



(19) **United States**

(12) **Patent Application Publication**
Peabody et al.

(10) **Pub. No.: US 2019/0330886 A1**

(43) **Pub. Date: Oct. 31, 2019**

(54) **ELECTRIC STRIKE FOR INTERLOCKING LATCH MECHANISM**

Publication Classification

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(51) **Int. Cl.**
E05B 47/00 (2006.01)
E05B 15/02 (2006.01)

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(52) **U.S. Cl.**
CPC .. *E05B 47/0046* (2013.01); *E05B 2047/0076* (2013.01); *E05B 15/0205* (2013.01)

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(57) **ABSTRACT**

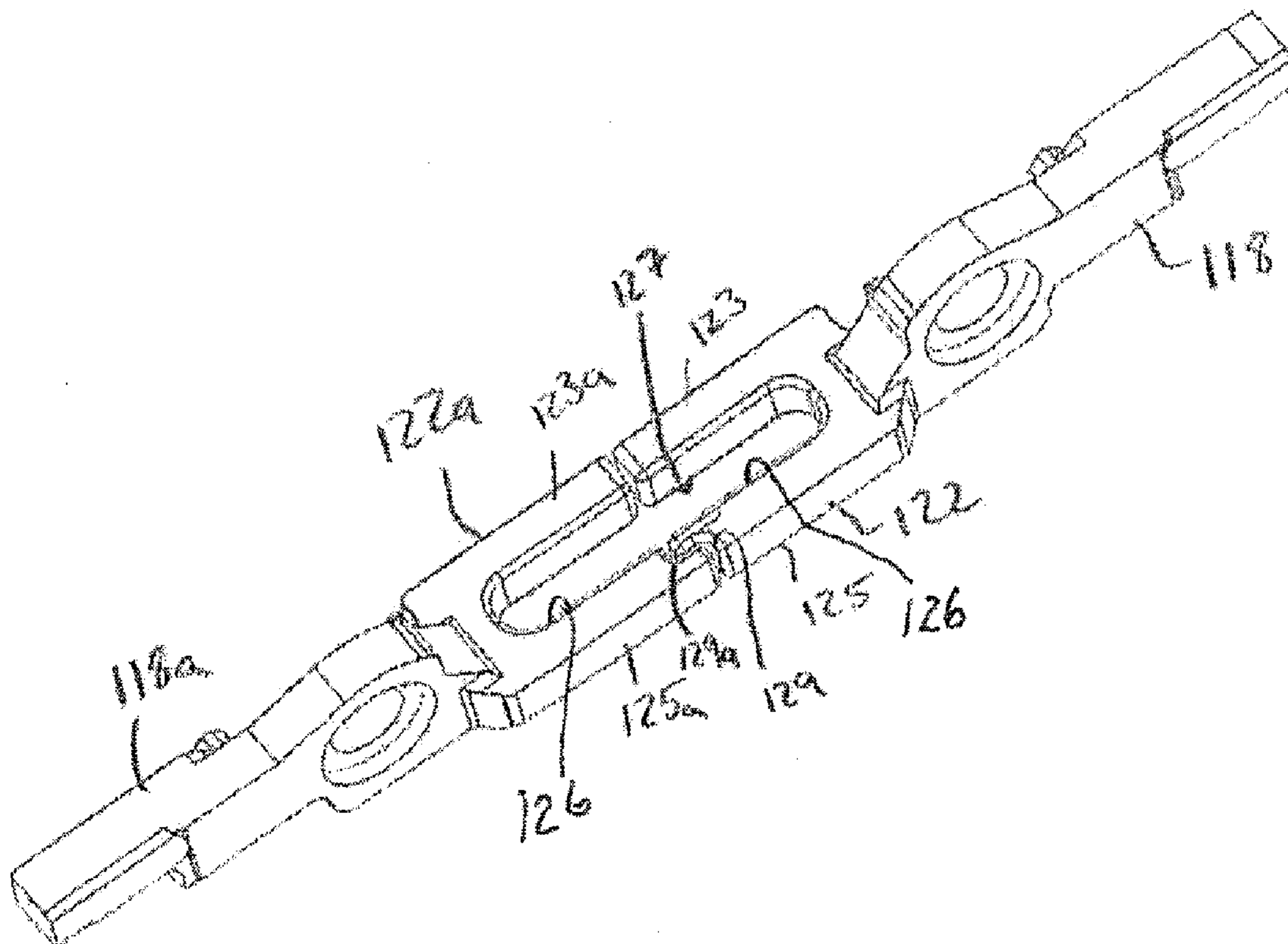
(21) Appl. No.: **16/397,667**

An electric door strike assembly includes a housing and at least one keeper arm. The housing has an opening for admission and retraction of a door latch. The at least one keeper arm has a latch portion and is mounted on the housing. The at least one keeper arm is movable between a closed position, where the opening is occluded by the latch portion, and an open position, where the door latch may be released from the opening. The latch portion may include a bifurcated member having inside and outside legs arranged in spaced parallel relation so as to define a gap therebetween. The gap is configured to receive a latch plate of an interlocking latch mechanism when the at least one keeper arm is in the closed position.

(22) Filed: **Apr. 29, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/664,627, filed on Apr. 30, 2018.



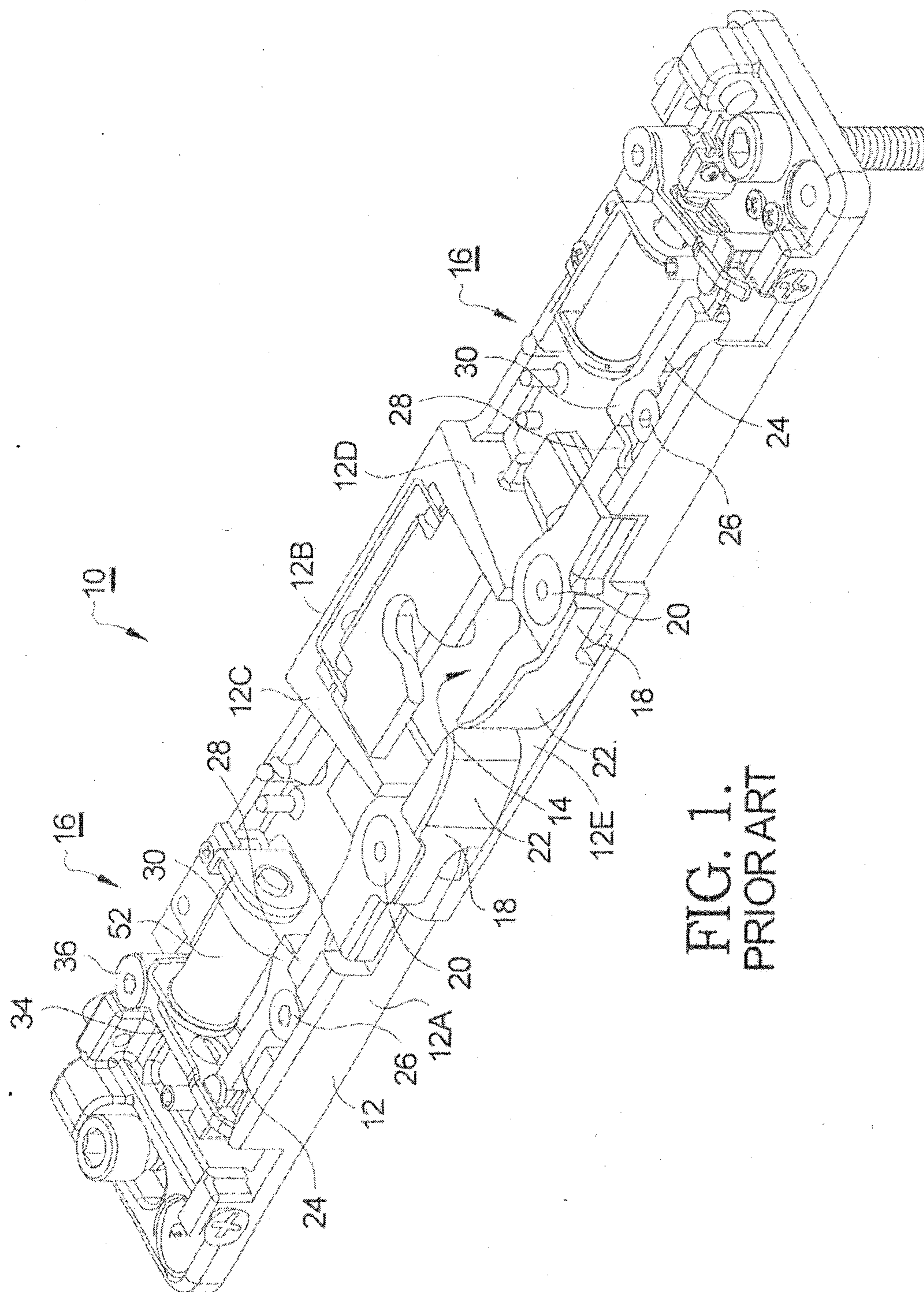


FIG. 1.
PRIOR ART

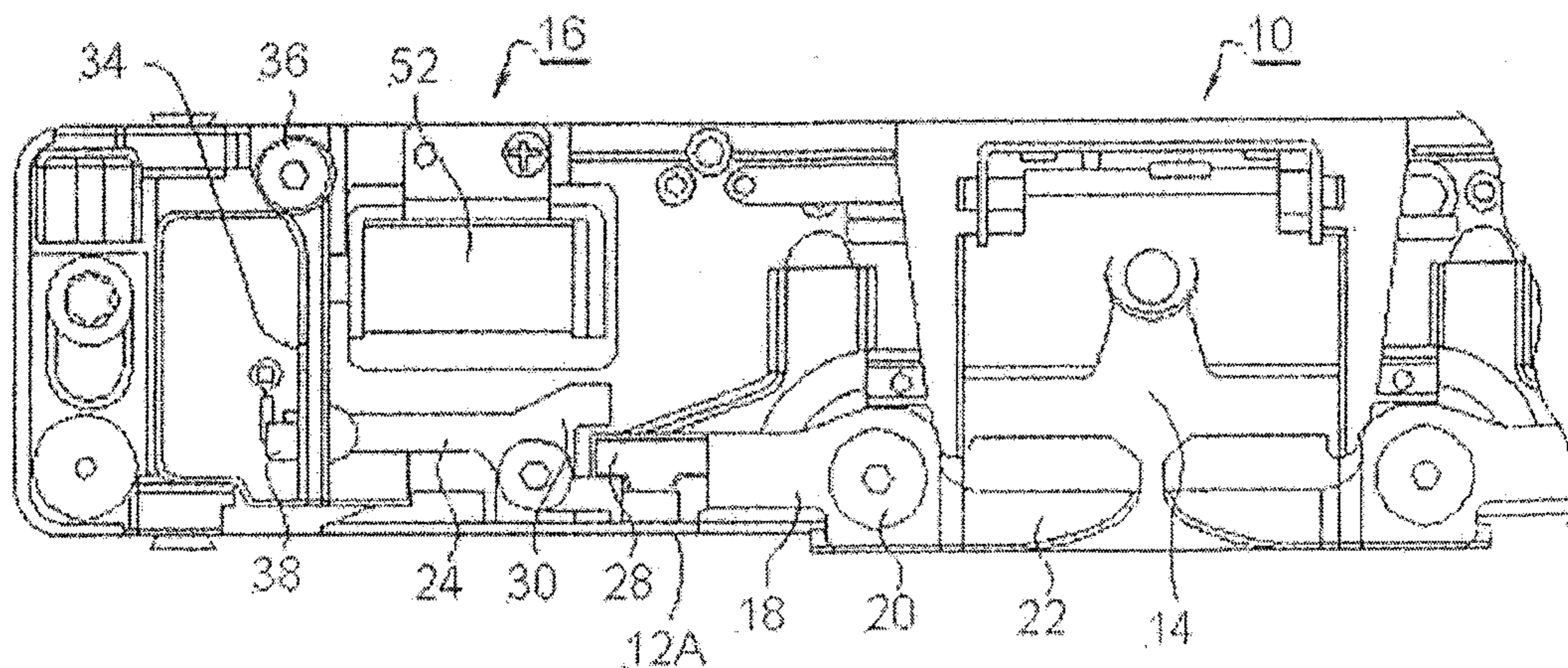


FIG. 2.
PRIOR ART

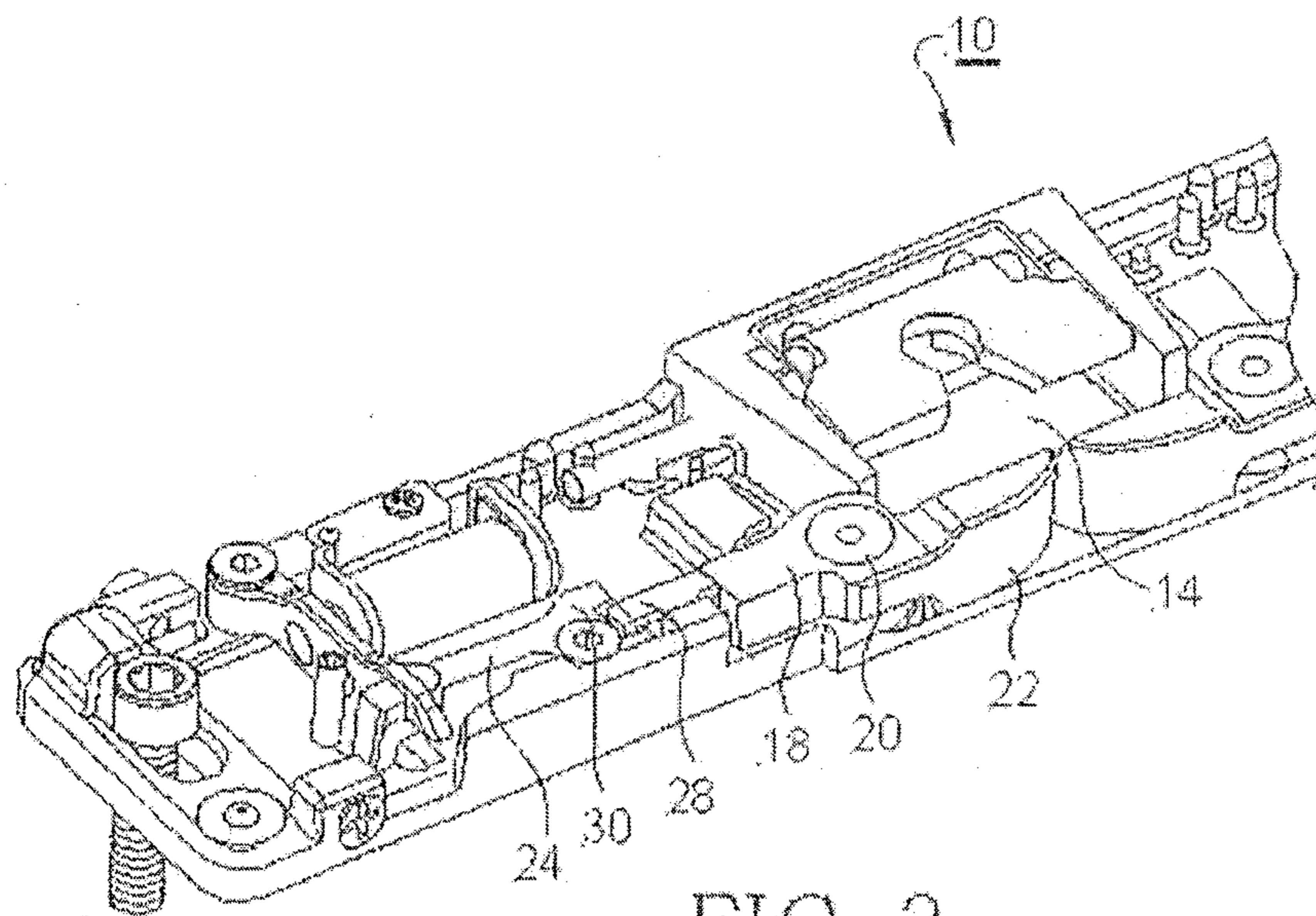
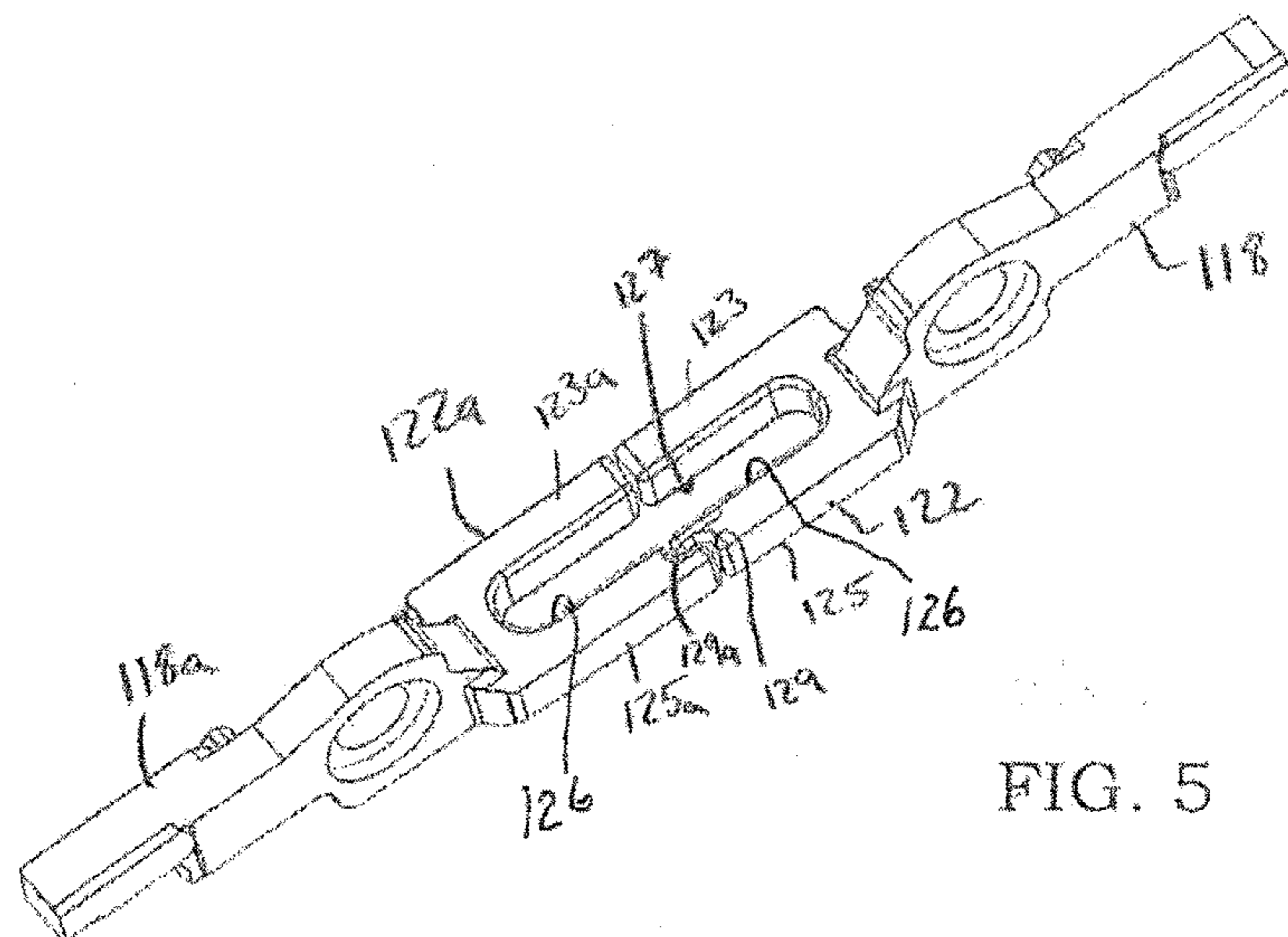
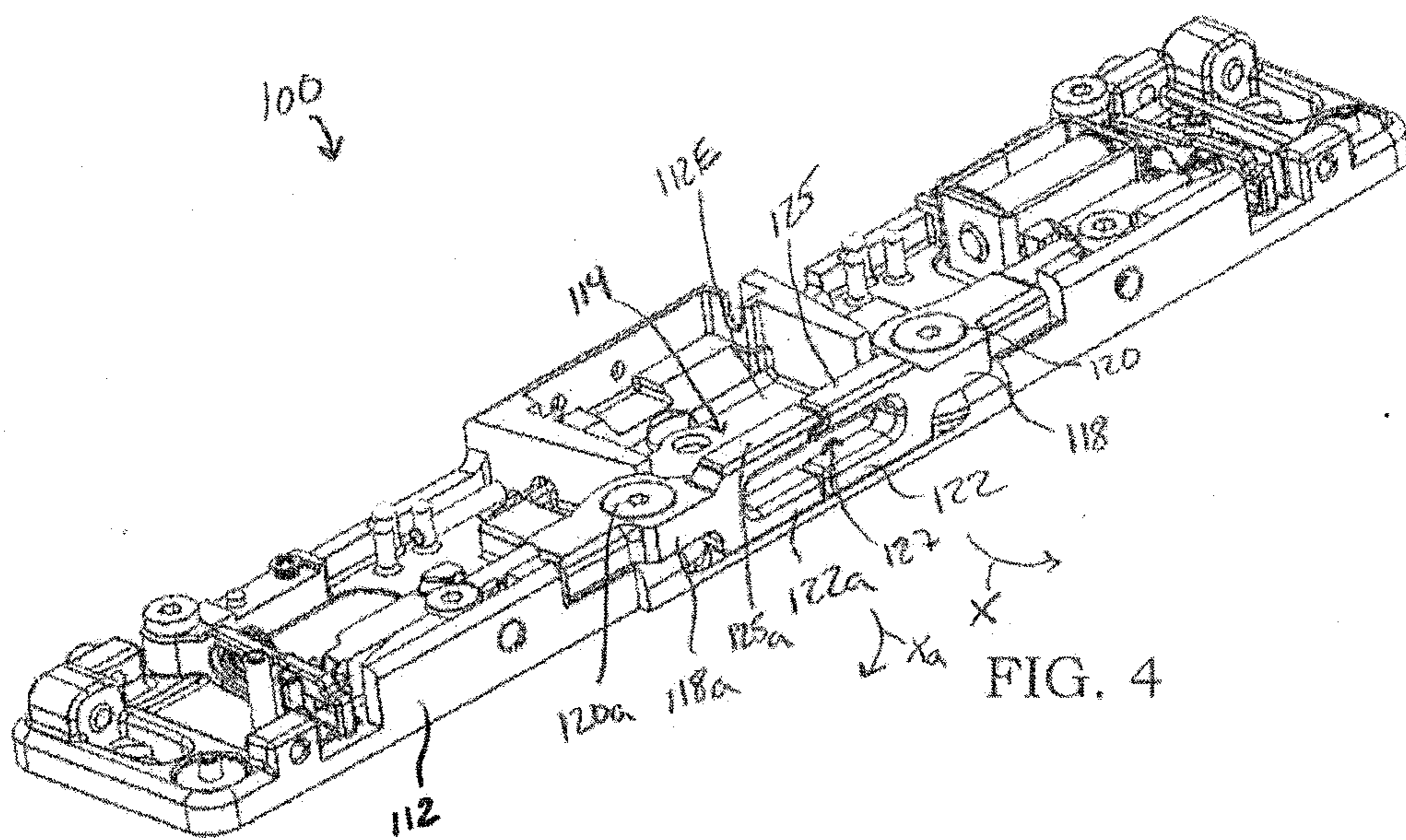


FIG. 3.
PRIOR ART



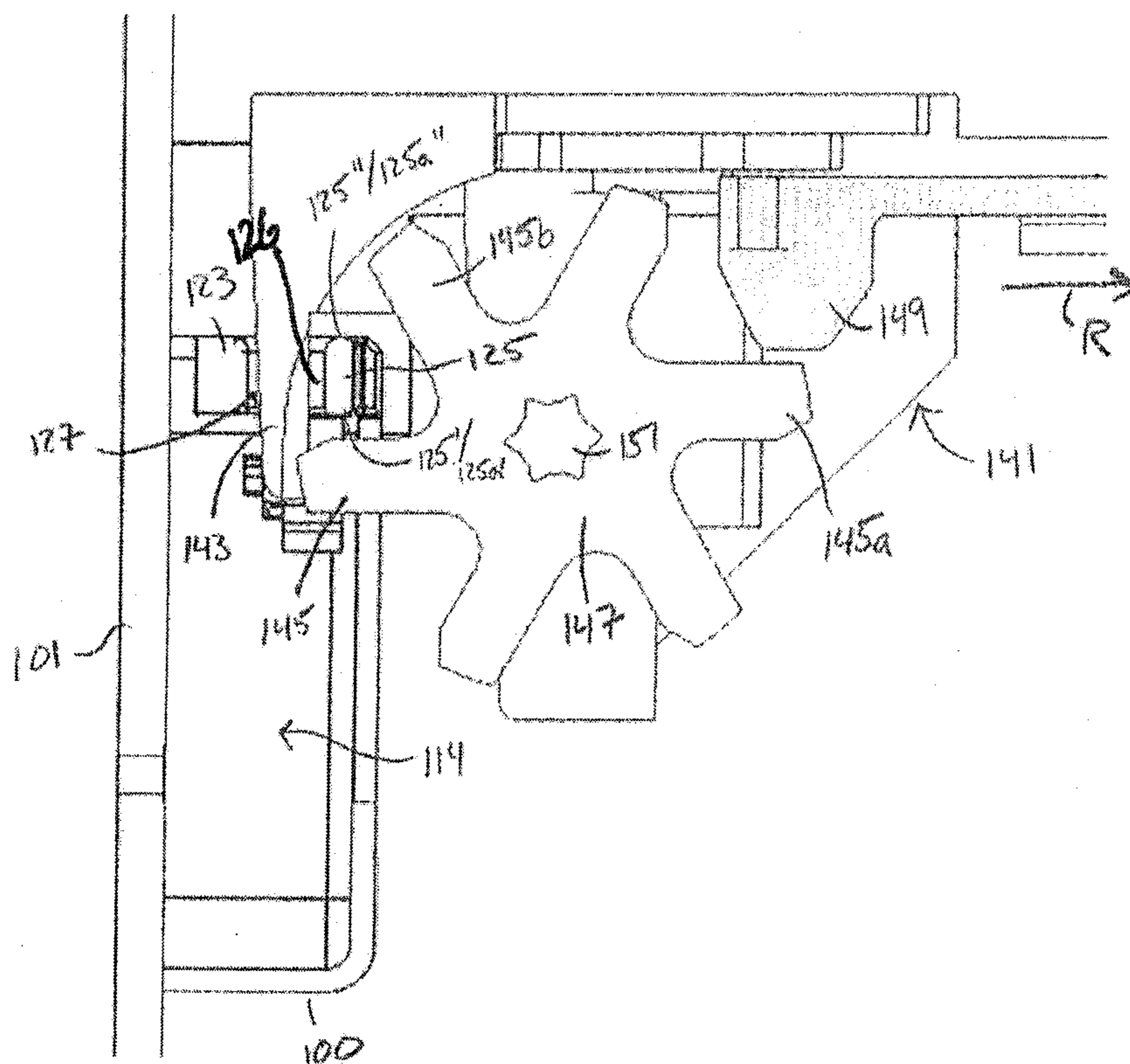


FIG. 6

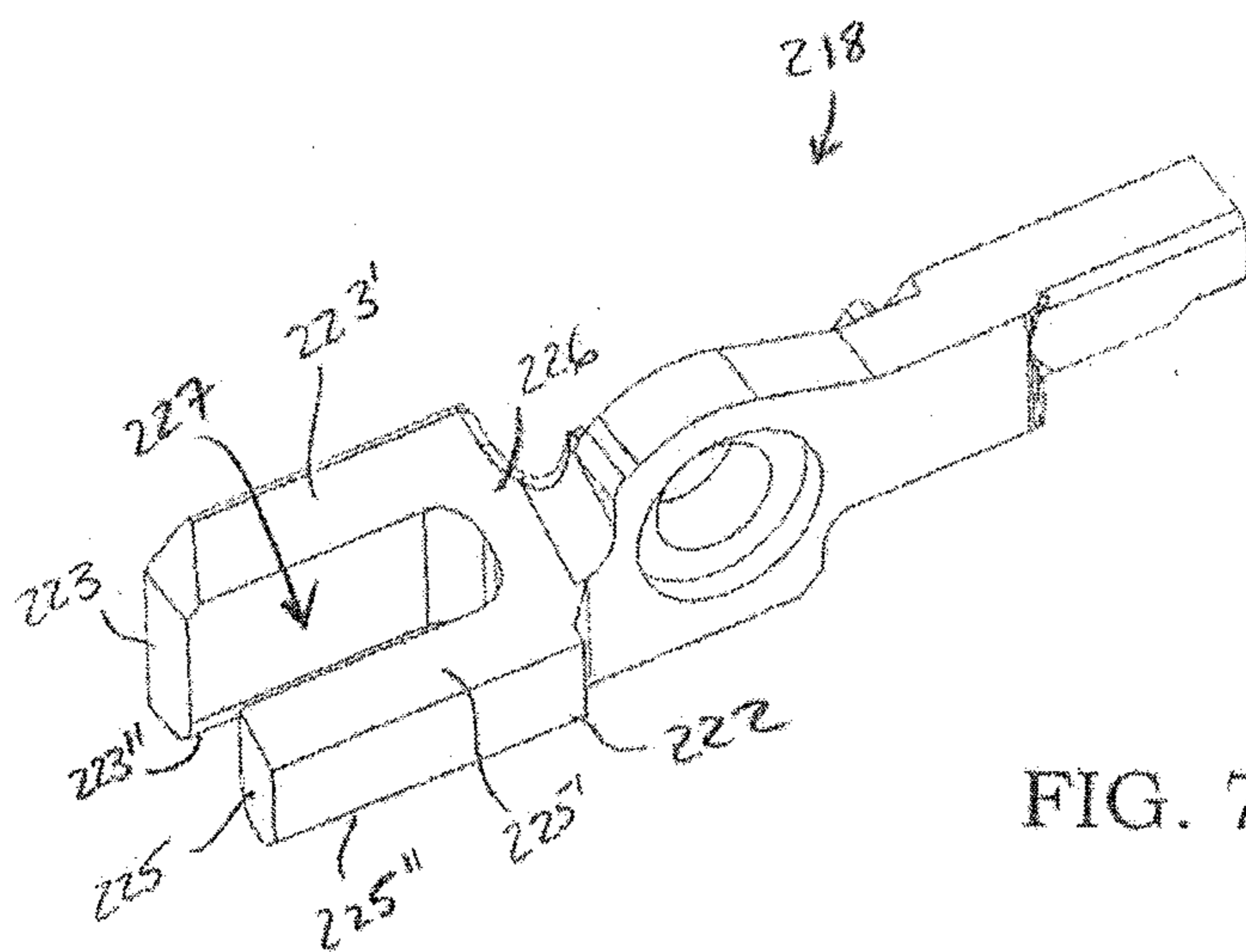


FIG. 7

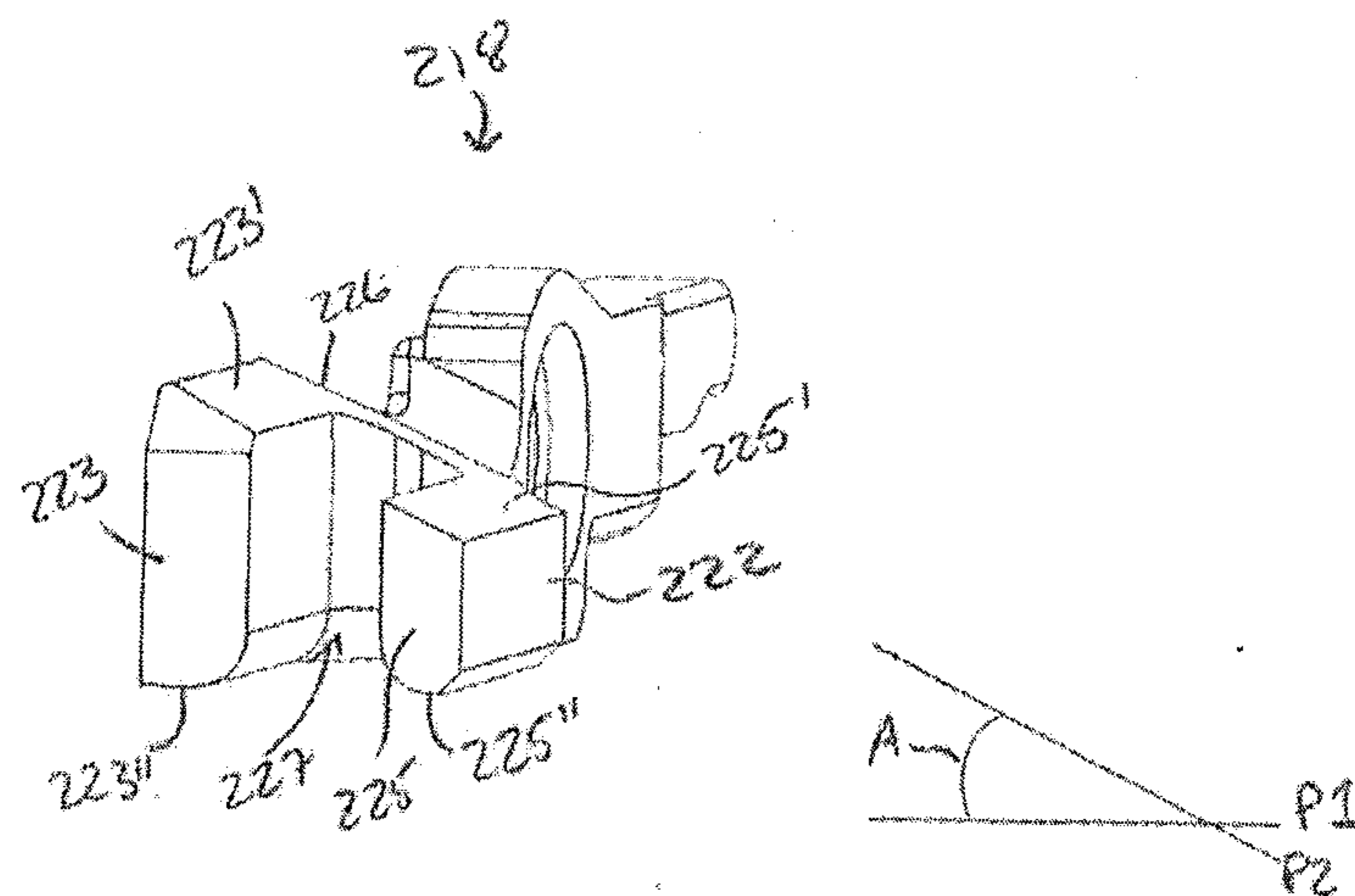


FIG. 8

ELECTRIC STRIKE FOR INTERLOCKING LATCH MECHANISM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. Provisional Patent Application No. 62/664,627, filed Apr. 30, 2018, which is hereby incorporated by referenced in its entirety.

TECHNICAL FIELD

[0002] The present invention relates to mechanisms for electrically locking a door in a frame; more particularly, to an electrical door strike having movable keeper arms for selectively retaining and releasing an associated door latch, and most particularly to an electric door strike including keepers arms configured to receive an interlocking door latch.

BACKGROUND OF THE INVENTION

[0003] U.S. Pat. No. 8,454,063, entitled “Mode-Switchable Door Strike” (the ’063 patent), the relevant disclosure of which is herein incorporated by reference, discloses an electric door strike assembly of the type forming the basis of this invention. As shown, latch portions **22** of keeper arms **18** are configured in the electric door strike assembly to be contacted by and withstand the force of an extended door latch when an attempt is made to open the door while the electric door strike assembly is in its locked mode.

[0004] The electric strike assembly disclosed in the ’063 patent is widely used in conjunction with a Pullman-style latch mechanism. However, when used with aluminum door/door frame members, metal distortion upon a forced entry may allow an unwanted release of the latch from the strike. An interlocking latch mechanism in which a star wheel-style latch as described below is used instead of a Pullman-style latch may remedy the problem. However, heretofore, when an electrified interlocking latch mechanism was desired, whereby the door could be released from its locked position remotely, power had to be supplied to the door where the interlocking mechanism resided. An electrified strike as disclosed in the ’063 patent that would be compatible with an interlocking latch mechanism was not available.

[0005] What is needed in the art is an electric door strike assembly that is compatible with an interlocking latch mechanism.

[0006] What is also needed in the art is such an electric strike assembly that would also be compatible with a Pullman-style latch mechanism.

[0007] It is a principal object of the present invention to provide such an electric strike assembly.

[0008] It is also a principal object of the present invention is to provide a means to electrify an interlocking latch mechanism for remote release whereby power is supplied to the door frame and need not be supplied to the door itself.

SUMMARY OF THE INVENTION

[0009] Briefly described, an electric door strike assembly in accordance with the present invention comprises a housing and at least one keeper arm. The housing has an opening for admission and retraction of a door latch. The at least one keeper arm has a latch portion and is mounted on the

housing. The at least one keeper arm is movable between a closed position, where the opening is occluded by the latch portion, and an open position, where the door latch may be released from the opening. The latch portion includes a leg configured to receive a latch plate of an interlocking door latch mechanism when the at least one keeper arm is in the closed position.

[0010] In a further aspect of the invention, the latch portion may be a bifurcated member having inside and outside legs arranged in spaced parallel relation so as to define a gap therebetween. The gap is configured to receive a latch plate of a star wheel latch when the at least one keeper arm is in the closed position.

[0011] In yet a further aspect of the invention, respective front walls of the singular leg or the front walls of the inside and outside legs lie along a first longitudinal plane and respective back wall(s) of the leg or legs lie along a second plane. The second plane is disposed at an angle to the first longitudinal plane whereby the back wall(s) define a ramped surface. The ramped surface of the back wall(s) is configured to allow a Pullman-style latch to be received within the opening when the at least one keeper arm is in the closed position.

[0012] In still another aspect of the present invention, the at least one keeper arm is two, wherein a first keeper arm is disposed at a first side of the housing opening and a second keeper arm is disposed across the housing opening at a second side thereof. Respective front walls of the inside and outside legs of each of the first and second keeper arms lie along a common longitudinal plane and the outside leg of the first keeper arm includes a first step and wherein the outside leg of the second keeper arm includes a second step which is complementary to the first step. The first and second steps interlock with one another when the first and second keeper arms are in the closed position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

[0014] FIG. 1 is an isometric view from the right front showing a prior art electric door strike assembly with the cover removed for clarity (cover is removed and not shown in all views herein);

[0015] FIG. 2 is a plan view of one end of the prior art electric door strike assembly shown in FIG. 1;

[0016] FIG. 3 is an isometric view of one end of the prior art electric door strike assembly shown in FIG. 1;

[0017] FIG. 4 is an isometric view from the right front showing an embodiment of the present invention;

[0018] FIG. 5 is an isometric view of the keeper arms in accordance with the invention;

[0019] FIG. 6 is a cross-sectioned view of an interlocking latch mechanism engaged with the electric strike in accordance with the invention; and

[0020] FIGS. 7 and 8 are views of an optional keeper arm in accordance with the invention that may also be used with a Pullman-type latch mechanism.

[0021] Corresponding reference characters indicate corresponding parts throughout the several views. The exemplifications set out herein illustrate currently preferred embodiments of the invention, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.

DESCRIPTION OF THE PREFERRED
EMBODIMENTS

[0022] Referring now to FIGS. 1 through 3, a prior art electric door strike assembly 10 comprises a housing 12 mountable to a door frame (not shown). The prior art electric door strike assembly 10 is to be regarded as exemplary in nature and does not serve to limit application of the present invention to embodiments solely thereto. The mounting of housing 12 may be either surface mounting or recessed mounting, as is well known in the prior art. A cover (not shown) protects the interior of housing 12 from tampering as well as from dirt, dust, and the like. Housing 12 includes a cutout portion 14 adapted to receive a latch (not shown) of a door (not shown) as is also known in the prior art. Cutout portion 14 is generally defined by housing rear wall 12B and cutout side walls 12C, 12D.

[0023] The referenced prior art electric door strike assembly shown in FIG. 1 preferably comprises first and second mirror-image locking mechanisms 16 mounted to housing 12 and disposed symmetrically about cutout portion 14. For simplicity and clarity in presentation, general reference may be made to only one of the two mirror-image mechanisms 16, but such reference should be considered as being equally applicable to both except as otherwise noted. The use of a pair of keeper arms 18 is presently preferred over a single keeper arm as each keeper arm of the pair is subject to only half of any force induced by the latch which, in turn, means that the strength of the device is essentially doubled.

[0024] Opposing keeper arms 18 are mounted at keeper arm pivots 20 positioned proximate the midpoint of keeper arms 18 and are positioned proximate to cutout portion 14. When keeper arms 18 are oriented in a closed position wherein their longitudinal axes are aligned in a plane generally parallel to the plane created by front housing wall 12A, latch portions 22 of arms 18 extend into and occlude cutout portion 14 thereby retaining the door latch within cutout portion 14. As is known in the prior art, when the door is moved closed, upon the door latch contacting the latch portions, the door latch retracts against a return spring force and is then free to be received by cutout portion 14, even when keeper arms 18 are in closed positions. That is, when the door is shut into a frame supporting strike assembly 10, the door latch retracts to allow passage past latch portions 22 but then snaps into cutout portion 14. Once in cutout portion 14 and when keeper arms 18 are in closed positions, the latch is trapped in cutout portion 14 and the door cannot be opened. Such keeper and strike action are well known in the art and the operation thereof will not be further discussed herein.

[0025] Keeper arms 18 are adapted to engage with transmission levers 24 mounted to housing 12 by transmission lever pivots 26. The axes of rotation of transmission lever pivots 26 are parallel to and aligned vertically with the axes of keeper arm pivots 20.

[0026] Prong 28 is positioned on each keeper arm 18 opposite latch portion 22. Prong 28 is received within a fork 30 positioned on a corresponding side of transmission lever 24 when keeper arm 18 is in a closed position.

[0027] Keeper arms 18 are resiliently urged to the closed position by springs (not visible) which may be mounted on pivots 20. One arm of each spring may engage a keeper arm 18 on its prong side and the other arm may engage a sidewall of cutout portion 14. Thus, when prongs 28 are released from forks 30, keeper arms 18 are held in the closed position

only by the springs. To open the door, a user simply pushes against the door, causing the latch to rotate keeper arms 18 against the springs. Once the latch clears keeper arms 18, the keeper arms rotate back to the closed position under the urging of the springs. Further, to best position each transmission lever 24 to receive prong 28, a compression spring (not shown) may be mounted on one end thereof to fork 30 and at the other end thereof to housing 12 proximate fork 30. The compression springs urge transmission levers 24 rotatably away from housing 12 to best position fork 30 to receive prong 28.

[0028] A release lever 34 is used to control the motion of each transmission lever 24 from a rotatable state to a locked state. In the example shown, release lever 34 is mounted at one end thereof to housing 12 by release lever pivot 36. The axes of rotation of release lever pivots 36 are parallel to but offset laterally from the axes of both keeper arm pivots 20 and transmission lever pivots 26. The other ends of release levers 34 engage ends 38 of transmission levers 24 opposite forks 30. Solenoid 52, when energized, moves release lever 34 into either engagement with or disengagement from transmission lever 24, thereby locking or unlocking the transmission lever so as to allow the keeper arm to move from a latch-blocking position under a force exerted by the extended door latch when the door is opened. The conjunctive operation of the solenoid, release lever, transmission lever and keeper arm is fully described in the incorporated-by-reference '063 patent and need not be described in further detail here.

[0029] In the electric door strike assembly described above, keeper arms 18 are suitable for use with Pullman-style latch mechanisms, as are known in the art. Keeper arms 18 of an electrified strike assembly, however, are not amenable for use with a latch mechanism shown in FIG. 6 having a star wheel shaped latch (herein referred to as an "interlocking latch mechanism").

[0030] With reference to FIGS. 4 through 6, in accordance with an aspect of the present invention, an electric door strike assembly 100 includes all elements of prior art electric door strike assembly 10 except latch portions 122/122a of opposing keeper arms 118/118a are configured for use with an interlocking latch mechanism. Electric door strike assembly 100 is exemplary of a door strike amenable for including keeper arms 118/118a and is in no way meant to limit application keeper arms 118/118a solely to this embodiment. It is to be understood by those skilled in the art that keeper arms 118/118a may be proportioned to function within any suitable door strike device irrespective of how the solenoid operationally connects to the keeper arm or arms.

[0031] As shown most clearly in FIG. 5, each keeper arm 118/118a includes a respective latch portion 122/122a. Each latch portion 122/122a includes outside leg 125/125a wherein each outside leg 125/125a includes a respective edge 126. Optionally, each leg portion 122/122a may be bifurcated to include both a respective outside leg 125/125a and a respective inside leg 123/123a as shown in FIG. 5. With reference to FIGS. 4 and 6, inside legs 123/123a are so designated because they are located proximate bottom surface 112E of electric door strike assembly 100 which is mounted to or within the doorframe 101 (see FIG. 6), while outside legs 125/125a lie toward the open doorway so as to receive the latch mechanism, such as but not limited to interlocking latch mechanism 141, when the door is closed.

[0032] Referring to FIG. 6, when keeper arms 118/118a are in the closed position (FIG. 4), edge 126 of outside leg 125/125a is disposed to receive a latch plate 143 of star latch mechanism 141. When presented as a bifurcated latch portion, a gap 127 is defined between inside leg 123/outside leg 125 and inside leg 123a/outside leg 125a, and gap 127 (and edge 126 of outside leg 125/125a) is configured to receive a latch plate 143 of interlocking latch mechanism 141.

[0033] To improve strike performance, outside leg 125 of latch portion 122 may include a first step 129 while outside leg 125a of latch portion 122a may include a second step 129a which is complementary to first step 129. As a result, first and second steps 129/129a may interlock or become interleaved with one another when the latch portions 122/122a are in the closed position, such as that shown in FIGS. 4 and 5.

[0034] With reference to FIG. 6, when the door is closed, latch plate 143 of interlocking latch mechanism 141 resides within gap 127 while a first spoke 145 on star wheel 147 resides within cutout portion 114 of electric door strike assembly 100. Clockwise rotation CW (as viewed in FIG. 6) of star wheel 147 is prevented by engagement of first spoke 145 with outside leg 125. Conversely, counterclockwise rotation (CCW) of star wheel 147 is prevented by engagement of a second spoke 145a with a blocking member 149 of interlocking latch mechanism 141. As a result, interlocking latch mechanism 141 is locked within electric door strike assembly 100 such that unauthorized opening of the door is prohibited.

[0035] By way of example and without limitation thereto, to open the door through actuation of the latch mechanism, blocking member 149 may be translated to the right, as generally indicated by arrow R, such as through actuation of a push bar (not shown) on the unsecure side of the door (towards the bottom of FIG. 6) or keyed cylinder (not shown) on the secure side of the door (towards the top of FIG. 6). Once blocking member 149 clears second spoke 145a, pushing of the door towards the top of the page causes first spoke 145 to engage back wall 125' of outside leg 125 and/or back wall 125a' of outside leg 125a such that star wheel 147 of interlocking latch mechanism will rotate CCW about axis 151. Rotation about axis 151 withdraws first spoke 145 from cutout portion 114 such that the door may open. Conversely, when the open door swings closed, a spoke (such as spoke 145b) will engage front wall 125" of outside leg 125 and/or front wall 125a" of outside leg 125a. Star wheel 147 will then rotate clockwise until latch plate 143 is seated within gap 127. First spoke 145 also rotates to the position shown in FIG. 6 to again lock interlocking latch mechanism 141 within electric door strike assembly 100.

[0036] Alternatively, the door may be openable upon actuation of electric door strike assembly 100 as described above. With latch portions 122/122a freely movable within housing 112, such as and without limitation thereto, rotation about pivot 120/120a, pushing of the door from the unsecure side or pulling of the door from the secure side will cause first spoke 145 to engage outside leg 125/125a of latch portions 122/122a. CCW rotation of star wheel 147 is prevented by engagement of a second spoke 145a with blocking member 149. However, continued force against outside leg 125/125a of latch portions 122/122a by first spoke 145 causes latch portions 122/122a to pivot outwardly, such as in the direction shown by arrow X, Xa in FIG. 4. After latch portions 122/122a have pivoted a suffi-

cient amount, first spoke 145 will clear the opening created between the two latch portions such that the door may be opened. Closing of the door and locking of the interlocking latch mechanism 141 is the same as that previously described.

[0037] It should be noted that the star wheel of an interlocking latch mechanism may come in a variety of thicknesses as measured parallel with star wheel axis 151 across spokes 145 of the starwheel. By way of example, earlier star wheels have a thickness on the order of $\frac{1}{8}$ (0.125) inches. Other star wheels have a thickness of about $\frac{1}{4}$ (0.250) inches which may lead to a stronger, more durable latch mechanism. The electric strike as described above is compatible with either star wheel thicknesses.

[0038] Turning now to FIGS. 7 and 8, an alternative keeper arm 218 is shown. Keeper arm 218 is identical to keeper arm 118 except latch portion 222 includes a ramped surface 226. As shown in FIGS. 7 and 8, respective front walls 223" and 225" of the inside and outside legs 223/225 lie along a first longitudinal plane P1. Respective back walls 223' and 225' of the inside and outside legs 223/225 lie along a second plane P2. Second plane P2 is disposed at an angle A to first longitudinal plane P1 whereby the back walls 223'/225' define ramped surface 226. Ramped surface 226 is configured such that a Pullman-style latch mechanism may be received within cutout 114 instead of an interlocking latch mechanism as described above.

[0039] Note that the ramp surface described above may be provided on the front wall of a keeper portion having only one leg with equal effect.

[0040] While the invention has been described by reference to various specific embodiments, it should be understood that numerous changes may be made within the spirit and scope of the inventive concepts described. Accordingly, it is intended that the invention not be limited to the described embodiments, but will have full scope defined by the language of the following claims.

What is claimed is:

1. An electric strike assembly, comprising:
 - a) a housing having an opening for admission and retraction of a door latch; and
 - b) at least one keeper arm having a latch portion, wherein the at least one keeper arm is mounted on the housing, and movable between a closed position wherein the opening is occluded by the latch portion and an open position wherein the door latch may be released from the opening,

wherein the latch portion comprises a first leg, wherein an edge of said first leg is configured to receive a latch plate of a latch mechanism therein when the keeper arm is in the closed position.
2. The electric strike assembly in accordance with claim 1, wherein said latch portion comprises a second leg so as to define a gap said first leg and said second leg and wherein the gap is configured to receive said latch plate when the at least one keeper arm is in the closed position.
3. The electric strike assembly in accordance with claim 1 wherein a front wall of said first leg lie along a first longitudinal plane and wherein a back wall of said first leg lie along a second plane which is disposed at an angle to the first longitudinal plane whereby the back wall define a ramped surface.
4. The electric strike assembly in accordance with claim 1 comprising a second keeper arm having a second latch

portion, wherein said second keeper arm is mounted on the housing, and movable between a closed position wherein the opening is occluded by the latch portion and an open position wherein the door latch may be released from the opening,

wherein said second latch portion comprises a first leg, wherein an edge of said first leg of said second latch portion is configured to receive said latch plate of said latch mechanism therein when said second keeper arm is in the closed position.

5. The electric strike assembly in accordance with claim 4 wherein the first leg of the first keeper arm includes a first step and wherein the first leg of the second keeper arm includes a second step which is complementary to the first step whereby the first and second steps interlock with one another when the first and second keeper arms are in the closed position.

6. The electric strike assembly in accordance with claim 1 wherein said latch mechanism is an interlocking latch mechanism.

* * * * *