

No. 684,122.

G. H. SPAFFORD.  
TROLLEY.

Patented Oct. 8, 1901.

(Application filed Mar. 13, 1901.)

(No Model.)

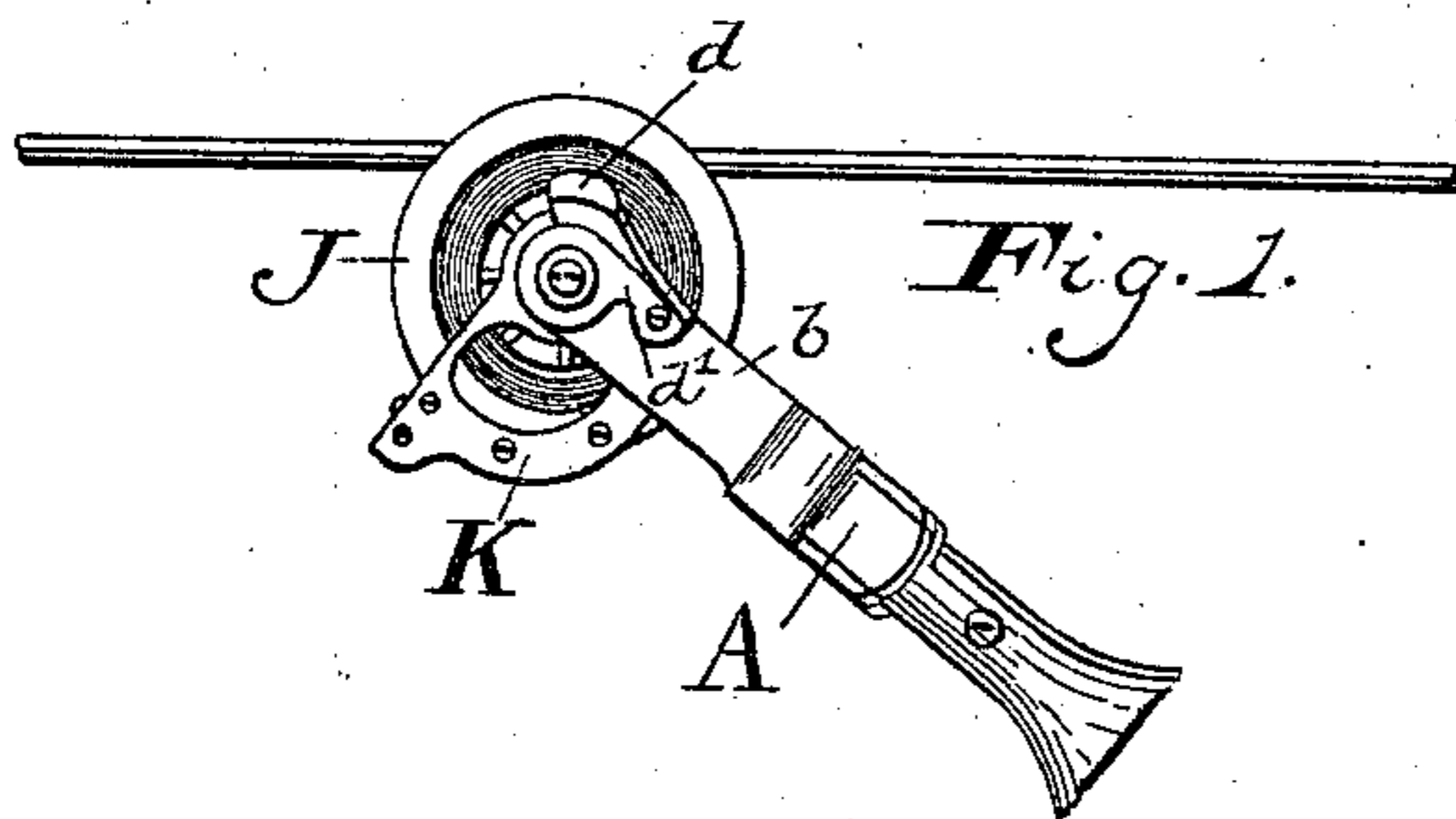


Fig. 2.

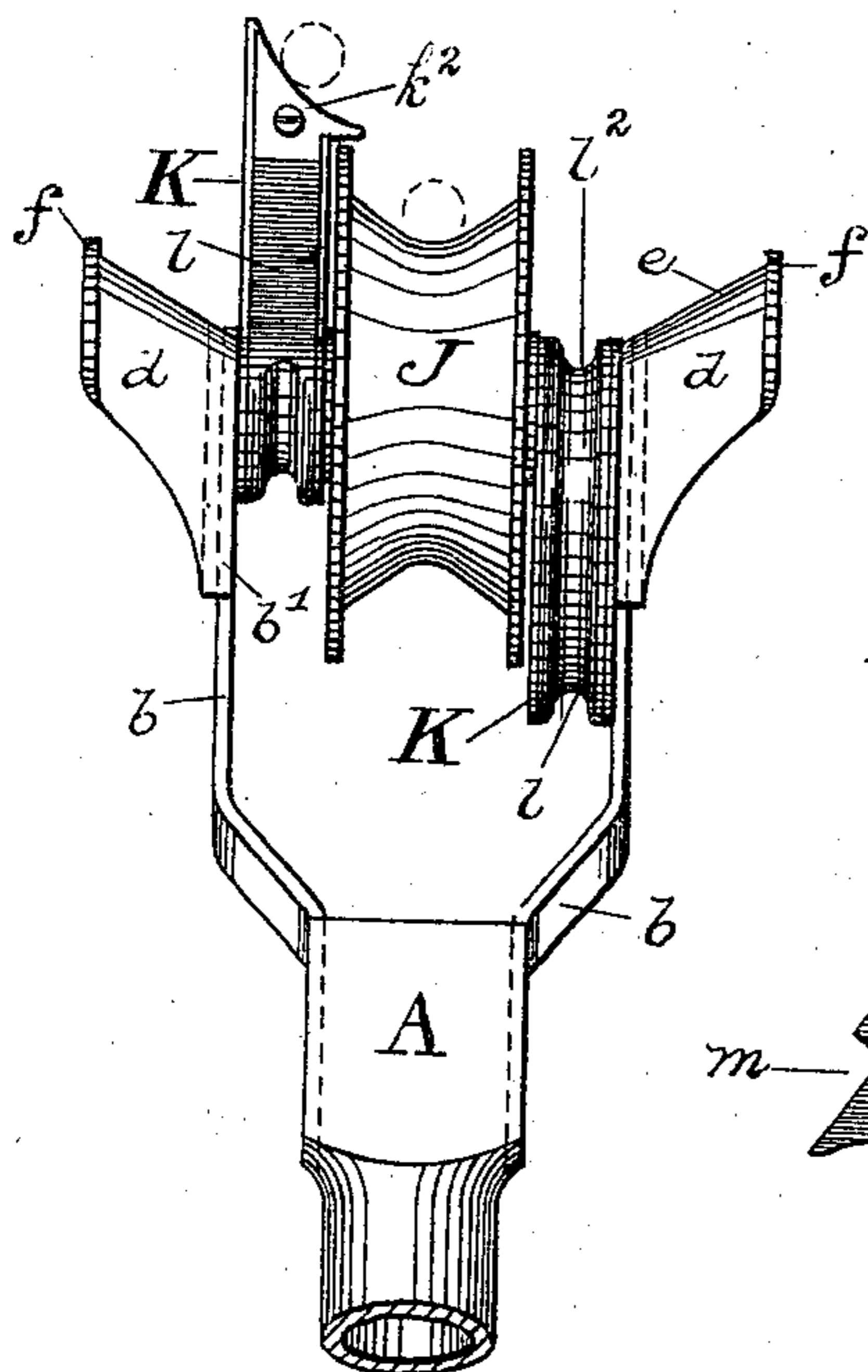


Fig. 3.

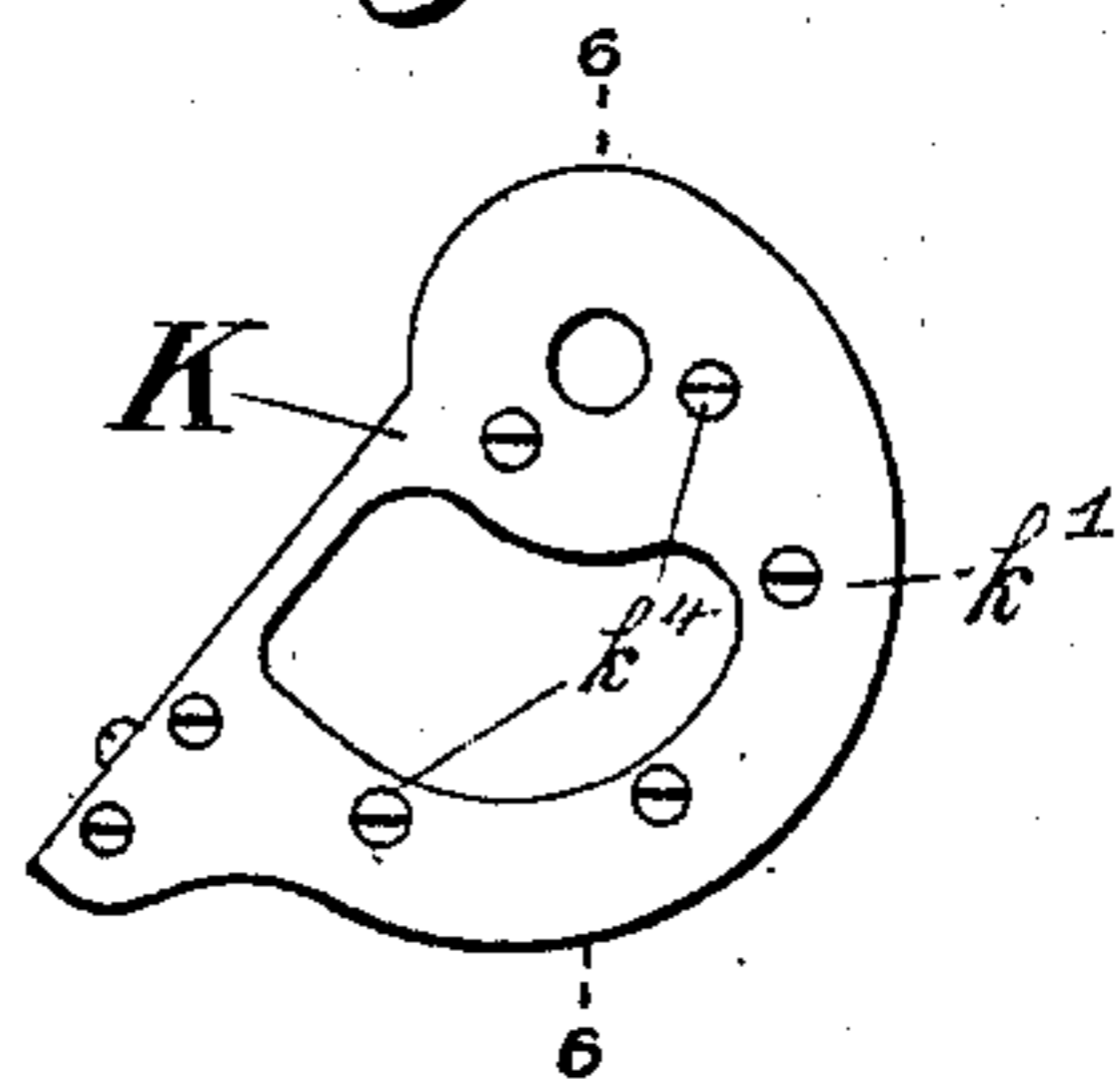


Fig. 4.

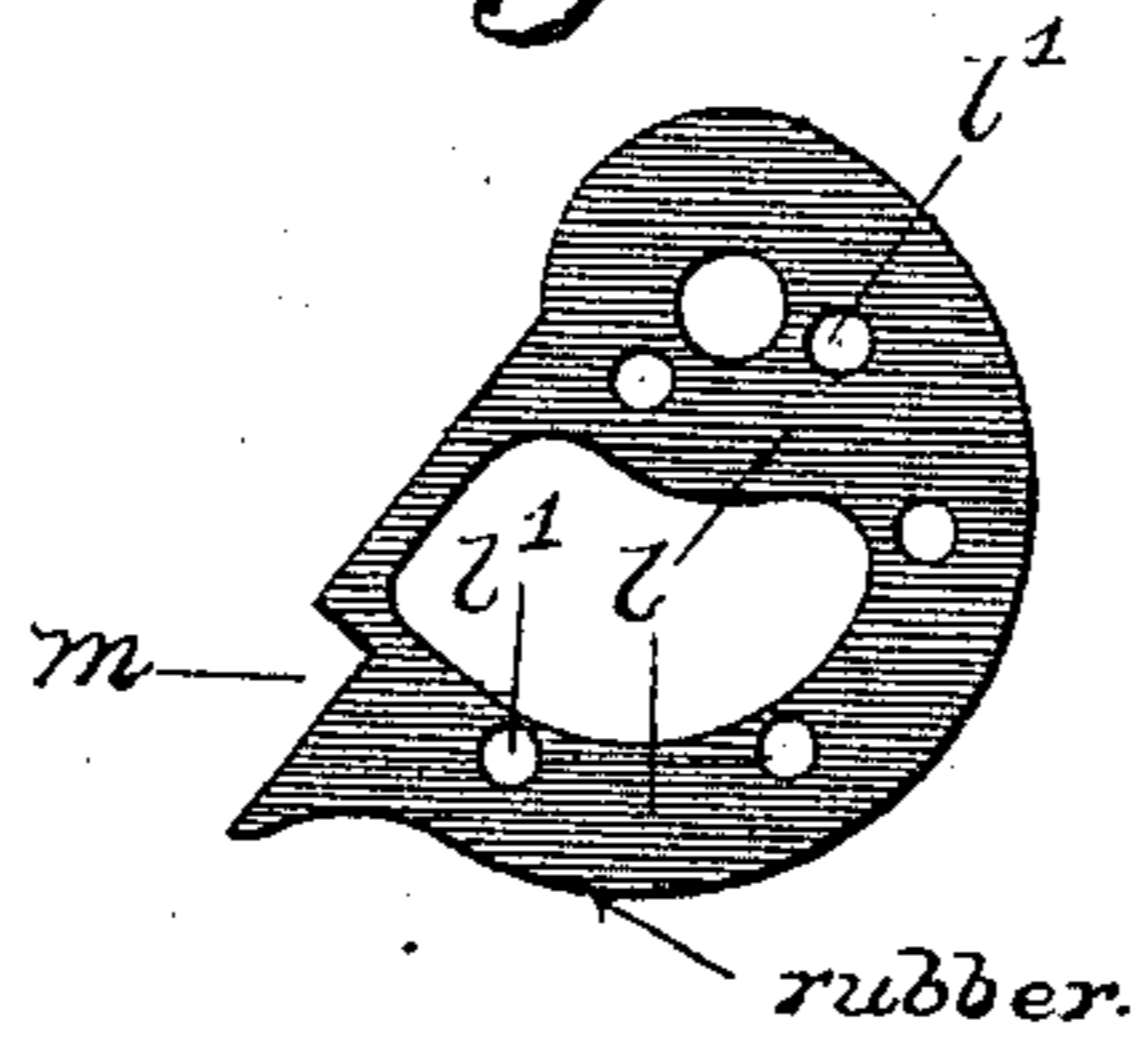


Fig. 5.

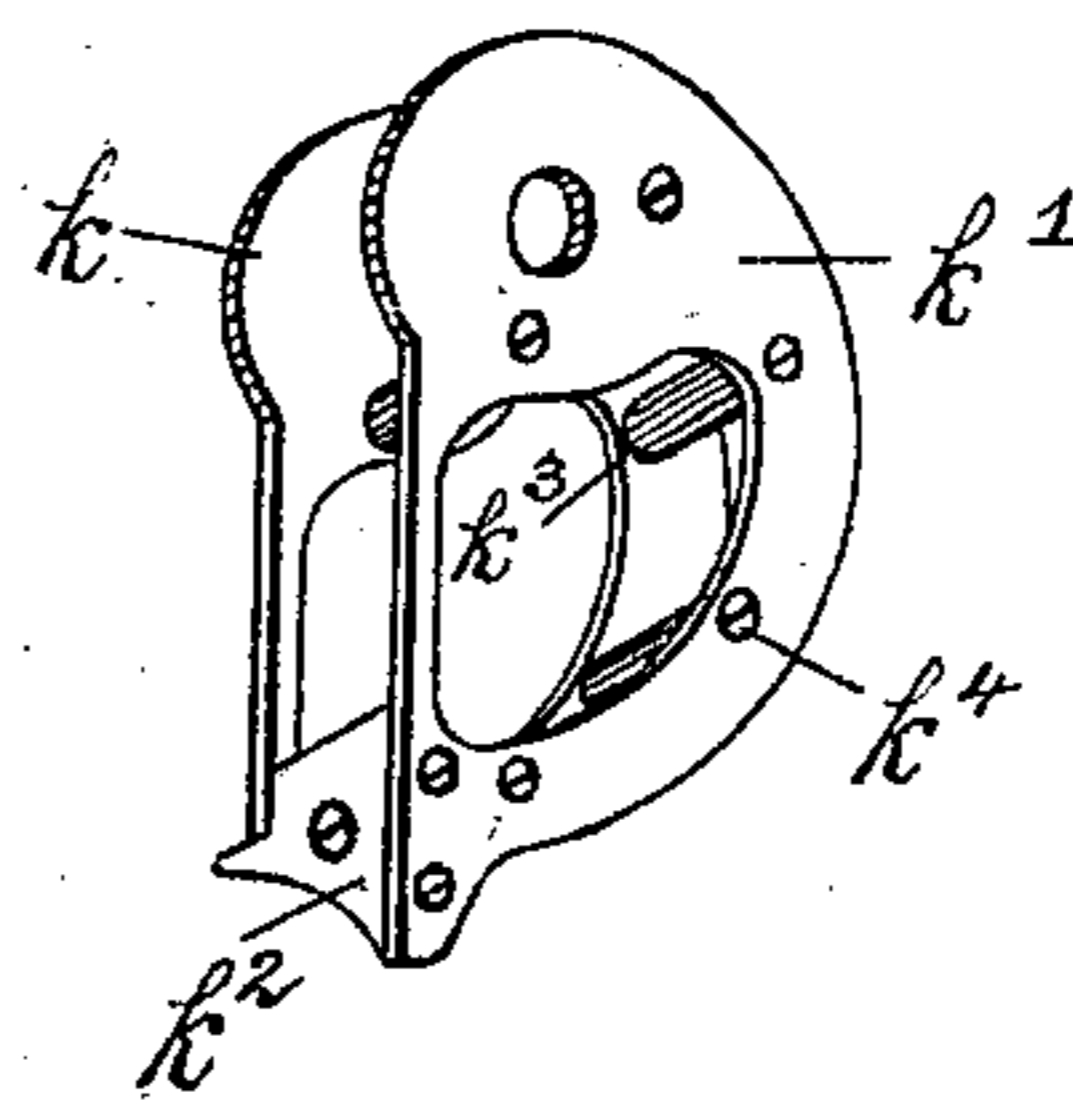


Fig. 7.

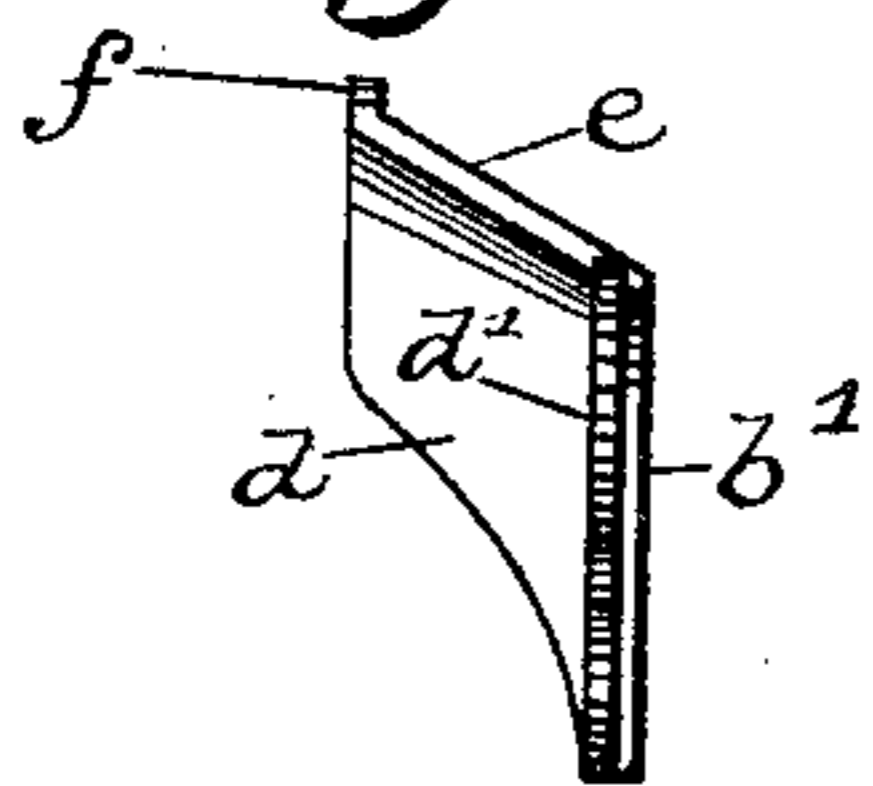


Fig. 8.

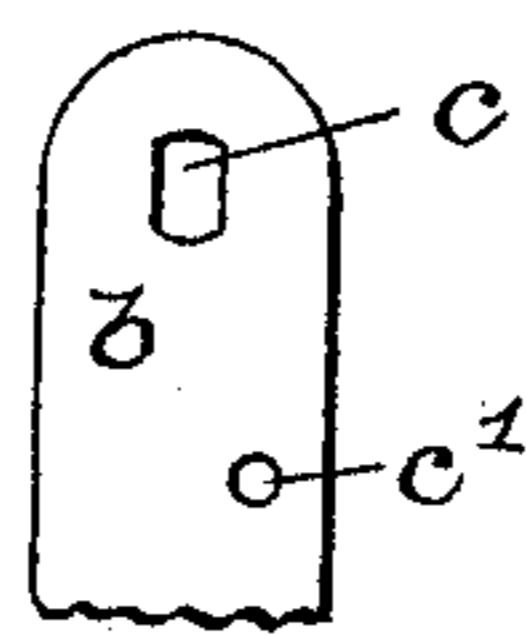


Fig. 6.

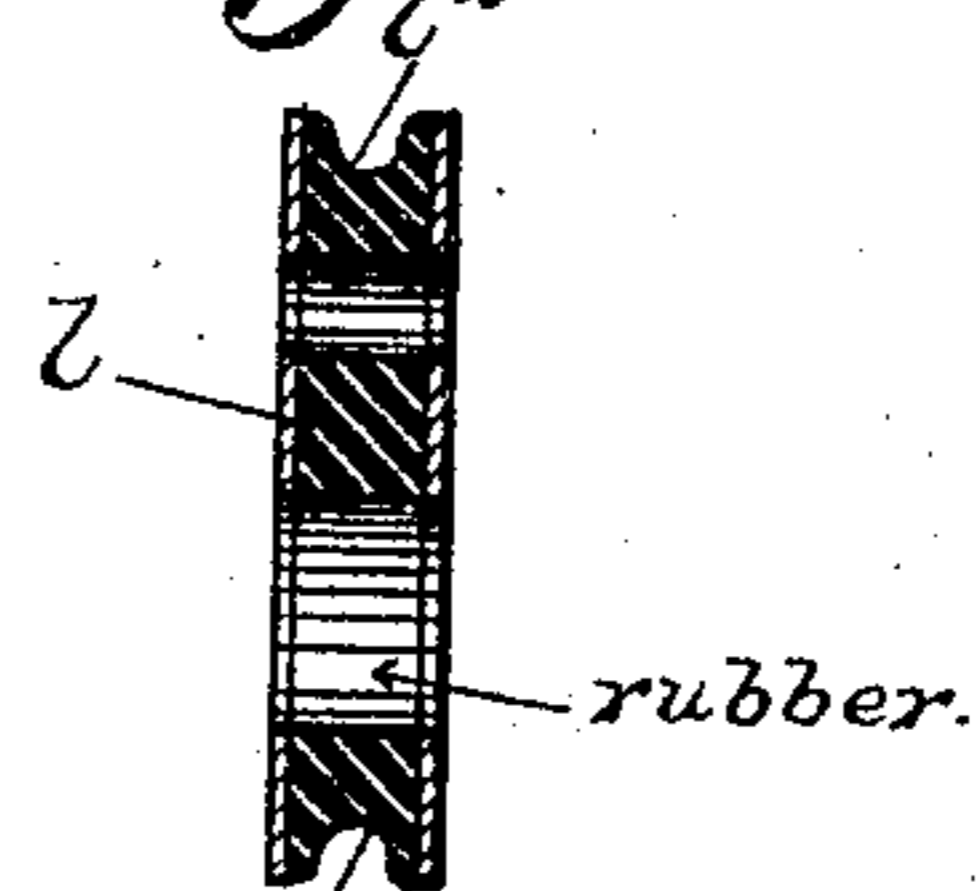
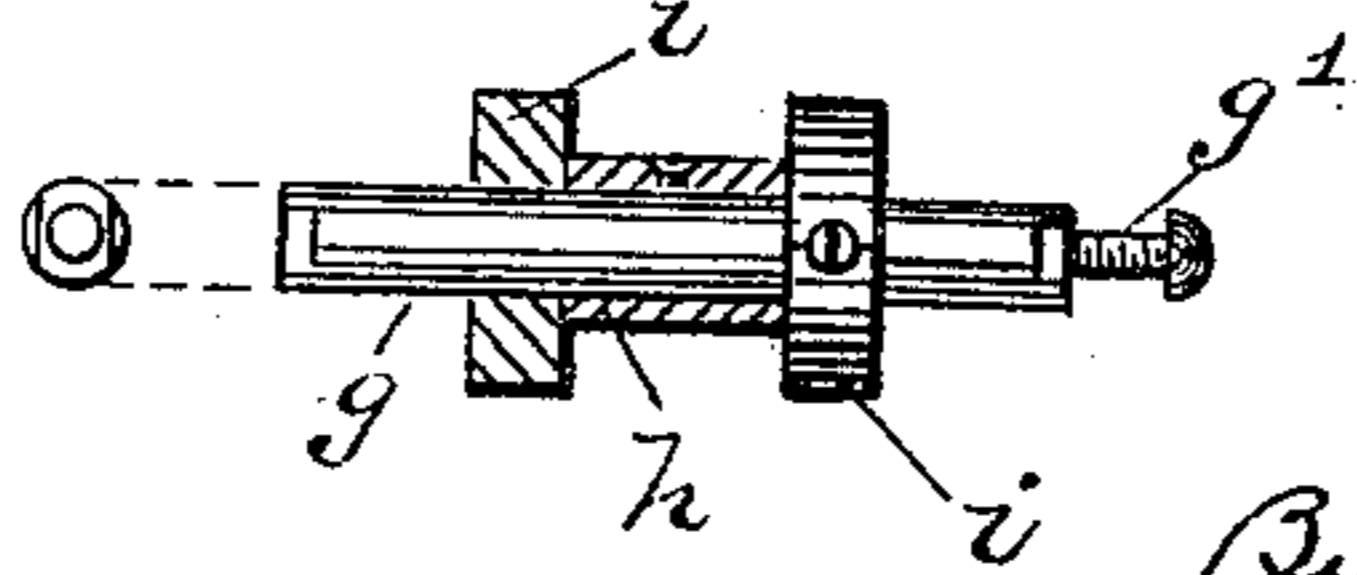


Fig. 9.



Witnesses.

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# UNITED STATES PATENT OFFICE.

GEORGE H. SPAFFORD, OF BALTIMORE, MARYLAND.

## TROLLEY.

SPECIFICATION forming part of Letters Patent No. 684,122, dated October 8, 1901.

Application filed March 13, 1901. Serial No. 50,957. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE H. SPAFFORD, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Trolleys, of which the following is a specification.

This invention relates to improvements in trolleys; and an object of the invention is to provide a trolley with replacer devices so constructed that when the trolley-wheel accidentally becomes displaced from engagement with the trolley-wire the wheel will be automatically returned to an engaged position with the wire.

Another object of the invention is to provide a construction of trolley harp and replacer which is light in weight and at the same time strong and durable.

The invention is illustrated in the accompanying drawings.

Figure 1 illustrates in side view the upper portion of my trolley-pole, harp, wheel, and replacer, the wheel being engaged with the wire. Fig. 2 is a plan view, on a larger scale, of the upper portion of the trolley. Fig. 3 is a detail side view of one of my eccentric replacers. Fig. 4 is a detail side view of my non-metallic replacer-filler. Fig. 5 is a perspective view of the skeleton replacer-frame. Fig. 6 is a sectional view of the replacer on the line 6 6 of Fig. 3. Fig. 7 is a rear elevation of one of the wire-catchers. Fig. 8 is a side elevation, broken, of one of the side arms for supporting the trolley. Fig. 9 illustrates two views of the shaft which carries the trolley-wheel and replacer mechanism, one of said views being partly in section.

In the drawings, A designates the trolley-head, having the two side arms *b*, which comprise the harp-frame, and at their upper ends each of said arms is provided with an elongated hole *c* and a screw-hole *c'*. A wire-catcher *d* is secured to each side arm *b* and projects outwardly away from the wheel. Said catchers have an inclined surface *e* extending upward from the inner toward the outer edge, and a flange *f* extends vertically from the upper edge of said inclined surface. Another flange *b'* is on the inner edge and takes over the front edge of the side arm *b*,

and a screw passes through the flat side *d'* of the catcher into the hole *c'* on the side arm *b*.

A spindle or shaft *g* is supported in the two side arms *b*, and the ends of said shaft are flattened to correspond with the elongated holes *c* in said arms, whereby when the shaft ends are inserted in said holes the shaft will be prevented from turning. Screws *g'* serve to keep the ends of the shaft in the holes *c*. A bushing *h* is secured centrally on the shaft *g* between two stationary collars *i*, and the trolley-wheel *J* has position between said two collars and revolves loosely around the bushing. By this construction the bushing receives the wear instead of the shaft and may be readily removed and replaced by new ones.

The shaft *g* at each side of the trolley-wheel *J* and on the ends outside of the collars *i* loosely carries the replacers *K*. When the trolley is in the normal or running position, the upper grooved edge of the replacer is practically flush or even with the lowermost edge of the inclined surface *e* of the wire-catcher.

The replacers *K* comprise two side plates *k* *k'*. The plate *k'* is provided at its depending end with a lug *k<sup>2</sup>*, which has position between the two plates. Short tubes *k<sup>3</sup>* are interposed between the two plates, and the two plates *k* *k'* are secured together by means of screws *k<sup>4</sup>*, which extend through the said short tubes. The two plates, tubes, and screws form a skeleton frame.

A filling or packing *l* of suitable non-metallic material is cut or otherwise formed in a shape corresponding to the shape of the plates *k* and *k'* and is provided at its lower end with a notch or cut-away portion *m*, which fits over the lug *k<sup>2</sup>*. Holes *l'* in the packing receive the short tubes *k<sup>3</sup>*, and the non-metallic packing is clamped between the two plates, and the plate *k* is secured to the short tubes on one side, while the plate *k'* is secured to said tubes on the opposite side of the packing. The packing *l* is also provided on its rounded side with a peripheral groove *l<sup>2</sup>*. I have found in practice that good results can be obtained by employing rubber, because it has the desired friction on the trolley-wire, and have illustrated my invention as employing a packing of that material; but I wish it to

be understood that any other non-metallic material may be used which will produce friction enough when in contact with the trolley-wire to turn said replacer over to the position shown at the left in Fig. 2.

I am aware that it is not new to provide a replacer eccentrically hung to revolve on a shaft and adjoining the trolley-wheel, and, further, that it has been proposed to provide an eccentrically-movable replacer having a groove to receive the trolley-wire; but as far as I am aware I am the first to provide the wire-contacting edge of an eccentric replacer with a non-metallic friction material to cause the replacer to bind against the trolley-wire during its operation, and thereby cause the replacer to revolve. Heretofore replacers having metal contacting surfaces have failed because the frictional contact with the wire is not sufficient to cause the eccentric replacer to turn over.

The operation is as follows: The trolley-wheel, which is usually carried on the end of a pole, as in the present instance, is held in contact with the trolley-wire by the action of springs applied to the pole, and the tendency of such springs is to raise the pole and wheel in a vertical position. When the trolley-wheel runs over crossings in the wire or over places where the wire has been spliced, and also in turning curves, it often happens that the wheel will jump off the wire and the springs will raise the pole and trolley-wheel from the usual inclined position to a vertical position and cause damage to the overhead-wire construction, as well as delay. By my construction when the wheel leaves the wire and the trolley is raising to assume the vertical position the inclined surfaces *e* of the outwardly-projecting catchers *d* will take under the wire and cause the wire to slide down the said inclined surface into the groove *f* of the replacer, and the forward motion of the car will cause the replacer to turn over, as seen to the left of Fig. 2, and raise the wire up above the trolley-wheel, when it will slide off the inclined end onto the trolley-wheel, and thereby be automatically returned to the wheel without stopping the car and causing delay. The friction material *l* on the replacer is essential, as it prevents the wire from merely sliding through the groove without turning or revolving the replacer.

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

1. The combination with a trolley-harp frame provided at each side with a wire-catcher; a trolley-wheel revoluble within the frame; and a trolley-wire replacer revoluble within the frame between the wire-catcher and the trolley-wheel.

2. The combination with a trolley-harp frame provided at each side with an inclined wire-catcher; a trolley-wheel revoluble within the frame; and a trolley-wire replacer revoluble within the frame, between the wire-catcher and the trolley-wheel—the upper edge of said replacer when in the normal position being substantially flush with the lower edge of the inclined surface of the wire-catcher.

3. The combination of a trolley-harp frame provided at each side with a wire-catcher; a trolley-wheel revoluble within the frame; and a revoluble wire-replacer having a peripheral groove which latter is provided with a non-metallic material for producing friction.

4. The combination of a trolley-harp frame provided at each side with an inclined wire-catcher projecting outwardly; a shaft carried by said frame and provided with two collars and a bushing between the collars; a trolley-wheel revoluble on said bushing between said collars; and wire-replacers revoluble on the shaft on the outside of said collars and adapted to receive the trolley-wire as the latter drops off said inclined catcher.

5. The combination of a trolley-harp frame comprising two upright arms each provided at their upper ends with an oblong slot; a wire-catcher secured to each of said arms; a shaft having squared ends which take in the oblong slots in said arms; a trolley-wheel revoluble on said shaft; wire-replacers each having a groove of friction material to receive the trolley-wire whereby the wire will cause the replacer to turn over and thereby deliver the wire on the trolley-wheel.

6. The combination of a trolley-harp frame provided at each side with a rigid wire-catcher; a trolley-wheel revoluble within the frame; a wire-replacer revoluble within the frame and comprising two plates and a filling or packing of non-metallic friction material interposed between said two plates.

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

GEORGE H. SPAFFORD.

Witnesses:

F. S. STITT,  
CHARLES L. VIETSCH.