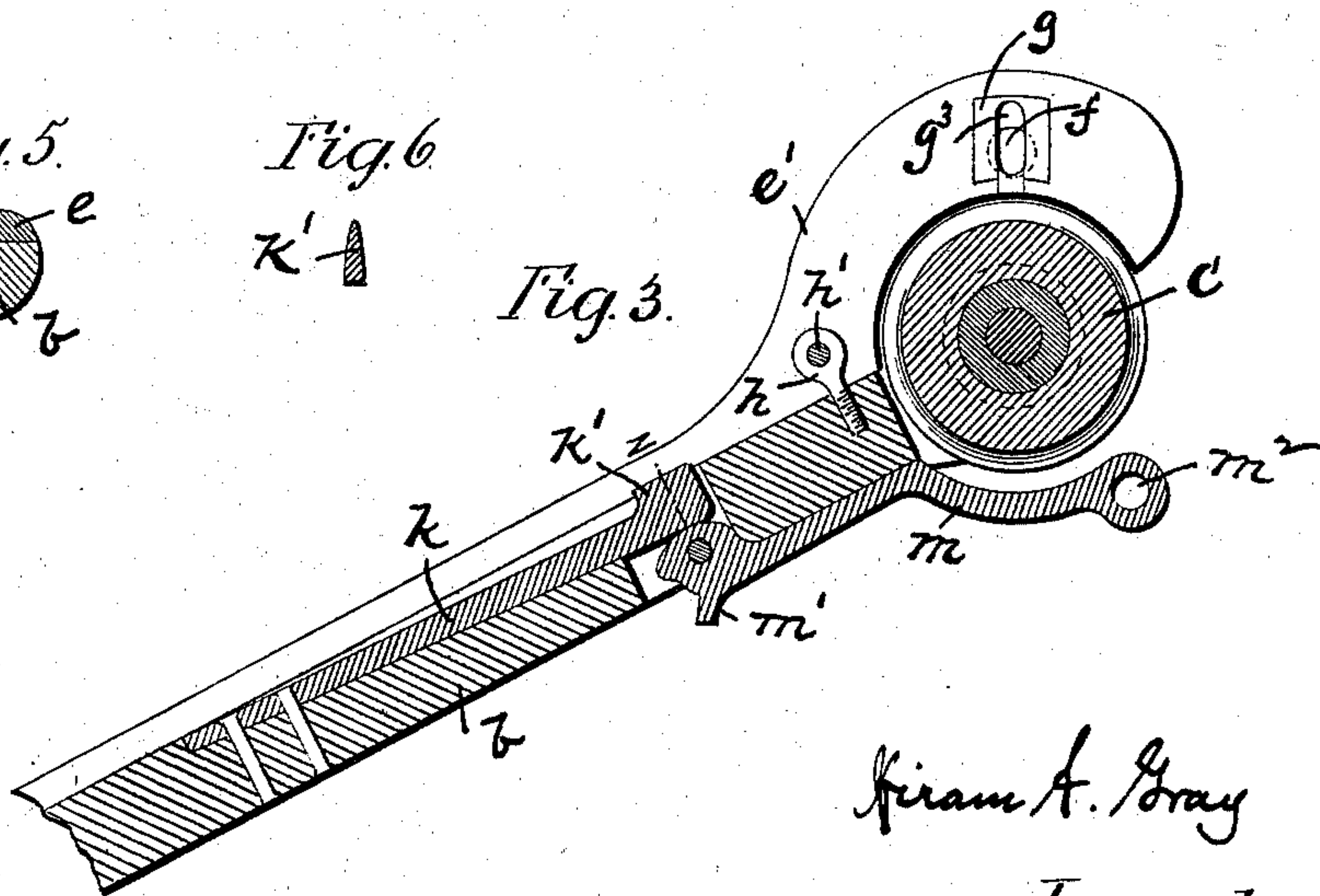
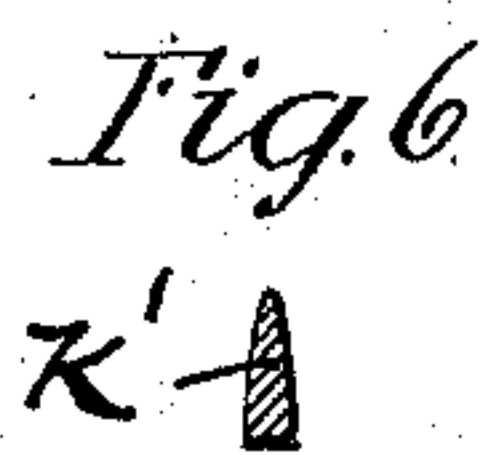
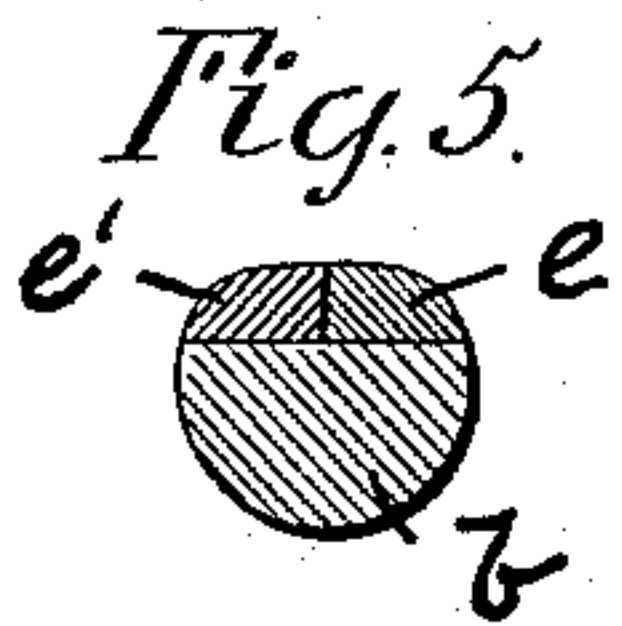
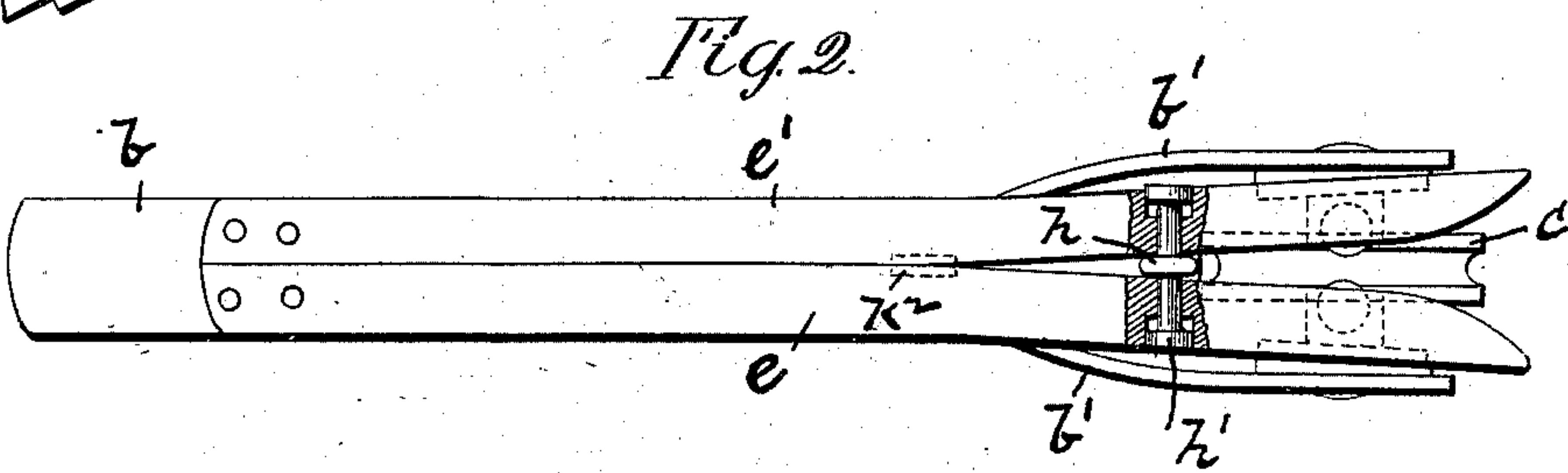
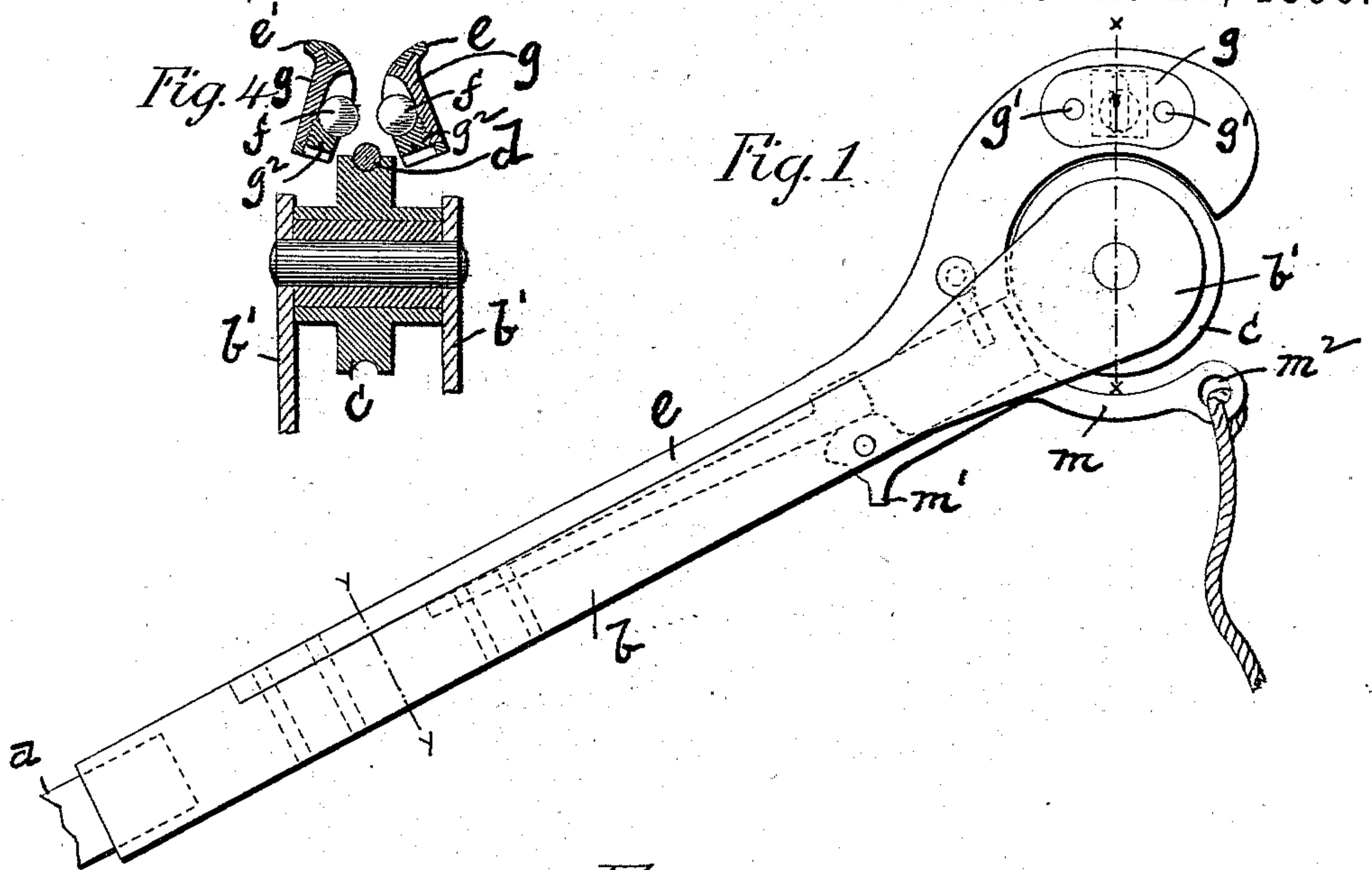


(No Model.)

H. A. GRAY.
TROLLEY DEVICE.

No. 562,523.

Patented June 23, 1896.



Witnesses:
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UNITED STATES PATENT OFFICE.

HIRAM A. GRAY, OF NEW HAVEN, CONNECTICUT.

TROLLEY DEVICE.

SPECIFICATION forming part of Letters Patent No. 562,523, dated June 23, 1896.

Application filed August 1, 1895. Renewed April 27, 1896. Serial No. 589,331. (No model.)

To all whom it may concern:

Be it known that I, HIRAM A. GRAY, a citizen of the United States, residing at New Haven, county of New Haven, and State of Connecticut, have invented a new and useful Improvement in Trolley Devices, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to trolley devices for supplying the current from an overhead conductor to an electrically-propelled car, and it has for its object to provide such a device with means for preventing the trolley-wheel from leaving the conductor at any time unless positively withdrawn therefrom, and thereby obviate all danger of injury to the span-wires or other supports of the conductor from the rising of the upper end of the trolley-pole above the level of the conductor.

To this end my invention consists in the trolley device hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like letters designate like parts, Figure 1 is a side view of the trolley device invented by me. Fig. 2 is a plan view thereof. Fig. 3 is a longitudinal section of the same. Fig. 4 is a partial cross-section taken at line $x x$ of Fig. 1. Fig. 5 is a cross-section taken at line $y y$ of Fig. 1. Fig. 6 is a cross-section of the spreader, taken at line $z z$ of Fig. 3.

The letter a designates a portion of the upper end of a trolley-pole of common form, and b designates the head which supports the device invented by me and which is adapted to be secured to said pole in any suitable manner. Said head is in the form of a metallic rod or bar which terminates at its outer end in the fork b' , between the two arms of which is journaled in any suitable manner trolley-wheel c , having a peripheral groove, as shown, to adapt it to closely engage the overhead conductor d . (See Fig. 4.) Upon the upper side of said head b are secured by rivets, as shown, or in any convenient manner, the two metallic arms $e e'$, which arms at their outer end diverge slightly from each other, as shown in Fig. 2, and are curved upwardly and outwardly, as shown in Figs. 1 and 3, to cause them to overhang the trolley-wheel c , from the periphery of which they are but slightly

removed. The inner surface of the diverging portion of said arms $e e'$ is preferably beveled both longitudinally and transversely, as shown in Figs. 2 and 4, whereby the conductor d is caused to exercise a wedging action to slightly separate them when the pole is moved upwardly to engage the trolley-wheel with said conductor, the resiliency of said arms causing them to return to their normal position after they have passed above the conductor. By reference to Fig. 4 it will be observed also that the diverging portions of said arms diverge slightly from each other from their upper to their lower edges, thereby forming a converging recess or space between their inner faces. In the practice of my invention I locate within such converging space between said arms antifriction balls or rolls f , adapted to engage the upper side of the conductor d whenever the trolley-wheel moves downwardly away from said conductor, and so supported that they are free to have a limited rising-and-falling movement within said space, whereby as they are moved upwardly by their contact with the conductor they will be caused to approach each other, and, by closing the outlet at the upper edge of the arms $e e'$, prevent the escape of the conductor through said outlet. There are obviously various ways in which said balls or rolls can be thus mounted on said arms; but I prefer to mount them within independent boxes g , (see Fig. 4,) adapted to be inserted within an opening or mortise in the arms and having a projecting flange to engage the outer surface of said arms and to receive the bolts or rivets g' , by which they are secured in position. Said boxes g are provided with a chamber to receive the balls f , which chamber is closed after the insertion of the ball by a threaded plug g^2 , and are provided at their inner side with a slot g^3 , communicating with said chamber, through which slots the balls slightly project, as shown in Fig. 4, for engagement with the conductor d when the trolley-wheel is lowered, as just described. The chambered boxes g thus form guides for the balls f , which permit them to have a limited rising-and-falling movement and cause them to gradually approach each other in their rising movement and separate from each other in their downward movement, and such action

of said balls or similar antifriction devices constitutes an important feature of my invention.

To hold the outer ends of the arms $e e'$ from movement away from the head b while affording capacity for a limited lateral movement thereon, I utilize a screw-eye h , secured to the head adjacent to the fork b' , and pass through said arms and said screw-eye a pin h' , the headed ends of which are received within countersunk recesses in the outer side of the arms, as shown in Fig. 2, thus securing the result stated in a very simple and inexpensive manner.

To provide for positively spreading the arms $e e'$ whenever it is desired to remove the trolley-wheel from the conductor d or to apply it thereto, I utilize a spreader k , consisting of a bar of spring metal located within a longitudinal groove or recess in the upper side of the head b , and secured at its lower end to the latter by rivets, as shown in Fig. 2, or in any convenient manner, said bar terminating at its upper end in the wedge-shaped head k' , which enters a recess k^2 in the abutting edges of said arms, whereby said head will act to slightly spread the arms laterally when forced outwardly within said recess. A cam-lever m , hung upon a transverse pivot m' within a mortise in the head b , is provided with a cam-shaped head, which engages the inner side of the spreader k in such manner that by exerting a downward movement upon the free end of said lever it will force the spreader-head k' outwardly to spread the arms $e e'$, a projecting toe m' on the lever by its engagement with the under side of the head b serving as a stop to limit the amount of such movement. Said lever m is provided at its free end with an eye m^2 to enable the end of the trolley-cord to be conveniently secured thereto.

The head b is preferably made substantially round in cross-section with its upper side flattened, as shown in Fig. 5, and the arms $e e'$ are preferably provided with a flat lower side and rounded upper side, as shown.

The device thus constructed being suitably secured to a trolley-pole having the usual spring connections for causing it to normally stand in a perpendicular position, to apply the trolley-wheel c to the conductor d , the operator grasps the trolley-cord and pulls downwardly thereon, thereby rocking lever m and actuating the spreader k to slightly spread the arms $e e'$ and bringing the stop m' into engagement with the under side of the head b . A continued downward pull upon the cord will draw the trolley-pole downwardly against the stress of its springs until it is beneath the conductor d , whereupon the operator permits it to rise until the wheel c engages the under side of the conductor, the separated ends of the arms $e e'$ passing upwardly on opposite sides of the latter and by their beveled inner sides greatly facilitating

the action of guiding the wheel to the same. The operator now releases his hold of the trolley-cord, whereupon the resiliency of the spreader k immediately restores the lever m to its normal position as shown in Figs. 1 and 3, and permits the resiliency of arms $e e'$ to restore them to their normal position as shown in Fig. 4. In such position of said arms, the balls f are in their lowest position in which they slightly overhang the conductor without touching it, as shown. If now, by reason of the jolting of the car or for any reason, the trolley-wheel seeks to move downwardly away from the conductor, such movement will instantly bring the latter into engagement with said balls and, by raising the latter, cause them to approach each other in such manner as to close the outlet at the upper edge of the arms $e e'$, as before described, and prevent any further descent of the trolley-wheel, which latter is caused by the tension on the trolley-pole to immediately return to its contact with the conductor.

It will thus be seen that the device herein described constitutes an absolutely sure safeguard against accidental upward movement of the trolley-wheel above the plane of the conductor, and such detaining action thereof is equally as effectual upon curves, where the conductor is usually considerably to one side of the plane of the track upon which the car moves, as upon straight sections of track. The freedom of the balls f to revolve about their own axes as well as to have an upward and downward body movement reduces the friction of their contact with the conductor to a minimum and prevents any undue strain upon the conductor and undue wear of either the conductor or said balls. The curved outer edge of the diverging portions of the arms $e e'$ and their beveled inner surface cause them to pass switches and other irregularities in the conductor readily and without affecting the detaining action of the device on the trolley-wheel.

When it is desired to forcibly remove the trolley-wheel from the conductor, it is necessary simply to pull downwardly upon the trolley-cord, such action, as before explained, first spreading the arms $e e'$, so as to cause them to readily pass the conductor.

I do not wish to limit myself to the precise details of construction herein shown and described, as various modifications therein can be made within the spirit of my invention.

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

1. The device herein described for preventing a trolley-wheel from leaving an overhead conductor, comprising a head adapted to be secured to the trolley-pole, a trolley-wheel suitably journaled on said head, oppositely located, antifriction devices, supported upon said head above said wheel and capable of both an axial and a rising-and-falling move-

ment, and means for causing said devices to approach each other in their upward movement, substantially as set forth.

2. In a device for retaining a trolley-wheel in contact with an overhead conductor, a head adapted to be secured to a trolley-pole, a trolley-wheel suitably journaled upon said head, two arms mounted upon said head and projecting to a point above said wheel, antifric-
 10 tion devices, mounted upon said arms above said wheel and adapted for a rising-and-falling movement, and means for causing said devices to approach each other in the rising movement to close the opening between said
 15 arms, combined and operating substantially as described.

3. In a trolley device, the combination with a head adapted to be secured to a trolley-pole and a trolley-wheel suitably journaled upon
 20 said head, of two slightly elastic arms secured at their lower end to said head and curved at their upper end to cause them to partially overlie said wheel, two balls mounted upon
 25 said overlying portion of said arms respectively and capable of a rising-and-falling movement thereon, said balls having a portion thereof projecting beyond the inner faces of said arms, and means for causing said balls
 30 to approach each other in their upward movement, substantially as set forth.

4. In a trolley device, the combination with a trolley-wheel adapted to engage the under side of an overhead conductor, of two balls
 35 supported above said wheel and capable of a rising-and-falling movement, converging guides for causing said balls to approach each other in their upward movement, and means for imparting lateral movement to said guides
 40 to vary the distance between them, substantially as described.

5. In a trolley device, the combination with a trolley-wheel adapted to engage the under side of an overhead conductor, of two balls
 45 mounted upon laterally-yielding supports above said wheel and adapted to engage the upperside of said conductor when said trolley-

wheel is lowered from the latter, and means for spreading said supports to permit the conductor to pass between them, arranged and operating substantially as set forth.

6. In a trolley device, the combination with
 50 a trolley-wheel and a suitable support therefor, of two laterally-yielding arms mounted upon said support and partially embracing said wheel, antifriction-balls mounted upon
 55 said arms respectively above said wheel and capable of a rising-and-falling movement, means for causing said balls to approach each other in their upward movement, a spreader for causing a separation of said arms from
 60 each other, and means, as the trolley-cord, for actuating said spreader, substantially as described.

7. In a trolley device, the combination with a head, as *b*, and the trolley-wheel *c* journaled
 65 thereon, of the arms *e e'* secured to said head at one end and carrying the balls *f* at their opposite end, of a spreader, as *k*, for separating said arms from each other, and a lever, as *m*, for actuating said spreader, substan-
 70 tially as described.

8. In a trolley device, the combination with a head, as *b*, carrying the trolley-wheel *c*, of the arms *e e'* secured at one end to said head and having their opposite ends curved and
 75 beveled as described, balls *f* mounted on said arms and capable of a rising-and-falling movement, and guides on the arms for causing said balls to approach each other in their upward movement, substantially as set forth.

9. In a trolley device, the combination with a head, as *b*, and the trolley-wheel *c* mounted
 80 thereon, of the arms *e e'*, boxes *g* mounted upon said arms as described, balls *f* located within said boxes, and means, as the eye *h*
 85 and pin *h'*, for preventing movement of said arms away from said head, substantially as described.

HIRAM A. GRAY.

Witnesses:

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 J. E. CHAPMAN.