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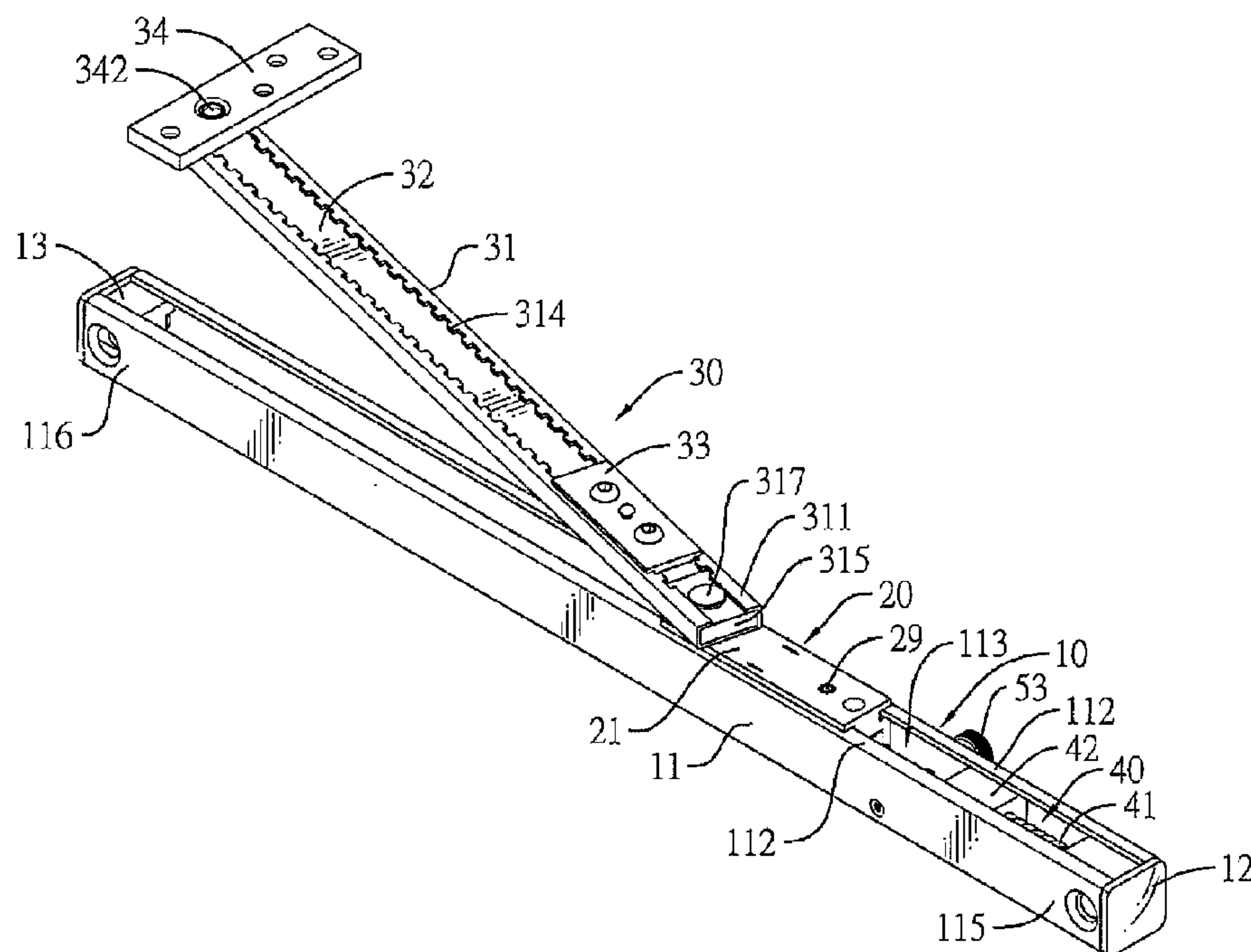
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(54) Titre : DISPOSITIF DE FERMETURE DE PORTE

(54) Title: DOOR CLOSER



(57) Abrégé/Abstract:

A door closer has a fixing set (10), a bidirectional set (20), and an extending set (30). The fixing set (10) has an elongated tube (11) with two opposite sidewalls (111) and an opening (113). The bidirectional set (20) is connected to the fixing set (10), is mounted in the elongated tube (11) and has a connecting board (21) formed on the bidirectional set (20) and extending out of the opening (113). The extending set (30) is connected to the bidirectional set (20) and has a guiding track (31), an extending arm (32), a locking board (33), and a connecting panel (34). The extending arm (32) is mounted in the guiding track (31). The locking board (33) engages the guiding track (31) and is connected to the extending arm (32) to adjust the extending set (30). The connecting panel (34) is connected to the extending arm (32).

1 **DOOR CLOSER**

2 **ABSTRACT**

3 A door closer has a fixing set (10), a bidirectional set (20), and an
4 extending set (30). The fixing set (10) has an elongated tube (11) with two
5 opposite sidewalls (111) and an opening (113). The bidirectional set (20) is
6 connected to the fixing set (10), is mounted in the elongated tube (11) and has a
7 connecting board (21) formed on the bidirectional set (20) and extending out of
8 the opening (113). The extending set (30) is connected to the bidirectional set (20)
9 and has a guiding track (31), an extending arm (32), a locking board (33), and a
10 connecting panel (34). The extending arm (32) is mounted in the guiding track
11 (31). The locking board (33) engages the guiding track (31) and is connected to
12 the extending arm (32) to adjust the extending set (30). The connecting panel (34)
13 is connected to the extending arm (32).

14

1 **DOOR CLOSER**

2 **BACKGROUND OF THE INVENTION**

3 1. Field of the Invention

4 The present invention relates to a door closer, and more particularly
5 relates to a door closer that is connected between a door frame and a door panel
6 to assist the door panel to move backwardly the original position relative to the
7 door frame and can be assembled between a door frame and a door panel of
8 different sizes.

9 2. Description of Related Art

10 With reference to Fig. 11, a conventional door closer is connected
11 between a door frame 60 and a door panel 61 and has an elongated tube 70, a
12 connecting base 76 and a linking set 72. The elongated tube 70 is hollow, is
13 connected to a top of the door panel 61 and has a top side, a track slot and a
14 sliding block 71. The track slot is formed in the top side of the elongated tube 70.
15 The sliding block 71 is slidably mounted in the track slot of the elongated tube 70
16 and had a top end extending out of the top side of the elongated tube 70. The
17 connecting base 76 is securely mounted on a side of the door frame 60 and has a
18 bottom side.

19 The linking set 72 is connected to the elongated tube 70 and the
20 connecting base 76 and has an arm pipe 73 and a linking shaft 74. The arm pipe
21 73 is hollow, is connected to the sliding block 71 of the elongated tube 70 and has
22 a connecting end and a mounting end. The connecting end of the arm pipe 73 is
23 pivotally connected to the top end of the sliding block 71. The linking shaft 74 is

1 mounted in the arm pipe 73, is pivotally connected to the connecting base 76 and
2 has an inserting end and a pivot end. The inserting end of the linking shaft 74 is
3 inserted into the arm pipe 73 via the mounting end of the arm pipe 73 and is
4 securely connected to the arm pipe 73 by a fastener 75. The pivot end of the
5 linking shaft 74 is pivotally connected to the bottom side of the connecting base
6 76. In addition, the position of the inserting end of the linking shaft 74 can be
7 adjusted relative to the arm pipe 73 to change the total length of the linking set
8 72.

9 In use, after the conventional door closer is connected to the door frame
10 60 and the door panel 61, when the door panel 61 is open to rotate relative to the
11 door frame 60, the linking set 72 is rotated relative to the connecting base 76 by
12 the sliding block 71 moving in the track slot of the elongated tube 70. In addition,
13 the linking set 72 can be used to limit the rotating angle of the door panel 61
14 relative to the door frame 60. Furthermore, when the door panel 61 is closed to
15 move backwardly to the door frame 60, the sliding block 71 is moved in the track
16 slot in an opposite direction, and this can enable the linking set 72 to assist the
17 door panel 61 to move backwardly the original position.

18 The linking set 72 of the conventional door closer can be adjusted to
19 change the total length of the conventional door closer, and this can enable the
20 conventional door closer to assemble on the door frame 60 and the door panel 61
21 of different sizes. However, based on the cost and operation considerations of the
22 conventional door closer, the adjusting range of the linking set 72 of the
23 conventional door closer is limited and cannot be assembled on various sizes of

1 door frame 60 and door panel 61. Therefore, different sizes of linking sets 72 are
2 needed to be manufactured to use on various sizes of door frame 60 and door
3 panel 61, and this will increase the cost of using the conventional door closer and
4 will limit the practicality of the conventional door closer.

5 Therefore, the invention provides a door closer to mitigate or obviate the
6 aforementioned problems.

7 SUMMARY OF THE INVENTION

8 One aspect of the present invention is to provide a door closer that is
9 connected between a door frame and a door panel to assist the door panel to move
10 backwardly the original position relative to the door frame and can be assembled
11 between a door frame and a door panel of different sizes.

12 The door closer in accordance with the present invention has a fixing set,
13 a bidirectional set and an extending set. The fixing set has an elongated tube. The
14 elongated tube has two opposite sidewalls and an opening. The bidirectional set
15 is connected to the fixing set, is movably mounted in the elongated tube and has
16 a connecting panel formed on and protruding from the bidirectional set and
17 extending out of the opening. The extending set is pivotally connected to the
18 bidirectional set and has a guiding track, an extending arm, a locking board and a
19 connecting panel. The extending arm is movably mounted in the guiding track
20 and has a connecting end extending out of the guiding track. The locking board
21 engages the guiding track and is connected to the extending arm to adjust a total
22 length of the extending set. The connecting panel is connected to the connecting
23 end of the extending arm.

3a

1 According to another aspect of the invention there is provided a
2 door closer comprising:
3 a fixing set having
4 an elongated tube having
5 a top;
6 a bottom;
7 a first end;
8 a second end being opposite to the first end of the elongated tube;
9 two opposite sidewalls formed on and protruding upwardly from the
10 bottom of the elongated tube, facing to each other and each one of the opposite
11 sidewalls having an upper track edge; and
12 an opening formed through the top of the elongated tube between the
13 upper track edges of the opposite sidewalls;
14 a bidirectional set connected to the fixing set, movably mounted in the
15 elongated tube between the first end and the second end of the elongated tube and
16 having
17 a connecting board formed on and protruding from the bidirectional set,
18 extending out of the opening of the elongated tube and having a top side and a
19 bottom side; and
20 an extending set pivotally connected to the bidirectional set and having
21 a guiding track pivotally connected to the bidirectional set and having
22 a bottom side abutting the top side of the connecting board;
23 a top side;

3b

1 a pivot end mounted over the connecting board and the elongated tube;
2 an inserting end formed on the guiding track opposite to the pivot end of
3 the guiding track;

4 a track opening formed through the top side of the guiding track to form
5 two end edges at the top side of the guiding track;

6 multiple positioning teeth formed on and protruding inwardly from the
7 end edges of the guiding track at intervals; and

8 a pivot pin mounted through the bottom side of the guiding track and the
9 connecting board of the bidirectional set and pivotally connected to the
10 bidirectional set to enable the guiding track to rotate relative to the bidirectional
11 set by the pivot end;

12 an extending arm movably mounted in the guiding track and having a
13 connecting end extending out of the guiding track via the inserting end of the
14 guiding track;

15 a locking board engaging the guiding track connected to the extending
16 arm to hold the locking board on the guiding track at the track opening of the
17 guiding track to adjust a total length of the extending set and having

18 an engaging segment abutting the extending arm, selectively engaging
19 the guiding track and having

20 a top side;

21 a bottom side abutting a top side of the extending arm;

22 two sidewalls; and

23 multiple engaging teeth formed on and protruding from the sidewalls of

1 the engaging segment at intervals and engaging the positioning teeth of the
2 guiding track; and

3 a compression spring mounted between the top side of the extending arm
4 and the engaging segment of the locking board to form a gap between the
5 extending arm and the locking board; and

6 at least one screw mounted through the engaging segment of the locking
7 board and securely connected to the extending arm to connect the locking board
8 securely with the extending arm; and

9 a connecting panel connected to the connecting end of the extending
10 arm;

11 wherein when the at least one screw is loosened, the compression spring
12 pushes the locking board to move upwardly relative to the guiding track to enable
13 the engaging teeth to separate from the positioning teeth to enable the extending
14 arm and the locking board to move relative to the guiding track to adjust a total
15 length of the extending set.

16

1 Other advantages and novel features of the invention will become more
2 apparent from the following detailed description when taken in conjunction with
3 the accompanying drawings.

4 BRIEF DESCRIPTION OF THE DRAWINGS

5 Fig. 1 is a perspective view of a door closer in accordance with the
6 present invention;

7 Fig. 2 is an exploded perspective view of the door closer in Fig. 1;

8 Fig. 3 is an enlarged and exploded perspective view of the door closer in
9 Fig. 2;

10 Fig. 4 is a top view of a door closer in Fig. 1;

11 Fig. 5 is an operational top view of a door closer in Fig. 1;

12 Fig. 6 is a side view in partial section of the door closer along line 6-6 in
13 Fig. 4;

14 Fig. 7 is an enlarged side view in partial section of the door closer along
15 line 7-7 in Fig. 5;

16 Fig. 8 is another operational top view of a door closer in Fig. 1;

17 Fig. 9 is a further operational top view of a door closer in Fig. 1;

18 Fig. 10 is an enlarged operational side view in partial section of the door
19 closer in Fig. 6; and

20 Fig. 11 is a top view of a door closer in accordance with the prior art
21 connected to a door frame and a door panel.

22 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

23 With reference to Figs. 1 and 2, a door closer in accordance with the

1 present invention comprises a fixing set 10, a bidirectional set 20, an extending
2 set 30, an optional buffering set 40 and an optional switching set 50.

3 The fixing set 10 has an elongated tube 11, a first end plug 12 and a
4 second end plug 13. The elongated tube 11 may be a hollow rectangular tube and
5 has a top, a bottom, a first end 115, a second end 116, a bottom board 114, two
6 opposite sidewalls 111, a track slot 112, an opening 113 and a limiting protrusion
7 117. The second end 116 of the elongated tube 11 is opposite to the first end 115
8 of the elongate tube 11. The bottom board 114 is formed on the bottom of the
9 elongated tube 11 and has two opposite sides. The opposite sidewalls 111 are
10 respectively formed on and protrude upwardly from the opposite sides of the
11 bottom board 114, face to each other and each one of the opposite sidewalls 111
12 has an upper track edge.

13 The track slot 112 is formed in the elongated tube 11 between the bottom
14 board 114 and the opposite sidewalls 111 of the elongated tube 11. The opening
15 113 is formed through the top of the elongated tube 11 between the upper track
16 edges of the opposite sidewalls 111 and communicates with the track slot 112.
17 The limiting protrusion 117 is formed on and protrudes from the bottom board
18 114 adjacent to the first end 115 of the elongated tube 11. The first end plug 12 is
19 connected to the first end 115 of the elongated tube 11. The second end plug 13 is
20 connected to the second end 116 of the elongated tube 11.

21 With reference to Figs. 2, 4 and 6, the bidirectional set 20 may be a
22 sliding block, is connected to the fixing set 10 and is movably mounted in the
23 track slot 112 of the elongated tube 11. In addition, the bidirectional set 20 can be

1 mounted in the track slot 112 via the first end 115 of the elongated tube 11 or the
2 second end 116 of the elongated tube 11. The bidirectional set 20 has a body 23,
3 a connecting board 21, two sliding recesses 22, a rod hole 24 and an engaging
4 group 25. The body 23 may be a rectangular block, is movably mounted in the
5 track slot 112 of the elongated tube 11 and has a top side, a bottom side, two
6 sidewalls, two end sides and a concaved recess. The top side of the body 23 faces
7 the upper track edges of the opposite sidewalls 111 of the elongated tube 11. The
8 sidewalls of the body 23 respectively face the opposite sidewalls 111 of the
9 elongated tube 11. The end sides of the body 23 respectively face the end plugs
10 12, 13 of the fixing set 10. The concaved recess is formed through the bottom
11 side and the end sides of the body 23.

12 The connecting board 21 is formed on and protrudes from the top side of
13 the body 23, extends out of the opening 113 of the elongated tube 11 and has a
14 top side. The sliding recesses 22 are respectively formed in the sidewalls of the
15 body 23 near the top side of the body 23 and below the connecting board 21.
16 Then, the upper track edges of the opposite sidewalls 111 of the elongated tube
17 11 are respectively mounted in the sliding recesses 22, and this can enable the
18 bidirectional set 20 to securely connect with the fixing set 10. The rod hole 24 is
19 elongated, is formed through the sidewalls of the body 23 and communicates
20 with the concaved recess of the body 23 and the sliding recesses 22.

21 The engaging group 25 is mounted in the concaved recess of the body 23,
22 is connected to the rod hole 24 and has an engaging rod 26, an elastic slice 27 and
23 a bolt 29. The engaging rod 26 may be a cylinder and is movably mounted in the

1 rod hole 24 of the bidirectional set 20. The elastic slice 27 is mounted in the
2 concaved recess of the body 23, is pressed against the engaging rod 26 and has a
3 pressing end, a connecting end, a middle, and a fixing element 28. The pressing
4 end of the elastic slice 27 is pressed against the engaging rod 26. The connecting
5 end of the elastic slice 27 is securely connected to the body 23 by the fixing
6 element 28 mounting through the connecting board 21, mounting in the concaved
7 recess of the body 23 and connecting with the connecting end of the elastic slice
8 27. Then, the elastic slice 27 can be securely held in the concaved recess of the
9 body 23 between the engaging rod 26 and the fixing element 28. The bolt 29 is
10 mounted through the connecting board 21, is mounted in the concaved recess of
11 the body 23 and is pressed against the elastic slice 27 at the middle of the elastic
12 slice 27. Then, the bolt 29 can be used to adjust the pressing force that the elastic
13 slice 27 is pressed against the engaging rod 26.

14 With reference to Figs. 1 and 2, the extending set 30 is pivotally
15 connected to the bidirectional set 20 and has a guiding track 31, an extending arm
16 32, a locking board 33 and a connecting panel 34.

17 The guiding track 31 is an elongated-rectangular track, is pivotally
18 connected to the bidirectional set 20 and has a bottom side, a top side, a pivot end
19 311, an inserting end 312, a track opening 313 and multiple positioning teeth 314,
20 a sealing block 315, a first washer 316, a pivot pin 317. The bottom side of the
21 guiding track 31 abuts the top side of the connecting board 21 to enable the pivot
22 end 311 of the guiding track 31 to mount over the over the connecting board 21
23 and the elongated tube 11. The inserting end 312 of the guiding track 31 is

1 formed on the guiding track 31 opposite to the pivot end 311 of the guiding track
2 31. The track opening 313 is formed through the top side of the guiding track 31
3 to form two end edges at the top side of the guiding track 31. The positioning
4 teeth 314 are formed on and protrude inwardly from one of the end edges of the
5 guiding track 31 at intervals or are formed on and protrude inwardly from the end
6 edges of the guiding track 31 at intervals.

7 The sealing block 315 is mounted in the guiding track 31 at the pivot end
8 311 of the guiding track 31. The first washer 316 is mounted between the top side
9 of the connecting board 21 and the bottom side of the guiding track 31. The pivot
10 pin 317 is mounted through the sealing block 315, the bottom side of the guiding
11 track 31, the first washer 316 and the connecting board 21 and is pivotally
12 connected to the body 23 of the bidirectional set 20. Then, the guiding track 31
13 can be rotated relative to the bidirectional set 20 by the pivot end 311.

14 The extending arm 32 is elongated, is movably mounted in the guiding
15 track 31 and has a top side, a bottom side, a positioning end 321, a connecting
16 end 322, two threaded holes 323 and a through hole 324. The positioning end 321
17 of the extending arm 32 is mounted in the guiding track 31 via the inserting end
18 312 of the guiding track 31 adjacent to the sealing block 315. The connecting end
19 322 of the extending arm 32 is formed on extending arm 32 opposite to the
20 positioning end 311 of the extending arm 32 and the extends out of the guiding
21 track 31 via the inserting end 312 of the guiding track 31. The threaded holes 323
22 are formed through the top side and the bottom side of the extending arm 32 at an
23 interval near the positioning end 321 of the extending arm 32. The through hole

1 324 is formed through the top side and the bottom side of the extending arm 32
2 between the threaded holes 323.

3 With reference to Figs. 3, 5 and 7, the locking board 33 is connected to
4 the extending arm 32, engages the guiding track 31 and has an engaging segment
5 331, a covering segment 333, two mounting holes 335, two screws 338, a rivet
6 hole 330, a rivet 336 and a compression spring 337.

7 The engaging segment 331 may be rectangular, abuts the extending arm
8 32 and selectively engages the guiding track 31. The engaging segment 331 has a
9 top side, a bottom side, two sidewalls and multiple engaging teeth 332. The
10 bottom side of the engaging segment 331 abuts the top side of the extending arm
11 32. The engaging teeth 331 are formed on and protrude from one of the sidewalls
12 of the engaging segment 331 at intervals or are formed on and protrude from the
13 sidewalls of the engaging segment 331 at intervals. In addition, the engaging
14 teeth 332 of the engaging segment 331 selectively engage the positioning teeth
15 314 of the guiding track 31.

16 The covering segment 333 is formed on the top side of the engaging
17 segment 331, is mounted over the positioning teeth 314 of the guiding track 31 to
18 cover the track opening 313 and has a top side, two opposite sides and two
19 pressing edges 334. The pressing edges 334 are respectively formed on and
20 protrude outwardly from the opposite sides of the covering segment 333 and
21 extend out of the engaging teeth 332 of the engaging segment 331 to press the
22 positioning teeth 314 of the guiding track 31. Then, the positioning teeth 314 of
23 the guiding track 31 are mounted between the top side of the extending arm 32

1 and the pressing edges 334 of the locking board 33.

2 The mounting holes 335 are formed through the covering segment 333
3 and the engaging segment 331 at an interval and are respectively align with the
4 threaded holes 323 of the extending arm 32. The screws 338 are respectively
5 mounted through the mounting holes 335 and are respectively and securely
6 connected to the threaded holes 323 of the extending arm 32 to connect the
7 locking board 33 securely with the extending arm 32. Then, the extending arm 32
8 is securely held in the guiding track 31 by the locking set 33.

9 The rivet hole 330 is formed through the covering segment 333 and the
10 engaging segment 331 between the mounting holes 335 and aligns the through
11 hole 324 of the extending arm 32. The rivet 336 is mounted through the rivet hole
12 330 of the locking board 33 and the through hole 324 of the extending arm 32 and
13 is connected to the bottom side of the extending arm 32. The compression spring
14 337 is mounted around the rivet 336 between the top side of the extending arm 32
15 and the engaging segment 331 of the locking board 33 to form a gap between the
16 extending arm 32 and the locking board 33.

17 Furthermore, with reference to Figs. 3 and 7, when the screws 338 are
18 loosen, the compression spring 337 will push the locking board 33 to move
19 upwardly relative to the guiding track 31 to enable the engaging teeth 332 to
20 separate from the positioning teeth 314. Then, the extending arm 32 and the
21 locking board 33 can be moved relative to the guiding track 31 and this can adjust
22 the total length of the extending set 30. In addition, in the present invention, the
23 extending arm 32 is securely connected to the guiding track 31 by the

1 engagement between the positioning teeth 314 and the engaging teeth 332.
2 Preferably, the extending arm 32 also can be adjustable connected to the guiding
3 track 31 by fastening, fixing or pressing and so on to adjust the total length of the
4 extending set 30. Additionally, when the screws 338 are loosen between the
5 extending arm 32 and the locking board 33 to enable the engaging teeth 332 to
6 separate from the positioning teeth 314, the rivet 336 can be used to provide a
7 limiting effect to the locking board 33 to prevent the locking board 33 fully
8 separating from the extending arm 32.

9 The connecting panel 34 is connected to the connecting end 322 of the
10 extending arm 32 and has a top side, a bottom side, a pivot rod 342, at least one
11 second washer 341 and multiple connecting holes. The pivot rod 342 is mounted
12 through the connecting end 322 of the extending arm 32 from the bottom side to
13 the top side of the extending arm 32 and is connected to the connecting panel 34.
14 The at least one second washer 341 is mounted around the pivot rod 342 between
15 the connecting panel 34 and the top side of the extending arm 32. The connecting
16 holes are formed through the connecting panel 34 at intervals. Then, the
17 connecting panel 34 can be mounted on a door frame by multiple fasteners
18 mounting through the connecting holes of the connecting panel 34 and
19 connecting to the door frame.

20 With reference to Figs. 2, 4 and 6, the buffering set 40 is mounted in the
21 fixing set 10 and has a buffering block 42 and a buffering spring 41. The
22 buffering block 42 is movably mounted in the track slot 112 of the elongated tube
23 11 at the first end 115 of the elongated tube 11 adjacent the first end plug 12 and

1 selectively abuts the limiting protrusion 117 of the elongated tube 11. The
2 buffering spring 41 is mounted in the track slot 112 of the elongated tube 11
3 between the first end plug 12 and the buffering block 42 to push the buffering
4 block 42 to abut against the limiting protrusion 117 of the elongated tube 11.
5 Furthermore, the buffering spring 41 can provide a buffering force to the
6 bidirectional set 20 via the buffering block 42.

7 With reference to Figs. 2 4 and 6, the switching set 50 is connected to the
8 fixing set 10, selectively engages the bidirectional set 20 and has a pivot pillar 51,
9 a switching mount 52 and a rotating button 53. The pivot pillar 51 is rotatably
10 connected to the opposite sidewalls 111 of the elongated tube 11 adjacent to the
11 first end 115 of the elongated tube 11. The switching mount 52 is securely
12 mounted around the pivot pillar 51, is rotatably mounted in the track slot 112 of
13 the elongated tube 11 and selectively engages the engaging rod 26 of the
14 engaging group 25 of the bidirectional set 20.

15 The switching mount 52 has a mounting end, an engaging end, a top, a
16 guiding face 521 and a holding face 522. The mounting end of the switching
17 mount 52 is securely mounted around the pivot pillar 51. The engaging end of the
18 switching mount 52 is opposite to the mounting end of the switching mount 52.
19 The guiding face 521 is obliquely formed on the top of the switching mount 52 at
20 the engaging end of the switching mount 52 and selectively abuts the engaging
21 rod 26 of the bidirectional set 20. The holding face 522 is obliquely formed on
22 the top of the switching mount 52 between the mounting end and the guiding face
23 521 of the switching mount 52, is selectively pressed against the engaging rod 26

1 of the bidirectional set 20 and has an angle relative to the guiding face 521. The
2 rotating button 53 is securely connected to a free end of the pivot pillar 51 at one
3 of the opposite sidewalls 111 of the elongated tube 11 to rotate the switching
4 mount 52 relative to the elongated tube 11. Then, the guiding face 521 and the
5 holding face 522 of the switching mount 52, the buffering set 40 and the
6 engaging group 25 can be used to provide a positioning effect to the bidirectional
7 set 20.

8 In assemble, with reference to Figs. 8 and 9, when assembling the door
9 closer in accordance with the present invention between a door frame 60 and a
10 door panel 61, the total length of the extending set 30 can be adjusted by the
11 engagement between the positioning teeth 314 of the guiding track 31 and the
12 engaging teeth 332 of the locking board 33 and has a wider range of adjustment,
13 and this can enable the door closer in accordance with the present invention to
14 assemble between the door frame 60 and the door panel 61 of different sizes.
15 Then, the cost of using the door closer in accordance with the present invention
16 can be reduced and the practicality of the door closer can be promoted.

17 After adjusting the total length of the extending set 30 to fit with the size
18 of the door frame 60 and the door panel 61, the directional set 20 is mounted in
19 the elongated tube 11 via the first end 115 of the elongated tube 11 or the second
20 end 116 of the elongated tube 11 according to the size and the open direction of
21 the door panel 61. The fixing set 10 is mounted in a recess of the door panel 61
22 that is formed in a top of the door panel 61 to enable the first end 115 of the
23 elongated tube 11 to mount adjacent the hinges between the door frame 60 and

1 the door panel 61 as shown in Fig. 10. After the above-mentioned assemble, the
2 buffering set 40 can be mounted between the door frame 60 and the door panel 61
3 adjacent the hinges. In addition, the connecting panel 34 of the extending set 30
4 is securely connected to a bottom side of the door frame 60. In operation, when
5 the door panel 61 is rotated relative to the door frame 60 to being in a closed
6 condition or in an open condition, the extending set 30 can be rotated relative to
7 the door frame 60 by the bidirectional set 20 moving in the elongated tube 11 of
8 the fixing set 10.

9 With reference to Figs. 9 and 10, during the door panel 61 is rotated
10 relative to the door frame 60 to move at an intended open position, the
11 bidirectional set 20 is moved by the extending set 30 toward the first end 115 of
12 the elongated tube 11. When the bidirectional set 20 is moved across the
13 switching set 50, the engaging rod 26 is pushed upwardly relative to the body 23
14 by abutting along the guiding face 521 of the switching mount 52. After the
15 engaging rod 26 is moved across the guiding face 521 of the switching mount 52,
16 the engaging rod 26 will be moved downwardly to abut along the holding face
17 522 of the switching mount 52 by a pressing force of the elastic slice 27. Then,
18 the bidirectional set 20 can be positioned between the buffering block 42 and the
19 switching mount 52, and this can held the door panel 61 stably at the intended
20 open position. When the door panel 61 is rotated to move backwardly to the door
21 frame 60, the engaging rod 26 will be moved with the bidirectional set 20 by the
22 extending set 30 to across the switching mount 52, and the extending set 30 can
23 provide an assist effect to the door panel 61 to move backwardly the original

1 position relative to the door frame 60 in a closed condition.

2 Even though numerous characteristics and advantages of the present
3 invention have been set forth in the foregoing description, together with details of
4 the structure and features of the invention, the disclosure is illustrative only. The
5 scope of the claims should not be limited by the preferred embodiments set forth
6 in the examples but should be given the broadest interpretation consistent with
7 the description as a whole.

8

1 WHAT IS CLAIMED IS:

2 1. A door closer comprising:

3 a fixing set having

4 an elongated tube having

5 a top;

6 a bottom;

7 a first end;

8 a second end being opposite to the first end of the elongated

9 tube;

10 two opposite sidewalls formed on and protruding upwardly

11 from the bottom of the elongated tube, facing to each other and each one of the

12 opposite sidewalls having an upper track edge; and

13 an opening formed through the top of the elongated tube

14 between the upper track edges of the opposite sidewalls;

15 a bidirectional set connected to the fixing set, movably mounted in the

16 elongated tube between the first end and the second end of the elongated tube and

17 having

18 a connecting board formed on and protruding from the

19 bidirectional set, extending out of the opening of the elongated tube and having a

20 top side and a bottom side; and

21 an extending set pivotally connected to the bidirectional set and having

22 a guiding track pivotally connected to the bidirectional set and

23 having

1 a bottom side abutting the top side of the connecting board;

2 a top side;

3 a pivot end mounted over the connecting board and the
4 elongated tube;

5 an inserting end formed on the guiding track opposite to the
6 pivot end of the guiding track;

7 a track opening formed through the top side of the guiding
8 track to form two end edges at the top side of the guiding track;

9 multiple positioning teeth formed on and protruding
10 inwardly from the end edges of the guiding track at intervals; and

11 a pivot pin mounted through the bottom side of the guiding
12 track and the connecting board of the bidirectional set and pivotally connected to
13 the bidirectional set to enable the guiding track to rotate relative to the
14 bidirectional set by the pivot end;

15 an extending arm movably mounted in the guiding track and having
16 a connecting end extending out of the guiding track via the inserting end of the
17 guiding track;

18 a locking board engaging the guiding track connected to the
19 extending arm to hold the locking board on the guiding track at the track opening
20 of the guiding track to adjust a total length of the extending set and having

21 an engaging segment abutting the extending arm, selectively
22 engaging the guiding track and having

23 a top side;

1 a bottom side abutting a top side of the extending
2 arm;

3 two sidewalls; and

4 multiple engaging teeth formed on and protruding
5 from the sidewalls of the engaging segment at intervals and engaging the
6 positioning teeth of the guiding track; and

7 a compression spring mounted between the top side of the
8 extending arm and the engaging segment of the locking board to form a gap
9 between the extending arm and the locking board; and

10 at least one screw mounted through the engaging segment of
11 the locking board and securely connected to the extending arm to connect the
12 locking board securely with the extending arm; and

13 a connecting panel connected to the connecting end of the
14 extending arm;

15 wherein when the at least one screw is loosened, the compression spring
16 pushes the locking board to move upwardly relative to the guiding track to enable
17 the engaging teeth to separate from the positioning teeth to enable the extending
18 arm and the locking board to move relative to the guiding track to adjust a total
19 length of the extending set.

20 2. The door closer as claimed in claim 1, wherein

21 the locking board has

22 a covering segment formed on the top side of the engaging segment,
23 mounted over the positioning teeth of the guiding track to cover the track opening

1 of the guiding track and having

2 two opposite sides; and

3 two pressing edges respectively formed on and protruding
4 outwardly from the opposite sides of the covering segment and extending out of
5 the engaging teeth of the engaging segment to press the positioning teeth of the
6 guiding track.

7 3. The door closer as claimed in claim 2, wherein the extending arm has
8 a positioning end mounted in the guiding track via the inserting end of
9 the guiding track; and

10 a rivet mounted through the compression spring, the locking board and
11 the extending arm and connected to a bottom side of the extending arm.

12 4. The door closer as claimed in claim 1 or 2 or 3, wherein
13 the fixing set has

14 a first end plug connected to the first end of the elongated tube; and

15 a second end plug connected to the second end of the elongated
16 tube; and

17 the elongated tube has a track slot formed in the elongated tube between
18 the bottom of the elongated tube and the opposite sidewalls of the elongated tube;
19 and

20 the bidirectional set has

21 two sidewalls; and

22 two sliding recesses respectively formed in the sidewalls of the
23 bidirectional set below the connecting board and respectively mounted on the

1 upper track edges of the opposite sidewalls of the elongated tube to enable the
2 bidirectional set to securely connect with the fixing set.

3 5. The door closer as claimed in claim 4, wherein

4 the bidirectional set has

5 a body formed on and protruding from the bottom side of the
6 connecting board, movably mounted in the track slot of the elongated tube and
7 having

8 a top side facing the upper track edges of the opposite
9 sidewalls of the elongated tube;

10 a bottom side;

11 two sidewalls respectively facing the opposite sidewalls of
12 the elongated tube;

13 two end sides respectively face the first end plug and the
14 second end plug of the fixing set; and

15 a concaved recess formed through the bottom side and the
16 end sides of the body;

17 an engaging group mounted in the concaved recess of the body and
18 having

19 an engaging rod mounted through the concaved recess of the
20 body and movably connected to the sidewalls of the body;

21 an elastic slice mounted in the concaved recess of the body,
22 pressed against the engaging rod and having

23 a pressing end pressed against the engaging rod;

1 a connecting end securely connected to the body by a
2 fixing element mounted through the connecting board, mounted in the concaved
3 recess of the body and connecting with the connecting end of the elastic slice;

4 a middle; and

5 a bolt mounted through the connecting board,
6 mounted in the concaved recess of the body and pressed against the elastic slice
7 at the middle of the elastic slice;

8 the sliding recesses are respectively formed in the sidewalls of the body
9 near the top side of the body and below the connecting board;

10 the elongated tube has

11 a bottom board formed on the bottom of the elongated tube and
12 having two opposite sides;

13 a limiting protrusion formed on and protruding from the bottom
14 board adjacent to the first end of the elongated tube;

15 a buffering set mounted in the fixing set and having

16 a buffering block movably mounted in the track slot of the
17 elongated tube at the first end of the elongated tube adjacent the first end plug
18 and selectively abutting the limiting protrusion of the elongated tube; and

19 a buffering spring mounted in the track slot of the elongated
20 tube between the first end plug and the buffering block to push the buffering
21 block to abut against the limiting protrusion of the elongated tube; and

22 a switching set connected to the fixing set, selectively engaging the
23 bidirectional set and having

1 a pivot pillar rotatably connected to the opposite sidewalls
2 of the elongated tube adjacent to the first end of the elongated tube;

3 a switching mount securely mounted around the pivot pillar,
4 rotatably mounted in the track slot of the elongated tube and selectively engaging
5 the engaging rod of the engaging group of the bidirectional set and having

6 a mounting end securely mounted around the pivot
7 pillar;

8 an engaging end being opposite to the mounting end
9 of the switching mount;

10 a top;

11 a guiding face obliquely formed on the top of the
12 switching mount at the engaging end of the switching mount and selectively
13 abutting the engaging rod of the bidirectional set; and

14 a holding face obliquely formed on the top of the
15 switching mount between the mounting end and the guiding face of the switching
16 mount, selectively pressed against the engaging rod of the bidirectional set and
17 having an angle relative to the guiding face; and

18 a rotating button securely connected to a free end of the
19 pivot pillar at one of the opposite sidewalls of the elongated tube to rotate the
20 switching mount relative to the elongated tube;

21 the opposite sidewalls of the elongated tube are respectively formed on
22 and protrude upwardly from the opposite sides of the bottom board;

23 the track slot is formed in the elongated tube between the bottom board

1 and the opposite sidewalls of the elongated tube and communicates with the
2 opening of the elongated tube; and

3 the bidirectional set is movably mounted in the track slot of the elongated
4 tube.

5 6. The door closer as claimed in claim 1 or 2 or 3, wherein

6 the guiding track has

7 a sealing block mounted in the guiding track at the pivot end of the
8 guiding track; and

9 a first washer mounted between the top side of the connecting
10 board and the bottom side of the guiding track;

11 the pivot pin of the guiding track is mounted through the sealing block,
12 the bottom side of the guiding track, the first washer and the connecting board
13 and is pivotally connected to the bidirectional set; and

14 the connecting panel has

15 a top side;

16 a bottom side;

17 a pivot rod mounted through the connecting end of the extending
18 arm from the bottom side of the extending arm to the top side of the extending
19 arm and connected to the connecting panel; and

20 at least one second washer mounted around the pivot rod between
21 the connecting panel and the top side of the extending arm.

22 7. The door closer as claimed in claim 4, wherein

23 the guiding track has

1 a sealing block mounted in the guiding track at the pivot end of the
2 guiding track; and

3 a first washer mounted between the top side of the connecting
4 board and the bottom side of the guiding track;

5 the pivot pin of the guiding track is mounted through the sealing block,
6 the bottom side of the guiding track, the first washer and the connecting board
7 and is pivotally connected to the bidirectional set; and

8 the connecting panel has

9 a top side;

10 a bottom side;

11 a pivot rod mounted through the connecting end of the extending
12 arm from the bottom side of the extending arm to the top side of the extending
13 arm and connected to the connecting panel; and

14 at least one second washer mounted around the pivot rod between
15 the connecting panel and the top side of the extending arm.

16 8. The door closer as claimed in claim 5, wherein

17 the guiding track has

18 a sealing block mounted in the guiding track at the pivot end of the
19 guiding track; and

20 a first washer mounted between the top side of the connecting
21 board and the bottom side of the guiding track;

22 the pivot pin of the guiding track is mounted through the sealing block,
23 the bottom side of the guiding track, the first washer and the connecting board

1 and is pivotally connected to the bidirectional set; and
2 the connecting panel has
3 a top side;
4 a bottom side;
5 a pivot rod mounted through the connecting end of the extending
6 arm from the bottom side of the extending arm to the top side of the extending
7 arm and connected to the connecting panel; and
8 at least one second washer mounted around the pivot rod between
9 the connecting panel and the top side of the extending arm.

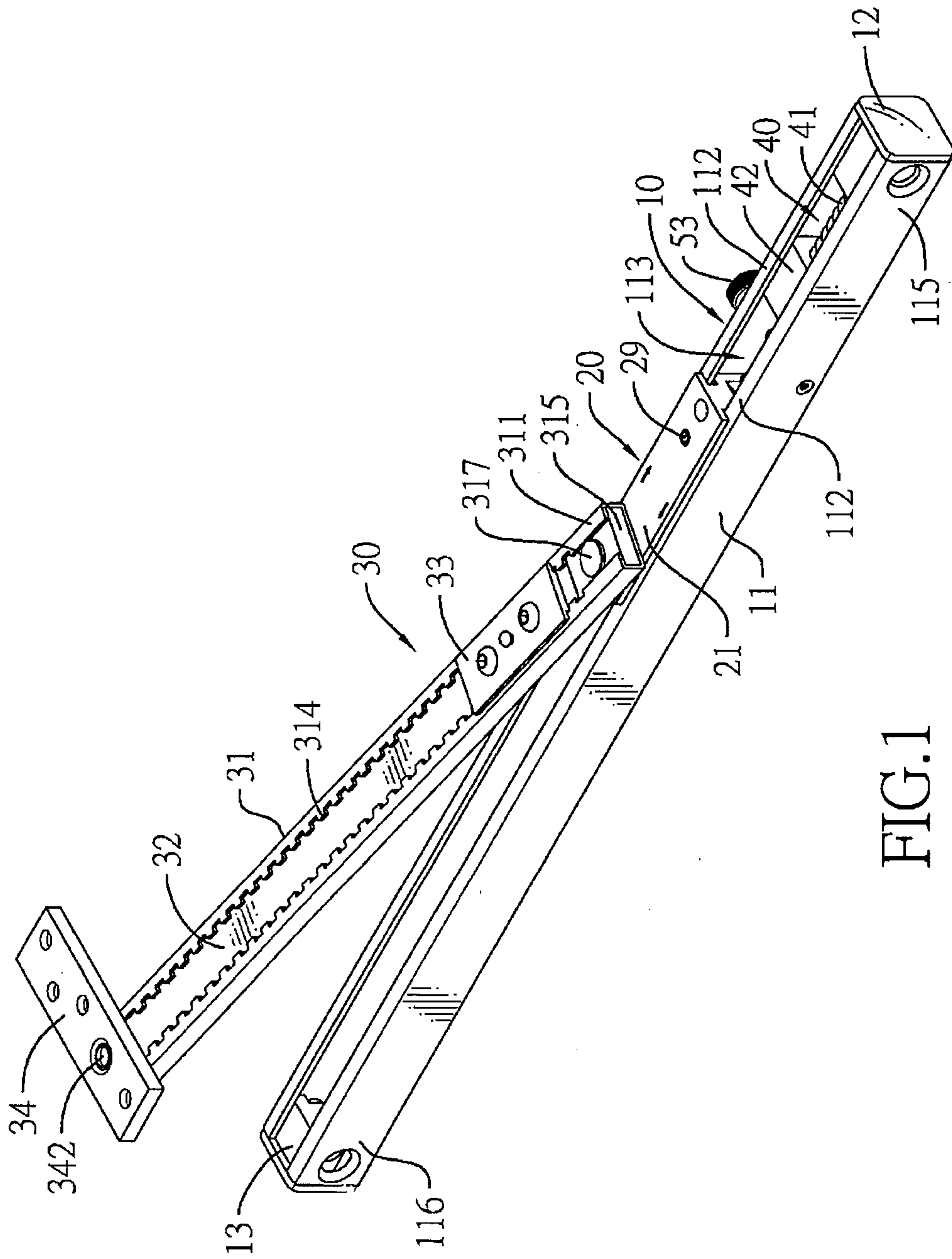


FIG.1

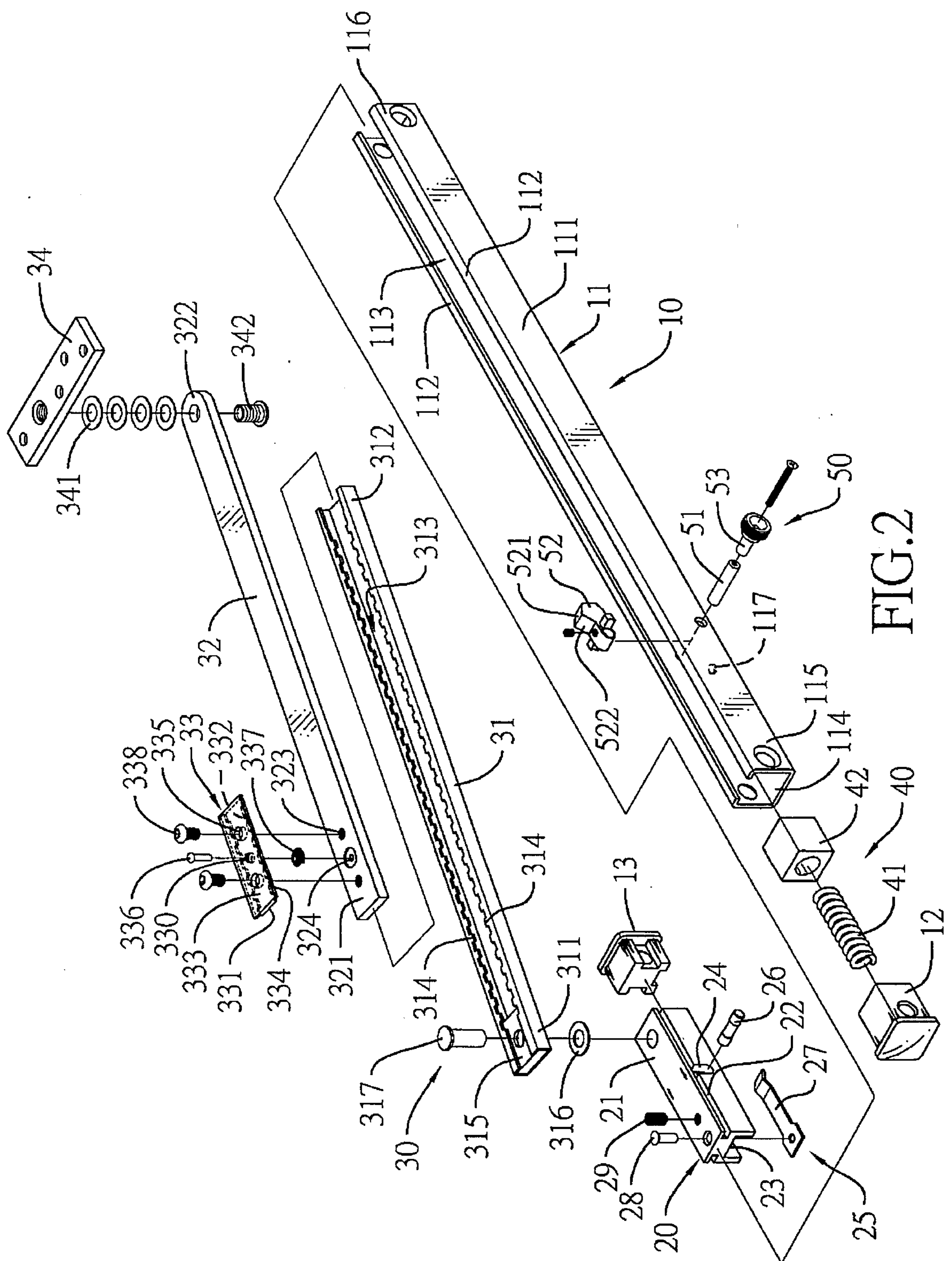


FIG. 2

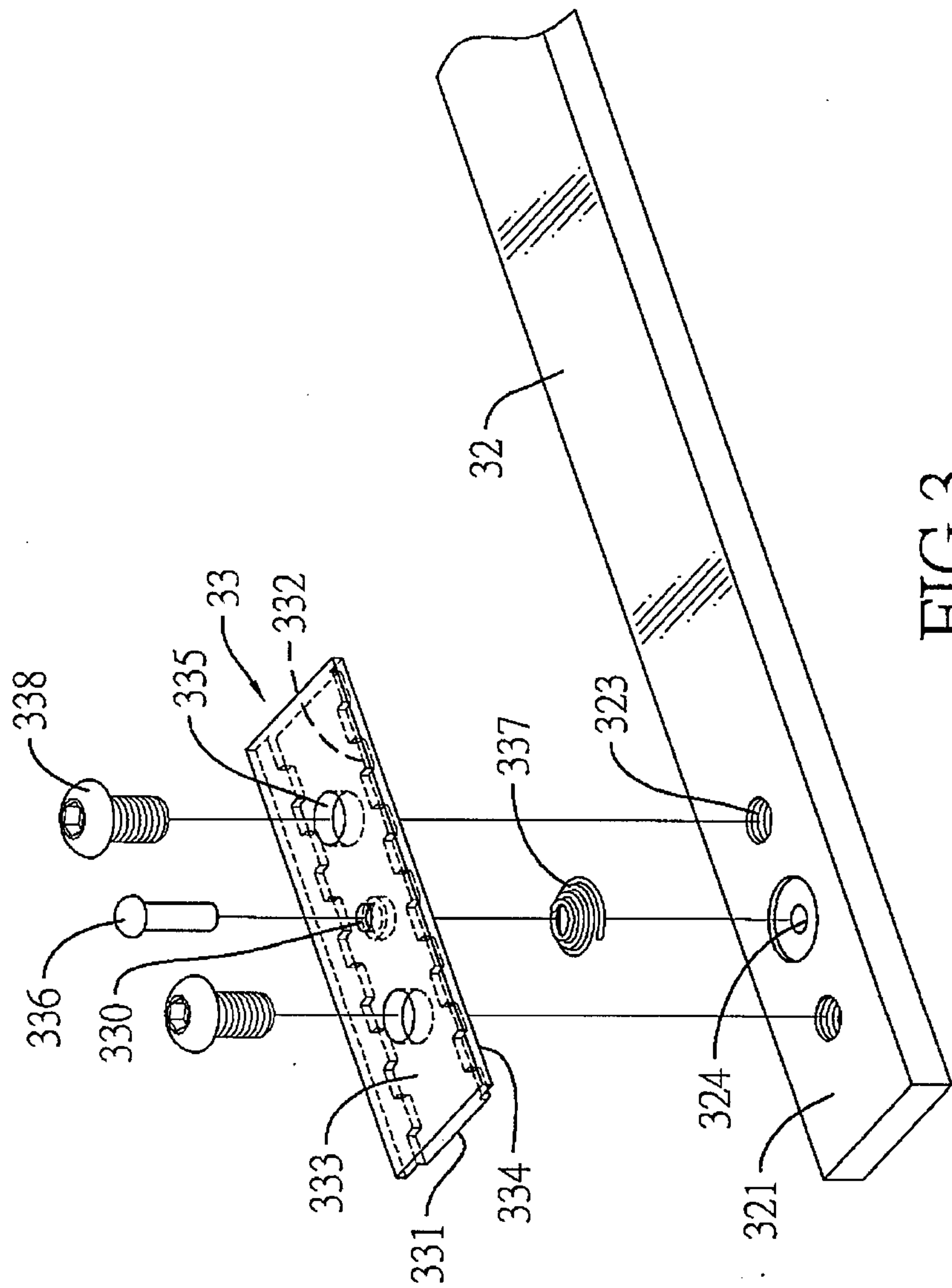


FIG.3

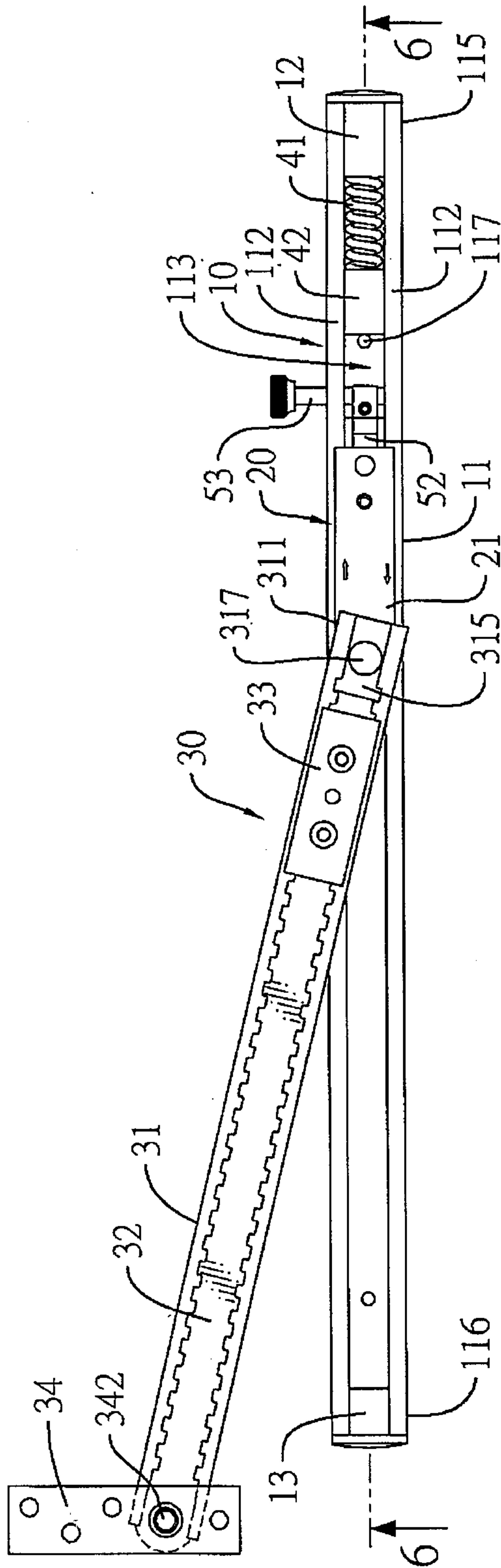


FIG.4

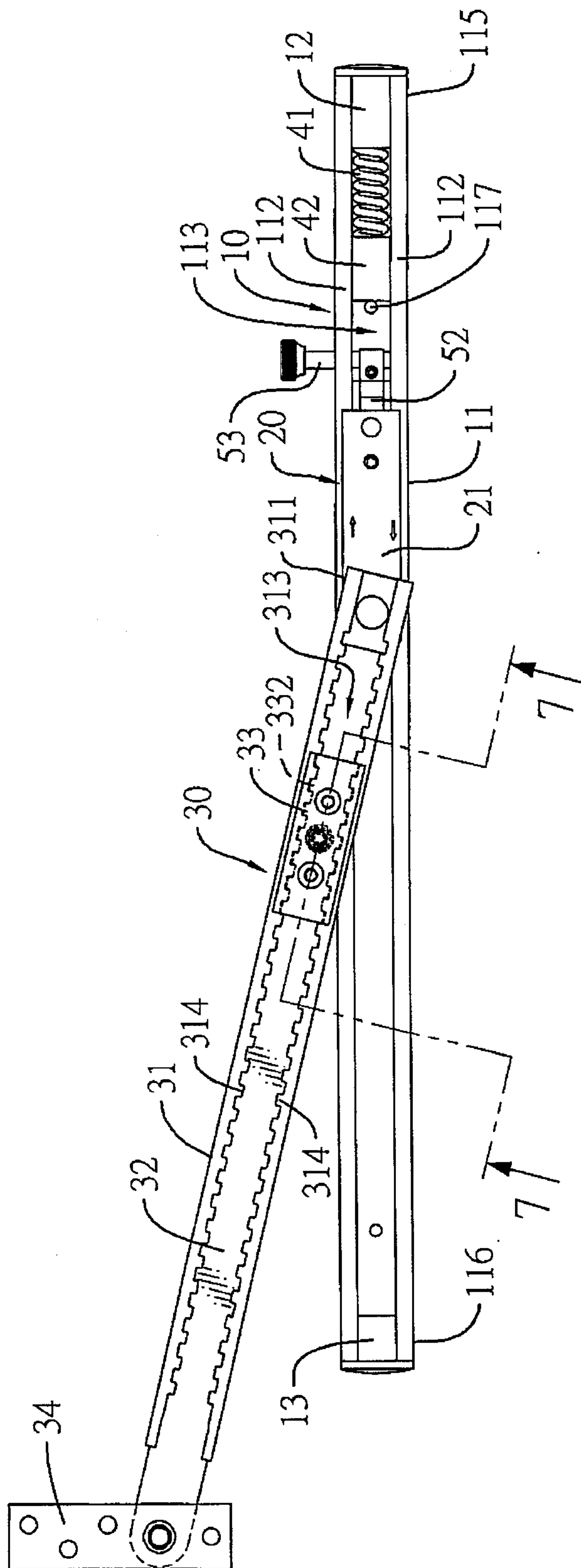


FIG. 5

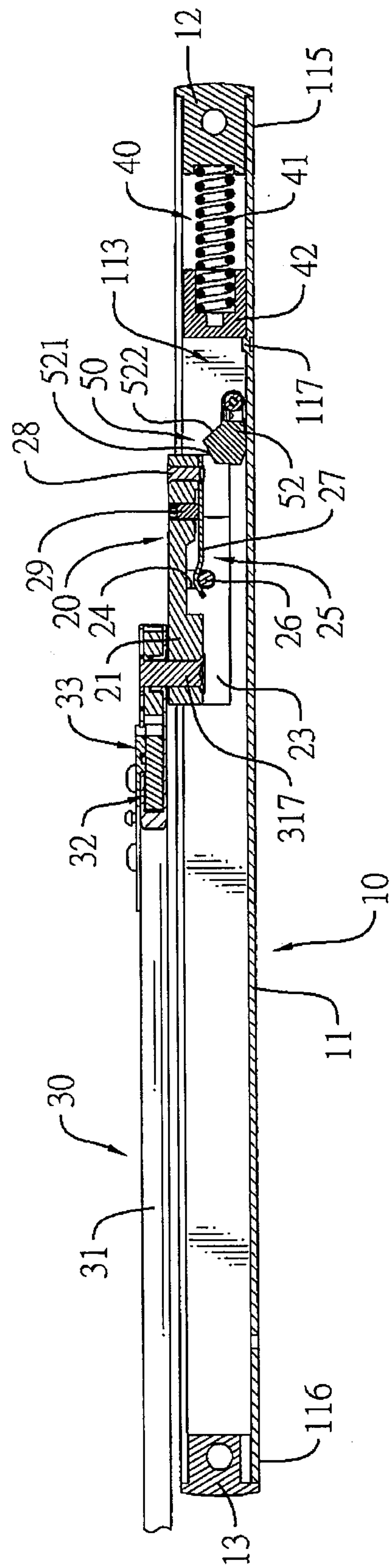


FIG. 6

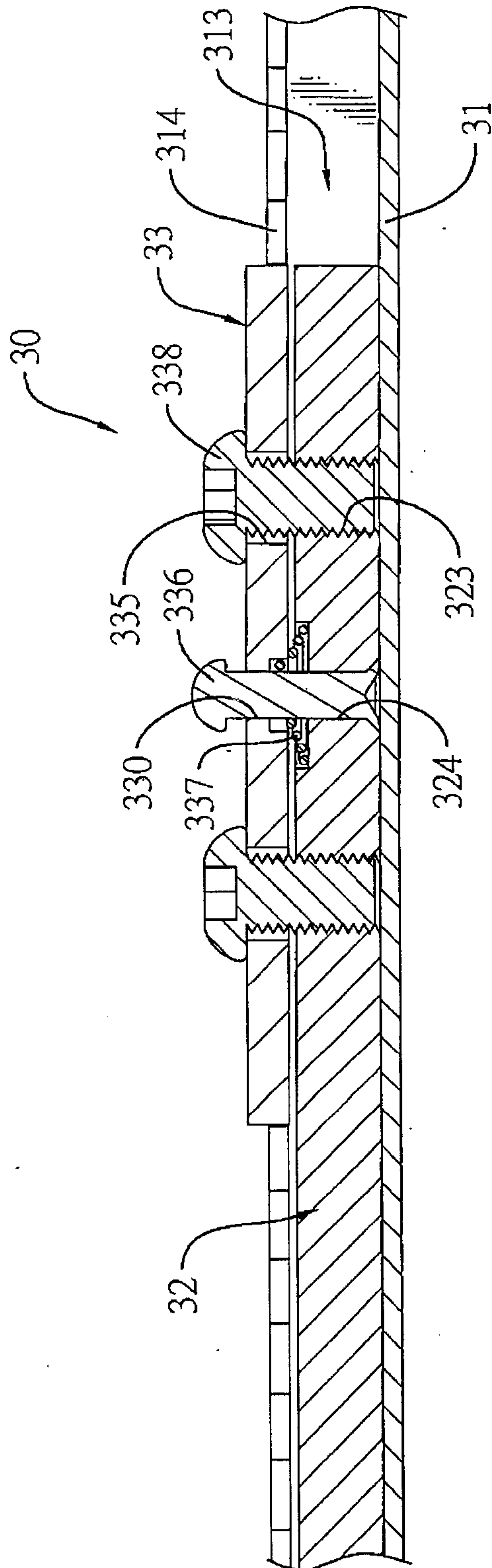


FIG.7

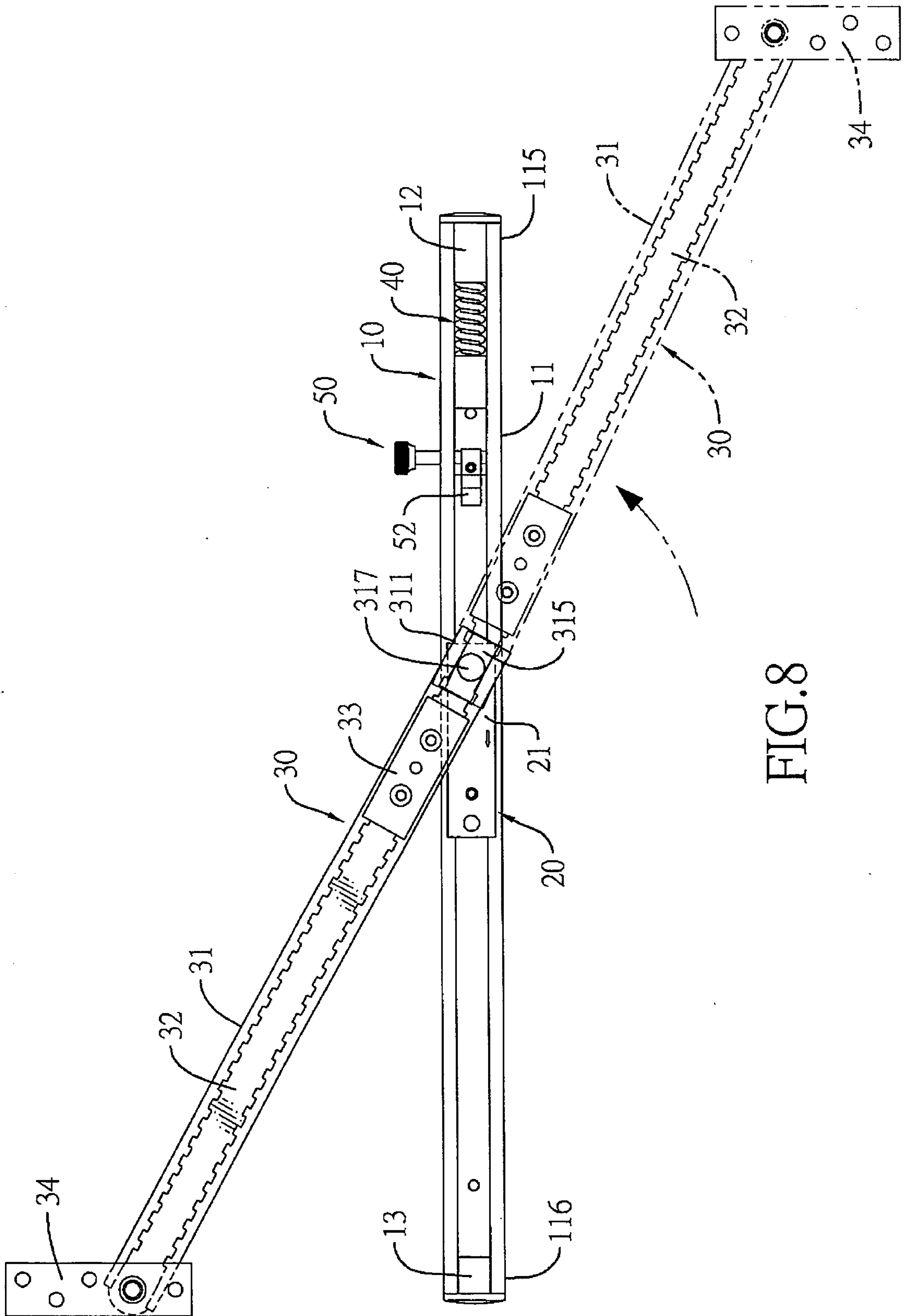


FIG. 8

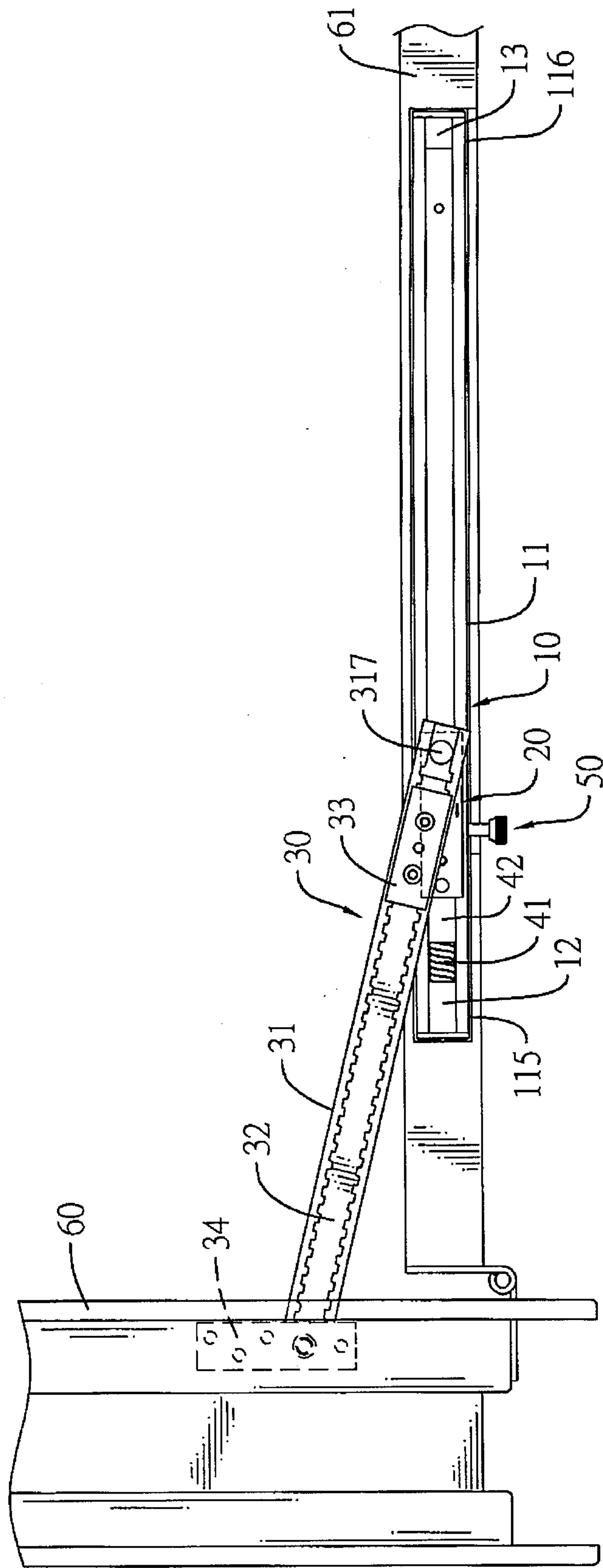


FIG.9

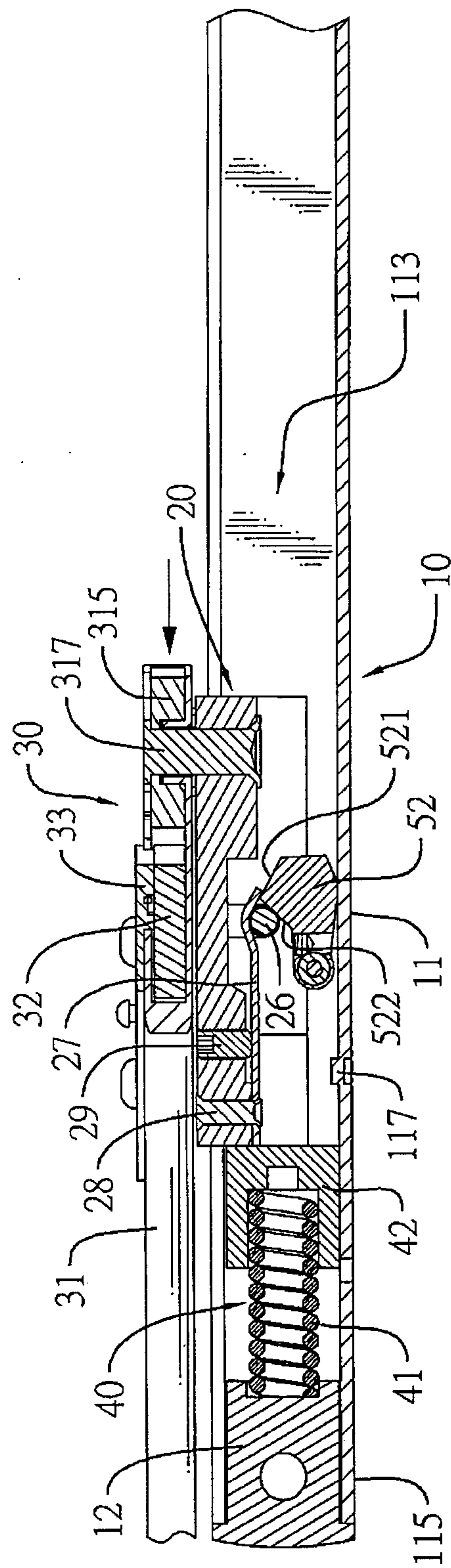


FIG.10

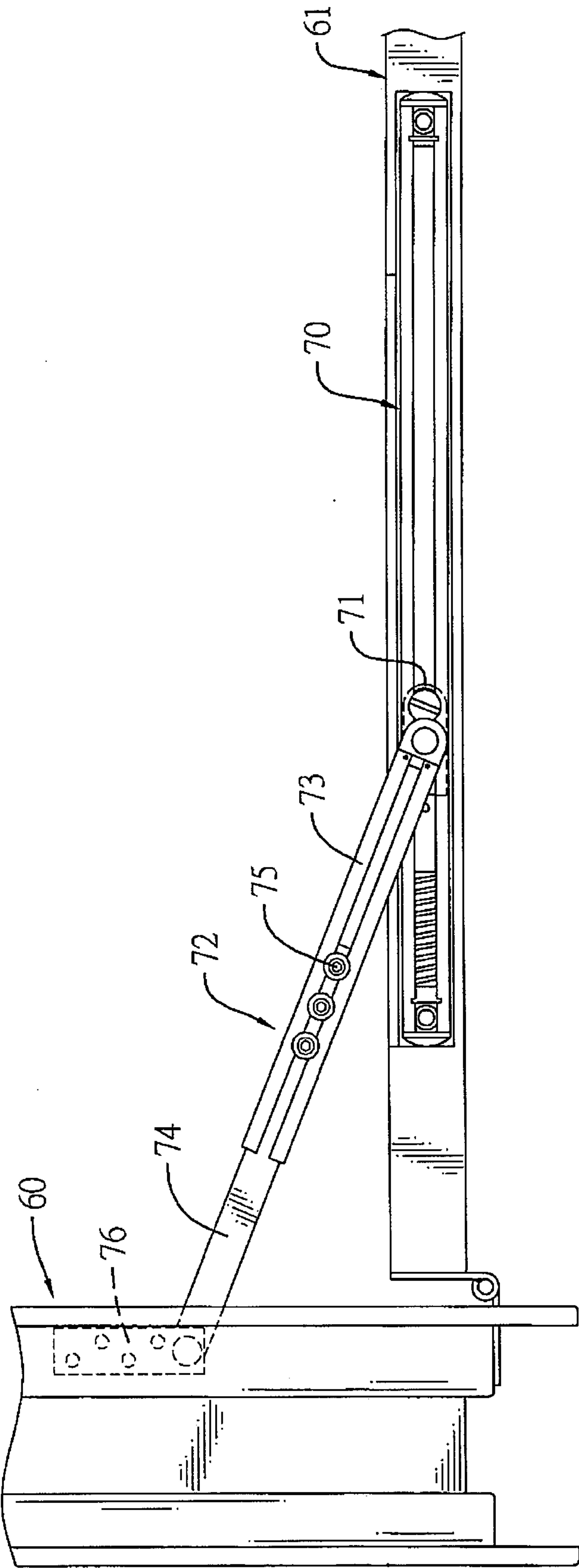


FIG.11
PRIOR ART

