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RETRACTOR ROLLER STRUCTURE FOR DOOR LOCKS

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2 Sheets-Sheet 1

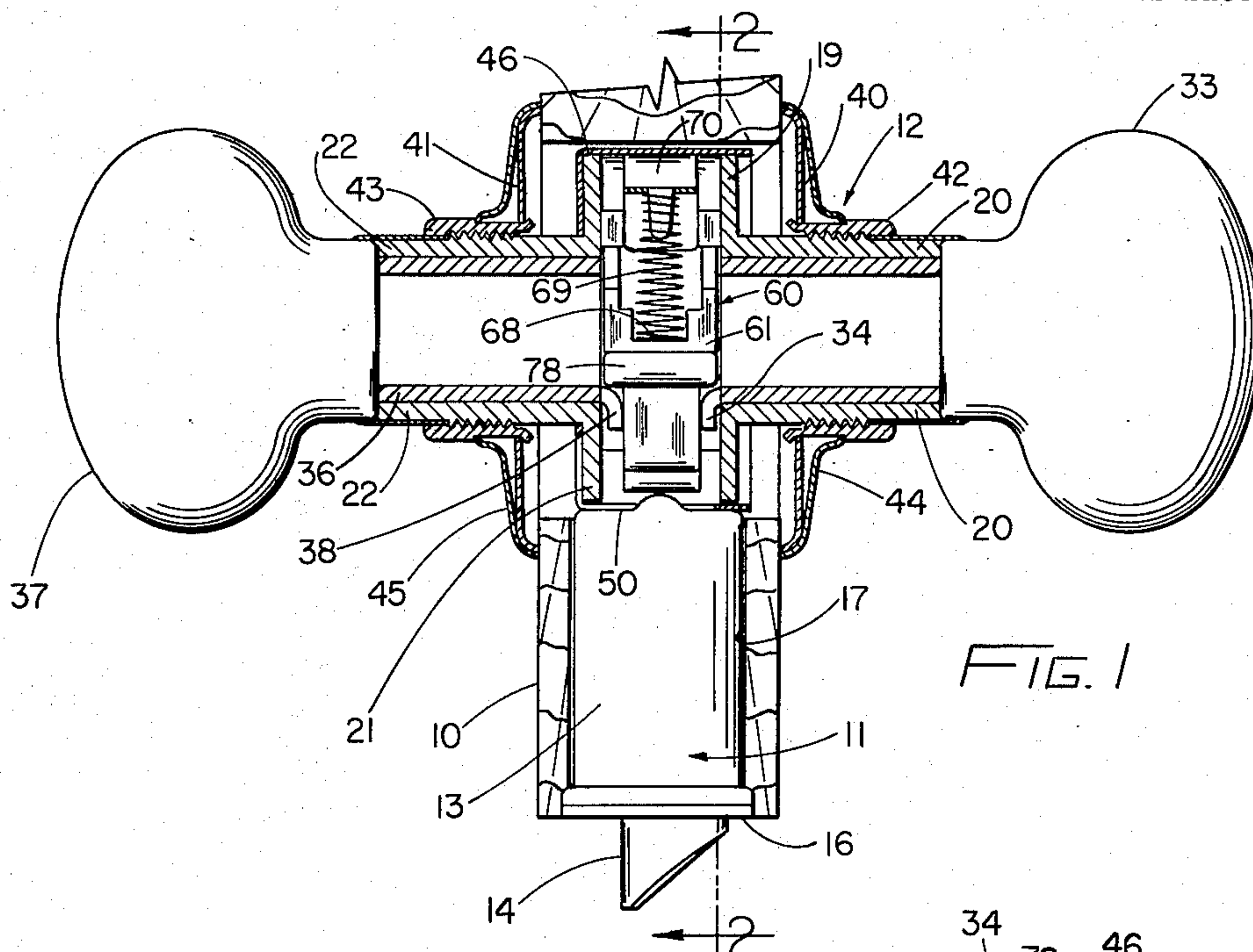


FIG. 1

FIG. 2

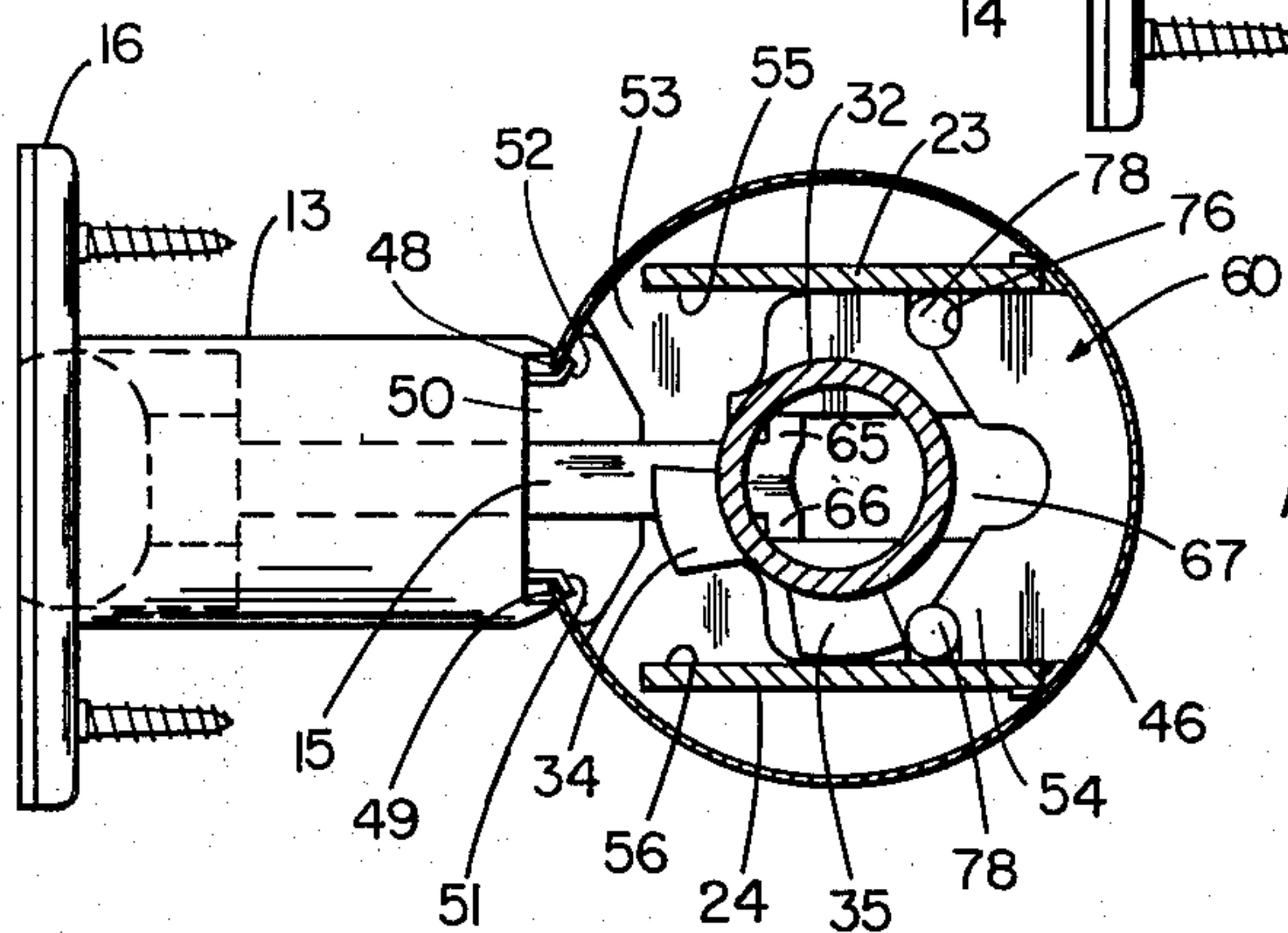
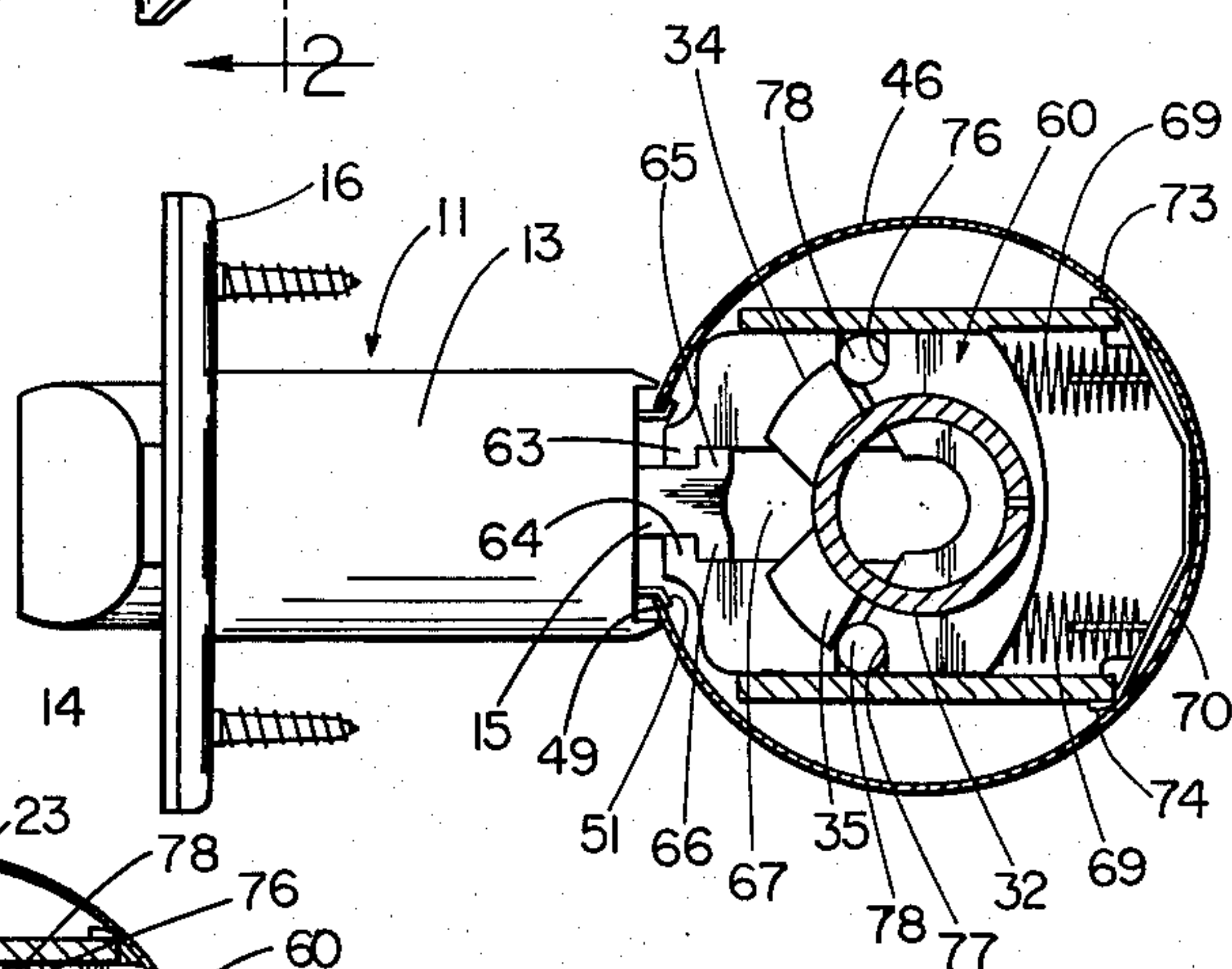


FIG. 3

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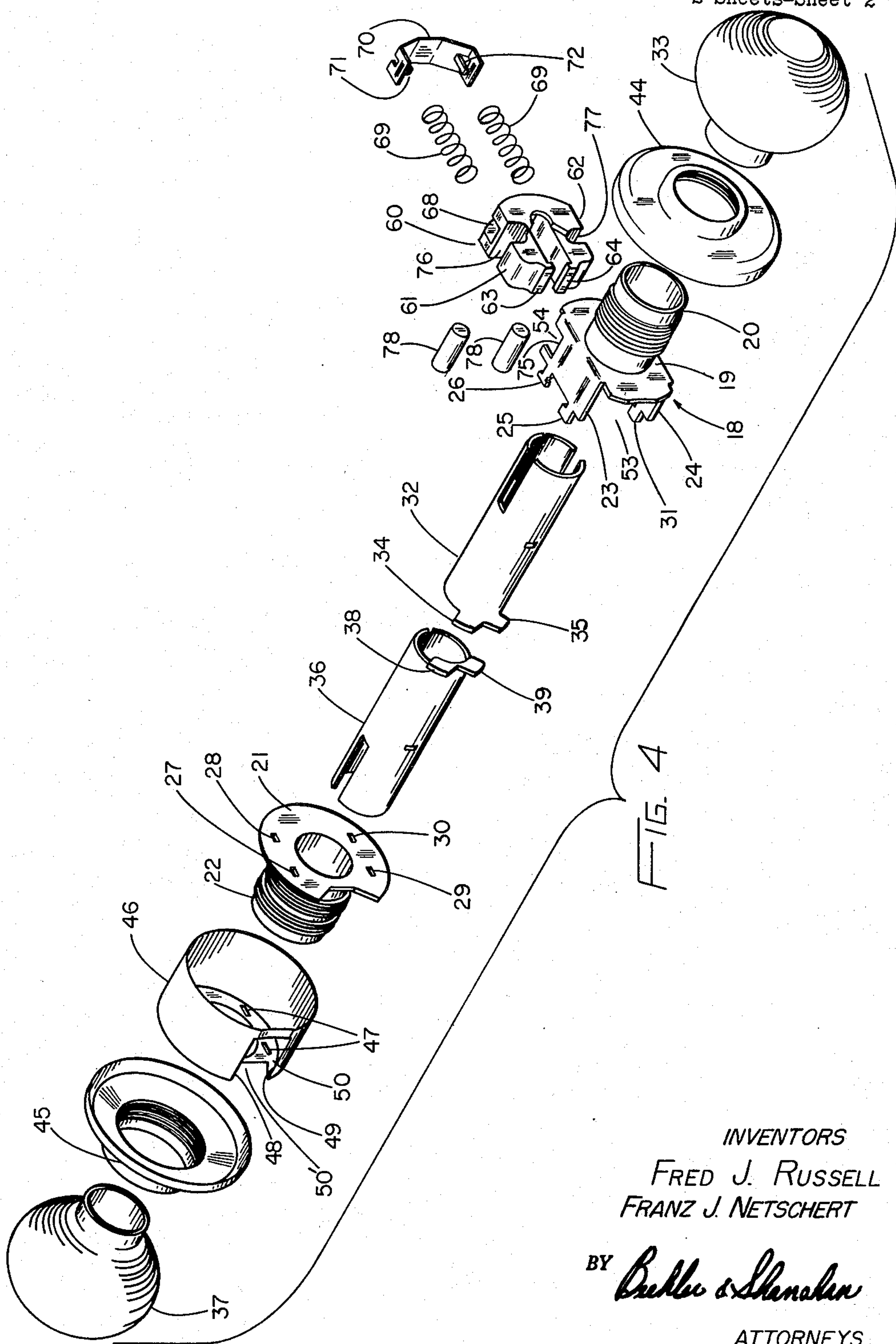
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## RETRACTOR ROLLER STRUCTURE FOR DOOR LOCKS

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4 Claims. (Cl. 292-169)

The invention relates to door locks of a type commonly referred to as cylindrical case locks and especially to an improved mechanism for retracting the latch bolt. The invention is especially concerned with the provision of a means for minimizing friction within the actuating structure.

Cylindrical case type lock structures which have been used rather widely in the past, although advantageous in many respects, have had certain objectionable features. Although these objectionable features have been recognized, the complicated nature of the mechanisms involved and the operations needed for manufacturing and assembly have been such that needed improvements have not been obvious to those skilled in the art. Where changes have been attempted in those devices heretofore available, the changes have been such as to further complicate the devices and to require additional parts and operations rather than to promote the development of simpler mechanisms.

It is, therefore, among the objects of the invention to provide a new and improved retracting mechanism for locks which is simple in its construction and assembly and which reduces the amount of friction existing during opening and closing operations and wear resulting therefrom.

Another object of the invention is to provide a new and improved operating mechanism for door locks making use of retractor slides which introduces an anti-friction device having a double function, namely that of reducing friction during reciprocation of the slide and also that of providing a low friction connection between the spindle and the reciprocating slide.

Still another object of the invention is to provide a new and improved operating mechanism for door locks of the cylindrical case type wherein a simple anti-friction roller mechanism is employed having a size and construction such that it can be contained within the mechanism without necessitating any material alteration of the size or shape of the mechanism or the accepted mode of operation, and which makes possible a selection of materials such as to improve the anti-friction character of the mechanism to a still greater degree.

With these and other objects in view, the invention consists of the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view through a door lock showing the mechanism therein;

FIGURE 2 is a cross-sectional view taken on the line 2-2 of FIGURE 1;

FIGURE 3 is a cross-sectional view similar to FIGURE 2, but showing the mechanism in a latch bolt retracted position; and

FIGURE 4 is an exploded view showing the parts of the device in perspective.

In an embodiment of the device chosen for the purpose of illustration there is shown a lock mounted for operation in a door 10, the lock consisting essentially of two assemblies, namely a latch bolt assembly 11 and an op-

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erating assembly 12. The latch bolt assembly is substantially conventional and includes a latch bolt casing 13, a latch bolt 14 reciprocatably mounted therein, a latch bolt extension 15 and a mounting plate 16. The latch bolt assembly is mounted in the door within a suitable bore 17.

The operating assembly consists of a number of parts all shown separately in the exploded view of FIGURE 4 and shown in assembled position in FIGURES 1, 2 and 3. The operating assembly includes a frame indicated generally by the reference character 18 which consists of a side plate 19 having a hub 20 mounted thereon and forming a part of the frame. A side plate 21 forms the opposite side of the frame when assembled and has a hub 22 attached thereto and forming part of the side plate. The frame further consists of a top plate 23 and a bottom plate 24. On the top plate are lugs 25 and 26 receivable in apertures 27 and 28 in the side plate 21. Apertures 29 and 30 in the side plate 21 are adapted to receive similar lugs 31 on the bottom plate 24. It will be noted that the lugs have overhanging portions forming shoulders so that when the lugs are received in the apertures, they can be anchored permanently in position by making use of the overhanging portions made reference to in some conventionally acceptable fashion.

A cylindrical hollow outer spindle 32 extends through and is rotatably mounted in the hub 20 and protrudes outwardly into engagement with an outer knob 33. At the inner end of the outer spindle 32 are a pair of roll-back elements 34 and 35 which in assembled position are located within the frame adjacent the side plate 19.

On the opposite side a hollow cylindrical inner spindle 36 is rotatably mounted in the hub 22 and extends outwardly to engage an inner knob 37. A pair of roll-back elements 38 and 39 on the inner spindle 36 also lie within the frame and in a position adjacent the side plate 21 when assembled.

In order to secure the spindles and knobs in proper position in the door, there are provided anchor plates 40 and 41 respectively secured to sleeves 42 and 43, the sleeves having a threaded engagement with threads on the respective hubs 20 and 22. Escutcheons 44 and 45 serve to complete the exterior portion of the installation and may comprise assembled portions of the anchor plates.

When the frame has been partially assembled by the engagement of the side plate 21 with the side plate 19 as heretofore described and suitably locked thereto, a cylindrical housing 46 is applied over the frame. The housing has a series of apertures 47 which match in size and position the apertures 27, 28, 29 and 30 so as to receive the lugs 25, 26 and 31 before the interlocking previously made reference to takes place.

In order to facilitate engagement of the latch bolt casing 11 with the operating assembly 12, flanges 48 and 49 forming opposite sides of an opening 50 in the housing are located so as to be interlocked with lips 51 and 52 extending inwardly from the latch bolt casing 13. It will be clear from an examination of the drawing that the lips 51 and 52 slide into engagement with the flanges 48 and 49 from an extension 50' of the aperture 50.

When assembled the frame and side plates form an enclosure which is rectangular in cross-section and having an open side 53 in alignment with and adjacent to the opening 50, there being an open side 54 opposite the open side 53. The top plate 23 provides on its inner face 55 an upper slideway whereas the bottom plate 24 provides on its inner face 56 a similar slideway spaced from and parallel to the inner face 55.

A retractor indicated generally by the reference character 60 is adapted to be mounted within the frame in a position permitting it to reciprocate between right and



lefthand positions as illustrated in FIGURE 2. The retractor 60 has upper and lower sides 61 and 62, respectively, parallel to each other and spaced apart a distance slightly less than the distance between the inner faces 55 and 56 thereby to permit free reciprocation of the retractor between the inner faces. At one end of the retractor 60 are lips 63 and 64 forming a retention means adapted to interlock and thereby engage oppositely extending lugs 65 and 66 of the latch bolt extension 15, the lugs being received freely within a space 67 inside of the retractor 60.

On the end of the retractor opposite the lips 63 and 64 are pockets 68, one of which is readily visible in FIGURE 1. The pockets are positioned respectively on upper and lower sides of the retractor and adapted to retain the ends of coiled springs 69. To complete the retention of the springs, there is provided a spring keeper member 70 at opposite ends of which are spring keeper tabs 71 and 72 which enter the ends of the respective springs 69 thereby to retain the ends in proper position. When the spring keeper member 70 is applied over the springs, flaps 73 and 74, respectively, fall within complementary slots 75 and overlie, respectively, the top and bottom walls 23 and 24 of the frame in the positions illustrated in FIGURE 2. It will be noted that the spring keeper member 70 is retained beneath the wall of the housing 46.

To facilitate the freedom of reciprocation of the retractor and also enable the retractor to be moved to a position retracting the latch bolt 14, the upper and lower sides 61 and 62 of the retractor are provided with semi-cylindrical laterally open recesses 76 and 77. A roller 78 is mounted in each of the recesses and is adapted to rotate freely therein. The rollers are of such length that they are contained in a freely rotating relationship between the side plates 19 and 21. It will further be noted that the recesses 76 and 77 are so positioned that when the rollers 78 are located therein, they are in positions of engagement respectively with the roll-back elements 34, 35, 38 and 39. Engagement with the roll-back elements 34 and 35 is clearly illustrated in FIGURES 2 and 3.

In operation the parts normally occupy the relative positions illustrated in FIGURES 1 and 2. In this position, by reason of pressure exerted by the springs 69 as well as the inherent conventional construction of the latch bolt assembly 11, the latch bolt 14 will be urged outwardly to the position shown in FIGURE 2 which will be a latched position for the door 11. When it is desired to unlatch the door moving the latch bolt from the position of FIGURE 2 to the position of FIGURE 3, one or the other of the knobs 33 or 37 is rotated. If the rotation be counterclockwise as viewed in FIGURES 2 and 3, the roll-back element 35 will be rotated against the roller 78 which lies in the recess 77. Continued rotation of the roll-back element presses against the roller and this in turn causes the retractor 60 to move from left to right from the position shown in FIGURE 2 to the position shown in FIGURE 3. As the action takes place, the roller 78 is free to rotate and minimizes friction not only between the roll-back elements and the rollers, but also between the retractor and the inner face 56 of the bottom plate 24. At the same time, should there be any tendency for the retractor to cock or rotate about a central axis, the roller 78 which is positioned in the upper recess 76, also being free to rotate, minimizes the frictional resistance of movement of the retractor against the inner face 55 of the top plate 23.

It will further be noted that the retractor has considerable length so that both its upper and lower sides 61 and 62 respectively have appreciable length and hence improve the ease of slidability of the retractor between the top and bottom plate assisted as heretofore described by action of the roller 78.

From this description it will be further clear that the ease of action will be the same whether the knob 33 is

rotated clockwise or counterclockwise, or whether the retracting action be exerted by the knob 37 rotated in either direction. Constructed and assembled as shown, one of the rollers 78 will always be free to rotate against the adjacent face of the frame even though the action of the roll-back elements against the opposite roller may tend to curtail its freedom of rotation momentarily.

The effect of the assembly is one to make possible a very smooth fitting relationship of the retractor within the frame without resorting to the holding of close tolerances and hence permits of a relatively inexpensive construction and assembly operation while at the same time producing a very desirable snug but free sliding action.

Although we have herein shown and described our invention in what we have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of our invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent structures and devices.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a lock, a frame, a hub on each side of the frame, a slideway forming part of the frame and located between said hubs, a retractor having upper and lower sides slidably mounted in said slideway, means forming transversely extending laterally open recesses at said upper and lower sides of said retractor, a roller rotatably mounted in each recess and in engagement with adjacent portions of said slideway, a spindle mounted in each hub, each said spindle at the inside end thereof having roll-back means in engagement with said rollers whereby to enable alternatively a retracting movement of said retractor by rotation of said spindles, one of said rollers during retraction having a rolling engagement with the roll-back means, and said rollers both being in rolling engagement with respective portions of the slideway during retraction and during return to initial position.

2. In a lock, a latch bolt assembly comprising a latch bolt casing and a latch bolt reciprocatably mounted in the casing, a housing, a frame in the housing and a hub on each side of the frame, said housing having a releasable engagement with said latch bolt casing, a slideway in said frame in alignment with said latch bolt, a retractor having upper and lower sides slidably mounted in said slideway, retention means on one end of said retractor having a releasable engagement with said latch bolt, means forming transversely extending recesses at upper and lower sides of said retractor each recess having a laterally open side in communication with the respective slideway, a roller having a diameter greater than the depth of the recess rotatably mounted in each recess and engageable through said laterally open side with adjacent portions of said slideway, a spindle mounted in each hub, each said spindle at the inside end thereof having roll-back elements in engagement with said rollers whereby to enable retraction of said latch bolt by rotation of said spindles.

3. In a lock, a latch bolt assembly comprising a latch bolt casing and a latch bolt element reciprocatably mounted in the casing, a housing, a frame in said housing, a hub on each side of the frame, means forming an opening at one side of the housing, said housing having a releasable engagement with said latch bolt casing, a slideway in the frame in alignment with the opening and with said latch bolt element, a retractor having upper and lower sides slidably mounted in said slideway, retention means on one end of said retractor having a releasable engagement with said latch bolt element, spring means between said retractor and said housing normally urging said retractor in a direction toward said latch bolt element, means forming transversely extending recesses at upper and lower sides of said retractor



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each recess having a laterally open side in communication with the respective side of the slideway, a roller rotatably mounted in each recess and protruding beyond the recess to a position of engagement with adjacent portions of said slideway, a spindle mounted in each said hub, each said spindle at the inside end thereof having roll-back elements in engagement with said rollers whereby to enable alternatively movement of said retractor against said spring means and retraction of said latch bolt by rotation of said spindle, one of said rollers during retraction having a rolling engagement with the roll-back means, and said rollers both being in rolling engagement with respective portions of the slideway during retraction and during return to initial position.

4. In a lock, a latch bolt assembly comprising a latch bolt casing and a latch bolt reciprocatably mounted in the casing, said latch bolt having an inside end, a housing, a frame in said housing, an inner hub on one side of the frame, an outer hub on the opposite side of the frame, means forming an opening at one side of the housing and retaining flanges adjacent said opening, said flanges having a releasable engagement with an inside end of said latch bolt casing, means in said frame forming a slideway in alignment with the opening and with said latch bolt, a retractor having upper and lower sides slidably mounted in said slideway, retention means on one end of said retractor having a releasable engagement with the inside end of said latch bolt, means forming transversely extending laterally open arcuate re-

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cesses at upper and lower sides of said retractor, a roller rotatably mounted in each recess and having the circumference thereof protruding beyond the recess to a position of engagement with adjacent portions of said slideway, an inner spindle having an inside end rotatably mounted in said inner hub, an outer spindle having an inside end rotatably mounted in the outer hub, said rollers having ends thereof extending outwardly with respect to the retractor, each said spindle at the inside end thereof having radially extending roll-back elements lying outside the retractor and in engagement respectively with the ends of said rollers whereby to enable retraction of said latch bolt by rotation of said spindles without engagement of said roll-back elements directly with said retractor.

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