(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 572 200 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93304011.5**

(22) Date of filing : **24.05.93**

(51) Int. Cl.[5] : **A62C 2/10,** E06B 9/72

(30) Priority : **23.05.92 DE 4217169**

(43) Date of publication of application :
01.12.93 Bulletin 93/48

(84) Designated Contracting States :
AT BE CH DE ES FR GB IE IT LI LU MC NL PT

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(54) A smoke apron.

(57) The invention relates to a smoke apron for subdividing and/or channelling smoke and fumes in buildings such as for example industrial structures, shopping centres and the like, particularly in the event of fire, the apron comprising a housing 2, 3, 4, 5 extending along a subdividing or channelling line, the housing 2, 3, 4, 5 supporting an apron sheet 7 which preferably consists of a woven fabric, is adapted to be weighted, and which is capable of being raised and lowered. In order to be able to lower the apron an electric motor drive 9 used to raise the apron can be subjected to a holding voltage by a measured value processing means 9.1 just sufficient to support the apron in its starting position inside the housing 2, 3, 4, 5. When there is a short fall in the holding voltage, the apron 7 can overcome the holding action of the electric motor drive 9 and move into its extreme lowered position by the action of gravity and with the assistance of weight.

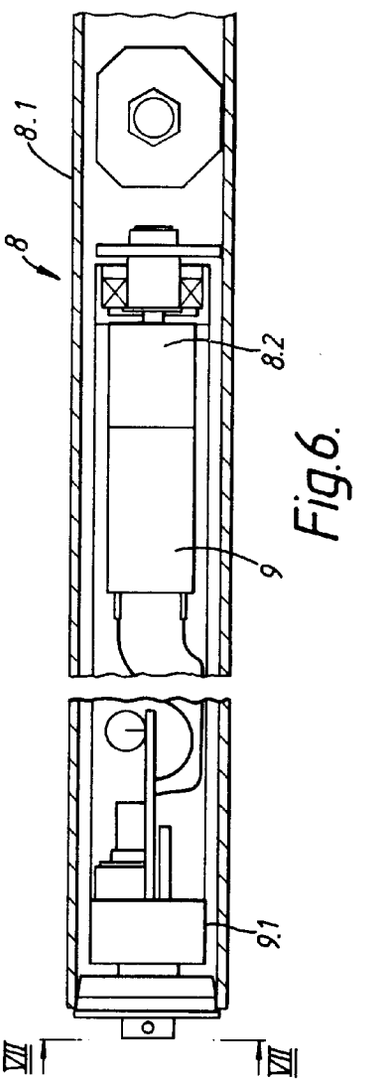

Fig.6.

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The invention relates to smoke aprons for subdividing and/or channelling smoke and fumes in and around buildings such as for example industrial structures, shopping centres and the like, particularly in the event of fire, and concerns such an apron having a housing extending along a sub-dividing or channelling line the housing supporting an apron sheet capable of being raised and lowered.

Smoke aprons of the aforementioned type are used in relatively large buildings such as shopping centres so that when smoke and fumes develop, for example, in the event of fire, it is possible to prevent the smoke and fumes spreading over extensive areas inside the building or - in case of a covered structure outside the interior of the building to prevent too great a lateral spread of a rising column of smoke resulting in an undesired degree of smoke logging under the covered structure. As smoke and fumes spread inside the building, the smoke cools down on parts of the structure or fittings, resulting in a loss of thermal updraught. This gives rise to a circulating pattern of flow of smoke billowing within the confines of the building so that it is no longer possible to recognise escape and rescue routes; and toxic fumes can cause death from asphyxiation.

A smoke apron as described at the outset, with an apron sheet which is supported in a building in such a way that it can be rolled up, is known from GB-PS 22 108 839. In its rolled-up starting condition, the apron is fitted into a housing formed by a suspended ceiling having a throughway. In this starting position, a weight fitted along the lower edge of the apron closes off the ceiling gap which provides the throughway. The apron is guided at its side edges in channels. The apron can be rolled up and down, the roll-up drive being provided by an electric motor. The apron is prevented from rolling down by an electromagnetic device which is generally coupled to a fire alarm so that its operation is controlled and so that when the fire alarm responds the electromagnetic device releases the apron into its extreme unrolled position. However, in the event of a fire, if the power supply fails, the functional reliability of this smoke apron is no longer assured. Since the electromagnetic device is fitted with magnetic parts and end contacts, corrosion and dirt can adversely affect its functional reliability, particularly since such smoke aprons usually remain in their rolled-up starting position for a very long time.

Therefore, it is the object of the invention to provide a smoke apron as described at the outset but which, in the event of a power failure, can still be reliably triggered in a structurally simple manner if there is a fire.

In order to resolve this problem, the smoke apron described at the outset is characterised by the features indicated in the characterising part of claim 1. With regard to what are substantially further developments of the smoke apron according to the invention, reference is made to claims 2 to 4.

Where a smoke apron according to the invention is concerned, the electric motor drive is only used for supporting the apron in its starting position so that in the event of a fire the apron is brought into its extreme lowered position by its own weight, possibly with the assistance of an auxiliary weight. When the electric motor drive propels the apron from its extreme lowered position into its retracted starting position, the drive encounters a resistance when the apron reaches the retracted position, an electronic control circuit being able to detect the resistance by the increase in motor current. When a given motor current level is exceeded, the control arrangement switches the motor voltage over to a pre-determinable holding voltage which guarantees that the apron is reliably held in the housing. No end contacts or magnetic parts which are subject to the risk of becoming dirty are required. In the case of a total power failure, the apron automatically drops into its lowered working position under its own weight. During the downwards movement, the apron acts on the electric motor drive so that it is lowered into the envisaged working position at a constant speed. Therefore, the possibility of any damage to objects or even persons who happen to be under the apron which is being lowered, is reliably obviated.

Some ways of carrying out the invention are described in detail below by way of example with reference to drawings which illustrate specific embodiments and in which:-

- Fig. 1 is a diagrammatic perspective view of two adjacent apron portions of one embodiment of smoke apron according to the invention, showing the area of overlap;
- Figs. 2 to 4 are perspective detail views of embodiments of housing parts with associated apron portions for making up smoke aprons according to the invention;
- Fig. 5 is a diagrammatic broken-away cross-sectional view of a smoke apron according to the invention assembled from a plurality of apron portions with associated housing parts;
- Fig. 6 is a diagrammatic cross-sectional view of a tubular roller of an apron portion with an integrated tubular motor, and
- Fig. 7 is a view of the embodiment shown in Fig. 6, taken on the line VII-VII in Fig. 6.

With reference now to the drawings, the examples of a smoke apron which are shown serve to break up or subdivide smoke and fumes in buildings but may be used also to channel smoke developing in an area outside but adjacent to a building in order for instance to keep escape doors from the building clear of developing smoke. The smoke apron generally designated 1 in the drawings consists of woven fabric and is intended to be installed under ceilings in buildings or under balconies in buildings or their breast work. The smoke apron comprises housing parts 2, 3, 4 (Fig. 2, Fig. 5) and housing parts 5, 6 (Fig. 3, Fig. 4) which have to be assembled

on the modular or unit construction principle to provide a finished smoke apron 1 of virtually any length along a sub-division or channelling line. Provided inside each individual housing part 2, 3, 4, 5, 6 is an apron portion 7 and each portion is disposed on a separate roller 8 with an electric motor drive 9 so that it can be rolled up and down.

As can be seen particularly also from the diagrammatic view in Fig. 1, the adjacent longitudinal edges 10 of adjacent apron portions 7 overlap by the amount X which ought expediently to be at least 80 mm. At the bottom edges of the apron portions 7 there are weights which, in the closed condition of the apron portions 7, close off the throughway 11 (Figs. 2 to 4). The throughway 11 and the weight 12 of each apron portion 7 are of matching cross-section so that the individual housing parts 2 to 5 are closed from the under side by the weights which are aligned flush when the apron portions 7 are rolled up.

As can be seen from Figs. 2 to 4, the smoke apron 1 as a whole is designed on the modular or unit construction principle. The individual housing parts 2 to 5 have, in each case, adjacently disposed housing boxes 13, 14, in the middle plane of division of which the throughway 11 is located. It is in this plane of division, too, that the apron portion is unrolled, the apron being positively guided between the housing boxes 13, 14 as it is unrolled and re-rolled.

As can also be seen from Figs. 2 and 5, the individual rollers 8 and also the housing boxes are so provided that the adjacent apron portions 7 with their overlapping longitudinal edge portions can be raised and lowered with positive guidance. To this end, alternate pairs of housing boxes 13 and 14 are made to a shorter and longer construction respectively and any desired smoke apron length can be created. Similarly, the individual rollers 8 which are of the same or different lengths are provided alternately in and made to fit the housing box 14 and the housing box 13. The result is that the respective apron portions 7 with their separate rollers 8 are disposed in the housing so that they overlap each other in a longitudinal direction but with the rollers offset in the horizontal direction by 180° with respect to the longitudinal centre line of the housing.

The apron portions 7 can be held by electric motor drives in their rolled-up starting position in the housing. As will be seen in greater detail from Figs. 6 and 7, each roller 8 consists of an octagonal housing shell comprising flat portions 8.1 and is hollow on the inside. Inside the housing and constructed as a direct current motor is a tubular motor 9 with an electronic control unit 9.1. The roller is adapted to be driven by the tubular motor 9 through a planetary gearing 8.2. The electronic control unit 9.1 is coupled to a fire alarm, not shown in detail. In addition, however, the tubular roller can also be actuated manually. Firstly, the tubular motor 9 rolls its apron portion 7 up out of its extreme lowered position and onto the octagonal roller. The apron portion arrives in its starting position inside the housing and its weight attached along its lower edge closes off the throughway 11. When this happens, the tubular motor 9 encounters a resistance, whereupon the motor current increases. Since the electronic control unit 9.1 compares the applied motor current with a desired motor current, when this desired value is exceeded the motor voltage is cut down to a level which makes it possible for the tubular motor 9 to hold the apron portion 7 securely in the starting position inside the housing. When the fire alarm responds, the electronic control unit controls the motor voltage so that it moves to a level below the holding voltage so that the apron portion 7 is extended from the housing under its own weight. While this is happening, the tubular motor is moved at the same time so that the apron web is unrolled evenly in a controlled fashion. This even unrolling also takes place in cases where there is a complete failure of the power supply.

Claims

1. A smoke apron (1) for sub-dividing and/or channelling smoke and fumes in and around buildings such as for example industrial structures, shopping centres and the like, particularly in the event of fire, the apron comprising a housing (2, 3, 4, 5, 6) to extend along a subdividing or channelling line, the housing supporting an apron sheet (7) capable of being raised and lowered, characterised in that an electric motor drive (9) for supporting the apron (7) in its starting position within the housing (2, 3, 4, 5, 6) may be subjected to a holding voltage by a measured value processing means (9.1) and in that, when there is a short fall in the holding voltage, the apron (7) can move into its extreme lowered position under its own weight and gravity, the lowering of the apron being controlled by the electric motor drive (9).

2. An apron according to claim 1, characterised in that the electric motor drive (9) consists of a direct current motor, and in that when a given motor current is exceeded, the motor voltage can be adjusted by the electronic measured value processing means (9.1) to a motor voltage corresponding to the holding voltage.

3. A smoke apron according to claim 1 or 2, characterised in that the electric motor drive (9) is constructed as a tubular motor disposed in a tubular roller (8) for the apron (7).

4. A smoke apron according to any one of claims 1 to 3, characterised in that the electric motor drive (9) is connected to the tubular roller (8) by a planetary gearing (8.2).

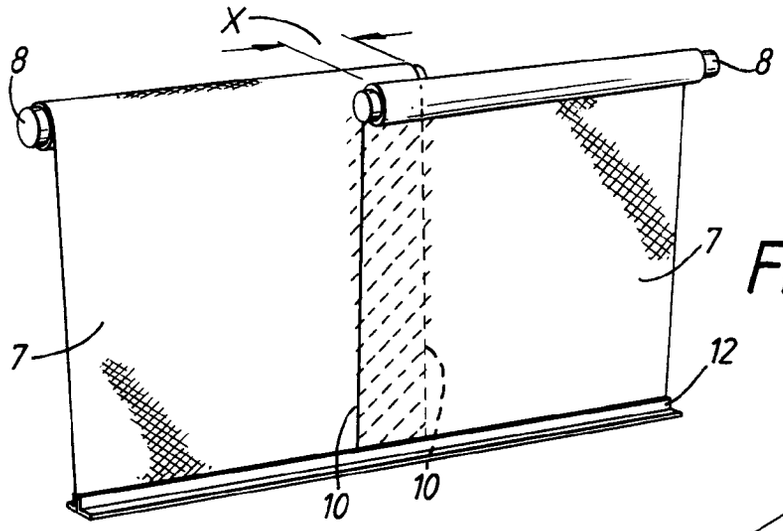

Fig.1

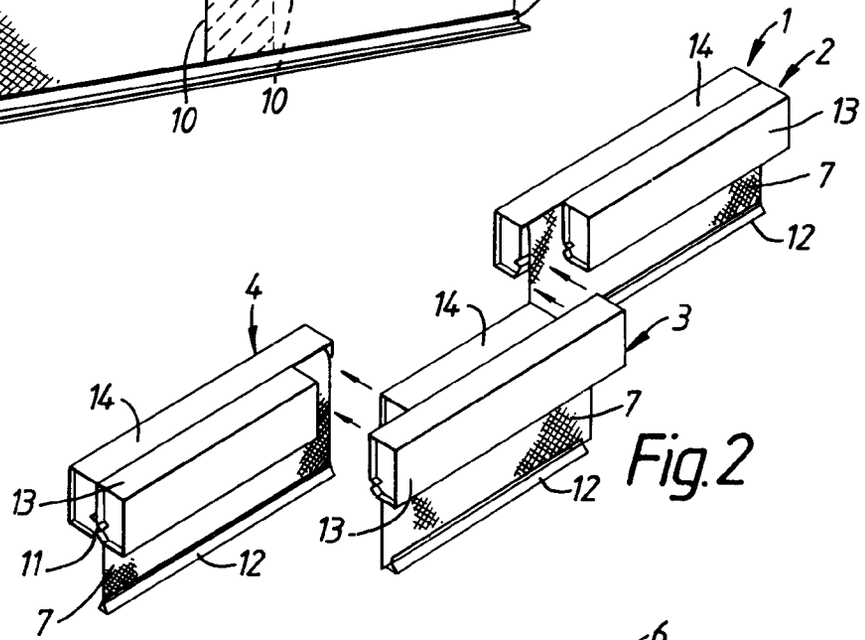

Fig.2

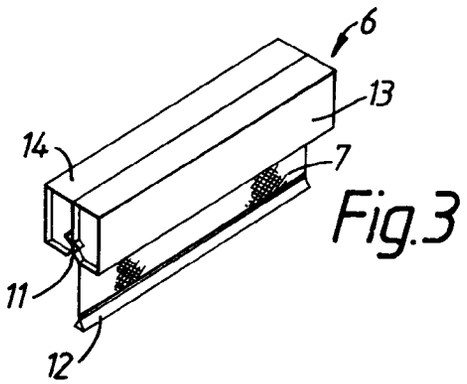

Fig.3

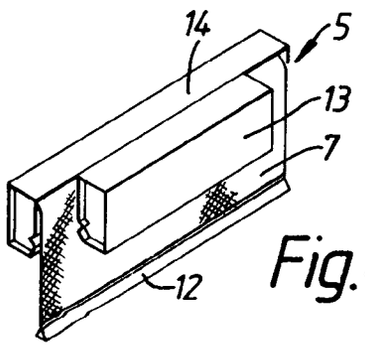

Fig.4

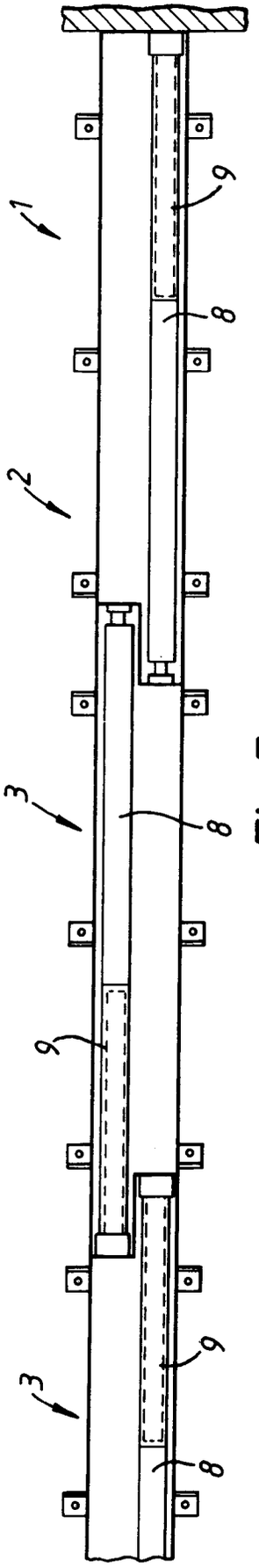

Fig 5

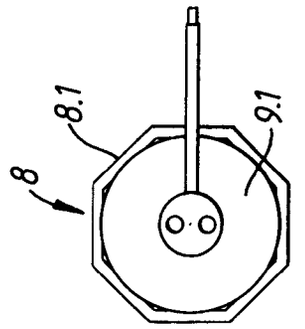

Fig.7.

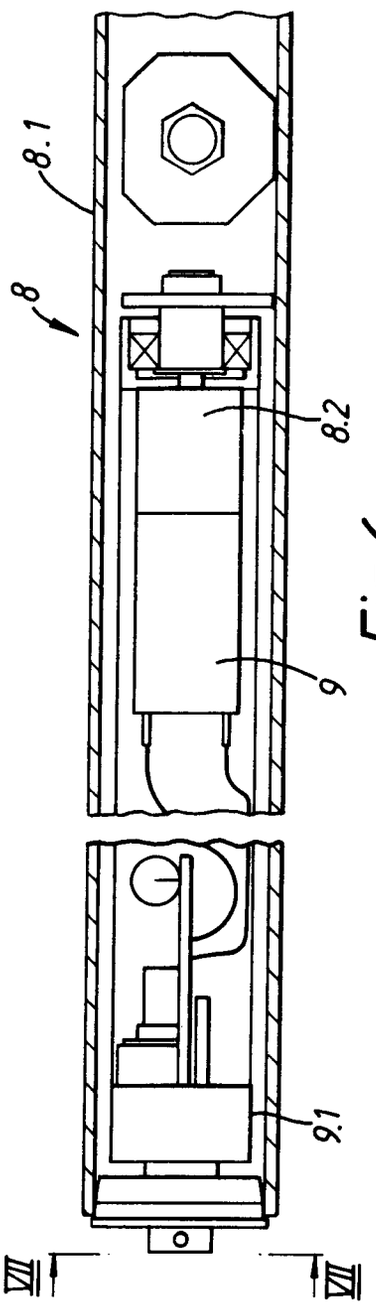

Fig.6.

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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 4011

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,Y A	GB-A-2 108 839 (COOPER) * the whole document *	1 2	A62C2/10 E06B9/72
Y	EP-A-0 406 493 (NUAIRE LTD.)	1	
A	DE-A-2 339 352 (HUSSON) * the whole document *	1	
A	FR-A-2 097 506 (SOCIÉTÉ GÉNÉRALE DES PRODUITS RÉFRACTAIRES) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A62C
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 JULY 1993	DIMITROULAS P.

CATEGORY OF CITED DOCUMENTS

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