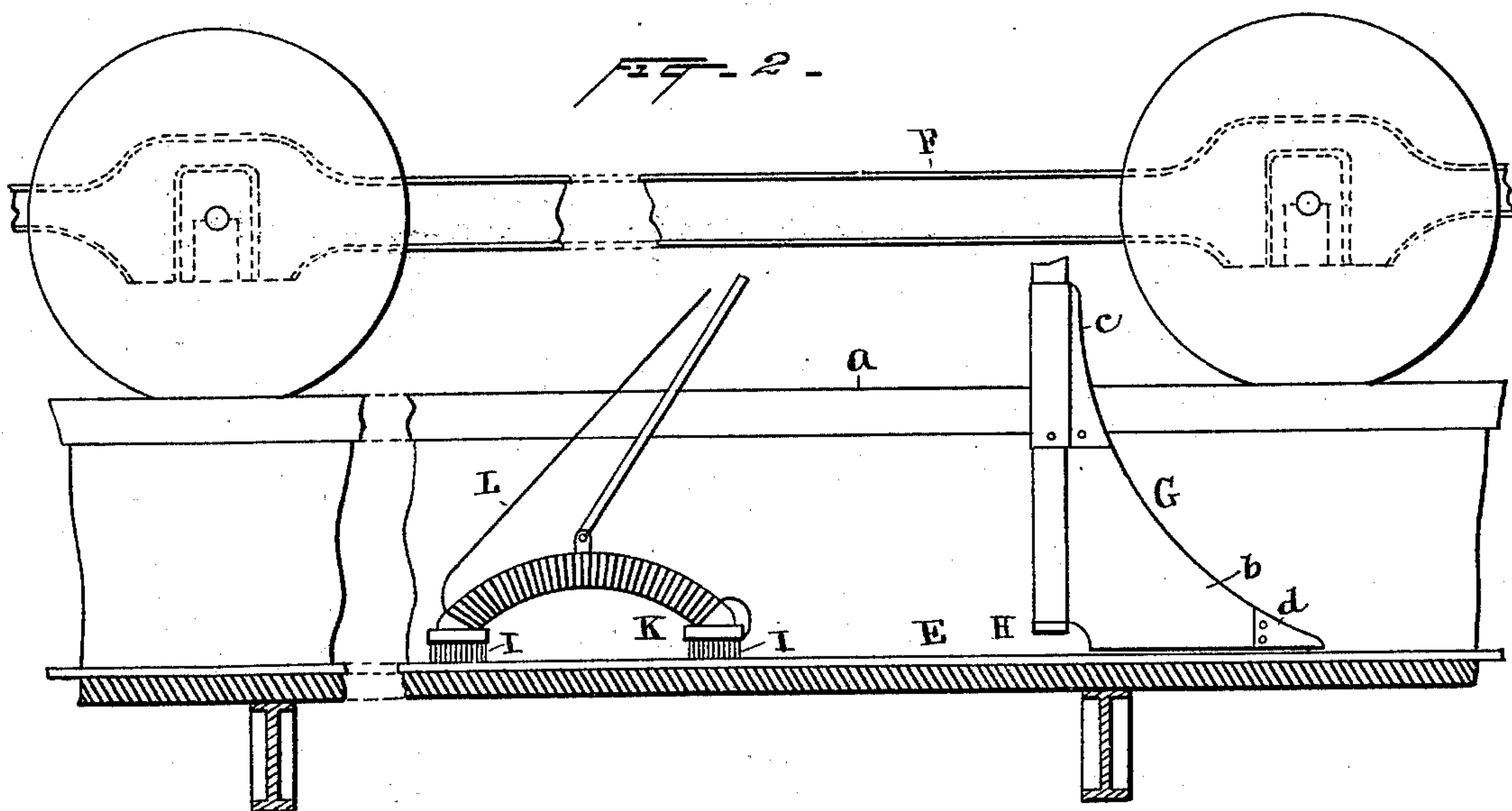
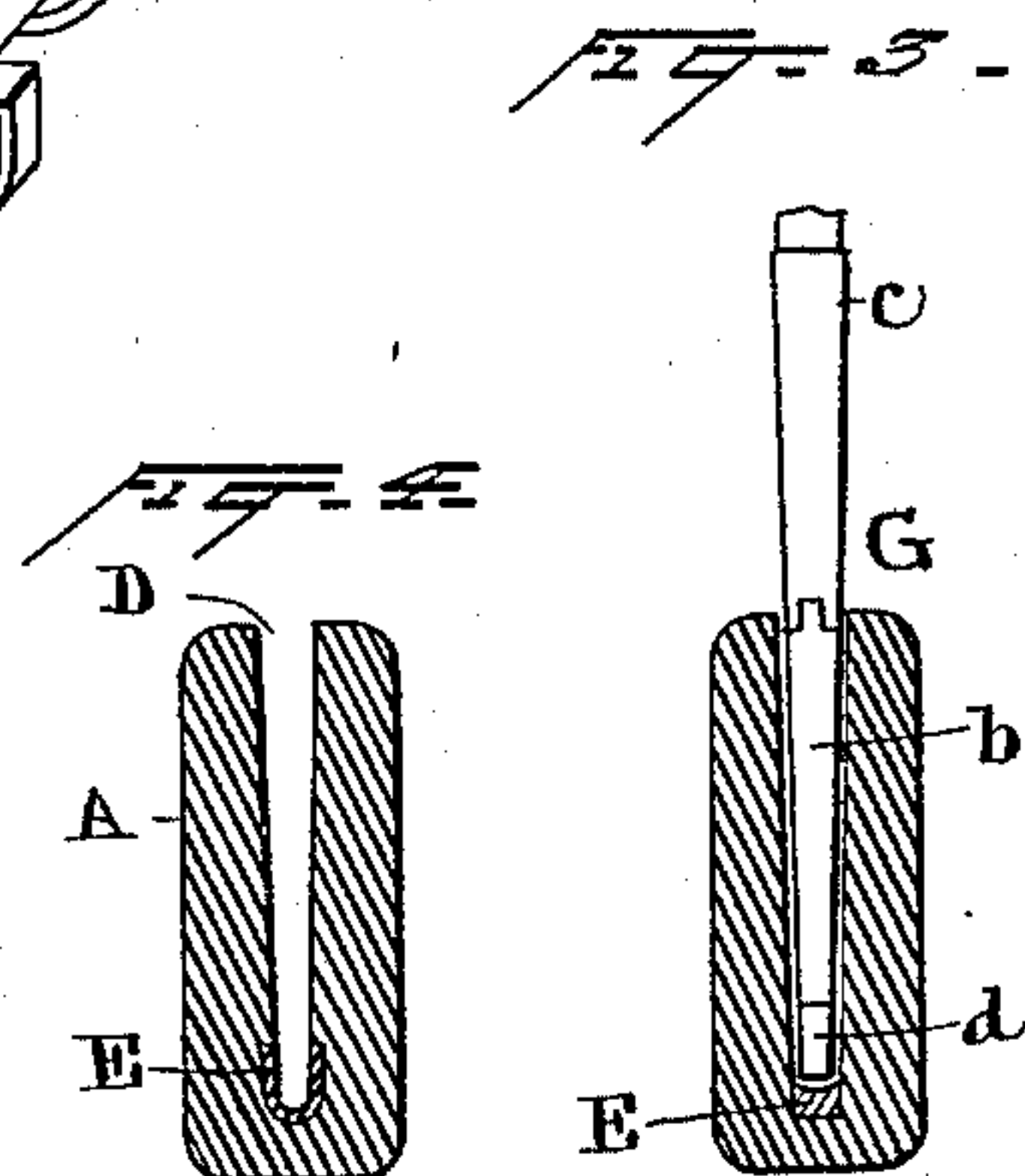
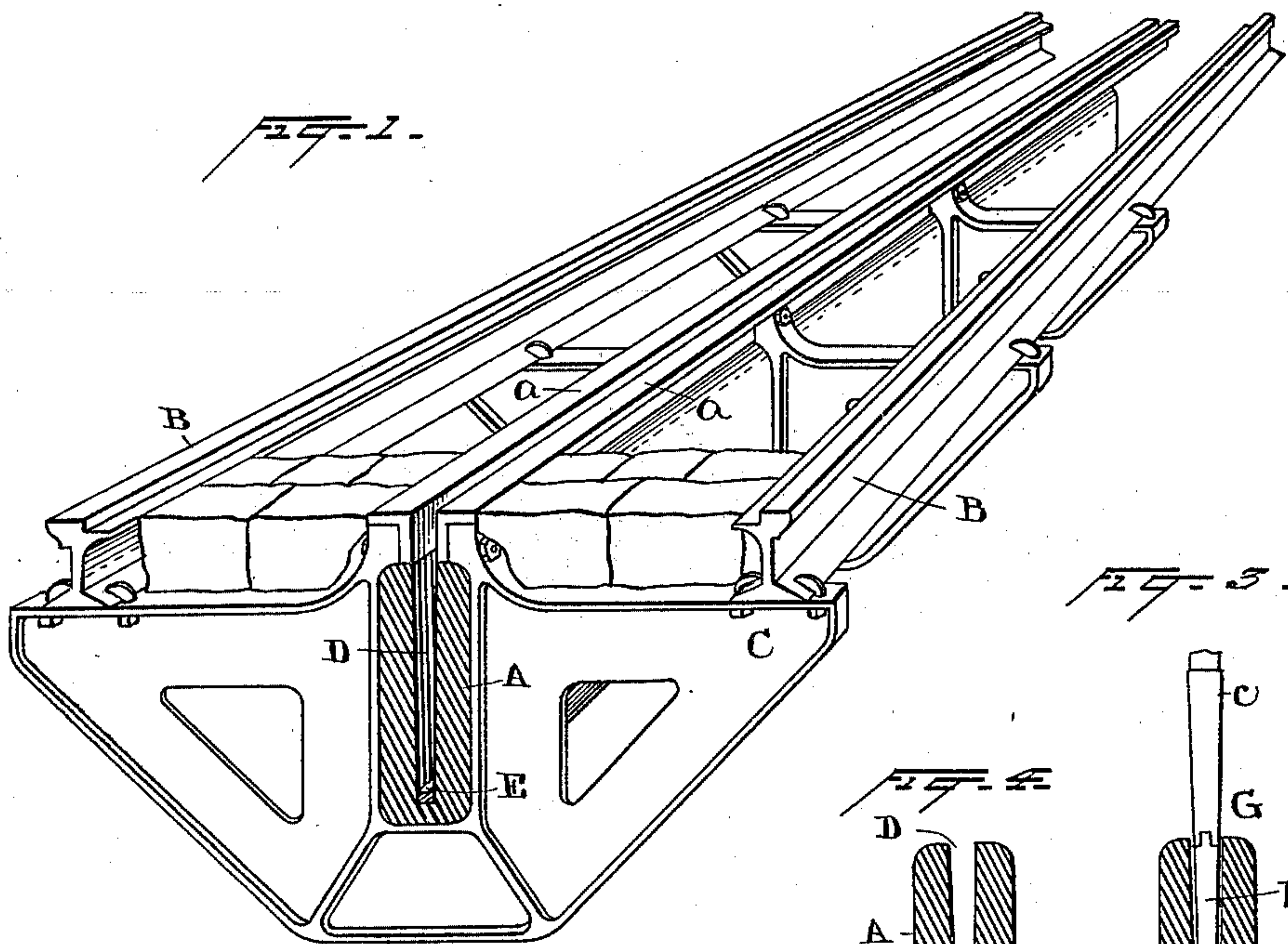


(No Model.)

E. H. JOHNSON.
CONDUIT ELECTRIC RAILWAY.

No. 509,622.

Patented Nov. 28, 1893.



Witnesses
 Horatio A. Clark
 W. P. Rizer

Inventor
Edward H. Johnson
By his Attorneys
J. H. Lacy

UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSON, OF NEW YORK, N. Y.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 509,622, dated November 28, 1893.

Application filed May 16, 1892. Serial No. 433,249. (No model.) Patented in Belgium June 30, 1892, No. 100,237; in France June 30, 1892, No. 222,720; in England June 30, 1892, No. 12,191, and in Italy July 15, 1892, LXIII, 247.

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, a citizen of the United States, residing in New York city, county and State of New York, have invented a certain new and useful Improvement in Electric Railways, (for which I have received patents in Belgium, No. 100,237, dated June 30, 1892; in France, No. 222,720, dated June 30, 1892; in Great Britain, No. 12,191, dated June 30, 1892, and in Italy, No. 247, Vol. LXIII, dated July 15, 1892,) of which the following is a specification.

My invention relates to that class of electric railways in which one or more of the supplying conductors are placed in a conduit beneath the surface of the ground, contact being obtained by means of suitable current collectors carried by the moving cars and entering said conduit through an opening at the surface of the ground.

The object of my invention is to provide a construction for the conduit, the current collector and the devices for keeping the conduit clean, whereby the loss by leakage from one side of the circuit to the other, due to the presence of moisture or foreign bodies, is reduced to a minimum, and whereby the conductor and the conduit itself may be kept clean and continuously freed from moisture and from dust, snow and other foreign materials, liable to impair the efficiency of the traveling contact and obstruct its passage.

My invention consists in the various novel devices and combinations of devices employed by me in accomplishing the above-named object, as hereinafter set forth and claimed.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a portion of an electric railway conduit embodying my invention; Fig. 2, a longitudinal section of the same, showing the cleaning scoop and the current collecting device; Fig. 3, a front view of the cleaning scoop; and Fig. 4, a section illustrating another form and arrangement for the conductor.

A is a continuous body of insulating material placed underground between the rails B, B, and held and supported in any suitable manner. As shown, this body, which constitutes the conduit, is held in a suitable iron

framework C, provided at the surface of the ground with the slot-irons *a, a*.

The insulating body A may be made of any suitable durable, moisture-proof, insulating material, such as a vitreous material, stone, slate or cement, or it may be of wood or other fibrous material impregnated or treated in any of the well-known ways with any substance which renders it moisture-proof and increases its insulating properties. The said insulating body A is provided with a groove D, extending longitudinally throughout its length, said groove being open at the top of the conduit, and, preferably, closed at the bottom. This is a narrow, open, unobstructed groove, having at no point in its depth a width greater than its width at the top or surface. Preferably, it is made widest at the top and narrows gradually toward the bottom, as shown. Such groove may have at the top a width of, say, three-quarters of an inch, and at the bottom, say, one-half of an inch. Preferably laid in the bottom of this groove is the conductor E, which, preferably, has a grooved upper surface, as shown. I prefer to make this conductor of iron, and to use therewith a magnetic contact device to be presently described, but if such a magnetic contact device is not employed, the conductor may be made of copper or other suitable metal.

Any suitable means may be employed, if desired, to hold the conductor in place, such means being such as will not interfere with the passage of the current collector along its upper side.

The groove D constitutes the conduit chamber for holding and protecting the conductor. The opposite side of the circuit is preferably formed by the rails and the earth, in the ordinary way. It will be seen that by using as the conduit chamber the single narrow slot or groove, the loss by leakage through moisture is practically done away with, since by making the slot of sufficient depth it is evident that, even if the slot were entirely filled with water, the body of water would be so small as not to furnish sufficient conductivity to allow the passage of sufficient current to seriously affect the operation of the railway; and this result may be obtained with certainty by estimating the resistance of a

body of water and of the ordinary refuse of the street, the size of the conduit chamber, and making the slot of such depth as to raise this resistance to a point sufficient to accomplish the desired result. Since, in practice, it is extremely improbable that the chamber will ever be completely filled with water, it will be seen that by this expedient, leakage from the conductor E to the surface is practically done away with.

In Fig. 2, F indicates a portion of a street car. Attached in any suitable manner to this car is the cleaning scoop G, which is a plow having a width and shape in cross-section such that it substantially fills the conduit chamber D, but, preferably, so as to not touch the sides of the chamber when placed centrally therein. It is formed with a sloping front edge, as shown, and when passing through the conduit it takes up all dust and other materials which may accumulate therein, carries them to the surface and throws them out of the slot opening. By this means, the conduit may be kept entirely clean. Preferably, the plow G has attached to it a brush H, which bears on the conductor E, for the purpose of cleaning the surface thereof. I prefer to make the body *b* of the plow or scoop G of insulating material, such as hard wood. There being no great wear upon it, such material will readily answer the purpose, and the plow may be readily changed if it wears out. By making this portion of insulating material, any danger of a short circuit through the plow between the conductor E and the slot-irons *a* is avoided. The upper portion *c* is preferably made of iron since it may wear against the slot-irons, and the toe *d* of the plow or scoop is also shod with iron. The scoop may be connected with the car in any suitable or well-known way which will enable it to maintain the same position with reference to the conduit and to follow the car as it passes around curves.

The plow G may itself have an attachment for collecting the current from the conductor B. I prefer, however, to employ a separate current collector, and, preferably, one which is maintained in contact with the conductor by electro-magnetic attraction. Such current collector consists of two brushes I, I, of iron wire, each held in a suitable back K, and such backs being united by an iron core, around which the wire which conveys current to the motor is given a sufficient number of turns, one end of such wire being soldered or otherwise connected to the magnet and the motor wire then being carried to the car, as shown at L. The current collector, like the cleaning scoop, is connected with the car in any suitable manner, and preferably so as to have its inclination reversible, so that it will trail behind the center of the car no matter in which direction the car is moving. This electro-magnetic current collector will adhere to the conductor with great force, although it

may readily be drawn along it, and its use insures an effective electrical contact with the conductor at all times.

In the form shown in Fig. 4, the conductor chamber is formed with offsets or shoulders near its bottom, and the conductor consists of a U-shaped strip of sheet-metal sprung into place beneath said shoulders and held thereby.

What I claim is—

1. A conduit for electric railways, having a conductor chamber the diameter of which decreases continuously from its surface opening to its bottom, and said opening being the full width of the chamber at that point substantially as set forth.

2. A conduit for electric railways having a V-shaped conductor chamber, whose surface opening is the full width of the chamber at that point substantially as set forth.

3. The method of cleaning an electric railway conduit consisting in moving through said conduit a device which lifts or conveys through the conduit opening such foreign materials as may have accumulated in the chamber, substantially as set forth.

4. The combination in an electric railway of an open conduit, a car and a cleaning scoop adapted to throw material to the street surface, carried by the car and traveling within the conduit, substantially as set forth.

5. The combination, in an electric railway, of a continuous body of insulating material placed underground and provided with a continuous open longitudinal groove and a conductor in said groove, a car, and a cleaning scoop carried by said car entering said groove and substantially filling the same, substantially as set forth.

6. The combination, in an electric railway, of a conduit for a conductor, a car, and a cleaning scoop carried by the car and substantially filling the conduit chamber, substantially as set forth.

7. The combination in an electric railway of a conduit having a conductor chamber the width of which decreases continuously from its surface opening to its bottom, a car, and a cleaning scoop carried by the car and traveling in the conduit and having substantially the same size and shape in cross-section as the conduit chamber, substantially as set forth.

8. The combination, in an electric railway, of a conduit containing a conductor, a car, a cleaning scoop, carried by the car and adapted to throw material to the street surface and a current collecting device carried by said car in the rear of said scoop, substantially as set forth.

This specification signed and witnessed this 13th day of May, 1892.

EDWD. H. JOHNSON.

Witnesses:

W. LAIRD GOLDSBOROUGH,
EUGENE COURAN.