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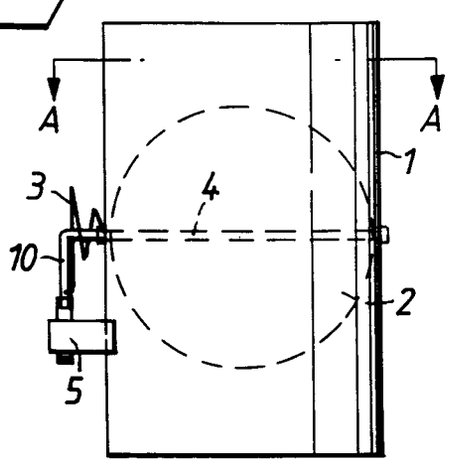
(54) A fire damper.

(57) A fire damper for use in a ventilation duct between a kitchen fan of the kind which is placed above a kitchen stove, and the surroundings, the damper being a rotatable damper which includes a disc (2) which is mounted for rotation about an axle (4) which extends along a diameter of a tube (1) forming part of the ventilation duct, the disc being rotatable between an open position, in which the plane of the disc coincides with the longitudinal axis of the tube (1), and a closed position, in which the disc lies transversely to the duct axis and therewith closes the same. The invention is characterized in that the disc (2) is biased by a spring (3) towards its closed position ; in that the disc is held in its open position by means of a thread (6 ; 9) which extends between the edge or rim of the disc (2) and the wall of the tube (1) and which includes a melt fuse (8) which melts at a predetermined, elevated temperature.

Fig.5



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The present invention relates to a fire damper for use in a ventilation duct, between a kitchen fan and the surroundings.

When investigating fire damage, it has been found that the damaged caused by the fire concerned would have been less serious if spreading of the fire via the ventilation duct above the kitchen fan had been stopped at an early stage. Such ducts are not often fire resistant. Particularly when a fire starts on the kitchen stove beneath the fan, it would be possible to contain the damage caused by the fire to local areas, and in certain instances to avoid any form of damage at all, if it had been possible to prevent the fire from spreading via the ventilation duct.

The present invention solves the aforesaid problem with the aid of a device which will prevent fire from spreading via the ventilation duct.

Accordingly, the present invention relates to a fire damper for use in a ventilation duct between a kitchen fan of the kind which is mounted above a kitchen stove, and the surroundings, said damper having the form of a rotational damper which comprises a disc that can be rotated about an axle which extends along a diameter of a tube forming part of the ventilation duct, said disc being mounted for rotation between an open position in which the plane of the disc coincides with the longitudinal axis of the tube and a closed position in which the disc is positioned transversely of the duct and therewith closes the same, and is characterized in that the disc is spring-biased towards its closed position; in that the disc is held in an open position by means of a safety device which extends between the edge of the baffle and the tube wall; and in that the safety device includes a meltable element, or melt fuse, which melts at a predetermined, elevated temperature, and a flame guard which includes a readily ignited thread.

The invention will now be described in more detail with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings, in which

- Figure 1 is a first side view of an inventive device, and shows said device in a first position;
- Figure 2 is a sectional view taken on the line A-A in Figure 1;
- Figure 3 is a first side view of an inventive device, with said device in a second position;
- Figure 4 is a sectional view taken on the line A-A in Figure 3;
- Figure 5 is a second side view of the inventive device, with the device in a first position;
- Figure 6 is a sectional view taken on the line A-A in Figure 5;
- Figure 7 is a second side view of the inventive device, with the device in a second position;
- Figure 8 is a sectional view taken on the line A-A in Figure 7;
- Figure 9 is an axial sectional view of part of the device, and shows part of the damper and part of a tube; and
- Figure 10 illustrates the safety device shown in Figure 9, as seen from above in Figure 9.

The drawings illustrate a fire damper for use in a ventilation duct extending between a kitchen fan of the kind which is placed above a stove, and the surroundings. The damper is a rotatable damper which includes a disc 2 which is mounted for rotation about an axle 4 extending along a diameter of a tube or pipe 1 forming part of the ventilation duct. The disc 2 can be rotated between an open position, see Figures 2 and 6, in which the plane of the disc coincides with the long axis of the tube 1, and a closed position, see Figures 4 and 6, in which the disc 2 lies transversely to the duct and therewith closes the same.

In accordance with the invention, the damper 2, 4 is biased by a spring 3 towards its closed position. The damper 2, 4 is held open by means of a thread 6 which extends between the edge or rim of the disc 2 and the wall of the tube 1, said thread including a meltable fuse 8 which melts when exposed to a predetermined, elevated temperature.

As shown in Figures 1 and 5, the damper axle 4 is angled externally of the tube 1, such as to present an L-shaped axle-part 10 externally of said tube.

The spring 3 is preferably a helical spring and, according to one preferred embodiment of the invention, is placed on the outside of the tube 1. In this case, the spring is intended to act on the L-shaped part 10 of the axle 4 and therewith strive to close the disc 2. When the damper is closed, it rests on a stop shoulder 7 firmly mounted on the inner wall of the tube 1.

It is stated in the aforegoing that the melt fuse shall melt at a predetermined temperature. A suitable temperature in this regard may be 150°C to 200°C. This temperature range exceeds the temperatures normally occurring above a kitchen stove. Such a high increase in temperature may be caused by a fire on the stove or in the vicinity of the stove, but can also be the result of overheating in the absence of an actual fire.

The melt fuse may consist of a lead alloy or tin alloy which will melt at a predetermined temperature. Alternatively, a plastic material can be used. The temperatures at which different metals melt is well known, and consequently the person skilled in this art will have no difficulty in choosing an appropriate material which will melt at the desired temperature.

In order to further enhance the security afforded by the inventive device, the whole of the thread, or a part 9 thereof, may consist of a combustible material. An example of a suitable material in this respect in cotton wool, or some other similar, combustible material. This arrangement will mean that the thread is burned away immediately it comes into contact with a flame, which may occur before the melt fuse has been subjected to a temperature sufficiently high and for a sufficiently long period of time for the fuse to melt.

When the melt fuse melts, or when the thread is burned away, the biassing force of the spring 3 acting on the L-shaped part 10 of the axle 4 will cause the disc 2 to rotate to its closed position. With the disc in its closed position, hot gases are prevented from flowing into the ventilation duct, therewith effectively stopping fire from spreading thereto.

A much preferred, alternative embodiment of the aforedescribed melt fuse and the flame guard in the form of said thread is illustrated in Figures 9 and 10.

According to this embodiment, the fuse or safety device comprises a first, a second and a third metal tongues 15, 16, 17, of which a first metal tongue 15 is L-shaped at its free end, which end extends through a slot 18 in the wall of the tube 1, and of which a third tongue 17 is also L-shaped at its free end, this end extending through a slot 19 in the disc 2. Because of their L-shapes, the tongues 15, 17 are held in relation to the tube 1 and the disc 2 respectively, see Figure 9, where the disc is thus held in its open position.

The second tongue 16 extends between the first tongue 15 and the third tongue 17. The second tongue 16 is soldered 20 to the first tongue 15, the solder used consisting of an alloy which will melt at relatively low temperatures, for example at 150°C to 200°C. As will be understood, the solder may consist of a substance which will melt at a lower temperature, for instance a temperature of 100°C.

The end of the second tongue 16 opposite the solder join 20 is bent to include a V-shaped part 21. The end of the third tongue remote from the disc 2 is also bent so as to include a V-shaped part 22.

The respective V-shaped parts 21, 22 of the second and the third tongues are placed one upon the other, see Figure 9. As will also be seen from Figure 9, a thread 23 is tied around the bottom of the V-shaped parts. A thread 29 which is attached in this way will press the V-shaped parts 21, 22 together, thereby preventing the second and the third tongues from being separated, in the manner indicated by the arrows 25 in Figure 10, unless the thread 23 is burned.

The thread 23 is intended to function as a flame guard, and is therefore made of a readily combusted material.

According to one preferred embodiment, the thread consists of nitrated yarn, which is readily ignited when exposed to a flame. Such nitrated yarn can be obtained, inter alia, from the company Tempus AB, Stockholm, Sweden.

According to an alternative embodiment, a thread 23 of less inflammable material is tied around the V-shaped parts, whereafter one or more turns of nitrated yarn are wound around the thread. In this case, the nitrated yarn is not load-bearing, but is merely intended to ignite when exposed to a flame, and therewith to burn the thread 23 of less inflammable material.

It will be evident that a reliable flame fuse is obtained in the aforedescribed manner.

There is also obtained a reliable melt fuse. The tongues 15, 16, 17 are preferably made of a material which has a high thermal conductivity, such as copper or brass, so that the solder 20 will melt as quickly as possible when the temperature in the ventilation duct exceeds the melting point of the solder.

It will also be obvious that the present invention solves the problem mentioned in the introduction.

The inventive damper may, of course, be installed in a factory in which kitchen fans are manufactured. According to one preferred embodiment, however, the damper is intended to be fitted to existing kitchen fans. In this case, the damper is mounted in a pipe whose one end 11 is intended to be connected to a pipe connector provided on the upper part of a kitchen fan for the departure of exhaust air from said fan, and the other end 12 of which is intended for connection to the inlet end of a ventilation duct.

According to another preferred embodiment, an electric microswitch 5 is positioned adjacent that part 10 of the damper axle 4 which is located on the outside of said tube 1, this microswitch 5 being activated when the disc 2 is rotated from its open position to its closed position. The microswitch 5 may include, for example, a leaf spring 13 which abuts a contact 14 of the microswitch when the damper is open. When the part 10 is rotated, the leaf spring is moved away from the contact 14, thereby activating the microswitch. The microswitch 5 is intended to form part of an electric alarm circuit. Such alarm circuits are well known to the art and do not need to described in detail here.

Although the present invention has been described with reference to an exemplifying embodiment thereof, it will be understood that the damper may be constructed in other ways. Furthermore, the thread and melt fuse may be given other configurations and attached relatively to the damper and the tube in other ways without departing from the aforedescribed function.

The present invention is not therefore restricted to the aforedescribed embodiments, since modifications can be made within the scope of the following Claims.

Claims

1. A fire damper for use in a ventilation duct between a kitchen fan of the kind which is placed above a kitchen stove, and the surroundings, said damper being a rotatable damper which includes a disc (2) which is mounted for rotation about an axle (4) which extends along a diameter of a tube (1) belonging to the ventilation duct, said disc being rotatable between an open position, in which the plane of the disc coincides with the longitudinal axis of the tube (1), and a closed position, in which the disc is positioned transversely to the duct axis and therewith closes the duct, **charac-**

terized in that the disc (2) is biased by a spring (3) towards its closed position; in that the disc is held in its open position by means of a safety device (6; 9) which extends between the edge or rim of the disc (2) and the wall of the tube (1); in that the safety device includes a melt fuse (8) which melts at a predetermined, elevated temperature, and a flame guard which comprises a readily ignited thread.

2. A damper according to Claim 1, **characterized** in that the flame guard includes a thread (9) which is made wholly or partially of combustible material.

3. A damper according to Claim 1 or 2, **characterized** in that the melt fuse and the flame guard include a first (15), a second (16) and a third (17) tongue, wherein the first tongue is attached to the wall of the tube (1) and the third tongue is attached to the disc (2); in that one end of the second tongue (16) is attached to a first of the other tongues by a solder join forming a melt fuse, and is attached to the second of the other tongues by means of a readily ignited thread which forms a flame guard.

4. A damper according to Claim 2 or 3, **characterized** in that the thread consists wholly or partially or nitrated yarn.

5. A damper according to Claim 1, 2, 3 or 4, **characterized** in that the disc (2) is mounted in a pipe connector (1) whose one end (11) is intended for connection to a pipe located on the uppert part of the kitchen fan and intended to receive the exhaust air of the fan, and the other end (12) of which is intended for connection to the inlet end of a ventilation duct.

6. A damper according to Claim 1, 2, 3, 4 or 5, **characterized** in that the spring (3), which is preferably a helical spring, is placed on the outside of said tube (1).

7. A damper according to Claim 1, 2, 3, 4, 5 or 6, **characterized** by an electric microswitch (5) which is placed adjacent a part (10) of the damper axle (4) located on the outside of said tube (1), wherein the microswitch is intended to be activated when the disc is rotated from its open position to its closed position, and is intended to be included in an electric alarm system.

Fig. 1

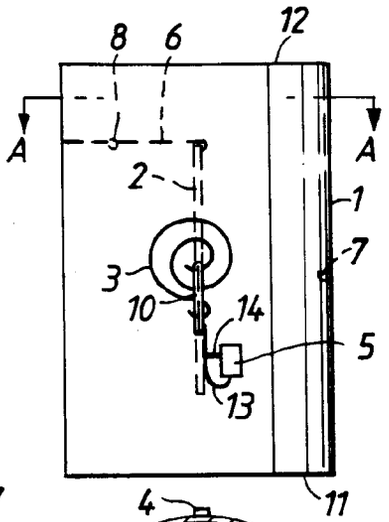


Fig. 5

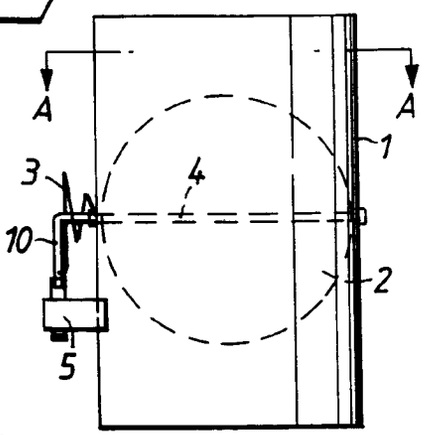


Fig. 2

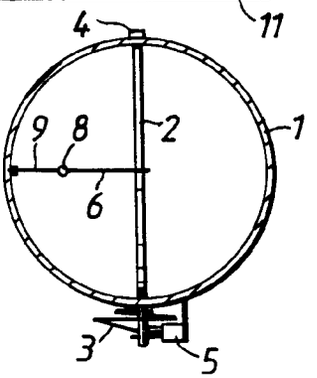


Fig. 6

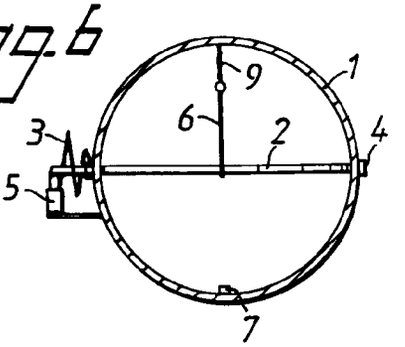


Fig. 3

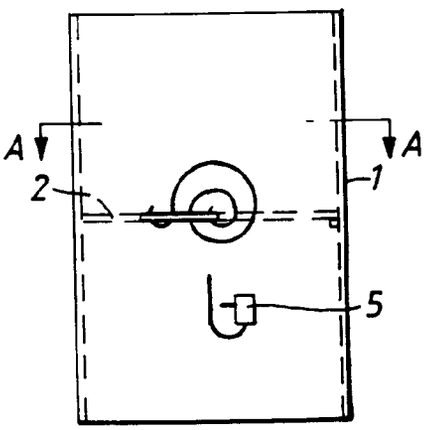


Fig. 7

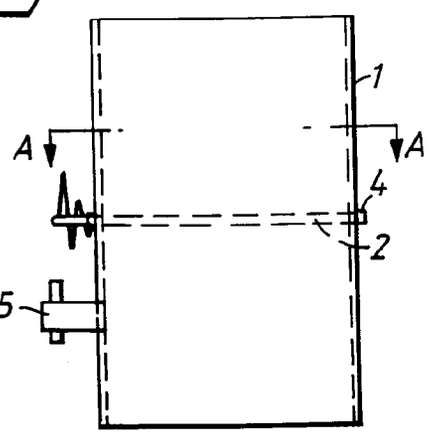


Fig. 4

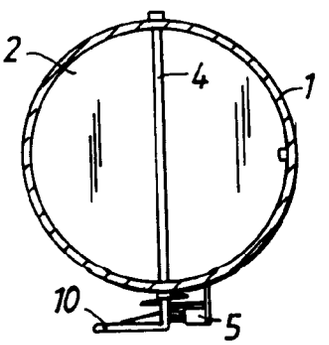
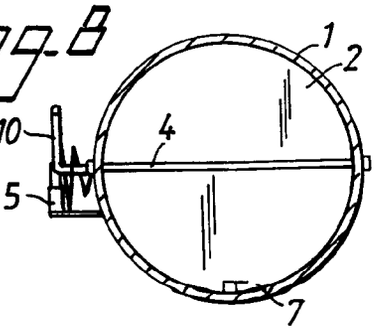


Fig. 8



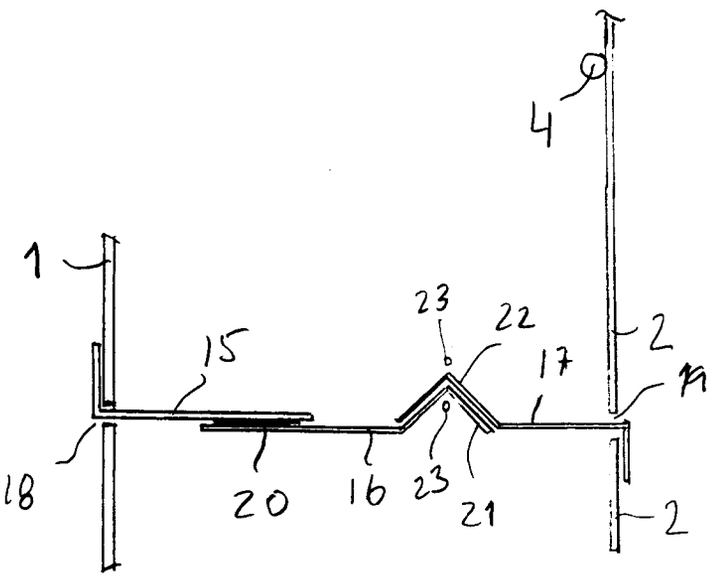


Fig 9

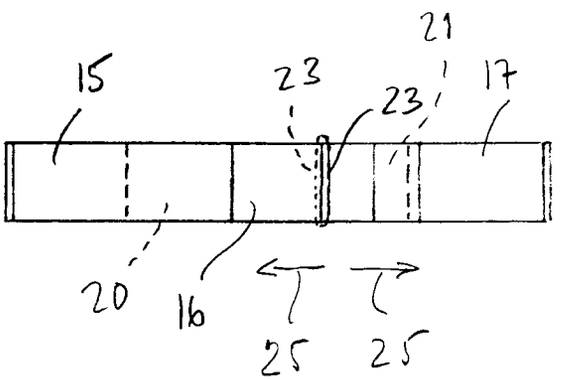


Fig 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 85 0296

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	DE-A-3 933 997 (DEUTSCHKREUTZ) * the whole document * ---	1	A62C2/12
A	US-A-4 958 687 (NAKAGAWA) * the whole document * ---	1	
A	FR-A-2 242 999 (FUTURUMVERKEN AB.) * the whole document * ---	1	
A	DE-U-8 805 225 (FRIEDRICH RATHGEBER KG REGELTECHNIK) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A62C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 FEBRUARY 1992	DIMITROULAS P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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