Feb. 18, 1936. L. N. HUNTER 2,031,314

DRAFT HOOD

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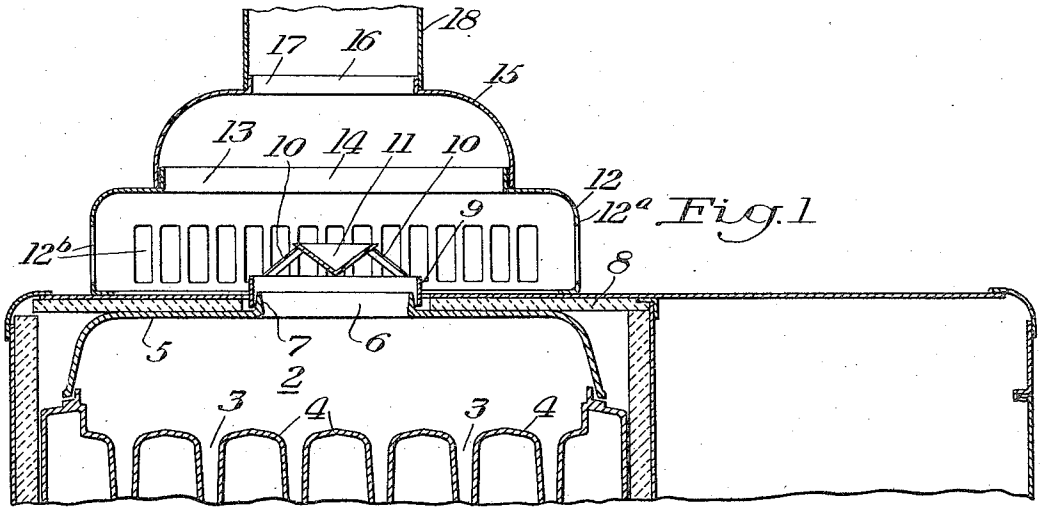
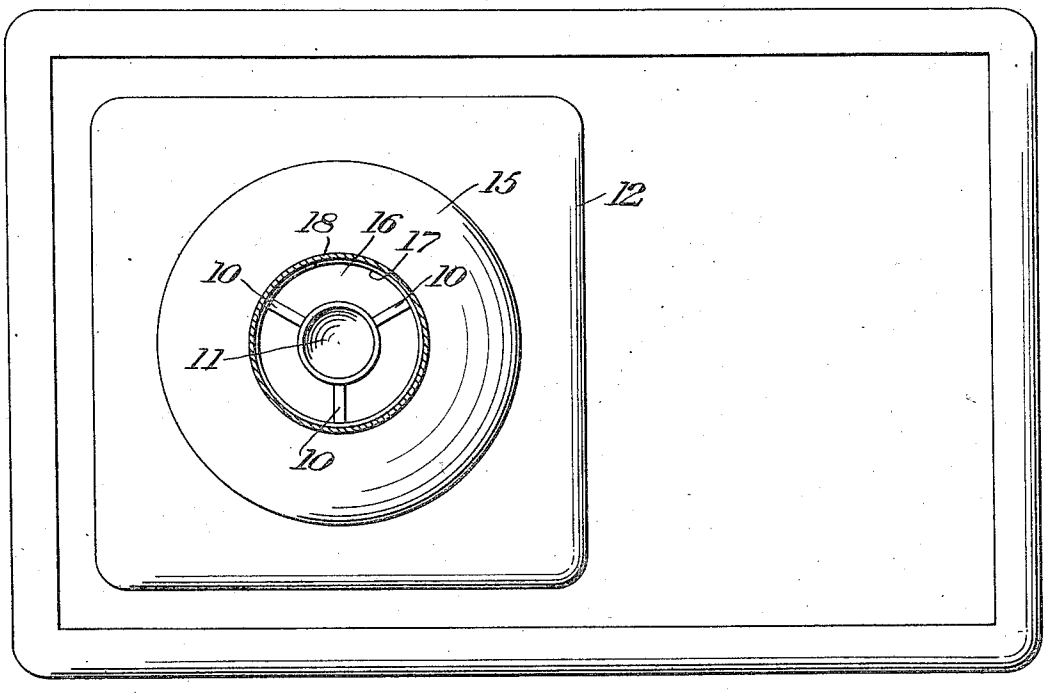


Fig. 1

Fig. 2.



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Fig. 3.

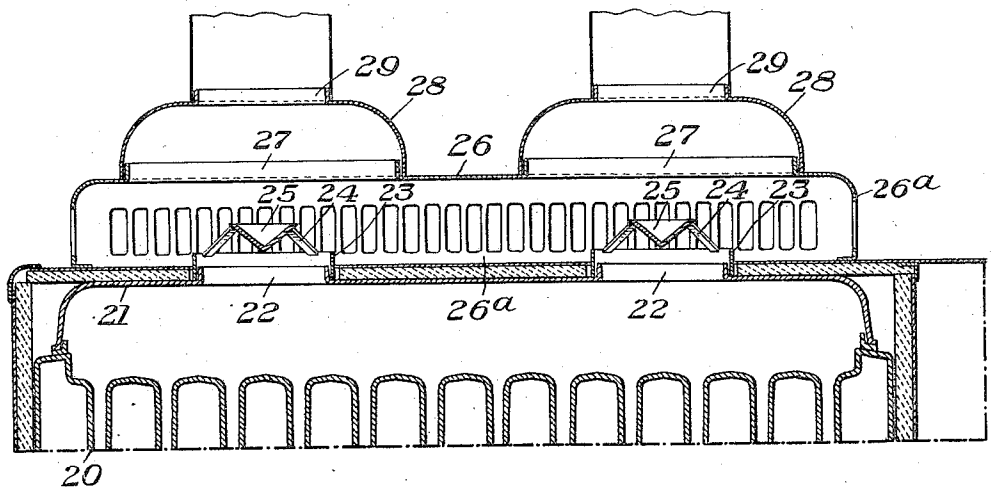
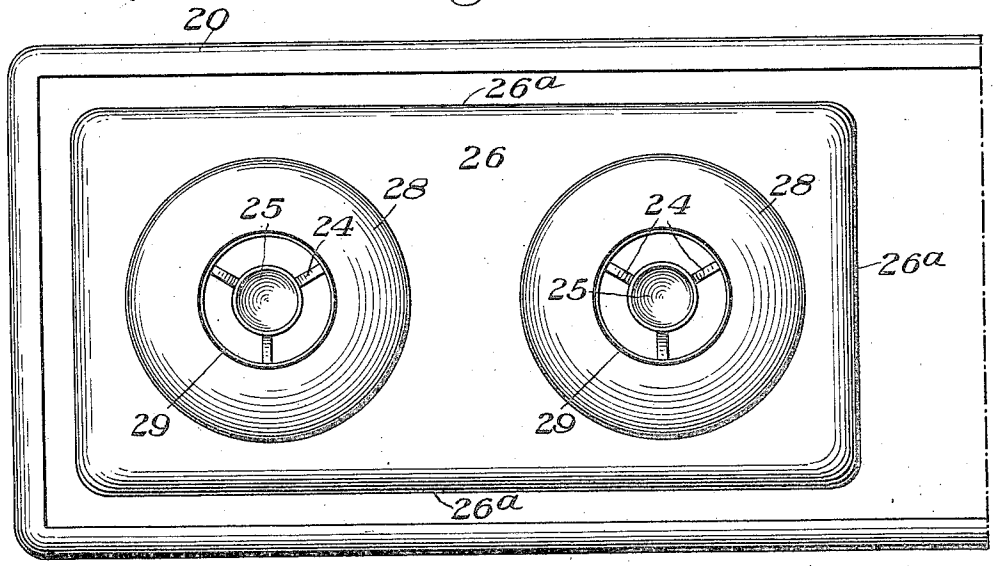


Fig. 4.



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DRAFT HOOD

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Application April 17, 1933, Serial No. 666,500

2 Claims. (Cl. 126—307)

This invention relates to what are known as draft hoods or draft diverters for fuel burning appliances, such as gas-fired heating furnaces and boilers.

A well constructed gas burning appliance is designed to operate with an extremely low or practically negligible chimney draft. At the same time it should be connected with a chimney in order that the products of combustion can be properly disposed of. The draft hood or draft diverter is located in the flue passage between the appliance and the chimney, and its main function is to break the chimney draft through the provision of passages which open into the room so that air may be drawn from the room into the chimney without having to pass through the gas burning appliance, allowing the appliance to operate under practically no draft. If this relief were not provided, too much air would be supplied to the appliance, with the result that its efficiency would be impaired and there would be danger of the strong draft extinguishing the flames in the pilot burners or in the main burners if they were very low.

With so little draft the possibility of down-draft or back-draft is greater, and a second important function of the draft diverter is to protect the gas appliance when there is a down-draft or a back-draft. If there is a down-draft or back-draft and the draft diverter does not function properly, the gases of combustion do not escape from the combustion chamber with sufficient rapidity, causing the flames to "float", and there is incomplete combustion and the possibility of the flame being smothered out. In the case of incomplete combustion, carbon monoxide is generated.

A well designed draft hood should therefore effectively break the chimney draft; the relief openings should be so disposed that the air coming in through the relief openings from the surrounding atmosphere does not create a suction on the flue passage from the appliance and it should provide for the discharge of the products of combustion through the relief openings at an ample rate to insure proper combustion in the combustion chamber in the event that the chimney becomes entirely stopped up or in the event that there is a down-draft or back-draft. Moreover, it should be such that under normal conditions all of the products of combustion pass up the chimney and do not escape through the relief openings into the atmosphere. Another important function is that it shall prevent back-drafts into the appliance sufficient to blow the flames, particularly the small flames of pilot burners.

Draft diverters as heretofore constructed have been sufficient to take care of one or more of these requirements, but I am aware of no draft diverter which adequately fulfills all of the requirements because the securing of one function with previous types of draft diverters has been accomplished only with the impairment of another factor.

According to the present invention there is provided a draft diverter which has adequate relief openings for breaking the draft wherein these openings are so disposed and arranged that the incoming air does not have any effect on the gases discharging from the appliance. It is so constructed that it will adequately handle all of the products of combustion of the appliance under what are termed "neutral draft conditions" by the American Gas Association. By this it is meant that with practically no draft in the chimney, but with the chimney open, all of the gases of combustion from the appliance will pass up the chimney without spilling out through the relief openings into the surrounding atmosphere. This is determined by smoke tests arranged under controlled conditions. If in these smoke tests it appears that the smoke comes out the relief openings, the diverter is not capable of taking care of the products of combustion under neutral draft conditions.

The diverter is further so constructed that in the event of a back-draft it will prevent the flames from being blown out or smothered and in case of the flue being completely closed, the products of combustion will discharge through the relief openings without building up a back pressure in the combustion chamber sufficient to impair combustion to a point where the concentration of carbon monoxide in an air-free sample of the products of combustion does not exceed 0.04%, this being the maximum carbon monoxide concentration permitted by the American Gas Association requirements for househeating appliances.

The invention may be readily understood by reference to the accompanying drawings, in which,

Figure 1 illustrates a transverse vertical section through the upper portion of a gas burning appliance and through a draft hood constructed in accordance with my invention;

Figure 2 is a top plan view of Fig. 1;

Figure 3 is a view similar to Fig. 1 showing a preferred construction of the hood for the larger

sizes of boilers where a plurality of flue outlets are desirable; and

Figure 4 is a view similar to Fig. 2 showing a top plan view of the arrangement illustrated in Fig. 3.

In the drawings, 2 designates the chamber in the upper part of a gas-fired boiler, the gases of combustion from the burners (not shown) rising through the spaces 3 between the boiler sections 4 into the space 2. The space 2 is covered by a flue top 5, this flue top having a discharge opening 6 therein, the opening 6 being surrounded by a flange 7 that projects through the top cover 8 of the boiler. Placed around the flange 7 in order to provide slightly increased height is a collar 9 to which is secured a plurality of supporting arms 10, which arms support an inverted conical baffle or deflector 11, the baffle 11 being centrally supported by the arms 10 over the flue opening 6. The baffle, moreover, is preferably of less diameter than the flue opening 6.

Supported on the top of the boiler is a hood 12, which is shown as being square, but which can be of any suitable contour, and which has a width considerably larger than the diameter of the ring 9 so that the vertical walls 12*a* of this hood are spaced a considerable distance away from the draft discharge ring 9. The side walls 12*a* of the hood are provided with a series of draft relief openings 12*b*, these relief openings being formed of the side walls of the hood and covering the major portion of the area of the side walls.

The top of the hood 12 has a circular opening 13 therethrough, this opening being surrounded by a vertical flange 14. The vertical flange 14 serves to center a circular dome 15 above the hood, the dome 15 being of a height substantially equal to the height of the hood. The dome has a circular opening 16 therein with a flange 17 thereabout over which is fitted the flue pipe 18. The opening 16 is in vertical alinement with the opening 6. The dome and hood together form a collector unit, and the effective lower edge of this collector unit is the top of the relief openings in the hood. The open area provided by the relief openings is the equivalent to having the hood open completely below the plane of the top of the relief openings so that for all purposes the effective lowermost edge of the hood is the plane of the tops of the relief openings.

The purpose of the different parts of the construction may now be followed. Assume first that the flue pipe 18 is connected to the chimney in which there is normally a strong draft. The gases of combustion passing through the opening 6 enter the hood and dome and pass out the flue pipe 18. The force of the draft, however, is broken by the relief openings 12*b* so that this draft is not communicated to the interior of the boiler. By reason of the large dimension of the hood and the large amount of open area in the side walls thereof, the velocity of the incoming air through any one opening is relatively small so that the air does not sweep across the top of the ring 9 in such manner as to have any suction effect. The distance from the opening 16 to the draft baffle 11 is so great that the air coming in through the relief openings can reach the flue pipe without producing any low pressure area directly above the opening 6, tending to accelerate the flow of gases out of the chamber 2. Moreover, the greater portion of the open area provided by the relief openings is above the top of the ring 9, serving further to produce a condition in which the incoming air produces no suction effect in the opening 6. The area of the hood and the diameter of the dome, moreover, is such that if the draft is not strong the gases discharging from the furnace can expand and spread out, and then travel out the flue pipe 18, but they will not spill through the relief openings 12*b*. However, if there is a back-draft in the pipe 18 or the flue becomes entirely choked, the gases of combustion can fill the dome 15 and then flow out through the relief openings 12*b* and no substantial back pressure will be built up in the chamber 2, because of the fact that the relief openings are largely above the top of the ring 9, so that the flow of gases is generally upward and outward. If the dome 15 were not provided and the hood 12 were brought in to the diameter of the pipe 18, the spent gases would have a greater choking effect on the escape of the gases of combustion from the opening 6 and therefore the dome 15 materially improves the action of the hood in the event of the chimney or flue 18 being blocked. The large area of the relief openings in proportion to the area of the flue gas outlet 6 also facilitates the removal of the spent gases when the flue 18 is blocked or under conditions of back-draft.

In the event of a current of air coming down the chimney and pipe 18, the dome 15 permits the air to expand before it reaches the draft deflector 10 and the back flow of air can escape through the relief openings 12*b* without exerting any appreciable back pressure on the flue openings 6. The draft baffle of course breaks any direct down flow of air that may occur.

Moreover, since the dome 15 and the hood 12 provide progressively larger chambers into which the back-draft can expand, the draft baffle 11 can be relatively small in diameter. Being relatively small in diameter, it offers a minimum impedance to the flow of the burnt gases under normal operating conditions.

Moreover, the draft relief openings 12*b* being in the side walls of the hood and being of such extensive area, they are not likely to become closed or stopped up sufficiently to impair their function, whereas with the usual type of conical hood wherein the draft relief space is in the bottom, the edge of the hood may be so close to the top of the furnace that the space may become choked or restricted to an undesirable extent.

In boilers of the larger sizes it is desirable to provide a plurality of flue outlet openings, and the preferred manner of constructing the draft hood for boilers having a plurality of outlets is shown in the modification illustrated in Figs. 3 and 4. In these views the boiler, designated generally as 20 has a flue top 21 therein similar to the flue top 5 of Figure 1, except that this flue top spans a greater number of boiler sections and is provided with a plurality of discharge outlets 22 instead of a single one, as shown in Figure 1. I have shown a flue top in which there are two discharge outlets, but this number can be increased as the number of boiler sections is increased. Surrounding each flue outlet 22 is a ring 23 having arms 24 supporting the inverted cone 25 similar to the cone 11 of Figure 1. Formed on top of the boiler housing is a single large hood 26 which, in the example shown, is rectangular and which has a length and width such that the side walls 26*a* thereof

are spaced a considerable distance away from the flue outlets **22**. The distance of the side walls **26***a* from the outlets **22** is preferably as much as the diameter of the flue outlets **22**.

The side walls **26***a* are perforated throughout the greater portion of their area so as to provide an ample number of draft relief openings. This hood **26** has a plurality of outlets **27**, there being one outlet **27** over each outlet **22**, and each outlet **27** is provided with a dome **28**. The domes **28** have restricted upper portions **29** providing for a flue pipe connection.

The hood as thus constructed gives the same advantages as the one illustrated in Figs. 1 and 2, and has the additional advantage of providing a single hood for a boiler requiring two or more flue discharge outlets.

While this invention has been described particularly in connection with gas burning appliances, it is also adapted for use with various other fuels.

Not only does the hood function well under all possible chimney conditions, but it is of a unique and pleasing appearance.

Various changes and modifications may be made in the particular construction and arrangement of parts and obviously where desired the hood **12** and dome **15** may be in one piece, all within the contemplation of my invention and under the scope of the following claims.

I claim:

1. A draft hood comprising a collector unit having a flue connection at the top thereof, an opening to atmosphere around its effective lower edge, said collector being of downwardly increasing diameter, means below the effective lower edge of the collector for discharging gases of combustion into the collector, and a back draft baffle over said last means having a diameter less than the diameter of said means and having its upper edge in a plane below the lowermost edge of said collector.

2. A draft hood comprising a collector unit having a flue connection at the top thereof, an opening to atmosphere around its effective lower edge, said collector being of downwardly increasing diameter, means below the effective lower edge of the collector for discharging gases of combustion into the collector, and a back draft baffle over said last means having a diameter less than the diameter of said means and having its upper edge in a plane below the lowermost edge of said collector, the collector comprising a dome portion and a hood portion below the dome portion, there being a shoulder between the lowermost edge of the dome portion and the effective lower edge of the hood, said means for discharging gases into the collector being of less diameter than the lower edge of the dome portion.

LOUIS N. HUNTER.