

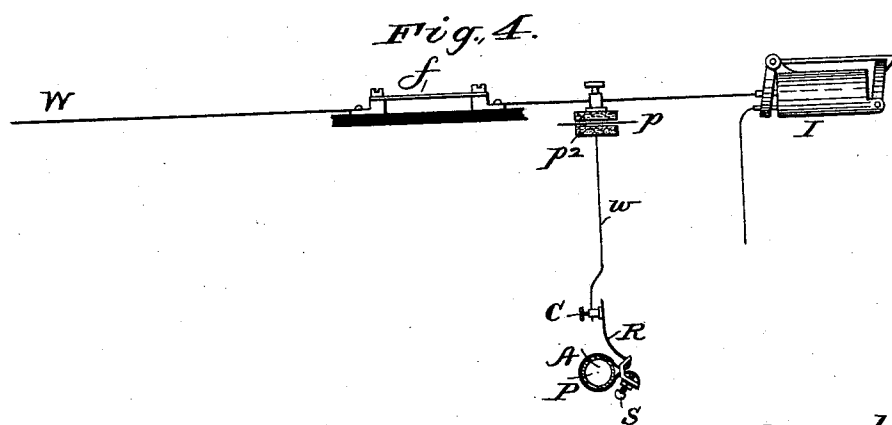
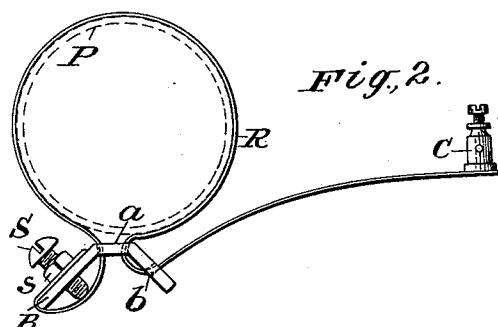
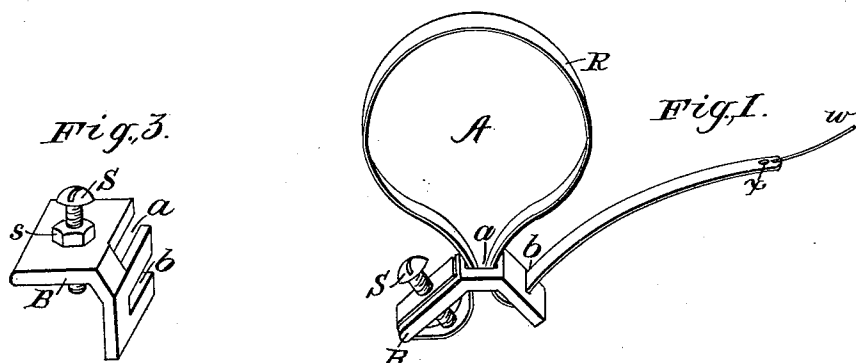
(No Model.)

H. M. CRANE.

EARTH CONDUCTOR OR GROUND WIRE ATTACHMENT.

No. 585,185.

Patented June 29, 1897.



Witnesses
H. R. Edelen
H. M. Crane

Inventor.
Harry Middlebrook Crane,
by Solomon Mauro,
his attorney.

UNITED STATES PATENT OFFICE.

HENRY MIDDLEBROOK CRANE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO
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EARTH CONDUCTOR OR GROUND-WIRE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 585,185, dated June 29, 1897.

Application filed May 10, 1897. Serial No. 635,873. (No model.)

To all whom it may concern:

Be it known that I, HENRY MIDDLEBROOK CRANE, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Earth Conductors or Ground-Wire Attachments, of which the following is a specification.

The earth is employed in association with telegraphic, telephonic, and other kinds of electric circuits both as a return-conductor and as a discharge-conductor for lightning-arresters and similar protective devices.

In either case it is customary and highly convenient to attach the wire leading from the circuit or protective appliance to a metal gas or water pipe, for by reason of the extensive ramifications of these pipes of gas and water systems a very large conductor-surface exposed to the crust of the earth is thus made available.

The necessity of a thoroughly-efficient connecting device, especially in the "protector" association, has lately become very manifest.

Prior to my invention the method of attaching the earth conductors to the gas and water pipes has been to wind the copper wire in many contiguous turns round the pipe and to attempt the formation of a homogeneous electrical union of the said pipe and wire by soldering.

Soldering is a difficult process in places where ordinarily ground-wire connections have to be made, and experience shows that it is often slurred and imperfectly done, and in such cases this mode of connection, never thoroughly trustworthy, is very inferior and cannot be relied upon as a safe and successful adjunct to the protector-ground.

The object of my invention is to provide a suitable connector for easily and conveniently attaching the ground-wire to the gas or water pipe, which connecting appliance shall also be perfectly trustworthy as a good electrical connection of low resistance, shall be permanent in the perfection of its attachment, and shall likewise be easily detached if disconnection is required.

My connecting appliance consists of a metal angle-piece with slots in one of its sides and a tapped hole, to which is fitted a tightening set-screw, in the other. A strip of metal is attached by soldering or otherwise to the

tapped side of the angle-piece, being tapped or slotted for the passage of the screw.

The metal strip is preferably formed of 55
tinned brass, and the bracket or angle-piece may be a punching and brass also.

To use such a connector in attaching the ground-wire to the pipe, the latter is carefully cleaned and brightened, the strip of metal is 60
passed round it and looped through the slots in the angle-piece. On setting up the screw the strip is drawn about the pipe as tightly as desired, and an excellent and permanent electrical connection is made. The strip of 65
metal can be as long as may, in each individual case, be convenient, and the ground-wire is secured to it by riveting or soldering or by a binding-screw, as preferred.

Of course all screws employed in this form 70
of connection may be fitted with jam-nuts.

In the drawings accompanying this specification, Figure 1 shows the connecting appliance with the brass strip looped through the slots of the angle-piece, the conducting- 75
wire being brazed or soldered thereto. Fig. 2 is a view of the same applied to a gas or water pipe and provided with a binding-screw attachment for the conducting-wire. Fig. 3 is a perspective view of the bracket or 80
angle-piece detached; and Fig. 4 represents a portion of an electric circuit provided with protective apparatus, the ground-wire and connecting appliance of my invention being 85
clearly shown.

A is the conductor-connecting appliance; B, its bracket or angle-piece having slots *a* and *b* and a set-screw *S*, preferably supplied with a jam-nut *s*.

R is the strip of brass or other metal or alloy soldered, brazed, or otherwise attached 90
to the said angle-piece and slotted or perforated for the passage of the screw *S*.

In a connecting appliance or grounding attachment of this class for pipes which I have 95
made the end of the strip is doubled back on itself, soldered to the outer surface of the unslotted face of the bracket, and then passed over the point of the set-screw and threaded through the slot *a* in the other face or close 100
to the apex of the angle of said bracket.

The earth conductor or ground-wire *w* may be soldered or brazed to the end of the metal strip *R*, as at *x*, or, if desired, the latter may

be provided with a binding-screw C, preferably furnished (like the set-screw S) also with a jam-nut.

P represents a gas or water pipe belonging to or associated with an ordinary city system, and in Fig. 2 the strip R has been drawn through the first slot *a* backwardly about or round the pipe, drawn again through the same slot *a* reversely, and then backwardly through the second slot *b* of the angle-piece and bent backward therefrom. This being done it only remains to set or turn up the screw S, when the brass strip is strongly tightened up around the pipe and an excellent electrical connection with the said pipe is thus provided. The position of the screw may then be secured by the jam-nut *s*. If a soldering connection is wanted for the ground-wire *w*, it may, if desired, be made before the connector is applied to the pipe, and so made will avoid the chance of poor work due to inaccessibility.

In Fig. 4, W is the conductor of the main circuit and is shown as leading through a fuse-protector *f* and a plate and air space protector *p* to a call-receiving instrument I. The ground-wire *w* extends from the ground-plate *p*² of the air-space protector to earth at the water-pipe P, to which it is attached by means of the connector appliance A, which connects with the wire *w* through the binding-screw C and with the pipe P through the metal strip R, angle-piece B, and set-screw S, constituting the said appliance A.

The arrangement is very efficient, almost the entire circumferential surface of the pipe being in contact with the metal strip, thus making a first-class electrical connection and preventing the ingress of moisture and the resulting corrosion, which otherwise might be expected. The connector has but three essential parts, all of which are simple, inexpensive, and easily made, and it can be attached without taking it apart, thus not only facilitating the process of attachment, but avoiding the chance of the parts loosening or being lost.

I am aware that grounding clamps or connectors, broadly considered, are not new, and I consequently make no claim to such a device *per se*; but

I do claim—

1. A connector for attaching a ground-wire, or an electric circuit or protector earth conductor, to a gas or water pipe, consisting of a metal angle-piece having slots as described, and a threaded perforation through one of its faces; a metal strip secured at one end to the outside of the perforated face, arranged to

pass twice in opposite directions through the first slot, and once through the other, and adapted to surround the said grounding-pipe between the points passing the said first slot; and a tightening set-screw associated with the threaded perforation of the said angle-piece, and impinging upon the metal strip between its fixed end and the nearest slot thereto, substantially as set forth.

2. The combination with the ground or earth wire of an electric circuit or protective device; and a metal pipe or rod in permanent earth connection, such as a gas or water pipe; of an attachment comprising a metal bracket or angle-piece having slots as described in one of its sides, and a screw-threaded hole through the other, a metal strip at one end secured to the said angle-piece, and its other end to the ground-wire, and arranged to pass through the first slot and back, and then through the second, successively, and to embrace the said rod or pipe by that portion of its length between the said two passages of the first slot; together with a tightening-screw passing through the threaded hole of said angle-piece, and adapted to bear at its point on the said strip; the said attachment forming the terminal of the said earth-wire, and constituting a conveniently-applied and efficient electrical connection between the said earth-wire and the said permanently-grounded pipe or rod; substantially as and for the purposes specified.

3. A connector for attaching an electric conductor to a gas or other pipe, consisting of a bent or curved metal base slotted as described, and provided with a tightening-screw at one end thereof, a metal band fixed by one end to the said base, and extended over the point of said screw through the first of said slots, backwardly and forwardly in succession, and adapted to be returned through the second slot, and to be secured over the end of the base, as and for the purpose set forth.

4. A connector for attaching an electric conductor to a gas or other pipe, consisting of a metal band looped around the pipe, in combination with a holding or securing device through which said loop passes, and whereby it is held in close contact with the pipe, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of May, 1897.

HENRY MIDDLEBROOK CRANE.

Witnesses:

JOSEPH A. GATELY,
THOMAS D. LOCKWOOD.