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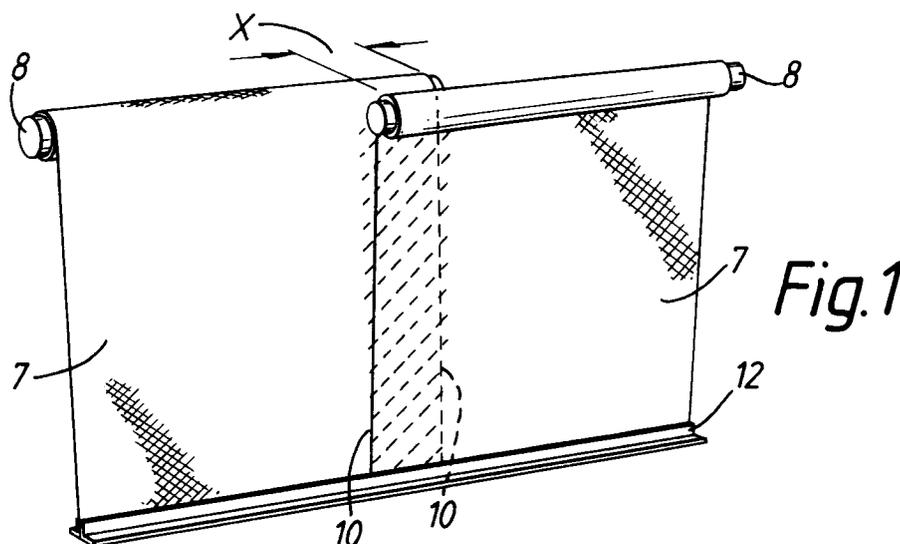
71 Applicant : **COLT INTERNATIONAL
HOLDINGS A.G.**
Ruessenstrasse 5A
CH-6340 Walterswil/Baar (CH)

72 Inventor : **Veldhuizen, Henricus Marie
Theodorus**
Reekstraat 32
NL-6641 KK Beuningen (NL)

74 Representative : **Holdcroft, James Gerald, Dr.**
et al
Graham Watt & Co., Riverhead
Sevenoaks, Kent TN13 2BN (GB)

54 **A smoke apron.**

57 The invention relates to a smoke apron 1 for subdividing and/or channelling smoke and fumes for instance in buildings such as industrial structures, shopping centres and the like, particularly in the event of a fire and with a housing extending along a sub-dividing or channelling line. So that even very long sub-dividing or channelling lines can be made up in a safe structural way, the apron sheet is formed by adjacently disposed apron portions 7 having mutually overlapping longitudinal side edges 10.



The invention relates to a smoke apron 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, and concerns such an apron having a housing to extend 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 a fire, it is possible to prevent the smoke and fumes spreading over extensive areas inside the building or - in the case of a covered structure, outside the interior of the building - to prevent too great a lateral spread of a rising column of smoke and fumes which would result 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 the smoke billowing within the confines of the building so that it is no longer possible for people 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 which can be raised by an electric motor, 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.

If it is intended that such a smoke apron extends over very long sub-dividing or channelling lines, then either the apron sheets and thus also the rolling-up parts have to be of correspondingly long construction or separate smoke apron elements have to be disposed beside one another. The elongate extension of the apron sheets or of the rolling-up parts does however have its limitations, if only on account of the weights and manufacturing techniques involved. When smoke aprons are adjacently disposed, each with its own self-contained electric motor drive, gaps occur in the apron so that in the event of fire smoke and fumes are able to escape freely through the gaps along the channelling line.

The object of the present invention is to provide a smoke apron as described at the outset which can be constructed in a structurally simple manner for the secure sub-division or channelling of smoke and fumes along even really long sub-division and channelling lines.

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, reference is made to claims 2 to 11.

In the case of a smoke apron according to the invention, virtually any length of sub-dividing or channelling line can be made up from individual overlapping apron portions without any fear that, in the event of a fire, clear spaces or gaps along the longitudinal edges will allow smoke and fumes to escape. In the event of fire, therefore, the prerequisite that escape routes and the like must be kept reliably free from developing smoke and fumes is satisfied.

To this end, each apron portion which may be of manageable width is expediently supported on a separate roller, the roller being selected in length in accordance with the width of the respective apron portion and constructed in a structurally simple manner. The rollers of adjacent apron portions are in a staggered arrangement so that the adjacent apron portions can be fed from horizontally oppositely disposed sides of the sub-dividing or channelling line to an aligned throughway, a positive guidance arrangement inside the housing ensuring, by a corresponding structural adaptation of housing parts, that the overlapping longitudinal side edges of adjacent apron portions can be lowered in such a way that they are closely adjacent one another. The housing parts and consequently individual apron parts are, therefore, preferably designed on the unit construction or modular principle for making up really long sub-dividing lines so that such lines can be assembled in an easily handled manner, even around corners or through angled portions of the lines, in such a way that when the apron is rolled up, its appearance is visually harmonious.

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, and,
- 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.

With reference now to the drawings, the examples of smoke apron which are shown serve to break up or sub-divide 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 a woven fabric and is intended to be installed under ceilings in buildings or under balconies in buildings or their breast work. The smoke apron according to the invention 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 of 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 especially 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. Not shown in greater detail is the fact that the apron portion 7 and thus the smoke apron as a whole is adapted to be supported in its starting position, in which it is rolled up in the housing, by an electric motor drive. For this purpose, direct current motors are provided in the relevant rollers 8 and these are connected to electronic measured-value-processing means. The said electronic measured-value-processing means comprises a fire alarm so that in the event of fire, a regulation of the motor voltage downwards causes the respective portion of smoke apron to be lowered. While this is happening, the direct current motor runs at the same time so that the apron portions are moved downwards in a controlled fashion. This obviates any risk of a sudden lowering of the apron possibly injuring anyone underneath. In addition, the direct current motors or the control arrangements are such that while the apron portions are being rolled up, the control units recognise when the respective throughways have been closed, since the direct current motor encounters a resistance when this happens. In fact, if the motor current voltage goes up to a value which is above a given level, then the motor voltage is cut down to a voltage which makes it possible for the apron portions to be held in their starting position. In the event of dirt or corrosion affecting the motors, it is also possible for the smoke apron to be operated in an extremely simple and functionally reliable automatic fashion in the event of fire since even if all the electric wiring should fail, smoke aprons will be reliably moved into their extreme fireguarding position.

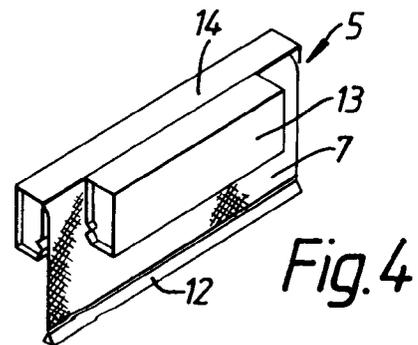
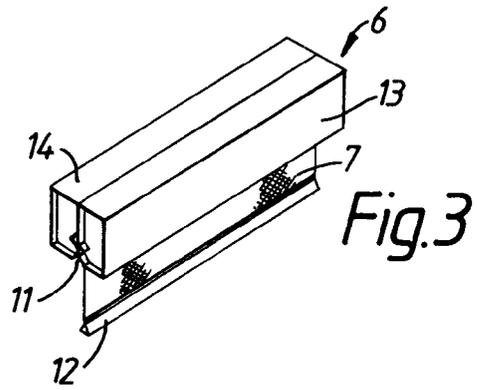
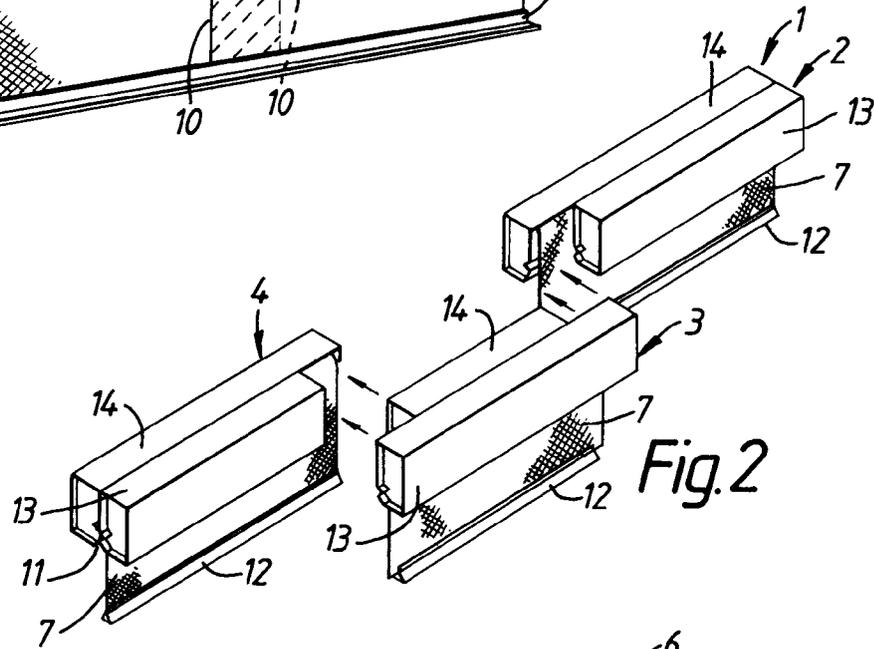
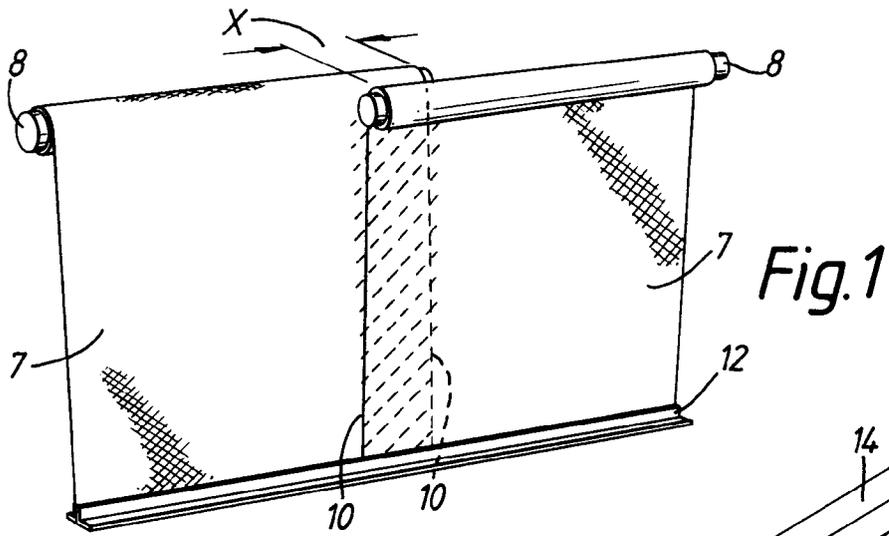
The operation of the electric motor drives and the control means therefor is more fully described in German Patent Application No. P 42 17170.9.

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 extending along a sub-dividing or channelling line, the housing supporting an apron sheet capable of being raised and lowered, characterised in that the apron sheet is constituted by adjacently disposed apron portions (7) having mutually overlapping longitudinal side edges (10).

2. A smoke apron according to claim 1, characterised in that the longitudinal side edges (10) overlap by at least 80 mm.

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3. A smoke apron according to claim 1 or 2, characterised in that each apron portion (7) is supported on a separate roller (8) and in that adjacent rollers (8) are disposed in the housing in such a way that in the horizontal they are offset by 180° with respect to the longitudinal centre line of the housing, the rollers overlapping one another in the longitudinal direction of the housing.
 4. A smoke apron according to any preceding claim, characterised in that the housing is constructed on the unit construction principle with a housing part (2, 3, 4, 5, 6) associated with each apron portion 7.
 5. A smoke apron according to any preceding claim, characterised in that the housing has a central through-way (11) for the apron and in that this throughway can be closed by weights (12) attached to the bottom edges of the apron portions (7).
 6. A smoke apron according to claim 5, characterised in that the throughway (11) and the weights (12) are of substantially complementary cross-sectional form, the weights (12) closing the throughways (11) in a substantially flat and flush manner.
 7. A smoke apron according to any one of claims 4 to 6, characterised in that each housing part (2, 3, 4, 5, 6) of an apron portion (7) has two horizontally adjacently disposed housing boxes (13, 14) constructed with positive guidance between the housing boxes for the apron portion (7) and in that the throughway (11) is constructed in the vertical plane of division between the housing boxes (13, 14).
 8. A smoke apron according to claim 7, characterised in that the housing boxes (13, 14) of adjacent apron portions (7) overlap one another in pairs and in an offset relationship.
 9. A smoke apron according to any one of claims 1 to 8, characterised in that the smoke apron (1) can be held in its starting position, disposed in the housing, by an electric motor drive.
 10. A smoke apron according to claim 9, characterised in that the electric motor drive is formed by a direct current motor, and in that in the event of the motor current applied being exceeded, the motor voltage can be regulated to a motor voltage corresponding to the holding voltage by an electronic measured-value-processing means.
 11. A smoke apron according to claim 9 or 10 characterised in that the smoke apron(s) can be lowered under a weight loading resisted by the electric motor drive in the event of the holding voltage not being attained.



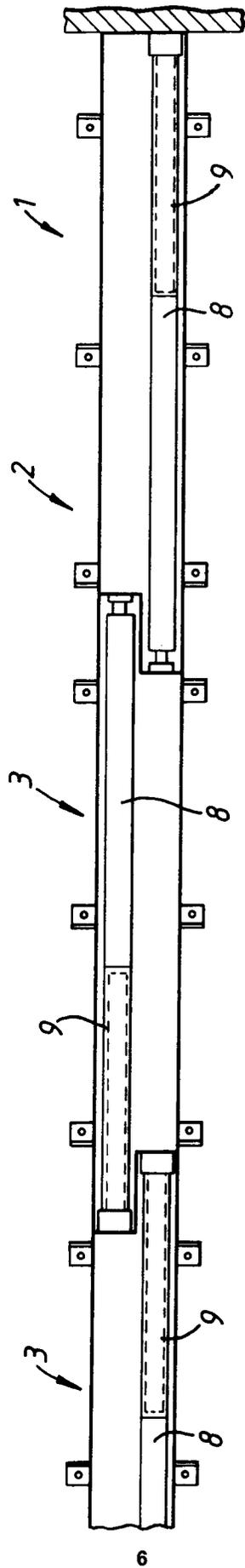


Fig 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 4010

| 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) |
| X | DE-A-2 339 352 (HUSSON) * the whole document * --- | 1-11 | A62C2/10 E06B9/174 |
| X | FR-A-2 097 506 (SOCIÉTÉ GÉNÉRALE DES PRODUITS RÉFRACTAIRES) * the whole document * --- | 1-3 | |
| D,A | GB-A-2 108 839 (COOPER) * the whole document * ----- | 1,9-11 | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.5) |
| | | | A62C E06B |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 16 JULY 1993 | Examiner DIMITROULAS P. |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

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