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(54) **REVOLVING DOOR**

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US-A- 4 557 073**

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Description

[0001] The invention relates to a revolving door comprising a stationary cylinder to be accommodated in a wall, and a rotatable partition dividing the cylinder substantially into two sections, comprising a wall element centrally positioned in the cylinder, whereby in, at or on the partition one or more detector means are provided.

[0002] Such a revolving door is known in practice and is used, for example, in shopping centres, large specialist shops, airports, and the like.

[0003] US-A-4 557 073 relates to a revolving door according to the preamble of claim 1. In this known revolving door the detector means are placed at the periphery of the cylinder and serve to detect a person wishing to pass the revolving door. The detector means sensing such person then results in that the revolving door starts to move.

[0004] DE-C-41 34 016 also relates to a revolving door of the above-mentioned type in which detector means are used. In this citation the detector means are capacitive sensors placed on the door wings sensing the presence of a human body part at a position where such body part is liable to get harmed. The capacitive sensors are connected to a circuit to prevent further rotation of the revolving door in that situation.

[0005] EP-A-0 506 152 concerns a three wing revolving door having a detection aerial placed on each of the door wings and means for switching on and off each aerial in turn such that when the revolving door is not rotating, only the detection aerial of that particular door wing is activated which, seen in the direction of passage, is in front of the person who wishes to pass the revolving door.

[0006] WO 93/04255 relates to an automatic revolving door having at least on one of the wings an obstacle detector.

[0007] DE-A-40 02 147 relates to a three wing revolving door employing light emitters and receivers for preventing that human body parts get stuck due to the rotation of the revolving door.

[0008] Especially in the case of the revolving door being used at airports, it is expedient that no inadmissible goods can be taken through the revolving door.

[0009] In this connection a revolving door is provided in accordance with the invention, wherein the partition has a ceiling that is fixed in relation to, and revolves together with said wall panel, and a downward directed sensor is, or downward directed sensors are, mounted in the ceiling near the wall element. By means of said sensors it is possible to scan the wall element in order to inspect it very carefully as to whether anything is stuck to the wall panel. In accordance with the requirements, the sensor may to a greater or lesser degree be placed such that the respective wall element is scanned completely or partially. By this means it is possible to detect whether weapons, bombs or other objects are being smuggled through the door.

[0010] Depending on the degree of protection desired

various measures may be taken which will be elucidated successively hereinbelow.

[0011] In a further embodiment the revolving door according to the invention comprises a sensor, preferably an infrared sensor mounted near the periphery of the partition. By means of this sensor it is possible to detect whether someone standing outside the door extends his arm into the cylinder to stick any undesirable object on a panel of the wall element.

[0012] In a third embodiment of the revolving door according to the invention, a passive infrared sensor for the detection of a temperature change per unit of time is mounted in the ceiling at a predetermined distance from the wall element. Said sensor serves primarily to detect the presence of persons in the revolving door, but also to detect, for example, a hand weapon that was carried on the body and that was subsequently thrown into the door.

[0013] In a fourth embodiment of the revolving door according to the invention, one or more sensors are mounted in the ceiling, preferably of the ultrasonic or radar type. By means of such sensors objects lying on the floor can be detected to, for example, 1 cm from the floor, so that it is possible also to detect thin objects such as hand weapons.

[0014] In a fifth embodiment of the revolving door according to the invention, near the floor the partition is provided with one or more preferably infrared sender/receiver combinations. This system, too, is suitable for the detection of objects placed on the floor of the revolving door.

[0015] Preferably each sender/receiver combination is embodied with one sender and at least three receivers. This measure provides a relatively robust means of detection so that false alarms are avoided as much as possible. This is achieved especially in the embodiment wherein the sender/receiver combination emits a detection signal only when the receivers are activated simultaneously or sequentially.

[0016] In a sixth embodiment of the revolving door according to the invention, sensors are mounted in the floor detecting a presence. By means of these it is not only possible to detect the presence of persons, but it is also possible to detect whether said persons are moving in a desired direction. This is achieved in particular in the embodiment, in which the sensors of a presence are separately activated, substantially abutting pressure pads.

[0017] The objectives of the invention may be achieved in all the embodiment variants discussed especially if the revolving door is provided with a control unit with which the detection means are connected and which, subject to said detection means and the actual position of the revolving door, determines the subsequent movement of the revolving door.

[0018] The invention will now be elucidated with reference to a drawing illustrating a non-limiting exemplary embodiment of a revolving door according to the invention.

Figure 1, shows a side view of the revolving door according to the invention; and

Figure 2, shows a cross section of the revolving door according to the invention according to the line B-B in figure 1.

[0019] Identical reference numbers used in the figures refer to identical components.

[0020] Referring first to figure 1, the basic configuration of a revolving door 1 according to the invention is shown. Said revolving door 1 is accommodated in a wall 2 extending at both sides of the revolving door 1, and is formed by a stationary cylinder 3, and a rotatable partition 6 dividing the cylinder 3 substantially into two sections 4 and 5 and comprising a wall element 7, centrally positioned in the cylinder. The partition further has a ceiling (not shown) that is fixed in relation to, and revolves together with said wall panel 7. So far, the revolving door according to the invention corresponds with the prior art. A further feature is that the revolving door 1 is embodied with a partition 6, in, at or on which one or more detection means for detecting inadmissible goods are provided. A part of said detection means is formed by a sensor 19, preferably an infrared sensor, being mounted near the periphery of the partition. Said sensor is usually embodied to revolve with the door and is located at both sides of the revolving door, so that section 5, to which the revolving door 1 gives access, is continually guarded at the access side of the door.

[0021] Figure 2 further shows that in the ceiling near the wall element 7, and in particular in the sloping portion 7' and 7", the partition 6 is provided with downward directed sensors 21. These sensors, located in the rotatable part of the partition, inspect the area immediately in front of the wall elements 7', 7", so that if, for example, a weapon were stuck to said wall elements, this would be detected. Naturally the sensors 21 may also be located near the panels 7, 7'" and 7''". The wall element 25 provided in the periphery of the rotating part, adjacent the triangular showcases between the wall elements 7", 7'" and 7', 7''", is preferably also provided with such sensors. The figure further illustrates the application of a passive infrared sensor 22, by means of which a temperature change per unit of time can be detected. Said sensor 22 thus not only detects the presence of a person in the revolving door 1, but can also react to, for example, a hand weapon that was carried on the body thereby acquiring a different temperature than the ambient temperature, and which weapon has subsequently been thrown into the door. Reference number 23 indicates an ultrasonic sensor mounted in the ceiling. Such an ultrasonic sensor is arranged such that it emits sound in downward direction, and measures the time needed for the reflected sound to arrive again at the sensor. Goods that have been placed on the floor of the revolving door 1 are detected by means of possible deviations in reflection time. Even rather thin objects can be detected by means of such an ultrasonic sensor 23. One thing and another de-

pends on the frequency of the sound that is emitted, but in practice objects having a thickness of approximately 1 cm can be detected effectively. Reference number 24 indicates that near the floor the partition is provided with an infrared sender/receiver combination. The figure shows four such sender/receiver combinations, two of which are located at both sides of the wall element 7, one is located near element 7'"', and one is located near wall element 7'''''. Preferably, each sender/receiver combination 24 comprises one sender 24' (see the combination located at panel 7''''') and three receivers 24''. Each sender/receiver combination is preferably wired such that the same emits a detection signal only when the receivers 24'' are activated simultaneously or sequentially. Preferably, the revolving door 1 according to the invention is further embodied such that sensors of a presence are mounted in the floor, which are preferably embodied as separately activated and substantially abutting pressure pads, by means of which the presence of persons in the revolving door 1 can be detected, as well as the direction of movement of said persons. Said pressure pads are not shown in the drawing. Likewise not shown, but completely obvious to the person skilled in the art, is the preferred embodiment of the revolving door 1 according to the invention, characterized in that the same is provided with a control unit to which the detection means elucidated in the foregoing are connected. Said control unit preferably operates such that the subsequent movement of the revolving door, i.e. facilitating the rotation of the revolving door, locking the revolving door, or causing the revolving door to rotate in the opposite direction, is determined subject to the detection means and the current position of the revolving door.

Claims

1. A revolving door (1) comprising a stationary cylinder (3) to be accommodated in a wall (2), and a rotatable partition (6) dividing the cylinder (3) substantially into two sections, comprising a wall element (7) centrally positioned in the cylinder, whereby in, at or on the partition (6) one or more detector means (19, 24) are provided, wherein the detection means are means for the detection of inadmissible goods and that the partition (6) has a ceiling that is fixed in relation to, and revolves together with said wall element (7), and that a downward directed sensor is, or sensors (21) are mounted in the ceiling near the wall element (7), **characterized in that** the sensor is, or sensors are arranged such that the wall element (7) is scanned completely or partially.
2. A revolving door according to claim 1, **characterized in that** a passive infrared sensor (22) for the detection of a temperature change per unit of time is mounted in the ceiling at a predetermined distance from the wall element (7).

3. A revolving door according to one of the preceding claims, **characterized in that** one or more sensors (23) are mounted in the ceiling, preferably of the ultrasonic or radar type.
4. A revolving door according to one of the claims 1 - 3, **characterized in that** near the floor, the partition (6) is provided with one or more preferably infrared sender/receiver combinations (24).
5. A revolving door according to claim 4, **characterized in that** each sender/receiver combination (24) is embodied with one sender (24') and at least three receivers (24").
6. A revolving door according to claim 5, **characterized in that** the sender/receiver combination (24) emits a detection signal only when the receivers (24") are activated simultaneously or sequentially.
7. A revolving door according to one of the preceding claims, **characterized in that** further sensors are mounted in the floor detecting a presence.
8. A revolving door according to claim 7, **characterized in that** said further sensors are embodied as separately activated and substantially abutting pressure pads.
9. A revolving door according to any one of claims 1-8, **characterized in that** a sensor (19), preferably an infrared sensor is mounted near the periphery of the partition (6).
10. A revolving door according to one of the preceding claims, **characterized in that** a control unit is provided to which said detector means and/or said sensors are connected and which, subject to said detector means and/or said sensors and the current position of the revolving door (1), determines the further movement of the revolving door (1).

Patentansprüche

1. Eine Drehtür (1), die einen ortsfesten Zylinder (3) zum Unterbringen in einer Wand (2) und eine drehbare Trennwand (6) aufweist, die den Zylinder (3) im Wesentlichen in zwei Abschnitte teilt, aufweisend ein Wandelement (7), das zentral in dem Zylinder positioniert ist, wobei in, an oder auf der Trennwand (6) ein oder mehrere Detektormittel (19, 24) vorgesehen sind, wobei die Detektionsmittel Mittel zum Detektieren von unerlaubten Waren sind und die Trennwand (6) eine Decke aufweist, die bezüglich des Wandelements (7) fixiert ist und sich gemeinsam mit diesem dreht, und in der Decke nahe bei dem Wandelement (7) ein nach unten gerichteter Sensor

oder Sensoren (21) montiert ist/sind, **dadurch gekennzeichnet, dass** der Sensor oder die Sensoren derart angeordnet ist/sind, dass das Wandelement (7) vollständig oder teilweise abgetastet wird.

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2. Eine Drehtür gemäß Anspruch 1, **dadurch gekennzeichnet, dass** ein Passiv-Infrarot-Sensor (22) für die Detektierung einer Temperaturveränderung pro Zeiteinheit in der Decke in einem vorbestimmten Abstand von dem Wandelement (7) montiert ist.

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3. Eine Drehtür gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein oder mehrere Sensoren (23), vorzugsweise vom Ultraschall- oder Radar-Typ, in der Decke montiert sind.

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4. Eine Drehtür gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Trennwand (6) in der Nähe des Fußbodens eine oder mehrere vorzugsweise Infrarot-Sender-/Empfänger-Kombinationen (24) aufweist.

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5. Eine Drehtür gemäß Anspruch 4, **dadurch gekennzeichnet, dass** jede Sender- /Empfängerkombination (24) mit einem Sender (24') und mindestens drei Empfängern (24 ") ausgebildet ist.

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6. Eine Drehtür gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die Sender- /Empfängerkombination (24) nur dann ein Detektionssignal aussendet, wenn die Empfänger (24 ") gleichzeitig oder der Reihe nach aktiviert werden.

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7. Eine Drehtür gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** weitere Sensoren, die eine Anwesenheit detektieren, im Fußboden montiert sind.

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8. Eine Drehtür gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die weiteren Sensoren als separat aktivierte und im Wesentlichen aneinandergrenzende Druckstücke ausgebildet sind.

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9. Eine Drehtür gemäß einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** ein Sensor (19), vorzugsweise ein Infrarotsensor in der Nähe des Umfangs der Trennwand (6) montiert ist.

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10. Eine Drehtür gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** eine Steuereinheit vorgesehen ist, an welche die Detektormittel und/oder die Sensoren angeschlossen sind, und die in Abhängigkeit von den Detektormitteln und/oder den Sensoren und der aktuellen Position der Drehtür (1) die weitere Bewegung der Drehtür (1) bestimmt.

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Revendications

1. Porte à tambour (1) comprenant un cylindre fixe (3) destiné à être reçu dans une paroi (2), et une cloison pouvant tourner (6) divisant le cylindre (3) sensiblement en deux sections, comprenant un élément de paroi (7) positionné de manière centrale dans le cylindre, de telle sorte que dans, au niveau de ou sur la cloison (6), un ou plusieurs moyens formant détecteur (19, 24) sont agencés, dans lequel les moyens de détection sont des moyens pour la détection de produits non autorisés et que la cloison (6) comporte un plafond qui est fixe par rapport audit élément de paroi (7) et tourne ensemble avec ce dernier, et en ce qu'un capteur ou des capteurs (21) dirigés vers le bas sont montés dans le plafond à proximité de l'élément de paroi (7), **caractérisé en ce que** le capteur ou les capteurs sont agencés de telle sorte que l'élément de paroi (7) est complètement ou partiellement scanné. 5 10 15 20
2. Porte à tambour selon la revendication 1, **caractérisée en ce qu'**un capteur à infrarouge passif (22) afin d'assurer la détection d'un changement de température par unité de temps est monté dans le plafond à une distance prédéterminée de l'élément de paroi (7). 25
3. Porte à tambour selon l'une des revendications précédentes, **caractérisée en ce qu'**un ou plusieurs capteurs (23) sont montés dans le plafond, de préférence, du type à ultrason ou radar. 30
4. Porte à tambour selon l'une des revendications 1 à 3, **caractérisée en ce qu'**à proximité du plancher, la cloison (6) comporte un ou plusieurs, de préférence des associations d'émetteur/récepteur d'infrarouge (24). 35
5. Porte à tambour selon la revendication 4, **caractérisée en ce que** chaque association d'émetteur/récepteur (24) est mise en oeuvre avec un émetteur (24') et au moins trois récepteurs (24"). 40
6. Porte à tambour selon la revendication 5, **caractérisée en ce que** l'association émetteur/récepteur (24) émet un signal de détection uniquement lorsque les récepteurs (24") sont activés de manière simultanée ou successive. 45 50
7. Porte à tambour selon l'une quelconque des revendications précédentes, **caractérisée en ce que** d'autres capteurs sont montés sur le plancher afin de détecter une présence. 55
8. Porte à tambour selon la revendication 7, **caractérisée en ce que** lesdits autres capteurs sont mis en oeuvre sous la forme de tapis sensibles à la pression
- activés séparément et sensiblement adjacents.
9. Porte à tambour selon l'une quelconque des revendications 1 à 8, **caractérisée en ce que** un capteur (19), de préférence un capteur à infrarouge est monté à proximité de la périphérie de la cloison (6).
10. Porte à tambour selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**il est agencé une unité de commande à laquelle sont raccordés lesdits moyens formant détecteur et/ou lesdits capteurs et qui, soumise auxdits moyens formant détecteur et/ou auxdits capteurs et à la position courante de la porte à tambour (1) détermine le déplacement supplémentaire de la porte à tambour (1).

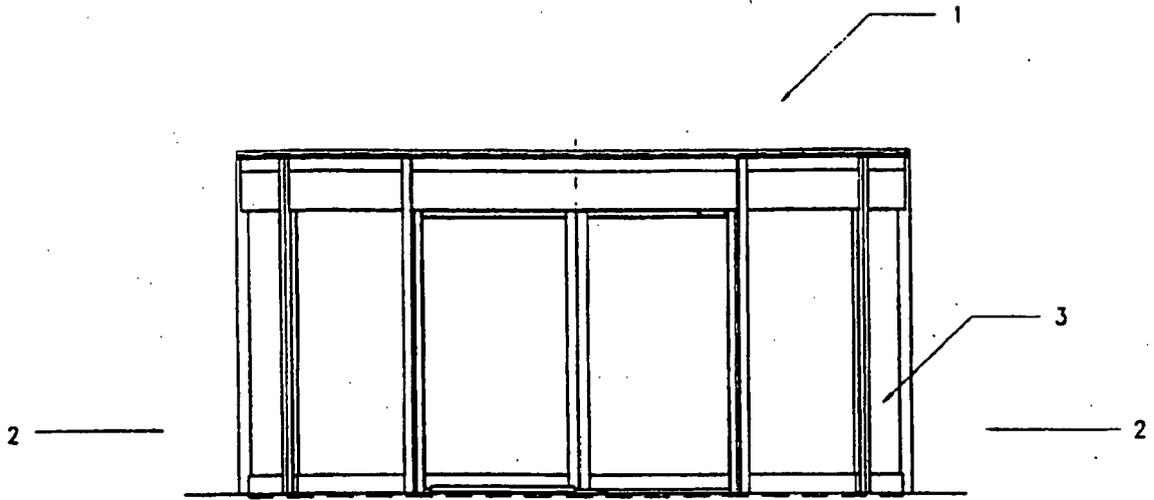


Fig. 1

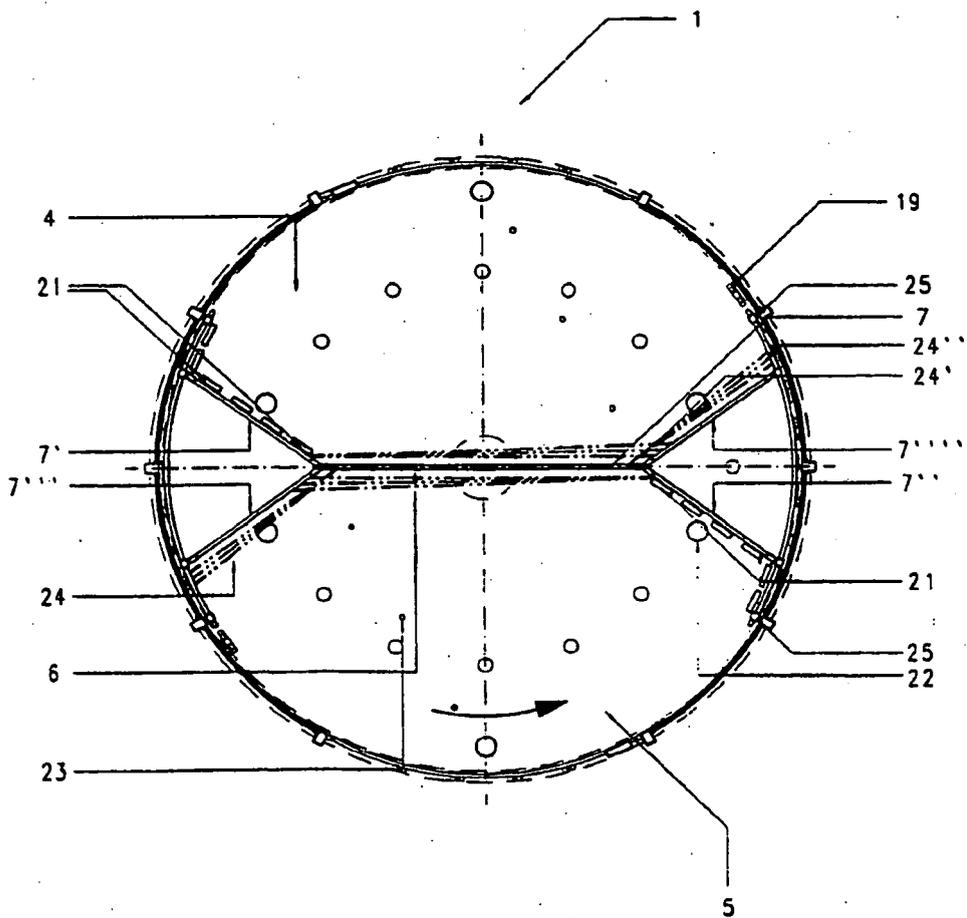


Fig. 2.

REFERENCES CITED IN THE DESCRIPTION

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