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ARRESTING UNIT FOR LOCKING A DOOR IN A HOLDING POSITION, DOOR CLOSING
SYSTEM HAVING SUCH AN ARRESTING UNIT AND METHOD FOR OPERATING SUCH
AN ARRESTING UNIT

[0001] The invention relates to an arresting unit for locking a door in a holding position with a blocking device for holding the door open and with a holding device formed in such a way that in a first operating state it locks the blocking device in a blocked position and in a second operating state it releases the blocking device.

[0002] A generic arresting unit is known, for example, from DE 10 2008 056 214 A1 and WO 2010/052012 A1 of the same applicant, as well as from EP 1 554 394 A2 and DE 196 06 204 C1. Such arresting units often form part of a door closing system having a door and a door closer, in particular a slide rail type door closer. Accordingly, a door closing system having an arresting unit according to the invention, which will be described in more detail below, also forms part of the invention.

[0003] An arresting unit which can be activated and deactivated manually is known from US 3,164,404 A. US 1,430,192 A discloses an arresting unit the blocked position of which can be cancelled manually. Finally, it is known from DE 199 01 773 A1 to integrate reed contacts in the slide rail in order to ascertain the position of a slider of a door closer.

[0004] Especially in the field of fire protection it is necessary for doors to automatically close in the case of an alarm, for example in order to prevent smoke from spreading within a building. At the same time, it is often desirable to be able to temporarily lock in particular large and heavy doors in an open position in order to facilitate passage through the door in particular during times of increased passage frequencies. For reasons of aesthetics, space and practicability, a generic arresting unit is often used to this end which locks the door in an opened position, i.e., holds it in an open position.

[0005] Generally, various approaches can be taken for this, and particularly integration of the arresting unit in the slide rail of a slide rail type door closer is widely used in this regard. On the one hand, the arresting unit can be accommodated in the slide rail in a concealed manner. In addition, it is possible to reliably and precisely set the opening angle of the door via the sliding block of the door closer guided in the slide rail. On the other hand, connecting the door closer enables continuous application of a door closing force to the door, so that a door which is not locked will always fall into the closed position. The opening angle corresponds to the

pivot angle in the pivot plane of the door between the closed position of the door and the current opening position of the door.

[0006] The essential elements of the arresting unit are, on the one hand, a blocking device and a holding device. The term blocking device hereinafter refers to that part of the arresting unit which directly engages an element interacting with the door or which directly interacts with the door and prevents the door from moving to its closed position by blocking it. Specifically, this may be, for example, a stop element engaging the slide path of a sliding block guided in a slide rail and articulated to a door via a door closer arm and a door closer. Alternatively, it is of course also possible that the arresting unit acts on other elements for locking the door, such as the door leaf, etc. What is essential for the blocking device is that it enables retaining of the door in a set open position.

[0007] Another essential element of the arresting unit is the holding device, which is configured in such a way that in its first operating state it locks the blocking device in a blocked position and in its second operating state it releases the blocking device. Thus, in a first aspect, the holding device is functionally coupled to the blocking device and governs the blocking state of the blocking device, i.e., locks the blocking device in its blocked position or releases it. The holding device can be controlled, for example, via electric signals, i.e., via energization and de-energization. When the blocking device is locked in its blocked position by the holding device, the blocking device is in a position in which it can retain, or arrest, the door in an opened position.

[0008] The switching of the holding device between the at least two operating states is performed, for example, through a suitable sensor or by means of a control unit which, for example in the case of an alarm, triggers automatic release of the locked door. The holding device is frequently configured in such a way that it is energized in one of the two operating states and is de-energized in the other operating state. Particularly in the field of fire protection the arresting unit is frequently designed as a closed-circuit current type model in order to ensure that the door is reliably released and closed, respectively, during a power failure possibly occurring in the case of fire. Thus, the essential criterion for the second operating state is that the blocking device is no longer locked in its blocked position by the holding device but is released. Release of the blocking device is to be understood in particular as an unlocking of the blocking device. In this state, the blocking device may still be in a blocked position, however the blocking device is no longer held in this blocked position but can be pushed into a release position, for example by door elements, in particular a sliding member of a door closer.

[0009] Although the arresting units disclosed in DE 10 2008 056 214 A1 and WO 2010/052012 A1, which are expressly incorporated herein by reference with respect to their structure and operating principle, have already proven to be highly effective, there still remains a need for improvement. For example, the noise developing during the use of a generic arresting unit, particularly during opening of the door, is perceived as annoying. Furthermore, the service life of the arresting unit, or a door closing system having such an arresting unit, is to be further improved and overcoming the arresting unit during opening of the door is to be facilitated.

[0010] The object of the invention is achieved with an arresting unit, a door closing system and a method for operating an arresting unit according to the independent claims. Preferred embodiments are specified in the dependent claims.

[0011] An essential element of the invention consists in the fact that the arresting unit includes a decoupling device which can be actuated by a sliding member of a door closer and the triggering of which decouples the holding device from the blocking device and triggers a release of the blocking device which is independent of the operating state of the holding device. The decoupling device is thus configured in such a manner that it intervenes in the functional connection of the holding device to the blocking device for locking and releasing the blocking device. In this case, it is possible to release the blocking device by means of the decoupling device without the need to switch the holding device from the activated state to the deactivated state, or to keep it released even if the holding device is activated, for example energized in the case of a closed-circuit current type model. Actuation is performed by the sliding member of a door closer sliding, for example, over the arresting unit during opening of the door. The decoupling device is thus configured in such a manner that it can be actuated by the sliding member, in particular mechanically.

[0012] By means of the decoupling device of the arresting unit according to the invention it is thus possible to integrate a control level for the blocking device in the arresting unit, said control level being hierarchically higher than the holding device and enabling alternative release of the blocking device independently of the holding device. As will be described in more detail below, this arrangement involves particularly low wear of the material and in particular enables relief of the blocking mechanism of the arresting unit, specifically the blocking device, during opening and subsequent locking of the door. Furthermore, this arresting unit enables effective noise reduction since, for example, clashing of parts of the holding device and the blocking device can be reduced. At the same time, pushing the door open, i.e., overcoming the arresting unit

during opening of the door, is facilitated, said process taking place automatically through actuation of the decoupling device by the sliding member.

[0013] In practice, intervention of the decoupling device in the control cascade between the holding device and the blocking device may be implemented in various ways. For example, it is possible to design the decoupling device as an electric or electronic device and to establish intervention of the decoupling device via suitable electronic control signals and/or circuits. Such an embodiment then comprises a decoupling device having appropriate electric or electronic regulating components. Especially in the field of fire protection, however, generic arresting units must meet strict requirements as it must be ensured that the arresting unit is as fail-safe as possible in an emergency. For this reason, it is preferred that the decoupling device decouples the holding device from the blocking device in a purely mechanical manner. In this embodiment, the decoupling device is thus configured in such a manner that it effects decoupling of the holding device from the blocking device using only mechanical means. This may ideally be a lever mechanism or a slider mechanism. Mechanical decoupling is advantageous in that it does not depend on a functioning power supply and provides increased reliability.

[0014] The holding device of a generic arresting unit frequently includes an electromagnetic unit having a coil and an armature, which is also preferred for the present invention. In this case, the decoupling device may in particular be arranged in such a manner that it acts on the armature of the electromagnetic unit for decoupling the holding device from the blocking device. During a switching operation, the armature of the electromagnetic unit is usually displaced along the longitudinal axis of the coil, which frequently has a cylindrical shape. In other words, energization of the coil triggers movement of the armature relative to the coil. Furthermore, the armature frequently includes a spring load which upon de-energization pushes the armature back to its starting position relative to the coil. In this case, integration of the decoupling device is achieved particularly well if the decoupling device is configured such that it acts on, or engages, the armature of the electromagnetic unit for decoupling the holding device from the blocking device. In addition to the operating states "energized" and "de-energized" and the spring load of the armature, it is thus possible to displace the position of the armature of the electromagnetic unit relative to the coil and/or to secure or at least temporarily hold it in a set position. Once the positioning of the armature relative to the coil is controlled by the decoupling device, the armature assumes its position regardless of the energization state of the coil and/or the direction in which the spring load acts on the armature. The decoupling device may in this case act on the armature in such a manner that it is locked in its current position. It is, however, preferred that the decoupling device moves the armature

relative to the coil towards a set position. This ensures that the armature will always assume, or be in, the desired position relative to the coil when the decoupling device is activated, i.e., engaged.

[0015] The functional connection of the decoupling device to the armature of the electromagnetic unit may be achieved, for example, via suitable articulated connections or other transmission elements. A particularly simple approach consists in arranging a stop on the armature against which an adjusting element of the decoupling device strikes. In this embodiment, the decoupling device thus includes *inter alia* an adjusting element configured to strike against the armature stop. The adjusting element may be, for example, a pivot lever. For reasons of space, the stop on the armature is ideally arranged on a face side of the usually at least partially rod-shaped armature. In this manner, an additional stop element can be dispensed with in the manufacture of the armature.

[0016] Generally, it is advantageous to design the arresting unit as compact as possible, or, with respect to its external dimensions, as small as possible, in order to account for the spatially restricted installation conditions existing, for example, in a slide rail of a slide rail type door closer. Consequently, it is advantageous to configure the decoupling device as small as possible. This can be achieved particularly well if the decoupling device comprises a deflecting device configured in such a manner that it translates the sliding movement of a sliding member of a door closer sliding over the arresting unit into a counter-directional movement, in particular of the armature. Thus, a first essential aspect for the configuration of the deflecting unit is that, on the one hand, it senses and absorbs the sliding movement of the sliding member sliding over the arresting unit, for example during an opening operation of the door. On the other hand, the deflecting unit must at the same time be capable of transmitting this movement in such a manner that ultimately the decoupling function of the decoupling device is triggered. The sliding member sliding over the arresting unit thus ideally introduces an actuating force into the deflecting unit, which force is used by the deflecting unit of the decoupling device to decouple the blocking device from the holding device. To this end, the deflecting unit preferably includes at least one element which projects into the slide path of the slider and can therefore contact the slider, or sliding member, as it slides over the arresting unit. This may be, for example, a suitable stop projecting into the slide path of the slider. The deflecting unit further comprises means which deflect the introduced actuating force with respect to its direction and use it to decouple the holding device from the blocking device. To this end, the deflecting unit of the decoupling device may specifically comprise a two-armed pivot lever having an armature stop and a sliding member stop. Said pivot lever is pivotally arranged in the arresting unit, preferably in such a manner that the slide path of the sliding member of the door closer extends in the

pivot plane of the pivot lever. The armature stop of the pivot lever is configured to engage the armature of the electromagnetic unit of the holding device. The sliding member stop, on the other hand, is configured in such a manner that it can interact with a sliding member guided in a slide rail. To this end, the sliding member stop protrudes, for example, beyond the arresting unit and projects into the slide path of the sliding member in the slide rail. If the sliding member is guided over the arresting unit, for example during opening of the door, it strikes against the sliding member stop and, if continuing its movement, causes the pivot lever to pivot out of the slide path and towards the arresting unit.

[0017] According to the invention, the decoupling device is configured in such a manner that during opening of the door the decoupling device is triggered first and the blocking device is activated only thereafter. With respect to the opening operation, the triggering of the decoupling device thus precedes the activation of the blocking device. This ensures that firstly the blocking device is decoupled before the set opening angle is reached, and that the decoupling is not cancelled until the set opening angle is reached or, in some embodiments, until the set opening angle has been at least slightly exceeded.

[0018] Current generic arresting units frequently comprise a sensor element which also projects into the slide path of the sliding member and actuation of which is a prerequisite to enable activation of the holding device, for example through energization. In this manner, position-dependent control of the energization depending on the position of the sliding member in the slide rail, i.e., ultimately depending on the opening angle of the door, is achieved. However, the positioning of this sensor element is frequently not adapted exactly to the opening operation of the door. For example, energization may sometimes start too early, i.e., before the sliding member has reached a position that can be blocked by the blocking device. On the other hand, the element of the blocking device which is configured to interact with the sliding member is frequently arranged in front of the sensor with respect to the opening operation of the door, so that this blocking element first strikes against the sliding member and is pushed out of the slide path by it, frequently against the direction of action of a blocking mechanism. The decoupling device according to the invention enables unlocking of the blocking device before the sliding member is reached, enabling more harmonic sliding over the arresting unit. Once the sliding member, i.e., the corresponding control faces, have completely slid over the decoupling device, the decoupling function of the decoupling device is interrupted and the holding device in the activated state can lock the blocking device in a blocked position, i.e., as a result, retain the door in an opened position. Hence, the sensor element no longer needs to be adapted to the opening movement of the door as exactly as previously.

[0019] The blocking device ultimately represents that part of the arresting unit which acts directly on at least one element functionally coupled to the door or directly on the door or the door leaf itself, and that enables retaining of the door in an opening position, in particular in the door closing direction. Generally, a number of elements may be considered for this, for example also the door leaf itself. What is essential is that the arresting unit is adapted to an element of the door which changes its position depending on the opening angle of the door. This is preferably achieved by a sliding member of a slide rail type door closer, which sliding member is retained in the door closing direction in a preset opening position of the door by the blocking device. The arresting unit according to the invention is therefore particularly suitable for integration in the slide rail of a slide rail type door closer and for retaining the sliding member in a preset position in the slide rail by means of the blocking device in order to hold the door open. Preferred locking angles are in an opening angle range from 80° to 120° and very particularly from 85° to 100°.

[0020] The requirements of maximum compactness and functional reliability also apply to the blocking device. In practice, it has therefore proven to be useful that the blocking device includes a blocking rocker having a blocking arm. Thus, in a first aspect, the blocking rocker is a spring-loaded two-armed pivot lever pivotally mounted in the arresting unit. One arm of the blocking rocker, hereinafter referred to as blocking arm, is responsible for retaining the sliding member in the slide rail and, to this end, for example includes a corresponding blocking stop having, for example, a hook-like shape. The blocking stop can be caused to pivot into the slide path of the sliding member in order to retain the sliding member in a set position. If the door locked in an open position by the arresting unit is to be closed, this blocking stop can be caused to pivot out of the slide path, so that, if a slide rail type door closer is used, the sliding member is released in the door closing direction and the door can close. A release may be achieved, for example, by pivoting of the blocking rocker as a whole. The blocking arm may generally be configured as a single-piece component. Preferably, however, the blocking arm is configured as a multi-piece component and is mounted such that it can at least partially pivot or be articulated. In this embodiment, the blocking arm thus comprises a blocking lever formed as an articulated arm on which the blocking stop is preferably arranged. Furthermore, the blocking rocker and/or the blocking lever preferably includes a spring load acting in the direction of the blocked position, or, if a slide rail type door closer is used, towards the position projecting into the slide path of the sliding member. The blocking arm of the blocking rocker is thus preferably formed as a two-piece component. For release, on the one hand, the whole blocking lever of the blocking rocker may be caused to pivot out of the slide path through a pivot movement of the whole blocking rocker. Alternatively, the blocking lever of the blocking arm may be selectively caused to pivot out of the slide path against the spring load, with the blocking rocker

remaining in its position. This function for example enables so-called override pushing of the arresting, wherein the door is manually closed from its arrested position by overriding the arresting unit.

[0021] The arresting unit according to the invention is further excellently suited for use in the field of fire protection. For example, in order to meet the protection objectives according to the EN 1155 standard "contained and secured fire compartment", the arresting unit is preferably designed as a closed-circuit current arresting unit. In this embodiment, the arresting unit is configured in such a manner that in its normal state it is energized constantly and thereby holds the door in an open position, for example by retaining a corresponding sliding member. Specifically, for example, an electromagnet of the holding device is energized and, if the holding device is coupled to the blocking device, in this activated state it is held in a position in which it locks the blocking device in a blocked position (first operating state). If, however, the supply voltage of the arresting unit or the holding device is interrupted, this results in deactivation of the electromagnet of the holding device, whereby the holding device is in a deactivated state and releases the blocking device (second operating state). As a result, the open door moves into its closed position. In this closed-circuit current type model, the power supply may be interrupted, for example, by detecting and triggering a fire alarm. Additionally, an external control element may be provided, via which the electric power supply can be deactivated irrespective of whether or not there is an emergency. However, it is generally also possible to design the arresting unit according to the invention as an open-circuit current type model. In this case, the holding device is configured in such a manner that it is activated, or energized, in the first operating state (blocking device is locked in the blocked position) and is deactivated, or de-energized, in the second operating state (release of the blocking device).

[0022] Generic arresting units are usually integrated in a door closing system having a door and a door closer, and the advantages of the invention also show clearly particularly in such a door closing system.

[0023] Particularly reliable integration of the arresting unit according to the invention is achieved in a door closing system comprising a door closer which comprises a sliding member guided in a slide rail. The door closer is arranged with a door closer arm between the door and the corresponding wall region. Further, the slide rail, in which the sliding member arranged at the end of the door closer arm is guided, is arranged opposite the door closer. When the door is opened or closed, the sliding member slides along the slide rail and assumes a displacement position in the slide rail depending on the opening angle of the door. The arresting unit according to the invention is preferably installed in the slide rail and, to this end, is generally

ideally configured in such a manner that it can be displaced along the slide rail and thus be locked in various positions in the slide rail for setting the desired opening angle of the door in the locked position. For locking the door, the holding device of the arresting unit preferably projects with a stop element into the slide path of the slide member and blocks it against continued sliding movement inside the slide rail in the door closing direction in order to hold the door in the desired open position. The closing direction refers to that direction of the sliding member relative to the arresting unit in which the sliding member moves inside the slide rail during closing of the door from the locked position in the open position of the door.

[0024] Energization and de-energization of the holding device are further frequently controlled via a sensor element of the arresting unit in order to enable position-dependent control of the energization state of the arresting unit. To this end, the sensor element of the arresting unit preferably also projects into the slide path of the sliding member and is actuated by it when sliding over the arresting unit. Of course, a contactless variant which, for example, uses a reed contact, may alternatively be considered. The sensor element is connected to the other components of the arresting unit in such a manner that it triggers energization of the holding device (and thus activation in the closed-circuit current type model) upon actuation by the sliding member. In the closed-circuit current type model, for example, it is thus ensured that energization of the holding device of the arresting unit for retaining the sliding member is effected only if the sliding member is in a suitable position relative to the arresting unit. Specifically, this may be achieved by providing an inclined control face on the sliding member, which triggers actuation of the sliding member at, or at least after reaching, a suitable position of the sliding member relative to the arresting unit. Moreover, the inclined control face is advantageous in that it facilitates sliding of the sensor element onto the sliding member guided in the slide rail.

[0025] In order to ensure mutually coordinated control of the decoupling device, which preferably also includes an element projecting into the slide path of the sliding member, for example the pivot lever, and the sensor element, the use of a sliding member having at least one and preferably two inclined control faces extending in the displacement direction has shown to be advantageous. One inclined control face controls the positioning of the sensor element via which activation of the holding device is triggered, while the other inclined control face controls the decoupling device. In other words, two slide tracks are integrated in the sliding member, on which slide tracks the sensor element and an element of the decoupling device slide along, particularly during closing of the door, and are thereby controlled in their adjusting position relative to the arresting unit. To this end, each of the inclined control faces includes, for example, a curved profile which changes in the vertical direction across the longitudinal

extension of the respective inclined control face in the door opening direction of the sliding member. This, on the one hand, allows for implementation of simultaneous position-dependent control of the sensor element and the decoupling device via one and the same sliding member. On the other hand, different sliding members having different inclined control faces may be provided, each of which may have different functions or settings. The suitable sliding member may then be selected depending on the particular requirements. The inclined control faces finally also aid in achieving a particularly smooth and harmonic control process between control of the sensor element and control of the decoupling device, whereby, for example, the noise developing during operation of the arresting unit can be further reduced. Thus, particularly via appropriate selection of the inclined control faces it can be ensured that during opening of the door the decoupling device first decouples the holding device from the blocking device, that only thereafter, if the opening movement continues, actuation of the sensor element (and thus in the closed-circuit current type model activation of the electromagnetic holding magnet) is triggered, and that finally, if the opening movement continues further, the decoupling device is deactivated and the holding device thereby locks the blocking device. The two inclined slide faces are expediently formed in such a manner that the last stage of the aforesaid sequence is not reached until the sliding member is in a position in which it can be held by the arresting unit.

[0026] Further, the door closing system according to the invention is preferably part of a closing system of a double-leaf door, in particular a fire door, and, to this end, is particularly integrated in a closing sequence control which controls the closing sequence of the two door leaves with respect to each other.

[0027] A further aspect of the invention finally consists in a method for operating an arresting unit according to the invention, particularly in a door closing system according to the invention. According to the method for operating an arresting unit, provision is particularly made for the following functions to be performed in succession during opening and locking the door. First, by triggering the decoupling device, particularly through actuation by a sliding member of a door closer, the holding device is decoupled from the blocking device. Said decoupling preferably occurs through displacement of the armature of the electromagnetic unit of the holding device, particularly by lifting the armature plate of the armature off the coil of the electromagnet. This causes the armature to assume a position which is independent of the energization state of the coil and in which the holding device does not block the blocking device, i.e., the blocking device is unlocked. Then the holding device is activated. In this process, the holding device is put in the state in which it locks the blocking device in a blocked position. In the closed-circuit current type model of the arresting unit, this is achieved, for

example, by energization of the electromagnetic unit of the holding device. However, since the holding device is still decoupled from the blocking device by the activated decoupling device, the blocking device remains unlocked for the time being. Thereafter, the decoupling device is deactivated, so that the blocking device is blocked in the blocked position by the holding device, which is no longer decoupled. Activation of the holding device for holding the blocking device in the blocked position is then maintained for as long as the door is to be held in its open position. In the closed-circuit current type model, this is achieved, for example, by constant energization of the electromagnetic unit of the holding device. In order to close the door, it is possible to either interrupt activation of the holding device or, in certain embodiments, to manually close the door by pushing and thus overcoming the blocking force applied by the blocking device, i.e., to apply override pushing to the arresting unit.

[0028] Generally, it is possible that the aforesaid functions are stopped with the start of the subsequent step. For example, decoupling of the holding device may end exactly with the start of activation of the holding device, for example with the start of energization in the closed-circuit current type model. However, this requires precise alignment of the arresting unit in the door closing system. Operation and installation of the arresting unit according to the invention are simplified if the individual functions at least partially overlap with respect to the opening movement of the door, for example if decoupling of the holding device through triggering of the decoupling device overlaps with activation of the holding device. Therefore, decoupling of the holding device is not stopped immediately upon activation of the holding device but is firstly maintained within a certain overlap range. The overlap range, or the relation between the individual functional stages, depends on the position of the sliding member in the slide rail, i.e., the opening angle of the door. If the opening movement is performed continuously until the desired opening position is reached, the aforesaid functional stages therefore occur successively in the mentioned order. The same applies for an at least partial overlap of the individual functional stages, which also relates to the continuation of the opening movement of the door until the desired blocking position is reached. However, if the opening operation is interrupted before the blocking position is reached, the door is urged back into the closed position by the door closer.

[0029] The generally position-dependent sequence of the method according to the invention is achieved particularly well if the individual control steps occur depending on the position of a sliding member of a door closer relative to the arresting unit, i.e., depending on the opening angle of the door.

[0030] The operating principle of the invention will be illustrated in more detail below by means of the embodiment shown in the following figures. In the schematic figures,

- Fig. 1 shows a double-leaf door with a door closing system having an arresting unit;
- Fig. 2 is an oblique perspective view of a section of a slide rail in the region of the arresting unit of Fig. 1;
- Fig. 3 is an oblique perspective view of the arresting unit of Fig. 2;
- Figs. 4 to 9 are sectional views through the arresting unit in the slide rail according to Fig. 1 in different operating states along section line I of Fig. 2;
- Fig. 10a is an oblique perspective top view of the inner surface of the sliding member of Figs. 1 to 9;
- Fig. 10b is a sectional side view of the sliding member of Fig. 10a along section line II; and
- Fig. 10c is a sectional side view of the sliding member of Fig. 10a along section line III.

[0031] In the figures, like components are designated by like reference numerals, although designation of recurring components may be omitted in some of the figures.

[0032] Fig.1 illustrates the general structure of a door closing system 1 for a double-leaf door, comprising an inactive leaf 2 and an active leaf 3. Each of the two door leaves 2 and 3 includes a door closer 4 and 5, respectively, applying a door closing force acting in the door closing direction (against the door opening direction a) to the door leaves 2 and 3. To this end, a door closer arm 6 and 7, respectively, guided in a slide rail 8 and having a respective sliding member (not visible in Fig. 1) arranged at its end, is provided between the wall region, or the door frame 9, and the door leaves 2 and 3, respectively. The sliding members are linearly guided in the slide rail 8 located above the door frame 9. If the door leaves 2 and 3 are caused to pivot open in the direction of arrows a for opening the doors, the linearly guided sliding members in the slide rail 8 move away from each other in the direction of arrows b in the slide rail 8 (whereas they move towards each other in the direction of arrows c during closing). The pivot movement of the door leaves is thus translated into a linear displacement movement of the respective sliding members in the slide rail 8. The opening angle of the doors refers to the angle of the

current position of the door leaf relative to the closed position of the door leaf in the pivot plane (i.e., usually the horizontal plane) of the inactive leaf 2 and the active leaf 3, respectively, which is horizontal in Fig. 1. " α " designates the opening angle of the active leaf 3, while " β " designates the opening angle of the inactive leaf 2.

[0033] In the door closing system 1 shown in Fig. 1, a closing sequence control is further provided which ensures that during closing of the two door leaves 2 and 3 the inactive leaf 2 will always reach its closed position before the active leaf 3 does. In this manner, it is ensured that both door leaves close in the correct order with respect to their respectively provided rabbet regions and ensure that the room is sealed as tightly as possible. The closing sequence control is provided particularly for fire protection purposes and ensures that the two door leaves 2 and 3 can close reliably and tightly and prevent smoke from spreading in the case of fire.

[0034] An arresting unit is further associated with each door leaf 2 and 3, which arresting unit is also arranged in the slide rail 8 (not shown in Fig. 1). The arresting unit enables retaining of the inactive leaf 2 and the active leaf 3 in a respective open position in a desired opening angle. Typical opening angles range from 80° to 120° , particularly at 85° to 95° . The approximate position of the arresting unit of the inactive leaf 2 in the slide rail 8 is indicated by the dashed box 10 in Fig. 1. Of course, a further arresting unit may be provided on the side of the active leaf 3.

[0035] Fig. 2 shows an enlarged view of this marked region of the slide rail, viewed from the side opposite the door hinge of the door closing system 1 from obliquely below. The slide rail 8 is shown only as a cut out element which continues in its longitudinal extension to the right and left sides in Fig. 2. Fig. 2 further clarifies the articulation of the door closer arm 7 in the slide rail 8 by means of a sliding member 11 guided in the slide rail 8 so as to be displaceable in the opening direction b and the opposite or closing direction c, respectively. b and c indicate the respective directions of movement of the sliding member when the respective door is opened or closed. With respect to their orientation, b and c do thus not correspond to the opening/closing direction of the door but reflect the translated linear movement. Further, Fig. 2 clarifies that the arresting unit 12 is arranged in the slide rail 8 in such a manner that it can be slid over by the sliding member 11 in the opening direction b and the closing direction c, respectively, of the sliding member 11. The arresting unit 12 is further configured to be longitudinally displaceable in the slide rail 8, so that it can be locked in the slide rail 8 in various positions. It is thus possible to vary the opening angle of the door leaf 2 at which the door is held in the open position by the arresting unit 12. It is further important that the door closer 4 applies a door closing force to the sliding member and accordingly pushes it in the direction of

arrow c. The driving force for the closing operation of the inactive leaf 2 from the open position is thus transmitted via the door closer 4 and its door closer arm 7 to the sliding member 11. The same likewise applies for the active leaf 3.

[0036] Fig. 3 shows the arresting unit 12 of Fig. 2 in a state in which it has been demounted from the slide rail 8, and in particular already clarifies the position of essential elements of the arresting unit 12 relative to each other. Arranged in succession in the door opening direction b, the arresting unit 12 thus comprises a coil 13 of an electromagnetic unit, a pivot lever 45 of a decoupling device, a blocking lever 15 having a blocking stop 16, and a sensor element 17 actuation of which by the sliding member 11 triggers energization of the electromagnetic unit in the present model (closed-circuit current type model). It is essential for the operating principle of the arresting unit 12, which will be described below in more detail, that the elements "pivot lever 45" of the decoupling unit, "blocking lever 15" with blocking stop 16 of the blocking device 20 and "sensor element 17" are arranged in succession in the sliding direction b, that each of them projects into the slide path of the sliding member 11 guided in the slide rail 8, and that they are thus actuated or non-actuated depending on the position of the sliding member 11 relative to the arresting unit 12. In the arresting unit 12, energization of the electromagnetic unit, i.e., the coil 13, is thus controlled in a position-dependent manner, i.e., depending on the position of the sliding member 13 relative to the arresting unit 12. The sensor switch 17 is provided to this end, which in its top region includes a gable-like profile with which it projects into the slide path of the sliding member 11. When the sliding member 11 slides over the arresting unit 12, it actuates, within a certain position range, the sensor element 17 and thereby triggers energization of the coil 13. In the present exemplary embodiment, however, actuation of the sensor element 17 is not effected across the entire region in which the sliding member is guided by underneath the arresting unit 12. Instead, an inclined control face 51, the influence of which on the actuation of the sensor element 17 will be explained in more detail below, is arranged in the slide member 11 for controlling the sensor element 17. The inclined control face 34 (inclined control face for the pivot lever 45), which will be described in more detail below, and the inclined control face 51 (inclined control face for the sensor element 17) extend in the sliding direction b and c, respectively, of the sliding member 11 across its entire length. The two inclined slide faces are further situated next to each other in the sliding direction b-c, so that, when slid over by the sliding member, the sensor element 17 runs solely on the inclined control face 51 and the pivot lever 45 runs solely on the inclined control face 34. The two inclined control faces 34 and 51, the relative profile of which with respect to each other can be taken from the two sectional views according to Figures 10b and 10c and 10a, thus enable the coordinated control sequence of the decoupling device 44, the blocking device

20 and the holding device 21 in the above described manner depending on the position of the sliding member 11 relative to the arresting unit 12.

[0037] The specific operating principle of the arresting unit 12 will be explained in more detail in the following paragraphs. The individual components of the arresting unit 12 are arranged in a housing 18, which on both sides includes the slide rails 19 using which it is possible to longitudinally guide the arresting unit 12 inside the slide rail 8. Suitable fixation means such as clamping screws, which are not shown in the figures, are provided for fixation of the arresting unit 12.

[0038] Figures 4 to 9 concern sectional views through the arresting unit 12 of Figures 2 and 3, wherein the sectional plane I is oriented in the longitudinal direction of the arresting unit 12 and constitutes a vertical section through the installed arresting unit 12 of Figures 1 and 2. Sectional plane I is indicated in Fig. 2 for further clarification.

[0039] The sectional view of Fig. 4 corresponds to the situation as depicted in Figures 2 and 3. In Figures 2, 3 and 4, the active leaf 3 is held open in the desired opening position at an opening angle α of, for example, 90° . Starting with Fig. 4, the essential elements of the arresting unit 12 are hereinafter firstly described.

[0040] In terms of function, the arresting unit can firstly be broken down roughly to a blocking device 20 and a holding device 21. The blocking device 20 firstly comprises a blocking rocker 22 mounted so as to pivot about the bearing axis 28 relative to the housing 18. The blocking rocker 22 is two-armed and includes a pivot limiting arm 24 and a blocking arm 25. A blocking cam 26, via which locking of the blocking rocker 22 is achieved by the holding device 21 in the manner described below, protrudes on the blocking arm 25. Further, the blocking arm 25 has arranged thereon a blocking lever 27, which can pivot about the bearing axis 28 relative to the blocking rocker. The blocking lever 27 enables override pushing of the blocking device 20 in the blocking position through the sliding member 11, so that ultimately the held open door can be closed manually by pushing without the need to unblock the blocking device 20. To this end, the blocking lever 27, which projects with its blocking stop 29 into the slide path of the sliding member 11 and, in the blocked position shown in Fig. 4, prevents it from further sliding in the door closing direction c and thus holds the door open, can pivot about the bearing axis 28 relative to the blocking rocker 22. Towards the interior, the blocking lever has a gable-like design, with its two teeth respectively striking against the guide sleeve 31 in the pivot direction of the blocking lever. In the sectional views of Figures 3 to 9, only the tooth situated in the back in the viewing direction is visible (indicated with dashes).

[0041] One option to close the door held in the opened position by the arresting unit 12 is the so-called override pulling or override pushing of the door. For this, the door is pushed over the arresting unit without releasing the latter and is thus, so to speak, forcibly closed. However, in order to be able to overcome the blocking lever 27 by manually closing the door by pushing, it is necessary that the blocking lever 27 with the blocking stop 29 can pivot out of the slide path of the sliding member 11 towards the arresting unit without the arresting unit being switched to a release position for this. This process is shown in Fig. 5 starting from Fig. 4. For override pulling of the arresting unit 12, the spring force created by a spring load 30 and acting on the blocking stop 29 of the blocking lever 27 must be overcome. To this end, the pressure spring 30 is arranged in the pivot limiting arm 24 of the blocking rocker 22, which pressure spring strikes against a stop arm 32 of the blocking lever 27 via a guide sleeve 31. Thus, the blocking lever 27 is two-armed as well, although in the form of an L-lever. Through application of a closing force (force in door closing direction, i.e., opposite to a) to the door leaf of the active leaf 3 held in the opening position by the arresting unit, the force acting on the blocking stop 29 in the door closing direction c is increased via the door closer 4, the door closer arm 6 and the sliding member 11 until the holding force applied through the spring force of the pressure spring 30 is overcome. The blocking stop 29 can then be pushed to an inward pivot position by the sliding member 11, whereby the pressure spring 30 is compressed. This so-called override pulling of the arresting unit is indicated in Fig. 5. The arrows d reflect the relationships of the movements of the sliding member 11, the blocking lever 27 and the guide sleeve 31 for compressing the pressure spring 30. The sliding member 11 thus pushes the blocking stop 29 of the blocking lever 27 out of the slide path and into the housing 18 of the arresting unit 12. In this process, the lever arm 32 (of the blocking arm 27 in the present case) opposite the blocking lever 27 presses the sleeve 31 against the pressure spring 30, so that the latter is further compressed with continued pivoting of the blocking stop 29 into the interior of the housing. The override pulling of the door shown in Fig. 5 is thus a manual closing operation and not a door closing process enabled through release of the sliding member 11 conveyed via the arresting unit 12.

[0042] Fig. 6 sequentially follows Fig. 5 and shows the positioning of the individual elements of the arresting unit 12 when the blocking stop 33 of the sliding member 11, which engages the blocking stop 29 of the blocking lever 27 when the door is locked in the open position, as shown in more detail for example in Fig. 4 or also in Fig. 2, has slid by. The blocking stop 33 does not extend across the entire length of the sliding member 11 in the door closing direction. Instead, an inclined control face 34 is provided behind the blocking stop 33, which inclined control face is stepped and, in the first flattened region, leaves enough space for the blocking lever 27 to pivot back to its aforesaid starting position of Fig. 4 even though the sliding member

11 has not yet fully slid over it. The reverse pivot movement of the blocking lever 27 occurs due to the spring load of the compressed pressure spring 30 of Fig. 5 and occurs in the direction of arrow e starting from Fig. 5 to Fig. 6. With the positioning of the individual elements relative to each other as shown in Fig. 6, the corresponding door will thus fall into its closed position due to the door closing force applied by the door closer as the sliding member 11 is no longer prevented from continuing the sliding movement in the door closing direction c.

[0043] Another option to close the door locked by the arresting unit 12 according to Fig. 4 is releasing the door by switching the arresting unit 12 from its blocked position in Fig. 4 to a released position as shown in more detail, for example, in Fig. 7. Starting from Fig. 4, Fig. 7 thus shows the position of the individual elements of the arresting unit 12 relative to each other when the holding device 21 is released, for example in the case of an alarm, when a closing of the door is desired. Release specifically occurs through cancellation of the blocking of the blocking device 20 by the holding device 21.

[0044] Essential elements of the holding device 21, besides the coil 13, are an armature 35 guided in the coil so as to be linearly displaceable, a magnet counter-plate 36 arranged on the face-sided end of the armature 35 opposite the blocking device 20, a blocking stop 37 arranged on the opposite side of the armature shaft 35, a blocking lever 39, which is mounted so as to pivot about the bearing axis 38 and has a blocking roller 40 and an armature stop 41. The armature 35 and the coil 13 together form an electromagnetic unit connected to a suitable voltage supply, which is not shown in the figures in more detail, via corresponding lines. The arresting unit 12 according to Figures 1 to 9 is further configured as a so-called closed-circuit current type model. This means that in the energized state the holding device 21 is activated and locks the blocking device 20 in the blocked position shown in Fig. 4 (first operating state). The blocking specifically occurs through extension of the armature 35, so that the blocking stop 37 of the armature 35 strikes against the armature stop 41 of the blocking roller 40 and causes the blocking lever 39 to pivot into the blocked position shown in Fig. 4. In this process, the blocking roller 40 engages behind the blocking cam 26 of the blocking rocker 22, whereby the latter is prevented from pivoting out of the assumed blocked position, i.e., from pivoting out of the slide path of the slider 11. If, however, the power supply of the electromagnetic unit consisting of the coil 13 and the armature 35 is interrupted, for example in the case of an alarm, the armature 35 can move linearly towards the coil and thereby enables the blocking roller 40 to pivot away underneath the blocking cam 26. The blocking rocker 22 is then held in position merely through a relatively weak torsion spring acting thereon, which holding force is considerably exceeded by the door closing force developed by the door closer. Overall, the inward pivot movement of the blocking rocker 22 about its bearing axis 28 together with the

blocking lever 27 out of the slide path of the sliding member 11 is thus released, as indicated by arrows f in Fig. 7. The arrows here indicate the direction of movement of the corresponding elements starting from Fig. 4 toward Fig. 7. As a result of the interrupted energization of the coil 13, the armature 35 is no longer held in its position by the coil 13 and is thus displaceable relative to the coil without significant counteracting force. The holding device 21 is thus de-energized, or deactivated (second operating state). The blocking rocker 22 is thereby unlocked and, as a result, can be caused to pivot out of the slide path by applying a substantially smaller force than necessary for override pulling of the door according to Figures 5 and 6. Since even the door closing force applied by the door closer of the door closing system 1 is sufficient for this, as a result, the door closes automatically.

[0045] If the closing movement is continued in the door closing direction c, the individual elements of the arresting unit 12 likewise assume the positions relative to each other as shown in Fig. 6. In this regard, it is further essential that, due to the spring load applied by the torsion spring 42 (arranged between the housing 18 and the blocking rocker 22 and accommodated in the hole 23; in Fig. 8, 42 designates the approximate position of the torsion spring), the blocking rocker 22 tends to assume its blocked position when unloaded. However, the force created by this spring load is substantially smaller than, for example, the spring force created by the compressed pressure spring 30.

[0046] An essential feature of the arresting unit 12 is the existence of a decoupling device 44 comprising a two-armed pivot lever 45 and a stop disc 46. The stop disc 46 is, in a non-displaceable manner, arranged on the armature in the region of the face side of the armature 35 facing the blocking rocker 22 and thus protrudes outward in the radial direction relative to the longitudinal axis of the armature 35. The pivot lever 45 of the decoupling device 44 is arranged at the housing 18 of the arresting unit so as to pivot about a bearing axis 47, the bearing axis 47 running parallel to the bearing axes 38 and 28. Further, the pivot lever 45 of the decoupling device 44 is likewise two-armed and includes an armature stop 48 on one arm (on the armature arm) and a sliding member stop 49 on the other arm. The armature stop 48 is configured to strike against the stop disc 46 such that continuation of the pivot movement of the pivot lever 45 about its bearing axis 47 results in displacement of the armature 35 relative to the coil 13 at least if pivoting in the door opening direction. The indication "in the door opening direction" here refers to the pivot movement of the pivot lever 45 when being slid over by the slide member 11 during opening of the door. "In the door opening direction" should thus not be understood with respect to spatial orientation but in a functional sense.

[0047] Figures 8 and 9 are to illustrate the operating principle of the decoupling device 44 in more detail. Figures 8 and 9 show a movement of the sliding member 11 occurring during opening and sliding over the arresting unit 12. With respect to the opening sequence, the positions shown in Figures 8, 9 and 4 thus occur successively when the sliding member 11 continues to slide over the arresting unit 12 in the door opening direction b.

[0048] If the sliding member 11 is moved over the arresting unit in the door opening direction b during opening of the door, firstly the pivot lever 45 runs up the inclined control face 34 and pivots inward towards the arresting unit 12 in such a manner that the armature 35 is displaced in the opposite direction (in the direction c). For this, the armature stop 48 of the pivot lever 45 strikes against the stop disc 46 and displaces it together with the armature 35 against the door opening direction b. The stop disc 46 is arranged on the shaft of the armature 35 in a non-displaceable manner. The pivot lever 45 thus overall triggers a deflection of the sliding movement of the sliding member 11 in the door opening direction b to a displacement of the armature 35 in the door closing direction c. The magnet counter-plate 36 is thus lifted off the coil 13, as a comparison of Figures 8 and 9 and 4 illustrates (illustrated by the air gap Δs in Figures 8 and 9, which expands from Fig. 8 to Fig. 9). If the magnet counter-plate 36 directly rests against the coil 13 in the blocked state of the arresting unit 12, it is spaced from the coil 13 by the distance Δs in Figures 8 and 9. As a result, the decoupling device 44 provides that an air gap is temporarily obtained between the magnet counter-plate 36 and the coil 13. It is further important for the effect of the decoupling device 44 that energization of the coil 13 no longer has a retaining effect on the armature 35 in its blocked position due to the obtained air gap Δs . As long as the magnet counter-plate 36 is lifted off the coil 13, a holding force of the armature 35 in its blocked position can no longer be established through energization of the coil 13.

[0049] If the closing operation is continued, the sliding member 11 continues to slide over the arresting unit 12 in the door opening direction b. As a result, after the decoupling device 44 has displaced the armature 35 in such a manner that the magnet counter-plate 36 is lifted off the coil 13 (Fig. 8), the sensor element 17 sliding on a further inclined control face 51 in the sliding member 11 is displaced towards the arresting unit 12 and is thus actuated. Upon reaching the pushed-in state of the sensor element 17 seen in Fig. 9, energization of the coil 13 is thus triggered. In this state, however, the magnet counter-plate 36 is still lifted off the coil 13 by the decoupling device 44, as shown in Fig. 9. In this state, despite energization of the coil 13, the armature 35 is thus not displaced to its holding position displaced to the left, i.e., held in the position lifted off the coil. Therefore, energization of the coil 13 does not influence the position of the armature 35.

[0050] If, starting from Fig. 9, the opening movement of the door is continued further in the door opening direction b to the holding position in Fig. 4, the sliding member 11 slides past the pivot lever 45 of the decoupling device. The pivot lever 45 is thus no longer prevented from pivoting out by the sliding member and pivots back out into the slide path of the sliding member 11 behind the sliding member 11. As a result, the decoupling device 44 releases the armature 35, whereby the latter is displaced to its blocked position as soon as the blocking roller 40 is able to slide beneath the blocking cam 26. This is the case when the sliding member 11 with its blocking stop 33 has slid over the blocking stop 29 and past the blocking lever 27 in the door opening direction b. The blocking lever 27 of the blocking rocker 22 is thus likewise displaced by the inclined control face 34 when being slid over by the sliding member in the door opening direction b. It is not until the sliding member 11 has slid over the blocking rocker 22 far enough for the blocking stop 29 of the blocking lever 27 to be able to engage behind it that the blocking rocker 22 can pivot into its blocked position and thus ultimately release the armature 35 so that it can assume its blocked position. Thus, the holding device 21 can then couple back in so as to block the blocking device 20 and retain the blocking rocker in its blocked position. It is thus ensured that the arresting unit 12 will assume its blocked position not until the sliding member 11 has slid past the blocking stop 29 of the blocking lever 27 far enough. The transitions between decoupling of the armature 35, actuation of the sensor element 17 and subsequent energization of the coil 13, release of the armature 35 through the decoupling device 44 are thus fluent and mutually overlapping, to that overall a harmonic switching operation enabling position-dependent control of the arresting unit is achieved.

[0051] Damping means in connection with the decoupling device 44 are provided only for the two pivot positions of the pivot lever 45. When the pressure pad 11 slides past the pivot lever 45 in the door closing direction c, the inward pivot movement of the pivot lever 45 is damped by a corresponding torsion spring 52. In the opposite direction, as shown in Figures 8 and 9, the pivot lever 45 is damped by a damping arm 53 arranged on the pivot lever 45, which in the inward pivoted state of the pivot lever 45 is pressed towards the pivot lever and thus applies a restoring force to the pivot lever 45 acting towards its position projecting into the slide path of the sliding member 11 as shown, for example, in Fig. 4. Restoration of the pivot lever 45 is thus established by the torsion spring 52 and the damping arm 53 and the pressure spring of the armature 35. The damping spring, or the damping arm 53, thus covers, for example, the restoring region in which the pressure spring of the armature 35 has no effect. The torsion spring 52 thus returns the pivot lever 45 to the starting position in the direction b, and the damping arm 53 (spring element) returns the pivot lever 45 to the starting position in the direction c, when, in a small position range of the sliding member 11 relative to the arresting unit 12, the pressure spring between the disc and the coil housing has no effect for a short

moment. In this small position range, the blocking lever 39 prevents the armature 35 from being displaced in the direction b.

[0052] Finally, according to another essential aspect of the invention, the decoupling device 44 is configured in such a manner that it acts only in one displacement direction of the sliding member 11 relative to the arresting unit 12, i.e., in the door opening direction b, or only in this direction when the sliding member 11 slides over the arresting unit 12 during opening of the door. This is illustrated by a comparison of the situations in Figures 8 and 9 with the positioning of the individual elements indicated in Fig. 6. The effect of the decoupling device 44 during sliding of the sliding member 11 over the arresting unit 12 in the door opening direction b has already been explained above. However, in the door closing direction c, that is when the sliding member is thus released by de-energization or the arresting unit 12 is overcome by override pulling, the pivot lever 45 pivots in the opposite direction into the arresting unit 12 and does not rest against the stop 46 on the armature 35. The decoupling device 44 thus has no effect in this direction.

[0053] Overall, with the configuration of a door closing system according to the figures, position-dependent control of energization of the coil 13, or activation of the blocking device 20, can thus be achieved reliably and safely. Position-dependent in this context specifically means the dependence of the control functions of the arresting unit 12 on the positioning of the sliding member 11 relative to the arresting unit 12. This is achieved particularly through the successive arrangement of the pivot lever 45 and the sensor element 17 in the door opening direction, which are slid over by the sliding member 11 being guided past the arresting unit 12 in the door opening direction b.

P A T E N T K R A V

1. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling med en blokeringsindretning (20) til at holde døren åben, og med en holdeindretning (21), som er udformet på en sådan måde, at den

5 a) i en første driftstilstand fastholder blokeringsindretningen (20) i en blokeringsposition, og

b) i en anden driftstilstand frigiver blokeringsindretningen (20),

hvor låseenheden (12) omfatter en frakoblingsindretning (44), som kan betjenes ved hjælp af et glidestykke (11) af en dørlukker (4, 5), og hvis udløsning frakobler holdeindretningen (21) i forhold til blokeringsindretningen (20), og udløser en fra driftstilstanden af holdeindretningen (21) uafhængig frigivelse af låseindretningen (20),

k e n d e t e g n e t ved, at

frakoblingsindretningen (44) er udformet på en sådan måde, at der ved en åbning af døren (2, 3) først følger en udløsning af frakoblingsindretningen (44), og først derefter en
15 aktivering af blokeringsindretningen (20).

2. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge krav 1,

k e n d e t e g n e t ved, at

frakoblingsindretningen (44) mekanisk frakobler holdeindretningen (21) i forhold til blokeringsindretningen (20).

20 3. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge ét af de foregående krav,

k e n d e t e g n e t ved, at

holdeindretningen (21) omfatter en elektromagnetisk enhed med en spole (13) og et anker (35), og at frakoblingsindretningen (44) er anbragt på en sådan måde, at den til
25 frakobling af holdeindretningen (21) i forhold til blokeringsindretningen (20) virker på ankeret (35) af den elektromagnetiske enhed.

4. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge krav 3,

k e n d e t e g n e t ved, at

der på ankeret (35) er anbragt et anslag (46), mod hvilket et justerelement af frakoblingsindretningen (44) slår.
30

5. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge ét af de foregående krav,

k e n d e t e g n e t ved, at

frakoblingsindretningen (44) omfatter en omledningsindretning, som er udformet på
35 en sådan måde, at glidebevægelsen af et glidestykke (11), der glider hen over låseenheden (12), af en dørlukker (4, 5) omsættes til en modsat rettet bevægelse, navnlig af ankeret (35).

6. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge ét af de foregående krav,

k e n d e t e g n e t ved, at
 frakoblingsindretningen (44) omfatter en svingløftestang (45) med to arme, med et ankeranslag (48) og med et glideestykkeanslag (49).

7. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge ét af de foregående krav,

k e n d e t e g n e t ved, at
 blokeringsindretningen (20) omfatter en blokeringsvippe (22) med en fjederpåvirket blokeringsløftestang (27), som kan ombøjes i forhold til blokeringsvippen (22).

8. Låseenhed (12) til at fastholde en dør (2, 3) i en åben stilling ifølge ét af de foregående krav,

k e n d e t e g n e t ved, at
 den foreligger i hvilestrømsudførelse.

9. Dørlukkesystem (1) med en dør (2, 3), med en dørlukker (4, 5), der omfatter et glideestykke (11) ført i en glideskinne (8), og med en låseenhed (12) ifølge ét af kravene 1 til 8.

10. Dørlukkesystem (1) ifølge krav 9,
 k e n d e t e g n e t ved, at
 glidestykket (11) omfatter to styreskråflader (34, 51), som udstrækker sig i forskydelsesretningen, hvor den ene styreskråflade (51) styrer positioneringen af et aftastningselement (17), over hvilket aktiveringen af holdeindretningen (21) udløses, og den anden styreskråflade (34) styrer frakoblingsindretningen (44).

11. Dørlukkesystem (1) ifølge ét af kravene 9 eller 10,
 k e n d e t e g n e t ved, at
 det er del af et lukkesystem (1) af en to-fløjet dør (2, 3), navnlig en branddør, og er integreret i en lukkesekvensstyring.

12. Fremgangsmåde til drift af en låseenhed (12) i et dørlukkesystem (1) ifølge ét af kravene 9 til 11,

k e n d e t e g n e t ved, at
 ved åbning og fastholdelse af døren (2, 3) afvikles følgende funktioner efter hinanden:

30 a) frakobling af holdeindretningen (21) fra blokeringsindretningen (20) ved hjælp af en udløsning af frakoblingsindretningen (44) ved hjælp af et glideestykke (11) af en dørlukker (4, 5);

b) aktivering af holdeindretningen (21);

c) deaktivering af frakoblingsindretningen (44); og

35 d) opretholdelse af aktiveringen af holdeindretningen (21) til at holde blokeringsindretningen (20) i blokeringspositionen.

13. Fremgangsmåde til drift af en låseenhed (12) ifølge krav 12,

k e n d e t e g n e t ved, at
 trinene a) til d) følger afhængigt af positionen af et glideestykke (11) af en dørlukker

(4, 5) relativt til låseenheden (12).

Fig. 1

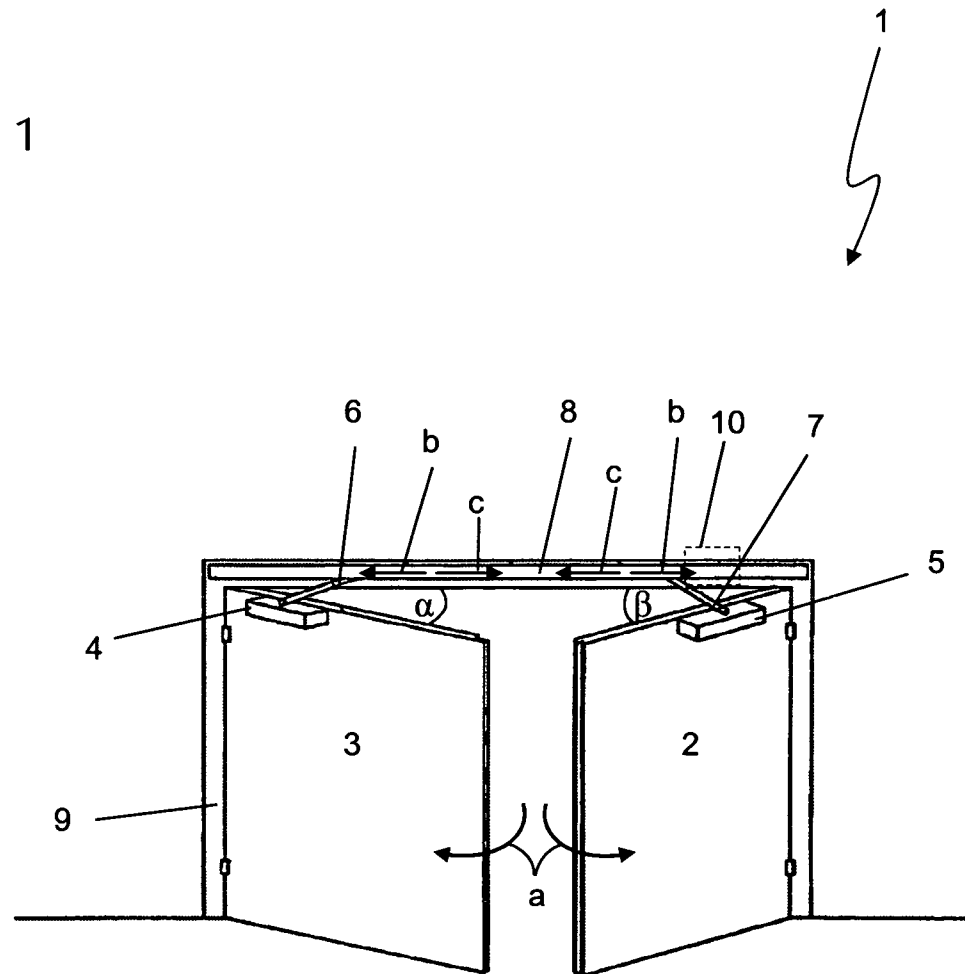


Fig. 2

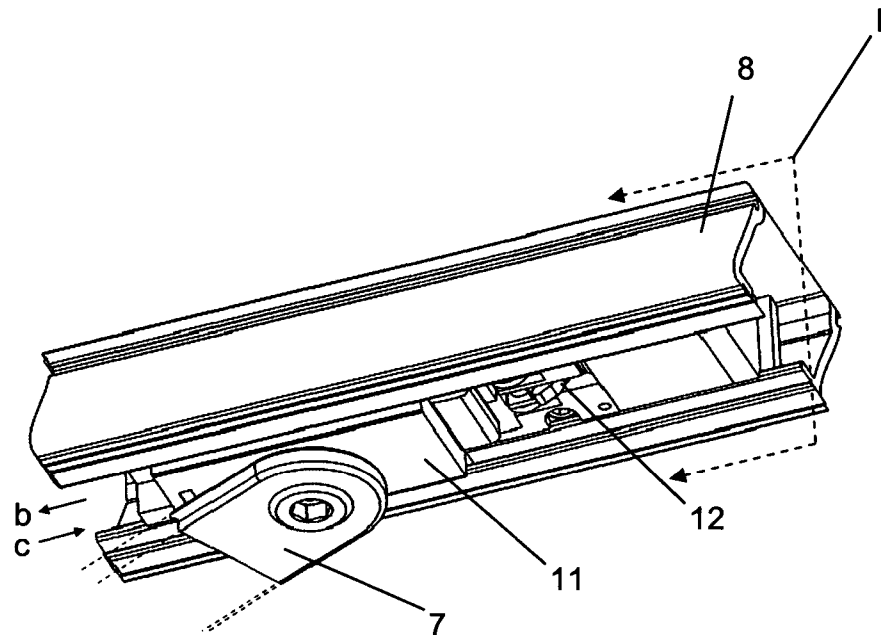


Fig. 3

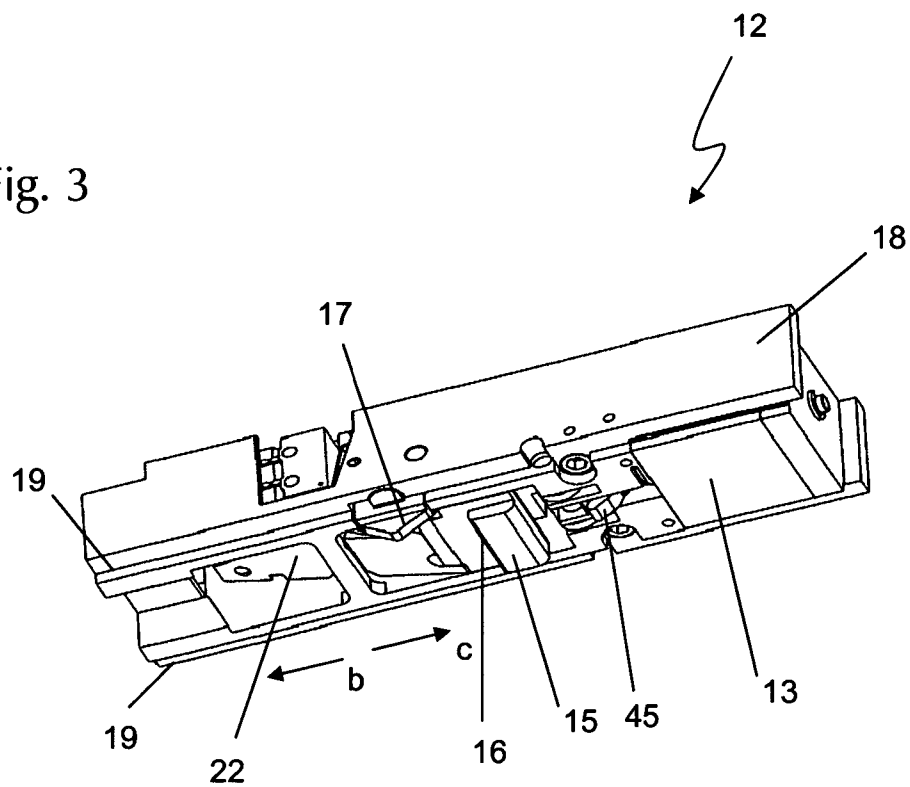


Fig. 4

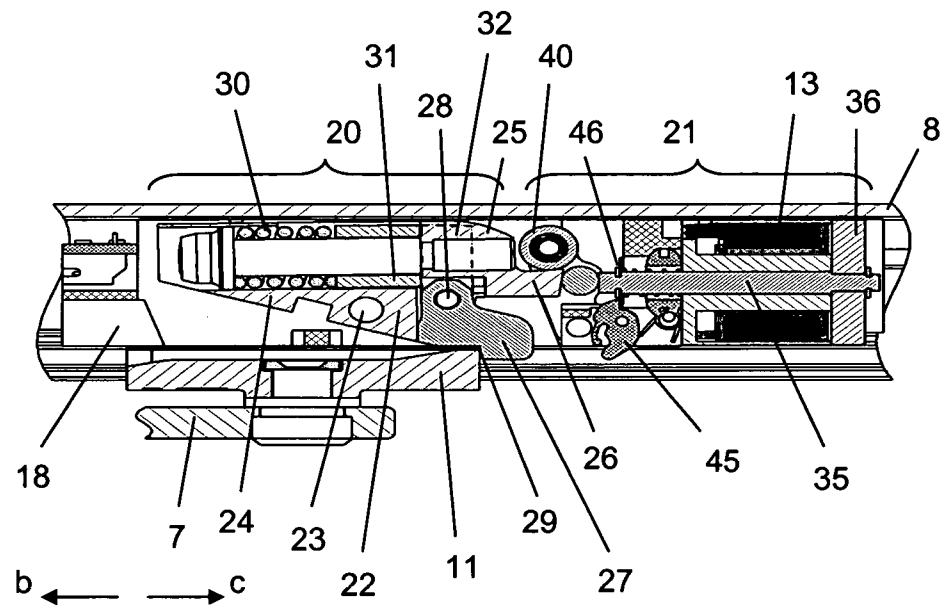


Fig. 5

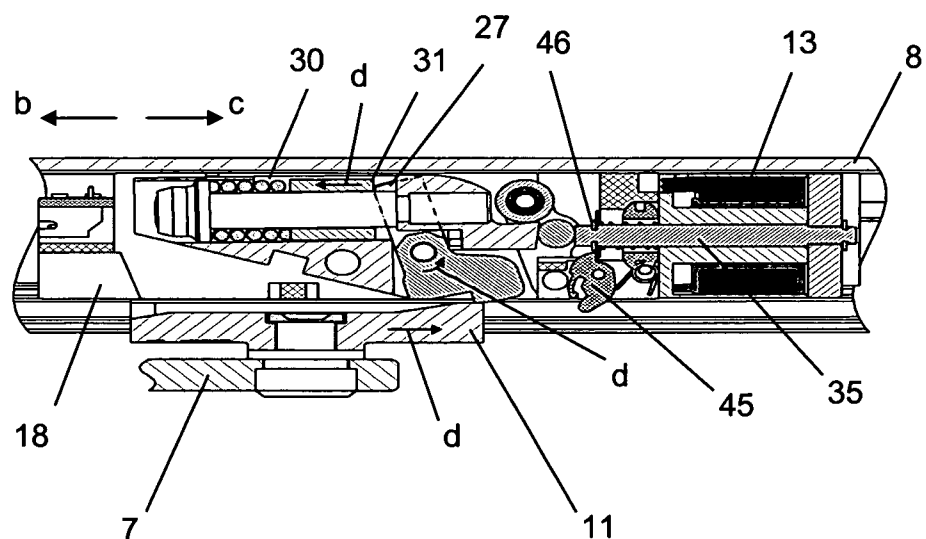


Fig. 6

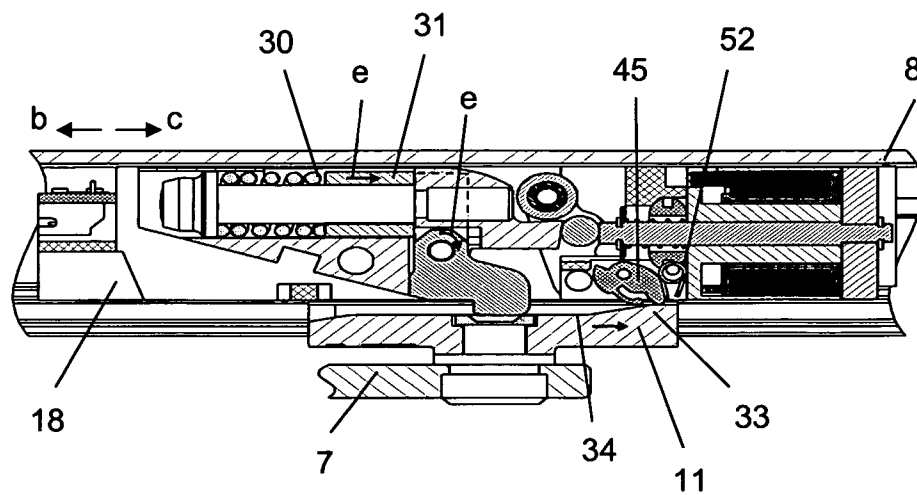


Fig. 7

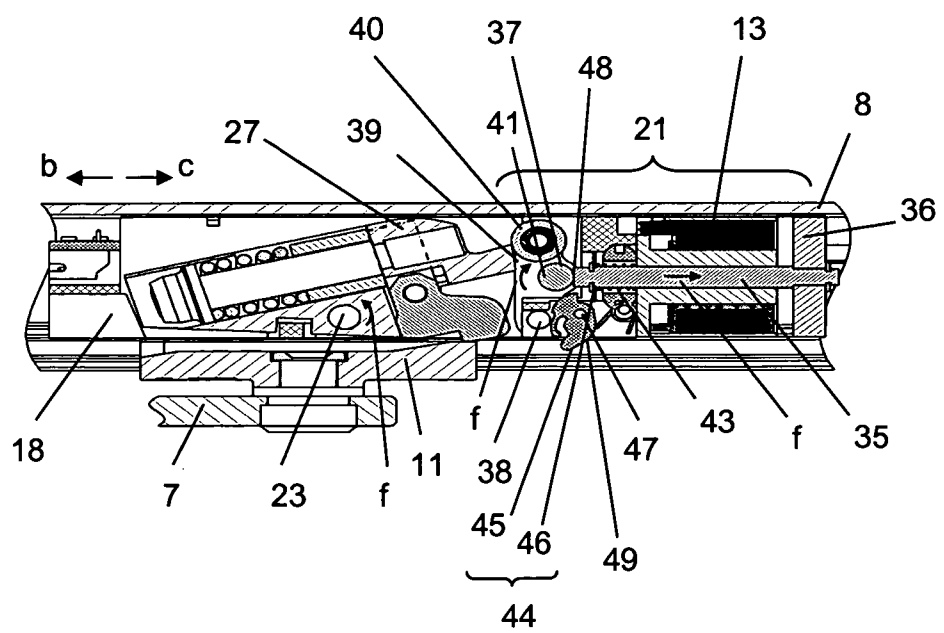


Fig. 8

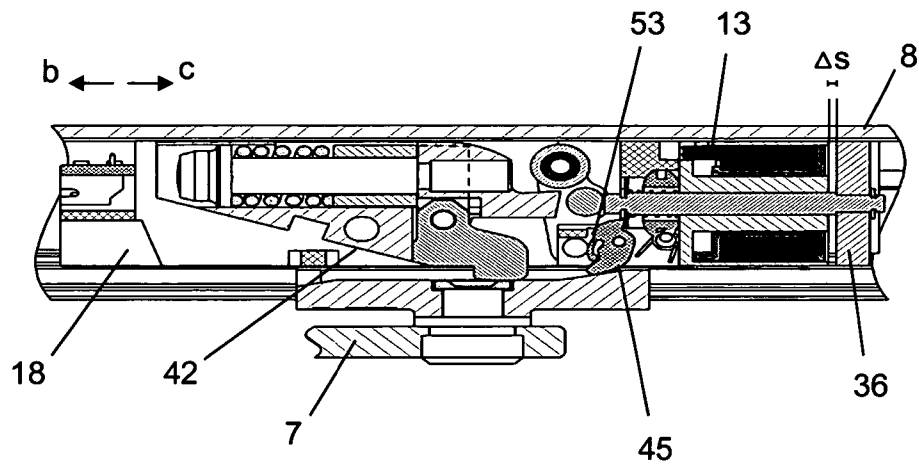


Fig. 9

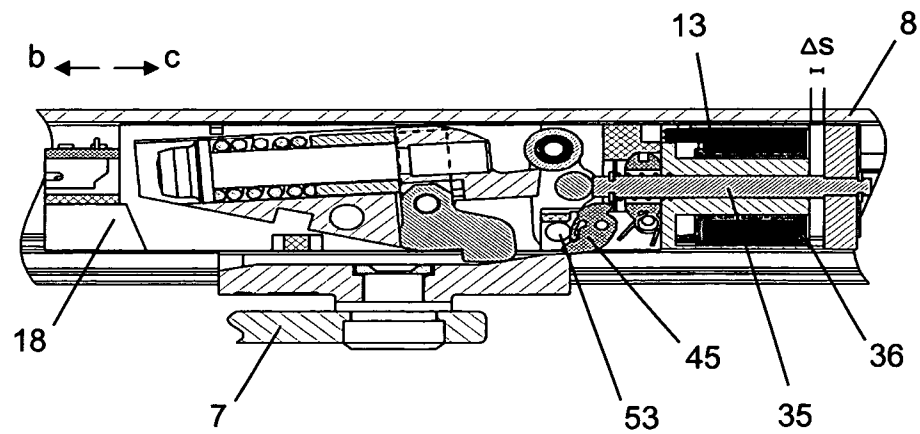


Fig. 10a

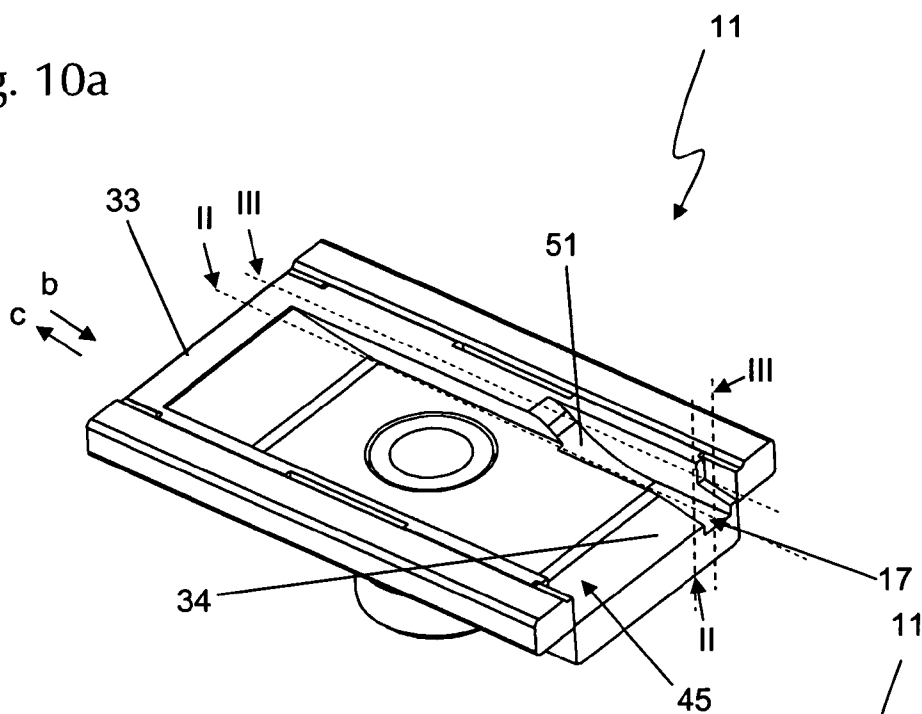


Fig. 10b

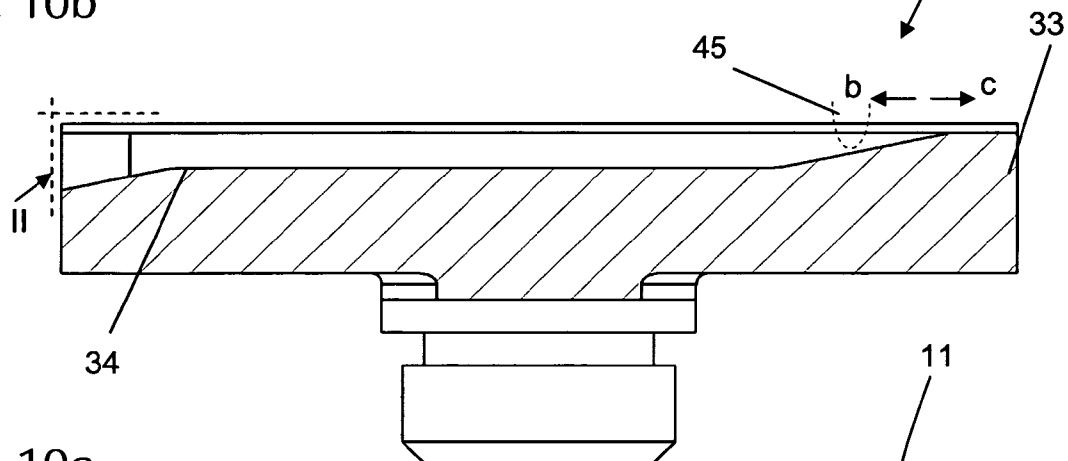


Fig. 10c

