June 4, 1935. M. CRAIGHEAD 2,003,580

UNDERGROUND CONDUIT CONSTRUCTION

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Fig. 1.

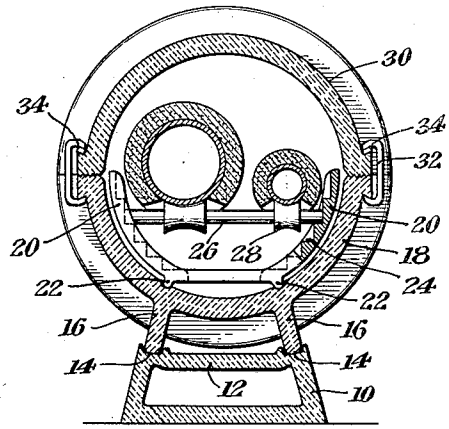


Fig. 2.

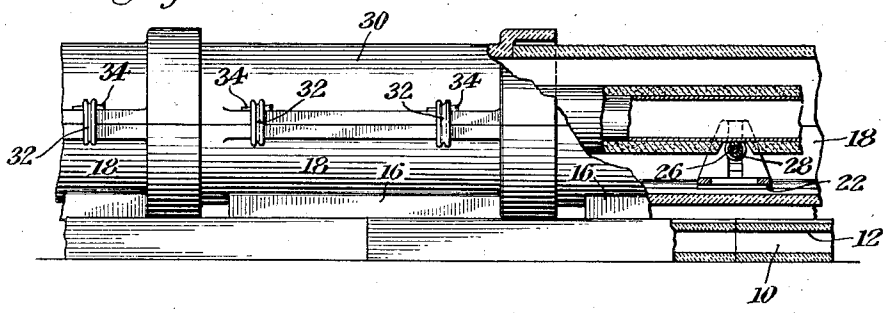


Fig. 4.

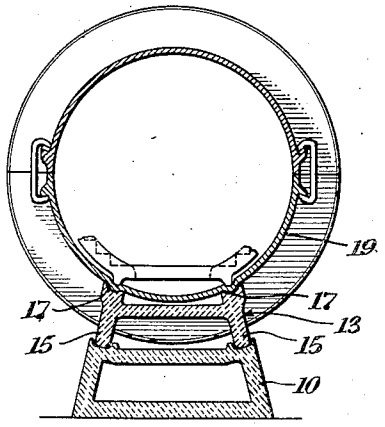
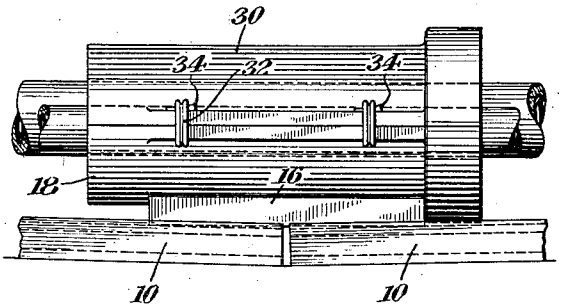


Fig. 3.



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Fig. 5.

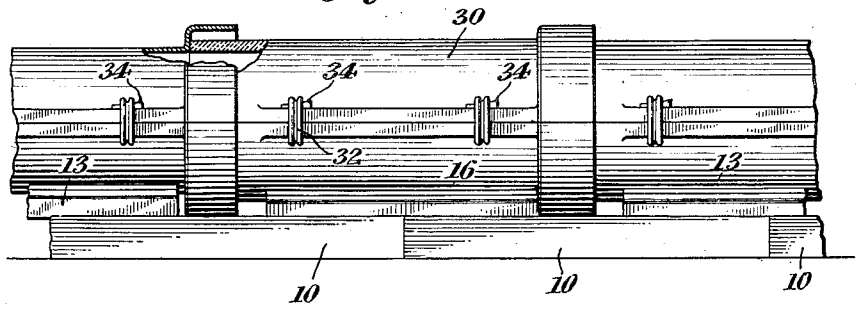


Fig. 6.

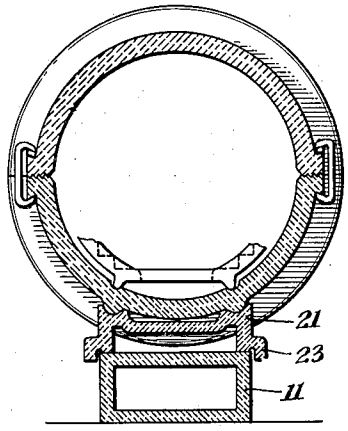


Fig. 7.

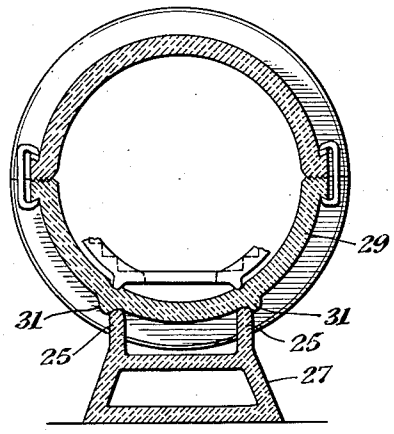
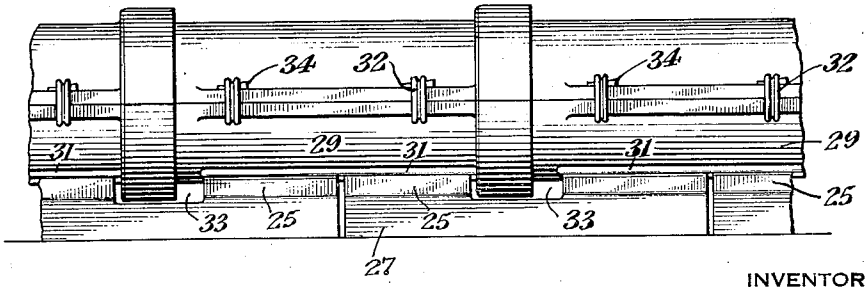


Fig. 8.



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Patented June 4, 1935 2,003,580

UNITED STATES PATENT OFFICE

2,003,580

UNDERGROUND CONDUIT CONSTRUCTION

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Application March 30, 1933, Serial No. 663,569

4 Claims. (Cl. 137—75)

This invention relates to underground conduit constructions of the type used for enclosing steam pipes and the like. Ordinarily such conduit systems include a bottom tile or underdrain to take away water collections, and above this is positioned the conduit proper. Such conduit ordinarily is made of vitreous ware (though sometimes made of metal) with bell and spigot connections, but instead of being made in the form of full circular pipes, ordinarily is installed as half sections. The steam pipes are positioned in the conduit sections, and in order to hold them in proper place, a support ordinarily called a "roll frame", is used. As the steam pipes impose a considerable load which would tend to break the vitreous conduit sections, it has heretofore been thought desirable in many instances so to arrange the pipe supports or roll frames that they extend through the bottom of the conduit and transmit the weight of the steam pipes to some form of external support, which might be the underdrain. In order to carry the roll frame to the exterior, it follows as a matter of course that the conduit sections must be perforated, which is objectionable in that it tends to permit moisture to enter the conduit and also may act as a conductor of electric currents which may have an injurious effect on the steam pipes, particularly in the summer time when unused heating lines are apt to become very damp and electrolytic action may occur. Ordinarily where such external type of roll frame is used, the conduit sections are perforated intermediate their ends and the external portion of the roll frame is brought down to rest on the underdrain at a junction point between the sections of the underdrain. Since the conduit sections are now made to rest directly on the underdrain, the latter must be cut away to provide space for the bell ends, and as these openings will come intermediate the ends of the underdrain sections, it is necessary that the underdrain tiles must either be made and laid with great accuracy or (as is ordinarily the case) they must be laid sufficiently far apart so as to allow some longitudinal flexibility in positioning them relative to the bells.

My invention relates to a system of this general type which is of great strength and stability, which can be manufactured efficiently, and can be installed quite simply and inexpensively while overcoming some of the difficulties of the types heretofore in use. In carrying out my invention, I do away with the use of external roll frame supports and keep these supports entirely within the conduit, but at the same time I provide for the thrust of these supports and take care of the flanges or bells of the conduit proper by a single expedient; this consists in providing support members between the conduit and the underdrain which will hold the conduit above the underdrain far enough so that the bells clear the underdrain, and so arrange these support members that they are held positioned directly in line with the thrust of the internal roll frames. In this way the weight of the steam pipes is transmitted through the conduit walls without exerting any undue strain on these walls and without the necessity of perforating them, so that substantially I obtain the full strength of an external roll frame support but without its necessary and inherent drawbacks.

The support members which are positioned between the underdrain and conduit shell may be made as separate sectional units or they may be formed integral with the conduit sections; as a third alternative, which is somewhat less desirable, they may be made integral with the underdrain sections. In any case, some means is provided such as notches or flanges on the cooperating parts so that the support members will be held in a proper predetermined position and this position is so arranged that when the roll frames are put in place in the conduit sections, the roll frames also will be held so that their thrust is in line with the support members.

My invention can readily be understood by reference to the accompanying drawings in which Fig. 1 is a sectional view of a form of device in which the support members are made integral with the lower conduit sections; Fig. 2 is a side view with a part broken away showing the construction of Fig. 1; Fig. 3 is a side view of one section of conduit showing what occurs when the underdrain is not laid quite true. In Fig. 4 I show a view similar to Fig. 1 (but with the roll frame and pipes omitted) but in this case the support members are separable from the conduit, and also in this figure the conduit is shown as made of metal. Fig. 5 is a side view of a construction shown in Fig. 4 with a part broken away to indicate that metal and vitreous conduit sections can readily be used in a single system. Fig. 6 is a detailed sectional view showing a different shaped underdrain and support member from that shown in Fig. 4. Fig. 7 is a section similar to Fig. 4 showing the support members made integral with the undertile, and Fig. 8 is a side view of this construction.

In Fig. 1 the underdrain 10 is formed with its sides converging toward the top 12, and substan-

tially directly above the sides are formed notches 14 which receive the support legs 16. In this case these legs constitute the "support member" but are made integral with the lower conduit section 18. The roll frame 20 is provided with ribs 22 which are received by notches formed in the conduit section 18 opposite the legs 16. This roll frame is provided with stepped notches 24 to receive the axle bars 26 which are provided with rollers 28 to carry the steam pipes. The top half of the conduit is designated by the numeral 30 and these two halves may be held together in some appropriate way as for example by the clamps 32 and wedges 34, or simply may be held by the weight of the backfilled earth.

With this form of construction the underdrain 10 is first laid in place in the trench in the usual manner preferably with a fill of broken stone on each side. The underdrain is laid without regard to the longitudinal position where the conduit sections will come, but generally it is best roughly to position the underdrain so as to break joints with the conduit sections. The underdrain sections preferably are laid with their ends quite close together so that they can receive seepage but will not have large enough openings to endanger washouts under the underdrain, resulting from large flow of water in the underdrain. As shown in Figs. 2 and 3, the support members or legs 16 extend along the conduit sections for less than their entire length, leaving ample room for the bell of one section to surround the spigot of another, and for the joint to be properly packed with cement or a bituminous compound in the customary manner, by trowelling or by the use of a joint runner. These legs or support members are made of such depth that bells of the conduit sections are kept above the top 12 of the underdrain so that there will be no strain on the bell sections and it will not be necessary to cut away the top of the underdrain sections. If by chance a conduit section is misplaced relative to the underdrain and the legs 16 do not rest in the notches 14, the conduit section will tip over far enough to make this immediately apparent and the parts will immediately be positioned properly. This cooperation of the legs 16 with the notches 14 ordinarily will keep the conduit sections properly aligned while the roll frames and steam pipes are being put in place and ordinarily it will not be necessary to cement these bottom sections together (as heretofore has been customary) in order to provide the necessary stability to permit the installation of the steam pipes without disturbance of the conduit. The roll frames are put in place in the conduit sections with the ribs 22 positioned in their appropriate notches so that the thrust of these supports runs directly through the sides of the conduit sections to the legs 16, thence through the sides of the underdrain 10 to the ground. The steam pipes are installed in the usual manner with appropriate insulation which, as is understood in the art, may be either a direct insulation around the individual pipes as here indicated, or may be in the form of a filling for the conduit sections. If during the installation of the roll frames and steam pipes, any of the bottom conduit sections have become misplaced, this will be immediately apparent, as the legs 16 will either rest in their notches or the section will be tipped at a substantial angle so that the need of adjustment is seen. When the steam pipes are in place and the proper positioning of the bottom conduit sections has been checked up, the cover members 30 are put on and may be fastened down to the lower sections as by the clamps 32 and wedges 34. Any appropriate form of cement is placed between the halves of the conduit as is understood in the art. After the cover sections of the conduit are put in place, the bell and spigot joints between the sections can be closed each as an entire unit by the use of a joint runner which makes a far more efficient closure than cementing up the bottom halves as one operation and later sealing the top halves. Actually, experience shows that where the bottom halves of the conduit sections are cemented together before the steam pipes are installed, there is a serious danger of these joints being broken during installation operations and such breaks may not be discovered. On the other hand, where sealing of the joints is done as a final operation, there is very little danger of the joints being broken.

With the form of construction here described, it will be seen that the weight of the steam pipes is transmitted in such a way that no strain is exerted on the conduit shell tending to break the same and that if for any reason any of the parts have been misplaced, this will be immediately apparent so that the same can be rectified before the installation is complete. At the same time, the necessity of perforating the conduit is done away with and the whole conduit can be sealed tightly against moisture, and the vitreous sections will act as an insulator to eliminate electrical action which (as stated above) may occur where metallic roll frames are carried through the conduit casing to the ground. In the form of device shown in Figs. 1, 2 and 3, the support legs 16 actually serve to strengthen the conduit sections and eliminate localized pressure that might result where the underdrains are at angle relative to each other. This is shown in Fig. 3 where the underdrain sections 10 are indicated at an exaggerated angle. In this case supports or legs 16 will contact with the underdrain at their ends, but due to their shape these supports will have adequate strength to distribute the strains throughout substantially the entire length of the corresponding conduit section.

In Fig. 4 the undredrain 10 is similar to the underdrain 10 of Fig. 1 but in this case a separate member 13 is provided having legs 15 and notches 17 which receive corresponding projections formed in the bottom conduit section 19. In this case the conduit section is shown as made of metal, but it may also, of course, be made of vitreous material as in the other figures. Where metal and vitreous conduit sections are to be used together (as indicated in Fig. 5) it is advisable that the internal diameters of the two be kept constant. The variation of the external diameter can readily be taken care of by the length of legs 15.

In Fig. 6, the underdrain 11 is similar to underdrain 10 but is rectangular in cross section so that ordinary flue lining may be used. In this case the support member 21 is provided with flanges 23 extending over the sides of the underdrain.

Fig. 7 illustrates a case where the support members 25 are made integral with the underdrain 27 and the bottom half of the conduit 29 is provided with projections 31 to align with the support members 25. In this case they are shown as coming outside of the support members though obviously they may be made to come between the support members, and in such instance only one broad projection is necessary. In any event,

these should be so positioned that the notches for the roll frames will come opposite the support members. This form of construction has many of the advantages of the preferred forms of Figs. 1 and 4 but has the drawback that the underdrain sections must be positioned accurately to receive the bells of the conduits as illustrated in Fig. 8. It is preferable to have the bells of the conduit come intermediate the ends of the underdrain tiles and so the support members are cut away to receive the bells as shown at **33**. It will be noted that in any event the support members **25** preferably are high enough to keep the bells above the underdrain proper so that no perforation of the upper wall of the underdrain is needed.

In all of the forms described, it will be noted that means is supplied to create a direct thrust from the conduit sections through the support members and sides of the underdrain to the ground, and the notches or other means used to position the roll frame supports are so located on the inside of the conduit sections that the weight of the steam pipes is transmitted to and carried by this column-like arrangement. Since the various sections of underdrain, supports and conduit ordinarily will be made from uniform sets of extrusion dies, or molds, it follows that if the underdrain sections are laid in proper alignment, the conduit sections will all be aligned both angularly and vertically, with the result that when the roll frames are inserted in the places provided for them, they also will be properly aligned.

While I have shown a number of modifications of my invention, it is to be understood that these are given only by way of illustration and further forms and embodiments may be used without departing from the spirit of my invention.

What I claim is:

1. A series of conduit sections, a series of underdrain sections, roll frame supports adapted to fit inside the conduit sections, support members adapted to support the conduit sections upon and over the underdrain sections, and means carried by the conduit sections for positioning and carrying the roll frame supports in predetermined angular relation relative to the conduit sections so that their pressure is exerted substantially in line with said support members and is thereby transmitted substantially directly to the underdrain sections.

2. In a conduit construction, a series of underdrain sections, a series of support members separable from and resting on said underdrain sections, a conduit comprising top sections, and a series of approximately semi-circular lower sections carried by said support members and so connected with said support members that said conduit sections are located in predetermined angular relation to said underdrain sections, a series of roll frames fitting within said conduit sections, and means whereby said roll frames are held in predetermined angular relation relative to said conduit sections and thereby are held in predetermined angular relation relative to said underdrain sections.

3. A construction as specified in claim 2, in which the conduit sections are made with bell and spigot connections and in which the support members are made integral with the conduit sections and are of sufficient depth to support the conduit sections with their bells above the underdrain sections.

4. A construction as specified in claim 2, in which the lower conduit sections are provided with internal grooves to receive and position the roll frames and with external ridges substantially opposite said grooves to position said conduit sections relative to said underdrain sections.

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