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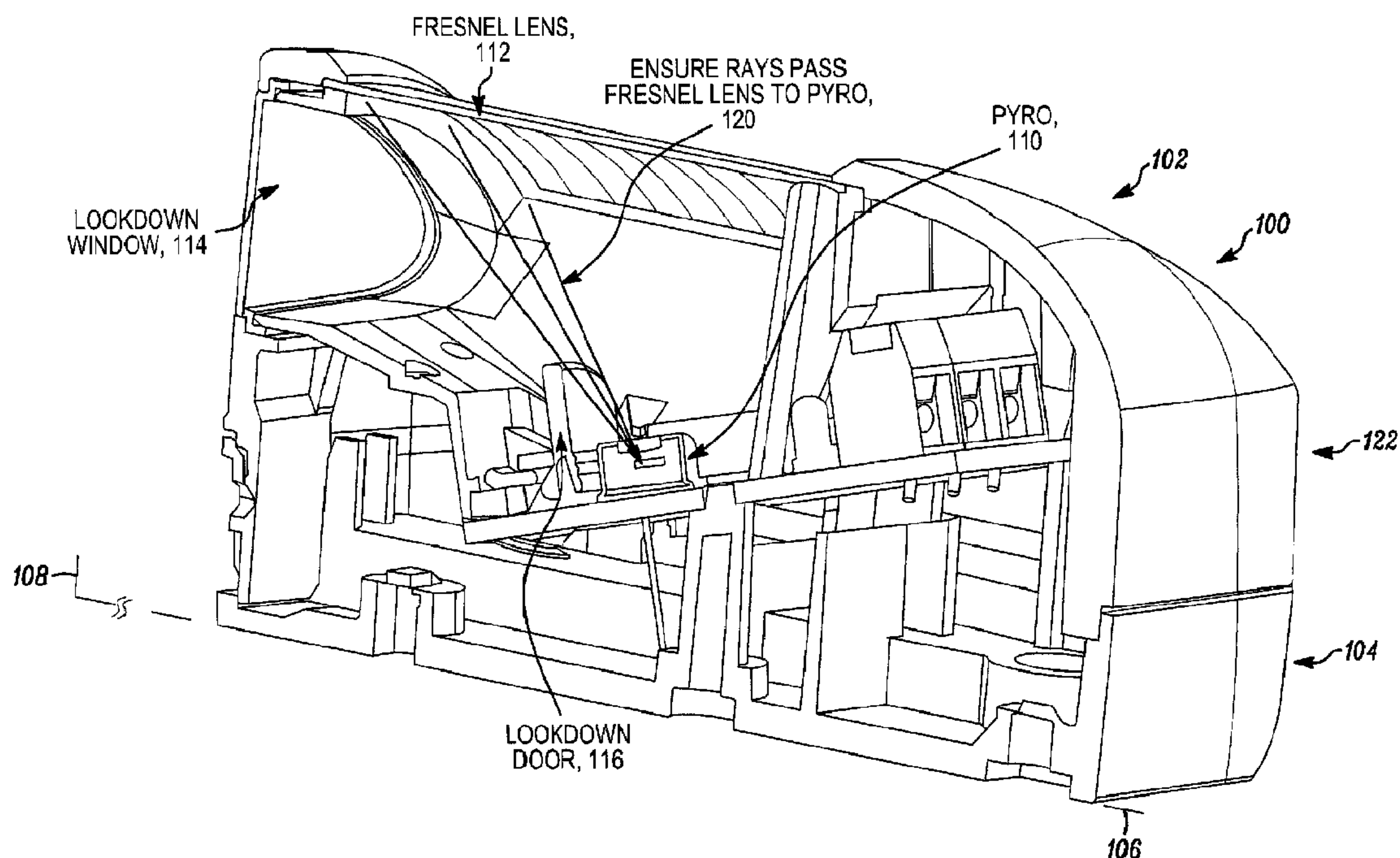
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(54) Titre : **MODELE D'INTERRUPTEUR DE FONCTION DE VERROUILLAGE INTELLIGENT DESTINE AUX  
DETECTEURS D'INTRUSION**

(54) Title: **SMART LOOKDOWN FUNCTION SWITCH DESIGN FOR INTRUSION DETECTORS**



(57) **Abrégé/Abstract:**

A system including a security system that protects a secure geographic area and a passive infrared (PIR) detector of the security system that detects intruders within the secured area, a pyroelectric element carried by the PIR detector, the pyroelectric element being tilted downwards towards a floor within the secured area to receive and detect a predominant portion of energy from an area extending outwards PIR detector and directly in front of the PIR detector and a relatively small portion of energy from a floor area directly below the PIR detector and a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

**ABSTRACT**

A system including a security system that protects a secure geographic area and a passive infrared (PIR) detector of the security system that detects intruders within the secured area, a pyroelectric element carried by the PIR detector, the pyroelectric element being tilted downwards towards a floor within the secured area to receive and detect a predominant portion of energy from an area extending outwards PIR detector and directly in front of the PIR detector and a relatively small portion of energy from a floor area directly below the PIR detector and a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

## SMART LOOKDOWN FUNCTION SWITCH DESIGN FOR INTRUSION DETECTORS

### FIELD

**[0001]** This application relates to security systems and more particular to intrusion detectors.

### BACKGROUND

**[0002]** Systems are known to protect people and assets within secured areas. Such systems are typically based upon the use of one more sensors that detect threats within the secured area.

**[0003]** Threats to people and assets may originate from any of number of different sources. For example, a fire may kill or injure occupants who have become trapped by a fire in a home. Similarly, carbon monoxide from a fire may kill people in their sleep.

**[0004]** Alternatively, an unauthorized intruder, such as a burglar, may present a threat to assets within the area. Intruders have also been known to injure or kill people living within the area.

**[0005]** In the case of intruders, sensors may be placed in different areas based upon the respective uses of those areas. For example, if people are present during some portions of a normal day and not at other times, then sensors may be placed along a periphery of the space to provide protection while the space is occupied while additional sensors may be placed within an interior of the space and used when the space is not occupied.

**[0006]** In most cases, threat detectors are connected to a local control panel. In the event of a threat detected via one of the sensors, the control panel may sound a local audible alarm. The control panel may also send a signal to a central monitoring station.

**[0007]** While security system work well, they are sometimes difficult to set up and use, especially when large numbers of sensors and different levels of security are involved. Accordingly, a need exists for better methods of expediting the setup of such systems.

## BRIEF DESCRIPTION OF THE DRAWINGS

- [0008]** FIG. 1 illustrates a block diagram of a system in accordance herewith;
- [0009]** FIG. 2 is a cut-away view of a PIR detector used within the system of FIG. 1;
- [0010]** FIGs. 3A-B depicts alternate positions of a lookdown door within the PIR detector of FIG. 2;
- [0011]** FIGs. 4A-B depict further details of the lookdown door of FIG. 3;
- [0012]** FIG. 5 depicts additional details of the cut-away view of FIG. 2; and
- [0013]** FIG. 6 depicts details of the cover of the PIR detector of FIG. 2.

## DETAILED DESCRIPTION

**[0014]** While disclosed embodiments can take many different forms, specific embodiments thereof are shown in the drawings and will be described herein in detail with the understanding that the present disclosure is to be considered as an exemplification of the principles thereof as well as the best mode of practicing same, and is not intended to limit the application or claims to the specific embodiment illustrated.

**[0015]** FIG. 1 is a block diagram of a security system 10 shown generally in accordance with an illustrated embodiment. Included within the system are a number of sensors 12, 14 that detect threats within a secured geographic area 16. Threats within the secured area may be either physical or environmental. For example, a physical threat may be presented in the form of a burglar or other unauthorized intruders. Environmental threats may be presented in the form of fires or gas leaks.

**[0016]** The detectors may be embodied in any of a number of forms. For example, limit switches may be placed on the doors and/or windows located around a periphery of the secured area. Alternatively, passive infrared (PIR) detectors may be placed within an interior of the space to detect intruders who have been able to circumvent the sensors located along the periphery.

**[0017]** The sensors may be monitored by a control panel 18 either located within the secured area as shown in FIG. 1 or located remotely. Upon detecting a threat via the sensors, the control panel may compose and send an alarm message to a central monitoring station 20. The central monitoring station may response by summoning help (e.g., the police, fire department, etc.).

**[0018]** FIG. 2 is a cut-away side view of a PIR detector 100 that may be used as one of the sensors of FIG. 1. The detector may include a housing 102 made up of a base plate 104 and cover 122. The detector may be mounted to a wall 106 via the baseplate at some known distance above a floor 108 within the secured area.

**[0019]** Included within the PIR detector of FIG. 2 is a pyroelectric detector element 110 that detects infrared energy from intruders. The pyroelectric element may include two halves arranged adjacent one another in a horizontal direction and corresponding electrical circuits that generate an electrical output signal upon detecting an intruder. The output signal is generated via a differential signal received from the pyroelectric element that is generated by the intruder separately activating the two halves of the pyroelectric element.

**[0020]** The pyroelectric element is slightly tilted towards the floor. The slight tilt allows a relatively small portion of the detected infrared energy to be received from the floor directly below the PIR detector. The fact that the tilt is only slightly towards the floor allows most of the detected infrared energy (or a predominant portion thereof) to be received from the area directly in front of the PIR detector.

**[0021]** Interposed between the pyroelectric detector and the area in front of the PIR detector is a Fresnel lens 112. The Fresnel lens acts to transmit energy received from in front of the PIR detector onto the pyroelectric detector.

**[0022]** The PIR detector also includes a lookdown window 114. The lookdown window allows light from the area directly below the PIR detector (and intruders) to be detected by the tilted pyroelectric element.

**[0023]** Included within the PIR detector is a lookdown door 116. The lookdown door 116 is moveable between first and second positions. In the first, raised position (shown in FIGs. 2, 3A, 4A, 5), rays 118 the arriving through the lookdown window from below the PIR detector are blocked as shown by the X in FIG. 3A. In a second, lowered position (shown in FIGs. 3B, 4B) rays through the lookdown window from the area below the PIR detector are transmitted through (as shown by the check mark in FIG. 3B) and are detected by the pyroelectric element.

**[0024]** In this regard, rays 120 arriving from the area in front of the PIR detector are not affected by the lookdown door or the position of the lookdown door. As shown in FIG. 2, rays 120 through the Fresnel lens from in front of the PIR detector are always received and detected by the pyroelectric element.

**[0025]** The cover supports, the Fresnel lens, the lookdown window and the lookdown door. FIG. 6 shows the cover removed from the base and the lookdown door.

As shown, the lockdown door includes a transverse shaft 124 extending through the lockdown door and extending outwards from opposing sides of the lockdown door. The lockdown door pivots around this transverse shaft.

**[0026]** As shown in FIGs. 3, 4 and 6 a flange 128 on the inside of the cover extends around the opening for the Fresnel lens. A pair of slots 130 are formed in this flange for support of the lockdown door. Mating surfaces on the lockdown door (FIGs. 4A-B) engage a corresponding set of mating surface on the support of the pyroelectric element in order to maintain the lockdown door within the slot and the ridge within the groove.

**[0027]** Opposing ends 126 of the transverse shaft engage the pair of slots 130. A rib 132 on the outside surfaces of the opposing ends engage corresponding grooves 134 within a periphery of the slots to retain the lockdown door in either the first or second position.

**[0028]** The lockdown door is movable without tools between the first and second position using only the fingers of a user as otherwise depicted by the image of the hand superimposed over the cover in FIG. 6. As shown in FIG. 6, the user places his/her forefinger on the base 136 of the lockdown door and pushes away from the lockdown window to retract the lockdown door. The user reverses the process to deploy or otherwise raise the lockdown door. A set of instructions for accomplishing this changes are shown on the back of the cover as depicted in FIG. 6.

**[0029]** In general, some intrusion motion sensors have a lockdown function (e.g., a lockdown window), but in some applications, the lockdown function needs to be disabled. The system shown in FIGs. 1-6 accomplishes this objective and provides a number of additional benefits. First, the system is easy to assembly, operate and install without any tools. It has a minimum of parts and therefore has a competitive cost advantage. In blocking the lockdown function, no parts need to be removed from the unit and stored for potential reuse. In this regard, the lockdown function can be enabled and disabled by rotating a single unique part (i.e., the lockdown door).

**[0030]** The lockdown door has a shape optimized for the inside contour of the cover to substantially block light from the lockdown window but doesn't affect the rays passing through the Fresnel lens and that are detected by the pyroelectric element. Only the lockdown function is disabled when the lockdown door is set to the OFF state.

**[0031]** The assembly of the lockdown door is relatively simple. A user simply presses it into a pair of slots in the cover (often referred to as the "bugguard").

**[0032]** A mating feature including recessed features on the lookdown door and protruding features on the cover are provided to avoid inserting the lookdown door backwards.

**[0033]** Tools are unnecessary for the use of the lookdown door except that a user must use one finger to pull/push the lookdown door into the proper orientation. The lookdown door can be easily disabled in the same manner as shown in the figures.

**[0034]** The lookdown door uses redundant features to maintain the proper orientation. First, there is a small rib on each side of the lookdown door. The ribs mate with the grooves in the slots of the cover at two different functional positions shown in the drawings, so as to make sure that the lookdown door is not positioned improperly. Second, there are two mating surface on the lookdown doors so that they will separately mate with the PCB board of the pyroelectric sensor in the two different lookdown door positions.

**[0035]** In the past, there were two alternative methods of disabling the lookdown function. The first method is to use a black thin label to otherwise mask the lookdown window. When enabling the lookdown function, a user would need to fully disassemble the detector to remove the label from the lookdown window and then reassembly the detector block.

**[0036]** The second method was to use a rubber sheet or membrane to mask the lookdown mirror. When enabling the lookdown function a user would need to disassembly the detector to remove the rubber sheet or membrane from the mirror and then reassemble the detector.

**[0037]** These two prior methods have at least two disadvantages. First, the need to fully disassembly the detector in order to remove the label or rubber sheet and then reassemble the detector. Second the installation of a label or rubber sheet is complicated and time consuming.

**[0038]** In general, the PIR detector of FIGs. 1-6 includes a base plate for a passive infrared (PIR) detector adapted for attachment via a rear surface to a wall, a pyroelectric element mounted to a front surface of the base plate, the pyroelectric element being tilted downwards to receive and detect a predominant portion of energy from an area extending outwards and directly in front of the PIR detector and a relatively small portion of energy from an area directly below the PIR detector, a Fresnel lens mounted in front of the pyroelectric element that transmits the predominant portion of energy from the area directly in front of the PIR element onto the pyroelectric element, a lookdown window mounted below the pyroelectric element that transmits the relatively

small portion of energy from the area directly below the PIR detector onto the pyroelectric detector and a pivoting door having a first and second positions mounted below the pyroelectric element between the lookdown window and pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

**[0039]** Alternatively, the system includes a security system that protects a secure geographic area and a passive infrared (PIR) detector of the security system carried by a wall within the secured area, a base plate of the PIR detector adapted for attachment via a rear surface to a wall, a pyroelectric element mounted to a front surface of the base plate, the pyroelectric element being tilted downwards to receive and detect a predominant portion of energy from an area extending outwards from the wall and directly in front of the PIR detector and a relatively small portion of energy from a floor area adjacent the wall directly below the PIR detector and a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

**[0040]** Alternatively, the system includes a security system that protects a secure geographic area and a passive infrared (PIR) detector of the security system that detects intruders within the secured area, a pyroelectric element carried by the PIR detector, the pyroelectric element being tilted downwards towards a floor within the secured area to receive and detect a predominant portion of energy from an area extending outwards PIR detector and directly in front of the PIR detector and a relatively small portion of energy from a floor area directly below the PIR detector and a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

**[0041]** From the foregoing, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope hereof. It is to be understood that no limitation with respect to the specific apparatus illustrated herein is intended or should be inferred. It is, of course, intended to cover by the appended claims all such modifications as fall within the scope of the claims. Further, logic flows depicted in the figures do not require the particular order shown, or sequential order, to

achieve desirable results. Other steps may be provided, or steps may be eliminated, from the described flows, and other components may be add to, or removed from the described embodiments.

## Claims:

1. An apparatus comprising:
  - a base plate for a passive infrared (PIR) detector adapted for attachment via a rear surface to a wall;
  - a pyroelectric element mounted to a front surface of the base plate, the pyroelectric element being tilted downwards to receive and detect a predominant portion of energy from an area extending outwards and directly in front of the PIR detector and a relatively small portion of energy from an area directly below the PIR detector;
  - a Fresnel lens mounted in front of the pyroelectric element that transmits the predominant portion of energy from the area directly in front of the PIR element onto the pyroelectric element;
  - a lookdown window mounted below the pyroelectric element that transmits the relatively small portion of energy from the area directly below the PIR detector onto the pyroelectric detector; and
  - a pivoting door having a first and second positions mounted below the pyroelectric element between the lookdown window and pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.
2. The apparatus as in claim 1 wherein the Fresnel lens further comprises a cover that supports the Fresnel lens and the lookdown window, the cover being attached to a periphery of the base plate and extending outwards over the pyroelectric element.
3. The apparatus as in claim 2 wherein the cover further comprises a flange extending partially around the Fresnel lens that supports the pivoting door.
4. The apparatus as in claim 3 wherein the pivoting door further comprises a transverse shaft extending through the door that is supported by the flange.
5. The apparatus as in claim 4 wherein the flange further comprises a pair of slots on opposing sides of the Fresnel lens that receives opposing ends of the transverse shaft via an interference fit.

6. The apparatus as in claim 5 wherein the opposing ends of the transverse shaft further comprises a rib extending outwards from a side of the shaft thereby engaging a marginal edge of the slot.

7. The apparatus as in claim 6 further comprising first and second grooves extending into the marginal edges of the slot parallel to the transverse shaft, the first and second grooves engaging the rib to retain the pivoting door in one of the first and second positions.

8. An apparatus comprising:  
a security system that protects a secure geographic area; and  
a passive infrared (PIR) detector of the security system carried by a wall within the secured area;  
a base plate of the PIR detector adapted for attachment via a rear surface to a wall;  
a pyroelectric element mounted to a front surface of the base plate, the pyroelectric element being tilted downwards to receive and detect a predominant portion of energy from an area extending outwards from the wall and directly in front of the PIR detector and a relatively small portion of energy from a floor area adjacent the wall directly below the PIR detector; and  
a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

9. The apparatus as in claim 8 further comprising a Fresnel lens mounted in front of the pyroelectric element that transmits the predominant portion of energy from the area directly in front of the PIR element onto the pyroelectric element.

10. The apparatus as in claim 9 further comprising a lookdown window mounted below the pyroelectric element with the pivoting door interposed between the lookdown window and pyroelectric element, the lookdown window transmits the relatively small portion of energy from the area directly below the PIR detector onto the pyroelectric detector.

11. The apparatus as in claim 9 wherein the Fresnel lens further comprises a cover that supports the Fresnel lens and the lookdown window, the cover depending from the base plate and extending outwards over the pyroelectric element.

12. The apparatus as in claim 11 wherein the cover further comprises a flange extending from the Fresnel lens towards the pyroelectric element and that supports the pivoting door.

13. The apparatus as in claim 12 wherein the pivoting door further comprises a transverse shaft extending from opposing sides of the door, the opposing ends being supported by the flange.

14. The apparatus as in claim 13 wherein the flange further comprises a pair of slots on opposing sides of the Fresnel lens, a bottom of each of the slots receives opposing ends of the transverse shaft via an interference fit.

15. The apparatus as in claim 14 wherein the opposing ends of the transverse shaft further comprises a rib extending outwards from a side of the shaft thereby engaging a marginal inside surface of the slot.

16. The apparatus as in claim 15 further comprising first and second grooves extending into the marginal edges on the inside of the slot, the grooves being parallel to the transverse shaft, the first and second grooves engaging the rib to retain the pivoting door in one of the first and second positions.

17. An apparatus comprising:  
a security system that protects a secure geographic area; and  
a passive infrared (PIR) detector of the security system that detects intruders within the secured area;  
a pyroelectric element carried by the PIR detector, the pyroelectric element being tilted downwards towards a floor within the secured area to receive and detect a predominant portion of energy from an area extending outwards PIR detector and directly in front of the PIR detector and a relatively small portion of energy from a floor area directly below the PIR detector; and

a pivoting door having a first and second positions mounted below and directly adjacent the pyroelectric element, the door pivoting upwards to a first position where the relatively small portion of energy is blocked and pivoting downwards where the relatively small amount of energy is transmitted onto the pyroelectric element.

18. The apparatus as in claim 17 wherein the PIR detector further comprises a base plate that supports the PIR detector from a wall of the secured area.

19. The apparatus as in claim 17 further comprising a Fresnel lens mounted in front of the pyroelectric element that transmits the predominant portion of energy from the area directly in front of the PIR element onto the pyroelectric element.

20. The apparatus as in claim 19 further comprising a lookdown window mounted below the pyroelectric element with the pivoting door interposed between the lookdown window and pyroelectric element, the lookdown window transmits the relatively small portion of energy from the area directly below the PIR detector onto the pyroelectric detector.

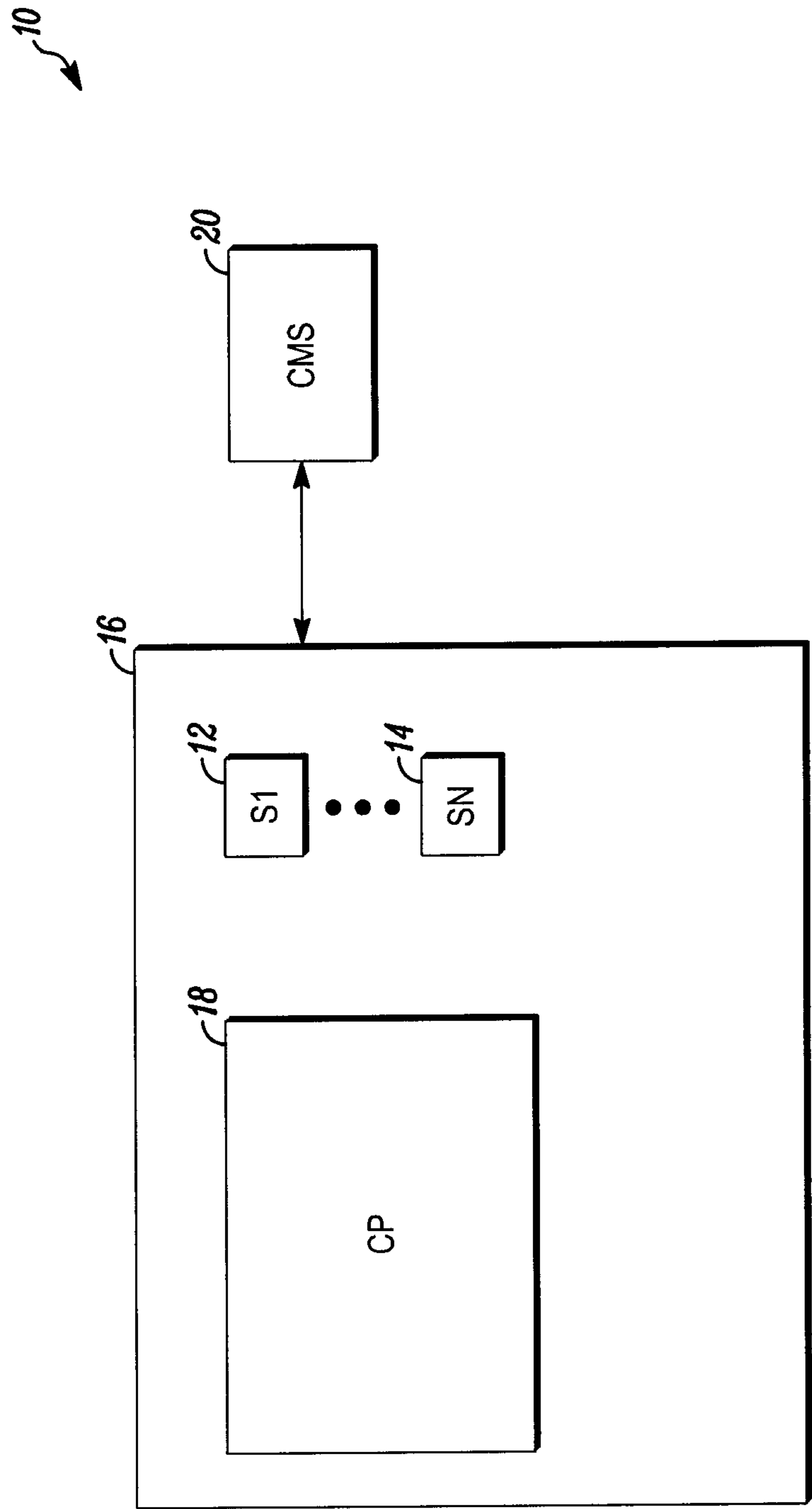


FIG. 1

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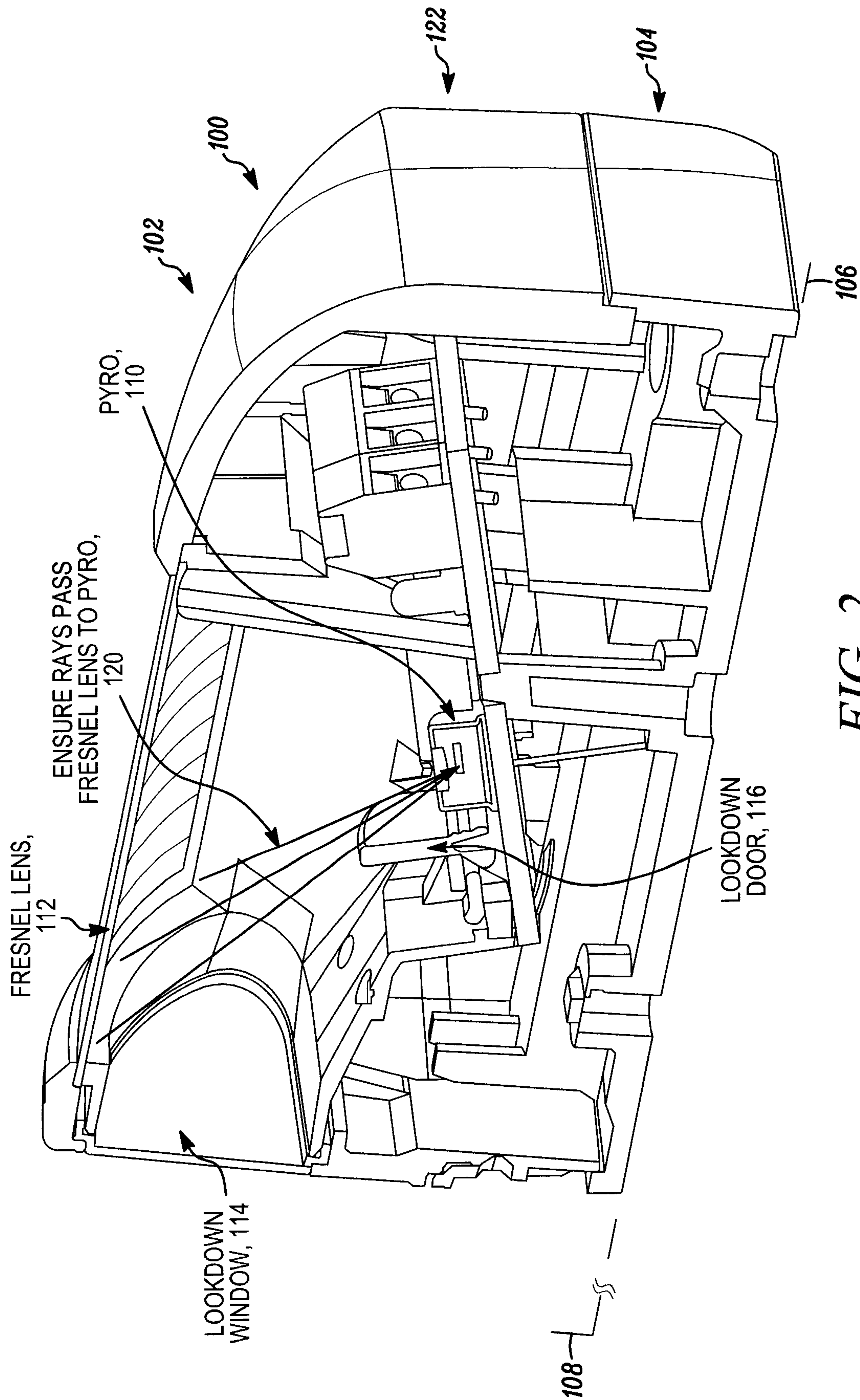


FIG. 2

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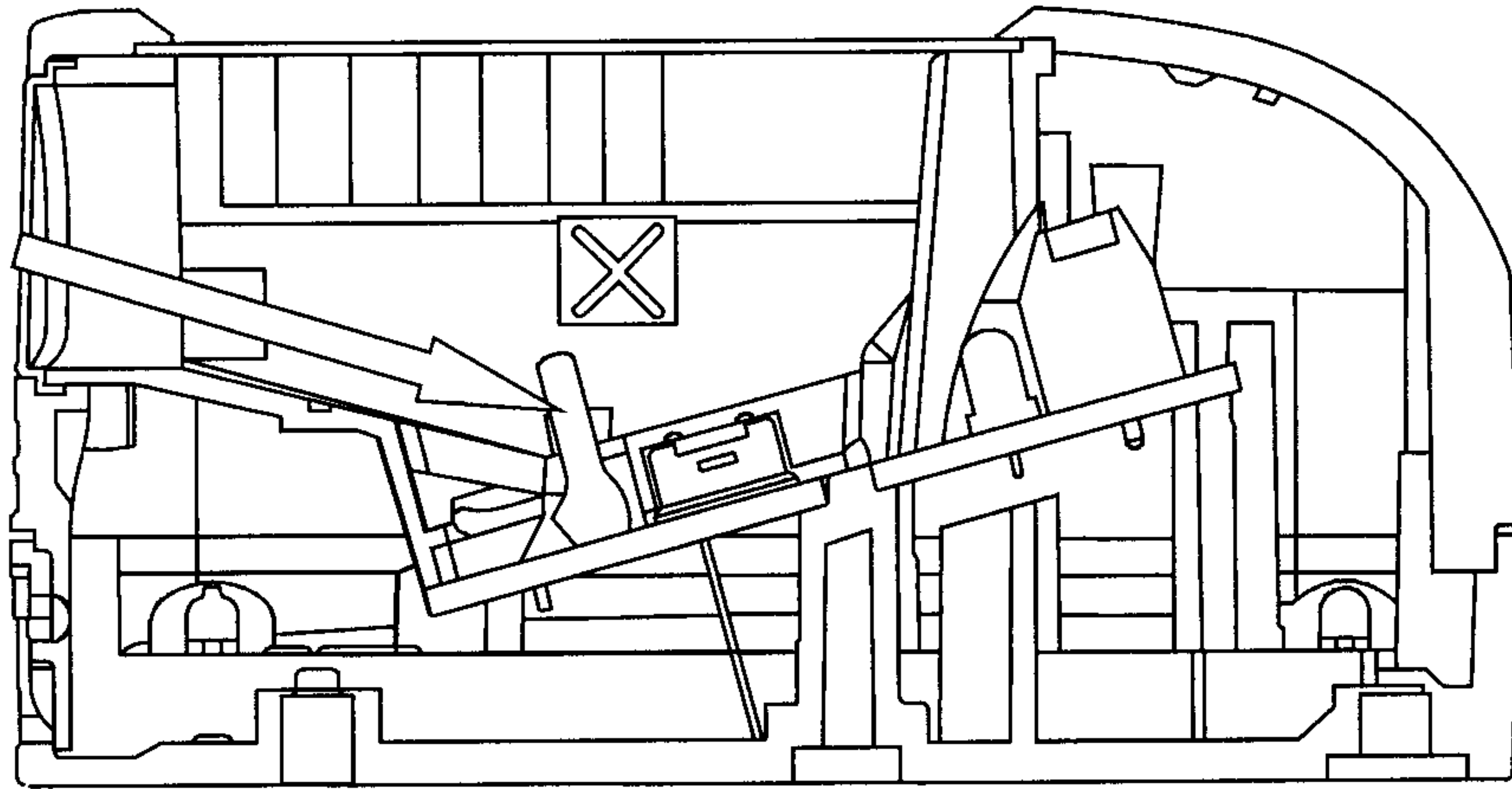


*FIG. 3A*

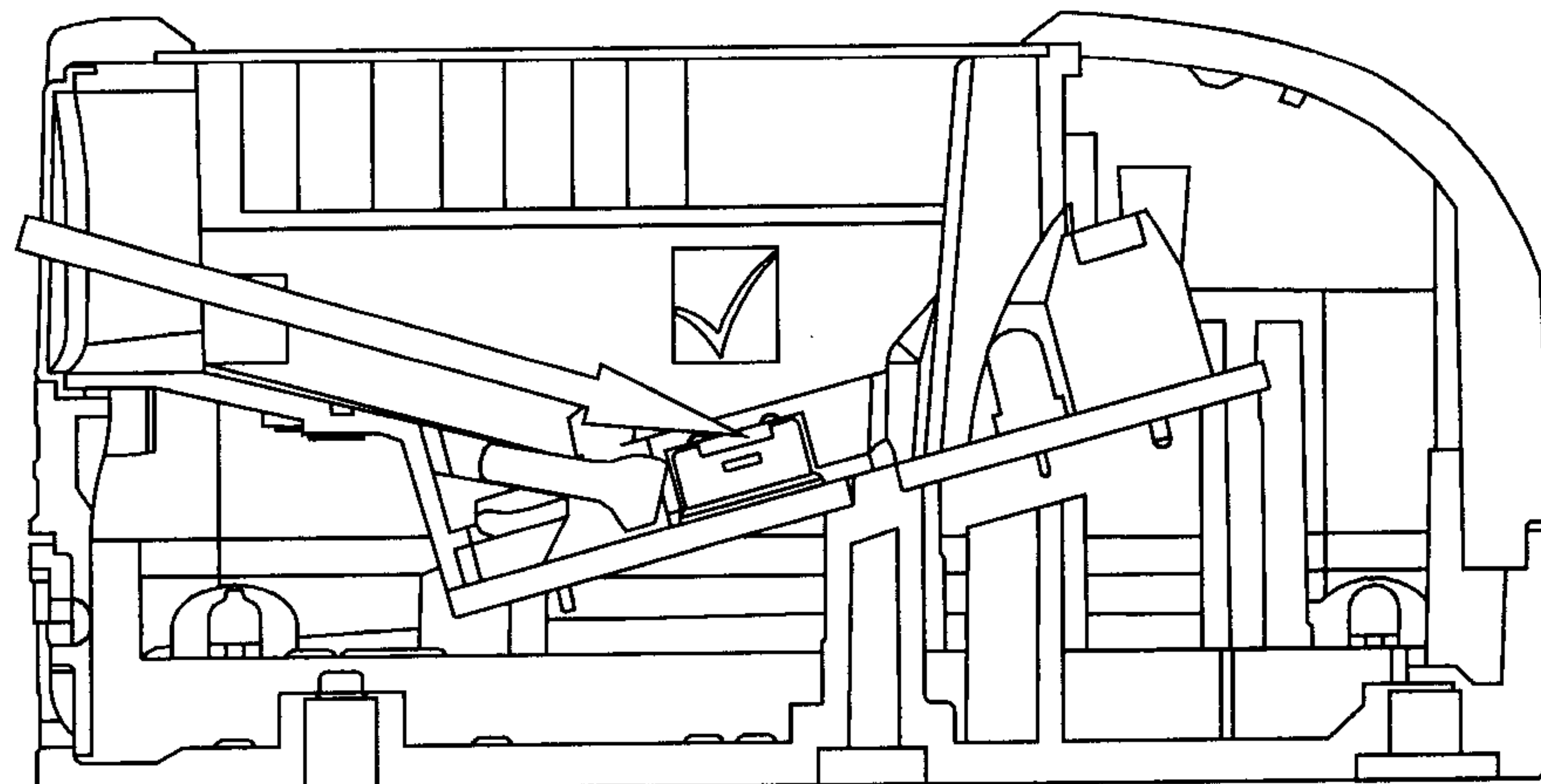


*FIG. 3B*

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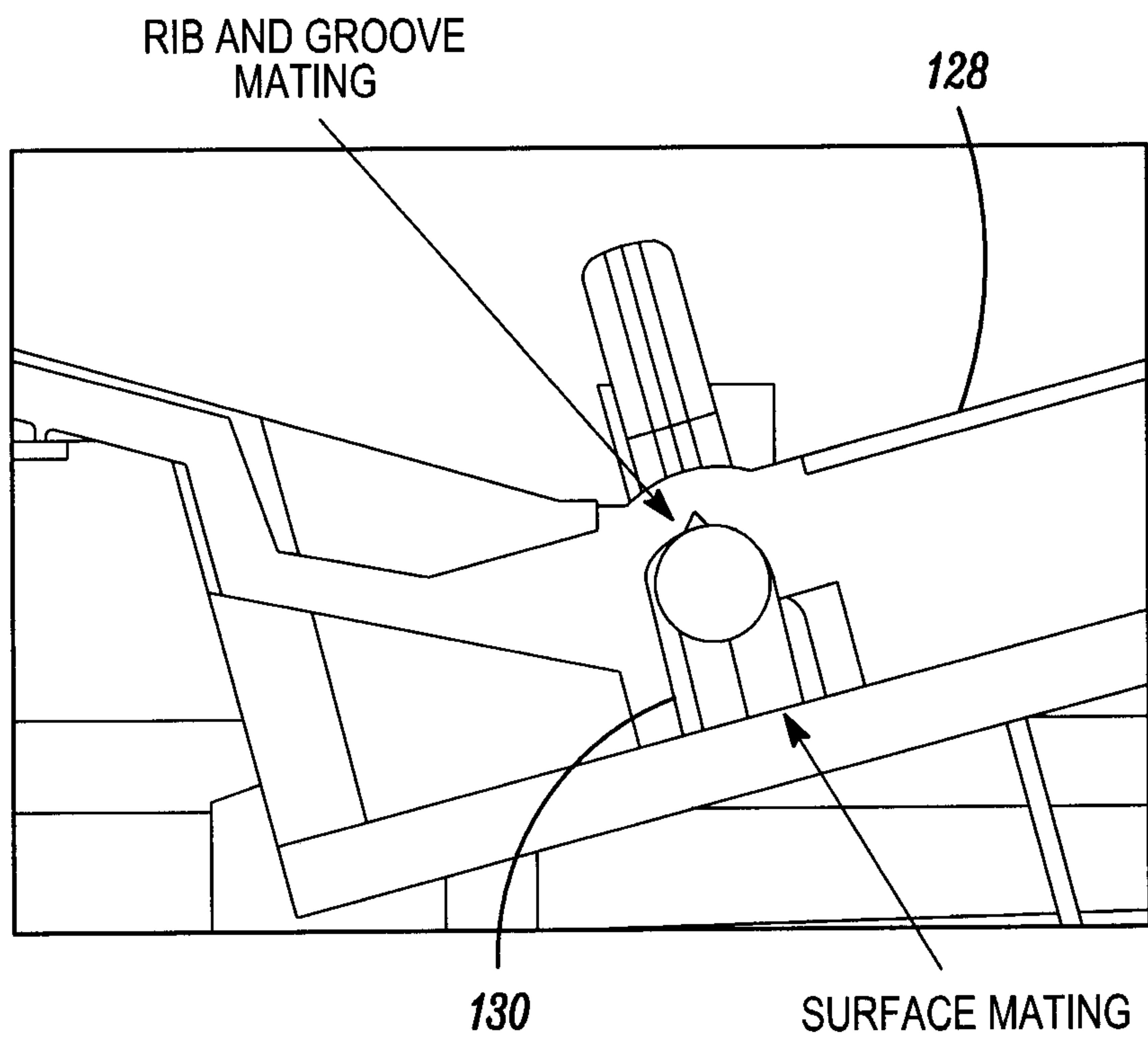


*FIG. 4A*

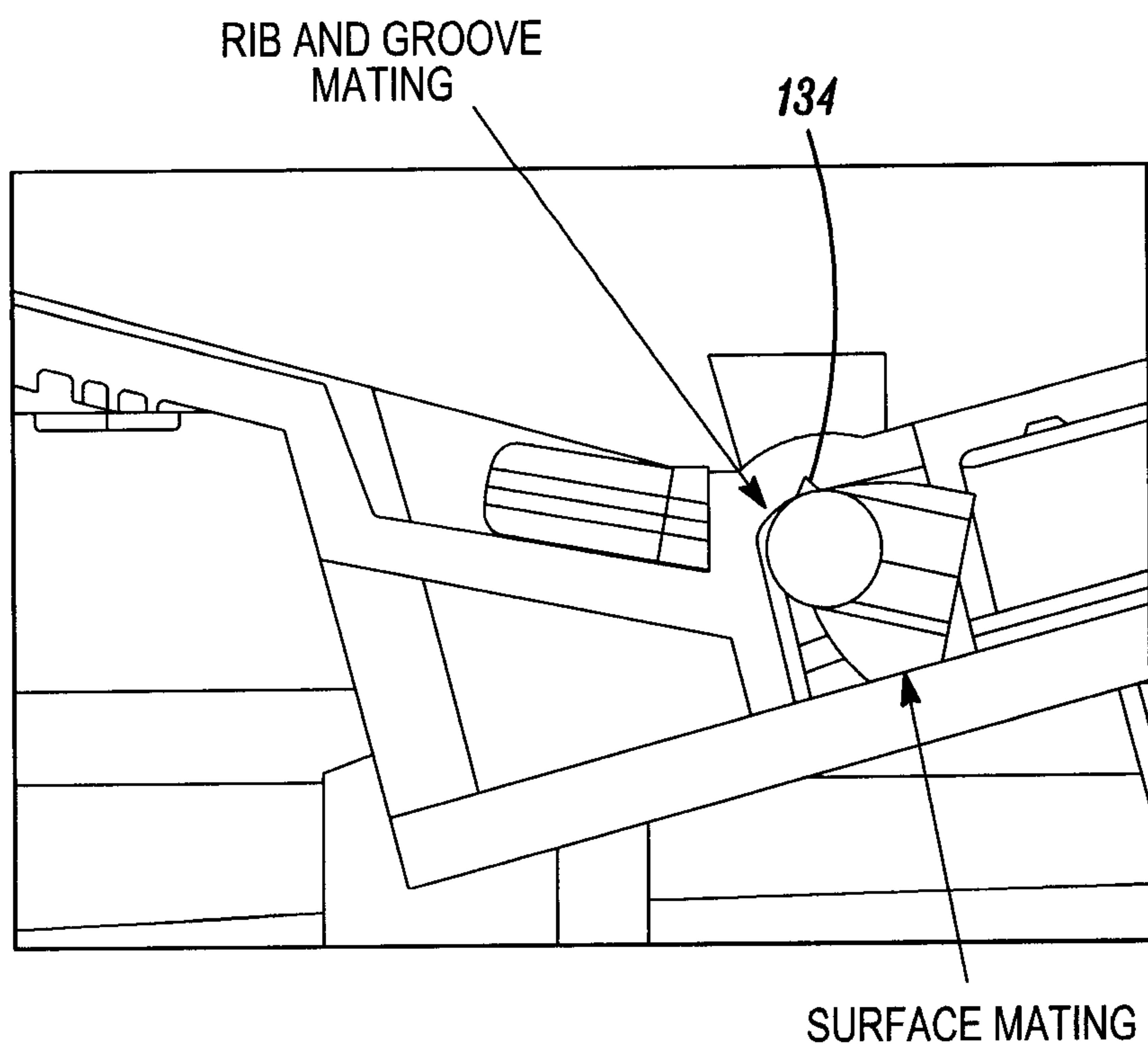


*FIG. 4B*

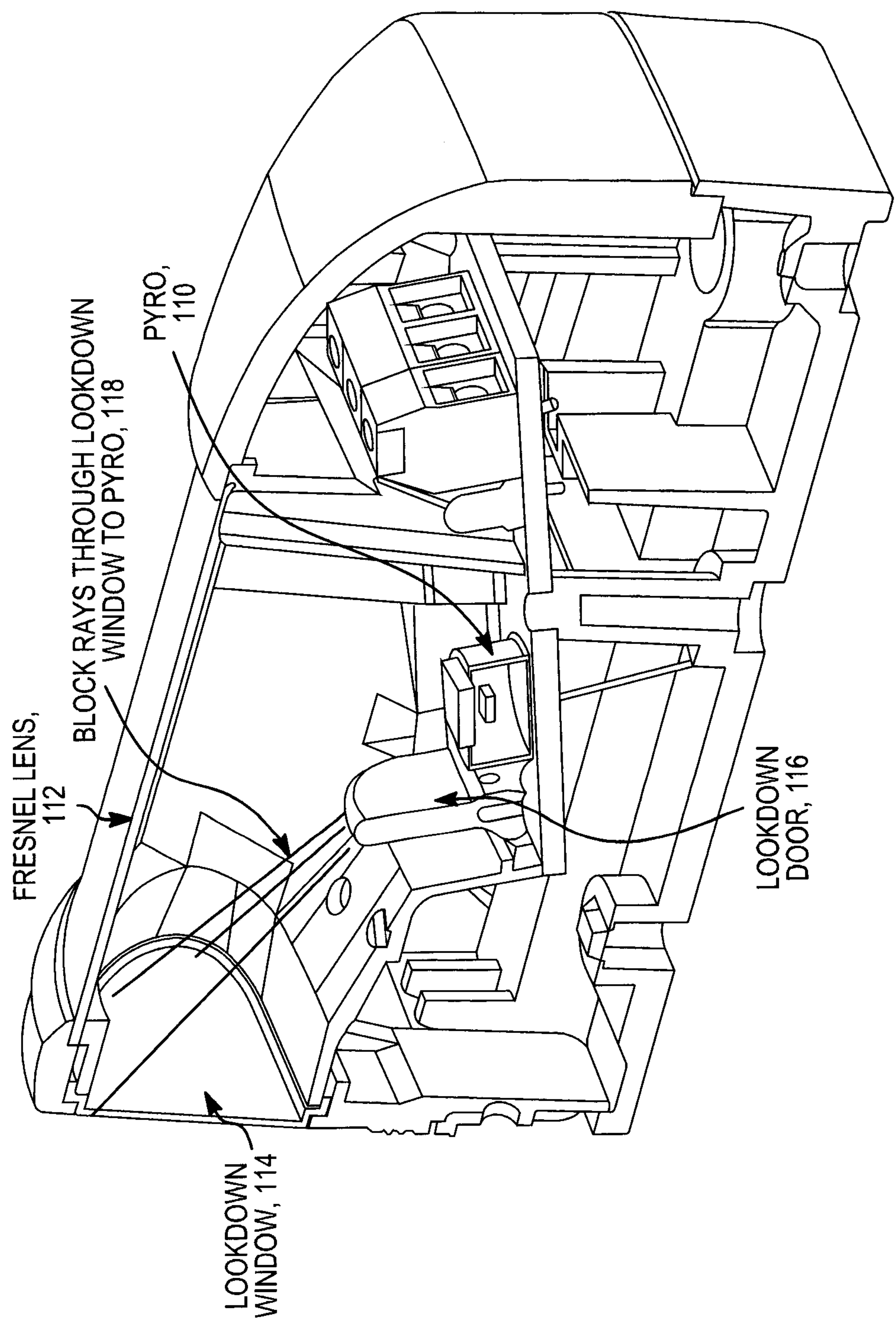


FIG. 5

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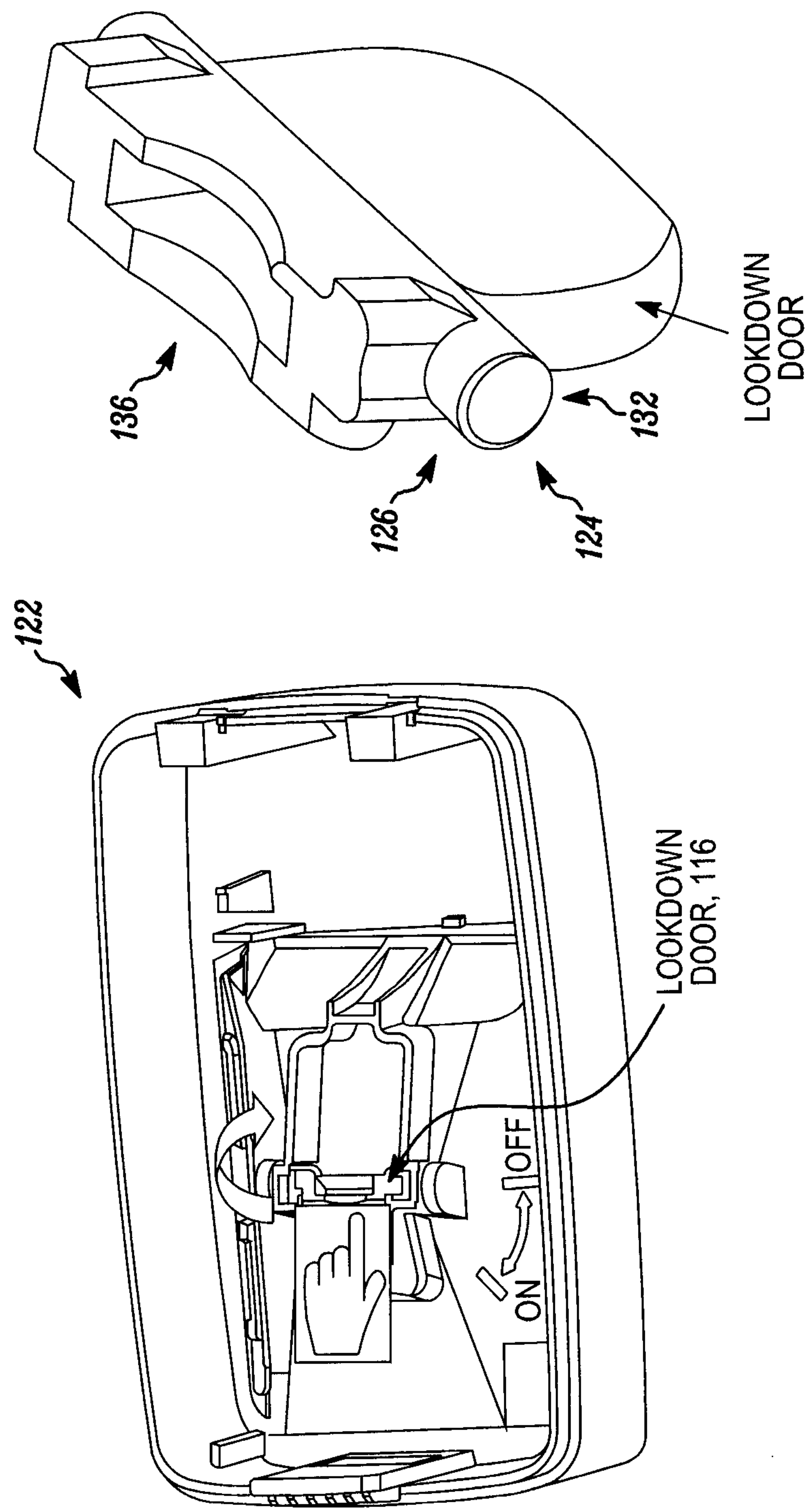


FIG. 6

