

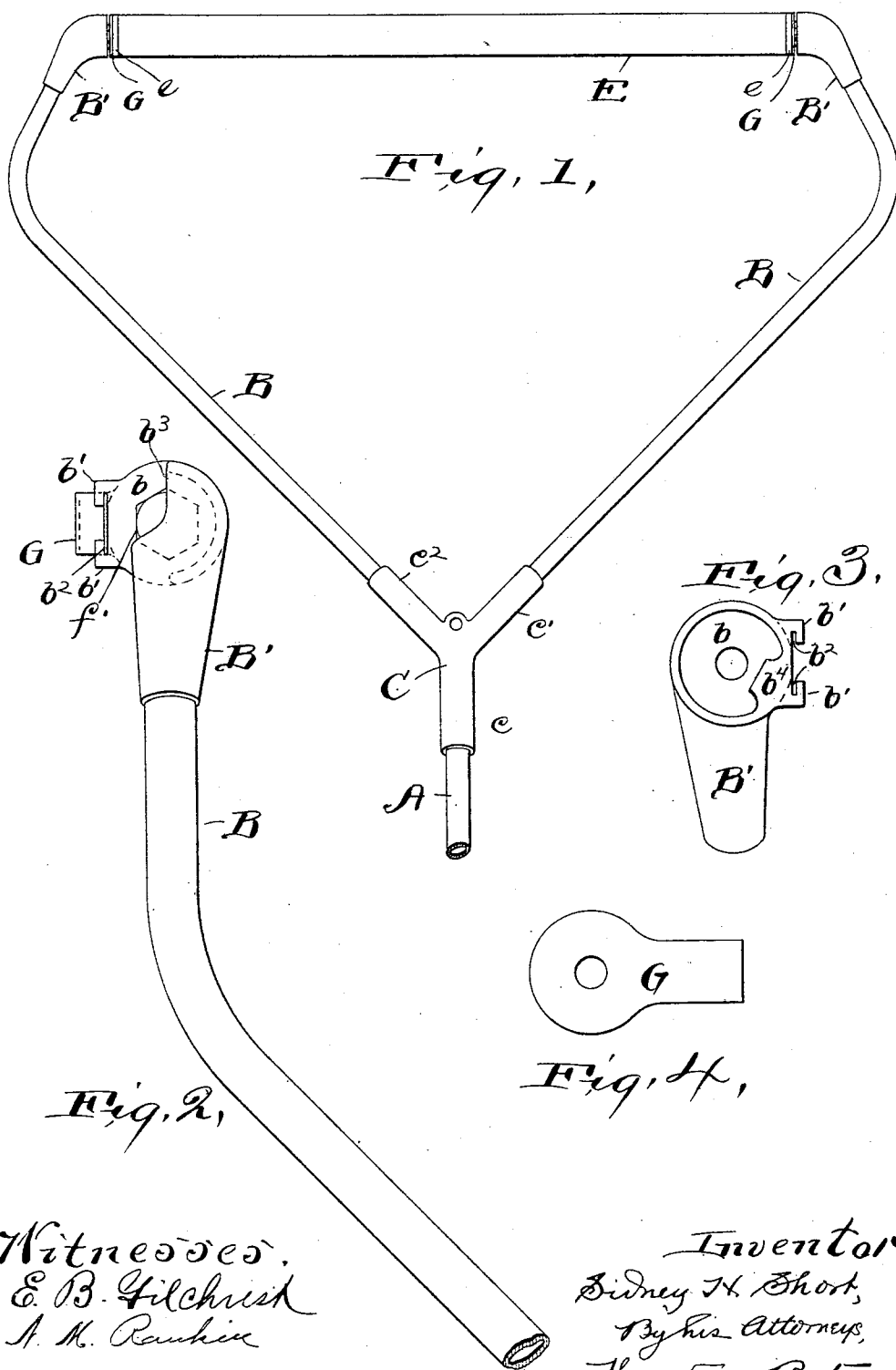
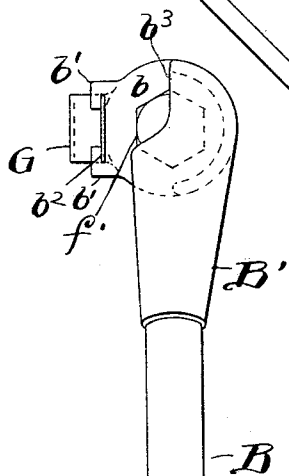
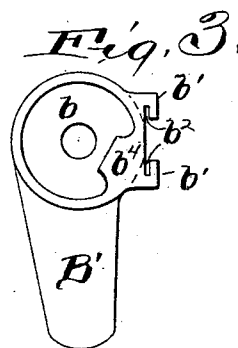
(No Model.)

2 Sheets—Sheet 1.

S. H. SHORT.
TROLLEY.

No. 587,870.

Patented Aug. 10, 1897.



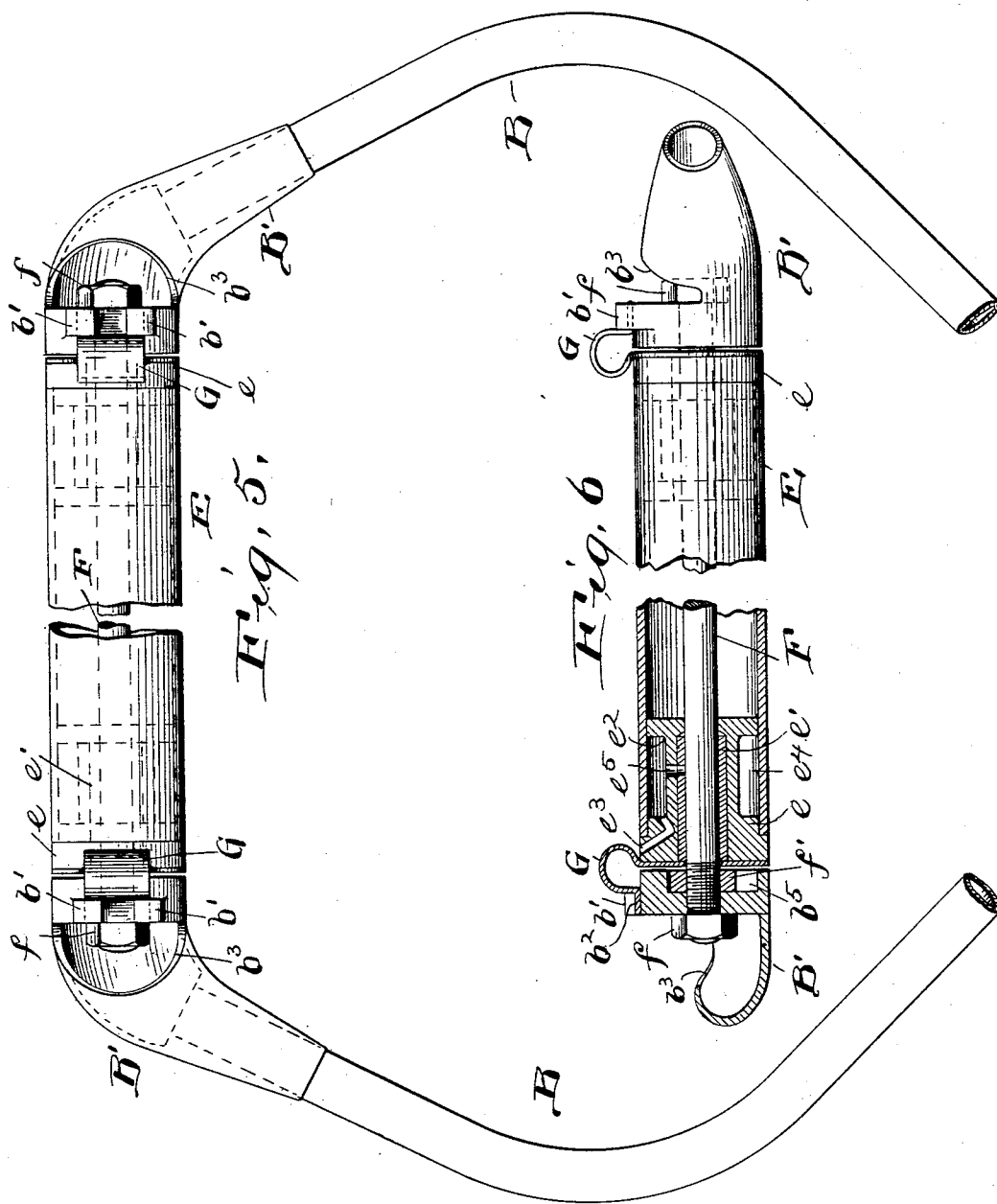
Witnessed,
E. B. Gilchrist
A. M. Rankin

Inventor
Sidney H. Short,
By his Attorneys,
Thurston & Bates.

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UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO.

TROLLEY.

SPECIFICATION forming part of Letters Patent No. 587,870, dated August 10, 1897.

Application filed February 16, 1897. Serial No. 623,758. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. SHORT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Trolleys; 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.

My invention relates to trolleys wherein the contact device is a long flangeless roller which is mounted in the forked upper end of the trolley-arm.

The object of the invention is to provide a trolley of this class which shall be cheap and simple in construction and practically efficient and durable in operation. Trolleys of this class to be practical must be so constructed that when the car passes onto a branch track and the trolley-roller is thereby drawn laterally out of contact with the main conductor said conductor shall neither be caught by the trolley-forks nor be dropped suddenly when it runs off the said roller. It must also be constructed in such manner that when the car approaches a point where a branch conductor joins the main conductor the said branch conductor, if it sags more or less, will neither be broken nor will it tend to break the trolley when the two come into contact, but that, on the contrary, the sagging conductor shall be lifted by the trolley to permit the roller to pass under it. The roller, moreover, must revolve freely, and suitable electrical connections which are not rendered inefficient by the lubricating medium (if such be used) must be provided for connecting the roller with the forks. These practical characteristics are possessed in a large degree by the trolley shown in the drawings and hereinafter described, and the invention shown and described is definitely pointed out in the claims.

In the drawings, Figure 1 is a front view of the upper end of a trolley embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is an inside end view of one of the trolley-forks. Fig. 4 is a view of one of the contact-springs before it is bent into the form in which it is used. Fig. 5 is a rear elevation of the upper end of the trolley-arm;

and Fig. 6 is a plan view, partly in section, of the trolley-roller and the fork ends.

A represents the trolley-arm, and B B the forks which form its upper end. The connections between the arm and its forks may be effected by means of a casting C, having one vertical tubular arm *c*, which fits upon the upper end of the trolley-arm, and two diverging tubular arms *c'* *c''*, which receive the lower ends of the forks B B. These forks diverge at an angle of approximately ninety degrees, continuing at that angle to a point near their upper ends, from which point the forks converge. When the trolley-arm is in service, it commonly and preferably extends at an angle of about forty-five degrees to the conductor, and the forks up to the point where they are bent inward, as described, lie in the same plane with the arm A. At said point the forks are likewise bent upward to an extent which causes them to occupy an approximately vertical position when in service, as shown in Fig. 2.

B' B' represent the fork ends. They are tubular castings which fit upon the upper ends of the forks. They are tapering, being smallest at their lower ends, where their walls are very thin, wherefore they do not form around the fork any shoulder which would prevent a wire from sliding up in contact with the fork onto the fork end. The upper parts of the fork ends are curved inward, the upper ends of said fork ends being substantially vertical and in a plane at right angles to the horizontal axis of the roller E. The upper end of each fork end is closed by a plate *b*, cast integrally with the fork end and centrally perforated to permit the passage of the shaft F, on which the roller is mounted. This plate is cylindrical in form on its front and top edges, which edges are continuations of the adjacent surfaces of the fork ends. The radius of the cylindrical parts of those plates is the same as the radius of the adjacent ends of the roller.

On the rear side of the upper ends are formed the two ears *b'* *b''*, the proximate faces of which are grooved, and the ends of the contact-springs G are inserted in these grooves *b''*. An opening *b'''* is formed through the rear wall of the fork ends just outside of the plate *b*, whereby one may introduce a wrench to turn

the nut f on the shaft F . The inner face of the plate b is recessed, said recess b^3 being as deep, at least, as the nut f' is thick. A lug b^4 on the inner recessed face of this plate is for the purpose of engaging with the side of the nut f' , thus preventing it from rotating.

The roller E is tubular, and the bearing-pieces e are fitted tightly into the ends thereof. These bearing-pieces are centrally perforated and fitted with the bushings e' . An annular groove e^2 is formed on each between its ends, whereby an oil-chamber e^4 is formed in the tube around said bearing-piece. An oil-duct e^3 is formed in the bearing-piece to said chamber, and an oil-duct e^5 is also formed from said chamber through the bearing and bushing to the shaft F .

The springs G from their point of attachment, as described, with the ears $b' b'$ are bent rearward and then forward, passing between the plate b and the end of the roller, against which they pass, the shaft F passing, as stated, through the springs.

It will be apparent from the foregoing description that the side and front of each fork end is smooth and curved and that the surface of said fork end is in effect a continuation of the top and front surfaces of the roller. The conductor-wires will therefore slide freely from the roller to the fork end and then slide gradually down onto the fork. A sagging branch wire will first strike the outwardly-inclined fork or fork end, up which it will slide and pass freely onto the roller. The roller may be thoroughly lubricated, but the current does not have to pass through the lubricant from the roller to the fork ends, because it passes over the springs G .

The described construction is simple and cheap and thoroughly practical and durable, as I have demonstrated by considerable experimental use.

Having described my invention, I claim—

1. In a trolley; the combination of the trolley-arm, its forks which converge at their upper ends, and the curved and tapering fork ends which are secured to and form parts of the forks, said fork ends having at their upper ends the vertical plates $b b$, which plates at their top and front edges are cylindrical in form, and are continuations of the corresponding surfaces of the fork ends, with a shaft secured to said plates $b b$, and a flangeless roller rotatably mounted upon the shaft and being at its ends of the same radius as the cylindrical parts of said plates $b b$, substantially as and for the purpose specified.

2. In a trolley, the combination of the trolley-arm, its forks which converge at their upper ends, and the curved and tapering fork ends which are secured to and form parts of the forks, said fork ends having at their upper ends the vertical plates $b b$, which plates at their top and front edges are cylindrical in form and are continuations of the corresponding surfaces of the fork ends, which fork ends are each recessed in their rear sides just out-

side of the plates $b b$, with a shaft passing through and secured to said plates $b b$, and a flangeless roller rotatably mounted upon the shaft and being, at its ends, of the same radius as the cylindrical parts of said plates $b b$, substantially as and for the purpose specified.

3. In a trolley, the combination of the trolley-arm, its forks which converge at their upper ends, and the curved tapered tubular fork ends which embrace the upper ends of said forks and have their upper ends closed by centrally-perforated vertical plates $b b$ which are cylindrical in form at their top and front edges, which edges are continuations of the corresponding surfaces of the fork ends, said fork ends having holes through their rear walls just outside of said plates, with a shaft with threaded ends which passes through and is secured to the said plates by nuts which screw thereon, and a flangeless contact-roller rotatably mounted upon said shaft, said roller being at its ends of the same radius as the cylindrical parts of the plates $b b$, substantially as and for the purpose specified.

4. In a trolley, the combination of the trolley-arm, its forks which converge at their upper ends, and the curved and tapering fork ends having at their upper ends the vertical plates $b b$, which plates at their top and front edges are cylindrical in form, and are continuations of the corresponding surfaces of the fork ends, with a shaft secured to said plates $b b$, and a flangeless roller rotatably mounted upon the shaft and being at its ends of the same radius as the cylindrical parts of said plates $b b$, and bent contact-springs which are secured to said fork ends and extend between them and the ends of the said roller, being in contact with the latter, substantially as and for the purpose specified.

5. In a trolley, the combination of the trolley-arm, its forks which converge at their upper ends, and the curved and tapering fork ends which are secured to and form parts of the forks, said fork ends having at their upper ends the vertical plates $b b$, which at their top and front edges are cylindrical in form, and are continuations of the corresponding surfaces of the fork ends, and the rearwardly-projecting grooved lugs on said fork ends, with a shaft secured centrally to said plates $b b$, a flangeless roller rotatably mounted upon said shaft, which roller at its ends has the same radius as the cylindrical parts of said plate, and bent springs which are secured to said grooved lugs and extend between the fork ends and ends of the roller, substantially as and for the purpose specified.

6. In a trolley, the combination of the trolley-arm, its forks which converge at their upper ends, and the curved tapered fork ends which are secured upon and form parts of the forks, and have at their upper ends centrally-perforated plates $b b$, which plates are cylindrical in form at their front and top edges, which edges are continuations of the corre-

sponding surfaces of the fork ends, the said plates being recessed on their inner faces and provided with lugs b^1 , the fork ends being recessed in their rear sides outside of said plates, 5 with a shaft having threaded ends, which ends pass through said plates b , nuts $f' f'$ on said shaft inside the said plates and in contact with said lugs, nuts on the outer ends of said shaft, and a flangeless contact-roller rotatably 10 mounted on said shaft and having ends of the same radius as the cylindrical parts of said plate, substantially as and for the purpose specified.

7. In a trolley, the combination of the trolley-arm, its forks, and fork ends, and a shaft 15 which extends between and is secured to said

fork ends, with a tubular roller surrounding said shaft, bearing-pieces fitted and secured in the ends thereof, which bearing-pieces are circumferentially grooved, an oil-duct 20 through each bearing-piece to said groove, and an oil-duct through said grooved part to the shaft, and bent springs secured to the fork ends and extended between the same and the roller, substantially as and for the purpose 25 specified.

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

SIDNEY H. SHORT.

Witnesses:

E. L. THURSTON,
ALBERT H. BATES.