Nov. 8, 1949 C. R. H. BLACK 2,487,689

FURNACE DUST AND SMOKE COLLECTOR

Filed April 29, 1946 3 Sheets-Sheet 1

FIG. 2.

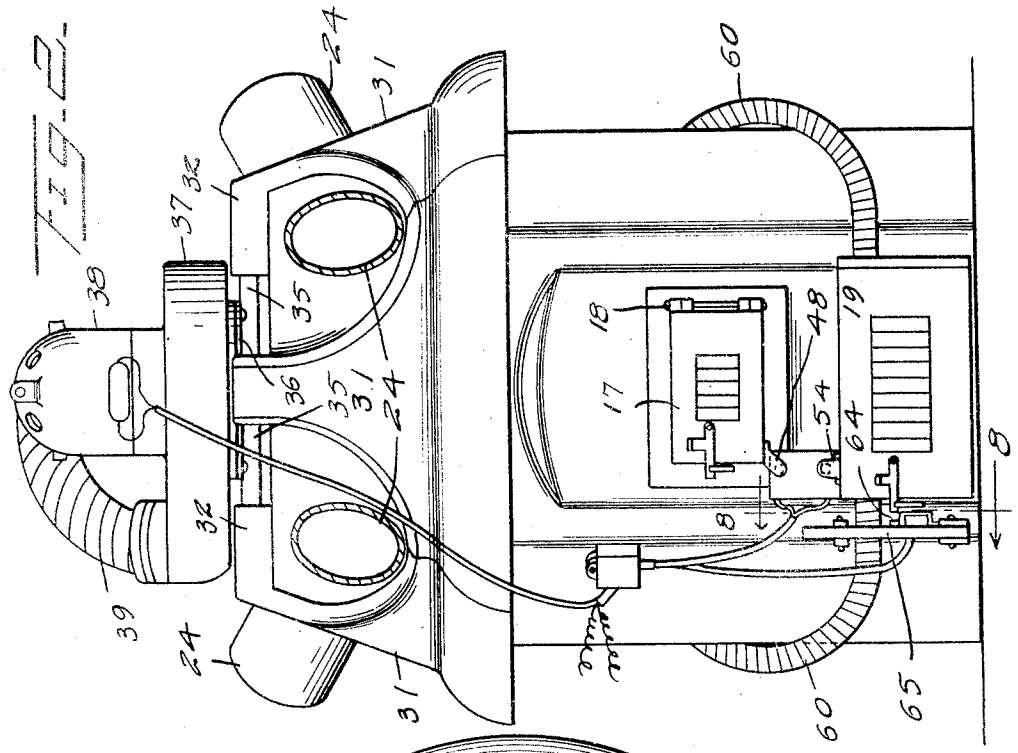
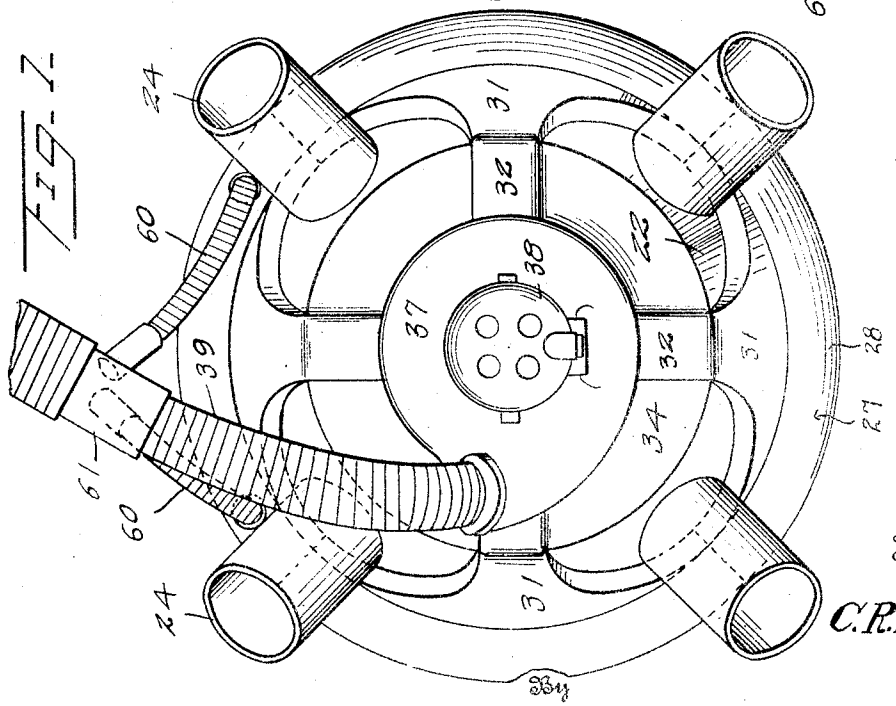


FIG. 1.



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Filed April 29, 1946 3 Sheets-Sheet 2

Fig. 3.

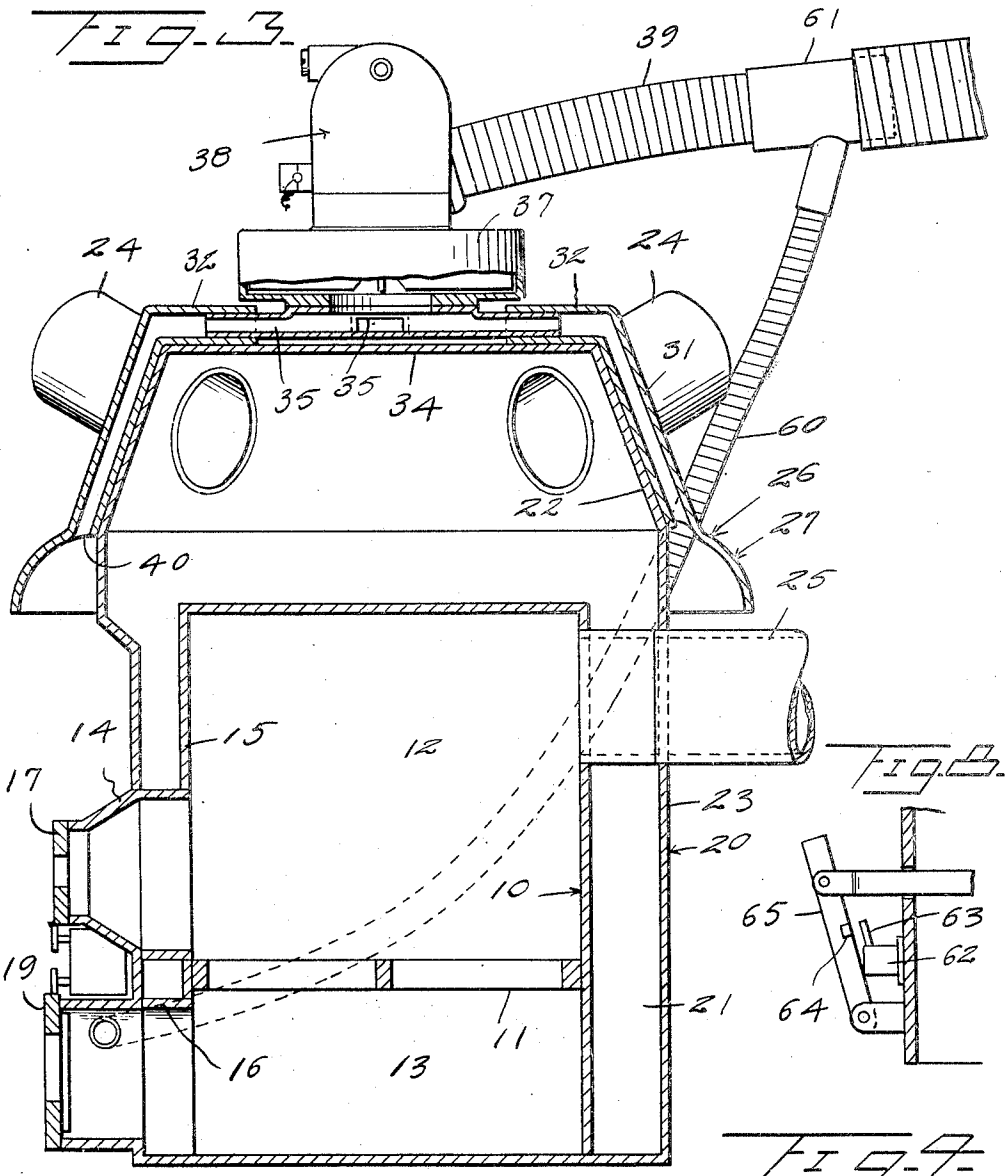
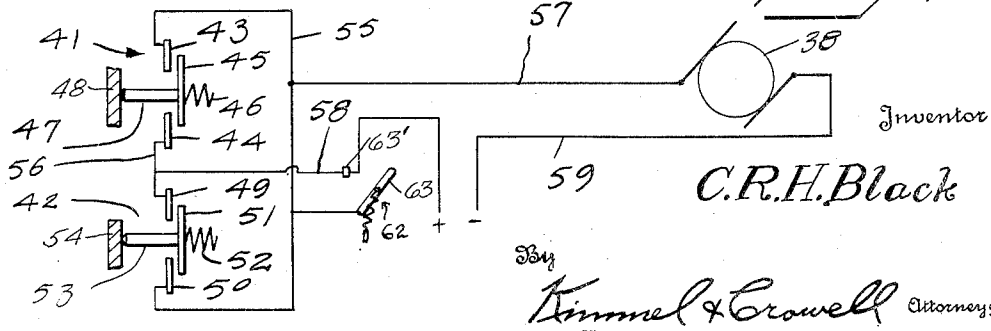


Fig. 5.

Fig. 4.



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Filed April 29, 1946 3 Sheets-Sheet 3

Fig. 5.

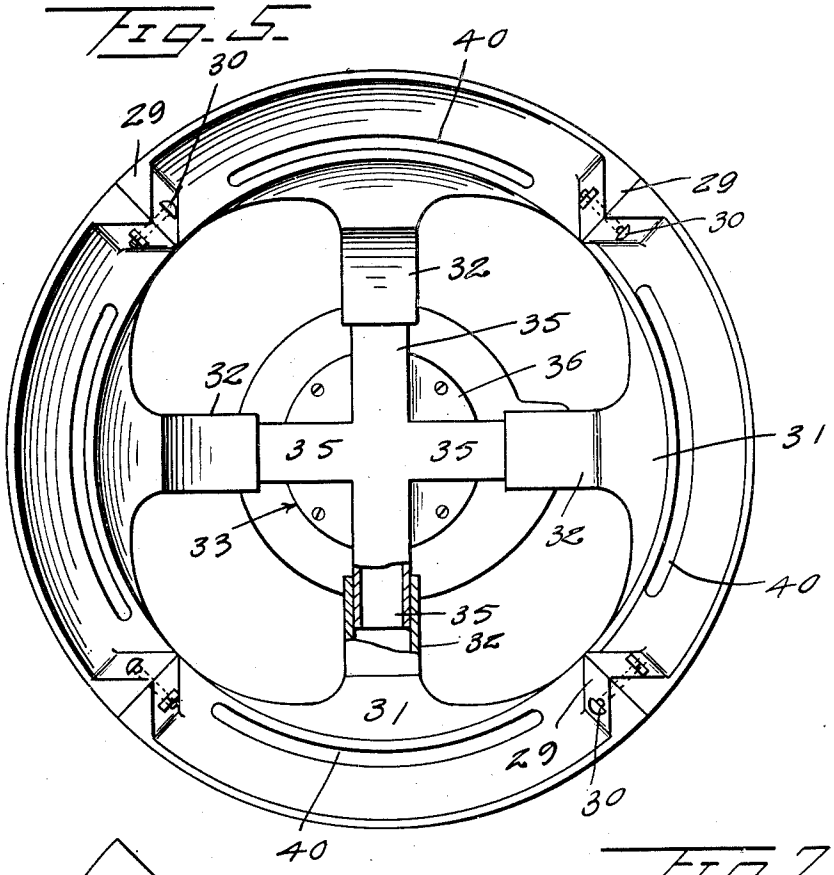


Fig. 6.

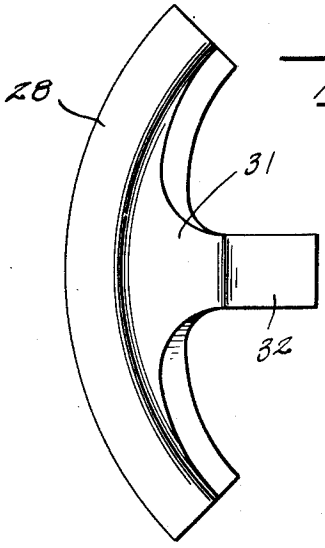
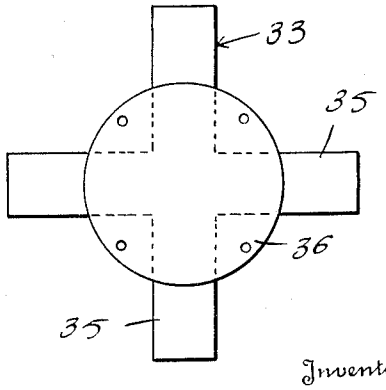


Fig. 7.



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FURNACE DUST AND SMOKE COLLECTOR

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Application April 29, 1946, Serial No. 665,677

11 Claims. (Cl. 126—80)

1

This invention relates to furnaces and more particularly to an improved means for withdrawing gases, dust, smoke or the like from the exterior and interior of the furnace.

In furnaces, such as coal furnaces of either the hot air or hot water type, also stoker fed furnaces, when one of the doors to the furnace is opened, gases, smoke or dust emerge from the furnace and usually fill the furnace room and seep into the upper floors of the house. It is, therefore, an object of this invention to provide in combination with a furnace, a suction means which will be automatically set into operation when a furnace door is opened so that gases, smoke or dust emerging from the open door will be withdrawn from about the furnace and at the same time an induced draft is formed in the chimney.

Another object of this invention is to provide, as an attachment for a furnace, a suction means for mounting on the furnace which includes means for making the suction means automatically operable when either the feed or ash doors are opened or the grate is shaken.

Another object of this invention is to provide a dust and gas collector attachment which discharges the dust and gas laden air into the stack and constitutes a forced draft for the furnace so that if desired the suction device may be operated at will without regard to the automatic means for causing the desired draft.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings,

Wherein similar characters designate similar parts throughout the respective views,

Figure 1 is a detail top plan of a furnace embodying this invention,

Figure 2 is a detail front elevation of the device mounted on the furnace,

Figure 3 is a vertical section through the furnace,

Figure 4 is a diagrammatical view of the electric circuits in this invention,

Figure 5 is a bottom plan view, partly broken away and in section, of the suction members,

Figure 6 is a plan view of one of the suction elements,

Figure 7 is a plan view of the suction manifold,

Figure 8 is a fragmentary sectional view taken on line 8—8 of Figure 2.

Referring to the drawings, the numeral 10 designates generally a furnace of conventional construction having a grate 11 mounted in the lower portion thereof, dividing the interior of the furnace into a combustion chamber 12 and ash pit 13. A fuel entrance throat 14 is connected to the side wall 15 of the combustion chamber or fire box of the furnace 10 and an ash removing neck 16 is also connected to the side wall 15 below the throat 14. A door 17 engages the outer end of throat 14, being hingedly mounted on hinges 18, and the lower door 19 is hingedly secured to the ash throat or neck 16.

2

A jacket 20 is disposed about the furnace body 10 thereby forming an air heating space 21 about the side wall 15, and jacket 20 includes a frustoconical hood 22 extending upwardly from the side wall 23 of the jacket. A plurality of hot air conducting nipples 24 are connected to the hood 22 for being connected to suitable air conducting pipes at suitable points within the building. A smoke pipe 25 extends from the upper portion of combustion chamber 12 and extends through the jacket 23. The furnace hereinbefore described is a conventional hot air furnace and the particular configuration of the furnace is only illustrative of a hot air furnace with which the suction device to be hereinafter described may be correlated.

In order to provide a means whereby smoke, gases, dust or the like may be removed from about the jacket 20 when any one of the doors have been opened, I have provided a suction hood generally designated as 26. The suction hood or nozzle 26 includes a downwardly flaring ring generally designated as 27 which is formed of arcuate segments 28 having lugs 29 (Fig. 5) at the opposite ends thereof, through which fastening members 30 are extended for securing the several segments together in order to form a complete ring. Each segment 28 has extending upwardly therefrom upwardly reducing central hollow member 31 which is adapted to engage over the tapered side of the hood 22 and the tapered member 31 terminates at its upper end in a horizontally disposed tubular member 32.

In the present instance there are four of these segments 28 and adjacent suction tubes 32 are disposed at right angles with respect to each other. A suction manifold generally designated as 33 is disposed over the top wall 34 of the hood 22 and comprises a plurality of right angularly arranged tubular arms 35 which are formed as an integral unit, and which have secured to the upper sides thereof a disk-shaped plate 36. The plate 36 has mounted thereon the suction housing 37

of a suction fan or blower 38 and the blower 38 is connected on the discharge side thereof by means of a flexible tubular member 39 to the smoke stack associated with smoke pipe 25.

The suction hood 27 is formed with spaced elongated arcuate suction openings 40 which are carried or provided, one by or centrally in each segment 28 leading into members 31, and disposed adjacent the outer jacket 20. In order to provide a means whereby the motor for the blower 38 will be automatically operated when one of the doors 17 or 18 is opened, I have provided a pair of switch members (Fig. 4) generally designated 41 and 42 which are disposed adjacent the doors 17 and 19. The switch 41 includes a pair of contacts 43 and 44 which are adapted to be bridged by a bridging contact 45 constantly urged to closed position by means of a spring 46.

The bridging member 45 has extending therefrom an operating pin 47 which is adapted to be normally engaged by a lug 48 which is fixed to the lower edge of the door 17. The switch 42 is similar to switch 41 and includes a pair of contacts 49 and 50 which are adapted to be bridged by a bridge member 51 constantly urged to circuit closing position by means of a spring 52. A pin or operator 53 is carried by bridge member 51 and disposed in a position for engagement with an upwardly extending lug 54 carried by the upper edge of the lower door 19.

The two contacts 43 and 50 are connected together by the conductor 55 and the two contacts 44 and 49 are connected together by conductor 56. Conductor 55 is connected by means of a conductor 57 to one side of the motor 38, and conductor 56 is connected by means of a conductor 58 to one side of the electric current source. The other side of the electric current source is connected by conductor 59 to the opposite side of motor 38. By the circuit arrangement shown in Figure 4, when either switch is automatically moved to a closed position by opening of either door, motor 38 will be in circuit with the supply source and will operate the fan or suction member to withdraw and carry off the smoke, gases or dust about the jacket 20.

In order to provide additional suction means for preventing ash dust from passing out of the neck 16 when the door 19 is open, I have provided an auxiliary suction tube 60 which is connected at one end to neck 16, and at the other end is connected to a connector 61 carried by the flexible tube 39. Two tubes 60 are shown connected to opposite ends of neck 16. In order to provide a means whereby the motor 38 may also be automatically operated when the grates 11 are shaken, I have provided a conventional snap switch 62 which is mounted on the jacket 20 adjacent the ash door 19. The switch 62 includes a switch operating arm 63 constituting a movable contact in conductors 55 and 57 cooperating with a contact 63^1 in conductor 58 disposed in a position for engagement by a lug 64 which is carried by the grate operating lever 65. When the lever 65 is rocked inwardly or to the right, as viewed in Figure 8, switch arm 63 will be moved inwardly to circuit closing position and will remain in this position until manually moved outwardly to a position as shown in Figure 8.

It will be apparent from the foregoing that the motor 38 will be operated without opening either of the doors 17 or 19, and by providing the auxiliary suction tubes 60 which are mounted in the ash throat 16, all generated dust from the ash pit 13 will be withdrawn and forced outwardly and upwardly into the stack. It will also be understood that if it is desired to provide additional draft for the furnace, switch 62 may be moved to a closed position manually by swinging lever 63 inwardly to close the circuit to the motor 38. The air pulled into the suction manifold 33 will be forced upwardly through the outlet member 39 and then into the stack for forcing the air in the stack upwardly. This will thereby increase the draft in the furnace without increasing the direct flow of air through the combustion chamber 12.

The suction member hereinbefore described can be mounted on any conventional furnace and when so mounted will automatically withdraw the dust, smoke or gases from about the furnace when the doors or any one of them are opened so as to eliminate the seepage of the dust or gases into the upper floors of the house, or prevent the accumulation of dust or gases in the furnace room. While I have shown the suction member as being made of four segments 28, it will be understood that there may be as many of these segments as may be desired, the number of segments depending on the size of the furnace and the number of hot air outlets carried by the hood of the furnace.

What I claim is:

1. In combination, a furnace having a door, a suction nozzle encompassing said furnace above the door thereof and having branch conduits, a suction manifold engaging on top of said furnace and connected to the branch conduits of said nozzle, a suction member connected to said manifold, and means effecting operation of said suction member only when said door is opened.

2. In combination, a furnace having a feed door, a suction nozzle encompassing said furnace above the feed door thereof, a suction manifold engaging on top of said furnace and connected to said nozzle, a suction member connected to said manifold, a switch spring-pressed to a circuit closing position and connected to said suction member, and means carried by said door engageable with said switch for holding said switch in circuit breaking position when said door is closed.

3. In combination a furnace having a feed door, a suction nozzle encompassing said furnace above the feed door thereof, a suction manifold engaging on top of said furnace and connected to said nozzle, a suction member connected to said manifold, and means effecting operation of said suction member only when said door is opened, said nozzle comprising a plurality of end abutting hood-shaped members, means securing said members together, and means telescoping said manifold for connecting said hood-shaped members to said manifold.

4. In combination, a furnace having a feed door correlated with the combustion chamber of the furnace and an ash pit, an ash door correlated with the ash pit of the furnace, a circular suction nozzle on the exterior of said furnace above the feed door, a suction member connected to said nozzle, means correlated with both of said doors for effecting operation of said suction member when either door is opened, and a suction tube connected to said suction member and to said furnace inwardly of said ash door for removing the ash dust from said pit.

5. In combination, a furnace having a feed door correlated with the combustion chamber of the furnace and an ash pit, an ash door correlated with the ash pit of the furnace, a

suction nozzle on the exterior of said furnace above the feed door, a suction member connected to said nozzle, means correlated with both of said doors for effecting operation of said suction member, said furnace including a grate and an operator therefor, and means correlated with said operator and said suction member for effecting operation of said suction member when said operator is operated.

6. The combination set forth in claim 5 wherein said second correlated means includes a snap switch.

7. The combination set forth in claim 5 wherein said second correlated means includes a snap switch fixed to the furnace adjacent said operator, and means carried by said operator for moving said snap switch to closed position when said operator is operated.

8. A suction attachment for removing dust and gases from about the exterior of a furnace comprising an annular nozzle member encompassing said furnace at the upper portion of the latter, upwardly directed tubular members connected to said nozzle, a suction manifold connected to said tubular members, a suction member connected to said manifold, and switch means connected to said suction member.

9. In combination, a furnace having a feed door correlated with the combustion chamber of the furnace and an ash pit, an ash door

correlated with the ash pit, a suction nozzle on the exterior of said furnace, a suction member connected to said nozzle, said furnace including a grate and an operating means therefor, and means correlated with said operating means and said suction member for effecting operation of said suction member when said grate is operated.

10. The combination set forth in claim 9 wherein said second correlated means includes a snap switch.

11. The combination set forth in claim 9 wherein said second correlated means includes a snap switch fixed to the furnace adjacent said operating means, and means carried by said operating means for moving said snap switch to closed position when the grate is operated.

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