

No. 704,809.

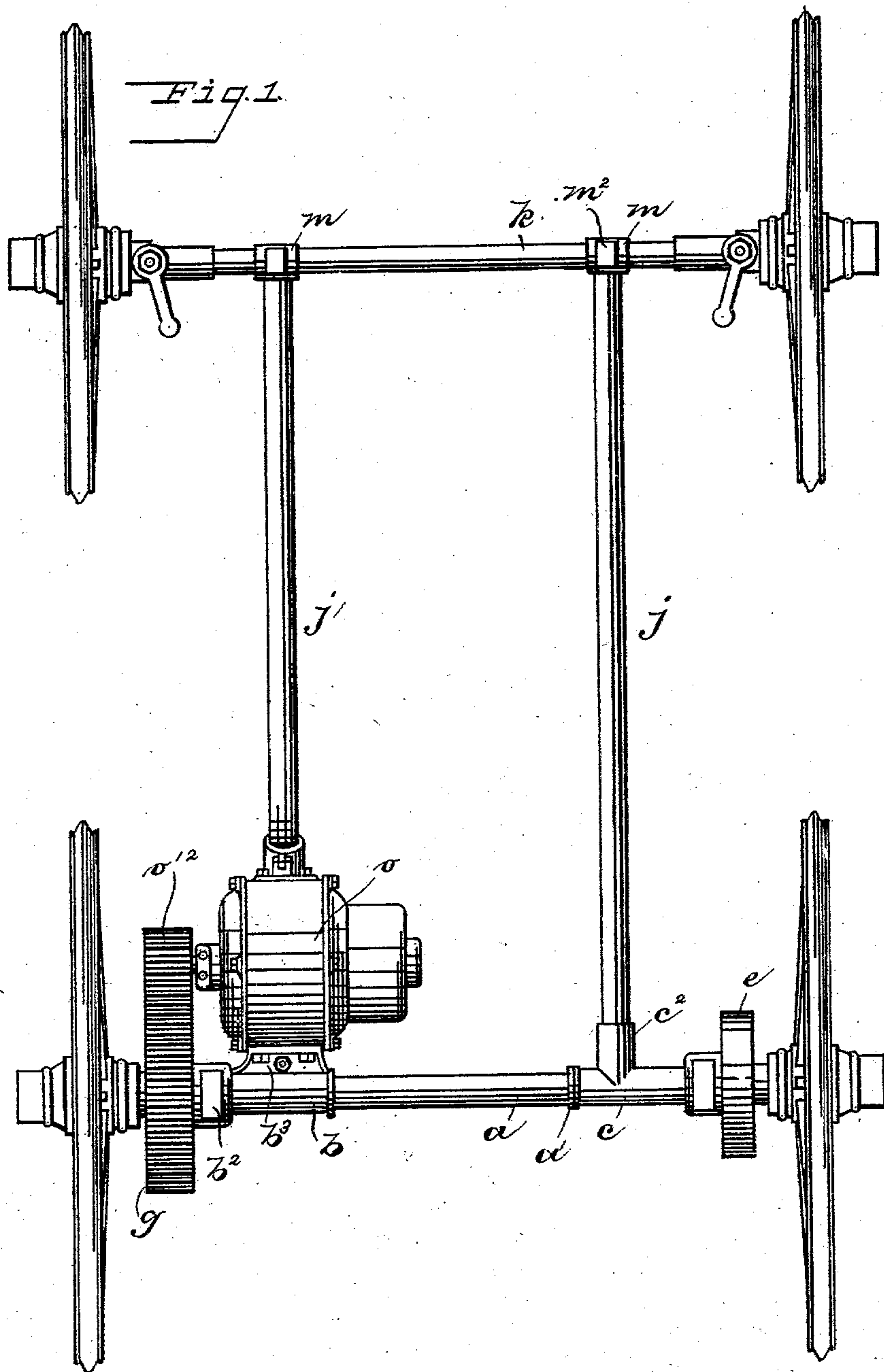
Patented July 15, 1902.

A. S. KROTZ.
AUTOMOBILE.

(Application filed July 8, 1901.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

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Clifton P. Grant.

INVENTOR.

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No. 704,809.

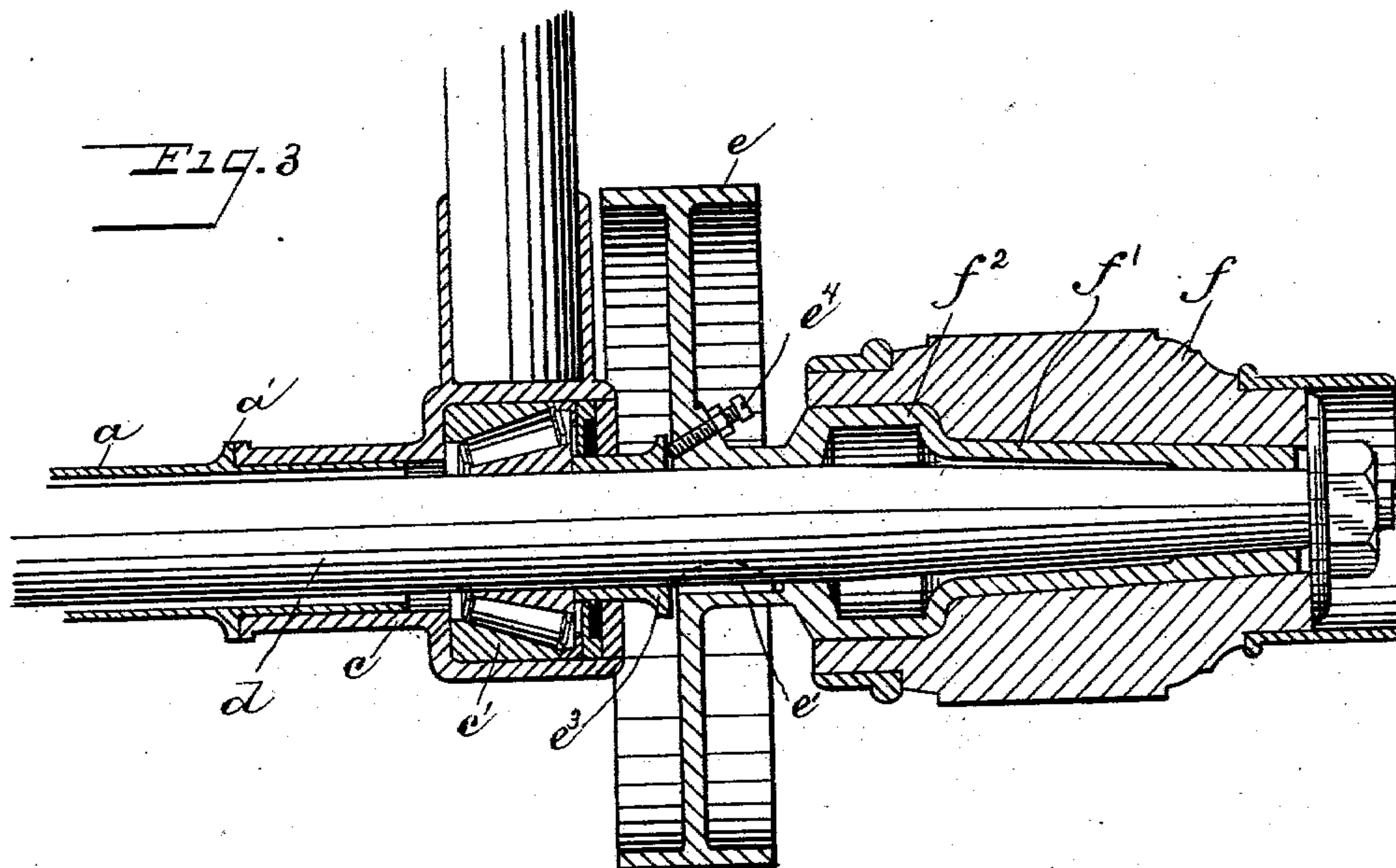
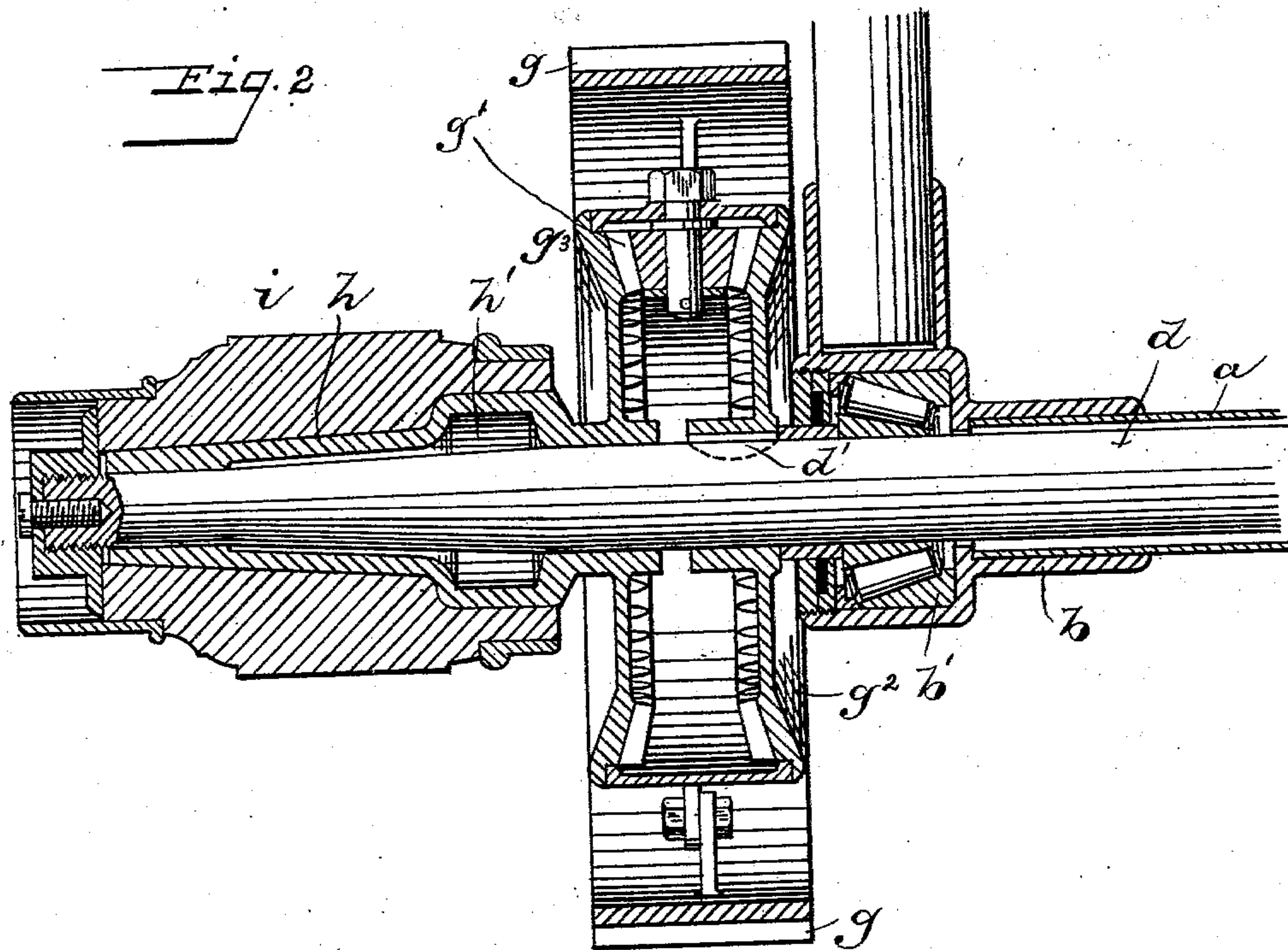
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4 Sheets—Sheet 2.

(No Model.)



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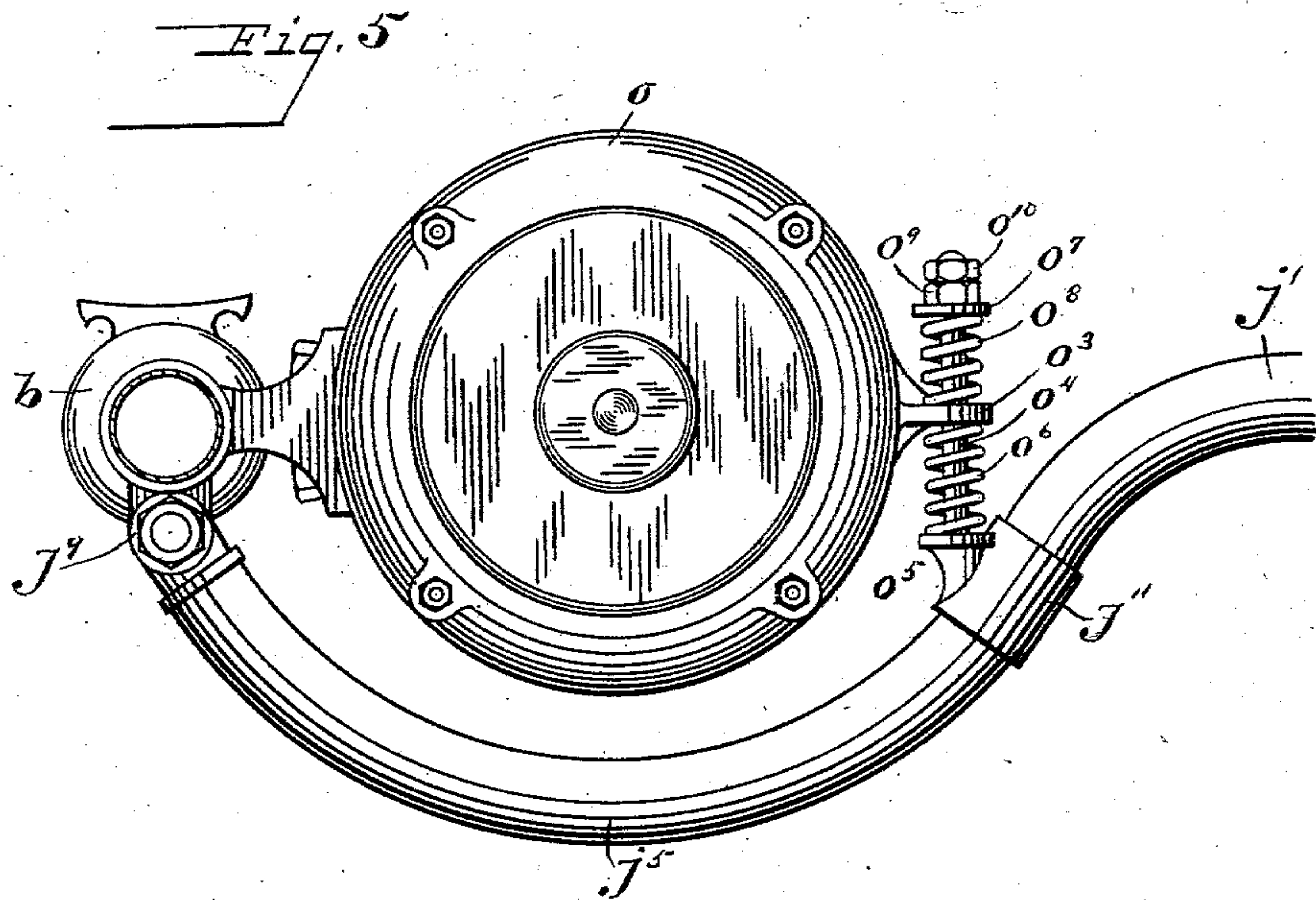
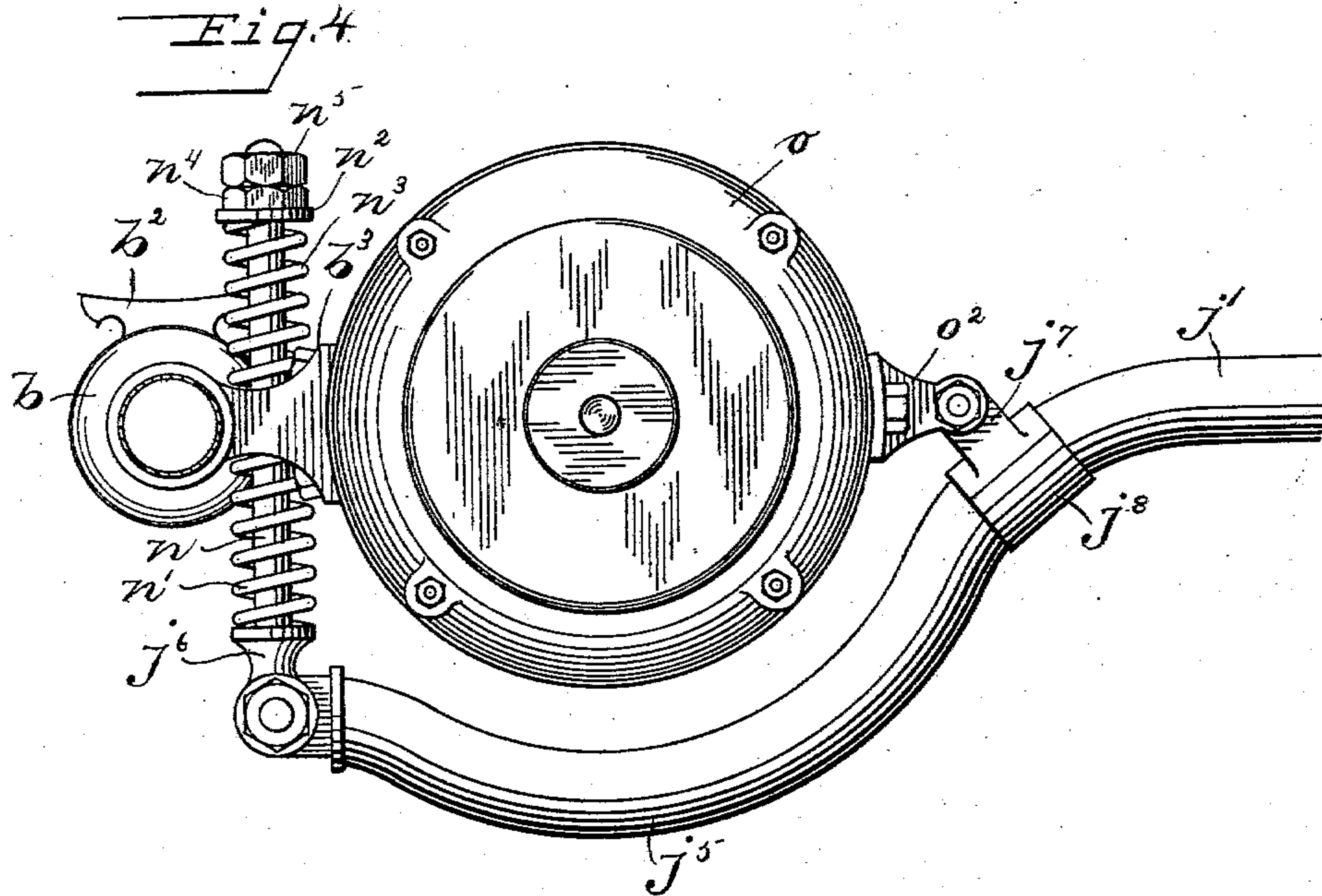
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4 Sheets--Sheet 4.

(No Model.)

Fig. 6.

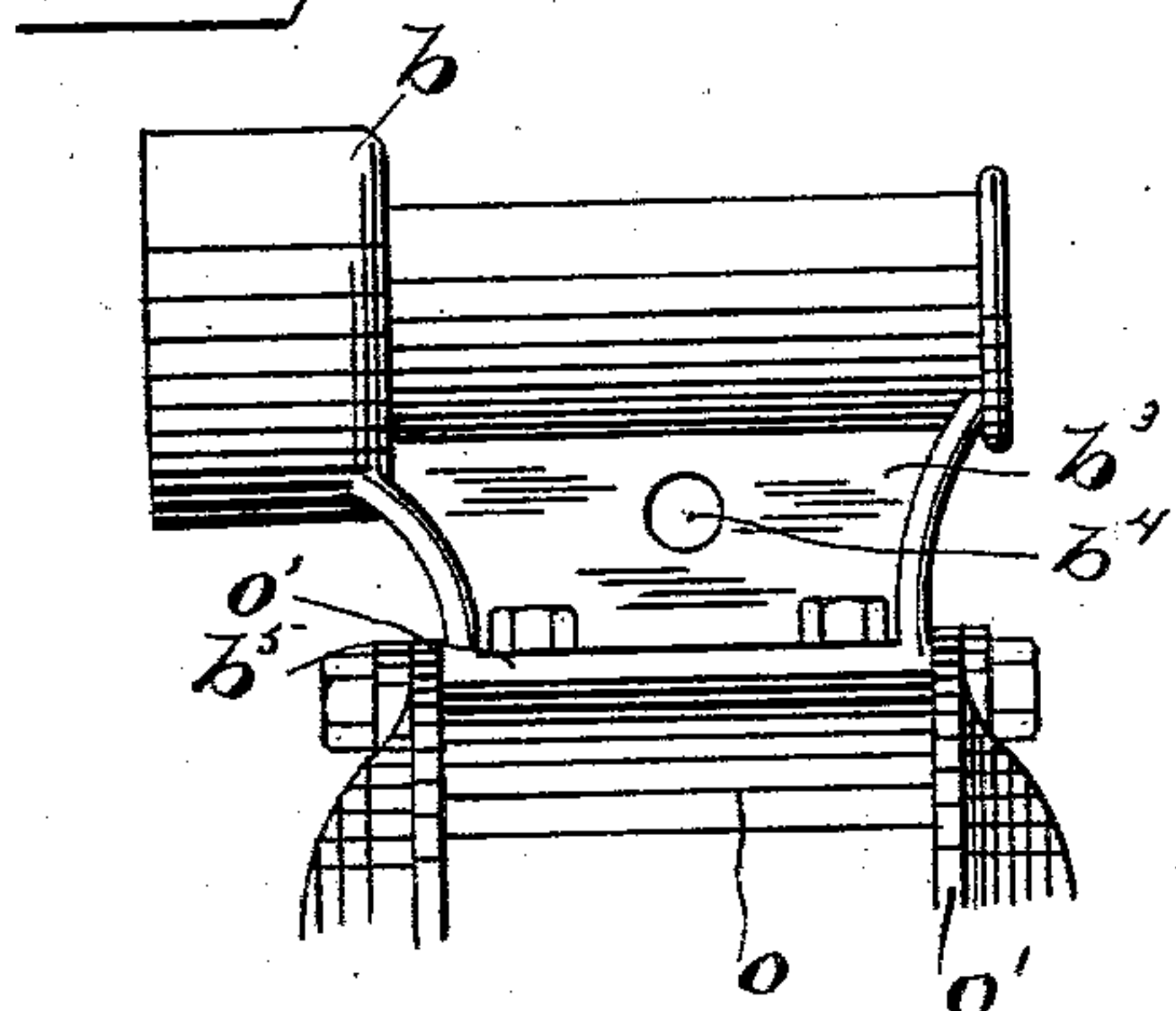


Fig. 7.

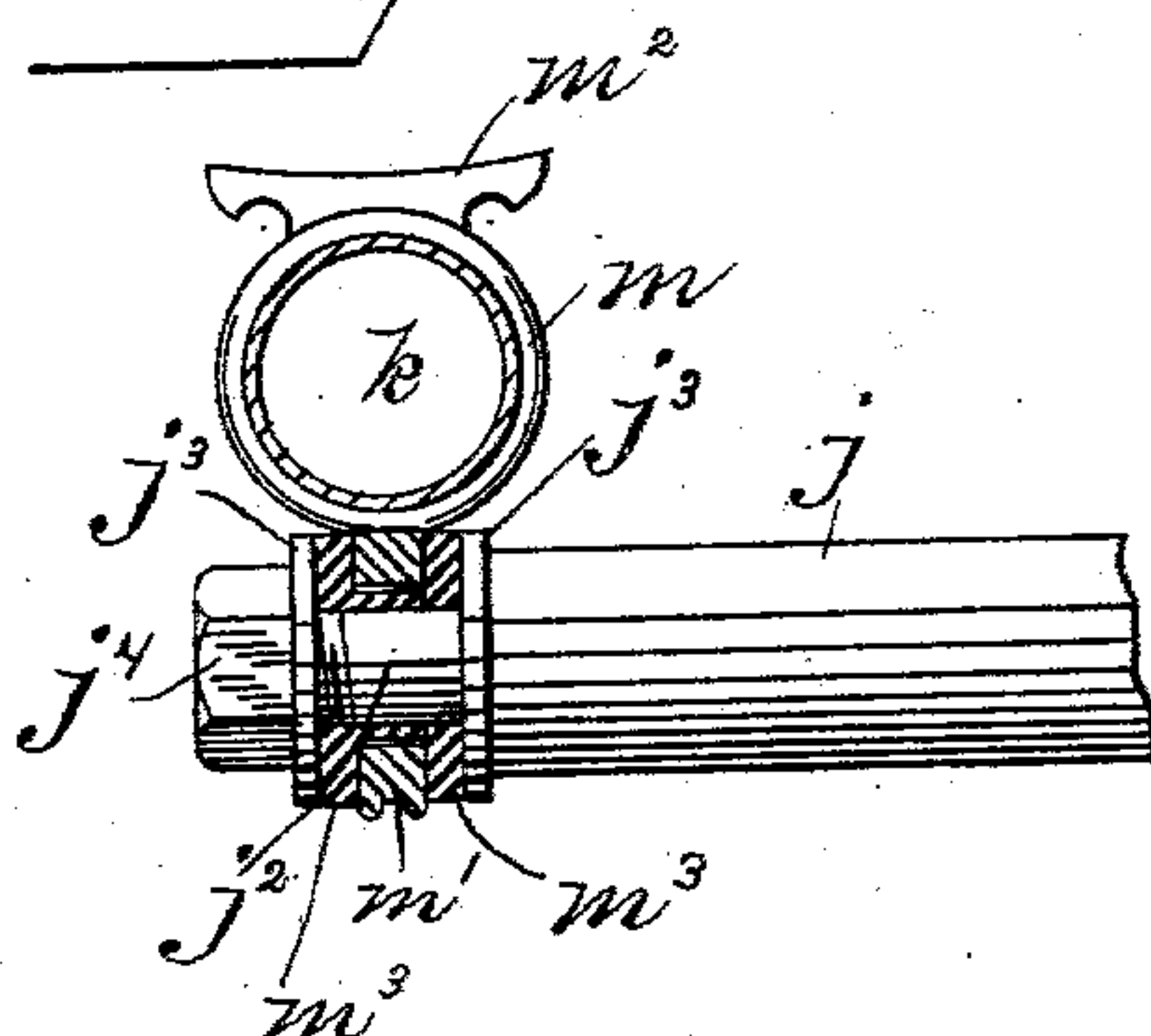


Fig. 9.

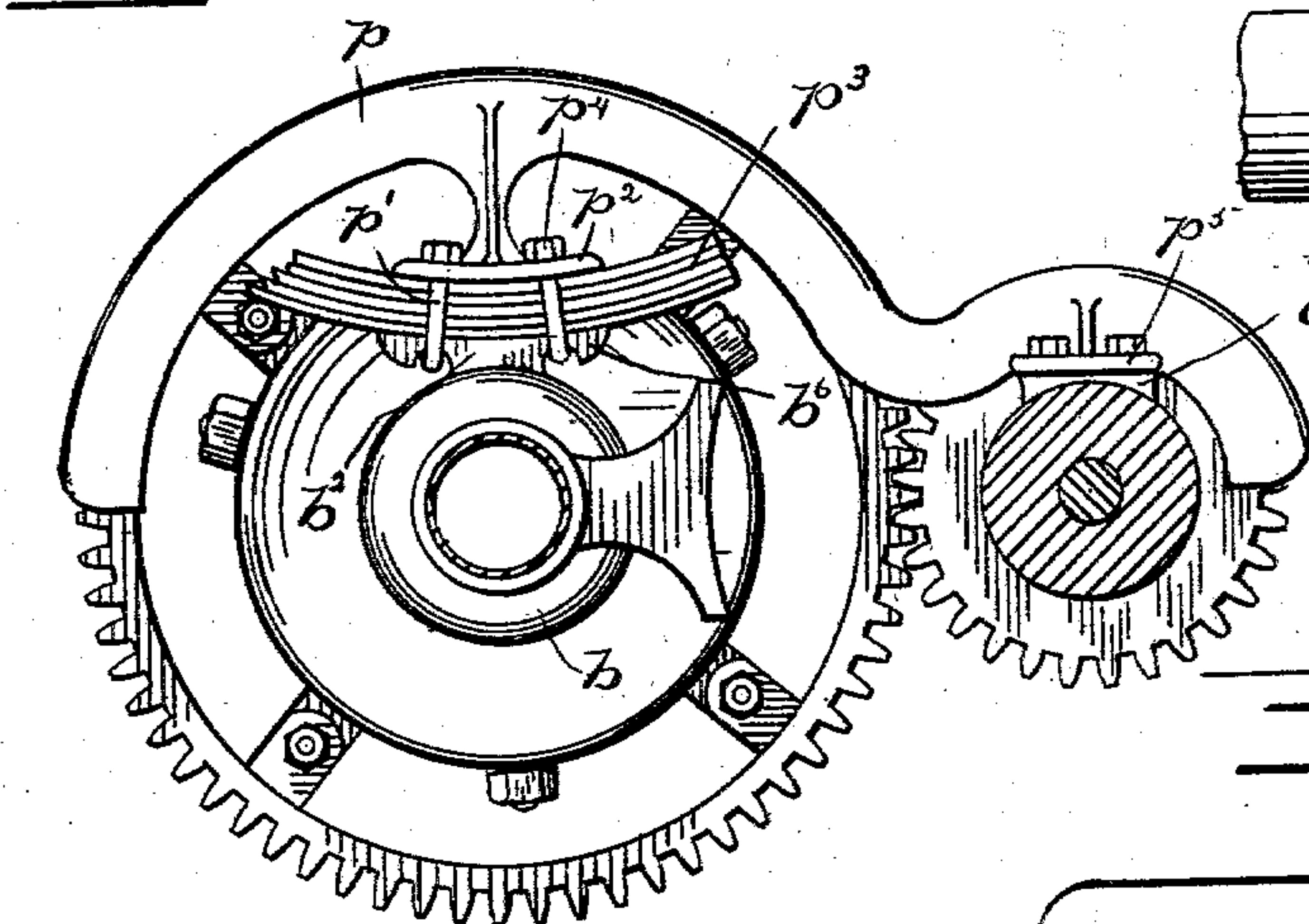


Fig. 8.

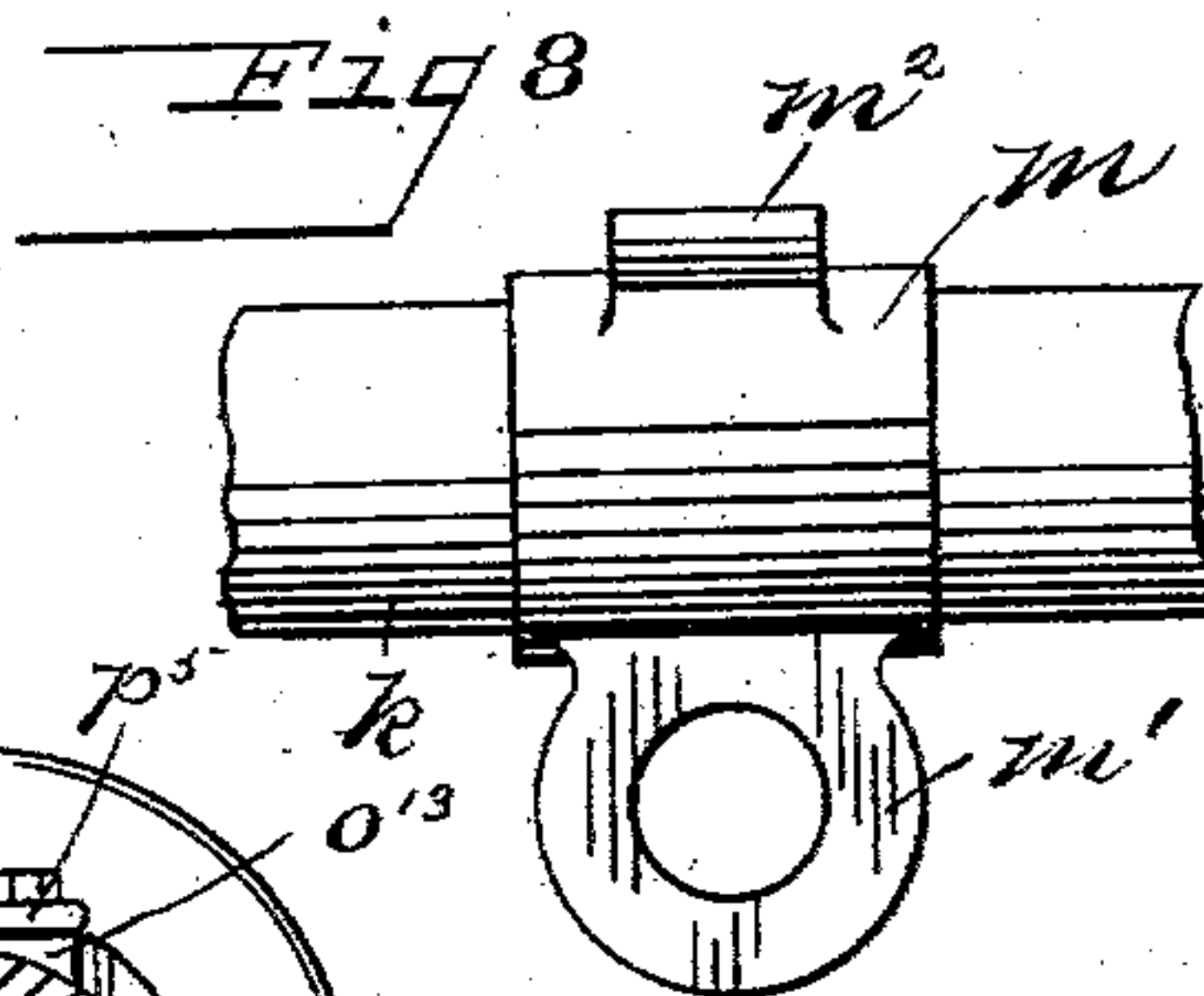


Fig. 12.

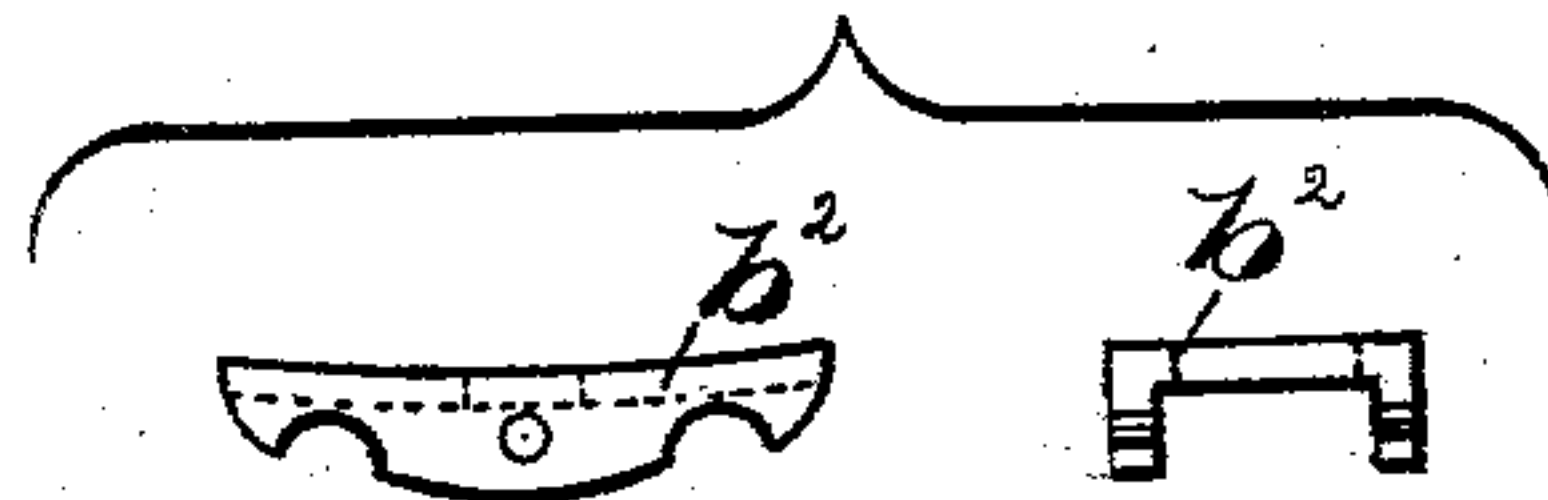


Fig. 10.

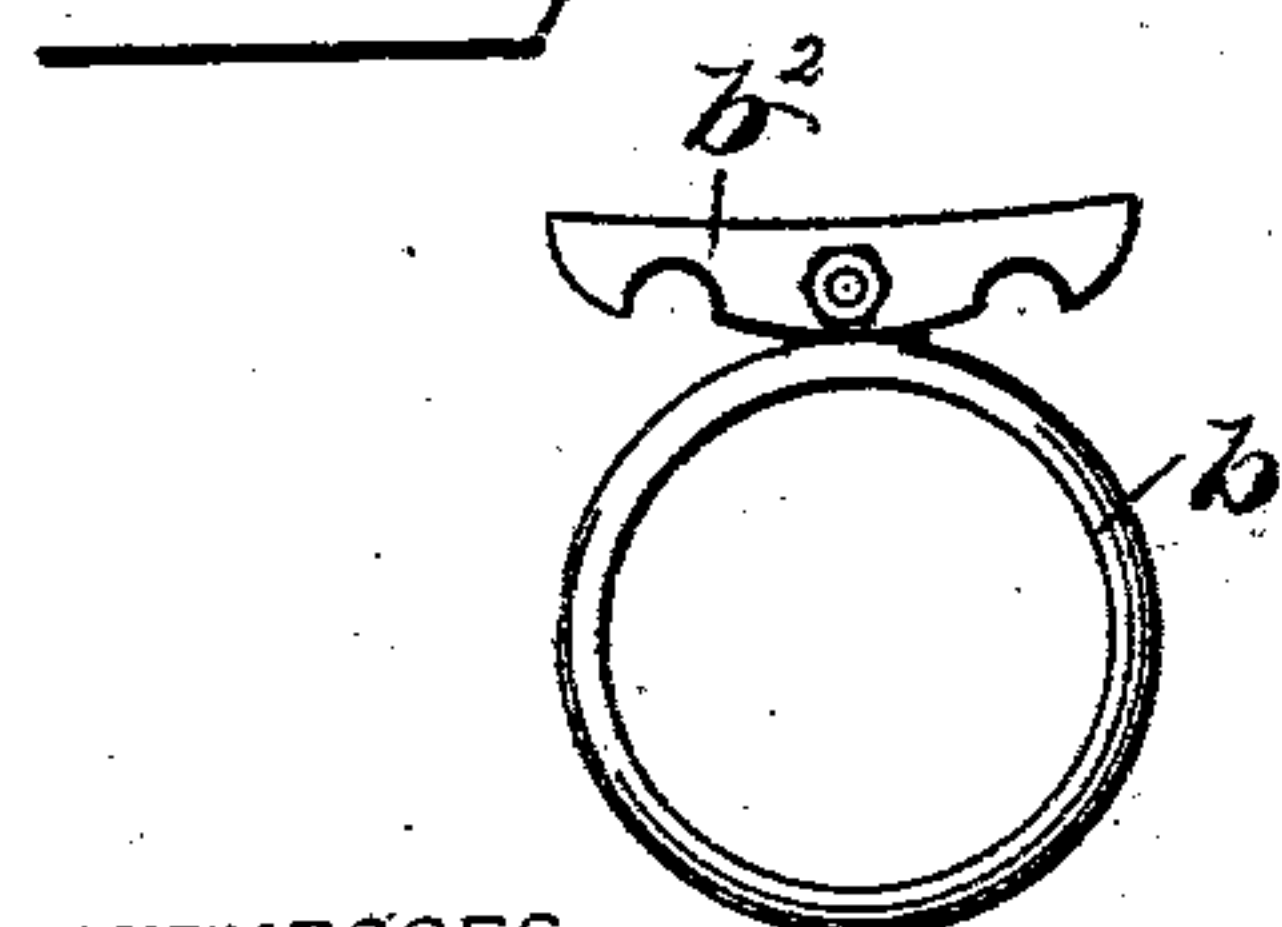
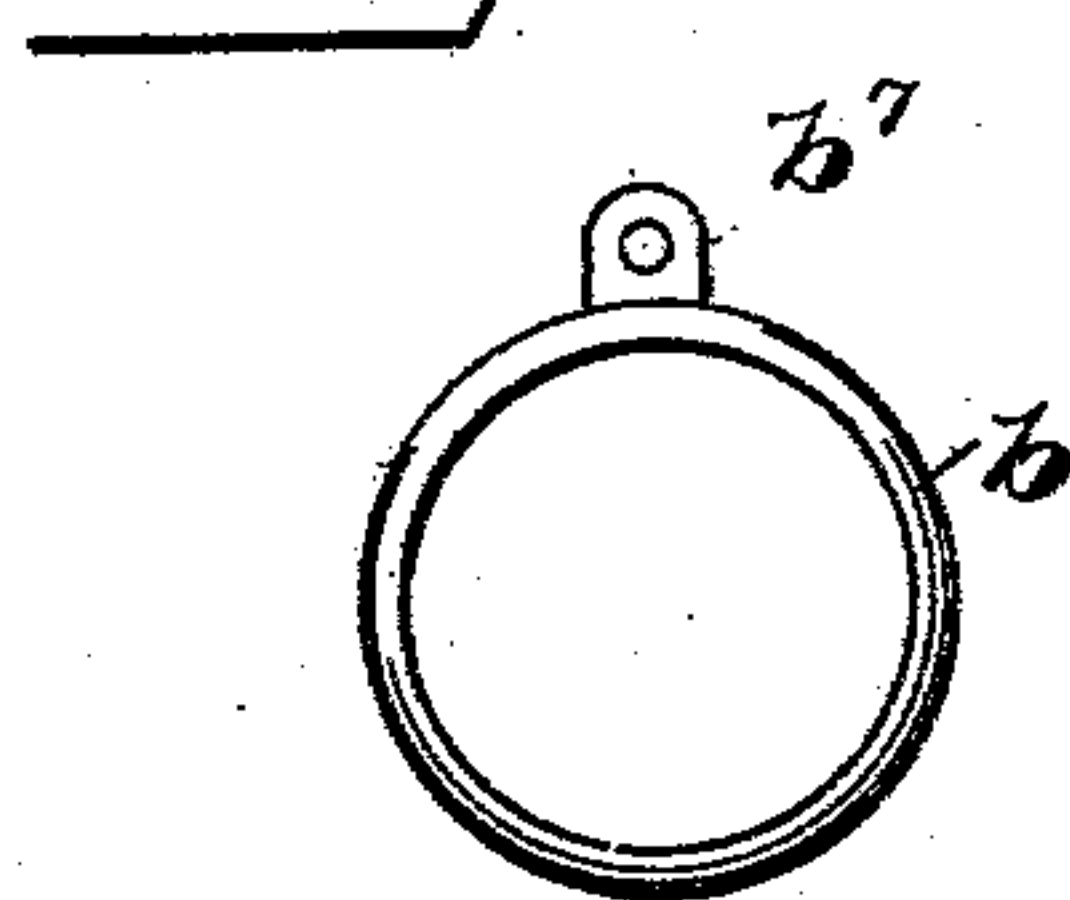


Fig. 11.



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UNITED STATES PATENT OFFICE.

ALVARO S. KROTZ, OF SPRINGFIELD, OHIO.

AUTOMOBILE.

SPECIFICATION forming part of Letters Patent No. 704,809, dated July 15, 1902.

Application filed July 8, 1901. Serial No. 67,391. (No model.)

To all whom it may concern:

Be it known that I, ALVARO S. KROTZ, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Automobiles, of which the following is a specification.

My invention relates to automobiles, and more especially to improvements in the frame structure and its operating parts.

The object of my invention is to provide an improved construction of the frame, simplifying and lessening its parts, and so arranging them as to improve their operation and compensate for the unequal strains and jars incident to the travel of the machine. I attain these objects by the construction shown in the accompanying drawings, in which—

Figure 1 is a plan view embodying my invention. Figs. 2 and 3 are sectional views of the hubs of the rear supporting-wheels, the driving-gears, and bearings adjacent to one of the wheels being shown in Fig. 2 and the brake-wheel and bearings adjacent to the other wheel being shown in Fig. 3. Fig. 4 is a side elevation of the motor, showing mode of attachment to the frame, and Fig. 5 is a modification of the same. Fig. 6 is a detail of the corner-piece and supporting-brackets for motor. Figs. 7 and 8 are detail views of the yielding couplings between the side bars and front axle. Fig. 9 is a detail view showing mode of attaching the guard for gears. Figs. 10, 11, and 12 are details showing modifications of the seat for body-springs.

Like parts are represented by similar letters of reference in the several views.

In the construction of the frame I employ the tube *a*, brazed at one end in the corner-piece *b*, its other end being journaled in and free to allow the movement of the corner-piece *c* against its shoulder *a'*. The rear axle *d* extends through the tube *a* and the corner-pieces *b* and *c*.

The corner-piece *c* is provided with a recess in which a half roller-bearing *c'* of a well-known construction is preferably used. Adjacent to the corner-piece *c* the brake-wheel *e* is keyed at *e'* to the axle *d*, the hub of said brake-wheel being extended and formed integrally with the box *f'* of the hub *f*, said box *f'* being formed with a recess *f''* to reduce the

weight of the part. The collar *e''* is placed on the axle *d*, bearing against the roller-bearing *c'*, and a set-screw *e''* in the hub of the brake-wheel bears against said collar for the purpose hereinafter mentioned.

The corner-piece *b* is recessed to carry a half roller-bearing *b'*, similar to the bearing in the corner-piece *c*, said bearings being inclined toward each other, so that in operating the set-screw *e''* both bearings are adjusted.

Adjacent to the corner-piece *b* is placed a differential gear, consisting of a spur-gear *g* with bevel-pinions *g'*, journaled at right angles to its inner periphery, operating two bevel-gears *g''* and *g'''*, facing each other, the bevel-gear *g''* being keyed to the axle *d* at *d'* and the hub of the bevel-gear *g'''* being extended and formed integrally with the box *h* of the hub *i*. Said box *h* is provided with a recess *h'* to reduce the weight of the parts. It will be seen that as the bevel-gear *g''* is keyed to the axle *d* and the bevel-gear *g'''* is formed integrally with the box *h* of the hub *i* the two rear wheels of the machine operate independently of each other, so that the machine may travel in a circle.

The side bars *j* and *j'* are joined to the front axle *k* by the couplings *m*, as shown in Figs. 7 and 8, said coupling *m* being provided with a perforated lug *m'* and the body-spring seat *m''*. The extension *j''* of the side bars *j* and *j'* are screw-threaded at their outer ends and are provided with the collars *j'''*, between which the perforated lug *m'* engages the extension *j''* of the side bars. Space is allowed between the perforated lugs *m'* and the collars *j'''* for the packing-rings *m'''*, made of rubber or other yielding material, and the nuts *j''''* tighten the coupling in place. The rear end of the side bar *j* is brazed into the corner-piece *c* at its extension *c''*, and the rear end of the side bar *j* is curved, as shown at *j''* in Fig. 4, and at said end is pivoted to the lug *j''''*, which carries the upright spindle *n*.

The corner-piece *b* is formed on its upper side with the body-spring seat *b''* and on its forward side with the bracket *b'''*, to which the motor *o* is attached, said bracket being formed with a web having a perforation *b''''*, through which the spindle *n* extends, said bracket on its outer edge having an extending flange *b''''''*, formed to the curve of the mo-

tor *o* to fit between the flanges *o'* of said motor *o*, which maintains perfect alinement between the motor and the corner-piece *b*. Surrounding the spindle *n* and bearing between the lug *j*⁶ and the under side of the web of the bracket *b*³ is the holding-down spring *n'*, and surrounding the spindle *n* and bearing between the upper side of the web of the bracket *b*³ and collar *n*² is the supporting-spring *n*³.
 10 The upper end of the spindle *n* is screw-threaded and is provided with the tightening-nuts *n*⁴ and *n*⁵. The motor *o* at its forward end is provided with an extending lug *o*², pivoted to the lug *j*⁷, projecting from the collar *j*⁸ on the side bar *j'*, as shown in Fig. 4.

In Fig. 5 I have shown a modification of the means of supporting the motor *o* by extending and pivoting the curved end *j*⁵ of the side bar *j'* to a lug *j*⁹, projecting from the corner-piece *b*, and on the forward end of the motor *o* providing an extending perforated plate *o*³, through which the spindle *o*⁴ extends, said spindle being attached to the projecting lug *o*⁵ of the collar *j*¹¹ on the side bar *j'*. Surrounding the spindle *o*⁴ and bearing between the lug *o*⁵ and the under side of the plate *o*³ is the supporting-spring *o*⁶, and surrounding said spindle *o*⁴, between the upper side of said plate *o*³ and the collar *o*⁷, is the holding-down spring *o*⁸, the nuts *o*⁹ and *o*¹⁰ holding the same in place. Keyed to an extension of the motor-shaft *o*¹¹ is the driving-pinion *o*¹², which meshes in the spur-gear *g* of the differential.

35 The guard *p* for the spur gear and pinion is mounted on the body-spring seat *b*² of the corner-piece *b* and is held in place by U-shaped clamps *p'* engaging the ears *b*⁶ of said seat and a plate *p*² of the guard, the body-springs *p*³ being interposed between said seat and plate and the clamp being tightened by the nuts *p*⁴ on the screw-threaded ends of said U-shaped clamps, thereby attaching both the springs and guard to said seat, said guard being further attached by its plate *p*⁵ to the bracket *o*¹³ on the motor *o*.

In Figs. 10, 11, and 12 I have shown a modification of the mode of attaching the body-spring seat *b*² to the coupling *b* by forming said coupling with a perforated lug *b*⁷ and pivoting said seat to the said lug *b*⁷, as shown.

In putting the frame together it will be seen the construction is such that the front axle, the side bars, the corner-pieces *b* and *c*, with their bearings, and the tube *a* may be first assembled and the rear axle then put in place, following which the collar *e*³, the brake-wheel *e*, and hub *f* may be placed in the order named on one end of the rear axle, and upon the other end of said axle the differential gear, with its inner bevel-gear, can be first keyed to said axle adjacent to the corner-piece *b*, and then the outer bevel-gear of said differential, which is attached to or formed with the hub-box of the adjacent rear wheel, may be placed with said wheel on the axle. It is obvious that the arrangement of

the parts is such that they can be readily assembled and that in the event of a breakage the parts may be consecutively removed for renewal or repair.

The motor *o* and the tube *a* being rigidly attached to the corner-piece *b* and the tube *a* bearing at its other end against the end of the corner-piece *c* forms a long leverage to hold said motor in alinement and its driving-pinion *o*¹² in proper mesh with the spur-gear *g*. The collar *e*³, with its adjusting-screw *e*⁴ on the rear axle, not only provides a means for taking up the wear and adjusting the roller-bearings *b'* and *c'*, but also by reason of the corner-piece *c* bearing against the end of the tube *a* serves in like manner to take up the wear and keep the motor in alinement and its driving-pinion in proper mesh with the spur-gear *g*. The motor being hinged on the same axis with the spur-gear *g*, the mesh of the driving-pinion *o*¹² with said spur-gear is not disturbed by the vertical vibration of the motor. By reason of the side bars being joined to the front axle by the yielding couplings *m* and hinged to the rear axle by the corner-pieces *b* and *c* provision is thereby made to relieve the frame from strains caused by the travel of the machine over uneven roads, and further provision is made for the easy carriage of the motor by the supporting and holding-down springs, as described. It is obvious that the motor can be rigidly attached to its side bar without disturbing the essential features of the frame.

Having thus described my invention, I claim—

1. The combination with the front and rear axles, side bars flexibly connected to said front axle, and a motor, of corner-pieces through which the rear axle extends, one of which carries said motor in connection with one of said side bars and the other rigidly attached to the other side bar, and a tube rigidly attached to said motor-carrying corner-piece and extending to and pivotally connected with the other corner-piece, substantially as and for the purpose specified.

2. The combination with the front and rear axles and side bars, body-spring couplings flexibly connecting said bars with the front axle, and a motor, of body-spring bearing corner-pieces through which the rear axle extends, one of said corner-pieces having a tube rigidly attached thereto extending to and pivotally connected with the other body-bearing corner-piece, the corner-piece having a tube attached, being pivotally attached to the side bar carrying said motor and the other being rigidly attached to the other side bar whereby the frame will adjust itself to the unevenness of the road without disturbing the alinement of the motor, substantially as specified.

3. The combination with the front and rear axles, the motor and the frame having corner-pieces and a tube rigidly attached to one and pivotally connected to the other of said corner-pieces, as described, of antifric-tion-

bearings on said rear axle in recesses formed in each of said corner-pieces, and a body-spring seat on each of said corner-pieces over said antifriction-bearings, substantially as specified.

4. The combination with the front and rear axles, the motor and the frame having the corner-pieces and the tube rigidly attached to one and pivotally connected to the other of said corner-pieces, as described, of antifriction-bearings on said rear axle in recesses formed in each of said corner-pieces, and a body-spring seat centrally located on each of said corner-pieces over said antifriction-bearings, said bearings being inclined toward each other, and means to tighten and adjust said bearings and tube, substantially as specified.

5. The combination with the front and rear axles and side bars flexibly connected to said front axle, and a motor, of corner-pieces through which the rear axle extends, one of which carries said motor in connection with one of said side bars, and the other rigidly attached to the other side bar, and the tube rigidly attached to said motor-carrying corner-piece and extending to and pivotally connected with the other corner-piece, supporting and holding-down springs engaging one end of said motor, said motor being pivotally connected at the other end, substantially as specified.

6. The combination with the front and rear axles and the side bars flexibly connected to the front axle and a motor connected to one of said side bars, of corner-pieces for said side bars through which the rear axle extends, to one of which said motor is rigidly attached, and a tube, also rigidly attached to said motor corner-piece, extending to and pivotally connected with the other side-bar corner-piece, said last-named corner-piece being rigidly attached to its side bar, whereby the motor-supporting corner-piece and side bar may vibrate independently of the other side bar and its corner-piece, substantially as and for the purpose specified.

7. The combination with the rear axle, of a differential gear, as described, mounted on said axle and adjacent to one of the rear wheels of the machine, one bevel-gear of said differential gear being keyed to said axle and the other bevel-gear of said differential being attached to said rear wheel, and a spring-supported motor pivoted to said axle having a driving-pinion for said differential gear, and a casing for said gears attached to the motor and its support, whereby said casing and pinion, under the vibration of the motor caused by uneven roads, are retained in their relative position, the pinion in proper mesh with said gear and the rear wheels of the machine operate independently of each other, substantially as specified.

8. The combination of the frame consisting of the front axle, the motor-carrying side bar, the motor and body supporting corner-piece

with the rigidly-attached cross-tube, the opposite side bar and its body-supporting corner-piece pivotally connected to said tube, and the revolving rear axle journaled in said corner-pieces, said side bars being flexibly connected to the front axle and pivotally connected to the rear axle, substantially as and for the purpose specified.

9. The combination of the frame consisting of the front axle, the motor-carrying side bar, the motor and body supporting corner-piece with the rigidly-attached cross-tube, the opposite side bar and its body-supporting corner-piece pivotally connected to said tube, and the revolving rear axle journaled in said corner-pieces, said side bars being flexibly connected to the front axle and pivotally connected to the rear axle, and said motor being held in its normal position by holding-down and supporting springs, as described, whereby the motor vibrates independently of the vibration of its side bar, substantially as specified.

10. The combination with the front and rear axles, of side bars flexibly connected with said front axle and pivotally connected with said rear axle, said side bars also being pivotally connected, at their rear ends, with each other, by a tube through which said rear axle extends, substantially as specified.

11. The combination with the front and rear axles, of the side bars flexibly connected with said front axle and pivotally connected with said rear axle, said side bars also being pivotally connected, at their rear ends, with each other, independent of the rear axle, and a motor carried by one of said side bars and said pivoted connection, substantially as specified.

12. The combination with the front and rear axles, side bars flexibly connected with said front axle, and a motor, of corner-pieces pivoted to said rear axle, one of which carries said motor in connection with one of said side bars, and the other rigidly attached to the other side bar, said corner-pieces being pivotally connected with each other, independent of the rear axle substantially as specified.

13. The combination with the front and rear axles and side bars flexibly connected with said front axle, and a motor, of corner-pieces through which the rear axle extends, one of which carries said motor in connection with one of said side bars, said corner-pieces being pivotally connected, independent of the rear axle, supporting and holding-down springs engaging one end of said motor, said motor being pivotally connected at the other end, substantially as specified.

In testimony whereof I have hereunto set my hand this 3d day of July, A. D. 1901.

ALVARO S. KROTZ.

Witnesses:

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CHAS. I. WELCH.