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VENT FOR ROOF AND WALL

Abstract

A vent assembly for connecting exhaust ducts from exhaust fans and routing the exhaust air outside of a building. The vent assembly can be mounted into a penetration in a wall or the roof of the building. The vent assembly includes a vent member that is of a hollow tubular profile. The vent assembly may further include a mounting member that can receive the vent member and allow for mounting the vent assembly to the roof or wall. The vent member includes a vent portion and a duct portion. The mounting member includes a flange and a collar. The collar may snugly slide over the vent portion and retain over a distal portion of the vent portion, while the flange can abut against the wall or roof surface. The vent portion can be inserted into the penetration.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application claims priority from U.S. Pat. No. 11,536,486, Utility patent application Ser. No. 17/316,414 and a U.S. Provisional Patent Appl. No. 63/742,603, filed on Jan. 7, 2025.

FIELD OF INVENTION
[0002] The present invention relates to an exhaust vent cap assembly, and more particularly, the present invention relates to an exhaust vent cap assembly that can be easily installed.
BACKGROUND OF INVENTION
[0003] As part of the ventilation system of a house, exhaust fans are installed in bathrooms and toilets to remove the odor and humid air. Exhaust fans are usually installed in the ceiling of the bathroom. A small duct is connected to the exhaust fan and the duct runs through the space between floors or in the attic to vent air outside. The duct ends in the roof deck or outside wall of a building. The roof deck is prepared for installing the duct by making a round hole of the size proportional to the size of the duct, also known as penetration, either on the outer wall of the house or in the roof deck for the air to exhaust to the outside.
[0004] A roofer later installs a waterproof cap over the hole where the duct is attached, to waterproof the penetrations. In colder climates, the moist air running through the round duct to the outside can condensate and water will drip down to the fan assembly in the ceiling of the bathroom or where the fan is installed and cause damage. To avoid condensation issues, ducts are insulated. To ease installation, round flexible ducts with insulation around them, also known as flex ducts, are used in connecting the fans to the roof culler.
[0005] During the construction of a building, the HVAC company installs the fans in the ceilings and makes a round hole in the plywood (roof deck) and attaches the duct to a piece of round steel tube and attaches the round tube to underneath the roof deck in front of the hole on the roof. The round tube is secured to the roof deck with a few metal sheet strips. The hole is open to the outside air for the rain to get into the duct.
[0006] In the normal course of construction, the HVAC personnel are the first trade to work on the house once the house is framed. The plumber and then the electrician come after HVAC workers and other trades follow them. Roofers install the roof when HVAC personnel and plumbers have made the penetrations and are done with their work. Therefore, the holes that HVAC personnel make on the roof are open to the atmosphere till the roofers come and install the permanent cap over the holes.
[0007] There could be a one- or two-week gap or even sometimes more till the holes on the roof can be covered by the permanent caps. During such a time, rain or snow often comes and water travels down the open hole toward the fan and brings water inside the house and damages the insulation around the duct attached to the fan.
[0008] The HVAC personnel must come back and replace the ducts that were soaked with water and deemed useless. With a typical house having two or three vents through the roof, the cost of replacing the flexible duct or the insulation around the ridged duct can get expensive. Since these ducts are in the attic, workers must maneuver between the roof trusses and frame members to make the holes and attach the roof collar. This makes the work even more challenging and labor-intensive. The additional material and labor with the trip to make the repairs add to the operational

expense of the HVAC Company, chipping away at their profits. This phenomenon happens repeatedly and often enough that the cost of the additional repairs becomes substantial.

[0009] Also, many kinds of exhaust fans, such as roof-mounted exhaust fans, are installed inside of a building unit away from windows or exhaust units in walls. Such exhaust fans are connected to vent units in the wall or windows through duct pipes. The duct pipes must pass through different structures, exterior walls, attic gable ends, and/or roof areas. The existing systems have several drawbacks. For example, holes in the roof or side wall cause potential water leaks or air leaks. The cost of materials and labor to install the vents is quite high. Also, the greater the number of bathrooms, stoves, microwaves, and dryers, the greater the number of structural penetrations required. The current method of installing the vent assembly includes drilling a hole in the exterior wood components or sheeting and inserting a vent assembly from outside of the house. The installer then goes inside the house and connects the duct to the vent assembly and the exhaust fan. The current vent assemblies are made of a tubular duct that is attached to permanent metal or plastic vents that are visible from the outside of the structure. They come with a flapper to keep the duct covered when the air is not exhausting. Inserting the vent assembly from outside requires the use of ladders or lifts for multiple-story structures. Safety concerns about using tall ladders such as slipping and falling are significant. Many employees are reluctant to get on tall lifts thus making the installation job limited to a group of traders who are comfortable with the use of tall ladders or have safety equipment for the task.

[0010] Besides the safety concerns, the building structures have various types of materials and finishes for the exterior. During the rough-in stage where ducts are run in the structure and exhaust ducts are installed, the contactor installs the vent from outside and leaves a space between it and the exterior wall according to the thickness of the exterior material that will be installed later time. Those materials could be brick, vinyl siding, fiber cement siding, stone or stucco to name a few. Most often the space between the vent cap and the structure is not set correctly or the vent assembly is installed crooked causing additional complications during final finishes of the exterior. It is common to visit the job site several times to correct the vent placement.

[0011] Another drawback is that it is hard to cut and shape exterior materials, such as bricks, stones, and cement boards around a round duct. In another method of installation which is usually for multifamily and tall buildings, the contractor installs a fixed length of exhaust tube through the structure with a tailpiece sticking out of the structure. Then they use a squared shape block with a pre-cut center hole to create a square-shaped surface so the exterior materials can butt against it neatly and nicely. The excess length of the tube/duct is cut flush with the exterior surface later and the vent cap is installed over it. This process is very tedious and laborious.

[0012] Thus, an industrial need is there for a vent assembly that overcomes the aforesaid drawbacks with conventional vent assemblies and their installation.

SUMMARY OF THE INVENTION

[0013] The following presents a simplified summary of one or more embodiments of the present invention to provide a basic understanding of such embodiments. This summary is not an extensive overview of all contemplated embodiments and is intended to neither identify key or critical elements of all embodiments nor delineate the scope of any or all embodiments. Its sole purpose is to present some concepts of one or more embodiments in a simplified form as a prelude to the more detailed description that is presented later.

[0014] The principal object of the present invention is therefore directed to a vent assembly that can be installed from inside a building.

[0015] It is another object of the present invention that the assembly prevents labor, cost, and time for replacing the damaged ducts.

[0016] It is still another object of the present invention that the assembly prevents undesired alterations in the building for replacing the damaged insulated exhaust ducts.

[0017] It is a further object of the present invention that the assembly is easy to install.

[0018] It is yet another object of the present invention that the assembly is economical to manufacture.
[0019] Still, it is an additional object of the present invention that the vent assembly can be adapted for different exterior wall finishes and thicknesses by having adjustability feature.
[0020] These and other objects and advantages of the embodiments herein and the summary will become readily apparent from the following detailed description taken in conjunction with the accompanying drawings.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0021] The accompanying figures, which are incorporated herein, form part of the specification and illustrate embodiments of the present invention. Together with the description, the figures further explain the principles of the present invention and enable a person skilled in the relevant arts to make and use the invention.
[0022] FIG. **1** is a perspective view of the disclosed exhaust vent cap assembly, according to an exemplary embodiment of the present invention.
[0023] FIG. **2** is an exploded view showing the cap and the tubular body of the disclosed exhaust vent cap assembly, according to an exemplary embodiment of the present invention.
[0024] FIG. **3** is a side planar view of the exhaust vent cap assembly, according to an exemplary embodiment of the present invention.
[0025] FIG. **4** is a sectional view of the exhaust vent cap assembly taken along the line **8**-**8** of FIG. **3**, according to an exemplary embodiment of the present invention.
[0026] FIG. **5** is a bottom view of the exhaust vent cap assembly, according to an exemplary embodiment of the present invention.
[0027] FIG. **6** is an exploded perspective view of another exemplary embodiment of the exhaust vent cap assembly, according to the present invention.
[0028] FIG. **7** is a perspective view of another exemplary embodiment of the exhaust vent cap assembly, according to the present invention.
[0029] FIG. **8** is a side view of the exhaust vent cap assembly shown in FIG. **7**, according to an exemplary embodiment of the present invention.
[0030] FIG. **9** is a sectional view of the exhaust vent cap assembly taken along the line **27**-**27** shown in FIG. **8**, according to an exemplary embodiment of the present invention.
[0031] FIG. **10** shows the exhaust vent cap assembly installed in a roof deck and connected to a duct, according to an exemplary embodiment of the present invention.
[0032] FIG. **11** shows a flange of the exhaust vent cap assembly that has apertures with sealed knockouts, according to an exemplary embodiment of the present invention.
[0033] FIG. **12** is a sectional view of the exhaust vent cap assembly with a tie to secure the duct, according to an exemplary embodiment of the present invention.
[0034] FIG. **13** shows another embodiment of the exhaust vent cap assembly for a wall, according to an exemplary embodiment of the present invention.
[0035] FIG. **14** shows a vent assembly that is mounted to an exterior wall, and further shows a duct, according to an exemplary embodiment of the present invention. Duct **1405** can move back and forth within the flange **1420** to provide adjustability function.
[0036] FIG. **15** shows extension tubes for the vent assembly, according to an exemplary embodiment of the present invention.
[0037] FIG. **16** shows an embodiment of the vent assembly where duct **1704** moves within flange **1701** in a spiral motion, allowing for precise adjustment of the vent portion.
[0038] FIG. **17** illustrates the vent portion, featuring a dimple positioned at the mouth.

[0039] FIG. **18** shows an embodiment of the vent assembly with telescopic adjustability.

DETAILED DESCRIPTION

[0040] Subject matter will now be described more fully hereinafter with reference to the accompanying drawings, which form a part hereof, and which show, by way of illustration, specific exemplary embodiments. Subject matter may, however, be embodied in a variety of different forms and, therefore, covered or claimed subject matter is intended to be construed as not being limited to any exemplary embodiments set forth herein; exemplary embodiments are provided merely to be illustrative. Likewise, a reasonably broad scope for claimed or covered subject matter is intended. Among other things, for example, the subject matter may be embodied as methods, devices, components, or systems. The following detailed description is, therefore, not intended to be taken in a limiting sense.

[0041] The word “exemplary” is used herein to mean “serving as an example, instance, or illustration.” Any embodiment described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other embodiments. Likewise, the term “embodiments of the present invention” does not require that all embodiments of the invention include the discussed feature, advantage, or mode of operation.

[0042] The terminology used herein is for the purpose of describing embodiments only and is not intended to be limiting of embodiments of the invention. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises”, “comprising,”, “includes” and/or “including”, when used herein, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0043] The following detailed description includes the best currently contemplated mode or modes of carrying out exemplary embodiments of the invention. The description is not to be taken in a limiting sense but is made merely for the purpose of illustrating the general principles of the invention, since the scope of the invention will be best defined by the allowed claims of any resulting patent.

[0044] Disclosed is an exhaust vent cap assembly for a ventilation system of a building. The disclosed exhaust vent cap assembly secures the insulated or non-insulated exhaust ducts of a ventilation system to the roof deck or outer wall of the building. Disclosed exhaust vent cap assembly eliminates the redundant work, and the extra costs associated with replacing the insulated exhaust ducts in the attic that are damaged by water and stopping water from entering the house through the exhaust fans.

[0045] Referring to FIG. **1**, which shows the disclosed exhaust vent cap assembly **100** having a cap **110** and a tubular body **120**. FIG. **2** is an exploded view of the exhaust vent cap assembly **100** showing the cap **110** separated from the tubular body **120**. The tubular body **120** has a cylindrical hollow tubular body **130** that is rigid and made of durable material. The cylindrical hollow tubular body **130** has a proximal end and a distal end. Around the periphery of the proximal end of the cylindrical hollow tubular body **130** extends a flange **140** perpendicular to the cylindrical hollow tubular body **130**. The flange **140** can be used to secure the disclosed exhaust vent cap assembly **100** to the roof deck or the outer wall. The flange **140** can be welded to the tubular body **130** or can be continuous with the wall of the tubular body. At the proximal end of the tubular body can be seen a mouth **150** of the tubular body **120**. The mouth and the cap can have a fastening mechanism for securing the cap to the mouth. The cap saleably engages with the mouth **150** of the tubular body **120** to prevent the ingress of water into the tubular body and the ducts. FIG. **2** shows the cap and the mouth having corresponding threads **160** and **170** for securing the cap **110** to the mouth. FIG. **3** is a side planar view and FIG. **4** is a sectional view showing the cap secured to the mouth wherein the threads of the cap are engaged to the threads of the mouth of the tubular body. A ridge **190** can also be seen in FIG. **4** which helps in retaining the duct over the tubular body. FIG. **5** is a bottom

view of the tubular body **120** showing the hollow cylindrical tubular body. The cap can also include a handle **180** for turning the cap **110** over the mouth **150** of the tubular body **130**.
[0046] The fastening mechanism and the handle can be varied for desired water tightness. FIG. **2** shows the roof cap assembly having the screw mechanism. The screw mechanism can be replaced by the snap-fit mechanism. FIG. **6** shows the assembly **200** having the cap **210** and mouth **220**, wherein the cap can snap-fit over the mouth of the tubular body. The cap can be placed from inside, wherein vertical ridges **230** are shown on the outer surface of the mouth. The vertical ridges around the mouth can be replaced by horizontal ridges that surround the mouth. The top of the cap is planar and may or may not have any handle.
[0047] FIG. **7** shows another exemplary embodiment of the exhaust vent cap assembly **300**, wherein the cap **305** has a furrow **310** which can act as a handle for lifting the cap **305**. FIG. **8** is a side view of the exhaust vent cap assembly **300**. FIG. **9** is a cross-sectional view of the exhaust vent cap assembly shown in FIG. **8** taken along the line **27-27**. The tubular body can have circling recess **320** which engages with a dimple **330** on the outer side of a skirt of the cap **305**. The dimple can snap fit into the recess with some force applied to the cap. This assembly can be made from a variety of materials, such as plastics, metal, composite materials, etc. The shape of the cap and handle can be varied. Similarly, any fastening mechanism for sealable securing the cap to the tubular body is within the scope of the present invention.
[0048] The removable cap can have different shapes to achieve water tightness. The removable cap can be snapped onto the top of the tubular member. The removable cap can also be in the shape of a lid that goes over the tube and secured through a friction fit, a lid/cover that goes inside the tube and secured through a friction fit, a cap that can be screwed onto the tubular member by fasteners, or any other suitable methods of securing the cap to the tubular member such that the tubular member may not be easily removed by wind. All these methods are meant to produce a waterproof assembly so water may not seep into the ducts.
[0049] FIG. **10** shows the exhaust vent cap assembly installed on the underside of roof deck **430** and secured to the duct **400** of the ventilation system. First, a hole can be made in the roof deck **430**. The diameter of the hole in the roof deck can be the same as the external diameter of the mouth of the tubular body **410**, such as the mouth can slide into the hole. The mouth is inserted into the hole while the flange **420** rests against the underneath of the roof deck **430**. The flange **420** can then be secured to the roof deck using fasteners. The mouth of the tubular body can extend above the roof surface. A cap **450** can be secured to the mouth to prevent the ingress of water into the duct.
[0050] The duct **400** can be pushed onto the distal end of the tubular body and secured using fasteners **440** and/or a strap. The tubular body may further have a protrusion **460** that prevents the slipping of the duct from the tubular body. An instruction label may be affixed or printed onto the cap for a roofer that may provide indications to remove the cap before they install the permanent roof cap **470**.
[0051] Alternatively, this disclosed exhaust vent cap assembly can also be attached to one end of the exhaust duct in a factory for ease of installation in the field. All the installers must do is to make a hole in the roof deck, as usual, insert the disclosed exhaust vent cap assembly through the hole in the roof deck, and screw the flange with a few fasteners underneath the roof deck and connect the other end of the duct to the exhaust fan. Roofers can remove the removable cap later without the chance of water entering the house or damaging the duct insulation.
[0052] The different components of the disclosed exhaust vent cap assembly can be made of different materials, such as virgin or recycled plastics, sheet metal, metal casting, PVC, or any material that is commonly used.
[0053] Referring to FIG. **11** which shows an exemplary embodiment of a cylindrical hollow tubular body **1100** with a flange **1110**. The flange **1110** has holes **1120** that are sealed by one or more knockouts **1130**. The knockouts **1130** can be broken to gain access to the holes **1120**. Insulation

foam or caulking materials can be delivered through the holes. For example, the tip of a foam insulation tool can be inserted into the holes for applying foam insulation. The foam insulation can fill in any gaps created by drilling holes in the roof or the wall. For example, the diameter of the hole drilled in a structure for installing the vent may be larger than the tubular body of the disclosed assembly. The space between the structure and the tubular body can be filled with insulation foam. The knockouts can seal ably cover the holes and may be of a thin profile that can be broken, for example using a sharp object. For example, plastic can be used for knockouts that can easily rupture. When using metal for the knockouts, perforation in the periphery or a similar line of weakness can be provided.

[0054] The above embodiments describe an assembly for use in roof vents, however, the disclosed assembly can also be adapted for vents in the wall. Vents can be made in the walls of a building, in particular, multistory buildings, such as multi-family dwellings, offices, or commercial places. Currently, the exhaust vents that are inside a building envelope for bathroom fans, dryers, or other equipment that needs exhaust vents to the outside of the building are commonly placed in the band boards, exterior walls, attic gable ends, or roof area. Typically, a hole for the vent is drilled in the perimeter of the house and through the band board. Band boards are usually a wood product that covers the ends of the floor joists.

[0055] The hole for the vent can also be made in the exterior sheeting or band board. The disclosed exhaust vent assembly can be adapted for such wall venting applications. The advantage of the disclosed vent assembly in the wall mount applications is that it can be installed from inside the building instead of outside as it is currently done. This makes the installation of the vent assembly much easier. FIG. **12** illustrates an exhaust vent assembly **1200** that includes a cap **1210** and a tubular body **1220**. The tubular body is a cylindrical hollow tubular body that is rigid and made of durable material. The cylindrical hollow tubular body has a proximal end and a distal end. Around the periphery of the proximal end of the cylindrical hollow tubular body is a flange **1225** that extends perpendicular to the cylindrical hollow tubular body. The flange can be used to secure the disclosed exhaust vent cap assembly to a band board **1230**. At the proximal end of the tubular body can be seen a mouth **1260** of the tubular body. The exhaust vent assembly adapted for mounting to a wall vent can be like the above-described exhaust vent assembly in FIGS. **1-10** and thus the details are not repeated herein.

[0056] For installation, the tubular body **1220** with removable cap **1210** is inserted into the hole made through the structure from inside. The duct **1240** extending from the vent of the room's exhaust system is coupled to the tubular body **1220** of the disclosed assembly. In another implementation, the duct can be a part of the disclosed assembly, wherein the rigid or flexible duct, the tubular body, and the cap can be pre-assembled i.e., the removable cap is secured to the mouth, and the duct is secured to the tubular body. The free end of the duct can be coupled to the fan assembly **1250**. The removable cap is accessible from outside of the wall and can be removed later and a permanent cap can be placed over the vent hole.

[0057] The disclosed assembly with or without the connected rigid or flexible duct can be installed from inside the structure. Installing from inside can be safer avoiding the need for climbing tall ladders thus addressing the fall or injury concerns using tall ladders or complications associated with installation from outside. Moreover, installation from inside the building can be easier and quicker. A tie strap **1270** can secure the flexible duct mounted over the tubular body. Screws and foil tapes are used as well with metal or rigid ducts.

[0058] For Installation, a hole is drilled in the exterior sheeting of a structure from the inside. Then, the tubular body, having a cap secured to the mouth, can be inserted from the inside and the flange of the tubular body can be secured to the structure using multiple fasteners, such as screws. The flexible duct may already be attached to the tubular body or can be attached to the tubular body later. The free end of the duct can be extended to the fan of the ventilation system. The removable and disposable cap of the disclosed exhaust vent assembly can seal the vent hole preventing ingress

of dust and water. Upon finishing the exterior of the wall (structure), the cap of the disclosed exhaust vent assembly can be removed, and a permanent cap of choice can be installed. The temporary cap can be designed in several ways as shown in FIGS. **1-10**.

[0059] Referring to FIG. **13** shows an exemplary embodiment of the disclosed exhaust vent assembly **1300**. The exhaust vent assembly **1300** includes a tubular body **1310**, the tubular body has a mounting flange **1320** and removable cap **1330** coupled to the mouth **1340**. The tubular body **1310** has a rim-like profile that can receive a flexible duct, the tubular body has protrusions to prevent the flexible duct from slipping out. Also, a zip tie **1360** is shown wrapped around the duct tightening the duct around the tubular body. The flexible duct can also be taped to the tubular body using foil tape or other adhesives appropriate for this application. Instead of flexible ducts, rigid ducts can also be used and are within the scope of the present invention. For a rigid duct, the end of the tubular body can be tapered inwards so that the duct can easily go into the sleeve of the tubular body.

[0060] In one implementation, the length of the tubular body can be made of different sizes corresponding to various thicknesses of the framing structures and exterior finish materials. The length of the tubular body and its diameter are of sufficient size to allow ease of use. The disclosed vent assembly can be designed to fit various sizes of flexible or rigid ducts in the market, such as 4″, 6″, 8″, 10″, or any other conceivable size. Rigid ducts are typically made of sheet metal and flexible ducts with plastic tubes with wire reinforcement having outer insulation and some are made of aluminum.

[0061] In certain embodiments, disclosed is a vent assembly for exhaust fans that can be installed in walls, roofs, and the like structure. The disclosed vent assembly can be connected to exhaust fans through suitable ducts. The vent assembly can be used to exhaust air from fans or bring fresh air inside a structure. The vent assemblies act as an interface between the inside and outside facilitating the air movement. The vent assembly can be installed on the walls or roof of a building structure, such as a house, a multi-family dwelling, an office, or a commercial place. Since the vent assembly can be installed from inside of a house, this prevents the need to climb tall ladders or lifts thus addressing the risks of fall and injury. The disclosed vent assembly can be easily adapted to accommodate various walls' exterior finishes. Examples of exterior finishes are brick, stone, cement board, stucco, cladding, vinyl siding, or other conceivable materials to cover the exterior of a structure.

[0062] Referring to FIG. **14** shows a schematic view of an exemplary embodiment of the vent assembly **1400** that is adjustable. FIG. **14** shows connecting the round vent assembly **1400** to a flexible duct **10** for adjustability. The vent assembly may include a vent member **1405** that may form a vent of the vent assembly. The vent member shown in FIG. **14** is of a tubular profile having a vent portion and a duct portion. The vent portion has a proximal portion and a distal portion. The distal portion extends between the proximal portion and the duct portion. The vent assembly may also include a mounting member **1410** that includes a collar **1415** and an integral flange **1420** extending perpendicular from the periphery of the collar. The flange may be formed of a plate having an opening, and the collar is formed by a skirt extending perpendicularly from the periphery of the opening. The size of the collar may correspond to the size of the vent member. The vent member **1405** may pass snugly through the collar **1415**, such that there may be some friction between the vent member and the collar that may provide air-tight sealing. The inner surface of the collar and/or the outer surface of the distal portion of the vent member may have a layer of soft material, such as rubber or silicone. The soft material may enhance friction-fit and air-tight seal. The collar may provide stability in holding the vent member. The collar of the mounting member and the vent member may be designed such that to slide over each other freely with a friction fit.

[0063] The vent member may be divided into a vent portion and a duct portion, as described above. The vent portion may be manufactured long enough to accommodate all types of exterior finish materials. After the disclosed vent assembly **1400** is installed as described earlier, at the time of

installing the exterior finish, the vent portion **1405** may be pushed inwards to make it flush with the exterior material of the wall and a permanent vent cover can then be installed.

[0064] FIG. **15** shows a method of adjusting the duct portion wherein the duct **1802** and flange **1801** are integral and connected and extension tubes are added as needed to adjust the length of the vent according to the thickness of exterior finish. The vent assembly **1500** may be adapted for thicker exterior finishes using extension tubes/ducts **1530**. The extension tubes **1530** can be manufactured in different lengths and can be interchangeably coupled to the end of the vent portion **1520** to increase the effective length of the vent portion **1520**. An extension tube of such a length can be chosen to accommodate thicker exterior materials like brick or stone. The round extension members **1530**, as shown in FIG. **15**, may be manufactured in various lengths and can be attached to the vent portion. The extension tube/duct may be attached to the vent portion using any suitable mechanism, such as threaded rings portion around the diameter like bolt and nut coming together, spiral movement of the tubes over each other or a snap-fit mechanism. In certain implementations, the vent portion may be made long enough to accommodate various exterior wall finishes or can be made to a specific length to match a specific type of exterior wall finish. For example, vinyl siding is not as thick as brick and the length of the vent portion may be different for each. The vent portion may also include a telescoping mechanism to increase or decrease the length of the vent portion.

[0065] For installation, the vent portion of the vent assembly may be inserted into a pre-drilled hole in the wall from inside the building while the distal portion of the vent portion may not be inserted into the hole and may remain within the collar of the mounting member. The flange of the vent assembly abuts against the wall. The flange may be secured using suitable fasteners screwed into the wall through the flange. The pre-drilled hole in the wall may be slightly larger than the outer diameter of the vent portion of the vent member.

[0066] The installer can then connect a duct from the exhaust fan to the duct portion of the vent member. To maintain the adjustability function, at least an end portion of the duct, connecting to the vent assembly may be flexible and pliable. The duct portion of the vent member may also include anti-slip rings **1425** that resist the flexible duct from slipping out. The duct can be further secured using suitable fasteners or tapes, such as a tie wrap **1430**, as shown in FIG. **14**. The joint may be further secured using foil tape or specialty tape for this application. It should be noted that the end portion of the duct may be rigid or flexible, and the vent member can receive different types of ducts without departing from the scope of the present invention.

[0067] The vent assembly may further include a disposable cap covering an open end of the vent portion. The disposable cap may seal the end of the vent portion preventing any ingress of dust and water. This cap can be removed when desired. For example, the cap can be removed after the exterior finish is applied and replaced with a permanent vent cap of choice. The end of the duct portion of the vent member may be slightly tapered inwards to allow easy and quick installation of the duct. The rigid duct may alternatively be used and go inside the duct portion of the vent member and be secured. By using a rigid duct, the vent assembly may not be adjustable. The flange of the mounting member may have a large diameter that covers the hole made in the exterior framing or sheathing and has pre-made holes for mounting.

[0068] While applying the exterior material or finish on the wall, the worker can adjust the length of the vent portion that is protruding out, by pushing it inside and making it flush or near flush with the exterior material or finish. The vent can be covered with the appropriate permanent vent cap that is commercially available to cover the hole made for the vent assembly.

[0069] The length of the vent member can be made of different sizes to allow for various thicknesses in the framing structures and various thicknesses of exterior surfaces. Exterior surfaces can be made from any of the several available materials such as brick, stucco, cement board siding, vinyl siding, or any other type of materials that cover the exterior of a house or a structure. The length of the vent member and its diameter may be of sufficient size to allow ease of use and the

ability to mate with commercially available vent caps. The disclosed vent assembly may be designed to fit various sizes of flexible or rigid ducts in the market including but not limited to most common sizes 4″, 6″, 8″, 10″, or any other conceivable sizes. Rigid ducts are typically made of sheet metal or aluminum, and flexible ducts are made of plastic or aluminum foil that is wrapped around spiral wire. Some flexible ducts are covered with insulation as well.

[0070] In an alternative embodiment, as illustrated in FIG. **16**, duct **1704** is designed to move within flange **1701** in a spiral motion. This design prevents the duct **1704** from being pushed in suddenly and enables finer, more precise adjustment. The duct **1704** features a groove that slides over the protruding dimple **1706**, as shown in FIG. **17**. The groove and dimple are engineered to move over one another smoothly and securely. The duct **1704** extends to the vent portion. Like other embodiments, the vent assembly **1700** is installed by inserting the duct through a pre-existing hole in the structure from the interior. The flange **1701** is then secured to the structure using appropriate mounting hardware. A cover on duct **1704** prevents dust and debris from entering the duct. During the installation of the exterior finish, the duct **1704** can be rotated spirally in or out to align with the surface of exterior materials such as siding, brick, or stone. Once this is done, the temporary cap is removed, and a permanent vent cap is installed.

[0071] FIG. **17** illustrates the vent portion, featuring a dimple positioned in the mouth of the duct.

[0072] FIG. **18** illustrates an alternative embodiment of the vent assembly featuring telescopic adjustability. In this embodiment, duct **1802** and flange **1801** are integrally formed as a single unit. Telescopic extension tubes **1803** are inserted into duct **1802** from the duct side. The extension tubes are dimensioned so that the larger section remains in contact with mouth **1804**, while the smaller extension tubes slide out from within the first tube. The distal end of the final tube is sealed with a vent cap, which serves to prevent the ingress of dust and debris into the duct.

[0073] The number of extension tubes and their corresponding lengths are selected to accommodate the most common building materials, such as brick, stone, stucco, and siding. These extension tubes are available in various lengths to provide flexibility in adjusting the vent assembly to the specific needs of the structure.

[0074] As with other embodiments, the vent assembly is installed by inserting the duct portion through a pre-existing hole in the structure, with the smaller ducts of the vent section passing through the penetration. The flange is then securely fastened to the structure using mechanical fasteners. During the installation of the exterior finish, the smaller telescopic tubes are extended to match the surface of the exterior material. Once the desired extension is achieved, the temporary cap is removed, and a permanent vent cap is installed. The extension tubes are sized similarly to the permanent cap to ensure a seamless fit.

[0075] The key advantage of this design is that the duct portion remains stationary and securely positioned from the interior of the building, thereby allowing the external surfaces to be fully finished before the vent cap is installed. Additionally, duct **1802** is configured to receive either flexible or rigid ducts of the same size, enhancing the assembly's versatility.

[0076] The disclosed vent assembly can be made of several different materials like virgin or recycled plastics, which have additives to make them fire retardants and self-extinguishing. Other materials of choice are sheet metal, cast metals, extruded or rolled metal, polymers, or any material that is commonly used.

[0077] Also, the vent member can be made in lengths of various standard sizes that may be specific to the type of exterior finish or fixing the adjustable vent portion before installation to the desired length by taping or screwing the flange and vent portion together. The disclosed vent assembly allows the use of existing vent caps that are in the market and allows adjustability to the exterior finish.

[0078] In certain implementations, the vent assembly may be made of plastic materials with additives to make it fire retardant and self-extinguishing to avoid the spread of fire. It can also be made in various other materials like galvanized steel sheets and extruded or cast metals.

[0079] While the foregoing written description of the invention enables one of ordinary skill to make and use what is considered presently to be the best mode thereof, those of ordinary skill will understand and appreciate the existence of variations, combinations, and equivalents of the specific embodiment, method, and examples herein. The invention should therefore not be limited by the above-described embodiment, method, and examples, but by all embodiments and methods within the scope and spirit of the invention as claimed.

Claims

1. A vent assembly for mounting to a structure, comprising: a vent member including a vent portion and a duct portion, wherein the vent portion has a proximal portion and a distal portion; a mounting member comprising a collar and a flange, wherein the collar is configured to snugly slide over the distal portion of the vent portion and retain the distal portion, and the flange extends perpendicularly from the collar to abut against the structure; wherein length of the vent portion is adjustable, thereby enabling the vent assembly to accommodate various thicknesses of exterior finish of the structure.
2. The vent assembly of claim 1, wherein the collar includes a spiral adjustment mechanism that allows the vent portion to be adjusted in length by rotating the vent portion, providing enhanced adjustability for various thicknesses of exterior finishes.
3. The vent assembly of claim 1, wherein the vent portion includes a telescopic mechanism, allowing the adjustable length of the vent portion to be extended or retracted by sliding one portion of the vent inside another, thereby accommodating various exterior wall thicknesses.
4. The vent assembly of claim 1, further comprising a removable cap configured to securely seal the vent portion and prevent the ingress of water and debris.
5. The vent assembly of claim 1, wherein the duct portion is cylindrical and is configured to receive a duct, the duct portion further comprising one or more anti-slip rings spaced along its length.
6. The vent assembly of claim 1, further comprising one or more extension tubes, wherein the one or more extension tubes are configured to be interchangeably coupled to an end of the vent portion to increase the effective length of the vent portion.
7. The vent assembly of claim 1, wherein the collar and the distal portion of the vent member include a layer of soft, gripping material to enhance the friction fit and provide an airtight seal.
8. The vent assembly of claim 1, wherein the flange is secured to the structure using mechanical fasteners.
9. A method for installing a vent assembly to a structure, comprising: creating a penetration in a structure; inserting a vent assembly into the penetration, wherein the vent assembly comprises: a vent member with a vent portion and a duct portion, a mounting member including a collar and a flange; securing the flange by a mechanical fastener; adjusting length of the vent portion thereby enabling the vent assembly to accommodate various thicknesses of exterior finish of the structure.
10. The method of claim 9, wherein the collar is adjusted by rotating the collar to extend or retract the vent portion.
11. The method of claim 9, wherein the vent portion is adjusted using a telescopic mechanism to extend or retract one portion of the vent inside another.
12. The method of claim 9, further comprising connecting a duct to the duct portion of the vent assembly and securing it using fasteners or adhesive.
13. The method of claim 9, further comprising securing a removable cap to the vent portion to prevent water or debris from entering the duct.
14. The method of claim 9, wherein the vent portion is pushed inwards to align with the exterior material after installation.
15. The method of claim 9, further comprising inserting extension tubes to increase the effective length of the vent portion.

16. The method of claim 9, wherein the flange of the vent assembly is secured using screws or other mechanical fasteners.

17. The vent assembly of claim 1, wherein the collar comprises a spiral thread or ridge along its inner surface, and the vent portion includes a corresponding spiral or ridged exterior to enable the vent portion to be adjusted by rotating the collar relative to the vent portion.

18. The vent assembly of claim 1, wherein the removable cap includes a snap-fit mechanism that allows it to securely fasten over the vent portion and can be easily removed for maintenance or replacement.

19. The vent assembly of claim 1, wherein the vent assembly is configured to be mounted in both horizontal and vertical positions.