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M. H. GYSLING

2,081,867

STEAM MAIN CONSTRUCTION

Filed June 8, 1935

2 Sheets-Sheet 1

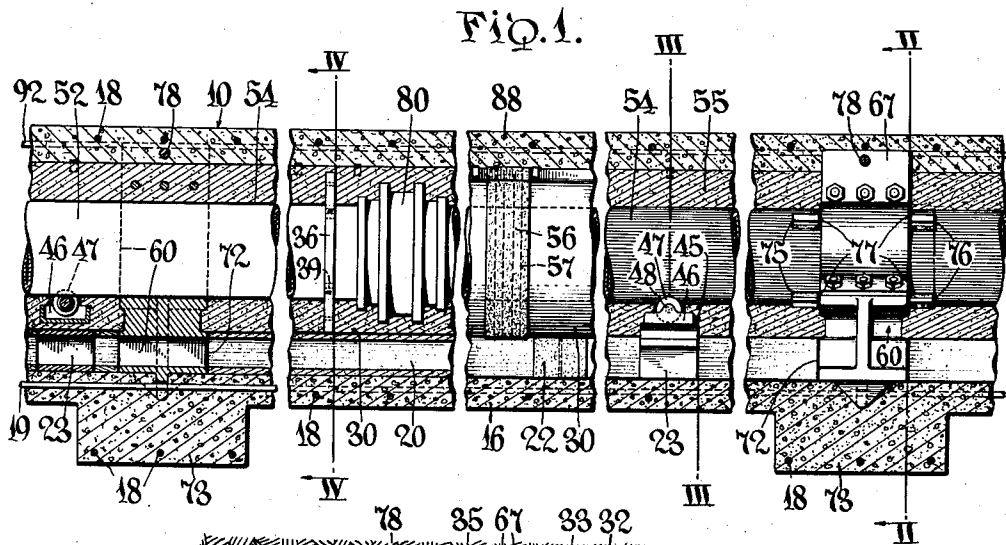
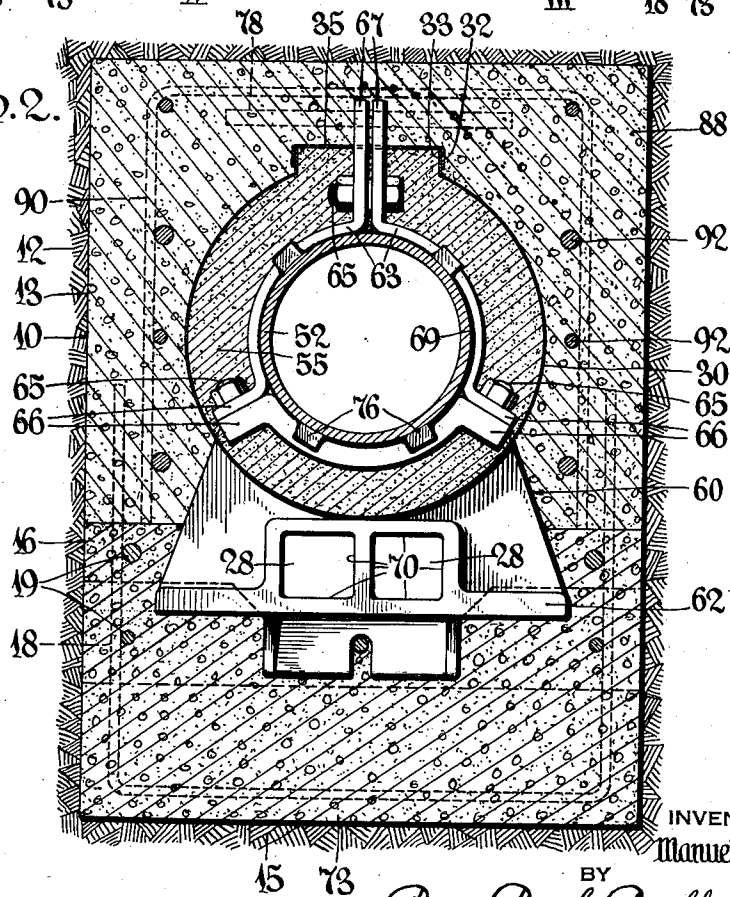


FIG. 2.



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FIG. 3.

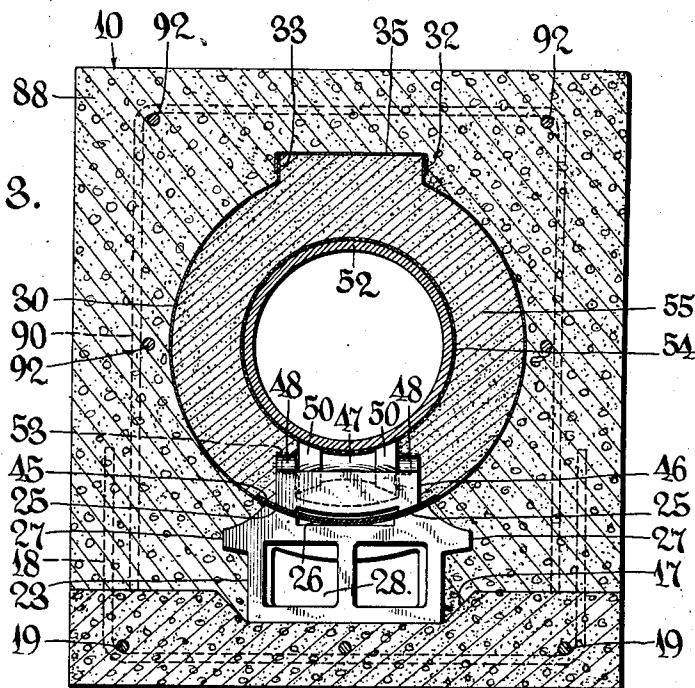
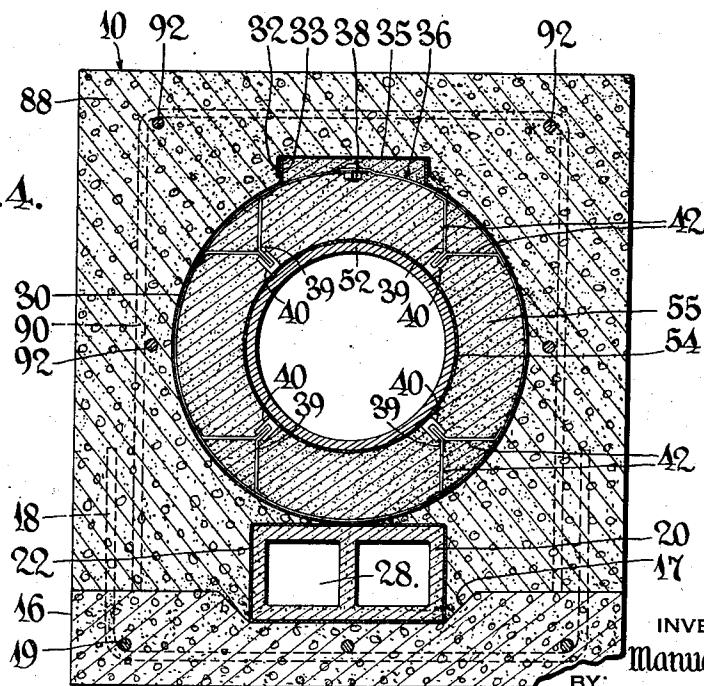


FIG. 4.



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STEAM MAIN CONSTRUCTION

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8 Claims. (Cl. 138—48)

This invention relates to fluid conveying conduits and it has particular relation to steam main construction for underground installation.

One object of the invention is to provide an improved unitary steam main construction which is self-draining and in which the steam main proper is completely insulated.

Another object of the invention is to provide an improved arrangement for mounting and insulating a steam main in a surrounding body of masonry, or like material.

Another object of the invention is to improve the manner of arrangement of structural elements of a steam main so as to insure immediate dissipation therefrom of any moisture resulting from either seepage or condensation, and at the same time, insuring efficient heat insulation of the steam carrying pipe of the construction.

In constructing steam mains of the type previously known, it has been customary to dig a trench of considerable size and then to provide drainage tiles in connection with gravel, or the like, arranged in the bottom of the trench before the main was laid. This preliminary drainage structure was for the purpose of preventing water from settling around or seeping into the main construction. While this kind of arrangement functioned satisfactorily to a certain extent, it involved considerable extra work and expense in laying gravel and tiles as a base for the main, and in the event moisture seeped, or otherwise found its way, into the structure about the steam main, such moisture was injurious to the structural elements of the main, as well as adversely affecting efficiency of the construction.

One of the principal advantages of this invention resides in the control of moisture and protection of the heat insulating features of the main construction against adverse effects of the moisture. The surrounding tile drainage and gravel is not required because the main is constructed as a self-contained unit, including a cellular pipe insulating body surrounded or embedded in masonry, and regardless of whether water or other moisture settles around the construction, or even seeps into it, the self-draining features are always ready to carry such moisture away immediately, and before it can injure or adversely affect the efficiency of the structure as a whole. This is also true with respect to water of condensation that may occur around the steam pipe. The invention is also concerned with the novel arrangement of ele-

ments employed in effecting the improvements.

Referring to the drawings:

Fig. 1 is a side view of a steam main construction, partially in elevation and partially in longitudinal section;

Fig. 2 is a cross section, on a larger scale, taken substantially along the line II—II of Fig. 1;

Fig. 3 is a cross section, on a larger scale, taken substantially along the line III—III of Fig. 1; and

Fig. 4 is a cross section, on a larger scale, taken substantially along the line IV—IV of Fig. 1.

In practicing the invention a steam main construction 10 is provided as a unit to be laid underground in earth 12 which, in certain instances, is sufficiently firm to provide form walls 13 and bottom 15, or such walls can be formed of boards, or other suitable material.

A base or slab 16 of masonry, such as concrete extending longitudinally of the main is provided with a central longitudinal depression or shallow channel 17 and has spaced upright U-shaped reinforcing rods 18 embedded therein, together with other spaced longitudinal reinforcing rods 19 also similarly embedded. The upper ends of the U-shaped rods extend upwardly beyond the surface of the base 16. A draining conduit 20 of terra cotta, tile, or other suitable material, is disposed longitudinally in the channel 17 of the base and is covered with a protective material 22, such as felt, or the like. Sectional portions at spaced intervals along the conduit 20 are in the form of metal supports 23, each having lateral anchoring flanges 27 and upper arcuate seating surfaces 25 separated by an upper central shallow channel 26. All of the sections of the conduit register to provide continuous longitudinal draining openings 28.

A tubular jacket 30 composed of sheet metal, or other suitable material, rests upon the seats 25 of the spaced supports 23, and in all other locations upon the draining conduit 20, and has upwardly extending flanges 32 providing an upper longitudinal opening 33. The material of the jacket 30 is of such nature that the flanges 32 can be spread apart or drawn closer together to provide for fitting of a metal cover 35 thereon to close the opening 33 between the flanges 32, or the jacket 30 can be left open and the elements 35 can be in the form of straps to prevent the flanges 32 from spreading.

A series of spacers 36 are mounted inside the jacket and include rings 37, each of which has a

rivet or bolt 38 for securing its overlapping ends, and each ring is also provided with a series of brackets 39 welded or otherwise secured to the inner wall of the ring. Inner extremities of the brackets are provided with blocks 40 of wood, or other suitable heat insulating material, arranged at substantially equal radial distances from the center of the jacket, or they may be so arranged as to locate the metal jacket in eccentric position in relation to a pipe or main 52 disposed therein, in order to provide, if so desired, space for a greater amount of insulation along the top, bottom or side of the pipe. Converging legs 42 of each bracket are composed of strips of material that can spring or yield slightly in response to pressure applied thereto radially of the jacket.

A sheet of insulating material 45, such as an asbestos mat, is disposed at the inside bottom of the jacket 30 in registering relation to the support 23, and a guide 46 having bearing means, such as a transverse cradle roller 47 journaled therein, as indicated at 48, is positioned upon the mat. Each roller 47 is provided with substantially conical end sections 50 for receiving the lower curved surface of the steam or hot water main or other similar conduit 52 partially supported thereon and extending substantially coaxially of the jacket 30 in inwardly spaced relation thereto.

Incidental to the installation of each guide 46, together with its roller 47, it is encased in a block of paraffin 53, or other material which will melt upon the application of heat transmitted ordinarily in hot water or steam mains. If desired, a mould can be provided for encasing the guide 46 in the paraffin before it is mounted in the jacket, or paraffin can be applied after the guide is placed in its normal operating position.

The steam main 52 is encased in a layer of yieldable and flexible corrugated material 54, such as paper or card board, which may or may not scorch and deteriorate as a result of the heat in the steam main. The heat insulating blocks 40 of the brackets 39 provide for proper spacing and centering of the jacket 30 about the steam main 52, and these blocks can contact, or even press slightly against the paper casing 54. In placing the main 52 in the jacket the flanges 32 of the latter can be spread apart sufficiently to receive the main or the main can be inserted axially into the jacket.

At this stage of the building of the steam main construction, a supply of plastic material 55 is poured into the jacket 30, which serves primarily as a form or mold, through the upper longitudinal opening 33 and is permitted to set or harden in surrounding relation about the steam main 52. This plastic material is of such nature as to be porous and light after it has set, and it can be formed of asbestos fibre, rock-wool, cellular concrete, or the like. This body of plastic material completely and closely surrounds the steam main but has clearance by virtue of the corrugated material 54 of such degree as not to interfere with the expansion or contraction of the conduit. The material 54 thus provides a yieldable spacer between the body of the insulating material and the metal of the steam main.

It is to be understood that the jacket 30 is constructed in sections and abutting end portions of the sections are covered with moisture-proof material 56, such as treated paper, that is pasted or otherwise secured over the section joints 57. If desirable, the spacers 36 can be installed adjacent the joints in the jacket sections.

At proper intervals sectional anchors 60 each having a lower anchor saddle 62 embedded in the concrete base 16, together with upper clamps 63, surround the steam main 52. The clamps are secured tightly around the steam main by means of bolts 65 secured through flanges 66 and 67 formed on the clamp sections.

A band of insulating material 69, such as asbestos paper or matting, spaces the embracing anchor surfaces from the steam main 52. The anchor saddle 62 is provided with conduit walls 70 forming a part of the conduit 20 thus insuring uninterrupted continuation of the drain openings 28 and the anchor 60 further provides for firm support of the steam main 52. The joints surrounding the anchor conduit portions are sealed, as indicated at 72, with material, such as roofing cement. The base 16 has a larger block portion 73 to accommodate the anchor 60.

The edges of the anchor 60 fit snugly between two circumferential sets 75 and 76 of metal blocks welded to the surface of the steam main 52 and insulated from the anchor 60 by means of insulating material 77, such as asbestos paper, or the like. The upper flanges 67 of the anchor 60 extend upwardly above the top of the jacket 30 and an anchoring rod 78 is disposed transversely there-through. These anchors 60 are installed at intervals along the steam main construction and rigidly hold the latter while expansion joints 80 installed in the steam pipe between the anchors compensate for expansion and contraction under varying conditions of heat. After the elements thus far described have been assembled, a body of masonry material 88, such as reinforced concrete, is poured into the form provided by the walls 13, which, as previously indicated, can be built of boards, or the like, or can be in the form of firm earth to mold the concrete in such manner as to be substantially uniform in cross section, wherein the elements of the structure are embedded. Reinforcing rods 90 and 92 similar to the previously described rods 18 and 19, respectively, complete the reinforced concrete body of the steam main structure. The overlapping rods 18 and 90 insure proper union between the base 16 and the remainder of the body of concrete, and the transverse rods 78 provide further rigid assembly of concrete and anchors 60.

When the steam main construction is connected for conveying steam the heat from the latter will melt the paraffin 53 surrounding the guide 46 and rollers 47, and the rollers will then be free to rotate in order to carry the main in its expanding and contracting motion. There is no interference with this motion by the embracing insulating body 55 of porous material because the corrugated paper 54 is yieldable and provides for proper spacing and for relative movement. Likewise, the asbestos insulating mat 45 prevents heat from being dissipated from the main 52 through the guides 46 and supports 23. In the event any moisture finds its way into the construction about the main 52, or jacket 30, or guides 23 or anchors 60, it will be drained out immediately through the conduit 20. Therefore, this self-contained unit provides for efficient protection of the main 60 by insulation and drainage, and regardless of the amount of moisture settling around the concrete body 16, 88 of the main, or that may seep into the structure, such moisture will be carried away in the conduit 20 while the steam main 60 remains adequately protected.

Although only one form of the invention has been shown and described in detail it will be ap-

parent to those skilled in the art that the invention is not so limited, but that various changes can be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. A steam main construction comprising a steam conduit, a body of porous insulating material surrounding the conduit, a yieldable filler separating the material from the conduit, means for effecting relative movement between the insulating material and the steam conduit in response to expansion and contraction of the latter, a draining conduit disposed longitudinally adjacent the steam conduit, and a body of masonry heavier than the porous material and having the porous material, steam conduit and means embedded therein to form a self-contained and self-draining unit.

2. A fluid main construction comprising a fluid conveying pipe, a jacket of sheet material having a longitudinal opening therein and substantially surrounding the pipe in spaced relation thereto, a cover for at least partially closing the opening, a body of insulating material disposed in the space between the jacket and the fluid conveying pipe, means for facilitating expansion and contraction of the fluid conveying pipe, a draining conduit disposed longitudinally adjacent the jacket, and a body of masonry surrounding said pipe, jacket, means and draining conduit.

3. An underground main comprising a body of reinforced masonry, a substantially tubular jacket of sheet material completely embedded in the masonry, a fluid pipe disposed inside the jacket in spaced relation thereto, a body of cellular insulating material substantially filling the jacket around the pipe, yieldable spacing members mounted between the inner wall of the jacket and the outer wall of the pipe for yieldably maintaining predetermined spaced relation between the jacket and pipe prior to the application of said body of insulating material filling the jacket around the pipe, draining conduits disposed below the jacket and embedded in the reinforced body of masonry, and means for facilitating expansion and contraction of the pipe.

4. An underground main construction comprising a body of reinforced masonry, a substantially tubular jacket of sheet material completely embedded in the masonry, a fluid pipe disposed inside the jacket in spaced relation thereto, a series of roller elements embedded in a substance readily fusible upon application of steam heat to the pipe and constituting bearing elements for the pipe, means for supporting the roller elements inside the masonry, and a drainage conduit embedded in the masonry adjacent the jacket.

5. An underground main construction comprising a body of reinforced masonry, a substantially tubular jacket of sheet material completely em-

bedded in the masonry, a pipe disposed inside the jacket in spaced relation thereto, a layer of flexible insulating material surrounding the pipe, a body of cellular material molded about the pipe and the insulating material inside the jacket, a series of roller members supported upon an insulating mat in the jacket for carrying the pipe and encased in material readily meltable in response to steam heat applied to the pipe, drainage conduit structure disposed longitudinally of the tubular jacket and embedded in the masonry, and insulating material surrounding the conduit structure.

6. A steam main system comprising a drain conduit structure for conveying moisture, a substantially tube-like jacket carried above the drain structure longitudinally thereof, a steam conveying pipe disposed centrally in the jacket and longitudinally thereof, cellular insulation molded in the jacket around the pipe, yieldable sheet material spacing the cellular insulation from the steam pipe and preventing the cellular insulation from contacting the pipe upon application of the insulation, a body of concrete completely surrounding the drain structure and jacket in molded relation, and supports in the concrete body and carrying the pipe for expansion and contraction in response to variations of temperature.

7. A steam main comprising a drain structure for freely conveying liquid, a substantially tube-like jacket carried adjacent the drain structure longitudinally thereof, a steam conveying conduit disposed centrally of the jacket and longitudinally thereof, a sheet of fibrous material surrounding the conduit and being deterioratable upon application of heat thereto, moisture-proof cellular insulation formed in molded relation inside the jacket around said sheet and conduit, bearing means supporting the conduit for expansion and contraction in response to variations in temperature, and a body of concrete completely surrounding the drain structure and jacket in contacting relation and providing a foundation for carrying the weight imposed upon said bearing means.

8. A fluid main construction comprising a fluid conveying pipe, a jacket of sheet material arranged in surrounding spaced relation to the pipe, a body of cellular insulating material disposed in molded relation in the space between the jacket and the fluid conveying pipe, said jacket having a lateral opening to receive therethrough the cellular material to be molded in the jacket about the pipe, means for facilitating expansion and contraction of the fluid conveying pipe in the molded body, a draining conduit disposed longitudinally adjacent the jacket; and a body of masonry surrounding said pipe, jacket, means and draining conduit.

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