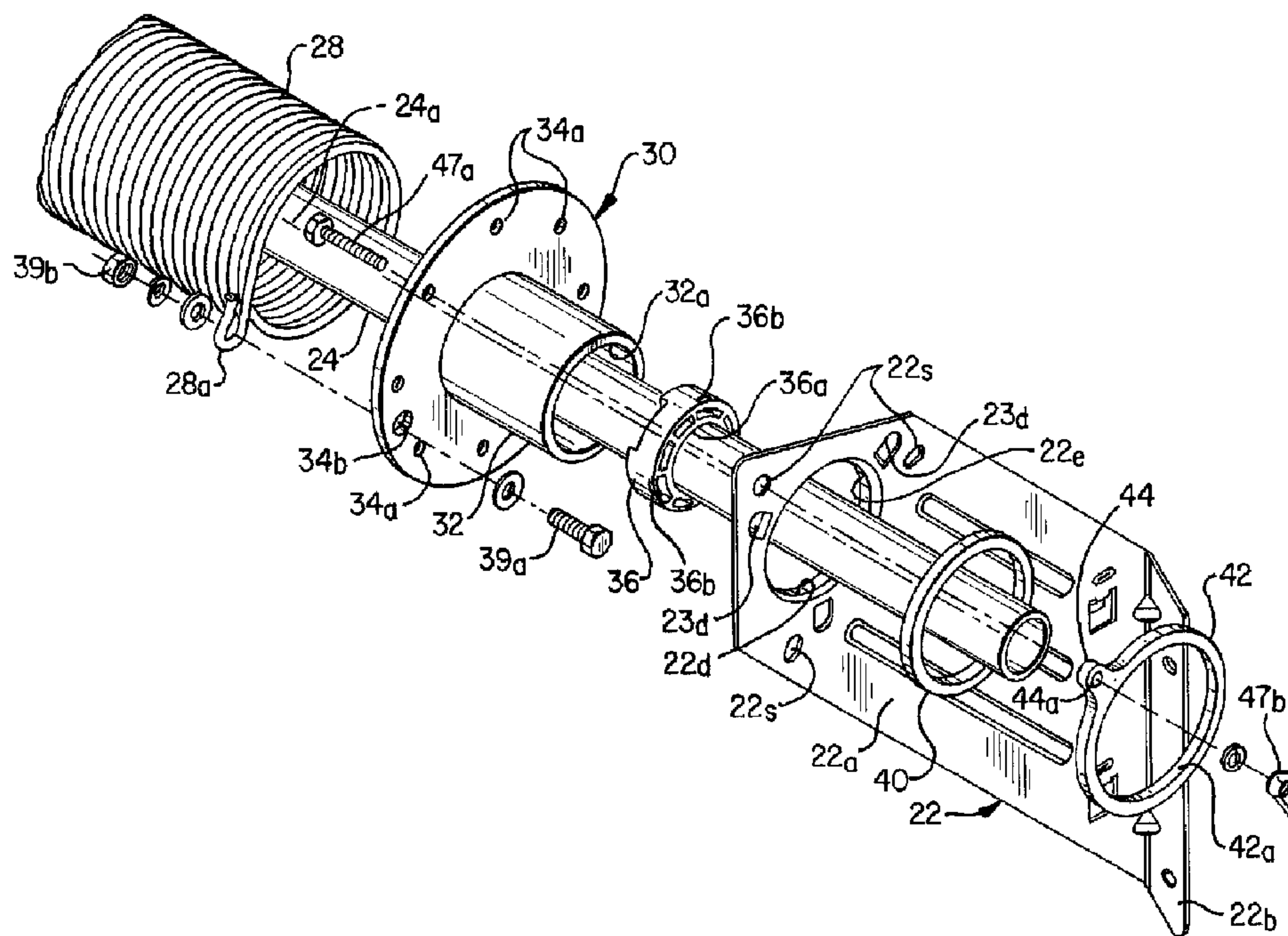




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(54) Titre : MECANISME DE REGLAGE DE SYSTEME DE CONTREPOIDS POUR PORTE A ENROULEMENT
(54) Title: COUNTERBALANCE SYSTEM ADJUSTMENT MECHANISM FOR ROLLUP DOOR



(57) **Abrégé/Abstract:**

A counterbalance spring adjustment mechanism, particularly adapted for a rollup type upward-acting door (10) which is supported between spaced apart wall brackets (20, 22) on a rotatable shaft (24). One end of the torsion spring (28) is connected to a hub including a tubular hub member (32) and a circumferential radially extending flange (22e). The tubular hub member (32) is disposed in a bore (22d) formed in one of the wall brackets (20, 22) and is retained in assembly therewith by a cylindrical collar (40). The door support shaft (24) is disposed in a self-lubricating polymer bushing (36) which is supported in the tubular hub member (32). A reinforcing collar (42) is fixed to the wall bracket (20) and includes a boss (44) formed thereon having a lock pin receiving bore (44a) for receiving a lock pin (46) which projects through the bore (22d) in the reinforcing collar (42), through a slot (22s) in the wall bracket (20) and through a selected one of a plurality of circumferentially spaced pin-receiving bores (34a) in the hub flange (34) for locking the hub (32) in a selected rotative position which determines the torsional windup of the torsion spring (28).

ABSTRACT

A counterbalance spring adjustment mechanism, particularly adapted for a rollup type upward-acting door (10) which is supported between spaced apart wall brackets (20, 22) on a rotatable shaft (24). One end of the torsion spring (28) is connected to a hub including a tubular hub member (32) and a circumferential radially extending flange (22e). The tubular hub member (32) is disposed in a bore (22d) formed in one of the wall brackets (20, 22) and is retained in assembly therewith by a cylindrical collar (40). The door support shaft (24) is disposed in a self-lubricating polymer bushing (36) which is supported in the tubular hub member (32). A reinforcing collar (42) is fixed to the wall bracket (20) and includes a boss (44) formed thereon having a lock pin receiving bore (44a) for receiving a lock pin (46) which projects through the bore (22d) in the reinforcing collar (42), through a slot (22s) in the wall bracket (20) and through a selected one of a plurality of circumferentially spaced pin-receiving bores (34a) in the hub flange (34) for locking the hub (32) in a selected rotative position which determines the torsional windup of the torsion spring (28).

TITLE: COUNTERBALANCE SYSTEM ADJUSTMENT MECHANISM FOR
ROLLUP DOOR

FIELD OF THE INVENTION

The present invention pertains to an adjustment mechanism for a torsion spring actuated counterbalance system for an upward acting door, particularly a rollup type
5 door.

BACKGROUND

In the art of upward acting doors, torsion spring actuated counterbalance systems are widely used for
10 counterbalancing the weight of the door. In rollup type or so-called sheet doors, in particular, the counterbalance mechanism is relatively uncomplicated, of necessity, to minimize the cost of fabrication and installation, since such doors are typically used in large numbers in low cost
15 installations, such as so-called miniwarehouses. A typical rollup type door for miniwarehouse applications includes a flexible sheet closure member which is wound on a series of spaced apart drums which are supported on a rotatable shaft. The shaft is mounted on spaced apart brackets secured to a
20 vertical wall in which the door opening is formed. At least one torsion type counterbalance spring is sleeved over and connected at one end to the door drum shaft and the opposite end of the spring is operably connected to one of the stationary wall brackets.

25 The adjustment of torsion type door counterbalance springs is a relatively difficult exercise and several attempts have been made to develop a simplified mechanism for adjusting and locking the torsion spring at the end

which is operably fixed to the door support structure, including the so-called header bracket or wall bracket. However, in a continuing effort to improve adjustment or tensioner mechanisms for adjusting torsion springs for
5 rollup type doors, the present invention has been developed.

SUMMARY OF THE INVENTION

The present invention provides an improved mechanism for supporting and adjusting the counterbalance system for an upward acting door, particularly a rollup or so-called
10 sheet type door.

In accordance with one aspect of the present invention, a torsion spring adjustment mechanism is provided for adjusting a torsion spring counterbalance system for a rollup type door. The torsion spring adjustment mechanism is
15 operable to be adjusted manually using a suitable lever, such as a long-handled pipe wrench for rotating a hub member which is connected to one end of a torsion spring, the opposite end of the spring being operably connected to a roller or drum assembly for a rollup type door.

20 In accordance with another aspect of the invention, a spring adjustment mechanism for a rollup door counterbalance system is provided which includes a collar secured to a hub which is connected to the torsion spring for retaining the hub in assembly with a support plate or wall bracket for
25 supporting the door roller or drum assembly. A second reinforcing collar is secured to the support plate in concentric relationship to the hub collar and is adapted to support a lock pin which is secured to the hub at a selected rotative position of the hub to adjustment the torsional
30 windup of a torsion spring connected to the hub.

Still further in accordance with the invention, an adjustment mechanism for a door counterbalance system is provided wherein a hub which is connected to a torsion type counterbalance spring is locked with respect to a support plate in a selected one of rotative positions by a pin which interconnects the hub with the support plate by an improved support structure including a reinforcing collar member fixed to the support plate. A door roller or drum support shaft is advantageously supported by the support plate or wall bracket through a bearing bushing, preferably formed of a self-lubricating polymer material. The shaft is free to rotate in and with respect to the bushing and the bushing is journaled by the torsion spring hub which, in turn, is normally held stationary with respect to and supported by the door supporting wall bracket.

The spring adjustment mechanism and shaft support structure of the present invention is advantageous with respect to mechanical simplicity and reliability, as well as providing for ease of spring torque adjustment thanks to the configuration and arrangement of the torsion spring hub, lock pin, the reinforcing collar and the wall bracket.

Those skilled in the art will further appreciate the above-mentioned advantages and superior features of the invention together with other important aspects thereof upon reading the detailed description which follows in conjunction with the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a front elevation of an upward-acting rollup type door including a counterbalance system adjustment mechanism in accordance with the present invention;

FIGURE 2 is a detail front elevation of one of the door supporting wall brackets and the torsion spring connecting and supporting hub;

FIGURE 3 is a side elevation of the hub and wall bracket assembly shown in FIGURE 2;

FIGURE 4 is an exploded perspective view of the mechanism shown in FIGURES 2 and 3;

FIGURE 5 is a side elevation of a hub lock pin; and

FIGURE 6 is a central section view of the hub and shaft bushing assembly.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

In the description which follows, like parts are marked throughout the specification and drawings with the same reference numerals, respectively. The drawing figures are not necessarily to scale and certain elements may be shown in generalized or schematic form in the interest of clarity and conciseness.

Referring to FIGURE 1, there is illustrated an upward-acting door comprising a flexible rollup or sheet type door, generally designated by the numeral 10. The door 10 is of a type generally well known and includes a flexible multi-section corrugated metal panel 12 guided for movement between opposed vertically extending guide tracks 14 and 16 suitably secured to a substantially vertical wall 18 in which a door opening, not shown, is covered by the door 10 in the closed position shown. The door 10 includes opposed headplates or wall brackets 20 and 22 mounted on the wall 18 adjacent the upper ends of the guide tracks 14 and 16. A rotatable shaft 24 is mounted for rotation on the brackets 20 and 22 and is provided with plural spaced apart circular disk-like drum members 26 which are fixed to the shaft 24

for rotation therewith and are adapted to support the panel 12 in the rolled-up as well as the unrolled configuration. At least one of the drums 26 is suitably secured to one end of a torsion coil spring 28, which spring is sleeved over the shaft 24 and extends toward the wall bracket 22.

The door 10 may be provided with a single counterbalance spring, or opposed counterbalance springs, each secured to one of the drums 26 or otherwise operably secured to the shaft 24 and having their opposite ends operably secured to the respective wall brackets whereby torque may be exerted on the shaft 24 to counterbalance the weight of the door and to minimize unwanted high-speed closing movement of the door. For the sake of discussion herein, only one counterbalance spring 28 and its associated adjustment mechanism will be described in detail. Those skilled in the art will recognize that the counterbalance adjustment mechanism of the present invention may be utilized in conjunction with doors which include opposed counterbalance springs, for example.

Referring now to FIGURES 2 and 3, further details of the support bracket 22 and the spring adjustment mechanism for the spring 28 are illustrated. Reference should also be made to FIGURE 4 with respect to the structure described in conjunction with FIGURES 2 and 3. As shown in FIGURES 2, 3 and 4, the support bracket 22 is preferably characterized by a relatively thin elongated metal plate portion 22a projecting upwardly from a transverse flange 22b adapted to be supported on wall 18. Spaced apart longitudinally extending plate reinforcing ribs 23a, 23b and 23c, FIGURE 3, assist in reinforcing the plate portion 22a. As shown in FIGURE 4, the plate portion 22a includes a generally cylindrical bore 22d delimited by a circumferential flange

22e. Axially projecting tabs 23d are formed in the plate portion 22a and are spaced apart circumferentially about the bore 22d. Each of the tabs 23d projects axially toward spring 28, as shown in FIGURE 2. Wall bracket plate portion 5 22a is also provided with three circumferentially and equally spaced elongated slots 22s, see FIGURES 3 and 4, spaced about the bore 22d. Wall bracket 22 is adapted to be connected to guide track 16 in a manner, preferably as described in copending U.S. Patent Application Serial No. 10 09/244,648 filed February 4, 1999 and assigned to the assignee of the present invention. Wall bracket 20 is constructed essentially like wall bracket 22 but is a mirror image thereof.

As shown in FIGURES 2 and 4, torsion spring 28 is 15 secured at one end 28a to a cylindrical hub 30 comprising a substantially axially extending tubular inner hub member 32 formed integral with a circumferential circular disk flange 34. The hub member 32 includes a central bore 32a formed therein for receiving a molded, self-lubricating polymer 20 bearing bushing 36 in snug-fitting relationship. The bushing 36 includes a central bore 36a, FIGURE 4, for journaling the tubular shaft 24 for rotation therein. As shown in FIGURES 4 and 6, the bushing 36 preferably includes a plurality of circumferentially spaced axially sloped and radially 25 outwardly projecting retention tabs 36b which are operable to register in a circumferential groove 32b, see FIGURE 6, in the hub central bore 32a to releasably retain the bushing 36 in the position shown in FIGURE 6.

As also shown in FIGURE 4, the hub flange 34 includes a 30 plurality of circumferentially and equally spaced pin-receiving bores 34a formed therein and at least one elongated slot 34b interposed two of the pin-receiving

bores, as shown. The hub member 32 is adapted to be received in bore 22d of wall bracket 22 in supported relationship by the wall bracket and is rotatable in the bore except for provision of a locking pin arrangement to be described in further detail herein for selectively securing the hub 30 in a desired rotative position with respect to shaft central axis 24a. As further shown in FIGURES 2 and 4, a conventional hexhead bolt and nut assembly 39a, 39b is operable to secure the hub 30 to the end 28a of torsion spring 28. Bolt 39a is adapted to project through slot 34b and be secured to nut 39b with suitable washers interposed the bolt and nut, as shown in FIGURE 4. As shown in FIGURES 3 and 4, a cylindrical ring collar 40 is adapted to be sleeved over the hub member 32 and suitably secured thereto, such as by welding, when the hub member 32 has been disposed in and projecting through bore 22d, as shown in FIGURES 2 and 3.

The adjustment mechanism of the present invention is further characterized by a generally cylindrical ring-like collar 42 which has a cylindrical bore 42a slightly larger in diameter than the outside diameter of the collar 40. The collar 42 includes at least one radially projecting boss 44, FIGURES 3 and 4, having a pin-receiving bore 44a formed therein for receiving a lock pin 46, FIGURES 2 and 3, which is adapted to project through bore 44a and one of the slots 22s and to be engaged with hub flange 34 at one of the circumferentially spaced bores 34a. As shown in FIGURE 5, one preferred embodiment of the lock pin 46 is preferably formed with a cylindrical head 46a, and a shank 46b which includes a spring biased ball detent retainer or lock 46c disposed adjacent pin distal end 46d. Alternatively, the means for locking the collar 42 to the hub 30 may comprise a

conventional hexhead bolt 47a, FIGURE 4, engageable with a wing nut 47b and used as the lock pin in place of the lock pin 46. Collar 42 may be permanently secured to the plate portion 22a, such as by welding, in a selected position on bracket 22 and further reinforces plate portion 22a as well as providing additional strength for the wall bracket 22 due to the collar's own thickness.

Accordingly, bushing 36 has a snug-fitting relationship with hub member 32, but the hub 30 may be rotatable relative to the bushing. Bushing 36 is normally stationary with respect to hub member 32 and journals the shaft 24 for rotation therein. On assembly of the hub 30 to the wall bracket 22, the hub is preferably securely retained in assembly with the wall bracket by fixing collar 40 to the hub member 32. Collar 42 may be substantially permanently secured to the bracket plate portion 22a with its bore 42a aligned with one of the slots 22s. When the adjustment mechanism for the torsion spring 28 is assembled to the condition shown in FIGURES 2 and 3, shaft 24 is rotatable in bushing 36 so that the door panel or sheet 12 may be rolled onto and off of the drums 26. Since one end of torsion spring 28 is secured to the hub 30 opposite the end which is connected to the shaft 24 by way of one of the drums 26, the hub 30 will tend to rotate except for the locking connection provided by the pin 46 (or pin 47a) and extending through bore 44a, a selected slot 22s and a selected bore 34a in the hub flange 34. Accordingly, the hub 30 and the torsion spring 28 may, when the pin 46 or 47a is removed from connection with the flange 34, be rotated to increase or decrease the torsional windup of the spring 28.

The hub 30 may be locked to the wall bracket 22 in a selected rotative position by aligning one of the bores 34a

with the bore 44a in collar 42 and securing the hub in a locked position connected to the wall bracket 22 via pin 46 or 47a. For example, when the door 10 is assembled and the panel 12 is moved to a closed position, prior to connecting the hub 30 to the bracket 22 with the pin 46 or 47a, the spring 28 may be in a substantially relaxed position. At this time the hub member 32 may be engaged by a suitable tool, such as a pipe wrench, and torsional windup of the spring 28 may be accomplished by rotating the hub 30 until the counterbalance force acting on shaft 24 and drums 26 is sufficient to just begin lifting the door 12 from its closed position to a rolled-up position on the drums 26. As shown in FIGURE 2, a substantial length of hub member 32, including cylindrical area 32b, is available for applying a tool thereto to rotate the hub 30. Once the hub 30 and the torsion spring 28 have been rotated to provided sufficient torsional counterbalance forces acting on shaft 24, hub 30 may be locked in a selected position with respect to the wall bracket 22 by extending pin 46 or 47a through bore 44a, slot 22s and through a selected aligned bore 34a whereupon the hub 30 may be then locked to the wall bracket 22, nonrotatably. If it is desired to adjust the windup of torsion spring 28 at any time, a suitable tool, such as aforementioned, is engaged with hub portion 32b and the hub 30 is rotated against the bias of the spring 28 to relieve any lateral forces acting on the pin 46 or 47a whereupon the pin may be removed from one of the bores 34a and the hub 30 allowed to rotate, or forced to rotate, to adjust the torsional windup of the spring 28. The pin 46 or 47a may then be reinserted through a bore 34a aligned with the slot 22s which is aligned with the bore 44a of collar 42.

Those skilled in the art will appreciate from the foregoing description that a mechanically uncomplicated and reliable torsion adjustment mechanism for adjusting the counterbalance effort on a rollup door or similar type of upward acting door is provided by the present invention. The elements described herein may be fabricated using conventional engineering materials for upward-acting door assemblies and the like and may be fabricated using conventional engineering techniques. As previously discussed, a preferred material for the bushing 36 is a molded polymer such as Nylon.

Those skilled in the art will also recognize that various substitutions and modifications may be made to the invention described herein without departing from the scope and spirit of the appended claims.

WHAT IS CLAIMED IS:

1. In an upward-acting rollup type door including spaced apart brackets for supporting a rotatable shaft, means on said shaft for rolling a flexible door panel thereonto and a torsion counterbalance spring fixed at one
5 end to said shaft for exerting a torsional counterbalance force on said shaft, a counterbalance force adjustment mechanism comprising:

a hub adapted to be secured to said torsion spring at an end of said spring opposite the end fixed to said
10 shaft;

at least one of said brackets including a bore for receiving a portion of said hub in supportive relationship thereto, said shaft being supported by said hub; and

a lock pin operably engageable with said hub and
15 said one brackets in a selected rotative position of said hub with respect to said one bracket for adjusting the torsional windup of said torsion spring.

2. The invention set forth in Claim 1 including:

a hub retaining collar for retaining said hub in assembly with said one bracket.

3. The invention set forth in Claim 2 wherein:

said hub includes a tubular hub member projecting through said bore in said one bracket and secured to said hub retaining collar and a radially extending
5 circumferential flange including a plurality of spaced apart bores for selectively receiving said lock pin secured to said one bracket and adapted to be secured to said flange in a selected rotative position thereof.

4. The invention set forth in Claim 3 including:

bearing means disposed in said tubular hub member and adapted to journal said shaft for rotation with respect to said hub.

5. The invention set forth in Claim 4 wherein:

said bearing means comprises a generally cylindrical bushing formed of a self lubricated bearing material.

6. The invention set forth in Claim 3 including:

a reinforcing collar disposed in sleeved relationship around said retaining collar and secured to said one bracket.

7. The invention set forth in Claim 6 wherein:

said reinforcing collar includes a boss formed thereon and a pin receiving bore formed in said boss for receiving said lock pin in supportive relationship thereto
5 for securing said hub nonrotatably with respect to said one bracket.

8. The invention set forth in Claim 6 wherein:

said reinforcing collar includes a cylindrical bore for receiving said retaining collar therein.

9. The invention set forth in Claim 1 wherein:

said hub includes a tubular hub member projecting through said bore in said one bracket and including a portion adapted to be engaged with a tool for rotating said
5 hub member to adjust the torsional windup of said torsion spring.

10. In an upward-acting door including spaced apart brackets for supporting a rotatable shaft, means on said shaft connected to said door for counterbalancing the weight of said door and a torsion counterbalance spring fixed at
5 one end to said shaft for exerting a torsional counterbalance force on said shaft, a counterbalance force adjustment mechanism comprising:

a hub including a tubular hub member and a circular flange having plural spaced apart pin receiving
10 bores therein adapted to be secured to said torsion spring at an end of said torsion spring opposite the end fixed to said shaft;

at least one of said brackets including a bore for receiving said hub member in supportive relationship
15 thereto, said shaft being supported by said hub;

a hub retaining collar for retaining said hub in assembly with said one bracket; and

a lock pin operably engageable with said hub at one of said pin receiving bores and said one brackets in a
20 selected rotative position of said hub with respect to said one bracket for adjusting the torsional windup of said torsion spring.

11. The invention set forth in Claim 10 including:

a bushing member disposed in said tubular hub member and adapted to journal said shaft for rotation with respect to said hub.

12. The invention set forth in Claim 11 wherein:

said bushing member comprises a generally cylindrical member formed of a molded polymer consisting of Nylon.

13. The invention set forth in Claim 10 including:

a reinforcing collar disposed in sleeved relationship around said retaining collar and secured to said one bracket.

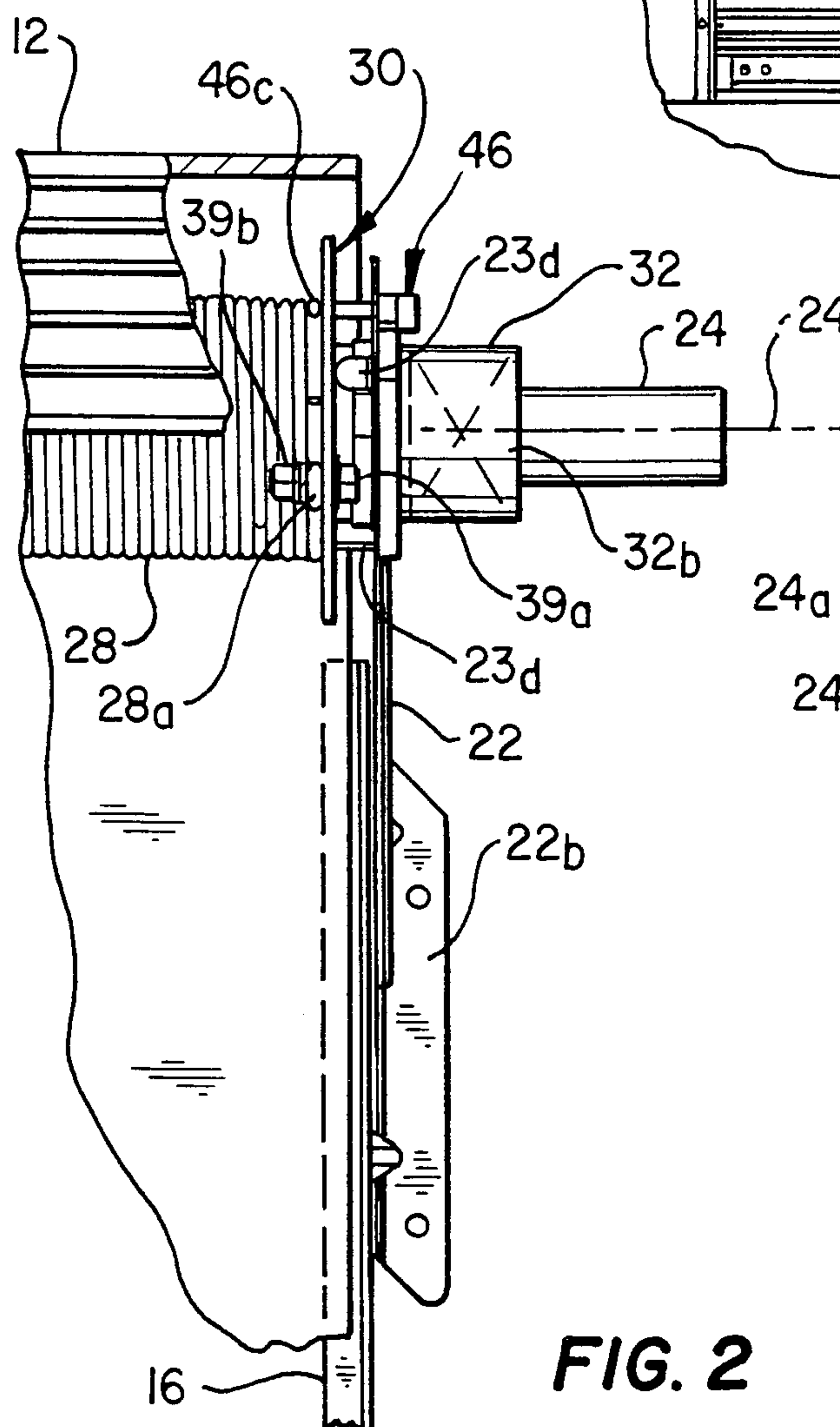
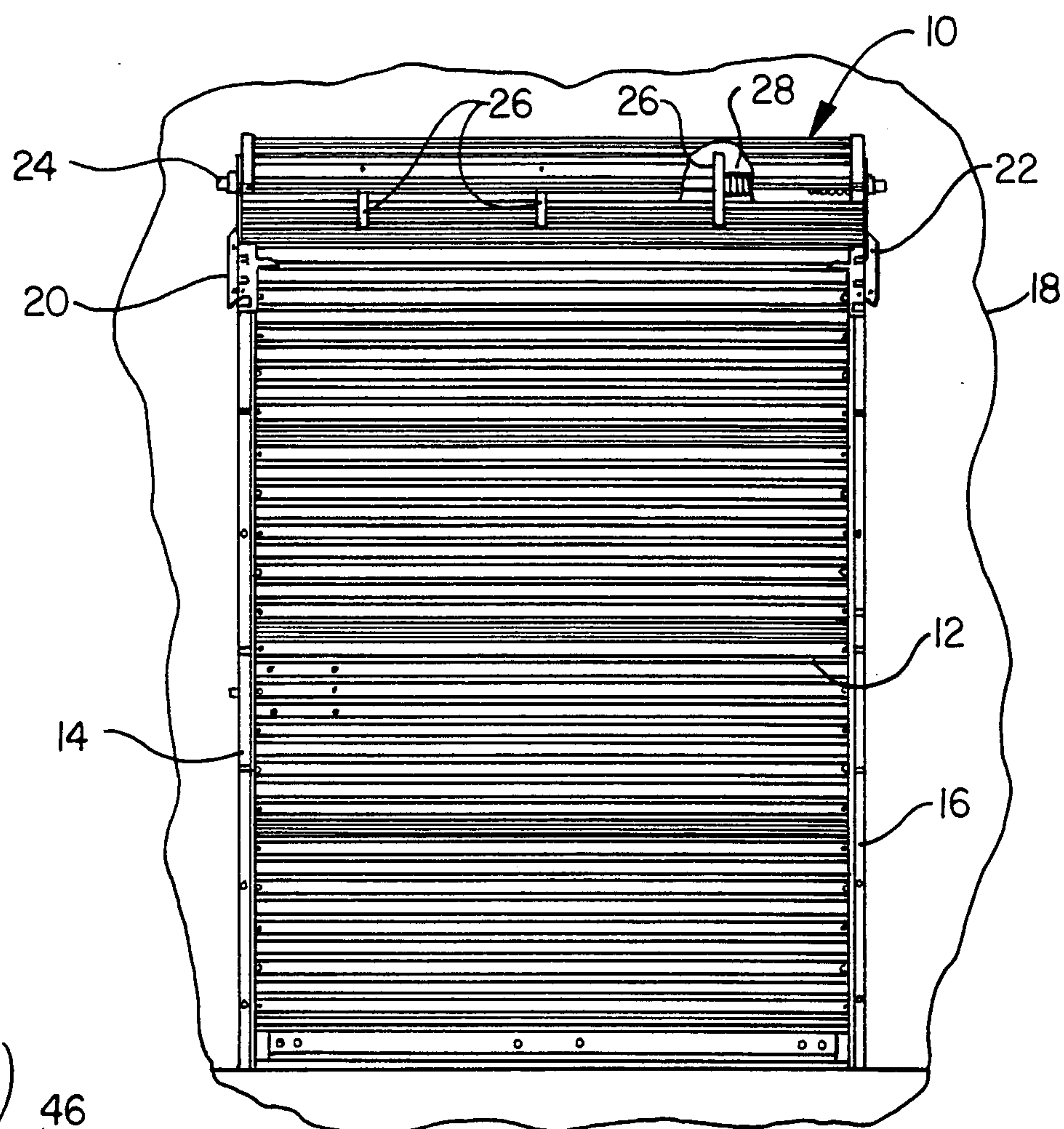
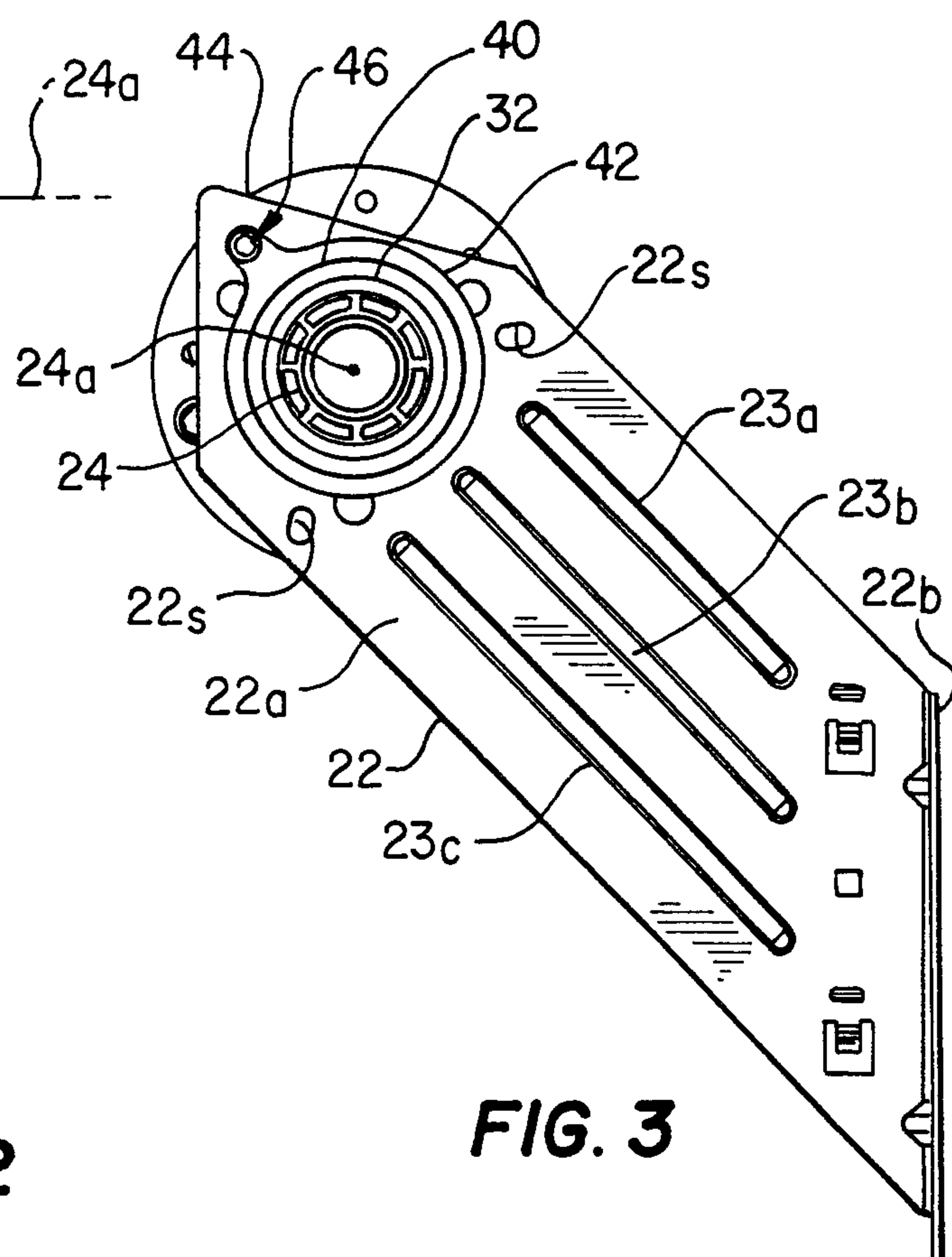
14. The invention set forth in Claim 13 wherein:

said reinforcing collar includes a boss formed thereon and a pin receiving bore formed in said boss for receiving said lock pin in supportive relationship thereto
5 for securing said hub nonrotatably with respect to said one bracket.

15. The invention set forth in Claim 10 wherein:

said hub member includes a surface thereon for receiving a tool in engagement with said hub for rotating said hub with respect to said one bracket.

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FIG. 1**FIG. 2****FIG. 3**

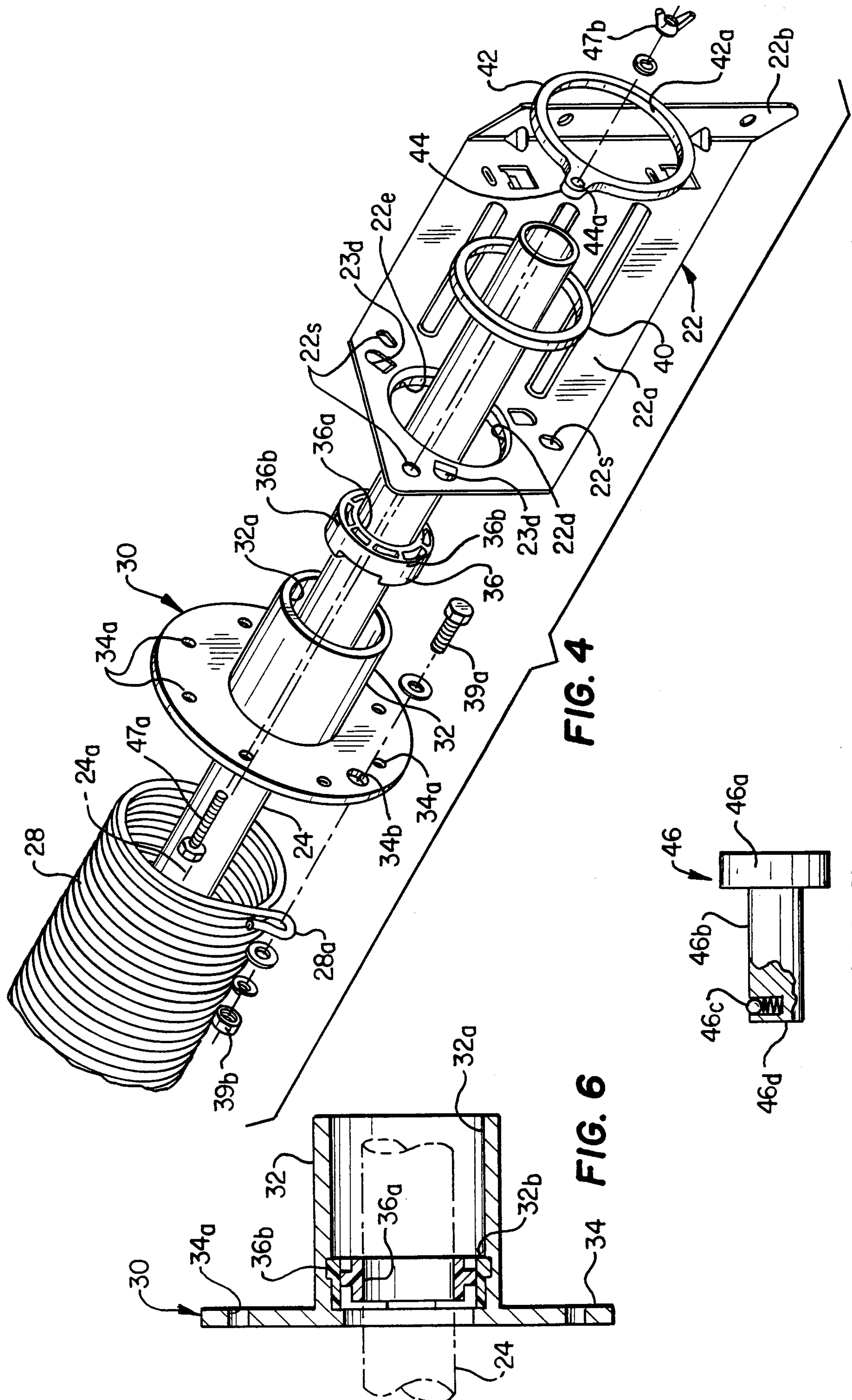


FIG. 4

FIG. 6

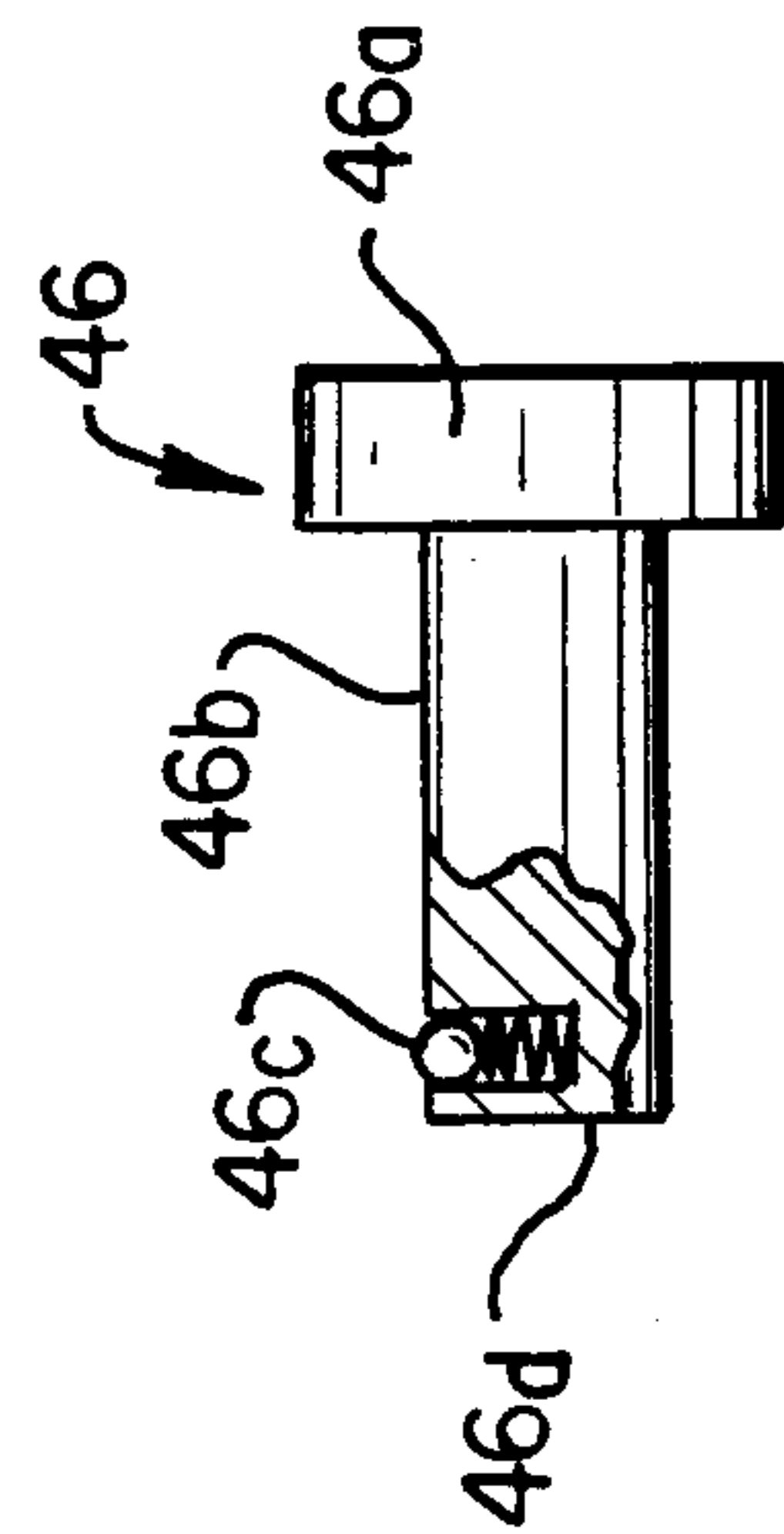


FIG. 5

