Feb. 4, 1969 R. L. STONE ET AL 3,425,178

RAIN TRAP FOR PREFABRICATED METAL CHIMNEY

Filed Oct. 23, 1965 Sheet 1 of 2

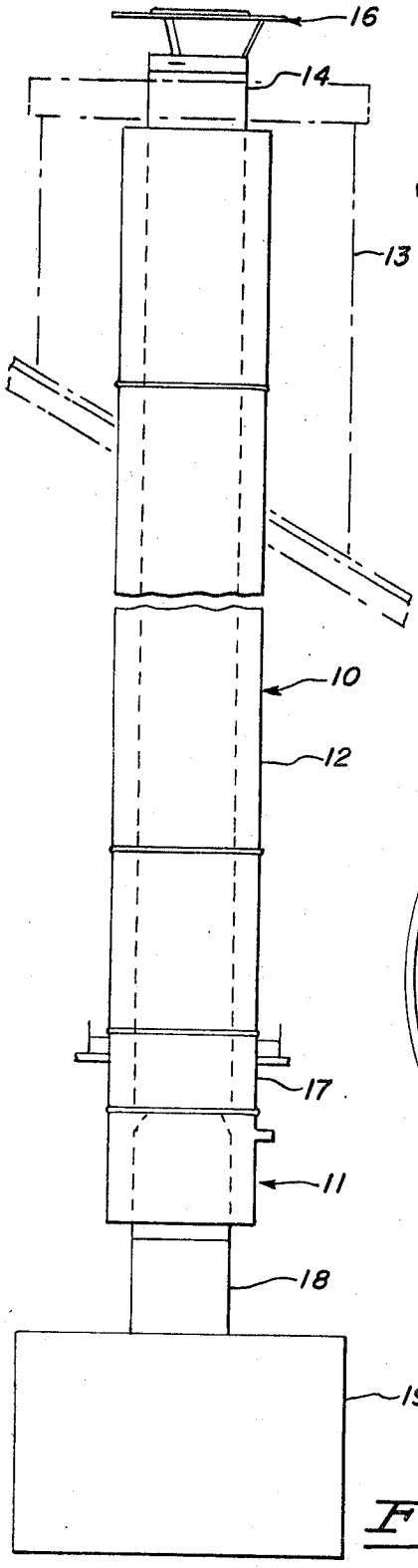

Fig. 1.

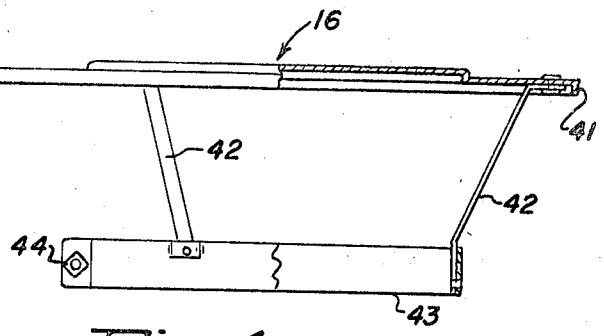

Fig. 4.

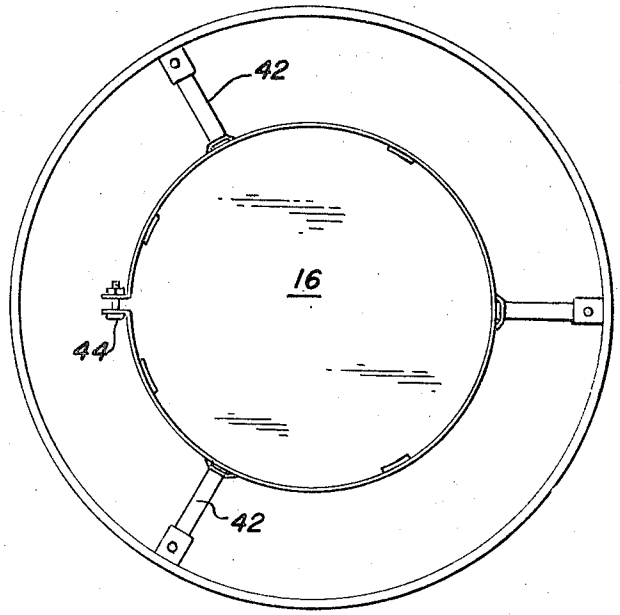

Fig. 5.

INVENTOR
RICHARD L. STONE
ALAN KINKEAD
BY
Owen, Wickersham & Erickson
ATTORNEYS

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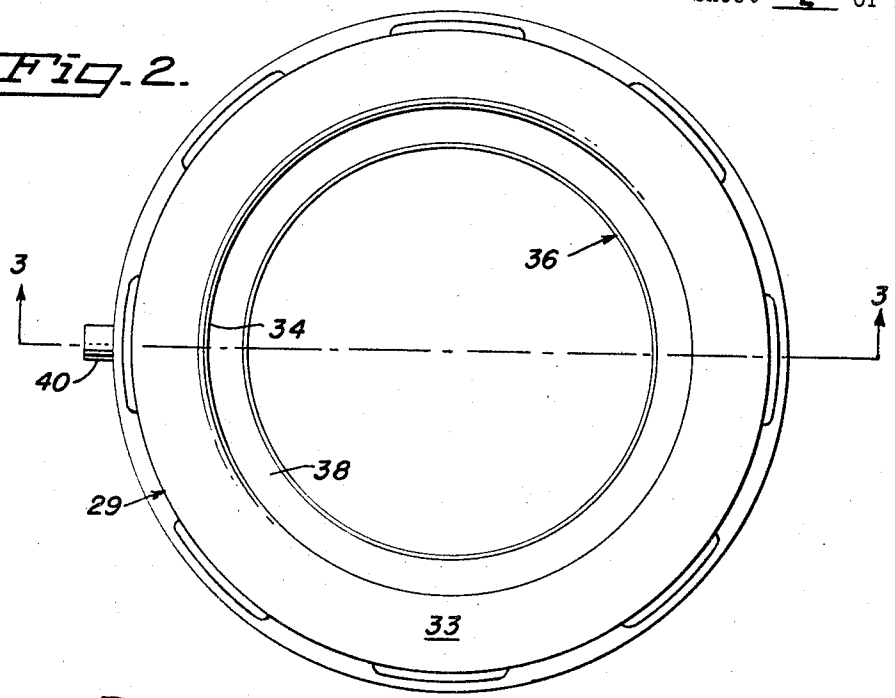
Fig. 2.



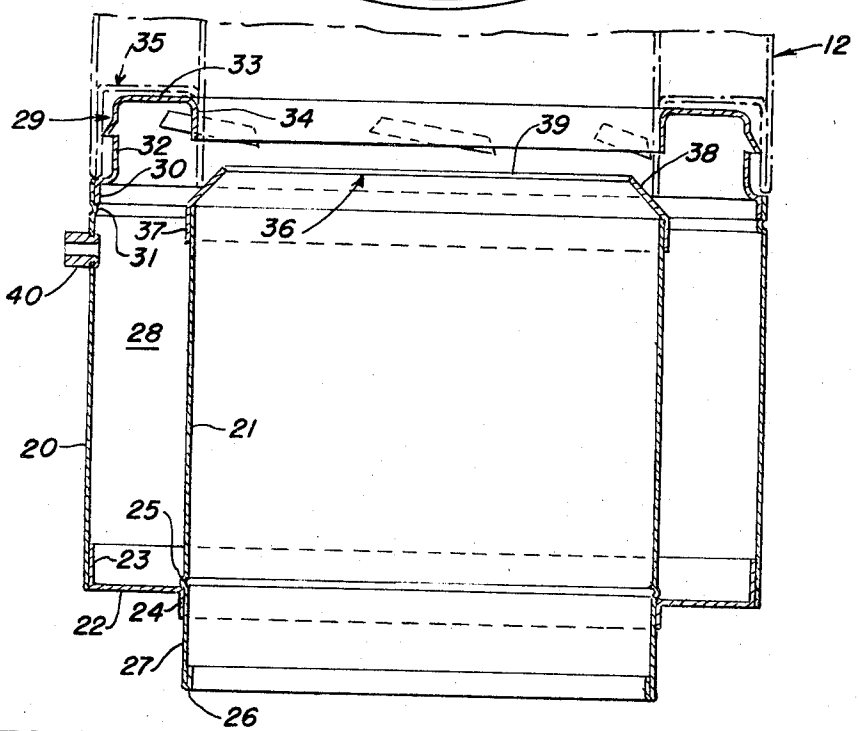


Fig. 3.

INVENTOR
RICHARD L. STONE
ALAN KINKEAD
BY
Owen, Wickersham & Erickson
ATTORNEYS

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RAIN TRAP FOR PREFABRICATED METAL CHIMNEY

Richard L. Stone and Alan Kinkead, Los Altos Hills, Calif., assignors to Wallace-Murray Corporation, New York, N.Y., a corporation of Delaware

Filed Oct. 23, 1965, Ser. No. 503,170
U.S. Cl. 52—244 1 Claim
Int. Cl. E04f *17/02*; F23j *13/00*; E04d *13/04*

This invention relates to a rain trap for prefabricated metal chimney structures or the like.

In general, the object of the invention is to provide a means for preventing the rain that normally enters the open end of a prefabricated metal chimney from passing through it and reaching the fireplace or stove from which the chimney extends. If excessive moisture is allowed to reach the furnace or stove apparatus it can cause a serious loss of efficiency and even a malfunctioning or excessive wear and corrosion over extended periods of time. Prior to the present invention the problem was particularly severe with prefabricated metal chimneys because their naturally smooth walls allow water to flow easily toward the furnace or stove below. Previous attempts to prevent the influx of rain in chimney pipes included the use of various traps or deflectors connected to or associated with the chimney opening or housing outside the building or above the roof level. However, these expedients were found to have serious disadvantages. For one thing, the installation of unattractive components was architecturally undesirable. Also, such arrangements often caused a very undesirable discoloration of the roof around the chimney, or they seriously aggravated any roof leakage problem around the chimney.

Accordingly, another object of the present invention is to provide a rain trap for a prefabricated metal chimney that can be installed at various convenient locations on the chimney inside the building below the roof level. This not only avoids any roof discoloration but it also eliminates any problem of the rain trap freezing, and moreover it provides a trap that can be accessible within the house and therefore easy to clean.

A more specific object of the invention is to provide a trap device connectable in a prefabricated metal chimney that intercepts and traps rainwater which strikes the inner wall of the chimney if the rain is descending at even a small angle to the absolute vertical. When such rain hits the inner wall of the chimney it rolls downwardly and is eventually trapped in an annular compartment around the chimney pipe near its lower end. The trapped rainwater being adjacent the inner wall of the chimney is thus subjected to constant heating by the flue gases, and this causes it to evaporate at a rapid rate. Except under unusual situations, therefore, only a small amount of trapped rainwater is allowed to accumulate.

Still another object of the present invention is to provide a rain trap that can be easily coupled with existing prefabricated metal chimney sections, and which is therefore easy to install as well as having a construction that is particularly well adapted for ease and economy of manufacture.

Other objects, advantages and features of the present invention will become apparent from the following detailed description of one embodiment thereof presented in accordance with 35 U.S.C. 112.

In the drawings:

FIG. 1 is a view in elevation showing a typical chimney installation utilizing a rain trap embodying the principles of the present invention;

FIG. 2 is an enlarged plan view of the rain trap shown in FIG. 1;

FIG. 3 is a view in elevation and in section taken along the line 3—3 of FIG. 2;

FIG. 4 is a somewhat enlarged plan view of the top cap shown in FIG. 1;

FIG. 5 is a view in elevation and in section of the top cap of FIG. 4.

Referring to the drawings, FIG. 1 shows a typical prefabricated metal chimney assembly **10** having, as one of its components, a rain trap **11** embodying the principles of the present invention. Such metal chimneys are generally formed by prefabricated double-walled sections **12**, as shown, which are coupled together in vertical alignment by means of an end coupler. The structural details of one form of double-walled chimney now available commercially are described in Patent No. 3,170,544. The upper end of such a chimney structure usually extends well above the roof level of the building, and it may be surrounded by a suitable housing **13** which is secured to the roof. The upper end **14** of the chimney assembly **10** which may extend slightly above the chimney housing is generally open and unprotected and may therefore be fully exposed to falling rain. In somes instances, however, a top can **16** may be attached to the upper end **14**, and this component and its function will be discussed in detail later with respect to FIGS. 4 and 5.

At some convenient location below the building roof the rain trap device **11** is normally connected to the lower end of a starter section **17** of the chimney assembly, and above the outlet pipe **18** from a furnace, fireplace or stove designated generally by the numeral **19** and located within the building.

As discussed, the general purpose of the rain trap device **11** is to prevent any water that enters the chimney from reaching any such heat source. In the embodiment which will now be described, the size and shape of the rain trap **11** presents an outward appearance similar to that of an ordinary chimney section. As shown in FIGS. 2 and 3, it has an outer wall member **20** made of sheet metal which is spaced outwardly from a concentric inner wall member **21** made of the same material or possibly a lighter gage material. These outer and inner wall members are connected together by an annular bottom ring **22** which has an upright outer flange **23** and a downwardly extending inner flange **24**. The outer flange **23** is fixed, as by spot welding or riveting, to the lower end of the outer wall member **20**. The inner wall member **21** is preferably provided with an annular bead **25** which is spaced above its lower end edge **26** by a predetermined amount. This bead serves as a stop for initially retaining the inner wall **21** in an axial position relative to the outer wall **20** so that a lower end portion **27** extends below and is readily insertable into a connecting outlet pipe section **18** from the furnace or stove **19**. The inner flange **24** of the annular ring **22** may also be welded, bonded or riveted to the inner wall member **21**. Thus, the combination of outer and inner wall members and the lower end ring **22** form an annular fluidtight storage compartment **28** within the rain trap **11**.

At the upper end of the outer wall member **20** is an annular coupling member **29** which enables the rain trap **11** to be readily connected to a prefabricated chimney section **12**. This coupling member can take various forms depending on the coupler configuration of the chimney section to which it will be attached. In the embodiment shown, the coupling member **29** has a lower peripheral flange **30** that rests on an internal annular bead **31** located near the upper end of the outer wall member **20** and is secured thereto by welding or riveting. From the flange **30** the metal bends inwardly and upwardly to form a relatively narrow wall portion **32** and then turns inwardly to form the top portion **33** which terminates on its inner periphery by a downwardly turned flange **34**. This male

coupling member thus has a generally annular shape and a size which enables it to fit within a similarly shaped female coupling member **35** of a connecting chimney section **12**.

At the upper end of the inner wall section **21** is an annular deflector **36** which comprises an important component of our rain trap **11**. It extends upwardly and inwardly around the entire upper edge of the inner wall member **21** of the rain trap to form a surface that will catch every drop of water which flows down and drops from the inner walls of the chimney sections **12** above. In the particular construction shown, the deflector **36** has a lower flange portion **37** which is fixed to the upper edge of the inner wall member **21** and integral with an upper flange portion which forms an inwardly extending conical surface **38**. The inner edge **39** of the upper deflecting flange portion has a diameter that is substantially less than the diameter of the inner peripheral flange **34** of the coupling member **29** and the diameter of all the chimney sections **12**. This assures that all water flowing downwardly from the inner walls of the chimney above will fall on and thus be deflected into the annular storage tank **28** of the rain trap **11**.

In the outer wall member **20** an outlet orifice **40** is provided for draining an overflow from the rain trap in extreme conditions or for cleaning it. A hose or pipe (not shown) can be connected from this orifice to some other suitable drain facility. In actual practice the constant heat provided by the flow of gases through the chimney **10** causes the collected water to evaporate at a high rate and only during periods of particularly heavy rainfall will the water rise as high as the orifice **40**.

When the chimney top is fully exposed to rainfall the percentage of rain falling into its open end which will be trapped in the rain trap **11** will depend on several factors. A most critical factor is the angle of fall of the rain. If the rain comes straight down a relatively large percentage of it will pass by the rain trap because it will not hit the inside walls of the chimney. However, rain rarely falls straight but instead falls at an angle. If the chimney has a normal height or length equivalent to one or more stories, rain falling at even a small angle (e.g., 5 degrees from the vertical) will eventually impinge against and roll down the inside chimney walls, and all rain which hits these walls will fall onto the deflector member **36** and into the annular storage compartment **28** of my rain trap.

If it is desired to completely eliminate the possibility of any rainwater reaching the stove, fireplace or furnace beneath the chimney, the top cap **16** can be used in combination with the rain trap device **11**. As shown in FIG. 4, the top cap **16** may have a disc shape with a peripheral flange **41** and a diameter that is substantially larger than the chimney opening. At least three support members **42** are evenly spaced apart and fixed at one end to the inside surface of the top cap near its periphery. At their lower ends these support members **42** are fixed to a relatively narrow circular band **43** whose ends are connected together by a tightening screw **44**. The band is adaptable to fit over the end of the stub section **14** of pipe which is normally placed in the chimney opening, and is held firmly to it when the screw **44** is tightened.

With the top cap **16** and the rain trap **11** installed in combination with a prefabricated chimney **10** as shown in FIG. 1, the problem of preventing rain from reaching the heat source is completely solved because all rain that enters the chimney must impinge against its inner walls and is then trapped below. Although the rain trap thus works with great effectiveness, it in no way reduces the efficiency of the chimney draft, and the overall result is a chimney having greater life and better operability even under the most severe weather conditions.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

We claim:

1. In a chimney assembly including a plurality of prefabricated chimney sections coupled together in vertical alignment above a heat producing means, rain protection means comprising, in combination:

a rain trap connected to and in line with a prefabricated chimney section, said rain trap being comprised of a pair of concentric wall members;

an annular ring intetrconnecting said wall members near their lower ends and forming therewith an annular storage compartment;

an annular ring interconnecting said wall members member at its upper end and having a peripheral inner flange having a diameter substantially equal to the inside diameter of the chimney;

a deflector member fixed to the top of said inner wall member having an inwardly extending conical surface and terminating at an upper edge whose diameter is substantially less than said peripheral inner flange and the inside diameter of said chimney;

and a top cap attached to the upper end of said chimney assembly and extending completely above the area of the chimney opening and thereby preventing rain from falling vertically past said rain trap.

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JOHN E. MURTAGH, *Primary Examiner.*

U.S. Cl. X.R.

52—218, 303; 126—307

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,425,178 February 4, 1969

Richard L. Stone et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 22, beginning with "1. In a chimney" cancel all to and including "said rain trap." in line 45, same column 4 and insert:

1. In a chimney assembly including a plurality of prefabricated chimney sections coupled together in vertical alignment above a heat producing means, rain protection means comprising, in combination:

a rain trap connected to and in line with a prefabricated chimney section, said rain trap being comprised of a pair of concentric wall members;

an annular ring interconnecting said wall members near their lower ends and forming therewith an annular storage compartment;

an annular coupler member fixed to said outer wall member at its upper end and having a peripheral inner flange having a diameter substantially equal to the inside diameter of the chimney;

a deflector member fixed to the top of said inner wall member having an inwardly extending conical surface and terminating at an upper edge whose diameter is substantially less than said peripheral inner flange and the inside diameter of said chimney;

and a top cap attached to the upper end of said chimney assembled and extending completely above the area of the chimney opening and thereby preventing rain from falling vertically past said rain trap.

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents