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(71) Applicant: **SOUTHCO, INC.** [US/US]; 210 North Brinton Lake Road, Concordville, PA 19331 (US).

(72) Inventors: **JI, Lianli**; 115 Woodmint Drive, Westchester, PA 19380 (US). **STRAKA, Robert**; 8 East High Street, Phoenixville, PA 19460 (US). **CLISHAM, Gerry**; 1859 Huntsman Lane, Westchester, PA 19382 (US).

(74) Agents: **NGO, Steve, H.** et al.; Paul and Paul, 2900 Two Thousand Market Street, Philadelphia, PA 19103 (US).

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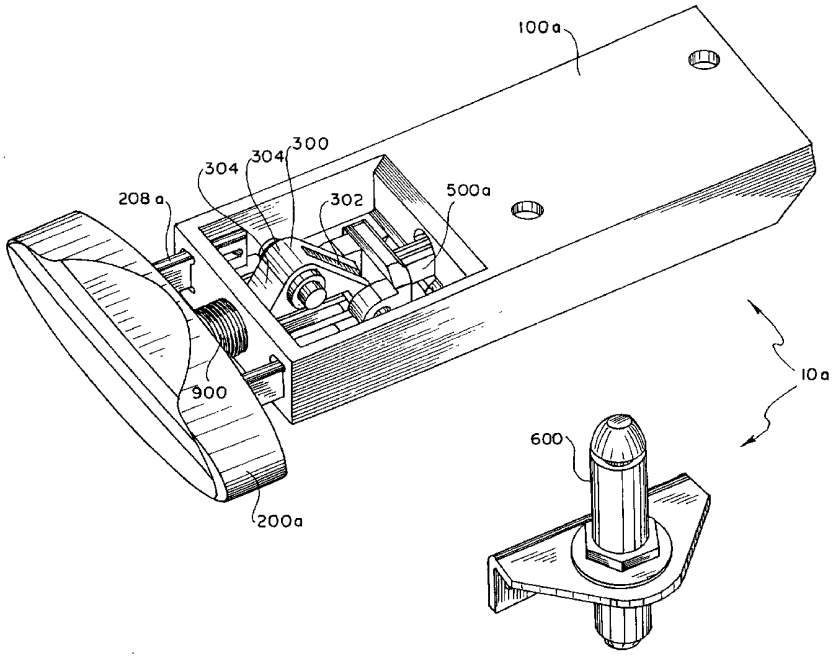

(57) Abstract: The present invention is a gravity-sensitive latch. The latch includes a pendulum pivotally secured between the actuating button or handle and the pawl. When the latch is in a first position, gravity acting on the pendulum rotates the pendulum so that it abuts the button or handle, permitting actuation of the latch. When the latch is in a second orientation, gravity acting on the pendulum rotates the pendulum away from the button or handle, thereby preventing actuation of the latch. The latch may use a wide variety of buttons, handles, or pawl/keeper combinations.

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GRAVITY-SENSITIVE LATCH

BACKGROUND OF THE INVENTION

1. Field of the invention.

The invention is a gravity-sensitive latch. The latch is operable when in a first orientation, secured in its closed position when in its second orientation.

2. Description of the related art.

Although other inventors have proposed various means for selectively permitting and preventing opening of a latch, the present inventor is unaware of any other publicly known latches that provide the option of using gravity for this purpose.

Some presently existing latches incorporate a catch fitting within a T-shaped slot in the handle. When the latch is in the closed position, the catch fits within the narrow portion of the T-shaped slot, thereby preventing the handle from being actuated to open the latch. To open the latch, the catch must first be moved to the wide portion to the T-shaped slot. The catch must be moved manually, and does not rely on gravity for automatic movement, unlike the present invention.

While not limited to such use, the present invention is directed towards lids attached to a center console of an automobile. Such consoles sometimes pivot between a horizontal position providing access to the console, and a vertical position wherein the console is contained within the seat back. An example of such a latch is pictured in Southco, Inc. Catalog No. 48 NA, 1998, p. G-10. This latch does not permit the use of gravity to selectively permit or prevent opening of the latch.

Other latches intended for use on automobile consoles use a push-button actuator to control a pair of hooks that engage a keeper in a scissors-like manner. Pushing the button pushes the hooks apart, and releasing the button allows the hooks to come together.

None of the above-referenced publications, taken singly or in combination, is seen to describe the present invention as claimed.

SUMMARY OF THE INVENTION

The invention is a gravity-sensitive latch. When the latch is in a first orientation, such as horizontal, the latch may be actuated. When the latch is in a second orientation, preferably vertical, the latch cannot be actuated. The latch includes a housing, a handle or button, a pendulum, a pawl dimensioned and configured to engage a keeper, and means for connecting the pendulum to the pawl.

The critical feature of all embodiments of the present invention is the pendulum, because the pivoting of the pendulum in response to gravity permits or prohibits actuation of the latch. A preferred and suggested pendulum is triangular in shape, having a connection

corner pivotally secured to a pawl assembly, a weighted corner, and an abutment corner dimensioned and configured to abut a corresponding surface of the handle or button.

A housing for a first embodiment of the present invention is preferably rectangular and elongated, with the sides having the largest surface area forming the top and bottom. The top is substantially open within the housing's front portion, and the bottom is substantially open within the rear portion. The housing includes a front end dimensioned and configured to receive a button, preferably including a central aperture and a pair of slots on either side.

The button includes a body having a front surface. A short, wide shaft protrudes from the rear of the button, and is dimensioned and configured to fit within the central aperture of the housing's front. The button includes means for securing to the housing, preferably in the form of flanges on either side of the shaft, dimensioned and configured to fit within the slots on the housing's front. When the button is installed on a latch, the end of the central shaft will abut the abutment corner of the pendulum. The button is spring-biased away from the housing, towards its forward position.

The pendulum is pivotally secured to a connecting rod, which is in turn secured to a pawl. The weighted corner of the pendulum extends upward. A preferred and suggested pawl is configured as a box with a bottom surface having a pawl-engaging aperture. The pawl is secured to the housing by a pawl-retaining bracket, with the pawl-retaining bracket having a second pawl-engaging aperture substantially the same as the pawl's aperture, and located adjacent to this aperture. The pawl reciprocates between a latched position wherein the two apertures are slightly offset from each other, and an unlatched position wherein the apertures are aligned with each other. The pawl is spring-biased towards its latched position. A second spring preferably extends downward from the top of the pawl's box.

A keeper corresponding to the first embodiment of the latch will typically be a cylindrical shaft having a channel around its upper end. The upper end or tip of the keeper has a tapered configuration. Typically, the latch will be secured to a lid, and the keeper will be secured to the frame surrounding the lid.

Latching the latch is accomplished by inserting the keeper into the two apertures in the pawl and flange, causing the tapered tip of the keeper to bias the pawl towards its unlatched position, allowing the keeper to enter the pawl. The pawl's upper spring is thereby compressed. Once the keeper's channel is even with the pawl's bottom surface, the pawl moves under spring pressure towards its latched position, thereby trapping the keeper's channel between the edge of the pawl's aperture and the edge of the pawl retaining flange's aperture.

When the latch is in its horizontal position, the pendulum abuts the central shaft of the button, so that a rearward push on the button pushes rearward on the pendulum. The

connecting rod and pawl are thereby also pushed rearward, releasing the keeper's channel from between the pawl aperture and pawl flange's aperture. The pawl's top spring then pushes the keeper out of the latch.

When the latch is in its vertical position, the pendulum pivots away from the button through gravity acting on the pendulum's weighted corner. When the button is pressed rearward, it is thereby prevented from actuating the latch. Rotating the latch into a horizontal position will again pivot the pendulum into engagement with the button, permitting actuation of the latch.

A second embodiment of a latch according to the present invention uses a handle that is pulled to actuate the latch, instead of a button to be pushed. The handle is preferably L-shaped when viewed from either side. The handle includes means for pivotally securing to the housing, and a rearward-projecting flange for abutting the pendulum. The handle preferably includes a stop to prevent travel beyond the desired range of motion. The handle pivots between a latched position and an unlatched position, and is spring-biased towards its latched position.

The pendulum is pivotally secured to a pawl-retaining arm. The pawl-retaining arm is pivotally secured to the housing at its end adjacent to the pawl, permitting it to pivot between a latched position and an unlatched position. The pawl-retaining arm is spring-biased towards its latched position, wherein its opposite end engages a pawl.

The pawl is pivotally secured to the housing. The pawl includes a pair of arms extending towards the handle, and a third arm extending rearward. The rearward arm is dimensioned and configured to engage the pawl-retaining arm. The two forward arms are dimensioned and configured to secure a keeper, which will typically be an inverted U-shaped wire or rod. The pawl pivots between a latched position wherein the two forward arms are substantially horizontal, and an unlatched position wherein the two forward arms point downward. The pawl is spring-biased towards its unlatched position The housing includes a slot dimensioned and configured to receive a keeper.

Typically, the latch will be secured to a lid, and the keeper will be secured to a frame surrounding the lid. When the lid is closed and the keeper enters the housing, it engages the upper forward arm of the pawl, pushing the pawl towards its horizontal position. As the pawl rotates, the pawl's rearward arm pushes the pawl retaining arm rearward, permitting the pawl to rotate into a horizontal position. Once the pawl is horizontal, the pawl-retaining arm moves forward under spring pressure, to a position under the pawl's rear arm. The keeper is thereby secured between the pawl's upper and lower front arms, and by the slot in the housing.

The unlatching of the latch is controlled by the position of the pendulum. When the latch is in its horizontal position, the pendulum abuts the handle, so that an upward pull on

the handle will push the pendulum rearward. The pawl-retaining arm will thereby also be pushed rearward, releasing the pawl to rotate under spring pressure towards its unlatched position. The keeper can then exit the latch. When the latch is in its vertical position, the pendulum rotates away from the handle, so that a pull on the handle does not push rearward on the pendulum. Rotating the latch back to its horizontal position causes the pendulum to again rotate so that it abuts the handle, permitting actuation of the latch.

A third embodiment of the invention is actuated by depressing a button. The button is pivotally secured to the housing, and includes a flange for abutting the pendulum. The button is spring-biased forward, away from the housing. The pendulum is secured directly to the upper end of a pawl. The pawl of the third embodiment is a vertically oriented plate having a lower end dimensioned and configured to engage a keeper. The pawl is pivotally secured along its central section to the housing, so that a rearward push on the pawl pushes the pawl's lower end forward towards its unlatched position. The pawl is spring-biased towards its rearward latched position.

Typically, the latch will be secured to a lid, and the keeper will be secured to a frame surrounding the lid. A preferred keeper is a plate having an opening dimensioned and configured to receive the pawl. When the latch is closed, the edge of the pawl's ramped lower end strikes the keeper, pushing the lower end of the pawl forward and allowing the pawl to enter the keeper's opening. Once the pawl's lower end clears the edge of the keeper, the pawl returns to its latched position under spring pressure, latching the latch.

Unlatching of the latch is controlled by the position of the pendulum. When the latch is in its horizontal position, the pendulum is rotated to engage the button. Depressing the button will therefore push rearward on the pendulum and the upper end of the pawl, unlatching the latch. When the latch is in a vertical orientation, the pendulum pivots away from the button, so that pressing the button will not unlatch the latch. Rotating the latch to its horizontal orientation will again rotate the pendulum to abut the button, permitting actuation of the latch.

The latch may include a lock for preventing actuation of the latch regardless of its orientation. A preferred and suggested lock includes a standard lock plug having a pin at its rear end, and a locking arm. The locking arm includes a diagonal slot at one end, dimensioned and configured to receive the pin of the lock plug. The opposite end of the locking arm includes a ramp dimensioned and configured to push the pendulum out of engagement with the button. Turning the key in the lock plug rotates the pin, thereby pushing the locking arm under the pendulum, moving the pendulum away from the button. Turning the key in the opposite direction slides the locking arm away from the pendulum, thereby removing the locking arm from engagement with the pendulum and permitting free rotation of the pendulum.

While not limited to such use, a gravity-sensitive latch is particularly useful for the center consoles of automobiles. Such consoles can sometimes rotate into a vertical position to provide additional seating space, or a horizontal position to provide access to storage space within the console. When the console is vertical, it is desirable to prevent accidental opening of the storage compartment therein. When the latch is horizontal, it is desirable to permit access to the storage compartment. A gravity-sensitive latch performs both functions automatically.

It is therefore an object of the present invention to provide a latch that automatically permits actuation when in a first orientation, and precludes actuation when in a second orientation.

It is another object of the present invention to provide a gravity-sensitive latching mechanism useable with a wide variety of buttons and/or handles.

It is a third object of the present invention to provide a gravity-sensitive latching mechanism permitting the use of a wide variety of pawl/keeper combinations.

These and other objects of the invention will become apparent through the following description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top perspective view of a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 2 is a bottom perspective view of a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 3 is a partially exploded, top perspective view of a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 4 is an exploded side view of a pawl and keeper assembly for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 5 is an exploded perspective view of a pawl and keeper assembly for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 6 is a perspective view of a housing for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 7 is a front view of a housing for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 8 is a bottom view of a housing for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 9 is a perspective view of a button for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 10 is a perspective view of a spring for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 11 is a perspective view of a connecting rod for a first embodiment of a gravity-sensitive latch according to the present invention.

FIG. 12 is a perspective view of a pendulum for all embodiments of a gravity-sensitive latch according to the present invention.

FIG. 13 is a bottom view of a pendulum for all embodiments of a gravity-sensitive latch according to the present invention.

FIG. 14 is a back view of a pendulum for all embodiments of a gravity-sensitive latch according to the present invention.

FIG. 15 is a top perspective view of a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 16 is an exploded top perspective view of a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 17 is a perspective view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 18 is a top view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 19 is a bottom view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 20 is a back view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 21 is a side view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 22 is a front view of a housing for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 23 is a perspective view of a handle for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 24 is a side view of a handle for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 25 is a back view of a handle for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 26 is a perspective view of a pawl-retaining arm for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 27 is a back view of a pawl-retaining arm for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 28 is a bottom view of a pawl-retaining arm for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 29 is a perspective view of a pawl for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 30 is a side view of a pawl for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 31 is a perspective view of a pawl spring for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 32 is a perspective view of a spring for a pawl-retaining arm for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 33 is a perspective view of a pin for a second embodiment of a gravity-sensitive latch according to the present invention.

FIG. 34 is a side perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, showing the pendulum abutting the button.

FIG. 35 is a side perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, showing the pendulum rotated to disengage from the button.

FIG. 36 is a front perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, showing the pendulum abutting the button.

FIG. 37 is a side perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, showing the pendulum rotated to disengage from the button.

FIG. 38 is a rear perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, showing the pendulum rotated to disengage from the button.

FIG. 39 is an exploded top perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, including a lock plug.

FIG. 40 is an exploded top perspective view of a third embodiment of a gravity-sensitive latch according to the present invention, not including a lock plug.

FIG. 41 is a rear perspective view of a button for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 42 is a front view of a button for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 43 is a perspective view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 44 is a top view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 45 is a back view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 46 is a side view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 47 is a front view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 48 is a bottom view of a housing for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 49 is a perspective view of a locking arm for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 50 is a back view of a locking arm for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 51 is a bottom view of a locking arm for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 52 is a perspective view of a pawl for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 53 is a side view of a pawl for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 54 is a perspective view of a lock plug for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 55 is a front view of a lock plug for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 56 is a perspective view of a spring for a third embodiment of a gravity-sensitive latch according to the present invention.

FIG. 57 is a perspective view of a pivot rod for a third embodiment of a gravity-sensitive latch according to the present invention.

Like reference numbers denote like elements throughout the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention is a gravity-sensitive latch. When the latch is in a first orientation, such as horizontal, the latch may be actuated. When the latch is in a second orientation, preferably vertical, the latch cannot be actuated. Referring to the **FIGURES**, the latch **10** includes a housing **100**, a handle or button **200**, a pendulum **300**, a pawl **400** dimensioned and configured to engage a keeper, and means for connecting the pendulum to the pawl. Components of specific embodiments of the invention will be referred to herein by reference numbers including a lowercase letter, for example, **10a** for a first embodiment of a latch. Components included in all embodiments will be referred to by reference numbers by

themselves. A first preferred embodiment of a latch is illustrated in **FIGS. 1-11**, a second preferred embodiment is illustrated in **FIGS. 15-33**, and a third preferred embodiment is illustrated in **FIGS. 33-57**.

Referring to **FIGS. 12-14**, a preferred and suggested pendulum **300**, used within all embodiments of the invention, is illustrated. A preferred and suggested pendulum **300** is triangular in shape, having a connection corner **302**, a weighted corner **304**, and an abutment corner **306** dimensioned and configured to abut a corresponding surface of the handle or button. The connection corner **302** includes means for pivotally securing the pendulum **300** to a pawl or pawl assembly, with preferred and suggested means being a pair of pegs **308** extending perpendicular to the pendulum. The weighted corner **304** has significantly more mass than the remainder of the pendulum **300**, ensuring that gravity acting on the pendulum **300** will primarily act on this weighted corner **304**. The abutment corner **306** provides a generally flat surface area for abutting a flange extending rearward from a button or handle, as described below.

Referring to **FIGS. 6-8**, a housing **100a** for a first embodiment of the present invention is preferably rectangular and elongated, having a top **102a**, bottom **104a**, a pair of sides **106a**, a front end **108a**, and a back or rear end **110a**. The top **102a** is substantially open within the housing's front portion **112a**, and the bottom **104a** is substantially open within the rear portion **114a**. The housing includes a front end **108a** dimensioned and configured to receive a button, preferably including a central aperture **116a** and a pair of slots **118a** on either side, with another aperture **120a** on each side **106a**, adjacent to the slots **118a**.

A button **200a** for a first embodiment of a latch is illustrated in **FIG. 9**. The button **200a** includes a body **202a** having a front surface **204a**. A short, wide shaft **206a** protrudes from the rear of the button, and is dimensioned and configured to fit within the central aperture **116a** of the housing's front **102a**. The button includes means for securing to the housing, preferably in the form of flanges **208a** on either side of the shaft, dimensioned and configured to fit within the slots on the housing's front, and having apertures **210a**, corresponding to the apertures **120a** in the housing. A pin (not shown, and well-known) inserted through both the apertures **210a** and **120a** will thereby secure the button **200a** within the housing **100a**. When the button is installed on a latch, the end of the central shaft **206a** will pass through the aperture **116a** to abut the abutment corner **306** of the pendulum **300**. The button is spring-biased away from the housing, preferably by a spring **900**, illustrated in **FIG. 10**, surrounding the central shaft **206a**, towards its forward position.

The pendulum **300** is pivotally secured to a connecting rod **500a**, illustrated in **FIG. 11**. The connecting rod **500a** includes one end having means for pivotally securing the pawl **300**, which are preferably a pair of flanges **502a** defining a pair of apertures **504a**, with the

apertures **504a** being dimensioned and configured to receive the pegs **308**. The opposite end **506a** is secured to a pawl **400a**, thereby forming part of a reciprocating pawl assembly **508a**. The weighted corner **304** of the pendulum **300** is preferably oriented upward.

The pawl **400a** and corresponding keeper **600a** are best illustrated in **FIGS. 1-5**. A preferred and suggested pawl **400a** is configured as a box having a bottom **402a**, a top surface **404a**, a back or rear end **406a**, a front end **408a**, to which the connecting rod **500a** is secured, and a pair of sides **410a**. The bottom **402a** includes a pawl-engaging aperture **412a**. A preferred and suggested pawl **400a** has a bottom **402a** as a separate component, securing to the rest of pawl **400a** using an upward flange **414a**, having an aperture **416a**. The back **406a** includes a shaft **418a**, dimensioned and configured to fit within the aperture **416a**. The pawl is secured to the housing by a pawl-retaining bracket **420a**, with the pawl-retaining bracket having a second pawl-engaging aperture **422a** substantially the same as the pawl's aperture **412a**, and located adjacent to the aperture **412a**. A ring **430a** extends upward from the aperture **422a**, corresponding in height to a forward flange **432a** extending downward from the bottom **402a**. The pawl-retaining bracket **420a** preferably includes a second aperture **424a**, dimensioned and configured to receive the shaft **418a**. The pawl-retaining bracket also preferably includes a forward flange **426a** defining an aperture **428a**, dimensioned and configured to guide the connecting rod **500a**. The pawl **400a** reciprocates between a latched position wherein the two apertures **412a,422a** are slightly offset from each other, and an unlatched position wherein the apertures **412a,422a** are aligned with each other. The pawl is spring-biased towards its latched position, preferably by a spring (not shown) surrounding the shaft **418a**. A second spring (not shown) preferably extends downward from the top of the pawl's box.

A keeper **600a** corresponding to the first embodiment of the latch **10a** will typically include a cylindrical shaft **602a** having a channel **604a** around its upper end. The tip **606a** of the keeper has a tapered configuration. The cylindrical shaft **602a** will be secured to a mounting bracket **608a**. Typically, the latch will be secured to a lid, and the keeper will be secured to the frame surrounding the lid.

Latching the latch **10a** is accomplished by inserting the keeper **600a** into the two apertures **412a,422a** in the pawl **400a** and flange **420a**. The tapered tip **606a** of the keeper will bias the pawl **400a** towards its unlatched position, allowing the keeper **600a** to enter the pawl **400a**. The pawl's upper spring is thereby compressed. Once the keeper's channel **604a** is even with the pawl's bottom surface **402a**, the pawl **400a** moves under spring pressure towards its latched position, thereby trapping the keeper's channel **604a** between the edge of the pawl's aperture **412a** and the edge of the pawl retaining flange's aperture **422a**.

When the latch **10a** is in its horizontal position, the pendulum **400a** abuts the central shaft **206a** of the button **200a**, so that a rearward push on the button **206a** pushes rearward on the pendulum **300**. The connecting rod **500a** and pawl **400a** are thereby also pushed rearward, releasing the keeper's channel **604a** from between the pawl aperture **412a** and pawl flange's aperture **422a**. The pawl's top spring then pushes the keeper **600a** out of the latch **10a**.

When the latch **10a** is in its vertical position, the pendulum **300** pivots away from the button **200a** through gravity acting on the pendulum's weighted corner **304**. When the button **200a** is pressed rearward, it is thereby prevented from actuating the latch **10a**. Rotating the latch **10a** into a horizontal position will again pivot the pendulum **300** into engagement with the button's central shaft **206a**, permitting actuation of the latch **10a**.

A second embodiment of a latch **10b** according to the present invention, illustrated in **FIGS. 15-33**, uses a housing **100b** such as one illustrated in **FIGS. 17-22.** The housing **100b** includes means for pivotally securing a handle **200b**, which are preferably a pair of pegs **102b**, protruding outward from the flanges **112b**, with the pegs **102b** being dimensioned and configured to fit within corresponding apertures **206b** on a handle, located at the front portion **104b** of the housing **100b**. The central portion **106b** of the housing **100b** defines a channel **114b**, dimensioned and configured to receive a pawl **400b** and a keeper **600b**, described below. The channel **114b** includes a pair of apertures **108b**, dimensioned and configured to pivotally secure a pawl **400b** within the housing. The rear portion **110b** of the housing **100b** includes an aperture **116b** dimensioned and configured to receive the pin **704b**, described below.

The latch **10b** uses a handle **200b** that is pulled to actuate the latch, instead of a button to be pushed. The handle **200b**, illustrated in **FIGS. 23-25**, is preferably L-shaped when viewed from either side **202b**, including a vertical portion **210b** and a horizontal portion **212b** The handle **200b** includes means for pivotally securing to the housing **100b**, preferably in the form of apertures **206b**, defined within the flanges **214b** protruding from the vertical portion **210b**, and a rearward projecting flange **204b** dimensioned and configured to abut the pendulum. The handle **200b** preferably includes a stop **208b** to prevent travel beyond the desired range of motion. The handle **200b** pivots between a latched position and an unlatched position, and is spring-biased towards its latched position, preferably by the spring **902**. A preferred handle **200b** has the apertures **206b** positioned below the flange **204b** and spring **902**, so that lifting up on the horizontal portion **212b** will compress the spring **902** (**FIG. 32**) and move the flange **204b** rearward.

The pendulum **300** is pivotally secured to a pawl-retaining arm **700b**, illustrated in **FIGS. 26-28**. The pawl-retaining arm **700b** is pivotally secured to the housing **100b** at its end **702b** adjacent to the pawl, preferably by pin **704b** (**FIG. 33**) passing through the

aperture **706b** within the pawl-retaining arm **700b** and into the corresponding aperture within the housing **100b**. The pawl-retaining arm **700b** is thereby permitted to pivot between a latched position and an unlatched position. The pawl-retaining arm **700b** includes means for pivotally securing the pendulum **300**, which are preferably a pair of flanges **708b**, each defining an aperture **710b**, dimensioned and configured to receive the pendulum's pegs **308**. The pawl-retaining arm's opposite end **712b** is dimensioned and configured to engage a pawl **400b**, as described below. The pawl-retaining arm is spring-biased towards its latched position, preferably by a second spring **902**, wherein it engages the pawl **400b**.

A preferred pawl **400b** is illustrated in **FIGS. 29-30**. The pawl **400b** includes means for pivotally securing to the housing **100b**, which are preferably a pair of pins **440b**, dimensioned and configured to fit within the apertures **108b**. The pawl includes an upper forward arm **442b**, a lower forward arm **444b**, defining a channel **448b** therebetween, and a rearward arm **446b**. The rearward arm **446b** is dimensioned and configured to engage the pawl-retaining arm **700b**. The channel **448b** is dimensioned and configured to secure a keeper **600b**, which will typically be an inverted U-shaped wire or rod. The pawl **400b** pivots between a latched position wherein the two forward arms **442b,444b** are substantially horizontal, and an unlatched position wherein the two forward arms **442b,444b** point downward. The pawl **400b** is spring-biased towards its unlatched position, preferably by a pawl spring **904b** as illustrated in **FIG. 31.**

Typically, the latch **10b** will be secured to a lid, and the keeper **600b** will be secured to a frame surrounding the lid. When the lid is closed and the keeper **600b** enters the housing **100b**, it engages the upper forward arm **442b** of the pawl **440b**, pushing the pawl **400b** towards its horizontal position. As the pawl **400b** rotates, the pawl's rearward arm **446b** pushes the pawl retaining arm **700b** rearward, permitting the pawl **400b** to rotate into a horizontal position. Once the pawl **400b** is horizontal, the pawl-retaining arm **700b** moves forward under spring pressure, to a position under the pawl's rear arm **446b**. The keeper **600b** is thereby secured within the channel **448b**, and by the channel **114b** in the housing **100b**.

The unlatching of the latch **10b** is controlled by the position of the pendulum **300**. When the latch **10b** is in its horizontal position, the pendulum **300** abuts the handle **200b**, so that an upward pull on the handle **200b** will push the pendulum **300** rearward. The pawl-retaining arm **700b** will thereby also be pushed rearward, releasing the pawl **400b** to rotate under spring pressure towards its unlatched position. The keeper **600b** can then exit the latch **10b**. When the latch **10b** is in its vertical position, the pendulum **300** rotates away from the handle **200b**, so that a pull on the handle **200b** does not push rearward on the pendulum **300**. Rotating the latch **10b** back to its horizontal position causes the pendulum **300** to again rotate so that it abuts the handle **200b**, permitting actuation of the latch **10b**.

A third embodiment of the latch **10c** is illustrated in **FIGS. 34-57**. The housing **100c** is illustrated in **FIGS. 43-48**. The front of the housing includes means for securing a button, which is preferably a pair of pegs **102c**. The rear portion of the housing defines means for pivotally securing a pawl **400c**, which preferably include a pair of flanges defining a pair of apertures **104c** dimensioned and configured to receive a pivot rod **490c**, illustrated in **FIG. 57**.

The latch **10c** is actuated by depressing a button **200c**, illustrated in **FIGS. 41-42**. The button **200c** includes means for pivotally securing to the housing, preferably including a flange **202c** protruding from the button's rear, with the flange **202c** defining a pair of apertures **204c**, dimensioned and configured to receive the pegs **102c** of the housing **100c**. The button **200c** also includes a flange **208c** for abutting the pendulum, and a flange **206c** for limiting travel of the button. The button is spring-biased forward, away from the housing, preferably by a spring **902**. The button may include an aperture **210c**, dimensioned and configured to receive a lock **800**, described below.

The pendulum **300** is secured directly to the upper end of a pawl **400c**, illustrated in **FIGS. 52-53**. The pawl includes an upper end **454c**, and a lower end **456c**. The upper end **454c** of the pawl **400c** includes means for pivotally securing the pendulum **300**, which preferably include a pair of apertures **450c** dimensioned and configured to receive the pegs **308** of the pendulum. The central section of the pawl defines means for pivotally securing the pawl to the housing, preferably at least one aperture **452c**, dimensioned and configured to receive the rod **490c**. The rod **490c** passing through the apertures **452c** and **104c** thereby pivotally secures the pawl **400c** vertically on the housing **100c**. The lower end **456c** includes a hook **458c**, dimensioned and configured to engage a keeper **600c**. The lower portion of the hook **458c** includes a ramped portion **460c**. The pawl pivots between a latched position wherein the lower end **456c** is rearward, and an unlatched position wherein the lower end **456c** is forward. It is now apparent that a rearward push on the pawl **400c** by the pendulum **300** pushes the pawl's lower end **456c** forward towards its unlatched position. The pawl **400c** is spring-biased towards its rearward latched position, preferably by a spring **906c**, illustrated in **FIG. 56**.

Typically, the latch **10c** will be secured to a lid, and the keeper **600c** will be secured to a frame surrounding the lid. A preferred keeper **600c** is a plate having an opening **602c** dimensioned and configured to receive the pawl's hook **458c**. When the latch **10c** is closed, the pawl's ramp **460c** strikes the keeper **600c**, pushing the lower end **456c** of the pawl **400c** forward and allowing the pawl **400c** to enter the keeper's opening **602c**. Once the pawl's lower end **456c** clears the edge of the keeper **600c**, the pawl **400c** returns to its latched position under spring pressure, latching the latch **10c**.

Unlatching of the latch **10c** is controlled by the position of the pendulum **300**. When the latch **10c** is in its horizontal position, as illustrated in **FIG. 34**, the pendulum **300** is rotated to engage the button **200c**. Depressing the button **200c** will therefore push rearward on the pendulum **300** and the upper end **454c** of the pawl **400c**, unlatching the latch **10c**. When the latch **10c** is in a vertical orientation, illustrated in **FIG. 35**, the pendulum **300** pivots away from the button **200c**, so that pressing the button **200c** will not unlatch the latch **10c**. Rotating the latch **10c** to its horizontal orientation will again rotate the pendulum **300** to abut the button **200c**, permitting actuation of the latch **10c**.

Any of the preferred latches **10** may include a lock **800** for preventing actuation of the latch **10** regardless of its orientation. A preferred and suggested lock **800** includes a standard lock plug **802** (**FIGS. 54-55**) having a pin **804** at its rear end, and a keyhole **806**at its front end. A locking arm **850** (**FIGS. 49-51**) is slidably mounted to the rear of the lock plug **802**. The locking arm **850** includes a diagonal slot **852** at one end, dimensioned and configured to receive the pin **804** of the lock plug **802**. The opposite end of the locking arm **850** includes a ramp **854** dimensioned and configured to push the pendulum **300** out of engagement with the button or handle **200**. Turning the key in the lock plug **802** rotates the pin **804**, thereby pushing the locking arm **850** under the pendulum **300**, moving the pendulum **300** away from the button **200**, as illustrated in **FIGS. 37-38**. Turning the key in the opposite direction slides the locking arm **850** away from the pendulum **300**, thereby removing the locking arm **850** from engagement with the pendulum **300** and permitting free rotation of the pendulum **300**, as illustrated in **FIG. 36**.

It is to be understood that the invention is not limited to the preferred embodiments described herein, but encompasses all embodiments within the scope of the following claims.

CLAIMS

What is claimed is:

1. A gravity-sensitive latch comprising:

a housing;

a button supported for slidable movement relative to said housing;

a pendulum operatively connected to said button, said pendulum pivoting between a latched position and an unlatched position;

a pawl being dimensioned and configured to engage a keeper, said pawl pivoting between a latched position and an unlatched position;

means for securing said housing and said button;

means for pivotally securing said housing and said pawl; and

means for operatively connecting said pendulum and said pawl.

2. The gravity-sensitive latch according to claim 1, wherein said latch can be actuated when said latch is in a horizontal position, and said latch cannot be actuated when said latch is in a vertical position.

3. The gravity-sensitive latch according to claim 1, wherein said housing has a top, a bottom, a pair of sides, a front end, and a rear end.

4. The gravity-sensitive latch according to claim 3, wherein said top of said housing is substantially open within a front portion of said housing, and said bottom of said housing is substantially open within a rear portion of said housing.

5. The gravity-sensitive latch according to claim 3, wherein said front end of said housing is dimensioned and configured for securing to said button.

6. The gravity-sensitive latch according to claim 5, wherein an end of said button abuts said pendulum when said button is installed on said latch.

7. The gravity-sensitive latch according to claim 1, wherein said button is biased away from said housing towards its forward position.

8. The gravity-sensitive latch according to claim 1, wherein said button includes a body having a front surface.

9. The gravity-sensitive latch according to claim 1, wherein said pendulum has a connection corner, a weighted corner, and an abutment corner dimensioned and configured to abut said button.

10. The gravity-sensitive latch according to claim 9, wherein said weighted corner extends upward.

11. The gravity-sensitive latch according to claim 9, wherein said weighted corner has greater mass than the remainder of said pendulum.

12. The gravity-sensitive latch according to claim 9, wherein said pendulum further has at least one peg protruding from said pendulum and said pawl has at least a corresponding aperture for being operatively connected with said pendulum.

13. The gravity-sensitive latch according to claim 1, wherein said pawl has a bottom, a top surface, a rear end, a front end operatively connected to said pendulum by said means for operatively connecting said pendulum and said pawl, and a pair of sides.

14. The gravity-sensitive latch according to claim 13, wherein said bottom of said pawl has a pawl-engaging aperture and said means for pivotally securing said housing and said pawl is a pawl-retaining bracket, said bracket has a pawl-engaging aperture that is substantially the same as and located adjacent to said pawl-engaging aperture of said bottom of said pawl.

15. The gravity-sensitive latch according to claim 13, wherein a biasing means extends downward from the top of said pawl.

16. The gravity-sensitive latch according to claim 1, wherein said pawl is biased towards its latched position.

17. The gravity-sensitive latch according to claim 1, wherein said means for securing said housing and said button is a pin.

18. The gravity-sensitive latch according to claim 1, wherein said means for operatively connecting said pendulum and said pawl is a connecting rod.

19. The gravity-sensitive latch according to claim 1, further comprising a keeper adapted for engaging with said pawl.

20. The gravity-sensitive latch according to claim 19, wherein said keeper is a cylindrical shaft having a channel around its upper end.

21. The gravity-sensitive latch according to claim 20, wherein said upper end of said keeper has a tip and a tapered configuration.

22. The gravity-sensitive latch according to claim 20, wherein said pawl has a bottom having a pawl-engaging aperture, said means for pivotally securing said housing and said pawl is a pawl-retaining bracket, said bracket has a pawl-engaging aperture that is substantially the same as and located adjacent to said pawl-engaging aperture of said bottom of said pawl, said latch is latched by inserting said keeper into said pawl-engaging apertures in said pawl and said bracket whereby causing said upper end of said keeper to bias said pawl towards its unlatched position so as to allow said keeper to enter said pawl.

23. A gravity-sensitive latch comprising:

a housing;

a handle pivotally secured to said housing, said handle pivoting between a latched position and an unlatched position;

a pawl pivotally secured to said housing, said pawl being dimensioned and configured to engage a keeper, said pawl pivoting between a latched position and an unlatched position;

a pawl-retaining arm pivoting between a latched position and an unlatched position;

a pendulum pivotally secured to said pawl-retaining arm, said pendulum being dimensioned and configured to abut said handle, said pendulum pivoting between a latched position and an unlatched position; and

means for pivotally securing said housing and said pawl-retaining arm.

24. The gravity-sensitive latch according to claim 23, wherein said latch can be actuated when said latch is in a horizontal position, and said latch cannot be actuated when said latch is in a vertical position.

25. The gravity-sensitive latch according to claim 23, wherein said housing is dimensioned and configured to receive a keeper.

26. The gravity-sensitive latch according to claim 23, wherein:

said housing includes a front end, a central portion defining a channel dimensioned and configured to receive said pawl and a keeper, and a rear portion dimensioned and configured to receive a pin, said channel dimensioned and configured to pivotally secure said pawl within said housing; and

said handle includes a vertical portion, a horizontal portion, and a rear end dimensioned and configured to engage with said front end of said housing.

27. The gravity-sensitive latch according to claim 26, wherein said handle includes a rearward-projecting structure for abutting said pendulum and said handle is biased towards its latched position by biasing means wherein the engagement portion of said rear end of said handle that engages with said front end of said housing is positioned below said rearward-projecting flange and said biasing means.

28. The gravity-sensitive latch according to claim 23, wherein said handle includes a rearward-projecting structure for abutting said pendulum.

29. The gravity-sensitive latch according to claim 23, wherein said handle includes a stop to prevent travel beyond a predetermined range of motion.

30. The gravity-sensitive latch according to claim 23, wherein said handle is biased towards its latched position.

31. The gravity-sensitive latch according to claim 23, wherein said pawl-retaining arm is biased towards its latched position.

32. The gravity-sensitive latch according to claim 23, wherein said pawl-retaining arm is pivotally secured to said housing at its end adjacent to said pawl.

33. The gravity-sensitive latch according to claim 23, wherein said pendulum has a connection corner, a weighted corner, and an abutment corner dimensioned and configured to abut said handle.

34. The gravity-sensitive latch according to claim 33, wherein said weighted corner extends upward.

35. The gravity-sensitive latch according to claim 33, wherein said weighted corner has greater mass than the remainder of said pendulum.

36. The gravity-sensitive latch according to claim 23, wherein said pawl-retaining arm includes a first end having at least one flange defining at least one aperture and a second end dimensioned and configured to engage said pawl, said pendulum has at least one peg protruding from said pendulum, said at least one aperture of said first end is dimensioned and configured to receive said peg of said pendulum.

37. The gravity-sensitive latch according to claim 23, wherein said pawl includes an upper forward arm and a lower forward arm extending toward said handle, a channel between said forward arms, and a third arm extending rearward, said third arm is dimensioned and configured to engage said pawl-retaining arm, said forward arms are dimensioned and configured to secure a keeper, said pawl pivots between said latched position wherein said forward arms are substantially horizontal, and said unlatched position wherein said forward arms point downward.

38. The gravity-sensitive latch according to claim 23, wherein said pawl is biased towards its unlatched position.

39. The gravity-sensitive latch according to claim 23, wherein said means for pivotally securing said housing and said pawl-retaining arm is a pin.

40. The gravity-sensitive latch according to claim 23, further comprising a keeper adapted for engaging with said pawl.

41. A gravity-sensitive latch comprising:

a housing;

a button supported for slidable movement relative to said housing, said button secured to said housing;

a pendulum operatively connected to said button, said pendulum pivoting between a latched position and an unlatched position;

a pawl pivotally secured to said pendulum, said pawl being dimensioned and configured to engage a keeper, said pawl pivoting between a latched position and an unlatched position; and

means for pivotally securing said housing and said pawl.

42. The gravity-sensitive latch according to claim 41, wherein said latch can be actuated when said latch is in a horizontal position, and said latch cannot be actuated when said latch is in a vertical position.

43. The gravity-sensitive latch according to claim 41, wherein said housing includes a front end dimensioned and configured for securing to said button, and a rear portion dimensioned and configured for securing to said pawl.

44. The gravity-sensitive latch according to claim 41, wherein said button includes a structure for abutting said pendulum.

45. The gravity-sensitive latch according to claim 41, wherein said button includes a stop to prevent travel beyond a predetermined range of motion.

46. The gravity-sensitive latch according to claim 41, wherein said button is biased away from said housing towards its forward position.

47. The gravity-sensitive latch according to claim 41, wherein button is dimensioned and configured to receive a lock.

48. The gravity-sensitive latch according to claim 41, wherein said pendulum has a connection corner, a weighted corner, and an abutment corner dimensioned and configured to abut said button.

49. The gravity-sensitive latch according to claim 48, wherein said weighted corner extends upward.

50. The gravity-sensitive latch according to claim 48, wherein said weighted corner has greater mass than the remainder of said pendulum.

51. The gravity-sensitive latch according to claim 41, wherein said pawl includes an upper end dimensioned and configured for pivotally securing with said pendulum, a lower end dimensioned and configured to engage a keeper, and a central section dimensioned and configured for pivotally securing with said housing.

52. The gravity-sensitive latch according to claim 51, wherein said pawl pivots between said latched position wherein said lower end is rearward, and said unlatched position wherein said lower end is forward.

53. The gravity-sensitive latch according to claim 41, wherein said pawl is biased towards its latched position.

54. The gravity-sensitive latch according to claim 41, wherein said means for pivotally securing said housing and said pawl is a rod.

55. The gravity-sensitive latch according to claim 41, further comprising a keeper.

56. The gravity-sensitive latch according to claim 55, wherein said keeper is a plate having an opening dimensioned and configured to engage with said pawl.

57. The gravity-sensitive latch according to claim 41, further comprising a lock for preventing actuation of said latch regardless of its orientation.

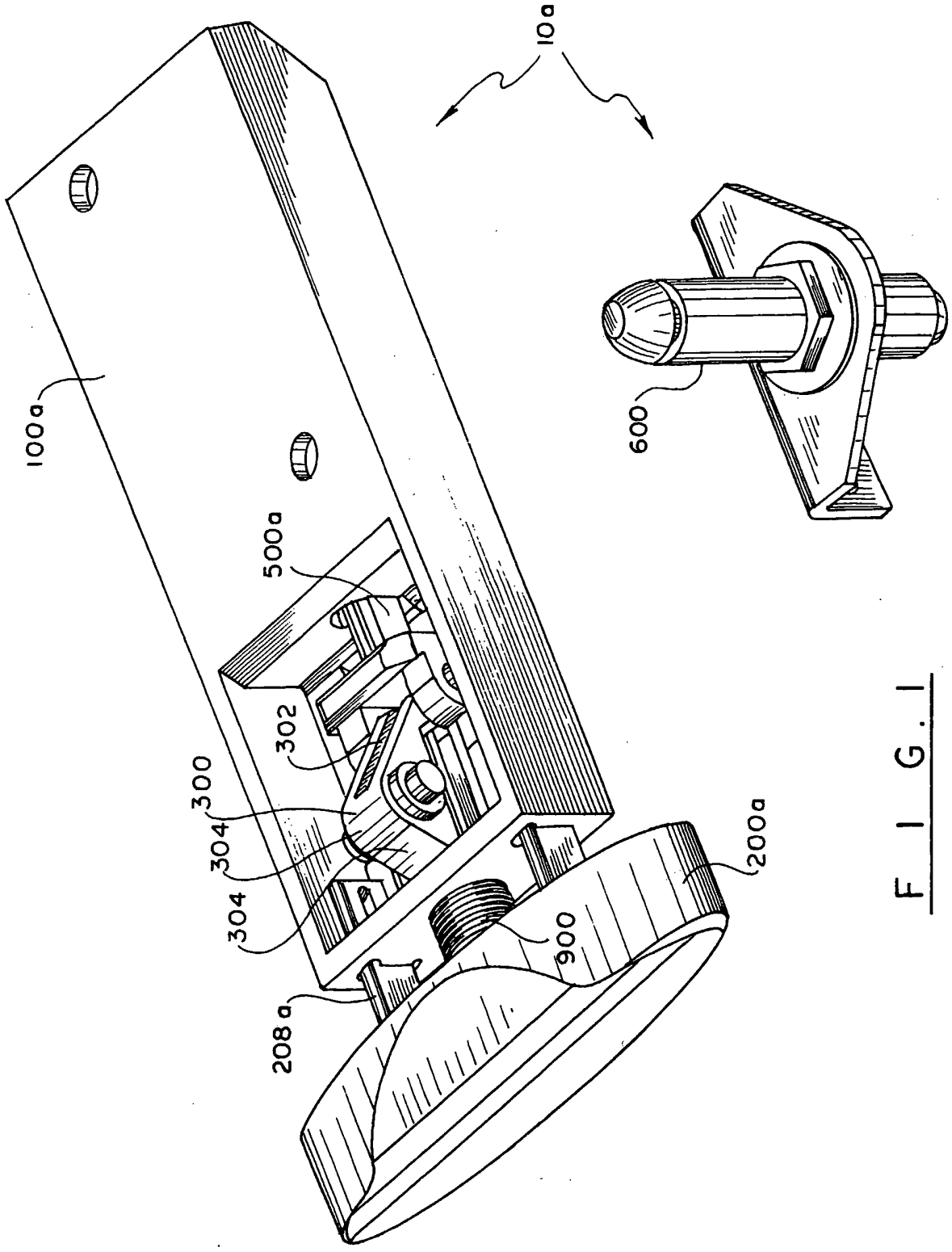


FIG. 1

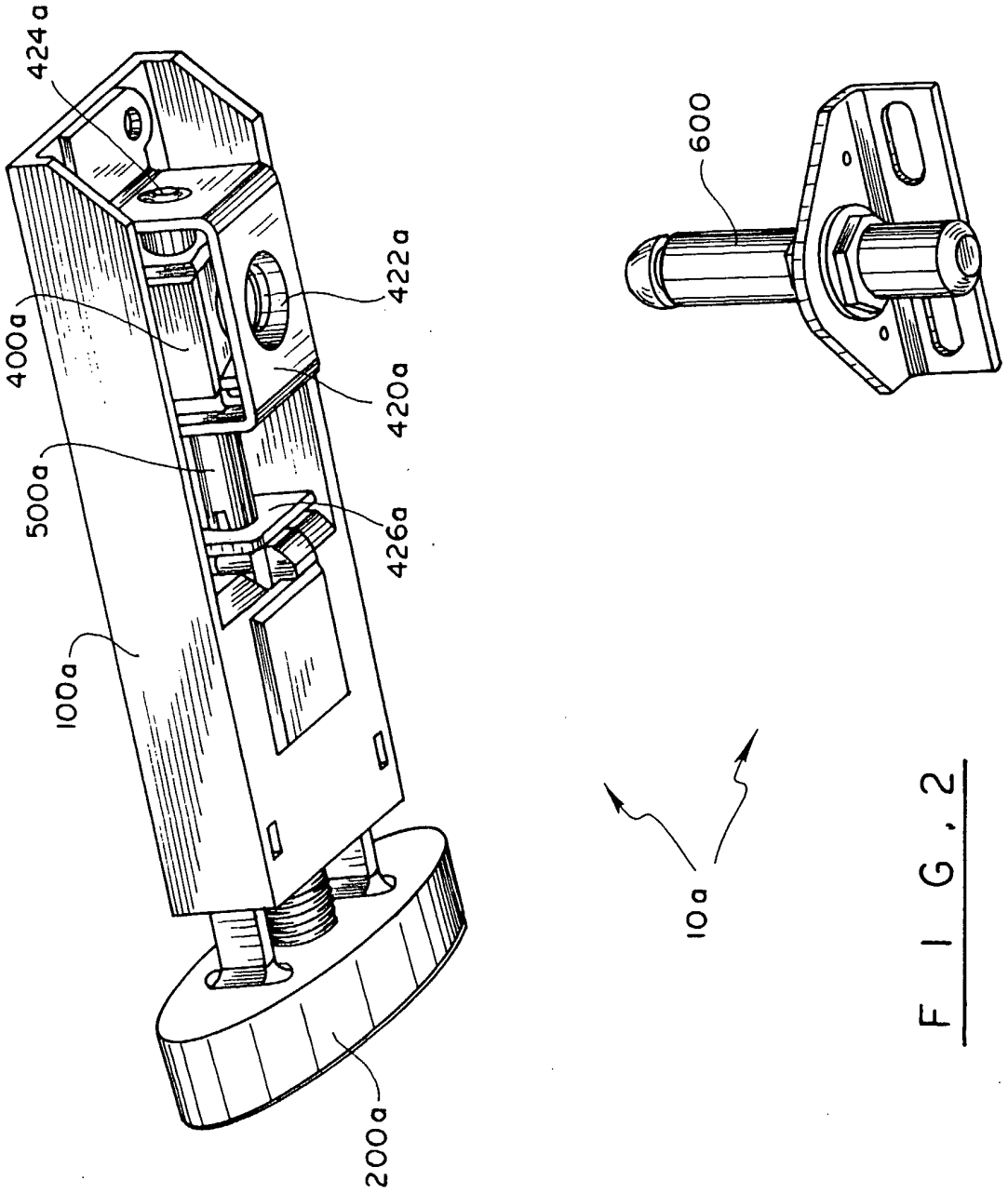


FIG. 2

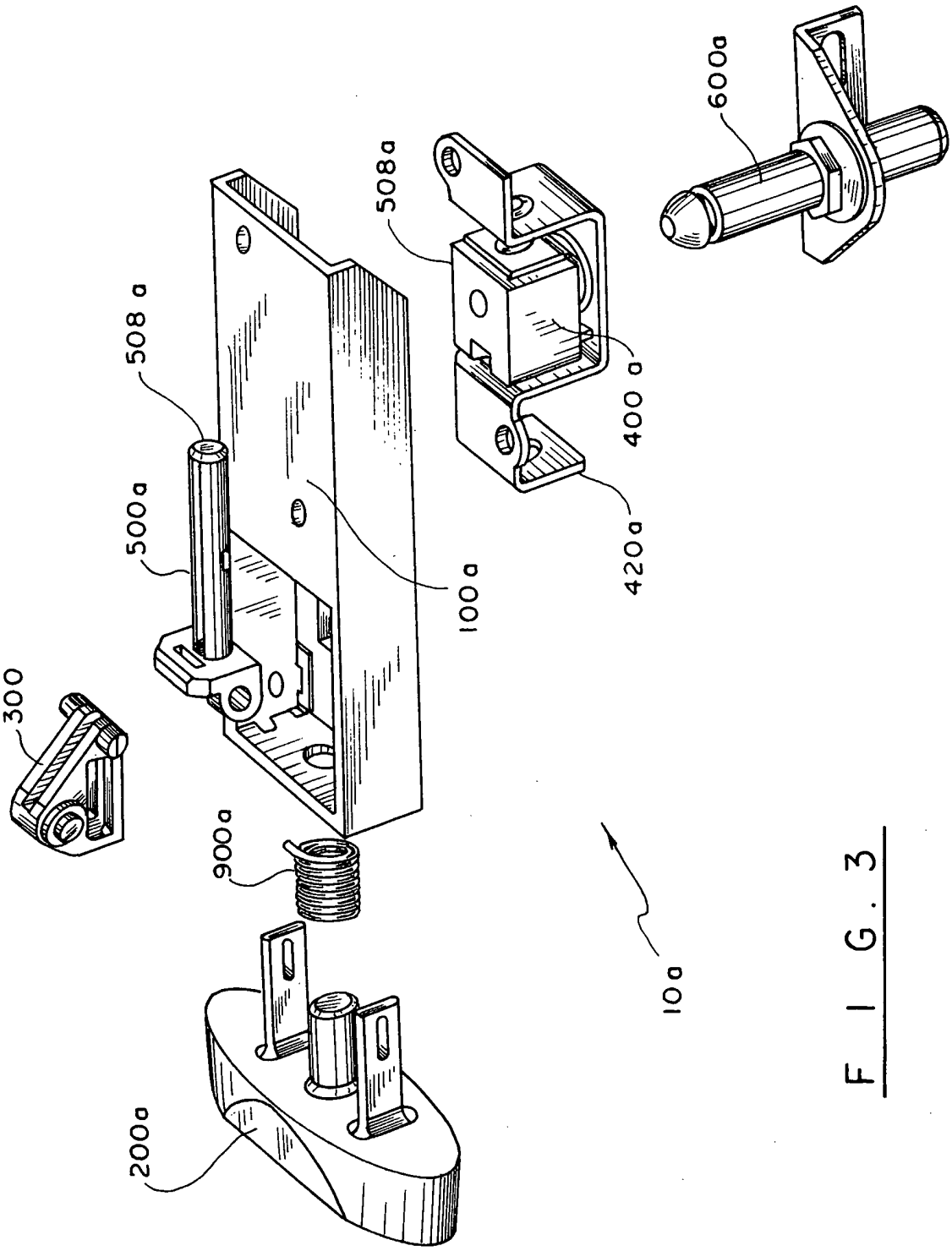
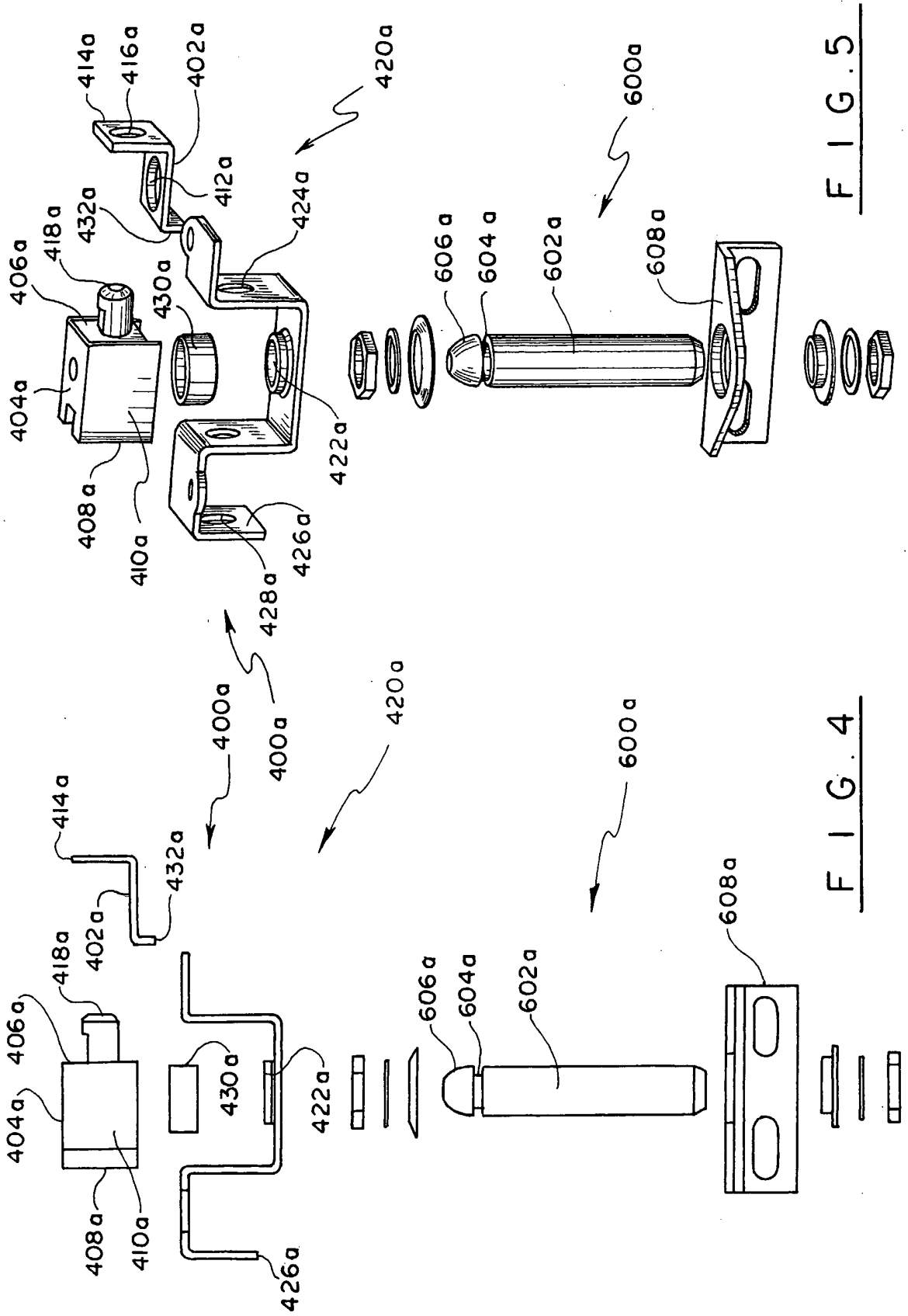


FIG. 3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432a
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FIG. 5

FIG. 4

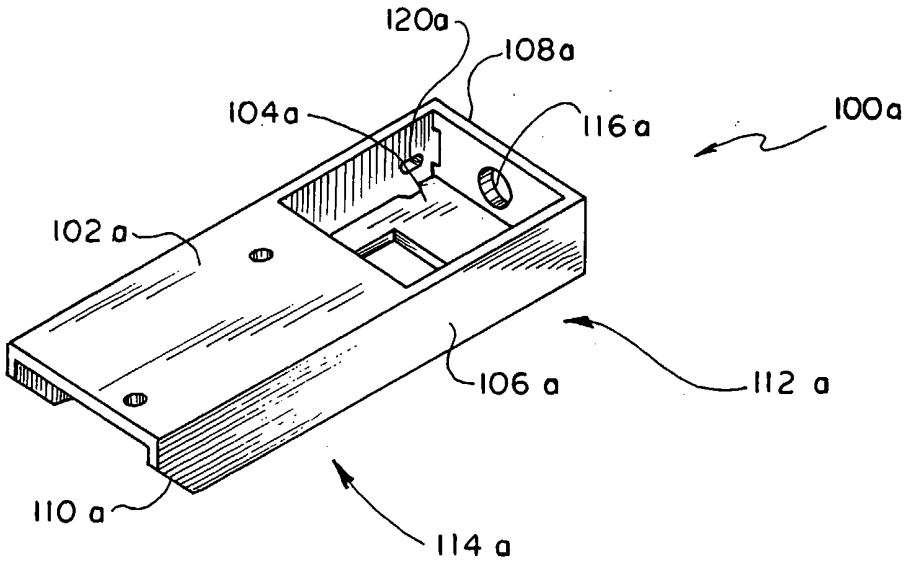

FIG. 6

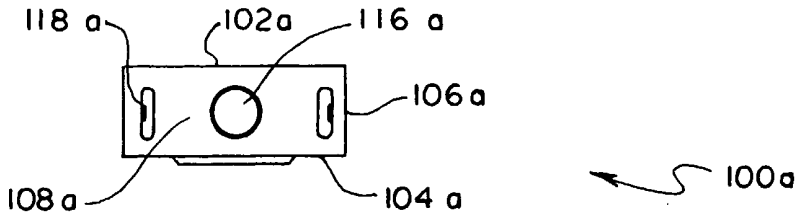

FIG. 7

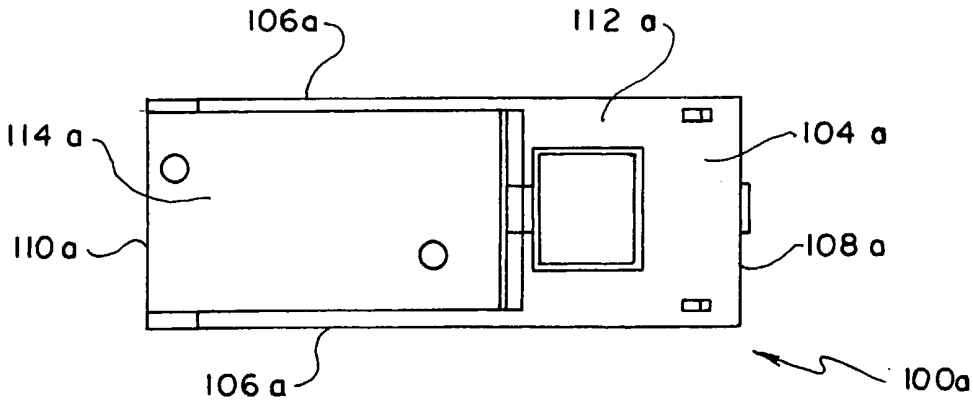

FIG. 8

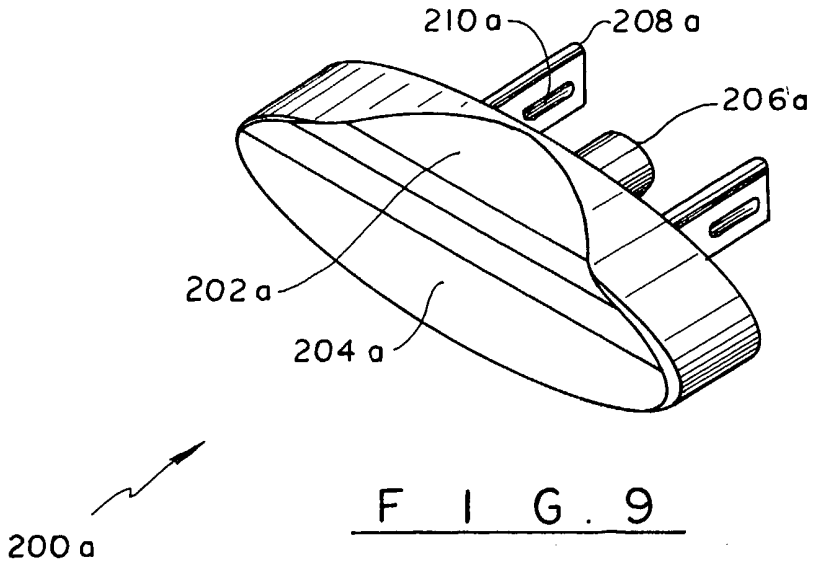

FIG. 9

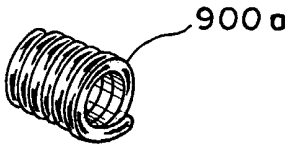

FIG. 10

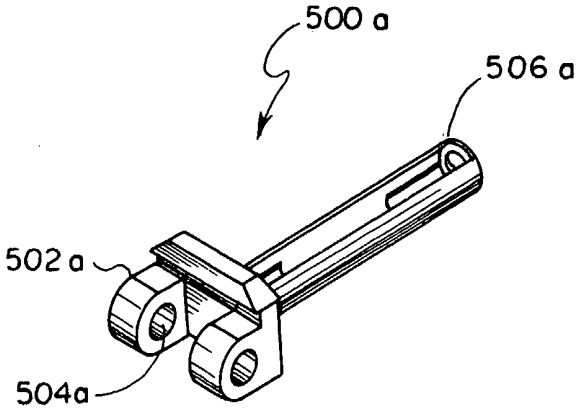

FIG. 11

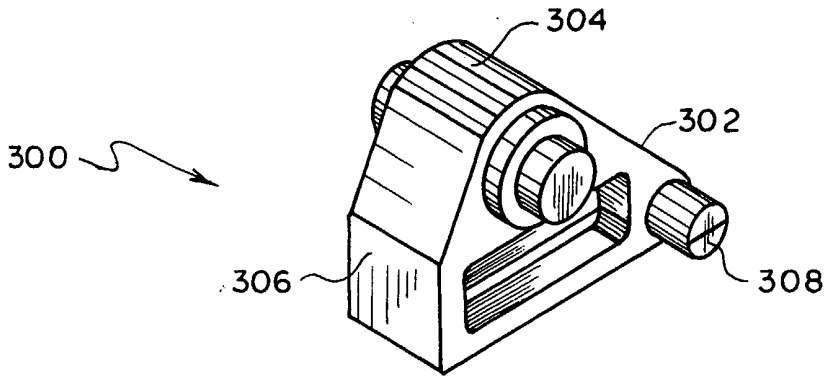

FIG. 12

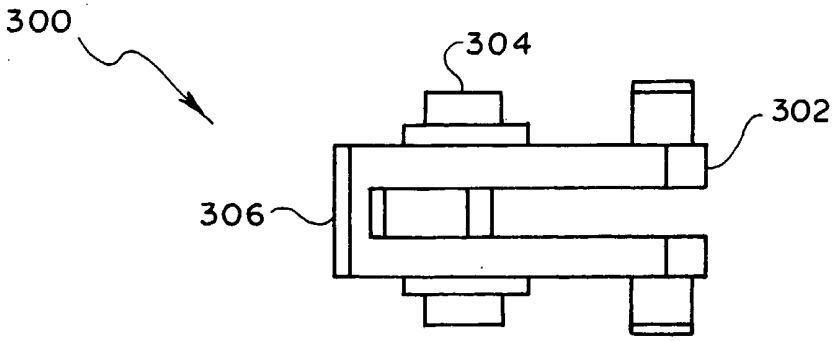

FIG. 13

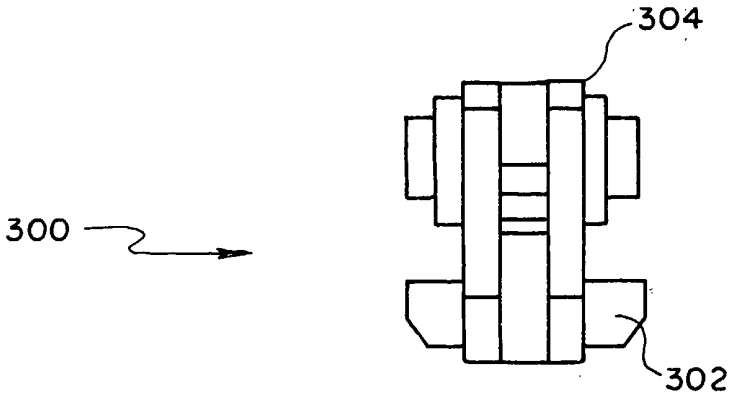

FIG. 14

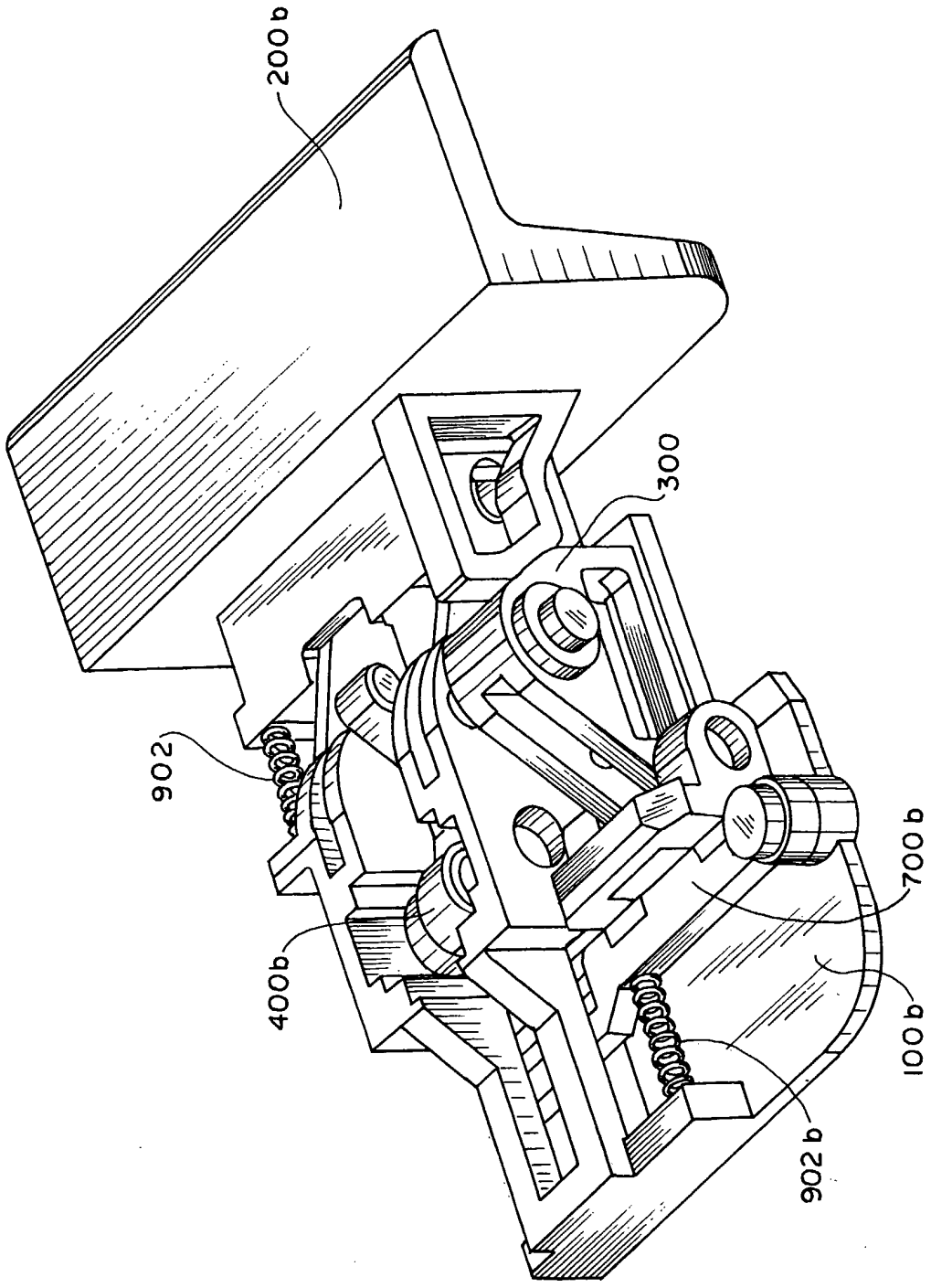

FIG. 15

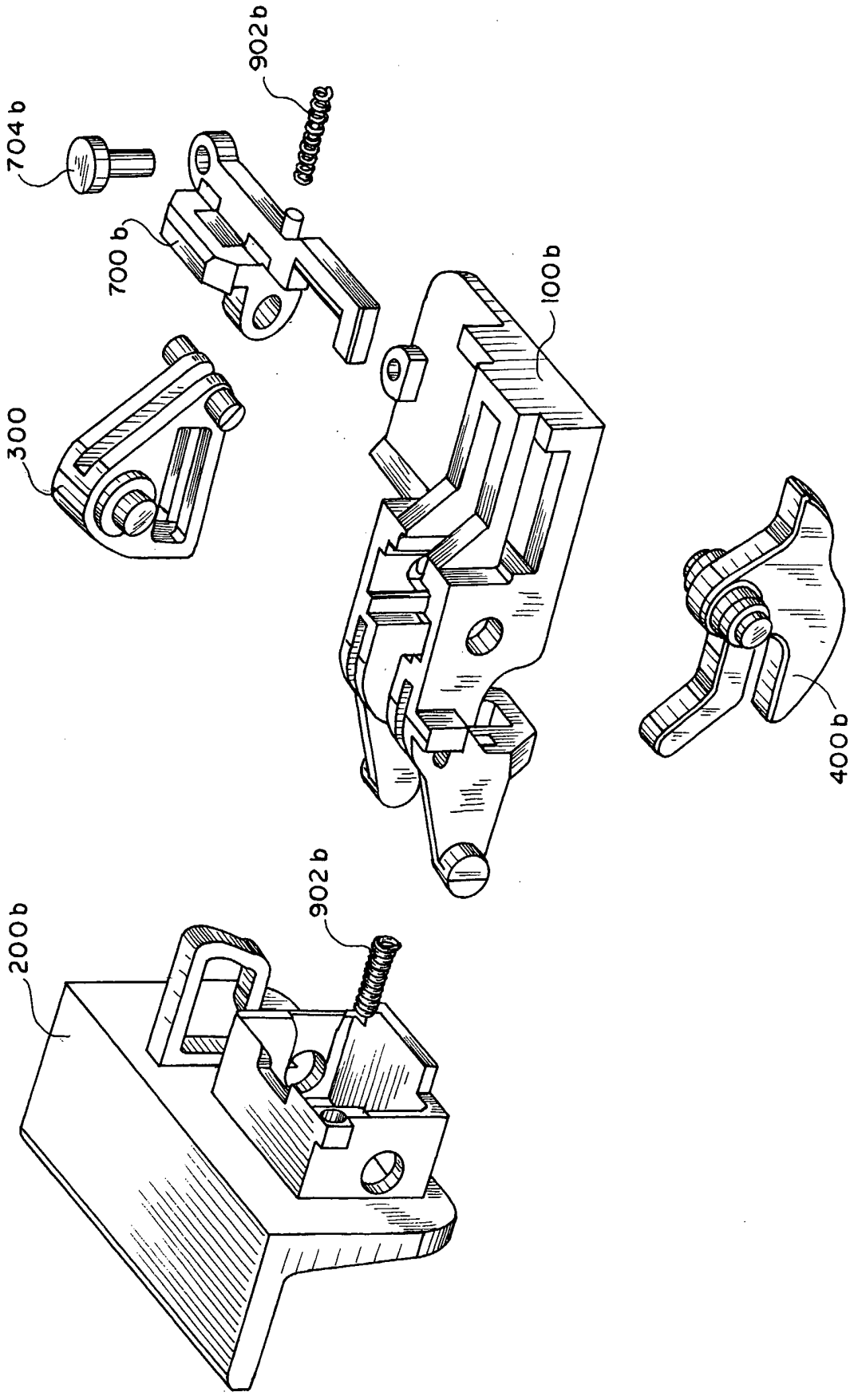

FIG. 16

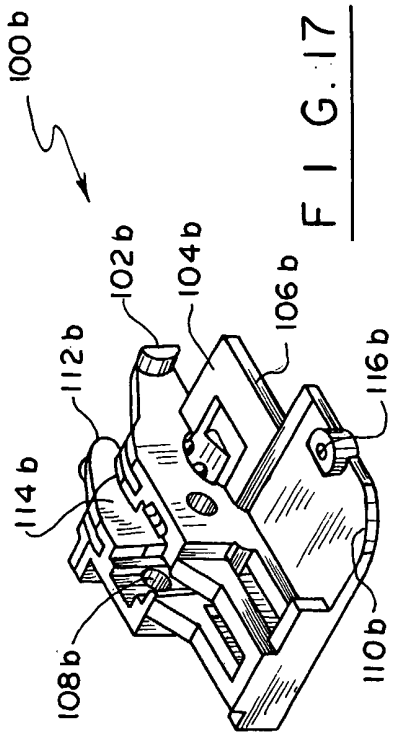

FIG. 17

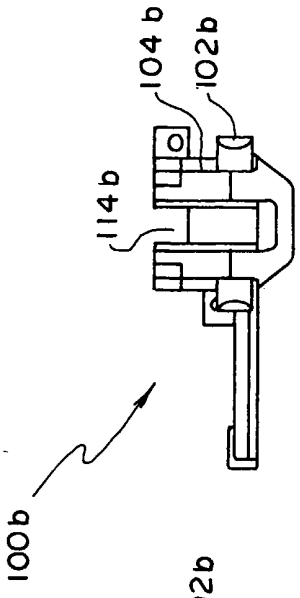

FIG. 22

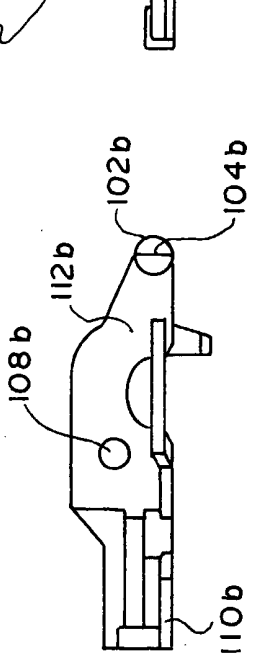

FIG. 21

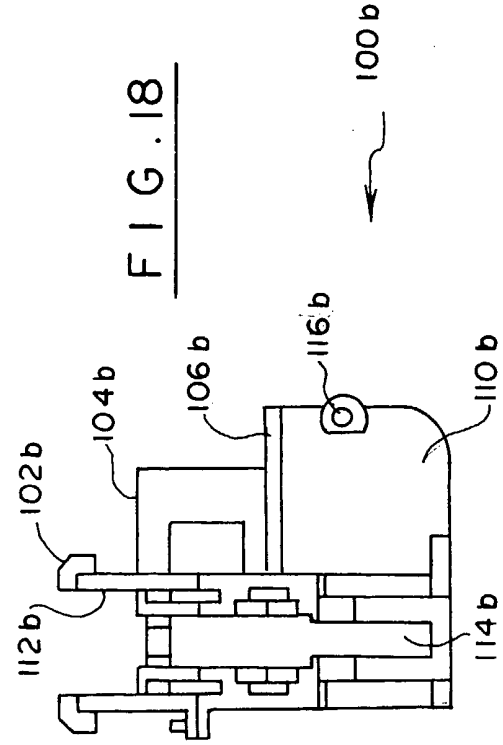

FIG. 18

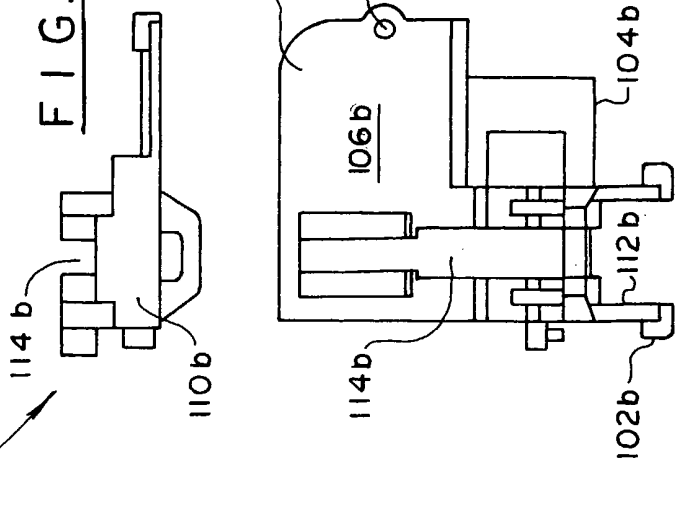

FIG. 19

FIG. 20

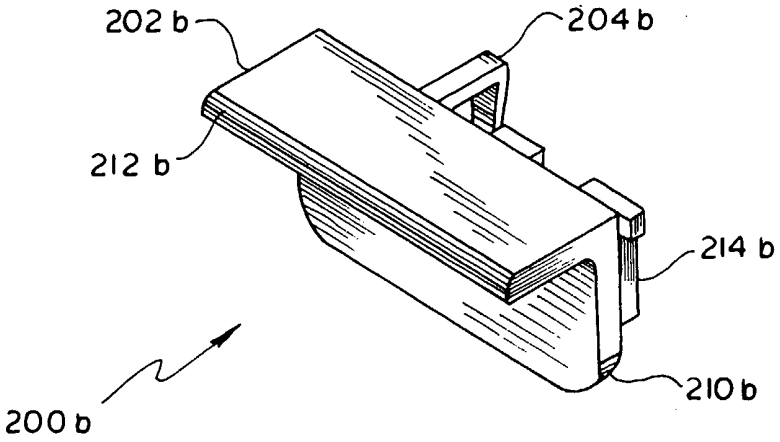

FIG. 23

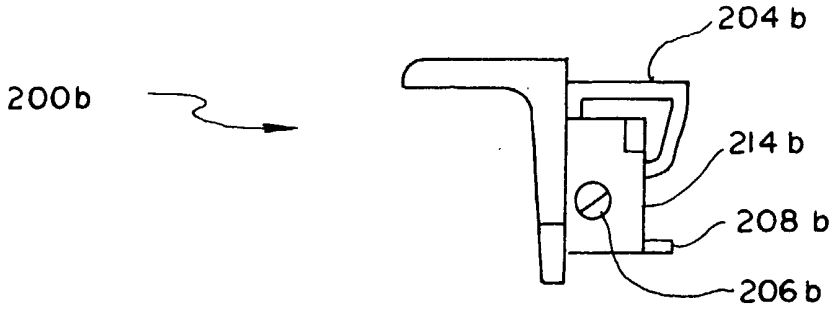

FIG. 24

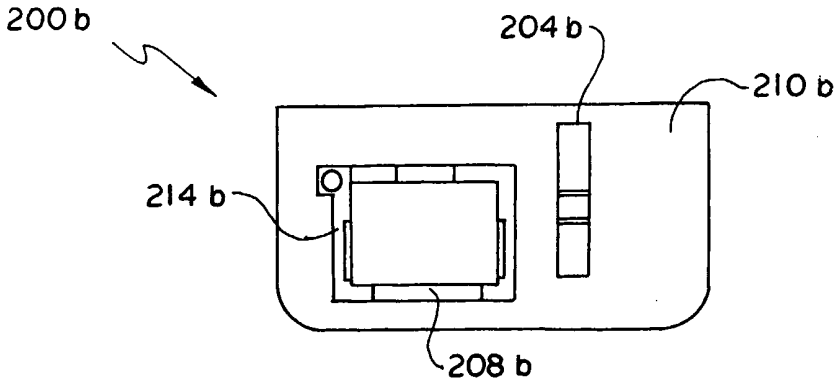

FIG. 25

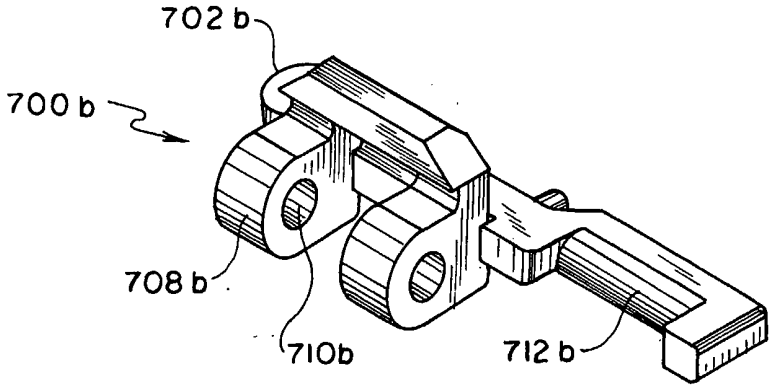

FIG. 26

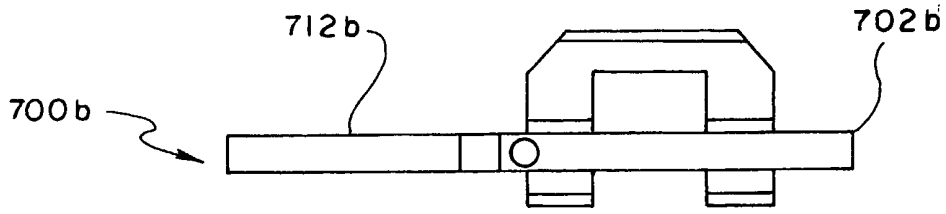

FIG. 27

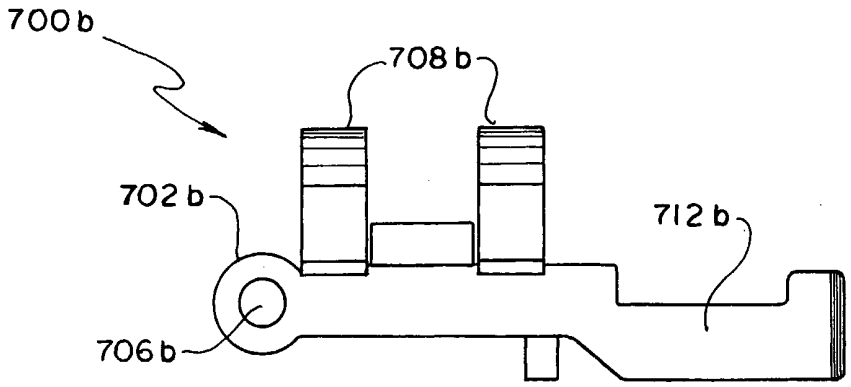

FIG. 28

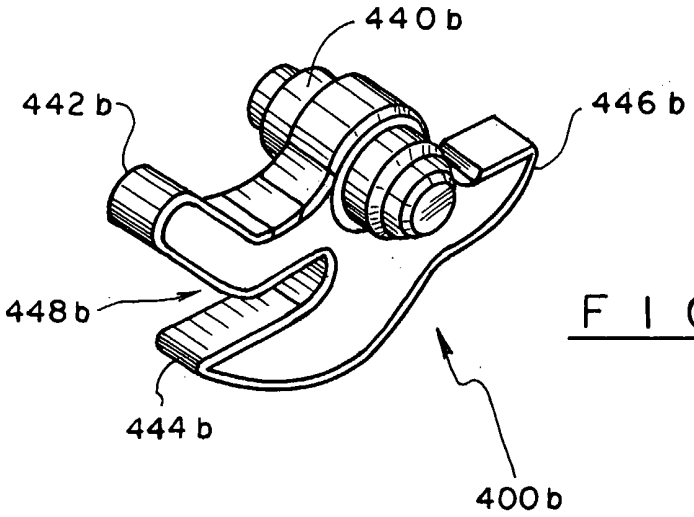

FIG. 29

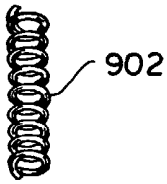

FIG. 32

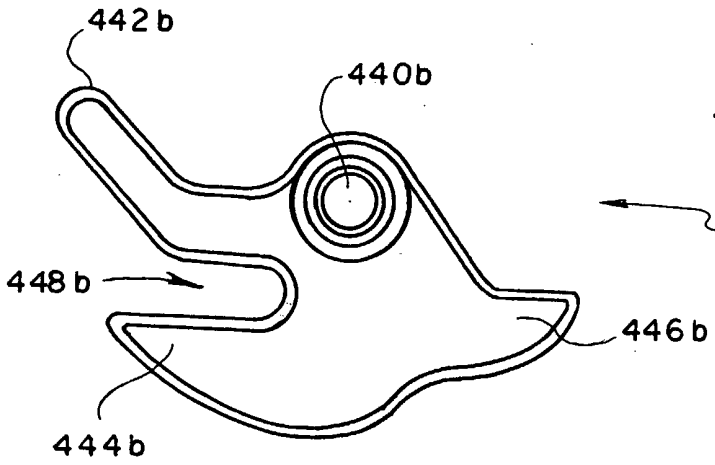

FIG. 30

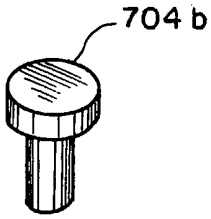

FIG. 33

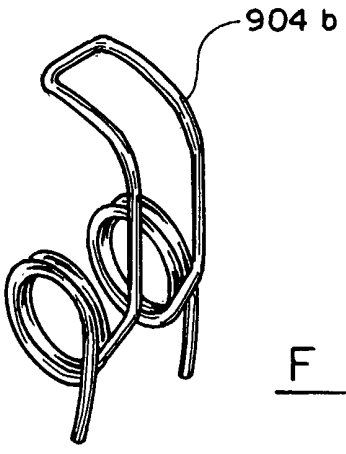

FIG. 31

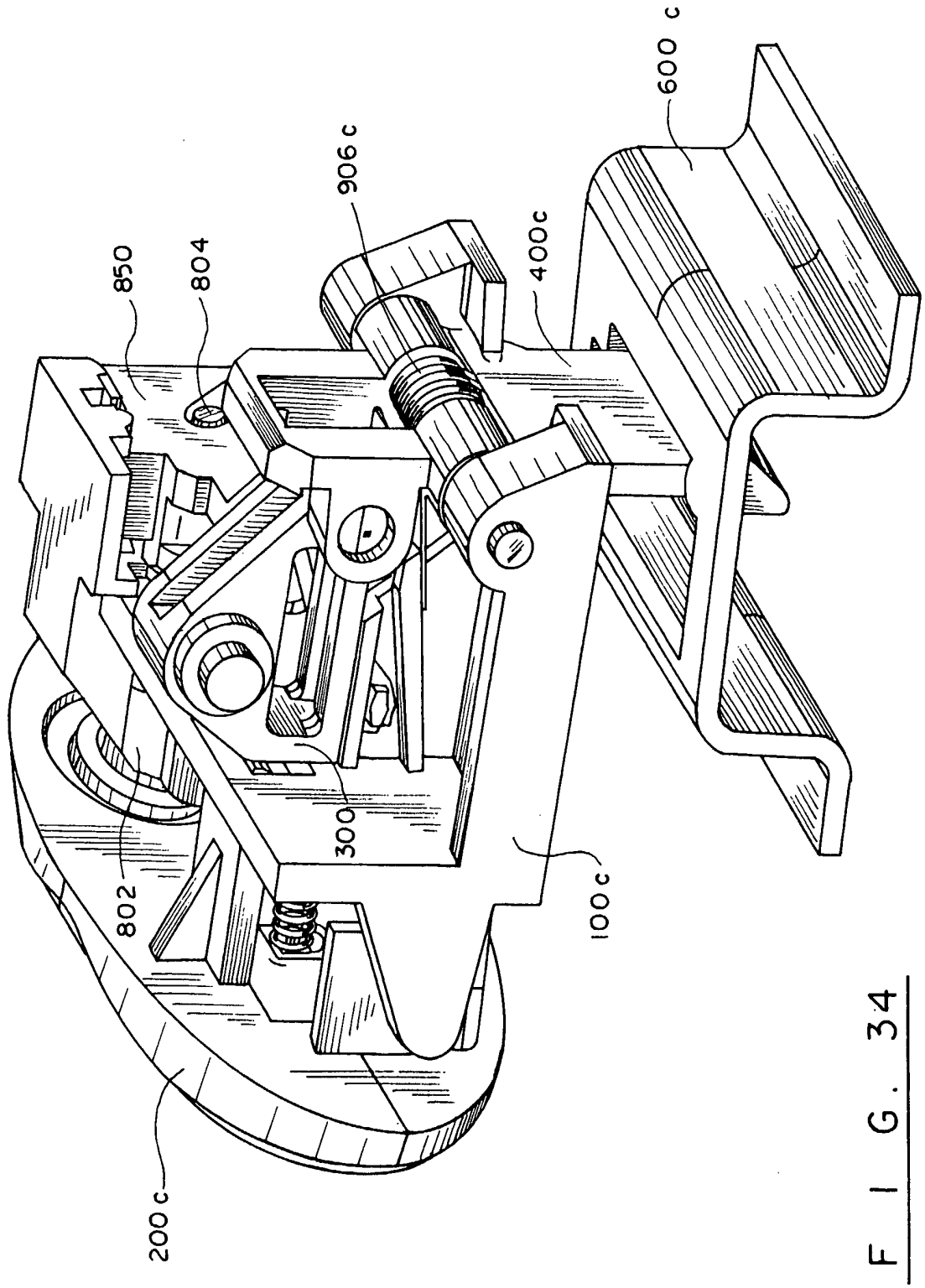

FIG. 34

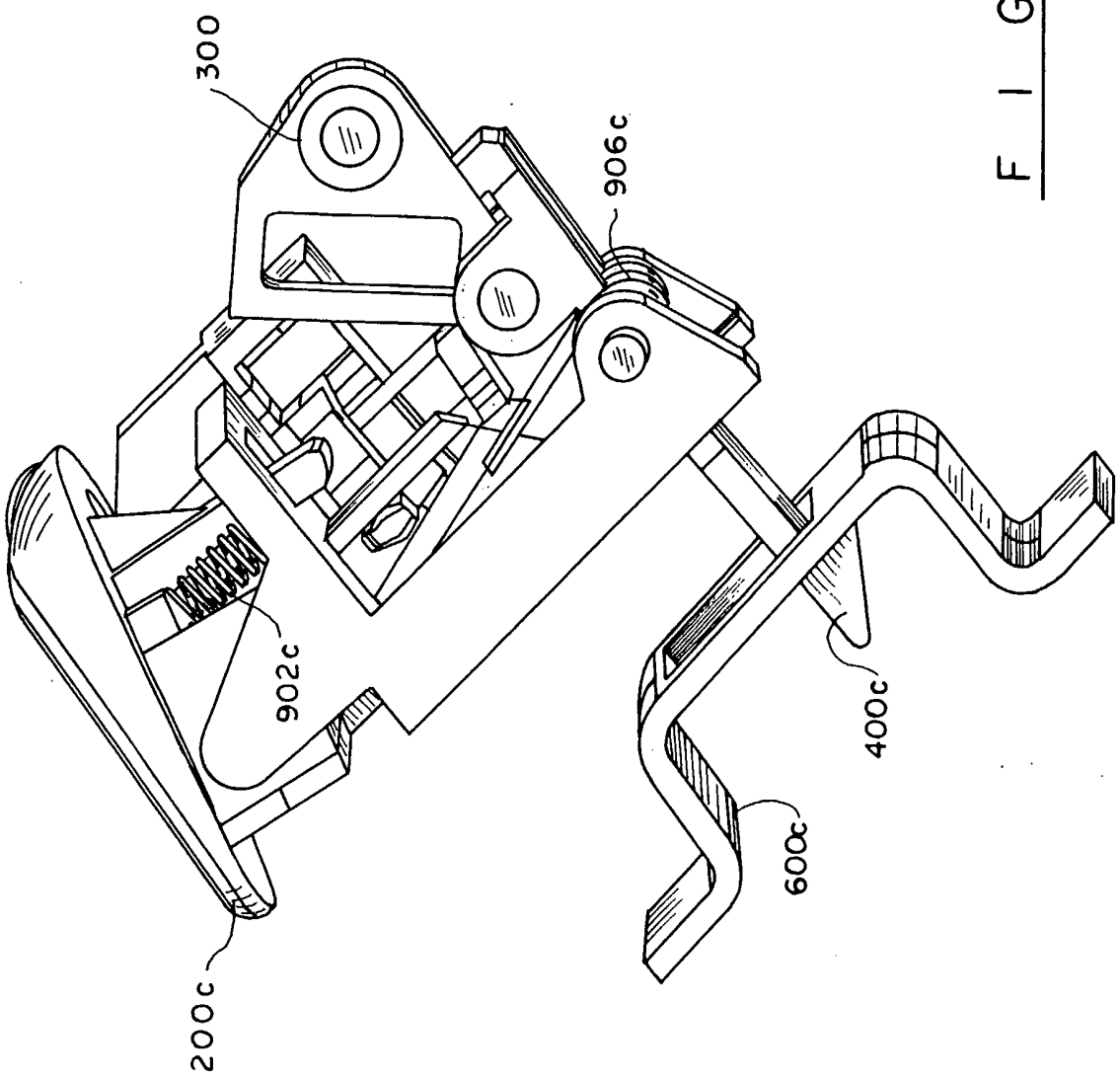

FIG. 35

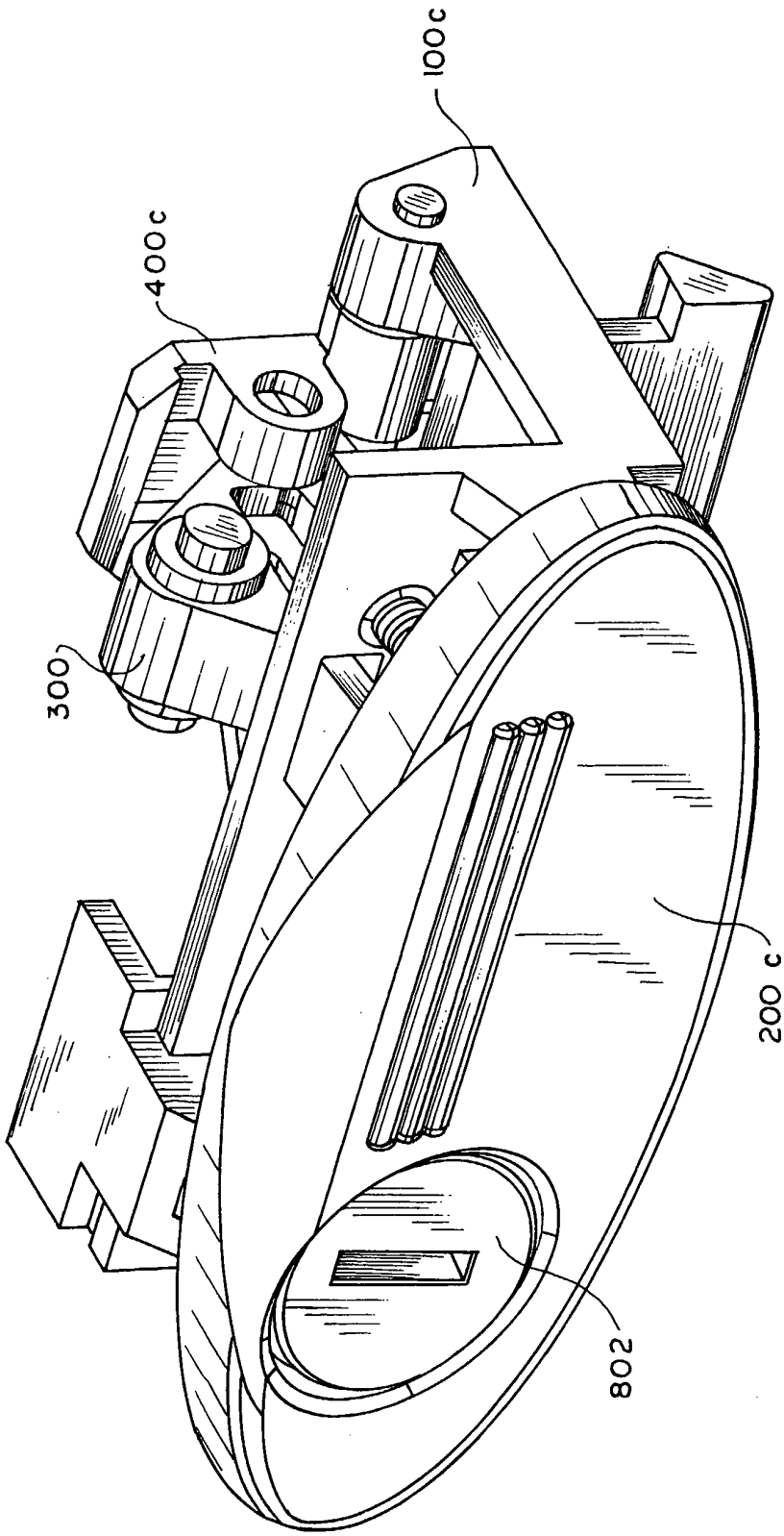

FIG. 36

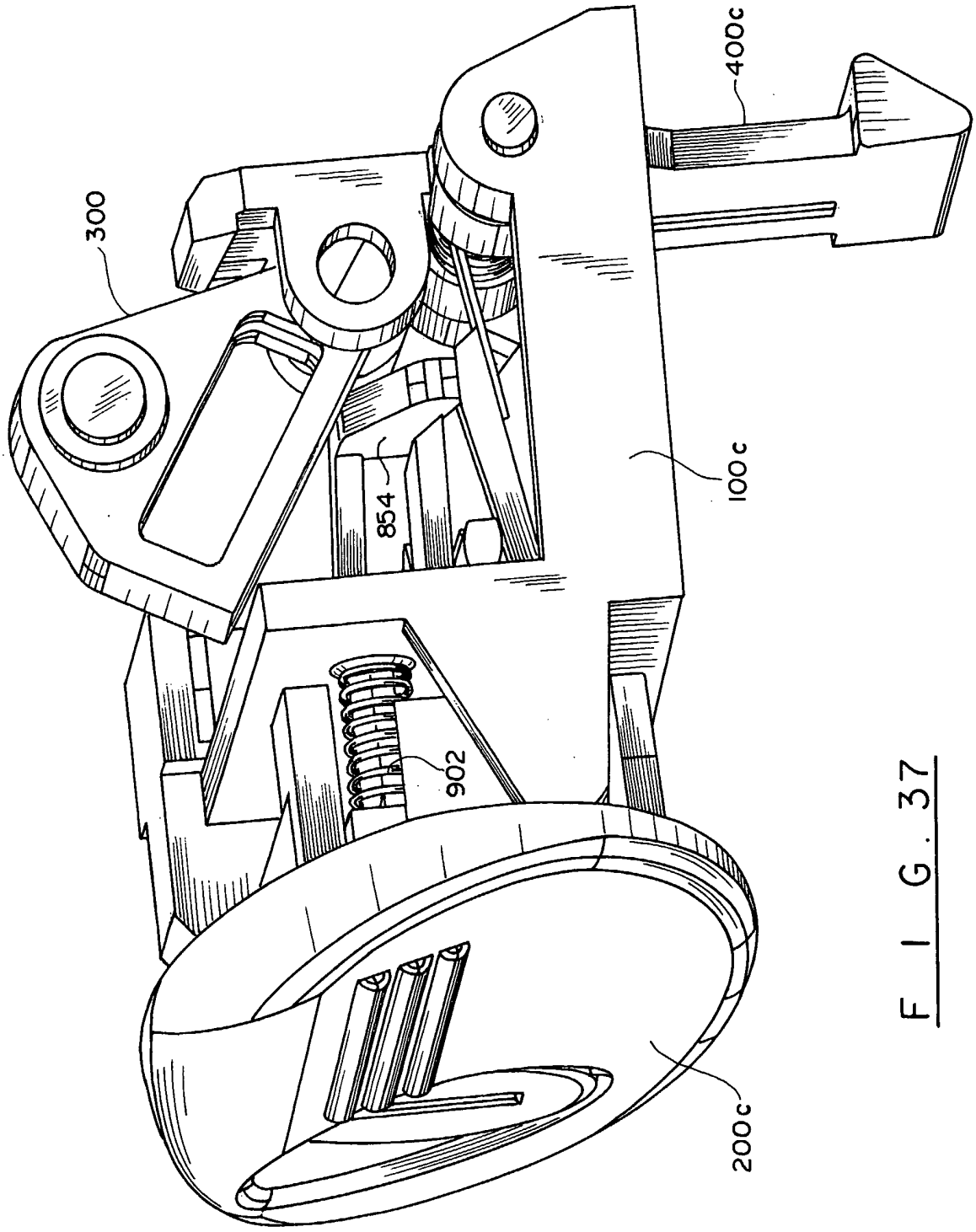

FIG. 37

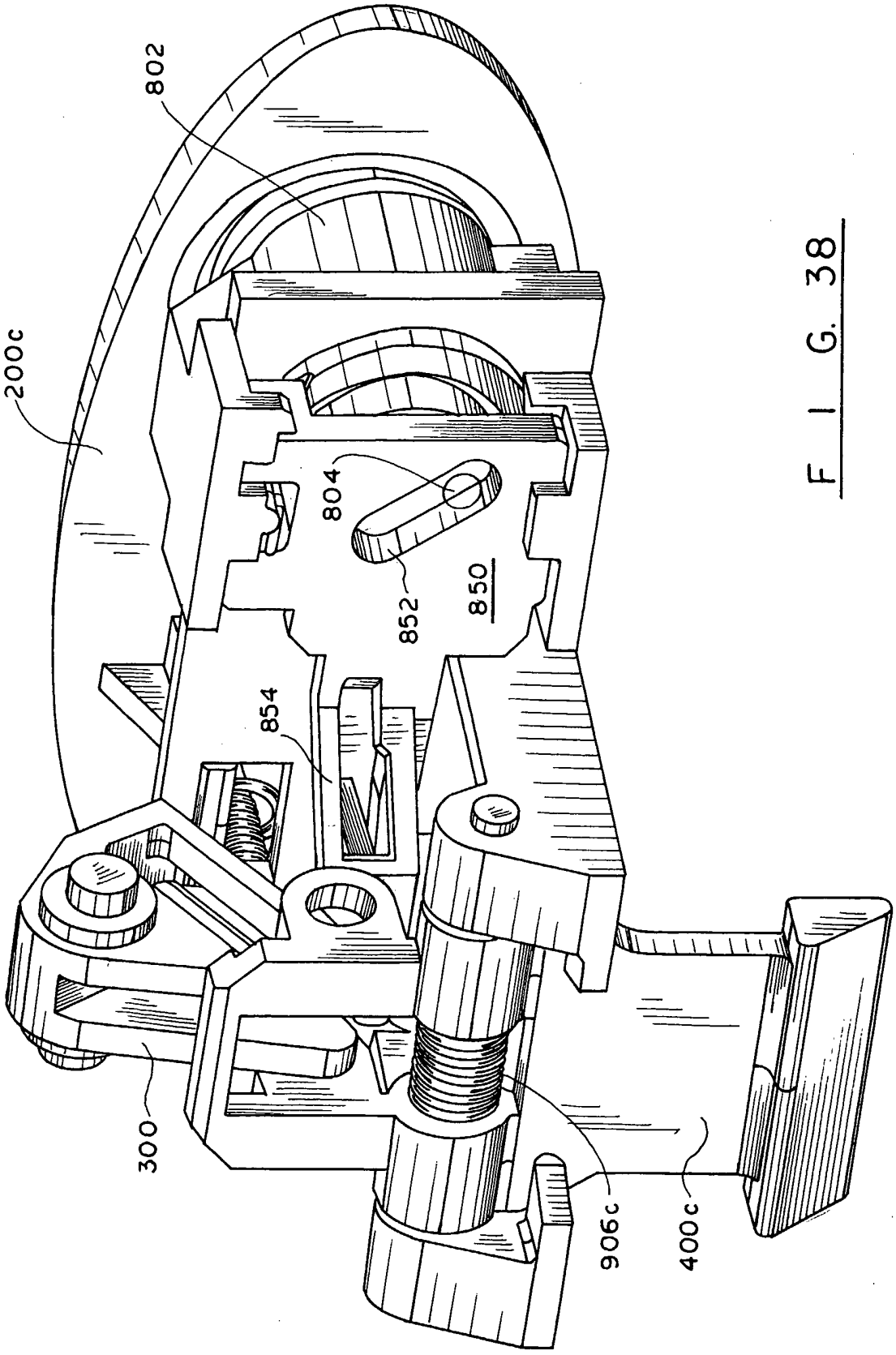

FIG. 38

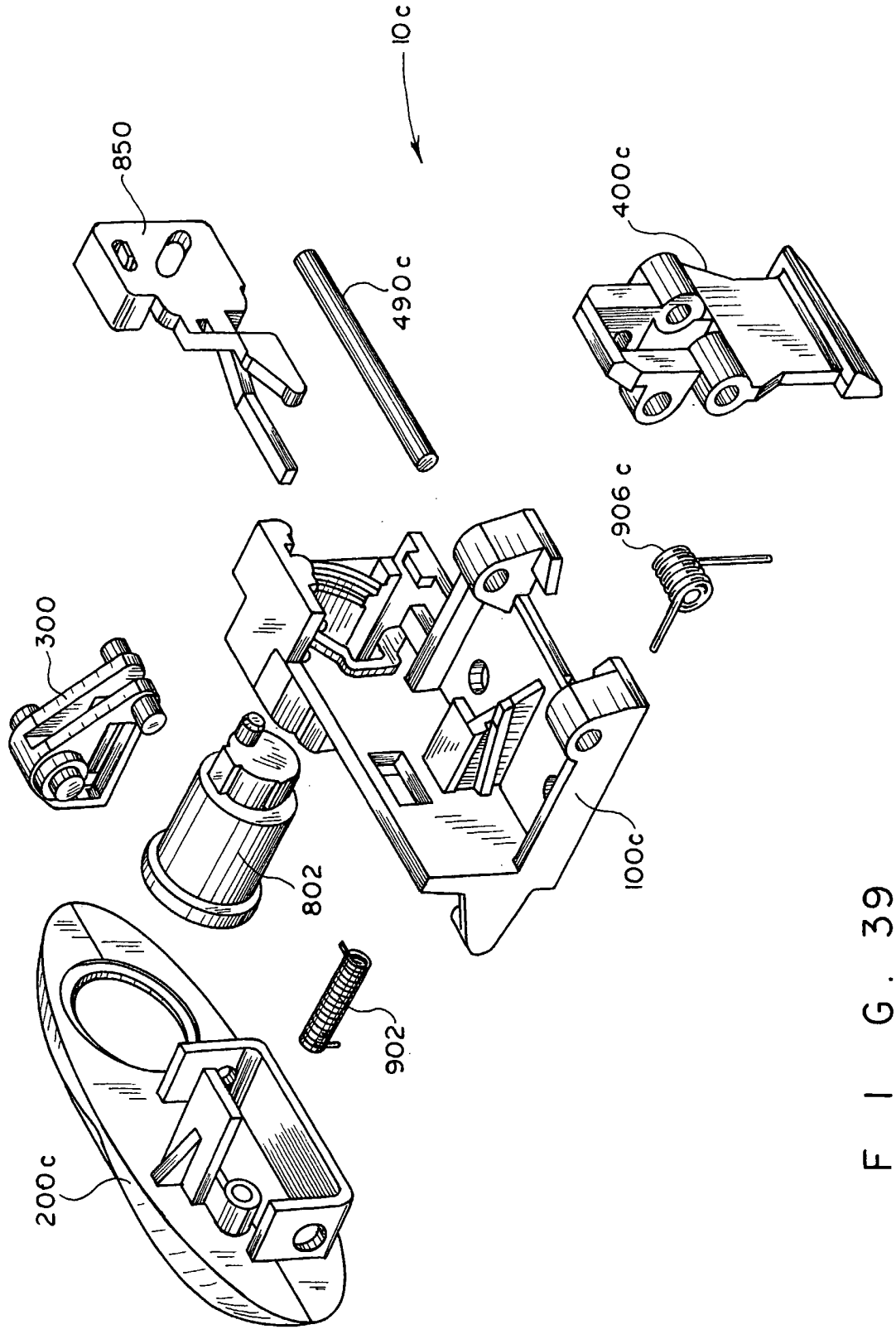

FIG. 39

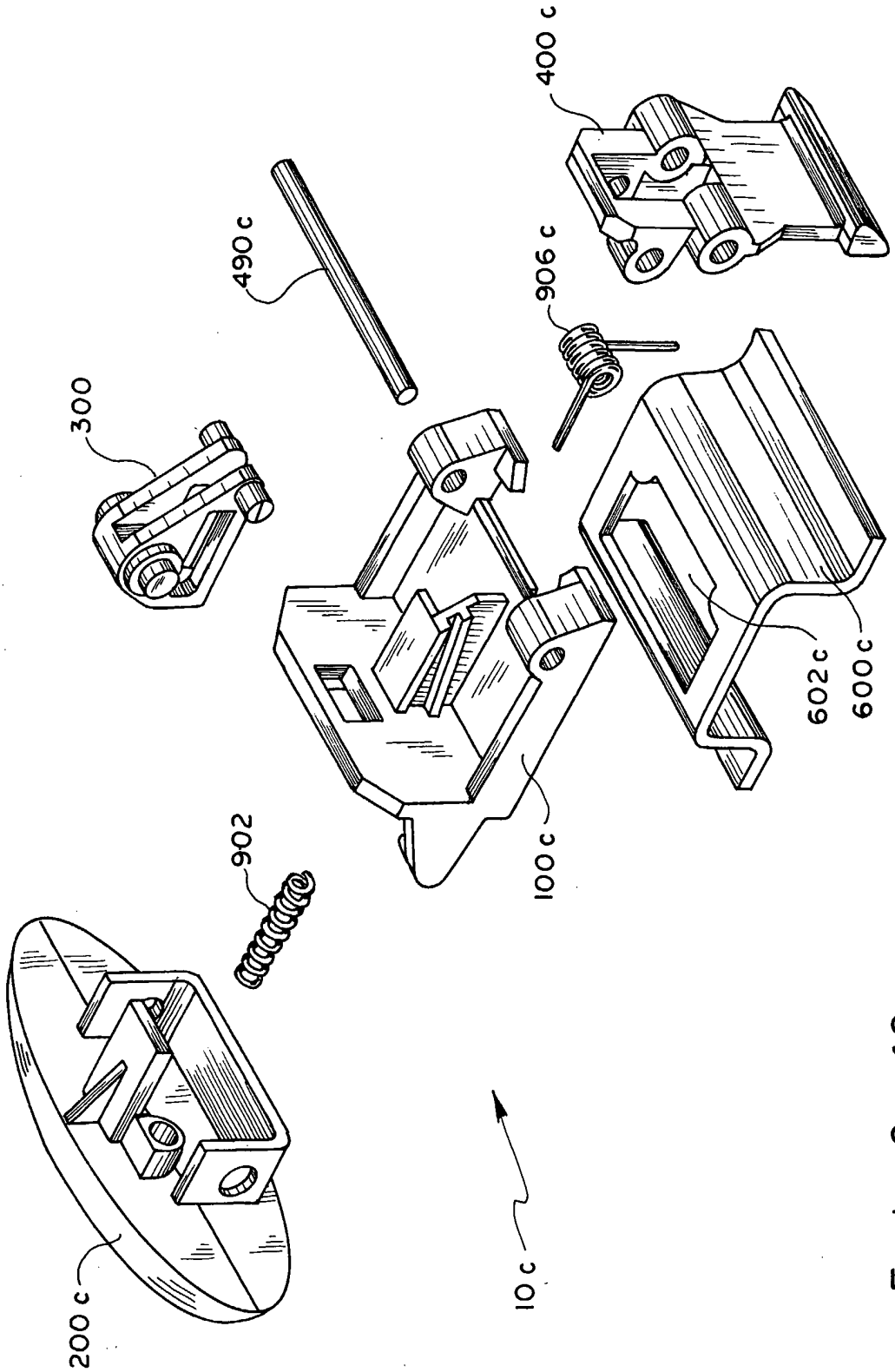

FIG. 40

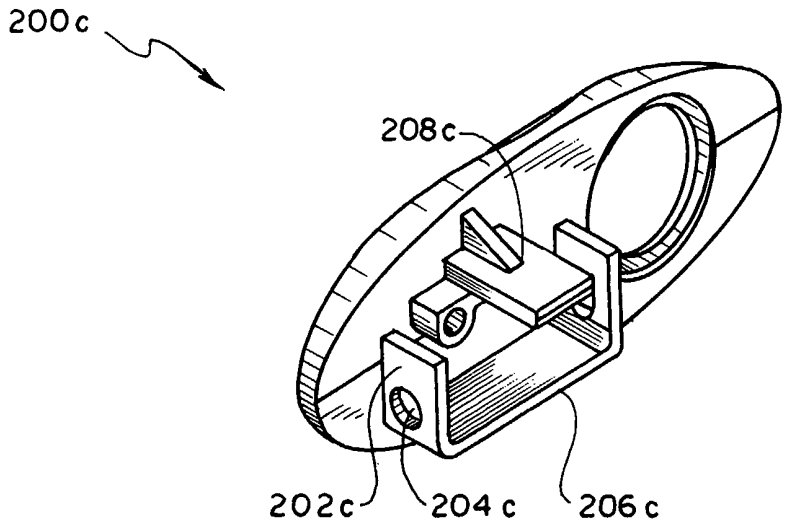

FIG. 41

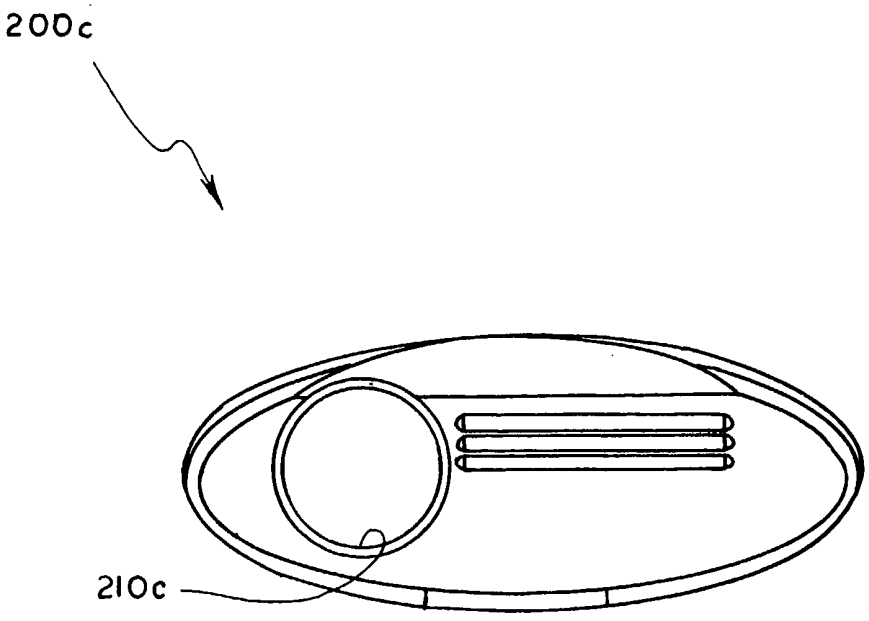

FIG. 42

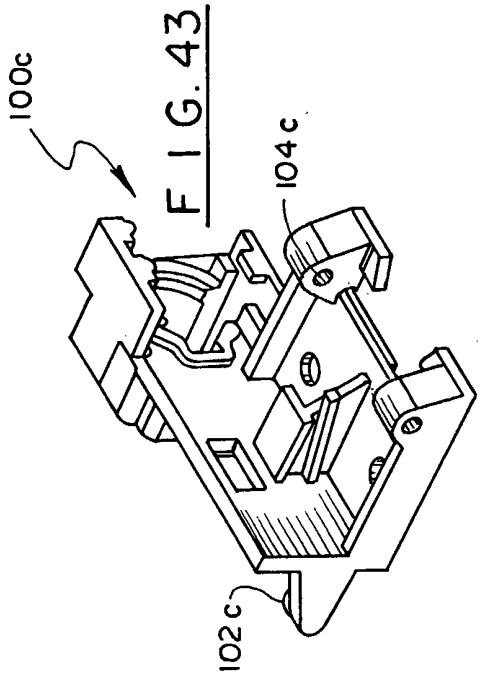

FIG. 43

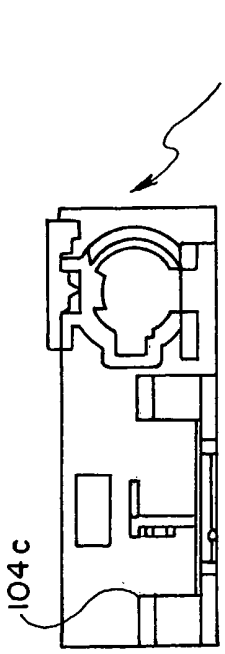

FIG. 47

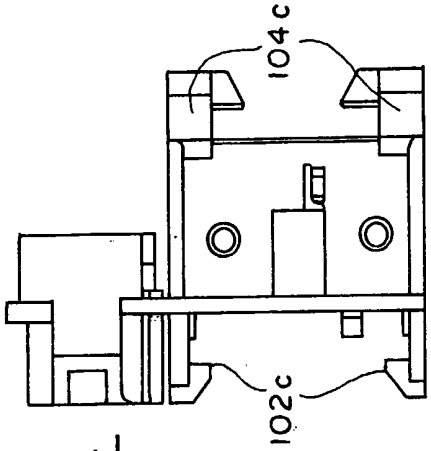

FIG. 44

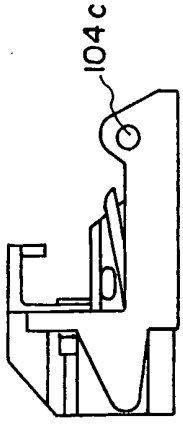

FIG. 46

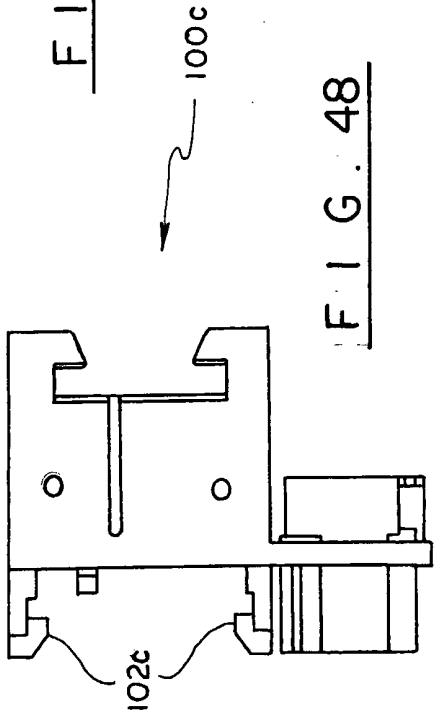

FIG. 48

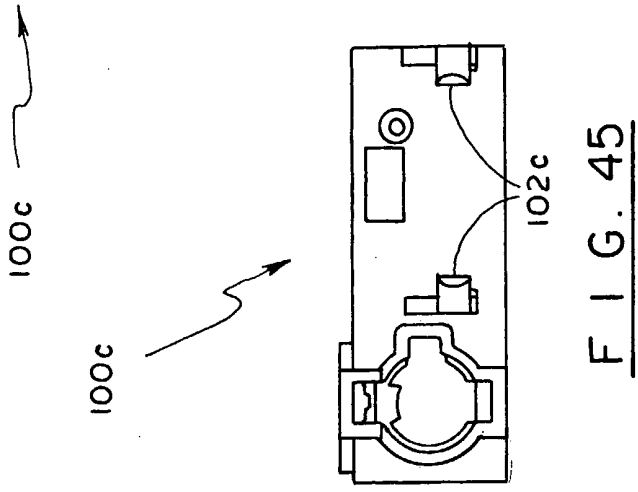

FIG. 45

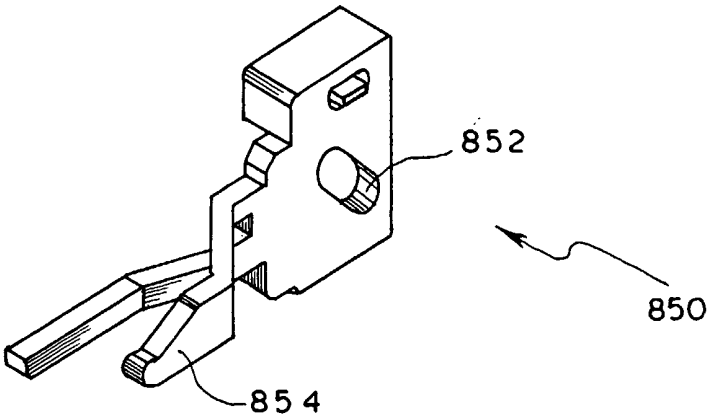

FIG. 49

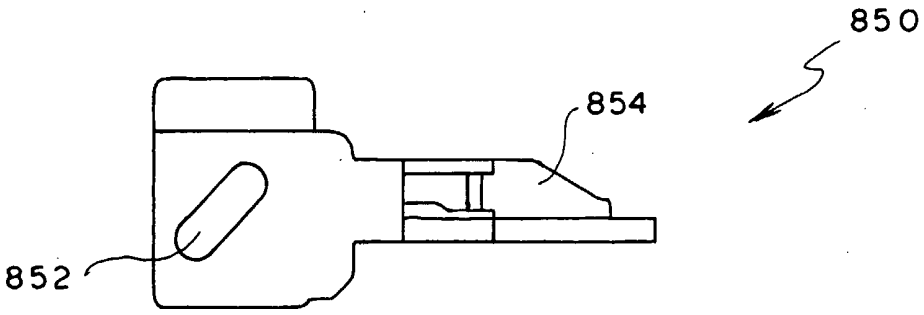

FIG. 50

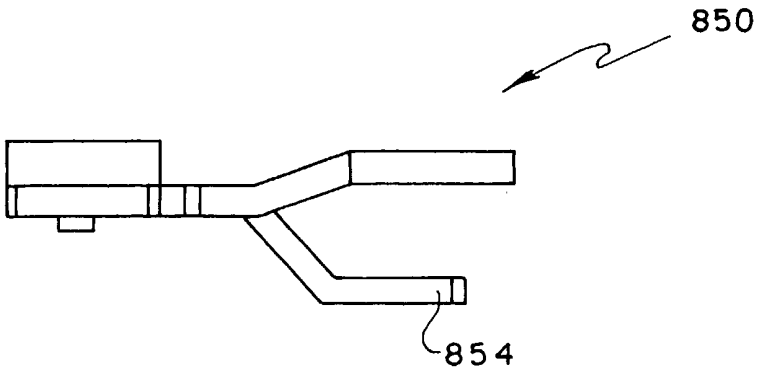

FIG. 51

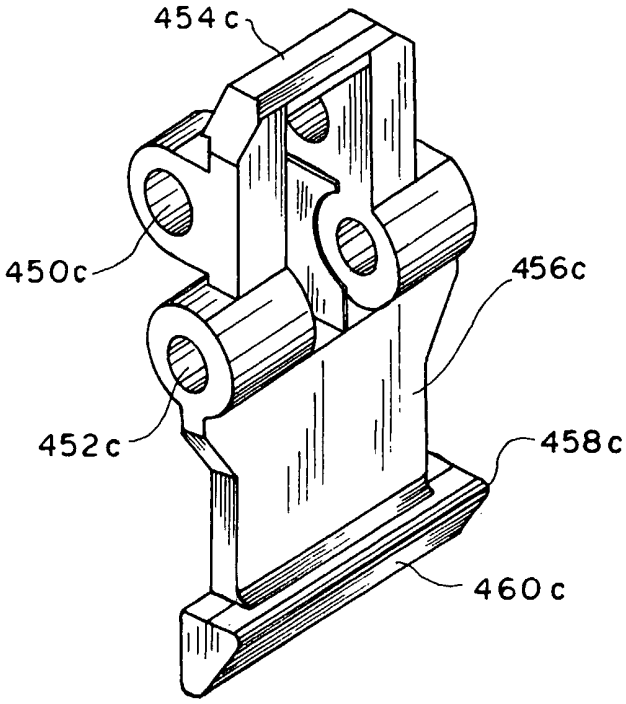
454c
400c
450c
456c
452c
458c
460c

FIG. 52

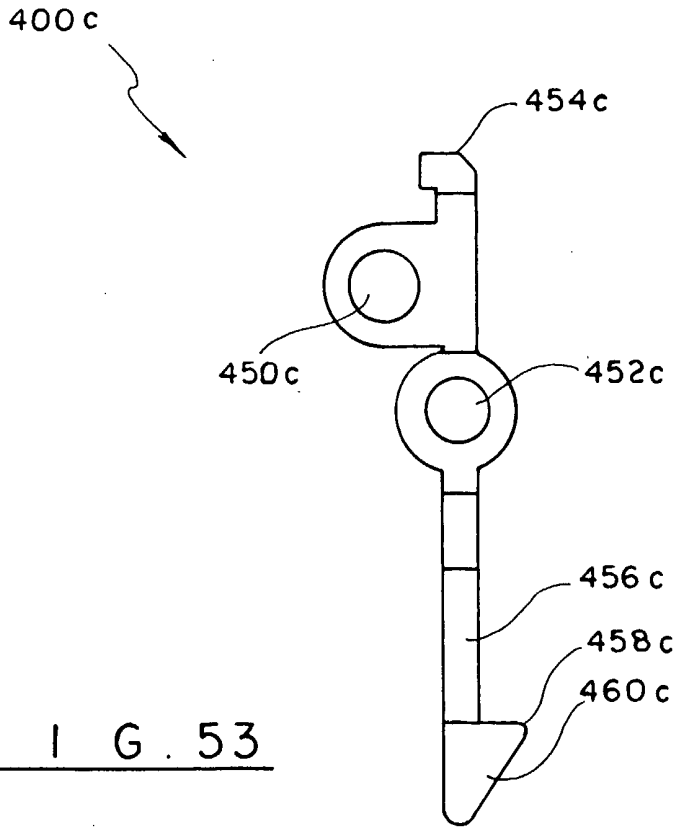
400c
454c
450c
452c
456c
458c
460c

FIG. 53

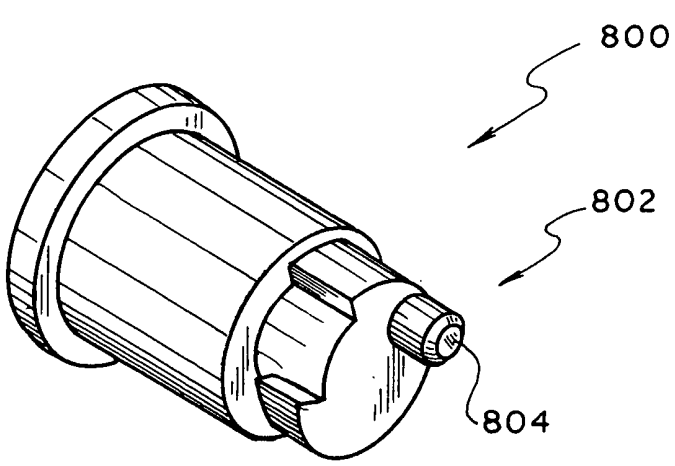

FIG. 54

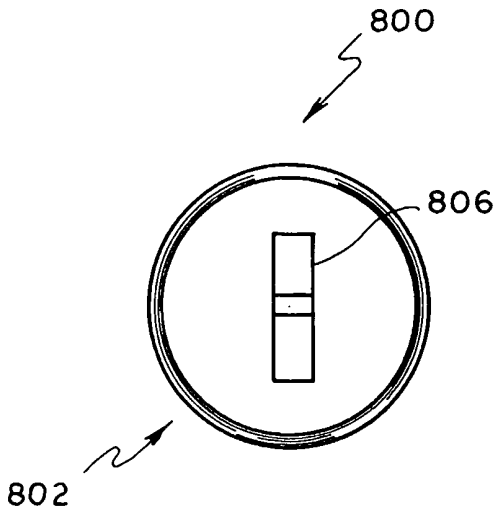

FIG. 55

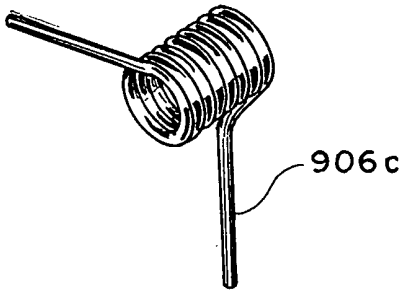

FIG. 56

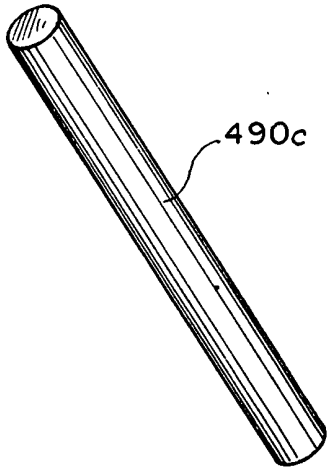

FIG. 57