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54 **Ventilating hatch.**

57 Curved ventilating hatch which can be closed off by means of a hinged closing cover cooperating therewith, the closing cover consisting of a plurality of separate hinged closing members. For opening and closing each of the closing members, there is provided a common pull rod whose axis follows a substantially arcuate curve, and which curve is substantially equal to the arcuate curve of the hatch, the pull rod having a plurality of connecting arms on the one hand coupled to the closing members and on

the other hand hinged to the pull rod, the hinge joints of the connecting arms being provided on the pull rod in such a location that when the pull rod is pulled or pushed in the direction of its axis for, respectively, opening or closing the closing members, the centre of the arc of the pull rod is fixed substantially in the same point, both in the position where the closing members are closed and in the position where the closing members are opened and vice versa.

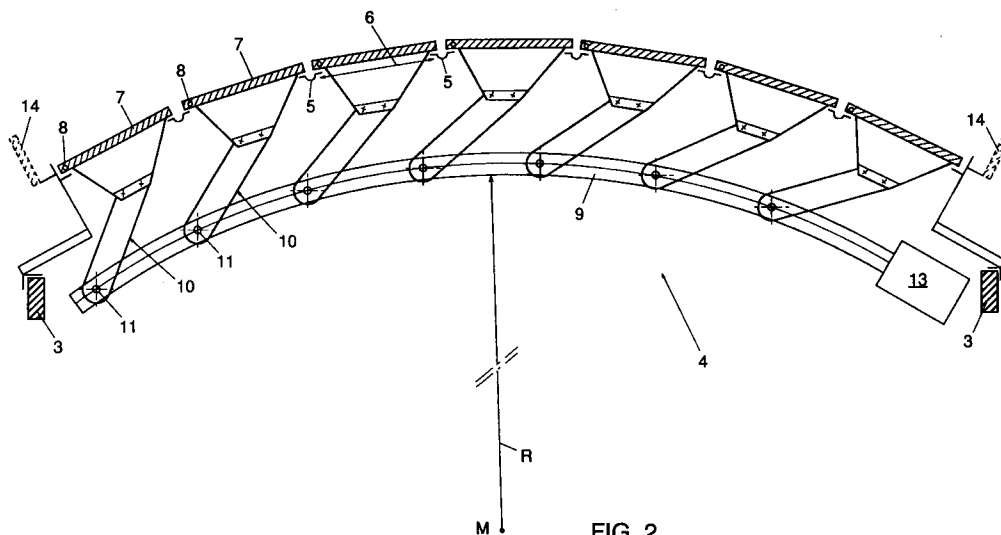


FIG. 2

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This invention relates to a ventilating hatch comprising a framework surrounding the hatch opening, the longitudinal sides of the framework following a generally arcuate curve in the same direction relative to their axes, and which hatch opening so curved can be closed off with a hinged closing cover cooperating therewith.

A ventilating hatch of this type is known and commercially available, and used inter alia on factory roofs as a so-called "light lane", for supplying the space therebelow with light as well as for ventilation, by hinging the closing cover into the open position.

A drawback of such a hinging curved closing cover is that the curved surface has a considerable catch of wind when the closing cover is in the open position, there being a very substantial chance that the closing cover is torn off by gusts of wind, with all unpleasant consequences thereof.

Another drawback is that the curved surface, at least in the open position of the closing cover, deflects the wind into the space below. This presents a great problem in fire fighting. In case of fire, the incoming wind will stir up the fire. This explains the increasing tendency to prohibit the use of ventilating hatches of the type described hereinabove, in which the closing cover can be opened. The point is that in fire fighting it is important for the air to be sucked out. This drawback could be overcome by mounting around the hatch a tube of such height that the closing cover in the open position does not project beyond it. This tube will ensure that the wind passes over the open tube surface, i.e. the air in the space below will be sucked out. However, this solution reduces the amount of incident light and, moreover, is un-aesthetic.

Another solution could be to divide the closing cover into a plurality of separate closing members, with each closing member being hinged relative to the short side of the hatch opening. It has been experimentally demonstrated that, at least when an upright edge is provided at the longitudinal ends, this solution prevents the wind from being deflected towards the space below and allows it to accommodate to the curved surface, i.e. to pass over the opened closing members. However, the problem involved here is opening and closing all closing members simultaneously, as the closing members are not in one straight line. A possibility is to use a flexible rope which interconnects all closing members. This means, however, that for opening the closing members the rope must be pulled at one end, and for closing them it must be pulled at the other. Apart from the aesthetic aspect, such a construction is clumsy and requires additional provisions, certainly if the closing members are to be operated by remote control, for instance

hydraulically.

Replacing the flexible rope by a common rigid connection between the closing members presents yet other problems because the successive closing members do not traverse the same trajectory all at the same time since the opening and closing trajectories differ owing to the arcuate curve which the closing members are disposed along. It is true that the beginning and the end of the trajectories of each of the closing members are identical, but because the trajectories are different between their beginning and end for each closing member, torsion will arise between the rigid connection and the corresponding hinge joints between each of the closing members and the rigid connection, i.e. it is impossible to bring all closing members into the opened position in one operation by means of a common rigid connection.

The object of the invention is to overcome the drawbacks and to provide a curved ventilating hatch which, in combination with a closing cover divided into a plurality of separate closing members and a common rigid connection between the closing members, permits opening and closing of the closing members in one operation of the rigid connection, without torsion arising.

The object is achieved in that, according to the invention, the closing cover consists of a plurality of separate closing members which can each be hinged relative to a longitudinal end thereof about a corresponding hinge pin coupled to the longitudinal sides of the framework, said hinge pins extending parallel to the transverse side of the framework, and that, for opening and closing each of the closing members, there is provided a common pull rod whose axis follows a substantially arcuate curve, and which curve is substantially equal to the arcuate curve of the longitudinal sides of the framework, the pull rod being so arranged that it is substantially perpendicular to the hinge pins; and a plurality of connecting arms corresponding to the number of closing members, each of said arms being, on the one hand, coupled to the associated closing members and, on the other, hinged to the pull rod, the hinge joints of the connecting arms being arranged at such a location on the pull rod that, when the pull rod is pulled or pushed in the direction of its axis for, respectively, opening or closing the closing members, the centre of the arc of the pull rod is fixed substantially in the same point both in the position where the closing members are closed and in the position where the closing members are opened and vice versa.

Owing to the specific location of the hinge joints of the connecting arms of the closing members on the pull rod, it is accomplished that all closing members can be opened and closed without any difficulty. This specific location can prefer-

ably be obtained by forming each of the connecting arms such that their hinge joints, in the closed position of the closing members, are coupled to the pull rod at the same predetermined distance before the hinge pins of the associated closing members, as viewed in the opening direction of the pull rod, with these predetermined distances being equal to the distance from the hinge joints to the plane that is perpendicular to the pull rod and includes the hinge pins, and by providing that in the opened position of the closing members, the hinge joints are disposed at the same predetermined distance on the other side of said perpendicular planes.

Preferably, the angle between the perpendicular plane and the line going through the corresponding hinge joint and hinge pin is approximately 40° .

One embodiment of the invention will now be explained, by way of example, with reference to the accompanying drawings.

In these drawings:

Fig. 1 is a top plan view of a curved ventilating hatch in the closed position;

Fig. 2 is a transverse elevation of the longitudinal section of the curved ventilating hatch, taken on the line I-I of Fig. 1;

Fig. 3 is an enlarged detail of Fig. 1, with dotted lines indicating the opened position.

The ventilating hatch shown in top plan view in Fig. 1, which may for instance be mounted on the roof of a building, comprises a framework 1 consisting of two opposite longitudinal sides 2 following an arcuate curve in the same direction relative to their axes, as can be clearly seen in Fig. 2, and two opposite transverse sides 3. The hatch opening 4 so formed by the framework 1 is divided into a plurality of hatch compartments 6 by a plurality of profiled members 5, U-shaped with the legs directed outwardly and arranged substantially parallel to the transverse sides 3.

Each of these hatch compartments 6 can be closed off by a separate closing member 7 fitted in a frame section (not shown), each closing member 7 being adapted for hinge movement relative to a longitudinal end thereof about a corresponding hinge pin 8. These hinge pins extend parallel to a transverse side 3 of the framework 1 and have their ends hinged to the longitudinal sides 2 of the framework 1.

The closing members 7 can be flat members or have a curved configuration following the arcuate curve of longitudinal sides 2.

By providing the frame section of each of the closing members 7 with downwardly directed rims (not shown) and a resilient sealing construction arranged around the frame section, a draught, water and snow tight seal can be obtained.

Due to the presence of the profiled members

5, any water disposed on the closing members 7 can be drained laterally of the ventilating hatch via the profiled members, and thus water is prevented from entering the space below.

As will appear from Figs. 2 and 3, for opening and closing the closing members, there is provided a common pull rod 9, whose axis follows a substantially arcuate curve and is substantially equal to the curve of the longitudinal sides 2 of the framework 1. The pull rod 9 is arranged such that it extends coaxially with the longitudinal sides 2, and hence with the series of closing members 7, and substantially perpendicularly to the hinge pins 8 of the closing members 7. Via a plurality of substantially identical connecting arms 10, the pull rod 9 is coupled to the corresponding closing members 7. The connecting arms are, at one end, rigidly coupled to the closing members, and, at the other, hinged to the pull rod 9 at hinge joints 11.

The connecting arms 10 are so constructed that, in the closed position of the closing members, the hinge joints 11 of the arms 10 on the pull rod 9 are disposed at the same predetermined distance before the hinge pins 8 of the corresponding closing members 7, as viewed in the opening direction of the pull rod (direction of arrow P). Fig. 3 shows that the predetermined distance equals the distance 'a' from the hinge joints 11 to the plane 12 which is perpendicular to the pull rod 9 and includes the hinge pin of the associated hinge joint, and that, in the opened position of the closing members, the hinge joints are disposed at the same predetermined distance 'a' on the other side of these perpendicular planes 12. Preferably, the hinge joints are at a distance 'a' such that the angle α between the perpendicular plane and the line going through the hinge joints 11 and the associated hinge pins 8 of the closing members 7 is approximately 40° , which means that the closing members 7 can be opened through an angle of approximately 80° . It will be clear that the angle α can have other desired values.

As a result of the fact that the distance from the hinge joints 11 to the associated perpendicular planes 12 in both the closed and opened position of the closing members 7 is always the same, the pull rod 9 - although it will first come down slightly since the hinge joints 11 traverse circular paths b during their displacement- after completion of an opening or closing movement, will invariably end up at the same radial distance R from its fixed centre, i.e. that the centre of the arc of the pull rod is in the same point before and after the opening and closing movement.

Owing to the specific location of the hinge joints 11 on the pull rod - as described above - it appears that upon opening and closing of the closing members 7 there is no torsion produced in the

successive connecting arms between the pull rod and the connecting arms with the closing members, so that the opening and closing operation can be carried out with the pull rod without difficulty.

Since during its movement the pull rod deviates only little from its radial distance R to its fixed centre M, the pull rod 9 can be simply driven by for instance a hydraulic drive 13 which can be arranged adjacent the ventilating hatch and which can be remote-controlled. Optionally, the drive 13 can be effected electrically, pneumatically or by hand.

Depending on requirements, the pull rod 9 can be arranged in the middle of the ventilating hatch or on one side or on both sides, for instance when the ventilating hatch has very large dimensions.

Optionally, the closing members 7 can be so arranged that they overlap. In that case, the provision of profiled members 5 can be omitted. Such a construction, in combination with a pull rod at one or at both sides of the ventilating hatch, gives a greater, freer light surface and a more aesthetic aspect from the space below.

To ensure that the wind passes over the ventilating hatch and is not deflected into the hatch, there may be provided end partitions 14 which are arranged at the two transverse sides 3 of the framework 1. These end partitions need only be of limited height to enable sufficient deflection of the wind and certainly need not project above the highest closing members 7. If necessary, also longitudinal partitions (not shown) can be arranged at the two longitudinal sides 2 of the framework 1, for instance to meet local fire security regulations.

Claims

1. A ventilating hatch comprising a framework surrounding the hatch opening, the longitudinal sides of the framework following a generally arcuate curve in the same direction relative to their axes, and which hatch opening so curved can be closed off with a hinged closing cover cooperating therewith, characterized in that the closing cover consists of a plurality of separate closing members (7) which can each be hinged relative to a longitudinal end thereof about a corresponding hinge pin (8) coupled to the longitudinal sides (2) of the framework (1), said hinge pins (8) extending parallel to the transverse side (3) of the framework (1), and that, for opening and closing each of the closing members (7), there is provided a common pull rod (9) whose axis follows a substantially circular curve, and which curve is substantially equal to the arcuate curve of the longitudinal sides (2) of the framework (1), the pull rod (9) being so arranged that it is substantially per-

pendicular to the hinge pins (8); and a plurality of connecting arms (10) corresponding to the number of closing members (7), each of said arms (10) being, on the one hand, coupled to the associated closing members (7) and, on the other, hinged to the pull rod (9), the hinge joints (11) of the connecting arms (10) being arranged at such a location on the pull rod (9) that, when the pull rod (9) is pulled or pushed in the direction of its axis for, respectively, opening or closing the closing members (7), the centre (M) of the arc of the pull rod is fixed substantially in the same point both in the position where the closing members (7) are closed and in the position where the closing members (7) are opened and vice versa.

2. A ventilating hatch according to claim 1, characterized in that each of the connecting arms (10) is so designed that their hinge joints (11), in the closed position of the closing members (7), are coupled to the pull rod (9) at the same predetermined distance (a) before the hinge pins (8) of the associated closing members (7), viewed in the opening direction of the pull rod (9), these predetermined distances (a) being equal to the distance from the hinge joints (11) to the plane (12) which is perpendicular to the pull rod (9) and includes the hinge pins (8), and that, in the opened position of the closing members (7), the hinge joints (11) are disposed at the same predetermined distance on the other side of said perpendicular planes (12).
3. A ventilating hatch according to claim 2, characterized in that the angle (α) between the perpendicular plane (12) and the line going through the hinge joint (11) and the associated hinge pin (8) is preferably approximately 40° .

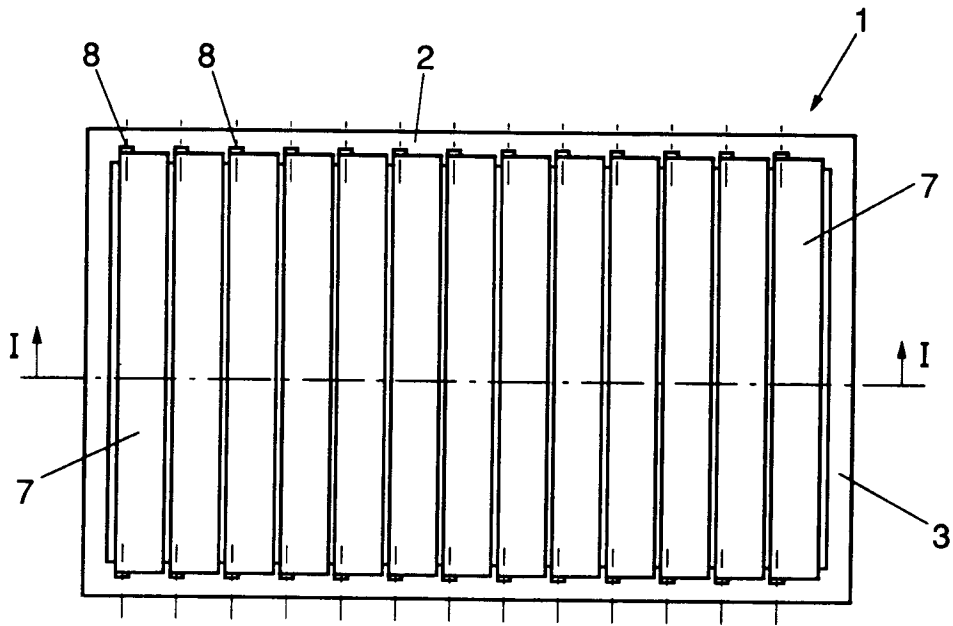


FIG. 1

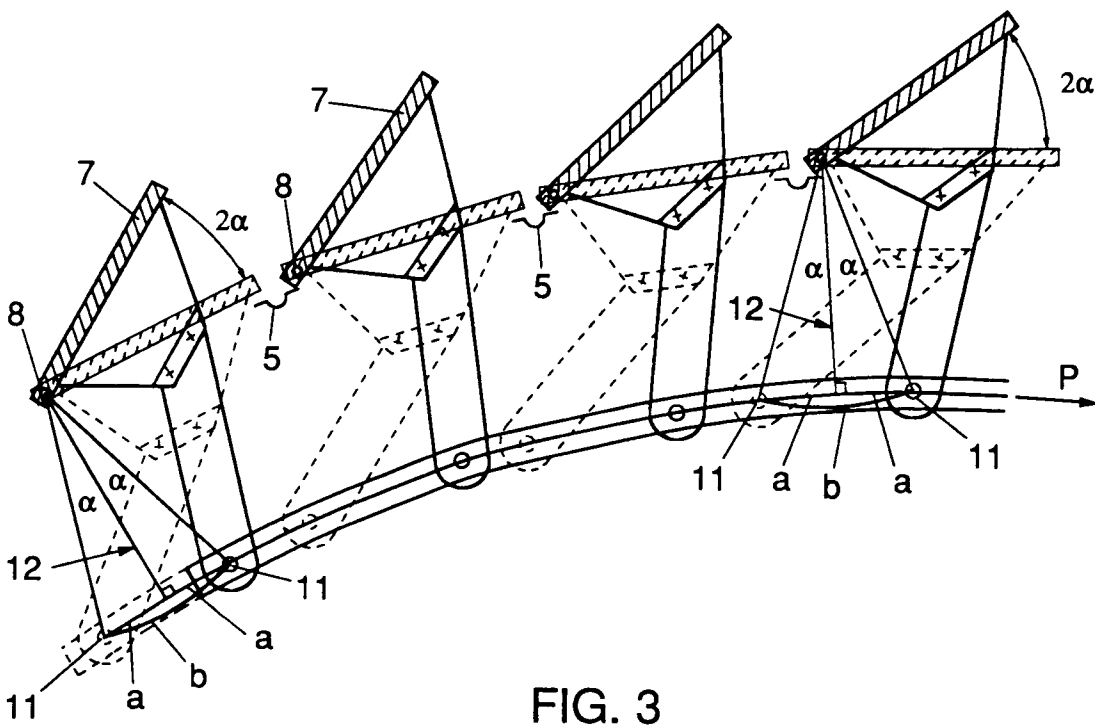


FIG. 3

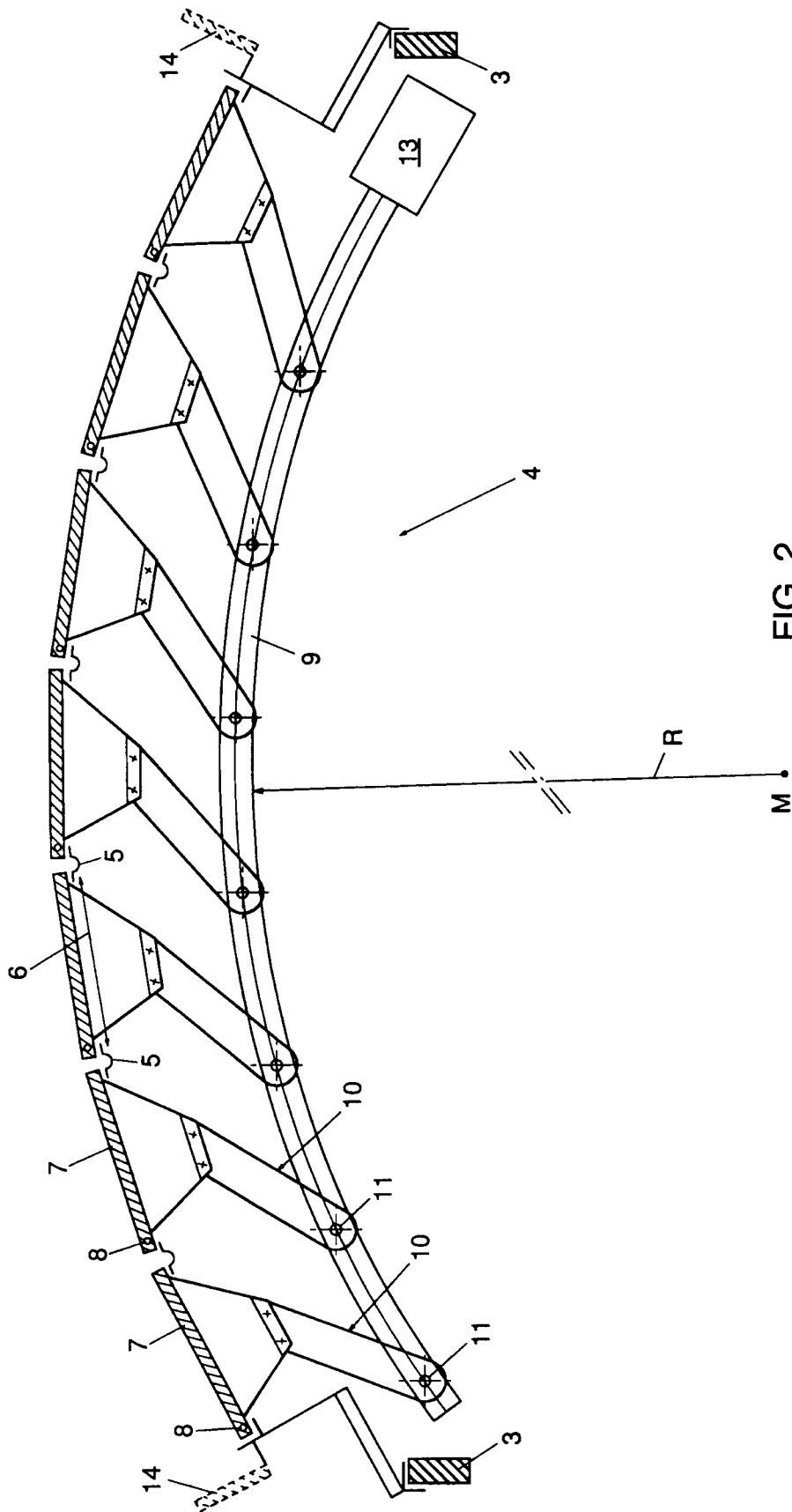


FIG. 2



EUROPEAN SEARCH
REPORT

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)
A	FR-A-2 405 638 (RICHEL) * page 2, line 32 - page 3, line 7; figures 1,3 * - - -	1	F 24 F 7/02 F 24 F 13/15
A	GB-A-1 374 739 (HOFSTETTER) * figures 1,2 * - - -	1	
A	FR-A-2 382 554 (SOUCHIER) - - - - -		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 24 F E 04 B
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		03 October 91	PESCHEL G.
CATEGORY OF CITED DOCUMENTS 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 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	