

[54] LOCKING HEAD

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[56]

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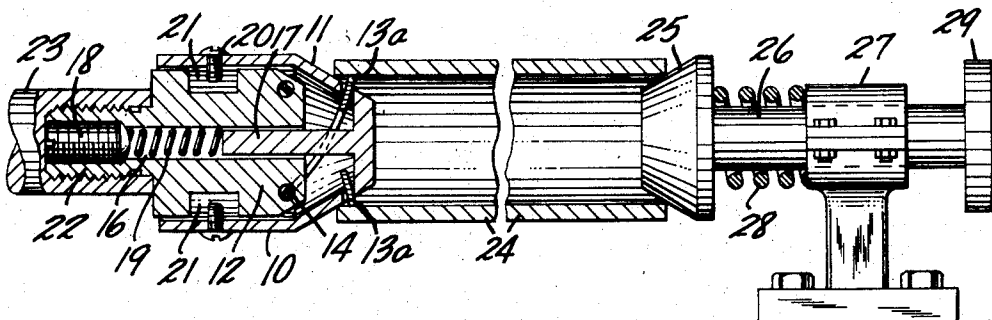
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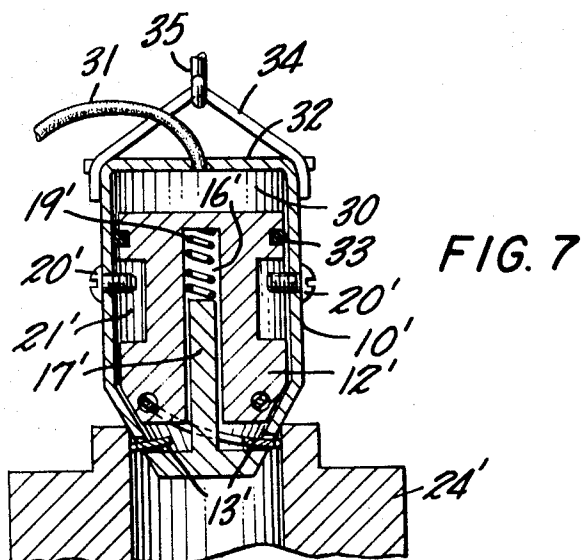
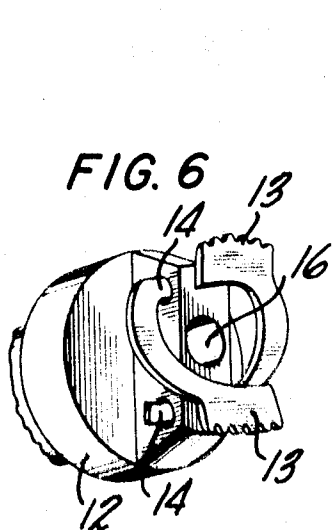
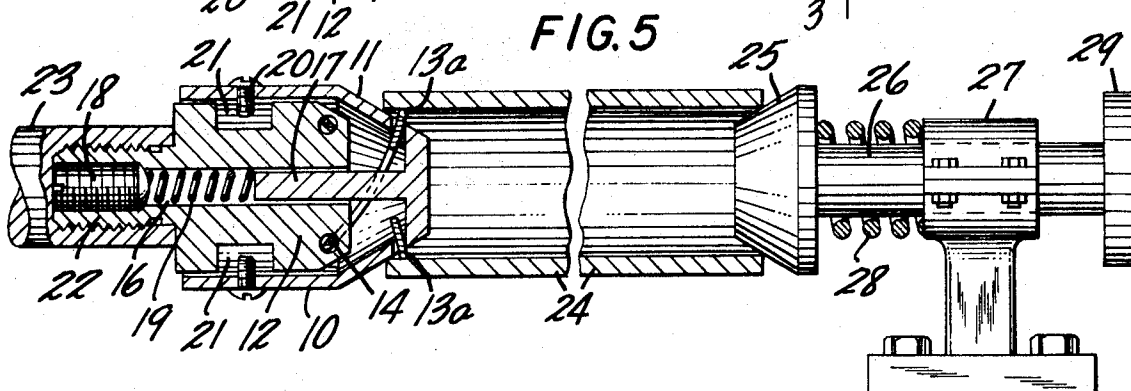
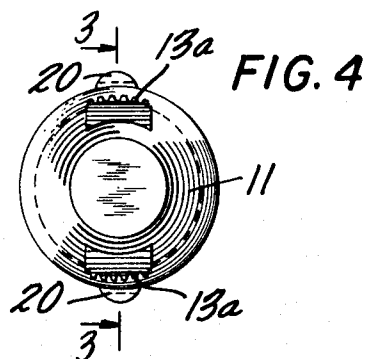
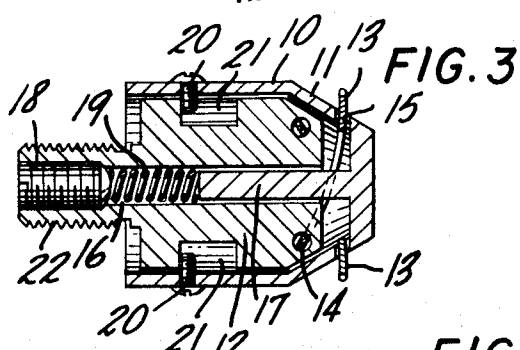
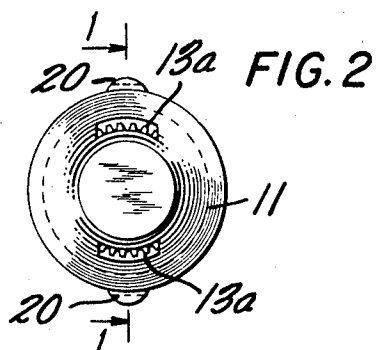
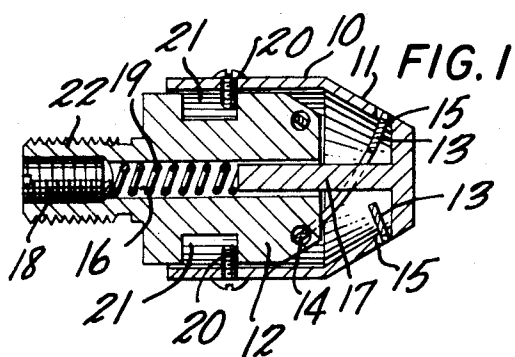
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ABSTRACT

A movable locking head which includes a hollow housing having a tapered end for engaging an annular member and containing an actuator which moves two or more locking arms mounted thereto through openings in the tapered end of the housing into locking engagement with the inner periphery of the annular member.

10 Claims, 7 Drawing Figures





LOCKING HEAD

This invention relates to a movable locking head for engaging and gripping an annular member, and particularly to a device of that type in which means are provided for locking said head to the annular member to avoid slippage therebetween.

The novel apparatus of the present invention has a variety of applications, for example, for handling pipes, tubes and the like, but it is particularly suited for use as a rotary drive for imparting rotation to a tubular bobbin or spool without slippage.

The locking head of the present invention, in its preferred form, includes a hollow housing having a tapered end which is engageable in telescoping relationship with the annular member, a movable actuator within the head which carries two or more locking arms, each movable through an opening in the tapered end of the hollow housing, and means for imparting movement to the actuator to move the locking arms into and out of locking engagement with the inner periphery of the said annular member, permitting the locking head to be readily locked to and released from the annular member. When locked to the annular member the locking head can be used to impart the desired rotary or translatory motion to the annular member without slippage therebetween. Moreover, since the tapered housing will always center itself relative to the tubular member and the actuator can be displaced relative to the housing over a range of movement, the locking head can be used in conjunction with annular or tubular members having a range of inner diameters.

For a complete understanding of the present invention reference can be made to the detailed description which follows and to the accompanying drawings in which:

FIG. 1 is a longitudinal cross-sectional view of the locking head of the present invention taken along the line 1—1 of FIG. 2 showing the parts in their inoperative positions;

FIG. 2 is an end view of the locking head shown in FIG. 1 and from which the section of FIG. 1 has been taken along the section line 1—1;

FIG. 3 is a view similar to FIG. 1 but showing the parts in their operative driving positions;

FIG. 4 is an end view of the locking head shown in FIG. 3 and from which the section of FIG. 3 has been taken along the line 3—3;

FIG. 5 is a sectional view showing the locking head of the present invention in driving relationship with a spindle;

FIG. 6 is a perspective view of the movable actuator and the locking arms; and

FIG. 7 is a longitudinal sectional view of another embodiment of the invention.

Referring to FIGS. 1 through 6 of the drawings, the locking head of the present invention includes a hollow housing 10 having a truncated tapered end 11, an actuator 12 accommodated for axial movement within the housing and a pair of curved locking arms 13 pivotally mounted at 14 to the actuator and extending through openings 15 diametrically spaced apart in the tapered end of the hollow housing.

The arms 13 are preferably relatively flat with serrated ends 13a which are displaced outwardly from the inoperative positions shown in FIG. 2 to the operative positions shown in FIG. 4 when the actuator 12 is dis-

placed within the hollow housing from the position shown in FIG. 1 to the position shown in FIG. 3.

The actuator 12 has an axial opening 16 which seats on and is guided for axial movement within the housing on an axially disposed spindle 17 which extends from the tapered end of the housing. The opposite end of the opening 16 has a plug 18 threaded therein. A compressed spring 19 is accommodated within the opening between the spindle and the plug, urging the actuator to the position illustrated in FIG. 1.

The axial movement of the actuator relative to the housing is limited by the engagement of inwardly extending screws 20 threaded through the outer periphery of the housing with the ends of longitudinally extending slots 21 formed in the outer periphery of the actuator. The screws 20 and slots 21 are interlocking tongue and groove formations which lock the actuator and the housing together for rotation about a common axis while permitting limited axial movement of the actuator relative to the housing.

The actuator 12 has a threaded extension 22 which protrudes outside the hollow housing 10 to enable the actuator to be threadably connected with a shaft 23 which imparts translatory and rotary motion to the actuator.

A preferred application of the present invention for rotatably driving an annular bobbin or spool 24 is illustrated in FIG. 5. The spool or bobbin is supported at one end by a truncated conical idler head 25 and at the opposite end by the tapered conical end of the housing 10. The idler head 25 is supported at the end of a shaft 26 which, in turn, is supported for both rotational and axial movement in a mounting 27. The idler head 25 is urged against the end of the spool by the action of a compressed spring 28 interposed between the head and the mounting. An enlarged head 29 at the opposite end of the shaft 26 retains the shaft within the mounting.

The locking head of the present invention is moved into driving relationship with the opposite end of the bobbin or spool 24 by the axial displacement of the shaft 23, and the resistance of the spring 28 displaces the actuator 12 relative to the head, moving the serrated end of the arms 13 into locking engagement with diametrically opposite surfaces of the inner periphery of the bobbin or spool 24 to prevent slippage therebetween. When the bobbin or spool has been securely locked in position rotary motion is imparted thereto through the shaft 23.

It is, of course, understood that the actuator 12 can be moved relative to the housing 10 by any suitable mechanical, electrical or fluid means. Toward this end, in an alternative embodiment shown in FIG. 7, the actuator 12' is in the form of a piston moved within the housing by either a hydraulic or pneumatic fluid admitted into a chamber 30 through a conduit 31. The chamber 30 is defined between the closed end 32 of the housing and the end of the actuator opposite the end to which the locking arms 13' are carried. A seal 33 prevents leakage of the fluid between the housing and the actuator.

As in the embodiment illustrated in FIGS. 1 through 6, the displacement of the actuator 12' relative to the drive head moves the locking arms 13' into engagement with the inner periphery of the annular part 24' to be driven. The actuator is formed with a central guide hole 16' at the lower end thereof which is guided for movement on an upwardly extending spindle 17',

and the upper end of the guide hole 16' accommodates a compressed spring 19' therein which moves the actuator upwardly relative to the drive head when the pressure within the chamber 30 has been released.

In the embodiment illustrated in FIGS. 1 through 6 of the drawings, the locking head of the present invention imparts rotary motion to the bobbin or spindle 24. Toward this end, both rotary and translatable motion are imparted to the locking head through the drive means 23. In the embodiment illustrated in FIG. 7, the head is supported by the engagement of a hook 34 with an eyelet or bracket 35 affixed to the housing, and translatable motion is imparted to the locking head by the hook.

The invention has been shown in preferred forms and by way of example only, and many modifications and variations may be made within the spirit of the invention. The invention, therefore, is not to be limited to any particular form or embodiment except insofar as such particular forms or embodiments are expressly set forth in the claims.

I claim:

1. A movable locking head comprising a hollow housing having a tapered end for engaging the end of an annular member and having an opening in the tapered end thereof, an actuator guided for movement within said hollow housing, and at least one locking arm connected at one end to said actuator and engageable with said opening in the housing to move the end of the locking arm from a retracted position into locking engagement with the inner periphery of said annular member when the actuator is shifted relative to the housing.

2. A movable locking head as set forth in claim 1 in which the hollow housing includes an axially disposed spindle therein for supporting and guiding the actuator for axial movement.

3. A movable locking head as set forth in claim 2 in which the actuator has an axial passage therethrough for receiving the spindle and including means closing the end of the axial passage and a compressed spring within said passage between the end of the spindle and the end closing means which urges the actuator to a position in which the locking arm is out of locking engagement with the inner periphery of the annular member.

4. A movable locking head as set forth in claim 3 including tongue and groove means for locking the housing and actuator together for rotation while limiting the axial movement of the actuator relative to the housing.

5. A movable locking head as set forth in claim 1 including a plurality of locking arms connected at one end to the actuator and an opening formed in the tapered end of the housing for each locking arm, the movement of the actuator moving all of the locking arms into locking or retracted positions relative to the inner periphery of said annular member.

6. A movable locking head as set forth in claim 5 including means for urging the actuator relative to the housing to a position in which said locking arms are out of engagement with the inner periphery of the annular member and means for limiting the axial displacement of the actuator relative to the housing to maintain the locking arms in retracted positions but still in engagement with the openings in the housing.

7. A movable locking head as set forth in claim 5 in which the locking arms are relatively flat members having serrated teeth at the ends thereof and including pivotal mountings between the locking arms and the actuator at the opposite ends thereof.

8. A movable locking head as set forth in claim 5 including means for imparting movement to the actuator relative to the housing to push the locking arms outwardly through the openings in the housing and into engagement with the part to be driven.

9. A movable locking head as set forth in claim 1 in which the housing has an opening in the end opposite the tapered end and including an extension connected to the actuator which protrudes through the opening and drive means connected to the protrusion for imparting movement to the actuator relative to said housing.

10. A movable locking head as set forth in claim 1 in which the end of the housing opposite the tapered end is closed to define a chamber between said closed end and the end of the actuator and in which the actuator functions as a piston within the housing and including means connecting said chamber with a source of fluid under pressure to impart movement to the actuator relative to the housing.

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