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AUTOMATIC SWINGING DOOR ASSEMBLY

The invention relates to an automatic swinging door assembly having at least one swinging door panel mounted for pivotal movement on a locally fixed jamb, according to the preamble of patent claim 1.

An automatic swinging door assembly with at least one swinging door panel mounted for pivotal movement on at locally fixed jamb is known from DE 102 28 930 A1, which document discloses all the features of the preamble of claim 1. A drive mechanism serves for the motorized opening and/or closing of the swinging door panel. By means of a sensor unit, whose assembly is shown in particular in Figures 10 to 12 of this generic printed specification, parts of the body and/or objects can be detected in the region of the vertical secondary closing edge of the swinging door panel. The sensor unit on detecting parts of the body and/or objects in the region of the vertical secondary closing edge of the door panel sends an output signal to a control unit of the drive mechanism whereupon the control unit can execute a safety reaction, for example stopping or reversing the closing swinging door panel. The sensor unit is arranged in a sensor strip which can be mounted in the region of the horizontal upper edge of the swinging door panel. Such sensor strips can have a negative effect on the appearance of the swinging door assembly since they protrude over the surface of the swinging door panel.

The object of the invention is to provide an automatic swinging door assembly having an optically inconspicuous sensor device which acts over the entire height of the vertical secondary closing edge.

This is achieved through the features of patent claim 1.

The dependent claims form advantageous possibilities for the configuration of the invention.

The sensor unit has at least one sensor which is designed as a transmitter and/or receiver of a light beam and which is arranged on a movable holder which when the swinging door panel is opened projects into the region of the vertical secondary closing edge and when the swinging door panel is closed can be sunk into the profile of the swinging door panel or the jamb.

A space-saving and optically unobtrusive installation of the sensor unit on the swinging door assembly is hereby achieved. Since as a result of this assembly when the swinging door panel is open the sensor is located directly in the region of the vertical secondary closing edge and the detection field of the sensor unit extends parallel to the secondary closing edge, the detection range of the sensor can cover the entire height of this secondary closing edge.

The holder of the sensor can be mounted displaceably inside a housing. This provides for an easy mounting of the sensor unit since the housing can be easily inserted into a suitable recess.

The holder of the sensor can be loaded by means of a spring against a stop of the housing in order to allow reliable extension of the sensor into its operating position. Under the compression of the spring the holder can be pressed into the housing when during closing the holder comes into contact with the opposing profile of the vertical secondary closing edge and is displaced through this.

The holder of the sensor can be mounted to engage selectively into a chamber of the jamb or of the swinging door panel. The former is offered in the case of a locally fixed drive mechanism, whilst the latter is advantageous if the drive mechanism is also mounted on the swinging door panel, so that the signal leads can each be made short and without movable cable transition.

The transmitter of the light beam can be arranged in the upper region of the vertical secondary closing edge and the receiver of the light beam can be arranged in the lower region of the vertical secondary closing edge, or vice versa.

Alternatively the transmitter of the light beam and the receiver of the light beam can be arranged on a common holder, wherein then a reflector can be arranged on a further holder which can be lowered when the swinging door panel is closed.

Alternatively the sensor can also be formed as an active infrared sensor, passive infrared sensor, or as a laser light beam.

The sensor unit can be automatically tested for its functionality by the control device, for example cyclically or with each actuation of the drive mechanism. In the event of a negative result, a safety reaction, e.g. an error warning and/or a stoppage of the drive mechanism can be triggered so that the greatest possible security is guaranteed.

The output signal of the sensor unit can be designed as an analogue signal. Depending on the extension path of the sensor, i.e. depending on the opening angle of the swinging door panel, the signal strength of the output signal can be different so that a clear, for example linear, function of the signal strength is produced over the opening angle of the swinging door panel, which, for example by a learning process when setting up the automatic swinging door assembly, can be filed as a reference curve in the control device.

In order during closing of the swinging door panel to avoid a faulty triggering of the sensor unit caused by the sensors entering into the housing and the thus resultant interruption of the light ray of the light beam, a fade-out of the output signal of the sensor unit then takes place by the control device of the drive mechanism. This fade-out can be set for example by a learning process which takes place when setting up the automatic swinging door assembly.

An embodiment will now be explained in further detail below with reference to the drawings.

These show:

Fig. 1 a plan view of the hinge side of a swinging door assembly according to the invention;

Fig. 2 a plan view of the opposite hinge side of the swinging door assembly according to Fig. 1;

Fig. 3 a horizontal section of the swinging door assembly according to Fig. 2 along the line A-A;

Fig. 4 a horizontal section of the swinging door assembly according to Fig. 2 along the line B-B when the door panel is closed;

Fig. 5 a horizontal section of the swinging door assembly according to Fig. 2 along the line B-B when the door panel is opened;

Fig. 6 a plan view of the opposite hinge side of a modified embodiment of the swinging door assembly according to Fig. 1;

Fig. 7 a horizontal section of the swinging door assembly according to Fig. 6 along the line C-C, with a closed door panel;

Fig. 8 a horizontal section of the swinging door assembly according to Fig. 6 along the line C-C, with an open door panel.

Fig. 1 illustrates an automatic swinging door assembly 1 with a swinging door panel 2 mounted on a door jamb 4 for pivotal movement by hinges 3. The swinging door panel 2 can be driven between a closed position and an opened position by means of a drive mechanism 5 which is mounted locally fixed on the door jamb 4. The drive mechanism 5 has an output shaft 6 with which one end of a slide arm 7 is connected secured against rotation. At the other end of the slide arm 7 there is a slider 8

which is guided displaceably in a slide rail 9. Through the said arrangement a rotational movement of the output shaft 6 is converted into a pivotal movement of the swinging door panel 2 wherein the control of the drive motor 10 can be undertaken by a control device.

From the view according to Fig. 2 which shows the opposite hinge side of the automatic swinging door assembly 1, it is apparent that – as in principle with each manual or automatic swinging door assembly – a place is located in the region of the vertical secondary closing edge 10 of the swinging door panel 2 where parts of the body and/or objects which are located in this region as the swinging door panel 2 closes can be jammed between the profiles of the swinging door panel 2 and the door jamb 4. In order to eliminate this risk of jamming, a sensor unit with sensors 17 is arranged in the region of the vertical secondary closing edge 10. The sensors 17 are each arranged on movable holders 11 which with a (partially) opened swinging door panel 2 project into the region of its vertical secondary closing edge 10. One of the sensors 17, for example the upper sensor 17, is formed of a transmitter of a light beam, and the other sensor 17, for example the lower sensor 17, is designed as a receiver of the light beam, so that the light ray of the light beam, i.e. the detection area of the sensor unit, extends in the region of the whole vertical secondary closing edge 10 parallel hereto. This arrangement provides an optimum safeguard in the vertical secondary closing edge 10 over its entire length. Alternatively it is possible to arrange the transmitter and the receiver adjacent to one another wherein then a reflector is to be arranged at the other end of the vertical secondary closing edge 10.

Fig. 3 illustrates the secondary closing edge 10 of the swinging door panel 2 in a horizontal sectional view along the line A-A. The door jamb which is fixed in a recess of the locally fixed wall 13 has a profile which contains chambers 14. The profile of the swinging door panel 2 which is pivotally mounted on the door jamb 4 by hinges 3, forms a stepped rebate with the profile of the jamb.

Fig. 4 shows the secondary closing edge 10 of the swinging door panel 2 in a horizontal sectional view along the line B-B. A wall of the profile of the door jamb 4 is recessed in this region so that the chamber 14 located inside the door jamb 4 is accessible from outside. A housing 15 is pushed through this recess into the chamber 14 and anchored on the profile of the door jamb 4. The housing 15 serves as a guide for the holder 11 which supports the sensor 17. The holder 11 which, as illustrated here, when the door panel 2 is closed is displaced through this into the housing 15, is loaded by a spring 16. This spring 16 has the effect that the holder 11 is pushed out from the housing 15 as the swinging door panel 2 is opened so that the sensor 17 also then passes with the holder 11 into the region of the secondary closing edge 10. This position is illustrated in Fig. 5.

The use of the arrangement described above with locally fixed sensors 17 is particularly advisable in the case of automatic swinging door assemblies 1 whose drive mechanism 2 is likewise arranged locally fixed so that a relatively short cable connection without any flexible cable transfers can be mounted between the sensor unit and the control unit of the drive mechanism 2.

Figs. 6 to 8 illustrate an embodiment which is modified compared with the arrangement previously described. The sensor unit is in this embodiment mounted on the swinging door panel 2 whereby the profile 18 of the swinging door panel 2 has a chamber 19 in which the housing 15 of the sensor unit can be mounted engaging through a recess. This arrangement is expedient with the drive mechanism 2 likewise mounted fixed relative to the panel as a result of the then short cable connection. The detection range and the functioning method of the sensor unit correspond to the arrangement described above however.

Alternatively or additionally to the spring-loaded bearing of the holder 11 described in the previous embodiments it is possible to control the holder 11 by means of active servo drives, e.g. electric motors, dependent on the position of the swinging door panel 2. It is furthermore conceivable to transfer the relative transmission

between the swinging door panel 2 and the jamb 4 to the holder 11 by means of a mechanical coupling unit.

LIST OF REFERENCE NUMERALS

1	Swinging door assembly
2	Swinging door panel
3	Hinge
4	Door jamb
5	Drive device
6	Output shaft
7	Slide arm
8	Slider
9	Slide rail
10	Secondary closing edge
11	Holder
12	Detection area
13	Wall
14	Chamber
15	Housing
16	Spring
17	Sensor
18	Profile
19	Chamber
20	Setting
21	Glass panel

Automatisk svingdørsanlæg

Patentkrav

1. Automatisk svingdørsanlæg (1) med en stationær karm (4) og med i det mindste en svingdørsfløj (2), der er lejret svingbart på den stationære karm (4) med en drivanordning (5) til en motordrevet åbning og/eller lukning af svingdørsfløjen (2), og

med en sensoranordning til registrering af legemsdele og/eller genstande i området ved en sidelukkekant på svingdørsfløjen (2),

idet sensoranordningen i forbindelse med registrering af legemsdele og/eller genstande i området ved den vertikale sidelukkekant på svingdørsfløjen (2) afgiver et udgangssignal til en styringsanordning i drivanordningen (5), hvorefter styringsanordningen kan udføre en sikkerhedsreaktion ved dørbevægelsen, og

idet sensoranordningen indeholder i det mindste en sensor (17), der er udformet som sender og/eller modtager i et fotocelleanlæg,

kendetegnet ved,

at lysstrålen i fotocelleanlægget, det vil sige sensoranordningens registreringsområde i området ved hele den vertikale sidelukkekant (10), strækker sig parallelt med denne, og

idet sensoren (17), der er udformet som sender og/eller modtager i fotocelleanlægget, er placeret på en bevægelig holder (11), der, når svingdørsfløjen (2) er åben, rager ind i området ved sidelukkekanten (10), og, når svingdørsfløjen (2) er lukket, kan nedsænkes i en profil på svingdørsfløjen (2) eller karmen (4),

idet holderen (11) kan trykkes ind i et hus (15), når den i forbindelse med lukning af svingdørsfløjen (2) kommer i berøring med den overfor liggende profil

på den vertikale sidelukkekant (10) og fortrænges af denne, og/eller idet holderen (11) ved hjælp af aktive aktuatorer kan aktiveres afhængigt af svingdørsfløjens (2) stilling, og/eller idet den relative overføring mellem svingdørsfløjen (2) og karmen (4) kan overføres til holderen (11) ved hjælp af en mekanisk koblingsanordning.

2. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoranordningen er placeret på den vertikale sidelukkekant (10).

3. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at holderen (11) til sensoren (17) er lejret forskydeligt inden i et hus (15).

4. Automatisk svingdørsanlæg ifølge krav 3,

kendetegnet ved, at holderen (11) ved hjælp en fjeder (16) kan bearbejdes mod et anslag på huset (15)

5. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at holderen (11) kan monteres således, at den griber ind i et kammer (14) på karmen (4).

6. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at holderen (11) kan monteres således, at den griber ind i et kammer på svingdørsfløjen.

7. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at senderen i fotocelleanlægget er placeret i det øverste område af den vertikale sidelukkekant (10), og at modtageren i fotocelleanlægget er placeret i det nederste område af den vertikale sidelukkekant (10) eller omvendt.

8. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at senderen i fotocelleanlægget og modtageren i fotocelleanlægget er placeret på en fælles holder (11).

9. Automatisk svingdørsanlæg ifølge krav 8,

kendetegnet ved, at der er placereet i det mindste en reflektor på en yderligere holder (11), der kan nedsænkes, når svingdørsfløjen (2) er lukket.

10. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoren (17) er udformet som en aktiv-infrarød-sensor.

11. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoren (17) er udformet som en passiv-infrarød-sensor.

12. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoranordningen ved hjælp af styringsanordningen kan testes automatisk med hensyn til sin funktionsevne.

13. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoranordningens udgangssignal er udformet som et analogt signal.

14. Automatisk svingdørsanlæg ifølge krav 1,

kendetegnet ved, at sensoranordningens udgangssignal er variabelt afhængigt af svingdørsfløjens åbningsvinkel.

15. Automatisk svingdørsanlæg ifølge krav 14,

kendetegnet ved, at det åbningsvinkelafhængige forløb af sensoranordningens udgangssignal kan lagres i styringsanordningen.

Fig. 1

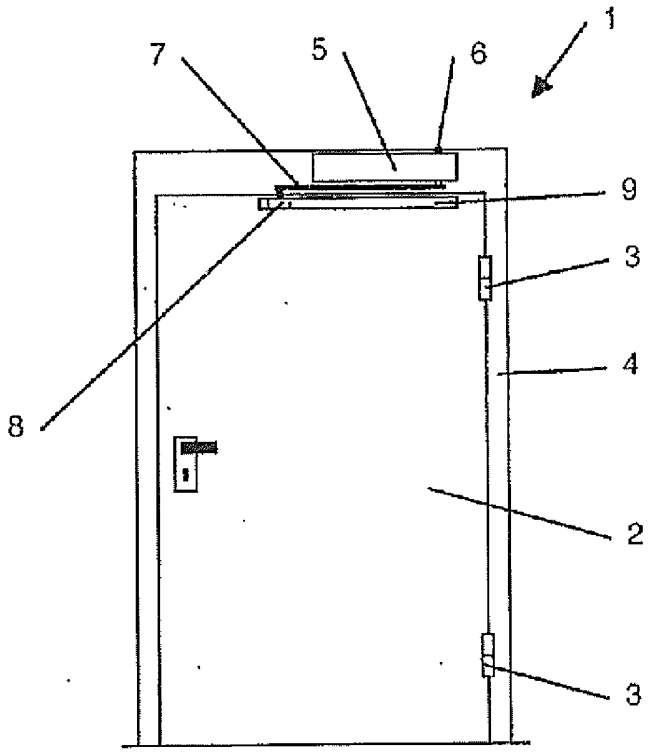

Fig. 2

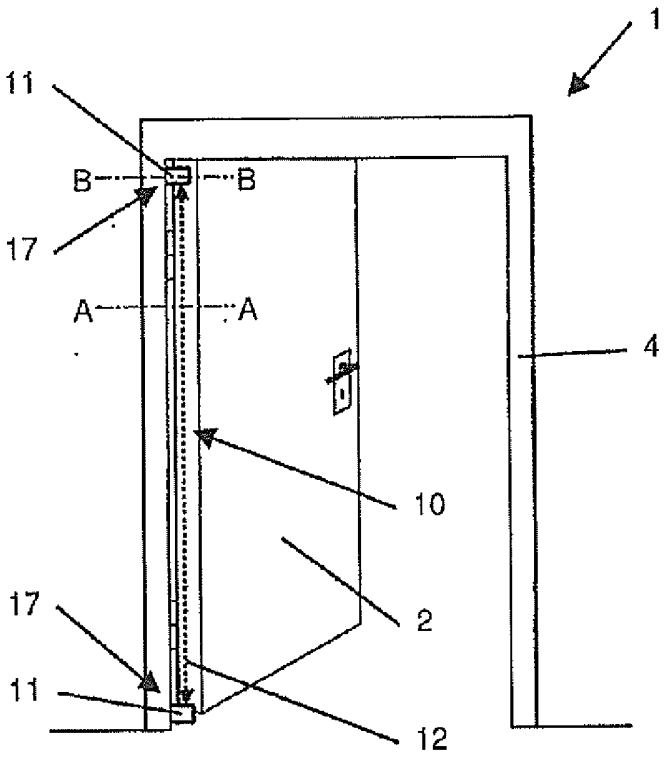

Fig. 3

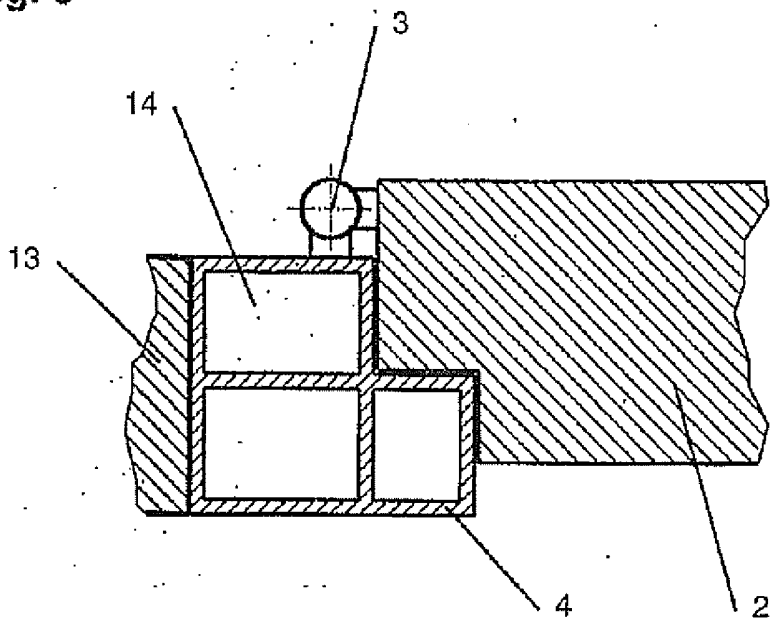

Fig. 4

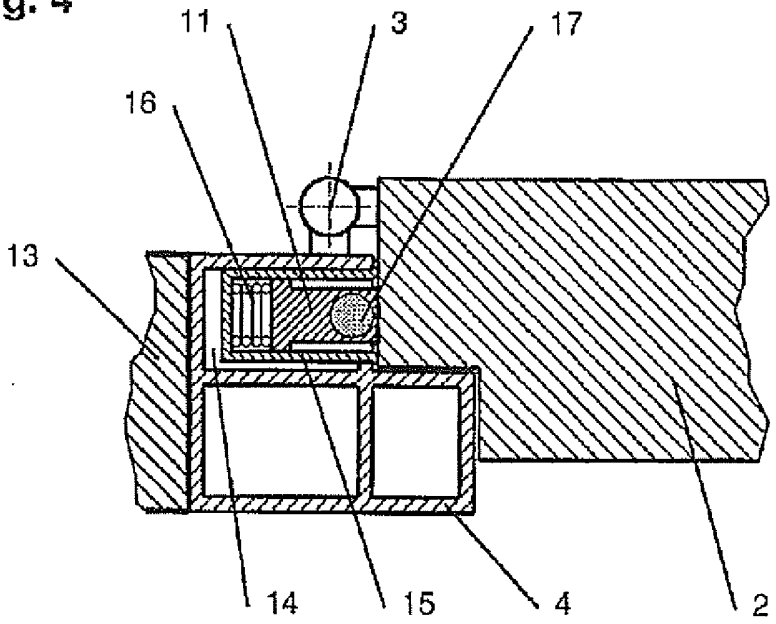

Fig. 5

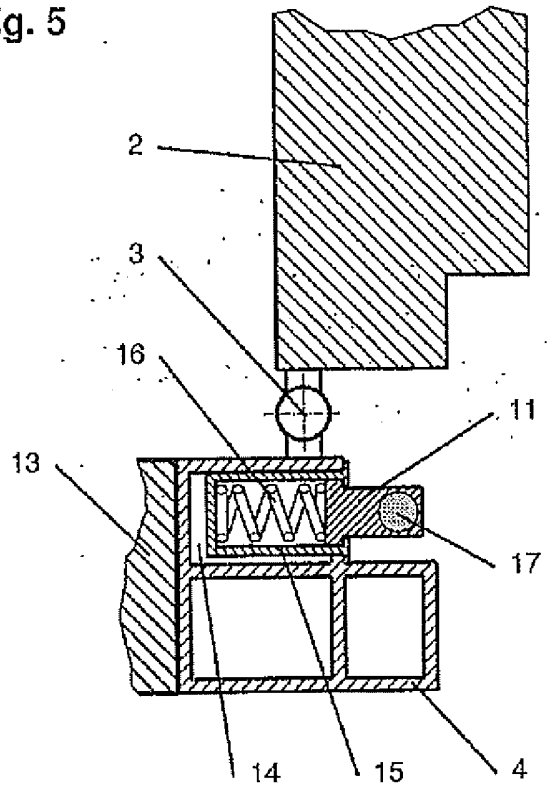

Fig. 6

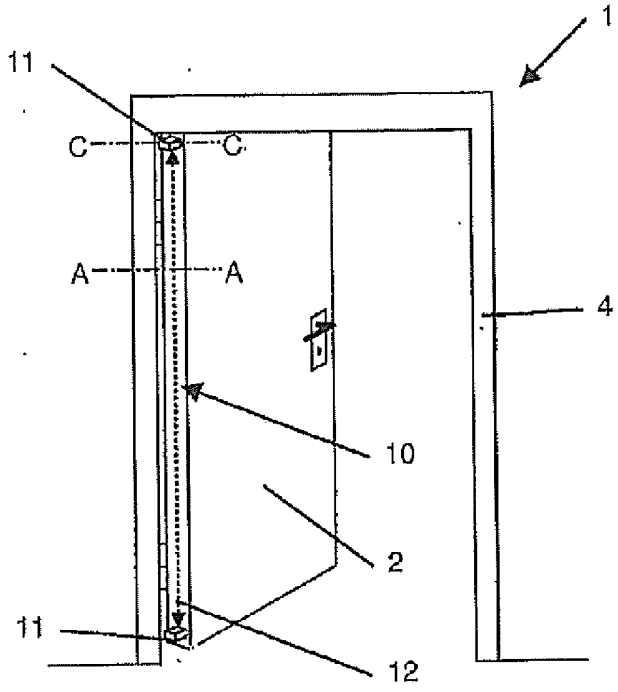

Fig. 7

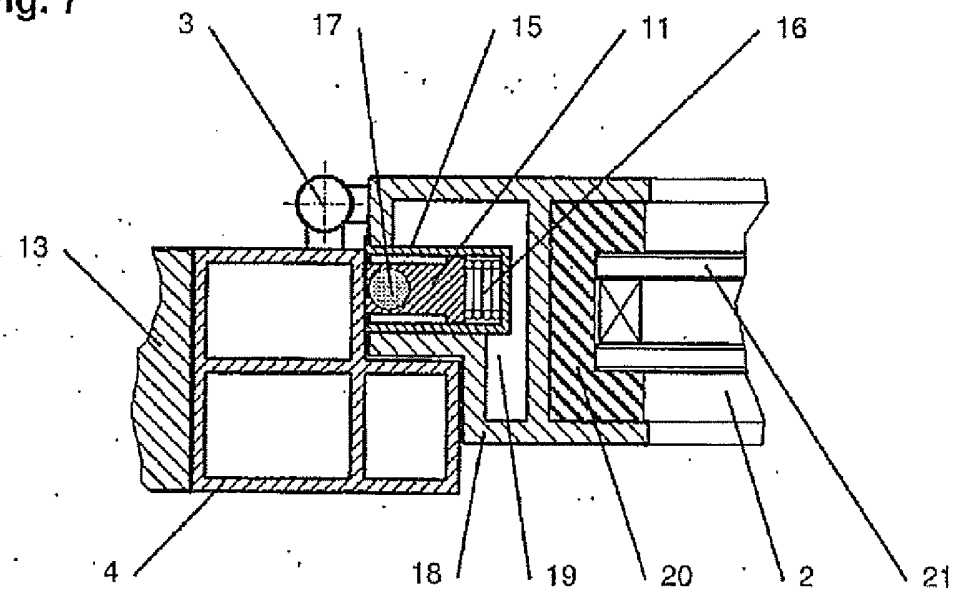

Fig. 8