to provide a novel and improved releasable clasp characterized by a plug-like configuration having telescopic tubular members presenting a divergent mouth structure for receiving a cooperable bar, which members at one and the same time are simple and economical to produce while being sturdy and reliable in operation; to provide such a clasp, wherein the components are easily and quickly assembled, which is readily understood and operated even by relatively unskilled personnel, is fool proof and not likely to malfunction or require servicing, is resistant to shock and vibration, and wherein the separable members may be easily and quickly latched together or else released as desired.

Other features and advantages will hereinafter appear.

In the drawings:

FIG. 1 is a side elevational view of one form of plug-like clasp structure as provided by the invention, and also a sectional view of a cooperable structure, both being in separated relation.

FIG. 2 is a right end elevational view of the plug-like clasp structure, referring to FIG. 1.

FIG. 3 is a view like that of FIG. 1, but with the structures being brought into initial contact with each other during the fastening operation.

FIG. 4 is a view similar to those of FIGS. 1 and 3, showing a further step in the fastening of the plug-like structure to the cooperable structure.

FIG. 5 is also a similar view, showing the final fastened positions of the structures.

FIG. 6 is an elevational-sectional view of a plug-like clasp and cooperable structure, illustrating a modification of the invention.

FIG. 7 is an axila sectional view of a plug-like clasp and cooperable structure, illustrating yet another modification of the invention.

FIG. 8 is an elevational-sectional view of a plug-like clasp and cooperable structure, constituting yet another modification of the invention.

Considering first FIGS. 1–5, the present improved releasable clasp is shown as comprising a plug-like configuration designated generally by the numeral **10**, said configuration being characterized by inner and outer telescopic tubular members **12** and **14** respectively, having corresponding (right) end portions which present a "fish-mouth" or divergent mouth structure adapted to receive a diametric bar **16** of a cooperable structural member, the latter being designated generally by the numeral **18**. The telescopic or concentric, tubular plug-like configuration **10** comprises a manually operable and releasable clasp, whereas the structure **18** (which is also hereinafter referred to as a "receiver structure") is not operable for releasing purposes.

The assemblage **10** is shown in FIGS. 1 and 3–5 in the process of being attached to the receiver structure **18** by the mere act of advancing the plug-like structure onto the receiver structure, with the advancing or left-to-right force being applied to the inner tubular member **12**. The inner and outer members **12, 14** are relatively axially movable from positions illustrated in FIGS. 1 and 5 wherein the member **14** is advanced, to positions illustrated in FIG. 4 wherein the member **14** is in a retracted position. The outer tubular member **14** is also herein

termed a locking and release sleeve or collar, since it must be actuated to effect release of the diametric pin **16** when the latter is held captive as in FIG. 5.

A loose sliding fit is provided between the inner and outer tubes **12, 14**; also, the outer tube **14** is preferably provided with an outward flare **20** at its left end, to constitute a convenient finger grip by which it may be grasped and pulled from right to left, to effect release of the diametric bar **16**.

The inner tube **12** has a pair of oppositely disposed longitudinally extending slots **22** through which there passes a cross pin **24** rigidly affixed in the release sleeve **14**. In the inner tube **12** there is a helical compression spring **26** which engages the cross pin **24** and also engages a second cross pin **28** rigidly affixed to the shank or body portion of the tube **12**. Thus, the release sleeve **14** is biased to the right, to the locking positions of FIGS. 1 and 5, being normally yieldably held in such positions and being retractable to the position of FIG. 4 either by force exerted by the fingers of the user or else, as shown in FIGS. 3 and 4, by force exerted on it by the diametric pin **16**.

It will be understood that the inner tube **12** may be carried by a structure (not shown) which is to be releasably connected with another structure (not shown) on which the receiver part **18** is mounted. In FIGS. 1–5, the receiver part **18** is shown as comprising a pair of spaced arms **30** which rigidly carry the diametric bar **16**, the latter extending between the arms **30**.

In accordance with the present invention, the plug-like clasp configuration **10** is constituted essentially of two concentric, telescopic tubular members and such members are so organized at one pair of corresponding ends (the right ends as viewed in the figures) as to present a divergent mouth or "fish-mouth" structure which is designated generally by the numeral **32**, for engagement by and reception of the diametric bar **16**. This entry or mouth structure **32** is arranged to guide the bar **16** to its center or smallest portion, and such mouth structure is constituted of a pair of diametrically opposite notches **34** only one of which is seen in the figures for the reason that the other is directly behind the visible or front notch and has an identical shape thereto.

Each of the notches **34** is characterized by divergent edges **36, 38** which are adapted for engagement by the diametric bar **16**. It will be understood that, by virtue of the members **12, 14** being tubular, the divergent edges **36, 38** will be curved when looking at the end of the plug-like configuration **10**, this for example being shown in FIG. 2.

The right end portion of the release sleeve **14** has a pair of straight edges **40**, said edges being parallel to the common axis of the tubes. The corresponding right end portion of the inner tube **12** has a pair of slots **42** (see FIG. 4), said slots being characterized by opposite parallel edges **44, 46**. The slots **42** extend transversely of the common axis of the members **12, 14** and communicate with the divergent notches **34**, being adapted also to receive the diametric bar **16** from the notches when relative movement of the tubes **12, 14** brings these to the bar-receiving position of FIG. 4.

It will be understood by observing FIG. 5 that the relative positions of the tubes **12, 14** in this figure and also in FIG. 1 is such that exit of the diametric bar **16** from the slots **42** is obstructed by the straight edges **40** which are disposed parallel to the common axis of the members **12, 14**.

The release sleeve or collar **14** also has a second pair of divergent edges **48** which, with the straight edges **40** define slots **50** in the release sleeve. The diametric bar **16** is received and locked in the slots **50** as seen in FIG. 5.

The "fish-mouth" configurations designated generally

by the numeral **34** constitute an advantageous feature, and represent a distinct advantage in that the divergent edges **36, 38** are adapted to guide the diametric bar **16** to the center or smaller portion of the mouth, whereby the bar thereafter as seen in FIGS. 3 and 4 can exert pressure on the sleeve **14** to retract the same while simultaneously finding its fully nested position in the slots **42, 50**. This greatly facilitates the connecting of the clasp parts **10, 18** even though the assemblage **10** is constituted of the simplest structural configurations, namely concentric or telescopic tubes one of which is slidable on the other.

With such tubular configuration and particularly with a telescopic assemblage, it can be understood that difficulty might be experienced in quickly and easily bringing together the clasp parts **10, 18**. However, by virtue of the advantageous configuration comprising the divergent notches **34** and wherein a portion of the retractable sleeve **14** is arranged to be engaged by the diametric bar when the latter is received in said notches, there can be effected a surprisingly simple and easy attachment or connection of the structures **10, 18** as is clearly illustrated in FIGS. 1 and 3–5. Further, with such simple tubular members **12, 14** and the "fish-mouth" configuration **34** there is still had a positive retention and locking action by which the diametric bar **16** is securely held in its captive position as illustrated in FIG. 5, until intentionally released by a right-to-left movement of the release sleeve **14**.

I have found that the illustrated configurations of the components may be economically fabricated and easily and quickly assembled, and that they enable an easy and simple securement of the clasp to be effected, while at the same time insuring a positive retention of the assembled clasp parts until these are intentionally released. Further, the release of the clasp parts can as well be easily and quickly effected by merely grasping the flare **20** of the release sleeve **14** and shifting the said sleeve from right to left, to the position illustrated in FIG. 4. But few components of extremely simple construction are thus seen to be involved in the concentric tube assemblage **10**, in accordance with the present invention.

Another embodiment of the invention is illustrated in FIG. 6. In this embodiment, the end configurations of the inner and outer tubular clasp members are exchanged or interchanged, so to speak, as compared with the structure of FIGS. 1–5. Additionally, the receiver is constituted as a socket-carrying structure having a floating diametric pin.

As shown, the plug-like configuration comprises inner and outer tubular members **56, 58** which are relatively axially movable between limits, the inner member **56** having longitudinal slots **60** through which a cross pin **62** passes, the pin being rigidly carried by the release collar or sleeve **58**. A helical extension spring **64** has its ends formed with eyes which encircle respectively a cross pin **66** of the inner tube **56** and also the cross pin **62**, thereby normally biasing the release collar **58** to a left-most position as shown.

The corresponding juxtaposed right end portions of the members **56, 58** are so organized as to present divergent notches **68** at the right end of the clasp, said notches having divergent edges **70, 72** and **74**. The inner member **56** has a pair of straight edges **76** which, with the edges **74** define slots **78**.

The release collar **58** has a pair of slots **80** defined by opposite parallel edges **82, 84**, the slots **80** extending transversely of the common axis of the tubes and communicating with the divergent notches **68**.

In FIG. 6 a receiver part **88** has a socket **90** in which there is disposed a diametric pin **92** which is floating by virtue of being carried in a pair of slots **94**. With such arrangement, the release sleeve **58** may slidably fit in the socket **90** without excessive clearance, inasmuch as the diametric pin **92** because of its floating mounting can accommodate itself to the different positions required for reception in the slots **78, 80** of the members **56, 58** respectively.

The releasing action of the clasp of FIG. 6 is the reverse of that of the clasp of FIGS. 1–5, in that the release collar **58** is moved from left-to-right to effect the release, as distinguished from the right-to-left movement of the release collar **14** previously described. Otherwise, the clasp of FIG. 6 has the various advantages already set forth above in detail.

The attachment of the clasp to the receiver part **88** is effected by pushing on the release collar **58** to shift the latter from left to right while holding the inner tube **56** stationary, whereby the slots **78, 80** will be cleared for the reception of the floating pin **92**. Release of the clasp is effected by merely pulling on the inner tubular member **56** to shift the latter from right to left. This type of action is intended for specialized applications wherein release is desired by exertion of a pull on the inner tubular member, as will be understood.

Another embodiment of the invention is illustrated in FIG. 7. Here, the clasp comprises inner and outer tubular members **98, 100** biased by a helical compression spring **102** and presenting a "fish-mouth" configuration comprising divergent notches **104** adapted to receive a diametric bar **106** carried by arms **108** of a receiver part **110**. The notches **104** have divergent edges **112, 114** on the inner tubular part **98**, and such part also has a pair of edges **116** which are parallel to the edges **112** and with the latter form slots **118** extending transversely of the common axis of the tubes. The release sleeve **100** has pairs of parallel straight edges **120, 122** forming slots **124** which extend parallel to the axis of the tubes. The slots **118, 124** receive the diametric bar **106** when the locking and release collar **100** is shifted from the position shown in FIG. 7 to the left, so as to remove the obstruction in the slots **118**, as will be understood. The features and advantages of the preceding forms of the invention are also had with the construction of FIG. 7.

Yet another embodiment of the invention is illustrated in FIG. 8. In this figure, the receiver part **130** has arms **132** carrying a diametric bar **134** which is engageable in divergent notches **136** of a plug assemblage **138**. The plug assemblage **138** comprises an inner tubular part **140** and an outer tubular part **142**, the latter having slots **144** defined by pairs of parallel edges **146, 148**, said slots extending transversely of the common axis of the members **140, 142**.

The divergent notches **136** are formed by pairs of edges **150, 152** on the inner tubular part **140**, said part also having pairs of straight edges **154, 156** which define slots **158** extending longitudinally or parallel to the common axis of the members.

A helical extension spring **160** normally biases the locking collar **142** to a leftmost position as shown in FIG. 8, and the releasing position of the collar **142** is one attained by shifting the collar to the right from the position shown in FIG. 8, as will now be understood.

With this form of the invention, the assemblage of the clasp is effected by pushing on the release collar **142** to shift the latter from left to right while the inner tube **140** is held stationary, this being similar to the form of the invention illustrated in FIG. 6.

It will now be seen from the foregoing that I have provided a novel, extremely simple and yet efficient and effective releasable clasp device utilizing the simplest of structural forms, namely concentric or telescopic slidable tube parts having special end configurations by which a divergent mouth structure is presented for the reception of a diametric pin. The clasp is sturdy and vibration resistant, and will withstand considerable rough usage without malfunctioning or requiring servicing.

Variations and modifications may be made within the scope of the claims, and portions of the improvement may be used without others.

I claim:

1. A concentric-tube releasable clasp comprising, in combination:

(a) a pair of inner and outer, coaxial, telescopically arranged tubes having one pair of corresponding end portions located in juxtaposition to each other,

(b) said tubes being relatively movable axially,

(c) said end portions providing an entry mouth structure constituted of a pair of diametrically opposite notches each characterized by divergent edges adapted for engagement by a diametric bar to guide the bar to the center of the mouth structure,

(d) said end portion of the inner tube having at least one pair of said divergent edges forming parts of both notches,

(e) said end portion of one of the tubes having a pair of straight edges parallel to the common axis of the tubes,

(f) said end portion of the other tube having slots characterized by opposite parallel edges,

(g) said slots extending transversely of the common axis of the tubes and communicating with said divergent notches, and being adapted to receive said diametric bar from the said notches when relative movement of the tubes brings them to a given relative bar-receiving position,

(h) said tubes having relative locking positions different from said bar-receiving position, wherein exit from said slots is obstructed by said pair of straight edges disposed parallel to the common axis, and

(i) resilient means biasing said tubes to and normally holding the tubes in said locking positions.

2. The invention as in claim 1, wherein:

(a) said end portion of said one tube has a second pair of straight edges spaced from the first said pair and parallel thereto,

(b) said two pairs of straight edges defining slots in the said one tube, in which the diametric bar is received and locked.

3. The invention as in claim 2, wherein:

(a) said one tube constitutes the inner of said tubes.

4. The invention as in claim 2, wherein:

(a) said one tube constitutes the outer of said tubes.

5. The invention as in claim 2, wherein:

(a) said other tube has portions disposed in the small part of the mouth structure and engageable by the diametric bar to enable the latter to shift said other tube with respect to said one tube as the bar is forced against the mouth structure.

6. The invention as in claim 1, wherein:

(a) the divergent edges of said notches which constitute the entry mouth structure comprise portions of both tubes.

7. The invention as in claim 1, wherein:

(a) the divergent edges of said notches which constitute the entry mouth structure comprise portions of one tube.

8. The invention as in claim 1, wherein:

(a) said one tube constitutes the inner of said tubes.

9. The invention as in claim 1, wherein:

(a) said one tube constitutes the outer of said tubes.

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BERNARD A. GELAK, *Primary Examiner.*