(No Model.)

S. R. BRADLEY.

CORD CARRIER FOR UNDERGROUND CONDUITS.

No. 479,397. Patented July 26, 1892.

Fig. 1.

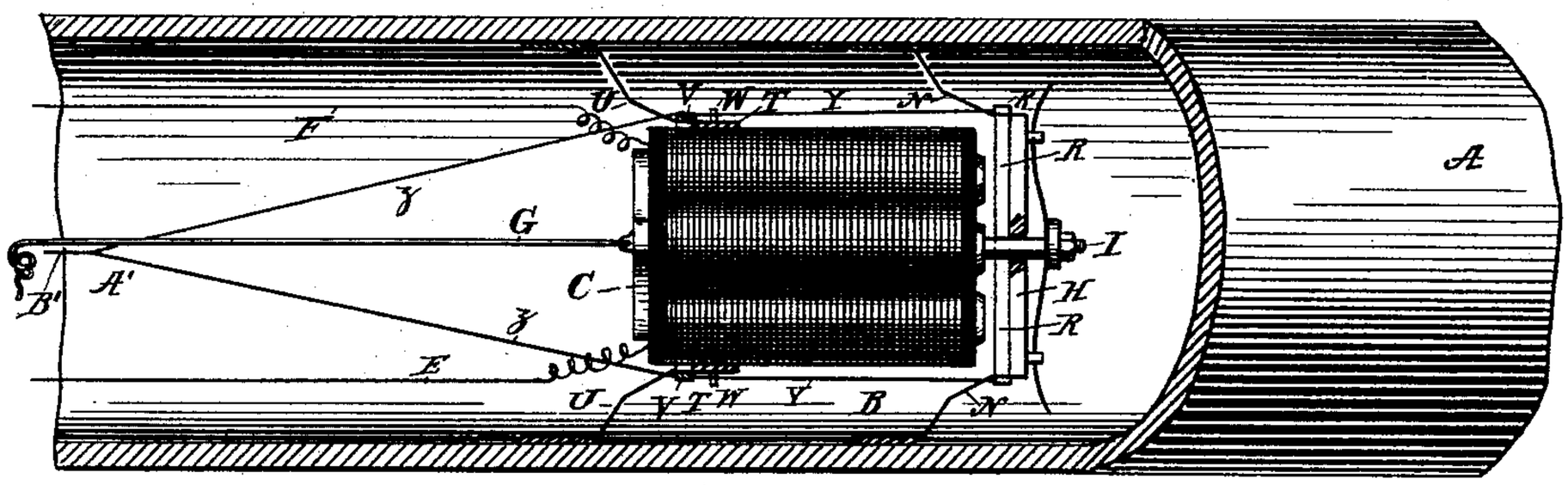


Fig. 2.

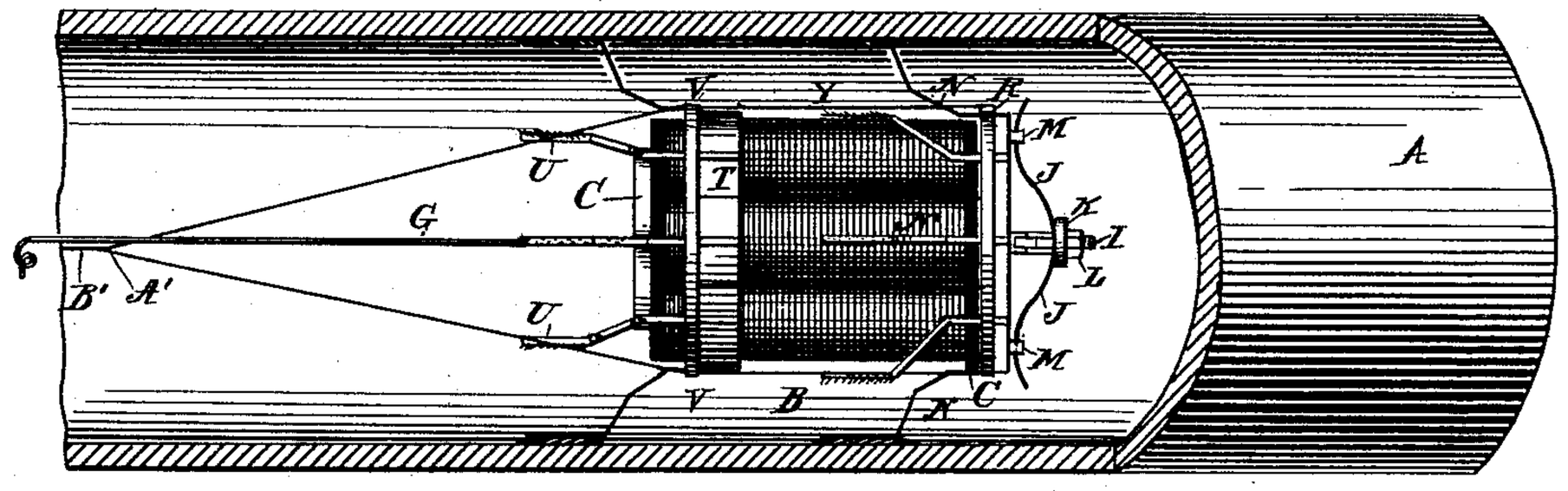


Fig. 3.

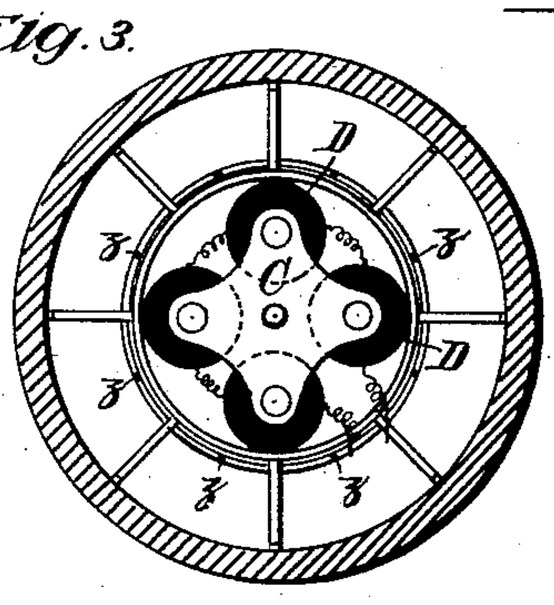
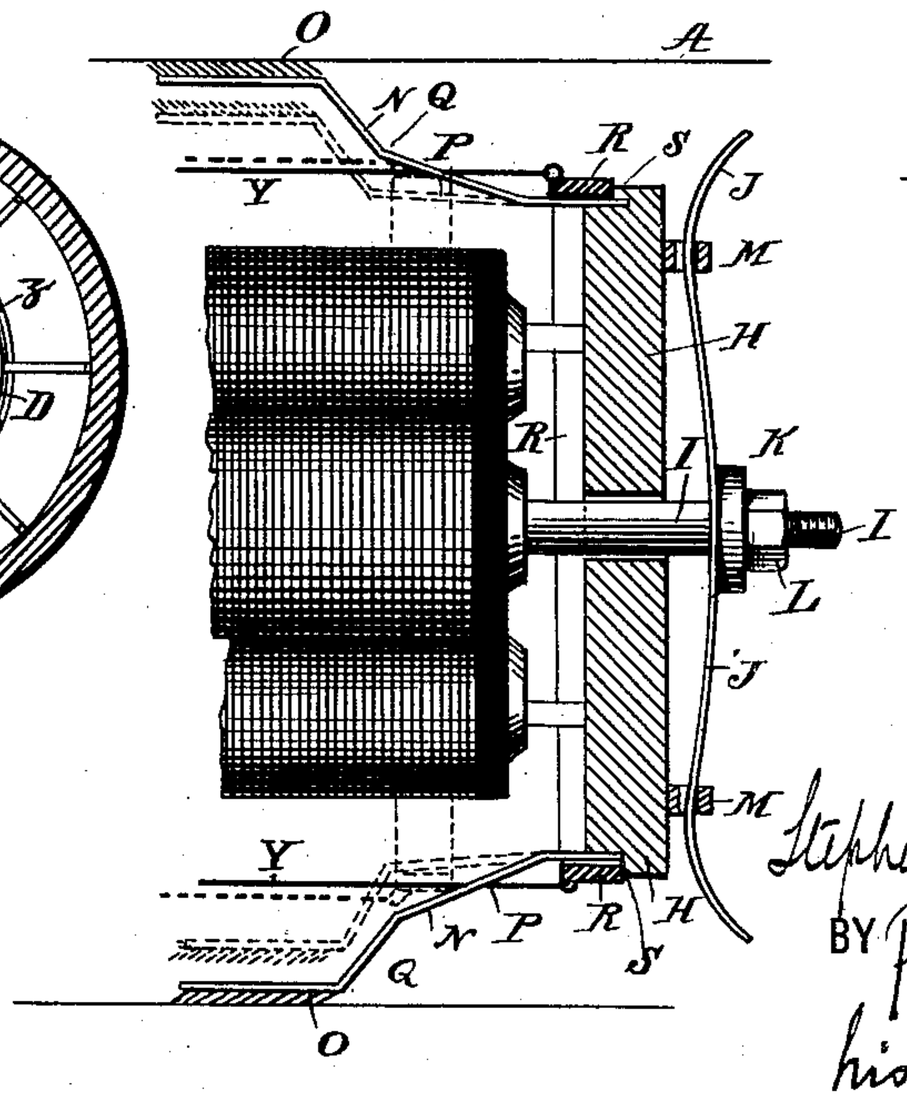


Fig. 4.



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CORD-CARRIER FOR UNDERGROUND CONDUITS.

SPECIFICATION forming part of Letters Patent No. 479,397, dated July 26, 1892.

Application filed January 27, 1892. Serial No. 419,475. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN ROWE BRADLEY, a citizen of the United States, and a resident of Nyack, in the county of Rockland and State of New York, have invented a certain new and useful Wire or Cord Carrier, of which the following is a specification.

My invention relates to a new and useful device for carrying wires or cords through tubes or conduits; and, generally stated, it consists in an electro-magnet or gang of magnets the armature or armatures whereof, by reason of the intermittent making and breaking of the electric circuit, actuates devices which engage with the interior wall of the tube or conduit in such manner as to propel the carrier through the tube. Various mechanism may be employed for this purpose. I illustrate one form hereinafter to be described; but others may be substituted for it.

My invention also contemplates means whereby the carrier may be withdrawn from the tube whenever desired, the devices which engage with the inner walls of the tube being at such time partially withdrawn therefrom, or at all events their pressure against the wall reduced, so that the carrier can be withdrawn without injury.

In the drawings hereof, Figure 1 illustrates an elevation of the device, partly in section, the circuit being opened. Fig. 2 illustrates an elevation, partly in section, the circuit being closed. Fig. 3 illustrates a rear view of the carrier sectioned transversely about midway of the length of the magnets. Fig. 4 is a detail of the armature and adjacent parts.

A is the tube or conduit.

B is the carrier. It comprises a frame C C, within which are supported electro-magnets. Four are shown in the drawings. There may be as many as desired, more or less than four.

E, Fig. 1, is the induction-wire.

F, Fig. 1, is the eduction-wire. These are ordinary wires for carrying current to and from the coils of the magnets.

G is a cord or wire, which is attached to the rear portion of the magnet-frame which is to be carried through the conduit by the carrier, to the exposed end of which the heavier conductor itself is to be attached, which will in turn be drawn through the tube by this wire.

H is the armature. In this instance it is made in the shape of a disk, which is mounted upon a spindle I and slides upon it. This spindle is fastened at its rear end to the frame of the magnets and is threaded at its forward extremity.

J is a double spring, which is clamped upon a shoulder made on the spindle I by means of a washer K and nut L. The ends of the spring J pass through and freely slide in holes made in two eyes M M, fastened to the armature-disk.

N N N, &c., are what I term the "spider-legs" of my device. They are made of spring metal and on their free ends are preferably provided with barbs or spurs O O, which are arranged with a rearward inclination, as shown clearly in Fig. 4. These legs have an inclined section P, in rear of which there is a somewhat abrupt turn Q, constituting a partial shoulder.

R is a ring, which is prevented from moving forwardly by a shoulder S on the armature-disk, but is free to move rearwardly.

T (see Figs. 1, 2, and 3) is a ring fastened to the exterior of the magnets, and to it are fastened other spider-legs U U, &c., the same in construction as the spider-legs N before described.

V is a ring, substantially the same as the ring R, adapted to move rearwardly, but prevented from moving too far forwardly by pins W W (see Fig. 1) on the ring T.

Y Y are cords or small chains, which connect the rings V and R, compelling them to move together rearwardly; but by reason of the slacking of the chain or cord the ring R can move, with the armature H, toward and from the magnets.

z z are cords, there being preferably a number of them, as shown in Fig. 3, which are attached to the ring V, and all come together at a point A′, (see Figs. 1 and 2,) and from that point a single cord B′ extends rearwardly to the end of the tube.

The operation is as follows: The traction-cord G is attached to the end of the device. It is then introduced by hand into the rear end of the tube or conduit and the circuit is closed. The magnets are immediately energized and the armature is attracted; but since the barbs of the spider-legs attached to it have

the rearward inclination, it (the armature) cannot move rearwardly; but the magnets can move forwardly because the spider-legs U attached to them have the same rearward inclination. The magnets consequently are drawn up to the armature, as shown in Fig. 2, pulling the traction-cord G and the cords A′ and B′ after it. The circuit is then opened and the springs J immediately assert themselves. They are not so powerful as the magnets when energized, but are sufficiently powerful to effect the movement of the parts herein described. They endeavor either to shove the magnets rearwardly or to pull the armature forwardly. The magnets now in their turn cannot move rearwardly, because the barbs on their spider-legs, setting into any inequalities in the wall of the tube, catch in them and prevent such movement. The armature can, however, come forwardly, because the barbs upon its spider-legs now act in the same way that those upon the magnets formerly acted. Consequently the armature is drawn forward into the position shown in Fig. 1. Thus an advance of the whole mechanism has been made through the tube a distance equal to the distance separating the armature and the magnets. The operation is now repeated. The circuit is now again closed, which of course effects a repetition of all the above-recited movements. As is well known, the making and the breaking of the circuit can be made a matter of great rapidity. Consequently my device moves through tubes and conduits at a satisfactory rate of speed.

If anything happens to the device—as, for instance, if one of the electric wires E or F should become detached or broken, or if the carrier meets any obstruction in the pipes and cannot get past it—then in order that the whole apparatus may be retracted and withdrawn it is desirable to remove the pressure of the spider-legs against the inner wall of the pipe. Consequently the cord B′ is pulled upon from the rear, it of course being of such length as to remain at all times under the control of the operator. The pull on this cord draws rearwardly the ring V, and the connecting cords or chains Y in turn draw rearwardly the ring R. They slide up upon the inclined section P (see Fig. 4) of the legs and crowd them inwardly, as shown in dotted lines in that figure. When, however, they come into engagement with the partial shoulder Q, they are stopped by those shoulders against further movement. Thus the spider-legs (all of them) are withdrawn from any considerable pressure against the sides of the conduit or pipe, the lower ones only having engagement with it and then only to the extent of the weight of the carrier. The carrier may then be drawn rearwardly by the wire or cord G and by the cord B′, if desired, and if the legs on the bottom of the conduit slightly catch upon pipe-joints and the like a little working of the parts or slight strain upon the cord G or B′ will cause the spider-legs to spring, which will immediately release the device and its withdrawal may be continued.

I make my carriers of differing sizes to coincide with different sizes of pipe, although carriers of the same size will run through pipes having considerable variation in size because of the elasticity of the legs, and I prefer to provide quite a number of legs upon both the ring T and the armature, as shown, so that the device may be properly centered in the tube, and also so that there may be a sufficient number of legs to secure the requisite engagement or holding action against the walls of the tube or conduit.

I do not limit myself to the details of construction shown and described.

It is obvious that alterations may be made in the details of construction of the parts and that other parts may be substituted for some of those mentioned by me and still the essentials of my invention be employed. It is also obvious that if the tube or conduit be of metal the induction-wire E is all that need come from the generator, because the return-current may be made through one or more of the legs to the metallic conduit itself. I prefer, however, to employ the two circuit-wires E and F; also, the wire E or F may be employed after the carrier has passed through the pipe as the means for pulling the permanent conductor through, or if it be too heavy then such wire may pull through another stronger cord or wire, which will in turn pull the conductor itself through. When so used, it will not be necessary to employ the traction-cord G.

I claim—

1. The combination, in a carrier, of an electro-magnet, an armature having a retractile spring, means connected with the armature, and other means connected with the magnet which bear against the walls of the tube, both of said means being adapted to resist rearward movement, whereby the attraction of the armature by the magnets effects a forward movement of the magnets and the action of the armature-spring effects a forward movement of the armature, substantially as set forth.

2. The combination, in a wire-carrier, of an electro-magnet, an armature, a spring or springs for retracting the armature, elastic legs attached to the armature, and other similar legs attached to the magnets, substantially as set forth.

3. The combination, in a wire-carrier, of an electro-magnet, an armature, a spring or springs for retracting the armature, elastic legs attached to the armature, other similar legs attached to the magnets, and longitudinally-moving rings provided with cords adapted to slide over the legs and draw them inwardly, substantially as set forth.

4. The combination, in a wire-carrier, of an

electro-magnet, a sliding armature, a spindle projecting beyond the magnets upon which the armature slides, a spring or springs attached to the spindle, which engage with the armature, and devices actuated by the movement of the armature which engage with the sides of the tube, and other devices for supporting the magnets, substantially as set forth.

5. In a wire-carrier, an electro-magnet, an armature, means for retracting the armature, and spider-legs attached both to the armature and to the magnets and provided with rearwardly-extending barbs, substantially as set forth.

6. In a wire-carrier, an electro-magnet, an armature, means for retracting the armature, spider-legs attached both to the armature and the magnets, provided with rearwardly-extending barbs, and means for drawing the spider-legs inwardly, operated by a cord or wire extending to the rear end of the tube, substantially as set forth.

7. In a wire-carrier, an armature provided with springs for its retraction and having legs attached to it extending from the armature to the inner walls of the tube, an electro-magnet, and a movable ring provided with means to pull the same rearwardly, adapted to slide over the inclined surface upon the legs, substantially as set forth.

8. In a wire-carrier, an electro-magnet and an armature provided with springs for its retraction and having legs attached to it extending from the armature to the inner walls of the tube, said legs having rearwardly-extending barbs or points to engage with the walls of the tube, substantially as set forth.

9. The combination, in a wire-carrier, of an electro-magnet provided with an armature, means attached to the armature which engage with the walls of the tube, and other means attached to the magnets, which likewise engage with the walls of the tube, said means being (both of them) provided with devices whereby they catch on the walls of the tube when moved in one direction, but not when moved in the other direction, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 22d day of January, A. D. 1892.

STEPHEN R. BRADLEY.

Witnesses:
PHILLIP ABBOTT,
J. E. HOFFMAN.