Feb. 3, 1953 C. D. MacCRACKEN 2,627,149

METHOD OF CLEANING DEPOSITS OF SOOT AND THE LIKE FROM PASSAGES

Filed Aug. 30, 1950 2 SHEETS—SHEET 1

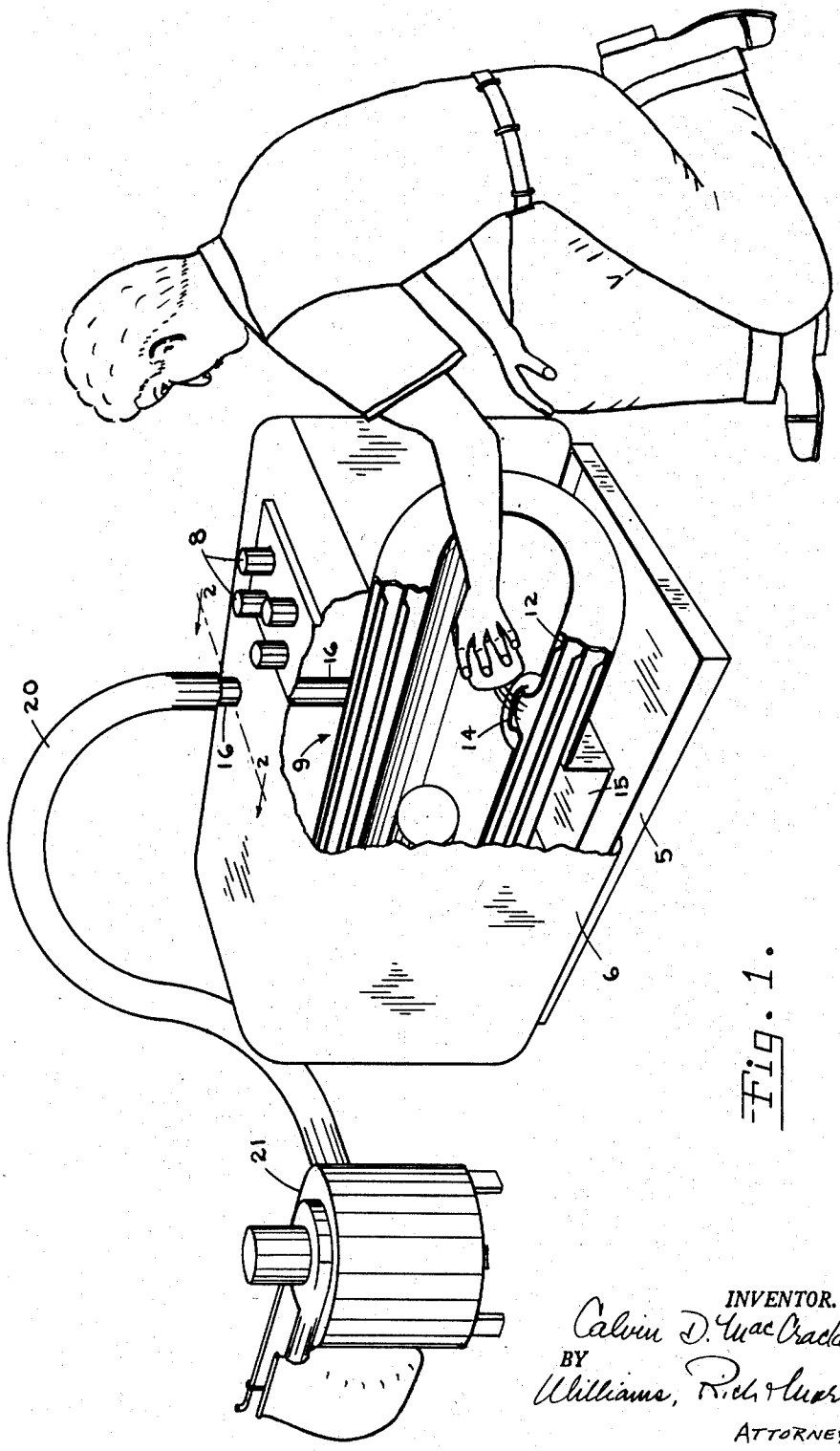


Fig. 1.

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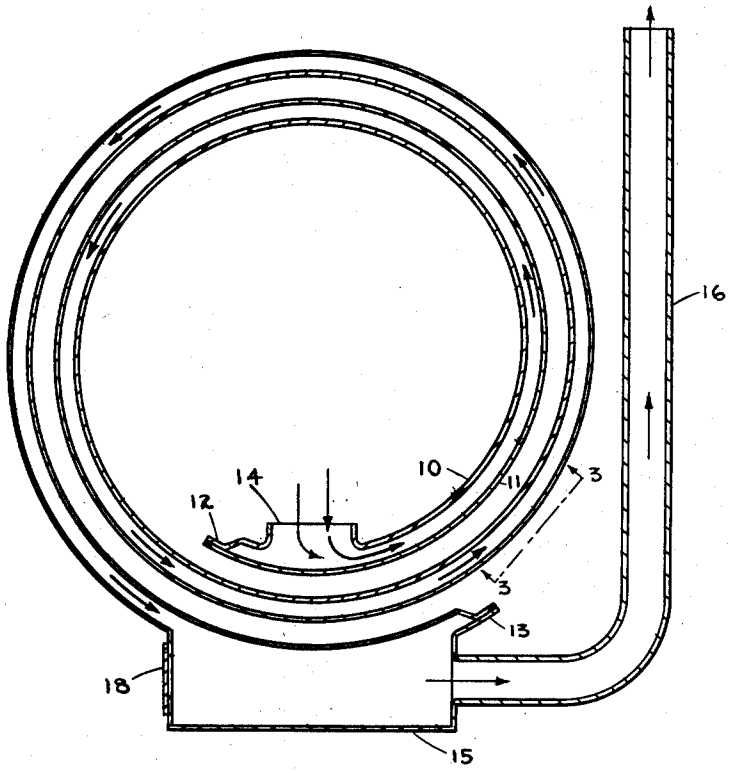


Fig. 2.

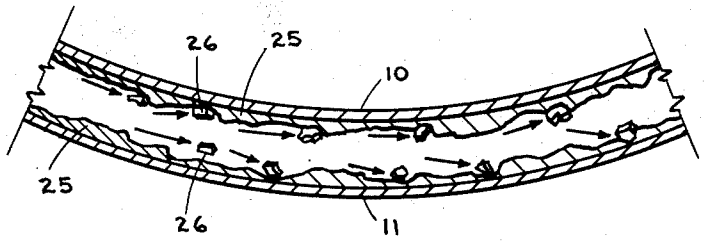


Fig. 3.

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METHOD OF CLEANING DEPOSITS OF SOOT AND THE LIKE FROM PASSAGES

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4 Claims. (Cl. 51—282)

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This invention relates to a method of cleaning, more particularly to the removal of sooty and similar deposits from passages, especially those which are inaccessible to cleaning tools.

The problem to which the invention is directed may be exemplified, and the invention illustrated, by reference to an oil or gas burning hot-air heating unit having a spiral heat-exchanger shown in the drawings, in which:

Fig. 1 is a perspective view, partly broken away, showing the unit, the heat-exchanger being shown in section;

Fig. 2 is a vertical cross-section through the heating element of the heat-exchanger, its inlet and its exhaust pipe showing the air flow therethrough, taken on the plane of the line 2—2 in Fig. 1; and

Fig. 3 is a fragmentary vertical section, on the line 3—3 of Fig. 2, through a portion of the heating element of the heat-exchanger illustrating the cleaning action taking place therein.

For a better understanding of the invention, a brief description of the illustrated heating unit will be given. Referring to the drawings, Fig. 1 shows the unit as having a base 5, a housing 6 and hot air outlets 8 which receive air from the heat-exchanger, generally indicated at 9, in a manner which need not be considered. Referring to Fig. 2, this heat-exchanger comprises a double-walled spiral of two turns, formed of an inner sheet metal wall 10 and an outer sheet metal wall 11, this spiral being closed at its inner end 12 and at its outer end 13 (Fig. 2). The front and rear edges of this spiral are also closed as shown in Fig. 1 at 12 by being welded together. The spiral is provided at its inner end with a short pipe or collar 14 which serves as an inlet and to which, when the heater is operating, is attached the burner or combustion-chamber which discharges into the spiral hot gases and other products of combustion which flow in the direction indicated by the arrows. The outlet end of the spiral adjacent the end 13 opens into a centrally located exhaust box 15 which connects with the exhaust pipe or stack 16. In the other side of the box 15 is a clean-out door 18.

Air to be heated is circulated around the walls of this heating element. It may be necessary, after a considerable period of use, to remove from the inside of the spiral heating element sooty deposits which adhere to the inner surfaces of the walls 10 and 11. As will readily be understood, it is not possible to reach all parts of the walls of this spiral with any cleaning tools by means of which such deposits could be removed.

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In accordance with the invention, the inner walls of this and similar tortuous passages can effectively be cleaned by producing a rapid flow of air or other gas therethrough and injecting into this gaseous stream a light-weight, granular, absorbent material which has sufficient abrasive properties to effect a scouring action.

Sooty deposits which are produced from the combustion of fuels are a sticky mixture of carbon, oily materials and a certain amount of water condensed from the combustion products. The cleaning material which is injected into the air stream, therefore, preferably has both oil and water absorption properties, although the characteristics of the material may vary with the nature of the deposit. It has been discovered that once the oil, water or other liquid or empyreumatic compounds have been absorbed from this soot, it rapidly disintegrates and yields readily to the abrasive action of the rapidly moving granules of cleaning material and the cleaning material also appears to absorb or adsorb the carbon particles at least to some extent.

The production of a rapidly moving air stream through the passage to be cleaned may readily be produced by attaching the intake hose 20 of a vacuum cleaner 21 to the exhaust stack 16. The vacuum cleaner is preferably of the industrial type which is capable of handling a considerable volume of air and producing a rapid flow. When the air flow has been established, the combustion-chamber having been removed from the inlet 14, the cleaning material is simply poured continuously into the inlet. Fig. 3 illustrates the cleaning action taking place, the sooty deposit being indicated at 25 and the granules or small lumps of cleaning material at 26. In contacting the soot they absorb the ingredients giving it its adhesive property and at the same time knock it off by impingement as they are whirled about in the air stream.

As a light-weight, absorbent, abrasive cleaning material, I have found a granular form of aluminum silicate material, such as fuller's earth, to be most effective. This material is naturally highly oil-absorbent, and, if it is dehydrated before use, it is likewise highly water-absorbent. Such a material is available commercially under the names "Speedi-Dri" and "Sol-Speedi-Dri," the latter being the preferred dehydrated form of the material. These materials are in the physical form of small hard flakes or granules of the approximate size of flax-seed which have rough sharp edges well adapted to scour off the sooty deposit. Their present use, so far as is

known, is merely as absorbents to be poured on the floor around machinery or in other places where oil or other liquids may undesirably accumulate. Another suitable material is a granular, oil and water absorbent, non-alkaline clay sold under the name of "Sta-Bright."

All that is necessary to do after establishing the air flow is to pour two or three handfuls of the selected granular material into the inlet and wait not over five minutes until it has been carried through the passage. Some of it may accumulate in the box 15, in the particular structure described, from which it can be removed through the door 18. Being non-combustible, it does not matter if some of the material remains in the heating unit when it is returned to use.

The air flow through the passage to be cleaned need not be produced by a vacuum device, of course, but may be produced by other means such as the injection of compressed air or other gas.

The process does not depend on the use of the specific materials described but may be practiced with any material having the required characteristics of sufficient lightness of weight to be air borne in the passage to be cleaned, absorbency or adsorbency for the absorbable or adsorbable components of the deposit and a hardness and particle shape adequate to scour off the remainder of the deposit. The invention is therefore not to be considered as limited to the details of the embodiments herein described merely for purposes of illustration but is to be construed broadly within the purview of the claims.

What is claimed is:

1. The method of cleaning sooty and like deposits from a passage which comprises establishing and maintaining a rapid flow of substantially dry gas through the passage, and feeding into the stream of gas small hard flakes, of the approximate size of flax-seed, of a granular absorbent material sufficiently light in weight to be borne by said stream.

2. The method of cleaning sooty and like deposits from a confined passage which comprises establishing and maintaining a rapid flow of substantially dry air through the passage by the application of a partial vacuum to an outlet thereof, and feeding into the air stream through an inlet of said passage small hard flakes, of the approximate size of flax-seed, of a granular absorbent material sufficiently light in weight to be borne by said stream.

3. The method of removing soot from a confined tortuous passage which comprises establishing a rapid flow of substantially dry air therethrough, and feeding into said passage sharp edged grains, sufficiently light in weight to be borne by said flow of air and of the approximate size of flax-seed of an aluminum silicate mineral.

4. The method of removing soot from a confined tortuous passage which comprises establishing a rapid flow of substantially dry air therethrough, and feeding into said passage sharp edged grains, sufficiently light in weight to be borne by said flow of air and of the approximate size of flax-seed, of a dehydrated aluminum silicate mineral.

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