Feb. 13, 1962 L. E. EWARD 3,020,618

CONCRETE FORM

Filed Jan. 20, 1958

2 Sheets-Sheet 1

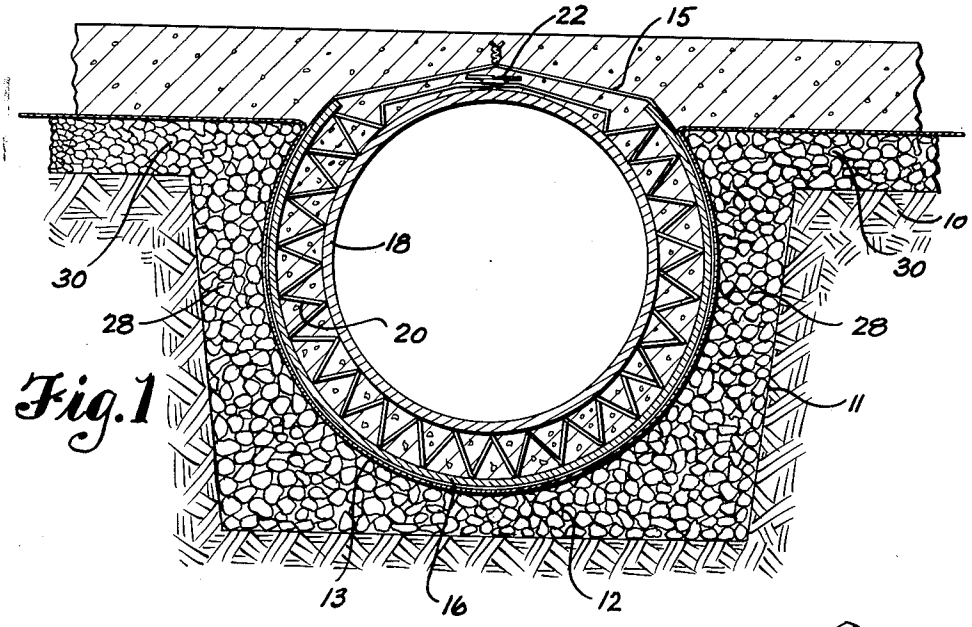


Fig. 1

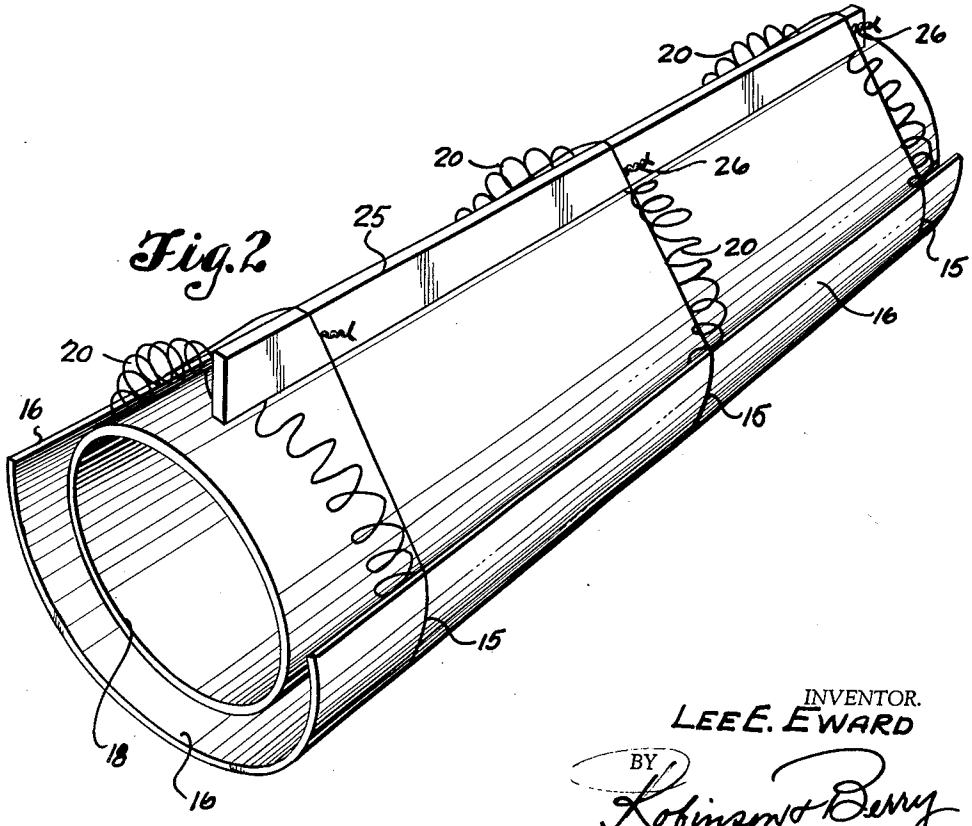


Fig. 2

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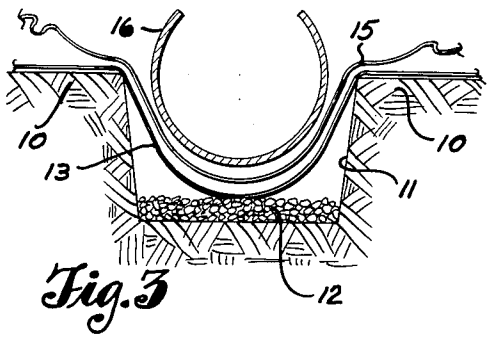


Fig. 3

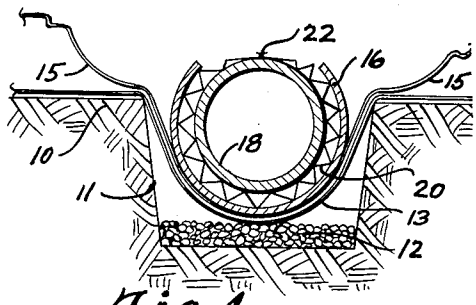


Fig. 4

Fig. 5

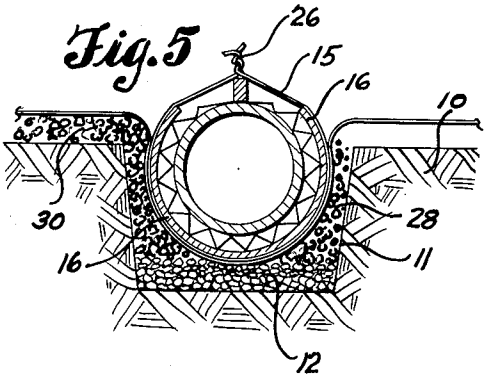


Fig. 7

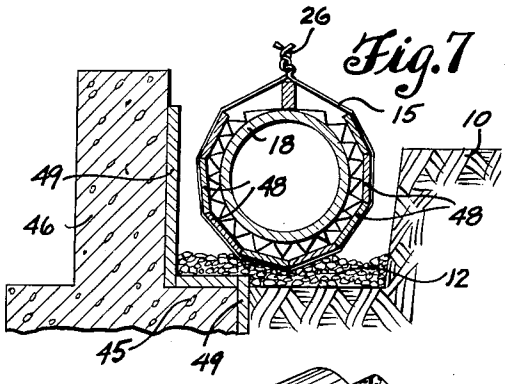
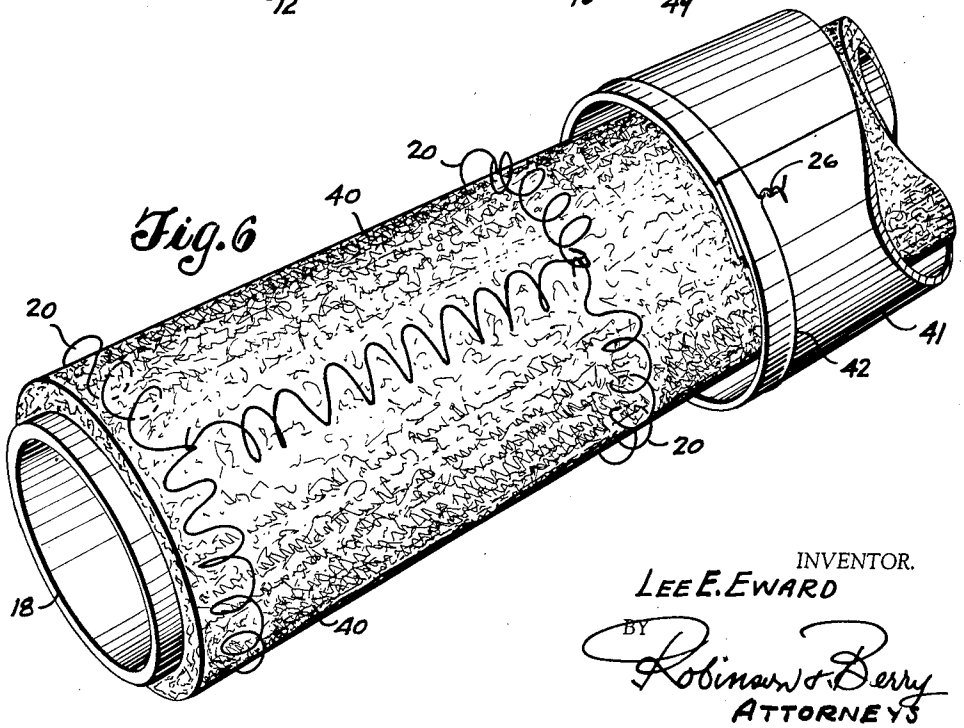


Fig. 6



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CONCRETE FORM

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2 Claims. (Cl. 25—154)

This invention relates to the installation of ducts as employed, for example, in present day residential heating systems such as those generally known in the home building industry as "slab floor perimeter heating systems," in which concrete encased, tubular ducts are employed to conduct heated air from a point of distribution to its places of use.

In hot air heating systems of the above kind, to which the present invention pertains, it is a general practice to employ ducts made of fiber or light weight metals as supply and return lines; these ducts being laid in trenches formed in the earth beneath concrete slabs which comprise the floor of the area to be heated. The ducts are laid on gravel bases and are encased in concrete. Normally the concrete is poured around the pipes in one pour and the floor slab is poured later, however, it can be done in a single pour. This method of laying the ducts and of encasing them, usually results in the use of what is considered to be an excessive amount of concrete for that particular accomplishment.

It has been the principal object of this invention to provide a novel method of and means for the encasing of such air ducts with concrete, that is practical, economical, easy to practice and provides for a material saving of concrete.

More specifically stated, the present invention pertains to the means for and method of enclosing the ducts within forms into which the duct encasing concrete is poured as an operation that may be separate and apart from the floor slab formation, and by which use of forms, the necessary or desired protection for the ducts will be obtained by use of a substantially lesser amount of concrete.

It is a further object of the present invention to provide what may be designated as "wrap around forms," which may be applied on the job for enclosing the ducts to receive the concrete and which may be easily and economically placed about the duct and secured in concrete receiving position; such forms being used in conjunction with spreaders or spacers of novel form which are applied about the ducts and whereby the thickness of the wall of encasing concrete is definitely established.

Additional advantages which result from my new and improved means and method of enclosing the ducts are that it provides an improved means of holding ducts in place when concrete is poured and prevents floating of the duct. Also, it prevents contamination of the concrete by dirt and sand.

Yet another object of the invention resides in the sequence of steps following in the practising of the novel method of forming the encasing concrete shells about the ducts.

Further objects and advantages of the present invention reside in the various elements employed for the formation of the concrete forms and in the method of their application to the ducts and in their mode of use.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings wherein:

FIG. 1 is a vertical cross-section of a portion of a residential floor showing an air duct that has been encased in concrete in accordance with the teachings of the present invention.

FIG. 2 is a perspective view of a duct with wrap around form applied thereto.

FIGS. 3, 4 and 5 are cross-sectional views illustrating progressive steps in the assembly of parts to form the wrap around form, the securing of the form, and the filling of the form with concrete.

FIG. 6 is a perspective view of a modification of the duct construction using an insulating material applied about the duct and held by the spacers.

FIG. 7 is a cross-sectional view showing another modification of the duct employing insulating blocks.

Referring more in detail to the drawings.

Preparatory to the laying of the present duct in a residential building operation, the earth floor surface is prepared, and a trench is formed therein to receive it and its encasing material. After the trench has been formed to a required depth and length, a gravel base is laid therein and brought to a predetermined level. These preparatory steps have been illustrated in FIG. 3 wherein the earth base or floor is designated at **10**, the trench as formed therein to receive the duct is designated by reference character **11** and the gravel base as applied in the trench is designated by reference numeral **12**.

After the gravel base has been properly prepared, large, flexible, light weight sheets **13** of material, effective as moisture barriers, are laid across the trench and pressed downwardly thereinto against the gravel bed. These sheets are applied to the full length of the duct with their opposite edge portions overlapping the earth shoulders along opposite edges of the trench to a substantial extent, as been illustrated in FIG. 3. These moisture resisting sheets **13** may be of any suitable material such as, for example, impregnated paper.

After the barrier sheets **13** have been thus positioned in and across the trench, tie wires **15** of a predetermined length and laid transverse of and across the trench at predetermined intervals therealong, at a spacing of about from two to three feet and these wires are pressed down against the barrier sheet with their opposite ends extended to opposite sides of the trench. Then, the present form defining strips or plys **16** of sheet material are laid in their normal troughed form, lengthwise in the trench, over the moisture barrier sheets **13** and across the tie wires **15**. The plys **16**, as thus placed form a continuous, open trough for the reception therein of the duct, equipped with spacers as presently will be explained.

The strips **16** are preferably single plys of fir, hemlock or other wood cut to a uniform thickness of from one-tenth to one-fifth of an inch. Preferably, they are made in eight foot lengths for easy handling and in widths that will best suit the sizes of ducts with which they are to be used. The method of cutting the plys, that is, by use of a rotary lathe, causes them to have a natural tendency to assume a cylindrical or troughed form which facilitates their use in the intended manner. This trough may be made of other suitable material, such as fiber board.

With the trench so formed, the gravel bed applied thereto, and the moisture barrier sheets, tie wires and form defining plys **16** placed in position as above described, they assume a relationship corresponding to their showing in FIG. 3 wherein it will be noted that the thin wood plys **16** provide an open trough of substantially semi-cylindrical form, and of sufficient width that the duct, as prepared for its particular use, can be easily laid therein.

The ducts **18** used in the present instance may be made in various diameters, ranging from two inches to twenty four inches, and they may be in various lengths. They are generally made of prepared fiber, but may be of light weight metal sheets.

To prepare a duct **18** for use in accordance with the present invention, spreaders or spacers **20** are applied circumferentially thereabout at predetermined intervals therealong. Each spacer or spreader comprises an elongated, uniform spiral wire coil. The coils are about two

inches in diameter and of such length that when applied about a duct it extends approximately three-fourths of the distance around it. These wire coil spreaders **20** are drawn across the bottom and upwardly along the opposite sides of the duct, and each is secured in place by joining the opposite ends of the wires from which it is formed, across the top of the duct; such joining of wires being as indicated at **22**. After the duct has been thus equipped with spreaders **20**, it is laid in the trench within the troughed form as provided by the wood plys **16**, as has been illustrated in FIG. 4.

A wooden plank **25** is then set on edge, lengthwise of and upon the top of the duct. Then, opposite ends of the tie wires **15** are brought together as at **26**, across the top edge of the plank **25** after the wires have been drawn so taut as to cause the form defining plywood sheets **16** to be formed cylindrically about the duct and tightly against the spreaders **20** to about three-fourths its circumference, leaving the arc across the top of the duct open, and thus providing an opening for the filling of the space between duct and form with concrete. The plank **25** causes the wires to lead in an upwardly direction and not directly across the top of the duct so as to close or reduce the size of the opening between the duct and the spaced form. Also the plank provides a convenient means for attaching guy wires and the like to hold the duct in position in the trench.

With the form defining plys thus secured, the ends of the moisture barrier strips are laid in overlapped relationship across the top edge of the plank **25**, and the trench is filled with gravel along opposite sides and bottom of the duct, as shown at **28** in FIG. 5. The gravel bed **30** is also formed on the ground surface up to the level of the bottom of the floor slab that will subsequently be laid over the duct. After the gravel has thus been filled in, the edge portions of the moisture barrier sheet are folded back to opposite sides of the duct, and concrete is filled in the space between the form defining plys **16** and the duct, as established by the interposed coils or spreaders **20**. After this concrete sets, the plank **25** is removed, the wires bent down against the duct, and the floor slab is laid to the desired thickness on the gravel bed **30**, thus completing the enclosing of the duct in concrete.

In FIG. 6, I have illustrated a modification wherein the duct **18** is wrapped with a heat insulating blanket of padding **40** which is held in place by the application of the spreader or spacer coils **20** thereabout. This is then enclosed by a insulating sheet of material **41** secured by tie wires **42**. The laying of this duct in the trench is on the same manner as previously explained.

In FIG. 7, I show still another modification of construction wherein the duct **18** is laid adjacent a footing **45** and foundation **46**. In this disposition of the duct, it is first prepared with the wire coil spacers **20** as previously explained, and about these heat insulating barrier strips **48** are arranged lengthwise to provide an insulating shell; these strips being drawn into place about the duct and secured by the tie wires **15** applied thereabout as previously explained. It is desirable also that suitable insulating and moisture barrier strips **49** be placed along the foundation and footing as shown. Gravel and concrete are applied in the placing of this duct in the manner as previously explained.

By following the mode of construction as described in the foregoing, the duct is effectively insulated and protectively enclosed in concrete but by use of a material lesser amount than by methods currently being followed. Therefore, at lesser expense but without any lessening of effectiveness.

Where I claim is:

1. The method of installing a duct of the character described comprising providing an earth trench of greater width than the duct and of a depth approximately equal to the diameter of the duct, placing a gravel bed in the bottom of the trench, assembling a duct and a spaced wrapper about the duct including applying and securing spacers about the duct at spaced intervals therealong, applying a flexible form defining sheet wrapper about the duct and spacers in such manner as to leave an opening only along the top of the duct into the space provided between the duct and wrapper, applying securing ties about the duct and wrapper, placing the duct as thus equipped with wrapper in the trench on said gravel bed, filling the trench at the outside of the duct wrapper with gravel and laying a gravel bed on the earth along opposite sides of the trench, filling the space between duct and wrapper as established by said spacers, with concrete and finally forming a concrete slab over the duct and trench integral with the concrete that fills the space between duct and wrapper.

2. The method of installing a duct of the character described comprising providing an earth trench of greater width than the duct and of a depth at least equal to the diameter of the duct, placing a water-pervious material bed in the bottom of the trench, effecting the disposition of an assembled duct and spaced wrapper about the duct within the trench upon the bed, including the steps of applying and securing spacers about the duct at spaced intervals therealong, applying a flexible form defining sheet wrapper about the spacers and duct in such a manner as to leave an opening only along the top of the duct into the space provided between the duct and wrapper, applying securing ties about the wrapper for retaining the wrapper against said spacers, filling the trench outside of said wrapper with a water-pervious material so as to leave access to said opening and laying a bed of water-pervious material on the earth along opposite sides of the trench, introducing concrete through said opening so as to fill the space between said duct and wrapper as established by said spacers with concrete, and forming a concrete slab over the duct and trench and in contact with the concrete that fills the space between said duct and wrapper.

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