March 16, 1965 A. KINKEAD ETAL 3,173,354

KNOCKED-DOWN CHIMNEY HOUSING

Filed March 28, 1961 2 Sheets-Sheet 1

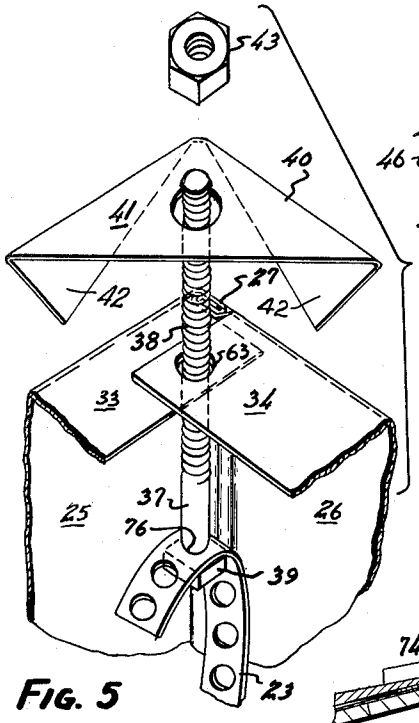


FIG. 5

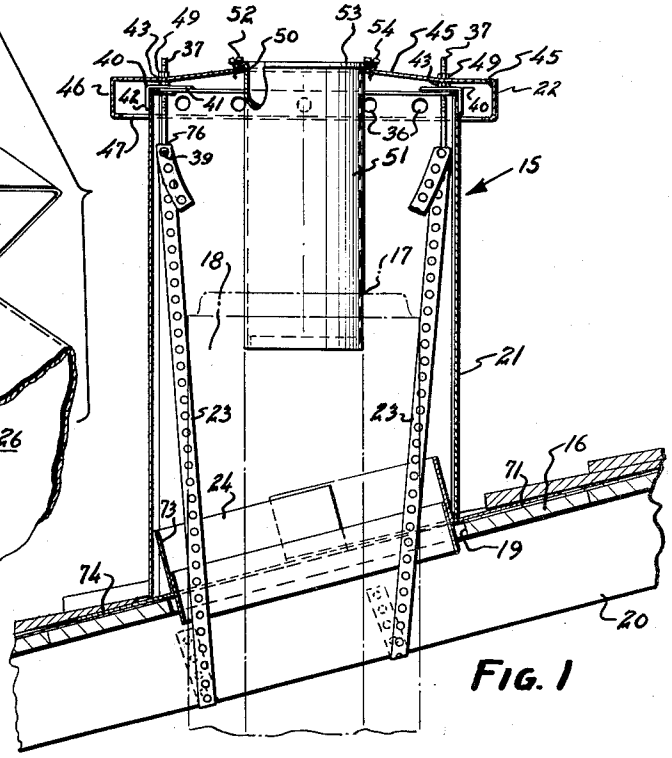


FIG. 1

FIG. 2

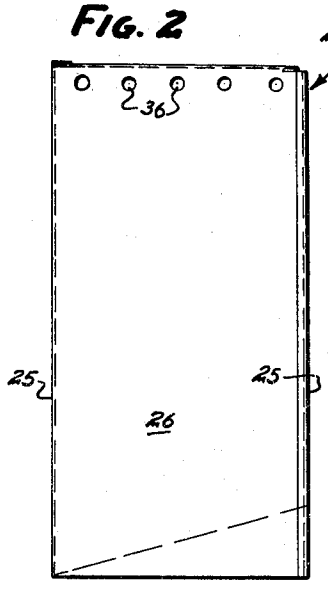
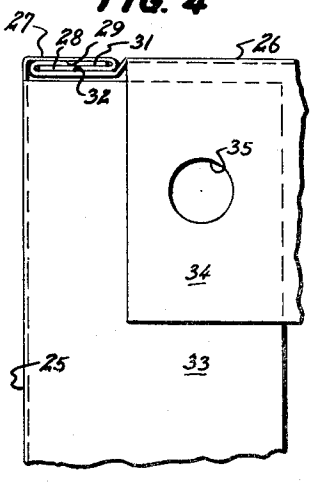


FIG. 4



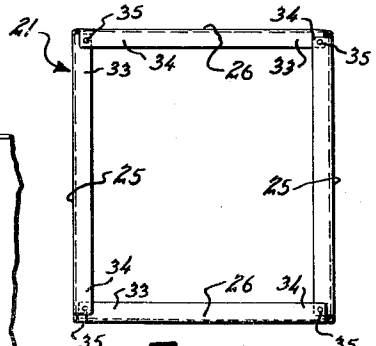


FIG. 3

INVENTORS
ALAN KINKEAD
RICHARD L. STONE
BY
ATTY.

March 16, 1965 A. KINKEAD ETAL 3,173,354

KNOCKED-DOWN CHIMNEY HOUSING

Filed March 28, 1961 2 Sheets-Sheet 2

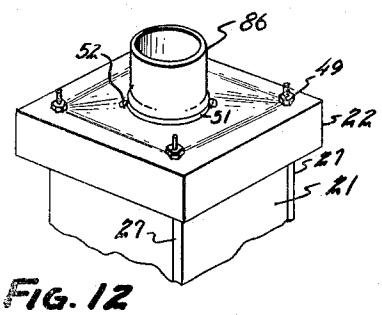


FIG. 12

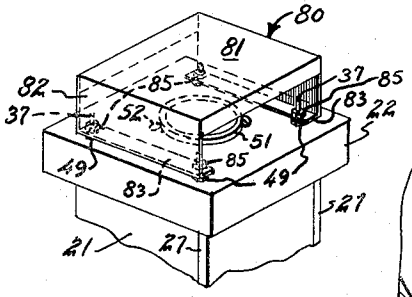


FIG. 11

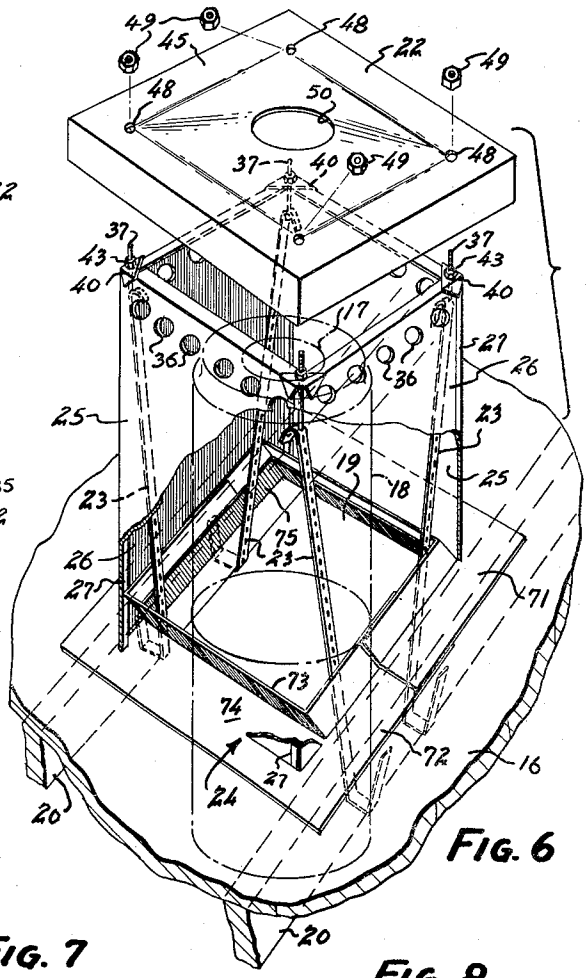


FIG. 6

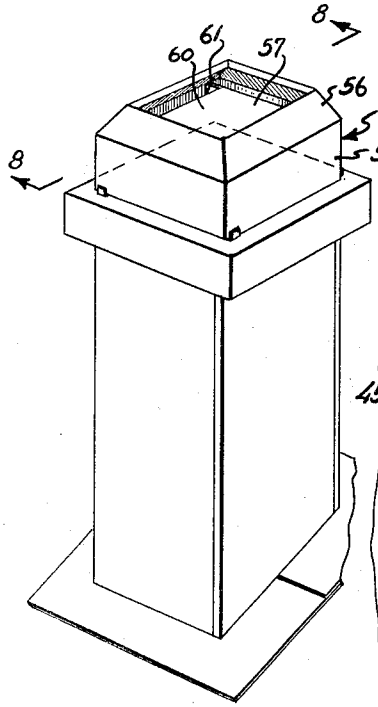


FIG. 7

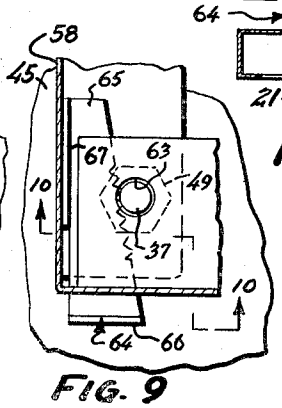


FIG. 9

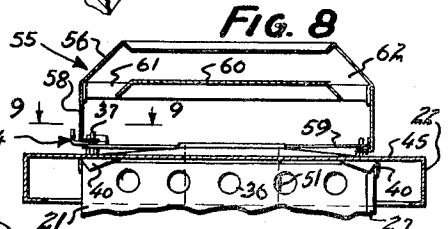


FIG. 8

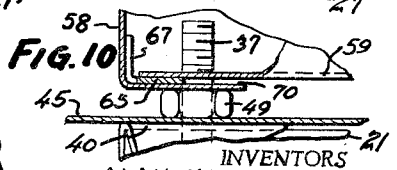


FIG. 10

INVENTORS
ALAN KINKEAD
RICHARD L. STONE
BY
ATTY.

United States Patent Office

3,173,354

Patented Mar. 16, 1965

3,173,354

KNOCKED-DOWN CHIMNEY HOUSING

Alan Kinkead, Los Altos, and Richard L. Stone, Palo Alto, Calif., assignors to William Wallace Corporation, Belmont, Calif., a corporation of Delaware

Filed Mar. 28, 1961, Ser. No. 98,928
5 Claims. (Cl. 98—46)

This invention relates to sheet metal chimney constructions, and more particularly, it relates to prefabricated chimney housings adapted to provide the exterior terminus for metal chimneys or flue pipes.

Sheet metal chimney constructions of various types are now widely used in modern housing facilities because they provide several important advantages over such traditional chimney materials as brick or stone. Chimneys having a masonry construction are much more expensive to erect and, from an operational standpoint, they absorb heat and cut down the flue draft. Double-walled sheet metal chimney constructions are particularly effective since they keep the heat inside the chimney so that the inner pipe is rapidly heated and kept hot, and thus produces a stronger, steadier draft than with brick chimneys.

As customarily used in the building industry, sheet metal chimneys are at least partially assembled by the manufacturer and then shipped to the point of use where the chimney must be assembled and installed at a particular predetermined location on a building or house. With each such chimney installation an end portion of the chimney extends above the roof line of the building and it must be covered by a chimney housing that must fulfill several vital functions. First of all, the chimney opening should be protected from rain and snow or other things which may fall upon it. Secondly, the chimney should have some means to maintain or preferably induce a proper draft through the chimney; and thirdly, the housing should provide an enclosure that is attractive architecturally and compatible with surrounding structure. It is also essential that the chimney housing be strong and rigid and firmly fixed in position to the house structure so that there will be no movement of the chimney relative thereto. This requirement is further increased by the fact that in order to comply with fire safety provisions, the chimney must extend a prescribed amount above the roof level and is thus often exposed to severe wind loads.

In addition to the aforementioned problems, another major difficulty with chimney housings prior to the present invention was that of providing a versatile chimney housing structure capable of accommodating various interchangeable top fittings. Different forms of chimney housing terminations or top fittings are often necessary to meet different environmental conditions such as the local climate, the type of building structure, the particular location of the chimney on the roof, and the type of heating plant attached to the chimney.

Still another problem with chimney housings was that of providing an inexpensive prefabricated housing that could be shipped in a compact, knocked-down form, and then easily assembled and attached to any of the well known roof structures.

An important object of the invention is to solve the aforesaid problems, and in particular one object is to provide an improved prefabricated metal chimney housing which can easily be combined with various forms of end fittings or weather crowns in order to meet certain environmental conditions or to accommodate certain structural requirements of the particular chimney installation.

Another object of the invention is to provide an improved prefabricated chimney flue housing which can

be shipped in knocked-down form and then be easily assembled by one man to form a strong, self-supporting yet attractive chimney housing.

Another object of the invention is to provide a prefabricated metal chimney housing which has unusual strength and rigidity and can therefore withstand extreme external wind pressures without the use of external bracing which would detract from the appearance of the housing. In the present invention the housing itself is supported internally by straps connected from the housing directly to the roof structure. Thus the housing is separately supported independently of the external roof structure and independently of the connected chimney sections.

Still another object is to provide a knocked-down prefabricated chimney housing having a minimum of parts which results in the housing being relatively inexpensive to manufacture and easily to assemble. The small number of parts is accomplished in a unique manner in the invention by utilizing a novel combination of elements wherein some of the parts fulfill more than one function.

In general the invention is characterized by a prefabricated housing assembly comprising a main housing section formed by four rectangular panels having means for rapidly connecting them together on the job site. The housing panels are provided with flange members having holes which are automatically aligned when the panels are connected to form bolt holes at the four corners of the assembled housing. Attached in the four bolt holes are bolts having a fixed head on the lower end which extend upward through the holes. The bolts provide a means to attach supporting straps at their lower ends and a housing top which retains a centrally located telescoping stud and to which may be attached a weather crown to shield the inlet to the telescoping studs.

The housing assembly, according to the present invention, has a minimum of parts and can be erected easily by one man using simple tools. When erected, the assembled chimney housing is rigidly secured and will resist severe wind loads even though extending for a considerable distance above the roof level. The invention also provides a novel means for attaching weather crowns with various baffle configurations, even though these baffles make the ends of the four bolts inaccessible for attaching conventional threaded fasteners.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment presented in accordance with 35 USC 112.

In the drawings:

FIG. 1 is a view in side elevation and in section of a chimney housing according to the invention shown installed on a roof;

FIG. 2 is a view in side elevation of the connected housing panels before being trimmed and assembled for installation;

FIG. 3 is a plan view of the connected housing panels shown in FIG. 2;

FIG. 4 is an enlarged fragmentary plan view showing one corner connection of the housing panels shown in FIG. 3;

FIG. 5 is an enlarged fragmentary exploded view in perspective showing one corner of the housing of FIG. 1;

FIG. 6 is an exploded view in perspective of the installed chimney housing of FIG. 1 with portions broken away to show the internal structural features;

FIG. 7 is a view in perspective of an installed chimney housing according to the invention with an attached weather crown;

FIG. 8 is a view in elevation and in section taken along the line 8—8 of FIG. 7 showing the upper portion of the chimney housing and its attached weather crown;

FIG. 9 is an enlarged fragmentary plan view in section

taken along line 9—9 of FIG. 8 showing one corner of weather crown attaching means;

FIG. 10 is an enlarged fragmentary view in elevation and in section taken along line 10—10 of FIG. 9;

FIG. 11 is a fragmentary view in perspective showing the chimney housing according to the invention with an attached rain cover;

FIG. 12 is a fragmentary view in perspective showing the chimney housing with an attached cylindrical extension sub-member.

An assembled chimney housing 15, embodying the principles of the invention, is shown in FIG. 1, as it appears when installed on a typical sloped roof 16. The housing 15 surrounds the exit end 17 of a double-walled chimney flue pipe 18 which may be one of the various types of prefabricated metal flue pipes approved by the Underwriters' Laboratories, Inc. and now used extensively in modern building construction. The metal flue pipe 18, which is generally made up from a number of connected sections, extends through an opening 19 between rafters 20 and well above the level of the roof 16.

In broad terms the chimney housing 15 includes a main box-like, central housing section 21 connected to and partially covered by a housing top 22. It is secured to the roof structure 16 and stabilized by a series of straps 23 which are attached to the housing 15 in a unique manner. A flashing assembly 24 protects the housing 15 and the roof opening 16 from the hot metal flue pipe 18. All of these components may be conveniently shipped in a compact, knocked-down form and then easily assembled and installed at the building site.

All of the structural components of the chimney housing 15 can be constructed from a well known sheet metal material of a suitable gauge. The central housing section 21 is composed of a pair of end panels 25 and side panels 26 (FIGS. 2 to 4) which can be rapidly placed together without tools and without any additional attaching means in assembling the housing 15. The edge portions 27 of the end panels 25 are bent inwardly at a right angle and have a bent back portion 28 forming a slot 29. The edge portions 30 of the side panels 26 are slightly offset inwardly, with a bent back portion 31 forming a slot 32. As shown in FIG. 4, when the adjoining end panels 25 and side panels 26 are connected, the bent back portion 28 of each end panel 25 fits with a sliding clearance within the slot 32 on a side panel 26, and similarly the bent back portion 31 fits within the slot 29. This corner fastening means 29 and 30 provides for quick assembly, and no extra components such as corner fasteners are required.

At the top of each end panel 25 is a bent over flange member 33 and similarly there is a bent over flange member 34 at the top of the side panels 26. Located near both of the ends of each of the flange members 33 and 34 is a bolt hole 35, and when the side and end panels 25 and 26 are connected, the bolt holes 35 are automatically aligned at the corners of the housing 15. Just below the flanges 33 and 34 along the top edge of each of the panels 25 and 26 are a series of evenly spaced vent holes 36 which are covered by the housing top 22 when the chimney housing 15 is assembled.

With the panels 25 and 26 connected and the bolt holes 35 aligned, four bolts 37 each having a relatively long threaded shank 38 and a fixed head 39 are placed extending upward through each pair of aligned holes 35. The fixed head 39 extends below the adjoining flanges 33 and 34 and supports the end of one of the straps 23 which are used to rigidly support the housing 15, as will be described later. Each bolt 37 also passes through the corner clip member 40 (FIG. 5) which has a triangular shaped horizontal portion 41 with side portions 42 that extend downward at right angles to the horizontal portion. The side poritons 42 of each clip member 40 are retained against the top sides of the panels 24 and 25 at each corner and thus supply greater strength and rigidity to the central

housing section 21. A first nut 43, attached to each bolt 37 on top of each corner clip member 40 and the adjoining flanges 33 and 34, serves to adjust the distance of the fixed head 39 of each bolt 37 from the flanges 33 and 34 and thus the tension on the straps 23.

With the corner clip members 40 in place and retained by the nuts 43, the bolts 37 extend upward from each corner of the central housing section 21 ready to receive the housing top 22. As shown in FIG. 1 and FIG. 6, the housing top 22 has a rectangular shape in plan form that is larger than the rectangular cross-section of the assembled panels 25, 26 which form the central housing section 21. The housing top 22 is the top cover for the chimney housing 15 and has a substantially horizontally top portion 45, an integral side portion 46 that extends downward vertically and completely around the top portion 45, and a folded back lower edge portion 47 that extends inward from the side portion 46 toward the central housing section 21. The housing top 22 has four holes 48 located in the corners of the top portion 45, which are aligned with the bolts 37 and it is thus easily placed in position on the central housing section 21 and held in place by nuts 49 which are attached to the exposed threaded bolts 37. The quickly removable housing top 22 provides a finished appearance to the chimney housing 15 while also closing the open end of the housing. To allow for the direct flow of gases through the top 22, a circular opening 50 is generally provided therein, and a short telescoping stub of metal pipe 51 is mounted in the opening 50 and extends downward into the exit end 17 of the chimney flue pipe 18. The pipe stub 51 preferably has a curled upper edge 52 which is adapted to fit over an outwardly flared edge 53 of the stub member 51 to retain it in position within the housing top 22. Sheet metal screws 54 may be used to retain the telescoping stub in position within the top portion 45.

While the housing 15 as described thus far, will, under certain environmental conditions, provide adequate chimney outlet protection, it is often necessary to provide an additional source of protection to the chimney outlet. As shown in FIGS. 7–12, the present invention provides a means to utilize various types of protective end fittings on the housing top to protect the chimney 18 and to increase the effectiveness of the draft through the chimney.

A typical such end fitting or weather crown 55, as shown in FIGS. 7–10 has an upper sloping side portion 56 which provides for a smooth flow of air over a central rectangular outlet opening 57 formed thereby. The sloping side portions 56 are attached to vertical sides 58 which are bent inwardly along their bottom edges to form flanges 59 that extend around the periphery of the lower edge of the weather crown 55. A baffle plate 60 supported by brackets 61 is mounted horizontally within the weather crown 55 near the upper edge of the vertical sides 58. The baffle plate 60 has an area somewhat greater than the outlet opening 57 but less than its internal cross-sectional area so that it forms an air passage 62 around the periphery of the baffle plate 60 above the outlet opening 49 in the housing top 22 (FIG. 8).

Located through the flanges 59 in each of the four corners of the weather crown 55 are aligned attaching holes 63 which are large enough to receive a bolt 37. The bolt holes 63 are so spaced apart that the weather crown 55 can be placed directly on the housing top 22 with the bolts 37 in the holes 63. Since the baffile plate 60 is fixed in position within the weather crown 55, it is impossible to reach the threaded ends of the bolts 37 to attach a nut thereto. The present invention provides a means to remedy this situation as shown in FIGS. 7–9. At each corner of the weather crown 55 and at the lower edge of the vertical sides 58 is a locking wedge member 64. As shown in FIG. 9, each locking wedge member 64 is made from sheet metal and has a flat central body portion 65 with a turned up flange 66 along one end thereof and a turned up vertical flange 67 partially along

one side thereof and substantially at a right angle to the end flange 66. The central body portion 65 is tapered from the end flange 66 toward its opposite end and the edge 68 opposite the side flange 67 is serrated with a series of teeth 69.

The weather crown 55 is preferably pre-assembled and the corner connections of the vertical sides 58 are made by attaching one side member to an adjoining side member by some suitable method such as riveting or welding. In constructing the weather crown 55 the flanges 59 of adjoining vertical side members 58 are overlapped and separated slightly to provide a space 70 that will permit an easy sliding clearance of a locking wedge member 64 at each corner of the weather crown 55. When the locking wedge 64 is within the space 70, its upturned side flange 67 is engaged by the end of a flange 59 of a vertical side member 58 so that the locking wedge 64 will slide in and out along a prescribed path.

When the weather crown 55 is placed in position on the housing top 22, the bolts 37 extend upward through the mounting holes 63, each locking wedge 64 is moved inward, and the increasing width of its body portion 65 causes the teeth 69 of the serrated edge 68 to contact an adjacent bolt 37. By tapping each wedge 64 lightly, a firm locking connection is made between the weather crown 55 and the housing top 22.

An important feature of the present invention is the means that are afforded by the novel combination of elements for making a strong, rigid installation of the housing 15 on a roof. In erecting a chimney housing 15, the opening 19 between the rafters 20 through which the chimney 18 will pass is first cut in the roof 16 as shown in FIG. 6. The flashing assembly 24 is then installed around the opening 19. The flashing assembly 24 (FIG. 6) generally comprises two complementary U-shaped members 71 and 72 each which have a vertical wall portion 73 and a horizontal portion 74 attached thereto. The two U-shaped members 71 and 72 are arranged around the edge of the opening 19 with the upper portion 71 of the flashing overlapping the lower flashing portion 72 where necessary to accommodate the particular size of the opening 19. The opening is preferably dimensioned so that the vertical flanges 73 of the flashing members 71 and 72 rest on the roof rafters 20. A flashing spacer 75 may be nailed around the inside of the roof opening 19 to assure that no part of the chimney flue pipe 18 engages a wood portion of the roof 16. Each of the straps 23 is then nailed firmly at one end to a rafter at the corner of the opening.

The side panels 26 are then cut on a bevel along their lower ends to match the bevel of the roof 16, and the side and end housing panels 26 and 25 are then assembled by engaging the appropriate end slots 29 and 32 and bent back portions 28 and 31 on each panel, as described previously. To insure that the housing 15 will remain quiet during windy or stormy weather, a bead of soft, non-drying caulking compound or mastic can be run along the full length of all four inside corners of the assembled panels. The central housing section 21 is then placed over the end of the chimney end 17 and the flashing 24 and is assembled further by threading each of the bolts 37 through an appropriate hole 76 in a strap 23, through the holes 35 in the housing top flanges 33, 34 and the corner clip 40. A nut 43 is then threaded to each bolt 37 above a corner clip 40 but the straps 23 are not yet tightened. The housing top 15 is now further assembled by pushing the telescoping stub 51 through the flanged hole 50 in the housing top 22. The telescoping stub 51 is then inserted into the top section 17 of the chimney 18 or gas vent pipe and the housing top 22 is placed over the central housing section 21 with the bolts 37 extending upward and aligned with the bolt holes 48.

The flashing sections 71 and 72 are then pulled up or down until the vertical flanges 73 are snug against the inside surfaces of the housing end panels 25 and

squared with the roof pitch. The flashing 24 may then be nailed in place by nailing the upper side 72 and two sloping sides firmly to the roof preferably using three roofing nails evenly spaced on each side of the upper three sides. The lower side 72 of the flashing 24 is generally not nailed.

The central housing section 21 should then be checked for plumbness and the tension straps 23 can be evenly tightened at each corner. With the telescoping stub 51 extending into the chimney pipe 18 at least 2" or with a gas vent pipe correctly attached, the housing top 22 is now placed all the way down over the bolts 37, and a nut 49 tightened to the end of each bolt 37.

With the chimney housing 22 in place, the weather crown 55 can be easily attached in the afore-described manner or any other types of termination such as the rain cover 78 can be attached to the extending bolts 37.

Where conditions do not require the improved appearance and performance of the weather crown 55, other forms of protective end fittings may be easily attached to the housing top 22 as shown in FIGS. 11 and 12.

In FIG. 11, a tunnel type of rain cover 80 is provided which has a complete top cover 81, and a pair of opposite side members 82 with inturned flanges 83 along the lower edges. Again, a series of spaced-apart predrilled bolt holes 84 are provided in the inturned flanges 83 to fit over the ends of the exposed bolts 37 with the rain cover 80 the bolts 37 are accessible so that conventional nuts 85 can be used to secure it to the housing 22. While the simple rain cover 80 does not provide the complete protection and as pleasing an appearance, it will be highly usable in some circumstances.

In FIG. 12 a simple end stub of pipe 86 is retained within the opening 50 in the housing top 22. In other arrangements (not shown), two more openings may be supplied in the housing top for pipe stubs. Adapter plates may be utilized to provide for the connection of the housing top to smaller vent pipes and various types of vent pipes can then be utilized. This versatility in the chimney housing 15 of the present invention provides a means for solving any chimney housing problem by means of the basic chimney housing 15 which includes the bolt means 37 to which can be rapidly attached the desired end fitting which is adapted to fulfill a certain need. The bolts 37 also, by virtue of their unique location, serve as a means to support the straps 23, and by raising the bolts 37, the tension in the straps 23 can be increased so that the housing will become a strong and rigid installation on the roof.

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. A chimney construction for a slanted roof comprising a flue extending through the roof, a rectangular housing around the flue, and perforated flexible straps internally of said housing securing the housing to the roof, said housing comprising a plurality of panel members and means securing the panel members together at their meeting edges; an internally projecting flange along the top edge of each panel, said flanges overlapping at the corners of the housing, and aligned bolt holes in the overlapping portions, bolt means extending through said perforated straps and through said aligned holes securing the flexible straps to the housing, and a rectangular housing cover secured to said housing, said cover including openings adjacent the corners thereof, said bolts extending through said openings, and means securing said housing cover on said bolts.

2. A device as in claim 1 further including a protective weather crown means having a baffle means for deflect-

ing rain, spaced bolt holes in said crown receiving said bolts, and means for locking said weather crown to said upwardly extending bolts.

3. A device as in claim 2 wherein the means for locking said weather crown comprises a wedge located at each corner of said weather crown and having a guide flange on one side for controlling the directional movement of said wedge and a serrated edge on the side opposite of said guide flange for forcibly engaging a said bolt.

4. A device as in claim 1 further including a weather protective means comprising a continuous wall means forming an upper and lower opening and a baffle means attached to said wall means above said lower opening and a baffle means attached to said wall means above said lower opening for covering the opening in said housing top; flanges along the lower edges of said wall means having spaced apart bolt holes for alignment with

said bolts; and wedge means located at the corners of said protective means and movable inwardly through said wall means for engagement with said bolts to thereby lock said protective means in position on said housing top.

5. A device as in claim 4 wherein said wedge means are tapered in horizontal plan form and include an integral vertical guide flange along one side edge and a serrated portion on the edge opposite said guide flange.

References Cited in the file of this patent

UNITED STATES PATENTS

490,536	Boston	Jan. 24, 1893
515,153	Miller	Feb. 20, 1894
758,510	Dickinson	Apr. 26, 1904
912,578	Kramer	Feb. 16, 1909
2,160,235	Slusar	May 30, 1939
2,956,495	Sublette	Oct. 18, 1960