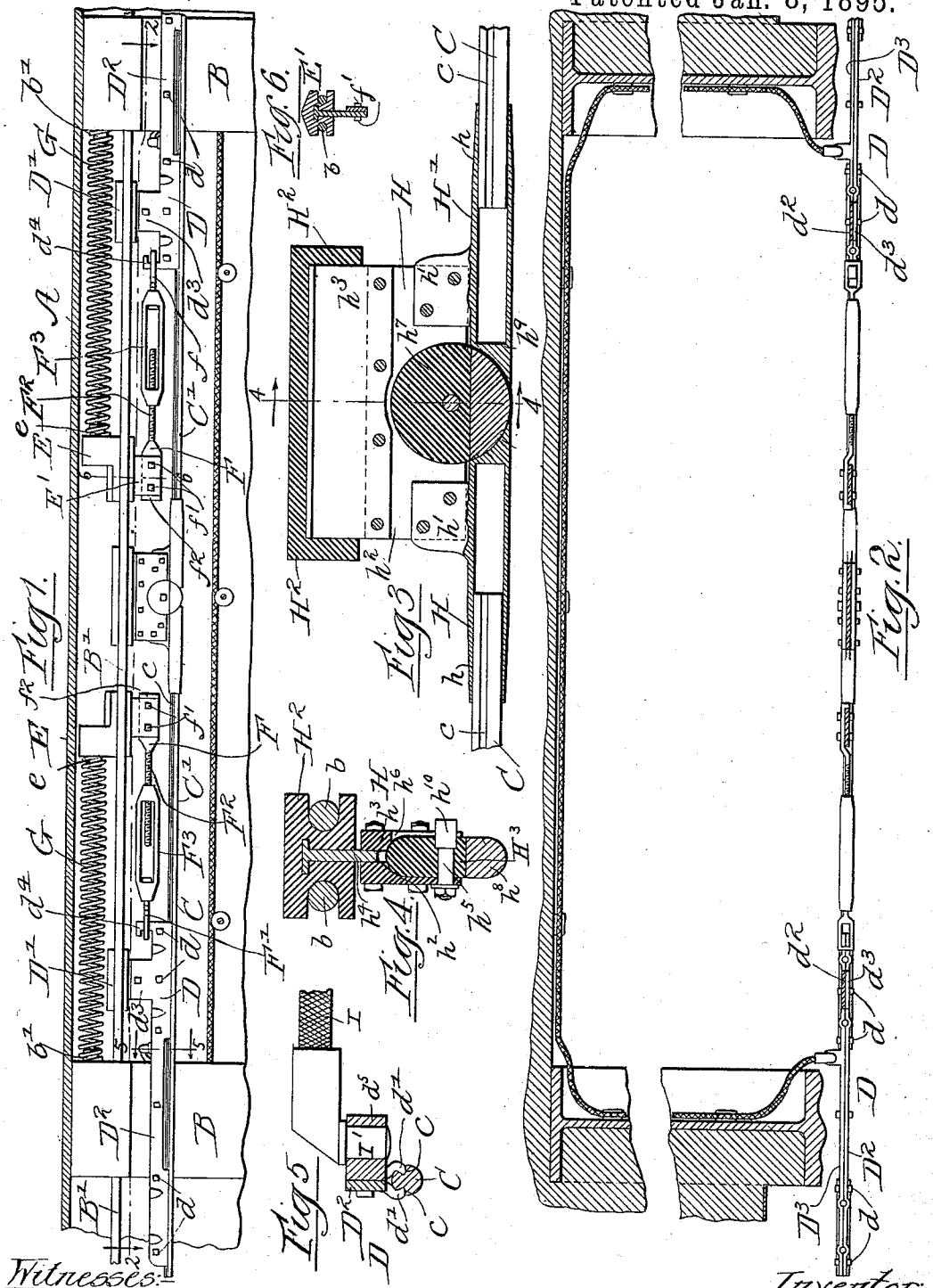
(No Model.)

J. C. LOVE.

TENSION DEVICE FOR ELECTRIC CONDUCTORS.

No. 532,166. Patented Jan. 8, 1895.



Witnesses:
Wm. F. Fleming.
Wm. M. Sheem.

Inventor:
John C. Love
by Dayton, Poole & Brown Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN C. LOVE, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LOVE ELECTRIC TRACTION COMPANY, OF SAME PLACE.

TENSION DEVICE FOR ELECTRIC CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 532,166, dated January 8, 1895.

Application filed May 9, 1894. Serial No. 510,654. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. LOVE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tension Devices for Electric Conductors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in devices for maintaining the line wires or conductors of electric railways under sufficient tension to prevent their sagging materially between the insulators upon which they are supported, or from being unduly neglected by the pressure of the traveling contact devices carried by the car; and it relates more particularly to improvements in tension devices for the purposes referred to of a character similar to that set forth in my prior patent, No. 511,345, granted December 26, 1893.

The invention consists in the matter hereinafter set forth and particularly pointed out in the appended claims.

In the practice of my invention the line wire or conductor to which the tension devices are applied is provided in separable sections of any desired length, and the sections are supported in such manner as to be capable of considerable longitudinal movement relatively to each other and to the road bed. At one or both of its ends each section of wire is secured to a movable or sliding insulating block mounted to slide longitudinally on horizontally arranged guides, and to which are connected tension devices adapted to draw taut the line wire. The continuity of the line wire as a whole is maintained by providing the adjoining ends of the sections with a sliding or telescopic joint permitting free longitudinal movement of the sections with relation to each other.

My invention is more especially designed for use in connection with the line wire of underground conduits and is accordingly so illustrated in the accompanying drawings.

In said drawings: Figure 1 is a longitudinal section of the upper portion of an electric conduit in which the line wires or conductors are provided with tension devices embodying one practical form of the invention. Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1. Fig. 3 is a longitudinal sectional detail of the telescopic connection for joining two adjacent sections on the line wire. Fig. 4 is a transverse sectional detail thereof taken on line 4—4 of Fig. 3. Fig. 5 is a transverse sectional detail taken on line 5—5 of Fig. 1. Fig. 6 is a similar view taken on line 6—6 of Fig. 1.

A designates a slotted underground conduit for electric railways and B B two of the yokes thereof.

C is a line wire supported longitudinally of the conduit upon any suitable insulators adapted to permit longitudinal movement of the line wire. The insulators disclosed in my prior patent, No. 511,344, granted December, 26, 1893, for example, may be conveniently used in this connection.

The line wire C is divided into separable sections C′, of any desired length from a hundred to a thousand feet or more or less, according to the circumstances of the case. Said sections C′ are each engaged at one or both ends by clips D which depend from insulating blocks D′ mounted to slide upon longitudinally extending stationary guides B′. As herein shown the guides B′ comprise parallel rods *b b* extending between the adjacent yokes B B, and the insulating blocks D′ are provided on opposite sides with longitudinal grooves which are engaged by the rods *b* when the blocks are placed between said rods. The clips D are herein shown as conveniently formed by two elongated plates D^2 and D^3 which are detachably secured together by bolts *d* so as to tightly embrace the wire C between their lower edges. Said wire is in this instance provided with longitudinal grooves *c c* and the lower edges of the plates D^2 D^3 are shaped to form jaws *d′* which engage said grooves and thus firmly grasp the wire. Near their forward ends the plates D^2 D^3 are pro-

vided with upwardly extending portions d^2 d^3, of which the part d^2 of the plate D^3 rises above the part d^3 and is embedded in the insulating blocks D′, thereby rigidly connecting the clip and blocks.

E designates an insulating block which is mounted to slide between the rods b b in the same manner as the block D′, and is elongated or has a long bearing on the said rods, in order that it may slide smoothly thereon. Said block D′ is connected with the clip D by a link or coupling rod F. The latter, as herein shown, is attached to the clip D by being formed at its rear end F′ with a loop f which detachably engages an upward projecting hook shaped lug d^4 on the front end of the clip. At its front end F^2 the link F is flattened as shown and is secured by bolts f' to the side of a downwardly projecting plate E′ the upper portion of which is embedded in the insulating blocks E. The extreme front edge f^2 of the flattened end F^2 of the link is furthermore herein shown as turned or bent laterally (Fig. 2) so as to hook over the front edge of the plate E′ and thus afford a shoulder adapted to directly resist the strain coming on the link. A turn buckle F^3 pivotally engaging the rear end F′ of the link and having a screw threaded engagement with its front end F^2 permits the length of the link F to be adjusted as desired.

G designates a coiled compression spring inserted between the back of the block E and the face of the adjacent yoke B, suitable lugs e and b' being in this instance provided on the block and yoke in position to enter or engage the ends of the spring and thereby maintain the same in position. Said spring G will obviously exert constantly a yielding pressure on the back of the block E tending to thrust the same forward on the rods b, and serving to draw taut the connected section C′ of line wire.

The tension device made as described is superior to that shown in my prior patent, No. 511,345, not only by reason of being more simple in structure, but from the fact that in the device of said prior patent the tension is transmitted to the conductor through an inclined tie-rod, while in the present case the use of the plate E′ which projects downwardly from the insulating block E, which block is elongated to have a long bearing on the guide-rods, brings the point of connection of the rod F in line with its point of connection with the clip D, so that said rod is parallel with the conductor and strain is exerted longitudinally instead of obliquely on the said conductor.

Tension devices of the construction thus described will usually be provided in pairs, one connected with each of the adjacent ends of two adjoining sections C′ of the line wire, as shown in Figs. 1 and 2, and with their springs acting in opposite directions against the faces of two adjacent conduit yokes B′. The extreme ends of the adjoining sections C′ must obviously be left separated by a sufficient space to permit the ends of said sections to approach each other or separate as the tension devices operate to take up any slack which may occur in said sections. The practical continuity of the line wire between the sections is, however, preserved by means of a telescopic connection H comprising a tubular sleeve H′ adapted to receive the ends of the sections C′ and depending from an insulating block H^2 which is in this instance mounted upon guide rods b. As herein shown said telescopic connection H is so constructed as to permit the interruption of the circuit between the adjoining sections C′ at will. To this end the sleeve H′ is formed of two separate sections h provided with upwardly projecting lugs h' h' which are rigidly bolted between the opposite ends of parallel plates h^2 h^3 of insulating material. Said plates h^2 h^3 are herein shown supported from the block H^2 by being bolted to the opposite sides of an intermediate plate h^4 at the lower edge thereof, the upper portion of said plate being embedded in the insulating block H^2. Midway between its ends and at a point slightly above its lower edge the plate h^2 is apertured to receive a stud h^5 upon which is mounted a revoluble disk H^3 of such diameter that the lowermost part of its perimeter is substantially in line with the lower edge of the sleeve H′, said disk being inserted within a suitable recess h^6 provided centrally in the plate h^3. Said disk H^3 is composed of a larger segmental portion h^7 of insulating material through which the stud h^5 is passed, and a smaller segmental portion h^8 of copper or other suitable conducting material. The inner ends h^9 of the sleeves h terminate on a curve concentric with the disk H^3, and having a radius equal to the radius of said disk so that said ends constantly engage the perimeter of said disk H^3. Consequently when the disk is turned to bring the conducting segment h^8 between the ends h^9 of the sleeve the latter will be electrically connected and the current will pass from one of the sections C′ of the conductor to the other through the sleeves h and the conducting segment h^8 without interruption. Obviously, however, when the disk is rotated to bring the insulating section lowermost and between the ends h^9 of the sleeves the passage of the current will be interrupted. Preferably the width or thickness of the disk H^3 and the radial thickness of the conducting segment h^8 are made substantially equal to the outer diameter of the sleeves h so that the area in cross section of the segment h^8 is ample to transmit the current which may pass through it. To enable the disk to be readily rotated when desired the stud h^5 is made to revolubly engage the plate h^2 and is formed with an enlarged square outer end h^{10} which is adapted to be engaged by a suitable wrench, and causes the disk H^3 to rotate with the stud when the wrench is so applied to the latter. Under the

most favorable conditions, however, the telescopic connection H will offer more or less resistance to the passage of the current, because of the sliding joint between the ends of the sections C′ and the sleeves *h*, and the joint between the inner ends of said sleeves and the conducting segment h^8. For the purpose, therefore, of affording a more perfect electrical connection between the adjoining sections C′, I provide a short flexible conductor I, preferably provided with an insulating covering, suitably connected at its ends to said sections C′ and extending loosely around the telescopic connection H. As herein shown said flexible conductor is provided at its ends with metallic plugs I′ adapted to be tightly fitted within sockets d^5 on the clips D. When the plugs I′ are inserted in the sockets d^5 the current is obviously free to pass from one section C′ to the next through the flexible conductor I without diminution by the resistance offered by the coupling H. By pulling out one of the plugs I′ the connection afforded by the conductor I may, however, be broken, and the current may then be entirely interrupted by rotating the disk H^3 to bring its insulating segment h^7 between the sleeves *h*. Between its ends the conductor I may be supported in any convenient manner as by insulators *i* projecting from the walls of the yokes and conduit. Said conduit will usually be enlarged, as shown to form a man-hole, (not shown) wherever the tension devices are located, to permit free access to said tension devices.

While the tension devices are in this instance provided in pairs, one applied to the end of each of the adjoining sections it will be understood that each device operates entirely independently of the other and would operate as well, so far as its own section is concerned, if the adjoining end of the next section were rigidly secured instead of being also supplied with a yielding tension device. Moreover although ordinarily intended to be applied to both ends of each section it is obviously practicable to provide a tension device embodying my invention at one end only of each section by attaching the other end of the section rigidly to the conduit. All such and similar constructions obviously come within the spirit of my invention.

I claim as my invention—

1. The combination with the yokes of a conduit and a conductor, of a guide rod or rods attached to the yokes, an insulating block sliding on said guide rod or rods, a clip for supporting the conductor secured to said insulating block, a second insulating block also sliding on said guide rods, a plate secured in said second insulating block, an adjustable coupling rod connected at its ends with the said clip and plate, and a compression spring applied between the said second insulating block and an opposing surface of one of said yokes, substantially as described.

2. The combination with a conductor consisting of a plurality of sections which are free to move longitudinally with relation to their supports, of a telescoping coupling for connecting the ends of the adjacent sections comprising insulated sleeves to receive the ends of the conductor sections, and a revoluble disk consisting of conducting and non-conducting parts and engaging at its periphery the inner ends of said sleeves, substantially as described.

3. A telescoping connection between the sections of an electric conductor comprising an insulating plate, sleeves attached to said plate to receive the ends of the conductor sections, and a revoluble disk mounted on said insulating plate with its periphery engaging the inner ends of said sleeves, said disk being provided with conducting and non-conducting parts, substantially as described.

4. The combination with a conductor which is free to move endwise relatively to its supports, of a tension device comprising a guide-rod or rods arranged parallel with the conductor, a sliding insulating block supported by said guide rod or rods, a supporting clip for the conductor attached to said insulating block, a second insulating block also adapted to slide on said rod or rods and having an elongated bearing thereon, a plate attached to said insulating block and extending toward the conductor, an adjustable coupling rod connected at its ends with said clip and plate, and a spring applied to act on the second insulating block for maintaining tension on the conductor, substantially as described.

5. The combination, with a sectional conductor, of means for electrically disconnecting two adjacent sections of the conductor comprising a revoluble disk which is mounted at one side of the conductor and projects between two adjacent parts of the same, said disk consisting of conducting and non-conducting parts, and being in contact at its periphery with the adjacent parts of the conductor, which latter are made concave to fit closely against the periphery of the said disk, substantially as described.

6. A tension device for electric conductors comprising guide-rods, an insulating block, a clip attached thereto and engaging the conductor, said clip being provided at one end with a hooked projection, a second sliding insulating block having an elongated bearing on said guide-rods, a plate secured in the same and extending toward the conductor, and a coupling rod provided with a turn-buckle and having at one end a loop or eye to engage the hooked end of the said clip and at its opposite end with a lateral projection adapted to engage the said plate, substantially as described.

7. The combination with a slotted underground conduit and a conductor therein, of an insulating block, longitudinal guides supporting said block, a clip secured in said in-

sulating block and engaging the conductor, a second insulating block supported by said guide-rods and having an elongated bearing thereon, a plate secured in said second insulating block and extending toward the conductor, an adjustable coupling rod provided with a turn-buckle and connected at its ends with said clip and plate, and a compression spring applied between said second insulating block and an opposing surface of the conduit, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN C. LOVE.

Witnesses:
C. CLARENCE POOLE,
W. S. HALL.