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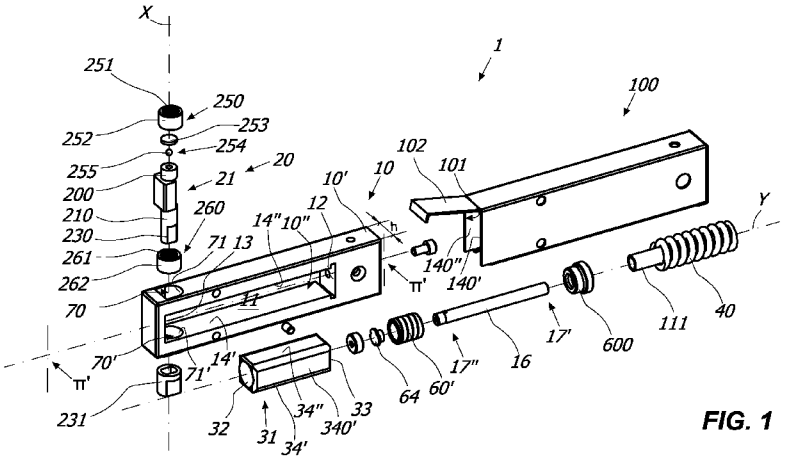


FIG. 1

(57) Abstract: A hinge for cold rooms or glass shutters that comprise a stationary support structure (S) and at least one shutter (A) movable between an open shutter position and a closed shutter position. The hinge comprises a hinge body (10) with a working chamber (11); a pivot (20) defining a first longitudinal axis (X) reciprocally coupled to the hinge body (10) to rotate around the first axis (X) between the open shutter position and the closed shutter position; a cam element (21) integral with the pivot (20); a plunger element (30) sliding in the working chamber (11) along a second axis (Y) substantially perpendicular to the first axis (X), the plunger element (30) comprising a slider (31) with an operative face (32) interacting with the cam element (21); elastic counteracting means (40) acting upon the plunger element (30) to move it along the second axis (Y) between a position proximal to the bottom wall (12) of the working chamber (11) and a position distal therefrom. The hinge body (10) has a substantially plate shape.

WO 2016/185394 A2

LOW-BULKINESS HINGE

DESCRIPTION

Field of the invention

The present invention is generally applicable to the technical field of hinges for doors, shutter or the like, and it particularly relates to a low-bulkiness hinge.

Background of the invention

As known, hinges generally comprise a movable element, usually fixed to a door, a shutter or the like, pivoted on a stationary element, usually fixed to the support frame thereof.

In particular, the hinges usually used in cold rooms or glass shutters are bulky, unaestethic and not very functional.

From documents US7305797, US2004 / 206007 and EP1997994 hinges are known wherein the action of the closing means that ensure the return of the shutter in the closed position is undisputed. Consequently, there is the risk that the shutter strongly impacts against the support frame, thus damaging itself.

From documents EP0407150 and FR2320409 door closers are known that include hydraulic damping means to counteract the action of the closing means. Such known devices are extremely bulky and, consequently, have to be necessarily mounted on the floor.

Therefore, the installation of such devices necessarily requires expensive and difficult breaking works of the floor, that have to be made by specialized personnel.

Therefore, it is evident that such door closer is not suitable to be mounted on the stationary support structure or in the shutter of the cold rooms.

From the German patent DE3641214 an automatic closing device is known for window shutters suitable to be mounted externally thereto.

Summary of the invention

Object of the present invention is to at least partially overcome the above mentioned drawbacks, by providing a hinge having features of high functionality, constructional simplicity and low cost.

Another object of the invention is to provide an extremely low-bulkiness hinge.

Another object of the invention is to provide a hinge that may be interposed between the shutter and the frame of the stationary support structure of a cold room.

Another object of the invention is to provide a hinge that ensures the automatic closing of the door from the open door position.

Another object of the invention is to provide a hinge that ensures the controlled movement of the door to which it is bound, both upon the opening and the closing.

Another object of the invention is to provide a hinge that is suitable to support also very heavy doors and frames, without changing the behaviour and without adjustments.

Another object of the invention is to provide a hinge that has a minimum number of constituent parts.

Another object of the invention is to provide a hinge suitable to maintain the exact closing position through time.

Another object of the invention is to provide an extremely safe hinge, that, if pulled, does not resist to the closing.

Another object of the invention is to provide a hinge extremely easy to install.

Such objects, as well as others which will appear more clearly hereinafter, are fulfilled by a hinge according to what is herein described, shown and / or claimed.

Advantageous embodiments of the invention are defined in accordance with the appended claims.

Brief description of the drawings

Further features and advantages of the invention will become more evident by reading the detailed description of some preferred but not exclusive embodiments of a hinge **1**, shown by way of non-limiting example with the help of the annexed drawing, wherein:

FIG. 1 is an exploded axonometric view of a first embodiment of the hinge **1**;

FIG. 2a is an axonometric view of the first embodiment of the hinge **1** of FIG. 1 before the insertion of the hinge body **10** in the shell **100**;

FIG. 2b is an axonometric view of the first embodiment of the assembled hinge **1** of FIG. 1;

FIGs. 3a and **3b** are respectively side and bottom axonometric views of the first embodiment of the hinge **1** of FIG. 1 inserted in a concealed way in a tubular frame **S** wherefrom the driving fitting **231** comes out;

FIG. 4a is a further axonometric view of the first embodiment of the hinge **1** of FIG. 1

inserted in a concealed way in a tubular frame **S** wherefrom the driving fitting **231** comes out, with some enlarged details in **FIG. 4b**;

FIGs. 5a and **5b** are section axial and radial views with respect to the pivot **20** of the first embodiment of the hinge **1** of FIG. 1 with the shutter **A** closed;

FIGs. 6a and **6b** are enlarged views of some details of the first embodiment of the hinge **1** of FIG. 1 with the shutter **A** closed and open;

FIGs. 7a and **7b** are section axial and radial views with respect to the pivot **20** of the first embodiment of the hinge **1** of FIG. 1 with the shutter **A** open at 90 °;

FIGs. 8a and **8b** are section axial and radial views with respect to the pivot **20** of the first embodiment of the hinge **1** of FIG. 1 with the shutter **A** open over 90 °;

FIG. 9 is an exploded axonometric view of a second embodiment of the hinge **1**;

FIGs. 10 and **11** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 9 with the shutter **A** closed;

FIGs. 12a and **12b** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 9 with the shutter **A** open at 90 °;

FIGs. 13a and **13b** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 9 with the shutter **A** open over 90 °.

FIG. 14 is an exploded axonometric view of another embodiment of the hinge **1**;

FIGs. 15a to **15d** are axonometric views of some steps of the mounting of the pivot **20** in the hinge body **10** of the embodiment of the hinge **1** of FIG. 14;

FIGs. 16a and **16b** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 14 with the shutter **A** closed;

FIGs. 17a and **17b** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 14 with the shutter **A** open at 90 °;

FIGs. 18a and **18b** are section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 14 with the shutter **A** open over 90 °;

FIG. 19 is an axonometric view of the embodiment of the assembled hinge **1** of FIG. 14;

FIG. 20 is a schematic partially exploded view of the embodiment of the hinge **1** of FIG. 14 mounted on a shutter **A**;

FIGs. 21a and **21b** are respectively front and rear schematic views of the embodiment

of the hinge **1** of FIG. 14 mounted on the shutter **A**;

FIG. 22 is an exploded axonometric view of a further embodiment of the hinge **1**;

FIGs. 23a to **23d** and **23f** are axonometric views of some steps of the mounting of the assembly slider **31** - rod **16** - spring **40** in the working chamber **11** of the hinge body **10** of the embodiment of the hinge **1** of FIG. 22, with in **FIGs. 23e** and **23g** respective section radial views with respect to the pivot **20** of FIGs. 23d and 23f;

FIGs. 24a, **24b** and **24c** are respectively side and section axial and radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 22 with the shutter **A** closed;

FIGs. 25a and **25b** are respectively side and section radial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 22 with the shutter **A** open at 90 °;

FIG. 25c is a section view of some details of a further embodiment of the hinge **1**;

FIG. 26 is an exploded axonometric view of a further embodiment of the hinge **1**;

FIGs. 27a and **27b** are section axial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 26 respectively with the shutter **A** closed and open at 90°;

FIGs. 28, **29a** and **29b** are schematic views of the embodiment of the hinge **1** of FIG. 26 mounted on a shutter **A**;

FIG. 30 is an exploded axonometric view of a further embodiment of the hinge **1**;

FIGs. 31a and **31b** are schematic views of the application of the embodiment of the hinge **1** of FIG. 30 to shutters **A** with different thickness;

FIG. 32 is an exploded axonometric view of a further embodiment of the hinge **1**;

FIGs. 33a and **33b** are section axial views with respect to the pivot **20** of the embodiment of the hinge **1** of FIG. 32 respectively with the shutter **A** closed and open at 90°;

FIG. 34 is a section axial view of the embodiment of the hinge **1** of FIG. 17a applied to a glass with a relatively high thickness.

Detailed description of some preferred embodiments

With reference to the above mentioned figures, the hinge according to the invention, globally indicated with the number **1**, has low bulkiness and, therefore, it is advantageously used in applications wherein the space to insert the hinge is limited or where for aesthetic reasons it is suitable to use a low-bulkiness hinge.

For example, the hinge **1** may be applicable to cold rooms, or it may be integrated in

the tubular frame thereof. In a further example, the hinge **1** may be applicable to glass shutters, such as those of a showcase or display cabinet.

In general, the hinge **1** is suitable to rotatably couple a stationary support structure, such as a tubular frame **S**, and a closing member, for example a shutter **A**, rotatably movable between an open position, shown for example in FIGs. 7a and 8b, and a closed one, shown for example in FIGs. 5a and 5b, around a rotation axis **X**.

It is understood that even though hereinafter we refer to the frame **S** and to the shutter **A**, the hinge **1** is applicable to any stationary support structure and to any frame without departing from the scope of the appended claims.

Suitably, the hinge **1** may include a hinge body **10** of substantially plate shape defining a plane **π'** and a pivot **20** defining the rotation axis **X**.

In a preferred but not exclusive embodiment, the hinge body **10** may be anchored to the shutter **A** and the pivot **20** to the frame **S**. In this case, the fixed element includes the pivot **20**, while the movable element may include the hinge body **10**.

Suitably, once the hinge body **10** is anchored to the shutter **A**, the plane **π'**defined by the former may be coincident or parallel to the plane **π** defined by the latter.

Viceversa, the hinge body **10** may be anchored to the frame **S**, while the pivot **20** may be anchored to the shutter **A**, without thereby departing from the scope of the appended claims. In this case, the fixed element includes the hinge body **10**, while the movable element may include the pivot **20**.

Advantageously, the hinge body **10** and the pivot **20** may be reciprocally coupled to rotate around the axis **X** between the open and closed shutter **A** positions.

Suitably, the pivot **20** may include a cam element **21** integral therewith interacting with a plunger element **30** sliding along an axis **Y**.

The sliding axis **Y** of the plunger element **30** may be substantially perpendicular to the axis **X**. Furthermore, the axis **X** of rotation of the shutter **A** may be substantially parallel to the plane **π'** or lying thereon.

In any case the plunger element **30**, that may include, respectively, consist of, a slider **31**, may slide in a working chamber **11** inside the hinge body **10** between a retracted end stroke position proximal to the bottom wall **12** of the working chamber **11**, shown for example in FIGs. 7a and 7b, and an extended end stroke position distal therefrom, shown for

example in FIGs. 5a and 5b.

Suitably, such retracted and extended end stroke positions may be any, and they may not necessarily correspond to the maximum distal and / or proximal position o that the plunger element **30** may assume.

In a preferred but not exclusive embodiment of the invention, the working chamber **11** may include counteracting elastic means acting upon the slider **31** to move it along the proximal and distal positions.

In a preferred but not exclusive embodiment, the elastic counteracting means may include, respectively, may consist of, a coil spring **40** of predetermined diameter.

Depending on the configuration, the elastic counteracting means **40** may be of thrust or restore.

In case of thrust elastic counteracting means, the strength thereof is such to automatically return the shutter **A** from the open or closed position that it reaches when the slider **31** is in the proximal position towards the other of the open or closed position that it reaches when the slider **31** is in the distal position.

In this case, depending on whether the position reached by the shutter **A** when the slider **31** is in the proximal position is open or closed, the hinge **1** is an opening hinge or a closing hinge or a door closer hinge.

Conversely, in case of restore counteracting elastic means, the strength thereof is such not to able to push the shutter **A** from the open or closed position that it reaches when the slider **31** is in the proximal position towards the other of the open or closed position that it reaches when the slider **31** is in the distal position. In this case, the shutter **A** has to be moved manually or with actuating means external to the hinge **1**, for example a motor.

However, the strength of the restore elastic means is such to move back the slider **31** from the proximal to the distal position.

In this case, depending on whether the position reached by the shutter **A** when the slider **31** is in the proximal position is open or closed, the hinge **1** is a control hinge upon the opening or the closing.

It is evident that the closing or opening hinge further acts as control upon the opening or the closing, while the opposite is not true.

It is understood that although in the annexed figures it is shown a closing hinge **1** the

same hinge may be a closing or opening hinge, as well as a controlling hinge upon the opening or the closing without departing from the scope of the appended claims .

In a preferred but not exclusive embodiment, the working chamber **11** may further include a rod **16** defining the axis **Y**. In this case, the elastic counteracting means may include, respectively, consist of, a coil spring **40** fitted on the rod **16**, that acts as guide thereof.

Possibly, the spring **40** may be guided by the side walls of the working chamber **11** during the sliding thereof along the axis **Y**, with or without the guiding rod **16**.

Preferably, the elastic counteracting means may consist of a single coil spring **40**, that may be a thrust or restore spring. In other words, the coil spring **40** may be the only elastic counteracting means of the hinge.

Once the coil spring **40** is inserted on the rod **16**, the spring **40** thereof remains interposed between the bottom wall **12** of the chamber **11** and the rear face **33** of the slider **31**, that acts as abutment face for the spring **40** thereof.

The hinge **1** may have both vertical and horizontal low bulkiness. The spring **40** may have an outer diameter **Øe** equal to or slightly lower than the thickness **h** of the hinge body **10**.

Suitably, such thickness **h** may be substantially equal to or slightly greater than that of the slider **31**. Indicatively, such thickness **h** may be lower than 30 mm, and preferably lower than 25 mm and even more preferably lower than 20 mm.

Moreover, the spring **40** may have an inner diameter **Øi** substantially equal to or slightly greater than the diameter of the support rod **16** whereon it is inserted. On the other hand, the inner diameter **Øi** of the spring **40** is appreciably greater than that of the rod **16**, such as shown in FIGs. 33A and 33B.

Advantageously, the slider **31** may comprise an axial blind hole **35** suitable to house the rod **16**, so as the former slides along the axis **Y** with respect to the latter between the distal and proximal positions.

More particularly, the rod **16** may include a first end **17'** operatively coupled to the bottom wall **12** of the chamber **11**, for example by screw means **18**, and a second end **17''** inserted in the axial blind hole **35** to remain faced to the bottom wall **36** of the latter.

Thanks to such a configuration, the hinge **1** is extremely simple and quick to

assemble. In fact, Once the spring **40** is fitted on the rod **16** and the latter is inserted in the axial blind hole **35** of the slider **31** it is sufficient to insert such an assembly in the working chamber **11**, to screw the rod **16** to the bottom wall **12** by means of the screw means **18** and, then, to insert the cam element **21** in the hinge body **10**.

In a preferred but not exclusive embodiment, the screw means **18** may be directly screwed on the rod **16** by means of an abutment plate **18'** of the spring **40**. This maximally simplifies the assembly of the hinge. In fact, once the spring **40** is fitted on the rod **16**, the spring **40** thereof is blocked by the plate **18'** and such an assembly is inserted from the top into the chamber **11**.

Advantageously, the slider **31** may have substantially a plate shape to define a plane **π''** substantially coincident with the plane **π'** defined by the hinge body **10**.

Suitably, the slider **31** may be guided by the walls of the working chamber **11** during the sliding thereof along the axis **Y**.

Preferably, the slider **31** may have a substantially parallelepiped shape with the operative face **32** facing the front wall **13** of the working chamber **11**, the rear face **33** facing the bottom wall **12** of the chamber **11** and side faces **34'**, **34''** facing and preferably in contact with the side walls **14'**, **14''** of the chamber **11** thereof. in this way, the latter act as as guides for the slider **31**.

To contain the costs of the hinge, the slider **31** may include an insert **31'** whereto the operative face **32** belongs. The slider **31** may be made of a first metallic material, for example aluminium, or of a polymeric material, while the insert **31'** may be made of a second metallic material harder than the first, for example steel. In this way, it is possible to realize only the parts actually in contact with the cam element **21** in the "hard" and more expensive material, while the remaining part of the slider **31** may be made of a cheaper material.

Suitably, moreover, the working chamber **11** may further have a pair of shaped facing walls **140'**, **140''** interacting with a respective pair of opposite counter-shaped walls **340'**, **340''** of the slider **31**.

Suitably, the faced walls **140'**, **140''** may be defined by the inner surface **101** of a closing element **100** of the hinge **1**, whose function is better explained hereinafter. Preferably, one or a pair of covers **82**, **83** may be placed on the closing element **100** with

aesthetic and / or protective function.

Preferably, the shaped facing walls **140'**, **140''** may have a flat shape, as the opposite walls **340'**, **340''**, and they may preferably be in reciprocal contact with the latter so as to guide them during the sliding of the slider **31** along the axis **Y**.

In a preferred but not exclusive embodiment, the walls **14'**, **14''** and **34'**, **34''** may be substantially parallel, as the walls **140'**, **140''** and **340'**, **340''**. Preferably, moreover, the walls **14'**, **14''** and **34'**, **34''** may be substantially perpendicular to the plane **π'** defined by the hinge body **10**, while the walls **140'**, **140''** and **340'**, **340''** may be substantially parallel to the plane **π'** defined by the hinge body **10**.

In a preferred but not exclusive embodiment, shown for example in FIGs. 1 to 18b, the cam element **21** of the pivot **20** may have a substantially parallelepiped shape with a first surface **23** susceptible to come in contact with the operative face **32** of the slider **31** when the same slider is in the distal position and a second surface **24** susceptible to come in contact with the operative face **32** of the slider **31** when the same slider is in the proximal position.

Advantageously, both the two surfaces **23** and **24** and the operative face **32** may be substantially flat or slightly curved.

The angle between the two surfaces **23** and **24** may be any, and it determines the opening angle of the shutter **A**.

Suitably, the two surfaces **23** and **24** may be substantially perpendicular to each other. In this case, when the slider **31** is in the proximal position the first and the second surface **23** and **24** may be respectively substantially perpendicular and parallel to the operative face **32**, while when the slider **31** is in the distal position the first and the second surface **23** and **24** may be respectively substantially parallel and perpendicular to the operative face **32** thereof.

Preferably, the second surface **24** of the cam element **21** may include a shock-absorbing portion **25** susceptible to interact with the slider **31** to slightly compress the coil spring **40** from the position of maximum compression in case the user further rotates the glass shutter to open it.

In this way, the coil spring **40** shock-absorbs the further rotary movement imparted by the user, by preventing the damage of the hinge and / or of the glass shutter.

Suitably, the shock-absorbing portion **25** may be interposed between the second surface **24** and a third surface **26** substantially perpendicular thereto and substantially parallel to the first surface **23**.

To block the rotation of the shutter **A**, the hinge **1** may further include an abutment portion suitable to come in contact with the slider **31** when the user further rotates the shutter **A** thereof, as particularly shown for example in FIG. 8a and 8b.

Suitably, such an abutment portion may be defined by the portions **110'**, **110"** of the hinge body **10**.

On the other hand, a tubular element **111** may be provided fitted on the rod **16** to remain interposed between the latter and the coil spring **40** that has a length such as to impact against the rear face **33** of the slider **31**.

To minimize the bulkiness of the hinge **1**, the cam element **21** may have a width **L** such that when the slider **31** is in the distal position the cam element **21** thereof is oriented so as to occupy a major portion of the thickness **h** of the hinge body **10** and that when the slider **31** is in the proximal position, the cam element **21** is rotated substantially of 90 ° in order to occupy a reduced portion of the thickness **h** of the hinge body **10**.

The major portion occupied by the cam element **21** when the slider **31** is in the distal position may have a width **L**, that naturally coincides with that of the cam element **21**, such that when the pivot **20** rotates around the axis **X** the cam element **21** thereof substantially occupies all the thickness **h** of the hinge body **10**. In other words, the edges of the cam element **21**, for example the shock-absorbing portion **25**, pass very close to the side walls **140'**, **140"**, up to brush them.

In this way, it is possible to maximally exploit the little space available for the rotation of the pivot **20**.

To allow the insertion of the pivot **20** in the hinge body **10**, the latter may include a passing-through elongated slot **70**, that may be dimensioned so as to allow the passage of the pivot **20** exclusively when the cam element **21** is rotated substantially of 90 °.

On the other hand, once the pivot **20** has been inserted in the working chamber **11**, the cam element **21** may be rotated in the position wherein it occupies the major portion of the thickness **h** of the hinge body **10**.

In such a position, the cam element **21** may be susceptible to impact against the

hinge body **10**, so as to avoid the reciprocal slippage.

On the other hand, as shown for example in FIG. 1, the hinge body **10** may include two passing-through slots **70**, **70'**. Such an embodiment is simpler to implement, since it only requires a drilling with a vertical drill and a punching with a square punching die for the slot **70**. Even in such a case the pivot **20** may be inserted as above mentioned.

Once inserted into the hinge body **10**, the pivot **20** has an operative portion that coincides with the cam element **21** inside the working chamber **11** and a fastening portion **230** that protrudes from the hinge body **10**.

In a further preferred but not exclusive embodiment, shown for example in FIGs. 22 to 26, the cam element **21** may be realized according to the teachings of the international application PCT / IB2007 / 051663, to which reference is made for consultation.

Due to the limited space available, the hinge **1** may be devoid of the classical thrust bearings.

However, alternative anti-friction and thrust means may be provided especially configured to perform their function in the very limited space available.

In particular, such anti-friction and thrust means may be placed in correspondence of the anchoring areas **210**, **200** of the pivot **20** to the hinge body **10**, that may remain faced to the passing-through slot **70'** and to the seat **70**. In the embodiment with two slots, the latter coincides with the other slot **70**.

Suitably, the distance **d** between the first and the second anchoring areas **200**, **210** may be substantially equal to the height of the cam element **21**. In this way, even the vertical bulkiness of the pivot **20** is minimized.

In a preferred but not exclusive embodiment, the hinge body **10** may include a first and a second annular element **250**, **260** inserted in the seat **70** and in the slot **70'** to come in contact with the first and the second anchoring area **200**, **210** of the pivot **20**.

More particularly, the first and second annular elements **250**, **260** include respective inner surfaces **251**, **261** susceptible to come in contact respectively with the first and the second anchoring area **200**, **210** of the pivot **20**.

In this way, the latter is axially and / or radially blocked, so as to counteract the thrust of the coil spring **40** and / or to avoid the misalignment.

Suitably, the first and the second annular element **250**, **260** may be inserted in the

seat **70** and in the slot **70'** in a removable manner.

More particularly, the first and the second removable annular element **250**, **260** may include respective outer surfaces **252**, **262** susceptible to come in contact with the inner surfaces **71**, **71'** of the seat **70** and of the slot **70'**.

In a preferred but not exclusive embodiment, the annular element **250** may include a bottom wall **253** substantially perpendicular to the plane **π'**. Such a bottom wall **253** may be monolithic with the annular element **250**, as shown for example in FIG. 9, or detachable therefrom, as shown for example in FIG. 1.

The anchoring area **200** of the pivot **20** may include an anti-friction element in contact with the bottom wall **253**, which may be defined by a ball **254** having a curved surface **255** that is in contact both with the pivot **20** and with the bottom wall **253**.

On the other hand, the anchoring area **200** may include the curved surface in contact with the bottom wall **253**.

Suitably, the first and second annular elements **250**, **260** may include further anti-friction elements **320** interposed between the respective outer surfaces **252**, **262** and the inner surfaces **71**, **71'** of the seat **70** and the slot **70'**.

For example, such anti-friction elements **320** may be respective series of cylindrical rollers. Thanks to such a configuration, it is possible to effectively prevent the misalignment of the shutter **A**.

More particularly, as shown in FIG. 25c, at least one of the annular elements, for example the annular element **250**, may include one or more anti-friction elements **320** interposed between the inner surface **251** thereof and the respective anchoring area **200** of the pivot **20** and in contact therewith.

In a preferred but not exclusive embodiment, shown for example in FIGs. 22 to 25c, the hinge body **10** may include a pair of pins **300**, **310** inserted into respective seats **10'''**, **10''''** transverse to the plane **π'** of the hinge body **10** thereof to engage in an annular peripheral groove **215** of the anchoring area **210** of the pivot **20**.

In this way, the annular element **250** and the pins **300**, **310** cooperate with each other to axially and / or radially block the pivot **20** by counteracting the thrust of the coil spring **40** and / or avoiding the misalignment thereof.

The hinge **1** may be fully assembled without screws. This further simplifies the

mounting, in addition to contain costs and bulkiness.

To the object, the hinge body **10** with all the components inserted in the working chamber **11** may be coupled to a box-shaped shell **100** so as the inner surface **101** of the latter remains in contact with the outer surface **10'** of the hinge body **10**.

The box-shaped shell **100** may cooperate with the inner surface **10"** of the hinge body **10** to define the working chamber **11**.

In particular, the hinge body **10** may comprise the first pair of shaped facing walls **14'**, **14"**, while the shell **100** may comprise both shaped facing walls **140'**, **140"**, or only one thereof.

Advantageously, to contain the costs of the hinge **1**, the hinge body **10** may be made of polymeric material, while the shell **100** may be made of metallic material.

In a preferred but not exclusive embodiment, shown for example in FIGs. 26 - 29b, the shell **100** may be opened laterally to allow the lateral insertion of the hinge body **10**. In this case, the wall **140'** belongs to the shell **100**, while the wall **140"** belongs to the hinge body **10**.

In another embodiment, shown for example in FIGs. 1 to 25b, the shell **100** may be an elongated box-shaped body wherein the hinge body **10** may be slidably insertable. In this case, both walls **140'**, **140"** belong to the shell **100**.

In any case, fastening means may be provided to reciprocally block in the operative position the hinge body **10** and the shell **100**. For example, the latter may have a blocking tab **102** or some teeth that are snap-fitted in the hinge body **10**.

FIG. 30 shows another embodiment of the closing element **100**, alternative to the box-shaped shell. In this embodiment, the closing element **100** may be a plate coupled to the hinge body.

The hinge **1** may be of a mechanical type, as shown for example in FIG. 14, or it may include hydraulic damping means, as shown for example in FIG. 1, to hydraulically dampen the sliding along the axis **Y**.

In turn, the mechanical hinge **1** may include the rod **16**, as shown for example in FIG. 1, or it may be devoid of it.

It is evident that the mechanical hinge is devoid of the hydraulic damping means, while the hydraulic hinge may include hydraulic damping means.

Suitably, such hydraulic damping means may be entirely contained within the slider **31**, so as the coil spring **40** and the pivot **20** are not immersed in oil bath.

Suitably, the hydraulic damping means may include, respectively, they may consist of, a working fluid, for example oil, entirely contained in a hydraulic circuit **50** inside the slider **31**. To the object, the hydraulic circuit **50** may include the blind hole **35**.

This maximally simplifies the hinge structure **1**, while minimizing the costs thereof. In fact, all the hydraulics of the hinge is entirely contained in the slider **31**, the remaining parts remaining dry and, therefore, being much simpler to realize and manage.

Suitably, the second end **17"** of the rod **16** may divide the blind hole **35** in a first and a second variable volume compartment **51'**, **51"** fluidly communicating and adjacent therebetween.

To the object, the second end **17"** of the rod **16** may include a cylindrical separation element **60** of the variable volume compartments **51'**, **51"**.

In a preferred but not exclusive embodiment, shown for example in FIG. 1, the cylindrical separation element **60** may be a cylinder open to be coupled to the second end **17"** of the rod **16**.

The separation element **60** may include an inner chamber **65** with a bottom wall **19'**, a side wall **63** and a front wall **61**.

The latter may have a front surface **62'** faced to the bottom wall **36** of the blind hole **35** and a rear surface **62"** faced to the bottom wall **19'** of an axial blind hole **19** made in correspondence of the second end **17"** of the rod **16**.

Suitably, the cylindrical separation element **60** may have the cylindrical wall **63** interposed between the side wall **19"** of the second end **17"** of the rod **16** and the side wall **37** of the blind hole **35** of the slider to act as a spacer therebetween.

Advantageously, the first compartment **51'** may be defined by the bottom wall **36** of the axial blind hole **35**, by the side wall **37** thereof and by the front surface **62'** of the front wall **61**, while the second compartment **51"** may be defined by the axial blind hole **19** of the rod **16** and by the interspace between the cylindrical separation element **60** and an oil-seal **600** faced thereto and coupled to the slider **31** to close the axial blind hole **35**. The first and the second compartment **51'**, **51"** are fluidly communicating therebetween by means of the passage **59**.

With regards to the second compartment **51''**, the axial blind hole **19** has constant volume, while the tubular interspace **52** varies in volume at the passage of the slider **31** from the distal position to the proximal one and vice versa.

Suitably, the compartments **51'**, **51''** may be configured to have in correspondence of the closed shutter **A** position respectively the maximum and the minimum volume.

To allow the fluid communication between the two compartments **51'**, **51''**, controlling means of the flow of the working fluid may be provided to allow the passage thereof from the first compartment **51'** to the second compartment **51''** upon one of the opening or the closing of the shutter **A** and to allow the passage from the second compartment **51''** to the first compartment **51'** upon the other of the opening or the closing of the shutter **A**.

In a preferred but not exclusive embodiment, the controlling means of the flow of the working fluid may comprise an opening **53** passing through the separation element **60** in correspondence of the wall **61** and valve means to allow the controlled passage of the working fluid between the two compartments **51'**, **51''**.

Suitably, the valve means may comprise a plug element **64** movable in a seat **65** defined by the inner chamber of the cylindrical separation element **60**. The valve seat **65** may be interposed between the passing-through opening **53** and the blind hole **19** of the end **17''** of the rod **16** and it allows the plug **64** to move between a first working position, shown for example in FIG. 6b, wherein the plug element **64** is in contact with the passing-through opening **53** and a second working position, shown for example in FIG. 6a, wherein the plug element **64** thereof is spaced thereto.

Depending on the configuration of plug **64**, when the same plug is in the first working position the two compartments **51'**, **51''** are or are not in fluid communication by means of the passing-through opening **53** of the cylindrical separation element **60**.

In a first embodiment, the plug element **64** may include a calibrated opening **54**, preferably in a central position, to allow the passage of the working fluid between the two compartments **51'**, **51''** by means of the passing-through opening **53** when the plug element **64** thereof is in the first working position.

The calibrated opening **54** may have a diameter lower than 1 mm, and preferably lower than 0,5 mm. Indicatively, such a calibrated opening **54** may have a diameter of 1 - 3

tenths of millimetre.

Therefore, when the plug element **64** is in the first working position, corresponding to the distal position of the slider **31**, the working fluid exclusively passes through the calibrated opening **54**, while when the plug element **64** thereof is in the second working position, corresponding to the proximal position of the slider **31**, the working fluid passes both through the calibrated opening **54** and through a plurality of peripheral passages **55** thereof. Therefore, in such an embodiment, the hydraulic circuit **50** may be entirely contained inside the blind hole **35** of the slider **31**.

In a preferred but not exclusive embodiment, shown for example in FIGs. 11a and 11b, the valve seat **65** may include a pin **650** passing through a hole **640** of the plug element **64**.

In this case, the calibrated opening **54** may be defined by the interspace between the hole **640** of the plug element **64** and the passing-through pin **650**.

In any case, the calibrated opening **54** may have a passage section lower than 2 mm^2, preferably lower than 1 mm^2, even more preferably lower than 0,5 mm^2 and ideally lower than 0,35 mm^2.

Advantageously, the pin **650** may be inserted through a hole **610** of the front wall **61** of the chamber **65**.

In this case, the passing-through opening **53** may be defined by the interspace between the hole **610** of the front wall **61** of the chamber **65** and the passing-through pin **650**.

Suitably, the pin **650** may be inserted through the plug element **64** and the front wall **61** of the chamber **65** to freely move along the axis **Y**.

To the object, the bottom wall **19'** of the chamber **65** may include a seat for the pin **650**, the seat thereof may be defined by the axial blind hole **19**.

Suitably, the pin **650** and the axial blind hole **19** may be reciprocally dimensioned so as in the distal position of the slider **31** the pin **650** is within the seat **19** thereof upon the interaction with the bottom wall **36** of the blind hole **35**, and in the proximal position of the slider **31** thereof, the pin **650** telescopically exits from the seat **19** thereof, remaining partially inserted therein, so as not to slip off.

Thanks to the above mentioned features, the free sliding of the pin **650** during the

sliding of the slider **31** maintains the passing-through opening **53** and the calibrated opening **54**, that are very low-bulky, free from any dirt and / or foreign bodies.

Suitably, slip-preventing means may be provided to prevent the slippage of the pin **650** from the seat **651** during the sliding. For example, the seat **651** may have ends that may be chamfered, that may act as abutments for the pin **650**.

In a second embodiment, shown for example in FIGs. 6a and 6b, the plug element **64** is devoid of the calibrated central hole **54**. Therefore, when the plug element **64** is in the first working position the working fluid may not pass through the passing-through opening **53** of the cylindrical separation element **60**.

To allow the fluid communication between the compartments **51'**, **51''** when the plug element **64** is in the first working position, a channel **60'** may be provided encompassing the separation element **60**.

As stated above, the hinge **1** is particularly suitable for glass shutters **A** or shutters of cold rooms.

In particular, in the embodiments of FIGs. 1 to 21b the hinge **1** once assembled as shown for example in FIG. 2b has a parallelepiped shape suitable to be inserted in the tubular frame of the shutter **A**, as shown for example in FIGs. 4a and 4b.

Moreover, the low-bulkiness of the hinge **1** further makes it suitable to be inserted between the two glass plates of a double-glazing glass, as for example shown in FIGs. 3a and 3b.

On the other hand, the hinge **1** may cooperate with one or more fastening plate-shaped elements **120** to fasten from opposite sides a glass shutter **A** so as the latter remains interposed therebetween.

More particularly, in the embodiment shown in FIGs. 26 to 29b the hinge **1** may include a portion **130** suitable to interact with a corresponding first portion **A1** of the glass shutter **A**, while the fastening element **120** may comprise a portion **131** faced to the portion **130** suitable to interact with a corresponding second portion **A2** of the glass shutter **A** opposite to the first portion **A1**. Suitably, the glass shutter **A** may be protected by suitable seals **160**, **160'**.

In the embodiments shown in FIGs. 14 to 25b, the hinge **1** may include portions **130**, **130'** extending from opposite sides of the hinge body **10** to interact with a corresponding

pair of first portions **A1**, **A1'** of the glass shutter **A**, while the fastening elements **120**, **120'** may have respective second portions **131**, **131'** suitable to interact with a corresponding pair of second portions **A2**, **A2'** of the glass shutter **A** opposite to the first portions **A1**, **A1'**.

Suitably, the first portions **130**, **130'** may extend from the hinge body **10** in correspondence of a side wall thereof, while the fastening elements **120**, **120'** may be dimensioned so as to remain flush with the opposite side wall of the hinge body **10**, so that the glass shutter **A** is placed in a substantially central position with respect to the hinge body **10** thereof.

Advantageously, the box-shaped shell **100** may leave free the portions **130** or **130**, **130'** of the hinge body **10** for the fastening of the glass shutter **A**.

In a preferred but not exclusive embodiment, one of the covers **83** may be couplable to the hinge body **10**, while the other of the covers **82** may be couplable to the fastening elements **120**, **120'**. In this way, as shown in FIGs. 31a, 31b and 34, the cover **82** may always remain in contact with the glass shutter **A** regardless of the thickness thereof.

For the reciprocal blocking of the hinge **1** and of the fastening plate-shaped elements **120** or **120**, **120'** that include a pair of screws **150**, **150'** insertable in a corresponding pair of seats **155**, **155'**, the latter possibly passing through a corresponding pair of passing-through holes **F1**, **F2** of the glass shutter **A**.

Thanks to the above mentioned features, the hinge **1** practically acts as "*patch*" for the glass shutter **A**, and, therefore, it has minimal visual impact thereon.

In a further preferred but not exclusive embodiment, shown for example in FIGs. 32, 33a and 33b, the hinge **1** may include a pressing element **400** coupled to the rod **16** to adjust the pre-loading of the coil spring **40**, preferably screwed on the rod **16** thereof.

To the object, the pressing element **400** may be coupled to the rod **16** by means of a sliding coupling element **410** having one operation end **411** controlled by a user and an opposite end **412** screwable on the rod **16**.

The coupling element **410** may include a smooth portion **413** for the idle sliding of the pressing element **400** and a portion **414** susceptible to abut against the latter.

In this way, the screwing / unscrewing of the coupling element **410** with respect to the rod **16** may determine the greater or lower pre-loading of the coil spring **40**.

From the above description, it appears evident that the hinge according to the

invention fulfils the intended objects.

The hinge according to the invention is susceptible of numerous modifications and variations, all falling within the inventive concept expressed in the appended claims. All the details may be replaced with other technically equivalent elements, and the materials may be different according to requirements, without departing from the scope of the invention.

Although the hinge has been described with particular reference to the annexed figures, the reference numbers used in the description and in the claims are used to improve the intelligence of the invention and do not constitute any limitation to the scope of protection claimed.

CLAIMS

1. A low-bulkiness hinge for the closing of a closing member (**A**), such as a door, a shutter, a double-glazing glass or the like, anchored to a stationary support structure (**S**), such as a wall, a frame or a floor, the closing member (**A**) or the stationary support structure (**S**) defining a first plane (**π**), the hinge being movable between an open position and a closed position, the hinge comprising:

- a hinge body (**10**) having a substantially plate shape to define a second plane (**π'**), said hinge body (**10**) being anchorable to one of the closing member (**A**) and the stationary support structure (**S**) so as the first plane (**π**) and the second plane (**π'**) are coincident or parallel to each other, said hinge body (**10**) internally comprising a working chamber (**11**) with a front wall (**13**) and a bottom wall (**12**) faced thereto;

- a pivot (**20**) anchorable to each other of the closing member (**A**) and the stationary support structure (**S**) defining a first longitudinal axis (**X**) substantially parallel to said second plane (**π'**) or lying thereon, said pivot (**20**) and said hinge body (**10**) being reciprocally coupled so as to rotate around said first axis (**X**) between the opening and closing positions of the closing member (**A**);

- a slider (**31**) sliding in said working chamber (**11**) along a second longitudinal axis (**Y**) substantially perpendicular to the first axis (**X**) between a position distal to said bottom wall (**12**) and a position proximal thereto;

wherein said pivot (**20**) further includes a cam element (**21**) integrally rotatable therewith, said slider (**31**) comprising an operative face (**32**) interacting with said cam element (**21**) so as upon the opening or the closing of the closing member (**A**) the rotation of the former (**20**) around said first axis (**X**) corresponds to the sliding of the latter (**31**) along said second axis (**Y**) from the distal to the proximal position, said working chamber (**11**) further comprising at least one coil spring (**40**) having a predetermined outer diameter (**Ø**) interposed between said bottom wall (**12**) of said working chamber (**11**) and said slider (**31**) to act on the latter (**31**) so as to move it from the proximal to the distal position.

2. Hinge according to claim 1, wherein the outer diameter (**Ø**) of said at least one coil spring (**40**) is substantially equal to or slightly less than the thickness (**h**) of said hinge body (**10**).

3. Hinge according to claim 1 or 2, wherein said working chamber (**11**) including first

and second guiding means to respectively guide the at least one coil spring (**40**) and said slider (**31**) during their integral sliding along said second axis (**Y**).

4. Hinge according to claim 1, 2 or 3, wherein said hinge body (**10**) includes an outer surface (**10'**) and an inner surface (**10''**) comprising said front wall (**13**) and bottom wall (**12**) of said working chamber (**11**).

5. Hinge according to claim 1, 2, 3 or 4, wherein said second guiding means comprise at least one first pair of shaped facing walls (**14'**, **14''**) and a second pair of shaped facing walls (**140'**, **140''**) of said working chamber (**11**) interacting or in reciprocal contact with said slider (**31**).

6. Hinge according to one or more of the preceding claims, wherein said hinge body (**10**) is laterally open, the hinge further comprising at least one closing element (**100**) cooperating with the inner surface (**10''**) of said hinge body (**10**) to define said working chamber (**11**).

7. Hinge according to the preceding claim, wherein said hinge body (**10**) comprises said first pair of shaped facing walls (**14'**, **14''**), said at least one closing element (**100**) comprising at least one of the shaped facing walls (**140'**, **140''**) of said second pair, the walls of said first pair (**14'**, **14''**) being substantially transversal with respect to the walls of said second pair (**140'**, **140''**).

8. Hinge according to the preceding claim, wherein said at least one closing element (**100**) includes one of the shaped facing walls (**140'**, **140''**) of said second pair, said hinge body (**10**) including the other of the shaped facing walls (**140'**, **140''**) of said second pair.

9. Hinge according to any one of claims 6 to the previous, wherein said at least one closing element (**100**) has walls with a thickness (**h'**) substantially lower than the thickness (**h**) of said hinge body (**10**).

10. Hinge according to the preceding claim, wherein the ratio between the thickness (**h'**) of the walls of said at least one closing element (**100**) and the thickness (**h**) of said hinge body (**10**) is greater than 1 : 5, preferably greater than 1 : 10 and even more preferably greater than 1 : 15.

11. Hinge according to any one of claims 6 to the previous, wherein said at least one closing element (**100**) is a box-shaped shell (**100**) or at least one plate (**100**) coupled to said hinge body (**10**).

12. Hinge according to any one of claims 6 to the previous, wherein said at least one closing element (**100**) is a box-shaped shell (**100**), said outer surface (**10'**) of said hinge body (**10**) being in contact with the inner surface (**101**) of said shell (**100**).

13. Hinge according to any one of claims 6 to the previous, wherein said at least one closing element (**100**) is a box-shaped shell (**100**) open in correspondence to a side wall thereof to allow the lateral insertion of said hinge body (**10**) therein.

14. Hinge according to any one of claims 6 to the previous, wherein said at least one closing element (**100**) is a box-shaped shell (**100**) open in correspondence to the front or rear wall thereof to allow the axial insertion of said body hinge (**10**) therein, said shell (**100**) including both shaped facing walls (**140'**, **140''**) of said second pair.

15. Hinge according to any one of claims 6 to the previous, wherein at least one of said at least one closing element (**100**) and said hinge body (**10**) includes means (**102**) for the reciprocal fastening thereof with the other of said at least one closing element (**100**) and said hinge body (**10**), so as they remain reciprocally coupled without any screws or similar fastening means.

16. Hinge according to any one of claims 6 to the previous, wherein said hinge body (**10**) is made of a polymeric material, said at least one closing element (**100**) being made of a metallic material.

17. Hinge according to any one of the preceding claims, wherein said cam element (**21**) of said pivot (**20**) has a generally parallelepiped shape with a first surface (**23**) susceptible to come in contact with said operative face (**32**) of said slider (**31**) when the same slider is in the distal position and a second surface (**24**) susceptible to come in contact with said operative face (**32**) of said slider (**31**) when the same slider is in the proximal position, said first and second surface (**23**, **24**) being reciprocally transverse therebetween.

18. Hinge according to the preceding claim, wherein said first surface (**23**) and said second surface (**24**) are substantially flat or slightly curved, said operative face (**32**) also being substantially flat or slightly curved.

19. Hinge according to claim 17 or 18, wherein said first and second surface (**23**, **24**) are substantially perpendicular therebetween, said cam element (**21**) of said pivot (**20**) generally having a rectangular parallelepiped shape, when said slider (**31**) is in said proximal position said first and second surface (**23**, **24**) being respectively substantially perpendicular

and parallel to said operative face (**32**), when said slider (**31**) is in said distal position said first and second surface (**23**, **24**) being respectively substantially parallel and perpendicular to said operative face (**32**).

20. Hinge according to claim 17, 18 or 19, wherein said at least one coil spring (**40**) in said proximal position has the maximum compression, said second surface (**24**) of said cam element (**21**) including a shock-absorbing portion (**25**) susceptible to interact with said slider (**31**) to slightly compress said at least one coil spring (**40**) from the maximum compression in case the user further rotates the closing member (**A**) from the open position towards the direction opposite to the one towards the closed position, so as said at least one coil spring (**40**) shock-absorbs the further rotary movement imparted by the user, said cam element (**21**) includes a third surface (**26**) substantially perpendicular to said second surface (**24**) and substantially parallel to said first surface (**23**), said shock-absorbing portion (**25**) being interposed between said second and said third surface (**24**, **26**).

21. Hinge according to the preceding claim, wherein said shock-absorbing portion (**25**) is defined by the edge between said second and third surface (**24**, **26**).

22. Hinge according to claim 19, 20 or 21, further comprising an abutment portion (**110'**, **110''**, **111**) susceptible to come in contact with said slider (**31**) when the user further rotates the closing member (**A**) so as to block the rotation thereof.

23. Hinge according to the preceding claim, wherein said slider (**31**) has a rear face (**33**), the shock-absorbing portion (**25**) of said cam element (**21**) acting upon the operative face (**32**) of said slider (**31**) to push the rear face (**33**) thereof against said abutment portion (**110'**, **110''**, **111**).

24. Hinge according to claim 22 or 23, wherein said abutment portion (**111**) is defined by a tubular element (**111**) fitted on said rod (**16**) to remain interposed between the latter (**16**) and said coil spring (**40**).

25. Hinge according to one or more of the preceding claims, wherein said slider (**31**) further includes an axial blind hole (**35**), said first guiding means further comprising a rod (**16**) defining said second axis (**Y**) having an end (**17'**) reciprocally connected with the bottom wall (**12**) of said working chamber (**11**) and the opposite end (**17''**) inserted in the axial blind hole (**35**) of said slider (**31**).

26. Hinge according to one or more of the preceding claims, wherein said at least

one coil spring (**40**) is a single coil spring (**40**).

27. Hinge according to one or more of the preceding claims, wherein said at least one coil spring (**40**), respectively said single coil spring, (**40**), is coaxially inserted in said support rod (**16**).

28. Hinge according to one or more of the preceding claims, wherein said at least one coil spring (**40**) has an inner diameter substantially equal to the diameter of said rod (**16**) whereon it is inserted.

29. Hinge according to one or more of the preceding claims, wherein the thickness (**h**) of said hinge body (**10**) is substantially equal to or slightly greater than the one of said slider (**31**).

30. Hinge according to one or more of the preceding claims, wherein said first and second guiding means coincide.

31. Hinge according to one or more of the preceding claims, wherein said first guiding means include at least one first pair of shaped facing walls (**14'**, **14''**) and a second pair of shaped facing walls (**140'**, **140''**) of said working chamber (**11**) interacting or in reciprocal contact with said coil spring (**40**).

32. Hinge according to one or more of the preceding claims, wherein said at least one coil spring (**40**) is a thrust spring, so as the hinge is a closing hinge.

33. Hinge according to one or more of the preceding claims, further comprising hydraulic damping means entirely contained within said slider (**31**), said at least one coil spring (**40**) and said cam element (**21**) not being immersed in oil bath.

34. Hinge according to one or more of the preceding claims, wherein said slider (**31**) has a substantially parallelepiped shape with an operative face (**32**) facing the front wall (**13**) of said working chamber (**11**), a rear face (**33**) facing to the bottom wall (**12**) of said working chamber (**11**) and side faces (**34'**, **34''**) reciprocally faced and preferably in contact with the side walls (**14'**, **14''**) of said working chamber (**11**).

35. Hinge according to one or more of the preceding claims, wherein the outer diameter (**Ø**) of said at least one coil spring (**40**) is substantially equal to or greater than the thickness of said slider (**31**).

36. Hinge according to one or more of the preceding claims, wherein said cam element (**21**) has a width such that when the slider (**31**) is in said distal position the cam

element (**21**) thereof is oriented so as to occupy a major portion of the thickness of said hinge body (**10**) and that when the slider (**31**) is in said proximal position the cam element (**21**) is rotated of substantially 90 ° in order to occupy a reduced portion of the thickness of said hinge body (**10**), said cam element (**21**) having a width such that upon the rotation of said pivot (**20**) around said first axis (**X**) said cam element (**21**) substantially occupies the entire thickness of said hinge body (**10**).

37. Hinge according to the preceding claim, wherein said hinge body (**10**) includes at least one passing-through elongated slot (**70**), the latter (**70**) and the pivot (**20**) being reciprocally dimensioned to allow the passage of the latter (**20**) through the former (**70**) exclusively when said cam element (**21**) is rotated of substantially 90 ° for the mounting or dismounting thereof, when said cam element (**21**) is oriented in such a way so as to occupy said major portion of said hinge body (**10**) the former (**21**) being susceptible to impact against the latter (**10**) to prevent the slipping thereof.

38. Hinge according to one or more of the preceding claims, wherein said hinge body (**10**) includes at least one passing-through elongated slot (**70**, **70'**) for the passage of said pivot (**20**).

39. Hinge according to the preceding claim, wherein said pivot (**20**) comprises an operative portion (**21**) inside said hinge body (**10**) that includes said cam element (**21**) and a fastening portion (**230**) protruding from the hinge body (**10**) thereof to allow the fastening to the stationary support structure (**S**).

40. Hinge according to the preceding claim, wherein said operative portion (**21**) of said pivot (**20**) comprises a first and a second anchoring area (**200**, **210**) of the latter (**20**) to said hinge body (**10**), said cam element (**21**) being interposed between said first and second anchoring area (**200**, **210**), said first anchoring area (**210**) being interposed between said cam element (**21**) and said fastening portion (**230**) of said pivot (**20**) to remain inserted in said at least one passing-through elongated slot (**70**, **70'**) of said hinge body (**10**), the latter (**10**) including a seat (**70'**) facing said elongated slot (**70**) susceptible to house said second anchoring area (**200**) of said pivot (**20**).

41. Hinge according to the preceding claim, wherein said hinge body (**10**) further includes at least one first annular element (**260**), respectively a first and a second annular element (**260**, **250**), inserted in or monolithic with said passing-through elongated slot (**70**)

or said seat (**70**), respectively said passing-through elongated slot and said seat (**70**, **70'**), to come in contact with the first anchoring area (**210**) or with the second anchoring area (**200**), respectively with both the first and the second anchoring area (**210**, **200**), of said operative portion (**21**) of said pivot (**20**), so as to axially and / or radially block it by counteracting the thrust of said coil spring (**40**) and / or avoiding the misalignment.

42. Hinge according to the preceding claim, wherein the distance between said first and second anchoring area (**210**, **200**) is substantially equal to the height of said cam element (**21**) of said pivot (**20**).

43. Hinge according to claim 41 or 42, wherein said at least one first annular element (**260**) includes an inner surface (**261**) susceptible to come in contact with the respective anchoring area (**210**), respectively said first and second annular element (**260**, 250) include respective inner surfaces (**261**, **251**) susceptible to come respectively in contact with the first and the second area (**210**, **200**), of the operative portion (**21**) of said pivot (**20**).

44. Hinge according to the preceding claim, wherein said at least one first annular element (**260**) includes one or more anti-friction elements (**320**) interposed between the inner surface (**261**) thereof and the respective anchoring area (**210**) of the operative portion (**21**) of said pivot (**20**) and in contact therewith, said one or more anti-friction elements (**320**) preferably including a plurality of cylindrical rollers.

45. Hinge according to one or more of claims from 37 to the previous, wherein said hinge body (**10**) includes said passing-through elongated slot (**70**) and said seat (**70'**), said hinge body (**10**) exclusively including said first annular element (260) inserted in or monolithic with one of said passing-through elongated slot (**70**) and said seat (**70'**) to come in contact with one of the first area (**210**) and the second area (**200**) of said operative portion (**21**) of said pivot (**20**), said hinge body (**10**) further including at least one pin (**300**, **310**), respectively a pair of pins (**300**, **310**), inserted, respectively inserted, in a respective seat (**10'''**, **10''''**) of said hinge body (**10**) transverse to said second plane (**π'**) to engage in a peripheral annular groove (**215**) of the other of the first anchoring area (**210**) and the second anchoring area (**200**) of said operative portion (**21**) of said pivot (**20**) faced to the other of said passing-through elongated slot (**70**) and said seat (**70'**), so as said first annular element (**260**) and said at least one pin (**300**, **310**), respectively said pair of pins (**300**, **310**), cooperate with each other to axially and / or radially block the pivot (**20**) by counteracting the thrust of

said coil spring (**40**) and / or avoiding the misalignment.

46. Hinge according to one or more of claims from 37 to the previous, wherein said at least one first annular element (**260**) is inserted in said elongated slot (**70**) or in said seat (**70'**), respectively said first and second annular element (**260**, **250**) are inserted in said elongated slot and in said seat (**70**, **70'**) in a removable manner.

47. Hinge according to the preceding claim, wherein said at least one first removable annular element (**260**) includes an outer surface (**262**) susceptible to remain faced or to come in contact with the inner surface (**71**, **71'**) of said passing-through elongated slot (**70**) or of said seat (**70'**), respectively said first and second removable annular element (**250**, **260**) include respective outer surfaces (**252**, **262**) susceptible to remain faced or to come in contact with the inner surfaces (**71** , **71'**) of said passing-through elongated slot and of said seat (**70**, **70'**), of said hinge body (**10**).

48. Hinge according to one or more of claims from 37 to the previous, wherein said second annular element (**250**) inserted in or monolithic with said seat (**70'**) includes a bottom wall (**253**), the second anchoring area (**200**) of the operative portion (**21**) of said pivot (**20**) includes an anti-friction element (**254**) in contact with said bottom wall (**253**).

49. Hinge according to the preceding claim, wherein said bottom wall (**253**) of said second annular element (**250**) is substantially perpendicular to said second plane (**π'**).

50. Hinge according to claim 48 or 49, wherein said second anchoring area (**200**) of the operative portion (**21**) of said pivot (**20**) includes a curved surface (**254**) lying on said bottom wall (**253**) defining said anti-friction element (**254**).

51. Hinge according to the preceding claim, wherein said anti-friction element (**254**) includes a first curved surface in contact with said second anchoring area (**200**) of the operative portion (**21**) of said pivot (**20**) and a second curved surface in contact with said bottom wall (**253**).

52. Hinge according to one or more of the preceding claims, wherein said closing member is a glass shutter or door (**A**) defining said first plane (**π**), further comprising at least one plate-shaped fastening element (**120**) cooperating with said at least one hinge (**1**) to fasten from the opposite parts the glass shutter or door (**A**).

53. Hinge according to the preceding claim, wherein said hinge body (**10**) includes at least one first portion (**130**) susceptible to interact with a corresponding first portion (**A1**) of

the glass shutter (**A**), said at least one fastening element (**120**) comprising at least one second portion (**131**) susceptible to interact with a corresponding second portion (**A2**) of the glass shutter (**A**) opposite to the first portion (**A1**), said at least one first portion (**130**) of said hinge body (**10**) and at least one second portion (**131**) of said at least one fastening element (**120**) being reciprocally faced so as the glass shutter (**A**) remains interposed therebetween.

54. Hinge according to the preceding claim, wherein said at least one first portion (**130**) of said hinge body (**10**) includes a single portion defining a side wall of said hinge body (**10**), said at least one fastening element (**120**) being a single fastening element substantially coextensive with said first portion (**130**) of said hinge body (**10**).

55. Hinge according to claim 53, wherein said at least one first portion of said hinge body (**10**) is a pair of first portions (**130**, **130'**) extending from opposite sides of said hinge body (**10**) to interact with a corresponding pair of first portions (**A1**, **A1'**) of the glass shutter (**A**), said at least one fastening element (**120**) being a pair of fastening elements (**120**, **120'**) with respective second portions (**131**, **131'**) susceptible to interact with a corresponding pair of second portions (**A2**, **A2'**) of the glass shutter (**A**) opposite to said first portions (**A1**, **A1'**), said first portions (**130**, **130'**) of said hinge body (**10**) and second portions (**131**, **131'**) of said at least one fastening element (**120**) being reciprocally faced so as the glass shutter (**A**) remains interposed therebetween.

56. Hinge according to the preceding claim, wherein said first portions (**130**, **130'**) extend from said hinge body (**10**) in correspondence of a side wall thereof, said fastening elements (**120**, **120'**) being dimensioned so as to remain flush with the side wall opposite to said hinge body (**10**), so as the glass shutter (**A**) is placed in a substantially central position with respect to said hinge body (**10**).

57. Hinge according to any one of claims of 52 to the previous, further comprising a pair of covers (**83**), one of the latter being coupled to said fastening elements (**120**, **120'**) so as to remain always in contact with the glass shutter or door (**A**) regardless of the thickness thereof.

58. Hinge according to any one of claims 52 to the previous, further comprising means for the reciprocal blocking of said at least one hinge (**1**) and at least a fastening plate-shaped element (**120**).

59. Hinge according to the preceding claim, wherein said blocking means include a

pair of screws (**150**, **150'**) insertable in a corresponding pair of seats (**155**, **155'**), at least one of said screws (**150**, **150'**) and said seats (**155**, **155'**) passing through a corresponding pair of passing-through holes (**F1**, **F2**) in the glass shutter (**A**).

60. Hinge according to any one of the preceding claims, wherein said at least one box-shaped shell (**100**) leaves free said at least one first portion (**130**) of said hinge body (**10**) for the fastening of the the glass shutter (**A**).

61. Hinge according to any one of claims 52 to the previous, wherein said pair of first portions (**130**, **130'**) extends from opposite sides with respect to said box-shaped shell (**100**).

62. Hinge according to any one of the preceding claims, further comprising adjusting means for the pre-loading of said at least one coil spring (**40**).

63. Hinge according to the preceding claim, wherein said adjusting means for the pre-loading include a pressing element (**400**) coupled to said rod (**16**) by means of a sliding coupling element (**410**) having one operation end (**411**) controllable by a user and an opposite end (**412**) coupled to said rod (**16**), said coupling element (**410**) including a portion interposed to the idle sliding of said pressing element (**400**) and an abutment portion for the latter, so as the sliding of the coupling element (**410**) with respect to the rod determines the greater or lower pre-loading of said at least one coil spring (**40**).

64. A system for the fastening of a glass shutter or door (**A**) defining a first plane (π) to a stationary support structure (**S**), such as a wall, a frame or a floor, comprising:

- at least one hinge (**1**) movable between an open position and a closed position of the glass shutter or door (**A**);

- at least one fastening plate-shaped element (**120**) cooperating with said at least one hinge (**1**) to fasten from opposite sides the glass shutter or door (**A**);

wherein said at least one hinge (**1**) is a hinge according to one or more of the preceding claims.

65. A double-glazing glass (**A**) that includes at least one pair of reciprocally faced glass plates and a hinge (**1**) according to one or more of claims 1 to 63, wherein the latter is interposed between said plates so as exclusively a fastening portion (**230**) of said pivot (**20**) to the stationary support structure (**S**) comes out from the double-glazing glass.

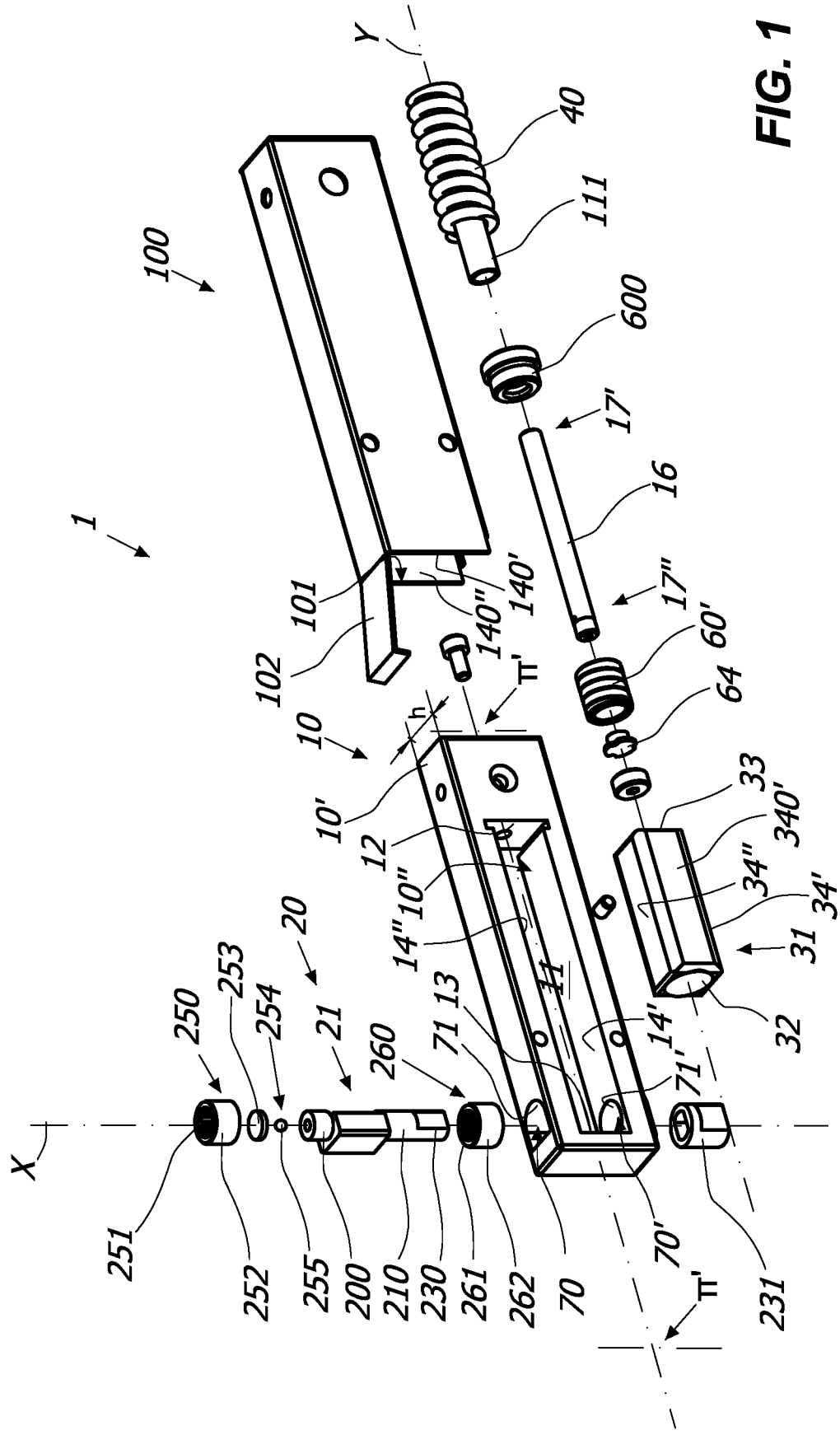

Y
40
111
100
600
17"
16
1
101
140'
140"
102
Π'
60'
17'''
64
h
10
10'
33
340'
12
10"
34"
14'''
34'
20
31
253
250
254
21
260
71 13
11
14'
32
71'
X
251
252
255
200
210
230
261
262
70
70'
Π'
231

FIG. 1

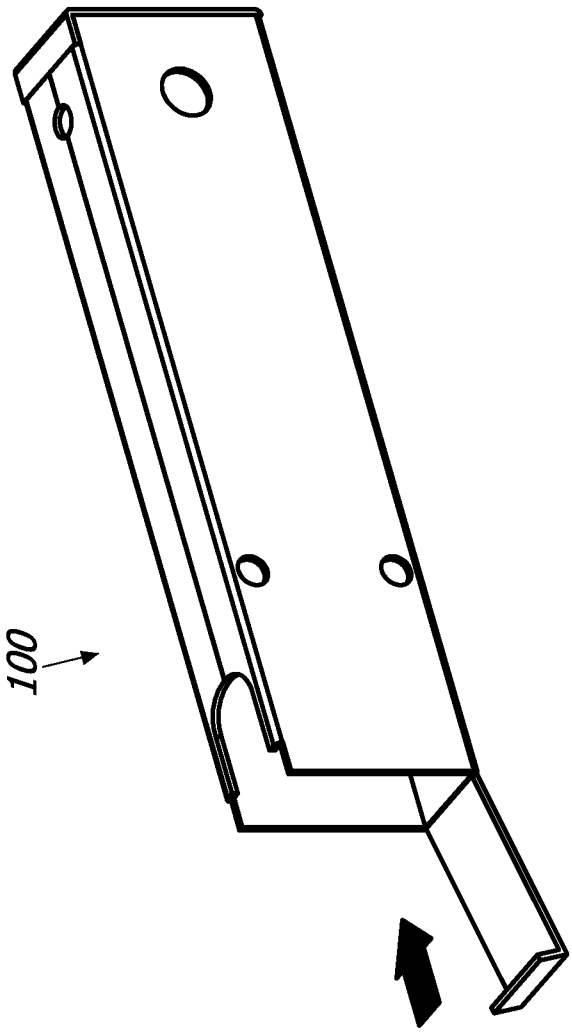


FIG. 2a

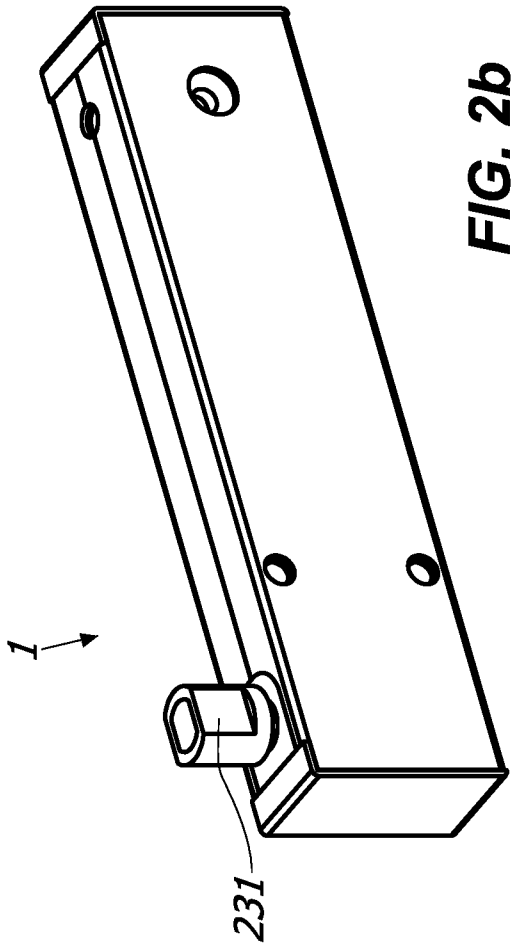
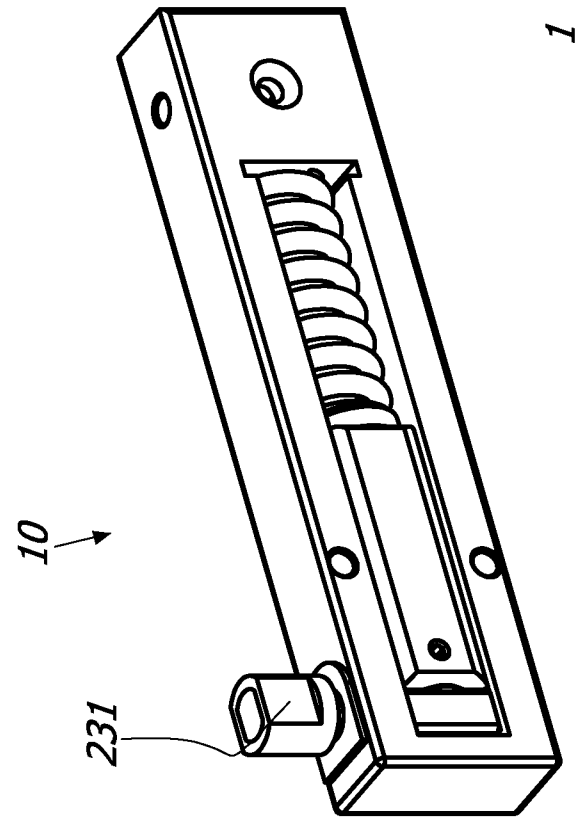


FIG. 2b



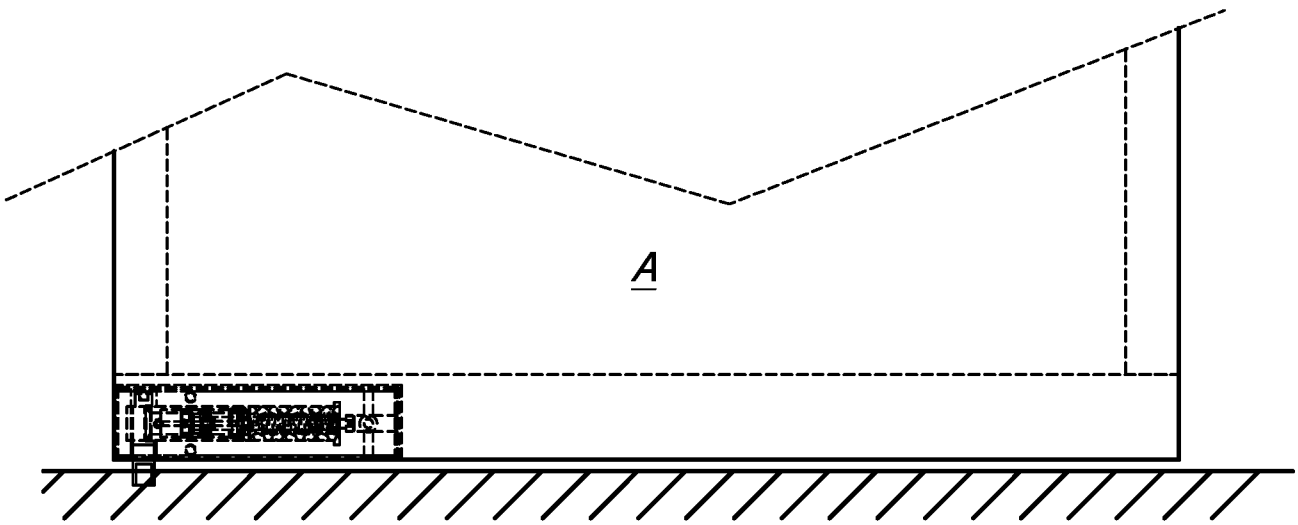


FIG. 3a

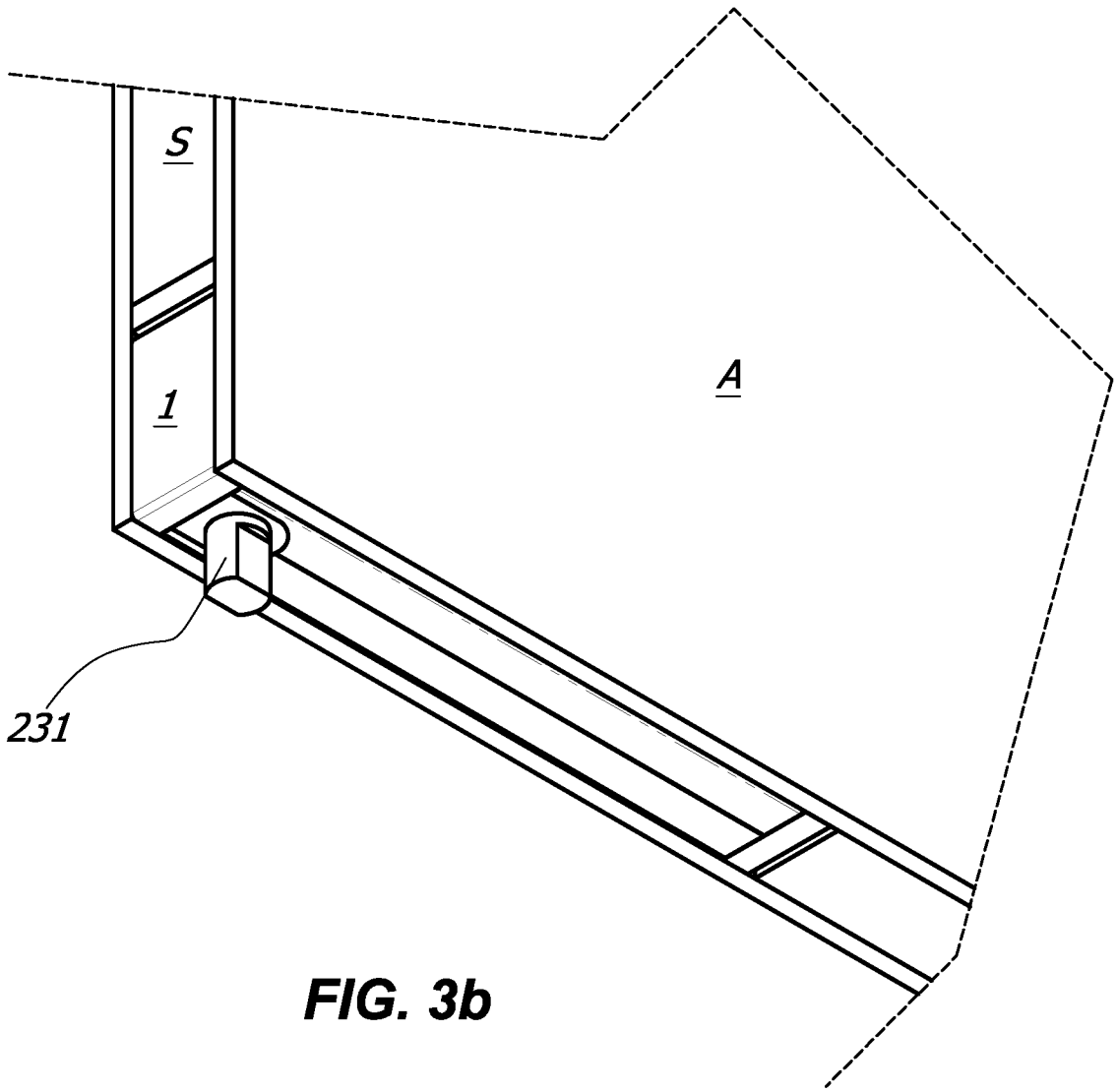


FIG. 3b

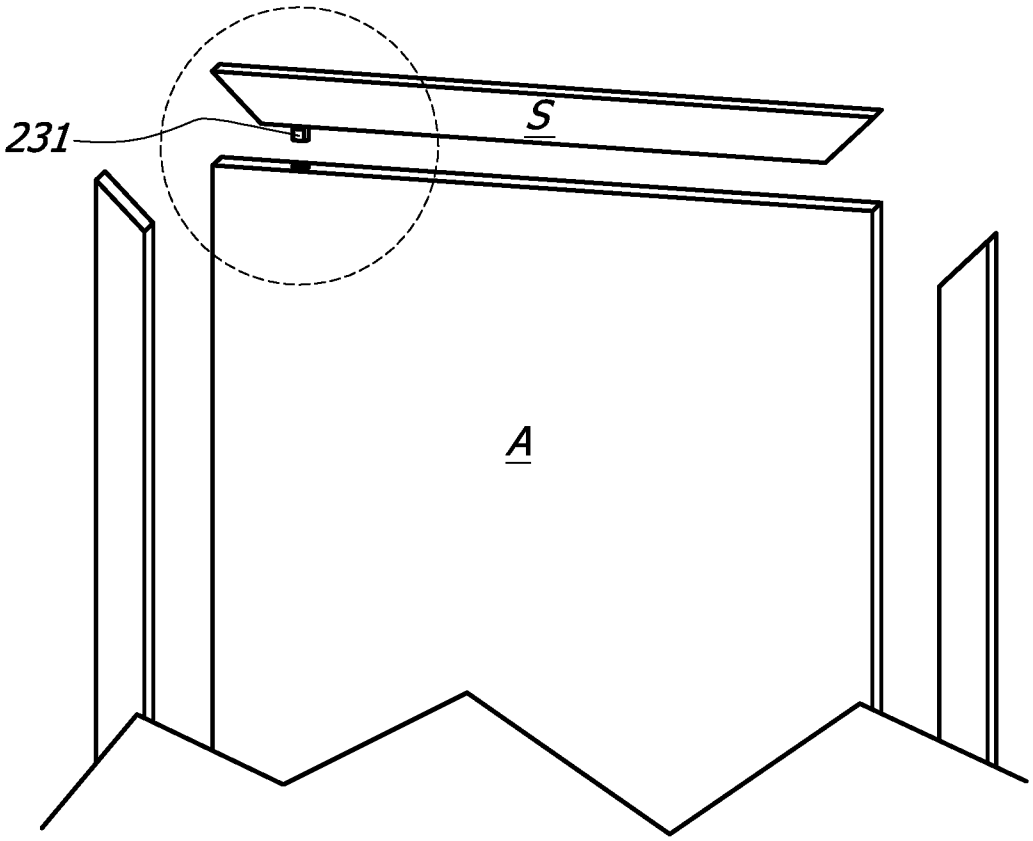


FIG. 4a

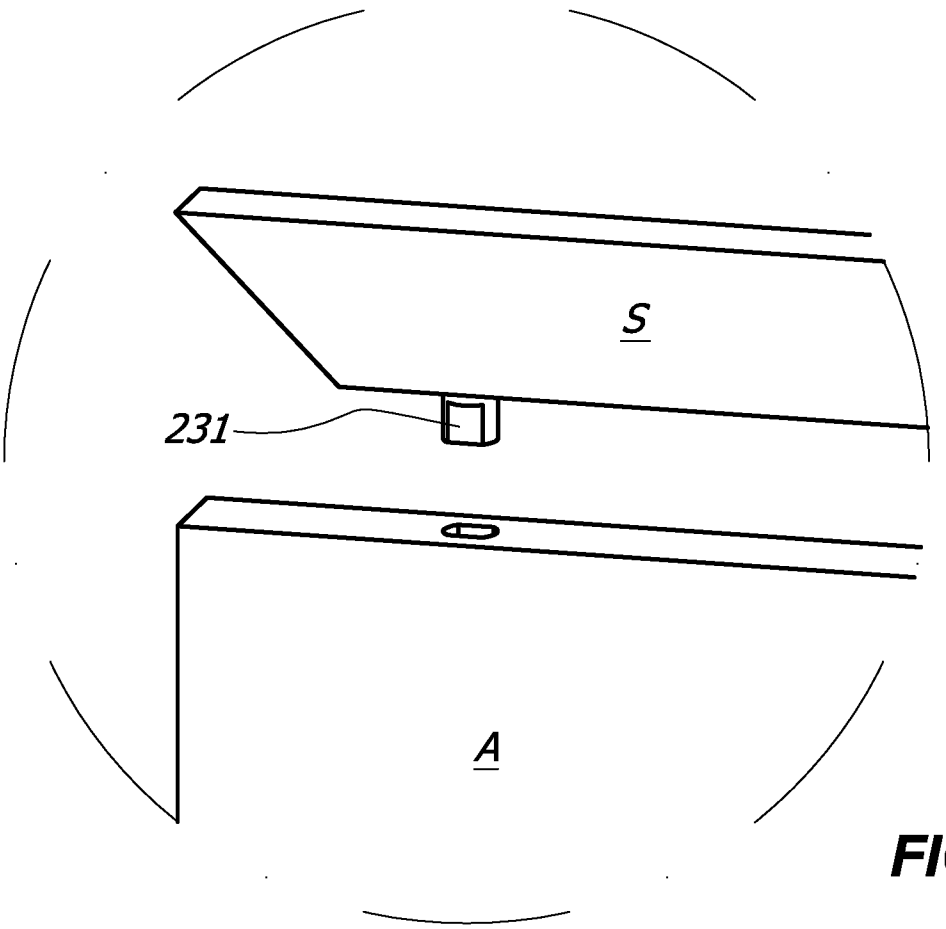


FIG. 4b

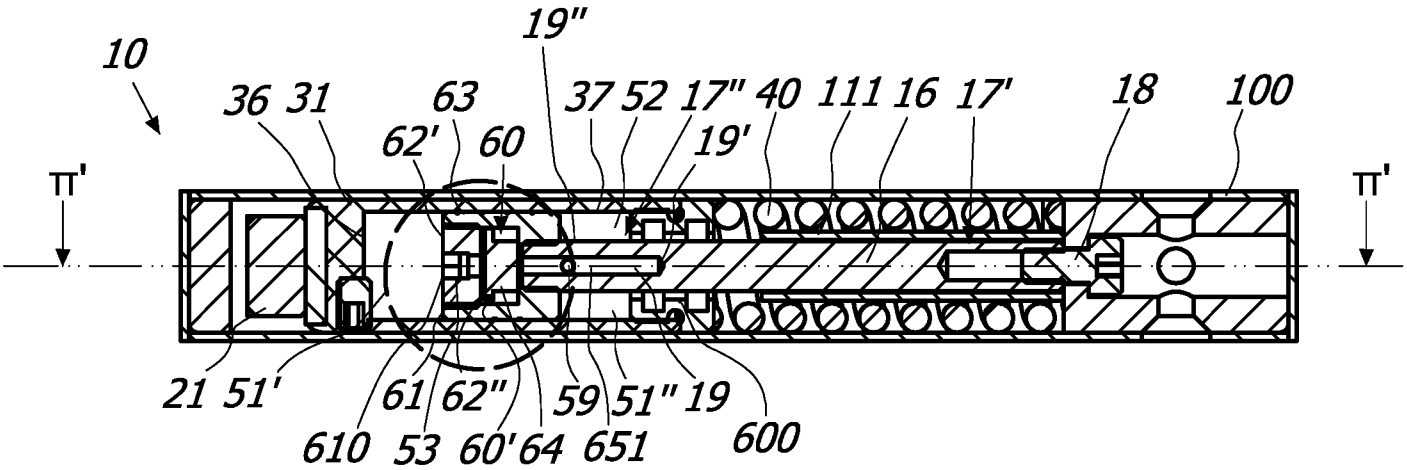

10
19"
36 31
63
37 52 17" 40 111 16 17'
18
100
62' 60
19'
TT'
TT'
21 51'
61 62"
59 51" 19
610 53 60' 64 651
600

FIG. 5a

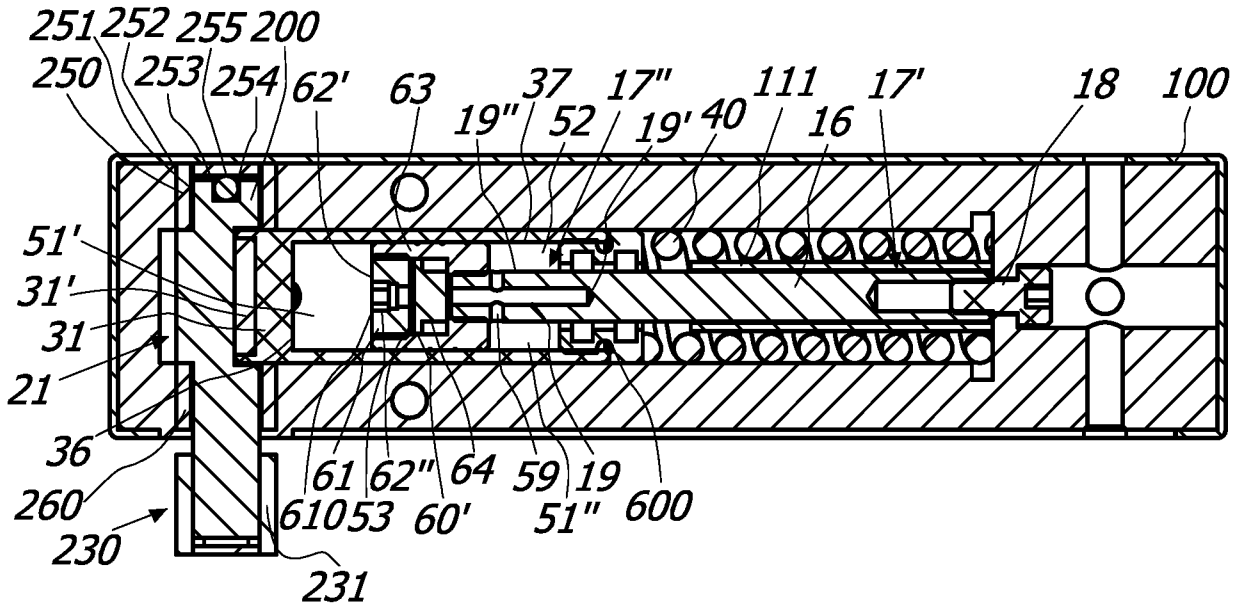

251 252 255 200
250 253 254 62'
63
37 17"
111
17'
18
100
19" 52 19' 40 16
51'
31'
31
21
36
260
230
231
61 62" 64 59 19
610 53 60' 51" 600

FIG. 5b

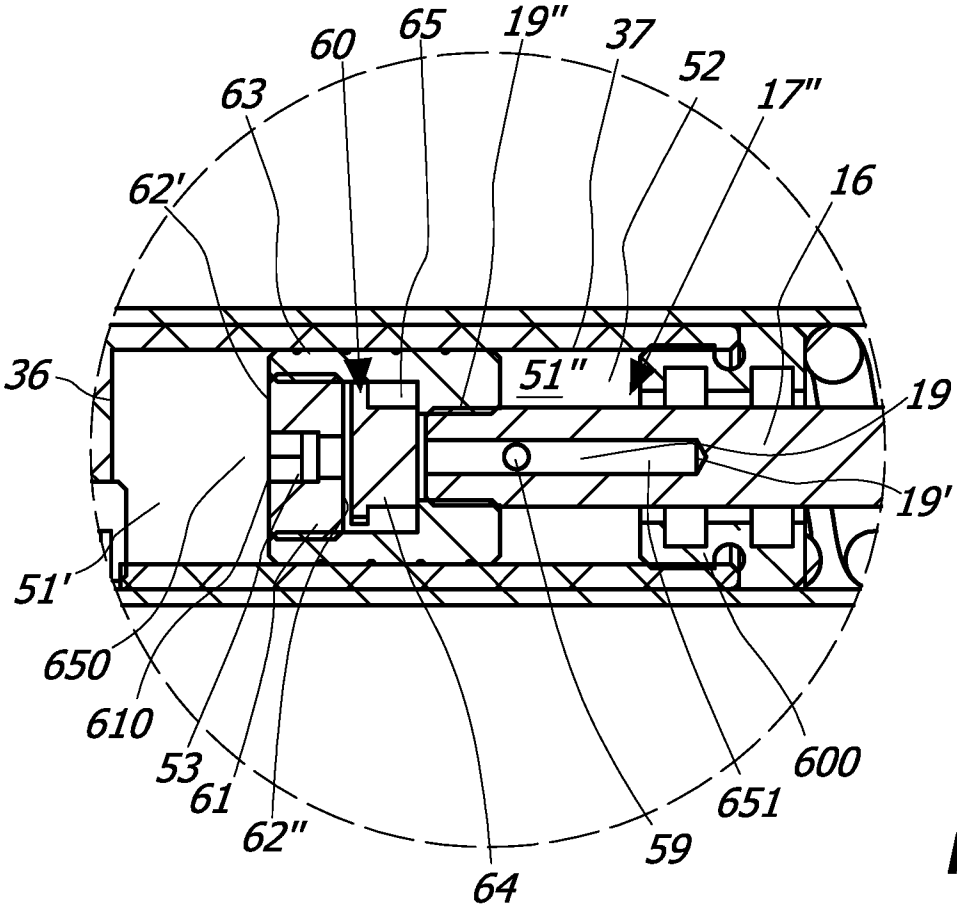

60
65
19"
37
52
17"
63
62'
16
36
51"
19
19'
51'
650
610
53
61
62"
64
59
651
600

FIG. 6a

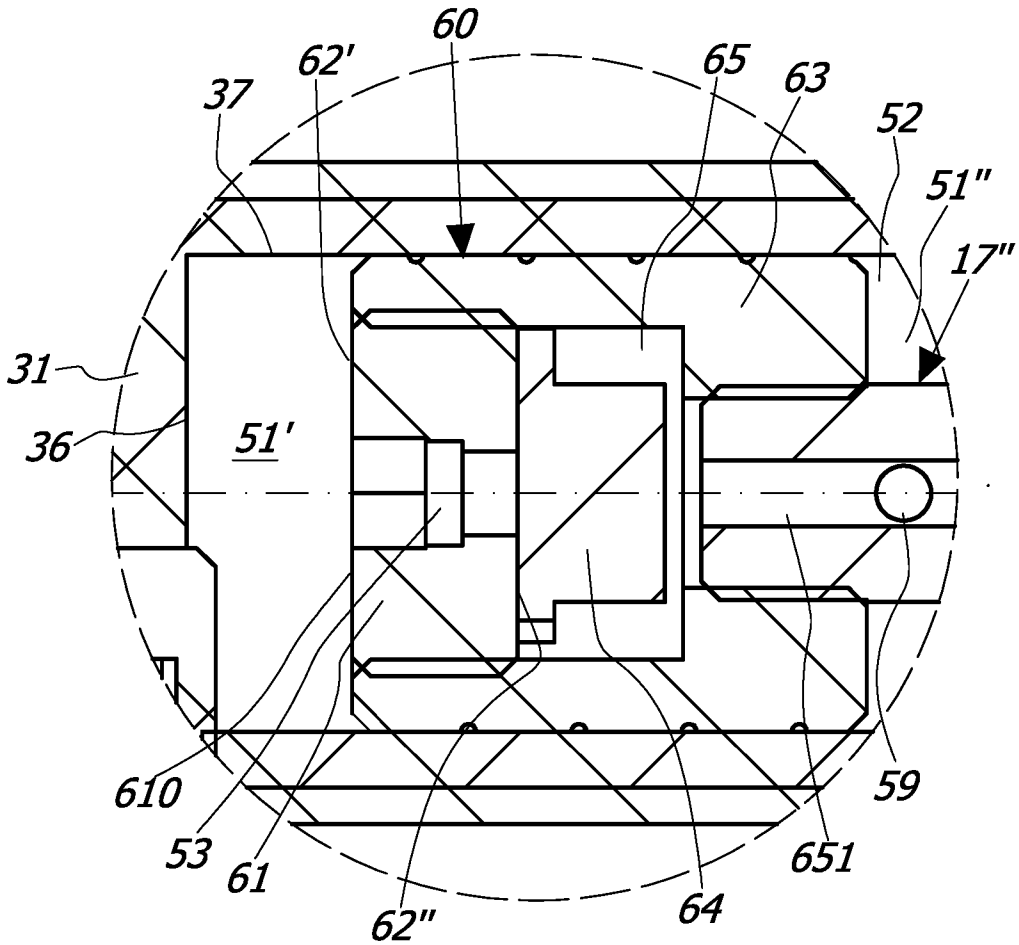

60
62'
65
63
37
52
51"
17"
31
36
51'
610
53
61
62"
64
651
59

FIG. 6b

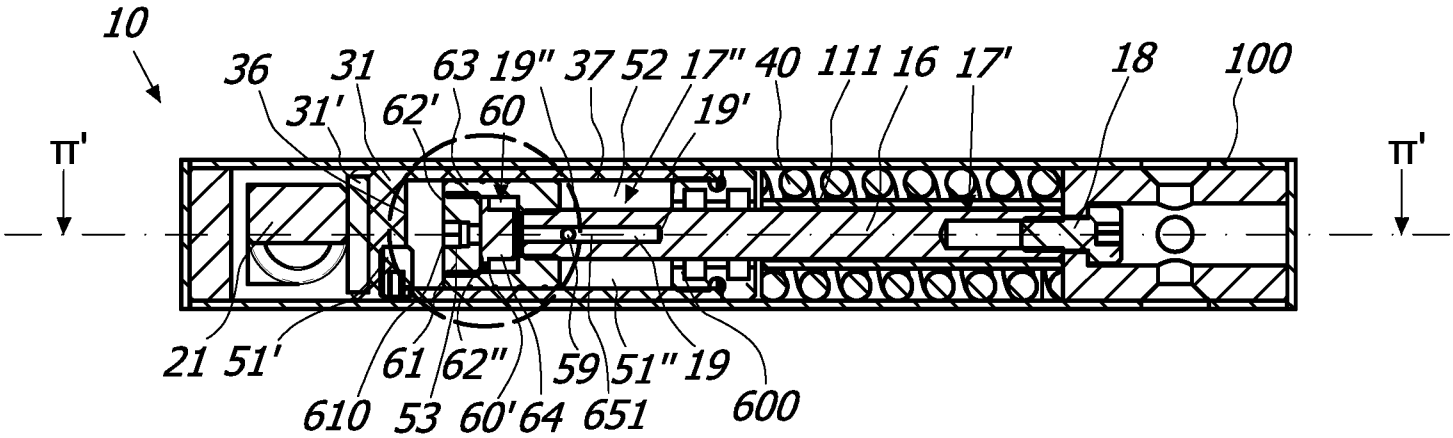

10
36
31
63
19"
37
52
17"
40
111
16
17'
18
100
31'
62'
60
19'
II'
II'
21
51'
61
62"
59
51"
19
610
53
60'
64
651
600

FIG. 7a

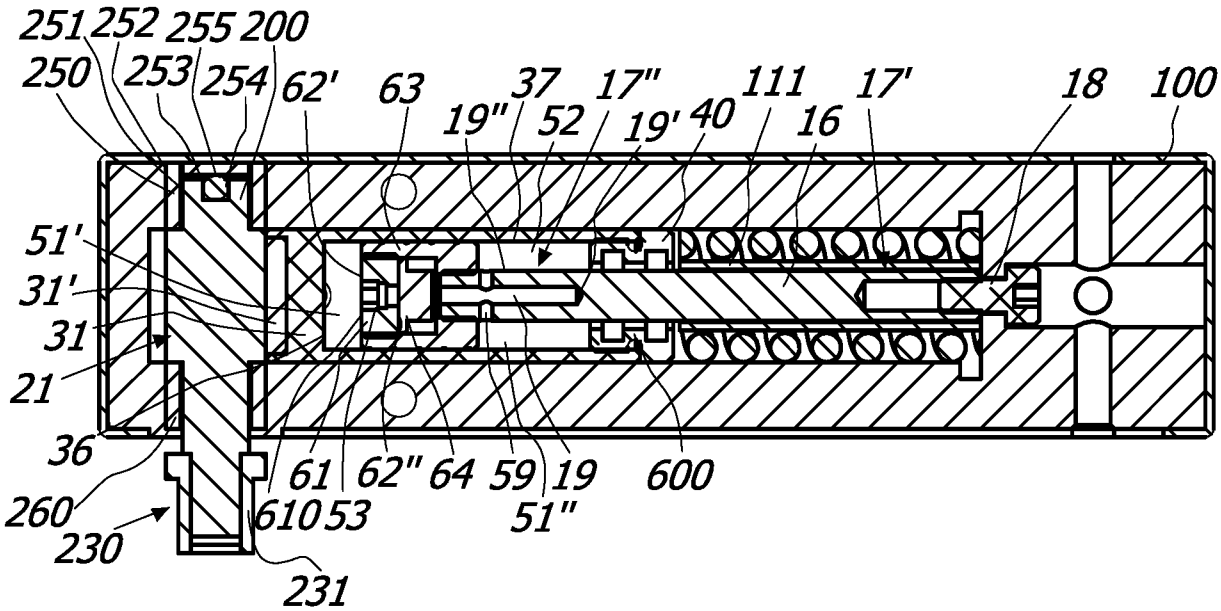

251
252
255
200
250
253
254
62'
63
37
17"
111
17'
18
100
19"
52
19'
40
16
51'
31'
31
21
36
260
230
231
61
62"
64
59
19
600
610
53
51"

FIG. 7b

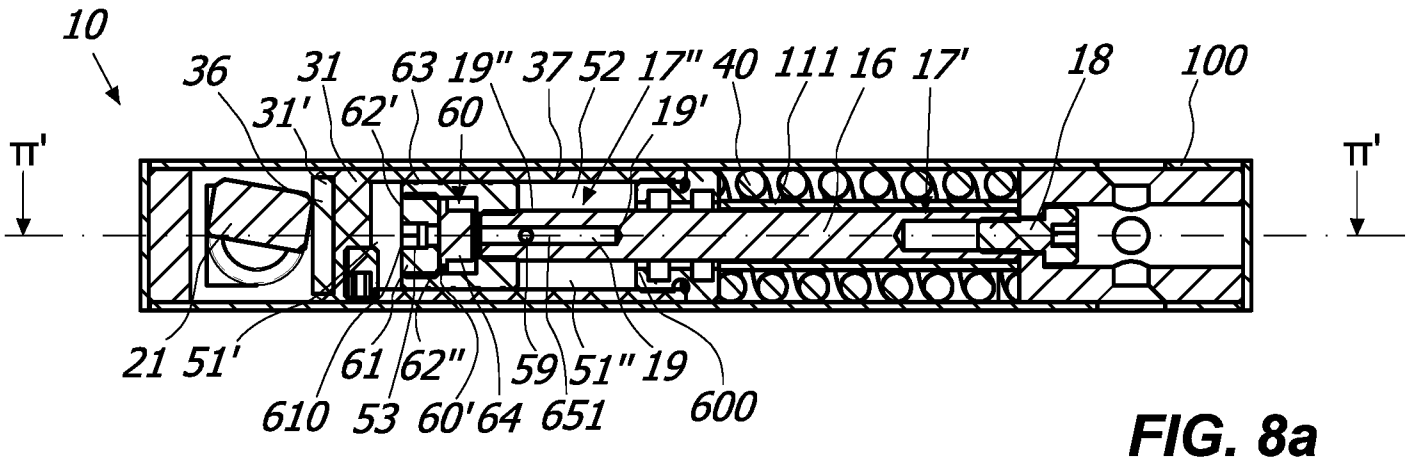

10
36
31
63
19"
37
52
17"
40
111
16
17'
18
100
31'
62'
60
19'
π'
π'
21
51'
61
62"
59
51"
19
610
53
60'
64
651
600

FIG. 8a

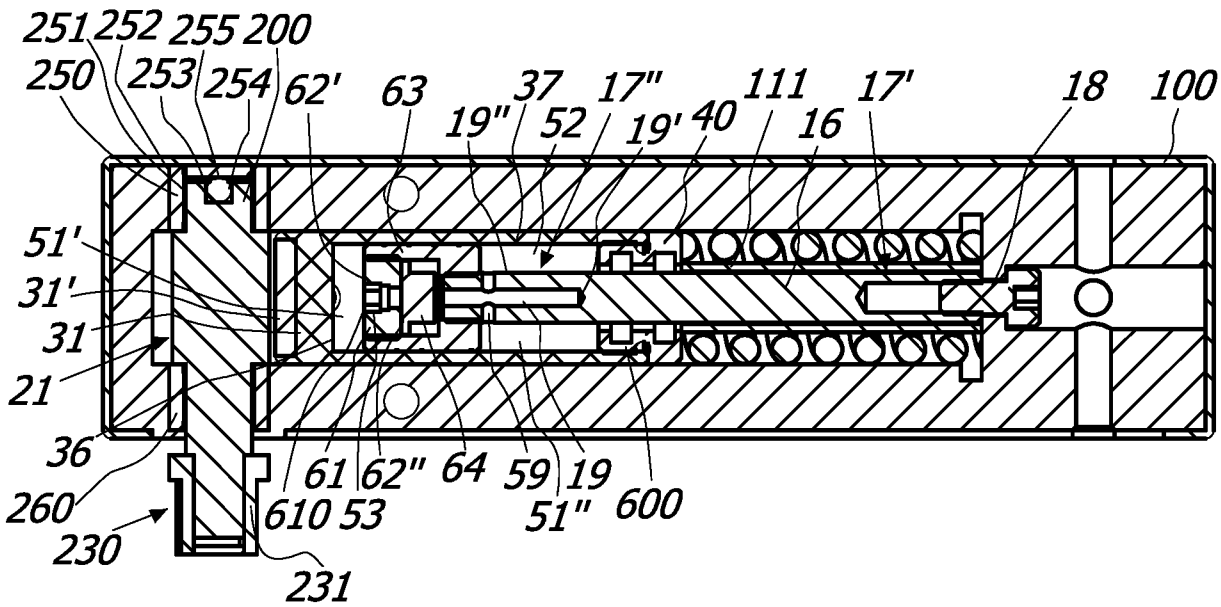

251
252
255
200
250
253
254
62'
63
19"
37
52
17"
19'
40
111
16
17'
18
100
51'
31'
31
21
36
260
230
231
610
53
61
62"
64
59
19
51"
600

FIG. 8b

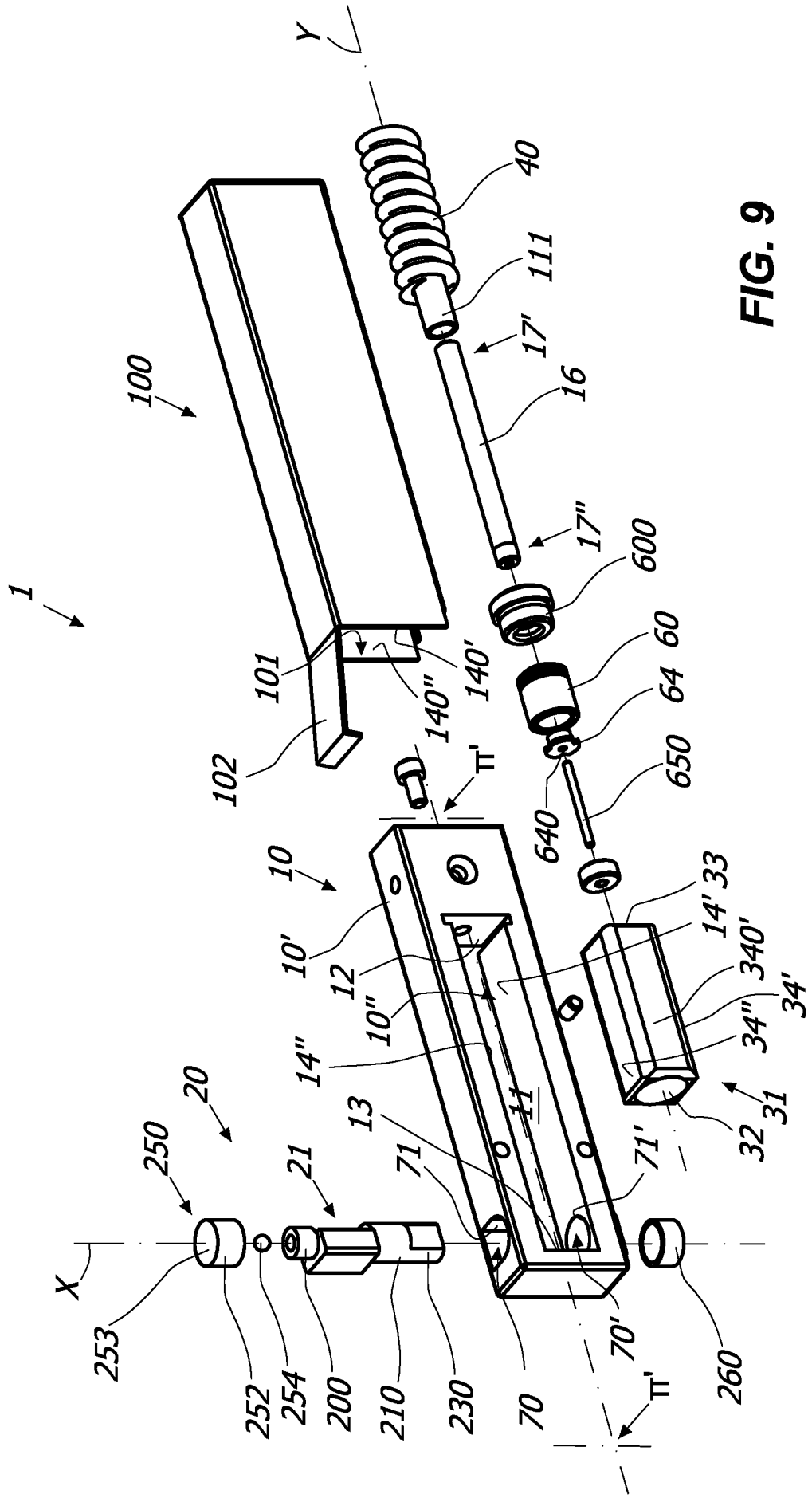

Y
40
111
17'
16
100
17"
600
60
64
650
640
1
101
140'
140"
102
π'
10
10'
12
10"
14"
14' 33
340'
34'
34"
31
32
20
250
21
13
11
71
71'
X
253
252
254
200
210
230
70
70'
π'
260

FIG. 9

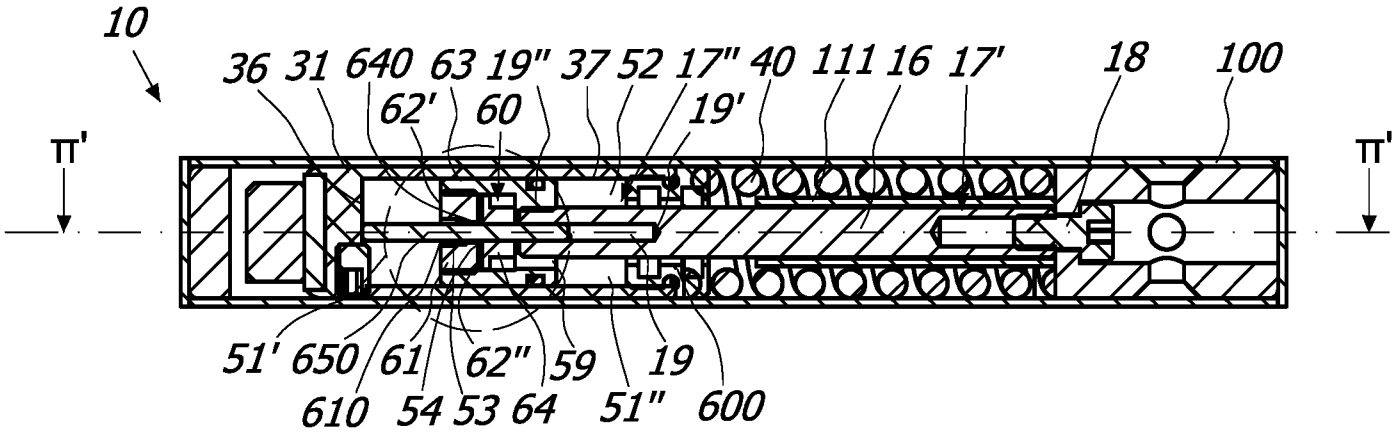

10
36 31 640 63 19" 37 52 17" 40 111 16 17' 18 100
62' 60 19'
π'
π'
51' 650 61 62" 59 19
610 54 53 64 51" 600

FIG. 10

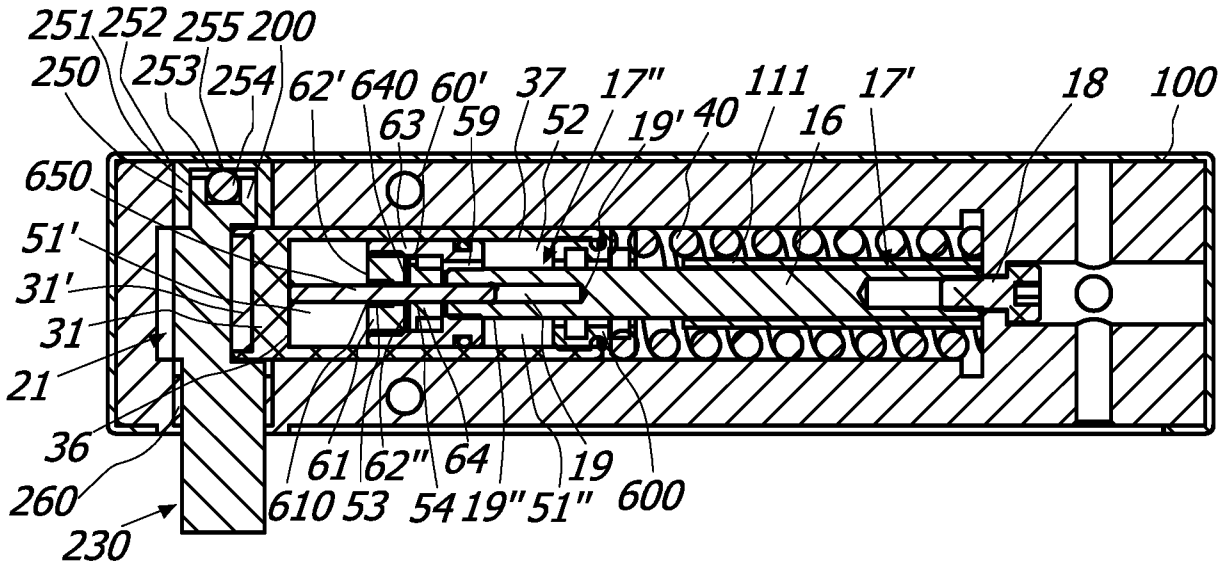

251 252 255 200
250 253 254 62' 640 60' 37 17" 111 17' 18 100
63 59 52 19' 40 16
650
51'
31'
31
21
36
260
230
61 62" 64 19
610 53 54 19" 51" 600

FIG. 11

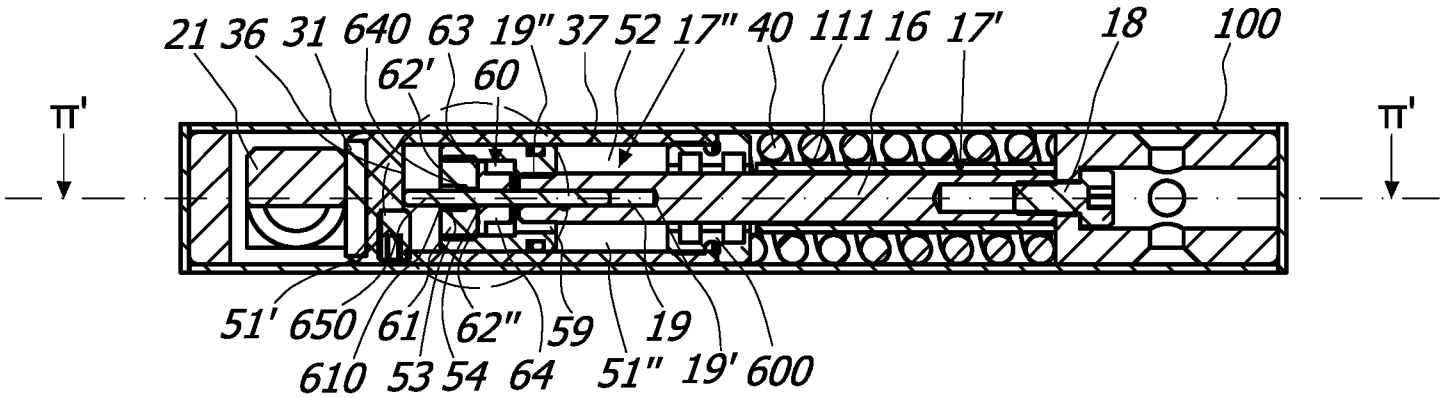


FIG. 12a

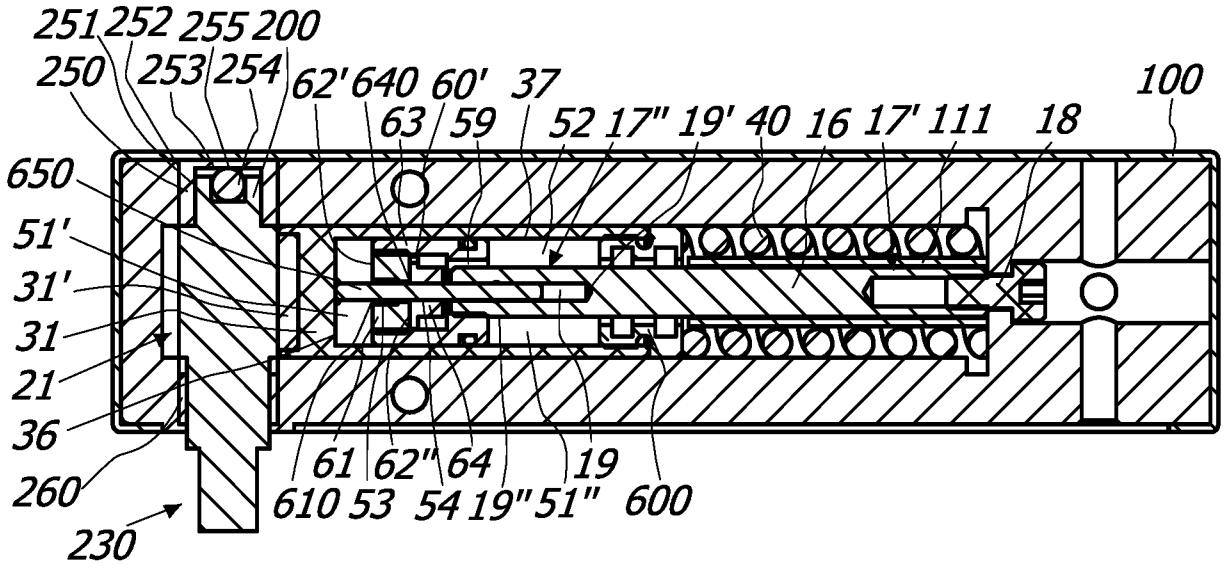


FIG. 12b

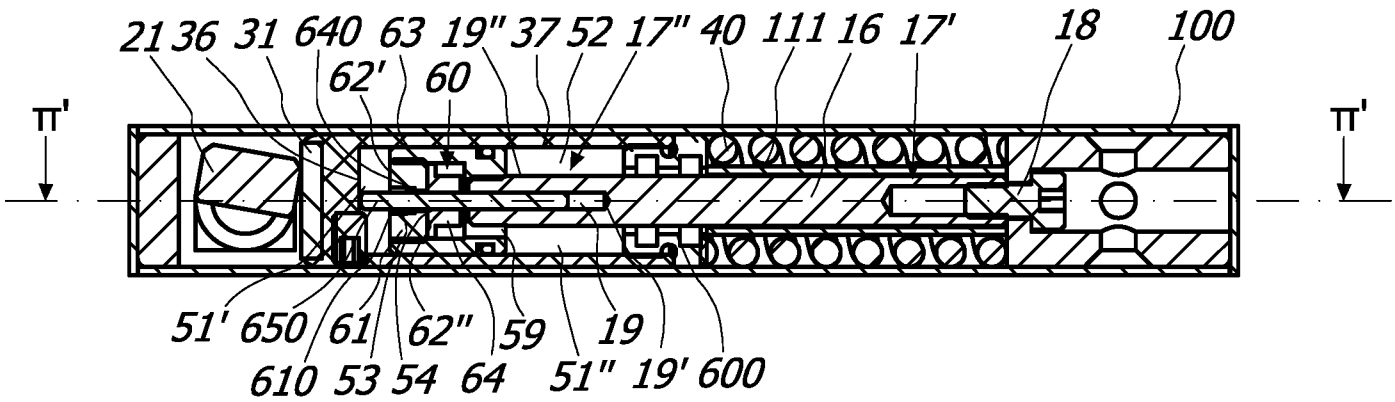


FIG. 13a

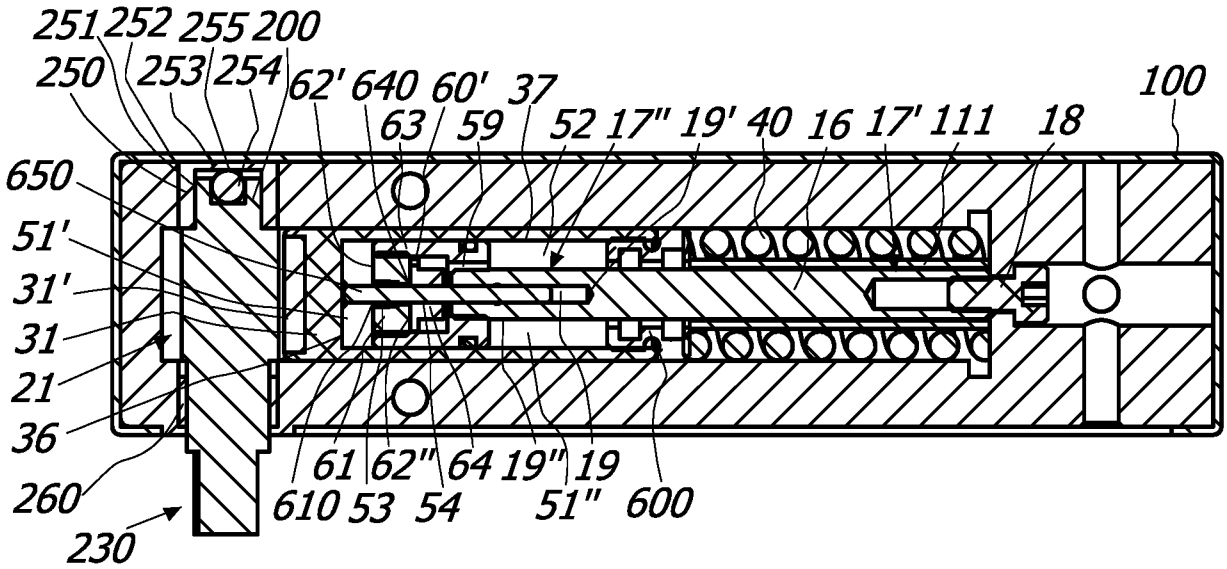


FIG. 13b

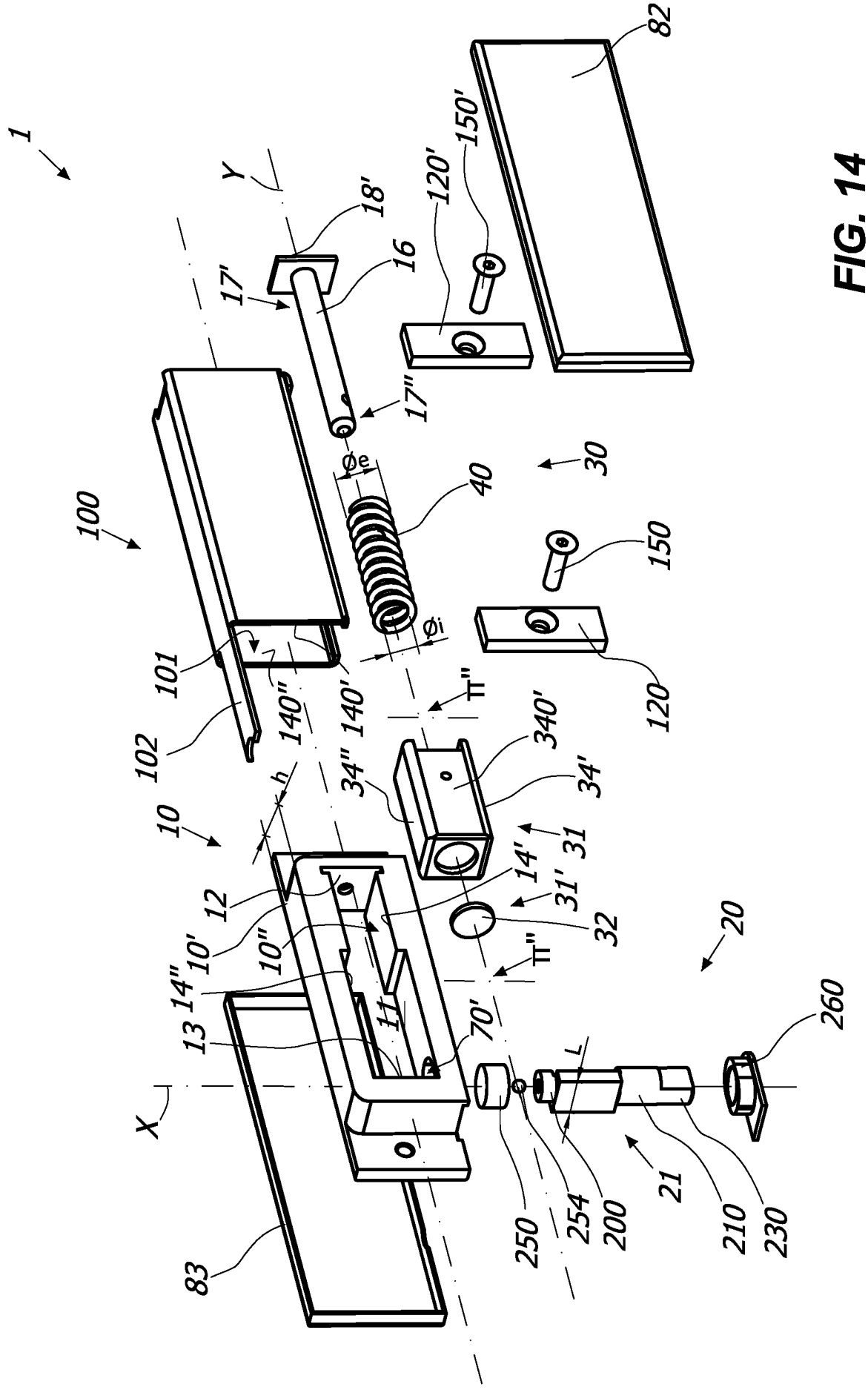

1
Y
18'
16
17'
17"
120'
150'
82
Øe
40
30
100
150
Øi
101
102
140"
140'
π"
340'
34"
34'
120
10
h
12
14'
31
31'
32
10'
10"
14"
11
13
70'
20
260
L
X
83
250
254
200
21
210
230

FIG. 14

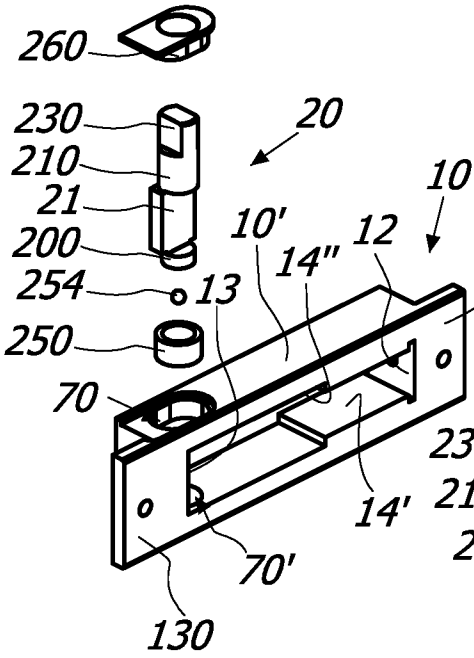


FIG. 15a

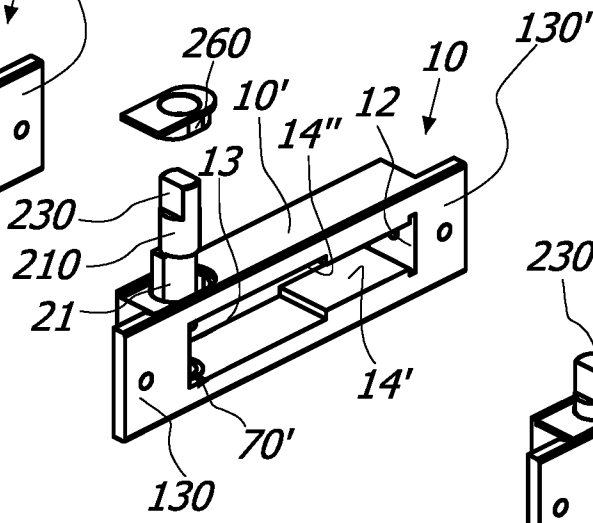


FIG. 15b

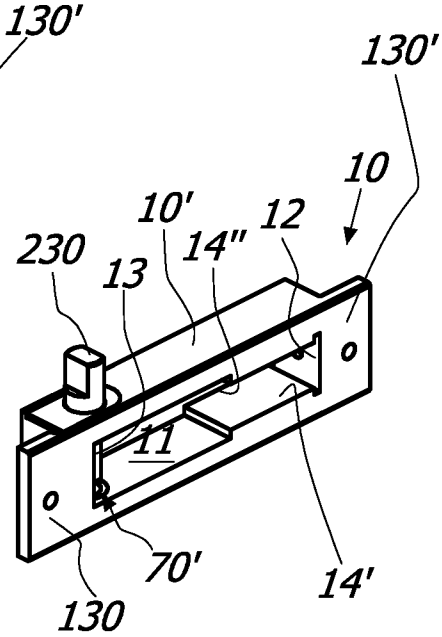


FIG. 15d

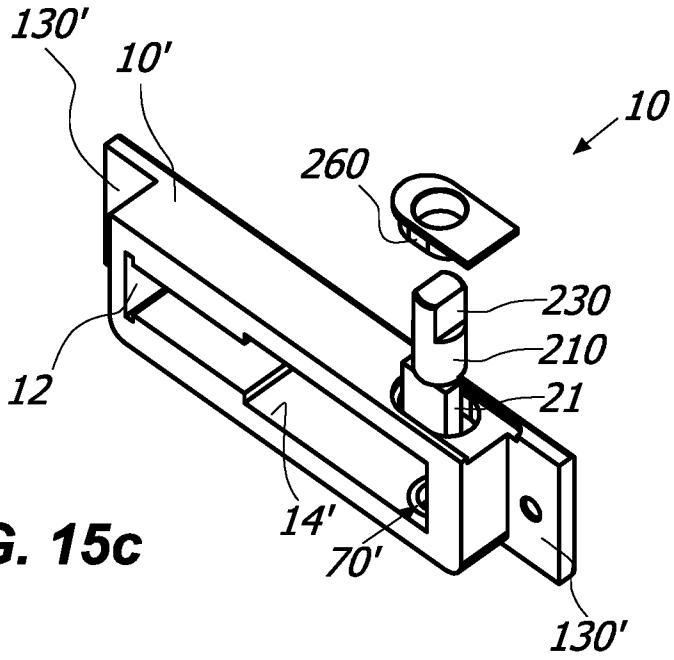


FIG. 15c

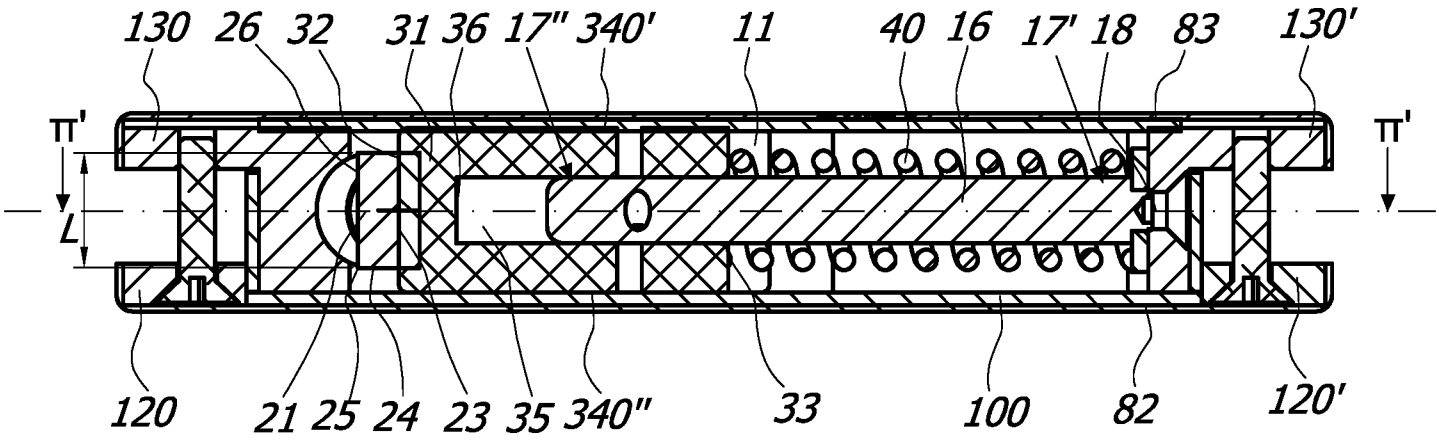


FIG. 16a

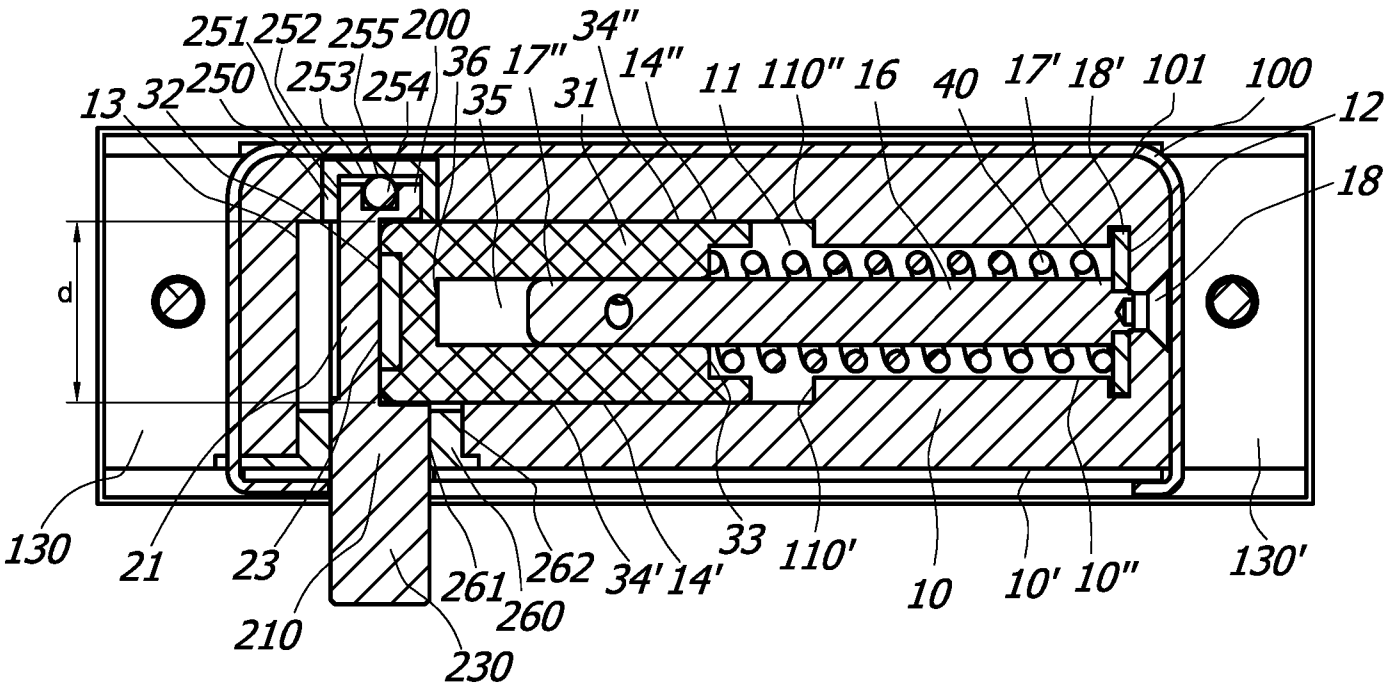


FIG. 16b

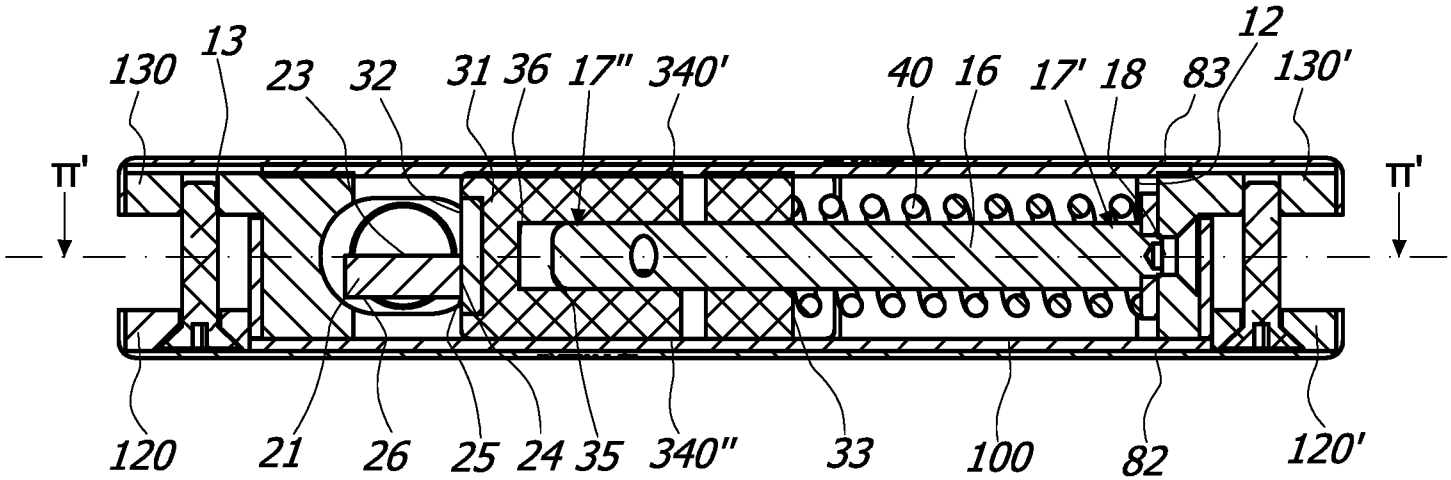


FIG. 17a

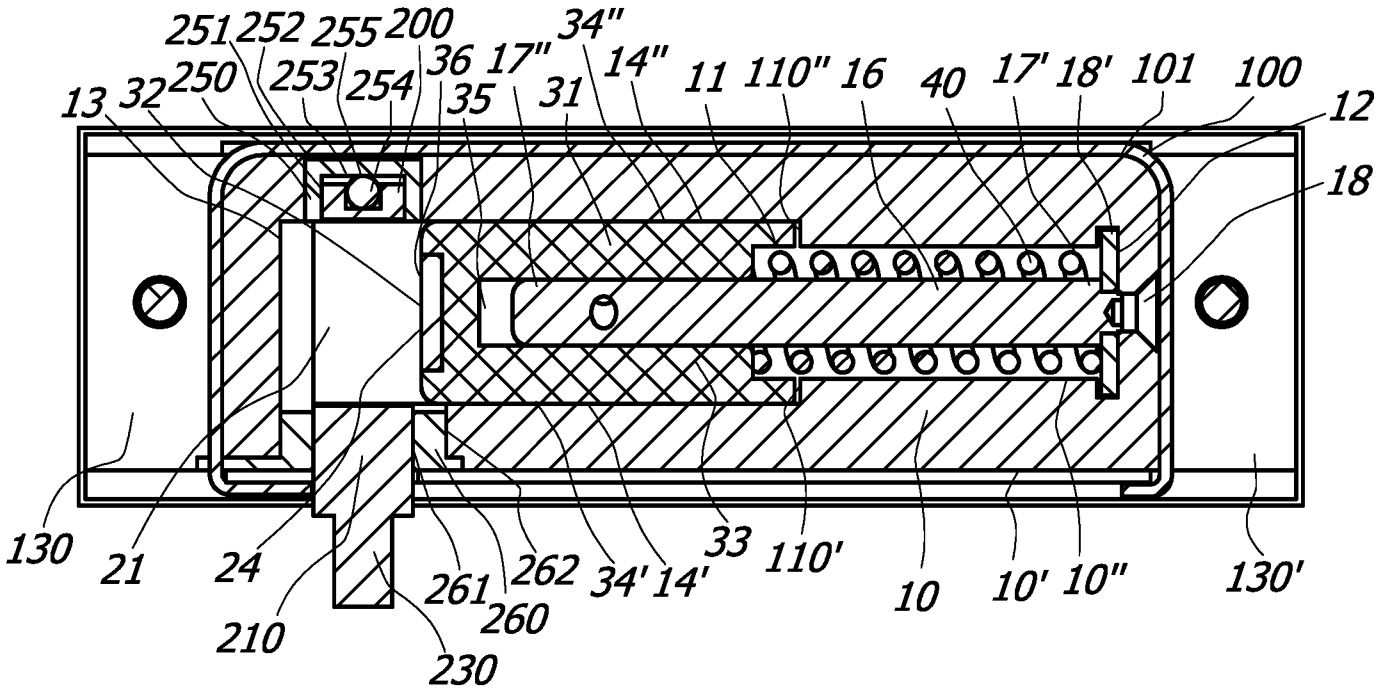


FIG. 17b

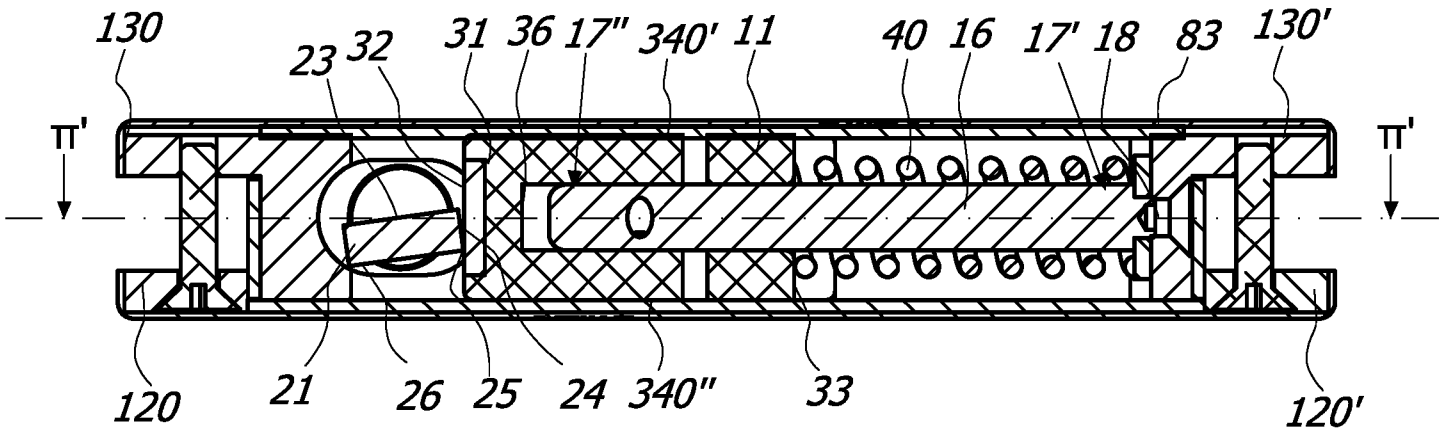


FIG. 18a

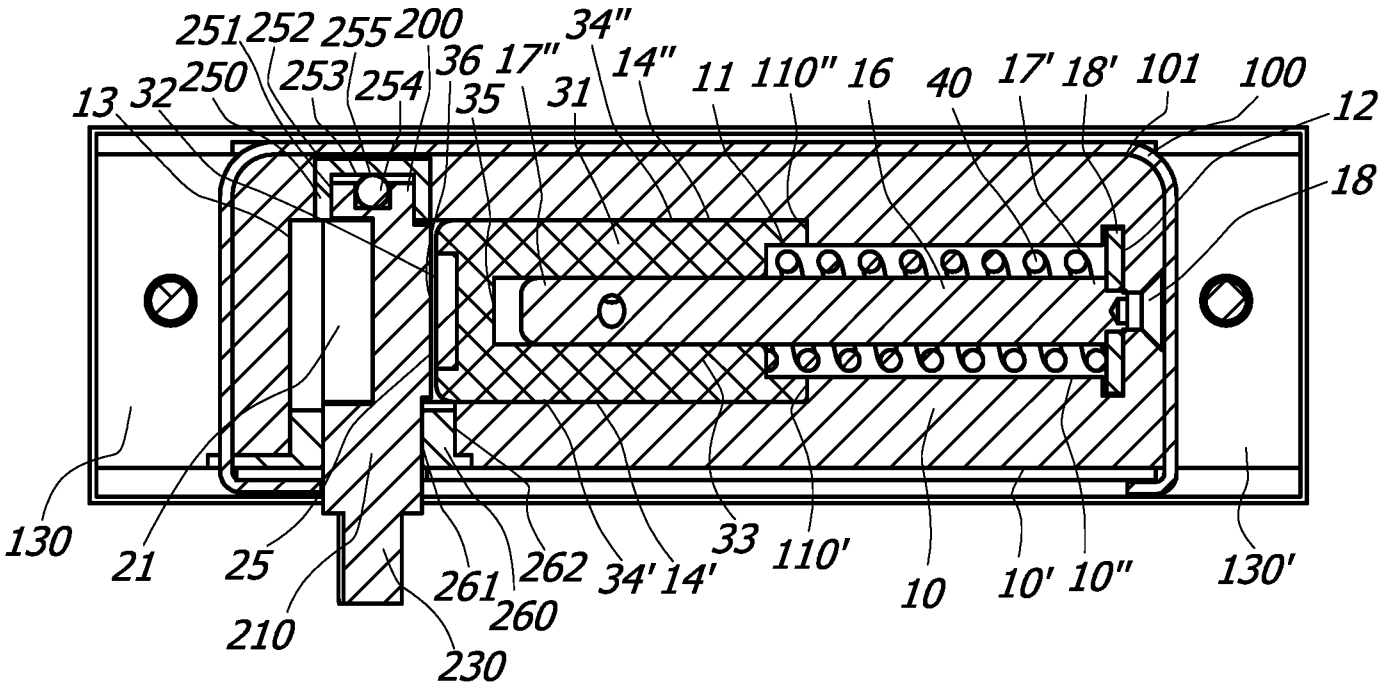


FIG. 18b

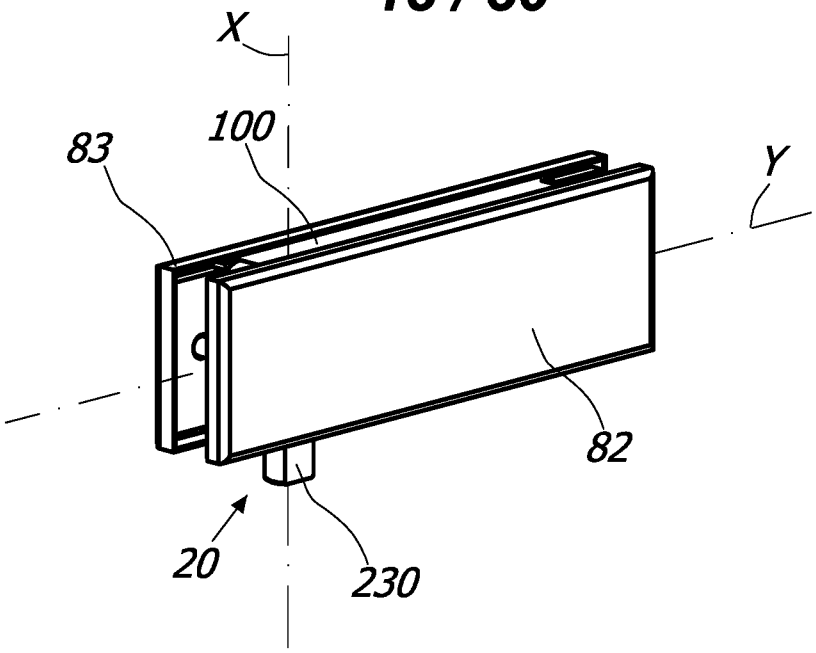


FIG. 19

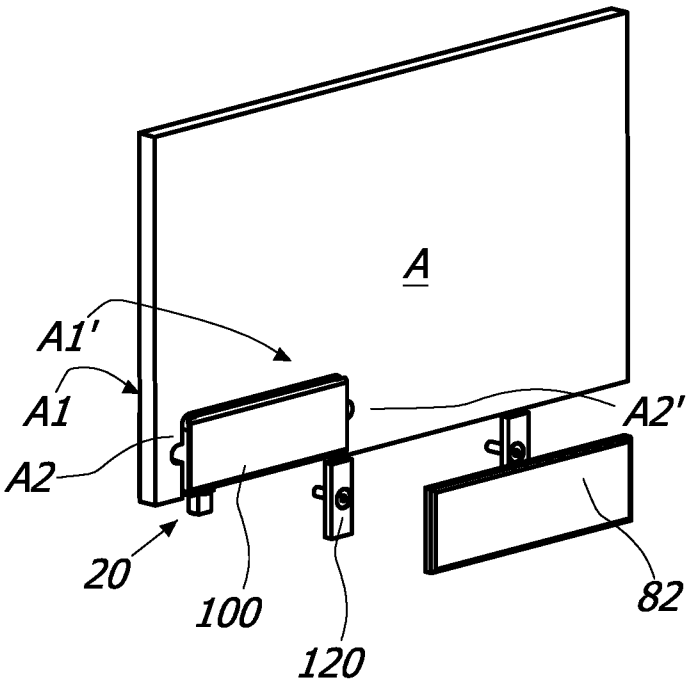


FIG. 20

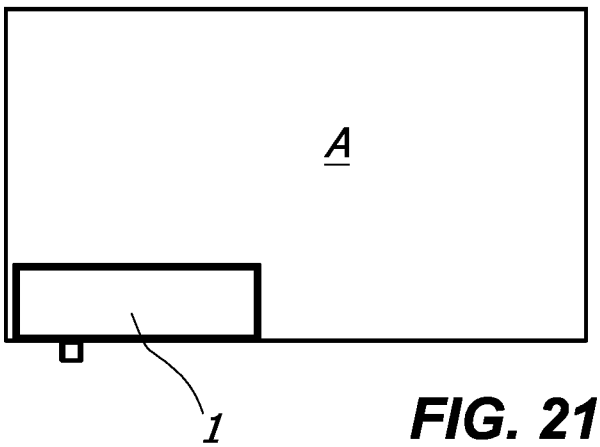


FIG. 21a

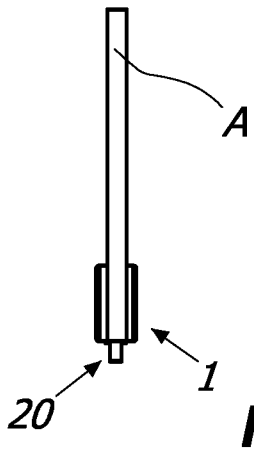


FIG. 21b

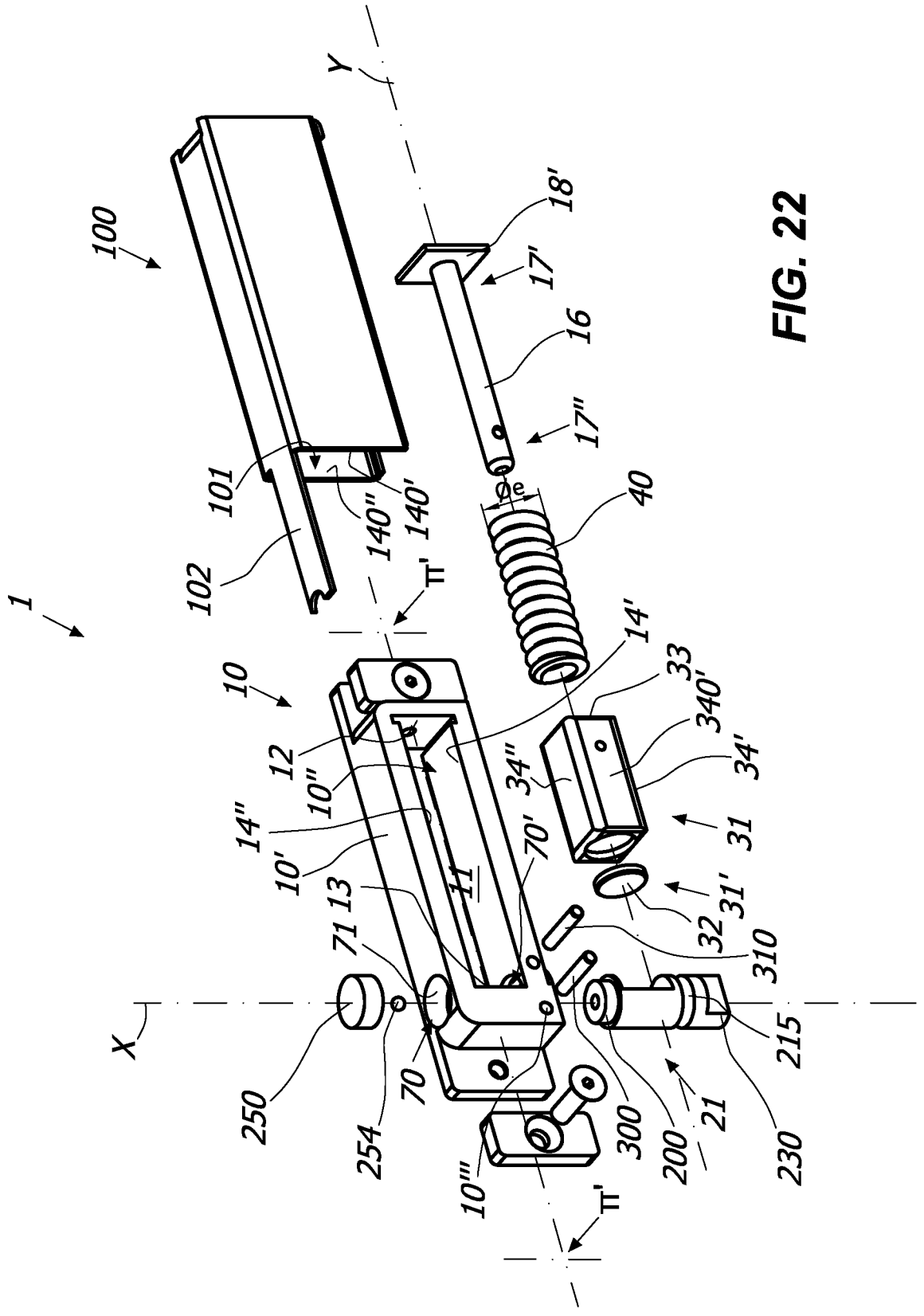

Y
X
100
18'
17'
16
17"
101
102
140"
140'
Π'
1
10
40
14'
33
340'
34'
12
10"
34"
14"
10'
70'
11
13
31
31'
71
32
310
215
250
254
70
300
200
21
230
10"'
Π'

FIG. 22

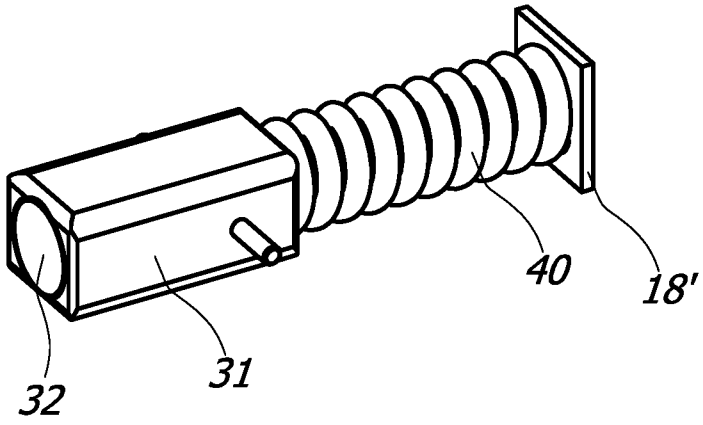


FIG. 23a

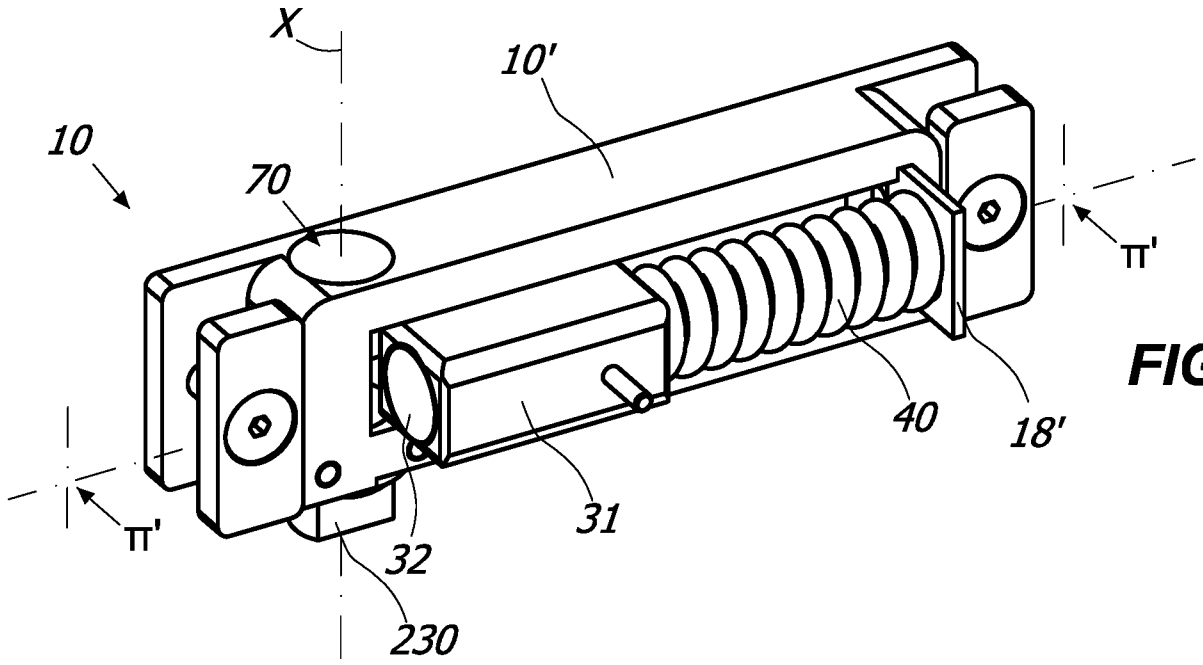


FIG. 23b

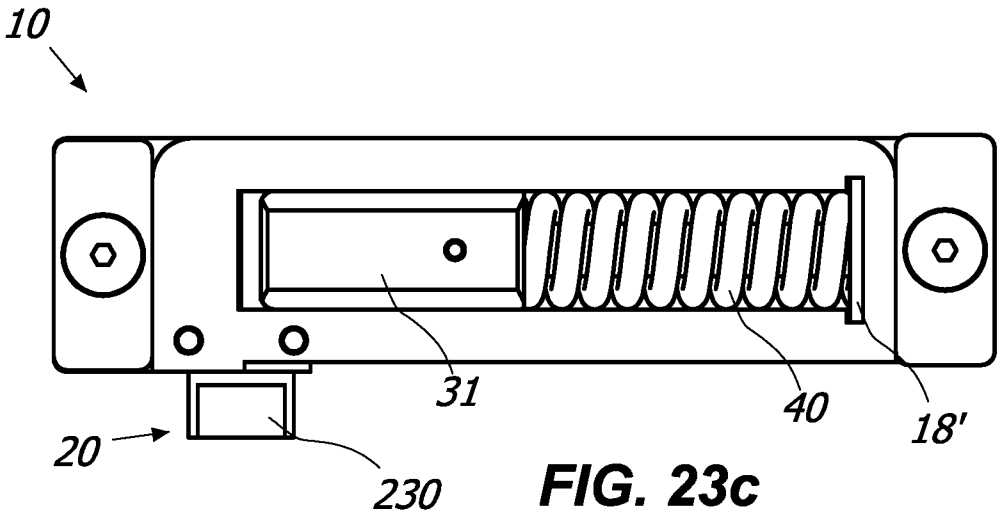


FIG. 23c

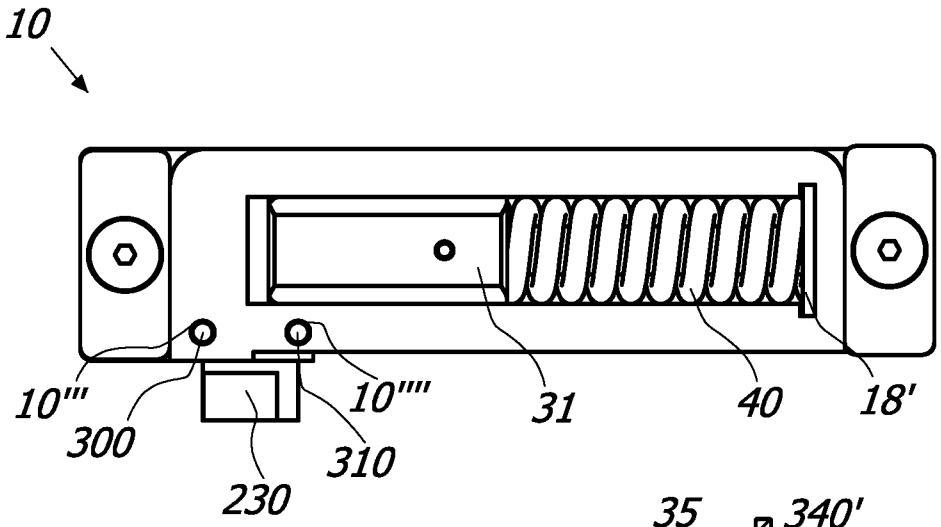


FIG. 23d

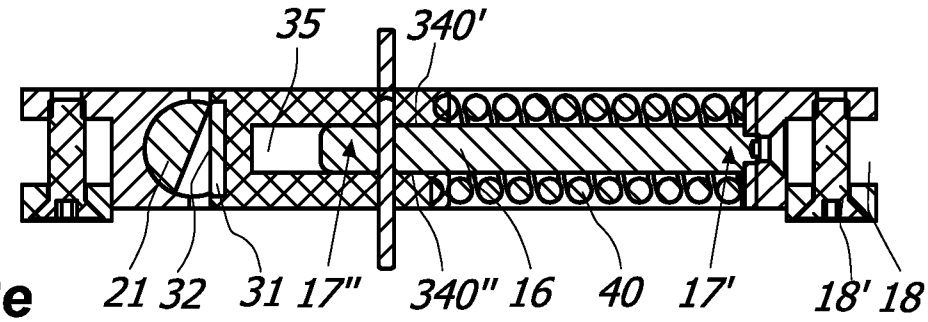


FIG. 23e

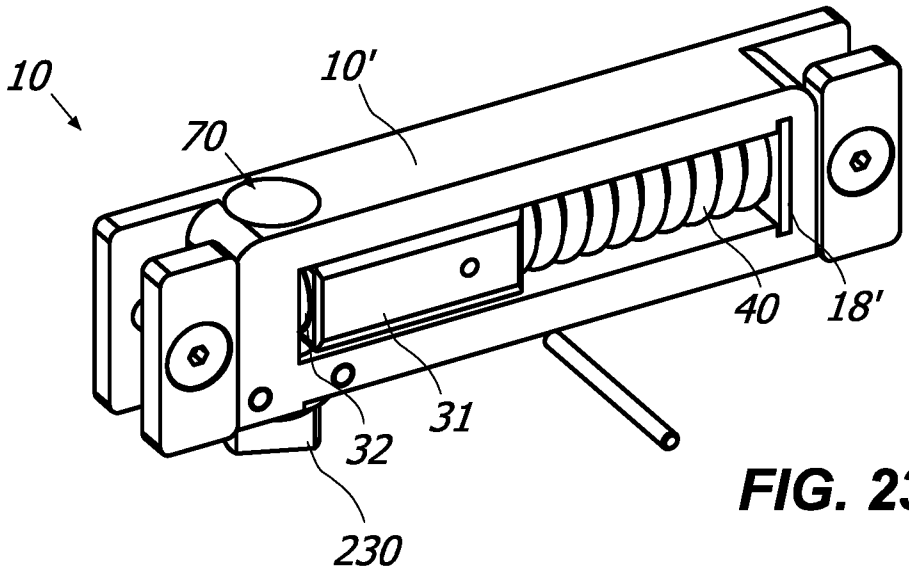


FIG. 23f

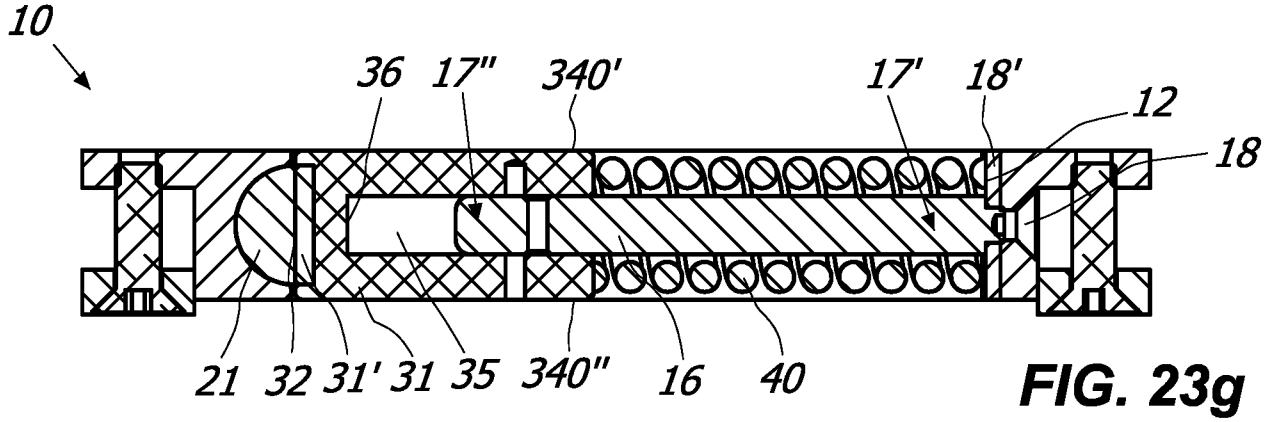


FIG. 23g

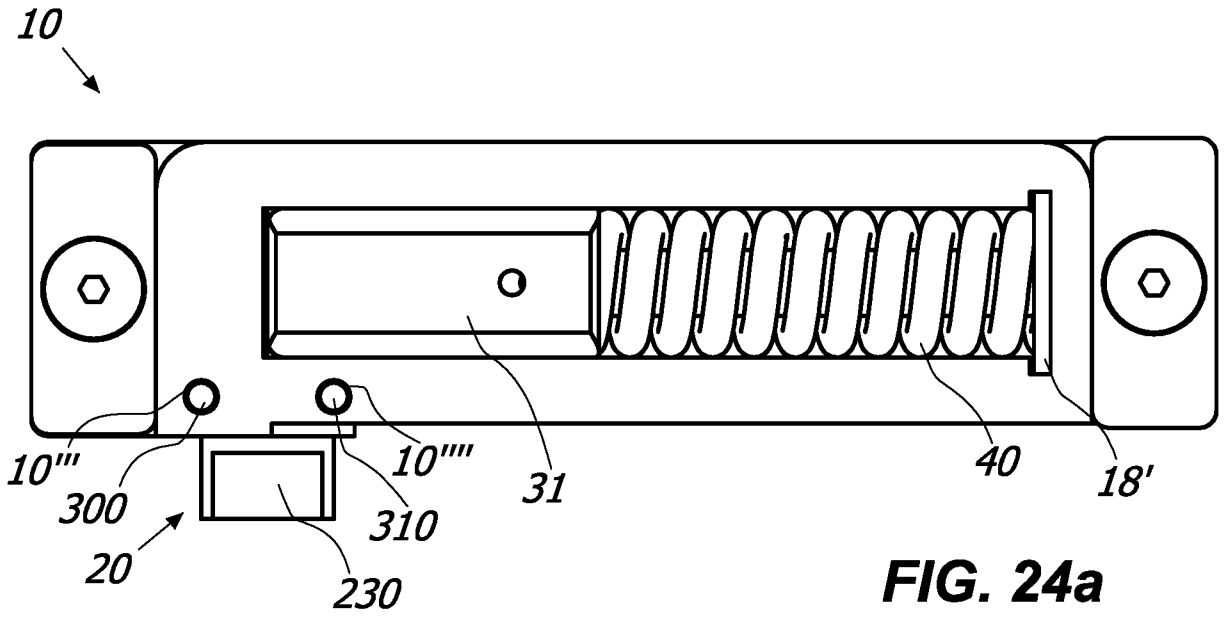


FIG. 24a

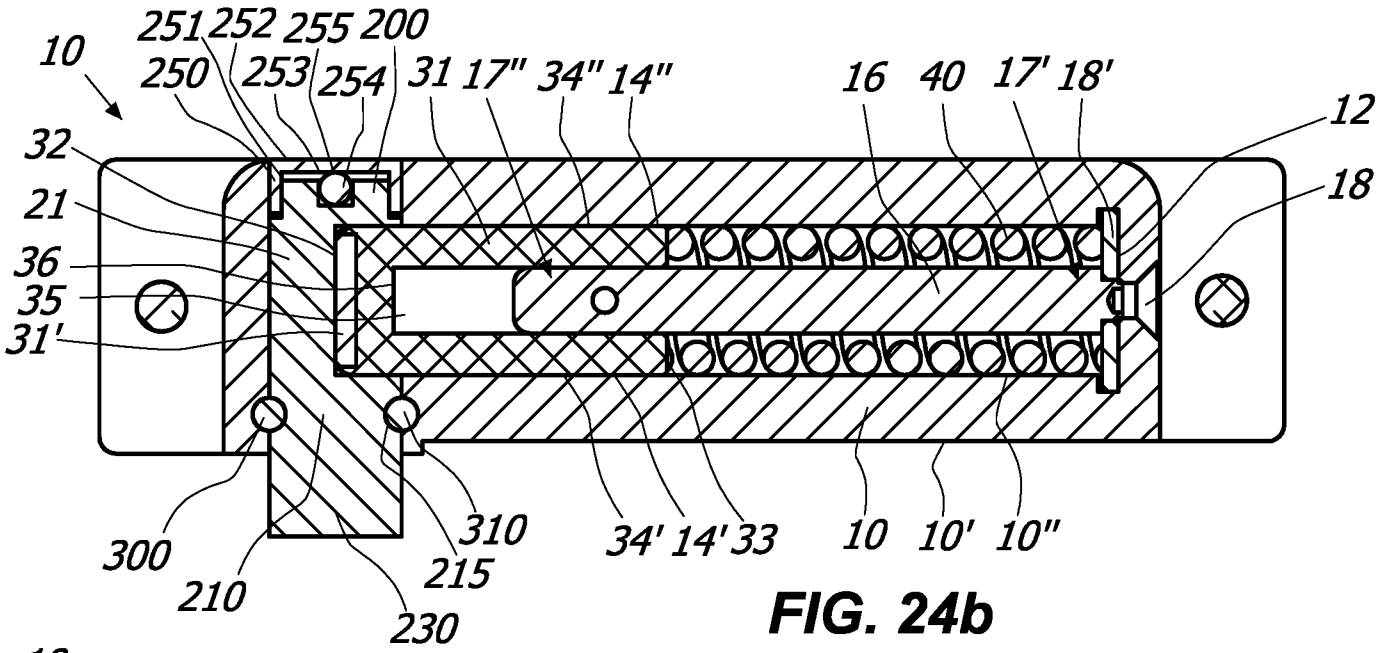


FIG. 24b

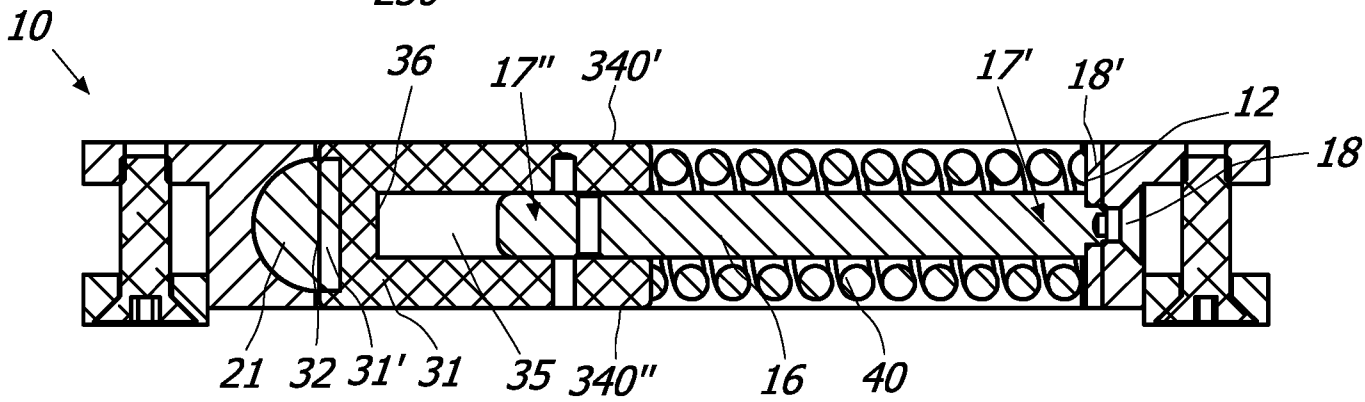


FIG. 24c

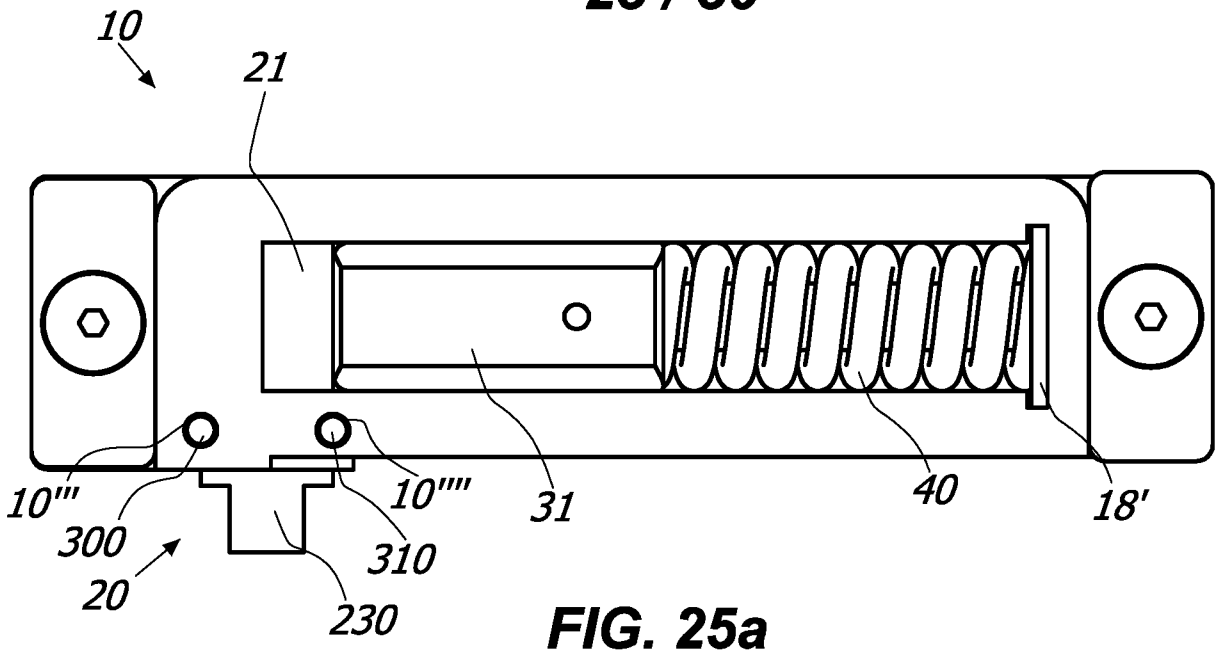


FIG. 25a

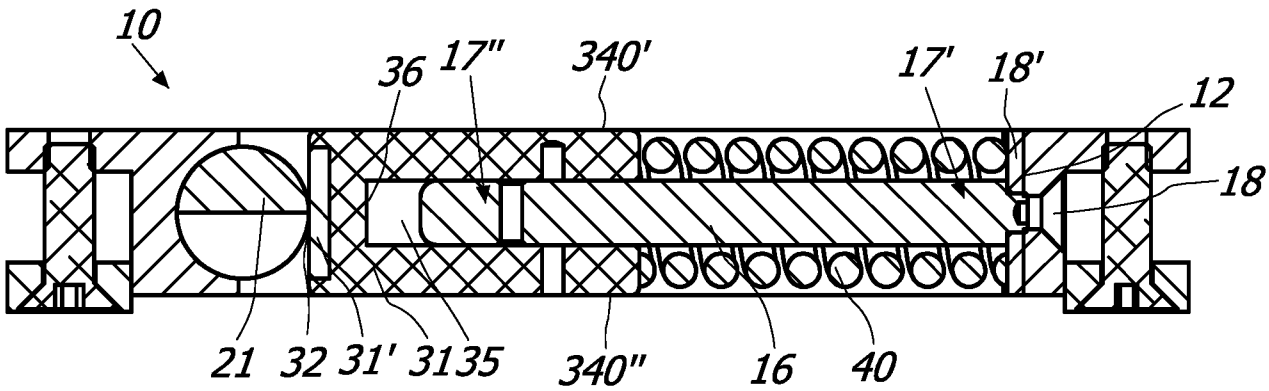


FIG. 25b

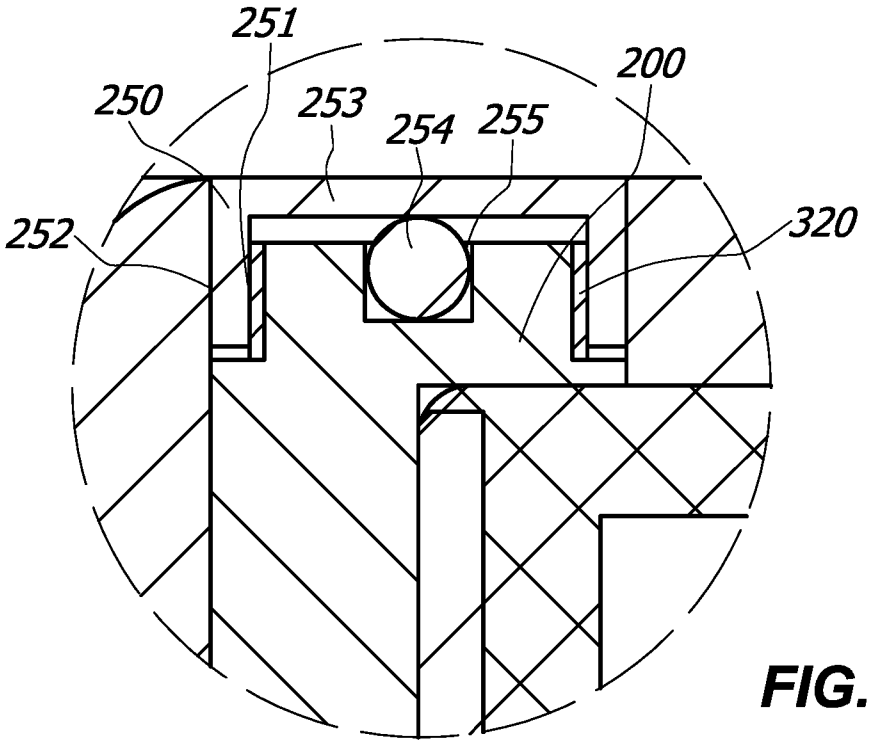


FIG. 25c

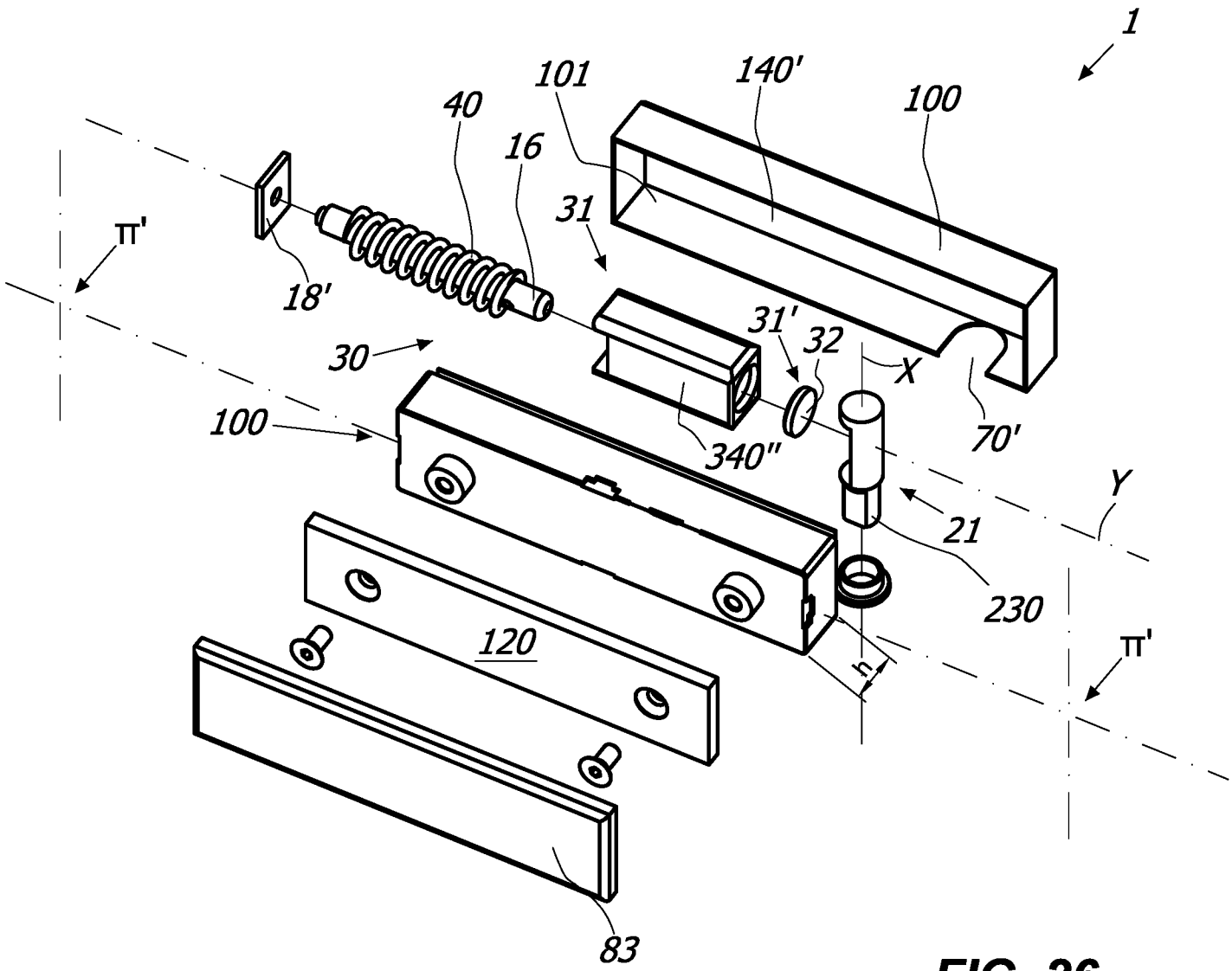


FIG. 26

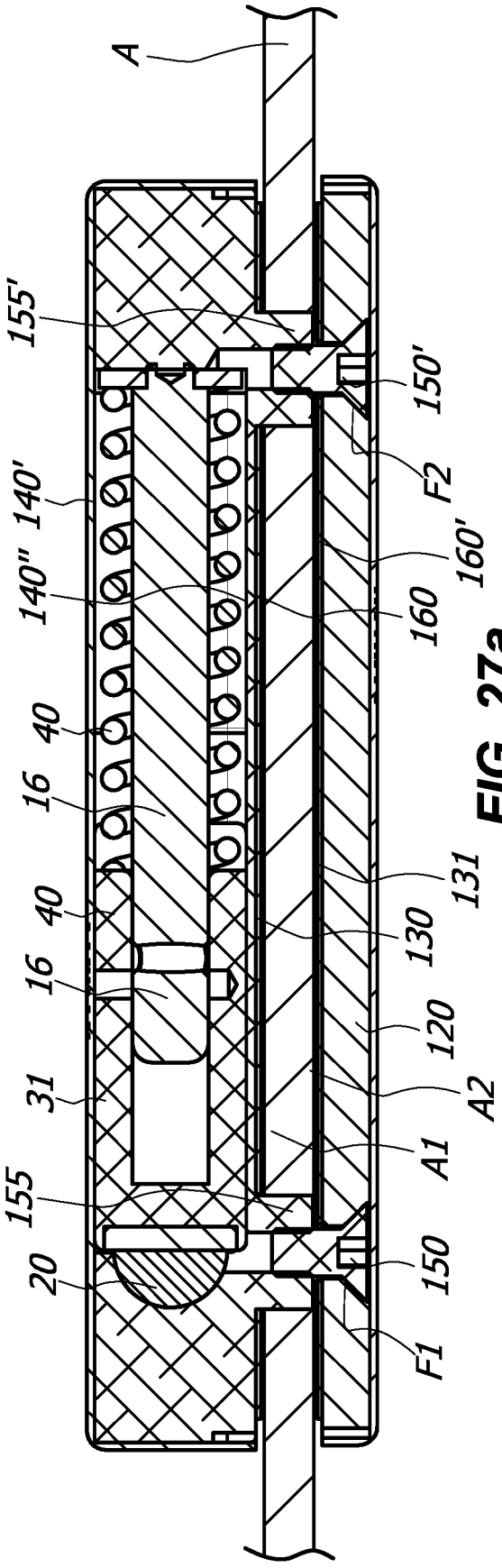


FIG. 27a

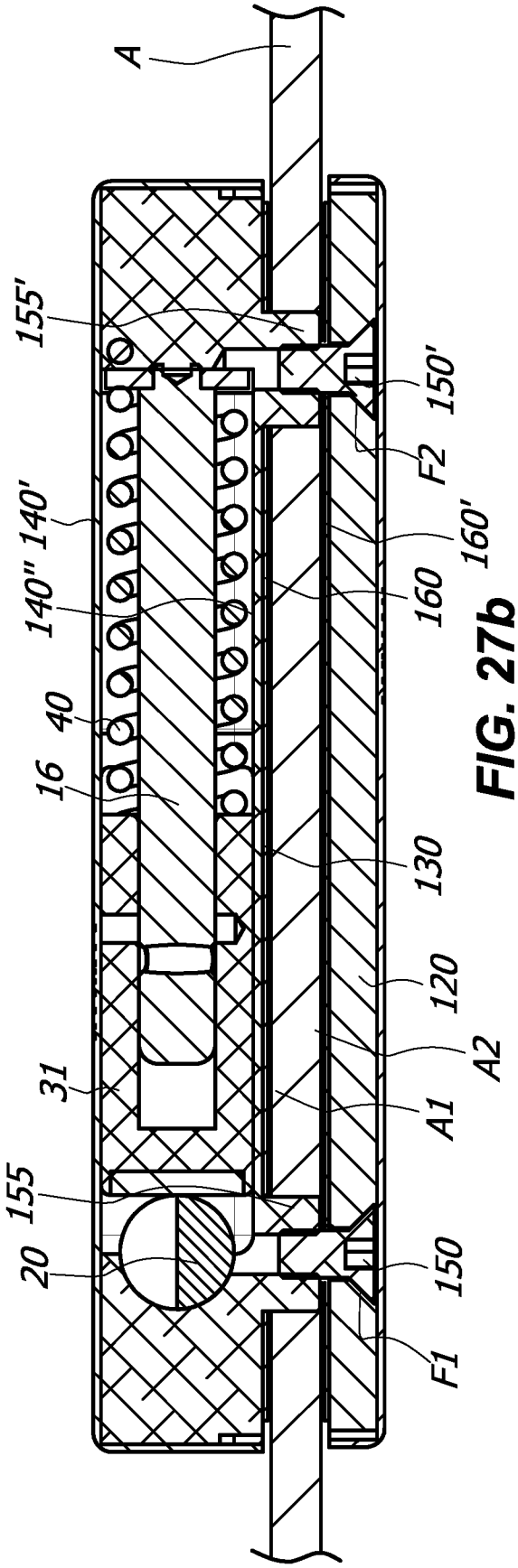


FIG. 27b

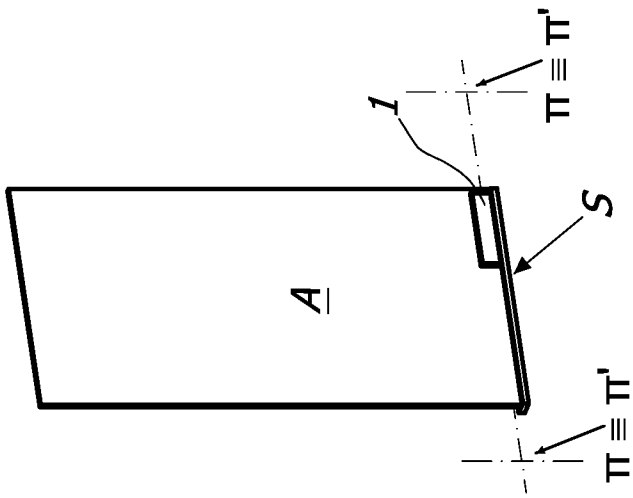


FIG. 29a

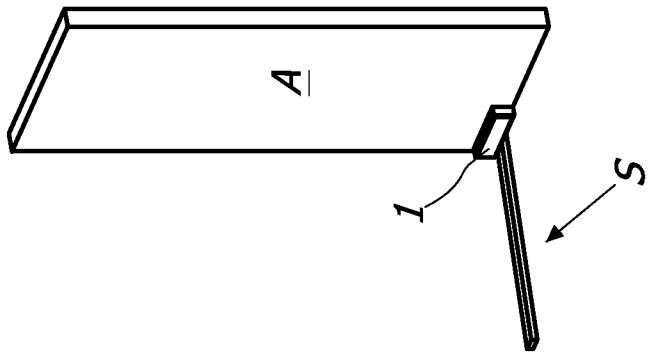


FIG. 29b

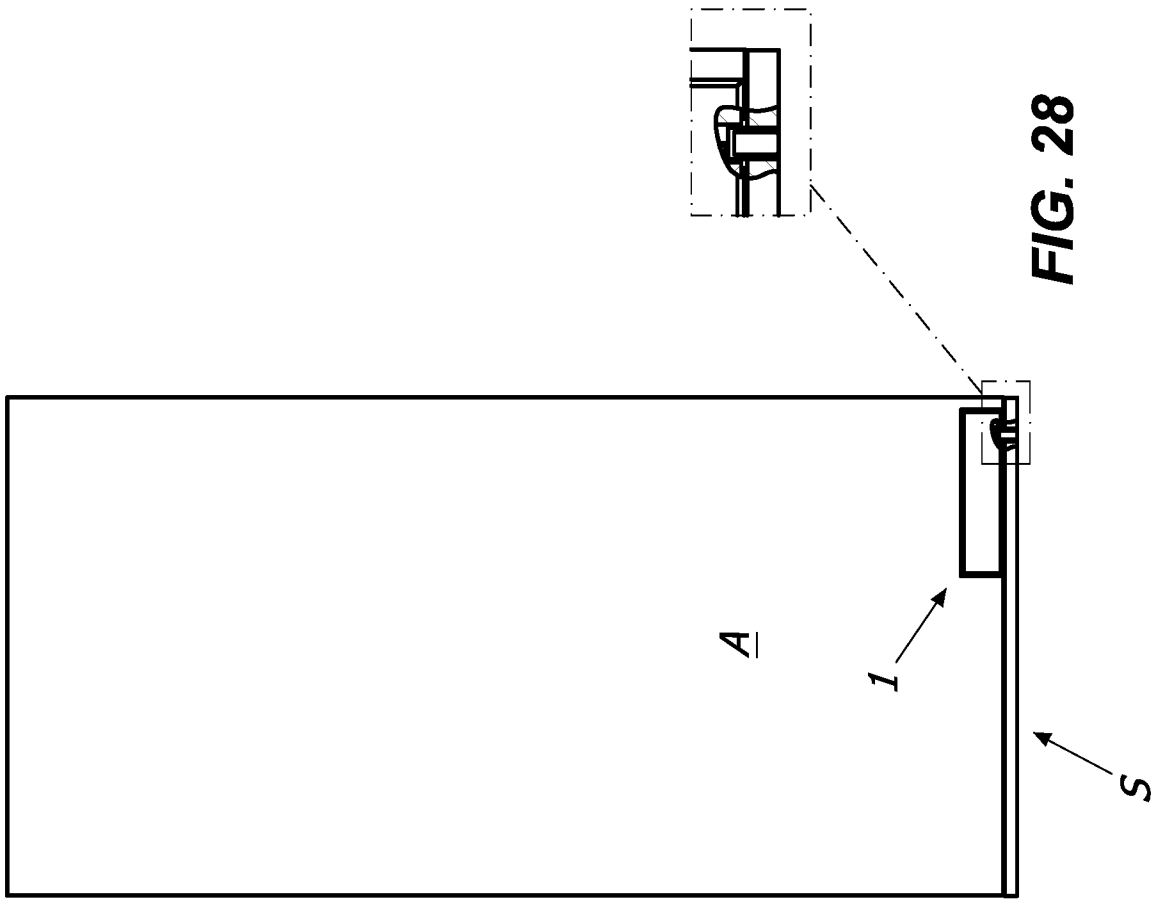


FIG. 28

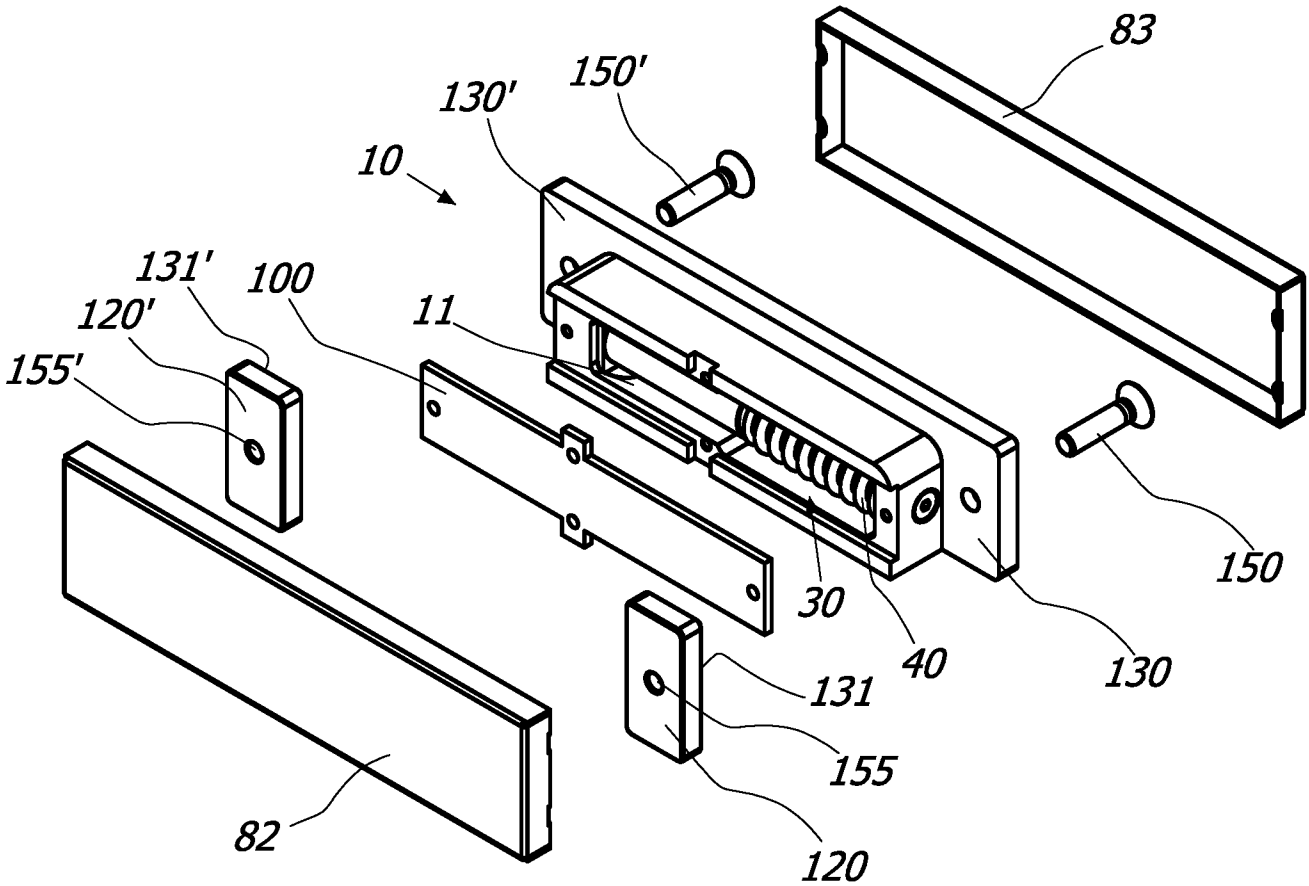


FIG. 30

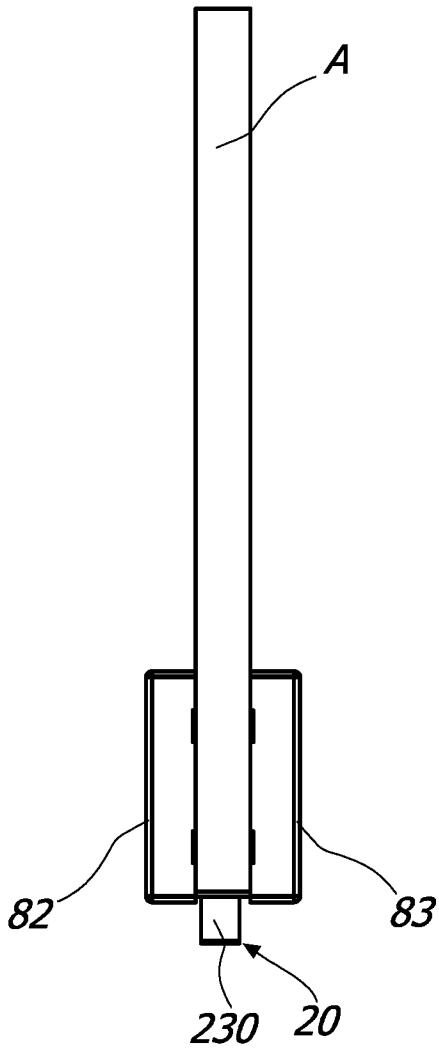


FIG. 31A

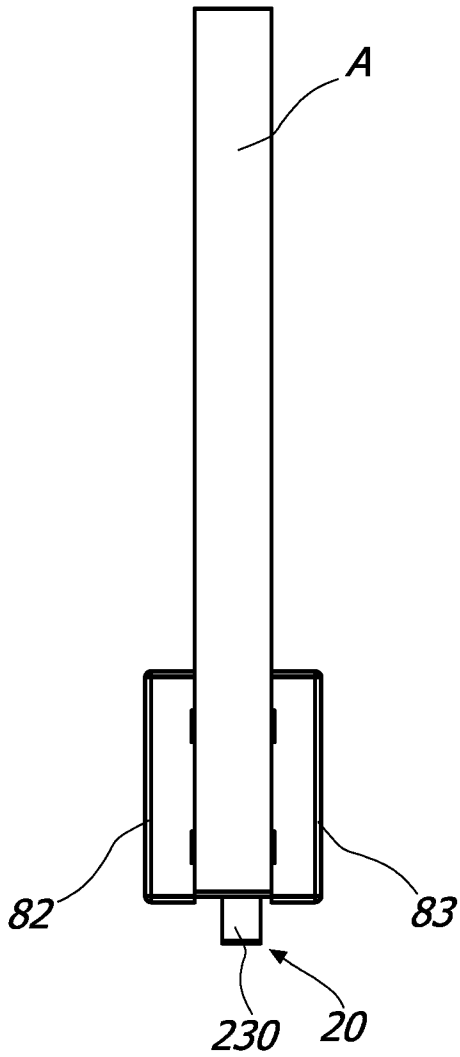


FIG. 31B

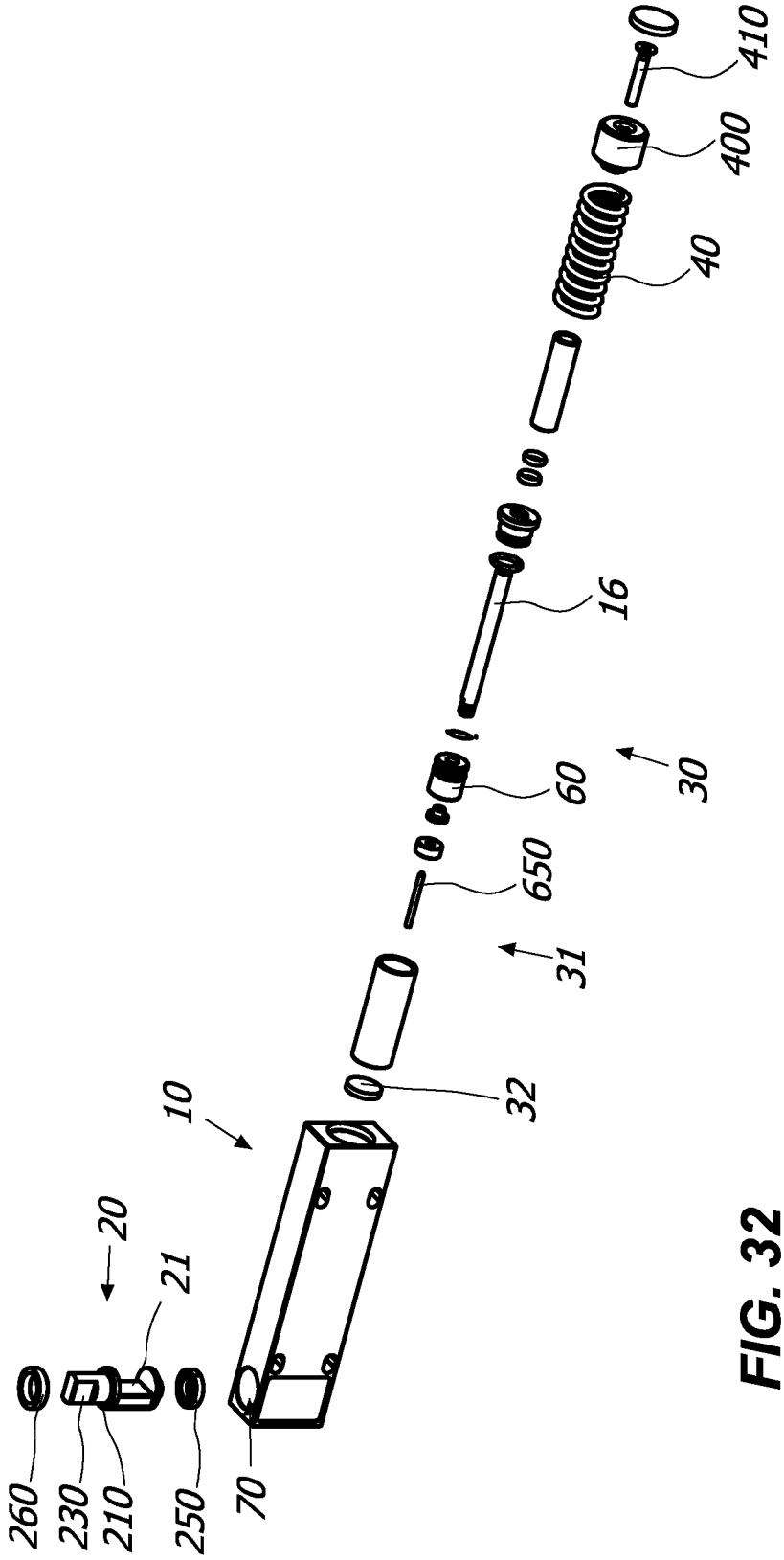


FIG. 32

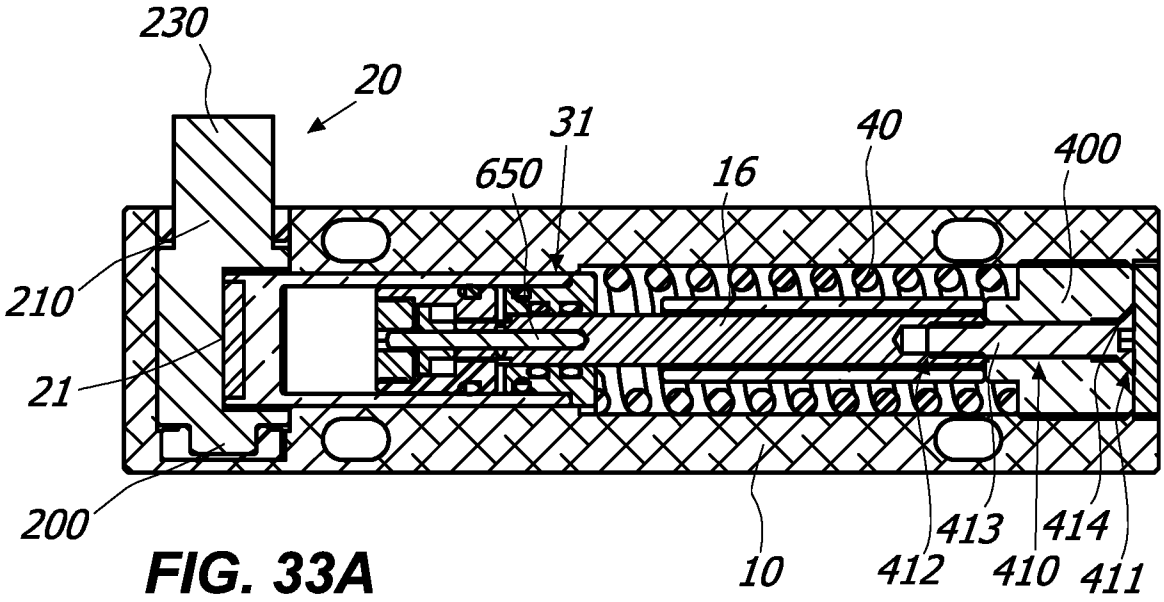


FIG. 33A

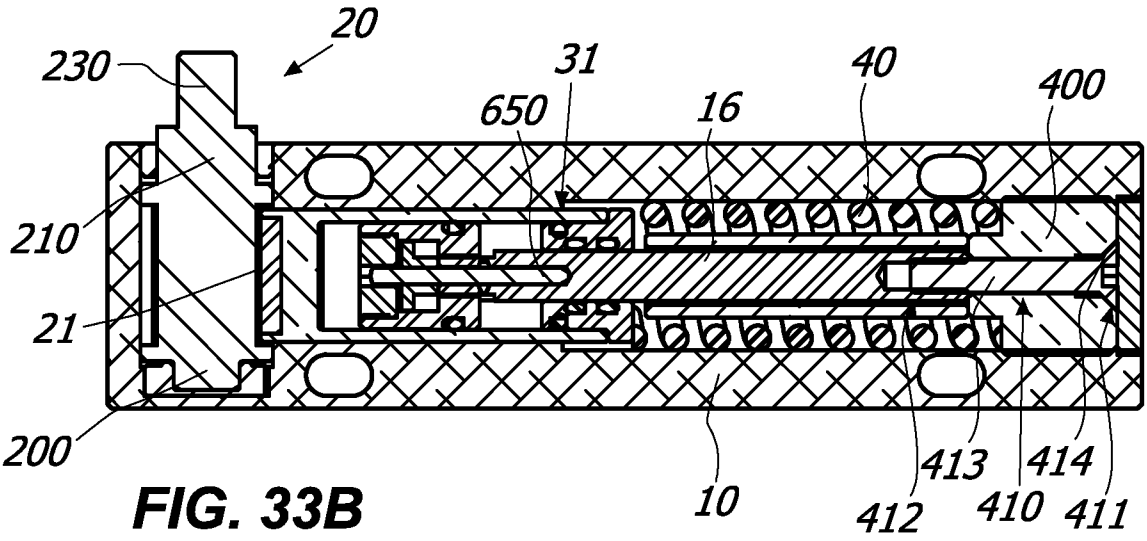


FIG. 33B

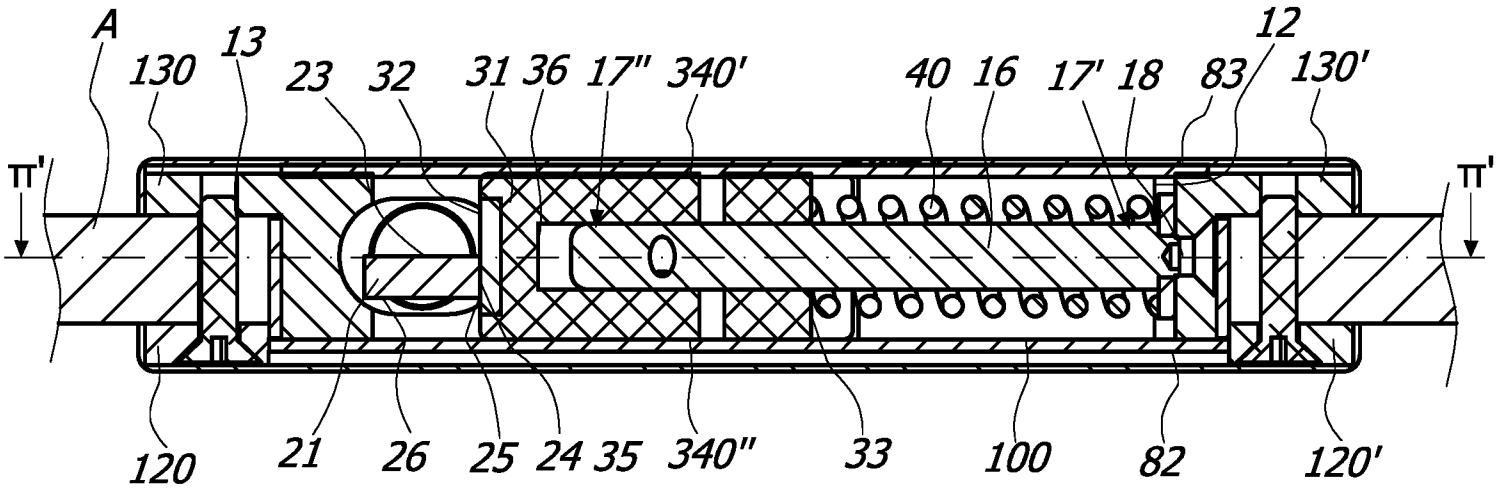


FIG. 34