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(54) Draught intensifying apparatus.

(57) A draught intensifying apparatus for chimneys comprising an inner gas channel (6) connected to the chimney having a chimney capital (2).

According to the improvement, the apparatus has a confusor (3) provided with an inner mantle (5) and an outer mantle (8) covered by a cap (4), and the gas channel (6) is formed within the inner mantle (5), and between the inner mantle (5) and the outer mantle (8) a confusor space (9) narrowing from the chimney capital (2) towards the cap (4) is provided, and gas outlets (12) are provided between the confusor (3) and the cap (4).

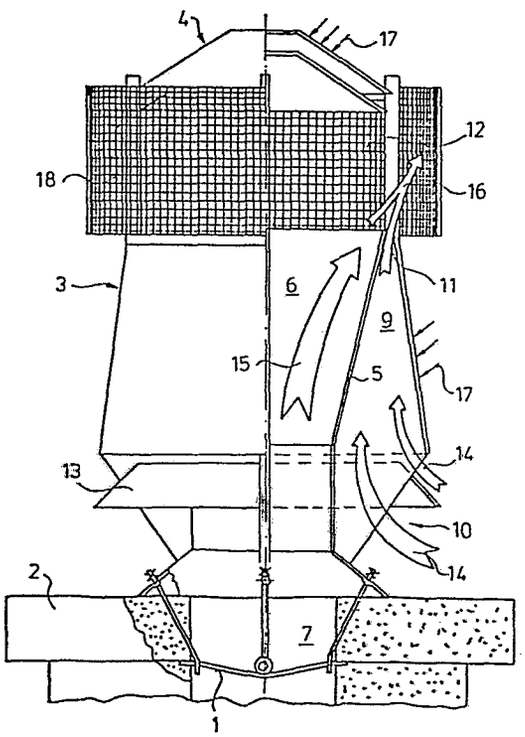

Fig. 1

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Draught Intensifying Apparatus

The invention relates to an apparatus for the intensification of the draught in chimneys comprising an inner gas channel connected to the chimney having a chimney capital. For the purpose of the invention, chimneys connected not only to furnaces and other firing equipment but to aeration channels and systems are also considered.

According to the prior art, the chimney capitals or cowls aim to prevent the wind from blowing into the chimneys and so produce a backward gas flow within the chimneys. Among these devices, the so called wind vanes or weathercocks are the best known ones which have a revolving upper part. When the wind impacts on the guide vane of the weathercock, the upper part rotates in respect to the lower part of the weathercock fixed to the chimney and, in this way, it turns away the gas outlet of the chimney from the wind direction. In the practice, however, it often occurs that the parts being rotatable in respect to each other get stuck as a result of mechanical deterioration, usually rusting and, therefore, the weathercock will not revolve when the wind impacts on it. As a result, the wind will blow right into the chimney funnel and, thus, produce a backflow of the gases in the funnel which is especially dangerous for chimneys connected to

furnaces. It may occur that the backflow forces the products of combustion out of the chimney and the furnace and into the room wherein the furnace is operated. Therefore, the use of the weathercocks is nowadays prohibited.

Another known solution for preventing the blow-in of the wind is a device which has a cylindrical mantle connected to the chimney capital provided with upwardly directed side tubes passing through the mantle at oblique angles in respect to the mantle's longitudinal axis.

The side wind blows into these tubes which produces an upward gas flow within the mantle. In the practice, however, it turned out that this kind of upward gas flow promoting the emission of combustion gases from the chimney does not infact occur due to the cavitation effect at the inflow of the oblique side tubes at the inner surface of the mantle. As it is known from experience, that this cavitation effect deterioritates the draught of the chimney.

As is well known, the gas flow within a chimney is caused by the effective pressure, the so called draught. The effective pressure is the sum of the gravitational pressure difference and the statical pressure difference occuring in the vicinity of the chimney head on impact of the wind and is related to the pressure measurable in wind lull. From among these parameters, only the increasing of the graviational pressure difference was attempted in the previous solutions. This could be realized by erecting higher and higher chimneys. For

the provision of a suitable draught, for example, a minimal chimney height above the trussing is prescribed in building regulations.

The effective pressure, i.e. the draught, is determined to a great extent by the statical pressure difference which, however, varies between broad limits since the force of the wind is ever changing. In the case of firing equipment , moreover, the combustion gases are cold at the beginning of the firing cycle, which does not enhance the draught. However, the largest draught is usually required at the start of the firing cycle.

The invention's main object is to provide an apparatus with which the effective pressure, the so called draught, could be increased and held at a possibly high and even level without endangering the security of the chimney's operation or any other factor or margin of safety.

According to this invention, the apparatus has a confusor provided with an inner mantle and an outer mantle covered by a cap, and the gas channel is formed within the inner mantle, and between the inner mantle and the outer mantle a confusor space narrowing from the chimney capital towards the cap is provided, and gas outlets are provided between the confusor and the cap.

In one embodiment, inlets of the confusor space are provided near the chimney capital and outlet of the confusor space are provided near the gas out-

lets of the apparatus. Therein, outer surfaces of the confusor and/or the cover have a dull-black surface finish.

In another embodiment, the gas outlets are surrounded by a guard grid.

According to yet another embodiment of the invention, an electric motor is arranged under the cap, on the shaft of which is provided an impeller of a ventilator sucking gas from the inner gas channel and forcing it towards the gas outlets.

In a further embodiment of this invention, as well as the electric motor, an electronic control circuit is attached having a signal transmitter detecting the draught within the chimney and a switching circuit controlling the electric motor in dependence upon the signal delivered by the signal transmitter. Therein, it is preferred, that the signal transmitter detecting the draught is a depression detector and is arranged in a gas funnel of the chimney.

Further objects and features of the invention will be described hereinafter in connection with preferred embodiments with reference to the accompanying drawings. In the drawing,

Fig. 1 shows a longitudinal semi-section of a preferred embodiment of the apparatus in this invention,

Fig. 2 illustrates a longitudinal semi-section of another embodiment.

As it is shown in Fig. 1 by an example of a pre-

ferred embodiment, the apparatus for intensifying the draught in this invention is mounted on a chimney capital 2 by an anchor frame 1 and is provided with a confusor 3 which is covered on the top by a cap 4. The confusor 3 has a double mantle, and within the inner mantle 5, an inner gas channel 6 of the apparatus is provided. This inner gas channel 6 is connected to a gas funnel 7 of the chimney, it is formed as an elongation of this funnel 7. Within the outer mantle 8 of confusor 3, a confusor space 9 is formed. As it is shown in the Figure, this confusor space 9 between inner mantle 5 and outer mantle 8 is narrowing from its inlets 10 at chimney capital 2 towards its outlets 11 at cap 4. Because of the inclined inner mantle 5, at the same time, inner gas channel 6 is widening in the same direction. Outlets 11 of confusor space 9 and outlets of inner gas channel 6 are practically at the same height, where gas outlets 12 of the apparatus are provided between confusor 3 and cap 4. As a result of these constructional features, a confusor effect is created within the apparatus which enlarges and intensifies the draught of the chimney.

At inlets 10 of confusor space 9, a horizontal rib 13 is provided. With this, the gas flow, e.g. the side wind entering the confusor space 9 as shown by arrows 14 will be distributed evenly therein. The narrowing confusor space 9 forces the entering gas flow to stream with an increasing speed as it proceeds towards outlets 11, where the highest flow speed will be reached. At

the same time , inner gas channel 6 is wider and wider towards gas outlets 12 and, therefore, the pressure of the gas flowing upwards therein as shown by an arrow 15 will be smaller and smaller. The flows comming from inner gas channel 6 and from confusor space 9 will be united at gas outlets 12 as shown by an arrow 16 with a remarkable drop in pressure. This drop in pressure "sucks" the inner gas channel 6 and, through this, the gas funnel 7 of the chimney. This results in a significant intensification of the draught in the chimney.

In the embodiment shown in Fig. 1, the outer surfaces of outer mantle 8 and cap 4 have a dull-black surface finish and, therefore, the impacting sunbeams shown by arrows 17 considerably warm up these surfaces. The gas particles along the inner side of these surfaces will be hot, which increases their upwards streaming. This results in a further intensification of the confusor effect within the apparatus.

In Fig. 1, it is also shown that a guard grid 18 is arranged round around gas outlets 12, the main function of which is to slow down the side wind and to prevent small animals or other things from falling into the apparatus.

In the embodiment shown in Fig. 2, confusor 3 arranged on chimney capital 2 is the same way as in the previous embodiment. The main difference between the two embodiments is the inclusion of an electric motor 19 under cap 4. On the shaft of electric motor 19, an

impeller 20 of a ventilator is arranged which sucks the gas from inner gas channel 6 and forces it towards gas outlets 12.Electric motor 19 under cap 4 is arranged in a closed housing 21 above guard grid 18.

In this embodiment (Fig. 2),the operation of electric motor 19 is controlled by an electronic circuit not shown in the Figure. The electric motor 19 should be in operation when the draught within the chimney is not sufficient. Therefore, the controlling signal for the operation of electric motor 19 should be delivered to motor 19 in dependence upon the strength of the draught. For this purpose, a signal transmitter 22 detecting the draught within the chimney is arranged in funnel 7 in an optional place, e.g. in the lower part of the funnel 7 of the chimney. In the simplest case, signal transmitter 22 is a depression detector having relatively high sensitivity. In the electronic control circuit, the signal comming from transmitter 22 is compared with a nominal value and if transmitter 22 delivers a smaller signal than desired, electric motor 19 will be switched on by the control circuit. Impeller 20 of the ventilator starts to revolve and sucks inner gas channel 6 of the apparatus. Of course, this also results in a drop in pressure within gas funnel 7 of the chimney and, thus, causes an increased draught in the chimney. If the draught as prescribed exists in funnel 7, the signal comming from transmitter 22 will no longer be smaller than the desired value, therefore,

after the signal comparison as mentioned above, the control circuit switches off electric motor 19.

The embodiment as shown in Fig. 2 is of particular importance for chimneys connected to firing equipment. It produces a sufficient draught even, when the chimney is cold and, thus, the graviational pressure difference small. After starting the firing equipment, this situation changes quite quickly, therefore, the electric motor 19 will be switched off after a relatively short period of time.

The importance of this embodiment is especially noticable. under special atmospheric circumstances. In these cases, it may occur that the draught of the chimney suddenly deterioritates. This occurance will at once be detected by signal transmitter 22 and the electronic control circuit will switch on the electric motor 19 without any delay. With this, the draught in funnel 7 will be regenerated, the importance of which cannot be over emphasized.

As it is clearly apparent from what has been said hereinabove, the electronic control circuit consists of relatively simple and well known circuitry, thus, a detailed description is not necessary.

As already mentioned, the apparatus intensifying the draught in this invention need not be confined only for use with chimneys connected to firing equipment . It can be mounted on aeration chimneys or on outlets of ventilation channels, since the draught of these chimneys or

channels can also be intensified with it.

Claims

1. Draught intensifying apparatus for chimneys comprising an inner gas channel connected to the chimney having a chimney capital, characterized in that it has a confusor (3) provided with an inner mantle (5) and an outer mantle (8) covered by a cap (4), and the gas channel (6) is formed within the inner mantle (5), and between the inner mantle (5) and the outer mantle (8) a confusor space (9) narrowing from the chimney capital (2) towards the cap (4) is provided, and gas outlets (12) are provided between the confusor (3) and the cap (4).

2. The apparatus as claimed in Claim 1, wherein inlets (10) of the confusor space (9) are provided near to the chimney capital(2) and outlets (11) of the confusor space (9) are provided near to the gas outlets (12) of the apparatus.

3. The apparatus as claimed in Claim 1 or 2, wherein outer surfaces of the confusor (3) and/or the cover (4) have a dull-black surface finish.

4. The apparatus as claimed in any one of Claims 1 to 3, wherein the gas outlets (12) are surrounded by a guard grid (18).

5. The apparatus as claimed in any one of Claims 1 to 4, wherein an electric motor (19) is arranged under the cap (4), on the shaft of which an impeller (20) of a ventilator sucking gas from the inner gas channel (6)

and forcing it towards the gas outlets (12) is provided.

6. The apparatus as claimed in Claim 5, wherein an electronic control circuit is attached to the electric motor (19), said electronic control circuit having a signal transmitter (22) detecting the draught within the chimney and a switching circuit controlling the electric motor (19) in dependence upon the signal delivered by the signal transmitter (22).

7. The apparatus as claimed in Claim 6, wherein the signal transmitter (22) detecting the draught is a depression detector and is arranged in a gas funnel (7) of the chimney.

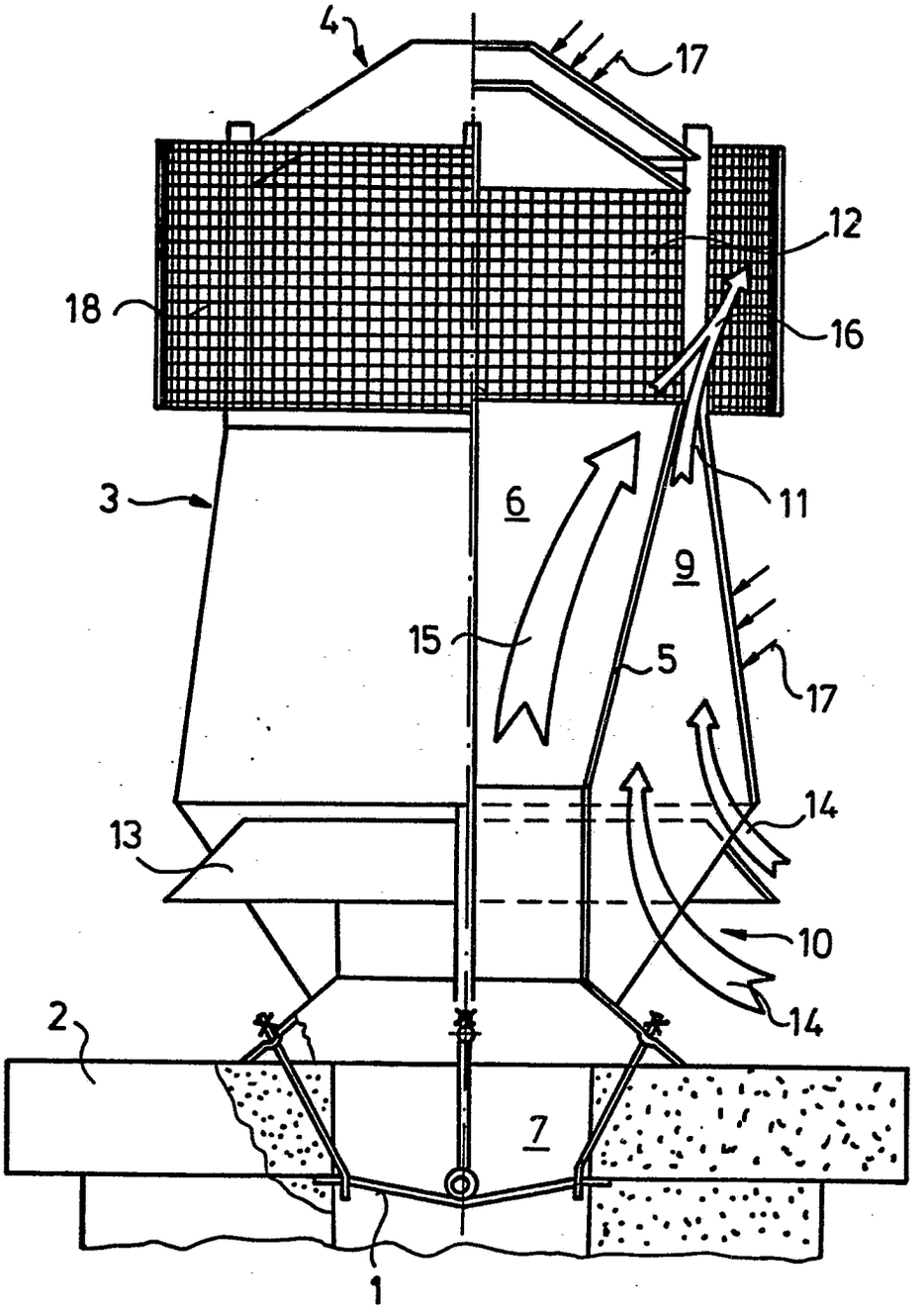

Fig. 1

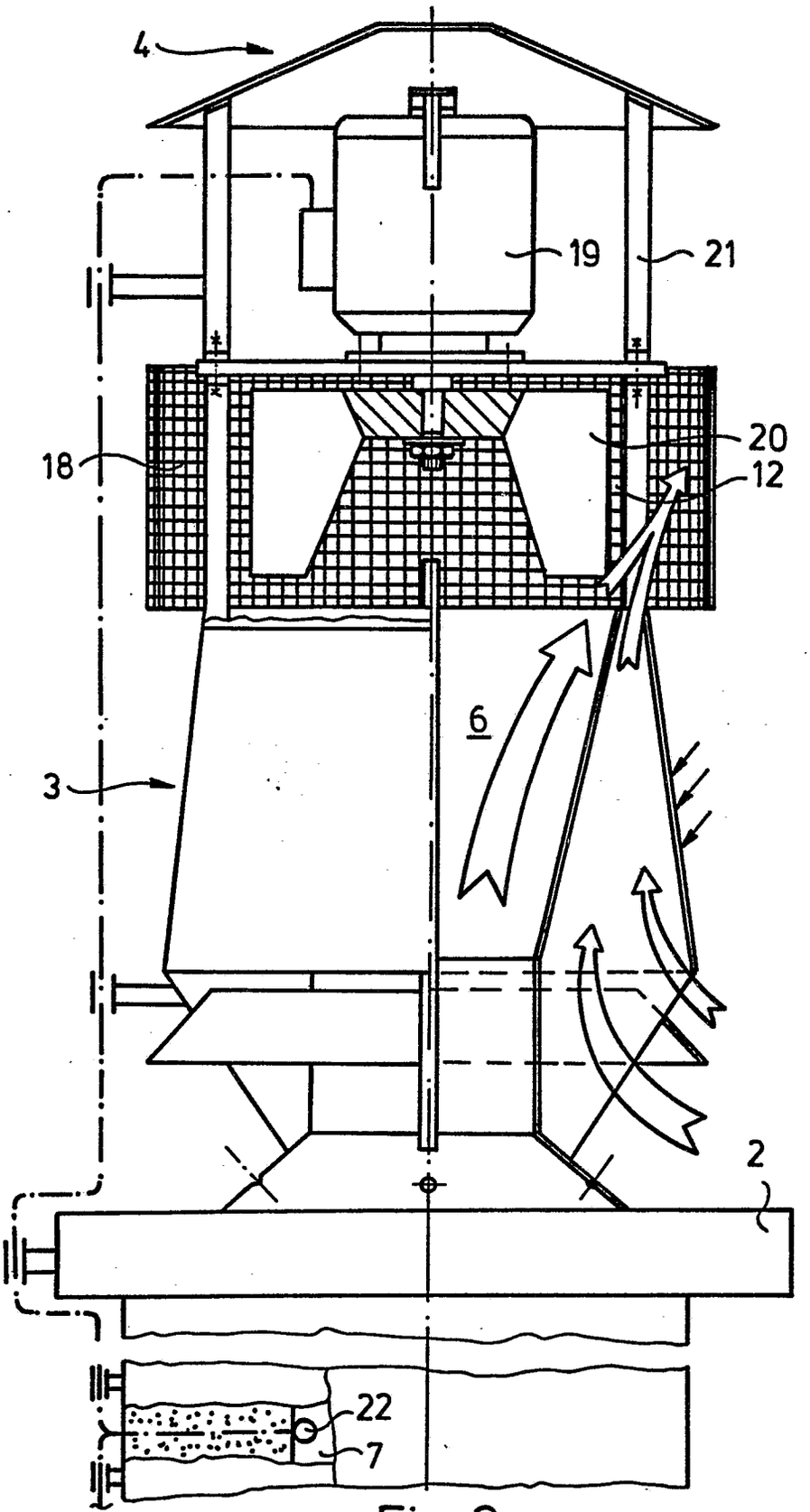

Fig.2