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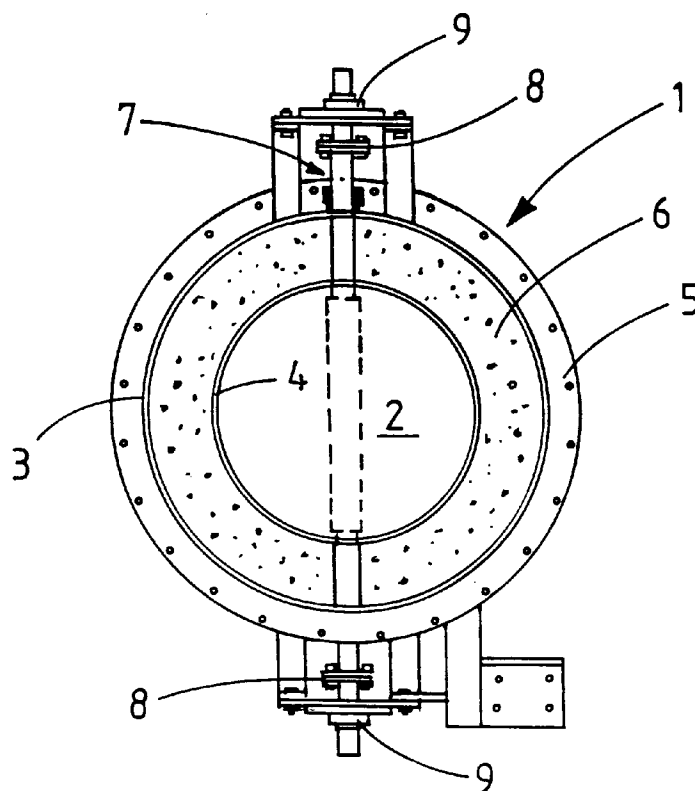
EUROPEAN PATENT APPLICATION

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Kespat Oy,
P.O. Box 601
40101 Jyväskylä (FI)**(54) A control damper, particularly for hot gases**

(57) The object of the invention is a control damper, particularly for hot gases, which includes an insulated duct component (1) and inside it a rotatable blade component (2) supported on an axle (7) and a rotating device (10) to rotate the axle (7) and the blade component (2) with it. The axle (7) is, at least at one side, supported by means of a support bearing (9) located outside the insu-

lation. The axle includes a heat gap (8), which comprises flanges (16, 17) bolted together and set on either side of the gap and separated by an air gap, in which the air gap is determined by a component (15') or group of components (15) attached to one flange (14) and in which there are both axial and radial machinings (22, 23), which correspond to the axial and radial machinings (20, 21) of the flange.

**FIG. 1****EP 0 779 476 A2**

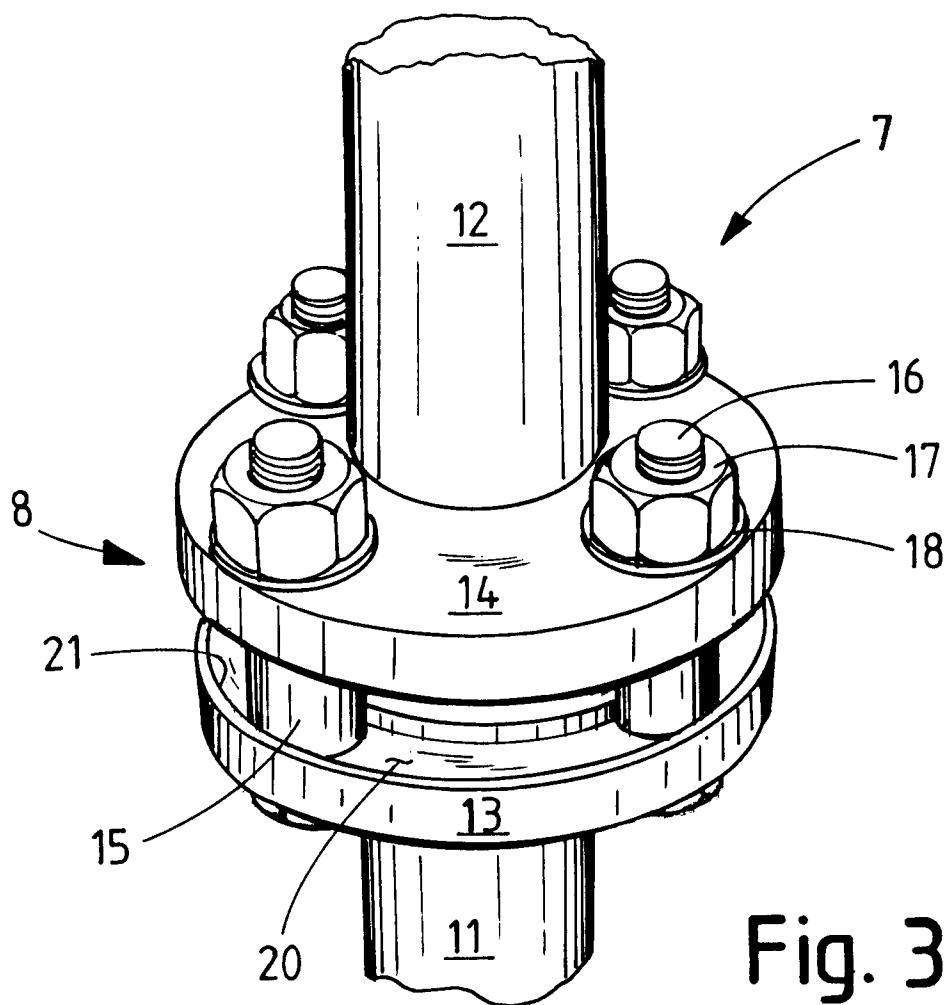


Fig. 3

Description

The object of the invention is a control damper, particularly for hot gases, which includes an insulated duct component and a blade component that rotates inside it on an axle, in which the axle is supported, at least on one side, by means of a support bearing placed outside the insulation.

A problem in the aforementioned type of damper is the strong flow of heat along the axle, which heats the bearing unreasonably. When the temperature of the flue gas is, for example 500 - 800°C, it is difficult to keep the bearing at a reasonable operating temperature (less than 150°C). According to the state of the art, the axle and the gaskets are cooled by means of an air current, such as that described in the French patent publication FR 2320548.

The intention of this invention is to solve the above problem in a simpler manner than previously. The characteristic features of the invention are described in the accompanying Patent Claims. By using a heat gap in the axle according to the invention, the temperature in the bearing is brought down to a quite normal level. The dimension of a control damper according to the invention in the direction of the axle increases quite little compared to the conventional dimension. It is quite essential, that the heat gap of the axle according to the invention is achieved as a parallel and concentric continuation to the axle.

In what follows, the invention is illustrated by reference to the accompanying Figures, which show in detail a control damper according to the invention and the heat gap used in its axle.

Figures 1 and 2 show the control damper as a general cross-section and in partial cross-section.
Figure 3 shows the heat gap as an axonometric diagram.
Figure 4 shows a cross-section of the blade part of the heat gap component.
Figure 5 shows an alternative method of constructing the heat gap.

The principal parts of the control damper are the duct component 2, which includes internal and external jackets 3 and 4, and the rotatable blade 2 supported by axle 7. The axle is rotated by means of rotating devices 9 and 10, in a manner that is, as such, known. Between the jacket components 3 and 4 there is thermal insulation 6, through which axle 7 is led. The bearing 9 is supported on an auxiliary structure resting on frame 1. The bearing 9 carries axle 7, the end of which is separated from the heat section by means of heat gap 8.

Figure 3 shows this heat gap in detail, in which axle 7 is shown by the first, hot axle 12, and its continuation axle 11. At the ends of these are flange components 13 and 14, which are set opposite one another, and which

are kept at a distance from one another by collars 15. These collars are welded to the first component 14, while the securing proper takes place by means of bolted connections 16, 17. It is advantageous to use spring washers 19 under nuts 17, to even the compressive force.

Figure 4 shows the construction of the heat gap in greater detail, which is used to align the continuation axle 11 with the hot axle 12. The welded collars 15 of the first flange 14 are machined in the direction of the axle, i.e. axially, in which case the axial machining 22 is made precisely at right angles to the line of the axle. The ends of the collars 15 are machined for a short distance from a point touching a common circumference creating radial machining 23, which is precisely concentric with the first part 12 of the axle.

Axial machining 20 is correspondingly formed in the flange 13 of the second component of axle 7, and is precisely at right angles to the continuation of the axle and correspondingly concentric with machining 21. The radial machining 21 and 23 correspond to one another with a suitable tolerance and determine the precise location of the continuation of the axle concentrically with the hot axle 12 and correspondingly end machining 20 and 22 align the axles precisely with one another. It is quite essential, that an undemanding level of precision of the axles, in engineering workshop terms, is sufficient. The precision of the location of continuation axle 11 is, in any event, considerably better than what could be achieved in, for example, a welded joint construction. The machining thus corrects the small faults that take place in the welding of the flanges and collars.

In thermal terms, the heat gap breaks the direct thermal conductivity of the first component 12 and offers a large heat dispersion surface between the flanges.

In the examples in Figures 1 - 4, small collars 15 set at the bolt-holes 25 and 26 have been used, but these can be replaced, according to Figure 5, with a single large coaxially set cylinder 15', in which ventilation openings 19 are machined, to permit the flow of air between the flanges to cool them. This large collar 15' is machined radially and at the ends in the same way. The machining of the opposing flange 13 is quite the same as above.

In the case of Figures 1 - 4, the internal diameter of the collars 15 is 10 - 15 % larger than the external diameter of the bolts 16.

Because the intention of the flange joint is to cut the flow of heat along the axle, the dimensioning of the construction has a significance beyond the mere withstanding of stress. The construction is intended to reduce heat leak. The diameter of flanges 13, 14 is advantageously 250 - 300 % of the diameter of hot axle 12 and their thickness 20 - 35 % of the diameter of the hot axle 12. Naturally, other kinds of components can be used in place of the collars 15, or the cylinder 15'. The total cross-sectional surface of the components should be minimized.

Claims

1. A control damper, particularly for hot gases, which includes an insulated duct component (1) and inside it a rotatable blade component (2) supported on an axle (7) and a rotating device (10) to rotate the axle (7) and the blade component (2) with it, and in which the axle (7) is, at least at one side, supported by means of a support bearing (9) located outside the insulation, characterized in that the axle includes a heat gap (8), which comprises flanges (16, 17) bolted together and set on either side of the gap and separated by an air gap, in which the air gap is determined by a component (15') or group of components (15) attached to one flange (14) and in which there are both axial and radial machinings (22, 23), which correspond to the axial and radial machinings (20, 21) of the flange. 5 10 15
2. A control damper according to Claim 1, characterized in that the group of components comprises collars (15) set at the bolts, and which are welded to the first flange (14). 20
3. A control damper according to Claim 2, characterized in that there are four collars (15) and that they are set at essentially a double radius in relation to the outer radius of axle (12). 25
4. A control damper according to Claim 3, characterized in that the internal diameter of the collars (15) is 10 - 50 % greater than the outer diameter of the bolts (16). 30
5. A control damper according to Claim 1, characterized in that the aforesaid component comprises a single, large, coaxially set cylinder (15'), which is welded to the first flange (13) and the aforementioned machinings are made in the ends of the cylinder (15'), and in which cylinder (15') there are ventilation openings (19) to cool the flanges (13, 14). 35 40
6. A control damper according to one of Claims 1 - 5, characterized in that the diameter of the flanges (13, 14) is 250 - 300 % of the diameter of the hot axle (12) and their thickness is 20 - 35 % of the diameter of the hot axle (12). 45

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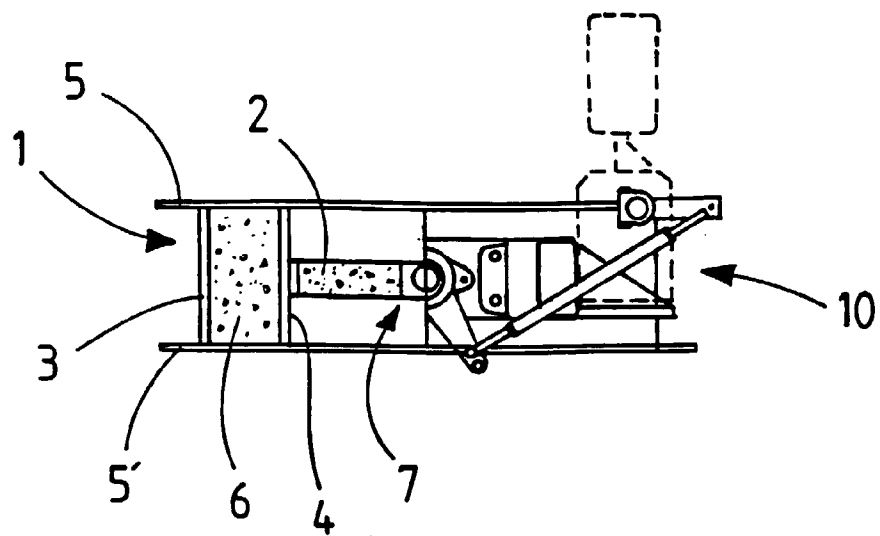


FIG. 2

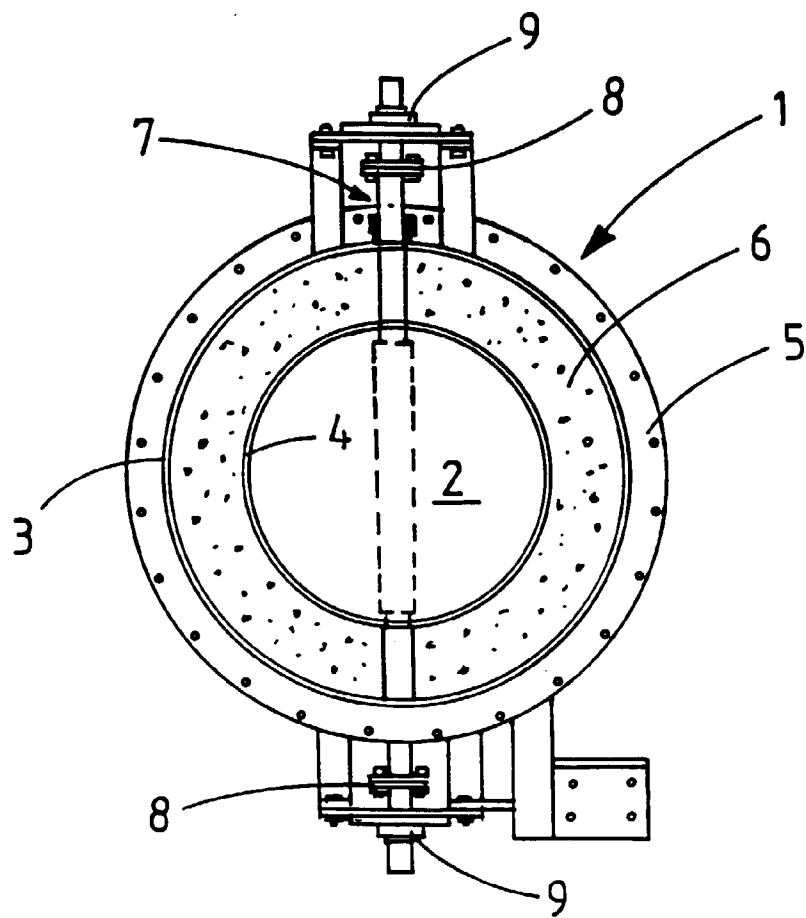


FIG. 1

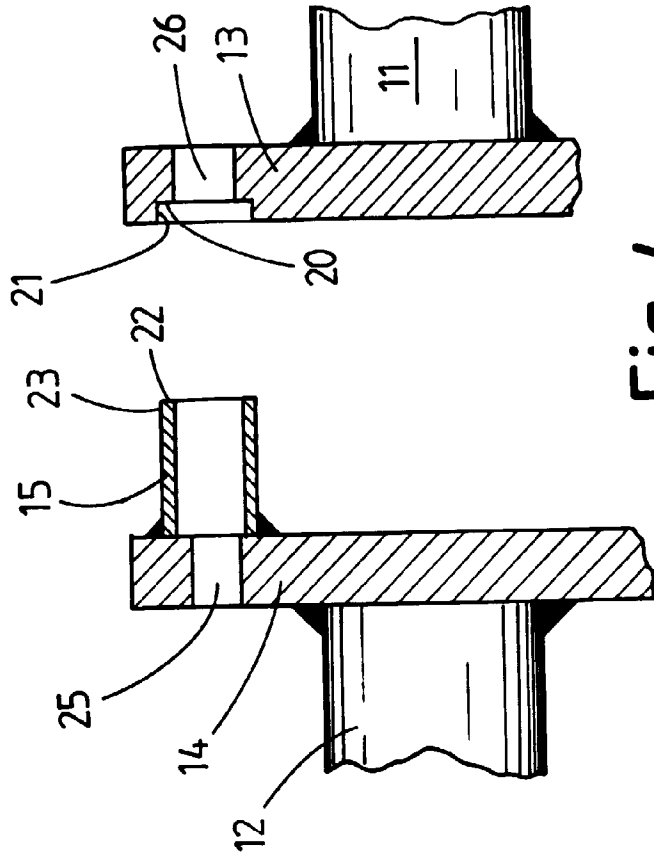


Fig. 4

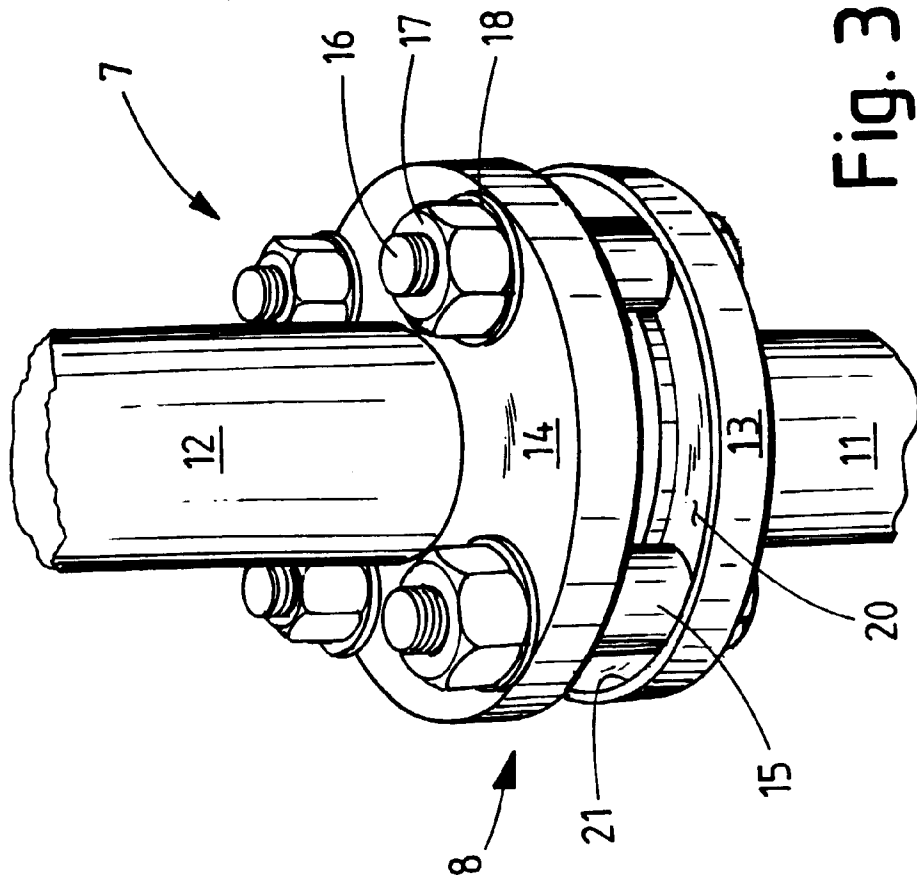


Fig. 3

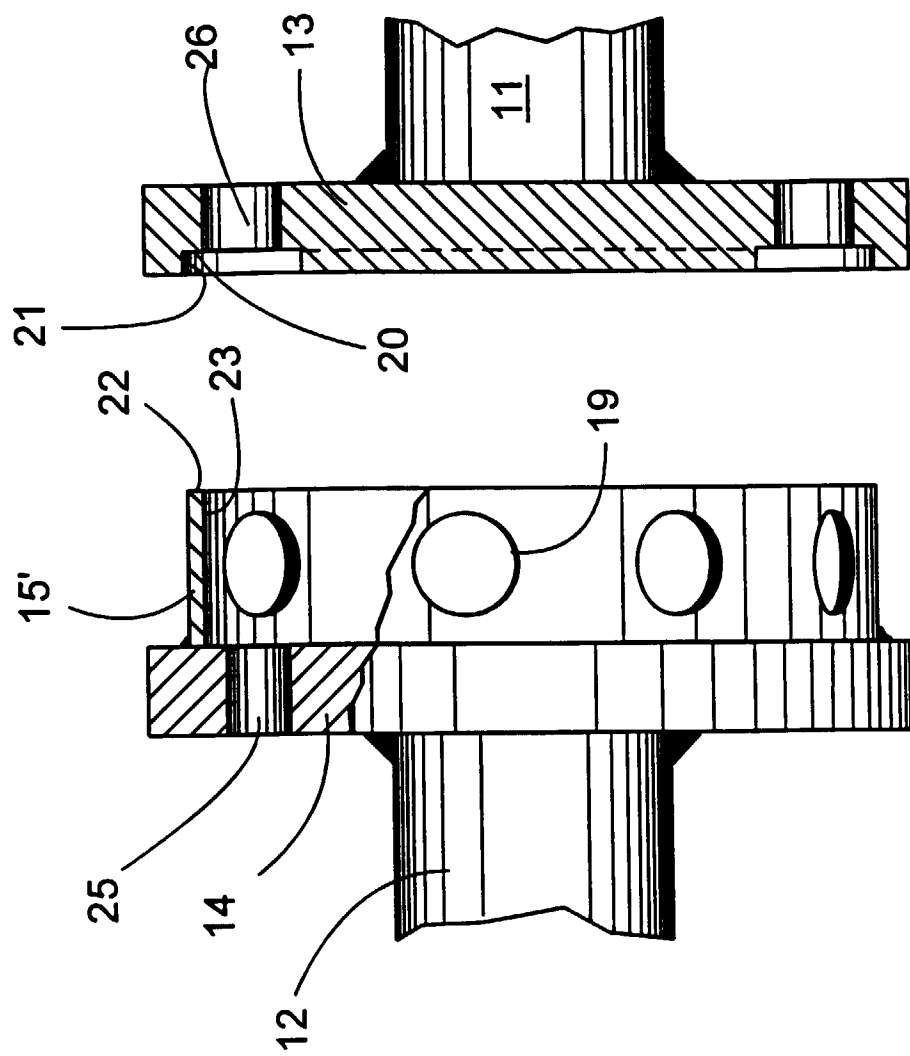


Fig. 5