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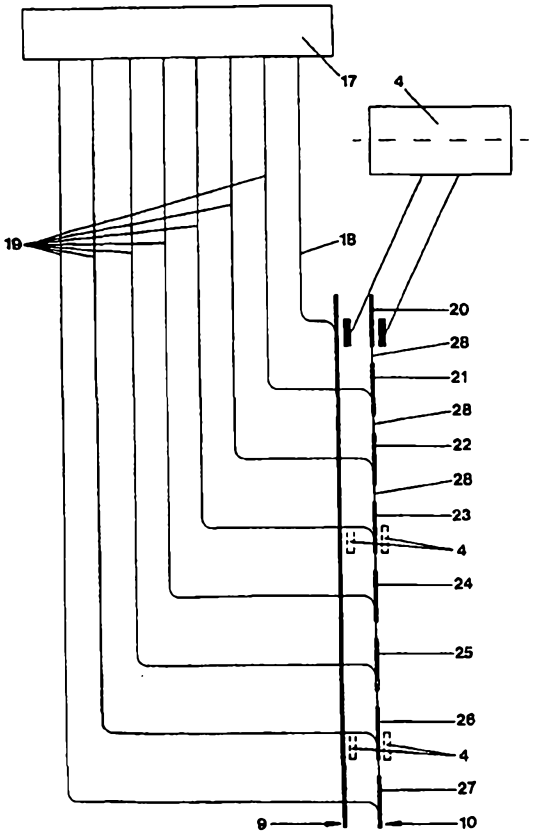
(54) Title: SLIDING WALL

(54) Bezeichnung: SCHIEBEWAND

(57) Abstract

The sliding wall has a plurality of traveling sliding wall elements placed on a horizontal rail (2). Each sliding wall element has its own electric motor (4). Each electric motor (4) has a current collector which passes along two fixed conductor rails (9, 10) which are part of the electrical circuit when the electric motor (4) is moved. These rails are connected via lines (18, 19) to a control unit (17) which controls the power supply and the operation. The first conductor rail (9) is provided with a line (18). On the other hand, the second conductor rail (10) has a plurality of lines (19) which lead to taps (20-27) which are isolated from one another by insulators (28), so that the control unit (17) can feed individually each tap (20-27) with current. This makes it possible to individually control and position the individual sliding wall elements.



(57) Zusammenfassung

Die Schiebewand weist eine Mehrzahl von an einer waagerecht anzuordnenden Führungsschiene (2) gelagerten und verfahrbaren Schiebewandelementen auf. Jedes Schiebewandelement besitzt einen eigenen Elektromotor (4). Jeder Elektromotor (4) ist mit einer Stromabnahmeeinrichtung versehen, die beim Verfahren des Elektromotors (4) entlang von zwei feststehenden zum Stromkreis gehörenden Stromschienen (9, 10) streift. Diese sind über Leitungen (18, 19) mit einer die Stromzufuhr und den Betriebsablauf kontrollierenden Steuerung (17) verbunden. Die erste Stromschiene (9) ist mit einer Leitung (18) versehen. Die zweite Stromschiene (10) weist dagegen eine Mehrzahl von Leitungen (19) auf, die zu einzelnen durch Isolationsstücke (28) gegeneinander isolierten Abgriffen (20-27) führen, so daß über die Steuerung (17) jeder Abgriff (20-27) einzeln bestrombar ist. Hierdurch ist eine individuelle Ansteuerung und Positionierung der einzelnen Scheibewandelemente möglich.

SLIDING WALL

Description

The present invention is directed to a sliding wall with motor drive in accordance with the preamble of Claim 1, which sliding wall has at least one travelling sliding wall element supported by means of at least one fixed horizontal rail.

Such sliding walls can be used for a variety of purposes. In such a sliding wall, in the region of the rail, there can be provided a rotary driving chain by means of which, on actuation of the drive, the individual sliding wall elements are carried along in the one or the other direction. Depending on the particular use, the individual sliding wall elements can consist of a closed panel, for instance wood or metal or of a translucent pane, for instance made of glass. By means of such a sliding wall, a large space can be subdivided. Such sliding walls also permit individual shop premises in shopping centres or shopping arcades to be closed off from the passage areas. For instance in the latter case, the sliding wall must be operated two or four times a day at the opening and closing of business respectively. Often it is required for a space to be subdivided only partially, so that only half of the sliding wall is required to be closed. In cases where there is only one single sliding wall normally displaceable and closable only towards one side, and where further subdivision of a space is desired, such as a temporary arrangement of sliding wall elements on both sides of a room, the respective sliding wall elements have to be labouriously uncoupled by hand and pushed into the desired position manually.

A sliding door consisting of several panels, where the individual panels travel by means of rollers on a double rail system in form of a rail is described in DE 40 15 870 A1. In this case, the individual panels form one front when the sliding door is in the closed position. To open the front, the panels are displaced manually via curved rail sections into a so-called parking position.

DE 44 24 660 C1 discloses a horizontal sliding wall, where in front of an existing rail in which the individual elements can be displaced, there is a further rail system arranged in the ceiling region. In this rail system there is a clutch which is equipped with an identification system to detect the individual elements, which contain corresponding indicators, and to bring these elements into a parking position turned by 90°. The entire device is driven by an electric motor which drives an endless belt over a deflection pulley. In conjunction with a memory-programmable control unit the identification system is controlled in such a way that it identifies the individual elements, following a learning drive, and brings them into the desired parking position or into the closing position of the partition wall. It is also possible to achieve a partial opening so as not to open the entire front area, for instance during the cold seasons. The clutch consists of an electromagnet which at its armature has a sliding contact which, in its projecting portion, is fork-shaped in such a manner that it grips a tag between the roller means and the element positioned below it and thereby displaces the entire element, corresponding to the selected program, within the rails. The clutch and the identification system are provided with the respective signals and the required voltage either via rubbing contacts or a trailing cable. The identification system in this case can be a sensor, for instance a proximity switch; or optical systems, magnets with respective reed contacts or switches may also be used.

The invention seeks to produce a motor driven sliding wall which enables the individual drive control and positioning of the individual sliding wall elements, is easy to construct and requires a minimal height and width of construction for drive components.

In one broad form, the invention is accomplished by the characteristic feature of Claim 1. Further embodiments of the invention are suggested in the dependent subclaims.

Some or all sliding wall elements in accordance with the present invention have their own drive unit. The drive unit is substantially an electric motor, the drive axle of which is provided with means which are designed for an active connection with a working surface or profile extending along the rail or approximately parallel to the rail, which connection allows the individual sliding wall elements to be displaced. To provide such an active connection a pinion is proposed, which is form-fitted and friction-fitted with the drive axle. The toothing of the pinion engages a toothed profile having the same modulus. The working profile in this case is a toothed belt. The toothed belt can in this case be fixed inside or at the rail.

In order for the drive units to be supplied with the required electrical energy, a current collection device is proposed which interacts with a fixed conductor rail device extending along the rail.

Since, in accordance with the invention, the drive motor is preferably a direct current motor, the conductor rail device consists of two parallel conductor rails. To enable the drive control of individual sections, at least one of the two conductor rails is subdivided into a plurality of sections which are isolated from one another and which can be supplied with power individually via a programmable control unit. The control unit is connected with the same number of lines as there are sections isolated from one another. In this manner a purposive power supply can be provided to one or several sections, which results in the respective sliding wall elements within the rail travelling to specific areas. In this manner it is possible for several sliding wall elements to be displaced at the same time. By this inventive step the time for displacing the entire sliding wall is drastically reduced. It is also possible to displace individual sliding wall elements, which would achieve for instance a partial opening or closing of the sliding wall.

Alternative to the above described drive type via pinion/toothed belt, a friction drive can also be used. For this purpose a wheel with a non-slip rubber coating around its circumference would be used on the drive axle, which wheel would be in active connection with a surface provided at the rail.

A preferred embodiment of the object of the invention is explained in greater detail by reference to the following drawings. These show:

Figure 1	view of the drive unit of a sliding wall element
Figure 2	a top view of the drive unit according to Figure 1
Figure 3	a section as per line A-A according to Figure 2
Figure 4	a control principle
Figure 5	sectional drawing of the conductor rails
Figure 5a	sectional drawing of the conductor rails

The drive unit 29 of a sliding wall element (not shown) according to the Figures 1 to 3 is in each case - either as a single unit or multiple units - to be attached at the upper end of the individual sliding wall elements. According to known practice, the sliding wall elements are supported by, and displaceable along, rail 2 extending in horizontal direction in the ceiling region 1 of a space to be partitioned or to be closed off. In this case the rail 2 can be fastened direct or by means of a holding profile 43, which is arranged via fastenings 37 in the ceiling region 1. The individual sliding wall elements are usually in the form of narrow rectangles arranged in vertical position and are equipped in the region of both ends of their upper edges with a suspension means intended to grip into the rail 2. In the present example the rail 2 is essentially a C-shape from which two suspension means, each near the horizontal ends of the sliding wall elements, are suspended by means of rollers 3. One of these two suspension means is in the form of the drive unit 29 which is shown in

the drawing and is described in greater detail below. The fastening of the drive unit 29 is achieved via sliding wall element connections 30, screwed into the sliding wall elements.

The drive is preferably in the form of a d.c. motor, electric motor 4. Its drive axle 5 in the present example is equipped with a driving pinion 6 which is intended to engage a toothed belt 8 which is fixed in a corresponding recess 7 of the rail 2, whereby the toothed belt 8 can also be arranged on the rail 2. The toothed belt 8 extends along the entire length of the rail 2, so that the sliding wall element is displaceable along the rail 2 by turning of the driving pinion 6 via the electric motor 4. The drive axle 5, projecting out of the electric motor 4, is form-fitted and friction-fitted with the driving pinion 6 by means of a pin 40. The driving pinion 6 is designed in such a manner that an axle stub 44 is present at the side opposite the electric motor 4, which axle stub engages a bearing 38. The bearing 38 is recessed into a mount 39, which is connected with the base mount 45 of the drive unit 29 via spacers 35. At the base mount 45, next to the electric motor 4, a displaceable mount 15 for the power supply as well as a mount 31 for the rollers 3 supported by axles 32, 33 are fixed. The rollers 3 move along running surfaces 41, which are located within the rail 2.

The configuration of the power supply of the electric motors 4 is of great importance. For this purpose each drive unit 29 is provided with a current collection device which has an electro-conductive connection with two conductor rails 9, 10 fixed relative to the rail 2., which conductor rails form part of the electrical circuit. The two conductor rails 9, 10, protected by an insulation 11, are arranged in a profile 12, which for instance extends laterally, for instance by means of corners 46, which are attached in the ceiling region 1 by means of fastenings 36. The current collection device in this case has two current collectors 13, 14, which extend to conductor rail 9 or 10 respectively and thus interact. The two current collectors 13, 14 are arranged in a mount 15, which again is firmly connected with the base mount 45 of the drive unit 29. If the drive unit 29 and

the associated sliding wall element are displaced along the rail 2, the two current collectors 13, 14 slide along the conductor rails 9, 10 in an electro-conductive manner and supply the electric motor 4 with the required driving energy from the control unit 17.

The rail 2 and therefore also the conductor rails 9, 10 are not required to extend in a straight line only, but can be conducted around a corner in a relatively small radius. This is useful for instance for closing off a sales area which is located in a corner or displacing the sliding wall elements around the corner into a concealed parking area (parking position/station). To ensure a reliable contact of the current connectors 13, 14 with the conductor rails 9, 10 also in the curved corner areas, the mount 15 is advantageously provided with a spring system 16. Through this spring system 16 the electric contact between the current connectors and the conductor rail is protected against undesirable interference and failure of the sliding wall opening or closing process.

We now look at the principle of the control of a sliding wall according to Figure 4 consisting of a plurality of sliding wall elements. The two conductor rails 9, 10 are connected via electric lines 18, 19 with the control unit 17 controlling the power supply and the operation. The first conductor rail 9 forming part of the electric circuit is in this case connected with the control unit 17 by means of a single electric line 18. The second conductor rail 10 of the electric circuit by contrast has a plurality of electric lines 19.

This second conductor rail 10 is subdivided into individual sections, i.e. taps 20 - 27. These taps 20 - 27 are isolated from one another by insulators 28 and are each provided with their own electric line 19, so that via the control unit 17 each tap 20 - 27 can be supplied with power individually. In the event that only one specific sliding wall element, i.e. actually the electric motor 4 serving as its drive, shall be displaced by a specific distance, the specific number of conductor-rail sections, i.e. of taps, corresponding to this distance will be supplied with power. The control unit knows at all times, due to the

subdivision of the conductor rail 10 into individual sections 20 - 27, in which section region the respective electric motor is at that particular time.

The motor-driven sliding wall constructed in accordance with this control principle offers, by contrast with the known state of the art for such sliding walls, a whole range of decisive advantages. Firstly, by the double conductor rail 9, 10, whereby the one conductor rail 10 is subdivided, there are provided two poles each for several electric motors 4; secondly the positioning of the electric motors 4 is possible without limit switches being required; thirdly, by use of the control unit 17 the monitoring of the respective positions of the electric motors 4 is possible at all times, and thereby the control of the sliding wall elements associated with the individual drive units 29.

This results in accomplishing the object of the invention, namely that the individual drive control, positioning and monitoring of the individual sliding wall elements is achieved without any problems. Since however for a plurality of sliding wall elements just one profile 12 supporting the double conductor rail 9, 10 is sufficient for the drive control, and since the power supply is arranged next to the rail 2, only a minimal height and width of construction is required. This would not be the case if, for each sliding wall element or its electric motor 4, a separate conductor rail or a trailing cable would need to be provided. Notwithstanding all these advantages, the sliding wall is relatively easy to construct. For this reason, it would even be technically feasible to undertake retrofitting of existing sliding walls incorporating the advantages offered by the present invention. The displacement of the sliding wall around room corners does not present any problems either.

The control unit 17 used is capable, without additional contacts or auxiliary attachments, to detect and to control the movements and positions of the individual sliding wall elements. This also applies to the sliding wall being at rest and even in the event of a

power failure. If the power supply is interrupted for a certain period, the control unit 17 recognises in which position the sliding wall elements are, and a respective signal is sent to the joint conductor rail 9, and due to the conductor rail 10 being subdivided, the control unit 17 is capable of recognising in which position the sliding wall element is at that time. To this end the electric motor of the associated sliding wall element serves as an energy impulse machine. In conjunction with a program which is contained in the control unit 17, the position of the sliding wall element is thus detected, even if during the period of the power failure the position of the individual sliding wall elements was changed manually. In such an event, a "sorting" of the individual sliding wall elements is undertaken. The control unit 17 also prevents that a travelling sliding wall element impacts upon a sliding wall element which is in a stationary position ahead of the former.

It is within the scope of the invention to construct the sliding wall in a design whose technical details vary from the ones of the preferred embodiment described above. For instance, both conductor rails 9, 10, instead of only the one conductor rail, can be subdivided into several taps 20 - 27.

In a further embodiment of the inventive idea to equip each sliding wall element with an electric motor 4, a friction wheel can also be used instead of the driving pinion 6 on the drive axle 5. This friction wheel can interact directly or indirectly with a running surface in or on the rail 2, whereby the drive control of the individual sliding wall elements is maintained.

Throughout the specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that that prior art forms part of the common general knowledge in Australia.

Nomenclature

1	ceiling region
2	rail
3	rollers
4	electric motor
5	drive axle
6	driving pinion
7	recess
8	toothed belt
9	conductor rail
10	conductor rail
11	insulation
12	profile
13	current collector
14	current collector
15	mount
16	spring system
17	control unit
18	electric line
19	electric line
20	tap
21	tap
22	tap
23	tap
24	tap
25	tap
26	tap

27	tap
28	insulators
29	drive unit
30	sliding wall element connection
31	mount
32	axle
33	axle
34	mount
35	spacer
36	fastening
37	fastening
38	bearing
39	mount
40	pin
41	running surface
42	fastening
43	holding profile
44	axle stub
45	base mount
46	corners

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Sliding wall for an automatic partition wall system with individual sliding wall elements which are each horizontally displaceable by means of a mount with two rollers in a rail fixed in the ceiling region, whereby at least some of the sliding wall elements have at least one own drive unit by means of which the respective sliding wall element, independent of and / or simultaneously with the other sliding wall elements, is displaceable along the rail in such a manner that the drive unit has an electric motor with a drive pinion which is attached to the sliding wall element by means of a base mount in such a way that at the drive pinion, at the side opposite the electric motor, there is an axle stub which grips into a bearing which is recessed into a mount, which is connected with the base mount via spacers, whereby the drive pinion interacts with a means which is fastened to the rail or approximately parallel to the latter, which means has a working surface or a working profile which allows the individual sliding wall elements to be displaceable, and that further there are next to the rail two fixed conductor rails separated by an insulation , which conductor rails interact in such a manner with current collectors which are provided with a spring system, that a programmable control unit causes current to be fed to the electric motor and the electric motor is simultaneously operated as an energy impulse machine for detecting the position of the connected sliding wall element.

2. Sliding wall in accordance with Claim 1, wherein the drive pinion designed to grip into a toothed working profile of a toothed belt, which is arranged in a corresponding recess at the rail.

3. Sliding wall in accordance with Claim 1, wherein the drive pinion is relaced by a friction wheel, which interacts with a working surface which is present at the rail.

4. Sliding wall in accordance with the Claims 1 and 2 wherein at least one of the two conductor rails is subdivided into a plurality of sections which are isolated from one another, i.e. taps which can be fed individually with current.

5. Sliding wall in accordance with the Claims 1 and 4, wherein the control unit is connected in such a manner by means of plurality of electrical lines with at least one conductor rail, which is subdivided into a plurality of taps isolated from one another, that one electrical line each is led to each of the taps isolated from one another.

6. Sliding wall in accordance with Claim 5, wherein the control unit is designed in such a manner that for specific sliding wall element, i.e. the electric motor serving as its drive, to be displaced, the specific number of conductor rail sections, i.e. of taps, of one conductor rail, corresponding to the distance to be travelled, can be fed with current .

7. Sliding wall in accordance with Claims 1 and 2, wherein the electric motor is a direct current motor.

8. Sliding wall as hereinbefore substantially described by reference to accompanying drawings.

Dated this 2nd day of November, 2000

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