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(54) Roller Shutter

(57) This invention relates to an assembly of a roller shutter (1) and a locking, whereby the roller shutter (1) can be rolled up and down between an open and a closed position, and the locking is provided for locking the roller shutter (1) in the closed position, which locking comprises a bolt (6), which is movable between a locked and an unlocked position, whereby the locking comprises a bolt which is provided to be movable into and out of a perforation (7) provided in the roller shutter (1), by means of a controllable drive mechanism (3), which drive mechanism (3) is connected to means for neutralising an external, unauthorised unlocking force exerted on the bolt (6).

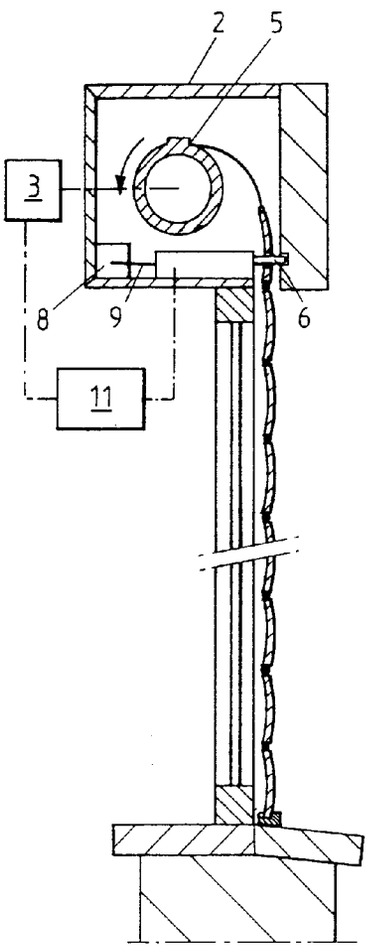


Fig.1

EP 0 866 208 A2

Description

This invention relates to an assembly of a roller shutter and a locking, whereby the roller shutter can be rolled up and down between an open and a closed position, and the locking is provided for locking the roller shutter in the closed position, which locking comprises a bolt that is movable between a locked and an unlocked position.

Such an assembly is used among others for the protection of buildings, and windows and doors of a building, so as to prevent that third parties can gain undesired access through these windows or doors.

In the open position, the roller shutter is for example rolled up around a reel which is rotatable around an axle. The roller shutter may be positioned in an encasement, or not. In the closed position of the roller shutter, the roller shutter is rolled down, and the window or door opening, or other opening is closed off by the roller shutter. Thereby, the bottom of the roller shutter rests for example on the floor, or on a windowsill, or in rails specially provided thereto. As an extra protection, the roller shutter may be provided with an alarm system for producing an alarm signal, if the roller shutter is opened by an unauthorised person, in an irregular way.

The known combination however, has the disadvantage that the roller shutter can be easily sabotaged to force an undesired access through the roller shutter, in spite of the presence of an alarm system. It has namely appeared, that the roller shutter can still be partially lifted from the closed position and pushed into the encasement, without thereby having to roll up the roller shutter. The opening obtained thereby, turns out to be sufficiently large for forcing a passage.

The aim of this invention consists in providing an assembly which allows to prevent such an unauthorised lifting of the roller shutter.

This is achieved according to the invention, in that the locking comprises a bolt that is movable into and out of a perforation provided in the roller shutter. The presence of such a bolt prevents that the roller shutter is moved in the direction of the opening of the roller shutter. Thereby, the bolt is connected to a controllable drive mechanism, which allows the bolt to be moved in an authorised way between the locked and unlocked position. By providing means for neutralising an external, unauthorised unlocking force exerted on the bolt, it is possible to maintain the bolt in the locked position, as long as its movement is caused by an unauthorised unlocking force, and thus not by the drive mechanism. With the assembly of this invention it is not only possible to prevent that the roller shutter can be lifted, but it is also prevented that the bolt can be unlocked from the outside, otherwise than by the drive. Because an external unlocking force exerted by an unauthorised person is always neutralised, a reliable locking of the roller shutter can be obtained.

Such an assembly is suitable for use in combination with both simple, manually controllable roller shutters and electrically controlled roller shutters, which are opened and closed by means of a motor.

According to the invention, various means may be used for neutralising an external unlocking force exerted on the bolt and maintaining the locking in the locked position. This can for example be realised in a mechanical way, or by means of electronic features.

According to a first embodiment of the invention, the drive mechanism comprises a controllable, rotating axle which is connected to means for converting the rotary movement of the axle in a first sense into a moving of the bolt between the unlocked and locked position, and a rotary movement of the axle in a second sense into a moving of the bolt between the locked and unlocked position. Thereby, the means for neutralising the external unlocking force comprise means for increasing the couple for driving the bolt, which means are positioned between the axle and the bolt. With a sufficiently large couple, it is namely impossible to induce the rotation of the axle by a translational force exerted on the bolt.

According to a second possible embodiment of the invention, the locking comprises a control unit connected to the drive mechanism, for generating a control signal for the movement of the bolt between the locked and unlocked position. The locking also comprises a motion detector connected to the control unit, for detecting an unlocking force exerted on the bolt, which is aimed at moving the bolt from the locked to the unlocked position. When the motion detector detects that an unlocking force is exerted on the bolt, a corresponding signal is given off by the motion detector to the control unit. The control unit verifies whether the unlocking force was initiated by itself. If the unlocking force was initiated by the control unit, a corresponding first signal is given off by the control unit to the motion detector for neutralising the motion detector and unlocking the locking. If the unlocking force was not initiated by the control unit, the locking is maintained in the locked position by the control unit.

Because the bolt can only be moved to the unlocked position following a command by the control unit, and because an external unlocking force exerted by an unauthorised person is always neutralised, a reliable locking of the roller shutter can be obtained. Such a locking cannot be forcibly unlocked from the outside.

According to a first preferred embodiment, the control unit comprises a pulse generator for pulse-wise moving the bolt to the locked position, if the unlocking force originates from an external, unauthorised force. In that case, the bolt is repeatedly moved by the control unit to the locked position, with a pre-determined frequency. The roller shutter can thus be maintained in the locked position, until it is unlocked in the regular way, by operation through the control unit.

According to a second possible embodiment, the bolt is driven by a motor connected to the control unit, preferably a rotary engine, and the motor is connected

to means for increasing the couple for driving the bolt. Thereby, the motor is positioned in such a way, that a controllable axle is located between the motor and the means for increasing the couple for driving the bolt. In that case, the controllable axle may be used for the manual unlocking of the locking, for example upon failure of the rotary engine or the control unit.

The rotary engine for driving the bolt is preferably provided with a force-sensitive circuit for switching off the rotary engine upon attaining the locked and/or unlocked position by the bolt.

This allows to automatically stop the driving of the bolt, when the bolt has attained its locked end position or the unlocked position. The force-sensitive circuit ensures that the bolt is no longer driven if the bolt, in order to be even further movable, has to overcome a resistance, which is larger than a pre-determined resistance. The force-sensitive circuit can also ensure that the bolt is movable over a pre-determined distance, from the unlocked to the locked position, and from the locked to the unlocked position. The locked position may for example correspond with the contacting of the bolt with the encasement, or a previously installed obstacle. The presence of the force-sensitive circuit also allows to automatically stop the driving of the bolt, when the movement of the bolt is opposed by an unexpected obstacle. In this way, it is possible to prevent that damage is caused to the drive mechanism of the bolt and/or the assembly.

According to the invention, the assembly preferably comprises a motor connected to the control unit, to facilitate the rolling up and down of the roller shutter. Thereby, the motor is preferably provided with an end connection for detecting the closed position of the roller shutter. The end connection for example detects whether or not current is consumed by the motor. The cessation of the current consumption by the motor corresponds with attaining the closed position by the roller shutter. If such an end connection detects that there is no longer current consumption by the engine, a corresponding signal is produced by the control unit for moving the bolt to the locked position. These measures allow to prevent that the bolt be moved to the locked position, without the roller shutter being in the closed position, as a result of which the roller shutter would thus not be locked. Such an end connection is also capable of ensuring that the motor is automatically switched off upon attaining the closed position of the roller shutter.

The motor is preferably only actuated for rolling up the roller shutter, if the control unit has received a signal that the bolt is situated in the unlocked position. This provides an extra protection, which allows to prevent the motor from being overheated upon a failure of the locking. In that way, it is for example possible to prevent that the motor is switched on for rolling up the roller shutter, while this rolling up movement is opposed, because the roller shutter is still locked.

Thereby, the locking preferably comprises a bolt which is provided for being movable into and out of a perforation provided in the roller shutter, in a direction perpendicular to the up and down rolling movement of the roller shutter. Both new and already existing roller shutters can be provided with such a perforation. A locking which acts in a direction more or less perpendicular to the motion direction of the roller shutter, is moreover efficient. The force required for forcing a movement of the roller shutter is namely the largest in the direction perpendicular to the locking force.

The bolt and the perforation are preferably located in the encasement of the roller shutter, so that they are not accessible from the outside. Such a positioning of the locking also allows to prevent that the roller shutter is piled up or double folded in the encasement, so as to force a passage at the bottom of the roller shutter.

The control unit preferably comprises a microprocessor, with an entry for receiving signals originating for example from a device for operating the roller shutter, the motor for rolling up and down the roller shutter, the bolt and the drive mechanism of the bolt. The entry is preferably connected to an optical coupling element, so that the operation can proceed with optically separate contacts, so as to prevent a negative influence of interference and voltage disturbances on the operation of the control unit.

The control unit may further be connected to an alarm device for producing an alarm signal, in case the locking is unlocked in an unauthorised way.

The invention is further illustrated in the attached figures and figure description.

Figure 1 shows a roller shutter according to the invention, in the closed position.

Figures 2 and 3 show a view on the locking in locked and unlocked position respectively.

Figure 4 shows a roller shutter with a perforation to receive the bolt.

Figure 5 shows a detail of a possible drive mechanism of the bolt.

In the embodiment of the invention shown in figure 1, the roller shutter is lodged in an encasement 2. The roller shutter 1 can be rolled around a reel 5, which can be rotated around an axle. The roller shutter 1 can be manually rolled up or by means of a motor 3. The motor 3 is preferably provided with an end connection, for automatically switching off the motor 3 upon attaining the closed position by the roller shutter 1. The end connection preferably also allows that the motor 3 is automatically switched off upon attaining the rolled up position by the roller shutter 1. Instead of an end connection, a simple end switch may also be used.

The roller shutter 1 may be a roller shutter comprising a plurality of parallel running laths 4 which engage each other sideways. The roller shutter 1 may for example be made of wood, plastic material or metal. The roller shutter may also be a metal stern framing which can be rolled up.

The roller shutter 1 can be unlocked and locked by

means of a locking. The locking shown in figure 1 comprises a bolt 6, that is movable between the locked and unlocked position. The locked position is shown in figure 2, the unlocked position is shown in figure 3.

The bolt 6 is preferably connected to a drive mechanism 8 for moving the bolt 6 between the locked and unlocked position.

Thereto, the bolt 6 is for example connected to the drive mechanism 8, for example by means of a cable 9. The drive mechanism 8 is for example a motor, for example a rotary engine. If he bolt 6 is driven by a rotary engine, the engine 8 is provided with a rotating axle 16. Between the axle 16 of the engine 8 and the bolt 6, preferably means are provided for converting the rotary movement of the axle 16 of the engine 8 to a translationalal movement of the bolt 6.

The means for driving the movement of the bolt 6 may also be mechanical. In that case, the drive mechanism for operating the movement of the bolt 6 comprises for example a rotating axle 12, which is controllable (13). The drive mechanism may also comprise an engine 8, for example a rotary engine 8, which is connected to an axle 16. In both cases, the drive mechanism is connected to means 14, 15 for converting the rotary movement of the engine 8 and the axle 16 into a translational movement of the bolt 6. In both cases, the axle 16 is connected to means for increasing the couple for driving the bolt 6. These means for increasing the couple may for example comprise a rotating spindle 15 driven by the rotary engine 8 or the axle 16, and a jacket 14 which is positioned around the spindle. The spindle 15 and jacket 14 are provided with complementary, mating surfaces, for example a rough screw-thread, so that upon rotation of the spindle 15, the jacket 14 is moved in longitudinal direction over the spindle 15. The jacket 14 is for example connected to the bolt 6. By rotation of the spindle 15 in a first sense, the jacket 14 is moved in a first direction which corresponds to the movement of the bolt 6 to the locked position (figure 2). By rotation of the spindle 15 in opposite sense, the jacket 14 is moved in opposite direction, which corresponds to a movement of the bolt 6 to the unlocked position (figure 3). According to the invention, the mechanical reversal of this may also be applied. If the couple is sufficiently large, it becomes impossible to force the bolt 6 out of the locked position, by means of an external translational force exerted on the bolt 6, which does not originate from the axle 16 or engine 8.

As is shown in figure 5, preferably also means 12, 13 are provided for the manual unlocking of the bolt 6. These means 12, 13 are controllable from the outside, and comprise a rotating axle 12 which is mounted between the rotary engine 8 and the bolt 6, and is manually operable. The axle 12 is for example a bobbin, which can be rotated in two directions, by means of a rope 13 engaging the bobbin. By the rotation of the bobbin 12 in a first direction, the bolt 6 is locked. By the rotation of the bobbin 12 in the other direction, the bolt 6 is unlocked.

The bolt 6 preferably co-operates with a perforation 7 made in the roller shutter. The bolt 6 is movable into and out of the perforation 7. The bolt 6 is preferably movable between the locked and the unlocked position in a direction which is more or less perpendicular to the rolling up and down motion direction of the roller shutter 1. This mostly corresponds with the plane of the roller shutter 1. According to the invention, also two or more of such bolts 6, two or more bolts 6 and two or more openings 7 co-operating with these bolts 6 may be provided.

Other embodiments of the locking are also possible. If the roller shutter 1 comprises hollow laths, it is for example possible to install the locking at the sides of the roller shutter, and to provide a bolt 6 that is movable into and out of the hollow laths, or an opening made therein. In that case, the bolt 6 is movable in a direction perpendicular to the motion direction of the roller shutter, and parallel with the plane of the roller shutter 1. It is further possible to provide, for example in the guiding of the roller shutter, and in the part of the roller shutter which is in the guiding, for example magnetic contacts for the locking of the roller shutter, or to mount the bolt 6 on the guiding of the roller shutter 1.

The locking and particularly the bolt 6 are preferably situated in the encasement 2. The perforation 7 is preferably made in that part of the roller shutter 1, which in the closed position of the roller shutter is situated in the encasement 2. Also the drive mechanism 8 and cable 9 are preferably situated in the encasement 2. In this way, it is possible to prevent the locking from being controllable in an irregular way from the outside, by an unauthorised person. As is shown in figure 1, such a locking is capable of preventing a movement of the roller shutter 1 towards the encasement 2. A movement towards the encasement may comprise both a rolling up movement of the roller shutter 1 and a forced piling up or folding of the roller shutter 1 in the encasement 2, as a result of the lifting of the bottom of the roller shutter 1.

The drive mechanism 8 preferably also comprises a force-sensitive circuit for switching off the drive mechanism 8 upon attaining the locked position by the bolt 6. This allows to automatically stop the drive mechanism 8 of the bolt 6 when the bolt has attained its locked end position. The force-sensitive circuit may also ensure that the bolt 6 is movable over a pre-determined distance, from the unlocked to the locked position, and vice versa. The locked position may for example correspond with the contacting of the bolt 6 with the encasement 2, or a previously installed obstacle. The force-sensitive circuit also allows to automatically stop the operation of the bolt 6 when the movement of the bolt 6 is opposed by an unexpected obstacle. In this way, it is possible to prevent that damage is caused to the assembly.

The motion detector 10 may be part of the drive mechanism 8.

The combination shown in figure also comprises a control unit 11. The control unit 11 is connected to the

drive mechanism 8. The control unit 11 is provided for generating a control signal to operate the drive mechanism 8 for moving the bolt 6 between the locked (figure 2) and the unlocked position (figure 3). The bolt 6 preferably co-operates with a motion detector 10 connected to the control unit, for detecting an unlocking force exerted on the bolt 6. The control unit 11 may be directly connected to the motion detector, or for example through the drive mechanism 8. The control unit 11 is preferably also provided to operate the motor 3 for rolling up and down the roller shutter 1. The control unit 11 is preferably provided with a microprocessor with an entry to receive the signals originating for example from the motor 3 of the roller shutter 1, the drive mechanism 8 of the bolt 6, the motion detector 10, and an exit to give off signals thereto.

The microprocessor preferably has an entry which is connected to an optical coupling element, for detecting signals originating from the motor 3 and the drive mechanism 8 and/or the motion detector 10. By the use of optical coupling elements, the operation proceeds with optically separate contacts, and it is possible to prevent the control from being deranged by interference and voltage disturbances. The microprocessor preferably has an exit connected to an amplifier, for amplifying the signal originating from the microprocessor for actuating the motor 3 and the drive mechanism 8.

The motion detector 10 is provided for giving off a signal to the control unit 11, if an unlocking force is exerted on the bolt 6. The control unit 11 verifies whether the unlocking force was initiated by itself. If that is the case, the motion detector 10 is neutralised, and the drive mechanism 8 of the bolt 6 is operated by the control unit 11 for moving the bolt 6 to the unlocked position. If the control unit 11 finds that the unlocking force exerted on the bolt 6 is not originating from itself, the bolt 6 is maintained in the locked position, by the means provided thereto. These may be both mechanical and electronically controlled means.

These means may for example comprise a pulse generator for the pulse-wise operation of the drive mechanism 8, and pulse-wise moving of the bolt 6 to the locked position.

The control unit 11 may also be connected to an alarm device for producing an alarm signal, for example a sound signal, if the bolt 6 is moved from the locked position, otherwise than by the drive mechanism 8.

The control unit 11 is preferably connected to an end connection provided in the motor 3 of the roller shutter 1, for detecting the presence or absence of voltage and a current drop over the motor 3. The simultaneous presence of voltage and current drop over the motor indicates that the control of the roller shutter 1 is in the switched-on position, and that the motor 3 is not running. The absence of a current drop indicates that the control is in the switched-on position and the motor 3 is running to roll up or down the roller shutter 1. The presence of such an end connection also allows to automatically stop the motor 3 upon attaining the open or closed position by the roller shutter.

The control unit 11 is preferably provided with or connected to a control to close or open the roller shutter 1.

To roll down the roller shutter 1 from the open to the closed position, the control is brought into the corresponding position. The control unit 11 gives off a corresponding signal for starting the motor 3 for the lowering of the roller shutter 1. Upon attaining the closed position by the roller shutter, the motor 3 is automatically stopped. The end connection detects that the motor 3 is not consuming current, and gives a corresponding signal to the control unit 11. The drive mechanism 8 is actuated by the control unit 11, for moving the bolt 6 in the direction of the perforation 7, to the locked position. The motion detector 10 detects the movement of the bolt 6 and gives a corresponding signal to the control unit 11. The control unit 11 verifies whether the movement of the bolt 6 was initiated by itself. The attaining of the locked position by the bolt 6 is detected by the force-sensitive circuit. The drive mechanism 8 is switched off. Corresponding information is sent to the control unit 11.

To open the roller shutter 1 from the locked position, the control is put in the corresponding position. The control unit 11 gives a corresponding signal which is sent to the drive mechanism 8, for moving the bolt 6 from the perforation 7, to the unlocked position. The motion detector 10 detects the movement of the bolt 6 and sends a corresponding signal to the control unit 11. The control unit verifies whether this signal was initiated by itself. By rotation of the axle 16, the jacket 14 is moved in longitudinal direction over the spindle, which involves a simultaneous moving of the bolt 6 over the spindle 15. The force-sensitive circuit detects the attaining of the unlocked position by the bolt 6, the drive mechanism 8 is switched off. The control unit 11 receives a signal from the drive mechanism 8 or the force-sensitive circuit that the bolt 6 is in the unlocked position. The control unit 11 gives a corresponding signal to the motor 3 to start the rolling up of the roller shutter 1. Upon attaining the rolled up position, the motor 3 is automatically switched off. This information is sent to the control unit 11.

If the control is switched off during the rolling up or lowering of the roller shutter, the control unit ensures that the motor 3 is switched off. The roller shutter 1 is in a partially rolled down position. Since the control unit 11 did not receive a signal from the end connection of the motor 3 that the roller shutter is completely lowered, no signal is sent by the control unit 11 to the drive mechanism 8. The bolt 6 is not operated to move.

If the bolt 6 is in the locked position, and the bolt 6 is moved from the perforation 7 by an external unlocking force, the movement of the bolt 6 is detected by the motion detector 10. The motion detector 10 sends a corresponding signal to the control unit 11. The control unit 11 finds that the movement of the bolt 6 was not initiated by itself. In case a pulse generator is provided, it is ac-

tivated to move the bolt 6 in a pulsed way in the direction of the perforation 7. Simultaneously, an alarm system is activated. In case the drive mechanism 8 comprises a rotary engine as described above, the rotary engine is not operated to move the bolt. Even if the drive comprises an axle 16 which can be manually rotated as described above, the bolt 6 cannot be moved and thus cannot be unlocked because the couple of the axle is sufficiently large.

Instead of an end connection, the simpler embodiment of an end switch can also be used.

The combination of this invention is preferably also provided with a detector for detectinh a lifting of the roller shutter. Thereby, the detector may be connected to an alarm device for producing a corresponding alarm signal.

According to the invention, the control unit 11 can also be provided for the simultaneous or separate operation of several roller shutters 1 and lockings 6, 7, 8.

The embodiment of the locking shown in figure 5 is also completely manually controllable. The engine 8 can be simply omitted. In that case, the movement of the bolt is driven by manually rotating the unit 12 by means of the rope 13. If the unit 12 is rotated in a first sense, the jacket 14 is moved in a first sense, which corresponds with the locking of the bolt 6. If the unit 12 is rotated in the reverse sense, the jacket 14 is moved in a second direction so that the bolt 6 is unlocked. Such an embodiment is completely manually controllable, without the intervention of the above mentioned control unit 11 or drive mechanism 8 being necessary, and can be used in combination with the above described roller shutter.

Claims

1. Assembly of a roller shutter and a locking, whereby the roller shutter can be rolled up and down between an open and a closed position, and the locking is provided for locking the roller shutter in the closed position, which locking comprises a bolt, which is movable between a locked and an unlocked position, characterised in that said locking comprises a bolt which is provided to be movable into and out of a perforation provided in the roller shutter, by means of a controllable drive mechanism, which drive mechanism is provided for exerting an authorised force to the bolt, for moving the bolt between the locked and unlocked position, which drive mechanism is connected to means for neutralising an external, unauthorised unlocking force exerted on the bolt.

2. Assembly according to claim 1, characterised in that said drive comprises a controllable rotating axle, and means for converting a rotary movement of the axle in a first sense into a moving of the bolt from the unlocked to the locked position, and a rotary movement of the axle in a second sense into a moving of the bolt from the locked to the unlocked position, and in that the means for neutralising an external unlocking force comprise means positioned between the axle and the bolt for increasing the couple for driving the bolt.

3. Assembly according to claim 1 or 2, characterised in that said drive is connected to a control unit for generating a control signal for driving the movement of the bolt between the locked and the unlocked position, and a motion detector connected to the control unit for the detection of an unlocking force exerted on the bolt, which control unit is provided for neutralising the motion detector and for unlocking the locking if the movement of the bolt is controlled by the control unit, which control unit is provided for neutralising the unlocking force if the movement of the bolt is not actuated by the control unit.

4. Assembly according to claim 3, characterised in that the means for neutralising the external unlocking force comprise a pulse generator connected to the control unit for pulse-wise moving the bolt to the locked position.

5. Assembly according to any one of claims 1 to 4, characterised in that the drive mechanism comprises a rotary engine for driving the movement of the bolt between the locked and the unlocked position.

6. Assembly according to claim 5, characterised in that the rotary engine is provided with a force-sensitive circuit for switching off the rotary engine upon attaining the locked or the unlocked position by the bolt.

7. Assembly according to any one of claims 3 to 6, characterised in that the combination comprises a motor which is connected to the control unit for the rolling up and down of the roller shutter, which motor is provided with an end connection for detecting the closed position of the roller shutter, and for giving off a corresponding signal to the control unit, which control unit is provided for actuating the bolt to move from the unlocked to the locked position, provided the roller shutter is in the closed position.

8. Assembly according to claim 7, characterised in that the rotary engine, the motion detector and/or the force-sensitive circuit are provided for giving off a signal to the control unit upon attaining the unlocked position by the bolt, and in that the control unit is provided for giving off a subsequent signal to the engine for rolling up the roller shutter.

9. Assembly according to any one of claims 1 to 8, characterised in that the roller shutter is situated in

an encasement, and the perforation is located in that part of the roller shutter which in the lowered position of the roller shutter is situated in the encasement.

10. Assembly according to any one of claims 1 to 9, characterised in that the locking comprises a bolt which is provided to be movable into and out of a perforation provided in the roller shutter, in a direction perpendicular to the up and down rolling motion direction of the roller shutter.

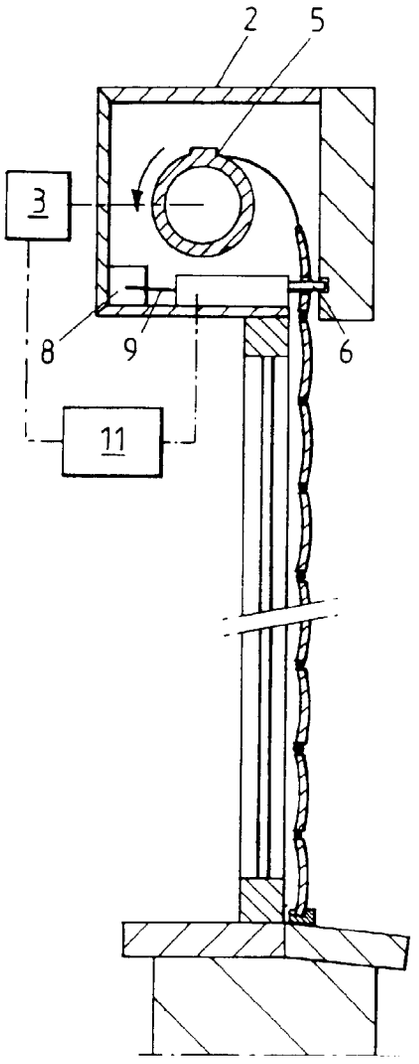


Fig.1

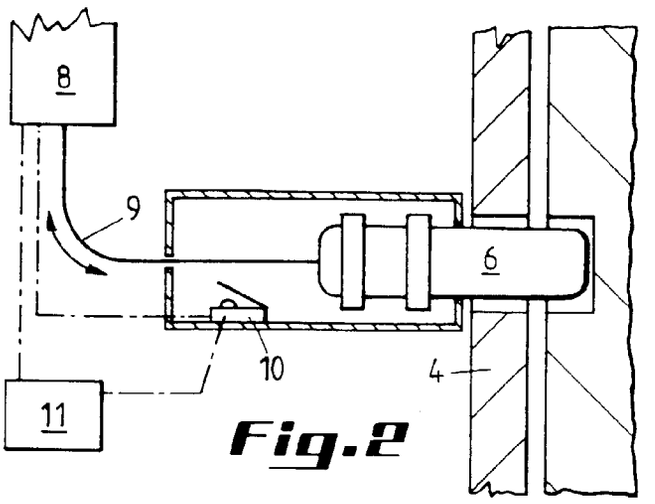


Fig.2

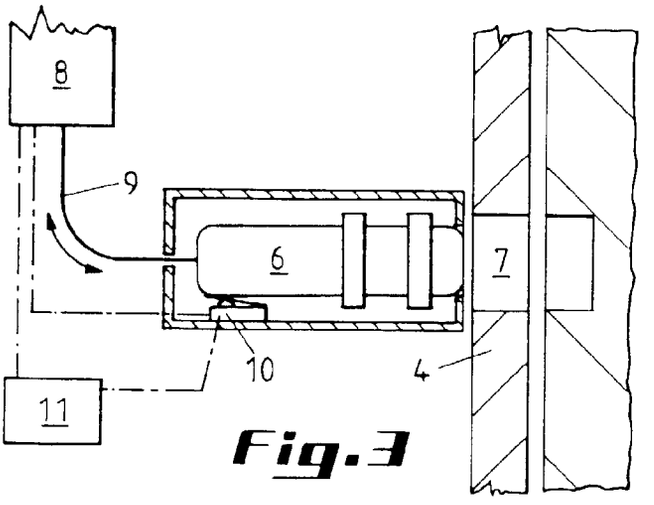


Fig.3

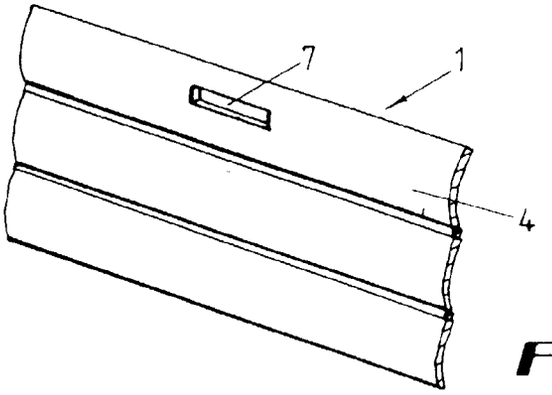


Fig.4

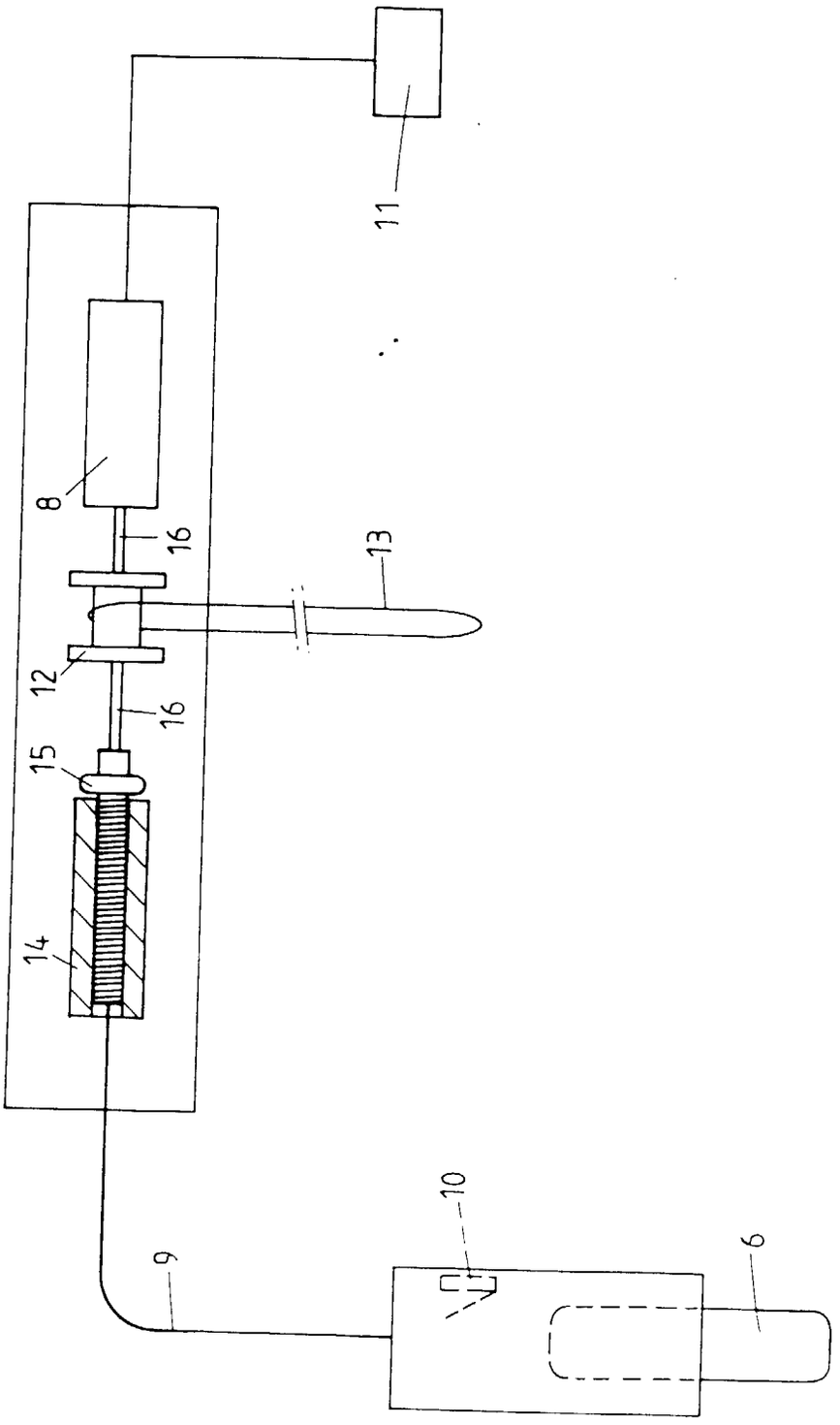


Fig.5