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3,430,676

DOOR CLOSURE

Filed Nov. 7, 1966

Sheet 1 of 2

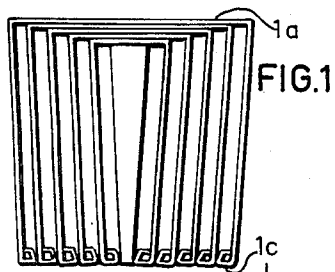


FIG. 1

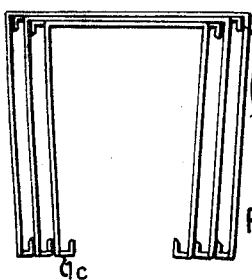


FIG. 2

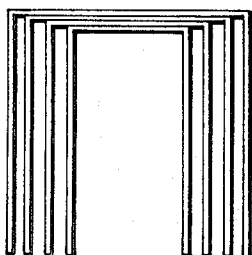


FIG. 3

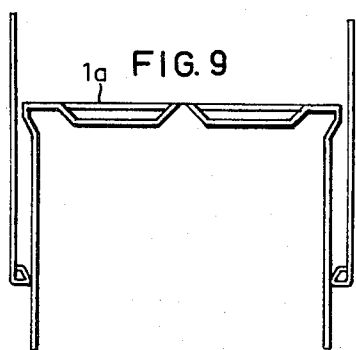


FIG. 9

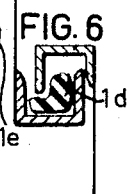


FIG. 6

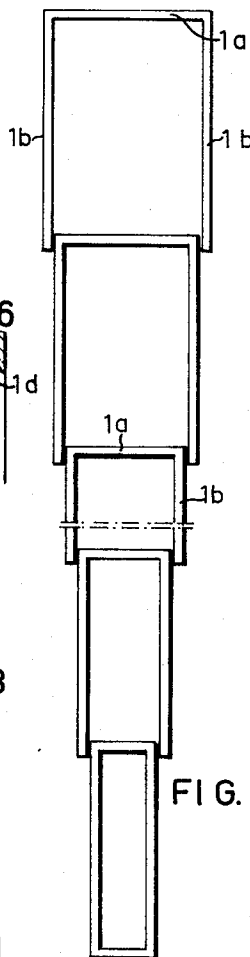


FIG. 4

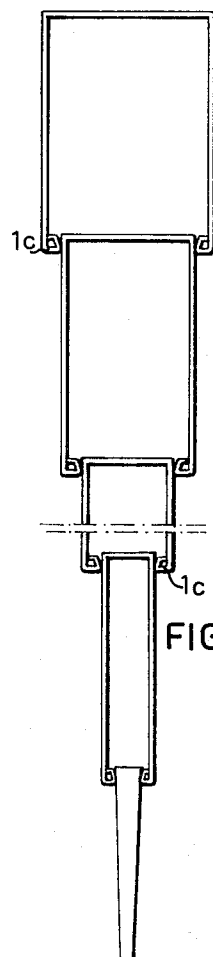


FIG. 5

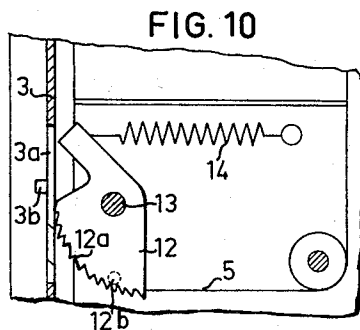


FIG. 10

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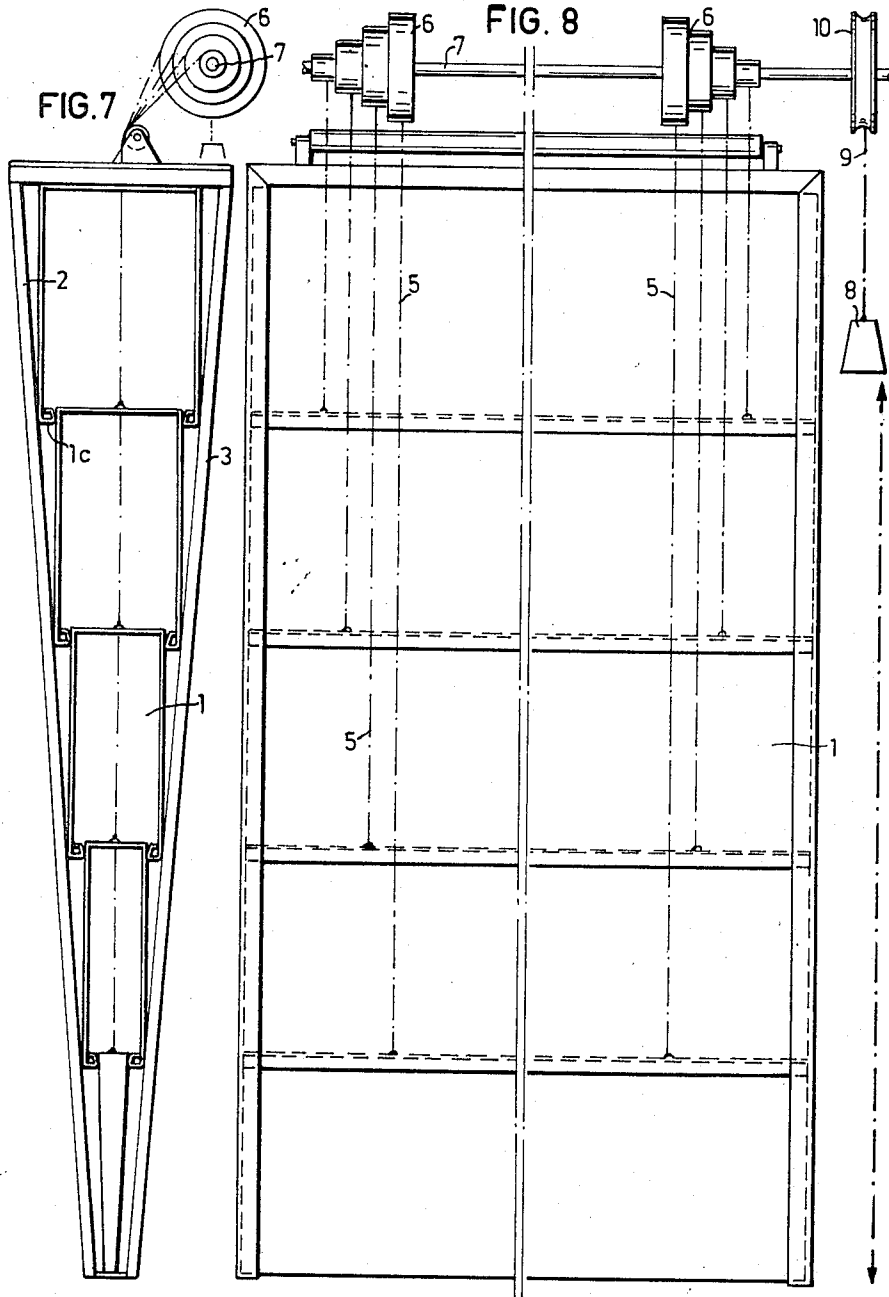
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DOOR CLOSURE

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14,664/65

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5 Claims

Int. Cl. E05d 15/06, 15/16, 15/26

ABSTRACT OF THE DISCLOSURE

The door closure comprises a plurality of telescoping horizontally-extending sections, each section including a base portion with depending legs and being substantially U-shaped in transverse cross section. The legs of the sections are inwardly inclined when the door is opened and the legs of each superposed section resiliently engage an underlying section adjacent the base portion of the underlying section when the door is closed wherein the sections are held together and extend substantially parallel with respect to each other when the door is closed. The door is mounted in a frame having side members which converge and act as guides for the door. In addition, the door is provided with a hoisting means for simultaneously retracting all of the sections and a locking means for locking the door in a closed position and for locking the door in any position in an emergency such as when a lift rope of the hoisting means breaks.

This invention relates to doors employed for opening and closing the doorways of industrial buildings, aeroplane hangars etc.

Objects of the present invention are to provide a vertically movable door which in an open position occupies a minimum of space, which without complicated arrangements can be manufactured at an almost unlimited size and at the same time is capable to resist strong thrusts, caused for example by wind, can be provided with a balancing means that makes possible simple opening and closing with a minimum of force, which consists of a number of parts which can be standardized and at a low cost manufactured in large series and if desired put together in various numbers.

Briefly, the invention comprises a plurality of telescoping, horizontally-extending sections that are substantially U-shaped in transverse cross section. Each section is made up of a base portion with depending legs which are inclined inwardly to such an extent when the door is opened that the distance between the terminal portions of the legs of each section is less than the width of the base of the section and also less than the width of the base of the adjacent underlying section. With this construction, when the door is closed, the legs of each superposed section resiliently engage an adjacent underlying section at the base portion of the underlying section so that the sections are held together and extend substantially parallel with respect to each other. The door is mounted within a frame having members which converge in the closing direction of the door to act as guides for the door. In addition, the door is provided with a hoisting means for simultaneously retracting all of the sections and a locking means for locking the door in a closed position and for locking the door in any position in an emergency.

These and other objects are provided by the invention, the essential features of which are given in the claims. A number of embodiments of the invention will be further described in the following in connection with accompanying drawings. FIGS. 1-3 show various embodiments of doors according to the invention in an open position. FIGS. 4 and 5 show the doors according to FIG. 1 and FIG. 3 respectively in a closed position. FIG. 6 is a detail

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of the door according to FIG. 2 in a closed position. FIG. 7, which is a vertical section view, discloses the door according to FIG. 1 in closed position and a guiding and locking means for the door in a side frame thereof. FIG. 8 is an example of a balanced drive arrangement for the opening and closing movements of the door. FIG. 9 shows a section with stiffened base portion. FIG. 10 is a detail of a locking device for the door.

Each door closure shown in the drawing consists of a substantially U-shaped with a base portion 1a and two legs 1b. The legs 1b of the door as shown in FIGS. 3 and 4 are substantially straight, whereas the legs 1b of doors shown in the other figures slightly incline inwards so that the lower portions of the legs, when the door is closed, resiliently connect to the top portions of the legs of connecting section and base portion respectively. The lowermost telescope section is preferably completely closed and provided with an adequate locking means. This section is preferably made with certain fixed, standardized widths and thicknesses depending on the object the door is to be used for. The width and possibly also height and length of the other sections increase continuously in accordance with a scale with fixed proportions which makes it possible to build doors of a substantially unlimited size.

The legs inclining inwards can be provided with lower bent connecting portions 1c or T- or U-shaped flanges which contribute to tightening between connecting sections and possibly have certain tightening means (1d, FIG. 6), e.g. of elastic material. Alternatively certain pneumatic tightening means or the like may be used, which can be automatically activated when the door is being closed.

FIGS. 2 and 6 show that lower U-shaped flanges of the sections cooperate with upper corresponding flanges on adjacent sections so that cooperating stops are provided. This design can be suitable in some cases, e.g. when it is desirable to simplify the driving device of opening and closing movements of the door.

When heavy thrusts on the door are expected to come forth, at least the base portions of the sections can be of box construction, FIG. 6. The sections can be covered with a layer of material having low friction and eliminating wear, e.g. nylon. Nylon has proved to be suitable as this material also prevents corrosion of the sections.

FIG. 7 shows a guiding and locking means fitted in the side frame of the door and which consists of two plates or girders 2, 3 between which the edge portions of the sections project and which approach each other. The lower leg portions of each section resiliently connect to these plates at the closing of the door and under influence of the base portion of the underlying section.

FIGS. 7 and 8 show a hoisting means which accomplish a simultaneous retracting of all sections. A rope 5, which is wound on different parts of a rope drum 6 of a diameter stepwise diminishing in correspondence to the height of the sections, is connected to both ends of each section except the topmost. The rope drum is cradled on a shaft 7 over the top section and provided with a counterbalance 8, held up by a rope 9 which, in the opposite direction, is wound on another rope drum 10 on the same shaft 7. By means of such a device only little force is needed for the opening and closing of the door, which can be done by hand if the door e.g. is used as a garage door. Alternatively, balancing can be achieved by means of e.g. a torsion spring which actuates the shaft 7.

Many other types of driving devices for the opening and closing movements of the door are possible. They can be arranged in the top section or the lowest section or consist of separate means separately arranged in each section, e.g. telescopic shafts.

In FIG. 9 is shown a locking means which is firstly meant to lock the door in a closed position and secondly

to function as an emergency lock to lock the door in any position, if e.g. the lift rope 5 engaging the lowest section, breaks. For this purpose, the locking means 12 is pivoted on a shaft 13, a spring 14 and the rope 5 engaging the locking means. The locking means has a toothed or fluted portion 12a with a progressively increasing radius and this portion 12a works as an emergency lock. At the lower part of the side frame 3, there is a slit 3a. The toothed portion 12a projects into said slit 3a by discharge of the rope 5 when the door obtains its lower position. At this moment a portion 12b, which is protruding sideways and is e.g. shaped like a nib, instead engages a stop in the side frame. In this position the lock has such a function that the door cannot be opened in any other way than by hoisting it in the usual way. If the door is to be kept in a closed position for a long period, e.g., for a night, this is made sure of by locking the control circuit of the driving motor of the door.

The different sections can be made of steel, plastic or any other suitable material which, considering the objects of the use of the door, has desired qualities. Some sections can if desired be designed in a different way from other sections, e.g. they can be provided with windows. On the whole, a great number of different variations in addition to those mentioned above are possible within the fundamental idea, of the invention.

What I claim is:

1. A door closure comprising a plurality of telescoping, horizontal sections substantially U-shaped in transverse cross section; said horizontal sections telescoping vertically in the closing direction of said door; legs of said sections being inclined slightly inward when said door is open; a side frame forming a guide and locking means for said sections, said side frame comprising two portions tapering in the closing direction of said door, and lower portions of said legs of said sections being urged against said tapering frame portions by base portions of underlying sections.

2. Door closure as claimed in claim 1, characterized by separate means such as ropes engaging the different sections, and adapted for simultaneous telescoping of all sections, said ropes being wound on different parts of a

driven rope drum of a diameter in correspondence to the height of the sections.

3. Door closure as claimed in claim 1, characterized in that the lowest section has a locking means meshing into the side frame of said door, a spring and a lifting rope for the door engaging said locking means in a way to accomplish locking when the rope is discharged in the closing position of the door or in case the said rope breaks.

4. Door closure as claimed in claim 3, characterized in that the locking means has a toothed or fluted portion which, in case the rope breaks, meshes into the side frame, and a portion which is adjusted for locking in the lower position of the door and which in said position cooperates with a suitable member in the side frame.

5. A door closure comprising a plurality of telescoping, horizontally-extending sections; said sections telescoping vertically in the closing direction of said door; said sections each including a base portion with depending legs; the legs of each superposed section being inclined inwardly when said door is open with the distance between terminal portions of said legs of each superposed section being less than the width of the base portion of said section and less than the width of the base portion of the adjacent underlying section wherein said legs of said superposed sections are flexed outwardly by said adjacent underlying sections as the door is being closed; and said legs of each superposed section resiliently engaging said base portion of said adjacent underlying section when said door is closed to retain said sections in substantially parallel positions.

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