

No. 776,064.

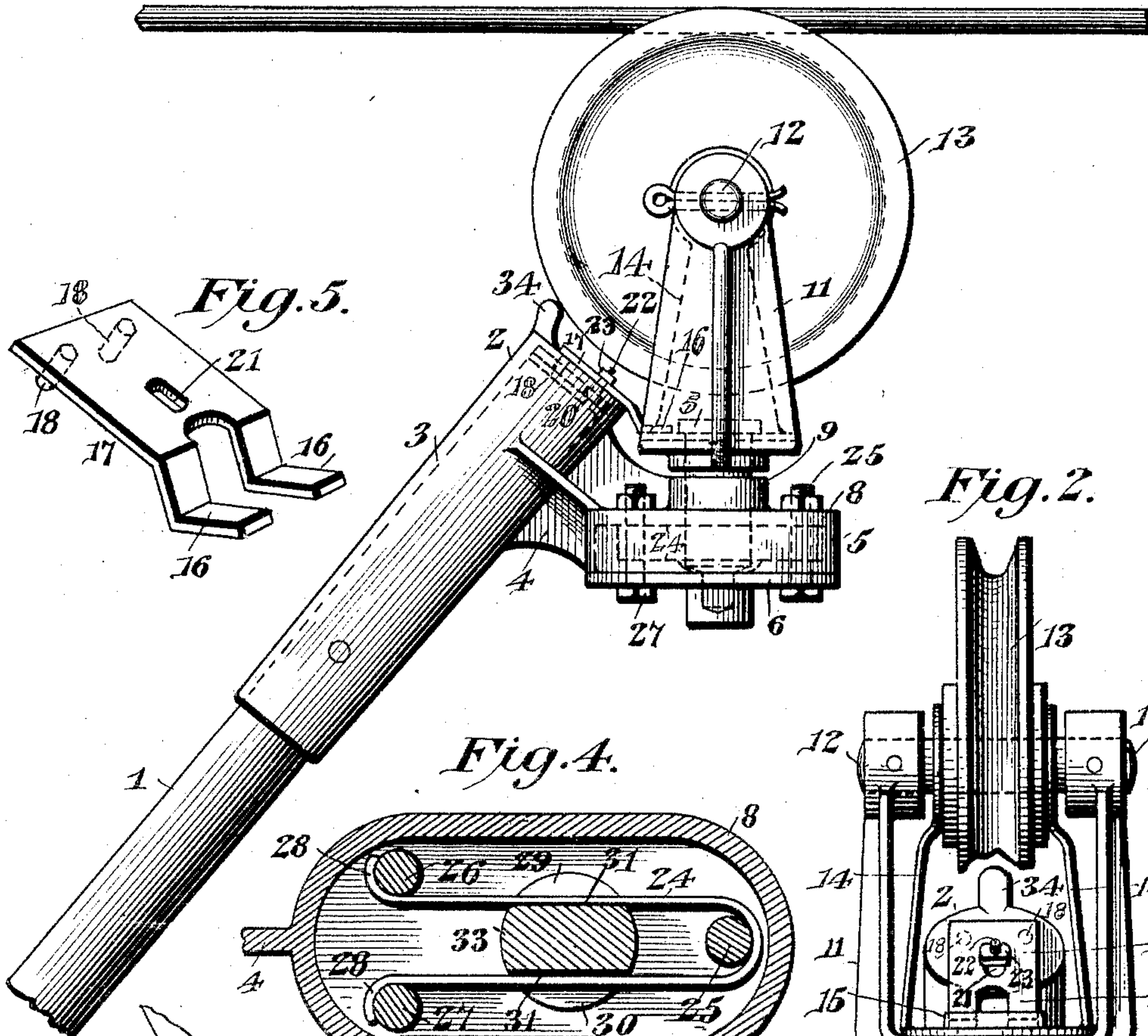
PATENTED NOV. 29, 1904.

W. A. HOLLAND.  
TROLLEY.

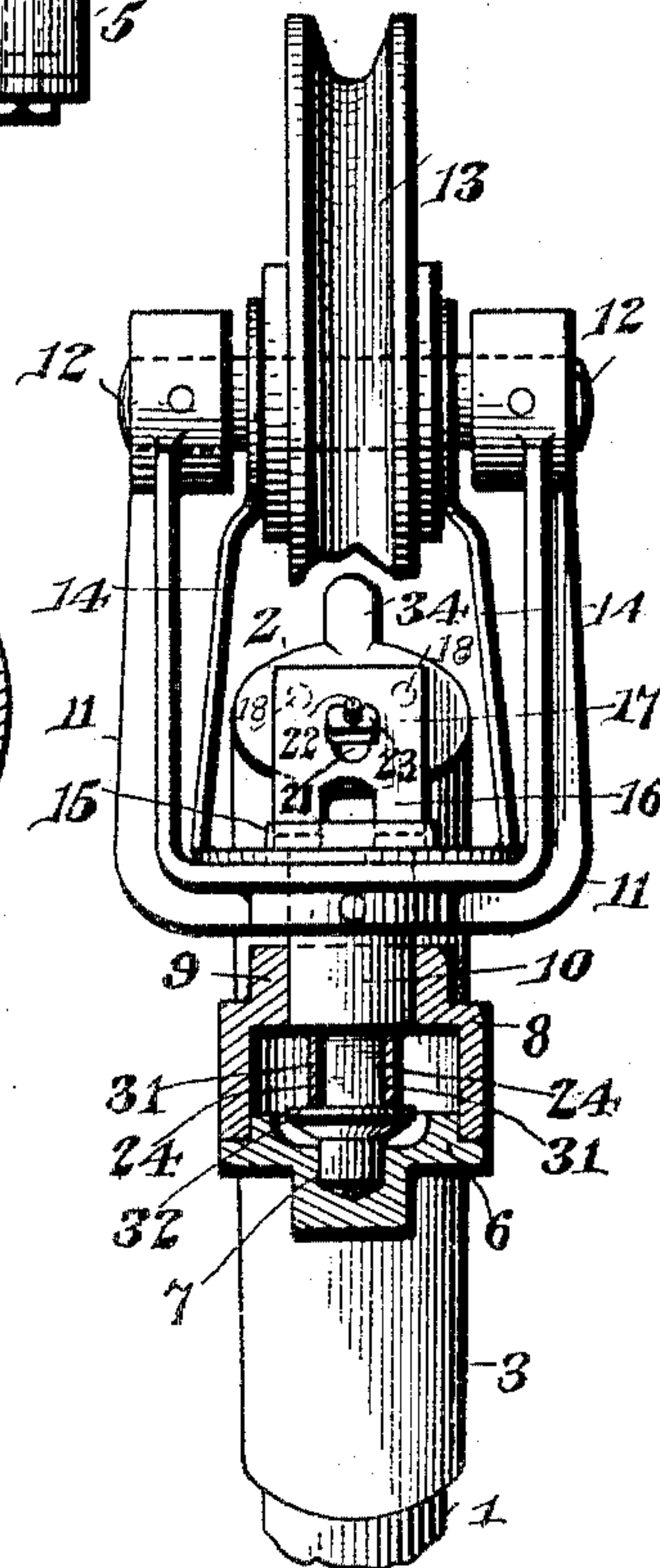
APPLICATION FILED DEC. 11, 1903.

NO MODEL.

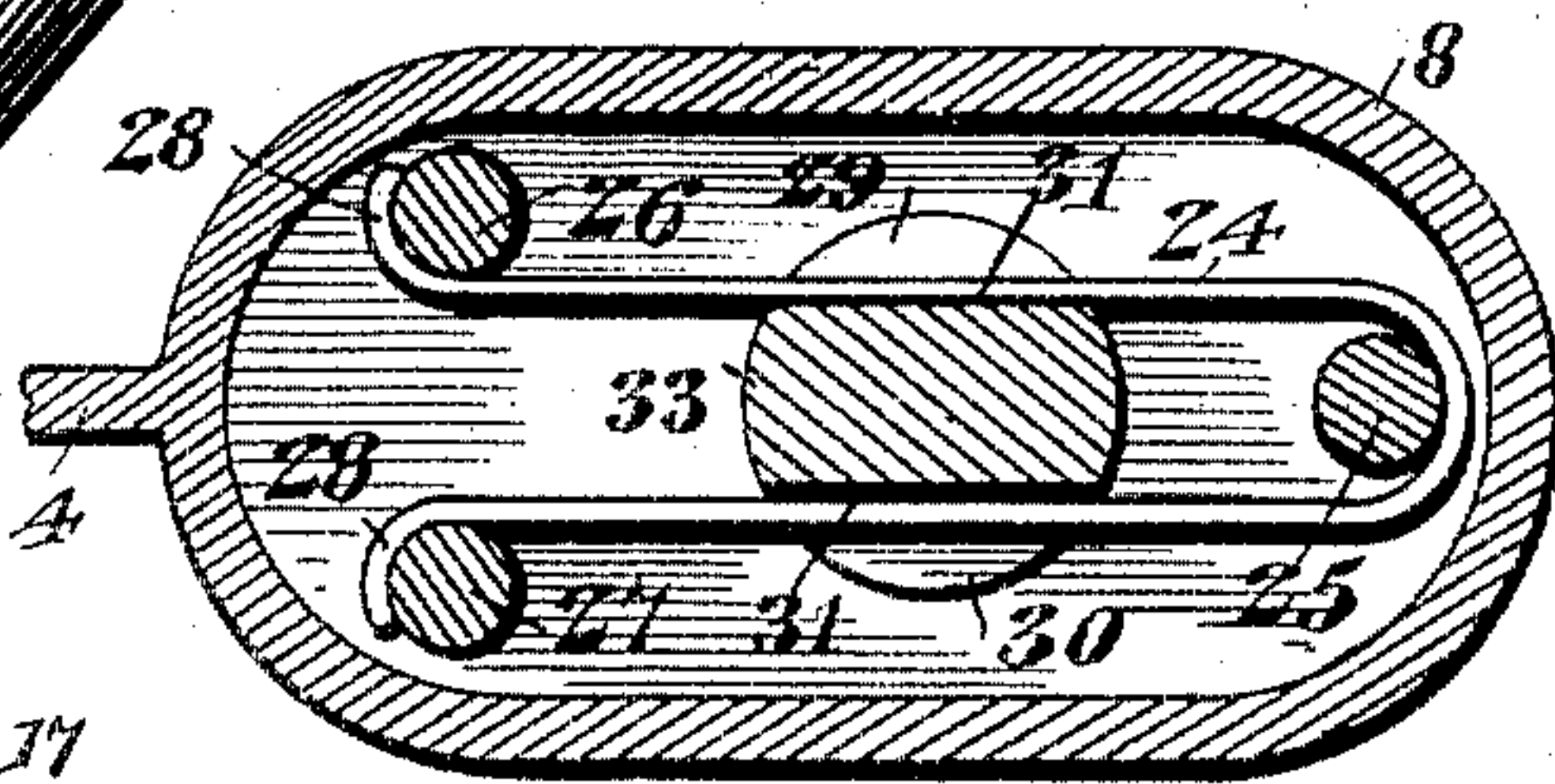
*Fig. 1.*



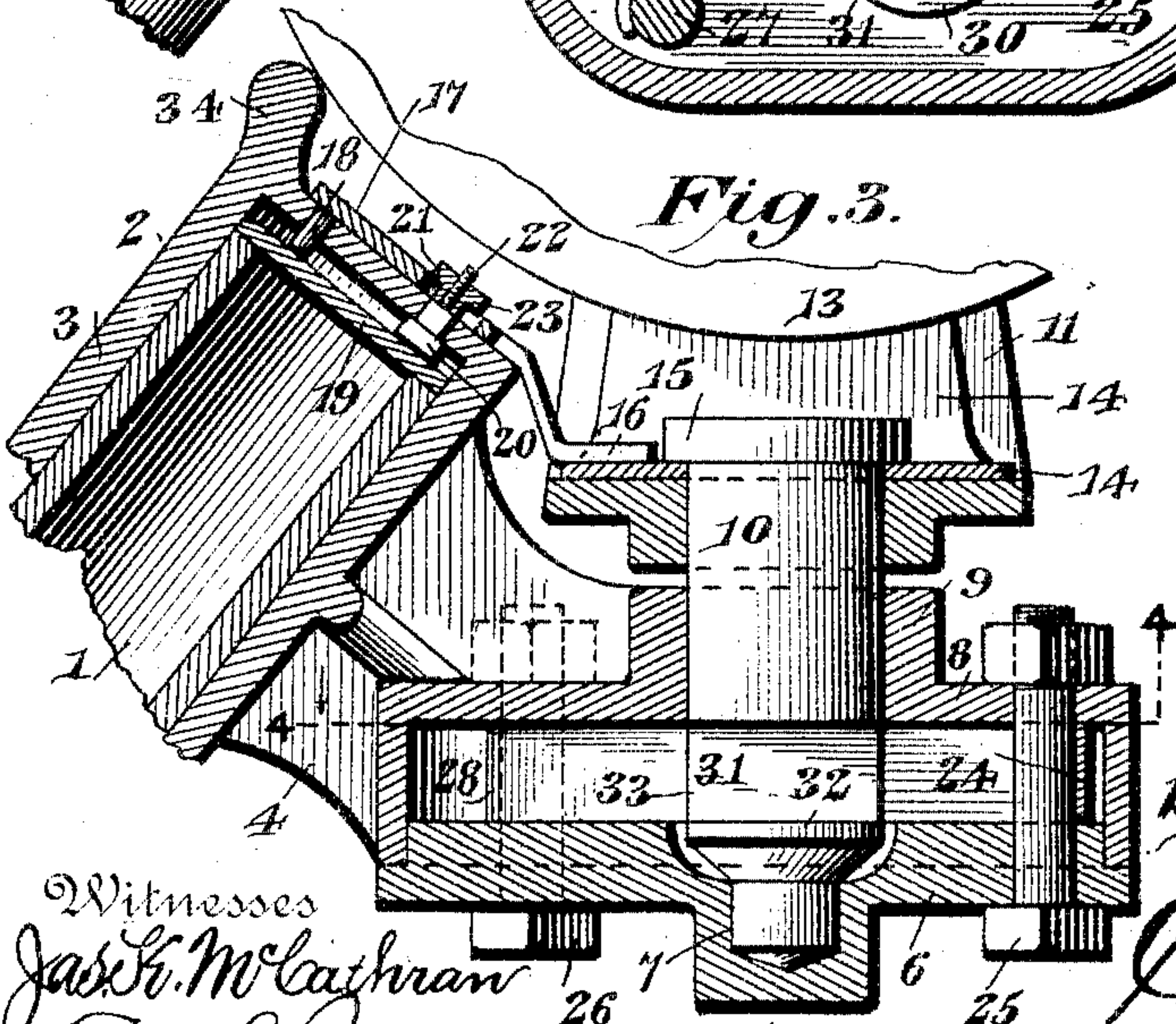
*Fig. 2.*



*Fig. 4.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## TROLLEY.

SPECIFICATION forming part of Letters Patent No. 776,064, dated November 29, 1904.

Application filed December 11, 1903. Serial No. 184,802. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ALBERT HOLLAND, a citizen of the United States, residing at London, in the county of Madison and State of Ohio, have invented a new and useful Trolley, of which the following is a specification.

This invention relates to a novel trolley for electrically-propelled vehicles.

One object of the invention is to so construct the mounting of the trolley that the latter will be free to move on a vertical axis independently of the pole to accommodate deflections and curves in the wire and will be automatically restored to its proper position in alinement with the pole when the wheel leaves the wire in order to facilitate the replacement of the wheel in contact with the wire by the manipulation of the pole in the usual manner.

Another object of the invention is to utilize the wheel-alining means as a latch normally retaining the trolley-harp, but arranged to permit the detachment of the latter from the head when the wheel is turned to a position substantially at right angles to that normally assumed by it.

A further object of the invention is to provide simple and efficient means for maintaining the electrical connection between the trolley and the pole and for preventing undue lateral vibration of the trolley-wheel on its shaft, while permitting such slight lateral movement as may be necessary to accommodate minor deflections in the wire.

A still further object of the invention is to provide a guard for preventing stay-wires and cross connections from catching under the trolley-wheel as the trolley advances.

To the accomplishment of the recited objects and others, which will more fully appear the preferred embodiment of the invention resides in that construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In the said drawings, Figure 1 is a side elevation of the upper end of a trolley-pole equipped in accordance with my invention. Fig. 2 is a rear elevation thereof, partly in

section and with the lower portion of the wheel broken away. Fig. 3 is a sectional view, on a large scale, showing the mounting of the harp, and the manner in which the electrical connection is established. Fig. 4 is a horizontal section on the line 4 4 of Fig. 3, and Fig. 5 is a detail view of the contact-plate.

Like numerals of reference are employed to designate corresponding parts in the several figures of the drawings.

The trolley-pole 1 is provided with a head 2, comprising a sleeve 3, fitted over the upper end of the pole, an arm 4, extending laterally from the upper end of the sleeve, and a harp support or socket carried by the arm and disposed horizontally. The socket 5 is in the form of a substantially oval chamber having a detachable bottom wall 6, formed with a thrust bearing or seat 7, directly above which the top wall 8 of the socket is provided with an apertured boss 9. The boss 9 and the seat 7 afford upper and lower bearings for the shank 10 of a trolley-harp 11, at the upper end of which is secured in the usual manner the short transverse shaft 12 for the support of the trolley or wheel 13.

Within the harp 11 is mounted a contact-spring 14 substantially U-shaped and retained by the head 15 of the shank 10, which latter passes through an opening in the base portion of the spring 14, as shown in Fig. 3. The upper ends of the contact-spring 14 are inwardly deflected to bear against the opposite sides of the wheel 13 and are pierced by the shaft 12. The opposite side portions of the contact-spring will therefore be seen to perform two distinct functions. First, they serve as a portion of the electrical connection between the trolley-wheel and the motor, and, second, they constitute means for yieldingly retaining the trolley-wheel centered within the arch, but permitting said wheel to have such slight lateral movement upon the shaft 12 as is necessary to accommodate minor deflections in the feed or line wire.

Upon the base portion of the contact-spring 14 bears the bifurcated end 16 of a contact-plate 17, imposed upon the upper closed end



of the sleeve 3 and provided with contact pins or plugs 18, passed through the end of the sleeve and into engagement with a disk 19, resting upon the upper end of the tubular trolley-pole 1, as shown in Fig. 3. The plate 17 is detachably secured in place by a headed bolt 20, passed through the end of the sleeve 3 and through an oblong slot 21 in the plate. Upon the reduced threaded end 22 of the bolt is secured a nut 23, corresponding to the slot 21 and arranged when turned crosswise of the slot, as shown in Fig. 2, to prevent the removal of the plate. When it is desired to detach the plate, it is simply necessary to turn the nut 23 into coincidence with the slot 21, when it will be obvious that the plate may be lifted from the end of the sleeve.

The bifurcated end 16 of the plate 17 is slightly resilient and is deflected so as to lie flat upon the base of the spring 14, this relation of parts serving to maintain the contact between the spring and the plate notwithstanding the movement of the harp upon its vertical axis. It will be seen that since the harp is swiveled in the socket 5 the trolley-wheel is permitted to swing upon a vertical axis in order to accommodate turnouts, curves, or other considerable deflections of the wire.

It has been stated that the invention contemplates the employment of means which retains the harp in engagement with the socket and which also serves to automatically aline the wheel with the pole whenever the wheel leaves the wire. The means referred to is in the form of a flat U-shaped spring 24, housed within the socket 5 and retained in place by the bolts 25, 26, and 27, which serve to secure the bottom wall 6 of the socket 5 in place. By reference to Fig. 4 it will be seen that the bolt 25 is located within the curved or looped end of the spring and that the extremities 28 of the spring 24 are bent outwardly around the bolts 26 and 27. It will thus be seen that the spring is retained against longitudinal movement by the bolts and is held against movement in a vertical plane by the top and bottom walls of the socket. The opposite parallel side portions of the spring 24 are received within recesses 29 and 30, formed in the opposite sides of the shank 10 and defining flat bearing-faces 31, against which the sides of the spring bear, and shoulders 32, opposed to the lower edges of the spring. The location of the spring above the shoulders 32 obviously prevents the withdrawal of the shank from the socket except when the wheel is turned at right angles to its normal position, at which time the rotation of the shank 10 will have expanded the sides of the spring to effect the disengagement of the spring and shoulders. The spring will thus be seen to constitute means for detachably retaining the harp in place; but it serves another function—to wit, the alinement of the wheel with the pole whenever the wheel is withdrawn from the wire.

The reason for this is that as the harp turns on its vertical axis the reduced portion of the shank lying between the recesses 29 and 30 will effect the expansion of the spring, the resiliency of which is sufficient to restore the wheel to its position in alinement with the pole whenever such movement of the wheel is unresisted by its contact with the wire. The reduced portion of the shank may therefore be said to constitute a cam 33, coacting with the spring 24 to rotate the harp for the purpose of automatically restoring the wheel to its alined position. It is also desired to provide a wheel-guard for preventing stay-wires and cross connections from passing under the wheel and into engagement with the harp. I form upon the upper end of the sleeve 3 a lug or projection 34, extended into proximity with the periphery of the wheel 13 and acting as a guard for the purpose stated.

It is obvious that the provisions for compelling the trolley to accommodate itself to the wire and for insuring its electrical connection with the pole conductor will obviate arcing, and thereby conserve the electrical energy.

It is thought that from the foregoing the construction, operation, and many advantages of my trolley will be clearly apparent to those skilled in the art without further description; but while the present embodiment of the invention is thought at this time to be preferable I desire to reserve the right to effect such changes, modifications, and variations of the illustrated structure as may fall fairly within the scope of the protection prayed.

What I claim is—

1. The combination with a head, a harp swiveled therein, and a trolley mounted in the harp; of a contact member mounted in the harp and engaging the trolley, and a second contact member carried by the head and contacting with the first-named member in a manner to permit free movement of the harp without breaking the connection between said members.

2. The combination with a head, a harp swiveled therein, and a trolley mounted in the harp; of a substantially U-shaped contact-spring engaging the opposite sides of the trolley to yieldingly retain the same against lateral movement, and a contact-plate carried by the head and engaging the contact-spring.

3. The combination with a head, a harp swiveled therein, and a trolley mounted in the harp; of a contact-spring engaging the opposite sides of the trolley, a contact-plate carried by the head and engaging the spring, and means for establishing electrical connection between the contact-plate and the trolley-pole.

4. The combination with a head, a harp swiveled therein, and a trolley mounted in the harp; of a substantially U-shaped contact-spring bearing against the opposite sides of the trolley, a contact-plate carried by the head



and bearing upon the contact-spring, contact-plugs extending into the head from the plate, and means for detachably securing the plate in place.

5 5. The combination with a trolley-pole; of a head comprising a sleeve fitted upon the upper end of the pole and a socket connected to the sleeve, a harp swiveled in the socket, a trolley mounted in the harp, a substantially  
10 U-shaped contact-spring mounted in the harp and bearing against the opposite sides of the trolley, a contact-plate mounted on the upper end of the sleeve and engaging the spring, contact-plugs extending into the sleeve from  
15 the plate, and a metal disk contacting with said plugs and with the upper end of the trolley-pole.

6. The combination with a head; of a harp, a trolley mounted in the harp, a U-shaped contact-spring bearing against the opposite sides  
20 of the trolley, and a headed harp-shank swiveled in the head and serving to retain the spring in the harp.

7. The combination with a head; of a harp  
25 swiveled therein, a trolley-wheel mounted in the harp, and means yieldingly retaining the trolley in alinement with the pole and also serving to detachably connect the harp to the head.

30 8. The combination with a head comprising a sleeve and a hollow socket extended laterally therefrom; of a harp provided with a shank swiveled in the socket, a trolley mounted in the harp, and a spring housed within  
35 the socket and engaging the harp-shank to yieldingly retain the trolley in alinement with the sleeve.

9. The combination with a head provided with a socket; of a harp provided with a shank  
40 journaled in the socket and formed with a cam portion, and a spring housed within the socket and bearing against the cam portion of the shank to yieldingly retain the harp in its normal position.

10. The combination with a head provided 45 with a socket; of a harp having a shank journaled in said socket, said shank having diametrically-opposed recesses, and spring members mounted in the socket and received within the recesses of the shank to yieldingly re- 50 tain the harp in its normal position.

11. The combination with a head provided with a hollow socket; of a harp having a shank journaled in the socket, said shank being provided with diametrically-opposed recesses, a 55 U-shaped spring housed within the socket and having its opposite sides engaging the recesses in the shank, and means for retaining the opposite ends of the spring.

12. The combination with a head, and a hol- 60 low socket provided with a detachable bottom wall formed with a seat; of a harp provided with a shank journaled in the socket and having its end received within the seat, diametrically-opposed recesses in the shank, and a 65 substantially U-shaped spring housed within the socket and having its opposite side portions disposed within said recesses.

13. The combination with a head comprising a sleeve, a laterally-extended arm and a 70 socket provided with a detachable bottom wall formed with a seat; of a harp having a shank extending through the socket and into the seat and formed with diametrically-opposed recesses, a substantially U-shaped spring 75 housed within the socket and having its side portions located in the recesses of the shank, and bolts constituting securing means for the bottom walls of the socket and engaging the spring to retain the opposite ends thereof. 80

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

WILLIAM ALBERT HOLLAND.

Witnesses:

BERTHA COOVER,  
JAMES F. BELL.