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Kaminski

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[54] **MULTIPURPOSE ROOF PENETRATING CURB**

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[52] **U.S. Cl.** **52/219,** 285/4, 285/44

[51] **Int. Cl.** **E04d 13/14,** E04g 15/06

[58] **Field of Search** .... 52/58, 219; 285/3, 4, 42–44, 285/137 R, 236

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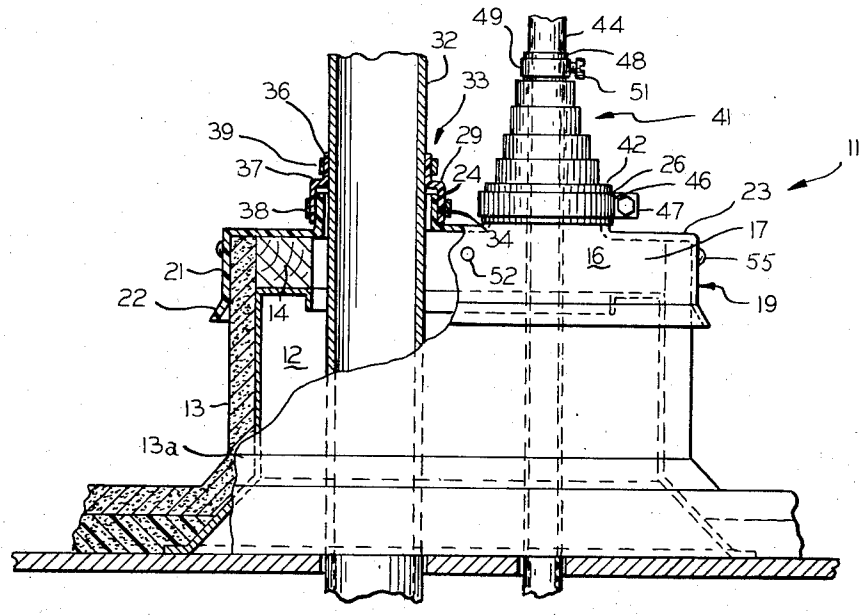
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[57] **ABSTRACT**

A multipurpose roof penetration curb comprises a rubber-like boot fitting over a plastic cap or cover over a curb surrounding an opening on the roof. The cap provides a plurality of potential openings any one of which may be cut open to provide a waterproof egress through the roof. The boot has a somewhat pyrimidal contour formed by a plurality of interconnected truncated cylinders. The boot may be cut away so that the cylinder having an inner diameter which matches the outer diameter of the pipe is the topmost cylinder. Strap clamps are used around the boot at the pipe and at the cap to provide a waterproof and weatherproof seal.

9 Claims, 3 Drawing Figures



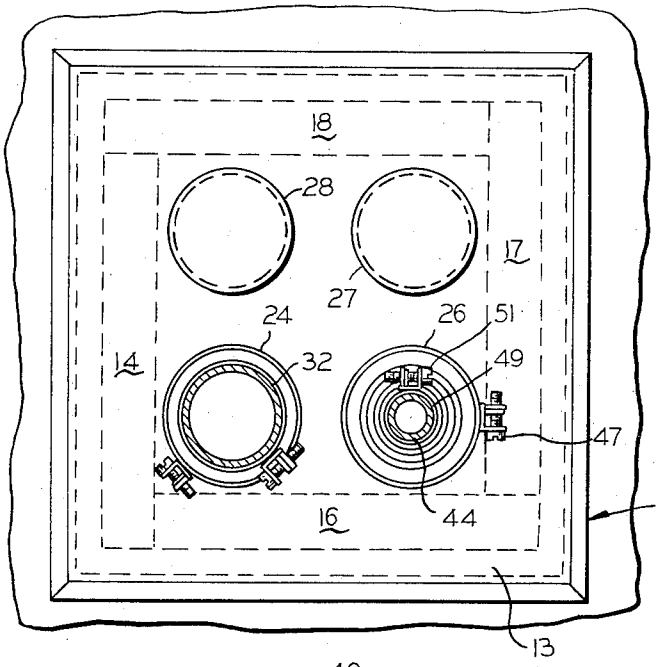


FIG.2

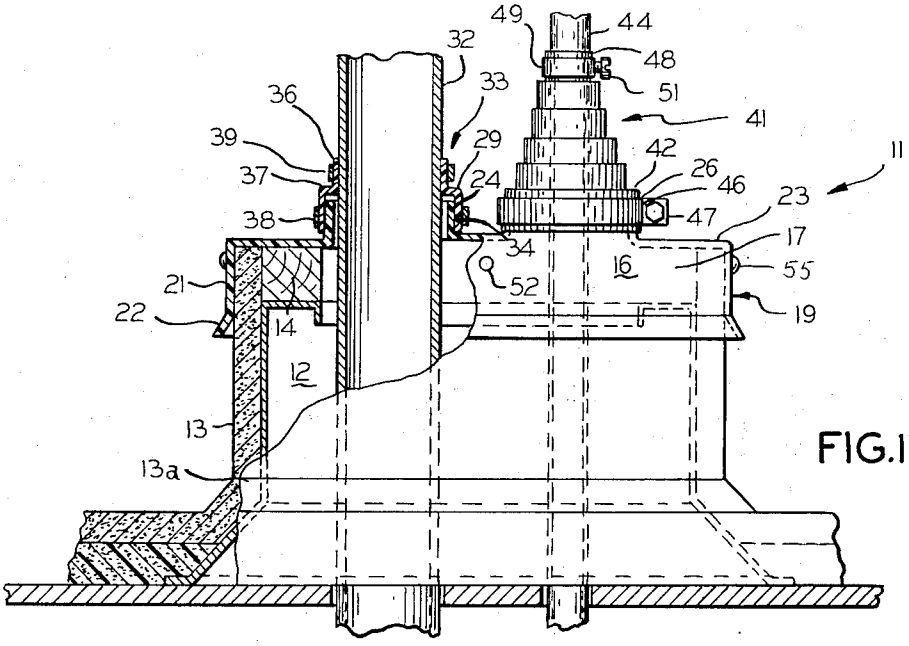


FIG.1

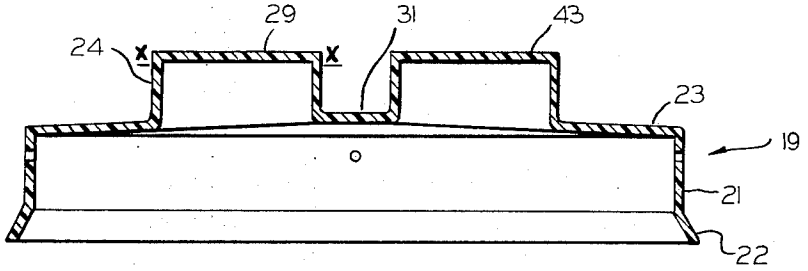


FIG.3

MULTIPURPOSE ROOF PENETRATING CURB

This invention relates to roof construction and, more particularly, to multipurpose roof penetration curb construction used to provide a weatherproof seal through a roof.

Many different types of pipes or other objects having generally circular cross-section pass through the outer covering or top of a roof on buildings. For example, antenna masts, plumbing and vent pipes or the like may pass through the roof of a building. These pipes may provide for roof-mounted air conditioners, electrical connections, water pipes, exhaust stacks, and the like.

It has always been a problem to provide a waterproof seal at points of egress through a roof, as at the juncture between the pipe and the roof. According to present day construction methods, this waterproof seal is essentially made by opening a hole in the roof, setting a curb over the hole, passing a smaller diameter pipe through the curb, filling the peripheral clearance between the pipe and curb, and then covering the curb and adjacent roof with any suitable pitch. This conventional method of construction not only is time consuming, but also is not the best way to provide a waterproof seal. Many problems arise due to leakage through the pitch, especially as it ages, shrinks, and cracks. The temperatures vary between baking in the hot summer sun and freezing during the cold winter night. Also, the seal must endure cold, wind, storm, snow, ice, and the like. Of course, there is a constant degradation due to the continual assaults by rain and ice.

One reason why this conventional method is used is that the pipes which pass through the roof have many different diameters. Thus, it has been most difficult to accommodate them with any prefabricated seal.

Accordingly, an object of this invention is to provide a new and improved roof penetration curb.

A related object of this invention is to provide a roof penetration curb assembly which can accommodate many different types and diameters of pipes.

Yet another object of this invention is to provide a multipurpose roof penetration curb having plastic caps or covers thereover and plastic boots used in conjunction with the caps or covers to enable egress from and provide a seal around the pipes that pass through the roof. Here an object is to avoid the necessity of using a pitch pocket.

Yet another object of this invention is to provide a boot which enables waterproofing and weatherproofing of pipes at the egress points through roofs.

Still another object of the invention is to provide such a cap made from ABS Plastic material that is especially well suited to protect it from the weather.

In keeping with an aspect of the invention, these and other objects and features are accomplished by providing a plastic cap or cover for a curb on a building roof. The plastic cap or cover is shaped with at least one upraised cylindrical section having an outside diameter for receiving the lowermost cylinder of the somewhat pyramidal boot. The boot is fabricated from a flexible, gasket-type of material. It comprises a plurality of integrally-formed truncated cylinders. The uppermost cylinder has the smallest diameter and the lowermost cylinder has the largest diameter, the inside diameter of which is the same as the outside diameter of the upraised cylindrical section of the cap or cover. Pipe clamps are used to seal both the smaller and the larger diameter boot cylinders.

A preferred embodiment of the invention may best be understood from a study of the following specification when taken in conjunction with the attached drawings wherein:

FIG. **1** is a side elevation view of the multipurpose roof penetration curb assembly in partial cross-section;

FIG. **2** is a plan view of the multipurpose roof penetration cap and curb assembly of FIG. **1**; and

FIG. **3** is a side cross-sectional view of a multipurpose roof penetration curb cap or cover without the boot and prior to cutting.

FIG. **1** shows at **11** the inventive roof penetration curb assembly. The curb assembly **11** comprises a curb **12** which may be a sheet metal box-like structure, such as those that are commonly used in current roof construction. One type of curb taught in the recently filed U.S. Pat. Application Ser. No. 246,565, filed Apr. 24, 1972, and assigned to the Assignee of this invention may be used in the subject invention.

The curb **12** is surrounded by roofing felt shown in partial sectional form at **13.** The roofing felt raises from the roof line and also surrounds the entire curb **12** and is nailed at the top of the curb to nailers or wooden beams **14, 16, 17** and **18.** The curb **12** itself might be made from metal, plastic, wood or other suitable materials.

The curb assembly is topped with a curb cap or cover **19.** The curb cover has a vertical apron **21** ending in a flared portion **19** which forms a drip edge. In a preferred embodiment of the cover the flare is 30° from the vertical. The vertical apron **21** goes into the top portion **23** which is integral to and forms the top portion of the curb cap or cover **19.**

As is best seen in FIGS. **2** and **3,** there are four upraised cylindrical sections on the curb cap or cover, such as upraised sections **24, 26, 27** and **28.** The four upraised cylindrical sections are shown as being somewhat cap-shaped. These sections and the cap or cover **19** are one integral curb cover unit. The top **29** of any one or each upraised portion **24, 26, 27, 28** of the cover **19** is cut away as at line *x—x* to enable a pipe to pass therethrough. If no pipe is to pass therethrough, of course, the cover is left intact.

As can best be seen in FIG. **3,** a drainage crown **31** is provided on the top of the curb cap or cover **19** to expedite the drainage of water, snow or the like from the top of the cover. The drainage crown is provided by molding the cap or crown with a raised center having a gentle slope toward all sides. The highest raised portion of the crown is at **31** and the slope is easily seen in FIG. **3.**

While the cap or crown may be made from any suitable material, it is preferably made from ABS thermoplastics. These plastics are derived from acrylonitrile, butadiene, and styrene. They are hard, rigid, and tough, and are in the medium cost range. Usually the resins are opaque, and dark to light ivory in color. They can be pigmented to match almost any color, and produce finished parts of high luster.

Preferred properties of ABS plastics for use in this invention are set forth in the following table:

TABLE 1.—Typical Properties of ABS Resins

	Grade				
	General purpose	Medium heat resistant	Maximum heat resistant	High impact	Self-extinguishing
Impact strength, notched ⅛ in., Izod specimen (ft. lb./in.):					
At 73 F	6.5	5.5	2.2	7.5	4.0
At −20 F	2.4	1.6	1.1	3.5	1.1
At −40 F	1.9	1.3	0.7	2.6	0.8
Tensile strength:					
At 73 F (p.s.i.)	5,900	6,500	7,400	4,900	5,300
Tensile modulus:					
At 73 F (1,000 p.s.i.)	300	340	390	240	290
Hardness, Rockwell R	103	105	111	89	92
Deflection temperature, unannealed (F):					
At 264 p.s.i	186	201	224	187	184
At 66 p.s.i	203	218	238	208	201
Coefficient of thermal expansion:					
(per °F × 10^{-5})	5.3	4.7	3.6	6.1	—

Blending grades may also be used for compounding with other resins to achieve special properties which are attractive when used to make the cap or cover **19.** For example, ABS is alloyed with polycarbonate to achieve higher flexural modulus than either resin alone plus the deflection temperature improvement contributed by the polycarbonate and the molding ease contributed by the ABS. Other ABS resins are used to modify rigid PVC. Although ABS resins are not highly flammable, self-extinguishing grades are sometimes preferred, in which case they are coated with a flame-resistant material. Also, it is well to provide protection from ultraviolet degredation in the form of an acrylic coating. When used in regions of extreme temperature change, it is well to improve reflection temperature by annealing the parts.

ABS thermoplastics are used according to this invention because of their impact resistance, surface hardness, rigidity, and heat resistance, as well as their chemical resistance. The chemical resistance is especially important since it enables the cap or cover to stand up under the attack of high pollution impurities found in many cities. The ABS thermoplastics also lend themselves well to vacuum forming, and large extruded shapes can be fabricated. Generally, all grades of ABS thermoplastics are considered impermeable to water and thus are useful for the purpose taught herein. The low moisture absorption and resistance to cold flow contribute to the dimensional stability of the ABS thermoplastics which, of course, is extremely useful in the waterproofing and weatherproofing purposes acting as a roof curb cover to enable the egress of pipes.

FIGS. **1** and **2** show two pipes passing through the cap or cover **19** and on through the roof of the building. The first pipe **32** passes through the raised cylindrical portion **24** of the cover. First, the top **29** of the raised portion **24** is cut along line *x—x* on site. Then the pipe is slipped through the cover.

Next, a boot such as boot **33** is cut at one of the sections to provide a good fit between the outside diameters of the pipe and the inside of the boot. The boot is attached to the pipe and cylinder **24** to give the necessary waterproofing and to protect against the varying ambient weather conditions. Thus, in extremely hot weather, for example, the pipe will tend to expand; in cold weather it will tend to contract; and a waterproof cover follows the variations in the diameter of the pipe. The clamp squeezes the boot sufficiently to prevent seepage or leakage of water through the space between the pipe and the curb cap or cover.

Initially, the boot **33** is a somewhat pyramidal unit having a stepped configuration to conform to almost any standard pipe reasonably expected to be used in conjunction with the barrier system. The boot is then cut to the appropriate diameter for any given pipe. In the case of pipe **32,** the cut boot has two steps with a first or larger diameter truncated cylindrical section **34** matching upstanding cylinder **24** and a second or smaller diameter cylindrical section **36.** These two steps are integrally joined together. Here, strap type pipe clamps **38, 39** are used to complete the waterproof connections. However, any other well-known type fastener may also be used in place of the strap clamp arrangements.

In a similar manner, boot **41** is cut at a much higher point so that it fits a smaller pipe **44.** The topmost cylindrical section **48** of the boot **41** is fixed to the pipe **44** by a strap clamp **49** and tightened with fastener **51.** In like manner, the boot may be cut at any other similar cylindrical section in order to accommodate virtually any diameter pipe. Boot **41** may be made from any good, flexible, weather-resistant rubber-like material, preferably, neopreme rubber.

For attaching the cap or cover to the curb, a plurality of screws pass through holes in the cover **19** and into the nailer, as shown at **55.** In practice then, the curb assembly surrounds an opening in the roof and attaches to adjacent structure. Roofing felt covers the curb and provides weatherproofing at the roof line. The opening in the top of the curb first covered with a curb cap or cover, preferably made from an ABS plastic having an acrylic coating. The cover has a numer of upraised cylindrical portions, any of which is cut to enable passage of pipes therethrough.

A boot having multiple cylinders, integral to one another, is built somewhat as a truncated pyramid, and is cut to have a desired upper inside diameter. The portions of the pyramidal boot that are smaller in diameter than the pipe are discarded. The pipe is fitted through the topmost cylinder, where the boot has been cut. Strap clamps attach the boot to the upraised portion of the curb cover and to the pipe. This roof sealing system provides an extremely efficient, long lasting water and weather proofed egress for pipes through roofs. The curbs, covers, and boots are fabricated away from the construction site but are fitted and assembled on the construction site. No additional flashing, pitch, or the like, is required. Thus, the device is less expensive and may be installed faster. It provides longer usage with less leakage or seepage during the years of actual use.

While the principals of the invention have been described above in connection with the specific apparatus and applications thereof, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention. Thus, the appended claims are to be construed to cover all equivalent structure.

I claim:

1. A multi-purpose roof penetration curb assembly for providing waterproof and weatherproof egress for pipes passing through roofs,

said assembly comprising curb means attached to a roof and surrounding an opening in the roof,

said curb having an open top,

plastic cover means shaped to fit over, be attached to and enclose the open top of said curb means,

said curb means having upstanding walls supported by and rising above said roof,

nailer means located atop said upstanding walls and surrounding the open top of said curb means,

roofing felt attached to said nailer means and covering said upstanding walls of said curb,

said cover means having substantially horizontal top side and a downwardly depending vertical apron integrally attached to said substantially horizontal surface,

said cover means being attached to said curb by fasteners going through said cover means and into said nailer,

said cover means having at least one upstanding vertical section integral therewith,

means for passing a pipe through said upstanding vertical section, and

boot means for making a waterproof seal between said pipe and said cover without requiring caulking,

said boot means having a first vertical section contiguous to the outer periphery of said pipe and a second vertical section contiguous to said upstanding cylindrical section.

2. The curb of claim 1 wherein said cover is an integral five-side box-like structure having a plurality of said cylindrical sections formed on one of said sides having a drainage dome and forming a top of said box-like structure,

each of said cylindrical sections comprising a circumfrential skirt with a closed top,

the other four of said sides of said box being a skirt depending from said top and forming a support at the perimeter thereof,

the free edge of each of said four sides flairing outwardly away from said curb to form a drip edge,

any of said cylindrical sections having said closed top cut therefrom providing a port for giving egress to said pipe, and

means for sealing said boot means around said pipe and around the circumferential skirt remaining after the top is cut from said cylindrical section.

3. The curb assembly of claim 1 wherein said boot means comprises a rubber-like member having a generally stepped pyramidal shape wherein each of the steps is generally cylindrical and integrally joined to adjacent members.

4. The curb of claim 3 wherein said boot is cut in the circumferential plane of at least one of said cylindrical members to fit the inside diameter of said boot to the outside diameter of said pipe.

5. The curb of claim 4 and strap clamp means surrounding said boot at the top and bottom thereof in order to attach said boot to said pipe and said upstanding cup means.

6. The curb assembly of claim 2 wherein said cover comprises a plurality of said upstanding cylindrical sections and the inside diameter of the largest cylindrical member of said boot means snugly fits over the outside diameter of said cylindrical sections.

7. The curb of claim 6 wherein said cover is an integrally formed member made of ABS plastic.

8. The curb of claim 7 wherein said cover is a five side box-like structure having said cylindrical sections formed on one of said sides at the top of said box-like structure, the other four of said sides depending from said top and forming a support at the perimeter thereof, the free edge of each of said four sides flaring outwardly to form a drip edge.

9. The curb of claim 8 wherein said upstanding cylindrical sections are formed on said top and said top is generally domed to provide drainage.

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