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APPARATUS FOR SEPARATING DUST FROM FLUE GASES

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Fig. 1

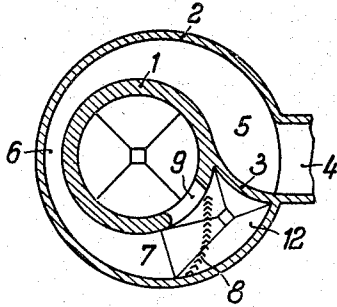


Fig. 2

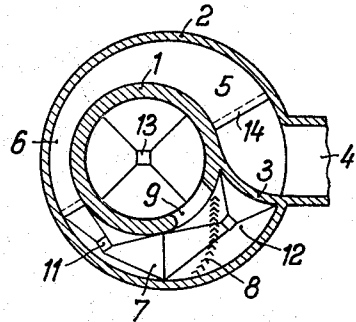


Fig. 3

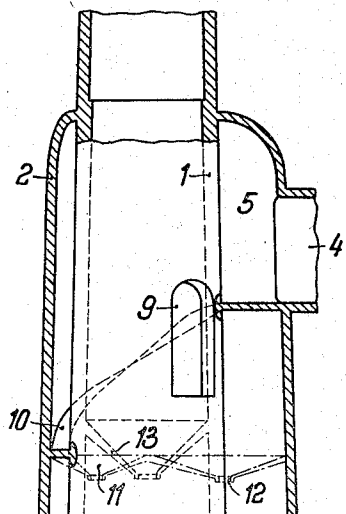
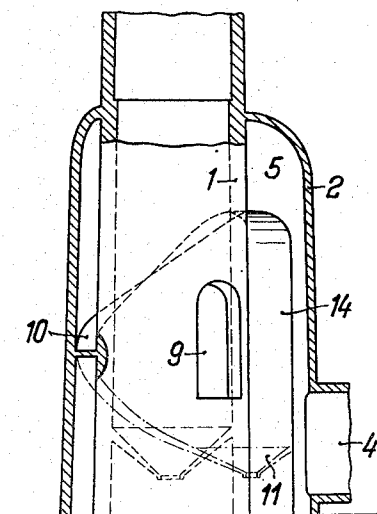


Fig. 4



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APPARATUS FOR SEPARATING DUST FROM
FLUE GASES

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6 Claims. (Cl. 183—83)

The invention relates to means for separating dust and the like from the flue gases from boiler or other furnaces before the gases are allowed to escape into the atmosphere.

Apparatus is known in which the separation of the dust particles is effected by the difference in weight between the gases and the impurities carried along by them. In one form of such apparatus, the flue gases are led into large settling chambers in which the dust or other particles in the flue gases are deposited in consequence of the substantially reduced velocity.

In another apparatus, large fans are provided for increasing the velocity of the gases so that the dust particles are thrown out by centrifugal force.

These known apparatus require considerable space and usually cannot be incorporated in existing plants owing to the lack of space. Apparatus fitted with fans require a constant supply of power and are liable to considerable wear and tear.

The subject matter of the invention is characterized by a cylindrical hollow body or a body of similar shape surrounding the lower part of a round chimney stack and between this body and the chimney stack is arranged a separating wall, on one side of which lies the inlet opening to the apparatus and on the other side the connecting opening to the chimney stack. When the gases of combustion stream into the annular space between the chimney stack and the cylindrical hollow body, the flying dust particles contained in them are thrown against the outer wall of the apparatus in consequence of their centrifugal force and intercepted there.

Advantageously, the cylindrical hollow body or the body of similar shape lies eccentrically to the chimney stack and the separating wall is arranged in the zone of the greatest distance between the hollow body and the chimney stack. In consequence of this arrangement, the flue gases first of all stream into a wide part of the annular space and on circling round the chimney stack they arrive at the narrowest part. Behind the narrowest part they are again subjected to the action of an enlargement. The velocity which has been reduced on the entrance of the flue gases into the wide part of the hollow space is increased on passage of the gases through the narrowed part and is again reduced in the further course of the flow. The increased velocity in the narrowed part of the annular space causes the flue gases to be powerfully forced to the outer wall of this annular space. The reduced velocity

behind the narrowest place causes the action of centrifugal force to be more effective.

According to the invention, an intercepting device is provided in front of the connecting opening to the chimney stack. This consists of combs or vanes arranged at an angle to the direction of the stream, on which vanes any dust still remaining in the gas is effectively separated.

In order to increase further the separating action according to the invention, the gases of combustion are led helically downwards in the cylindrical hollow space. This is attained by arranging the bottom of the hollow space so that it slopes in the form of a helix in the direction of the flow of the gases of combustion.

The leading in of the gases of combustion into the outer cylindrical hollow body may be effected both in its upper part and at the foot of the same. By leading in the gases of combustion at the foot of the hollow body according to the invention, the gases of combustion within the expanded part of the cylindrical hollow space are led upwards by a second wall which may be vertical or inclined, or to the upper part of the helically shaped sloping bottom of the hollow space.

In the accompanying drawing:

Figure 1 shows a cross section through a chimney shaft with a flue dust separating apparatus according to the invention.

Figure 2 shows a cross section through a chimney shaft with a modified form of separating apparatus.

Figure 3 shows a vertical section through a separating apparatus with an upper inlet for the flue gases.

Figure 4 shows a vertical section through a separating apparatus with a lower inlet for the flue gases.

In the drawing, in which similar reference numerals indicate corresponding parts, a cylindrical hollow body 2 is eccentrically arranged round the lower part 1 of a round chimney stack. The chimney stack is connected through a separating wall 3 with the outer hollow body. The gases of combustion enter by the inlet opening 4 into the enlarged part 5 of a cylindrical hollow space formed by the chimney stack 1 and the hollow body 2, and on one side of the separating wall, circle round the chimney stack through the contracted part 6 of the hollow space into the second enlarged part 7 on the other side of the separating wall 3. Here are arranged angular combs 8 in front of the separating wall for the interception of dust particles forced by centrifugal

gal force to the outer wall of the hollow space. From this point the gases of combustion are led away at an angle to this direction of flow and through a connecting opening 9 into the chimney stack. The cylindrical hollow space (5-7) closed at the top is likewise closed below by a helical bottom 10 sloping in the direction of flow of the gases, in addition to which this bottom terminates in a funnel 11 below the opening 9. An additional funnel 12 is provided below and behind the combs 8 for the reception of the flue dust separated at this position. The separated flue dust may be drawn from these funnels by means of valves or by a suction draught plant. In the interior of the chimney a further funnel 13 is provided which may receive any flue dust particles which may be separated therein. According to Figure 3, the gases of combustion pass through the inlet-opening 4 at the upper part of the cylindrical hollow space. According to Figure 4, the gases of combustion which enter below at the foot through the inlet-opening 4' are directed upwards within the enlarged part 5 of the hollow space by a second substantially vertical wall 14 and circle round the chimney 1 above the sloping bottom 10, in similar manner as before.

The combs 8 may be constructed of masonry or of iron bent in the form of an angle. The construction and arrangement of the apparatus for the remainder may be as desired.

I claim:

1. Apparatus for separating dust from flue gas, comprising an upright tubular member having a cylindrical lower part, a cylindrical hollow body surrounding said lower part and disposed eccentrically thereto to form therewith a dust separating chamber having a wide part and a restricted part, said chamber having a flue gas inlet and a flue gas outlet to said tubular member, the inlet and the outlet being arranged at the wide part of the chamber, a partition wall extending from said tubular member to the surrounding hollow body, said partition wall being situated adjacent to and between said flue gas inlet and outlet, a comb consisting of angle-shaped rods and extending from that edge of the outlet adjacent to the partition wall across the chamber so as to form the outer guiding wall for the curved part of the gas stream near the outlet, said guiding wall intercepting those dust particles still remaining in the gas, and a dust collecting funnel disposed in the lower part of said separating chamber beneath said comb.

2. Apparatus for separating dust from flue gases, comprising a vertically disposed tubular member having a cylindrical lower part, a cylindrical hollow body surrounding said lower part and disposed eccentrically thereto to form therewith a dust separating chamber having a wide part and a restricted part, said chamber having a flue gas inlet, and a flue gas outlet to said tubular member, the inlet and the outlet being arranged at the wide part of the chamber, a partition wall extending from said tubular member to the hollow body across said chamber and in a position adjacent to and between the flue gas inlet and outlet, a dust collecting funnel in the lower part on the outlet side of said chamber, a helical bottom extending from the inlet side to the outlet side and sloping to said collecting funnel, the outlet lying spaced above the funnel.

3. Apparatus for separating dust from flue

gases, comprising a vertically disposed tubular member having a cylindrical lower part, a cylindrical hollow body surrounding said lower part and disposed eccentrically thereto to form therewith a dust separating chamber having a wide part and a restricted part, said chamber having a flue gas inlet, and a flue gas outlet to said tubular member, the inlet and outlet being arranged at the wide part of the chamber, a partition wall extending from the tubular member to the hollow body across the chamber and in a position adjacent to and between the flue gas inlet and outlet, dust collecting funnels disposed along in the lower part on the outlet side of the chamber, a helical bottom extending from the inlet side to the outlet side and sloping to said collecting funnels, the outlet lying spaced above the funnel furthest from the inlet, a comb consisting of angle-shaped rods and extending above said last mentioned funnel from that edge of the outlet adjacent to the partition wall across the chamber so as to form the outer guiding wall for the curved part of the flow of gas near the outlet, said guiding wall intercepting those dust particles still remaining in the gas.

4. Apparatus for separating dust from flue gases, comprising a vertically disposed tubular member having a cylindrical lower part, a cylindrical hollow body surrounding said lower part and disposed eccentrically thereto to form therewith a dust separating chamber having a wide part and a restricted part, said chamber having a flue gas inlet at the lower part thereof, the inlet and the outlet being arranged at the wide part of the chamber, a flue gas outlet to the said tubular member, a partition wall extending between said tubular member and hollow body in a position adjacent to and between said flue gas inlet and outlet, a dust collecting funnel in the lower part of the outlet side of the chamber, a helical bottom extending from a relatively high level therein to said dust collecting funnel, and an upwardly extending wall for directing the gas entering at the low level of the inlet to the relatively high level of said helical bottom.

5. Apparatus for separating dust from flue gas, comprising an upright tubular member having a lower part with a continuously curved outline, a hollow body having a continuously curved inner wall and surrounding said lower part, the chamber formed by said hollow body and said tubular member having an inlet for flue gas and an outlet for flue gas to said tubular member and a partition wall between said inlet and outlet, and the cross-sectional area of said chamber on the way from said inlet to said outlet first diminishing and then increasing.

6. Apparatus for separating dust from flue gas, an upright tubular member having a cylindrical lower part, a cylindrical hollow body surrounding said lower part and disposed eccentrically thereto to form therewith a dust separating chamber having a wide part and a restricted part, said chamber having an inlet for flue gas arranged at the wide part thereof, an outlet for flue gas to said tubular member also arranged at the wide part of said chamber, and a partition wall extending across said separating chamber at a position in the widest part adjacent to and between the flue gas inlet and outlet to and from said chamber.

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