

No. 712,433.

Patented Oct. 28, 1902.

G. F. CHAPMAN.  
HEADLIGHT OPERATING MECHANISM.

(Application filed Aug. 8, 1902.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

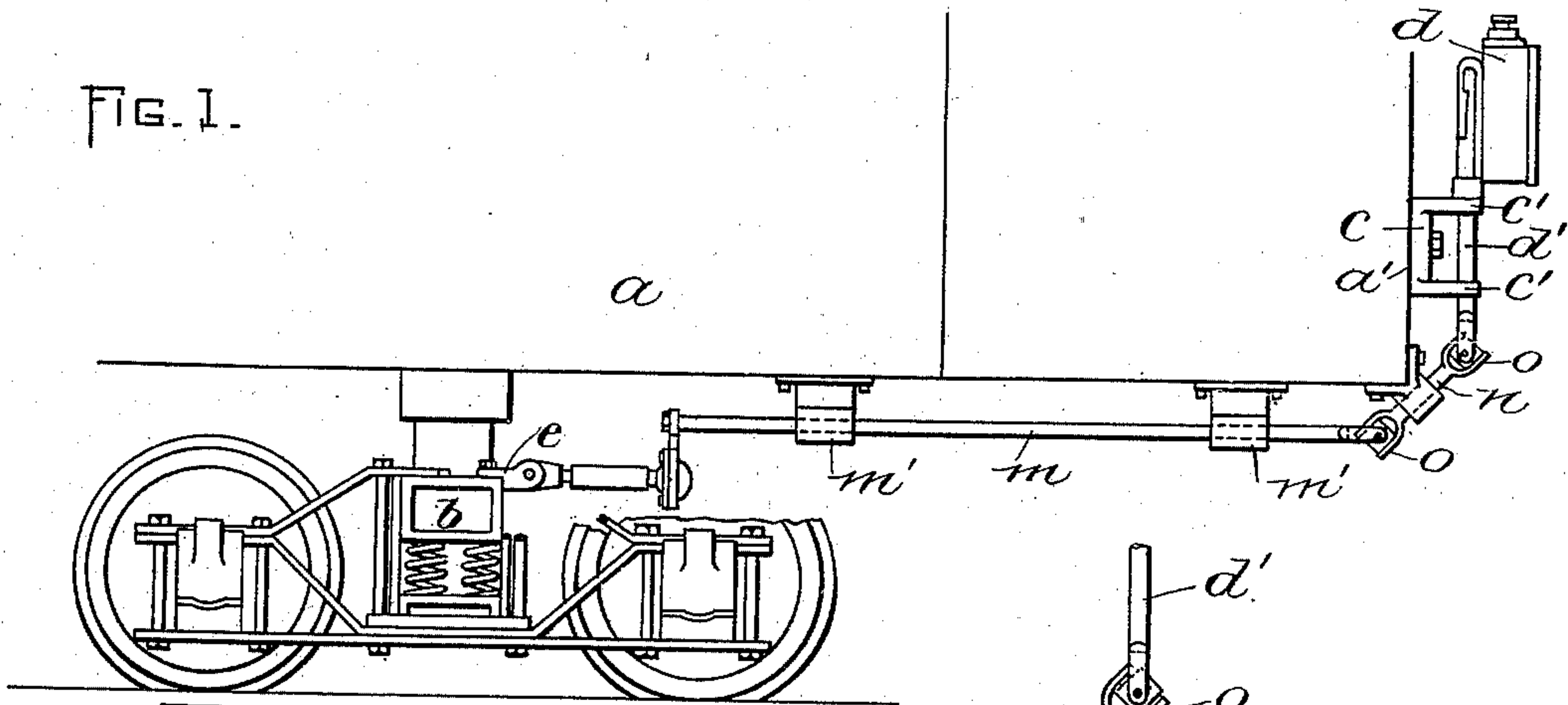


FIG. 3.

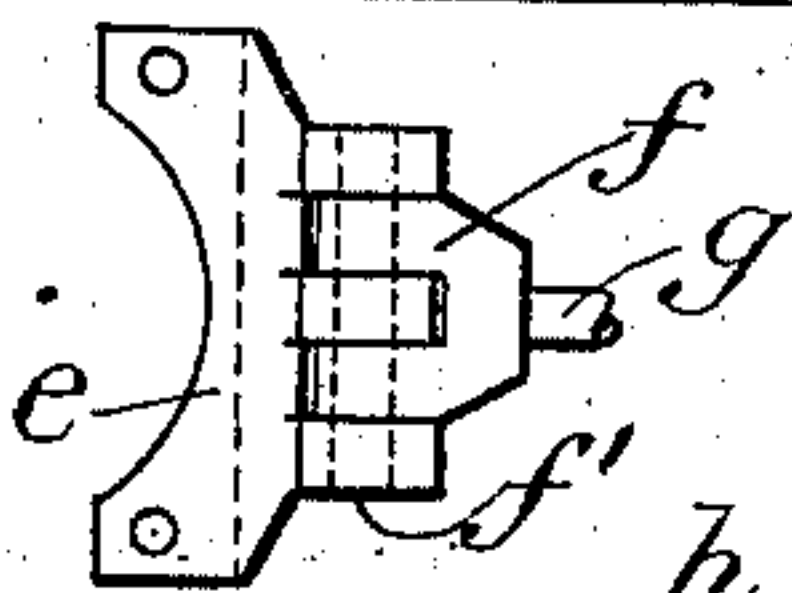


FIG. 4.

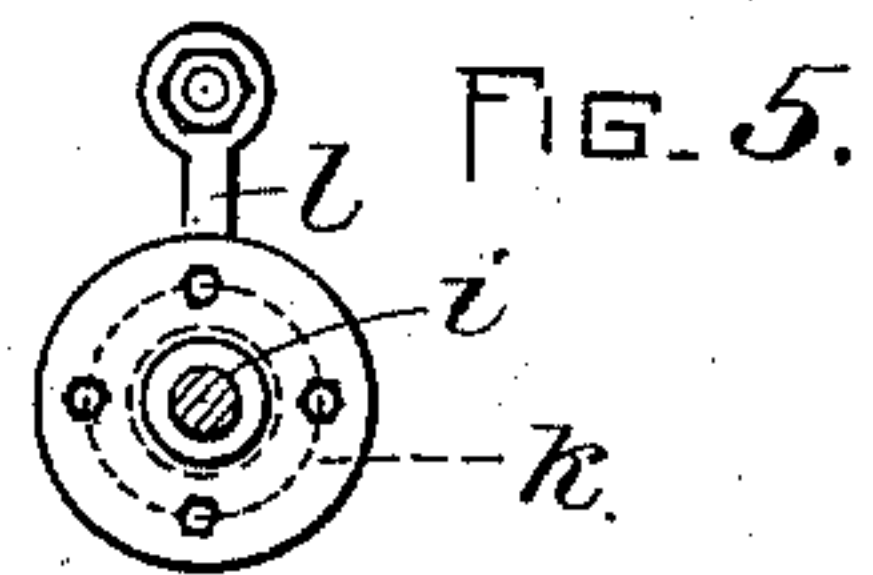
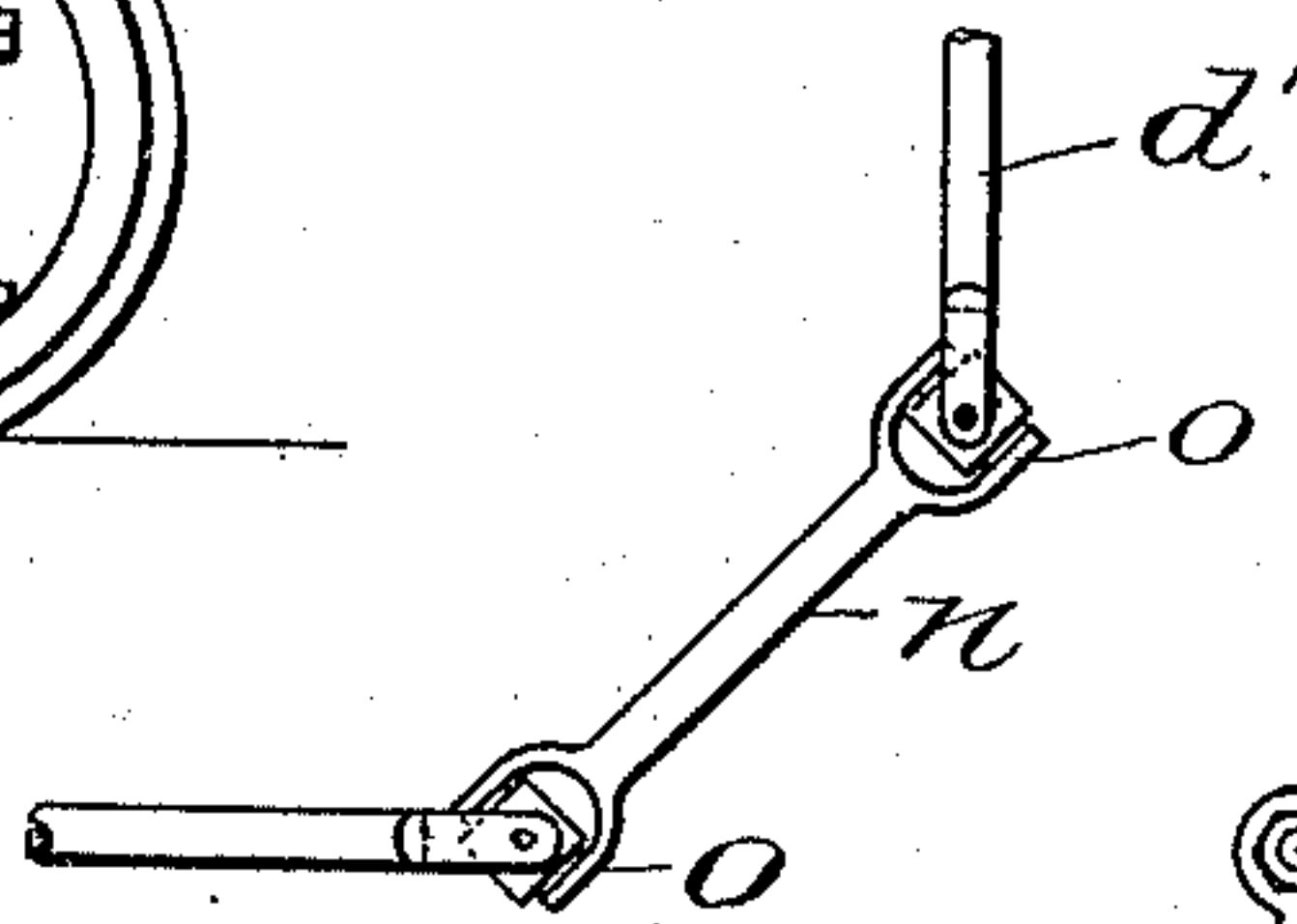
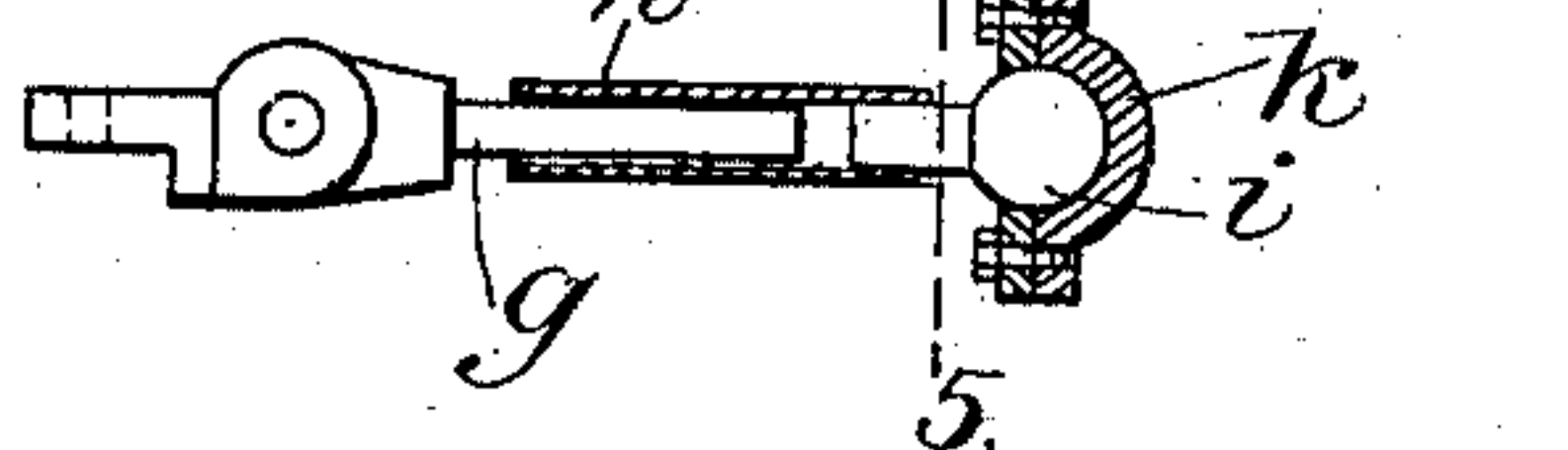
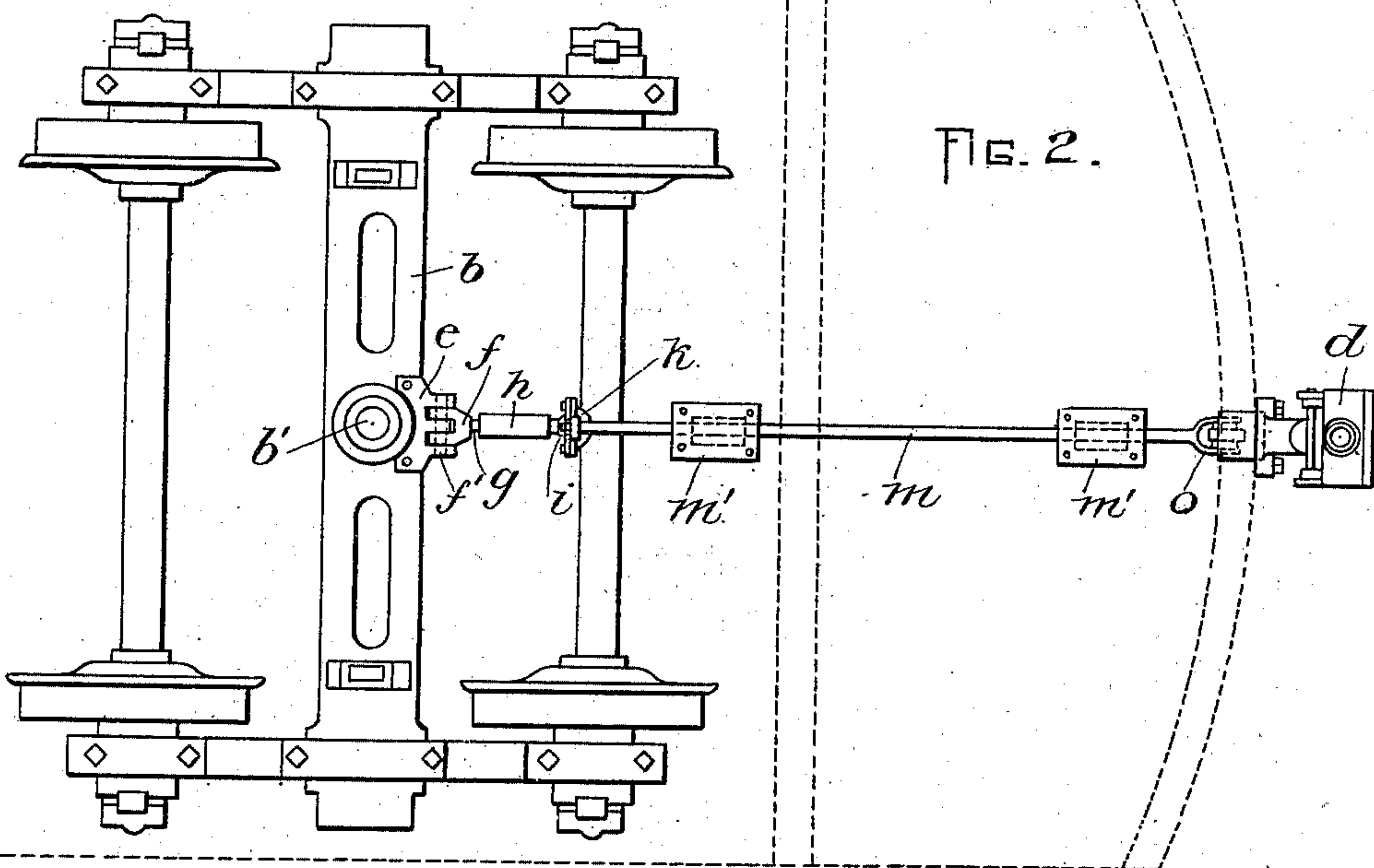


FIG. 2.



WITNESSES

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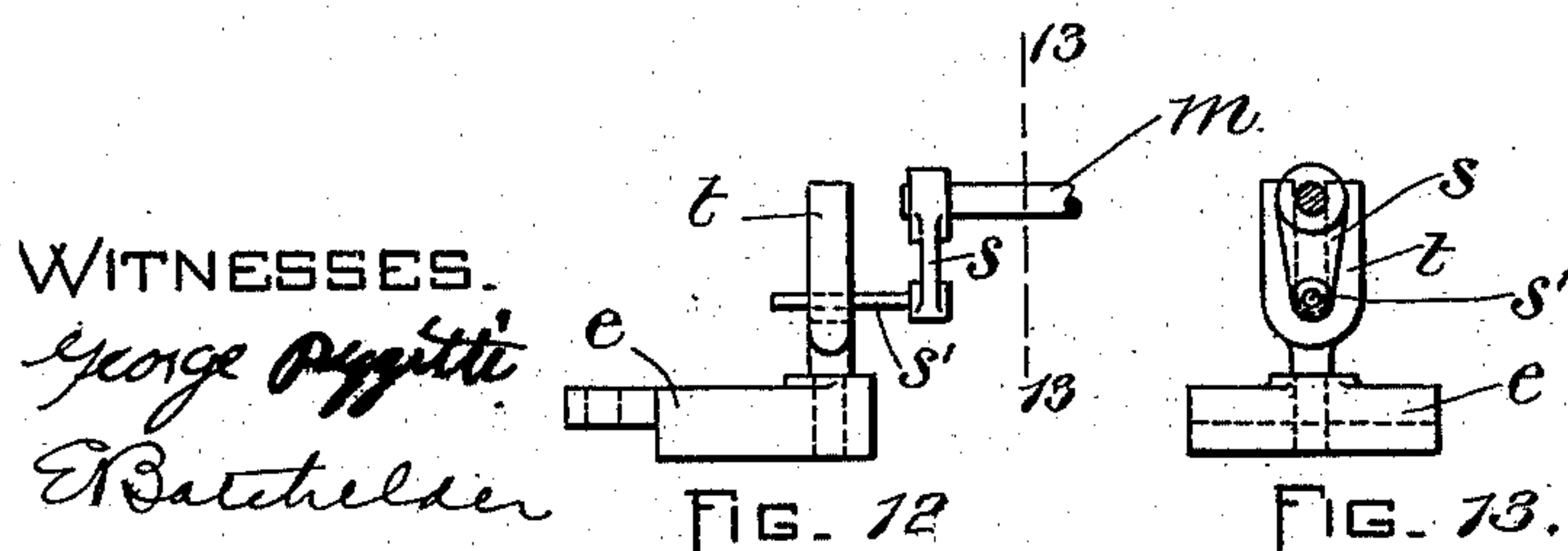
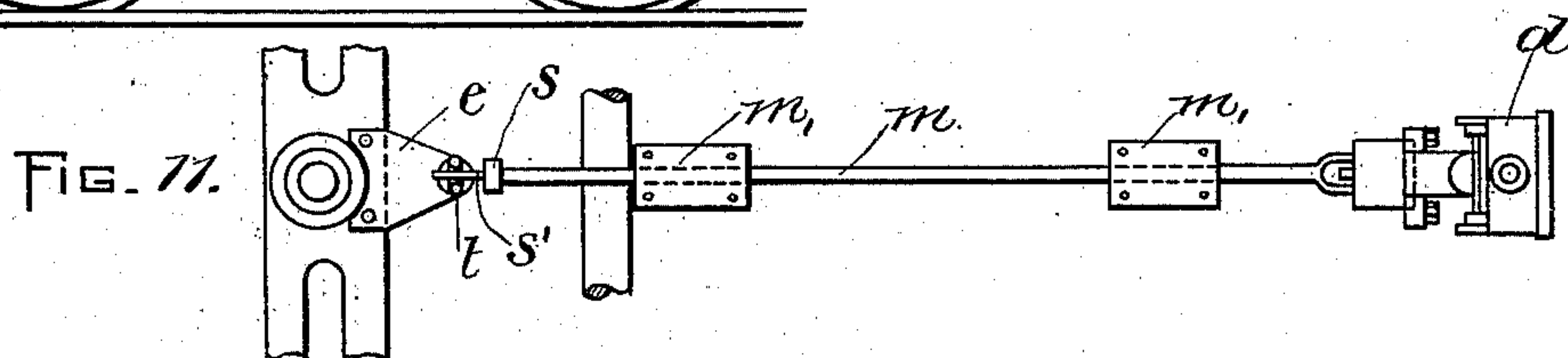
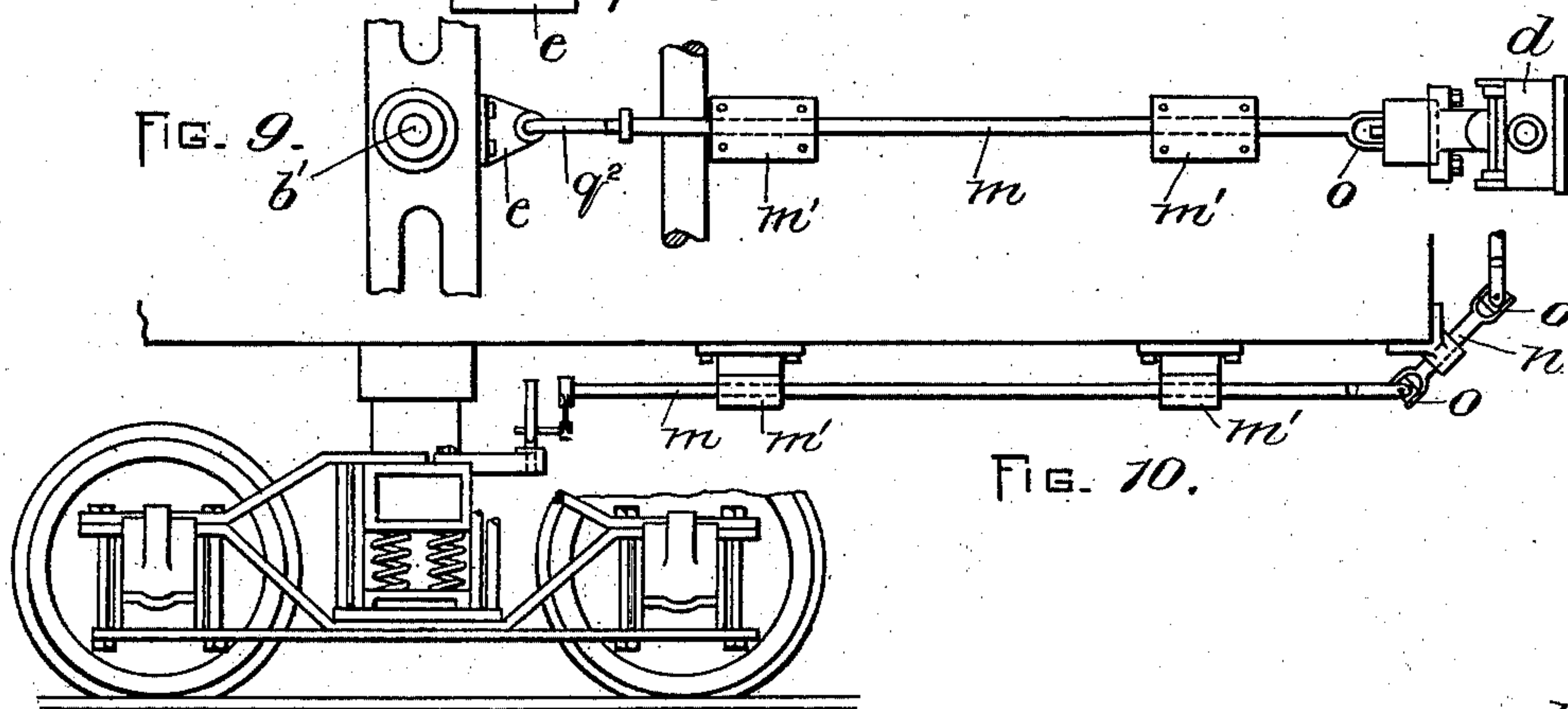
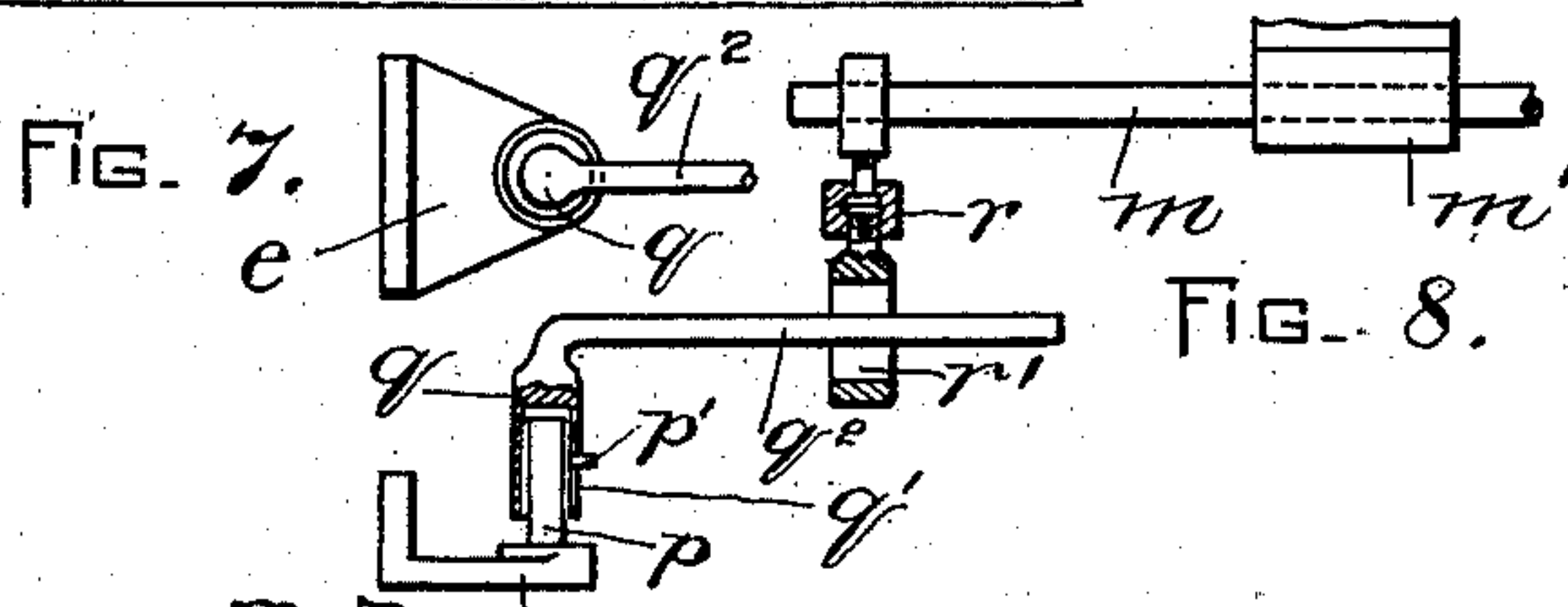
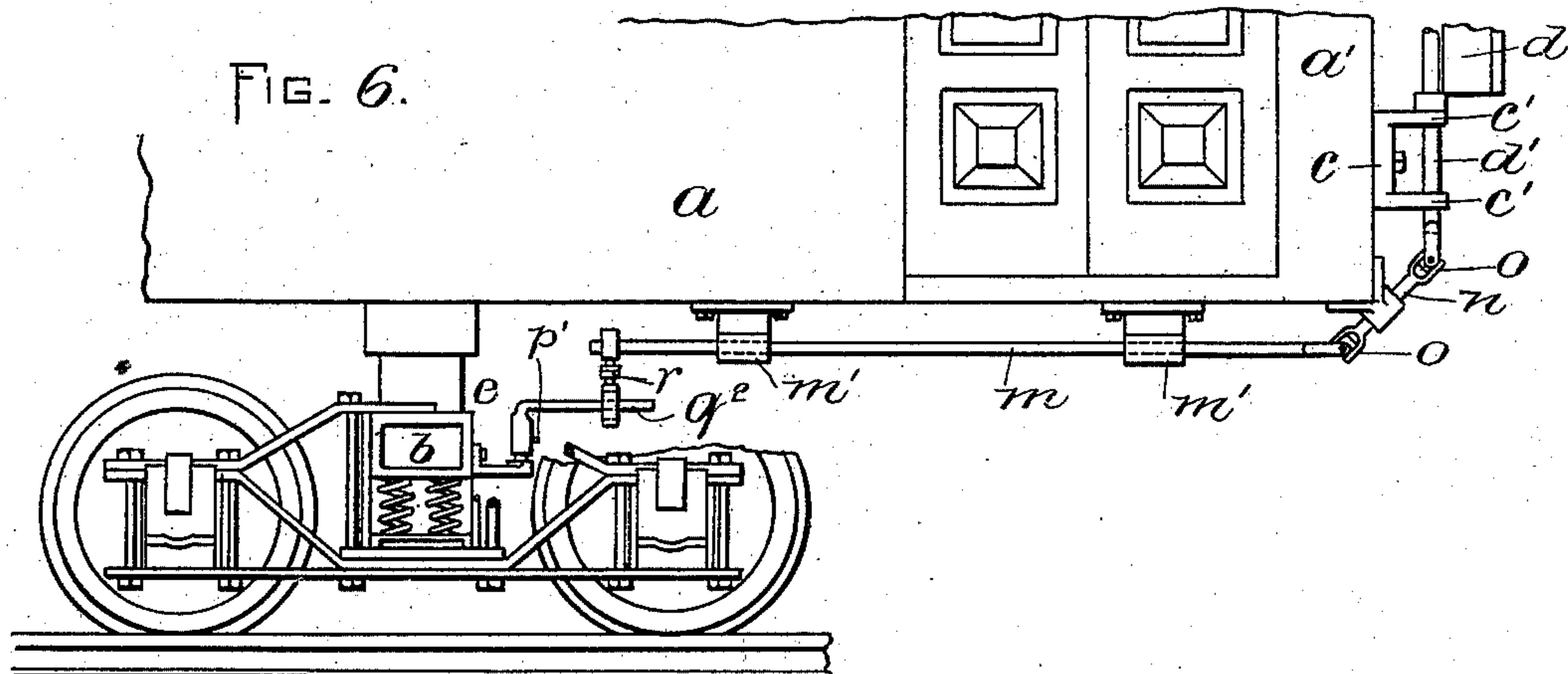
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2 Sheets—Sheet 2.



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*Geo. F. Chapman*  
*by Knight & Sons, Attys.*



# UNITED STATES PATENT OFFICE.

GEORGE F. CHAPMAN, OF MARLBORO, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO LEVI WALLACE, OF AYER, MASSACHUSETTS.

## HEADLIGHT-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 712,433, dated October 28, 1902.

Application filed August 8, 1902. Serial No. 118,894. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. CHAPMAN, of Marlboro, in the county of Middlesex and State of Massachusetts, have invented certain  
5 new and useful Improvements in Headlight-Operating Mechanism, of which the following is a specification.

This invention relates to means for connecting a pivoted headlight on a street-car or  
10 other vehicle with a portion of the running-gear of said vehicle, so that when the vehicle is running on a straight portion of track or roadway the rays from the headlight will be directed along a path in line with the longitudinal center of the vehicle, and therefore  
15 directly ahead of the same; but when the track or roadway is curved the rays from the headlight will be automatically deflected in the direction of the curvature, and thus  
20 caused to illuminate the curved path over which the vehicle is passing.

The particular object of the invention is to provide connections between a headlight on a car-body and a truck-frame which will be  
25 compact and also out of the way of other appliances which may be located beneath the car.

To these ends the invention consists in the construction and combination of parts,  
30 substantially as hereinafter described and claimed.

In the drawings, Figure 1 represents a side elevation of part of the front portion of a street-car, together with the front truck-frame, and showing one embodiment of my  
35 present invention. Fig. 2 represents a plan view of the parts shown in Fig. 1, the corresponding portion of the car-body being shown in dotted lines. Fig. 3 represents a detail plan view of a portion of the connection with the truck-frame. Fig. 4 represents a detail  
40 view, partly in section, of the complete connections shown in Fig. 1 between the bolster and the headlight-trunnion. Fig. 5 represents a section on the line 5 5 of Fig. 4 looking  
45 toward the right. Fig. 6 is a view similar to Fig. 1, illustrating a modified form of my invention. Fig. 7 is a detail plan view of a portion of the connections hereinafter described. Fig. 8 is a detail side elevation,  
50 partly in section, of the connections between

the bolster and an arm on the rock-shaft. Fig. 9 represents a detail plan of the connections shown in Fig. 1. Fig. 10 represents a view similar to Figs. 1 and 6, but representing another modification of the connections.  
55 Fig. 11 represents a plan view of the connections shown in Fig. 10. Fig. 12 represents an enlarged detail side elevation of a part of the connections shown in Fig. 9. Fig. 13 represents a section on the line 13 13 of Fig. 12 looking in the direction of the arrow.

In the drawings, *a* represents a portion of the body of a street-car, and *a'* represents a portion of the front fender or dasher of the  
60 car, or *a'* may be considered as representing the front wall of a vestibule at one end of the car-body.

*b* represents an independently-movable part below the body *a*, said part being in this  
70 instance the bolster portion of the truck-frame, said portion being pivotally connected at *b'* with the body *a*.

*c* represents a holder which is affixed to the part *a'* of the car-body and is here shown  
75 as a bracket having two ears or bearings *c' c'*.

*d* represents the headlight, which is secured to a vertical stud or trunnion *d'*, journaled in the ears or bearings *c' c'*. The relative arrangement of the headlight *d*, shaft or  
80 trunnion *d'*, and the car-body is such that the headlight can occupy a central position, so as to direct its rays ahead in line with the longitudinal center of the body or can be turned or deflected to direct its rays to either side of  
85 said longitudinal center. In the embodiment of my invention now under consideration the headlight is normally held in its central position and is automatically deflected from said position by changes in the position  
90 of the bolster *b* through connections between the headlight and the bolster. The connections illustrated in Figs. 1 to 5, inclusive, comprise an arm *e*, rigidly connected with and projecting forward from a part of the  
95 truck, as the bolster *b*. A bifurcated lug *f* is pivoted to the arm *e* at *f'* and is provided with a short rod *g*, projecting forward therefrom and entering a sleeve *h*, the forward end of which sleeve is provided with the ball  
100 member *i* of a ball-and-socket joint. The socket member *k* of said joint is suspended



by a crank-arm  $l$ , depending from a rock-shaft  $m$ , suitably mounted in bearings  $m'$  beneath the car-body. A shaft  $n$ , mounted in a suitable bearing at the bottom of the front of the car and supported substantially at an angle of forty-five degrees relatively thereto, is connected by a gimbal or other universal joint  $o$  with the front end of the rock-shaft  $m$  and the lower end of the stud or trunnion  $d'$  of the headlight  $d$ .

It will now be understood that any swinging movement of the truck-frame on the pivot or bolt  $b'$ , such as when the car begins to round a curve, will through the connections described turn the headlight in the direction toward which the car is moving. The joint between the lug  $f$  and the arm  $e$ , together with the sliding connection between the rod  $g$  and the sleeve  $h$ , will provide for a rocking movement of the truck-frame relatively to the car and for the difference between the direction of movement of the arm  $e$ , which swings horizontally on a vertical axis, and the crank-arm  $l$ , which swings on a horizontal axis.

In the modification illustrated in Figs. 6, 7, 8, and 9 the parts and their connections remain substantially the same, excepting those between the rock-shaft  $m$  and the forwardly-projecting arm  $e$  of the bolster. In said figures the forward end of the arm  $e$  is provided with a rigid upright stud  $p$ , having a lateral pin  $p'$ . Said pin enters a vertical slot  $q'$ , formed in the side of a socket  $q$ . From the top of said socket an arm or rod  $q^2$  extends forward and through a vertical slot  $r'$  in an adjustable crank-arm  $r$ , secured on the rock-shaft  $m$ . The connections between the rock-shaft  $m$  and the vertical stud  $d'$  of the headlight are substantially the same as in Fig. 1 and hereinbefore described. The sliding connection between the stud  $p$  and the socket  $q$  of the arm  $q^2$  provides for the same relative movements as that for which the pivot  $f'$  is employed in Fig. 1. The pin  $p'$ , projecting from the stud  $p$  through the slot  $q'$  of the socket, causes the arm  $q^2$  to vibrate laterally with the rigid arm  $e$  of the truck-frame, and said arm  $q^2$ , through the arm  $i$ , which is secured on the rock-shaft  $m$ , causes the latter to rock and through the shaft  $n$  turns the headlight.

In Figs. 10 to 13, inclusive, the rear end of the rock-shaft  $m$  has secured to it a crank-arm  $s$ , the wrist-pin  $s'$  of which enters between the arms of a fork  $t$ , which latter is swiveled to the front end of the arm  $e$ . In this form the height of the fork is such that differences in elevation between the truck-frame and car-body are compensated for.

In each form the device at the rear end of the rock-shaft  $m$  is essentially a crank, while the intermediate member between it and the arm  $e$  of the truck-frame is a compensating one.

In another application for Letters Patent for improvement in devices for operating

headlights, filed June 13, 1902, Serial No. 111,559, I have claimed the combination, with the truck of a car, a body thereon, and a headlight, of suitable connections between the headlight and the truck for turning said headlight and means interposed in said connections for automatically varying their length in unison with the independent movements of the car-body and car-truck.

The present invention is embodied in a combination of elements constituting relatively compact, durable, and simple connections between the headlight and truck. Important elements of said combination are as follows: first, the arm  $e$ , projecting forward from the truck-frame and movable laterally and horizontally by the turning movements of the truck-frame; secondly, the substantially horizontal rock-shaft between said arm and the shaft of the headlight, the rock-shaft having a crank which oscillates in a vertical plane, means for communicating motion from the arm to the crank and rock-shaft, so that the latter is turned in its bearings and caused to correspondingly turn the headlight-supporting shaft by horizontal movements of the arm, said means having provisions, therefore, for compensating for the difference between the direction of movement of the arm and the direction of movement of the rock-shaft. The combination as a whole also has provisions for converting lateral movements of the arm into turning movements of the headlight.

I claim—

1. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally by the turning movements of the truck-frame, a headlight pivotally mounted on the forward portion of the body, and self-adjusting connections between the arm and headlight, whereby lateral movements of the arm are caused to impart corresponding movements to the headlight.

2. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a headlight pivotally mounted on the forward portion of the body, and connections between said arm and body having provisions for converting lateral movements of the arm into turning movements of the headlight.

3. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a headlight pivotally mounted on the forward portion of the body, a substantially horizontal rock-shaft journaled below the body and extending lengthwise thereof, connections between the rear portion of the rock-shaft and the said arm, through which the shaft is rocked by lateral movements of the arm, and connections between the for-



ward portion of the rock-shaft and the headlight, through which the headlight is turned by the movements of the rock-shaft.

4. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a headlight pivotally mounted on the forward portion of the body, a rock-shaft journaled below the body and extending lengthwise thereof, flexible connections between the forward portion of the rock-shaft and the headlight, and flexible connections between the rear portion of the rock-shaft and the arm, the last-mentioned connections having provisions for compensating for the difference between the direction of movement of the arm and the direction of movement of the rock-shaft.

5. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a headlight pivotally mounted on the forward portion of the body, a rock-shaft extending lengthwise of the body, connections between the forward portion of the rock-shaft and the headlight, and compensating connections between the rear portion of the rock-shaft and the said arm, the said compensating connections including a crank member engaged with the rock-shaft, and an intermediate compensating member between the crank member and the arm.

6. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a headlight pivotally mounted on the forward portion of the body, a rock-shaft extending lengthwise of the body, connections between the forward portion of the rock-shaft and the headlight, and compensating connections between the rear portion of the rock-shaft and the said arm, the said compensating connections including a crank member engaged with the rock-shaft, and an intermediate compensating member jointed at one end to the arm and engaged at its other end with the crank member.

7. The combination with a truck-frame and a body, of a headlight mechanism comprising an arm projecting forward from the central portion of the truck-frame and movable laterally thereby, a substantially vertical headlight-supporting shaft journaled on the front end of the body, a substantially horizontal rock-shaft journaled below the body, flexible connections between the front end of said rock-shaft and the headlight-supporting shaft, and compensating connections between the rear end of the rock-shaft and the said arm.

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

GEORGE F. CHAPMAN.

Witnesses:

A. W. HARRISON,  
C. F. BROWN.