

24 July 1998

**CERTIFICATE**

**TO WHOM IT MAY CONCERN**

I, the undersigned, hereby certify the English translation's accuracy and conformity with the original international patent application PCT/EP97/07031 relating to a revolving door.



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**Title: REVOLVING DOOR****Description**

The invention relates to a revolving door with at least one sliding night security door leaf running concentrically with at the very least one drum wall, which leaf slides or is conducted in a rolling manner in a guide rail mounted to the floor construction or its add-on pieces and which moves along the drum wall by means of a flexible continuous traction mechanism.

The British patent application 2 052 615 A published a power operated closing security system by which means the inner exit can be locked in order to prevent armed individuals from penetration into the inside building. The power assisted traction of the closing security system is operated by means of a motor mounted on the revolving door's frame and is driving a rotating chain which itself is coupled to a centrically movable wall section. Only one single wall section can be connected to the rotating chain, that is to say it is not possible to connect to the chain two sliding night security door leaves moving towards each other. Furthermore to the chain, a couple of deflection rollers are necessary presenting a more complicated construction and a worsening in efficiency.

Likewise, an opening respectively closing mechanism for arched sliding doors has been published by DE 39 28 911 C2 making use of an endless belt with two horizontally ends positioned side by side. In this case, the endless belt is conducted around the belt pulley and the driven belt disc whereby both door leaves are simultaneously connected tightly to the endless belt. On operating the power motor, both door leaves are actuated and movable in opposite direction along a left respectively a right guide rail. This is a very complicated driving, as it demands numerous guide and deflection rollers.

The utilisation of a toothed belt will furthermore need to reverse the toothed belt by 180° in order to make possible its guidance along the corresponding guide rollers. In addition, the mechanism's efficiency is getting worse due to the guide rails' and rollers' frictional resistance.

With reference to the state of the art according to the British patent application 2 052 612 A, the invention is based on the technical problem to improve the initially described revolving door type with the effect that when using an endless traction mechanism, it is possible to connect by choice one sliding night security door leaf, or to operate by choice two sliding night security door leaves with reverse motion. Different kinds of traction mechanisms, e.g. roller chains or toothed belts, should alternatively be used without requiring additional special deflection rollers or having to reverse the traction mechanism by 180°. A simply designed and reliable solution is aimed which needs only one drive (power roll) and one appropriate deflection roller to operate the traction mechanism.

The invention solves the problem with the teaching according to claim 1.

Due to the restricted guidance of the endless traction mechanism in ends laying one upon the other, the traction mechanism may be conducted on the driven side by a power roll with horizontal axle and may be conducted on the reverse side by a deflection roller with a similar bearing, whereby a chain, preferably a roller chain, a toothed belt or a similar device may be used as traction mechanism. Turning the traction mechanism, that means a 180° reverse, is not necessary. The restricted guidance guarantees that the traction mechanism is as well horizontally as vertically reliably guided in the roller rail without requiring additional guide rollers. The roller rail, respectively the restricted guidance formed by

the roller rail is built according to the sliding night security door leaf's curvature and is running centrally with it, that means independently from the use of one or two sliding night security door leaves, only one single roller rail is needed which reduces the construction effort correspondingly.

More invention features are characterised by the subclaims.

According to claim 2, at least one slide connected to the sliding night security door leaf is force guided in the roller rail and between the flexible traction mechanism's ends, whereby the slide is combined by means of at least one connection link with the sliding night security door leaf (claim 3).

The slide's restricted guidance in the roller rail provides a secure and reliable connection between the flexible traction mechanism and the sliding night security door leaf, that means thanks to the force guided slide, the flexible traction mechanism is already eased of any oncoming forces that may effect the sliding night security door leaf, particularly because the slide – for example in a braced execution – may be conducted in the roller rail with a sufficient linear extension and may be equipped with two links for connection with the sliding night security door leaf (claim 4).

One axle preferably going through the slide, the link and the sliding night security door leaf, is provided for bearing a carrier and guiding roller (claim 5), so that all oncoming forces via the carrier and guiding roller affecting the sliding night security door leaf are deflected to the floor construction so that the slide itself as well as the flexible traction mechanism only have to take in the forces for moving the sliding night security door leaf. For this purpose, a cam links the slide to the flexible traction mechanism's one end (claim 6).

A particularly beneficial development of the invention is realised by the features described in claim 7, according to this there are two sliding night security door leaves movable towards each other and whereby at least one adjustable slide is assigned to each of the sliding night security door leaves and whereby the one sliding night security door leaf is connected to the lower end and the other sliding night security door leaf is connected to the upper end of the flexible traction mechanism. This advantageous development of the invention is given by the teaching of claim 1, namely the arrangement of the flexible traction mechanism that lays in ends one upon the other in the box-shaped roller rail according to claim 8, whereby the box-shaped profile presents a penetration slot to receive the link which means the roller rail may be designed mirror-symmetrically in its horizontal symmetry axis (claim 9).

According to claims 10 and 11, the flexible traction mechanism may be made advantageously as a roller chain whereby anti-wear inserts are put in the roller rail and the roller chain is force guided in the anti-wear inserts. As an alternative, a toothed belt may be used (claim 12).

When making use of the invention's teaching according to claim 1, an additional advantage results in that the flexible traction mechanism's drive is made by means of an assigned motor with self-locking gear (claim 13) so that an accessory closing mechanism for the night locking is not necessary.

As already mentioned, the flexible traction mechanism's operation simply demands on the roller rail's one free side a motorised drive actuating a power roll and a deflection roller on the other roller rail's free side; according to claim 14 it is advantageous having the deflection roller equipped with a tensioning device for obtaining a reliable guidance of the traction mechanism in the assigned restricted guidance.

A further development of the invention proposes to design the flexible traction mechanism's drive in a way that it either shuts off on responding to a power limitation arranged on the main locking edge of one sliding night security door leaf or on both sliding night security door leaves or that it drives the flexible traction mechanism in reverse motion resulting in an opening procedure of the sliding night security door leaf(ves).

Hereinafter, the invention is represented in one diagrammatic view of a possible execution example. It shows:

- Figure 1: a horizontal projection on the revolving door as diagrammatic view
- Figure 2: a view in the direction of arrow II-II according to figure 1
- Figure 3: the profile III-III according to figure 1 as enlarged presentation
- Figure 4: a view in the direction of arrow IV according to figure 3

In figure 1, the number 1 identifies a revolving door which is essentially composed of door leaves 5 revolving around an axle 6 which door leaves are arranged within delimiting drum walls 3, 3'. Two sliding night security door leaves 4, 4' are placed concentrically to the drum walls 3, 3' and are guided by means of the links 11 in the roller rail 7. Number 8 identifies the flexible traction mechanism conducted in the roller rail 7. To each of the sliding night security door leaves 4, 4' are assigned two links 11 which are connected on the one end to the sliding night security door leaf 4 respectively 4' and on the other end to one of the slides 10 respectively 10', whereby slide 10 respectively 10' is conducted inside the roller rail 7 (figure 3). Furthermore, figure 1 shows that the flexible traction

mechanism 8 is actuated by the drive 16 with assigned power roll 17 and is reversed on the other end by a deflection roller 19 equipped with a tensioning device 18.

According to figures 1 and 2, there are two sliding night security door leaves 4, 4', whereby (see figure 2) the sliding night security door leaf 4 is connected to the flexible traction mechanism's 8 lower end 9' by means of an allusively represented cam 14 and whereby the sliding night security door leaf 4' is connected to the flexible traction mechanism's 8 upper end 9 by means of the cam 14. The operation of drive 16 and of the rotating traction mechanism in the direction of arrow 27 moves the sliding night security door leaves 4, 4' towards each other in the direction of arrow 28, that means the night security system is locking. The main locking edges 29 are provided with not particularly represented power limitations that command the drive's shut-off or reverse operation.

As figures 3 and 4 reveal, in the present execution example, a retention bracket 22 is attached to the floor construction 2 to which bracket is combined the roller rail 7 developed concentrically to the drum wall 3' by means of a screw connection 26. The roller rail 7 is preferably made out of aluminium alloy. Inside the box-shaped roller rail 7 presenting a penetration slot 20 are put anti-wear inserts 15 in which the flexible traction mechanism 8 in form of a roller chain is force guided. The restricted guidance is realised by means of axle stubs 23 attached to the roller chain which stubs glide in accordingly grooved mortises in the anti-wear inserts 15 in order to assure the chain's restricted guidance as well in the vertical as in the horizontal direction. The anti-wear inserts 15 are preferably made of an appropriate synthetic material. It is obvious that the chain ends 9, 9' are vertically arranged one upon the other. Via a cam 14 the roller chain's upper end 9 is combined with the slide 10 by means of a screw connection 25.

An axle identified with 13 penetrates all the slide 10, the U-shaped link 11 when looking at its cross section, and the sliding night security door leaf 4' whereas a carrier and guiding roller 12 is mounted in the area of the bridge-shaped link 11 on the axle 13 which roller stays on a guide rail 21 sitting close to the floor construction 2. The sliding night security door leaf's 4' weight as well as all forces affecting the sliding night security door leaf 4' are transmitted by this means to the floor construction 2 without charging the slide 10 respectively the flexible traction mechanism 8. The roller rail's 7 support flanges identified with 24 only serve to guide the slide 10.

Figure 4 is showing that two carrier and guiding rollers are assigned to one slide 10'. In this case, when looking at the length, the slide 10' is made of one piece that may be formed corresponding to the roller rail's 7 curvature line, that means it may be bent or it may be divided over its length into several slide sections that are linked in a flexible way with each other.

## References

- 1 Revolving door
- 2 Floor construction
- 3 Drum wall
- 3' Drum wall
- 4 Sliding night security door leaf
- 4' Sliding night security door leaf
- 5 Door leaf
- 6 Axle
- 7 Roller rail
- 8 Traction mechanism, flexible
- 9 (Chain) end, upper
- 9' (Chain) end, lower
- 10 Slide
- 10' Slide
- 11 Connection parts
- 12 Carrier and guiding roller
- 13 Axle
- 14 Cam
- 15 Anti-wear insert
- 16 Drive
- 17 Power roll
- 18 Tensioning device
- 19 Deflection roller
- 20 Penetration slot
- 21 Guide rail
- 22 Retention bracket
- 23 Axle stubs
- 24 Support flange
- 25 Screw connection
- 26 Screw connection
- 27 Direction of arrow
- 28 Direction of arrow
- 29 Main locking edge



## Claims

1. A revolving door with at least one sliding night security door leaf running concentrically to at the very least one drum wall which leaf is conducted in a gliding or rolling way in a guide rail that is attached to the floor construction or the construction's connection parts and is movable towards the drum wall by means of a flexible endless traction mechanism, characterised in that the flexible traction mechanism (8) is force guided in ends (9, 9') that lay one upon the other in a roller rail (7) running concentrically to the sliding night security door leaf (4, 4') and attached to the floor construction (2) or its connection parts.
2. A revolving door according to claim 1, characterised in that between the flexible traction mechanism's (8) ends (9, 9') at the very least one adjustable slide (10, 10') connected to the sliding night security door leaf (4, 4') is force guided in the roller rail (7).
3. A revolving door according to claims 1 and 2, characterised in that the slide (10, 10') is connected by means of at least one link (11) to the sliding night security door leaf (4, 4').
4. A revolving door according to one of the claims 1 to 3, characterised in that the slide (10, 10') is equipped with two links (11).
5. A revolving door according to one of the claims 1 to 4, characterised by axle (13) penetrating the slide (10, 10'), the link (11) and the sliding night security door leaf (4, 4') and serving as bearing to the carrier and guiding roller (12).





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6. A revolving door according to one of the claims 1 to 5, characterised in that the slide (10, 10') is connected by means of a cam (14) with one of the flexible traction mechanism's (8) ends (9, 9').
7. A revolving door according to one of the claims 1 to 6, characterised in that there are two sliding night security door leaves (4, 4') with reverse motion and that at least one slide (10, 10') is assigned to each of the sliding night security door leaves (4, 4') and that the sliding night security door leaf (4) is connected to the lower end (9') and the other sliding night security door leaf (4') is connected to the upper end (9) of the flexible traction mechanism (8).
8. A revolving door according to one of the claims 1 to 7, characterised in that the roller rail (7) is made of a box-shaped profile with a penetration slot (20) provided for the link (11).
9. A revolving door according to one of the claims 1 to 8, characterised in that the roller rail (7) is designed mirror-symmetrically to its horizontal symmetry axis.
10. A revolving door according to one of the claims 1 to 9, characterised in that the flexible traction mechanism (8) is a roller chain.
11. A revolving door according to one of the claims 1 to 10, characterised in that anti-wear inserts (15) are arranged in the roller rail (7) and in that the roller chain is force guided in the anti-wear inserts (15).
12. A revolving door according to one of the claims 1 to 11, characterised in that the flexible traction mechanism (8) is a toothed belt.

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13. A revolving door according to one of the claims 1 to 12, characterised in that the flexible traction mechanism's (8) drive (16) is realised by a motor with allocated self-locking gear.
14. A revolving door according to one of the claims 1 to 13, characterised in that on the roller rail's (7) one free side is arranged a motorised drive (16) actuating on a power roll (17) and in that on the other roller rail's (7) free side there is a deflection roller (19) equipped with a tensioning device (18).
15. A revolving door according to one of the claims 1 to 14, characterised in that a power limitation is provided on the main locking edges (29) of the sliding night security door leaf (4, 4') or on the sliding night security door leaves (4, 4').

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### **Abstract**

The invention relates to a revolving door with at least one sliding night security door leaf running concentrically to the drum wall which leaf is movable towards the drum wall by means of an endless flexible traction mechanism and is guided in a rolling or gliding manner in a guide rail that is mounted to the floor construction. The invention is based on the fact that the flexible traction mechanism is arranged in a roller rail whereas the flexible traction mechanism's both ends are force guided while laying one upon the other.

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FIG.1

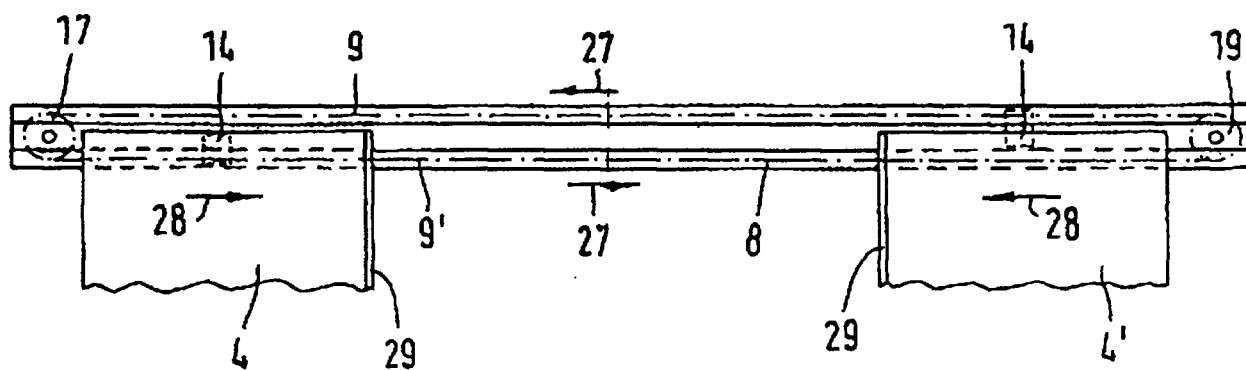
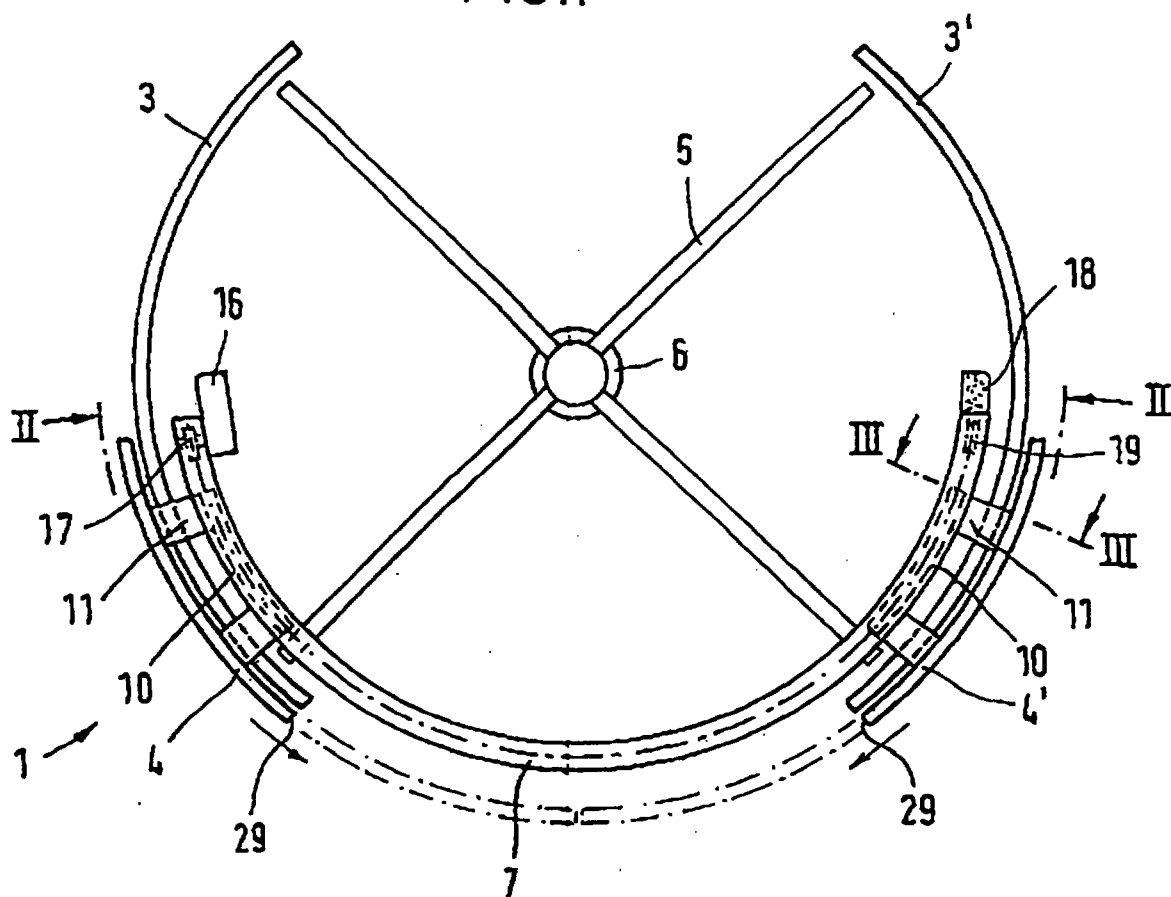


FIG.2

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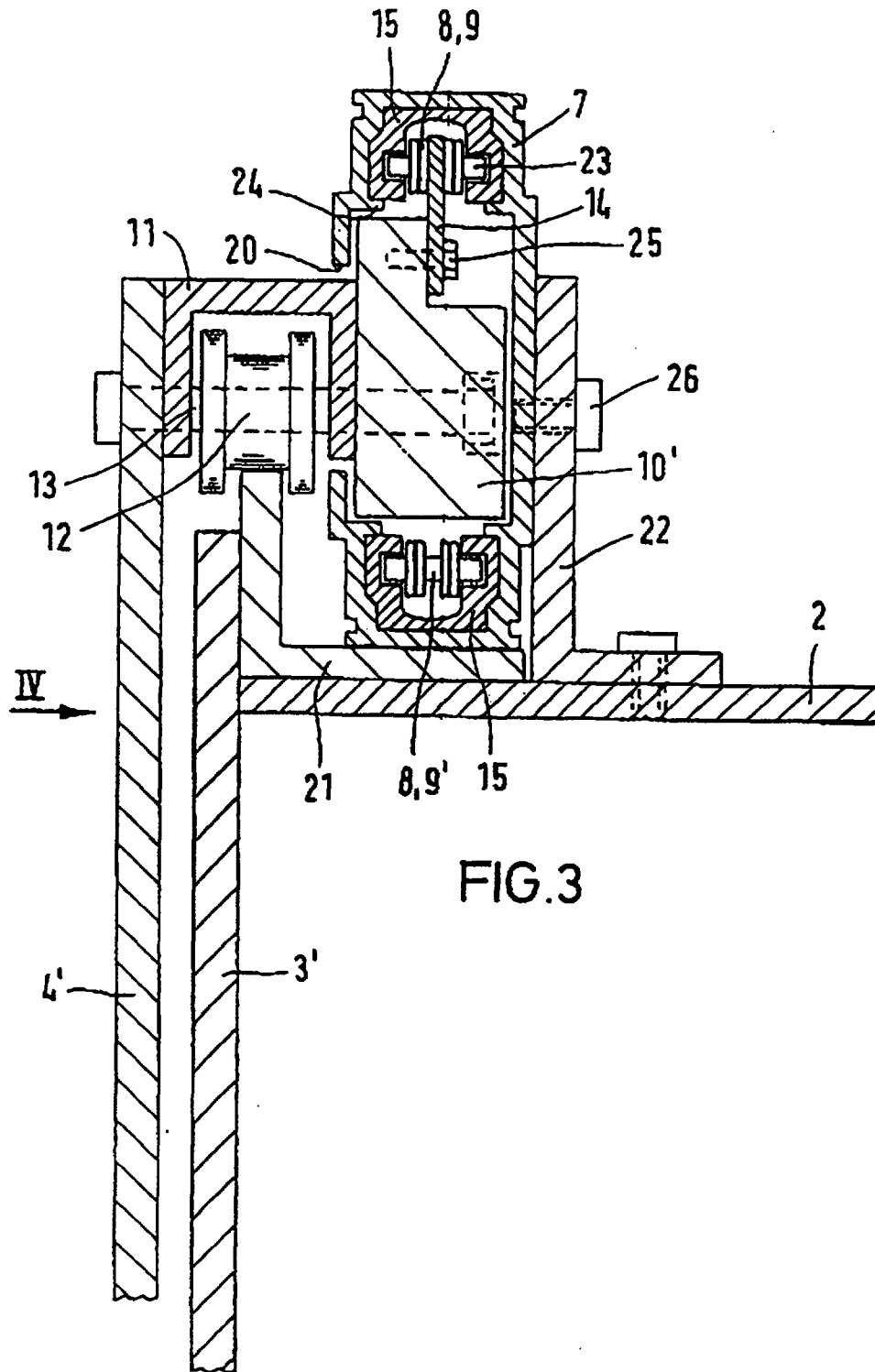
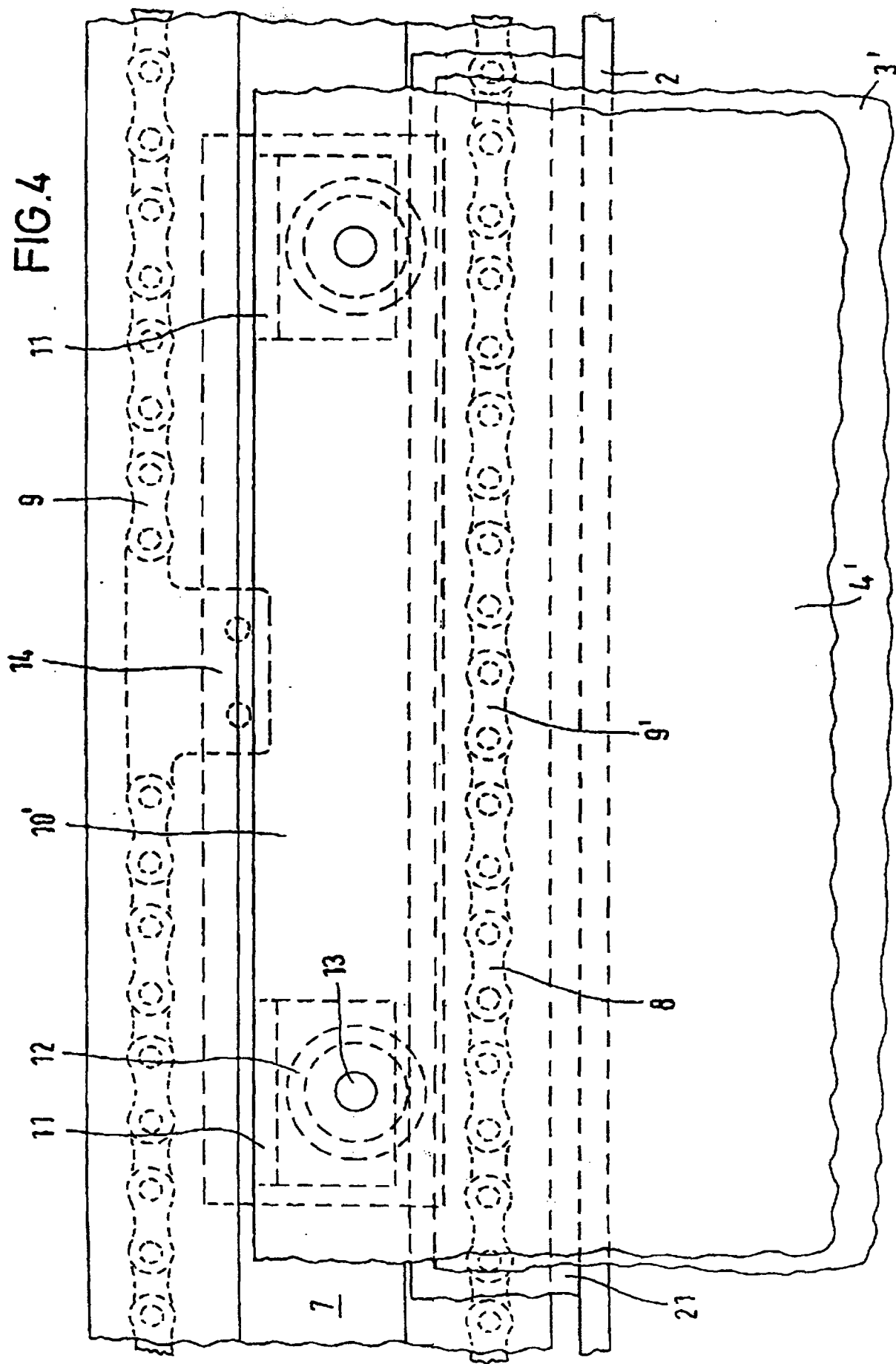


FIG. 4





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## Claims

1. A revolving door with at least one sliding night security door leaf running concentrically to at the very least one drum wall which leaf is conducted in a gliding or rolling way in a guide rail that is attached to the floor construction or the construction's connection parts and is movable towards the drum wall by means of a flexible endless traction mechanism, characterised in that the flexible traction mechanism (8) is force guided in ends (9, 9') that lay one upon the other in a roller rail (7) running concentrically to the sliding night security door leaf (4, 4') and attached to the floor construction (2) or it's connection parts.
2. A revolving door according to claim 1, characterised in that between the flexible traction mechanism's (8) ends (9, 9') at the very least one slide (10, 10') connected to the sliding night security door leaf (4, 4') is force guided in the roller rail (7).
3. A revolving door according to claim 2, characterised in that the slide (10, 10') is connected by means of at least one link (11) to the sliding night security door leaf (4, 4').
4. A revolving door according to claim 3, characterised in that the slide (10, 10') is equipped with two links (11).
5. A revolving door according to claim 3 or 4, characterised by axle (13) penetrating the slide (10, 10'), the link (11) and the sliding night security door leaf (4, 4') and serving as bearing to the carrier and guiding roller (12).
6. A revolving door according to one of the claims 1 to 5, characterised in that the slide (10, 10') is connected by means of a cam (14) with one of the flexible traction mechanism's (8) ends (9, 9').
7. A revolving door according to one of the claims 1 to 6, characterised in that there are two sliding night security door leaves (4, 4') with reverse motion and that at least one slide (10, 10') is assigned to each of the sliding night security door leaves (4, 4') and that the sliding night security door leaf (4) is connected to the lower end (9') and the other sliding night security door leaf (4') is connected to the upper end (9) of the flexible traction mechanism (8).
8. A revolving door according to one of the claims 1 to 7, characterised in that the roller rail (7) is made of a boxshaped profile with a penetration slot (20) provided for the link (11).
9. A revolving door according to one of the claims 1 to 8, characterised in that in that the roller rail (7) is designed mirrorsymmetrically to its horizontal symmetry axis.
10. A revolving door according to one of the claims 1 to 9, characterised in that the flexible traction mechanism (8) is a roller chain.

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11. A revolving door according to one of the claims 1 to 10, characterised in that anti-wear inserts (15) are arranged in the roller rail (7) and in that the roller chain is force guided in the anti-wear inserts (15).
12. A revolving door according to one of the claims 1 to 11, characterised in that the flexible traction mechanism (8) is a toothed belt.
13. A revolving door according to one of the claims 1 to 12, characterised in that the flexible traction mechanism's (8) drive (16) is realised by a motor with allocated self-locking gear.
14. A revolving door according to one of the claims 1 to 13, characterised in that on the roller rails (7) one free side is arranged a motorised drive (16) actuating on a power roll (17) and in that on the other roller rail's (7) free side there is a deflection roller (19) equipped with a tensioning device (18).
15. A revolving door according to one of the claims 1 to 14, characterised in that a power limitation is provided on main locking edges (29) of the sliding night security door leaf (4, 4') or on the sliding night security door leaves (4, 4').

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**ABSTRACT**

**REVOLVING DOOR**

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The invention relates to a revolving door with at least one sliding night security door leaf running concentrically to the drum wall which leaf is movable towards the drum wall by means of an endless flexible traction mechanism and is guided in a rolling or gliding manner in a guide rail that is mounted to the floor construction. The invention is based on the fact that the flexible traction mechanism is arranged in a roller rail whereas the flexible traction mechanism's both ends are force guided while laying one upon the other.