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(54) **Automatic sliding and swinging door assembly with break-away feature**

(57) The invention relates to an automatic sliding and swinging door assembly (10) with breakaway feature, comprising at least one sliding wing (20) which is arranged so as to be displaceable in a guided manner, with a slide drive (44), in which the sliding wing is furthermore arranged so as to be rotatable about a first vertical shaft (28), a first lock (52) for preventing rotation of the sliding wing about the first vertical shaft, at least one lateral wing (24), parallel to the sliding wing, which is arranged so as

to be rotatable about a second vertical shaft (26), and a second lock (64) for preventing rotation of the lateral wing about the second vertical shaft, in which the at least one sliding wing (20) and the at least one lateral wing (24) are each provided with a rotary drive (48; 58) for rotating the respective wing upon unlocking, and in which the operating element for unlocking the first and/or second locks comprises means (70; 72; 76) for remotely unlocking the locks.

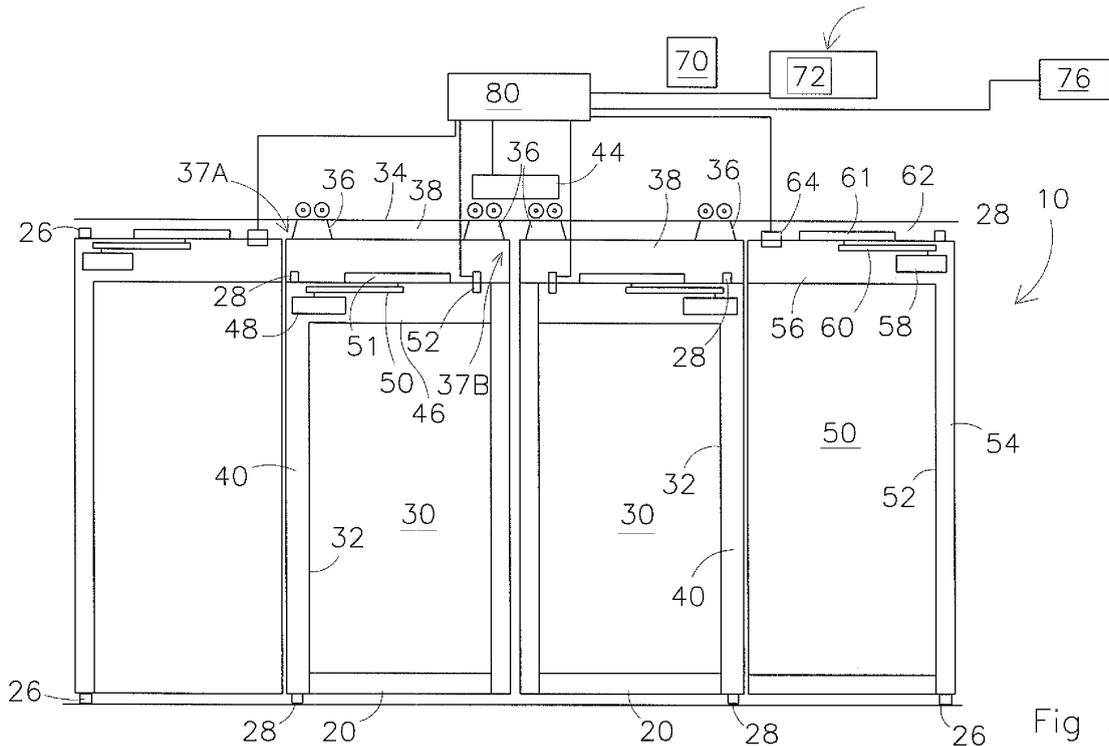


Fig 3

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Description

[0001] The invention generally relates to an automatic sliding and swinging door assembly with break-away feature, also referred to as a break-away, break-out or anti-panic door assembly. Such assemblies are used in particular in situations where large numbers of people may be present, such as entrance doors to large shops or department stores, shopping centres, (office) buildings, public buildings, etc.

[0002] In the field, automatic sliding and swinging door assemblies with break-away features are known. Usually, such an assembly comprises two central sliding door wings, which are arranged so as to be displaceable along a sliding track in a guided manner to and fro by means of a drive in order to open and close the sliding door wings. The drive is activated by means of detectors which detect the presence/absence of people within a specific detection area in the vicinity of the sliding door wings. The sliding door wings are furthermore arranged so as to be rotatable about a vertical shaft. A suitable lock keeps the sliding door wings in a sliding position during normal use, in which case rotation about the vertical shaft is prevented. Often, lateral wings (also referred to as fixed panels) are arranged on either side next to the sliding door wings, which are also referred to as mobile panels, which lateral wings are also arranged so as to be rotatable about a vertical shaft and are kept closed under normal circumstances by means of suitable locks.

[0003] In case of an emergency situation, the locks can be broken by manually and forcefully pushing against the door or using a push bar or the like. After unlocking, the user pushes the respective wing open further until there is a sufficiently wide clearance to pass. Each wing has to be unlocked and opened manually. This hampers smooth flow of people, as they are not always aware that all the wings can be opened and thus tend to only use a wing which has already been opened. Furthermore, due to the fact that the sliding door wings can be unlocked at any position in the sliding track, the passage (escape route) may not be free in an optimum manner, for example if a sliding door wing has not been slid open completely. This is often made worse by the fact that the opening angle of the wings is not fixed, so that these may take up, for example, a non-parallel open position or a position in which they are not substantially transverse to the doorway.

[0004] DE A1 10038866 discloses an automatic sliding door assembly which comprises sliding wings and fixed wings. The fixed wings are provided with an emergency drive, for which purpose a manually actuable push bar is provided on the fixed wing as unlocking element.

[0005] It is a general object of the present invention to provide a door assembly of the above-described kind in which it is possible to ensure the smooth flow of people in case of an emergency.

[0006] It is a further object of the present invention to ensure an optimum width of the opening or free passage.

[0007] It is yet a further object to provide such a door assembly which can also be operated in those cases where the door assembly itself is not readily accessible.

[0008] To this end, the door assembly according to invention comprises at least one sliding wing which is arranged so as to be displaceable in a guided manner, a slide drive for sliding the sliding wing to and fro along a track between an open and a closed sliding position, in which the sliding wing is furthermore arranged so as to be rotatable about a first vertical shaft, a first lock for preventing rotation of the sliding wing about the first vertical shaft, at least one lateral wing parallel to the sliding wing which is arranged so as to be rotatable about a second vertical shaft, and a second lock for preventing rotation of the lateral wing about the second vertical shaft, and at least one operating element for unlocking the first and/or second locks, in which the at least one sliding wing and the at least one lateral wing are each provided with a rotary drive for rotating the respective wing upon unlocking, and in which the operating element comprises means for remotely unlocking the first and second locks.

[0009] The door assembly according to the invention comprises at least one sliding wing and at least one lateral wing. One embodiment of the door assembly according to the invention comprises two central sliding wings with a lateral wing on either side, parallel to the sliding wings. The at least one sliding wing can be displaced to and fro in a guided manner by means of a drive, usually along a linear slide path, between a closed sliding position and an open sliding position. The open sliding position may be adjustable, for example between a winter position and a summer position with different set widths of the opening. Both the sliding wings and the lateral wings are provided with a feature so that they open, usually outwards, in a rotating manner in case of emergency. To this end, the wings are arranged so as to be rotatable about a vertical shaft. The wings are locked against an unintentional rotary movement by locks. In the case of the door assembly according to the invention, the rotary movement is effected, after the lock has been released, by means of a dedicated rotary drive for each wing, preferably a mechanical drive, so that the doors also open automatically in case of a power failure, should this be required. The operating element comprises unlocking means which can be operated remotely in order to release the rotational lock of the mobile and fixed panels.

[0010] Contrary to the known assemblies, in which the rotational lock of the wings has to be released manually and the wings subsequently have to be pushed open manually, the assembly according to the invention is opened by means of a rotary drive after the lock has been released remotely. This makes the door assembly according to the invention suitable for many applications, for which applications different safety requirements may have been issued by the regulatory authorities. Thus, it is possible to configure the door assembly according to the invention as a conventional anti-panic door facility, in which the unlocking means are, however, provided in

the vicinity of the door assembly, for example an emergency button control mechanism or a break-glass switch, which, in addition to releasing the locks, also actuate or release the rotary drives. It is also possible to use a conventional push rod on the mobile panels, in which case the push rod is not used for mechanical unlocking and actuation, but instead emits a signal as a result of which the lock is released and the rotary drives are activated. In case of an emergency, actuation of the unlocking means releases the rotational locks on all wings, after which the rotary drive of each wing ensures that the respective wing opens in the direction of escape and therefore does not have to be opened separately by hand. Alternatively, or in addition to the above-described situation, the unlocking means may also be fitted at a central desk, for example at a reception desk, which is advantageously manned permanently, since an emergency is often reported to a central desk. In case of fire, if the door assembly according to the invention is linked to the switchboard of a fire station, the fire brigade itself can operate the door assembly, for example in order to allow smoke to escape (in a controlled manner).

[0011] In order to maximize the width of the escape route, a control unit is advantageously provided for actuating the slide and rotary drives, which is configured such that the mobile panels move to a predefined open, preferably an outermost open sliding position, for example by means of the slide drive thereof or an additional, non-electrical drive. Preferably, the control unit is configured such that the sliding movement of the mobile panels takes place before, more preferably at the same time as, the rotary movement in order to avoid the risk of people becoming trapped between an open lateral wing and an open sliding wing which is moving towards the latter.

[0012] Examples of a suitable non-electrical rotary drive for the rotation of a wing comprise, inter alia, a spring under tension, a hydraulic pump, reversely operating (door) springs. Advantageously, the rotary drive makes it possible to carry out the rotary movement at a controlled speed, as is the case with a hydraulic pump. Preferably, the door assembly also comprises limiting means for limiting the rotational opening angle of the door wings. More preferably, a predetermined opening angle is set, advantageously approximately 90°, so that an optimum escape route in terms of width and opening angle is ensured. Angle limiters, stops, springs and hydraulic pumps are suitable examples thereof.

[0013] In one preferred embodiment, the locks comprise non-mechanical locks, preferably electromagnets. If desired, in addition to being connected to the regular electricity grid, such electromagnets are provided with an additional energy source which is not connected to the electricity grid, such as one or more batteries, in order to prevent that, in the case of a power failure and the absence of an unlocking signal, the wings would open of their own accord and thus give access to undesired visitors.

[0014] The door assembly according to the invention

can also be combined well with an access pass checking function with remote reading ability. In the case of a prior art door assembly with break-away feature, such a checking facility is limited to the passage between the sliding wings. Such a checking facility can then be avoided by using the lateral wings which can be opened manually at any time. With the assembly according to the invention, this is not possible when there is a central control mechanism.

[0015] The invention will be explained below with reference to the attached drawings, in which:

Fig. 1 shows an outline sketch of an embodiment of a door assembly according to the invention in a position during normal use;

Fig. 2 shows an outline sketch of an embodiment of a door assembly according to the invention in an open position in an emergency situation; and

Fig. 3 shows a detailed illustration of an embodiment of a door assembly according to the invention.

[0016] Fig. 1 shows an embodiment of a door assembly according to the invention which is denoted overall by reference numeral 10. The door assembly 10 is fitted in an opening in a wall 12 of a building. The illustrated embodiment of a door assembly 10 comprises two central sliding wings 20 which can slide linearly between a closed sliding position illustrated by a dashed line, in which the mutually facing edges 22 of the sliding wings 20 bear against each other, and an open sliding position illustrated by an interrupted solid line in which the sliding wings 20 are situated at a distance from one another. Linear displacement between a closed position and an open position and vice versa is achieved by means of a slide drive (not shown in Figs. 1 and 2) which is usually mounted centrally above the sliding wings. On the outer side of the sliding wings 20, lateral wings 24 are arranged which are closed during normal operation.

[0017] Fig. 2 shows this embodiment in the open position after the rotational lock of the sliding wings 20 and the lateral wings 24 has been released. The lateral wings 24 are turned in the direction of the escape route, usually to the outside, about a vertical rotary shaft denoted by reference numeral 26. The sliding wings 20 are also turned in the same direction as the lateral wings 24 about a vertical rotary shaft 28 and slid to their maximum open sliding position. As this figure clearly shows, the clear passage is at its greatest in this situation.

[0018] Fig. 3 shows an embodiment of a door assembly according to the invention in more detail. Parts which are identical to parts in Figs. 1 and 2 are denoted by the same reference numerals. A sliding wing 20 comprises a panel 30 which is usually made of a transparent material, such as glass, which is mounted in a frame 32. The sliding wing 20 is slidably mounted in an upper guide 34 by means of one or more carriages 36. In this embodiment, the carriages 36 are provided at the ends 37A, 37B of a slide bar 38. A vertical jamb 40 of frame 32 is arranged

at the upper end thereof so as to be rotatable about rotary shaft 28 in the end 37A of slide bar 38. On the bottom side, jamb 40 is slidably arranged in a bottom guide bar 42 and is rotatable about said rotary shaft 28. The carriages 36 are driven in the usual manner by means of a diagrammatically illustrated slide drive 44 which is arranged above the upper guide 34. On the inner side of the upper jamb 46 of the frame 32, a hydraulic rotary drive 48 is arranged which actuates a pushing arm 50, one end of which is hingedly connected to the drive 48 and the other end is hingedly connected to the slide bar 38 via guide 51. An electromagnet 52 situated between the slide bar 38 and the upper jamb 46 keeps the rotatable frame 32 in the normal sliding position, that is to say in the same vertical plane as the slide bar 38. The slide drive 44 is actuated by means of presence sensors, such as infrared safety sensors 49 (see Fig. 1) on the inside and outside of the central sliding wings and/or photocells (not illustrated).

[0019] Apart from the sliding feature, the lateral wings 24 are arranged rotatably in a similar manner. A lateral wing 24 comprises a panel 50 which is usually made from a transparent material, such as glass, which is mounted in a frame 52. Vertical jamb 54 thereof is arranged so as to be rotatable about a vertical shaft 26. On the inside of the upper jamb 56, a rotary drive 58, in this case a hydraulic pump, is fitted, the rotating arm 60 of which is hingedly connected to a guide 61 on the upper beam 62. An electromagnet 64 which is normally energized keeps the lateral wing 24 closed.

[0020] Unlocking of the wings takes place by switching off the power supply to the electromagnets 52 and 64. In Fig. 3, various possibilities therefor are indicated diagrammatically, which may be applied separately or in combination. On the inside of the building, a break-glass switch 70 is provided (see also Fig. 1). Another possibility is an operating button 72 at a central desk 74. Finally, a connection to a switchboard of an external (emergency) service department 76, such as a fire department, is illustrated, so that the wings can also be unlocked from remote sites over large distances.

[0021] Fig. 3 also shows a control unit 80 which takes over the control of the sliding wings (normally dependent on the abovementioned presence detectors) when a signal is received to deactivate the electromagnets and causes the lateral wings to move to their outermost open position, unlocks all locks and thereby puts the rotary drives into operation.

Claims

1. Automatic sliding and swinging door assembly (10) with break-away feature, comprising at least one sliding wing (20) which is arranged so as to be displaceable in a guided manner, a slide drive (44) for sliding the sliding wing to and fro along a track between an open and a closed sliding position, in which

the sliding wing is furthermore arranged so as to be rotatable about a first vertical shaft (28), a first lock (52) for preventing rotation of the sliding wing about the first vertical shaft, at least one lateral wing (24) parallel to the sliding wing which is arranged so as to be rotatable about a second vertical shaft (26) parallel to the sliding wing, and a second lock (64) for preventing rotation of the lateral wing about the second vertical shaft, and at least one operating element for unlocking the first and/or second locks, in which the at least one sliding wing (20) and the at least one lateral wing (24) are each provided with a rotary drive (48; 58) for rotating the respective wing upon unlocking, and in which the operating element comprises means (70; 72; 76) for remotely unlocking the first and second locks.

2. Assembly according to claim 1, in which the rotary drive (48; 58) comprises a spring under tension, a hydraulic pump or reversely operating door spring.

3. Assembly according to claim 1 or 2, in which the first and second locks (52; 64) comprise non-mechanical locks, preferably electromagnets.

4. Assembly according to one of the preceding claims, in which the electromagnets are provided with an additional energy source.

5. Assembly according to one of the preceding claims, further comprising limiting means for limiting the rotational opening angle of the sliding wing and the lateral wing.

6. Assembly according to one of the preceding claims, in which the means for remotely unlocking the first and second locks are selected from a central control unit (76) at a service authority, in particular the fire services, a control unit at the local switchboard (72), a break-glass switch (70) under glass, an emergency push-button, a push bar, in particular on a sliding wing.

7. Assembly according to one of the preceding claims, further comprising a control unit (80) for actuating the slide and rotary drives.

8. Assembly according to claim 7, in which the control unit (80) is designed to move the at least one sliding wing (20) into an outermost open position.

9. Assembly according to claim 5, in which the limiting means are designed to define an opening angle of approximately 90°.

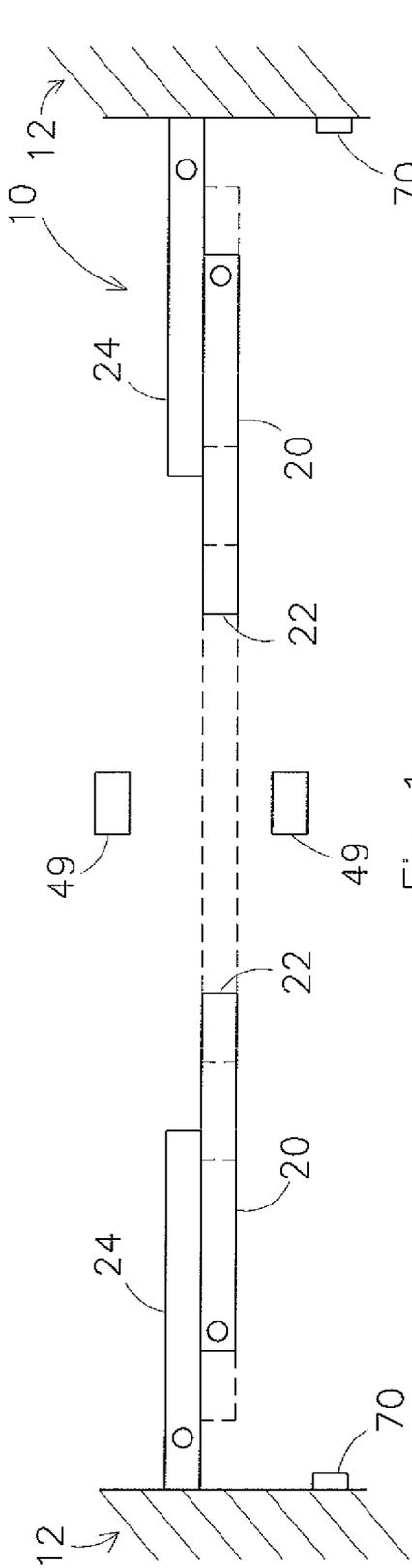


Fig 1

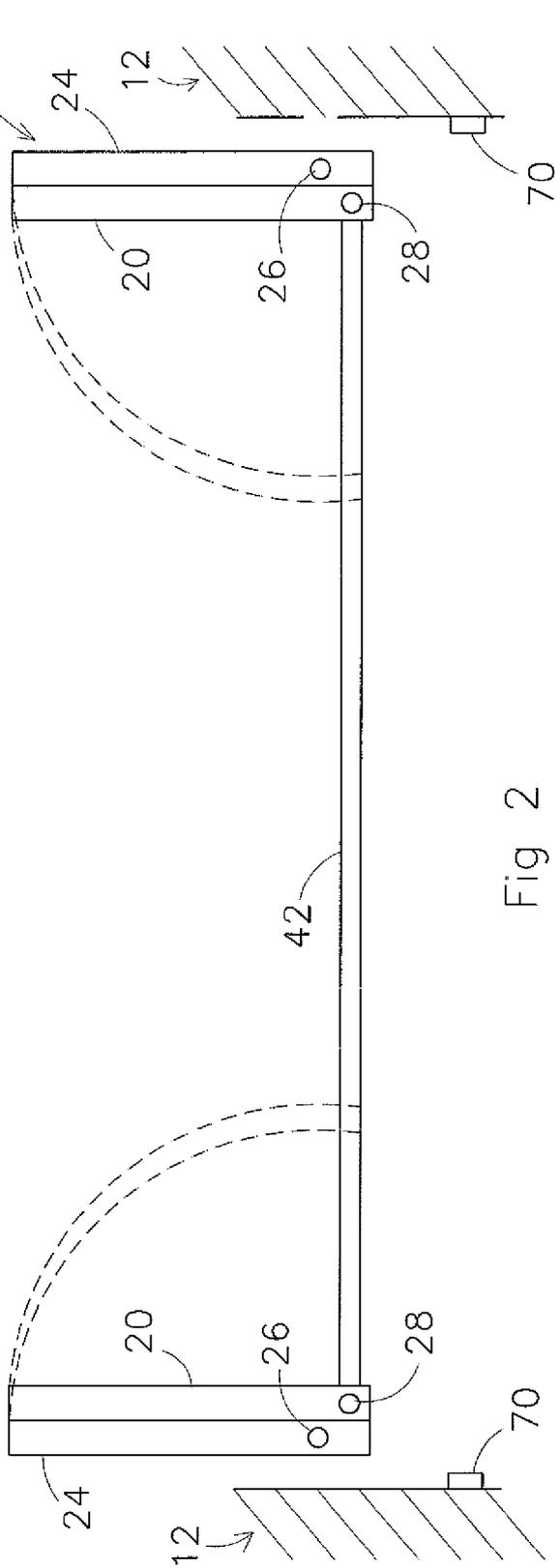


Fig 2

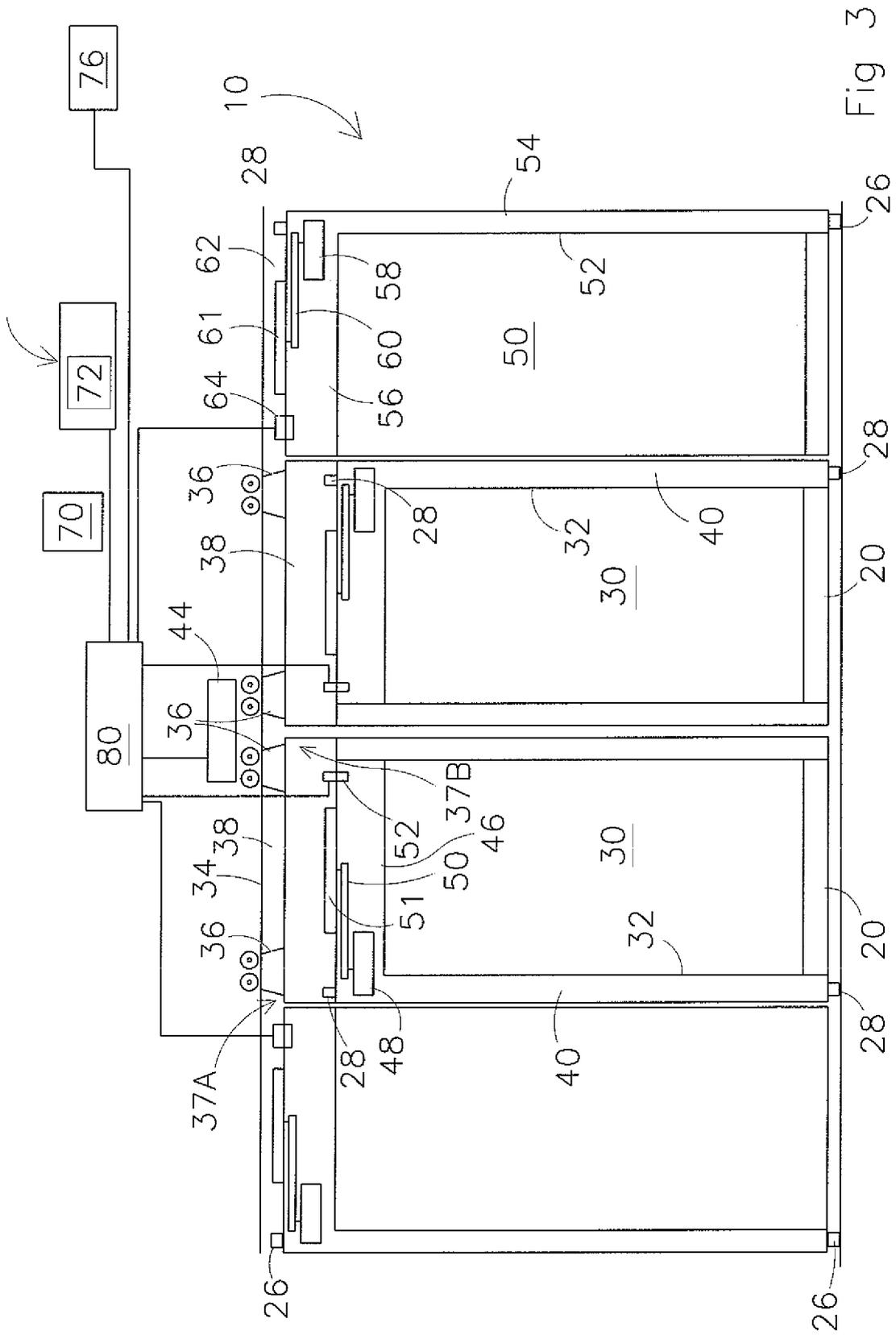


Fig 3



EUROPEAN SEARCH REPORT

Application Number
EP 10 18 1689

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 100 38 866 A1 (GEZE GMBH [DE]) 14 February 2002 (2002-02-14) * paragraph [0006] - paragraph [0008] * * paragraph [0026] - paragraph [0031] * * figures *	1,2,5-9	INV. E05D15/06 E05D15/58 E05F1/00 E05F15/14 E05F15/20
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A	DE 36 18 645 A1 (GEZE GMBH [DE]) 10 December 1987 (1987-12-10) * abstract *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05D E05F
Place of search		Date of completion of the search	Examiner
The Hague		13 December 2010	Van Kessel, Jeroen
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 18 1689

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-12-2010

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DE 10038866	A1	14-02-2002	NONE	

DE 2755110	A1	13-06-1979	NONE	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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