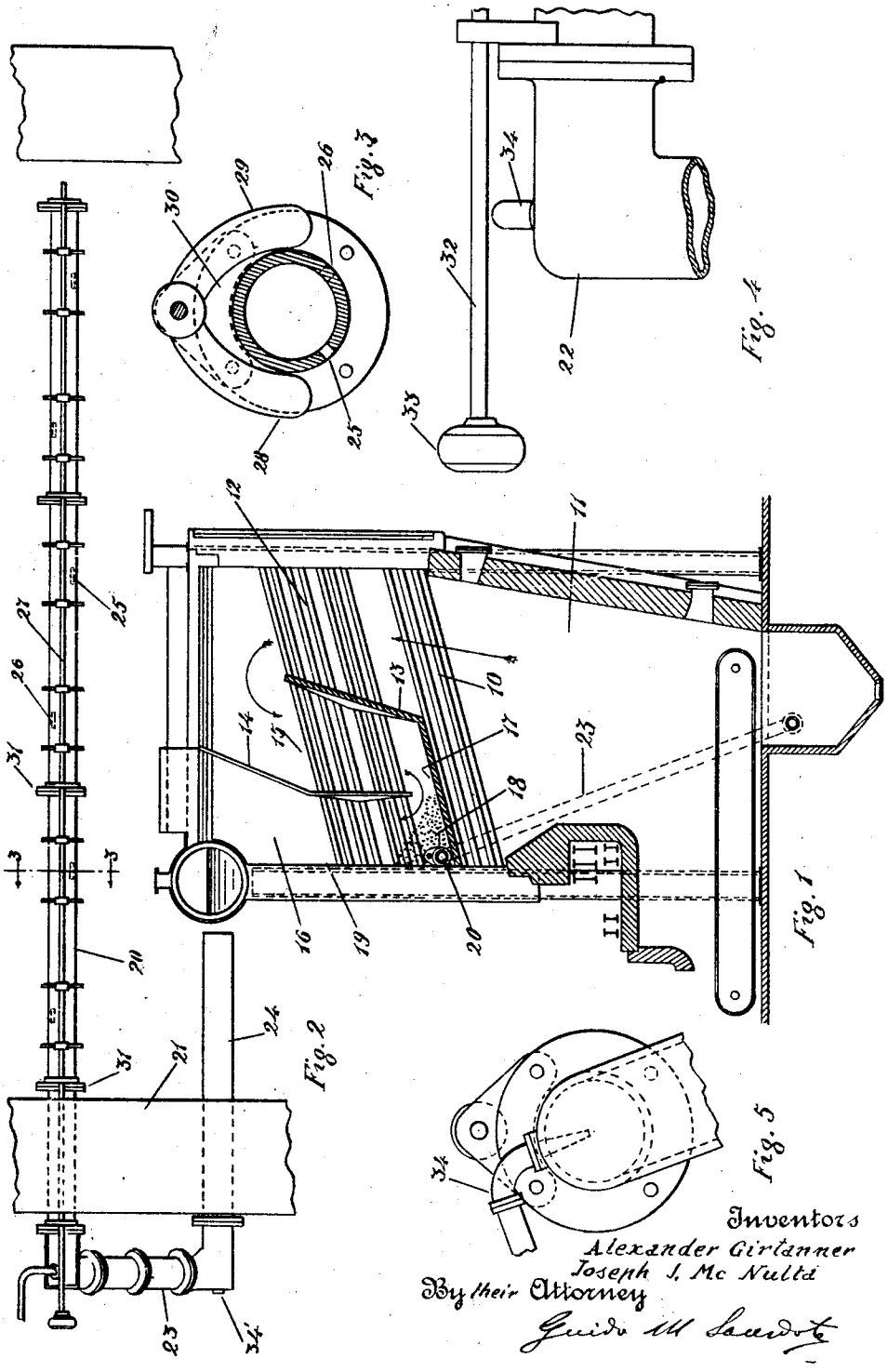
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SOOT REMOVING DEVICE

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SOOT-REMOVING DEVICE.

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Our invention relates to improvements in apparatus for the removal of soot, ashes and other materials in pulverized form by suction; and more particularly refers to devices for the removal of soot from pockets and other parts of boilers, where soot and fine dust constantly accumulate, as a consequence of the normal operation of said boilers.

The primary object of our invention is to provide a suction member of a novel and improved construction, adapted for permanent installation at such places where dust and soot may collect, said suction member having inlets provided at points where the possibility of their becoming clogged is positively prevented and uninterrupted operation of the device is consequently assured.

Another object of our invention is to provide a simple and efficient arrangement for stirring up and agitating the material to be removed so that it will readily disintegrate in order to be more readily carried away by the suction system.

A still further object is to provide a novel and improved arrangement of agitating and suction device for the removal of soot and other materials in pulverized form, designed in such a manner that its continued and reliable operation will be assured with practically no necessity of inspection at any time, so that the device is particularly suitable for use in places difficult of access such as are found at various points in a boiler, in the combustion chamber and along the course of the products of combustion.

Additional objects and advantages of our invention will more fully appear as the description proceeds and will be set forth and claimed in the appended claims.

An embodiment of our invention is illustrated in the accompanying drawings, in which

Fig. 1 is a side sectional view in elevation of a boiler to which our invention is applied;

Fig. 2 is a detail plan view of our device in one of its preferred forms, as installed in said boiler, in an enlarged scale;

Fig. 3 is a cross sectional view in elevation through line 3—3 of Fig. 2, in an enlarged scale;

Fig. 4 is a fragmentary front view in elevation in an enlarged scale of the end of the suction members where suction is created; and

Fig. 5 is a fragmentary end view in elevation of the same.

Referring to Fig. 1, 10 designates a bank of generating tubes placed directly above the combustion chamber 11. Above the tubes 10 is a second bank of inclined generating tubes 12 which is divided by baffles 13, 14 into a plurality of transverse passes 15, 16 beginning at the uptake end of the tubes. The lower end of the baffle 13 which is slightly inclined from the vertical towards the rear of the boiler, is connected to the front of the boiler by a wall or plate 17 which constitutes a forward extension of said baffle and which forms a pocket 18 together with the front part of the boiler 19.

The baffle 14 projects downwardly from the top of the boiler into the pocket formed by baffles 13, 17 and by the front 19 of the boiler, so as to form an inverted U passage for the products of combustion connecting the rear upper part of the combustion chamber with the front upper part leading to the stack.

This arrangement is one which is frequently employed in water tube boilers and compels the hot products of combustion to follow a devious course from the lower combustion chamber to the rear upper part thereof, passing between the tubes and then downwardly through passage 15 close to plate 17 and then once more upwardly through passage 16 as the arrows indicate; so that the hot products of combustion have a chance to transfer the greater part of their heat to the tubes in three successive passes before reaching the stack. Plate 17 as shown is inclined towards the front of the boiler.

The products of combustion always carry along a quantity of minute particles which are partly soot and partly dust and ashes in fine form and in striking the surfaces of the tubes as well as the surfaces of the baffle plates, most of these matters in suspension separate and fall to the bottom. That portion of ashes and dust and soot which thus becomes separated before the products of combustion reach the second pass, fall to the bottom of the combustion chamber and

from there to the ash hopper, but that portion which separates through the second and third passes accumulates at the bottom of pocket 18 and amounts to quite a proportion of the coal used in firing the boiler. This is particularly true when pulverized fuel is used and the ever increasing number of installations where this kind of fuel is used make it imperative that some suitable system of soot ejection be used.

As a general rule no access is provided to pocket 18 and furthermore the intense heat would seriously interfere with the removal of the dust thus accumulated, by manual labor; therefore, under these conditions the use of our device is particularly advantageous although its use may be extended to any case where similar conditions are likely to occur.

Our device consists of a tube 20 extending through the entire length of pocket 18 at the lower part thereof, one end of said tube projecting through the side wall 21 of the boiler. This projecting part is connected by an elbow section 22 to another tube 23 downwardly inclined towards the ash hopper, having a lateral bend 24 at its lower end which also passes through the side 21 of the boiler, leading to the ash hopper.

The horizontal tube 20 is provided with a plurality of openings or inlets 25, 26 through its lower surface, said inlets being preferably arranged in two longitudinal series in staggered relation to each other, one at each side of the vertical central line of the tube, as shown. Owing to this arrangement, there is no tendency of the dust particles to collect in the openings at any time, the tendency being rather to fall away from the openings unless a suction action is exerted therethrough. When a depression is created within the tube by suction the soot and other particles are drawn within the tube through inlets 25, 26 at different points through the entire length of the pocket, and are then directed to the ash hopper.

The arrangement of inlets described has the advantage of simplicity and very effectively prevents the clogging of the inlets so that the device is operative at all times in spite of the fact that no hand cleaning may be performed.

However, the deposits of soot and other matters which accumulate all around and above tube 20 are likely at times to cake or to become wedged in the space above the tube so that once the space in the immediate vicinity of the lower part of the tube has been cleared the device ceases to function because no more dust falls within reach of the suction inlets. Uninterrupted and reliable operation in this respect is assured by introducing another feature which is also one of the most important elements of our invention, in the form of an agitating and disintegrating device adapted to break up whatever semi-solid deposit of dust and soot may thus be formed.

In other words, the dust and other particles are prevented from caking and from becoming wedged between the walls of the pocket by some suitable device which causes them to break up and which therefore, insures their falling to the bottom of the pocket proper in loose form within the sphere of action of the suction exerted through the various inlets. Such a device does not need to be kept continuously in operation but only at times when the suction system itself is operating, and may be arranged for an occasional operation by hand.

The drawings Figs. 2, 3 and 4 show the preferred way of carrying this part of our invention into practice, in a manner which is both simple and effective. The agitating device comprises a bar 27, longitudinally extending above tube 20 for its entire length and a little over, said bar being capable of axial reciprocating motion by hand, and carrying blades or agitators 28, 29, extending downwardly to the sides of the tube. The bar 27 is supported by bearing blocks 30 which are mounted onto the flanges 31 of the various sections of which the tube is composed, being secured in position by the same bolts which are used to connect two adjoining sections together. The forward end 32 of the bar 27 projects beyond elbow 22 and is provided with a knob or handle 33 by means of which it can be operated when the suction system is operating. By shifting bar 27 back and forth, that part of the collected material which is above the tube is caused to disintegrate and to fall down to the sides of the tube by the action of blades or agitators 28, 29, which extend fin-like in a radial or outward direction.

Suction may be created within tube 20 in any suitable manner; in the particular application shown the obvious way is to make use of steam under pressure which is available, and therefore elbow member 22 at the front is shown provided with a steam inlet 34 capable of delivering a steam jet right across the forward end of tube 20 through tube 23. Steam thus directed under high pressure creates a suction within tube 20 as will be readily understood and causes both the steam and the dust and ashes drawn through tube 20 to be forced downwardly through tubes 23, 24 to the ash hopper.

It is obvious that other means of creating suction could be used, for instance, a fan, in any case where it should be preferable to do so, since the application of our invention is not limited to steam boilers but may also be extended to dust collecting systems of various kinds, grain conveying sand blast apparatus, etc.

The drawings are intended for illustrative

purposes only and not in a limiting sense; therefore, we reserve ourselves the right to carry our invention into practice in any way or manner which may enter fairly into the scope of the appended claims.

We claim:

1. In a device of the class described, the combination with a tubular suction member adapted to be inserted through a space where dust may accumulate, said suction member being provided with spaced inlets throughout its length, of a movable bar mounted upon and longitudinally extending above said tubular member and means carried by said bar adapted to break up and loosen the caked dust collected within said space.

2. In a device of the class described, the combination of a tubular suction member adapted to be inserted through a space where dust may accumulate, said suction member being provided with spaced openings through its lower surface, a longitudinally shiftable bar mounted upon said suction member and extensions from said bar adapted to break up and loosen the caked dust collected within said space above said suction member.

3. The combination with a dust collecting chamber having a limiting wall, of a tubular suction member provided with spaced inlets throughout its length, extending through said wall at the lower part thereof, caked dust breaking up means mounted upon and longitudinally extending above said suction member, and operating means therefor, external to said wall.

4. The combination with a dust collecting chamber having a limiting wall, of a tubular suction member, provided with spaced inlets through its lower portion throughout its length, a longitudinally shiftable bar mounted upon said suction member and extending for the entire length thereof, having its operating end projecting through said wall, and caked dust breaking up means carried by said bar.

5. The combination with a boiler having a dust collecting chamber having a side wall, of a tubular suction member provided with spaced inlets through its lower portion throughout its length, inserted within said chamber at the lower part thereof, and hand controlled means projecting through said wall, carried by and longitudinally extending above said suction member adapted to break up and loosen caked dust collected within said chamber above said suction member.

6. The combination with a boiler having an ash pit and a dust collecting chamber having a side wall, of a tubular suction member inserted through said wall and extending within said chamber at the lower part thereof, said suction member being provided with spaced inlets through its lower wall throughout its length, means for drawing in dust through said inlets by suction and for discharging it within said pit, a hand controlled movable bar projecting through said wall carried by and longitudinally extending above said suction member within said chamber, and caked dust breaking up means carried by said bar.

7. The combination with a boiler having an ash pit, and a dust collecting chamber having a side wall, of a tubular suction member inserted through said wall and projecting within said chamber at the lower part thereof, said suction member being provided with spaced inlets through its lower portion throughout its length, an extension from the front of said tubular member leading to said ash pit, means for directing steam under pressure within said extension, so as to draw dust by suction through said inlets discharging it within said pit and hand controlled means mounted upon said tubular member and projecting through said wall for breaking up and loosening dust collected within said chamber above said suction member.

8. The combination with a boiler having a dust collecting chamber, of a tubular suction member coextensive with said chamber inserted through the lower portion of said chamber so as to be surrounded by dust collecting therein, a longitudinal series of spaced openings through the lower wall of said tubular member, extending from one end to the other of said member, means for inducing by suction an upward flow of dust through said openings and into and through said tubular member and means for breaking up caked dust which may collect about the upper surface of said tubular member.

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