

B. HOLLY.

TUNNEL FOR UNDERGROUND STREET MAINS.

No. 262,670.

Patented Aug. 15, 1882.

Fig 1.

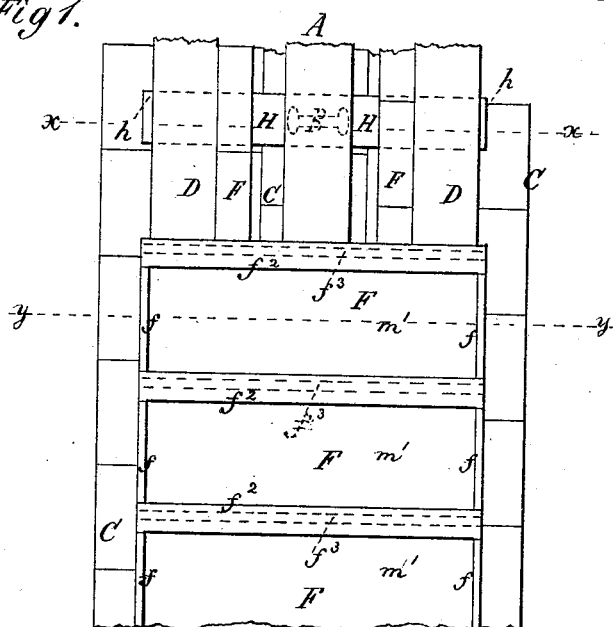


Fig 2.

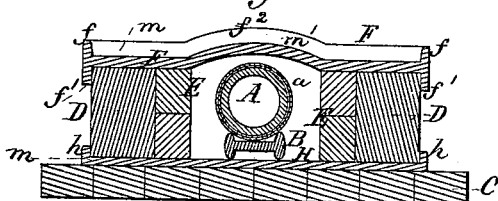
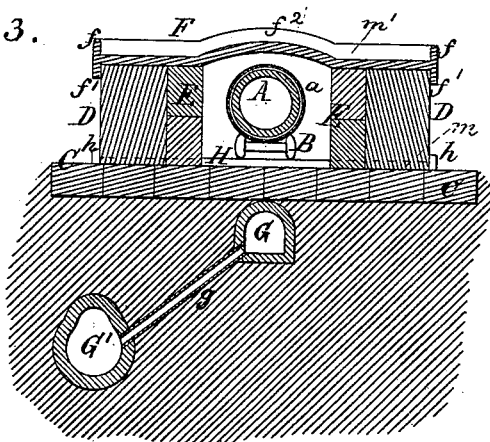


Fig 3.



Witnesses:

J. P. Theo. Lang.  
Robt. L. Fenwick

Inventor:

Berolide Holly  
by his atty.  
Wm. Fenwick & Lawrence

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Fig 6.

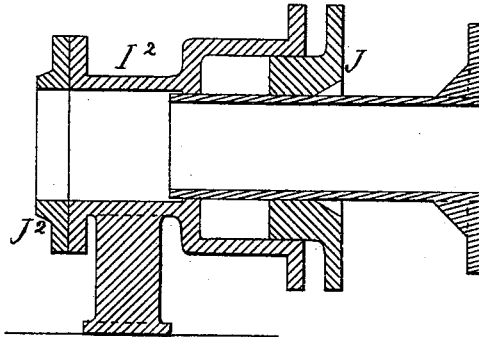


Fig 4.

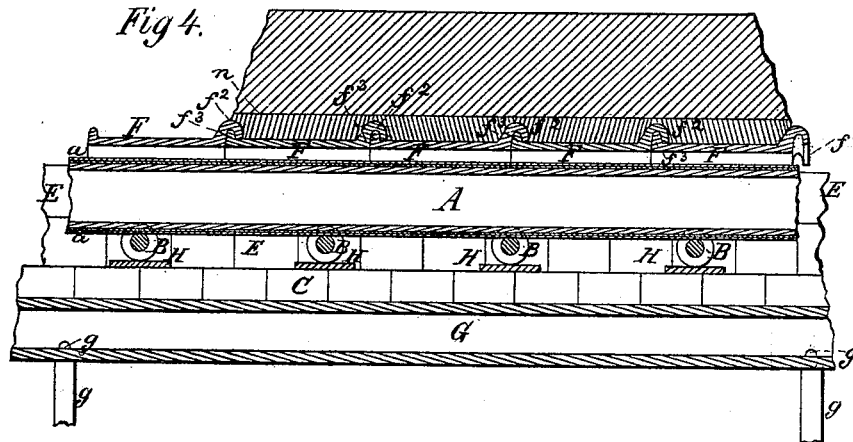
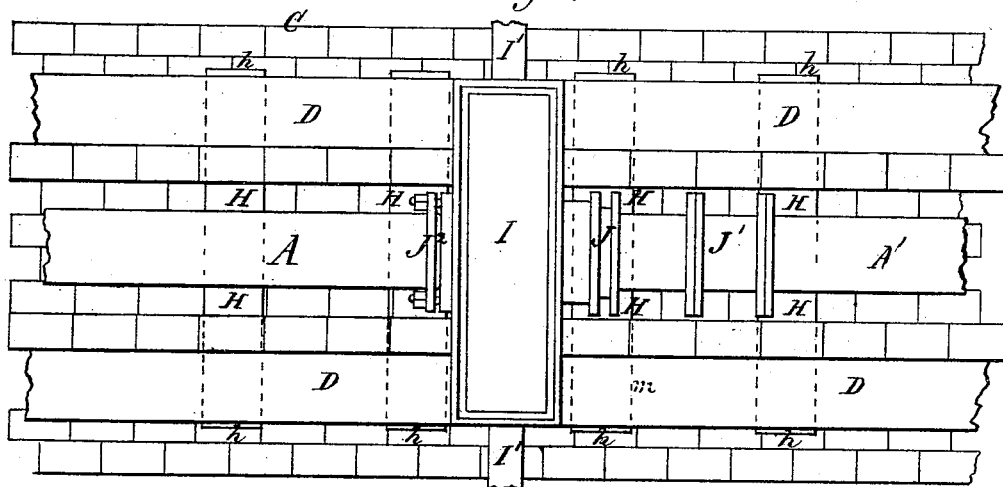


Fig 5.



Witnesses:

J. P. Thos. Lang.  
Robt. L. Fenwick

Inventor:

Birdie Holly  
by his atty.  
Mason, Daniels & Lawrence

# UNITED STATES PATENT OFFICE.

BIRDSILL HOLLY, OF LOCKPORT, NEW YORK.

## TUNNEL FOR UNDERGROUND STREET-MAINS.

SPECIFICATION forming part of Letters Patent No. 262,670, dated August 15, 1882.

Application filed October 31, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, BIRDSILL HOLLY, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented a new and useful Improvement in Underground Street-Mains for Steam Heating Systems, of which the following is a specification.

My invention relates to a means whereby the street-mains of a steam heating system are protected, insulated, and drained, and whereby the junction-boxes or junction service-boxes of such mains are permanently anchored and prevented from moving, while the sections of the mains are allowed freedom to expand and contract longitudinally; and the nature of my invention will be clearly understood from the following description and accompanying drawings, in the latter of which—

Figure 1 is a broken plan view of a portion of an underground street-main constructed and laid down in accordance with my invention. In this view a portion of the covering and protecting devices are left off in order to expose the main-pipe and other parts, and the dirt roadway is not shown in order that the sustaining and protecting plates or tiles may be seen. Fig. 2 is a vertical transverse section of Fig. 1 in the line *x x*. Fig. 3 is a vertical transverse section in the line *y y* of Fig. 1. Fig. 4 is a longitudinal section of Fig. 1. Fig. 5 is a plan view, illustrating my invention as when used in connection with a junction-box or junction service-box of street steam-mains. In this view all of the covering-plates are removed. Fig. 6 is a detail section of an expansion-joint anchored permanently, and which at intervals may be used with the pipes or mains at points between the junction or junction service-boxes of a street steam heating system.

In the aforesaid drawings, A is the street-main pipe; B, roller-supports for pipe A. Any other suitable supports may be adopted—for instance, such as stationary iron ribs cast on the plates H.

C is a porous brick bed or foundation.

H H are transverse iron plates fastened upon the foundation C, and having the roller-supports set upon them. These plates have respectively at each end a flange, *h*.

D D are strong scantlings or timbers, pref-

erably of rectangular form in transverse section. These are placed within the flanges *h h*, and they extend from one junction-box or junction service-box I to another junction-box or junction service-box similar to I. The junction-boxes are anchored in any suitable manner in the earth or cement in their proper position, and this anchored position is maintained against ordinary and extraordinary expansion of the mains A by means of the wooden timbers D D, these timbers forming abutments for these boxes when a force in a longitudinal direction comes upon them.

E E are soft-burned brick placed in form of narrow walls between the wooden timbers and the iron pipe. Between these walls of brick and the pipe is placed an insulating-packing of either mineral-wool, hair, asbestos, sawdust, tan-bark, or any other known suitable insulating material. This insulating substance is arranged loosely, so that the main-pipe A may move through it while expanding and contracting. On the main a wrapping, *a*, of abestus or other insulating material, may be placed so as to move with the pipe as it expands and contracts. The scantling or timbers D D are held from lateral movement by the brick walls E and the flanges *h*, and they are prevented from longitudinal movement by the plates H, said plates being fitted into transverse notches *m*, cut into the under surface of the timbers in such a manner that the timbers are prevented from moving longitudinally upon them.

The brick foundation C, walls E, and wooden timbers D form an inclosing insulating-chamber at bottom and sides of the pipe, and they also afford a firm support for a strong covering, upon which the dirt of the street or roadway rests, and by which it is sustained. The top covering consists of thin cast-iron or earthen or cement plates F, of an arching form between their ends. These plates have top flanges, *f*, and bottom flanges, *f'*, on their respective ends. They also have grooved or hooking flanges *f''* on one of their edges and a tongue or solid flange on the other. The grooved flange of one plate receives the tongue or solid flange of another plate; or the solid flange of one plate enters the grooved flange of another, as illustrated in Fig. 4 of the drawings. By thus uniting the plates they cannot

move sidewise upon one another, and water-joints are formed. The flat portions of the plates are placed upon the brick walls E and wooden timbers D, while the arched portion spans and stands over the chamber in which the main A is placed. The flanges  $f'$  of the plates extend down against the sides of the timbers D, and thus hold the plates from moving lengthwise of themselves or transversely of the main. The flanges  $f' f^2$  form a chamber or cavity on top of the plates, and this is filled with cement, and above the flanges, as well as over the plates, a bed of cement,  $n$ , is placed, as shown in Fig. 4. The covering, by being constructed as described, will insulate the main pipe at its upper side, and by its arched form, together with the firm foundation upon which it is placed, it affords a firm support for the earth forming the roadway or street. This covering also serves to conduct off or prevent surface-water entering into the chamber where the street-main A is placed. The material  $n$ , which is placed between the earth and the plates, is made of water-lime cement, which will exclude the surface-water from contact with the plates. Beneath the porous brick foundation C tile G are placed, and these tile lead by smaller tile  $g$  into the city sewer  $G'$ , as shown, or into any other place, as deemed best. The foundation C and the tile being porous, any water about the main A finds its way into the tile and off into the ground or into the sewer.

The scantling or timbers D serve a three-fold purpose—viz., holding the junction-box or junction service-box from moving with the steam-main while it is expanding and contracting longitudinally, sustaining the brick walls E, and supporting the covering F; and the advantage of using the plates F, which tongue and groove with one another, is that tight joints may be formed, and when necessary the covering may be conveniently removed in sections for the purpose of repairing the mains.

In Fig. 5 of the drawings I have shown a junction service-box, I, with service outlets or pipes  $I'$ , similar to the one shown in Letters Patent of the United States, No. 193,086, heretofore granted to me. This box is shown provided with an expansion-joint,  $J^2$ , an accommodation-joint, J, and a removable section,  $J'$ , same as in said patent; and against the outer walls of the box the timbers D D are represented as abutting snugly.

In Fig. 6 I have shown a stationary connec-

tion,  $I^2$ , which is provided with an expansion-joint, J, and accommodating connection  $J^2$ . This connection may be used at points between sections of pipe which are connected to sections extending out from the junction or junction service-boxes, or at any point along the main A found desirable.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with underground steam street-mains, of the foundation C, walls E, plates H, timbers D D, junction-boxes, as I, and plates F, this combination being such that while the mains can expand and contract longitudinally the junction-boxes are held immovable, and also such that the mains are properly insulated by suitable materials, while water is excluded by a suitable substance applied upon the covering-plates F, substantially as and for the purpose described.

2. The plates F, made with grooved flanges, solid tongues, and end flanges, in combination with the timbers D, substantially as and for the purpose described.

3. The combination, with underground steam-mains, of supports B, plates H, junction-boxes, as I, and timbers D, substantially as and for the purpose described.

4. The combination, with underground steam street-mains, junction-boxes, as I, and timbers D, of the flanged plates  $F f'$ , substantially as and for the purpose described.

5. The combination, with underground steam street-mains, junction-boxes, as I, and timbers D, of the plates F, having flanges  $f f^2$ , which form chambers for cement, substantially as and for the purpose described.

6. The porous brick walls E and foundation C, in combination with the tile G, substantially as described.

7. The combination of the main A, walls E, timbers D, covering F, foundation C, tile G, pipe  $g$ , and sewer or other receptacle,  $G'$ , substantially as and for the purpose described.

8. A street steam-main inclosed and insulated substantially as described and having its cover F made of plates jointed together and removable in sections, and which sustains the weight of the earth of the roadway or street at a point above the steam-main, and which also excludes the water from the main, substantially as described.

BIRDSILL HOLLY.

Witnesses:

ISAAC H. BABCOCK,  
WM. D. HALL.