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2,767,465

APPARATUS FOR TIGHTENING CAPS ON TELEPHONE HAND SETS

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3 Sheets-Sheet 1

FIG. 1

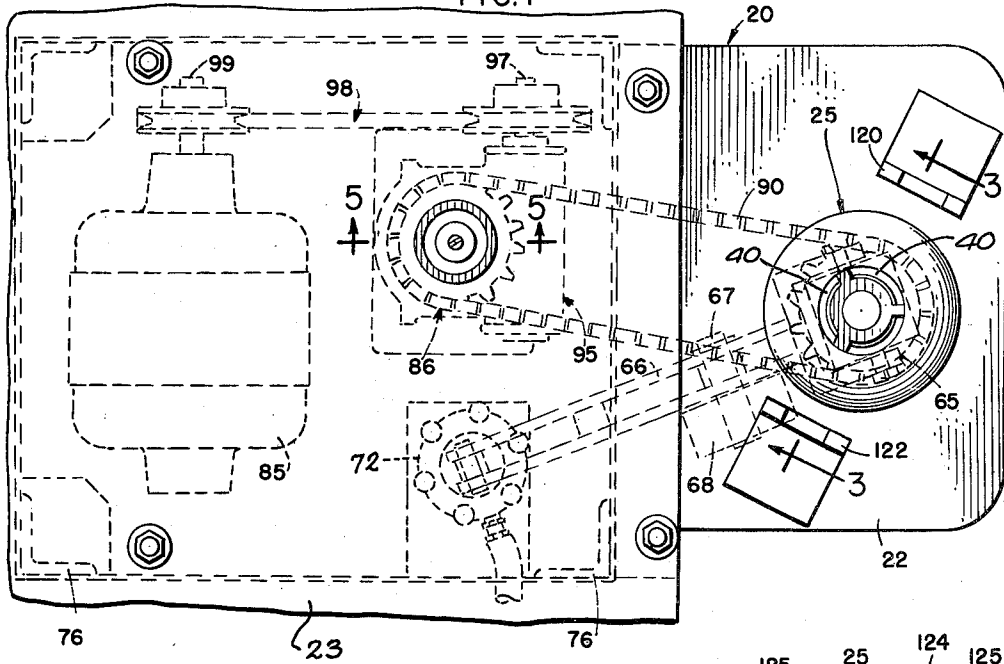
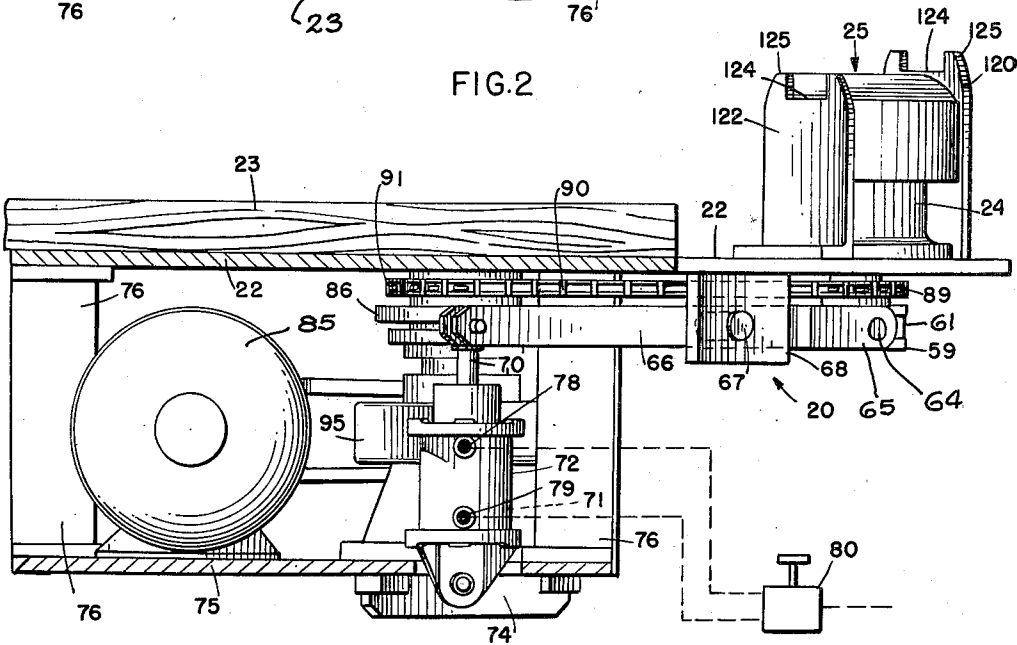


FIG. 2



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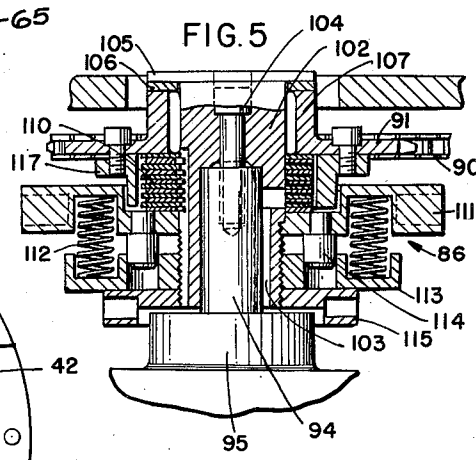
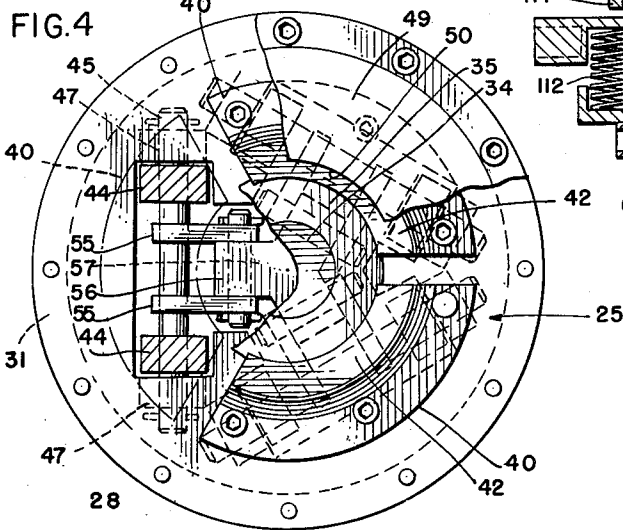
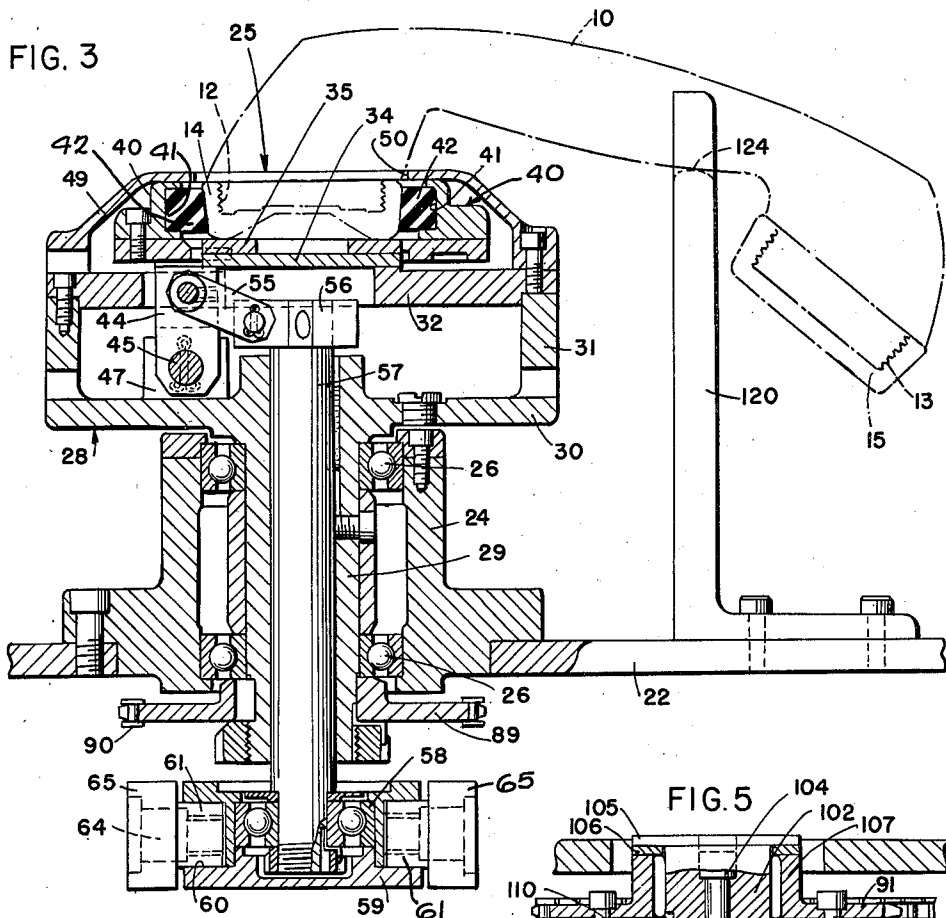
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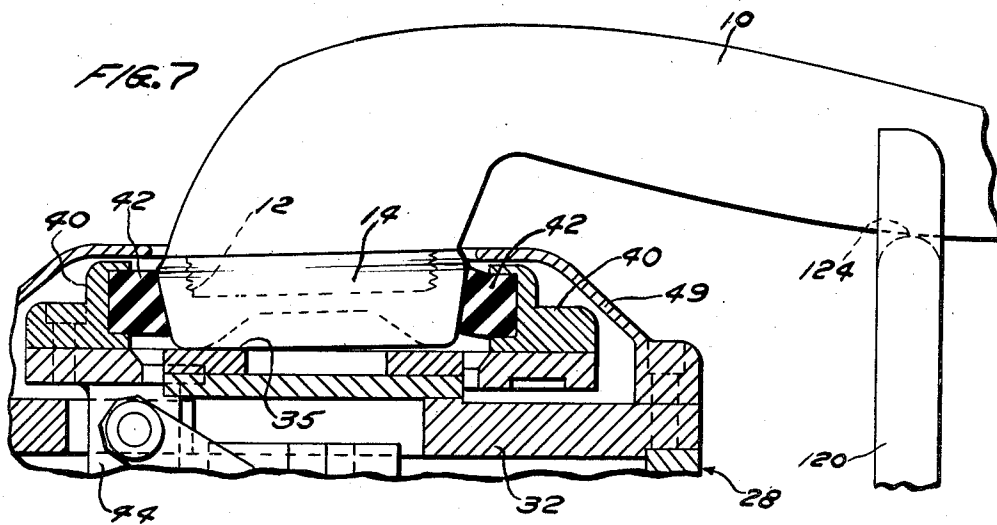
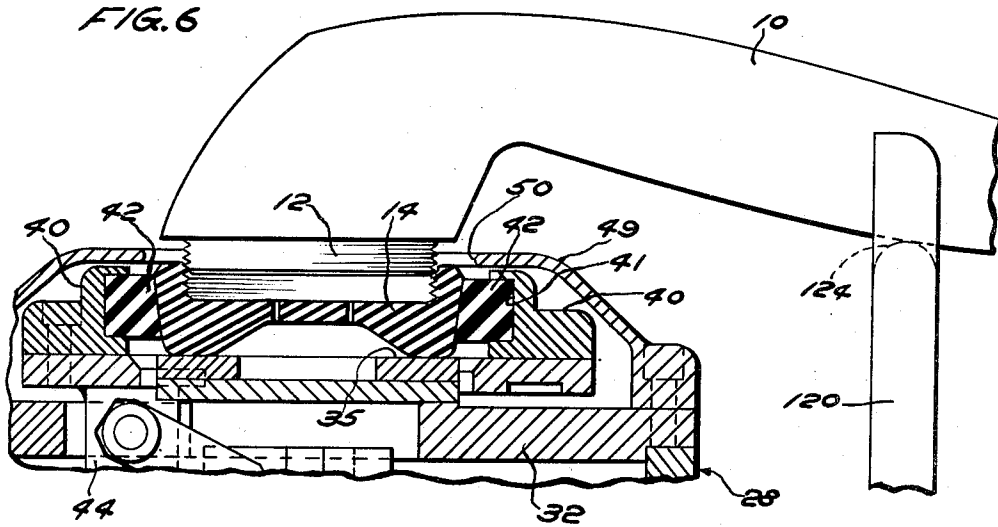
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3 Sheets-Sheet 3



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APPARATUS FOR TIGHTENING CAPS ON TELEPHONE HAND SETS

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Application July 5, 1951, Serial No. 235,158

4 Claims. (Cl. 29—240)

This invention relates to an apparatus for screwing threaded elements onto threaded articles and more particularly to a mechanism for tightening caps on telephone hand sets with a predetermined torque.

In securing threaded caps to telephone hand sets it is desirable to tighten the caps with a predetermined uniform torque. Formerly the caps were manually applied to the handles of telephone hand sets and tightened thereon by the use of hand tools with the result that the torque applied to the caps and the degree of tightness to which they were assembled on the handles varied considerably.

It is an object of the present invention to provide a simple apparatus for screwing threaded members onto threaded articles with a predetermined torque.

In accordance with one embodiment of the invention a rotatable chuck is provided which is driven through a friction clutch for transmitting a predetermined torque, the chuck having a plurality of jaws movable radially from an open to a closed position under control of the operator for gripping and rotating a cap positioned therebetween. A holder is adapted to support a telephone handle against rotation with the threaded end thereof in engagement with the threaded cap in the chuck so that the cap is quickly screwed thereon with a predetermined torque.

Other objects and advantages of the invention will become apparent by reference to the following detailed description thereof when considered in conjunction with the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 is a plan view of the apparatus;

Fig. 2 is a side elevational view of the apparatus;

Fig. 3 is an enlarged vertical cross-sectional view of a portion of the apparatus including a chuck taken on the line 3—3 of Fig. 1 and showing a telephone hand set and cap therefore in dotted lines;

Fig. 4 is a plan view of the chuck shown in Fig. 3 with portions broken away;

Fig. 5 is a fragmentary vertical sectional view through the friction clutch drive of the apparatus taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary view of the apparatus showing a cap placed on the spindle and showing a telephone handle supported on a holder therefor and with one end of the handle resting on the cap; and

Fig. 7 is a fragmentary view similar to Fig. 6 showing the cap screwed onto the end of the telephone handle.

The present apparatus is designed to screw the internally threaded caps onto the threaded ends of telephone hand set handles. As shown in Fig. 3 the handle 10 of the telephone hand set has a pair of threaded end portions 12 and 13 for receiving internally threaded transmitter and receiver caps 14 and 15 respectively.

The apparatus 20 for tightening the caps onto the handle 10 is mounted on a main supporting plate 22 which may be secured to the underneath side of a bench or table top 23. A portion of the plate 22 projects beyond the

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edge of the bench 23 and is provided with a tubular bracket or bearing boss 24 (Fig. 3) for supporting a rotatable chuck 25. A pair of anti-friction bearings 26 are mounted in the tubular member 24 for rotatably supporting a chuck housing member or spindle 28. The chuck spindle 28 has a tubular portion 29 and a flat disk portion 30 extending transversely from the upper end thereof and from the outer edge of which disk extends a cylindrical flange 31. Secured to the upper edge of the cylindrical flange 31 is a plate 32 having an irregular shaped opening in the center thereof which is partially closed by a disk 34. An annular member 35 secured to the disk 34 forms a seat for receiving and supporting a cap 14 thereon.

The chuck 25 is provided with three segmental arcuate jaws 40 oscillatably mounted on the chuck housing 28 and arranged to encircle a cap 14 on the seat 35 and to be moved radially inwardly and outwardly to engage and release the cap 14. Each segmental jaw 40 has a groove 41 in which is mounted an arcuately shaped rubber liner member 42, the inner surface of which is adapted to frictionally engage the peripheral surface of the cap 14. Each of the jaw members 40 has a pair of arms 44 extending downwardly therefrom through the apertured lower ends of which pass rods 45 for oscillatably supporting the jaws 40 for radial movement. The rods 45 are mounted for rocking movement in lugs 47 extending upwardly from the disk 30 and the rods 45 are provided with cotter pins in the ends thereof to prevent axial displacement of the rods. A cup shaped cover plate 49 is secured to the plate 32 to enclose the jaw members 40 of the chuck and has a central circular opening 50 for guiding the caps 14 onto the seat 35.

The jaw members 40 of the chuck are adapted to be oscillated radially to and from a closed position and a normally open position to alternately grip and release the caps 14 by a mechanism under control of the operator. This mechanism includes links 55 pivotally connected at one end to the arms 44 of the jaws 40 and at the other end to lugs 56 formed on the upper end of a rod or shaft 57 which is slidably mounted for vertical movement in the tubular portion 29 of the clutch housing 28 and is splined thereto for rotation therewith. At its lower end the rod 57 has fixed thereto a ball bearing unit 58 which is mounted within a rectangular block member 59 in which slots 60 are formed to receive slide members 61. The members 61 are mounted on pins 64 pivotally connected to the bifurcated ends 65 of an actuating lever 66 (Fig. 2) which is supported intermediate its ends for rocking movement on a pin 67 which in turn is supported in a bracket 68 fixed to the plate 22. Thus in response to oscillation of the lever 66 the rod 57 is reciprocated to cause the jaws 40 to be moved to and from their open and closed positions.

The opposite end of the actuating lever 66 is connected to one end of a piston rod 70 of a piston 71 mounted within a cylinder 72 of a fluid actuator. The lower end of the cylinder is pivotally supported on a bracket or member 74 secured to a plate 75 which is fixed to and supported from the main supporting plate 22 by a plurality of posts 76. Compressed air or other fluid may be admitted alternately to opposite ends of the cylinder 72 through pipes 78 and 79 under control of a manually actuated control valve 80 to rock the actuating lever 66 and effect the closing and opening of the chuck 25. The control valve 80 which preferably is of the foot-actuated type mounted on a foot treadle permitting the operator free use of his hands during actuation of the valve, has a normal position in which the chuck is maintained in its open position.

During the normal operation of the apparatus the

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chuck 25 is adapted to be rotated by a drive including a motor 85 and an adjustable friction clutch 86 to cause the clutch to tighten the caps 14 onto the telephone handles 10 with a uniform predetermined number of foot pounds of torque. A sprocket 89 fixed to the lower end of the tubular portion 29 of the chuck spindle 28 is connected through a chain 90 to a sprocket 91 which in turn is connected to and driven by the clutch 86. The clutch 86 is mounted on a shaft 94 of a worm and worm wheel gear reducer unit 95 which is mounted on the plate 75 and has a horizontally extending shaft 97 driven through a pulley and belt drive connection 98 from the motor shaft 99 of the motor 85.

The clutch 86 is of the multiple friction disk type (Fig. 5), having a cylindrical member 102 secured to the shaft 94 of the gear reducer 95 by a key 103 and a screw 104. The member 102 has flange 105 faced with a lining 106 which bears against the end of the hub 107 of the sprocket wheel 91. A plurality of disks 110 are positioned between the sprocket 91 and a plate 111 which is stressed upwardly by springs 112 toward the sprocket 91 to compress the plates 110 therebetween. The springs 112 sit in recesses in an annular plate 113 which is threadedly secured on the lower threaded portion of the member 102 and may be adjusted thereon to vary the pressure applied to the discs 110. The plate 111 is guided for vertical movement by pins 114 thereon which slidably engage in apertures in the plate 113. A lock nut 115 secures the threaded annular plate 113 in adjusted position. Alternate ones of the plates 110 are provided with splines on the inner and outer peripheral edges thereof respectively which engage with conforming grooves in the member 102 and a member 117 fixed to the sprocket 91. The clutch 86 is set to transmit a predetermined torque to the chuck 25 and cause the jaws 40 thereof to tighten the caps 14 with a predetermined uniform pressure.

As previously stated the apparatus is designed to tighten either the transmitter cap 14 or the receiver cap 15 and in order to support the handle 10 in the proper position during the application of the cap thereon holders 120 and 122 are provided (Fig. 3). Each of the holders is mounted on the supporting plate 22 and has a surface 124 engageable with the underneath side of the handle 10 and a pair of arms 125 for receiving the handle 10 therebetween and engageable with the side of the handle during the tightening of the cap to prevent the turning of the handle. It will be understood that because of the shape of the handle 10 it is supported in one position by the holder 120 while the transmitter cap 14 is applied thereto and is supported in a different position with the holder 122 while the receiver cap 15 is applied thereto. Either of the holders 120 and 122 engages the telephone handle 10 in spaced relation to the threaded end onto which a cap is to be screwed and supports the handle for vertical pivotal or rocking movement thereon to permit the threaded end of the handle to move down into the cap while the cap is being screwed thereon. The resilient rubber members 42 in the jaws 40 permit a slight tilting or wobbling movement of the cap to enable it to accommodate itself to the slight change in angular position of the handle while the cap is being threaded thereon. As shown in Fig. 6, the cap 14, when placed on the seat 35 of the spindle 28, is supported in horizontal position and the telephone handle 10 is supported on the surface 24 of the holder 120 with the threaded end portion 12 of the handle resting on the cap 14 in coaxial alignment therewith and with the lower end face of the threaded end portion 12 disposed horizontally. Threads formed on the end portions 12 and 13 of the telephone handle 10 and on the caps 14 and 15 terminate a short distance from the end faces thereof and permit the threaded ends of the telephone handle 10 to nest within the ends of the caps to facilitate the screwing of the caps thereon. On completion of the operation of screwing the cap 14

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onto the threaded end 12 of the telephone handle 10, the end 12 of the telephone handle has been pulled down into the cap, and the handle has been oscillated about the surface 124 of the holder 122 and has changed slightly the angular position of the telephone handle 10 and the cap 14 as shown in Fig. 7. The operation is somewhat analogous to the action of a universal joint.

The caps may be applied to the handle by either manually starting the caps on the threaded end portions of the handles and then placing the handle with the cap thereon into the tightening apparatus, or the cap may be placed on the seat 35 of the apparatus after which the handle 10 may be positioned in the proper holder with the threaded end portion of the handle placed in engagement with the cap. The operator may then actuate the valve 80 to cause the jaws 40 to move from their open position to their closed position in gripping engagement with the cap 14 and turn it up tight on the threaded end portion of the handle 10. After the cap has been screwed onto the threaded end portion of the handle and tightened to a predetermined degree of tightness the clutch 86 will slip and disconnect the drive to the chuck 25. The operator may then release the valve and cause the jaws 40 to be moved to their open position after which the handle 10 with the cap applied thereto may be removed from the apparatus.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An apparatus for screwing transmitter and receiver caps onto the threaded ends of telephone handset handles comprising a spindle, supporting means mounting said spindle for rotation about a substantially vertical axis, a plurality of arcuate jaws having resilient elements engageable with said caps, means mounting said jaws on the spindle about the axis thereof for movement toward and away from said axis and for rotation with said spindle, means on said spindle forming a seat for supporting a cap in position to be gripped by the resilient elements of said jaws, means for moving said jaws to and from a closed position in gripping engagement with a cap on said seat, means mounted on said supporting means in laterally spaced relation to said spindle for supporting said handle against rotation and for vertical pivotal movement thereon to permit the threaded end of the handle to be drawn downwardly into the cap as the cap is being screwed thereon the resilient elements of said jaws permitting a slight tilting movement of the cap to enable the cap to accommodate itself to the slight change in angular position of the handle as the cap is screwed thereon, and drive means for rotating said spindle.

2. An apparatus for screwing caps onto threaded ends of telephone handset handles comprising a spindle, supporting means mounting said spindle for rotation about a substantially vertical axis, a plurality of arcuate jaws having resilient elements engageable with said caps, means mounting said jaws on the spindle for rotation therewith and for movement toward and away from said axis, means on said spindle forming a seat for supporting a cap in position to be gripped by the resilient elements of said jaws, means for moving said jaws to and from a closed position in gripping engagement with a cap on said seat, drive means for rotating said spindle, and a stationary holder on said supporting means in laterally spaced relation to said spindle for supporting the telephone handle with a threaded end thereof in axial alignment and engagement with a cap on said seat, said holder having a portion for supporting the handle for vertical pivotal movement to permit the threaded end of the handle to be drawn downwardly into the cap as the cap is being screwed thereon and having another portion for holding

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said handle against rotation with the cap being screwed thereon, the resilient elements of said jaws permitting a slight tilting movement of the cap to enable the cap to accommodate itself to the slight change in angular position of the handle as the cap is screwed thereon.

3. An apparatus for screwing caps onto threaded ends of telephone handset handles comprising a hollow spindle, supporting means mounting said spindle for rotation about a substantially vertical axis and against axial movement, a seat secured to said spindle for rotation therewith for supporting a cap, a plurality of arcuate jaws disposed about the axis of said spindle and having resilient elements engageable with a cap on said seat, arms extending downwardly from said jaws pivotally connected at their lower ends to said spindle to support said jaws for radial movement toward and away from said axis and for rotation with said spindle, a rod mounted in said spindle for rotation therewith and for axial movement relative thereto, links interconnecting one end of said rod and said arms intermediate the pivots and the jaws to impart radial movement to said jaws in response to axial movement of said rod, means for moving said rod axially to effect the movement of said jaws to and from a closed position with the resilient elements in gripping engagement with a cap, means for rotating said spindle with a predetermined torque, and a stationary holder on said supporting means in laterally spaced relation to said spindle for oscillatably supporting the telephone handle with a threaded end thereof in axial alignment and engagement with the cap on said seat, said holder having a portion for supporting the handle for vertical pivotal movement to permit the threaded end of the handle to be drawn downwardly into the cap as the cap is being screwed thereon and having another portion for holding said handle against rotation with the cap being screwed thereon, the resilient elements of said jaws permitting slight tilting movement of the cap to enable the cap to accommodate itself to the slight change in angular position of the handle as the cap is screwed thereon.

4. An apparatus for screwing caps onto threaded ends of telephone handset handles comprising a hollow spindle, supporting means mounting said spindle for rotation about a substantially vertical axis and against axial movement, a seat secured to said spindle for rotation therewith for supporting a cap, a plurality of arcuate jaws disposed

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about the axis of said spindle and having resilient elements engageable with said caps, arms fixed to said jaws and extending downwardly therefrom pivotally connected at their ends to said spindle to support said jaws for movement toward and away from said axis and for rotation with said spindle, a rod mounted in said spindle for rotation therewith and for axial movement relative thereto, members interconnecting one end of said rod and said arms intermediate the pivot and the jaws to impart radial movement to said jaws in response to axial movement of said rod, means for moving said rod axially to effect the movement of said jaws to a closed position with the resilient elements in gripping engagement with a cap on said seat, means for rotating said spindle, a stationary holder on said supporting means in laterally spaced relation to said spindle engageable with the telephone handle for supporting it with an end thereof in axial alignment and engagement with a cap on said seat, said holder having a portion for supporting the handle for vertical rocking movement thereon to permit the threaded end of the handle to be drawn downwardly into the cap as the cap is being screwed thereon and said holder having a portion for holding said handle against rotation with the cap being screwed thereon, the resilient elements of said jaws permitting a slight tilting movement of the cap to enable the cap to accommodate itself to the slight change in angular position of the handle as the cap is screwed thereon, and an apertured cover mounted on said spindle for rotation therewith for enclosing said jaws and providing an opening for guiding the cap onto said seat and between said jaws.

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