

M. HANFORD.  
TROLLEY CUT-OUT.

Patented Jan. 9, 1894.

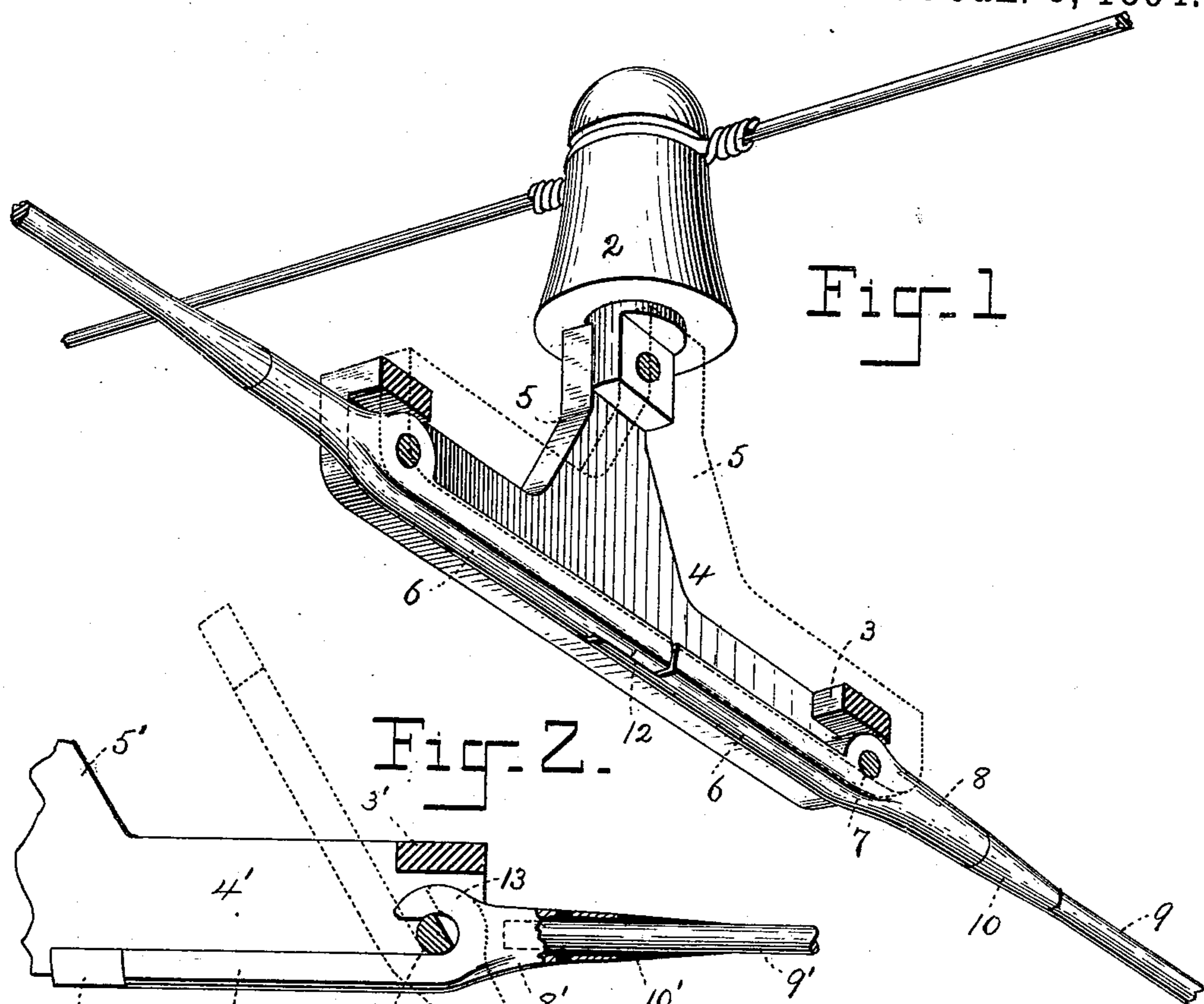


Fig. 1

Fig. 2.

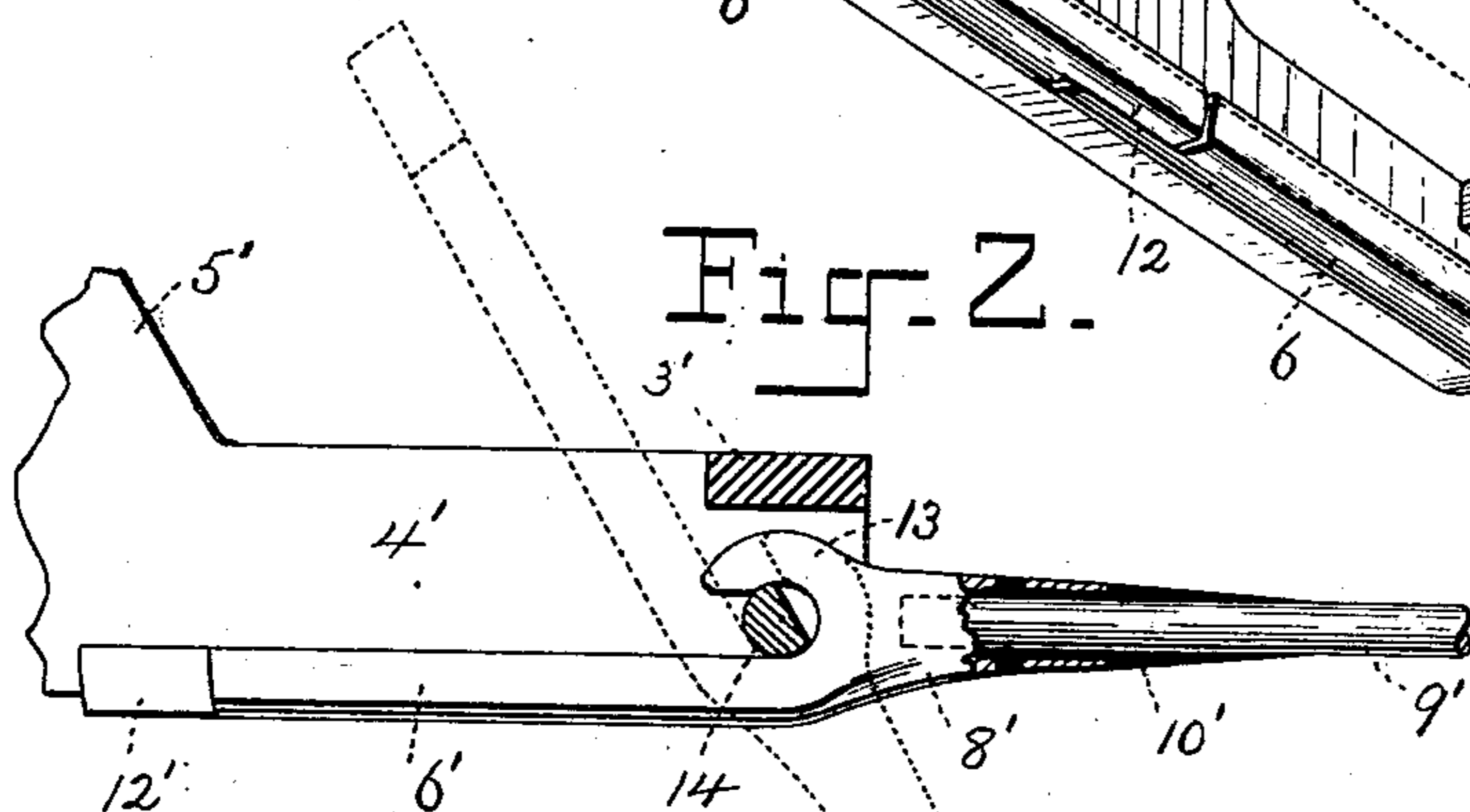


Fig-4.

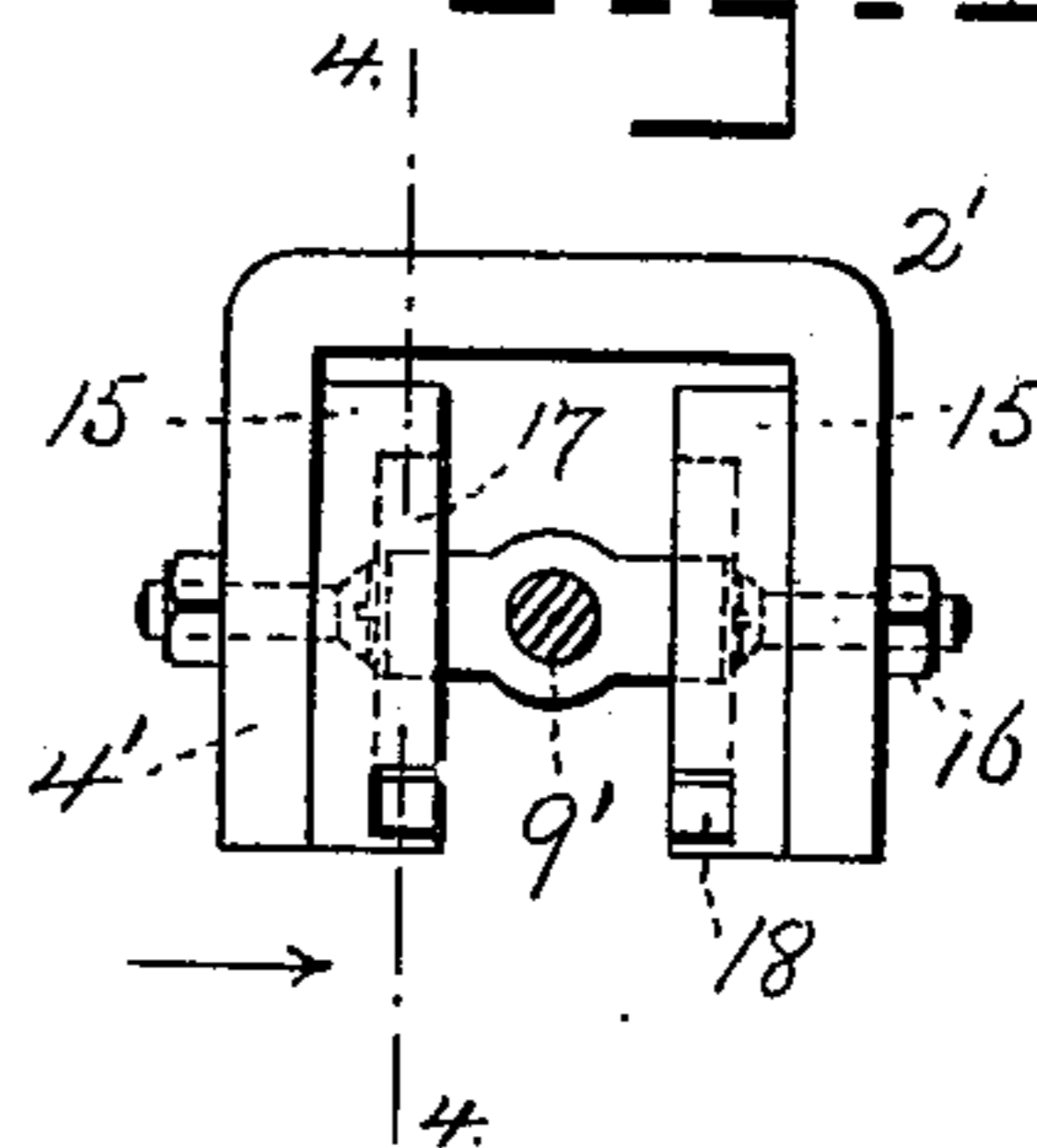


Fig 3.

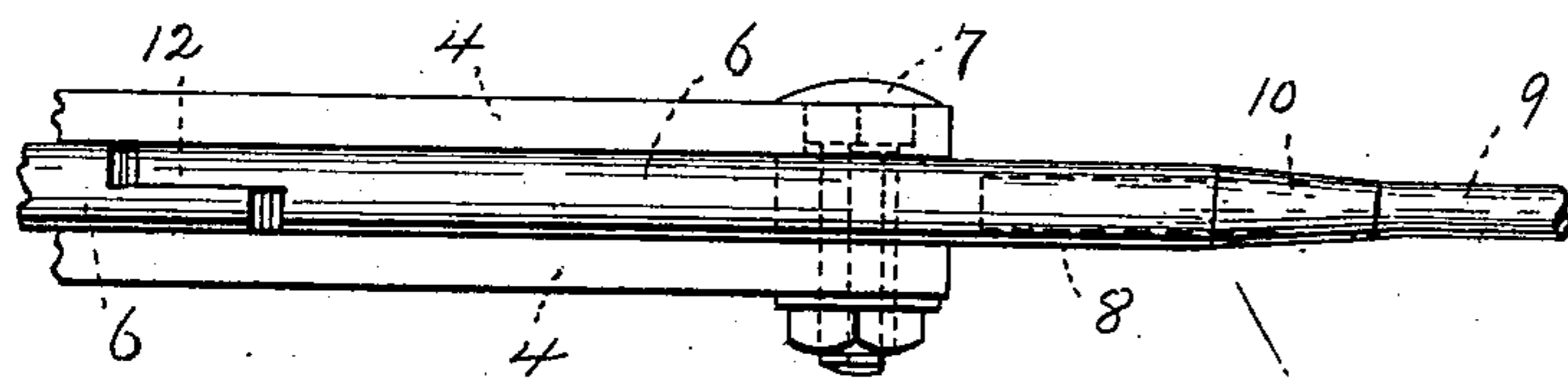
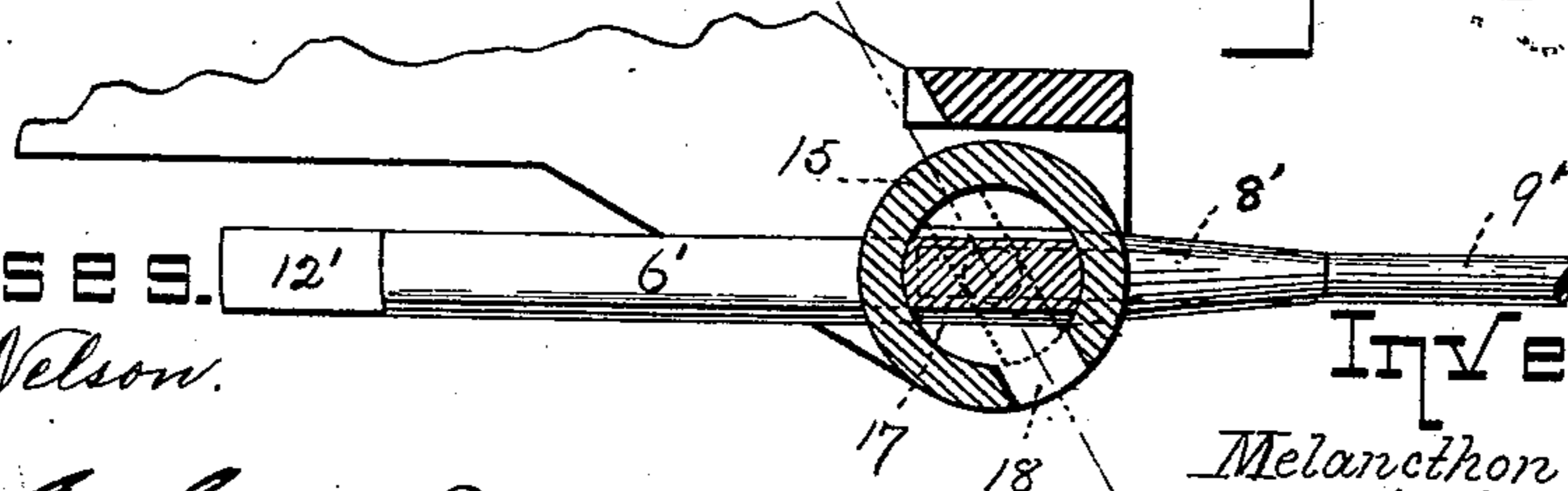


Fig 5.



Witnesses.

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# UNITED STATES PATENT OFFICE.

MELANCTHON HANFORD, OF MALDEN, MASSACHUSETTS.

## TROLLEY CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 512,373, dated January 9, 1894.

Application filed September 22, 1893. Serial No. 486,162. (No model.)

*To all whom it may concern:*

Be it known that I, MELANCTHON HANFORD, a citizen of the United States, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Trolley Cut-Outs; and I do hereby declare the following to be a full clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to safety cut-outs for trolley wires employed in overhead systems for electric street car service.

The object of my invention is to make a dead wire of the trolley in that section, where a break occurs. In this way the danger, which now exists in having the current discharge through the broken wire into the street, is obviated, and fatal accidents, which have resulted from such breaks, are avoided.

My invention consists in making the trolley wire in independent sections or lengths, but still have such electrically united. The ends of the trolley wire sections are fastened to metallic clips, and said clips are pivotally mounted. Hence so long as the wire remains unbroken the current is free to pass as if the wire was one continuous piece; but should a break occur and the parted ends drop to the surface or hang from the horizontal these pivotal clips or plates are tilted up simultaneously and both ends of the broken wire are separated from the live ends of the next adjacent intact sections. Hence the current is stopped and the portions of the broken trolley wire are rendered dead and consequently harmless. Moreover in connection with my invention I provide such construction that should a break occur the pivotal plates, which hold the ends of a trolley length are detached from the support and drop to the ground.

The drawings accompanying this specification represent in Figure 1. a perspective view of an automatic cut-out embodying my invention the pivotal plates being merely intended to rock. Fig. 2 is a vertical sectional side elevation of a cut-out adapted to be de-

tached from the support. Fig. 3. is a plan from beneath. Fig. 4 is an end elevation, and Fig. 5 is a section on line 4. 4. showing a modification where detachment occurs.

In said drawings 2 represents a hanger or support suspended in any suitable manner above the street in order to uphold a trolley wire 9 for an overhead electric car system. Said support is to be composed of suitable insulating material. Hence the several parts attached thereto are electrically separated. In the present instance said hanger consists of an open rectangular frame composed of two parallel castings 4 united at the ends at 3 and centrally provided with uprights 5. 5.

Heretofore the trolley wire has been made in long continuous lengths upheld at points by supports of any suitable construction. In my invention I propose to divide the trolley wire into separate sections and yet allow them to convey the current as usual. To this end I provide rocker plates 6, 6, which are mounted upon bolts 7 transversely thereof and through a point near their outer extremities. The under surface of said plates is rounded in order to conform to the under side of the trolley wire, and thus allow easy passage of the trolley wheel. Furthermore the outer ends of said rocker-plates are extended and terminate in a short cylindrical arm 8 bored to admit the ends of a trolley wire 9, which latter is secured by solder 10 or otherwise. This arm unites with the rocker-plate proper by an easy curve to allow the trolley wheel to pass along without shock or jar from the wire to the plate or vice-versa. By providing the arms 8 which are positioned to bring the longitudinal axis of the trolley wire in alignment with the center of the bolts 7, it will be understood, that so long as the wire is intact the tension is exerted directly through the pivot of the rocker-plate, while the wire is held horizontally at this point as if it was one continuous uninterrupted length. It will be seen that the thickness of the plates allows them to move vertically and thus compensates for any sag in the wire, since the movement of the plates at this point is very slight about the bolts 7 even for the maximum sag which may occur. Conversely should the wire break for any cause whatsoever the un-

supported ends will drop to the street or hang vertically, if they do not touch the street; in any event the deviation of the wire from the horizontal will cause the extremities within the hanger to tilt up, thereby breaking the current at this point and rendering the broken length or section of the trolley wire dead, the two pieces being electrically disconnected from the next adjacent and active lengths of said wire. In order to allow such separation of the adjacent ends of any two adjacent lengths of a trolley wire, I have arranged that the said ends shall overlap; preferably the contiguous extremities 12, 12, have their line of meeting in a vertical plane. Hence the rocking movement of the plates 6, 6, can easily occur accompanied by separation of the ends of the adjacent lengths of wire, while electrical connection is made and continues so long as the wire is unbroken; further, the joint affords an uninterrupted surface for the passage of trolley wheels. Hence it will be seen that the method of supporting the trolley wire under my invention creates an automatic safety cut-out for every portion of the trolley wire, and any broken section always becomes a dead end simultaneously with the break, the movement of the rocker-plate being such that no arc can be established, even under a high tension current, between the live end of the intact wire and the adjacent extremity of the broken portion.

In lieu of the construction hereinbefore premised and to provide for complete separation of the broken trolley section from the system, the ends of the plates 6 are formed (see Fig. 2) with open hooks 13 instead of a closed eye as in Fig. 1. Said hooks are to engage upon a mutilated bolt 14 or one having a segmental cross-section; thus so long as the wire remains intact and approximately in a horizontal position the hook remains locked upon the bolt. But should a break occur, and an oblique position, as indicated by the broken lines be assumed by the wire, the end of the hook moves up to the edge of the flat portion of the bolt, when the hook is free to slip off and the plate and wire fall to the ground. This is a very simple, and positive method of completely separating the broken sections from the main intact portion of the trolley wire system.

In Figs. 4 and 5 I have shown a modified construction embodying the idea illustrated in Fig. 2 that is to enable the broken trolley length to be detached from the intact portion of the system. To this end a pair of annular rings 15 are secured by bolts 16 to the support 4', while trunnions 17 are formed

laterally and transversely upon the rocker plate. These trunnions are in length equal to the inside diameter of the ring 15 and are adapted to oscillate therein. Furthermore an opening or slot 18 is created in each ring and the position of said openings are to coincide and to be situated at such point as it is desired to have the rocker-plate detached. Hence by releasing the bolts 16 the rings can be turned axially to so adjust the slots 18 that the rocker plate may be detached at any given angle. So long as the trolley wire is intact the trunnions bear upon the intact portion of the ring, as shown in Fig. 5. Conversely if the wire breaks and drops one end of the trunnions is brought in alignment with the slots, which permit their passage through, since the width of each trunnion is less than that of the slot.

What I claim is—

1. An automatic safety cut-out for wires for electrical service adapted to form an uninterrupted metallic surface for the passage of a traveling brush, and composed of a hanger of suitable insulating material, two bolts transversely secured in said hanger, and pivotal plates, which form the terminals for adjacent ends of independent lengths of the system, the broken gravity end of a length causing its plate to rock and be detached from the hanger bolts, substantially as and for the purposes explained.

2. An automatic safety cut-out for trolley wires, consisting of a hanger of suitable insulating substance, and two oppositely disposed rocker-plates mounted therein, said plates adapted to overlap and form a vertical joint in the longitudinal axis of the wire and thus create a continuous metallic surface for the trolley wheel, combined with independent lengths of trolley wire which terminate in rocker plates, all operating substantially as specified.

3. In combination with a suitable hanger, and two bolts segmental in cross-section, two oppositely disposed rocker-plates formed with hooks at one end and tubular arms at the opposite ends, said hooks to engage said bolts, and two independent lengths of trolley wire electrically united and affixed at their extremities to said plates, all operating substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MELANCTHON HANFORD.

Witnesses:

F. CURTIS,

H. E. LODGE.