(No Model.) 2 Sheets—Sheet 1.

H. A. CHASE.

UNDERGROUND TELEGRAPH LINE.

No. 306,057. Patented Oct. 7, 1884.

Fig. 1.

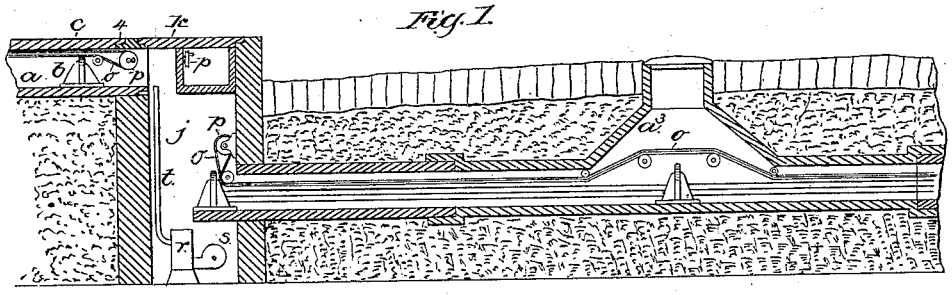


Fig. 2.

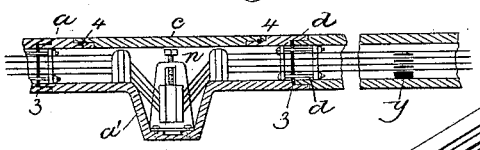


Fig. 3.

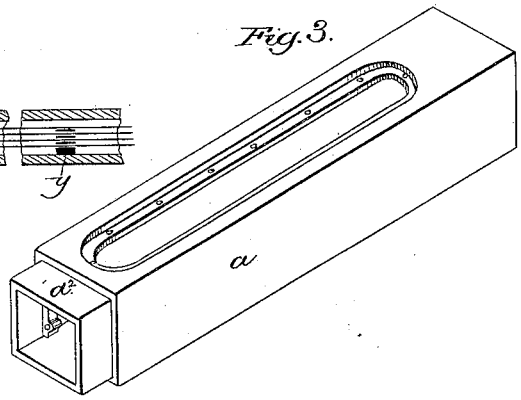
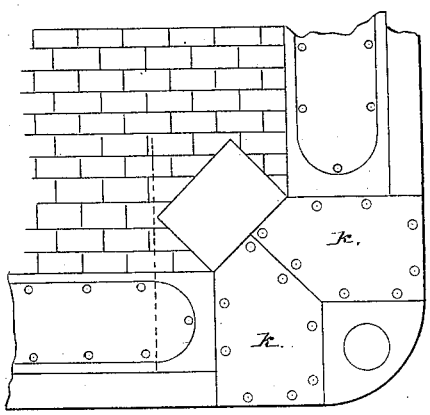


Fig. 4.



Witnesses.
John F. C. Reinkert
F. A. Kelley

Inventor.
Henry A. Chase.
by Crosby & Gregory Att'ys.

(No Model.) 2 Sheets—Sheet 2.

H. A. CHASE.

UNDERGROUND TELEGRAPH LINE.

No. 306,057. Patented Oct. 7, 1884.

Fig. 5.

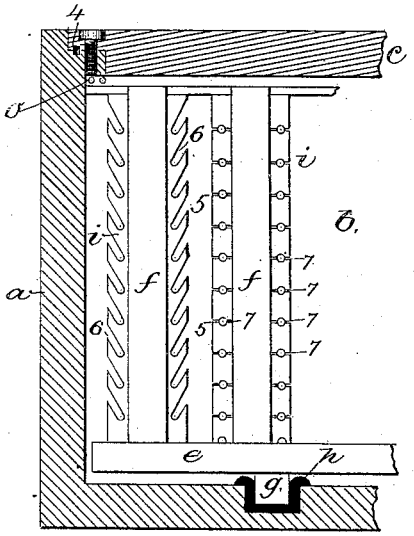


Fig. 6.

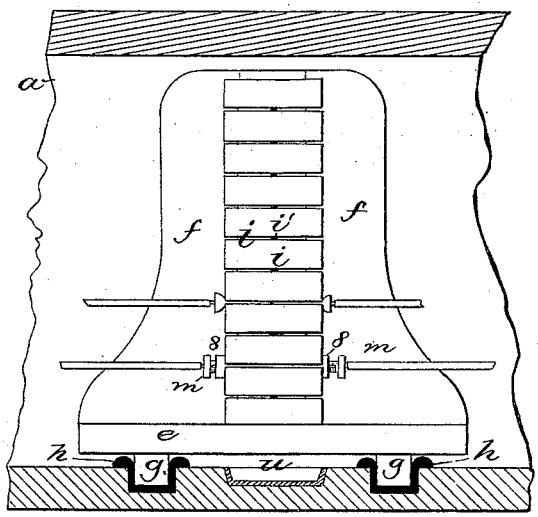


Fig. 7

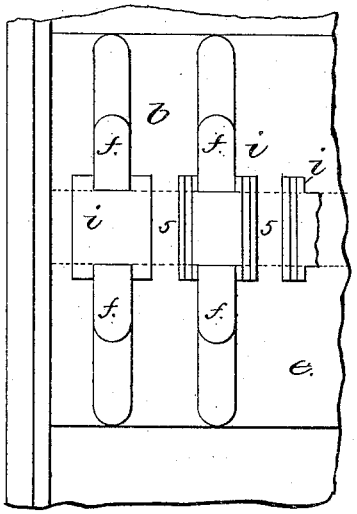


Fig 8.

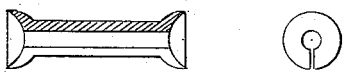
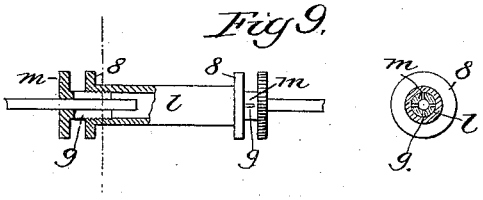


Fig 9.



Witnesses.
Wm F. C. Reinkert
F. A. Kelly

Inventor:
Henry A. Chase
by Crosby & Gregory
Att'ys.

UNITED STATES PATENT OFFICE.

HENRY A. CHASE, OF LYNN, MASSACHUSETTS.

UNDERGROUND TELEGRAPH-LINE.

SPECIFICATION forming part of Letters Patent No. 306,057, dated October 7, 1884.

Application filed February 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CHASE, of Lynn, county of Essex, State of Massachusetts, have invented an Improvement in Underground Telegraph-Lines, of which the following description, in connection with the accompanying drawings, is a specification.

This invention relates to underground telegraphs, and is embodied in a conduit for telegraph-wires which is adapted to form a portion of a sidewalk or road-bed. In a former patent granted to me September 20, 1881, a series of trough-like boxes of cast-iron were shown properly arranged to form a continuous conduit for wires, the said boxes having removable covers adapted to form a pavement or flagging for a sidewalk, and being provided with wire carriers or holders.

The present invention consists, partly, in a novel construction of the conduit-section, it being made tubular and continuous in cross-section at its ends where it is to be connected with the next section. The sections are shown as provided with a projecting flange at one end and a socket at the other end, so that when laid together with the flange of one section in the socket of the next a perfect joint is afforded. The sections that are to contain the wire-carriers are provided at their upper sides with an opening for obtaining access to the said carriers, and the said opening is provided with a removable cover properly constructed to make a perfectly-tight joint with the main portion of the conduit-section.

The invention also consists in a novel construction of the wire holders or carriers and means of supporting them, and in the combination, with the said carriers, of insulating bushings and means for readily separating and joining the wires for the purpose of testing them; also, in means for tightening or taking up the slack in the wires, and in a method of drying the interior of the conduits to prevent moisture or dampness therein to interfere with and lessen the effective insulation of wires, especially those having a fibrous covering, such as most commonly used. The various lines of conduits meeting at a street-corner are shown as entering a pit which is covered with a tight-jointed removable flagging or plate, and in which the connections are made between the wires in the different lines of conduits. The portion of the conduit that crosses streets is shown as buried beneath the surface, and the conduit-sections that contain the wire-carriers have their upper sides extended up to the surface of the street, and provided with an opening and cover put on air-tight. The conduits are preferably lined with moisture-proof material, a coating of asphaltum or bitumen, for example, serving this purpose, or board or other similar material may be coated therewith and placed in the conduits.

Figure 1 is a vertical longitudinal section of a portion of an underground telegraph system embodying this invention, it showing the construction for a street-corner and to cross a street; Fig. 2, a longitudinal section of that portion of the conduit where it is desired to tighten the wires or take up slack therein, the said portion of the conduit being supposed to have been broken off from the line of conduits at the left of Fig. 1 to economize space in the drawings; Fig. 3, a perspective view of one of the conduit-sections, with its cover removed; Fig. 4, a top view of a portion of the conduit shown in Fig. 1; Fig. 5, a front elevation of a portion of one of the carriers on a larger scale; Fig. 6, a side elevation thereof; Fig. 7, a partial top view of Fig. 5, and Figs. 8 and 9 details to be referred to.

The hollow sections *a*, preferably of cast metal, and forming the conduit, as herein shown, are provided at one end with a flange, a^2, shown as rectangular in cross-section, to enter the socketed ends of adjacent sections, the said ends, when fitted one within the other, forming a strong air and water tight joint, which may be effectually sealed or closed by means of any suitable or usual packing, as shown at 3, Fig. 2. Such of the sections as are to contain the wire-carriers *b* are provided with openings at their upper sides having removable covers *c*, which are shown as shouldered or rabbeted at their edges to make a secure flush joint, made air and water tight, preferably by means of a suitable packing, as shown at 4, Figs. 2 and 5. The meeting ends of the sections will preferably be fastened together by bolts *d*, Fig. 2, which will be provided with an elastic washer under the head or nut, to compensate for expansion and contraction of the said sections.

The wire-carriers *b*, (see Figs. 5 and 6,) in-

stead of resting directly upon the bottom of the conduit, are mounted on standards consisting of a platform, *e*, with upwardly-extended supporting arms or guides *f* thereon, the said platforms having studs *g* at their under side, which rest in cups *h*, of insulating material, let into the bottoms of the conduit.

The different sections *i* of the wire-carriers are provided with grooves on opposite edges, whereby said sections can be slid vertically and held one above the other between the said guides *f*, and instead of being matched together, as shown in my former patent, have a small space, 5, left between them of sufficient size for the passage of a wire, so that a single wire may be removed laterally from its holding-notch and be then raised up through the space 5, and it can thereafter be replaced in its holding-notch, all without disturbing any of the other wires.

The section *i* of wire-carriers shown at the left hand of Fig. 5 is somewhat similar to those shown in my former patent, the wires being sustained in notches in the side of the said section, which is made as a single piece. The wire-holding notches 6 are inclined downward, as shown, to prevent the wires from accidentally slipping out.

The other sections of the wire-carriers consist of separate blocks grooved to slide between the guides *f*, and provided with corresponding notches, 7, at their upper and under sides and at each side of the supporting-guides *f*, so that two wires are held between each pair of adjacent blocks. The meeting portions of the said blocks are preferably provided with small studs *i'*, to prevent their whole surfaces from being in contact, and thus becoming electrically connected by a film of moisture. It will be seen that by slightly raising the blocks *i* above it any desired wire may be removed laterally from the notches 7, and then raised through the space 5 without necessitating the withdrawal of the whole section of the wire-carrier, as in my former invention.

In order to insure more perfect insulation, the portion of the wire that is received in the holding-notches of the carrier may be inclosed in a bushing of suitable non-conducting material split longitudinally, to enable it to be sprung over the wire, as shown in Fig. 8.

At the corners of the streets and at other convenient points the conduits *a* open into pits *j*, (see Fig. 1,) where the wires of one conduit may be connected with those of another conduit, or another portion of the same line of conduits located at different levels, as for the purpose of crossing the streets. The said chambers *j* are provided with movable covers or flagging *k*, to enable the operator to enter them, and they form convenient points for testing the wires and otherwise manipulating them, to discover in what portion of the conduit a break or other fault is or has occurred, and to remove such defect or introduce new wires. At these points the wires are preferably connected by means of connecting-tubes *l*, (see Fig. 9,) made of conducting material of suitable size to be held in the notches of the wire-carriers, and provided at their ends with flanges 8, to prevent longitudinal movement in the said holding-notches. The ends of the wires are inserted in nipples *m*, which are slotted across, as shown at *g*, so that when screwed into the connecting-tubes 8 they take a firm hold upon the end of the wire. By removing one of the nipples *m* the line is severed or disconnected, and its open end may be connected with any suitable testing-instrument, as desired.

At suitable points, preferably midway between the connecting points or chambers *j*, the conduits and carriers are arranged to take up the slack in the wire to give the said wires a uniform tension after they have been secured at their ends as just described. For this purpose the conduit-section has a downward projection, *a'*, (see Fig. 2,) so that the carrier-holding arms therein are not in line with those at either side of the said depressed portions. The said carrier-sections, after the wires have been placed in them, will be forced into their guides, as by the threaded bolts *n*, until the proper tension is attained. A permanent endless belt or chain, *o*, will be placed in the conduit in the process of its construction, it being passed over suitable pulleys, *p*, at its ends, and running over the tops of the carriers or suitable rollers in the interior of the conduit, the said belt being as long as can be safely operated, and serving to enable a wire suitably connected therewith to be drawn through the conduit without opening any part thereof except the points from which the endless belt is operated. Thus a new wire can readily be inserted to take the place of a broken one, it lying upon the tops of the carriers until it becomes desirable to remove the covers of the conduit, when the said wires can be placed in the proper holding-notch, the damaged wire being previously removed. At the points where it is desired to lead the wires from the conduit into the neighboring buildings, the conduit will preferably be tapped at its bottom or side, and a threaded wrought-iron pipe of sufficient size to accommodate all the wires to be thus connected will be screwed into the conduit. The said pipe will have a sealing material poured into it around the wires, thus hermetically sealing it. The said sealing material may consist of paraffine or other suitable material, which may be poured in in a molten condition, the wires being provided with a suitable washer or wound with yarn to close the pipe and retain the said molten material while it solidifies. It will be seen that the conduits thus formed are substantially air-tight, so that no moisture can enter them, and if any moisture should collect, either through any accidental leak or by condensation, provision is made for its drainage beneath the carrier-supports *e f*, as shown in Fig. 5. The conduits are properly graded to cause such moisture to flow toward the pits *j*,

where it may be properly disposed of. In order to thoroughly dry the interior of the conduits, however, I provide means for forcing heated air or other moisture-absorbing gas through the conduit, such means being shown in Fig. 1 as a furnace, *r*, and a draft-forcing apparatus or blower, *s*. Carbon may thus be burned in the furnace *r*, and the heated products of combustion, consisting, mainly, of carbonic-acid gas, will be carried by a suitable conducting-pipe, *t*, into and forced through the conduit *a* to be dried, the said heated gas being a good absorbent of moisture. In addition, moisture-absorbing material may be placed from point to point in the conduits—such as pans containing sulphuric acid, quicklime, or other moisture-absorbing material—as shown at *u*, Fig. 6. The portions of the conduit that cross streets, or which for other reasons are placed below the surface of the ground, will be provided with suitable upwardly-extended chamber, a^3, Fig. 1, passing to the surface of the ground, and will be closed by suitable covers, thus affording access to the carriers.

If desired, horizontal separating-strips may be employed at intermediate points between the carriers, as shown at *y*, Fig. 2, to prevent the wires from touching in case the tension is not uniform upon all of them. The said separating-strips will preferably be corrugated to maintain the wires properly spaced in the horizontal rows.

By the term "continuous in cross-section," used in speaking of the conduit-sections, I mean having the ends completely inclosed, as shown in Fig. 3, so that the joint is practically continuous between the meeting ends of the sections when laid, whereby no portion of the said joint is disturbed after the conduits are laid, as would be the case in the construction shown in my former patent when the covers are removed.

I claim—

1. In a conduit forming a part of the surface of a sidewalk or street, composed of a series of united sections having their upper surfaces flat, and lying in substantially the plane of the sidewalk or street, the section *a*, having a flange, a^2, to fit in a corresponding socket in the end of an adjacent section, as shown and described, combined with the removable tight-fitting cover fitted in an opening in one or more of the sections composing the conduit, and a packing in the joint of said cover and section, as set forth.

2. The combination of the conduit, the wire-carrier-supporting arms, and the platform for said arms, provided with studs or legs, and the sockets or cups therefor in the said conduit, substantially as described.

3. The herein-described wire-carrier, consisting of independent sections each made up of independent blocks provided with wire-holding grooves and studs or projections to prevent the entire surfaces of adjacent blocks from being in contact, as set forth.

4. The platform *e*, provided with the block-holding arms, combined with a series of grooved wire-holding blocks held in said arms, whereby a space may be left between adjacent series of wire-holding sections, substantially as and for the purpose described.

5. A wire-carrier consisting of two standards, *f*, combined with wire-holding blocks grooved on opposite edges, whereby they can be slid between and held in place by said standards, substantially as shown and described.

6. A conduit-section provided with a depressed or offset portion and with wire-carriers at either side thereof, combined with a carrier sliding in a frame or guide in said depressed or offset portion, and means connected with said guide or frame to force the carrier out of line with relation to the other carriers, substantially as and for the purpose described.

7. In a conduit having a series of wire-carriers, a pile of insulating-plates for separating the wires in horizontal rows, whereby any wire can be removed or a new one inserted without disturbing the others, substantially as described.

8. The combination, with the wire-carriers provided with wire-holding points, of the connecting-tubes flanged to prevent longitudinal movement in the said carriers, and the wire-holding nipples adapted to be screwed into the ends of the said tubes, substantially as described.

9. In combination with a wire-carrier, substantially as described, a slotted insulating-bushing flanged to prevent longitudinal movement of said bushing in its seat, substantially as shown.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY A. CHASE.

Witnesses:

G. W. GREGORY,

W. H. SIGSTON.