

[54] **GRIPPER WITH CENTER PULL FEED  
THROUGH RELEASE MEMBER**

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52/223 L**

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[58] Field of Search ..... **403/369, 371, 16, 19, 374,  
403/333, 334; 52/223 L; 279/28, 58, 51**

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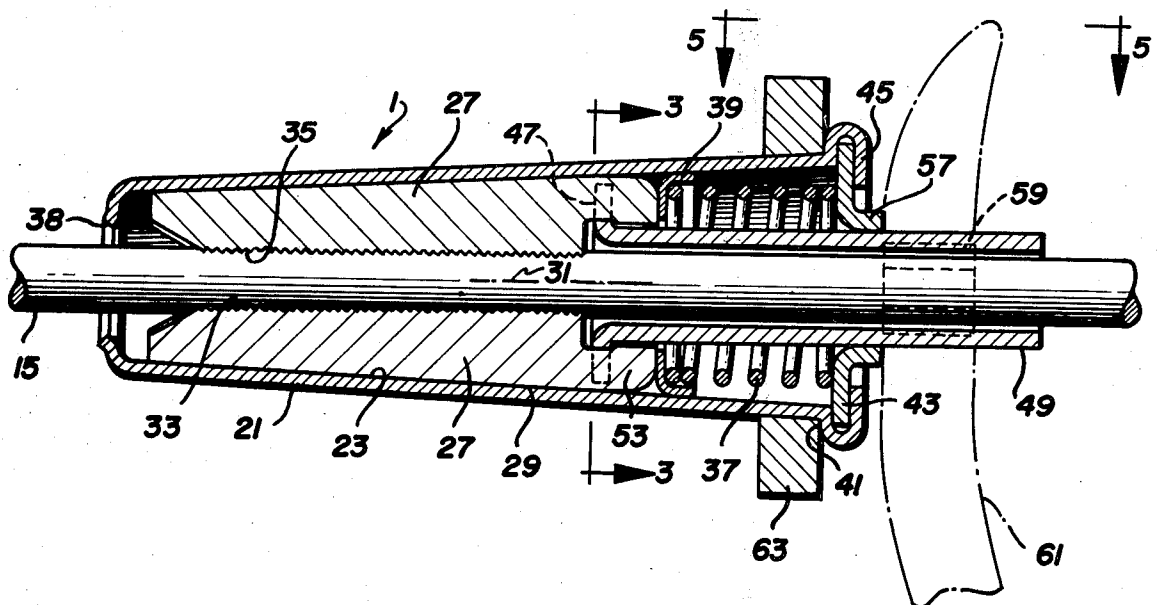
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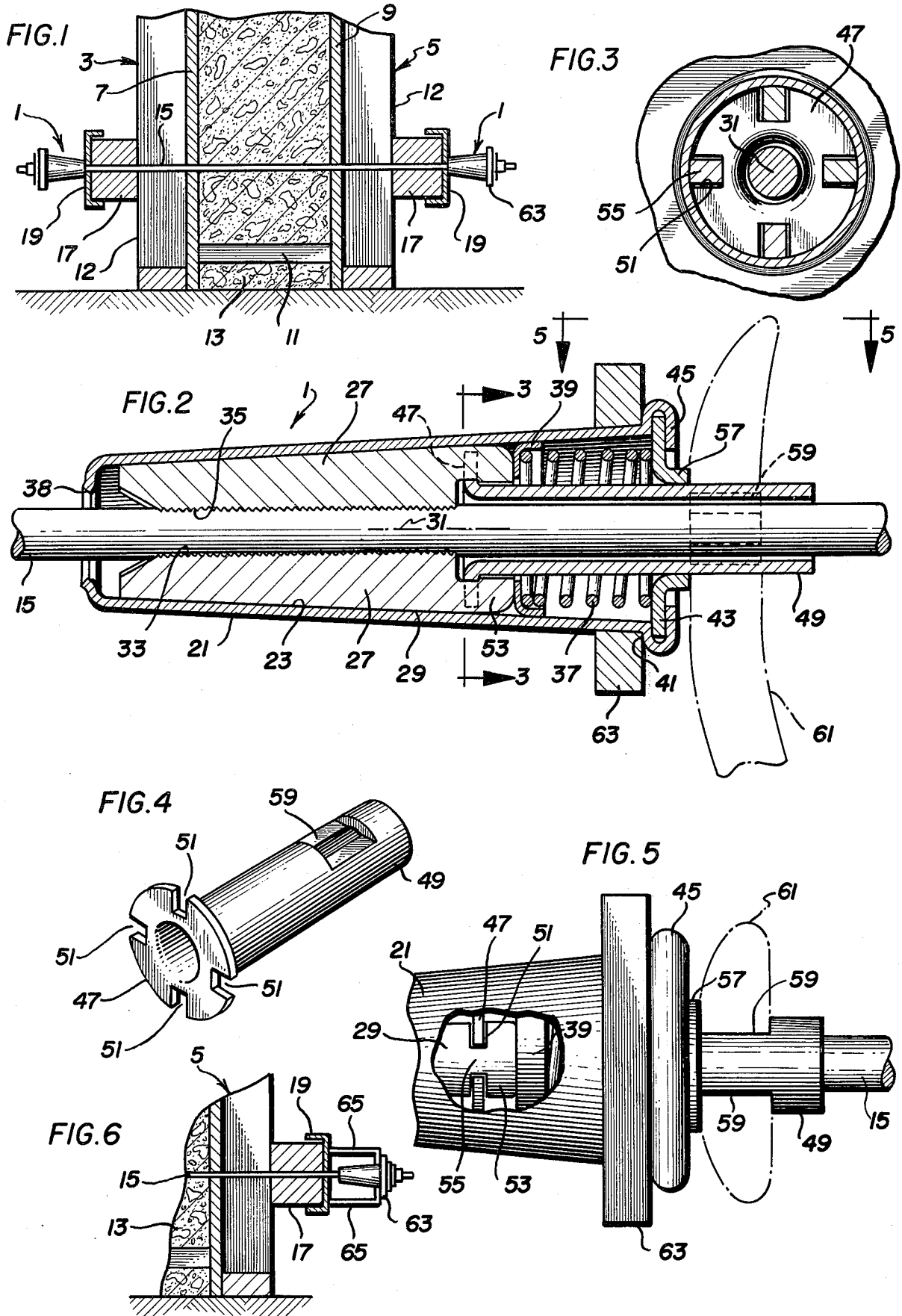
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[57] **ABSTRACT**

A gripping device or anchor includes a tapered casing with a jaw cluster therein that is spring biased for wedging engagement with a tendon. A one-piece release tube and jaw retaining washer holds the jaws of the cluster assembled. The release tube extends out from the casing and has surfaces for engagement by a pull tool so that an axial pull on the tube will release the grip of the jaws from the tendon.

**2 Claims, 6 Drawing Figures**





# GRIPPER WITH CENTER PULL FEED THROUGH RELEASE MEMBER

## BACKGROUND OF THE INVENTION

This invention relates to improvements in gripping devices of the type that comprise a hollow tubular casing and a jaw cluster therein for purposes of gripping a tendon such as that used in connection with the casting of concrete.

In one type of concrete form assembly the spaced-apart form members are retained in position during the pouring of the concrete by an arrangement that includes spacer elements, plastic tie rods, and gripping devices or anchors. These anchors are on the outsides of the forms and grip the plastic tie rods. Each anchor comprises a tapered jaw cluster in a tapered shell so arranged that outward forces applied to the forms due to concrete being poured therebetween increases the grip of the anchors on the tie rods to retain the forms at the established spacing. However, after the concrete has set and the forms are to be removed, it is first necessary to remove the anchors. To do this requires releasing the grip of the jaws on the tendon. Sometimes, however, problems have been encountered by workmen in quickly releasing the grip of the jaws on the tendon. In some instances the casing may have an opening in the wall thereof for insertion of a release tool of special construction. In another proposal the gripping device has a pull rod that extends outwardly of the larger diameter end of the casing and is adapted, within the casing, to pull jaws as a unit axially to release the grip on the tendon.

## OBJECTS AND SUMMARY OF THE INVENTION

It is an object of this invention to provide a gripping device or anchor of the type having a tapered shell with a tapered jaw cluster therein and wherein a release tube extends outwardly of the shell for engagement by a pull tool, and furthermore wherein the inner end of the release tube is bent or otherwise formed to provide a washer that retains the jaw segments of the jaw cluster assembled and permits the jaw segments to be moved as a unit toward the larger diameter end of the casing to release the grip on the tendon.

It is a further object of this invention to provide a gripping device of the type stated in which the release tube is sized to permit the tendon to be passed freely therethrough so that the length of the tendon need not be critically determined.

A further object of this invention is to provide a gripping device of the type stated in which the one-piece release tube and jaw-retaining washer is relatively easy to fabricate and at the same assures that the release tube is coaxially positioned relative to the central axis of the casing and the bore defined by the jaws of the jaw cluster. This assures proper clearance space for the part of the tendon that extends through the release tube. Consequently, it is a significant feature of this invention that the release tube and the jaw-retaining washer are integral rather than being separate.

In accordance with the foregoing objects the gripping device comprises a hollow tubular shell, the shell being open at its opposite ends and being internally conically tapered from one of its ends to the other. A jaw cluster is in the shell, the jaw cluster being formed of tapered jaw segments with external conical surfaces conforming approximately to the internal conical surface of the

shell. The jaw segments define a bore centered on a central axis of the casing, and the jaw segments have teeth presented to the bore for gripping a tendon. A spring at the larger diameter of the shell or casing applies pressure against the jaw cluster to urge the jaws to gripping engagement with the tendon. The release tube projects outwardly from the larger diameter end of the casing and at its inner end integrally includes the substantially flat jaw-retaining washer that is substantially perpendicular to the axis of the casing. The washer and the ends of the jaw segments have parts interengaging such that a pull on the release tube by a gripping tool releases the grip of the jaw segments on the tendon.

## BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a fragmentary sectional view showing a concrete casting arrangement that uses the gripping device of the present invention;

FIG. 2 is an enlarged longitudinal sectional view of the gripping device with a tendon or rod therein;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2; FIG. 4 is a perspective view of the combined retaining washer and release tube;

FIG. 5 is a view taken along line 5—5 of FIG. 2 and with the shell partially broken away; and

FIG. 6 is a fragmentary view of a modification of the apparatus of FIG. 1.

## DETAILED DESCRIPTION

Referring now in more detail to the drawing, FIG. 1 shows an arrangement in connection with which the anchor or gripping device 1 of the present invention is used. More particularly, such use is in conjunction with a form assembly that comprises spaced apart form members 3,5 that include panels 7,9 that are rigidified and reinforced by braces 12,12. The spacing between the panels 7,9 is determined by the length of a number of spacers 11 whereby the space between the panels 7,9 define a cavity into which concrete 13 is poured. To retain the forms at the required spacing, a number of plastic or steel tendons or rods 15 are used, one such rod being shown in FIG. 1. These rods 15 pass through the form members 3,5 and also through cross bars 17,17 and metal brackets 19,19 for connection to the anchors 1,1. Each anchor is, therefore, positioned such that its smaller diameter end is presented to the associated bracket 19. Consequently, when concrete 13 is poured between the form members, the pressure of the concrete tends to force the form members apart and this in turn increases the tension or grip of the anchors 1,1 on the tendon or rod 15 whereby the tendency of the forms to separate will be resisted by tension in the rods 15. After the concrete 13 has set, the gripping devices 1 are removed after which form members 3,5 and related hardware are removed.

Referring now to FIGS. 2-5 it will be seen that the device 1 includes a hollow tubular casing or shell 21 which is open at its opposite ends and has an internal wall 23 that is tapered. Within the shell 21 is a jaw cluster formed by a plurality of jaw segments 27. In the present example of the invention four jaw segments are used.

Each jaw segment 27 has a tapered exterior surface 29 and with the several exterior surfaces defining substantial conical surface portions that conform approximately to the internal conical wall 23 of the casing. The

jaw segments 27 are, in general, longitudinally separated but are circumferentially disposed about the central axis 31 of the shell 21. The jaw segments 27 also cooperate to provide a bore 33 that is likewise centered on the axis 31. The inwardly presented surfaces of the jaw segments 27, namely those surfaces of the bore 33, are formed with teeth 35 for gripping engagement with the tendon 15.

A coil compression spring 27 is used to apply axial pressure against the jaw cluster in a direction toward the smaller diameter end 38 of the shell 21. At the larger diameter end 41 of the shell 21, the spring 37 bears against a centering washer 43 which is clinched in place by a bent over flange 45. The inner end of the spring 37 is received in and bears against the base of a spring cup 39, the latter in turn bearing against the axial ends of the jaw segments 27. The spring pressure urges the teeth 35 on the jaw segments into biting engagement with the tendon or rod 15.

The ends of the jaws that are adjacent to the spring cup 39 are retained assembled together by a one-piece member that comprises a retaining washer 47 and a release tube 49. The retaining washer 47 is substantially flat, as is best seen in FIG. 4, and includes four peripheral notches 51 for receiving end fingers 53 on the respective jaw segments. It will best be seen from FIGS. 3 and 5 that each jaw segment is formed with a narrow back 55 that slidably fits into a notch 51.

While the flat washer 47 is substantially perpendicular to the axis 31, the release tube 49 integral therewith is centered on the axis 31 and extends outwardly of the shell at its larger diameter end 41. The release tube 49 is guided and is maintained in centered relationship with the axis 31 by a tubular bushing portion 57 of the centering washer 43. Preferably the bore of the release tube 49 is of a size sufficiently large to accommodate freely the maximum diameter of rod 15 that is intended to be used with the device 1.

Outwardly of the end 41 of the shell, the release tube 49 is cut away to form opposed parallel flats that define notches 59,59 on opposite sides of the axis 31. These notches 59,59 provide a means at which a suitable prying tool 61, shown in broken lines, may be applied to the release tube 49 and through which an axial pull to the right (FIGS. 2 and 5) may be applied to release the grip of the jaw segments 27 on the tendon 15. The prying tool 61 may be a claw hammer or other suitable tool.

In some instances it may be desirable to utilize a reaction plate 63 on the larger diameter end of the shell 21. In such cases, and as shown in FIG. 6, one or more brackets 65 may be interposed between the form and the reaction plate 63 so that the force on the device 1 is applied through the reaction plate rather than against the smaller diameter end of the casing 21.

The invention is claimed as follows:

1. A gripping device comprising a hollow tubular shell, said shell being open at its opposite ends and being internally conically tapered from one of said ends toward the other end, a jaw cluster in said shell, said jaw cluster having jaw segments that are circumferentially disposed about the axis of said shell that extends between said ends, each jaw segment having a tapered exterior surface, said tapered exterior surfaces of the jaw segments defining substantially conical surface portions conforming approximately to the internal conical surface of said shell, said jaw segments also defining a

bore centered on said axis, said jaw segments having teeth presented to said bore for engagement with a tendon that is gripped by the device, a spring between the larger diameter end of said shell and the jaw cluster for applying axial pressure against the jaw cluster in the direction of the smaller diameter end of the shell to urge the jaw segments against the tendon, and means at the larger end of the jaw cluster for retaining the jaw segments assembled in the cluster; said last-named means comprising a one piece release tube extending from within said shell outwardly of the larger diameter end of the shell and being centered on said axis, said release tube having an internal diameter greater than the bore defined by said jaw segments so that the tendon gripped by said jaw segments can pass freely through said tube beyond the end of the tube that is outwardly of the shell, the end of the tube within the shell being shaped to form a substantially flat washer that is substantially perpendicular to said axis, said washer and the ends of said jaw segments having parts interengaging such that joint movement of the jaw segments and the release tube toward said larger diameter end is permitted so that the jaw cluster can be released from the tendon by an axial pull on said release tube in the direction away from said shell, and means on said tube outwardly of said shell forming a grip for a tool through which to exert said pull, said last-named means comprising opposed notches on opposite sides of said axis.

2. A gripping device comprising a hollow tubular shell, said shell being open at its opposite ends and being internally conically tapered from one of said ends toward the other end, a jaw cluster in said shell, said jaw cluster having jaw segments that are circumferentially disposed about the axis of said shell that extends between said ends, each jaw segment having a tapered exterior surface, said tapered exterior surfaces of the jaw segments defining substantially conical surface portions conforming approximately to the internal conical surface of said shell, said jaw segments also defining a bore centered on said axis, said jaw segments having teeth presented to said bore for engagement with a tendon that is gripped by the device, a spring between the larger diameter end of said shell and the jaw cluster for applying axial pressure against the jaw cluster in the direction of the smaller diameter end of the shell to urge the jaw segments against the tendon, and means at a larger end of the jaw cluster for retaining the jaw segments assembled in the cluster; said last-named means comprising a one-piece release tube extending from within said shell outwardly of the larger diameter end of the shell and being centered on said axis, said release tube having an internal diameter greater than the bore defined by said jaw segments so that the tendon gripped by said jaw segments can pass freely through said tube beyond the end of the tube that is outwardly of the shell, the end of the tube within the shell being shaped to form a substantially flat washer that is substantially perpendicular to said axis, said washer and the ends of said jaw segments having cooperating members interengaging such that joint movement of the jaw segments and the release tube toward said larger diameter end is permitted so that the jaw cluster can be released from the tendon by an axial pull on said release tube in the direction away from said shell, and means on said tube outwardly of said shell forming a grip for a tool through which to exert said pull, said cooperating members comprising notches on one of said members slidably receiving end fingers on the other member.

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