No. 714,267. Patented Nov. 25, 1902.

J. H. WALKER.

TROLLEY POLE HARP.

(Application filed Jan. 14, 1902.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

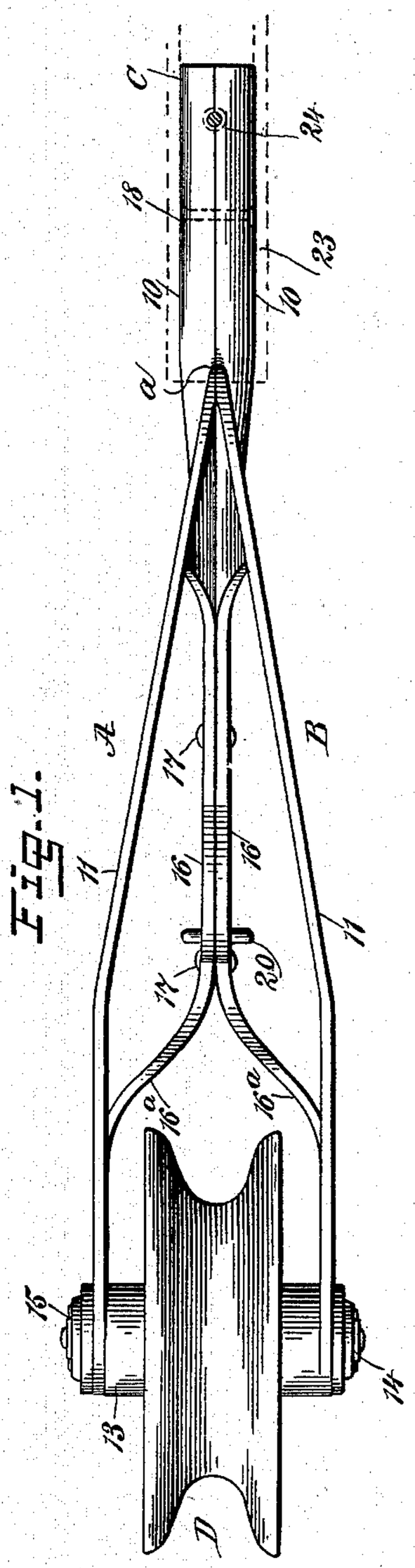
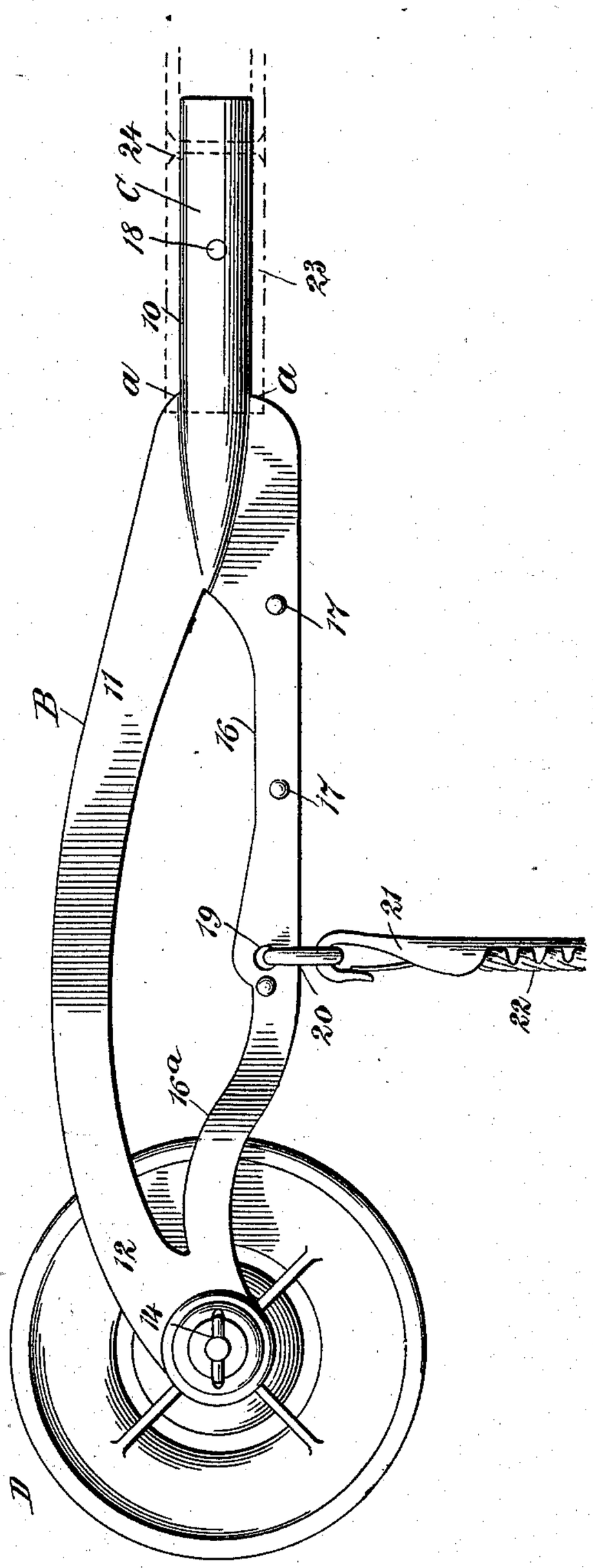


Fig. 2.



WITNESSES:

James J. Durham.

J. Fedotcher.

INVENTOR

John Henry Walker

BY

Munn & Co.

ATTORNEYS

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Fig. 3.

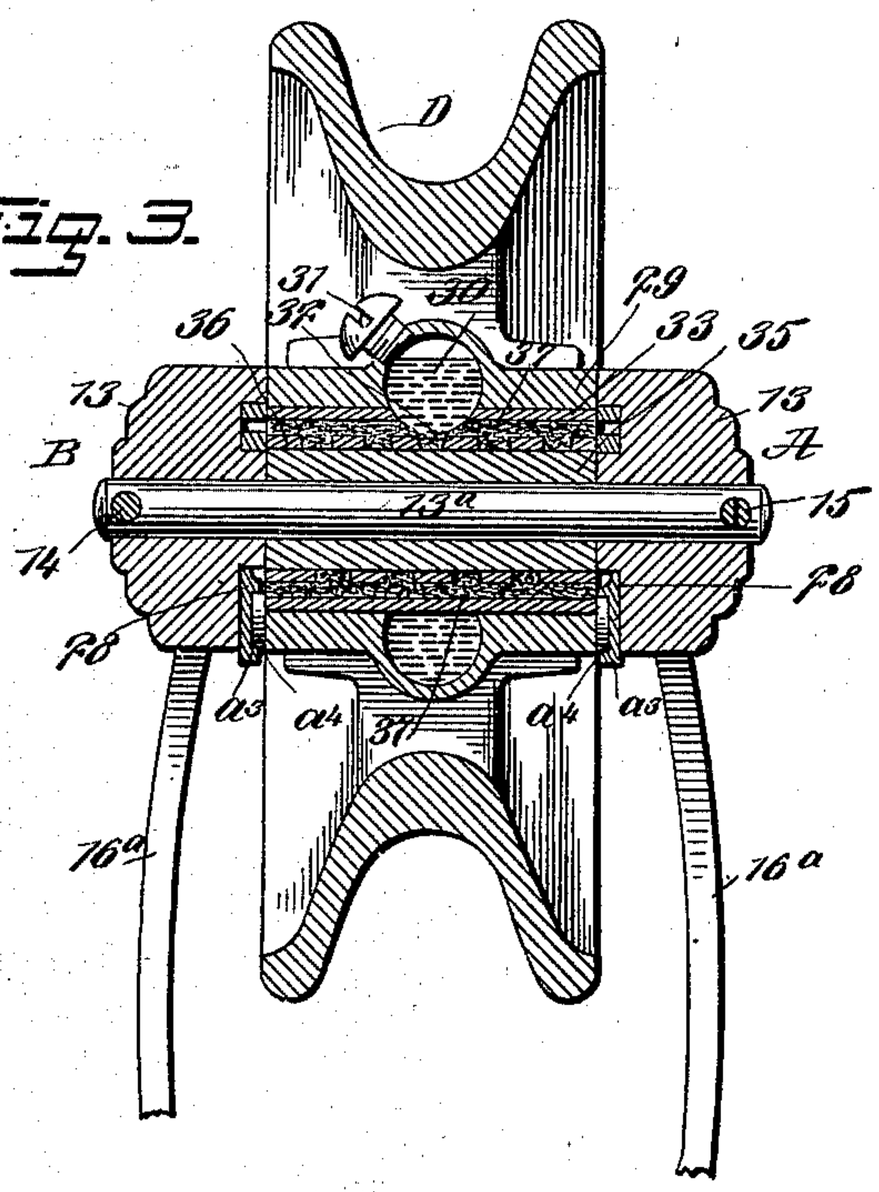


Fig. 8.

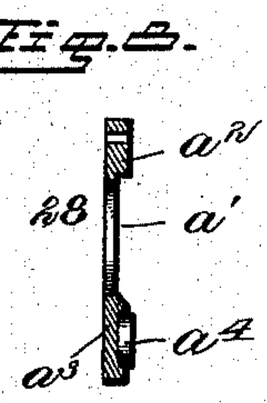


Fig. 4

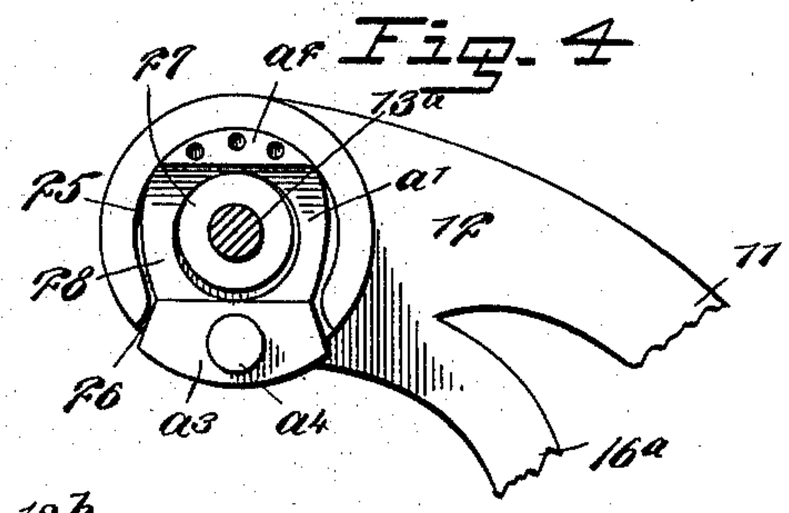
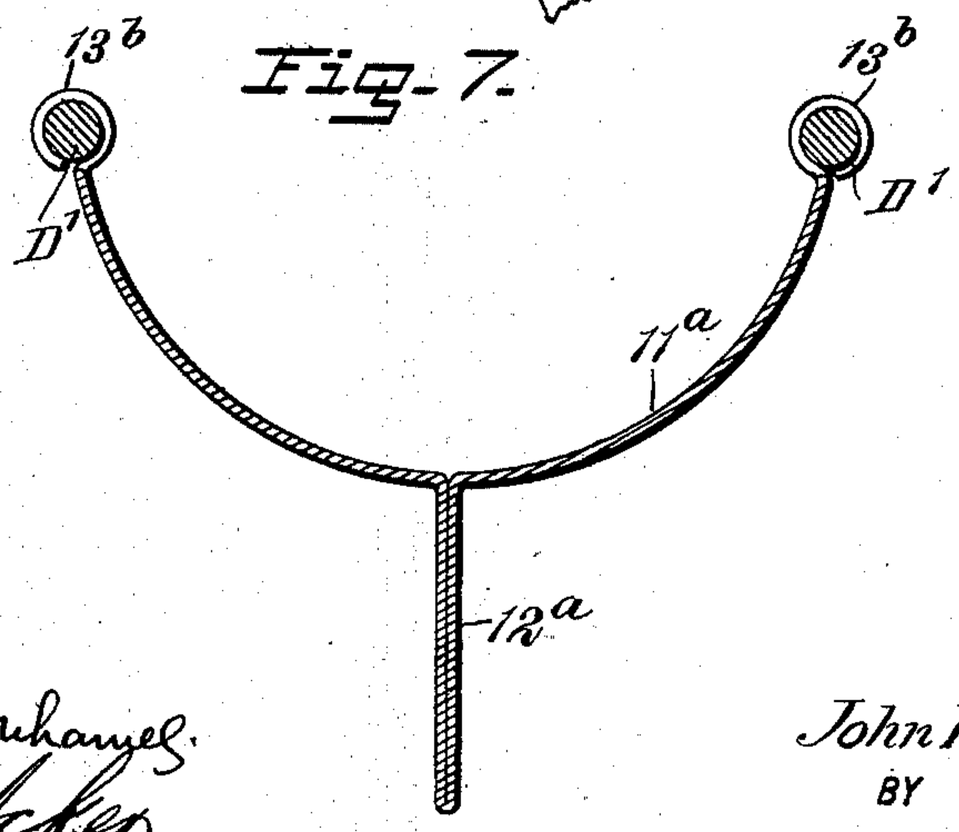


Fig. 7.



WITNESSES:

James F. Duhamel.

J. Fred Acker.

INVENTOR

John Henry Walker

BY

Munn & Co

ATTORNEYS

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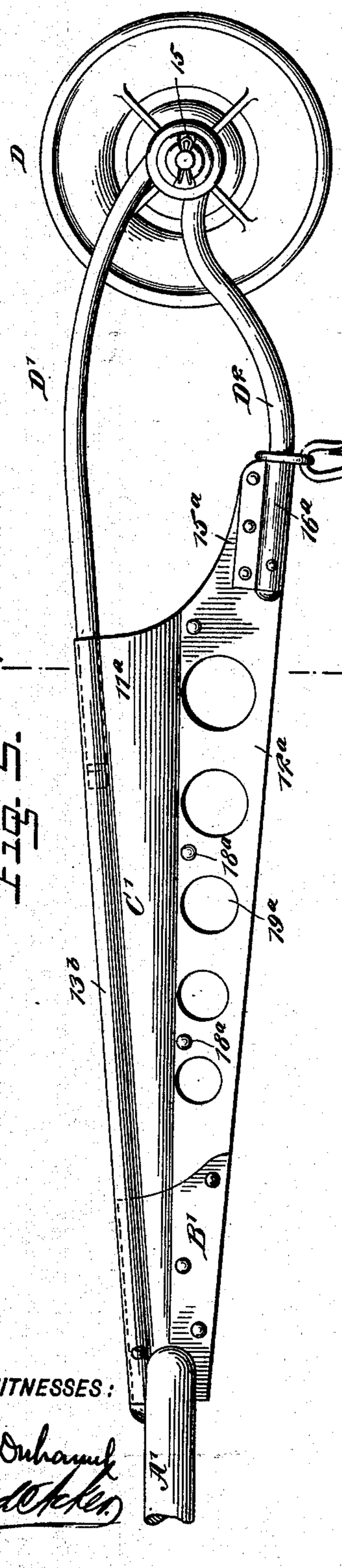

Fig. 5.

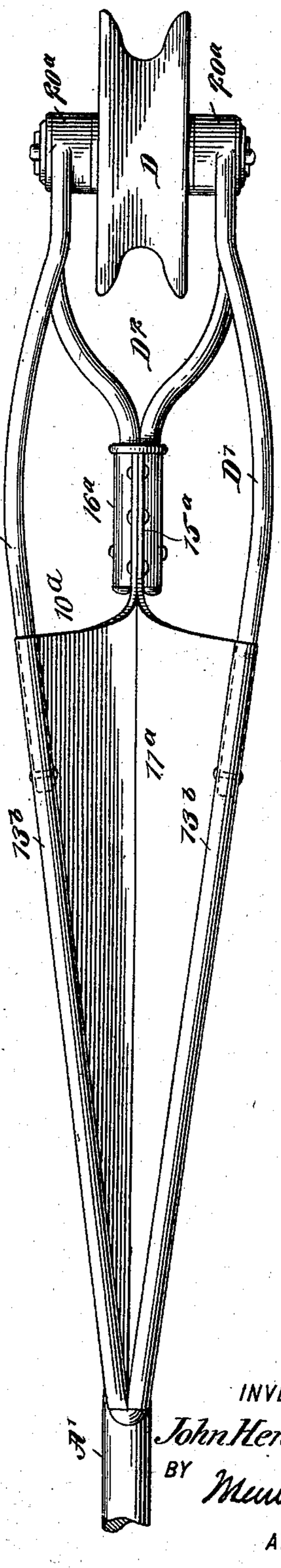

Fig. 6.

WITNESSES:

James F. Duhamel

J. Fred Acker.

INVENTOR

John Henry Walker

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN HENRY WALKER, OF LEXINGTON, KENTUCKY.

TROLLEY-POLE HARP.

SPECIFICATION forming part of Letters Patent No. 714,267, dated November 25, 1902.

Application filed January 14, 1902. Serial No. 89,697. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY WALKER, a citizen of the United States, and a resident of Lexington, in the county of Fayette and State of Kentucky, have invented a new and Improved Trolley-Pole Harp, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide a simple, light, and durable harp which will not hang up in any angle of wires and will not pull down on top of low wires nor allow wedging of the wires between the wheel and prongs of the harp.

A further purpose of the invention is to so construct the trolley-pole harp that it will not sheer off span-wires when the wheel leaves the wire, and, further, to so construct and locate the pin holding the wheel in the harp that it will last for a maximum of time and so that it will have antifriction-journals.

Another purpose of the invention is to provide a harp of such shape that it will render easy and quick the act of catching and adjusting the wire in the groove of the wheel and will cause the wheel to remain on the wire much better than under the ordinary construction, since the principal weight of the harp is not on the end of the pole, and, chiefly, to construct a trolley-pole harp that will last much longer and cause the wheel and trolley-wire proper to last much longer than under the ordinary construction of trolley-pole harps now in use.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the harp. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged vertical sectional view through the trolley-wheel and its bearings. Fig. 4 is an inner face view of a bearing-terminal of the trolley-pole harp, illustrating the contact-ring and its location. Fig. 5 is a side elevation of the trolley-pole harp, illustrating a slight difference in the construction of the body of the harp. Fig. 6 is a plan view of the harp constructed as shown in Fig. 5. Fig. 7 is a transverse section taken practically on the line 7 7 of Fig. 5, and Fig. 8 is a detail sectional view of the contact-ring.

The harp is made in two sections A and B, preferably of steel, and each section is provided with an inner member 10, semicircular in cross-section, and when these two members are brought together they form a socket member C. An upper arm 11, preferably flat in cross-section, is carried forward from the upper portion of each part of the socket member C, and said arms diverge from the socket member, and their forward ends 12 are downwardly curved to a greater or less degree, as is shown in Fig. 2, and at the forward curved ends of the arms 11 bosses 13 are formed, adapted as bearings for a spindle 13^a, which supports the trolley-wheel D between the forward ends 12 of the harp. The outer faces of the bearings 13 are provided with recesses to receive pins 14 and 15, which are passed through the ends of the spindle to hold the same from turning. The pin 14 is a plain or straight pin, while the pin 15 is a cotter-pin.

In the further construction of the body of the harp two lower arms 16 are provided. These extend forward from the lower portions of the parts 10 of the socket member C. The lower arms 16 extend forward in a straight line and in close contact with each other for a portion of their length and are outwardly and upwardly curved at their forward portions 16^a, as is shown in Fig. 1. The sections 16^a of the arms 16 meet and constitute an integral portion of the forward ends 12 of the upper arms 11, as is shown in Fig. 2. The straight sections of the lower arms 16 are held firmly together by rivets 17 or their equivalents, and these portions of the arms 16 occupy a longitudinal central position with respect to the socket member C. In fact, a line drawn longitudinally through the center of the socket member C would pass over the longitudinal center of the connected arms 16. Under this construction the harp is rendered exceedingly strong and presents the smallest possible surface for the collection of snow and ice. The outer or forward ends or prongs of the harp are sprung laterally to receive the hub of the trolley-wheel when the wheel is placed in position, the said prongs returning immediately to a proper contact with the hub

as soon as the hub is set, and the curved sections 16^a of the lower arms form inner guards for the trolley-wheel, as is shown in Fig. 1.

The two portions of the socket member C are held together by one or more rivets 18, and an aperture 19 is made in the connected arms 16, through which a ring 20 is passed to receive a snap 21, attached to the shifting-rope 22 of the harp. The socket member C of the harp is made to fit snugly in a chamber at the upper end of the trolley-pole 23 and is secured by one or more rivets 24, passed through the pole and socket member where the parts 10 of the latter are brought together, and by this means the parts of the socket of the harp are spread apart and forced to a positive contact with the pole, insuring the electric current passing in full volume from the trolley-wheel through the harp to the pole and thence to the motor of the car, and to further insure such result the upper portion of the pole is pressed to a firm engagement with the body of the harp where the arms connect with the socket member, as is shown at *a* in Fig. 2, the pole having a notch at its end which engages the end of the body of the harp, insuring a firm contact and also preventing turning of the parts.

In the inner face of each bearing 13 an annular recess 25 is made, which meets a marginal recess 26 in the bottom edge of the bearing, forming a central boss 27, apertured to receive the spindle 13^a, as is shown in Fig. 4. A contact-ring 28 is located in each recess 25 of each bearing 13, which rings are of brass and comprise a central thin spring-section a', an upper thick section a^2, and a lower brush-section a^3, which extends within the marginal recess 26 and conforms to the shape of the same, as is also shown in Fig. 4. The contact-rings are secured in the recesses 25 only at their upper thicker sections a^2, and the attachment is effected by indenting the said sections as illustrated or in any other approved manner. The spring of the sections a' is such that when the trolley-wheel is removed from the harp the brush-sections a^3 stand out from the bearings 13. When, however, the wheel is placed in position in the harp, the brush-sections are forced in the recess 26 and are protected, while at the same time they are in contact with the hub of the wheel, as is shown in Fig. 3. In order to prevent the brush-sections a^3 of the contact-rings from being unduly worn, the outer face of each of the said sections is provided with a steel stud a^4. The hub 29 of the trolley-wheel D is provided with an annular central lubricating-pocket 30, having an opening for the introduction of lubricating material and normally closed by a screw 31 or the like, and in the bottom of the lubricating-chamber an annular opening 32 is produced.

A ring 33 is snugly fitted in the hub 29 of the trolley-wheel, as is shown in Fig. 3, and this ring has an opening at one point communicating with the interior of the lubricating-chamber 30. A second ring or sleeve 35 is loosely mounted on the axle or spindle 13^a and is also within the said hub 29, and around this inner sleeve 35 a spirally-made ring 36 is located. In the space between the spirally-made ring 36 and the outer sleeve or ring 33 in the hub a packing 37, of graphite or other material adapted to conduct oil, is placed, and such packing passes through the spaces in the spirally-formed ring to engagement with the inner sleeve 35, so that the wheel when mounted on the spindle or axle 13^a turns in lubricated or antifriction bearings, and when the wheel is thus mounted the brushes a^3 of the contact-rings engage with the outer faces of the hub of the trolley-wheel, thus providing for a perfect contact.

It is to be understood that the trolley-wheel, with the graphite bearing, turns on the sleeve or ring 35, which latter is engaged at its ends by the bosses 27 and is held stationary by the pressure of the spring-arms of the harp.

In the construction of the trolley-harp shown in Figs. 5, 6, and 7, A′ represents a socket adapted to receive a trolley-pole, which socket is provided at each side of its forward end with plates B′, and these plates are flared outward in opposite directions from a point near their center to their top, and in plan view the side plates B′ are more or less V-shaped. C′ represents a body-plate, which is made of thin steel of suitable gage. The top portion 10^a of this body-plate is bowed outward in opposite directions from a point near its center and meets the bowed portions of the side plates B′. In plan view the said body-plate is also V-shaped, as is shown in Fig. 6. Thus it will be observed that at the upper portion of the body-plate a V or angular trough 11^a is formed, which continues into the corresponding portions of the side plates B′. The bottom portion of the body-plate and side plates B′ are in the form of a web 12^a, as is shown in both Figs. 5 and 7, and the web of the body-plate is attached to the web of the side plates by means of suitable rivets.

At the upper edge of each side member of the body-plate a tubular bead 13^b is formed, and this bead extends over the top portions of the side plates B′ as far as may be desired and is secured to the side plates by means of rivets or their equivalents. The forward or outer end of the web 12^a of the body-plate extends beyond the upper or trough section, forming a tongue 15^a, and at the bottom of this tongue a double socket 16^a is bolted or otherwise secured, a socket being at each side of the tongue, as shown in Fig. 6. The metal forming the web 12^a is held together by rivets 18^a or the like, as is shown in Fig. 5, and the web is lightened to a greater or less extent by a series of apertures 19^a produced therein.

In connection with the body-plate C′ two sets of prongs D′ and D^2 are employed, an upper set and a lower set. The prongs of the

upper set are bowed outward between their ends, and their inner ends are made to enter the tubular beads 13^b and are secured therein. The forward ends of the members of the upper set of prongs are curved in a downward direction. The members of the lower set of prongs D^2 are secured at their inner ends in the said sockets 16^a and are then curved upward and forward in direction of the upper prongs D' and are then carried slightly downward. Corresponding members of the two sets of prongs D' and D^2 are connected by caps 20^a in any suitable or approved manner, which caps are of the same construction as the bearings 13 shown in Figs. 3 and 4 and heretofore described.

The office or function of the circular contact-rings is to keep the electric current from breaking and forming arcs on the antifriction steel sleeve-journal and in the hub of the wheel, which proves very detrimental to the wearing and lasting qualities of both wheel and trolley-wire. This is overcome to a very great extent in the practical use of the trolley-pole harp constructed as herein described from the fact that the connections in the trolley pole and harp never permit an electric current to break, as the contact is at all times positive and can be truly relied upon under all circumstances incident to an overhead electric trolley system. The pressure of the contact-rings on the hub of the trolley-wheels is made so very delicate and light that the rotary motion of the trolley-wheel is obstructed but very little. Hence the trolley-wheel revolves very freely and comparatively without obstruction, which is conducive to the wearing qualities of both the trolley-wheel and the trolley-wire.

When a trolley-pole harp is constructed as specified, it enables a trolley harp and pole to convey all of the energy the wheel is capable of taking off of the wire to the motor under the car without loss.

It will be observed that the improved trolley-pole harp has an open construction of truss-like form, rendering it light and durable, and that the prongs of the harp are made so that they can be sprung apart with the hands to permit adjustment of the trolley-wheel on the axle or antifriction steel sleeve-journal preparatory to adjusting the pins to the same, which pins hold the antifriction steel sleeve-journal in place and prevents the prongs of the harp from spreading when the car is running around curves in the track. The principal object of the springs in the prongs of the harp is to hold the ends of the antifriction steel sleeve-journal in constant contact at all times with the inside facings of the bearings 13, thus holding the wheel against the vibrating motion and jar which are imparted to the trolley-pole harp by the vertical or up-and-down motion of the car when running.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A trolley-pole harp, comprising an end member for connection with a trolley-pole, diverging spring-arms extending forward from the end member, and a forwardly-extending member having outwardly-curved arms at its forward end connected with the terminals of the diverging arms, and a trolley-wheel carried by the harp.

2. A trolley-pole harp having spring-prongs, bearings on the prongs provided with recesses in their inner faces, and spring contact-rings located in the said recesses and secured to the prongs, the said rings being provided with a brush-section, and a central thin spring-section, as and for the purpose set forth.

3. In trolley-harps, a trolley-wheel carried thereby, and a contact-ring comprising a central thin spring-section, an upper thick section secured to the harp and a lower brush-section, substantially as described.

4. A trolley-pole harp, a trolley-wheel carried thereby, and contact-rings attached to the members of the harp and between which rings the hub of the wheel turns, the said rings each having a central thin spring-section, a thick section at one side of the spring-section for attachment to the harp and a brush-section at the opposite side of the spring-section and adapted for engagement with the hub of the wheel, as set forth.

5. A trolley-pole harp having spring-prongs provided with bearings for the trolley-wheel, each of the said bearings being provided in its inner face with an annular recess meeting a marginal recess in the bottom edge of the bearing forming a central boss, the boss being apertured to receive the spindle of the trolley-wheel, and a contact-ring located in each recess, and having a brush-section extending within the marginal recess, and adapted to engage the hub of the wheel, as set forth.

6. A trolley-pole harp constructed in two sections, each section comprising a semicircular end socket member, upper diverging spring-arms extending one from each of the socket members, lower straight arms extending forwardly and centrally below the upper arms for a portion of their length, the forward portions of the lower arms being outwardly curved and united with the terminals of the upper arms, the straight portions of the lower arms being securely fastened together, and bearings carried at the forward ends of the harp, as and for the purpose specified.

7. A trolley-pole harp constructed in two sections, each section comprising a semicircular end socket member, upper diverging spring-arms extending one from each of the socket members, lower straight arms extending forwardly and centrally below the upper arms for a portion of their length, the forward

portions of the lower arms being outwardly curved and united with the terminals of the upper arms, the straight portions of the lower arms being securely fastened together, and bearings carried at the forward ends of the harp, the said bearings being provided with recesses in their inner faces, and spring contact-rings located in the said recesses, which springs are secured at one point only, being provided opposite their point of attachment with a brush-section and a central thin spring-section, as and for the purpose set forth.

8. A trolley-harp constructed in two sections, each section comprising a semicircular socket member, upper diverging spring-arms extending one from each of the socket members, lower arms extending forwardly and centrally below the upper arms for a portion of their length, the forward portions of the lower arms being outwardly curved and united with the terminals of the upper arms, as and for the purpose set forth.

9. A trolley-harp having a socket member, upper diverging spring-arms extending from the socket member, lower arms extending forwardly and centrally below the upper arms for a portion of their length, the forward portions of the lower arms being outwardly curved and united with the terminals of the upper arms, the straight portions of the lower arms being securely fastened together, bearings at the forward ends of the harp, a shaft carried by the said bearings, and a trolley-wheel provided with antifriction-supports mounted to turn around the said shaft between the bearings therefor, the forward outwardly-curved portions of the lower arms forming a guard for the trolley-wheel, substantially as described.

10. A trolley-harp having a socket member, upper diverging spring-arms extending from the socket member, lower straight arms extending forwardly and centrally below the upper arms for a portion of their length, the forward portions of the lower arms being outwardly curved and united with the terminals of the upper arms, the straight portions of the lower arms being securely fastened together, bearings carried at the forward ends of the harp, a shaft carried by said bearings, a trolley-wheel provided with antifriction-bearings mounted to turn around said shaft between the bearings for the shaft, and spring contact-rings carried by the bearings for the shaft and arranged for engagement with the hub of the trolley-wheel, as and for the purpose specified.

11. A trolley-wheel, a shaft upon which the wheel turns, an inner ring or sleeve mounted on the shaft within the hub, the hub of the wheel being provided with a chamber adapted to contain lubricating material, an outer ring or sleeve fitted in the hub of the wheel and having an opening at one point communicating with the interior of the lubricating-chamber of the hub, a spirally-formed ring mounted on the inner ring or sleeve, and a packing adapted to conduct lubricating-oil and arranged in the space between the spirally-formed ring and the outer sleeve or ring, the packing extending in the spaces of the said spirally-formed ring, substantially as described.

12. A trolley-pole harp having spring-prongs provided with bearings, a trolley-wheel carried thereby, contact-rings held in recesses in the inner faces of said bearings, and each having a thin spring-section and a brush-section, and a stud on the face of each brush-section, for the purpose set forth.

13. A trolley-pole harp constructed in two sections, each section comprising a semicircular end socket member upper diverging spring-arms extending one from each of the socket members, lower arms extending forwardly and centrally below the upper arms and securely fastened together for a portion of their length, the forward portions of said lower arms being outwardly curved and connected with the terminals of the upper arms, bearings at the forward ends of the harp, and a ring carried by the lower members for connection with the shifting-rope of the harp as set forth.

14. A trolley-pole harp constructed in two sections, each section comprising a semicircular end socket member for connection with the trolley-pole, and spring-arms extending therefrom and provided with bearings, means for holding the two portions of the socket member together, and a rivet passing between the socket members at the point where the latter are brought together, and engaging the trolley-pole, the said rivet serving to spread apart the two parts of the socket member and force them into positive contact with the wall of the chamber of the pole, for the purpose set forth.

15. The combination with a trolley-pole, of a trolley-pole harp constructed in two sections each section comprising a semicircular end socket member, and spring-arms extending therefrom and provided with bearings for the trolley-wheel, the socket member of the harp being adapted to fit a chamber at the upper end of the trolley-pole, the upper portion of the trolley-pole engaging with the body of the harp at the point where the arms connect with the socket member, and means for forcing the sections of the socket member into positive contact with the wall of the chamber of the pole, as set forth.

16. A trolley-pole harp having spring members provided with bearings, a shaft held in said bearings, a sleeve on said shaft, a trolley-wheel mounted on the sleeve, the said bearings being each provided with an annular recess in its inner face forming a boss through which the shaft extends, and contact-rings held in the recesses in the bearings and each having a spring-section, and a brush-section adapted to engage the hub of the wheel, the bosses on the said bearings engaging the ends of the sleeve on the shaft and

held in contact therewith by the pressure of the spring members of the harp, substantially as set forth.

17. A trolley-pole harp having spring-arms provided with bearings at their forward ends, the said arms having side members and members arranged to exert inward tension on the said side members.

18. A trolley-pole harp having spring-arms provided with bearings at their forward ends, the said spring-arms having members extending inward or toward each other and connected together.

19. A trolley-harp having spring-arms comprising side members, and members connected with each other at the longitudinal center of the harp and having curved forward portions connected with the terminals of the side members.

20. A trolley-pole harp having an end or body member, spring-arms connected with the body member and provided at their forward ends with bearings for the shaft of the trolley-pole, the said arms comprising diverging side members and brace members connected with the side members at or near their forward ends.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN HENRY WALKER.

Witnesses:

GEORGE E. BILLINGSLEY,

A. A. PALMTREE.