March 28, 1967 T. E. McMAHON ETAL 3,311,092

TYPE SOOTBLOWER FOR CLEANING THE TUBES OF FURNACE WALLS

Filed Dec. 20, 1965 2 Sheets-Sheet 1

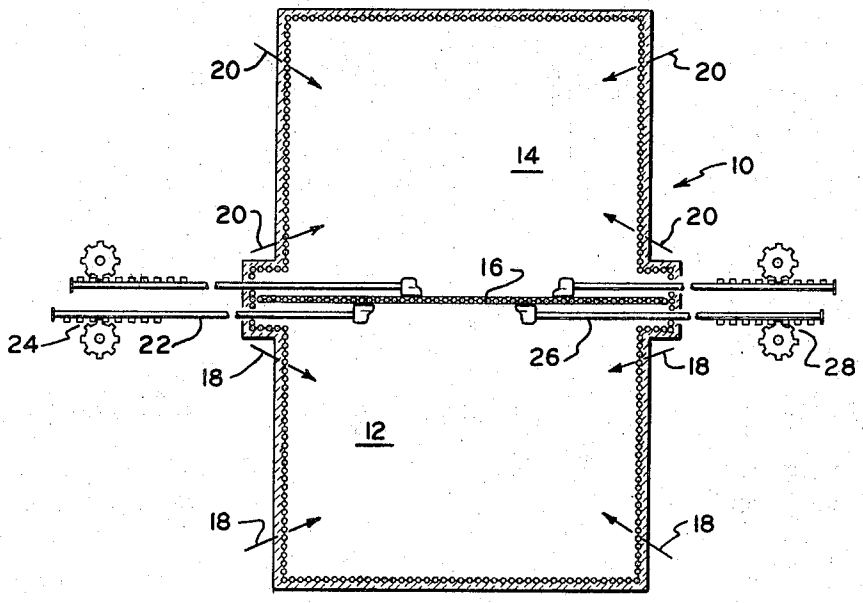


FIG. 1

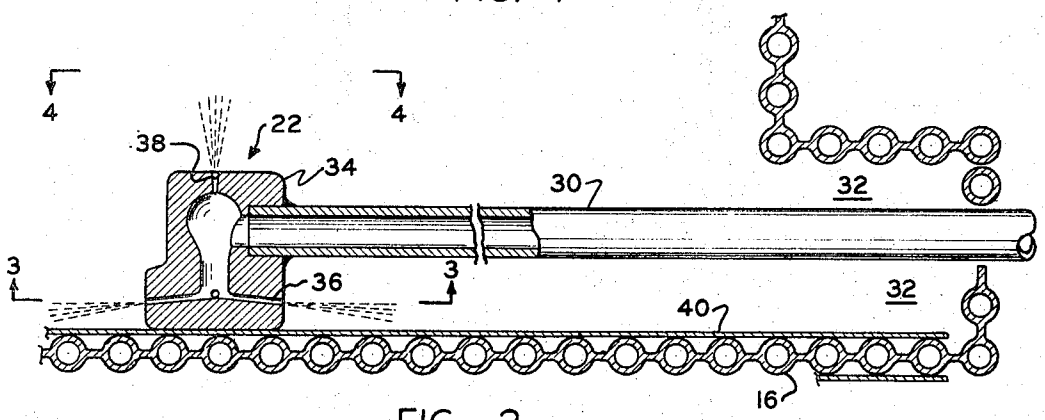


FIG. 2

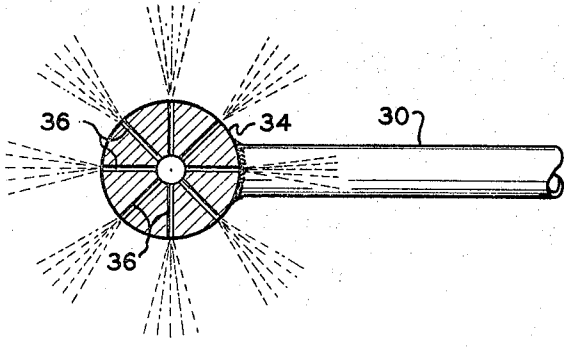


FIG. 3

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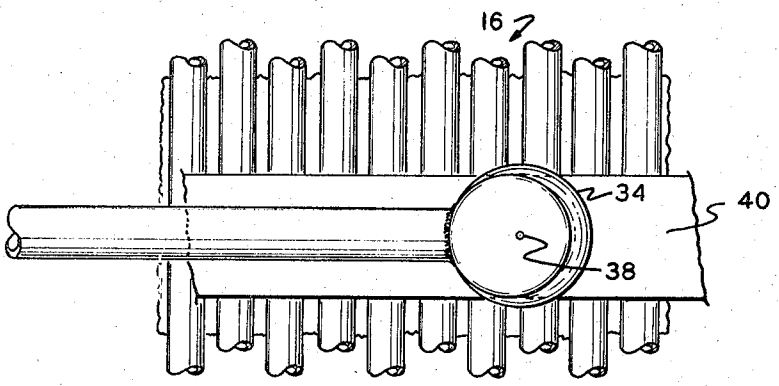


FIG. 4

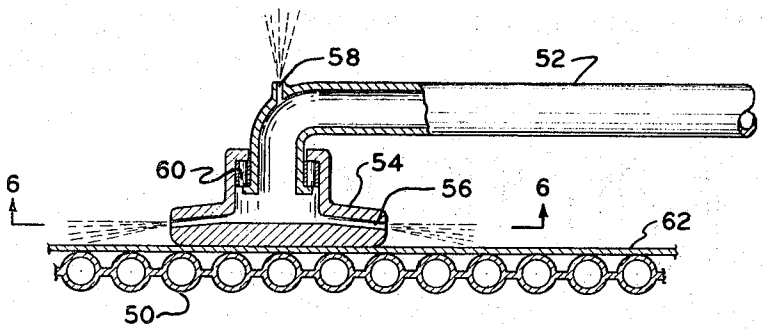


FIG. 5

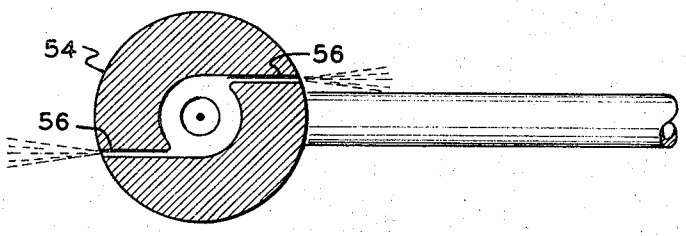


FIG. 6

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TYPE SOOTBLOWER FOR CLEANING THE TUBES OF FURNACE WALLS

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This invention is directed to a sootblower for cleaning furnace wall tubes, and in particular to such a sootblower capable of cleaning furnace wall tubes which have previously been inaccessible or hard to reach for cleaning purposes, such as the centerwall of a furnace.

In recent times, steam generating units are becoming larger and larger, mainly for economic reasons. Today many units being constructed are of such a size that it is desirable to make twin furnaces for the unit, or in other words, provide a centerwall for the furnace which divides it in half. This type of unit presents some problems, particularly on coal or oil fired units, as to how the centerwall can best be kept clean from ash and soot deposits. The normally installed wall sootblowers cannot be used for cleaning a centerwall, since there is a furnace on both sides of the wall. The normal long retractable sootblowers which rotate throughout a 360° arc as they move into and out of the furnace cannot be efficiently used, since during better than half of their cleaning cycle, the cleaning medium would not be effectively directed at the centerwall to be cleaned.

It is an object to provide a retractable sootblower which can be extended into a furnace adjacent a wall to be cleaned, which sootblower will direct the cleaning medium such that the wall area surrounding the head of the sootblower will be cleaned throughout a 360° arc.

It is a further object to provide a sootblower which will maintain the jets of cleaning medium at a fixed distance from the wall being cleaned at all times, thereby optimizing cleaning efficiency.

These and other objects will be made more clear upon a reading of the following, when taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a cross sectional plan view of a centerwall furnace utilizing our improved sootblower;,

FIGURE 2 is an enlarged sectional plan view showing a portion of one of the sootblowers of FIGURE 1 in more detail;

FIGURE 3 is a view taken on line 3—3 of FIGURE 2;

FIGURE 4 is a view taken on line 4—4 of FIGURE 2;

FIGURE 5 is an enlarged sectional plan view showing a second embodiment of the invention; and

FIGURE 6 is a view taken on line 6—6 of FIGURE 5.

Looking now to FIGURE 1 of the drawings, **10** designates a centerwall or divided furnace of a steam generating unit, containing furnace areas **12** and **14**, separated by centerwall **16**. All of the walls of both furnaces are made up of steam generating tubes welded together to form imperforate walls. Both furnaces **12** and **14** are fired by tangential burners **18** and **20**, respectively.

A pair of sootblowers **22** and **26** are illustrated in association with the furnace **12** side of the centerwall **16**, for periodically removing soot and ash deposits therefrom. These blowers are of the retractable type, and can be moved into and out of the furnace proper by suitable drive means, illustrated in FIGURE 1 by drive gear and rack means **24** and **28**. Sootblowers are also provided for cleaning the other side of centerwall **16**, and these blowers are identical in all respects to blowers **22** and **26**.

Looking now to FIGURE 2, sootblower **22** consists of

retract tube **30** through which the cleaning medium, steam or air, is supplied to sootblower head **34**. When the sootblower is not in operation, it is withdrawn from the furnace proper, with head **34** residing in space **32**, so that it is subject to very little radiant heat from the furnace.

During operation, as the retract tube **30** moves head **34** progressively further into the furnace, jets of cleaning medium are directed towards the wall **16** through nozzle means **36**. As shown in FIGURE 3, a plurality of nozzle means **36** are provided, each being equidistantly spaced around a 360° arc, so that the entire wall area surrounding head **34** is cleaned. Thus a single blower constructed in accordance with the invention can clean a large wall area efficiently.

In order to hold the head **34** in contact with wall **16** at all times, a reaction jet nozzle means **38** is provided. The force of the cleaning medium flowing through nozzle **38** counteracts the tendency of the jets **36** to force the head away from wall **16**. The size of jet **38** can be much smaller than the combined total of jets **36**, since all of the force created by jet **38** forces the head **34** in a direction towards wall **16**. In contrast, only a small component of each of jets **36** tends to force head **34** away from wall **16**.

In addition to maintaining the cleaning jets **36** at a fixed location from wall **16** so as to optimize cleaning efficiency at all times, reaction jet **38** also reduces "whipping" of the sootblower tube. In other words, the longer a retractable sootblower becomes, the harder it is to keep it running in a straight path into the furnace. Any small inequalities in the size of the jets **36** in a normal sootblower will cause the sootblower to whip about, and actually cause the head to be physically moved from the longitudinal axis of the retract tube.

Over a period of time the intermittent movement of sootblower **22** into and out of the furnace would wear down the tubes over which head **34** travels. To prevent this from happening, a metal wear strip **40** (FIGURE 4) is welded onto the tubes of centerwall **16** in the path of travel of head **34**. If this wear strip **40** becomes too badly worn, it can be removed and replaced by a new one.

FIGURES 5 and 6 illustrate a second embodiment of the invention. In this embodiment, a retract tube **52** of a sootblower has a head **54** rotatably attached thereto, for example by means of a sleeve journal or bearing **60**. This bearing surface should be suitably packed so that little or no cleaning medium escapes at this point. In the same manner as that of the embodiment shown in FIGURES 1–4, head **54** is moved longitudinally of centerwall **50**, along wear strip **62**. Reaction jet **58** maintains the head in contact with wall **50**. Instead of the multitude of nozzle means **36** contained in the other embodiment, only two nozzle means **56** are provided (FIGURE 6). The nozzles **56** are offset from the central axis of head **54**, so that the reaction from the cleaning medium flowing through these nozzles causes head **54** to rotate about journal **60** during operation. In this manner, the sootblower cleans a wall area completely surrounding head **54** throughout a 360° arc during operation.

From the above, it can be seen that a sootblower has been provided in accordance with the invention which can efficiently and effectively be used to clean the centerwall of a furnace. Although the invention has been described in relation to cleaning a centerwall of a furnace, it should be obvious that it could also be applied to outer walls of a furnace where it might be difficult or impossible to mount wall blowers. Having thus described our invention, what we claim is:

1. In combination, a furnace in which combustible matter is burned, wall means associated with said furnace

upon which ash or slag resulting from the combustion adhere, sootblower means associated with said wall means for periodically removing deposits of ash or slag from the wall means, said sootblower means comprising a tube through which a cleaning medium flows, means for moving the tube forward and backward in a direction parallel to the plane of the wall means, head means connected to the tube, said head means containing first nozzle means positioned so as to direct cleaning medium in a direction towards the wall means, said head means containing second nozzle means positioned so as to direct cleaning medium in a direction away from the wall means, the direction and size of the first and second nozzle means being such that the forces created by the cleaning medium flowing therethrough maintain the head means in continuous contact with the wall means.

2. In combination, a furnace in which combustible matter is burned, wall means associated with said furnace upon which ash or slag resulting from combustion adhere, sootblower means associated with said wall means for periodically removing deposits of ash or slag from the wall means, said sootblower means comprising a tube through which a cleaning medium flows, means for moving the tube forward and backward in a direction parallel to the plane of the wall means, head means connected to the tube, said head means containing first nozzle means, the first nozzle means being positioned such that they direct cleaning medium towards the wall means throughout

a 360° arc surrounding the head means, said head means containing second nozzle means which are positioned so as to direct cleaning medium in a direction away from the wall means, the direction and size of all of the nozzle means being such that a force is created which maintains the head means in contiuous contact with the wall means.

3. The combination set forth in claim 2, wherein the first nozzle means are a plurality of radial nozzle means which are equidistantly spaced throughout a 360° arc.

4. The combination set forth in claim 2, wherein there are at least two first nozzle means, being positioned at an angle to radial lines of the head means, and the head means is rotatably attached to the tube, so that the force of the cleaning medium flowing through the first nozzle means causes the head means to rotate, thereby allowing cleaning of the wall means throughout a 360° arc surrounding the head means.

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