



(11) **EP 2 215 612 B9**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

(15) Correction information:

Corrected version no 1 (W1 B1)

Corrections, see

Description Paragraph(s) 13, 18

Claims DE 2

Claims EN 1, 2

(51) Int Cl.:

G08B 25/00 (2006.01) **G08B 13/00** (2006.01)

B65G 69/28 (2006.01)

(86) International application number:

PCT/US2008/084398

(48) Corrigendum issued on:

21.11.2012 Bulletin 2012/47

(87) International publication number:

WO 2009/070509 (04.06.2009 Gazette 2009/23)

(45) Date of publication and mention
of the grant of the patent:

15.08.2012 Bulletin 2012/33

(21) Application number: **08853556.2**

(22) Date of filing: **21.11.2008**

(54) **ALARM SYSTEM FOR A LOADING DOCK**

WARNSYSTEM FÜR EINE LADERAMPE

SYSTÈME D'ALARME POUR QUAI DE CHARGEMENT

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **26.11.2007 US 945075**

(43) Date of publication of application:

11.08.2010 Bulletin 2010/32

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Description

Background of the Invention

Field of the Invention

[0001] The subject invention generally pertains to truck loading docks and more particularly to a safety method for warning dockworkers inside a building and a safety system for a building according to the preamble of claims 1 and 6 respectively.

Description of Related Art

[0002] Many buildings may have a doorway with a loading dock to facilitate transferring cargo between a truck and the building. A loading dock is a platform that is generally at the same elevation as the bed of the truck or its trailer. The dock may also include a dock leveler, which is a vertically movable ramp that compensates for a height differential that may exist between the platform and the truck bed. Dock levelers may also provide a bridge across which personnel and material handling equipment can travel between the platform and the truck.

[0003] For protection against weather and theft, the doorway of the building may include a manual or power operated door. Doors for loading docks usually open and close by moving vertically so as not to interfere with the rear of the truck or interfere with cargo and activity just inside the doorway; however, other types of doors can be used.

[0004] When there is no truck at the dock and the weather is mild, the door may be left open to help ventilate the building with fresh outside air. Leaving the door open, unfortunately, increases the risk of personnel or material handling or other equipment inside the building from accidentally falling off the edge of the dock's platform and through the open doorway to the driveway. In addition, the door being left open decreases building security due to entrance of unauthorized personnel or employee theft via the unsecured doorway.

[0005] To provide ventilation through the doorway while minimizing the falling hazard, some loading docks include a runoff barrier that provides an obstruction across the doorway when a truck is not present or otherwise moves to a nonblocking position as needed. Examples of such barriers are disclosed in U. S. Patents 5,271,183 and 5,299,386.

[0006] Regardless of whether a loading dock includes a runoff barrier, a forklift transferring cargo between the truck's trailer and the dock's platform can present a collision hazard for dockworkers or other people in the work area. If a forklift is operating deep inside the truck's trailer, the forklift driver and nearby pedestrians might not notice each other. Thus, the forklift might suddenly emerge from within the trailer and accidentally strike someone.

[0007] DE 100 00 131 A1 discloses a safety method and a system for a building that includes a doorway and

a loading dock adapted to receive a vehicle. More specifically, the system The safety system has a switching and control unit with buttons via which the safety system is operated and that controls and coordinates the individual modules of the safety device, a light indicator system that gives or denies the driver permission to drive, a warning unit activated if the vehicle moves, a protection device that prevents persons or vehicles from falling off the ramp when closed, and an optoelectronic loading bay with light barriers for detecting the vehicle's position.

[0008] US 2004/075046 A1 discloses a detection system for detecting a body near a doorway that includes two detectors having one or more activation lines that overlap each other. With certain mounting arrangements, the detectors cover areas within and on both sides of the doorway. The detectors are meant to help prevent an already open door from accidentally closing on the body. The door is powered by a drive unit that ignores the detectors when the door is closed.

Summary of the Invention

[0009] The object of the invention is to provide a method and safety system for warning dockworkers inside the building of a potential hazard at a loading dock.

[0010] According to a first aspect, the present invention provides a safety method for a building that includes a doorway and a loading dock adapted to receive a vehicle, according to the subject-matter of independent claim 1. A second aspect of the invention is directed to a safety system, according to the subject-matter of independent claim 6. Further aspects and embodiments of the invention are set forth in the dependent claims, the following description and the drawings.

Brief Description of the Drawings

[0011]

Figure 1 is a perspective view of a safety system, wherein the view is from inside a building looking at a loading dock whose door and barrier are open while a truck is present at the dock.

Figure 2 is similar to Figure 1 but showing the door closed.

Figure 3 is similar to Figure 1 but without the truck at the dock, so the safety system provides an alarm signal (e.g., a light).

Figure 4 is similar to Figure 3 but showing the barrier being closed.

Figure 5 is similar to Figure 4 but showing the barrier closed.

Figure 6 is similar to Figure 3 but with a person within a predetermined distance of the edge of the platform, so the safety system provides a more pronounced warning signal (e.g., a buzzer).

Figure 7 is a perspective view of a safety system, wherein the view is taken from outside the building,

and the drawing schematically shows numerous sensors installed at various locations.

Figure 8 is ladder diagram illustrating just one of many conceivable ways for controlling the safety system of Figure 1.

Figure 9 is a cross-sectional side view of a loading dock similar to Figure 1 but with a pivotal barrier and a vehicle restraint engaging a truck.

Figure 10 is a schematic diagram illustrating a basic concept of an alarm system for a loading dock.

Figure 11 is a perspective view of one embodiment of a safety system responding to a potential hazard at a loading dock and also possibly a potentially endangered person in the area.

Figure 12 is a perspective view of another embodiment of a safety system responding to a potential hazard at a loading dock and also possibly a potentially endangered person in the area.

Figure 13 is a perspective view of another embodiment of a safety system responding to a potential hazard at a loading dock and also possibly a potentially endangered person in the area.

Description of the Preferred Embodiment

[0012] Figures 1-6 provide an inside view of a building 10 with a doorway 12 and a loading dock 14, wherein the loading dock is shown in various situations. Under certain conditions, a safety system 16 provides one or more alarm signals that warn of a potential falling hazard where someone or something could possibly fall off a raised platform 18 of dock 14. If a door 20 and a barrier 22, for instance, were left open while a truck 24 or other type of vehicle was not present at the dock, as shown in Figure 3, an alarm system 26 (e.g., an alarm driven by a controller) could provide an audible or visual alarm signal 28 that could alert dockworkers in the area of the hazard. In some embodiments, system 26 may also provide a more pronounced audible or visual warning signal 30 (Fig. 6) to signify more imminent danger, such as a body 32 (e.g., a person, a forklift, etc.) being dangerously close to the exposed edge of platform 18.

[0013] The safety function can be achieved in numerous ways. The response of safety system 16 (i.e., alarm system 26 plus its sensors) depends on the situation that happens to exist at the dock.

Figure 1, for example, shows door 20 being open while truck 24 is backed up against the dock. In this situation there may be no need for an alarm because truck 24 being present at the dock minimizes or eliminates the possibility of something falling off platform 18 and onto the driveway or falling off a conventional dock leveler 34 installed within the platform.

Figure 2 shows door 20 closed where a door panel 36 covers doorway 12. With door 20 closed, an alarm may not be needed, unless there is still a concern for something breaking through the door.

Figure 3 shows no truck present at the dock while door 20 is open. Since this presents a potential falling hazard, a controller 38 may be wired or programmed to energize an alarm 40 to produce an alarm signal 28 such as, for example, a red flashing light. Controller 38 may energize alarm 40 in response to a vehicle sensor 42 determining that truck 24 is not within a certain distance 44 of doorway 12 (see Fig. 9) and a barrier sensor 48 determining that door 20 is not closed. Sensor 48 is referred to as a "barrier sensor" because door 20 may be considered a barrier itself. In some embodiments, for example, barrier 22 is omitted, and door panel 36 alone (or in combination with added structure) serves as a runoff barrier.

[0014] Barrier sensor 48 for door 20 is schematically illustrated to represent any device for detecting a particular position of door panel 36. With further reference to Figure 7, examples of barrier sensor 48 include, but are not limited to, an upper travel limit switch 48a, a lower travel limit switch 48b, a rotational switch (Figs. 1 - 6), electromechanical switch, electromagnetic sensor, ultrasonic proximity sensor, limit switch, proximity switch, photoelectric eye, Hall Effect sensor, magnetic switch, etc.

[0015] Vehicle sensor 42 is schematically illustrated to represent any device for detecting that vehicle 24 is adjacent to or within certain distance 44 of doorway 12. Examples of vehicle sensor 42 include, but are not limited to, a rotational switch, electromechanical switch, a treadle switch 42a actuated by a truck tire 50 (Fig. 7), a switch 42b actuated by movement of a dock seal/shelter 52, a switch 42c actuated by movement of a vehicle restraint 54, a switch 42d actuated by movement of a bumper 56, a switch 42e actuated by movement of dock leveler 34, electromagnetic sensor, an ultrasonic proximity sensor 42f, limit switch, proximity switch, photoelectric eye, Hall Effect sensor, magnetic switch, etc.

[0016] Controller 38 may be wired or programmed to energize alarm 40 when vehicle sensor 42 determines that a truck is not present at the dock while a barrier sensor 46 establishes that barrier 22 is in a nonblocking position. Barrier sensor 46 is schematically illustrated to represent any device for detecting a particular position of barrier 22. Again with further reference to Figure 7, examples of barrier sensor 46 include, but are not limited to, a travel limit switch 46a, a rotational switch on a take-up drum (Figs 1 - 6), electromechanical switch, electromagnetic sensor, ultrasonic proximity sensor, proximity switch, photoelectric eye, Hall Effect sensor, magnetic switch, etc. Barrier sensor 46 can be installed on a first stanchion 60 supporting barrier 22, or a barrier sensor 46b could be installed on a second stanchion 64 of barrier 22.

[0017] Controller 38 may also be wired or programmed to energize alarm 40 in response to vehicle sensor 42 determining that truck 24 is not present or within a certain

distance 44 of doorway 12 (see Fig. 9) and barrier sensor 48 determining that door 20 is not closed. Moreover, it should be appreciated that the depicted location of sensor 42 is for descriptive purposes only, and other locations for sensor 42 such as mounting it externally to the building adjacent the dock may be preferred.

[0018] Figure 4 shows barrier 22 being moved from its nonblocking position of Figure 3 to its blocking position of Figure 5. In the blocking position, barrier 22 obstructs the open doorway to help prevent something from falling through it. Although many different types of barriers would work, in this particular example barrier 22 is a tough fabric panel 58 that can be moved between blocking and nonblocking positions. In the nonblocking position of Figure 3, panel 58 wraps about a spring-loaded, rotatable drum supported within first stanchion 60. In the blocking position of Figure 5, one end 62 of panel 58 hooks onto second stanchion 64 so that panel 58 provides a taut protective fence between stanchions 60 and 64.

[0019] In Figure 5, controller 38 de-energizes alarm 40 in response to barrier sensor 46 determining that barrier 58 is in its blocking position where the barrier minimizes or eliminates the falling hazard.

[0020] Figure 6 shows how safety system 26 could be configured to respond when the falling hazard poses more imminent danger, such as when body 32 approaches the open doorway. To achieve this functionality, when body 32 comes within an area 66 adjacent to the doorway 12 when door 20 is open, no truck is present, and barrier 22 is in its unobstructed position, controller 38 energizes an alarm 68 to create warning signal 30 that is audible or otherwise distinguishable from alarm signal 28. Controller 38 energizes alarm 68 in response to a remote body sensor 70, which is schematically illustrated to represent any device for determining whether body 32 is within area 66 (i.e., within a certain distance of the doorway). Examples of remote body sensor 70 include, but are not limited to a metal detector, motion detector, a weight detector 70a associated with dock leveler 34 (e.g., attached to a lip keeper 72) for sensing when the weight of a body is on the dock leveler's deck 74, infrared sensor, photoelectric eye that determines whether a body crosses its beam or line of sight, ultrasonic proximity sensor, electromagnetic radiation antenna, etc. Although Figures 1-6 show remote body sensor 70 installed in an overhead location, Figure 7 indicates that a remote body sensor 70b can be installed at any location that would be appropriate for a particular type of sensor.

[0021] In some cases, controller 38 may include a disable switch 76 for disabling alarm 68 under certain conditions such as, for instance, when the door or other equipment in the area needs servicing. If the alarm system, for example, includes both a visual signal and an audible signal, switch 76 can be configured to silence the audible signal but still permit the actuation of the visual signal.

[0022] Figure 8 shows just one example of many possible control schemes that could achieve the results just

described. The various elements of Figure 8 are schematic symbols or representations of what could correspond to vehicle sensor 42, barrier sensor 48, barrier sensor 46, body sensor 70, disable switch 76, alarm 40, and alarm 68, wherein 42' corresponds to 42, 48' corresponds to 48, etc. In Figure 8, the various sensors or switches are shown in their "normal" positions when truck 24 is not present (normally closed contacts of sensor 42' are closed), door 20 is open (normally closed contacts of sensor 48' are closed), barrier 22 is in its nonblocking position (normally closed contacts of sensor 46' are closed), body 32 is not within an area 66 (normally open contacts of sensor 70' are open), and disable switch 76' is in its normally closed position. Controller 38 energizes visual alarm 40' until at least one of the following occurs: the arrival of truck 24 opens the contacts of vehicle sensor 42', door 20 closes to open the contacts of barrier sensor 48', or barrier 22 closes to open the contacts of barrier sensor 46'. In cases where the barrier is provided by the door itself, barrier sensor 46' is omitted (or short circuited). If in addition to visual alarm 40' being energized, body 32 enters an area 66 to close the contacts of remote body sensor 70', controller 38 also energizes audible alarm 68'. A clock 78 may be added to establish a timestamp that identifies when alarm 68' (and/or alarm 40') was activated, which can be useful for investigating an accident.

[0023] Figures 7 and 9 show another example of a barrier 80, wherein barrier 80 includes an arm 82 that pivots between a blocking position (phantom line 84 in Fig. 7) and a nonblocking position (solid lines in Figs. 7 and 9). Figures 7 and 9 also show dock leveler 34 having a lip 86 whose upper edge 88 can be used as a barrier for preventing accidental runoff, particularly for material handling equipment. An example of such a dock leveler is disclosed in U. S. Patent 4,920,598. If either of these barriers were used in a safety system as disclosed herein, there would be an associated sensor or sensing scheme (e.g., sensor 46a of Figure 7) to determine whether the barrier is or is not in a blocking position.

[0024] Figure 10 is a diagram that schematically illustrates the basic concept of an alarm system 81 for a loading dock. As will be appreciated, some forms of signaling/alarm systems already exist on a loading dock. For example, most vehicle restraints include a light communication package to provide an indication to personnel inside the facility whether or not the restraint is engaged to secure the trailer. Thus, while the general idea of sensing and signaling in this context is known, the embodiments disclosed herein advance the art by, for example, more specifically identifying and warning in regard to particular hazards, or more effectively communicating hazards to allow corrective or avoidive action or for other reasons. In the previous example, sensing and signaling were provided for, inter alia, the hazard of an open dock, and a person in the immediate vicinity of the loading dock. Other particular hazards, and/or more effective communication of hazards will be discussed in regard to the gen-

eralized system 81. System 81 comprises steps 81a-f, wherein step 81a is defining a potential hazard that is to be avoided, step 81b is determining which conditions indicate the hazard might exist, step 81c is selecting appropriate types of sensors that can detect the hazardous condition, step 81d is selecting appropriate locations for the sensors, step 81e is selecting an appropriate type of alarm, and step 81f is selecting the location of the alarm. There are several possible choices for each of steps 81a-f, and the resulting combinations of choices provide numerous embodiments.

[0025] For step 81a, for instance, examples of potential hazards include, but are not limited to: a) vehicle restraint 54 being unlocked and a first body 32 or a second body 108 approaching doorway 12 or entering unsecured vehicle 24 (either body 32 or 108 could be a forklift, other material handling equipment, or a person), b) vehicle restraint 54 unlocked and body 32 or 108 being inside vehicle 24, c) body 32 or 108 moving within vehicle 24, d) body 32 or 108 being inside vehicle 24 but not necessarily moving, and/or e) body 108 (e.g., a forklift) being inside vehicle 24 and body 32 being nearby (and probably unable to see body 108 because it is inside vehicle 24).

[0026] For step 81b, examples of conditions that indicate one or more of the aforementioned potential hazards might exist include, but are not limited to a) the hook of vehicle restraint 54 is retracted and body 32 or 108 is moving near deck 74 or doorway 12, b) the hook of vehicle restraint 54 is retracted and body 32 or 108 is present near deck 74 or doorway 12, c) the hook of vehicle restraint 54 is retracted and body 32 or 108 is moving within vehicle 24, d) the hook of vehicle restraint 54 is retracted and body 32 or 108 is actually inside vehicle 24 but not necessarily moving, e) body 32 or 108 moving within vehicle 24 regardless of the condition of vehicle restraint 54, f) body 32 or 108 being stationary inside vehicle 24 regardless of the condition of vehicle restraint 54, g) a body is moving or stationary inside vehicle 24 while a second body is moving or stationary near deck 74 or doorway 12, and h) the presence or absence of vehicle 24 at the loading dock.

[0027] For step 81c, examples of sensors that can detect one or more of the aforementioned conditions include, but are not limited to: a) an electromechanical limit switch, b) pressure switch, c) active infrared presence detector, d) passive infrared motion detector, e) photoelectric eye, f) ultrasonic proximity sensor, g) electromagnetic radiation antenna, h) metal detector, and i) weight detector.

[0028] For step 81d, examples of locations for the aforementioned sensors include, but are not limited to: a) on or near vehicle restraint 54, b) on or near deck 74, c) on a yieldable or stationary bracket adjacent to doorway 12, d) on body 32 (e.g., on a person), and e) on body 108 (e.g., on a forklift). One or more of these positions plus other sensor mounting locations are shown in Figures 7 and 15 - 17. In cases where a sensor comprises an emitter and a receiver, the emitter can be at one of

the locations just mentioned and the receiver at another. An emitter, for example, could be attached to a forklift or a person with a corresponding receiver mounted to a yieldable bracket adjacent to doorway 12, or the locations of the emitter and receiver could be reversed.

[0029] For step 81e, examples of suitable types of alarms include, but are not limited to: a) lights of different colors to indicate different conditions, b) flashing light, c) illuminated signs or icons that represent various hazards or conditions, d) conventional audio signal (e.g., siren, buzzer, horn, etc.), and e) directed audio or directional sound focused at a certain area or individual. In some cases, a person can carry some form of personalized identification such as an RFID tag that allows an alarm system to deliver a personalized message to that particular individual. The alarm, for example, might project a verbal message that mentions the individual's name or uses a language particularly suited to the individual.

[0030] For step 81f, examples of possible alarm locations include, but are not limited to: a) along a vertical edge of doorway 12, b) along an upper horizontal edge of doorway 12, c) along a continuous run extending from a side to horizontal edge of doorway 12, d) along an intermittent run extending from a side to horizontal edge of doorway 12, e) on a yieldable or fixed bracket that is elevated and spaced apart from an upper edge of doorway 12 (e.g., light 85 of Fig. 15), f) adjacent to a peripheral edge of deck 74 (e.g., light 83 of Fig. 15), g) a place where the alarm projects sound or light into vehicle 24, h) a place where the alarm projects sound or light in front of doorway 12 in the vicinity of dock leveler 34, and i) carried on or with a pedestrian being warned.

[0031] Various combinations of choices in steps 81a-f provide numerous possible embodiments. One example, for instance, might include energizing a red light visible in the loading dock area outside of vehicle 24 when body 32 or 108 is moving adjacent to or within vehicle 24 or when simply present in the vehicle, and energizing a green light when no motion and/or presence is detected. Another example might include selectively projecting lights of various color (e.g., red, green and amber) into vehicle 24 (where they can be seen by the forklift operator) and/or into the loading dock area to indicate the situation pertaining to vehicle restraint 54 (e.g. whether it is engaged or not) and the presence or movement of body 32 or 108 within or adjacent to vehicle 24. Light 83 projects light both inside and outside of vehicle 24. Relatedly, being able to sense the presence of a vehicle or pedestrian in vehicle 24 could be tied to light or other communication outside the building so that, for example, it can be seen by the driver of vehicle 24. The vehicle restraints mentioned herein are intended to prevent a vehicle 24 from leaving the loading dock. Clearly, the restraint cannot perform this function if it is not engaged. Moreover, when it is not engaged, the driver is typically presented with a green light, indicating he is unlocked and free to depart. Accordingly, it would be beneficial to signal the driver not to leave whenever a person or

forktruck is on the vehicle 24. The sensors disclosed herein could be used as a triggering signal to illuminate an outside red light (seen by the driver of vehicle 24) whenever a body is present on the trailer, irrespective of whether the vehicle restraint is engaged or not.

[0032] As mentioned earlier in the description of Figure 3, it was pointed out that in some embodiments, barrier 22 is omitted and door panel 36 alone can serve as a runoff barrier. Figure 11, for instance, shows a loading dock 106 without barrier 22. In this case, door panel 36 is open and vehicle 24 is properly parked adjacent doorway 12. Nonetheless, a body 108 (e.g., forklift or other type of material-handling equipment) loading or unloading cargo from within vehicle 24 can create a potentially hazardous situation for another body 32 (e.g., a person, another forklift, etc.) that is within the area 66 adjacent doorway 12.

[0033] To avoid a collision between bodies 32 and 108, a safety system 110 warns body 32 and/or 108 of the hazard. In some embodiments, safety system 110 includes one or more remote body sensors 112 mounted outside of vehicle 24 and preferably inside the building. Sensors 112 each transmit a sensing signal 114 through an interior 116 of vehicle 24, wherein sensing signal 114 detects whether body 108 is inside vehicle 24. Sensor 112 can be any suitable device including, but not limited to, a long range passive infrared motion sensor that responds to the movement of body 108, or a photo-eye beam installed at an appropriate location where the beam can be interrupted as body 108 enters or leaves vehicle 24.

[0034] To warn body 32 and/or body 108 of the potential hazard, an alarm system 118 in responsive communication with sensors 112 provides a visual or audible alarm signal. Examples of alarm system 118 includes, but are not limited to, a single light 40 emitting a light signal 28, a stop/go light 120 emitting a red or green signal 122 that is visible to body 108 within vehicle 24, or one or more elongate light fixtures 124 that can be mounted along the perimeter of doorway 12, preferably parallel to the doorway's vertical or horizontal edges. Of course, countless other light arrangements and displays are also well within the scope of the invention.

[0035] To avoid sending unnecessary warnings when no body 32 is present while body 108 is loading or unloading vehicle 24, in some embodiments, safety system 110 includes body sensor 70 for detecting the presence of body 32 being within area 66 adjacent doorway 12. In this case, alarm system 110 provides a visual or audible alarm signal only if both bodies 32 and 108 are present. Thus, an alarm is only activated in response to the combination of both a potentially hazardous situation at loading dock 106 plus the presence of a body (e.g., body 32) that could be adversely affected by the hazard.

[0036] Sensor 112 is best mounted at a location where it can detect the presence of body 108 deep inside vehicle 24, yet sensor 112 is preferably located where it is unlikely to be struck by body 108 entering or leaving vehicle

24. It might be desirable to have two sensors 112 at the two upper corners of doorway 12 or have a single sensor 112 centrally located above the doorway. If sensor 112 is located where body 108 might strike it, sensor 112 is preferably mounted to a movable bracket 126 that can yield in response to sensor 112 being hit. Bracket 126, for example, might include a pivotal or resilient arm 128 that can bend or swing out of the way upon being struck and afterwards automatically return to its original position. Bracket 126 can be designed to hold an individual sensor or a series of them.

[0037] As an alternative to mounting sensor 112 outside of vehicle 24 and "looking in," Figure 12 shows a safety system 130 where a body sensor 132 comprises an infrared transmitter 134 mounted to body 108 and a corresponding receiver 134 installed within the building. The presence of body 108 inside vehicle 24 is detected upon transmitter 134 transmitting an infrared sensing signal 136 through interior 116 of vehicle 24 to receiver 134. Transmitter 134 is preferably mounted to the rear of body 108, with receiver 134 mounted to "look" into vehicle 24, so that body 108 is only sensed when it has penetrated all the way in to vehicle 24. Connecting alarm system 11 in responsive communication with receiver 134 enables safety system 130 to operate in a manner similar to that of system 110. It will be appreciated that mounting transmitters 134 to individuals would allow them to be sensed inside the vehicle as well.

[0038] Figure 13 shows another safety system 138 that is similar to system 110; however a mirror 140 reflects a sensing signal 142 from a sensor 70 to detect the presence of body 108 within vehicle 24. Mirror 140 allows sensor 70 to be mounted at a location where sensor 70 is less likely to be struck by body 108. To protect mirror 140 from damaging impact, mirror 140 can be supported by a resiliently bendable bracket 144.

[0039] In some embodiments, a safety system for a building's loading dock warns dockworkers inside the building when a falling hazard exists due to the door or barrier being open while there is no truck present at the dock.

[0040] In some embodiments, the dock includes a barrier in addition to a door, and in other embodiments the door itself serves as a barrier and the additional barrier is omitted.

[0041] In some embodiments, the barrier is attached to the door, and in other embodiments the barrier is mounted separate from the door.

[0042] In some embodiments, a sensor determines whether a truck or other type of vehicle is within a certain distance of the doorway, wherein the certain distance is sufficient for the lip of a dock leveler to rest upon the truck bed.

[0043] In some embodiments, a sensor determines whether a truck or other type of vehicle is within a certain distance of the doorway, wherein the certain distance is sufficient for a vehicle restraint to engage a truck's ICC bar (rear impact guard).

[0044] In some embodiments, a sensor determines whether a body crosses a line of sight to enter an area or come within a certain distance of the doorway.

[0045] In some embodiments, a remote body sensor in the form of a strain gage or scale associated with a dock leveler determines when the weight of a person or object is on the dock leveler's deck, whereby the sensor can determine whether the body is near the doorway.

[0046] In some embodiments, the safety system is unresponsive to a remote body sensor when the door is closed.

[0047] In some embodiments, the safety system uses both visual and audible alarms to signify different levels of possible danger.

[0048] In some embodiments, the safety system provides a timestamp that identifies when a hazardous situation may have occurred.

[0049] In some embodiments, the safety system "looks" inside a trailer to determine if a forklift or other material handling equipment is present.

[0050] In some embodiments, a safety system sends a forklift-sensing signal into a trailer, and in other embodiments the signal originates from the forklift and is transmitted outwardly through the trailer. In either case, the signal is used for determining whether the forklift (or other type of material-handling equipment) is operating within the trailer.

[0051] In some embodiments, the safety system only generates an alarm when the combination of both a potential hazard and a potentially endangered person are at a loading dock.

[0052] In some embodiments, an elongate light illuminates the perimeter of a loading dock doorway to indicate that a hazard, such as a forklift operating inside a trailer, might be near the doorway.

[0053] It should be appreciated by those of ordinary skill in the art that various modifications are within the scope of the invention determined by reference to the appended claims.

Claims

1. A safety method for warning dockworkers inside a building that includes a doorway (12) and a loading dock (14) adapted to receive a vehicle (24), the safety method **characterized in that** it comprises:

transmitting a sensing signal into the interior of the vehicle (24);
using the sensing signal to determine whether a body (32,108) is inside the vehicle; and
providing an alarm signal in response to determining that a body is inside the vehicle.

2. The safety method of claim 1, wherein the body is a forklift (108).

3. The safety method of claim 1, wherein the sensing signal is generated outside the vehicle and is projected into the vehicle.

4. The safety method of claim 1, wherein the sensing signal originates from within the interior of the vehicle and is projected outward.

5. The safety method of claim 1, wherein the determination step comprises responding to movement of the body inside the vehicle.

6. A safety system for a building that includes a doorway (12) and a loading dock (14) adapted to receive a vehicle (24), the safety system **characterized in that** comprises:

a remote body sensor (112; 132; 70, 140) disposed outside the vehicle and projecting a sensing signal into the vehicle to detect whether a body (32,108) is inside the vehicle; and
an alarm system (26; 118) in communication with the remote body sensor (112; 132; 70, 140) such that the alarm system (26; 118) provides an alarm signal in response to the remote body sensor (112; 132; 70, 140) detecting the body inside the vehicle.

7. The safety system of claim 6, wherein the remote body sensor (112; 132; 70, 140) detects motion.

8. The safety system of claim 6, wherein the remote body sensor (112; 132; 70, 140) is inside the building.

9. The safety system of claim 6, further comprising a movable bracket (126) supporting the remote body sensor (112) so that in response to the remote body sensor (112) being struck, the remote body sensor (112) can move without significant damage.

10. The safety system of claim 6, wherein the alarm system (118) comprises an elongate light fixture (124) that lies generally parallel to at least a portion of the perimeter of the doorway (12).

11. The safety system of claim 6, wherein the alarm system (26; 118) comprises a light visible to the driver or the received vehicle, wherein the lights indicates the presence of the body inside the vehicle.

Patentansprüche

1. Sicherheitsverfahren zum Warnen von Verladestellenarbeitern innerhalb eines Gebäudes, das eine Türöffnung (12) und eine Verladestelle (14) umfasst, die ausgestaltet ist, ein Fahrzeug (24) aufzunehmen, wobei das Sicherheitsverfahren **dadurch gekennzeichnet**

zeichnet ist, dass es umfasst:

- Übertragen eines Erfassungssignals in das Innere des Fahrzeugs (24);
Verwenden des Erfassungssignals zum Bestimmen, ob ein Körper (32, 108) in dem Fahrzeug ist; und
Bereitstellen eines Alarmsignals in Reaktion auf Bestimmen, dass ein Körper in dem Fahrzeug ist.
2. Sicherheitsverfahren nach Anspruch 1, bei welchem der Körper ein Gabelstapler (108) ist.
3. Sicherheitsverfahren nach Anspruch 1, bei welchem das Erfassungssignal außerhalb des Fahrzeugs erzeugt wird und in das Fahrzeug projiziert wird.
4. Sicherheitsverfahren nach Anspruch 1, bei welchem das Erfassungssignal aus dem Inneren des Fahrzeugs entspringt und nach außen projiziert wird.
5. Sicherheitsverfahren nach Anspruch 1, bei welchem der Bestimmungsschritt Reagieren auf Bewegung des Körpers in dem Fahrzeug umfasst.
6. Sicherheitssystem für ein Gebäude, das eine Türöffnung (12) und eine Verladestelle (14) umfasst, die ausgestaltet ist, ein Fahrzeug (24) aufzunehmen, wobei das Sicherheitssystem **dadurch gekennzeichnet ist, dass** es umfasst:
- einen Fernkörpersensor (112; 132; 70, 140), der außerhalb des Fahrzeugs angeordnet ist und ein Erfassungssignal in das Fahrzeug projiziert, zum Erfassen, ob ein Körper (32, 108) in dem Fahrzeug ist; und
ein Alarmsystem (26; 118), das mit dem Fernkörpersensor (112; 132; 70, 140) in Verbindung steht, so dass das Alarmsystem (26; 118) ein Alarmsignal in Reaktion auf den Fernkörpersensor (112; 132; 70, 140) bereitstellt, der den Körper in dem Fahrzeug erfasst.
7. Sicherheitssystem nach Anspruch 6, bei welchem der Fernkörpersensor (112; 132; 70, 140) eine Bewegung erfasst.
8. Sicherheitssystem nach Anspruch 6, bei welchem der Fernkörpersensor (112; 132; 70, 140) in dem Gebäude ist.
9. Sicherheitssystem nach Anspruch 6, des Weiteren eine bewegliche Klammer (126) umfassend, die den Fernkörpersensor (112) trägt, so dass in Reaktion auf Anstoßen des Fernkörpersensors (112), der Fernkörpersensor (112) sich ohne wesentlichen Schaden bewegen kann.

10. Sicherheitssystem nach Anspruch 6, bei welchem das Alarmsystem (118) eine längliche Lichtbefestigung (124) umfasst, die im Allgemeinen parallel zu wenigstens einem Teil des Umfangs der Türöffnung (12) liegt.

11. Sicherheitssystem nach Anspruch 6, bei welchem das Alarmsystem (26; 118) ein Licht umfasst, das für den Fahrer oder das aufgenommene Fahrzeug sichtbar ist, wobei das Licht die Anwesenheit des Körpers in dem Fahrzeug anzeigt.

Revendications

1. Procédé de sécurité pour avertir des travailleurs sur plateforme à l'intérieur d'un bâtiment qui comprend une porte (12) et une plateforme de chargement (14) conçues pour recevoir un véhicule (24), le procédé de sécurité étant **caractérisé en ce qu'il** consiste à :

transmettre un signal de détection à l'intérieur du véhicule (24) ;
utiliser le signal de détection pour déterminer si un corps (32, 108) est présent à l'intérieur du véhicule ; et
fournir un signal d'alarme en réponse à la détermination de la présence d'un corps à l'intérieur du véhicule.

2. Procédé de sécurité selon la revendication 1, dans lequel le corps est un chariot élévateur (108).

3. Procédé de sécurité selon la revendication 1, dans lequel le signal de détection est généré à l'extérieur du véhicule et est projeté dans le véhicule.

4. Procédé de sécurité selon la revendication 1, dans lequel le signal de détection provient de l'intérieur du véhicule et est projeté à l'extérieur.

5. Procédé de sécurité selon la revendication 1, dans lequel l'étape de détermination consiste à répondre à un mouvement du corps à l'intérieur du véhicule.

6. Système de sécurité pour un bâtiment qui comprend une porte (12) et une plateforme de chargement (14) conçues pour recevoir un véhicule (24), le système de sécurité étant **caractérisé en ce qu'il** comprend :

un capteur de corps à distance (112 ; 132 ; 70, 140) disposé à l'extérieur du véhicule et projetant un signal de détection dans le véhicule pour détecter si un corps (32, 108) est présent à l'intérieur du véhicule ; et
un système d'alarme (26 ; 118) en communication avec le capteur de corps à distance (112 ; 132 ; 70, 140) de sorte que le système d'alarme

(26 ; 118) fournisse un signal d'alarme en réponse à la détection par le capteur de corps à distance (112 ; 132 ; 70, 140) du corps à l'intérieur du véhicule.

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7. Système de sécurité selon la revendication 6, dans lequel le capteur de corps à distance (112 ; 132 ; 70, 140) détecte un mouvement.

8. Système de sécurité selon la revendication 6, dans lequel le capteur de corps à distance (112 ; 132 ; 70, 140) est à l'intérieur du bâtiment.

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9. Système de sécurité selon la revendication 6, comprenant en outre un support mobile (126) supportant le capteur de corps à distance (112) de sorte que, si le capteur de corps à distance (112) est heurté, le capteur de corps à distance (112) puisse se déplacer sans dommage important.

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10. Système de sécurité selon la revendication 6, dans lequel le système d'alarme (118) comprend un luminaire (124) allongé qui s'étend généralement parallèlement à au moins une partie du périmètre de la porte (12).

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11. Système de sécurité selon la revendication 6, dans lequel le système d'alarme (26 ; 118) comprend une lumière visible par le conducteur ou le véhicule reçu, dans lequel la lumière indique la présence du corps à l'intérieur du véhicule.

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FIG. 1

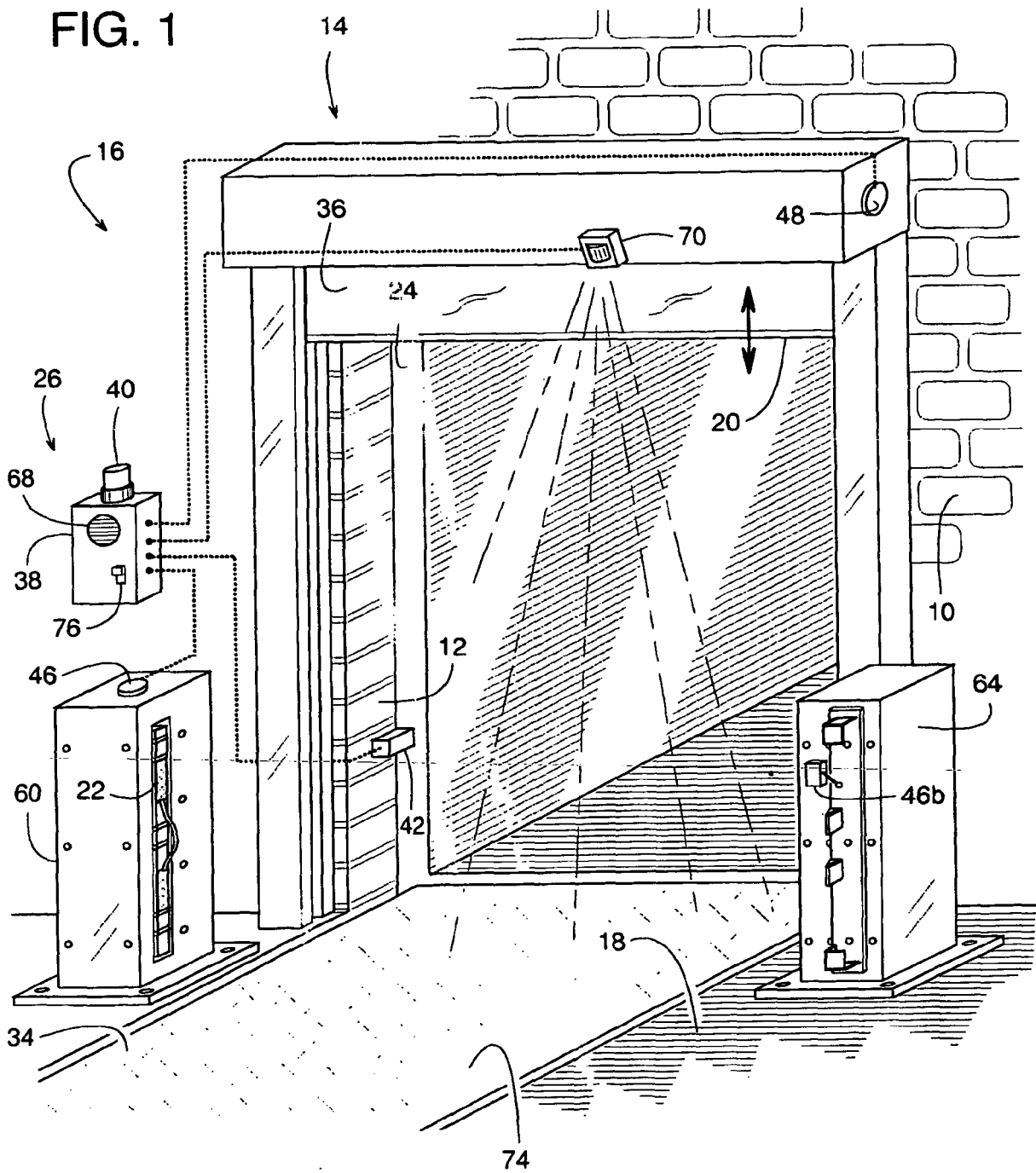


FIG. 2

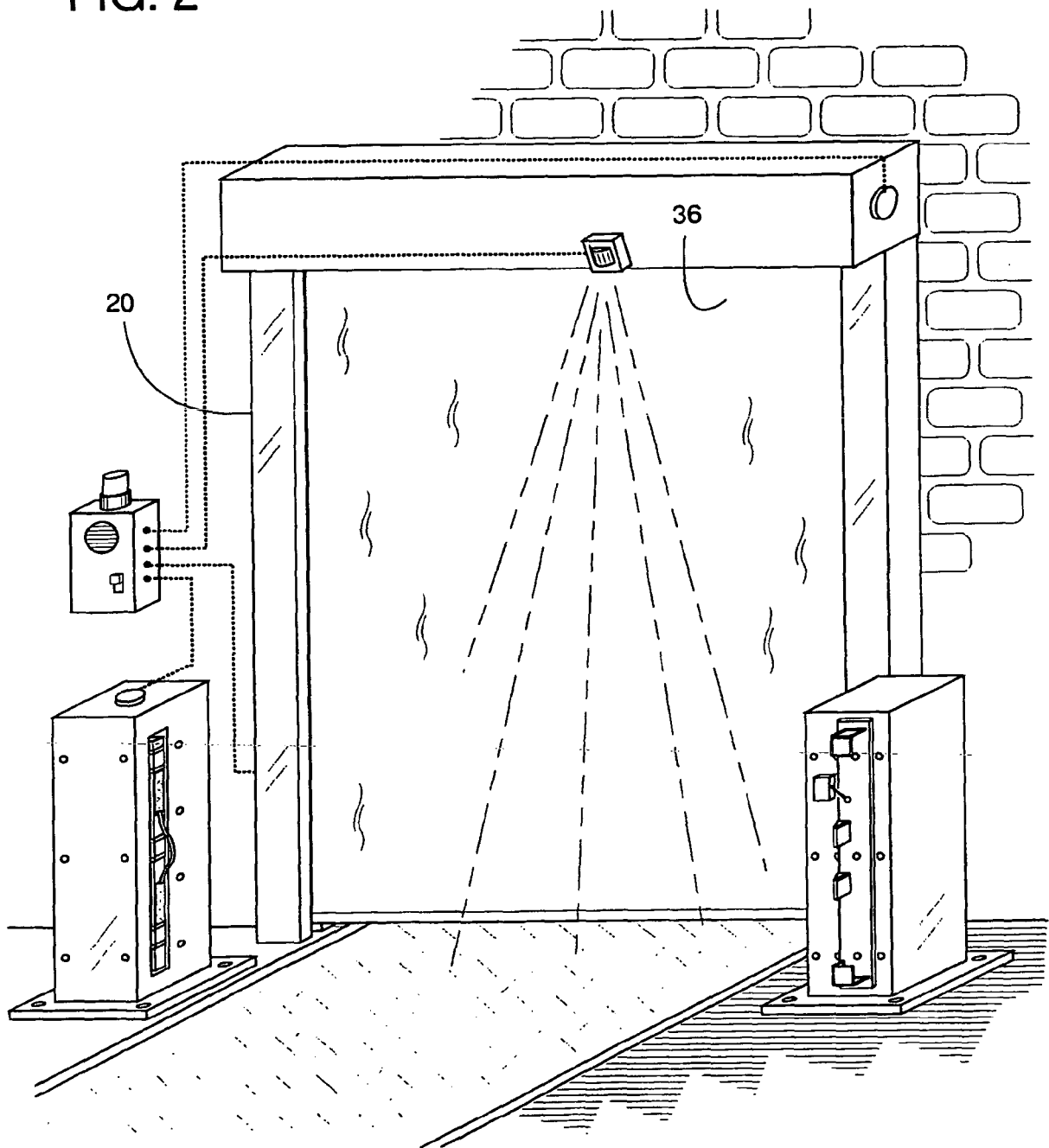


FIG. 3

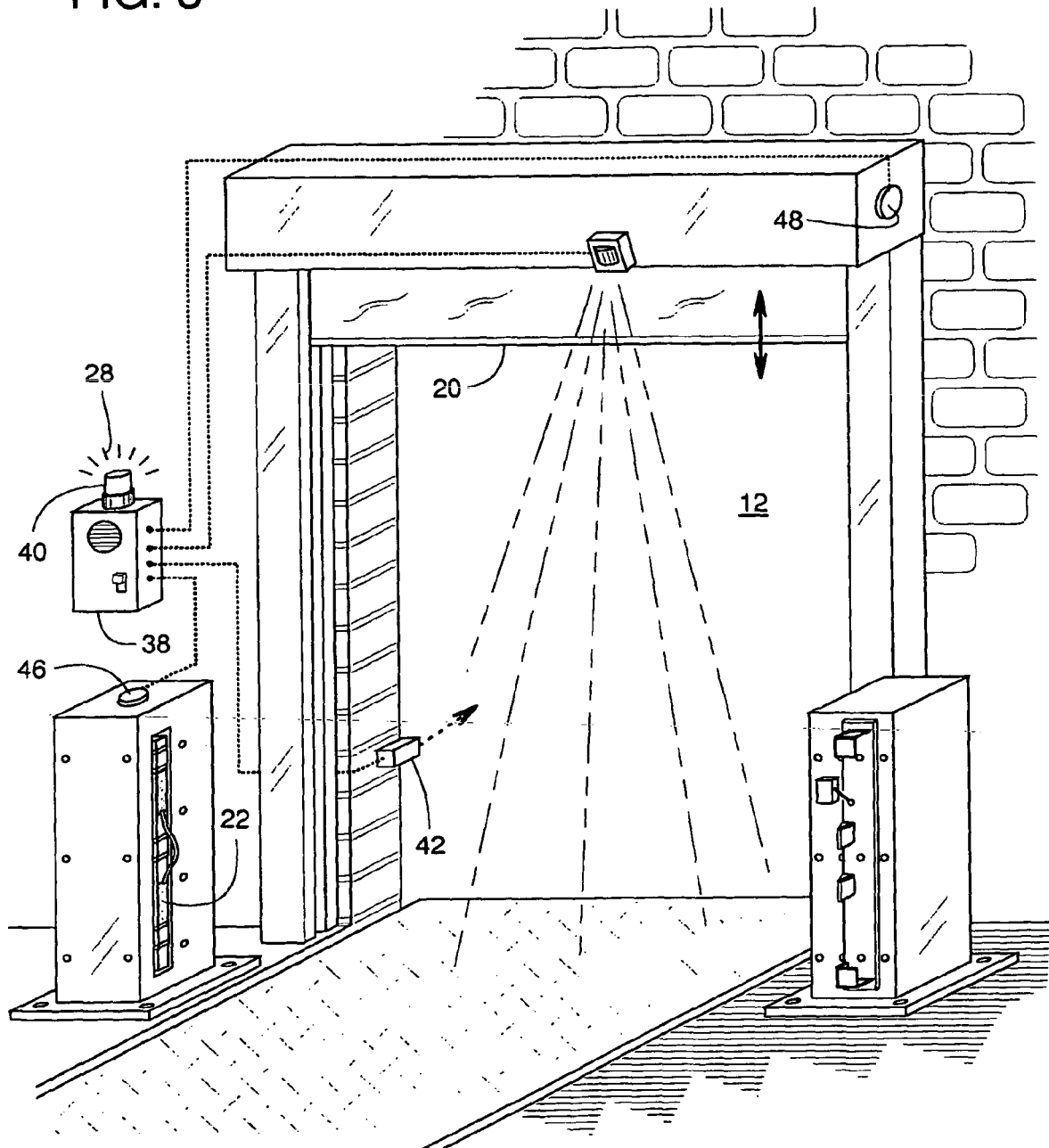


FIG. 4

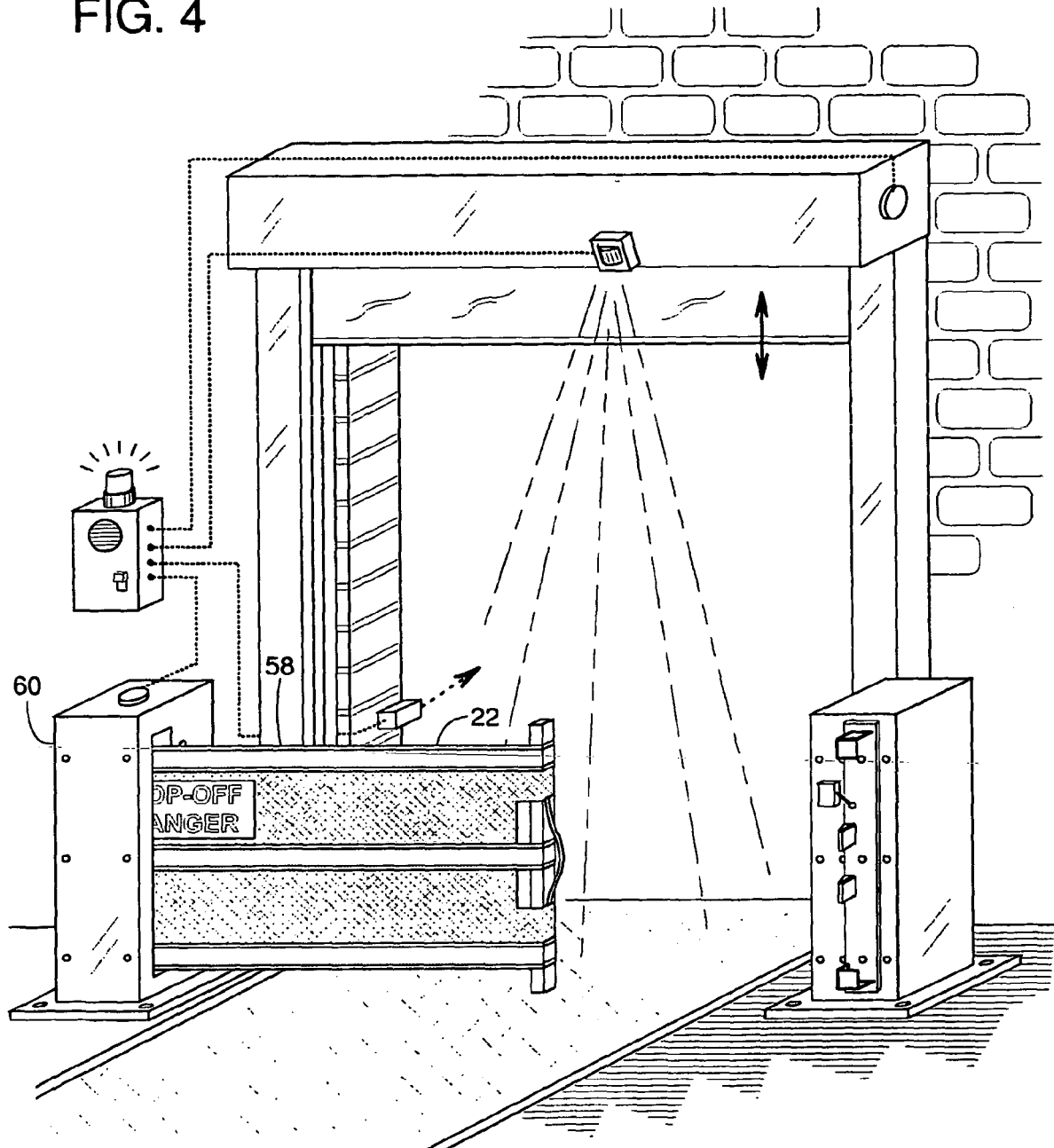


FIG. 5

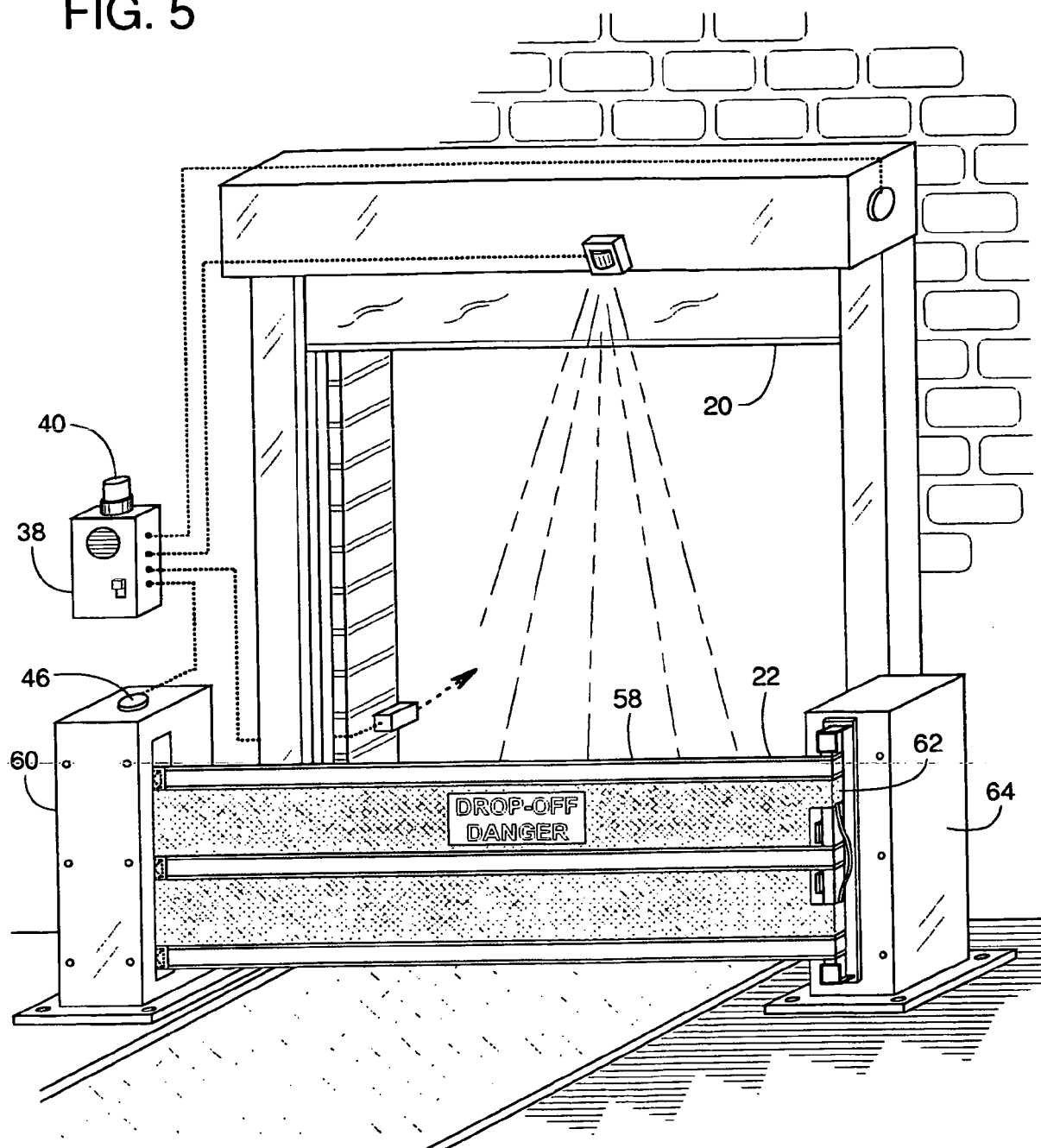


FIG. 6

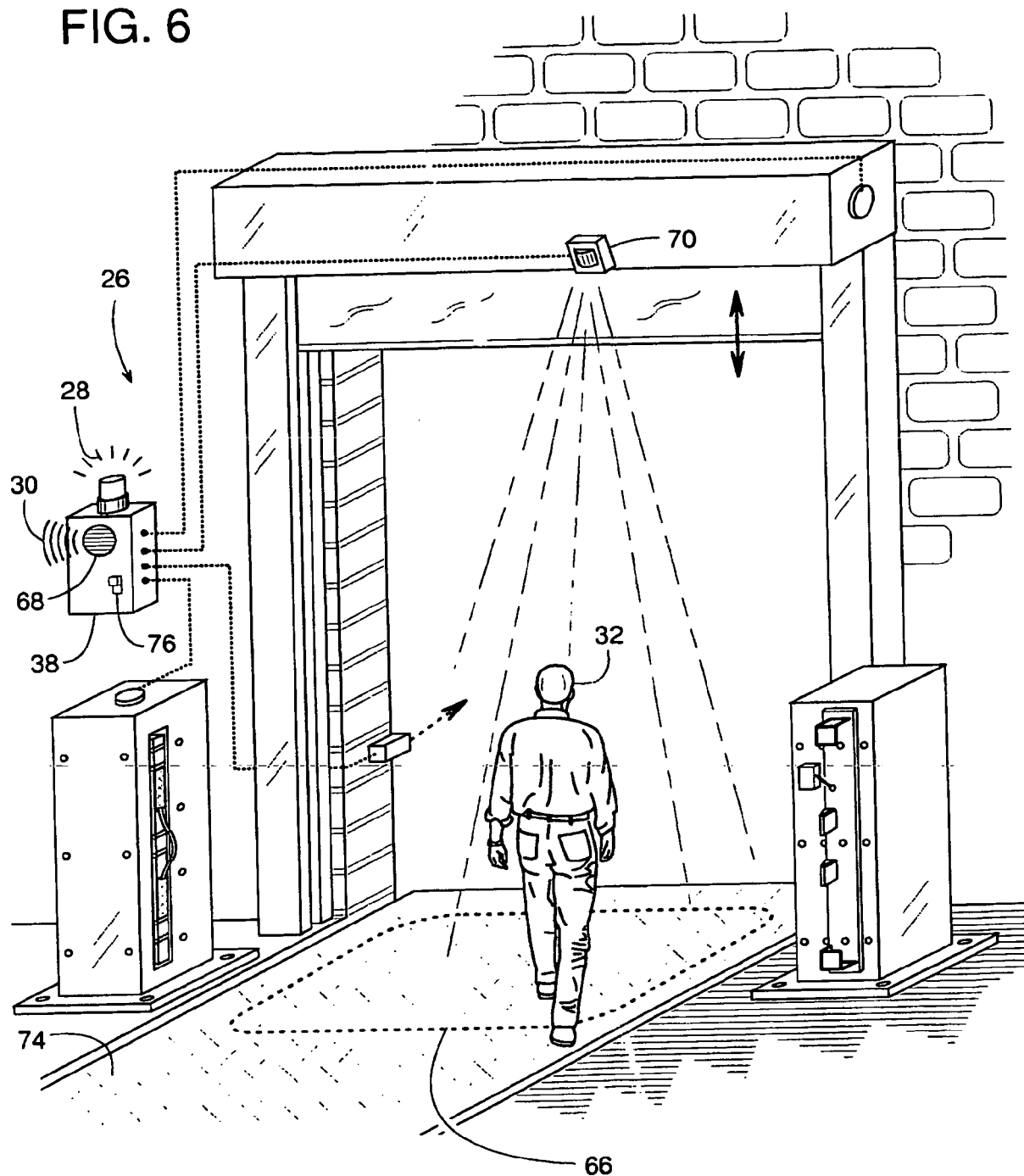


FIG. 7

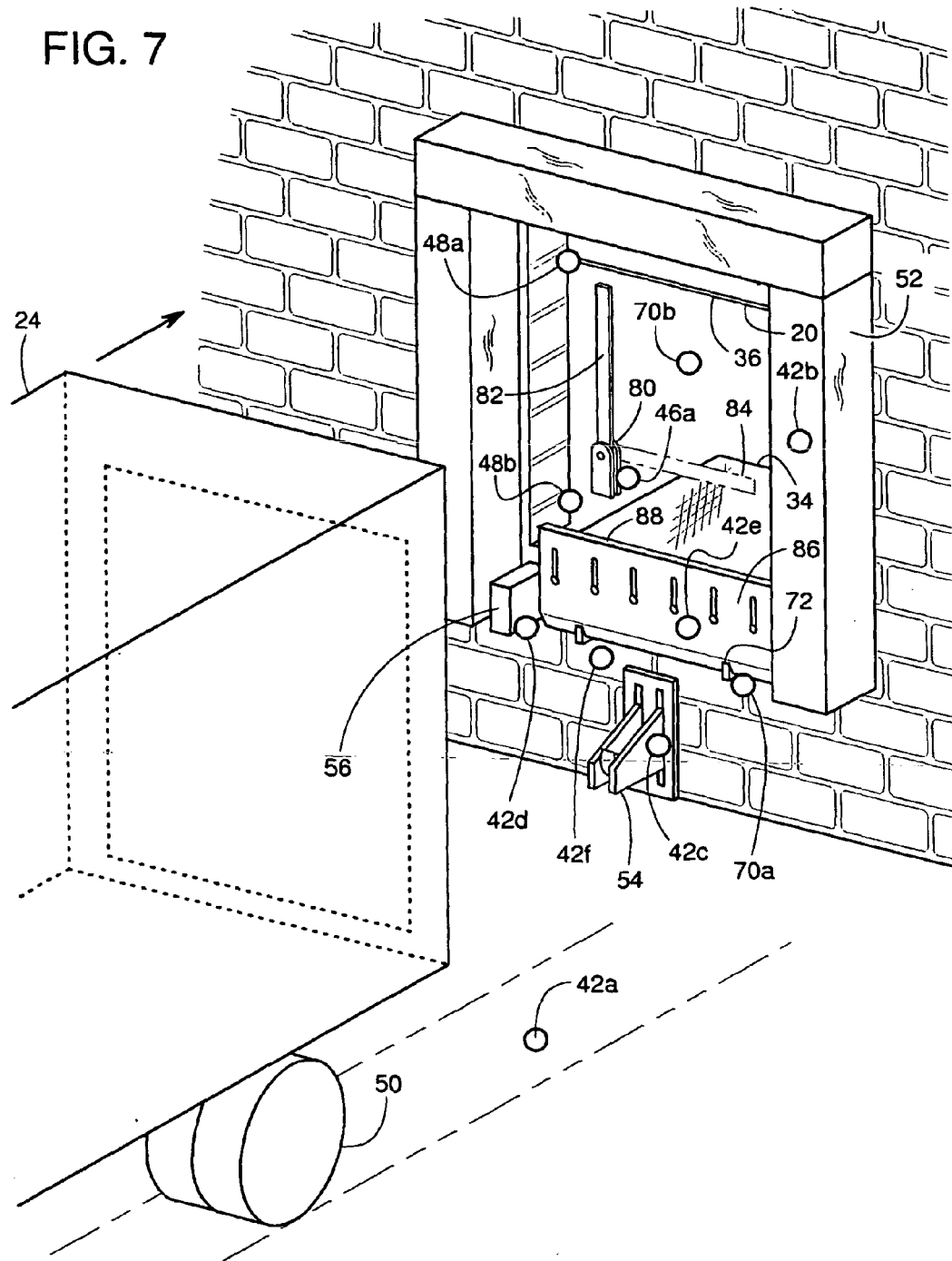


FIG. 8

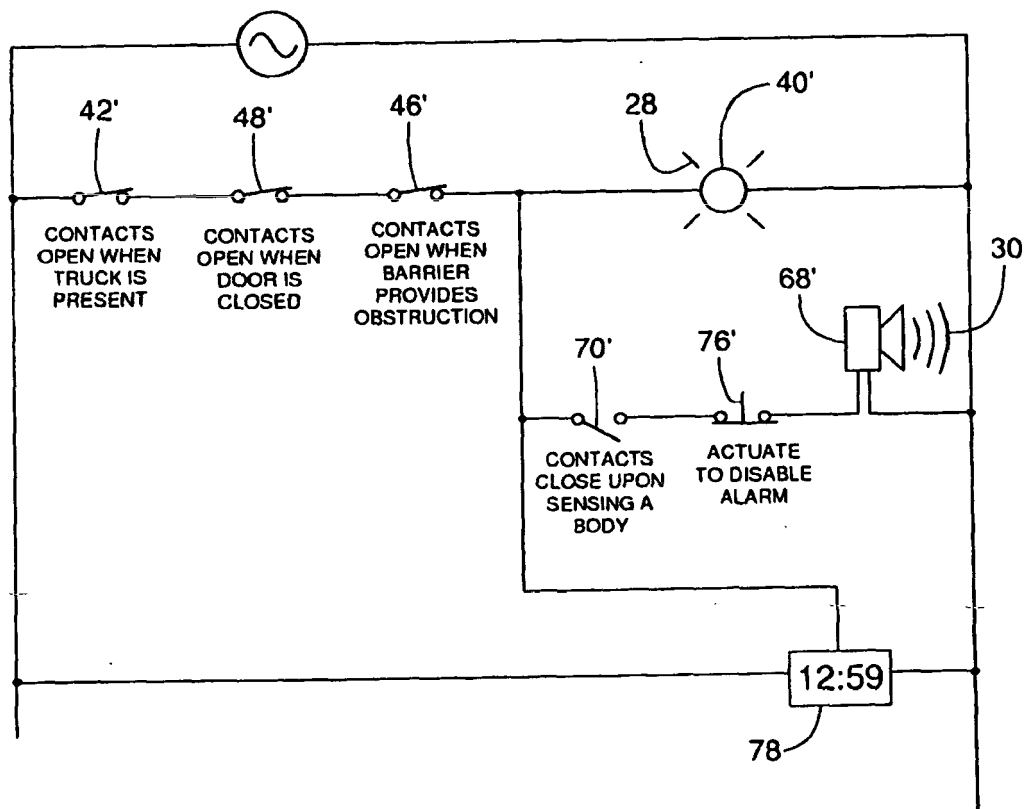


FIG. 9

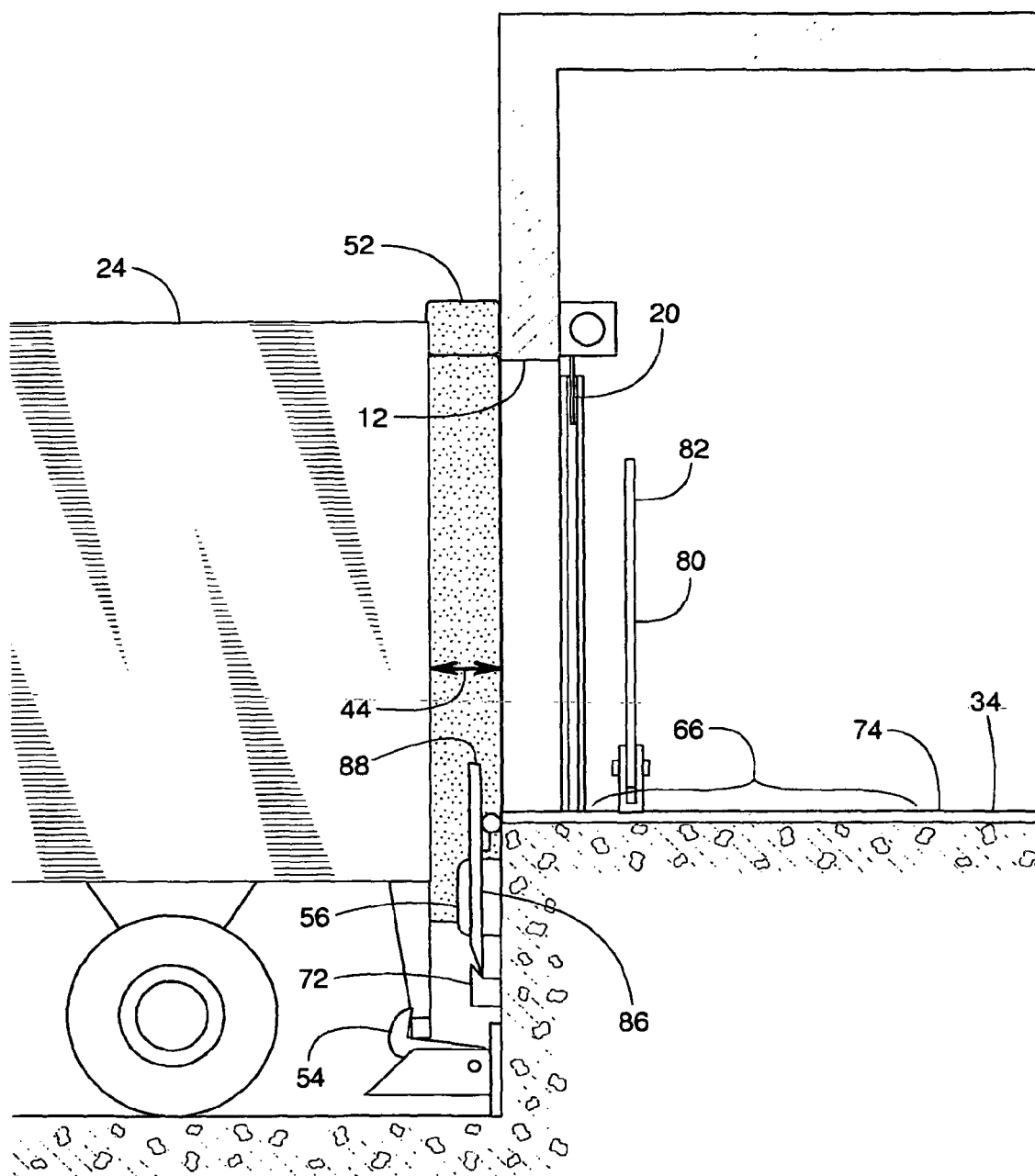


FIG. 10

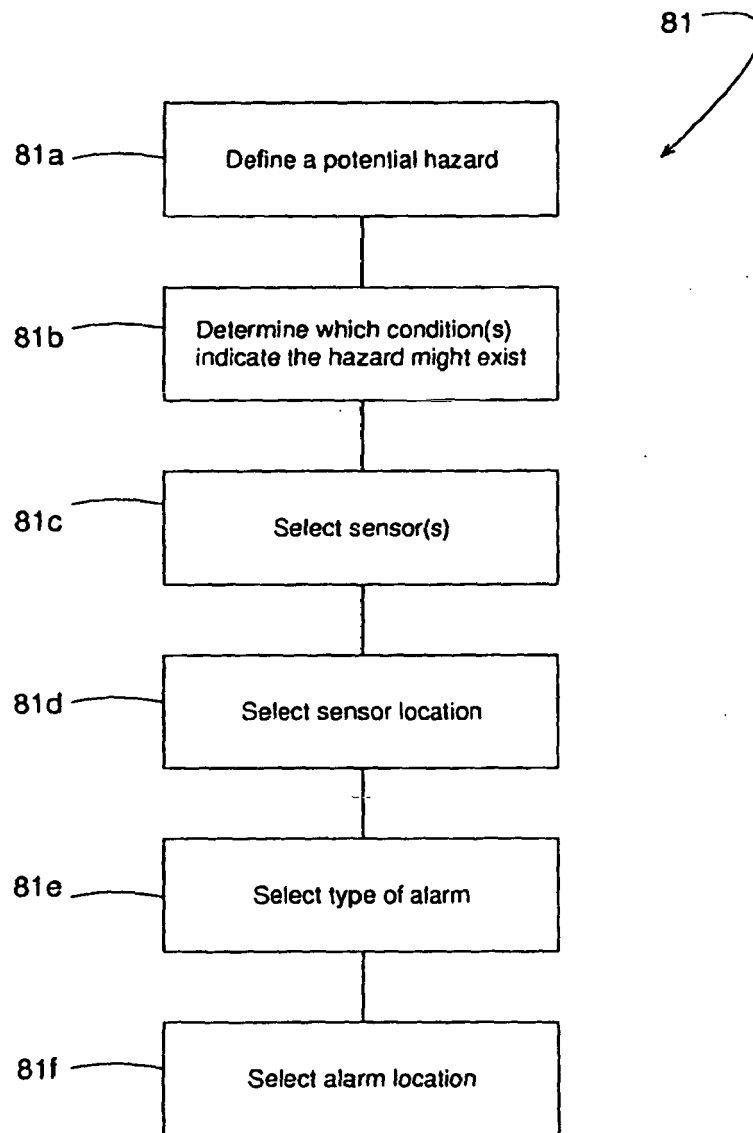


FIG. 11

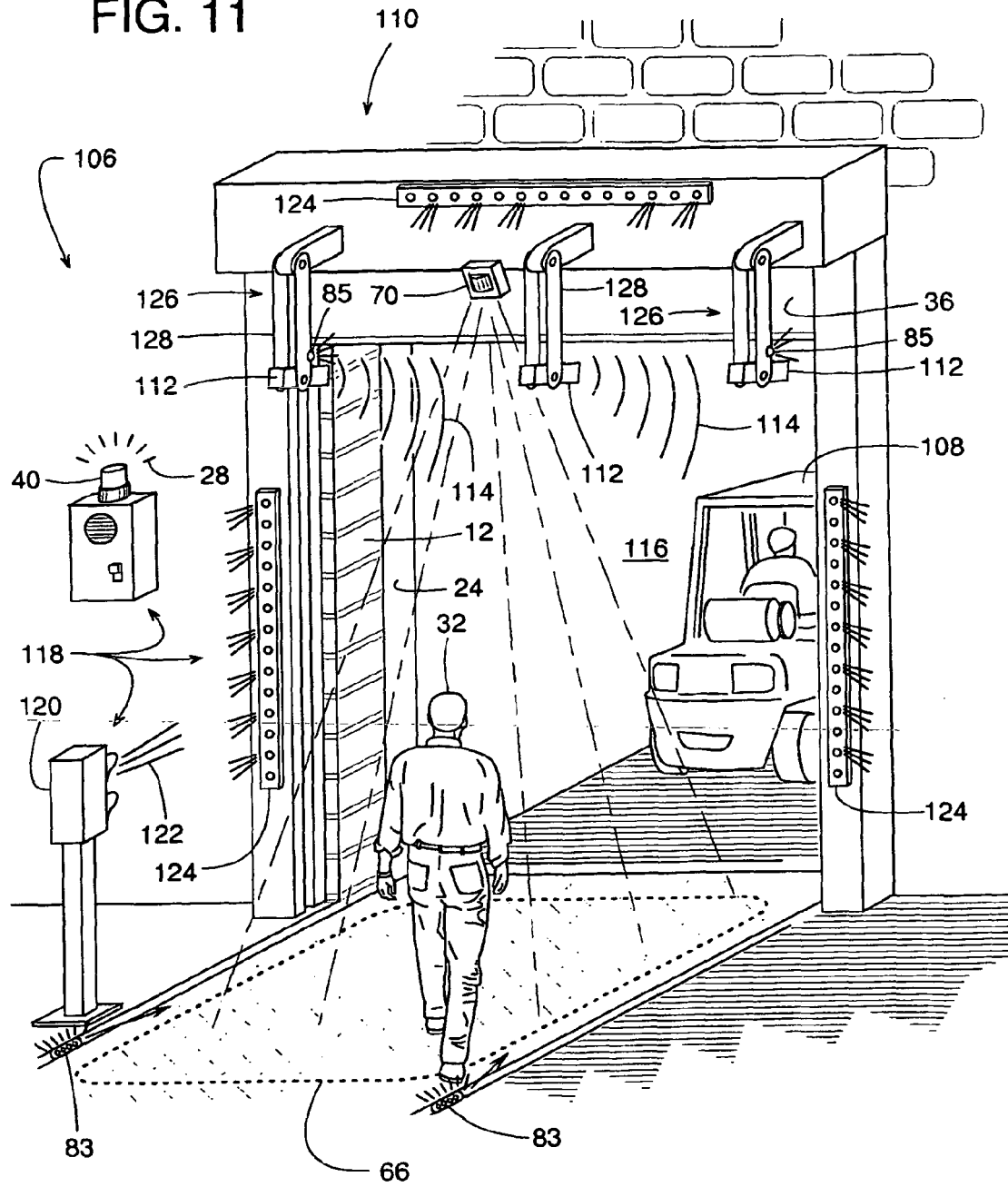


FIG. 12

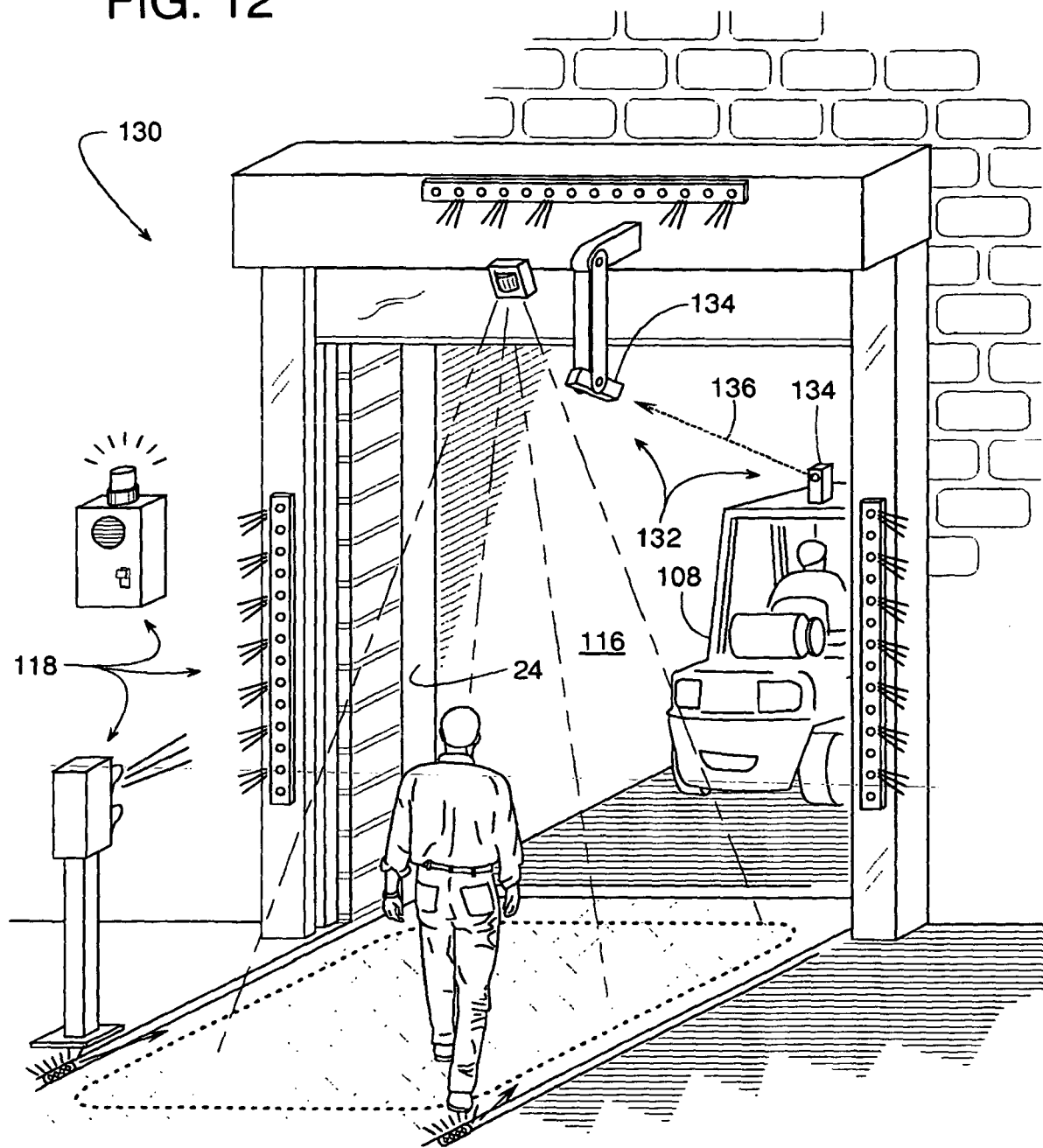
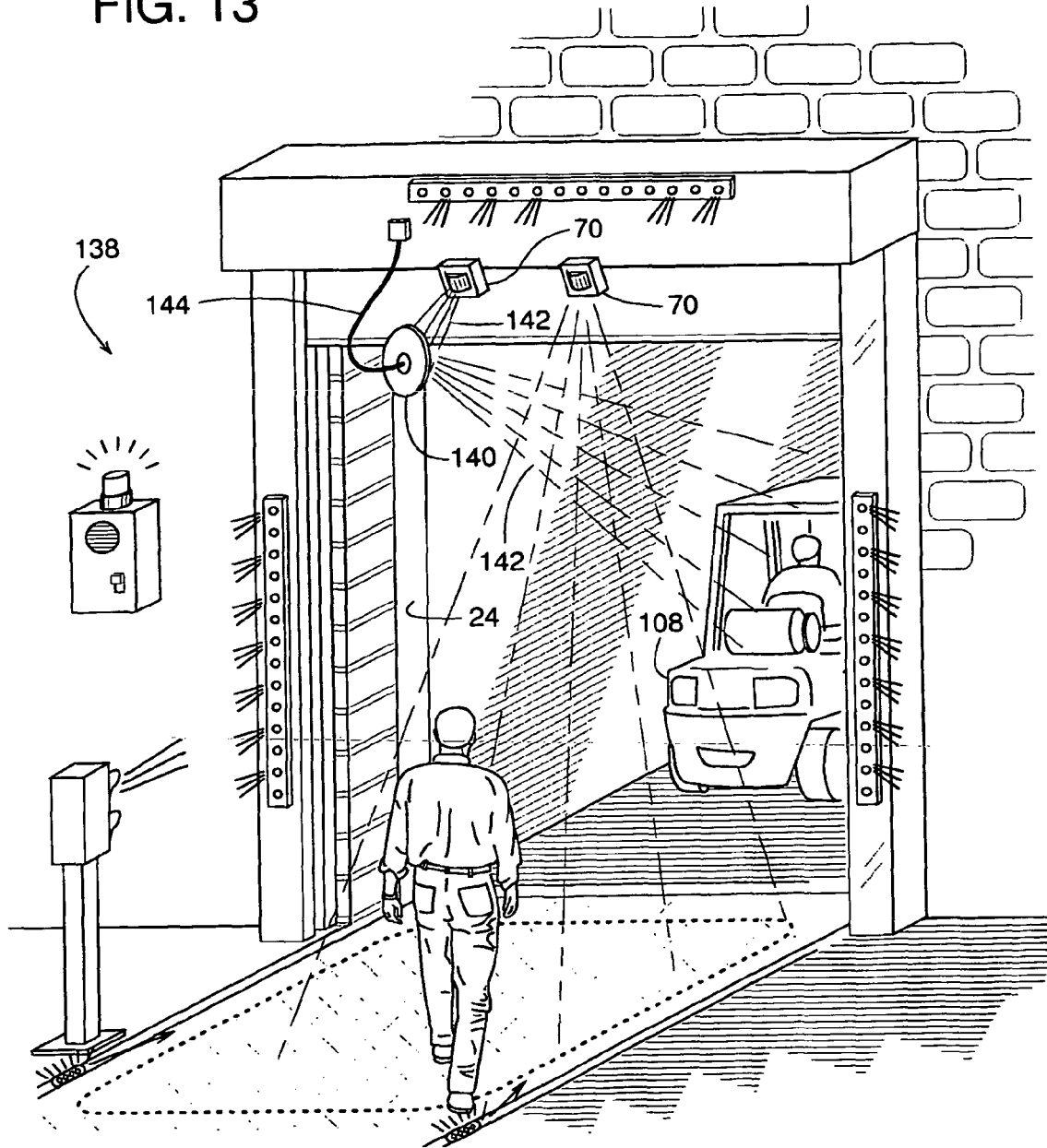


FIG. 13



REFERENCES CITED IN THE DESCRIPTION

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