July 19, 1927. 1,636,016

F. W. SHUELL ET AL

DRAFT HOOD FOR HOT WATER HEATERS

Filed July 12, 1926

Fig. 1.

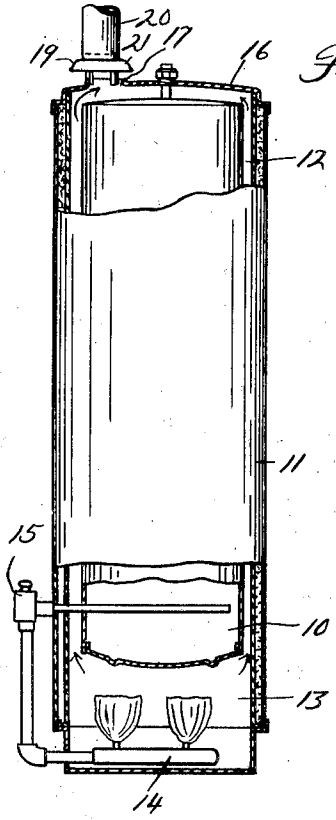


Fig. 2.

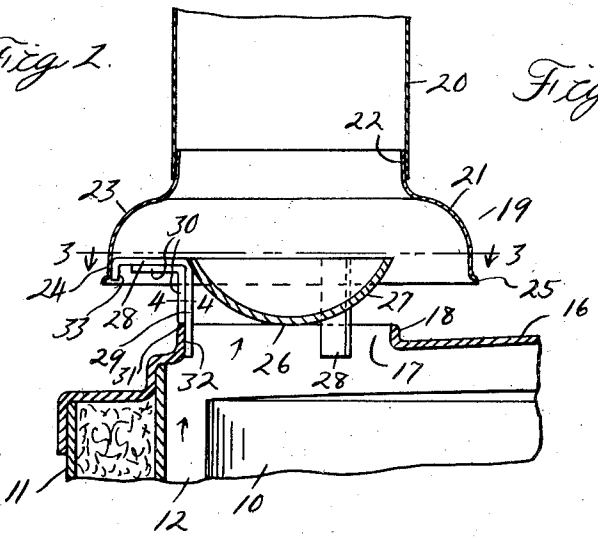


Fig. 3.

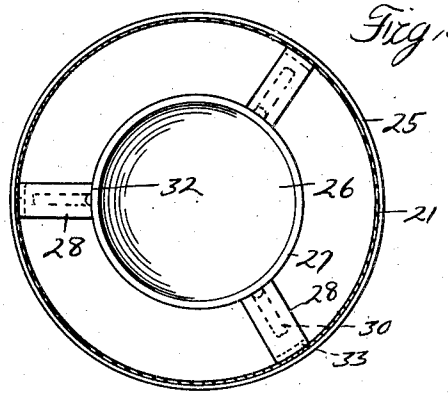


Fig. 5

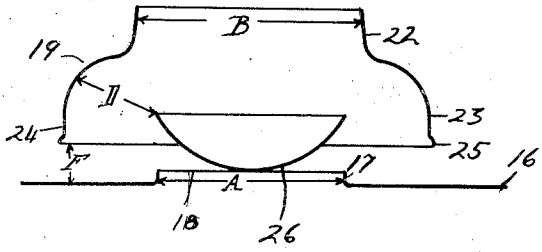
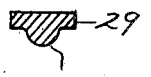


Fig. 4



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UNITED STATES PATENT OFFICE.

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DRAFT HOOD FOR HOT-WATER HEATERS.

Application filed July 12, 1926. Serial No. 121,920.

The invention relates to an improved construction of draft hood for gas fired water heaters and other similar devices where it is desired to remove the products of combustion through a chimney or exhaust conduit.

The primary object of the invention is to provide a construction which occupies the minimum amount of space while performing all of the necessary functions for securing the efficient expulsion of the exhaust products under all conditions.

Another object of the invention is to provide a device designed to prevent condensation within the exhaust conduit.

A further object is to produce a construction which will insure the expulsion of the waste gases from the heater when there is a down-draft in the chimney flue.

A further object is to secure an efficient draft hood wherein the vertical height of the same is reduced to a minimum.

A still further object is the provision of a simple construction which can readily be manufactured at a low production cost.

These and other objects are attained by providing the construction hereinafter described and illustrated in the accompanying drawings wherein:

Figure 1 is an elevation of a gas fired water heater provided with the improved draft hood, parts of this figure being broken away to show the device in section.

Figure 2 is an enlarged sectional elevation of the draft hood.

Figure 3 is a horizontal section on the line 3—3 of Figure 2.

Figure 4 is a transverse section on the line 4—4 of Figure 2.

Figure 5 is a diagrammatical view showing the relationship of the several openings in the construction.

In the particular embodiment of the invention illustrated in the drawings the draft hood is shown as applied to a gas fired water heater of the storage type. This heater comprises in general the inner storage tank 10, and outer insulated shell 11 spaced from the storage tank to provide an annular updraft flue 12. 13 is a combustion chamber in which is arranged a gas burner 14 preferably thermostatically controlled by the valve 15. 16 is the top surface of the outer shell which is provided with an exhaust opening 17 preferably of circular cross section and provided with a slightly upturned annular flange 18. 19 represents the draft hood as a unit, this structure being arranged on the top of the heater in alignment with the opening 17 and being connected by a conduit 20 to the chimney or other point of exhaust for the products of combustion.

The draft hood unit 19 comprises an outer shell 21 preferably formed of sheet metal and having an upper annular flange 22 preferably slightly tapered for receiving the exhaust pipe 20. The height of the flange 22 is limited to substantially that required for receiving the exhaust pipe 20 and the shell then flares outwardly and downwardly at 23 terminating in an annular flange 24 which may if desired be provided with a bead 25. Within the shell 21 is a baffle member 26 comprising a semi-spherical baffle portion 27 having extending from its upper edge the radial arms 28 which are secured to the flange 24 of the outer shell. The baffle member is also provided with a series of depending legs 29 the lower ends of which are adapted to be inserted within the opening in the top of the heater. The arms 28 and legs 29 are preferably reinforced by ribs 30 which extend into the angle formed by the junction of the two members. The reinforced ribs on the vertical legs 29 terminate in shoulder portions 31 which rest upon the annular flange 18 and form a support for the draft hood while the lower portions of the legs are rounded on their outer sides at 32 to conform to the inner radius of the flange 18.

The baffle 27 and the arms and legs projecting therefrom are preferably formed as an integral unit, the preferred construction being a casting. The arms 28 have, at their outer ends, the transverse flanges 33 which are secured to the outer shell by any suitable means but in the preferred form the parts are united by a welded joint.

As previously stated one of the objects of the invention is to provide a draft hood wherein the vertical height is reduced to a minimum and in order that a device may be constructed which at the same time insures the proper operation of the heater under all flue conditions it is essential that

the various parts as above described be arranged in a certain definite relationship. In order to establish this relationship it is necessary to discuss the various conditions under which the device must be designed to operate and to aid in this discussion the parts are diagrammatically represented in Figure 5. The outlet opening of the heater is designed to have a predetermined cross sectional area, indicated by the letter A, this area being determined by the design of the heater. The exhaust opening in the draft hood, indicated by the letter B, must be at least as great as the area A in order to handle the maximum amount of waste gases from the heater but it is preferable to have the opening B somewhat greater than the opening A in order that a certain amount of auxiliary air will be drawn into the conduit 20 to mix with the waste gases and thereby prevent condensation within the pipe 20. The auxiliary air introduced in this manner lowers the dew point of the products of combustion sufficiently so that the further cooling in the conduit 20 does not condense the water vapor.

When there is an up-draft in the chimney flue the combustion gases from the heater are deflected by the baffle 27 and pass upwardly through the outer shell through the outlet opening of the draft hood and it is therefore necessary that the annular area between the upper edge of the baffle and the flaring portion 23 of the outer shell be equal in area to the area B. This annular area is represented by the letter D indicating the minimum area between the baffle and the shell. In the particular construction illustrated the flaring portion 23 is of arcuate form in cross section, thus providing the same area for the passageway from the lower flange of the shell to the outlet opening at the top of the same.

Under certain flue conditions instead of having an up-draft in the chimney there will be a down-draft and when this occurs it is necessary to provide an escape for the products of combustion into the room in which the heater is located. Therefore, the lower flange 24 of the shell is spaced from the top surface 16 of the heater sufficiently to provide an area represented by the letter F which will accommodate all of the downgoing gases plus the products of combustion. This area, F determined by the vertical spacing of the shell of the heater and the diameter of the flange 24, must therefore be at least as great as the area A plus B.

Another feature in the design of the construction so as to reduce the height to a minimum is the location of the semi-spherical baffle 27. The minimum annular area between the flange 18 and the baffle 26 is indicated by the letter G and this must be at least equal to the area A of the outlet opening 17 to provide for the maximum amount of exhaust products from the heater. On the other hand the baffle should be located as close to the heater as permissible to avoid unnecessary spacing and consequent increase in height. In the preferred construction the lower portion of the convex surface is arranged in the plane of the annular flange 18 and this arrangement is determined by the location of the shoulders 31 which support the draft hood. The baffle 27 also has its projected area equal to the area A so that it completely shields the opening in the heater from the down-draft gases when such conditions exist in the chimney. Thus it will be apparent that the height of the draft hood is reduced to a minimum while still containing sufficient area for the passage of the gases under the various flue conditions.

While we have illustrated a specific construction of draft hood it will be obvious in view of the foregoing description that our invention contemplates other structures differing somewhat from the one specifically shown. One of the features of our construction is the proportioning of the various openings so as to insure the expulsion of the waste gases from the heater under all conditions of operation and another important feature is the arrangement whereby auxiliary air is introduced into the chimney flue to prevent condensation therein. Therefore our invention is not to be limited to any specific construction except in the light of the claims appended hereto.

What we claim as our invention is:

1. The combination with a heater having an exhaust opening for the products of combustion, of a draft hood above said opening having an outlet opening as great in area as said exhaust opening, and a downwardly rounded baffle within said hood spaced from said exhaust opening and in alignment therewith, said hood having a flaring portion surrounding said baffle and spaced therefrom to form a passageway as great in area as said outlet opening, and said flaring portion terminating in a portion spaced from said heater to provide an opening as great in area as the combined areas of said outlet opening and said exhaust opening.

2. The combination with a heater having an exhaust opening for the products of combustion, of a draft hood above said opening having an outlet opening greater in area than said exhaust opening and a baffle within said hood spaced from said exhaust opening and in alignment therewith, said hood having a flaring portion surrounding said baffle and spaced therefrom to form a passageway as great in area as the area of said outlet opening, and said flaring portion terminating in a portion spaced from said heater to provide a third opening equal in

area to the combined areas of said outlet opening and said exhaust opening.

3. The combination with a heater having an exhaust opening for the products of combustion, of a draft hood above said opening having an outlet opening as great in area as said exhaust opening, and a segmental spherical baffle within said hood in alignment with said exhaust opening, said baffle having its lower convex surface substantially flush with the plane of said exhaust opening, said hood having an enlarged lower portion spaced from said baffle to form a passageway substantially equal in area to said outlet opening, said flaring portion terminating at a point sufficiently spaced from said heater to provide a third opening substantially equal in area to the combined areas of said outlet opening and exhaust opening.

4. A draft hood for heaters comprising an outer shell having a body portion of arcuate form in longitudinal section, an upwardly extending annular flange above said arcuate portion, a baffle arranged centrally within said outer shell, radially extending arms connecting said baffle to said outer shell and legs depending from said arms adapted to be secured to said heater.

5. A draft hood comprising a shell having a larger opening at the bottom than at the top, a baffle arranged centrally within said shell, radial arms connecting said baffle and shell and legs depending from said shell having shoulders thereon for engaging the outlet conduit of the heater.

6. A draft hood comprising a shell having a larger opening at the bottom than at the top, a segmental spherical baffle arranged centrally within said shell, radial arms connecting said baffle and shell, legs depending from said shell, and shoulders on said legs lying in a plane substantially tangent to said spherical baffle.

7. A draft hood comprising a shoulder having a larger opening at the bottom than at the top, a segmental spherical baffle arranged centrally within said shell, radial arms connecting said baffle and shell, legs depending from said shell, the lower ends of said legs being arranged to fit within the interior of said outlet conduit, and shoulders on said legs for engaging said conduit to form a support for said hood.

8. A draft hood comprising a shell, a segmental spherical baffle secured to said shell and arranged centrally therewithin, said shell being longitudinally curved in arcuate form with the center of curvature substantially at the upper edge of said baffle, and a flange extending upwardly from said curved portion.

9. A draft hood comprising a shell, a segmental spherical baffle arranged centrally therewithin, said shell having a portion of arcuate form in longitudinal section extending above the upper edge of said baffle, said shell also having an annular flange merging with said arcuate portion.

10. A draft hood comprising a segmental spherical baffle, arms extending radially from the upper edge thereof, an outer annular shell surrounding said baffle and connected to said arms, said shell having a portion of arcuate form in longitudinal section spaced from the upper edge of said baffle forming an annular passageway and having an upper flange forming an opening substantially equal in area to the area of said exhaust opening, said shell having its sides curved longitudinally to conform to an arc struck from the upper edge of said baffle, the length of arc being such as to provide an annular opening around said baffle of an area greater than said exhaust opening, and an annular flange intersecting with the curved portion of said shell having an area substantially equal to said annular opening.

In testimony whereof we affix our signatures.

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