EUROPEAN PATENT SPECIFICATION

AIR SUPPLY VALVE
LUFTZUFUHRVENTIL
REGISTRE D’ENTREE D’AIR

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DISCLOSURE OF THE INVENTION:

[0005] A principal object of the present invention is therefore to solve the abovementioned problems and to provide Throttle device for achieving a high and virtually constant velocity of an inflowing current of gas through a channel, the device comprising a flap which is arranged so that it can pivot on an axle and which is designed in such a way that, at a certain pressure force exerted by the current of gas, it is opened from a position in which the channel is essentially closed.

[0006] In connection with boilers of various types, for example recovery boilers for use in the production of paper pulp, or heating boilers or steam boilers for solid fuels, such as, for example, bark, peat or coal, it is of great importance that the combustion take place with a uniform and controlled delivery of air and with sustained air penetration, even at partial loads. This leads to an optimized combustion, which results in a high degree of efficiency of the boiler and in a low proportion of environmentally hazardous discharge from the said boiler.

[0007] However, a disadvantage of these and other previously disclosed devices is that they do not permit a high penetration of air, that is to say a high degree of penetration of the air upon reduction of the air flow through the nozzle, without a considerable increase in the pressure for this penetration. Good penetration of air is necessary in order to achieve an optimized combustion in the boiler, while at the same time an increased pressure requirement for the combustion air increases the energy consumption in the plant. From DE 3104474 it is known a throttle device which indeed provides good penetration of air also when reduced air flow is received. However, this known device presents two serious disadvantageous. Firstly it requires the use of two separate counter weights in order to balance the flap in a desired manner. Secondly the flap starts from a vertical position, which means that the change of the torque exerted by the flap during pivoting will alter drastically closed to this vertical position, which is of course not desired since it would be more difficult to control.

DESCRIPTION OF THE FIGURES:

[0008] The invention will be described in greater detail hereinafter with reference to the attached figures, of which:

Figure 1 is a side view of the device according to the present invention.
Figure 2 is a diagrammatic view of another embodiment of the invention.

PREFERRED EMBODIMENTS:

[0009] Figure 1 shows a throttle device in the form of an air nozzle in accordance with the present invention, which device is arranged in a channel 1 for delivery of air to an inlet 2 of a furnace. The furnace is part of a boiler which is not shown in any detail and which may be a recovery boiler or a bark boiler. The air flows through the channel 1 in the direction which is indicated by the arrow 3.

[0010] The channel 1 consists of a pipe which preferably has a rectangular cross section, although some
other form of cross section, for example square, is of course also conceivable. Arranged inside the channel 1 there is a valve flap 4, by means of which the channel 1 can be gradually closed or opened. The valve flap 4 consists of a plate which is designed in such a way that its external dimensions essentially correspond to the internal dimensions of the channel 1, except that the length of the flap is normally greater than the height of the channel 1.

[0010] When the flap 4 is in its lowered position, which is shown by broken lines in Figure 1, the channel 1 will be almost closed with the aid of the flap 4. Only a narrow gap between the underside of the flap 4 and the channel 1 is available in this case, and this means that a small amount of air can flow in at all times. This arrangement has a certain cleansing effect on the channel 1 and the boiler.

[0011] In its upper portion, the flap 4 is pivotably suspended on an axle 5 which is arranged essentially at right angles to the longitudinal direction of the channel 1. The axle 5 is secured in the two side walls of the channel 1 in such a way that it can rotate, and it protrudes some distance outside the channel 1 on at least one side thereof. A lever arm 6 is arranged on that part of the axle 5 protruding outside the channel 1. The lever arm 6 is provided with a coupling piece which is fixed in terms of rotation on the axle 5. On the lever arm 6 there is also a separate weight 7 which can preferably be displaced along the lever arm 6, that is to say in the radial direction in relation to the axle 5. The position of the weight 7 is adjusted with the aid of an adjusting mechanism (not shown) which can comprise a screw, for example, with the aid of which the weight 7 can be screwed tight against the lever arm 6 when the latter is located in the desired position.

[0012] When the throttle device is located in its rest position, that is to say when the air pressure in the channel 1 is below the opening pressure which is defined by the weight 7 or the weight load on the flap 4, the gravity of the flap 4 results in a torque which acts in the counterclockwise direction around the axle 5. This results in the flap 4 coming to bear (almost sealingly) against the bottom side of the channel 1. In its closed position, the flap 4 forms an angle of 30° to 70° in relation to the longitudinal direction of the channel 1. When a certain air pressure is present in the air current in the channel 1, a pressure force is created which acts on the flap 4, and this gives rise to a certain torque. This leads to the flap 4 pivoting clockwise. As the flap 4 pivots clockwise, the weight 7 (which is connected to the axle 5 so that it is fixed in terms of rotation) also pivots clockwise. This gives rise to a certain additional torque which acts clockwise, that is to say, together with the pressure force of the air current, has the effect of opening the flap 4. According to this embodiment, the weight 7 is thus arranged to be rotated together with the axle 5 and to deliver a torque to the axle 5 in conjunction with the pivoting of the flap 4, so that the weight 7 counteracts the dead weight of the flap 4.

[0013] The mass of the flap 4 and the mass of the weight 7 are adapted to each other and to the air pressure prevailing in the channel 1 in such a way that the flap 4 and the weight 7 virtually counterbalance each other when the flap 4 is fully open. However, the mass of the flap 4 and the mass of the weight 7 must be adapted so that when the pressure of the air decreases or completely disappears, the torque from the flap 4 overcomes the torque from the weight 7 so that the flap 4 can again be closed.

[0014] The position of the weight 7 in relation to the axle 5, and consequently the torque of the weight 7 around the axle 5, can be adapted to different air pressures in the current of air. By virtue of the fact that the weight 7 is arranged outside the channel 1, it is also easy to gain access to it for purposes of adjustment.

[0015] The lever arm 6 can alternatively be arranged such that in the rest position (that is to say when the flap 4 is in its lowered position) it deviates from the vertical as shown in Figure 1. The lever arm 6 can be arranged, for example, in such a way that when the flap 4 is in its rest position, the lever arm produces a torque around the axle 5 which acts in the same direction as the torque which occurs as a result of the pressure force of the air. In this way, a relatively small pressure force of the air current is needed to open the flap 4. The lever arm 6 can also be arranged so that when the flap 4 is in its rest position, the lever arm contributes to the torque acting against the torque from the air current.

[0016] Figure 2 shows a diagrammatic representation of a further embodiment of the invention. In this case, the flap 4 is acted upon by two weights 7, 7' which are arranged on two lever arms 6, 6'. The device is otherwise constructed in analogy with what has been described above. The one lever arm 6' can be arranged on the axle 5 in such a way that the one weight 7' and its direction out from the axle 5 correspond to the result-ant of what is provided in each position by a weight acting with the flap (that is to say the weight 7), and a weight acting progressively against the flap.

[0017] The invention is not limited to the embodiments which have been mentioned, but can be varied within the scope of the patent claims which follow. For example, the invention functions for gases other than air which are suitable for different throttle devices where a high degree of penetration of the gas is sought.

[0018] Finally, a plurality of weights can be provided for the flap, either on the lever arm or on the flap itself.

Claims

1. Throttle device for achieving a high and virtually constant velocity of an inflowing current of gas through a channel (1), the device comprising a flap (4) which is arranged so that it can pivot on an axle (5) and which is designed in such a way that, at a
certain pressure force exerted by the current of gas, it is opened from a position in which the channel (1) is essentially closed and where the flap (4) forms an angle of 30° to 70° with the longitudinal direction of the channel (1). A weight (7) which is arranged to rotate together with the flap (4), which weight (7) is designed to deliver a torque to the axle (5) in conjunction with the pivoting of the flap (4), which torque assists in the opening of the flap (4) such as to virtually counterbalance the gravity of the flap (4) when the flap (4) is fully open and which weight (7) is further adapted so that, when the pressure of the gas decreases or completely disappears, the torque from the flap (4) overcomes the torque from the weight (7) so that the flap (4) can be closed.

2. Throttle device according to Patent Claim 1, characterized in that the weight (7) is provided on the axle (5) via a lever arm (6).

3. Throttle device according to Patent Claim 2, characterized in that the weight (7) is arranged such that it can be adjusted along the lever arm (6) in the radial direction in relation to the axle (5).

4. Throttle device according to any one of the preceding patent claims, characterized in that at least one part of the axle (5) protrudes outside the channel (1), and in that the weight (7) is provided on that part of the axle (5) which protrudes from the channel (1).

5. Throttle device according to any one of the preceding patent claims, characterized in that the axle (5) is arranged essentially at right angles to the longitudinal direction of the channel (1).

6. Throttle device according to any one of the preceding patent claims, characterized in that the weight (7) is arranged such that it is located essentially above the axle (5) when the flap (4) is in its closed position.

7. Throttle device according to Patent Claim 2, characterized in that it comprises two weights (7, 7') which are fixed in terms of rotation on the axle (5, 5') via a respective lever arm (6, 6').

8. Throttle device according to Patent Claim 7, characterized in that the lever arm (6') runs essentially parallel to the flap (4).

Patentansprüche

1. Drosselvorrichtung zur Erzeugung einer hohen und praktisch konstanten Geschwindigkeit eines einströmenden Gasstroms durch einen Kanal (1), wo-

be die Vorrichtung folgendes umfaßt: eine Klappe (4), die so angeordnet ist, daß sie an einer Achse (5) schwenken kann, und die so ausgeführt ist, daß sie bei einer bestimmten durch den Gasstrom ausgelösten Druckkraft aus einer Position, in der der Kanal (1) im wesentlichen geschlossen ist und in der die Klappe (4) einen Winkel von 30° bis 70° mit der Längsrichtung des Kanals (1) bildet, geöffnet wird, ein Gewicht (7), das so angeordnet ist, daß es zusammen mit der Klappe (4) rotiert, wobei das Gewicht (7) so ausgeführt ist, daß es der Achse (5) in Verbindung mit dem Schwenken der Klappe (4) ein Drehmoment verleiht, das das Öffnen der Klappe (4) insofern unterstützt, daß es die Schwerkraft der Klappe (4) praktisch ausgleicht, wenn die Klappe (4) vollständig geöffnet ist, und wobei das Gewicht (7) weiterhin so ausgelegt ist, daß, wenn sich der Gasdruck verringert oder vollständig verschwindet, das Drehmoment von der Klappe (4) das Drehmoment von dem Gewicht (7) überwirkt, so daß die Klappe (4) geschlossen werden kann.

2. Drosselvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Gewicht (7) über einen Hebelarm (6) an der Achse (5) vorgesehen ist.

3. Drosselvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß das Gewicht (7) so angeordnet ist, daß es entlang dem Hebelarm (6) in radialer Richtung bezüglich der Achse (5) eingestellt werden kann.


5. Drosselvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Achse (5) im wesentlichen im rechten Winkel zu der Längsrichtung des Kanals (1) angeordnet ist.

6. Drosselvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Gewicht (7) so angeordnet ist, daß es sich im wesentlichen über der Achse (5) befindet, wenn sich die Klappe (4) in ihrer geschlossenen Position befindet.

7. Drosselvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die zwei Gewichte (7, 7') umfaßt, die über einen jeweiligen Hebelarm (6, 6') drehfest an der Achse (5, 5') angebracht sind.

8. Drosselvorrichtung nach Anspruch 7, dadurch ge-
Reven{

1. Dispositif d'étranglement pour obtenir une vitesse élevée et relativement constante d'un courant entrant de gaz à travers un canal (1), le dispositif comprenant un volet (4) agencé de façon à pouvoir pivoter sur un axe (5) et conçu de manière à ce qu'à une certaine force de pression exercée par le courant de gaz, il s'ouvre depuis une position dans laquelle le canal (1) est essentiellement fermé, le volet (4) formant un angle compris entre 30° et 70° par rapport à la direction longitudinale du canal (1) une masse (7) agencée de façon à tourner avec le volet (4), laquelle masse (7) est conçue pour fournir un couple à l'axe (5) conjointement avec le pivotement du volet (4), lequel couple contribue à l'ouverture du volet (4) de manière à contrebalancer la gravité du volet (4) lorsque le volet (4) est entièrement ouvert, et laquelle masse (7) est en outre adaptée de façon à ce que, lorsque la pression du gaz diminue ou disparaît complètement, le couple du volet (4) surmonte le couple de la masse (7) de façon à ce que le volet (4) puisse se fermer.

2. Dispositif d'étranglement selon la revendication 1, caractérisé en ce que la masse (7) est fournie sur l'axe (5) par le biais d'un bras de levier (6).

3. Dispositif d'étranglement selon la revendication 2, caractérisé en ce que la masse (7) est agencée de façon à pouvoir être ajustée le long du bras de levier (6) dans la direction radiale vis-à-vis de l'axe (5).

4. Dispositif d'étranglement selon l'une quelconque des revendications précédentes, caractérisé en ce qu'au moins une partie de l'axe (5) fait saillie hors du canal (1), et en ce que la masse (7) est fournie sur cette partie de l'axe (5) qui fait saillie depuis le canal (1).

5. Dispositif d'étranglement selon l'une quelconque des revendications précédentes, caractérisé en ce que l'axe (5) est agencé essentiellement perpendiculairement à la direction longitudinale du canal (1).

6. Dispositif d'étranglement selon l'une quelconque des revendications précédentes, caractérisé en ce que la masse (7) est agencée de façon à être située essentiellement au-dessus de l'axe (5) lorsque le volet (4) se trouve en position fermée.

7. Dispositif d'étranglement selon la revendication 2, caractérisé en ce qu'il comprend deux masses (7, 7') fixées en rotation sur l'axe (5, 5') par le biais d'un bras de levier (6, 6') respectif.

8. Dispositif d'étranglement selon la revendication 7, caractérisé en ce que le bras de levier (6') s'étend essentiellement parallèlement au volet (4).