A register boot adapted for connection to ductwork and in a ducted heating or cooling system and has a unitary body of plastic. The unitary body has a substantially circular first opening for connecting to ductwork. The unitary body has a substantially rectangular second opening for connection to a register. The unitary body defines an air pathway between the first opening and the second opening. The unitary body preferably includes a first collar of a first diameter operatively connection to a second collar of a second diameter defining the first opening, the first diameter being greater than the second diameter. A fitting with the first and second collar is also disclosed. The fitting can be a register boot, flexible joint, or other type of fitting.
PLASTIC REGISTER BOOT

BACKGROUND OF THE INVENTION

[0001] The present invention relates to heating and cooling. More particularly, but without limitation, the present invention relates to a register boot for connection between ductwork and a register.

[0002] One common problem in heating and cooling is efficiency. Increasing the efficiency of a heating and cooling system results in decreased costs of operating the heating and cooling system. One aspect of a heating and cooling system that can contribute to the efficiency or inefficiency is the ductwork and register boot being used.

[0003] Conventionally, ductwork and associated fittings are formed of sheet metal. Ducts or pipes as well as fittings such as elbows, angles, and boots are formed of riveted or welded sheet metal. Due to the nature in which these various parts are made there are often cracks in the ductwork and associated fittings that result in heating or cooling loss. When cracks appear in these components, including the register boots, air flow can result in undesirable whistling sounds.

[0004] In more recent times, flex pipe is replacing sheet metal ducts. Flex pipe is generally associated with less heat loss and is easier to handle than conventional sheet metal ductwork.

[0005] Another problem relates to installation of ductwork. Metal ductwork can have sharp edges which result in injury.

[0006] A further problem relating to sheet metal ductwork is that it can easily become dirty which is problematic when the ductwork is exposed, such as in the basement of a residence.

[0007] Another problem relating to installation and repair is inventory. Ductwork can be of various sizes, including ducts being of 6 inch diameter or 7 inch diameter. Corresponding fittings come in 6 inch or 7 inch diameter, although reducers are available. The difference in diameters of ductwork requires that those who stock ductwork to carry inventory for both dimensions. This can be of particular concern to those who install or replace ductwork as they either need to maintain a full inventory of parts.

[0008] Therefore, it is a primary object, feature, or advantage of the present invention to improve upon the state of the art.

[0009] It is a further object, feature, or advantage of the present invention to provide for improving connections between ductwork and registers to improve the efficiency and reduce loss.

[0010] Another object, feature, or advantage of the present invention is to provide a plastic register boot that can be adapted to accommodate ductwork having different diameters.

[0011] A further object, feature, or advantage of the present invention is to provide a plastic register boot that reduces the amount of inventory needed.

[0012] A still further object, feature, or advantage of the present invention is to eliminate sharp metal edges which can result in injury.

[0013] Yet another object, feature, or advantage of the present invention is to provide a register boot suitable for use with flex pipe.

[0014] A still further object, feature, or advantage of the present invention is to provide a register boot that is seamless and without cracks that leak air.

[0015] Another object, feature, or advantage of the present invention is to provide a register boot that is quiet and does not allow whistling.

[0016] Yet another object, feature, or advantage of the present invention is to provide a register boot with a flange or lip to stabilize the register boot during installation.

[0017] A further object, feature, or advantage of the present invention is to provide a register boot and/or a flexible joint that do not require an adapter to couple to different size of piping.

[0018] One or more of these and/or other objects, features, or advantages of the present invention become apparent from the specification and claims that follow.

SUMMARY OF THE INVENTION

[0019] The present invention provides for plastic register boots. According to one aspect of the present invention a register boot is adapted for connection to ductwork and in a ducted heating or cooling system. The register boot includes a unitary body of plastic. The unitary body has a substantially circular first opening for connecting to ductwork. The unitary body has a substantially rectangular second opening for a connection to a register. The unitary body defines an air pathway between the first opening and the second opening. The unitary body can be adapted for connection to either ductwork of a first diameter or ductwork of a second diameter. Preferably the register boot is made of a plastic material. The ductwork can include a flange extending outwardly from the second opening to support the register boot when it is installed through a floor.

[0020] According to another aspect of the present invention, a register boot for providing a tight connection between ductwork and a ducted heating or cooling system and a register to prevent loss of air through the register boot while providing for ease of installation is provided. The register boot includes a unitary body formed of plastic for preventing the loss of air. The unitary body has a first opening for receiving air from the ductwork. The unitary body has a second opening for passing air to the register. The second opening is of a substantially rectangular shape and adapted for connection to the register. Preferably the register boot is adapted to be configured to fit ductwork of either a first size or a second size.

[0021] According to another aspect of the present invention, a fitting for providing a tight connection to prevent loss of air from ductwork while providing for ease of installation is provided. The fitting includes a unitary body formed of plastic for preventing the loss of air. There is a first opening within the uniform body for receiving air from the ductwork. The unitary body includes a first collar of a first diameter operatively connected to a second collar of a second diameter defining the first opening. The first diameter is greater than the second diameter. The second collar is adapted to fit ductwork of the second diameter when the first
collar is removed. The first collar can be removed through cutting. The first collar adapted to fit ductwork of the first diameter. There is also a second opening within the unitary body for passing air received through the first opening. The fitting can be a flexible joint or a register boot.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 is a perspective view of one embodiment of a heating and cooling system illustrating various embodiments of the present invention.

[0023] FIG. 2 illustrates a perspective view of one embodiment of a register boot of the present invention.

[0024] FIG. 3 illustrates a side view of the embodiment of a register boot shown in FIG. 2.

[0025] FIG. 4 illustrates an end view of the embodiment of a register boot shown in FIGS. 2-3.

[0026] FIG. 5 illustrates a top view of the embodiment of a register boot shown in FIGS. 2-4.

[0027] FIG. 6 illustrates a side view of a torpedo register boot according to one embodiment of the present invention.

[0028] FIG. 7 illustrates an end view of the torpedo register boot shown in FIG. 6.

[0029] FIG. 8 illustrates bottom view of the torpedo register boot shown in FIG. 6-7.

[0030] FIG. 9 is a perspective view of one embodiment of a register boot of the present invention having a flange.

[0031] FIG. 10 is a side view of the embodiment of FIG. 9.

[0032] FIG. 11 is an end view of the embodiment of FIGS. 9-10.

[0033] FIG. 12 is a top view of the embodiment of FIGS. 9-11 of a register boot with a flange.

[0034] FIG. 13 illustrates a top view of one embodiment of a flexible joint according to the present invention.

[0035] FIG. 14 illustrates an end view of the flexible joint of FIG. 13.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0036] The present invention provides for convenient plastic register boots and flexible joints for use in heating and cooling. FIG. 1 illustrates one embodiment of a heating and cooling system that uses various embodiments of the present invention. In FIG. 1 a furnace 12 is shown. The furnace 12 has a plenum 14 with regular ductwork 16 extending outwardly from the plenum. Various lengths of flex pipe 18 extend from the ductwork 16. A regular plastic register boot 24 is also shown. A regular plastic register boot 20 with a flange or lip suitable for installing in a floor is shown. A torpedo plastic register boot 22 is shown. The present invention contemplates that other configuration of register boot fittings can also be used. A flexible joint 70 is suitable for replacing an angle connector or a shown. Although the flexible joint 70 is shown in a straight position (0 or 180 degrees), it is to be understood the flexible joint 70 can flex to form a needed angle, including, but not limited to standard 90 degree, 45 degree, 30 degree, and 60 degree angles.

[0037] FIGS. 2-5 illustrate the 90 degree regular plastic register boot 24 in greater detail. The regular plastic register boot 24 includes a unitary body 26 of plastic. The plastic is preferably an injection molded thermoplastic. The unitary body 26 has a substantially circular first opening 30 for connecting to flex pipe. The unitary body 26 also has a substantially rectangular second opening 28 for connection to a register. Thus, air from the flex pipe, through the register boot and to a register. Due to the unitary plastic construction, the register boot is seamless thereby preventing loss of air within the register boot itself. Thus, the unitary plastic is generally advantageous over a multi-piece construction. A multi-piece construction would also tend to increase the labor required in installing the register boot.

[0038] The unitary body 26 has integrated collars 36 and 38 for fitting the plastic register boot 24 to different sizes of diameter flex pipe. For example, the collar 36 is preferably adapted to fit six inch diameter flex pipe while the collar 38 is preferably adapted to fit seven inch diameter flex pipe. Because the unitary body is of a plastic material, the second collar 36 can be cut away from the first collar 38 as needed. This is advantageous because only one plastic register boot needs to be stocked as opposed to two plastic register boots. This same type of connection can also be used in other type of fittings as well. The first collar 38 has a first rib 37 and the second collar 36 has a second rib 35. The ribs 37, 35, assist in holding ductwork, preferably flex ductwork, in place.

[0039] The unitary body 26 includes a central member 40 with a rectangular mouth 32 for connection to the register. The central member 40 provides a 90 degree angle between the register and the pipe. The present invention, however, contemplates that the central member 40 can be configured differently for other angles.

[0040] FIGS. 6-8 illustrate a torpedo boot embodiment of the present invention. In FIG. 8, the torpedo boot plastic register boot 22 is shown. Note that the torpedo boot is similar to the regular plastic register boot shown in FIGS. 2-5, however, the torpedo register boot has a torpedo boot central member 50 of a different configuration. The torpedo boot 22 has a substantially rectangular opening 52 in a rectangular mouth 54 for connection to a register. Note that the torpedo register boot 22 is configured for a different type of connection than the register boot shown in FIGS. 2-5 as the rectangular opening 52 is oriented differently with respect to the pipe. Also, the torpedo plastic register boot has a first rib 37, a second rib 35, and a third rib 39 for assisting in the connection of ductwork, preferably flex ductwork.

[0041] FIGS. 9-12 illustrate another embodiment of a plastic register boot with a flange or lip. The plastic register boot 20 has a flange or lip 60 with a first end 62 and a second end 64 extending outwardly from the central member 40 of the plastic register boot 20. One advantage of the flange 60 is that in floor applications the flange can be used to support the plastic register boot 20 in place during the installation process. This configuration is advantageous as it allows a single person to install the plastic register boot as opposed to requiring one person to hold the register boot in place from above with a second person working from below. Thus
the flange or lip 60 provides a significant savings in the labor cost associated with installation. The flange 60 also has a plurality of tabs (61, 63, 65, 67, and 69) to assist in holding the plastic register boot in place, particularly during the installation process. Each of the tabs (61, 63, 65, 67, and 69) extend outwardly from the flange 60.

[0042] FIGS. 13-14 illustrate a flexible joint of the present invention. As shown in FIG. 13, the flexible joint 70 includes a first opening 74 and a second opening 76 on opposite ends of the flexible joint 70. As the flexible joint 70 is flexible, the flexible joint 70 can be configured to be beaded at different angles to replace numerous types of angled joints associated with sheet metal ductwork pipes. The flexible joint 70 is made of a plastic material and is adapted for fitting either different sizes of flexible pipe. Because the integral collars 36 and 38 are of different diameters, the flexible joint can fit flexible pipe of different diameters. For example, flexible pipe can fit a six inch diameter flexible pipe when the first collar 36 is in place. The first collar 36 can be removed through cutting to leave a second collar 38 which can fit a seven inch diameter flex pipe. Due to the use of plastic material, the flexible joint can be easily cut.

[0043] It should also be apparent that the flexible joint 70 can fit one size of flex pipe on one hand and a different size of flex pipe on the other end. Thus, a single flexible joint 70 replaces numerous types of connectors used with sheet metal. The flexible joint 70 includes a first rib 37 and a second rib 35 to assist in connection to ductwork, especially flex pipe. When connecting to flex pipe the first rib 37 or second rib 35 helps maintain a secure connection.

[0044] One skilled in the art having the benefit of this disclosure will appreciate that the present invention extends beyond the specific embodiments shown in. The present invention contemplates numerous variations in the particular type of plastic used, the manner in which the plastic if formed, the shape or configuration of the register boots, joints, or other fittings, the type of flex pipe or diameter of flex pipe that can be used, and other variations. These and other variations of the present invention are well within the spirit and scope of the invention. The present invention is not to be limited to the specific embodiments shown herein.

1. A register boot adapted for connection to ductwork in a ducted heating or cooling system comprising:
   a unitary body of plastic without seams;
   the unitary body having a substantially circular first opening for connecting to the ductwork;
   the unitary body having a substantially rectangular second opening for connection to a register;
   the unitary body defining an air pathway between the first opening and the second opening.

2. The register boot of claim 1 wherein the unitary body further comprises a first collar of a first diameter operatively connected to and immediately adjacent a second collar of a second diameter defining the first opening, the first diameter being greater than the second diameter.

3. The register boot of claim 2 wherein the second collar is adapted to fit 6 inch diameter ductwork when the first collar is removed, the first collar is adapted to fit 7 inch diameter ductwork.

4. The register boot of claim 3 further comprising a first rib on the first collar and a second rib on the second collar for connecting the register boot to flex pipe.

5. The register boot of claim 1 wherein the first opening defines a first plane 90 degrees perpendicular to a second plane defined by the second opening.

6. The regular boot of claim 1 wherein the plastic is a thermoplastic.

7. The register boot of claim 1 wherein the unitary body is formed by injection molding.

8. The register boot of claim 1 further comprising a flange positioned at the second opening and extending outwardly from the second opening to support the register boot.

9. The register boot of claim 8 further comprising a plurality of tabs extending outwardly from the flange, and co-planar with the flange for assisting in installation of the register boot in a floor.

10. A register boot for providing a tight connection between ductwork in a ducted heating or cooling system and a register to prevent loss of air through the register boot while providing for ease of installation, comprising:

   a unitary body formed of plastic for preventing the loss of air, the unitary body of one-piece construction and without seams;
   a first opening within the uniform body for receiving air from the ductwork;
   a second opening within the unitary body for passing air to the register;
   the second opening of substantially rectangular shape and adapted for connection to the register.

11. The register boot of claim 10 wherein the unitary body is adapted to receive 7 inch ductwork.

12. The register boot of claim 10 wherein the unitary body is adapted to receive 6 inch ductwork.

13. The register boot of claim 10 wherein the unitary body is adapted to be configured to fit ductwork of either a first size or a second size.

14. A fitting for providing a tight connection to prevent loss of air from ductwork while providing for ease of installation, comprising:

   a unitary body formed of plastic for preventing the loss of air, the unitary body of one-piece construction and without seams;
   a first opening within the uniform body for receiving air from the ductwork;
   the unitary body comprising a first collar of a first diameter operatively connected to and immediately adjacent a second collar of a second diameter defining the first opening, the first diameter being greater than the second diameter;
wherein the second collar is adapted to fit ductwork of the second diameter when the first collar is removed, the first collar adapted to fit ductwork of the first diameter; a second opening within the unitary body for passing air received through the first opening.

15. The fitting of claim 14 wherein the unitary body is flexible thereby forming a flexible joint.

16. The fitting of claim 14 wherein the fitting is a register boot and the second opening is substantially rectangular for connecting to a register.

17. The fitting of claim 14 further comprising a first rib operatively connected to the first collar and a second rib operatively connected to the second collar wherein the first rib and the second rib are configured to assist in providing tight connection between the fitting and flex pipe.

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