J. A. SLOAN.

MEANS FOR REMOVING ICE FROM TROLLEY WIRES.

APPLICATION FILED JAN. 6, 1911.

1,021,637. Patented Mar. 26, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

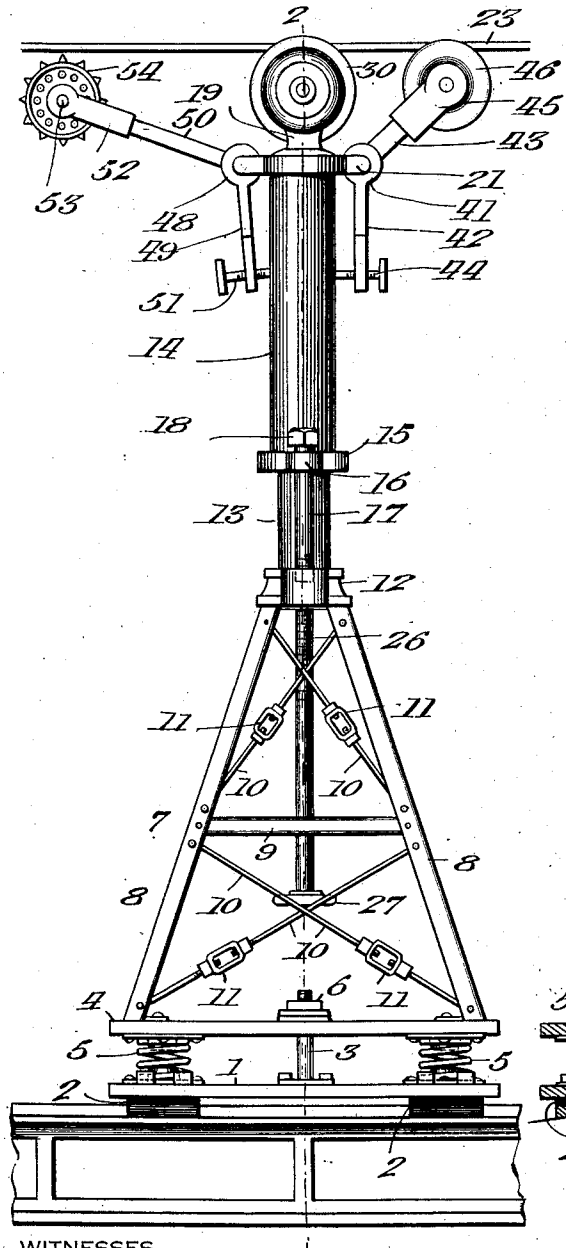
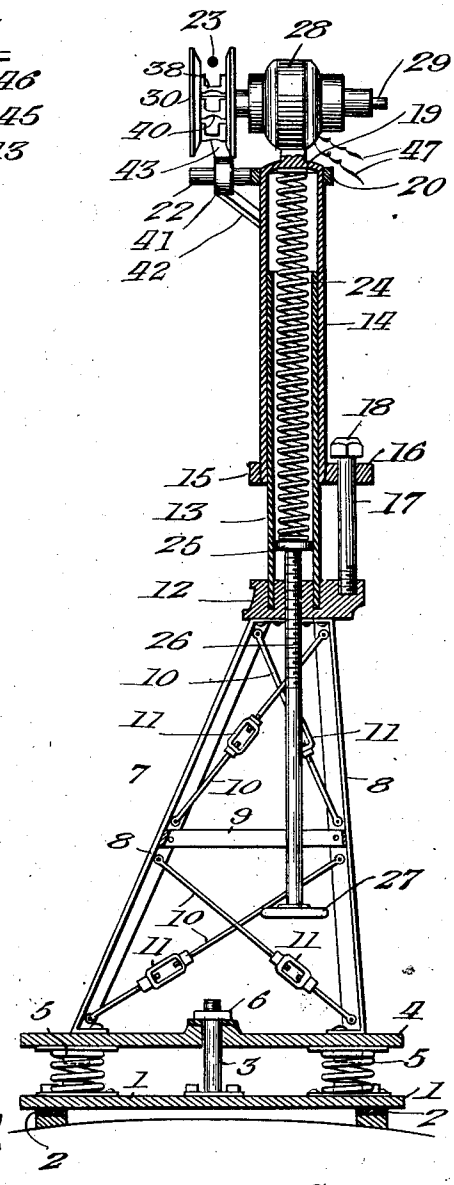


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

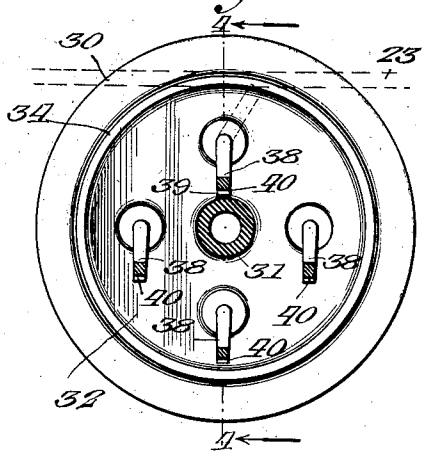


Fig. 4.

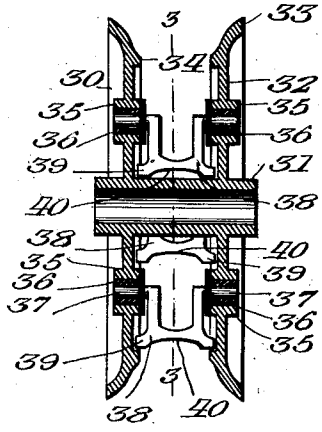


Fig. 5.

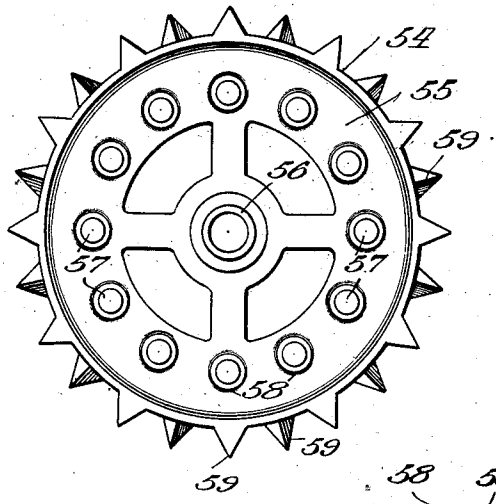


Fig. 6.

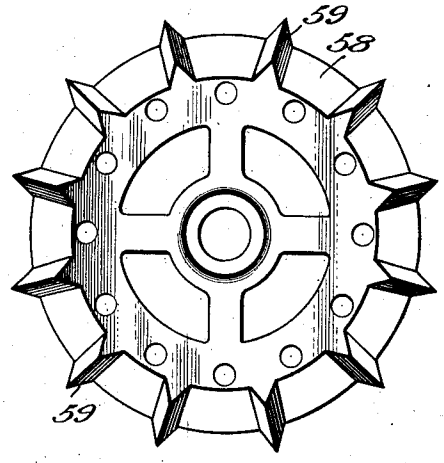
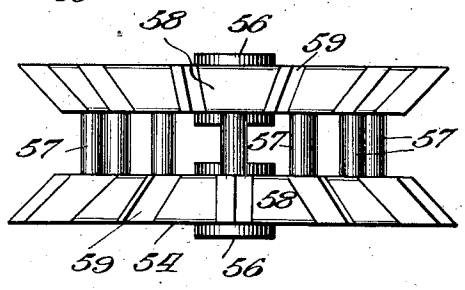


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN ALONZO SLOAN, OF WESTVILLE, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES H. SCHMIDT, OF DANVILLE, ILLINOIS.

MEANS FOR REMOVING ICE FROM TROLLEY-WIRES.

1,021,637. Specification of Letters Patent. **Patented Mar. 26, 1912.**

Application filed January 6, 1911. Serial No. 601,117.

To all whom it may concern:

Be it known that I, JOHN ALONZO SLOAN, a citizen of the United States, residing at Westville, in the county of Vermilion and State of Illinois, have invented a new and useful Means for Removing Ice from Trolley-Wires, of which the following is a specification.

This invention has reference to means for removing ice from trolley wires, and its object is to effect the freeing of the wire from ice accumulated thereon without scraping or burning the wire.

In accordance with the present invention there is provided a trolley pole designed to be applied to the top of a car with a trolley wheel designed to collect current from the trolley wire, which current may be employed in the usual manner for operating the car, and, also, for feeding a motor for driving a clearing device designed to knock the ice from the trolley wire without injury to the wire either from scraping or burning, which latter occurs where ice wheels are used to not only break off the ice but collect the current for running the car. Since it sometimes transpires that the ice accumulating on the trolley wire freezes hard between the last run at night and the first run in the morning, provision is made for the use of an ice breaking wheel carried by the same trolley arm or pole which carries the current collecting wheel or roller and the ice removing wheel. Under these circumstances the ice shattering wheel is not designed to carry current, but to simply break the ice by engaging the trolley wire, but since no current passes through this wheel the danger of burning the trolley wire is entirely avoided. The current collecting wheel or roller is in trailing relation to either or both the ice shattering wheel and the ice removing device, so that the collecting wheel travels upon the wire after being freed from the ice and arcing with consequent burning is avoided.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that while the disclosure of the drawings is of an operative structure, the invention is capable of other embodiments and consequently is not limited to the exact showing of the drawings.

In the drawings:—Figure 1 is a side elevation of the invention as applied to a car. Fig. 2 is a section on the line 2—2 of Fig. 1 with some parts shown in elevation. Fig. 3 is a section of the ice removing wheel on the line 3—3 of Fig. 4. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a side view of the ice breaking wheel. Fig. 6 is an elevation of the inner face of one side of the ice breaking wheel. Fig. 7 is a plan view of the structure of Fig. 5.

The present invention is designed to be mounted on a car which may be a special car to be sent over the road before the beginning of traffic in order to clear the trolley wires of accumulated ice, such as is apt to occur during what is usually designated a sleet storm, or when the temperature is such that falling rain freezes at once, thus coating the trolley wire with a sheet of ice, which under some conditions becomes quite thick and hard, preventing the running of the cars, so long as the covering remains. It is customary to apply to the ordinary trolley poles or arms collecting wheels provided with ribs designed to engage ice upon the trolley wires to shatter the same, and so cause its removal, but such wheels are uncertain in action, and since they are used to convey the current for feeding the car motors, constant arcing occurs, which results in the burning and roughening of the trolley wires, quickly deteriorating such wires.

In accordance with the present invention there is mounted on the car roof a platform 1 which may be electrically separated from the car by insulation 2. The platform 1 carries at its center a king bolt 3, by means of which there is connected to the platform 1 another platform 4 with interposed springs 5 spacing the platform 4 from the platform 1 to an extent permitted by the bolt 3, which may have a nut 6 applied thereto, so that the springs 5 will always be under some compression, these springs permitting such yielding of the platform 4 as may be necessary in the operation of the device. The platform 4 carries a supporting skeleton structure 7 made up of inclined angle iron posts 8 with cross braces 9 and diagonal straining rods 10 which may be provided with turn buckles 11, so that the frame 7 becomes a

short skeleton tower. On top of the tower 7 is a head block 12 from which rises a tube 13 fast at the lower end of the block in any appropriate manner. Surrounding the tube 13 and movable thereon is another tube 14 fitting the tube 13 with sufficient snugness to prevent side motion, but not interfering with longitudinal movement of the tube 14 on the tube 13. The tube 14 is formed at its lower end, or has attached thereto a collar 15 serving to strengthen this part of the tube, and at one side this collar has an offset 16, provided with a perforation for the passage of a bolt 17 having at its upper end a head 18 and at the other end secured in the head block 12 by being screwed thereinto or in any other suitable manner. The bolt 17 operates as a positioning guide for the tube 14, permitting the latter to move on the tube 13 lengthwise of the latter, but holding it in an otherwise fixed relation to the tube. The upper end of the tube 14 is closed in by a head or cap 19 and is surrounded by a collar 20, on opposite sides of which there are formed offsets 21 each carrying a rod or pin 22. These pins project in parallel relation one to the other toward the same side of the tube 14, so that when the structure is in use the outer ends of the pins will underride or approach underriding relation to a trolley wire, such wire being indicated at 23, while the longitudinal axis of the tube 14 is displaced with relation to the trolley wire to one side thereof. The purpose of the pins 22 will appear hereinafter.

Within the tubes 13 and 14, these tubes being in telescoping relation, there is housed a spring 24 of the extension type, this spring engaging at the upper end against the inner face of the head 19 and at the other end engaging against a plate 25 at the corresponding end of a screw rod 26 threaded through the head 12 and entering the tube 13, the other end of the rod being carried down into the frame 7 and there provided with a hand wheel 27 for manipulation, the purpose of the rod 26 being to determine the tension of the spring 24 with a normal tendency to elevate the tube 14, but yieldable to the action of the trolley wire, as will hereinafter appear.

Mounted on the head 19 is an electric motor 28 preferably of the inclosed type, but the particular type of motor is immaterial to the present invention, its purpose being to impart rotative movement to certain structures irrespective of the travel of the car. Since the parts to be driven by the motor are comparatively small, the motor may be of very small size, taking no material amount of current. The motor 28 is provided with an armature shaft 29, and on one end of this shaft which underrides the trolley wire 23 when in operation there is mounted an ice removing wheel 30 best shown in Figs. 3 and 4. This wheel has a hub 31 carrying spaced radial webs 32 terminating in flanges 33 curving outward with relation one to the other after the manner of an ordinary trolley wheel, but at the point where these flanges join the webs 32 there is formed on each web an inwardly directed annular shoulder 34 concentric with the hub 31. Each web 32 is formed with a circular series of hollow bosses 35, the bosses of one web matching those of the other, and in the particular structure shown each series comprises four such bosses, but it will be understood that a greater or a lesser number of bosses may be provided in each web, but whatever the number of bosses employed, those in one web should match those of the other. These bosses each contain a sleeve 36 of insulating material forming a bearing for a pintle 37 on the corresponding end of a wing 38 shown as a U-shaped frame with the pintles 37 projecting in opposite directions, but in alinement from the free ends of the legs of the U-frame, and at the junction of the legs of the U-frame with the yoke member thereof there are formed fingers 39 designed to project into the spaces defined by the annular shoulders 34. The outer edge of each wing 38 may have the form of an inset curve, as indicated at 40. These wings are insulated by the bushings 36 from the webs 32, and the engagement of the pintles 37 with their mountings is such that these wings when the wheel 30 is not rotating will hang pendently, but when rotative movement is imparted to the wheel the wings will fly outward under centrifugal force. When the device is in operation, the relation of the wheel to the trolley wire is such that these wings will impart blows to the ice which may have formed on the trolley wire with an energy dependent upon the speed of rotation of the motor 28, these blows tending to remove any ice which may be on the trolley wire, and unless the ice be quite hard, the blows imparted by the wings 38 are sufficient to cause the removal of the ice.

One of the pins 22 carries a hub 41 provided on one side with an arm 42 and on the other side with an arm 43 shown in the particular instances illustrated as at an angle to the arm 42. The arm 42 carries a set screw 44 designed to engage the sleeve 14 to thereby determine the position of the arm 42 with relation to the sleeve 14, but this relation may be changed at will by a manipulation of the screw 44. The other arm 43 carries a yoke 45 in which is journaled a wheel 46, such as is commonly employed for the collecting of current from trolley wires, and this wheel may be connected up in the usual manner to one side of the motor 28, the other side of which is grounded, as is customary, the conductors

leading to the motor 28 being indicated at 47 in Fig. 2. The other pin 22 carries a hub 48 on one side of which is an arm 49 and on the other side of which is another arm 50 at an angle to the arm 49 in the particular arrangement shown, while the said arm 49 carries a set screw 51 designed to engage the sleeve 14 and to regulate at will the relation of the arm 49 to the sleeve 14. The arm 50 is provided with a yoke 52 carrying a journal pin 53 designed to support an ice breaking wheel 54. This ice breaking wheel is best shown in Figs. 5, 6 and 7, and comprises two spaced side members 55, each provided with a hub 56 and joined in spaced relation by a circular series of connecting pins 57, each member 55 having a circular series of hollow bosses 58 for the reception of the ends of the pins 57, which may be secured to the members 55 in any appropriate manner. The peripheries of these members 55 are at an angle to the axis of rotation of the wheel, as indicated at 58, and these angular peripheries are formed with a circular series of teeth 59 of substantially triangular shape in cross section and set at an angle to the axis of rotation. Preferably the teeth of one wheel member 55 alternate with those of the other, while the angular peripheries face each other, so that when the wheel 54 is so carried by the arm 50 as to engage the under side of the trolley wire, the teeth 59 will come into operative relation to ice on the trolley wire to thereby break the ice by the engagement therewith of the comparatively sharp active edges of the teeth, the ice breaking wheel 54 being held against the trolley wire with any desired force due to the action of the spring 24 and the position of the arm 50 as adjusted by the screw 51.

When the weather is sufficiently cold the ice deposited on the trolley wire will often freeze quite hard during the hours intervening between the stoppage of traffic at night and the beginning thereof in the morning, so that the ice removing wheel 30 has not sufficient power to break off such ice. Under these circumstances the arm 50 is adjusted in a manner to bring the ice breaking wheel 54 into operative relation to the trolley wheel, and this wheel 54 is so positioned with relation to the ice removing wheel 30 as to travel in advance of the ice removing wheel 30, thus shattering the ice upon the trolley wire to make its complete removal by the wheel 30 a certainty. The trolley wheel 46 travels on clean wire and current is fed to the motor 28 without the production of any sparks or arcing. The same is true of the power trolley which the car is, of course, assumed to carry, for this trolley will be located in trailing relation to the ice removing apparatus which stands practically upright from about the middle of the car, although the tubes 13 and 14 are located to one side of the longitudinal central vertical plane of the car in the particular structure shown.

The springs 5 will hold the platform 4 in position to normally maintain the structure upright, but these springs will yield to any swaying of the car or change of relation sidewise between the car and the trolley wire. Should it become necessary to reverse the direction of the car, the trolley structure herein described must be turned around half way, so as to maintain the proper relation to the trolley wire. To do this the nut 6 may be removed and the platform 4 may be lifted sufficiently from the platform 1 to permit the turning of the platform 4 half way around, when a reapplication of the nut 6 will again secure the platform 4 in proper relation to the platform 1, with the springs 5 under the desired tension.

What is claimed is:—

1. A means for removing ice accumulations from trolley wires comprising a support mounted on the top of a car and of a length to extend upward from the car to a point adjacent to the trolley wire, an electric motor carried by the support, and a rotatable ice removing means carried and actuated by the motor, said ice removing means including members responsive to the action of centrifugal force on the rotation of the ice removing means to then engage the trolley wire.

2. A means for removing ice accumulations from trolley wires comprising a support adapted to the top of a car and of a length to extend upward from the car to a point adjacent to the trolley wire, an electric motor carried by the support, and rotatable ice removing means carried and actuated by the motor, said motor carried ice removing means comprising a series of wings each having an active edge adapted to engage the trolley wire and freely journaled at a point remote from the active edge, so that the wings will respond to centrifugal force under rotative movement caused by the motor.

3. A means for removing ice from trolley wires comprising a support on the top of a car and of a length to extend upward from the car to a point adjacent but laterally displaced with reference to the trolley wire, an electric motor carried by the support, ice removing means carried by the support in operative relation to the trolley wire, and current collecting means also carried by the support and individual to the motor, said current collecting means being in operative position for engagement with the trolley wire back of the ice removing means with reference to the progressive movement of the car.

4. A means for the removal of ice from

trolley wires comprising a support adapted to the top of a car and standing substantially upright in action, a motor carried by the upper end of the support, rotatable means carried and actuated by the motor for engaging the trolley wire to remove ice therefrom, a trolley wheel carried by the support for connecting the motor to the trolley wire, and a carrier for an ice shattering wheel also mounted on the support at the upper end thereof in position to engage the trolley wire in advance of the trolley wheel in the direction of travel of the car.

5. A self contained means for removing ice from trolley wires comprising a support on and insulated from the top of a car and including yielding connections adjacent the top of the car, said support being substantially upright in action and also including a telescoping section laterally displaced with reference to the trolley wire to be operated on and having a normal tendency to elongate, and ice removing means carried by the upper end of the support.

6. A self contained means for removing ice from trolley wires comprising a support on the top of a car and having means for electrically insulating the support from the car, said support being normally upright in action and including a telescoping portion laterally offset with reference to the trolley wire to be acted on and having a normal tendency to elongate, means for limiting the up and down travel of the telescoping section, and ice removing means carried by the upper end of the telescoping part of the support in position to be brought into engagement with the trolley wire to be acted on by the elongation of the telescoping portion.

7. A self contained means for the removal of ice from trolley wires comprising a support adapted to the top of a car with means for electrically insulating the support from the car, said support being normally upright in action and including a tubular member in fixed relation to the main body of the support, another tubular member in telescoping relation to the first tubular member, both tubular members being offset with reference to the longitudinal center line of the support, a spring housed in the tubular members and active to cause an elongating movement of the second named tubular member along the first named tubular member, means for limiting the elongating movement of the second named tubular member, means for adjusting the tension of the spring at will, an electric motor carried by the upper end of the second named tubular member, a current collecting wheel for the motor also carried by the upper end of the second named tubular member in position to engage the trolley wire, and an ice removing means carried and actuated by the motor in position to engage the trolley wire in advance of the current collecting means individual to the motor.

8. A means for the removal of ice from trolley wires comprising a support adapted to the top of a car and normally upright in action, said support including a tubular member in fixed relation to the main body of the support, another tubular member in telescoping relation to the first tubular member, a spring housed in the tubular members and active to cause an elongating movement of the second named tubular member along the first named tubular member, means for adjusting the tension of the spring at will, and ice removing means carried by the upper end of the second named tubular member, said ice removing means comprising an electric motor, a rotatable member carried by the motor and adapted to engage the trolley wire to remove ice therefrom, and current collecting means for coupling the motor to the trolley wire.

9. In a means for removing ice from trolley wires, a support adapted to be carried on the top of a car, an electric motor carried by the outer end of the support, ice engaging means carried and driven by the electric motor, a trolley wheel also carried by the outer end of the support for engaging the trolley wire to couple the motor thereto, and an ice shattering wheel also carried by the outer end of the support on the side of the motor remote from the trolley wheel.

10. In a means for removing ice from trolley wires, a support adapted to the top of a car, a motor carried by the end of the support remote from the car, ice engaging means driven by the motor, an adjustable carrier adjacent the motor and provided with a trolley wheel adapted to feed current to the motor, and another adjustable carrier for an ice shattering wheel on the side of the motor remote from the first named adjustable support.

11. In a means for removing ice from trolley wires, a support adapted to the top of a car and in operation extending toward the trolley wire, an electric motor carried by the outer end of the support, an ice removing rotatable member carried and actuated by the motor, a rock arm carried by the outer end of the support adjacent the motor, said rock arm being provided at one end with a trolley wheel and at the other end with an adjustable stop screw, another rock arm on the side of the motor remote from the first named rock arm, said second named rock arm also being provided with an adjusting stop screw, and an ice shattering wheel carried by the second named rock arm at the end thereof remote from the adjusting screw.

12. In a means for removing ice from trolley wires, a rotatable member provided

with spaced radial webs each having a series of insulated journal supports matching a like series of the other web, and wings provided with journals adapted to the matching journal supports and eccentric to such journal supports provided with trolley wire engaging edges.

13. In a means for removing ice from trolley wires, a rotatable member provided with spaced radial webs each having a series of insulated journal supports matching a like series of the other web, and wings provided with journals adapted to the matching journal supports and eccentric to such journal supports provided with trolley wire engaging edges, the webs being also provided with matching annular shoulders on the adjacent faces, and the wings being provided with outstanding portions adapted to move within the spaces defined by the shoulders.

14. In a means for removing ice from trolley wires, a rotatable member provided with spaced radial webs each having a series of insulated journal supports matching a like series of the other web, and wings provided with journals adapted to the matching journal supports and eccentric to such journal supports provided with trolley wire engaging edges, the webs being also provided with matching annular shoulders on the adjacent faces, and the wings being provided with outstanding portions adapted to move within the spaces defined by the shoulders, the webs having their marginal portions outturned with relation one to the other.

15. A means for removing ice from trolley wires comprising a support composed of a skeleton frame, a laterally extended platform therefor, another like platform adapted to be secured to the top of a car, a junction bolt for the two platforms, springs interposed between the two platforms for holding them elastically in spaced relation, a yielding member carried by the end of the frame remote from the platforms, and ice removing means carried by the end of the yielding member remote from the frame.

16. A means for the removal of ice from trolley wires, comprising a support consisting of a frame, a basic member therefor, another basic member adapted to be secured to the top of a car, connecting means between the two basic members, spring supports for yieldingly separating the two basic members, a telescoping member carried by the frame, a spring within the telescoping member tending to elongate the same, a spring adjusting screw carried by the frame member and engaging the spring, a motor carried by the end of the telescoping member remote from the frame, a rotatable ice removing member carried by the motor, a rock arm carried by the telescoping member adjacent the motor, said rock arm having adjusting means at one end and a trolley wheel at the other, another rock arm carried by the telescoping support adjacent the motor on the side thereof remote from the trolley wheel, said rock arm having at one end adjusting means therefor, and an ice shattering wheel carried by the other end of the second named rock arm and movable thereby into and out of active relation to a trolley wire.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN ALONZO SLOAN.

Witnesses:
JOHN B. QUARTIER,
J. P. QUARTIER.