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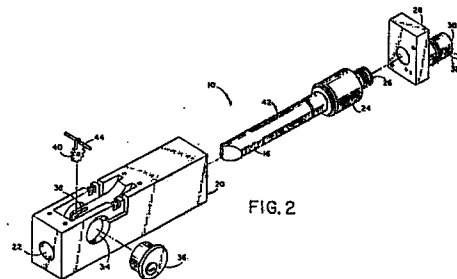
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54 **Pneumatically operated lock having manual override feature.**

57 An air lock (10) operated by a pneumatic retraction system includes a manual override feature in the event that the pneumatic system fails. The manual override is accessed through a key-operated cylinder lock (36) that rotates a pinion (40). The pinion (40) mates with rack teeth (42) journaled in a lock bolt (16) which mates with a bolt receiver (18) to close the lock. When the pinion (40) is rotated the bolt (16) is urged against a biasing spring (26) lifting it out of the bolt receiver (18) thus opening the lock.



Description

PNEUMATICALLY OPERATED LOCK HAVING MANUAL OVERRIDE FEATURE

Background of the Invention

The following invention relates to door locks and more particularly to pneumatically actuated locks for use in correctional facilities and the like.

Correctional facilities typically have door locks that operate by remote control. A common system for use in such environments is a pneumatic system which is capable of retracting a lock bolt mounted on a door or a jamb from a cooperatively mating bolt receiver. Pneumatic retractors of the type thus described, however, have certain drawbacks, among these being the possibility of failure of the pneumatic system caused by a power failure or leakage in the pneumatic supply lines. It has therefore been necessary in the past to provide a manual override system by which the locks on the various doors in a correctional facility can be opened in the event of such a failure. A typical example of such a manually operated retraction system might include a cylinder lock having a pulley and cable arrangement whereby the bolt is pulled back by a cable as the cylinder lock operates a pulley. This type of system, however, requires that proper tension be maintained on the pulley and requires a large number of moving pieces which makes the lock mechanism more expensive and more difficult to operate manually because of increased friction. The cable and pulley arrangement also takes up space and is therefore difficult to mount conveniently on the doors and door jambs where the system is to be installed.

Summary of the Invention

The present invention provides an air lock which is operated by a pneumatic retraction system and has a manual override feature for operating the lock in the event of failure of the pneumatic system. The lock comprises a bolt which extends from a pneumatically operated piston, wherein the bolt includes a rack journaled in its surface which mates with a pinion connected to the output shaft of a key operated lock. The pinion interacts with the rack to retract the bolt when the key-operated lock is opened.

The advantage of the system of the present invention is that the rack and pinion key-operated override may be installed in the same housing block with the other components of the air lock. Another advantage of the present system is that it operates directly on the spring loaded bolt, pushing it against the spring bias instead of pulling it. There is less friction with this arrangement and fewer moving parts as opposed to a conventional cable and pulley manual override. The use of a single housing for both the pneumatic bolt retraction system and the manual override allows the entire structure to be more compact so that it may be vertically mounted on a door jamb. A cooperatively mating door includes a bolt receiver which slides under the lock mechanism urging the bolt up against its bias spring. The bolt then locks into place when it encounters an aperture

in the bolt receiver. This is the most efficient way of positioning the bolt and bolt receiver on doors of the type found in correctional facilities.

It is a principal object of this invention to provide a pneumatically-actuated lock having a manual override feature with lower friction, fewer moving parts and a more compact size than has been heretofore available.

A further object of the invention is to provide a manual override for a pneumatic lock having a rack and pinion manual retraction mechanism operating directly upon the bolt of the pneumatic lock.

A still further object of this invention is to provide a pneumatic lock having a manual override system capable of being housed within a single housing block and adapted for vertical mounting on a door jamb.

The foregoing and other objectives, features and advantages of the present invention will be more readily understood upon consideration of the following detailed description of the invention taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

FIG. 1 is a partial front view of the lock of the present invention mounted on a door jamb and a cooperatively mating door.

FIG. 1a is a partial cutaway view taken along line B-B of FIG. 1.

FIG. 2 is an exploded perspective view of the lock of FIG. 1.

FIG. 3 is a side view of the lock of FIG. 1.

FIG. 3A is a cutaway view taken along line A-A of FIG. 3.

Detailed Description of the Invention

A pneumatically-operated lock 10 is vertically mounted on a door jamb 12 which mates with a door 14. The lock 10 includes a downwardly extending bolt 16 which cooperatively mates with a bolt receiver 18 mounted on the door 14.

Referring to FIG. 2, the lock 10 includes a housing block 20 which receives the bolt 16 for reciprocal sliding movement therein through a lower aperture 22. The bolt 16 is connected to a pneumatic piston 24 which is spring loaded by biasing spring 26. As shown best in FIG. 3A, the bolt 16 and piston 24 are wholly contained within the housing block 20 by a cap 28 which supports a pneumatic valve 30. The pneumatic valve 30 may be electrically remotely operated by wires 32.

The housing block 20 includes an aperture 34 for receiving a cylinder lock 36. The cylinder lock may also be mounted on the other side of the block 20 as shown by the cylinder lock 37 in dashed outline. The housing block 20 also includes a yoke 38 which supports a rotatable pinion 40. The rotatable pinion 40 interacts with rack teeth 42 which are cut in a surface of the bolt 16. The pinion 40 includes a pin 44 which is connected to the cylinder lock 36 as will be explained below.

Referring now to FIGS. 3 and 3A, the cylinder lock 36 includes an output shaft (not shown) which carries an output cam 46. The output cam 46 makes contact with pin 44, rotating the pinion 40 within the yoke 38. When this occurs, the pinion rotates in the direction shown by the arrow in FIG. 3A, and mating with the rack teeth 42 in the bolt 16, urges the bolt upwardly against the bias action of bias spring 26.

In normal operation, the bolt 16 is retracted pneumatically by allowing air or another similar gas to flow through valve 30 into passageway 48 which is bored in housing block 10 and empties into air chamber 50 on the forward side of sealing ring 52. This pushes the pneumatic piston 24 upwards against the biasing action of spring 26 until the bolt 16 is fully retracted. Air escapes from chamber 50 during this process through passageway 54 bored in cap 28. Air is provided to the valve 30 by a pneumatic supply line 56. However, in the event of a power failure or a failure in the pneumatic pressure system supplying line 56, the bolt 16 may be retracted by simply turning key 51 in cylinder lock 36.

Both friction and the number of moving parts of the system are minimized by the rack and pinion arrangement represented by pinion 40 cooperatively mating with rack 42 on bolt 16. For compactness, all pieces of the system are housed within housing block 20.

The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.

Claims

1. An air lock operated by a pneumatic retraction system and having a manual override feature for operating said lock in the event of failure of said pneumatic retraction system comprising:

(a) a pneumatically-actuated bolt adapted for mating with a bolt receiver, said bolt including rack means journaled in a surface thereof; and

(b) a key-operated lock having an output connected to a pinion for interacting with said rack to retract said bolt when said key-operated lock is opened.

2. The air lock of claim 1 wherein said piston, said bolt and said key-operated lock are mounted in a single housing block.

3. The air lock of claim 2 including pneumatic valve means mounted on said housing block for supplying gas to said air lock through a passage bored in said housing block.

4. The air lock of claim 2 wherein said block is vertically mounted on a door jamb.

5. A pneumatically-operated lock having a manual override feature comprising:

(a) a bolt normally deployed in an extended position for mating with a cooperative bolt receiver and including pneumatic means for retracting said bolt;

(b) a housing block journaled to receive said bolt for sliding reciprocal movement therein; and

(c) said block further including a yoke for mounting manually actuated rotatable means for retracting said bolt in the event of failure of said pneumatic means.

6. The lock of claim 5 wherein said housing block is journaled to receive a key-operated lock for controlling the rotation of said rotatable means.

7. The lock of claim 6 wherein said rotatable means comprises a pinion, and said bolt includes a rack for interacting therewith.

8. The lock of claim 7 wherein said key operated lock includes an output cam connected to said pinion.

9. The lock of claim 8 wherein said output cam is carried by an output shaft of said key-operated lock, and said pinion includes a transverse pin for contacting said cam when the output shaft of said key-operated lock is rotated.

10. The lock of claim 5 wherein said housing block is vertically mounted on a door jamb, and further including a bolt receiver mounted on a cooperatively mating door.

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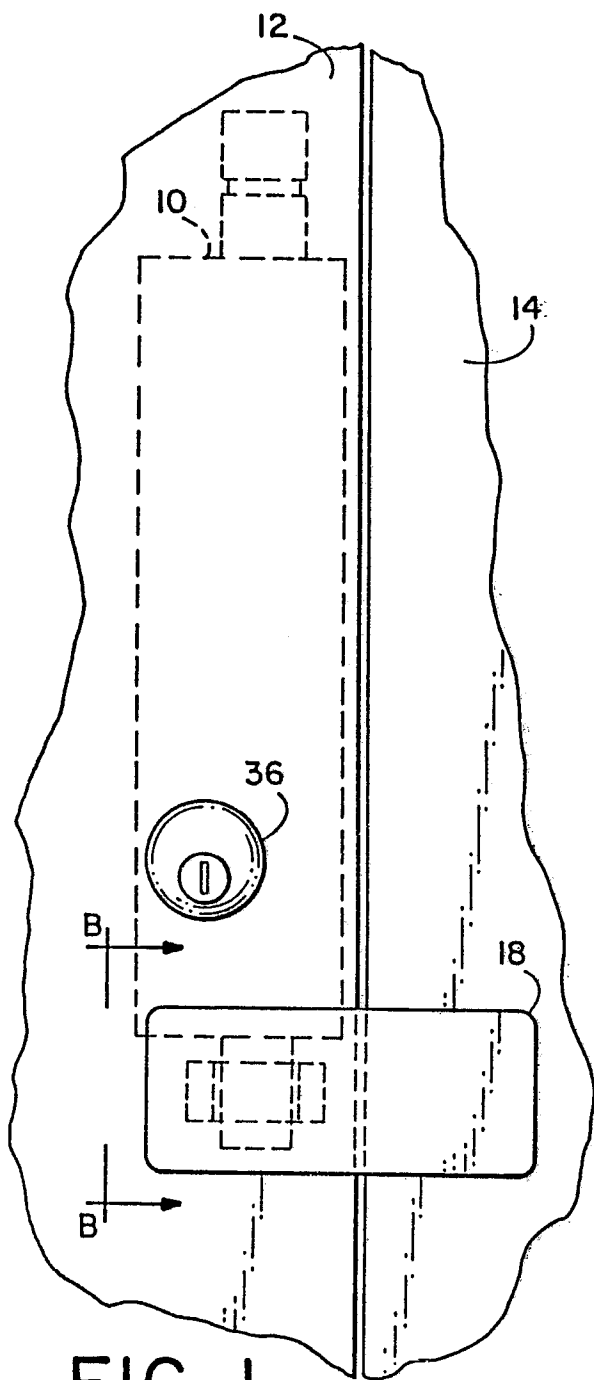


FIG. 1

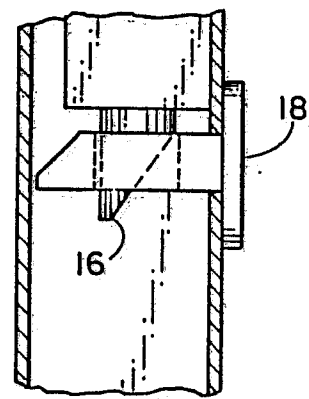
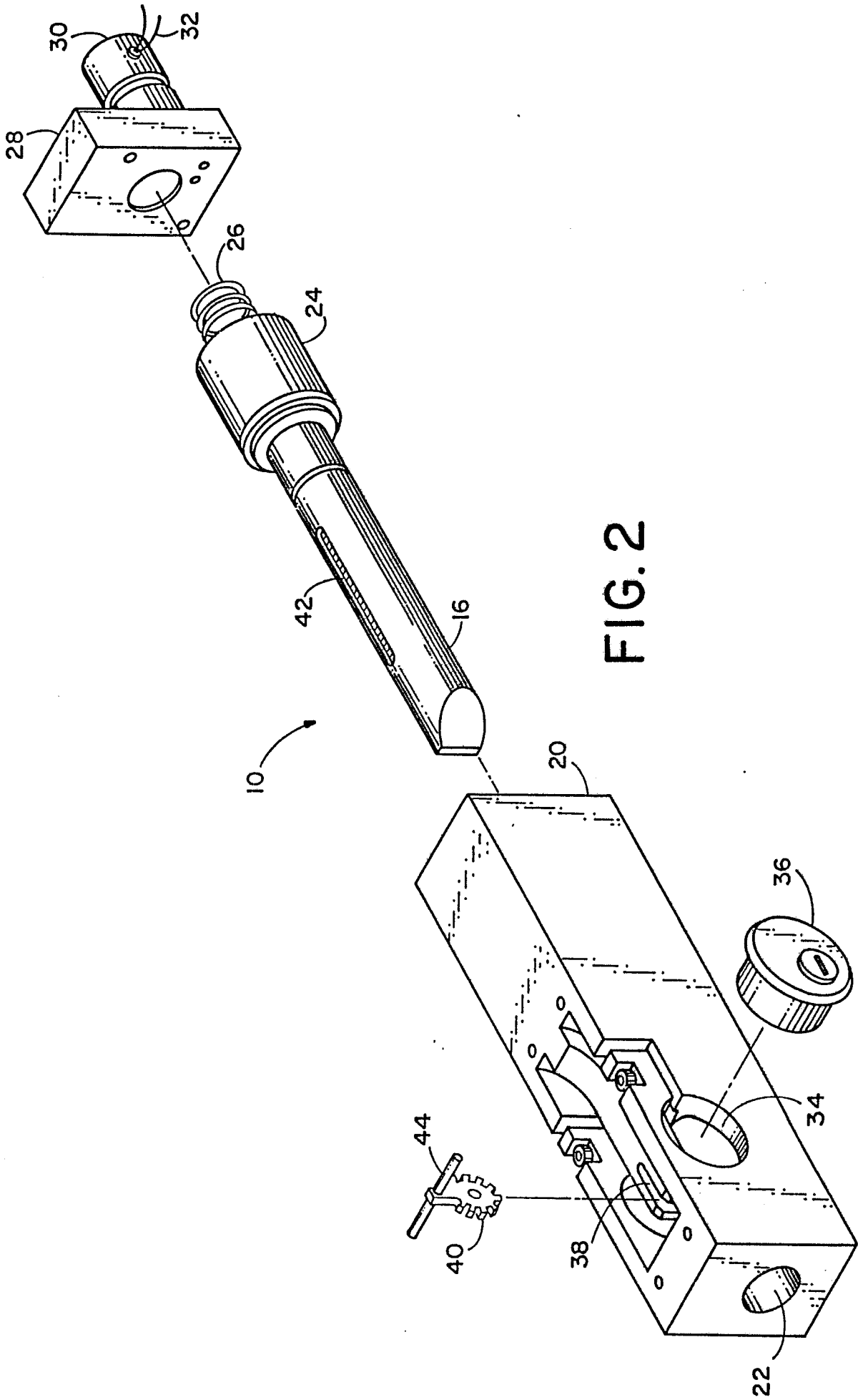


FIG. 1a



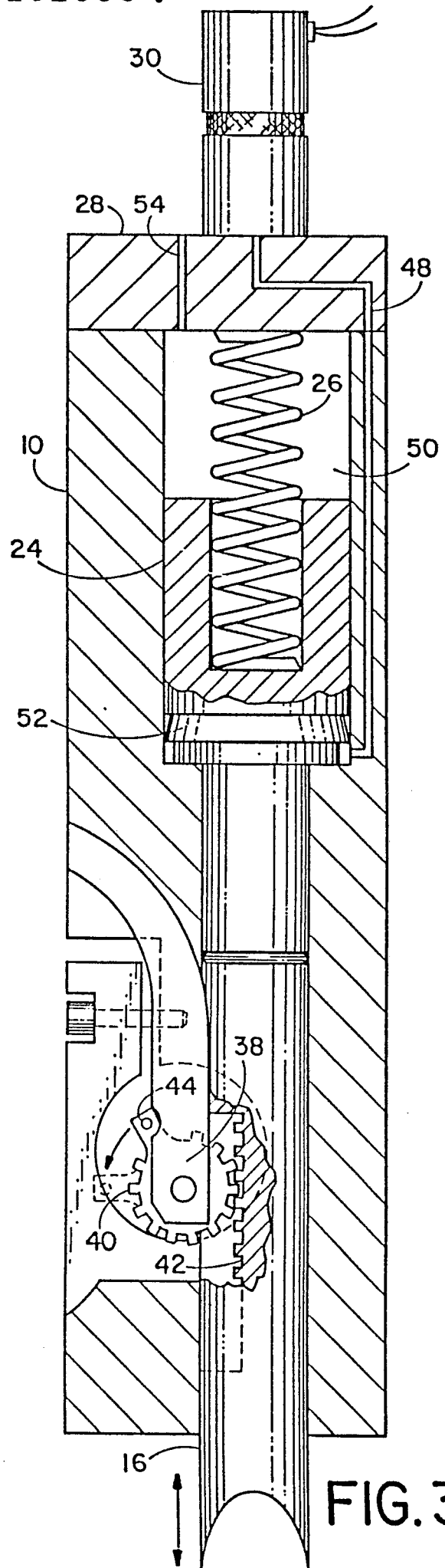


FIG. 3a

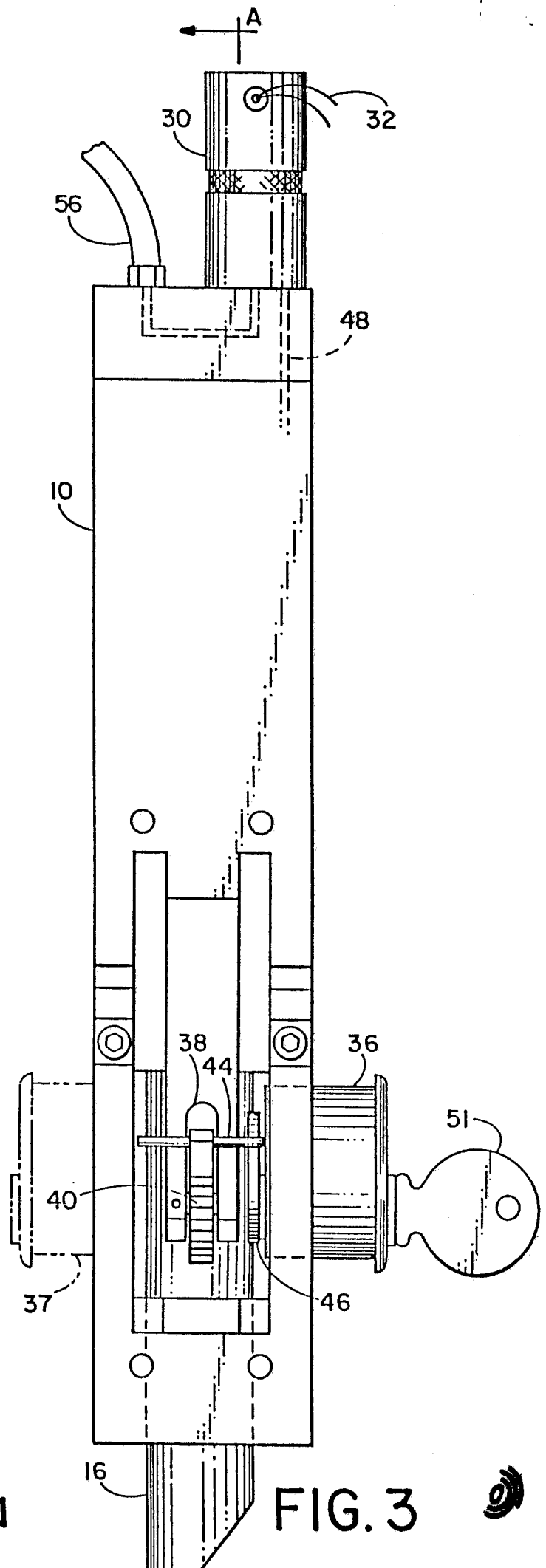


FIG. 3