

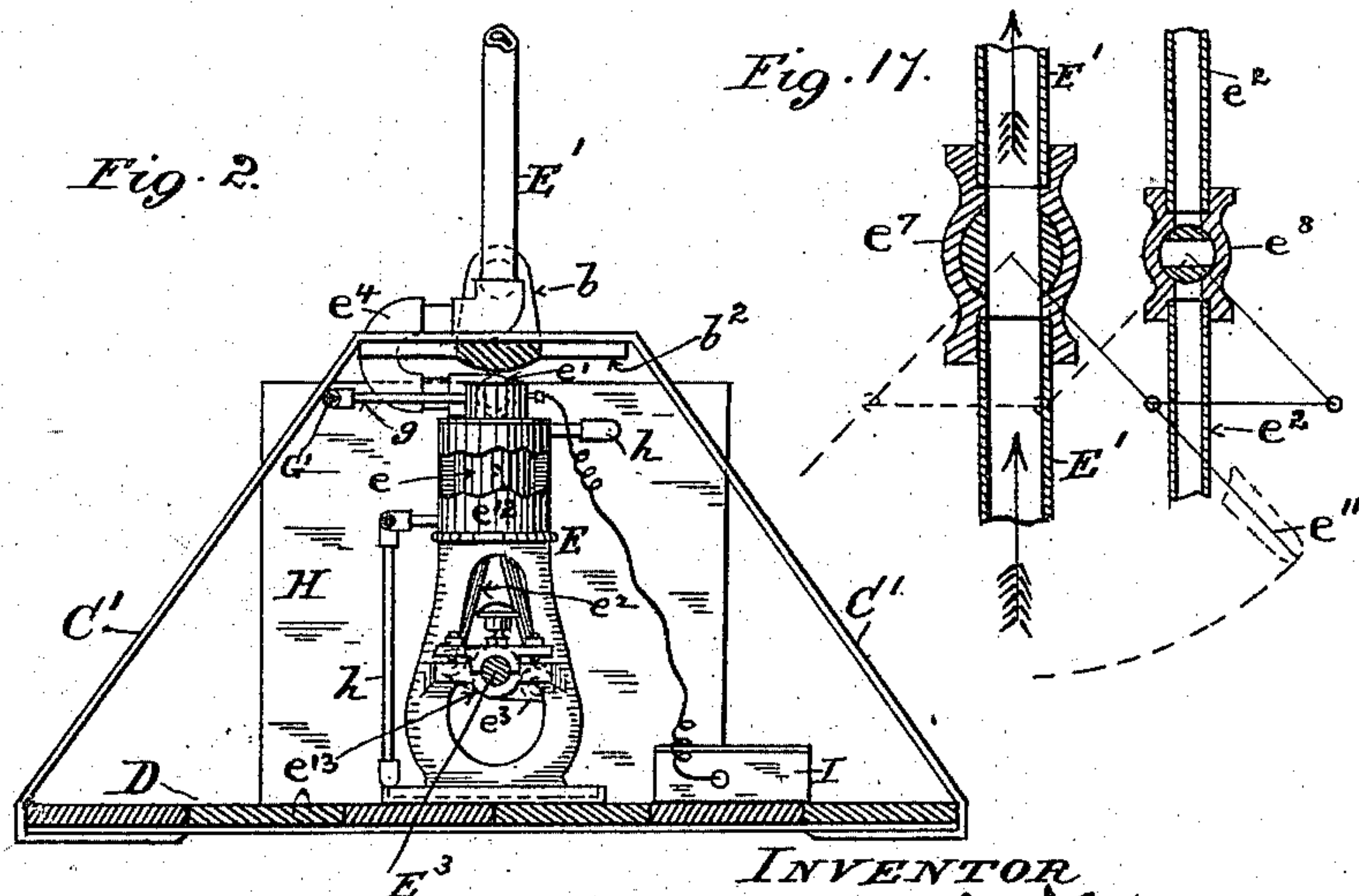
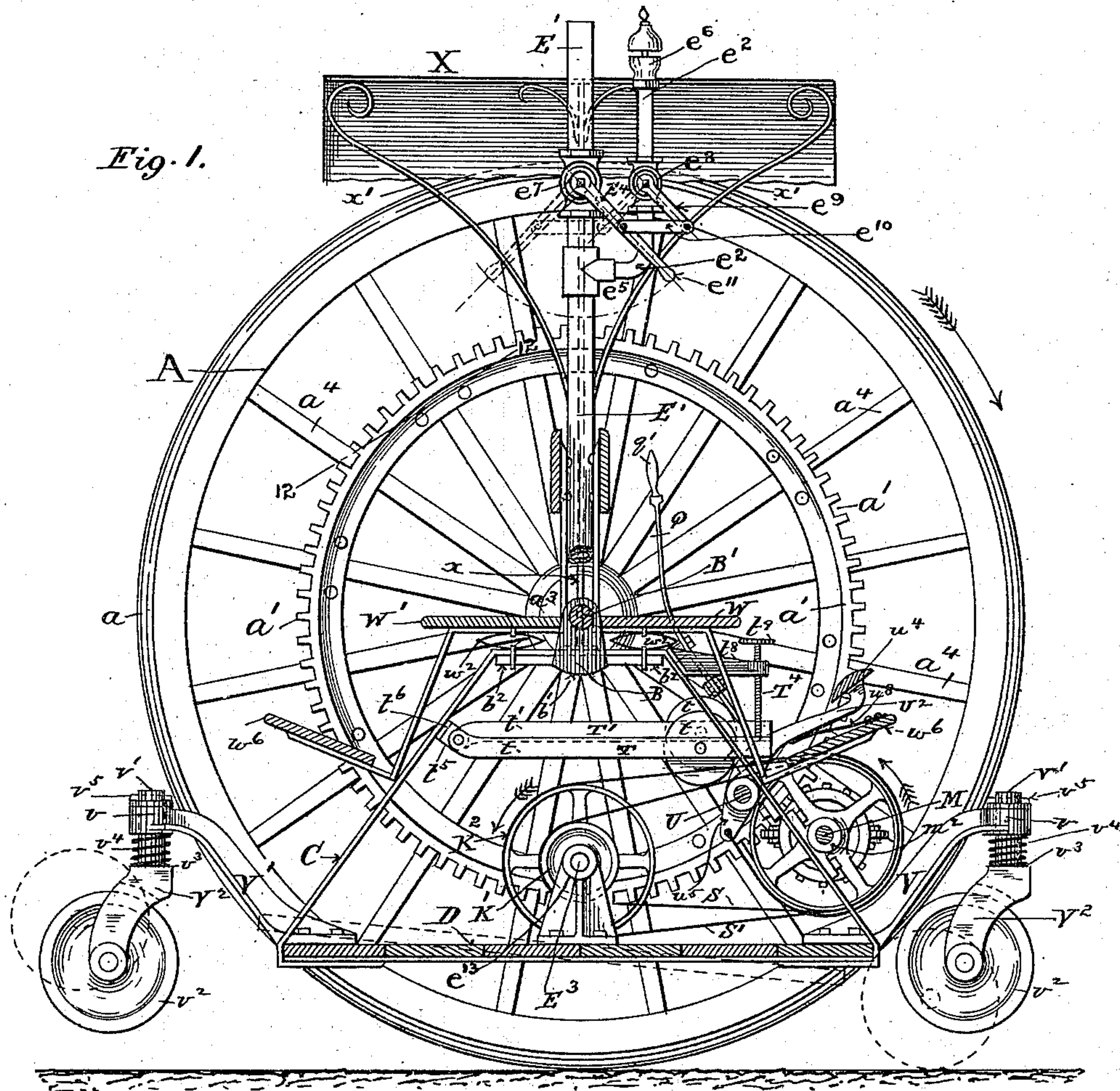
(No Model.)

4 Sheets—Sheet 1.

J. J. KULAGE.
WHEELED VEHICLE.

No. 573,334.

Patented Dec. 15, 1896.



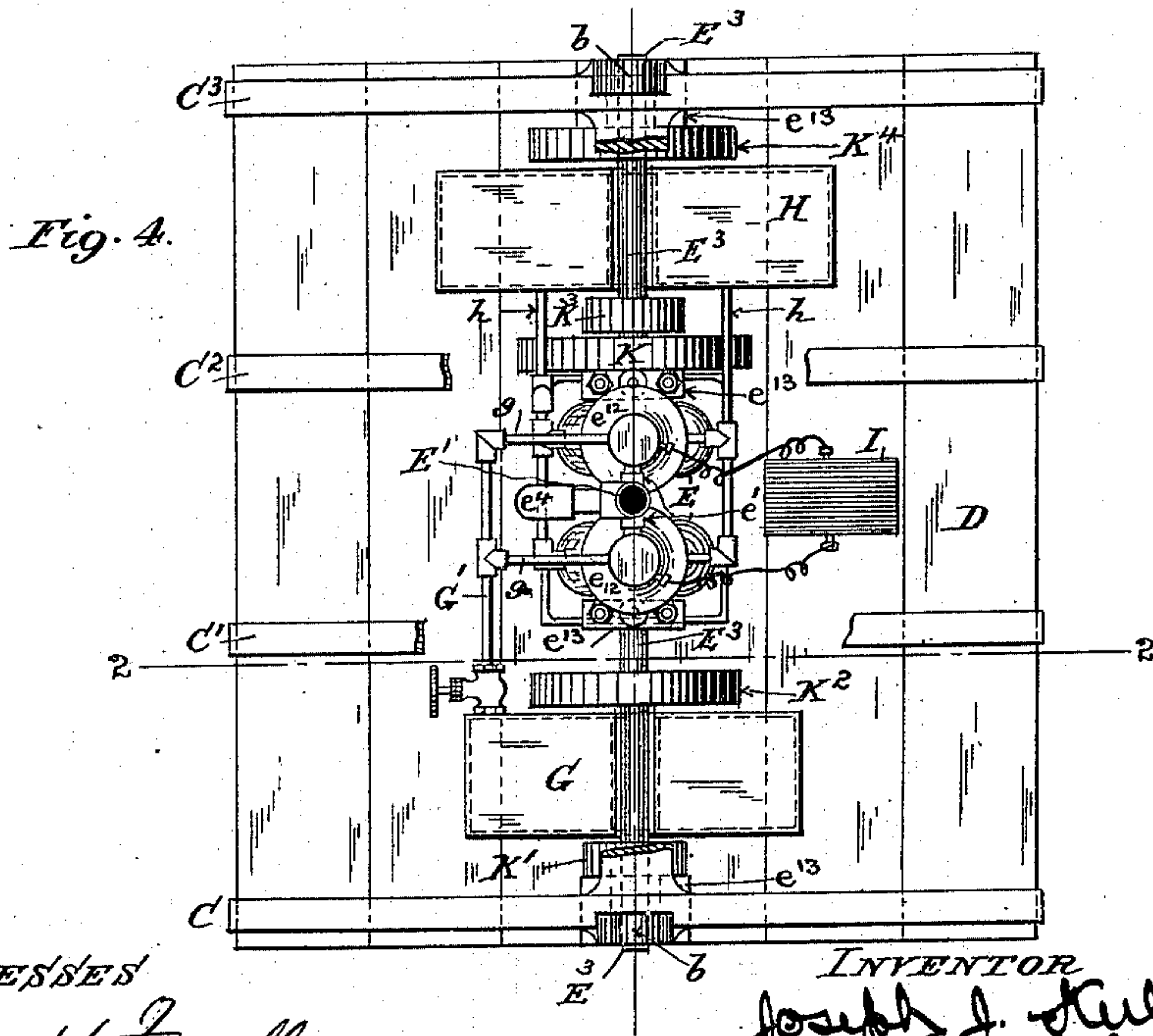
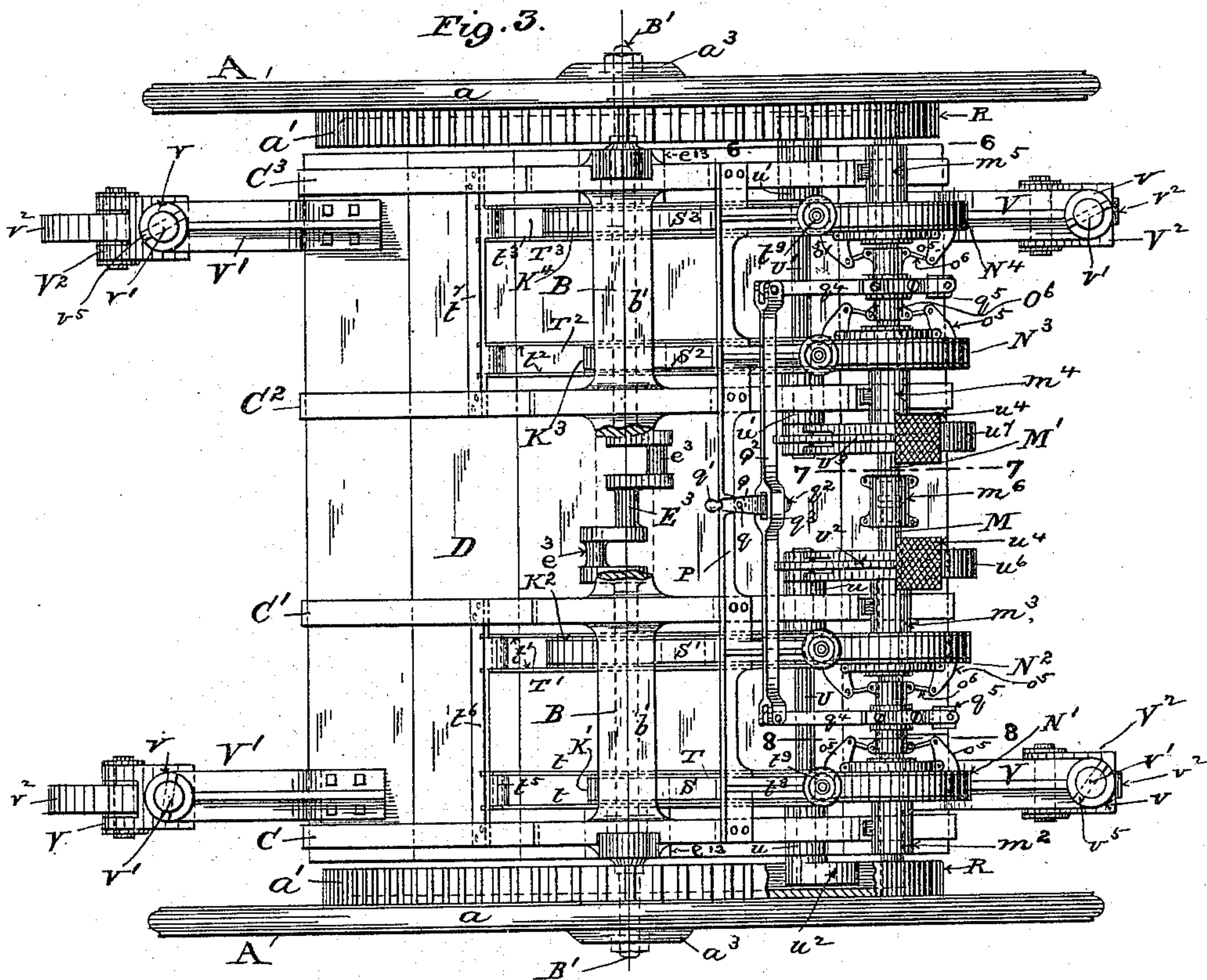
WITNESSES
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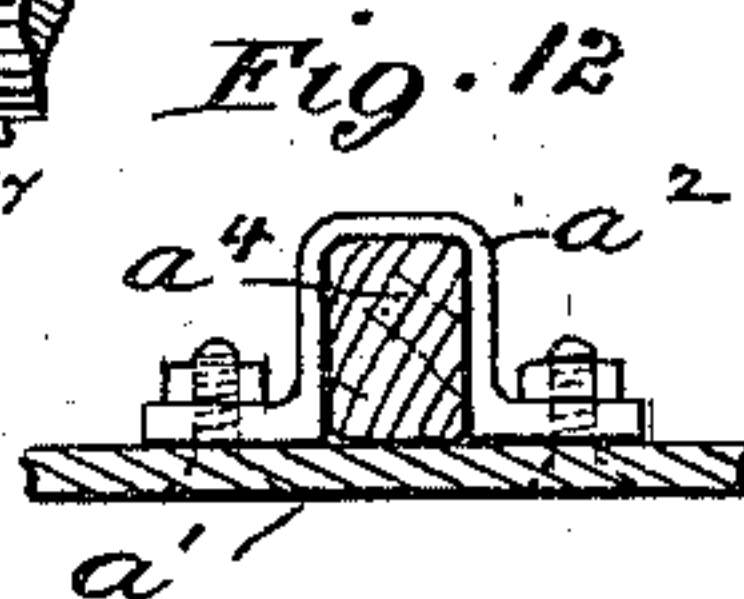
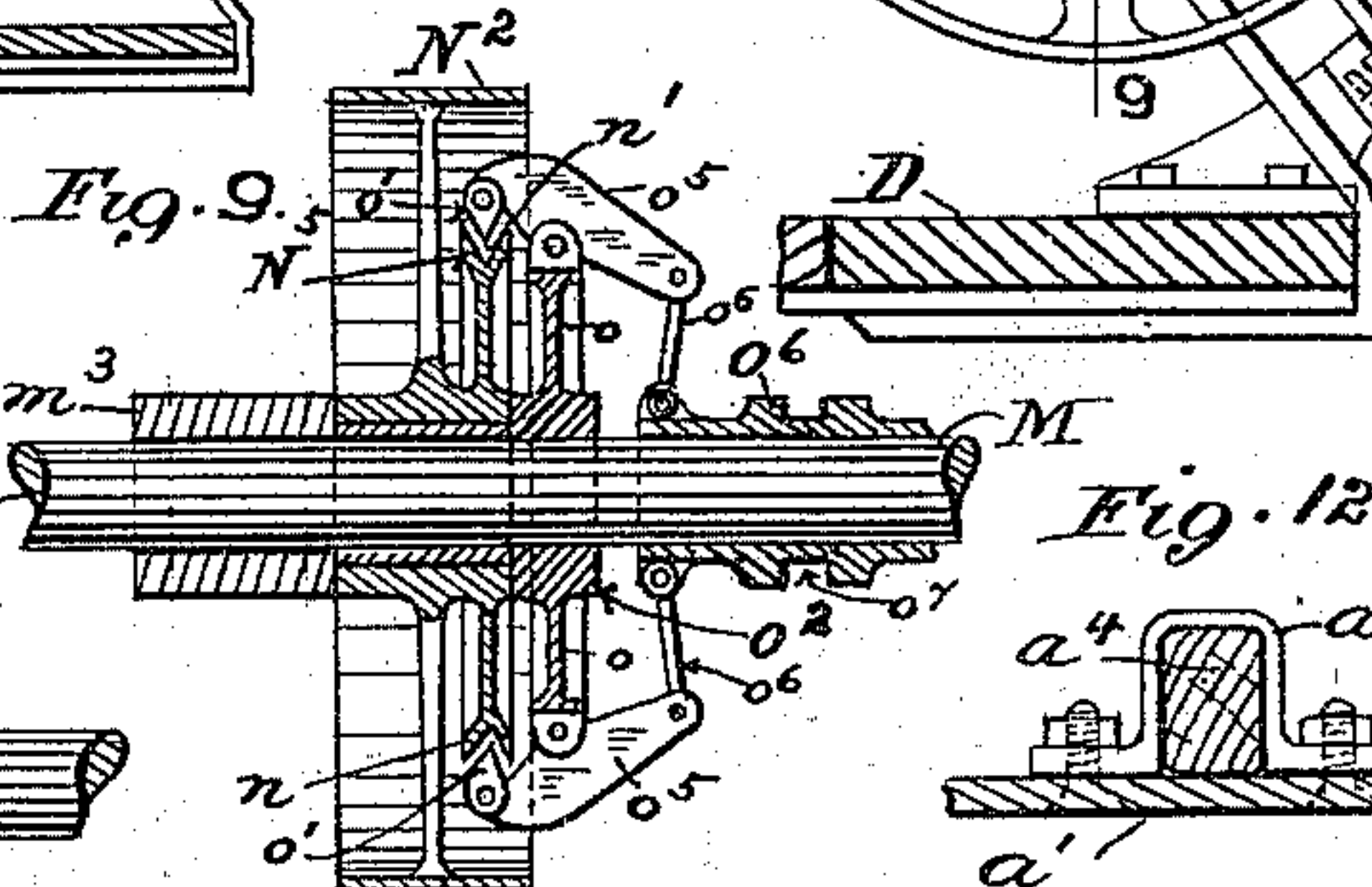
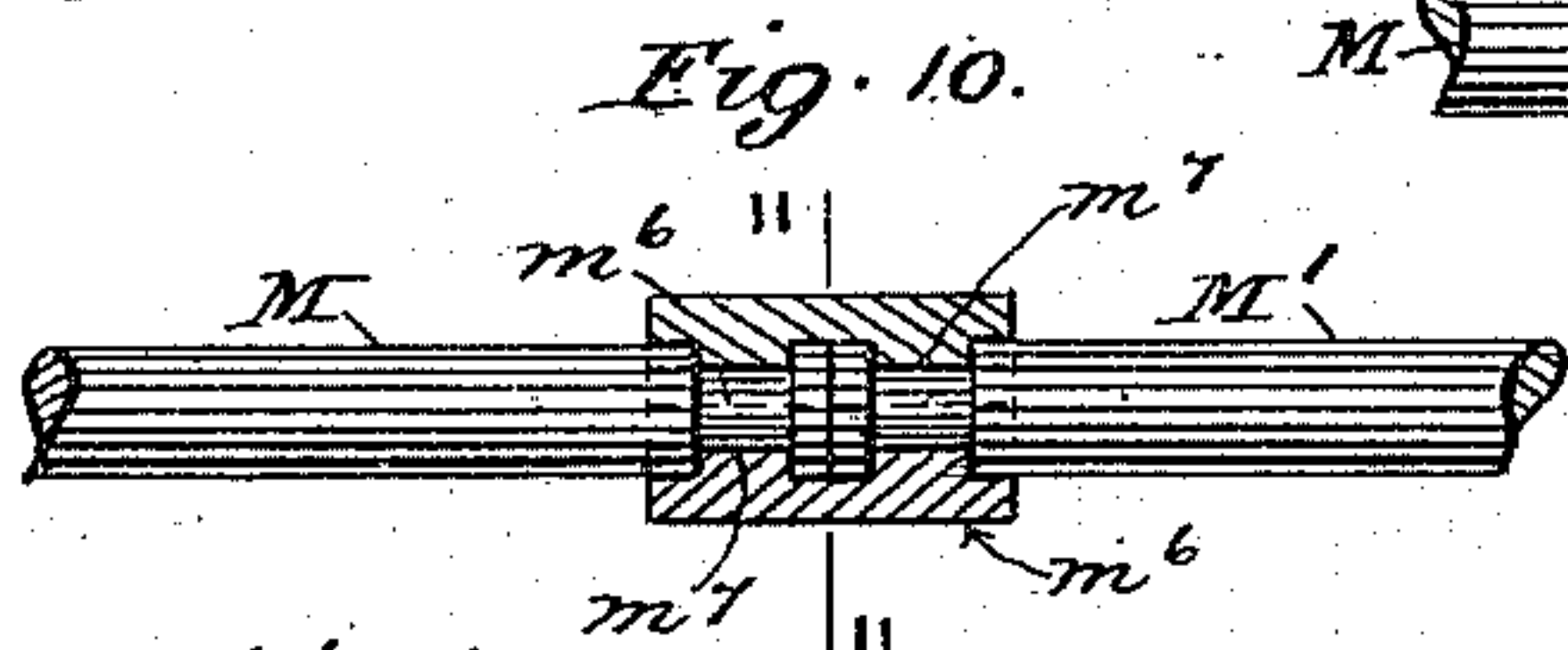
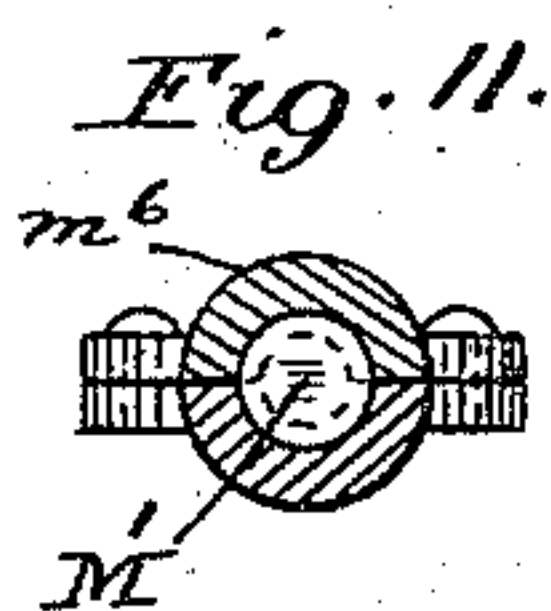
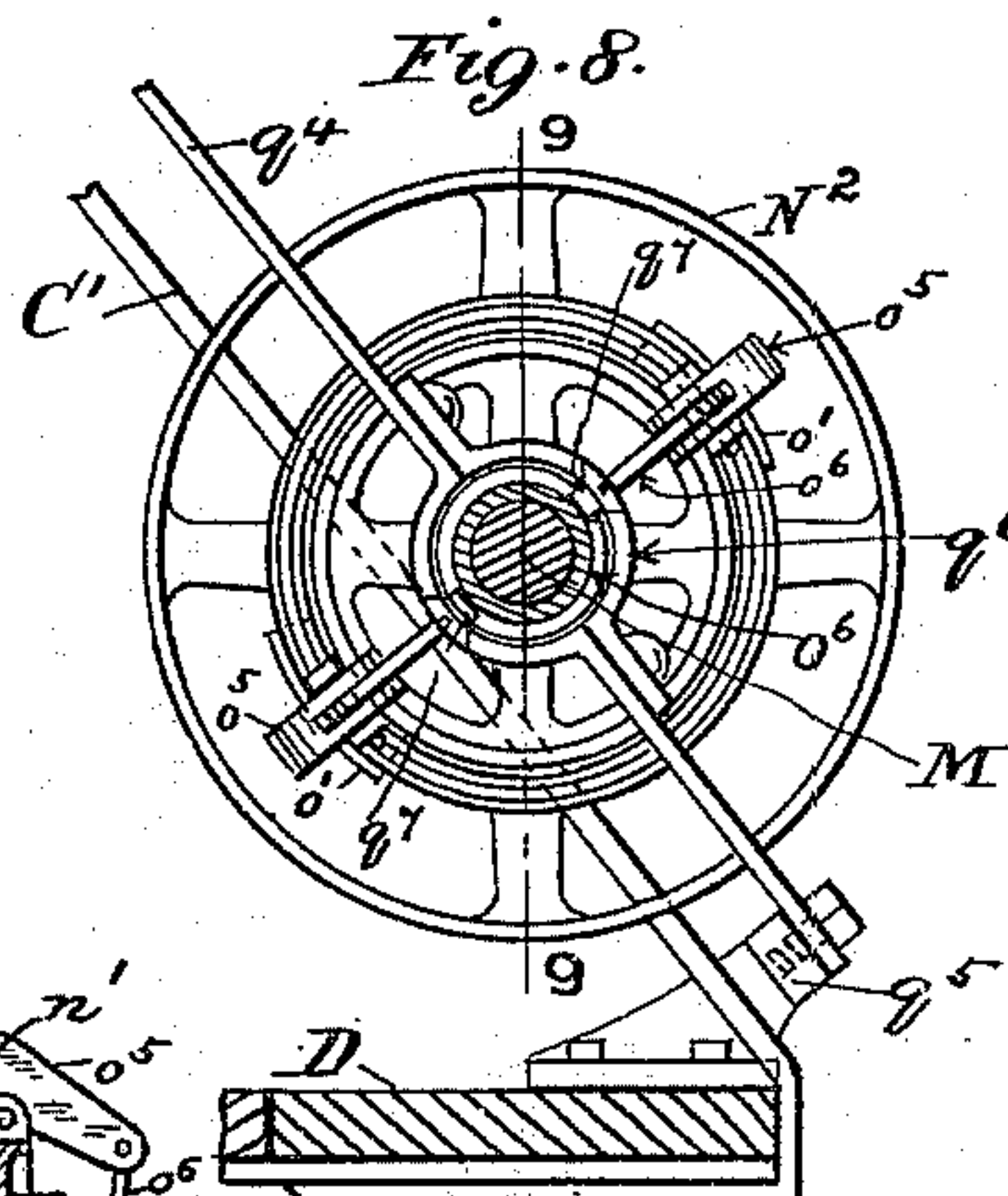
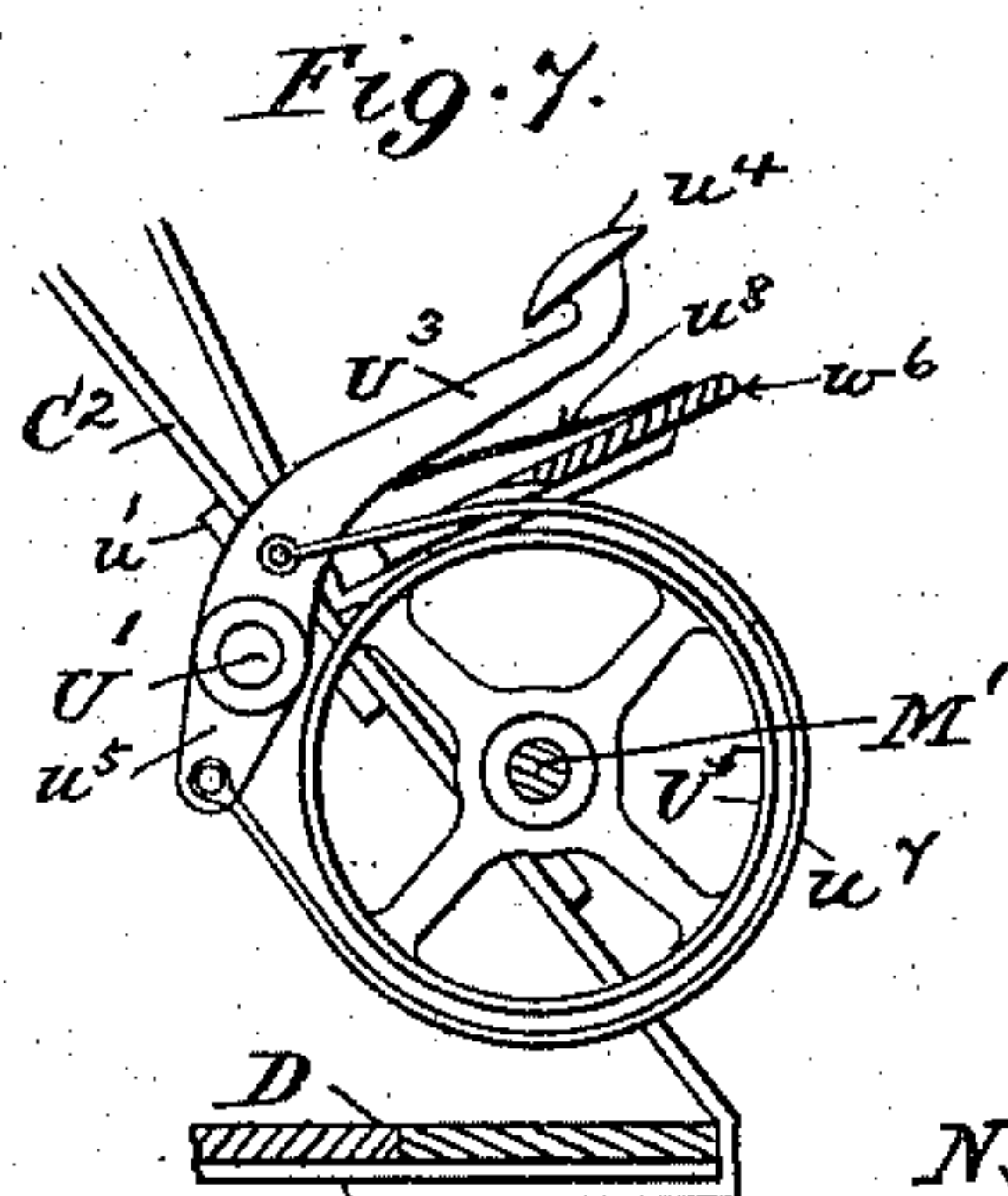
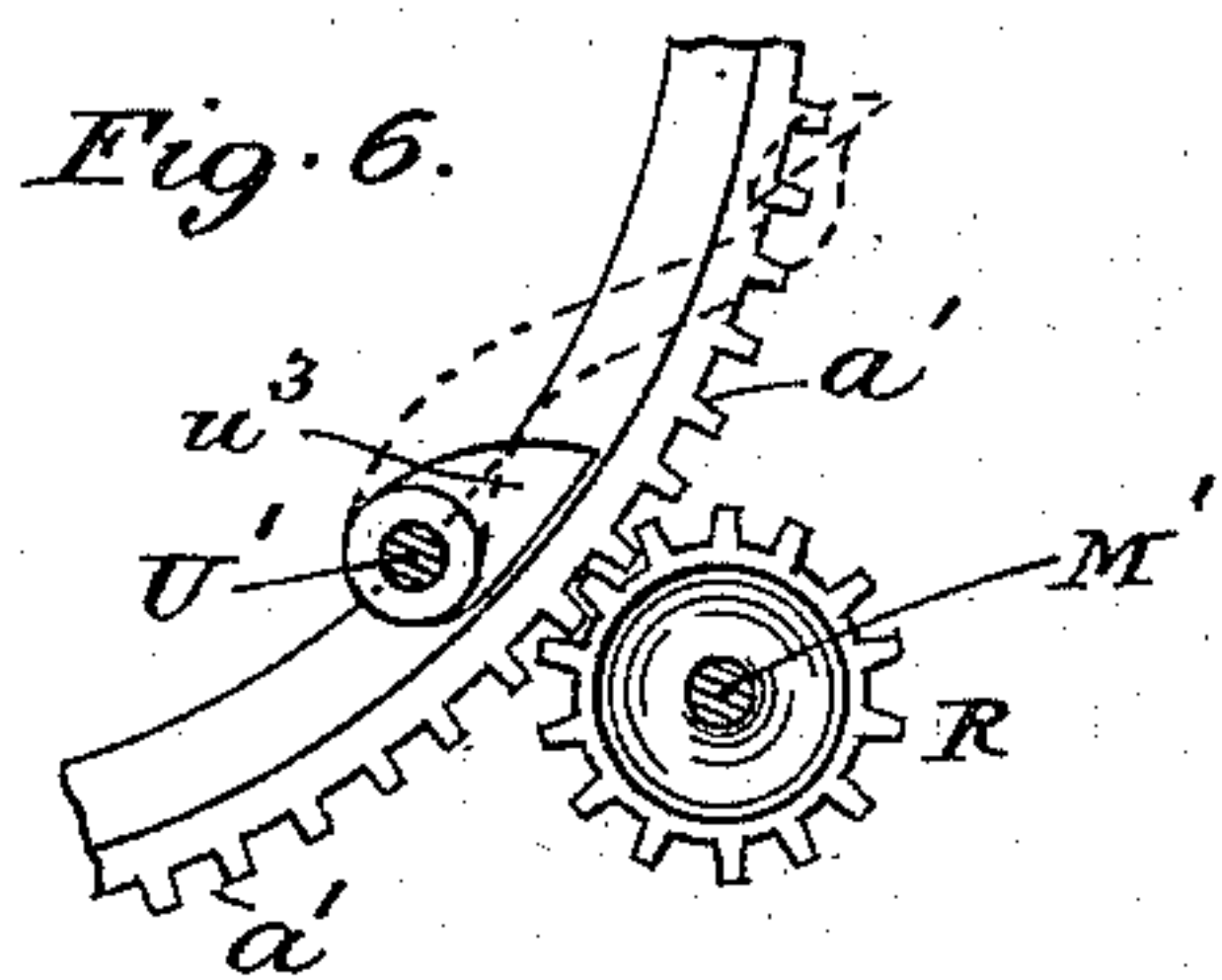
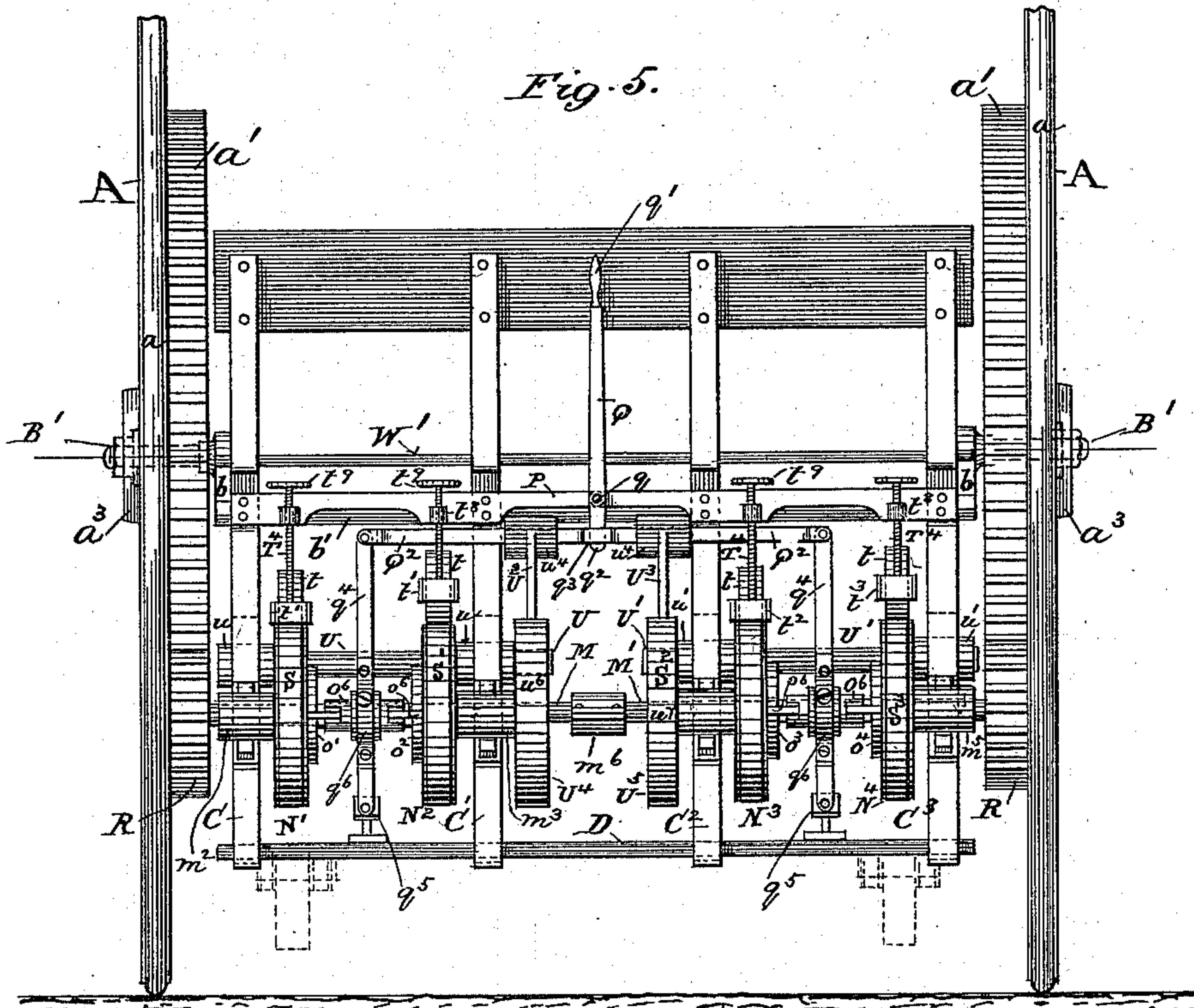
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Fig. 13.

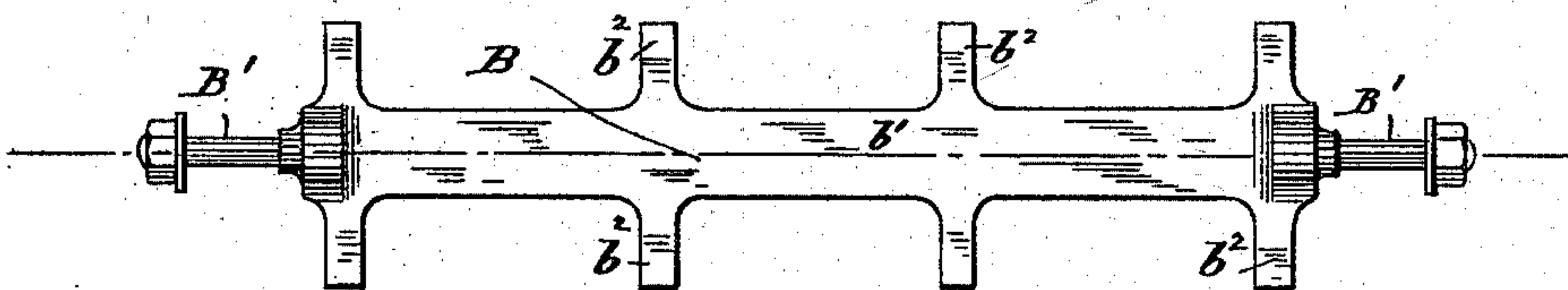


Fig. 14.

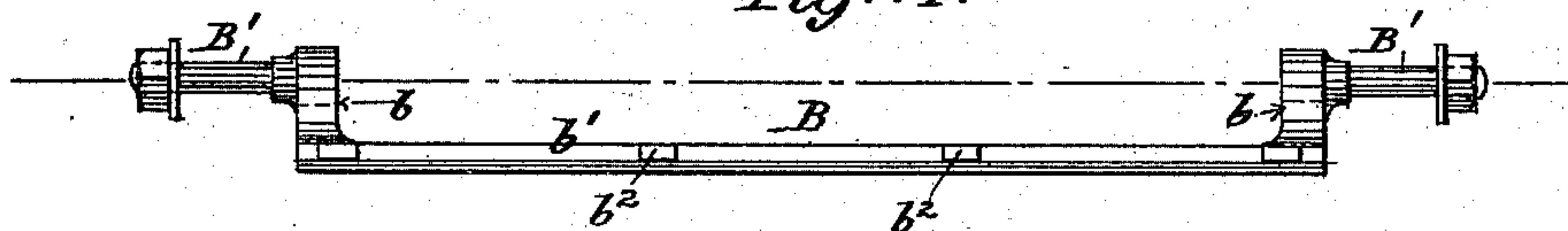


Fig. 15.

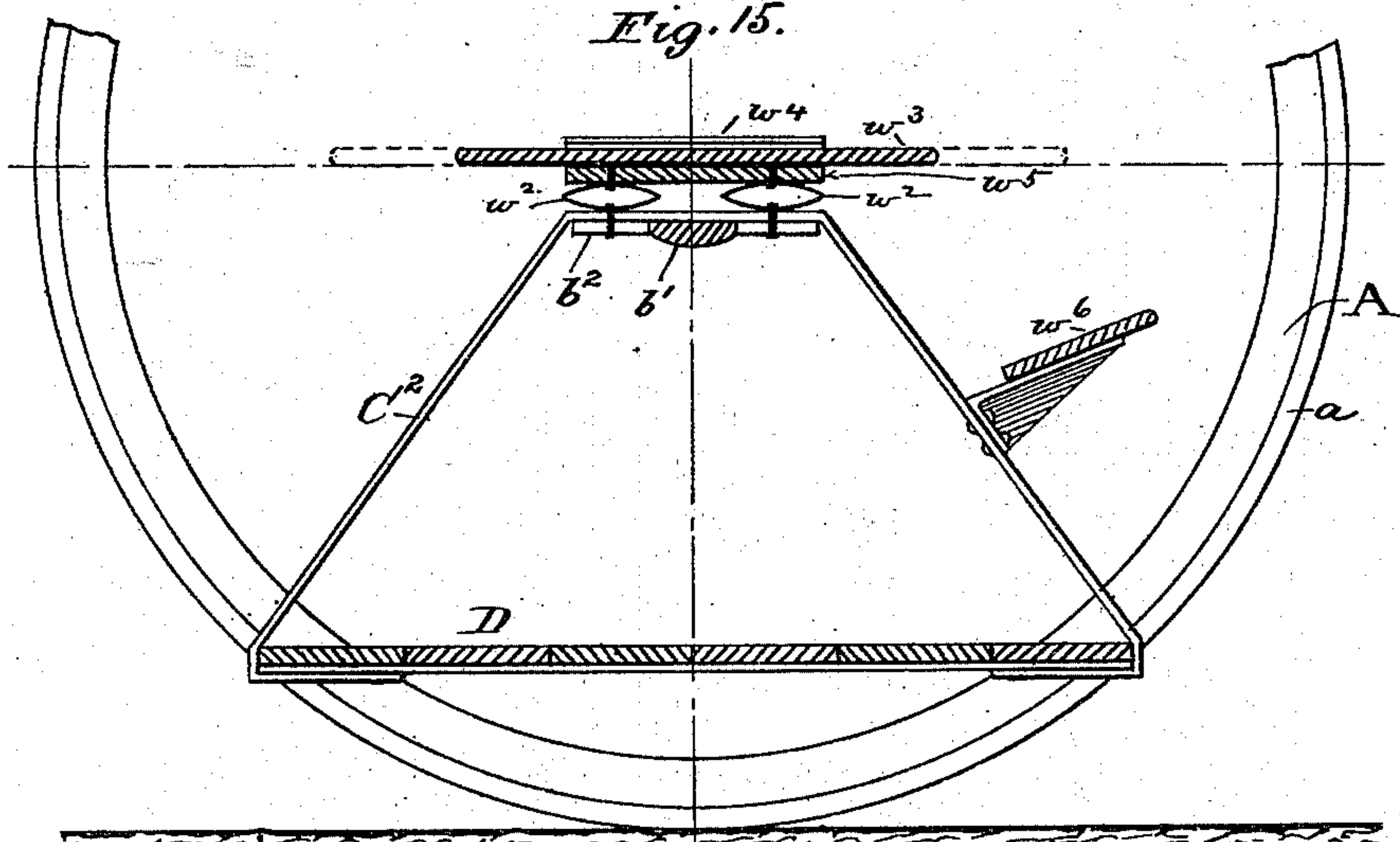
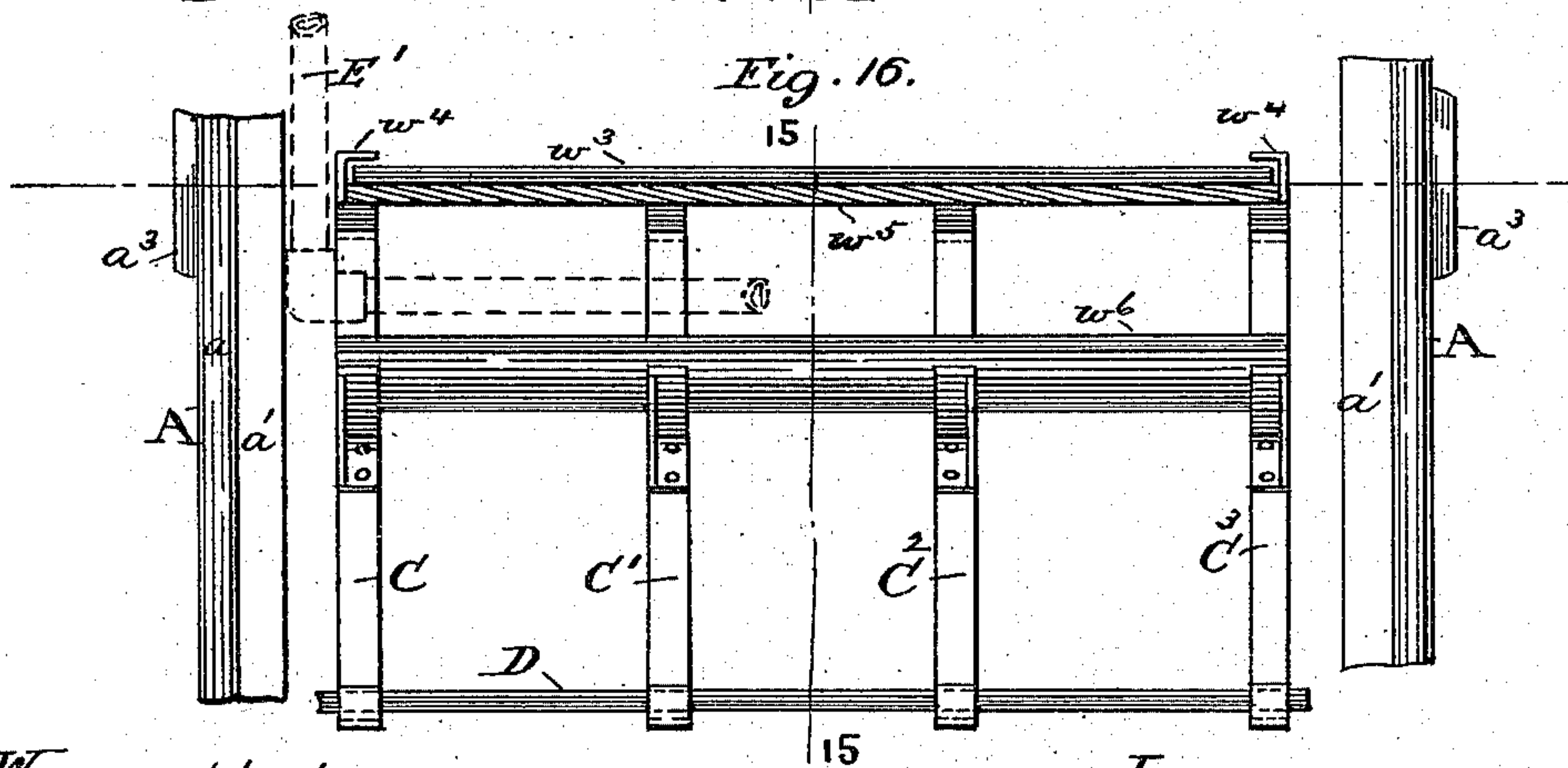


Fig. 16.



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UNITED STATES PATENT OFFICE.

JOSEPH J. KULAGE, OF ST. LOUIS, MISSOURI.

WHEELED VEHICLE.

SPECIFICATION forming part of Letters Patent No. 573,334, dated December 15, 1896.

Application filed February 3, 1896. Serial No. 577,953. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. KULAGE, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Wheeled Vehicles, of which the following is a specification.

My invention relates chiefly to vehicles which normally run upon two wheels placed side by side; and the chief objects of my improvement are, first, to enable such vehicles when in motion to support their loads entirely upon two such main wheels; second, to arrange the parts attached to the axle of the vehicle and the load thereby supported so that their combined center of gravity will lie in front of a vertical plane passing through the centers of the spindles upon which said supporting-wheels turn, and at such a point that when the motive power is applied to the wheels in the preferred manner and so as to drive the vehicle forward the front end of the vehicle will be thereby elevated from the position occupied when the vehicle is at rest, and its tendency to descend through the force of gravity will tend to assist in propelling the vehicle forward; third, to so arrange the parts of the vehicle and the load carried that the application of the driving power in the preferred manner from a motor supported by the axle will only turn the axle and elevate the front end of the vehicle far enough to bring the load-supporting portion to or about to a desired level in running at a predetermined speed over a given road; fourth, to provide means for readily shifting a portion of the load so as to throw the center of gravity farther forward or backward and thus compensate for changes in speed or in the character or level of the road, and in that way maintain the body of the vehicle at or near the desired level; fifth, to provide means which will prevent the vehicle from being upset; sixth, to provide an improved method of propelling two-wheeled vehicles; seventh, to provide improved means for transmitting power from a motor carried upon a platform suspended from the axle of a vehicle whose entire load is normally supported, when the vehicle is in motion, upon two wheels running side by side to such supporting-wheels; eighth, to provide means for readily connecting and disconnect-

ing the motor and wheels; ninth, to provide an improved brake; tenth, to provide improved means for turning the vehicle which will enable it to make very short turns; eleventh, to provide means for limiting the tilting of the vehicle-body either forward or backward, and, twelfth, to provide an improved whistle. I attain these objects by a mechanism whose preferred form is illustrated in the accompanying drawings, in which—

Figure 1 is a partial side elevation of a vehicle embodying my improvement, the near wheel and the motor and its appurtenances being omitted. Fig. 2 is a vertical longitudinal section on the line 2 2, Fig. 4, showing the preferred position of the motor and its appurtenances upon the platform of the vehicle, other supported parts being omitted. Fig. 3 is a plan view of the vehicle with the motor and appurtenances, the seats, and the foot-board omitted. Fig. 4 is a plan view of the platform detached, showing the position of the motor and its appurtenances. Fig. 5 is a front end elevation of the vehicle with the front seat and foot-board omitted. Fig. 6 is a detailed view of a vertical section on line 6 6, Fig. 3. Fig. 7 is a similar view of a vertical section on line 7 7, Fig. 3. Fig. 8 is a similar view, on an enlarged scale, on line 8 8, Fig. 3. Fig. 9 is a similar view on line 9 9, Fig. 3. Fig. 10 is a longitudinal section through the coupling of the pinion-shafts seen in Figs. 3 and 5. Fig. 11 is a vertical section of said coupling on line 11 11, Fig. 10. Fig. 12 is a section through one of the wheel-spokes on line 12 12, Fig. 1. Fig. 13 is a detailed plan view of the axle of the vehicle. Fig. 14 is a side elevation of said axle. Fig. 15 is a central vertical section on line 15 15, Fig. 16, through the platform and axle, showing an alternative arrangement in which the seat is movable backward and forward. Fig. 16 is a front view of the same seat and foot-rest. Fig. 17 is a longitudinal section, on an enlarged scale, through the exhaust and whistle pipes and cocks represented in Fig. 1.

Similar letters refer to similar parts throughout the several views.

A A, Figs. 1, 3, 5, 15, and 16, are wheels of ordinary construction upon which the load is normally supported when the vehicle is run-

ning. They are preferably provided with elastic tires a , and, as shown, each has attached to its inner side a gear-ring a' , whose teeth project outward and whose inner side is smooth. This ring may be attached to the spokes a^4 by means of bands a^2 , Fig. 12, passing around the spokes and attached to the ring as shown or in any other convenient manner.

B, Figs. 1, 3, 5, 13, 14, and 15, represents the preferred form of axle of the vehicle. Its spindles B' B' , Figs. 13 and 14, pass through the hubs a^5 a^3 of the wheels A A , and upon said spindles said wheels revolve.

As shown, the axle B is bent downward near the inner ends of its spindles, the vertical portions being lettered b b . The lower ends of the parts b b are shown connected by means of a straight portion b' , from whose sides project arms b^2 b^2 , &c. The bending of the axle is designed not only to lower the center of gravity, but also to enable the weight suspended therefrom to more powerfully oppose the tendency of the driving power to lift the front end of the vehicle-body, and assist, when lifted, in moving the vehicle forward.

C , C' , C^2 , and C^3 , Figs. 1, 2, 3, 4, 5, 15, and 16, are A -stands which are attached to the axle B . They are preferably so spaced apart as to each rest upon a pair of the arms b^2 b^2 , to which they are preferably attached, substantially as shown in Figs. 1, 2, and 3.

The A -stands C , C' , C^2 , and C^3 extend downward and preferably support a platform D , of ordinary construction. Upon the platform D a motor E , Figs. 2 and 4, in the form of a double-cylinder single-acting reciprocating gasolene-engine, of ordinary construction, is shown. No particular kind of motor is essential. The one shown is of an old and well-known construction, and will not therefore be fully described, except to state that e e represent the cylinders; E' , Figs. 2, 4, and 16, the exhaust-pipe; e' e' , branches connecting the main exhaust-pipe with the cylinders e e , and e^2 e^2 are pitmen, one of which is supposed to extend downward from each of the pistons (not shown) and connect with one of the cranks e^3 e^3 of the crank-shaft E^3 . (Shown in Fig. 3.) In Fig. 2 the pitmen are shown in the positions occupied at half-stroke, thus corresponding with the positions of the cranks represented in Fig. 3.

The exhaust-pipe E' may extend upward, as represented in Figs. 1 and 2, or pass horizontally to one side and then upward, as represented in Fig. 16. Its exact course is immaterial. As will be observed, it is represented as making a bend at e^4 , Fig. 2, in order to pass around the axle B . At some point in its course, e^5 , preferably above the seat of the vehicle, it connects with the branch pipe e^2 , at whose upper end a whistle e^6 , of any ordinary construction, is located. Above the point where these pipes join, a cock e^7 , Figs. 1 and 17, of ordinary construction, is located

in the exhaust-pipe, and a similar cock e^8 is located in the branch e^2 . The cocks e^7 and e^8 are so arranged that when one is open the other will be closed, as represented in Fig. 17, and to the cock e^7 a lever E^4 is attached, and a similar but preferably shorter lever e^9 is connected to the cock e^8 . These levers are preferably connected together by a coupling-bar e^{10} , one end of which is pivotally attached to each, so as to cause them to move together. They may be conveniently operated by grasping the handle e^{11} of the lever E^4 and moving it in the arc of a circle. (Shown in dotted lines in Figs. 1 and 17.) When the lever E^4 is in the position represented in full lines in Fig. 1 and dotted lines in Fig. 17, the cock in the exhaust is open and the other cock closed. When pushed into the position in which it is represented in dotted lines in Fig. 1, the cock in the exhaust-pipe is closed and the cock in the branch pipe e^2 is opened. The exhaust-gases from the engine then escape through the pipe e^2 and blow the whistle e^6 . If such an arrangement were connected with a steam-engine, the result would be the same.

G , Fig. 4, represents a gasolene-tank, connected to the engine by means of a pipe G' , having branches g g , in the usual manner.

H , Figs. 2 and 4, represents a water-tank connected with water-jackets e^{12} e^{12} around the cylinders by means of pipes h h in the usual manner.

I , Fig. 4, represents an electric battery, and i i are conductors connecting the engine and battery.

As there is nothing novel about either the engine, tanks, or battery or the means of connecting them, a more particular description is deemed unnecessary. The engine and tanks are preferably centrally arranged, as shown, low down and directly beneath the axle, and with the engine in the center, partly in order that their weight may tend to keep the wheels upon the ground and prevent the vehicle from being upset and partly in order that they may tend to keep the platform D and seats, hereinafter described, on a level and assist in propelling the vehicle forward when the platform is tilted upward in front; but inasmuch as I preferably arrange the machinery and load carried so that the center of gravity of the whole is in front of a vertical plane passing through the central axial lines of the spindles upon which the wheels which support the load revolve it will be evident that the particular arrangement of engine and tanks is not essential. I prefer, however, to move the center of gravity forward by the arrangement of other parts. The battery I , for instance, is preferably placed in front of the engine, as shown. The crank-shaft E^3 is shown journaled in bearings e^{13} e^{13} e^{13} e^{13} , Figs. 1, 3, and 4. It preferably carries a fly-wheel K , Fig. 4, and four pulleys K' , K^2 , K^3 , and K^4 , Figs. 1, 3, 4, and 5. They are preferably arranged two on

each side of the engine, as shown, and are alternately large and small, K' and K^3 being small and K^2 and K^4 large.

In front of the crank-shaft the shafts M M' , Figs. 1, 3, 5, 6, 7, 8, 9, and 10, are journaled in bearings m^2 m^3 m^4 m^5 , attached, respectively, to the **A**-stands C , C' , C^2 , and C^3 . These shafts may be, but are not necessarily, connected at their inner ends by a divided sleeve m^6 , fitting into annular grooves m^7 m^7 near the inner ends of said shafts; but said shafts are left free to revolve independently. Upon these shafts loose pulleys N' N^2 N^3 N^4 are mounted. Each of said pulleys has attached to its hub a wheel N^5 , the face of whose rim n contains a **V**-shaped groove n' . These loose pulleys are held in place in part by said bearings m^2 m^3 m^4 m^5 and in part by fast collars O' , O^2 , O^3 , and O^4 , attached to the shafts carrying said pulleys. Each of said fast collars has two arms o o , Fig. 9, extending in opposite directions. To the outer ends of these arms levers o^5 o^5 are pivoted. To the inner ends of these levers are attached segmental pieces o' o' , whose faces are **V**-shaped in cross-section and adapted to fit the groove n' in the rim of the adjoining wheel N^5 .

When the outer ends of the levers o^5 o^5 are moved outward, their inner ends move inward, and the segmental pieces o' o' , entering the groove n' , clutch the wheel N^5 , and in that way attach the loose pulley with which the wheel N^5 is connected to the shaft which carries it. Between the loose pulleys on each shaft a loose sleeve O^6 is located, which reciprocates upon the shaft. To each end of this sleeve two opposite arms o^6 o^6 are pivoted, and the outer ends of said arms are pivotally attached to the outer ends of opposite clutch-lever arms o^5 , so that when the sleeve O^6 is moved toward a pulley the outer ends of the connecting clutch-levers are drawn inward and the clutch opened, as shown in Fig. 9. On the other hand, when the sleeve O^6 is moved in the opposite direction the toggle-arms o^6 o^6 are straightened and the pulley made fast by the clutch. The sleeves O^6 are of such a length and so arranged that when they are in the midway positions, in which they are represented in Fig. 5, the clutches are loose, as represented in Fig. 9, and so that a movement to the right of the reader will tend to straighten the toggle-arms o^6 o^6 on the left of the reader and push the inner ends of the arms o^6 o^6 on the right of the reader inward still farther out of the perpendicular. The clutch described is old and is known as the "Medart" clutch. Other clutches may be substituted therefor without departing from the essence of this portion of my invention. The sleeves O^6 O^6 each contain an annular groove o^7 , Fig. 9.

P , Figs. 3 and 5, is a cross-piece attached to the front of the **A**-stands C C' , &c.

Q is a lever pivotally attached to said cross-piece P at q . Its upper end is provided with

a handle q' , and its lower end q^2 projects in the construction shown through an opening q^3 in a rocking bar Q^2 , which it thus engages. To each end of the bar Q^2 the upper end of a lever q^4 is pivotally attached, and the lower end of each of said levers q^4 is pivotally attached to a support q^5 , Figs. 3, 5, and 8. Each of said levers q^4 carries a collar q^6 , which surrounds one of said sleeves O^6 , and from said collar inwardly-projecting lugs q^7 q^7 , arranged opposite each other, enter the groove o^7 in the sleeve, and so engage the sleeve as to enable it to be moved by means of the lever. When the handle of the lever Q is moved to the reader's right, Figs. 3 and 5, the levers q^4 q^4 are made to move the sleeves O^6 O^6 in the opposite direction, and by straightening the arms o^6 o^6 on the right-hand end of each cause the clutches on that side to seize the pulley next it and force it to revolve with the shaft, while the adjoining pulley on the reader's left remains loose. A movement of the lever Q in the opposite direction loosens the pulleys on the right of said sleeves and makes the others fast. Each of said shafts M and M' carries on its outer end a pinion R , Figs. 1, 3, 5, and 6, whose teeth mesh in with those of one of the gear-rings a' .

S , S' , S^2 , and S^3 , Figs. 1, 3, and 5, are belts by which motion is transmitted from the crank-shaft pulleys to those on the shafts M and M' . As will be observed, the two small pulleys K' and K^3 on the crank-shaft E^3 are connected by belts S and S^2 with the pulleys N' and N^3 , which are made fast by the clutches at the same time, while the large driving-pulleys K^2 and K^4 are connected by the belts S' and S^3 with pulleys N^2 and N^4 , whose clutches also operate together. Hence by shifting clutch-lever Q so as to make the pulleys N' and N^3 fast the speed of the vehicle may be increased, and by shifting it so as to make pulleys N^2 and N^4 fast the speed may be lowered. By placing the lever Q in the position represented in Figs. 3 and 5 all the clutches are disengaged and the vehicle allowed to stop.

The direction in which the pulleys and the pinions R R turn when the vehicle is moving forward is indicated by arrows in Fig. 1.

T , T' , T^2 , and T^3 , Figs. 1, 3, and 5, are belt-tighteners of a well-known form. The small pulleys t t t t respectively rest upon the belts S , S' , S^2 , and S^3 . They are each pivotally supported in bearings formed in arms t' t' , t^2 t^2 , t^3 t^3 , and t^4 t^4 . The rear ends of these arms are pivotally attached to lugs t^5 t^5 , &c., projecting forward from cross-bars t^6 and t^7 , fastened to the **A**-stands C C' , &c., and the forward ends of said pivoted arms are shown adjustably supported by means of screws T^4 T^4 , &c., whose lower ends are attached thereto and which are themselves supported by means of brackets t^8 t^8 , &c., attached to the cross-bar P . Said screws pass through internally-screw-threaded holes in said brackets and are

provided at their upper ends with hand-wheels $t^9 t^9$, &c., by means of which said tighteners are adjusted.

U and U', Figs. 1, 3, 5, 6, and 7, are shafts 5 journaled in bearings $u u u' u'$, attached to the A-stands C C', &c., above and in the rear of the shafts M and M'. To the outer end of each of these shafts the brake-shoes u^2 and u^3 are respectively attached. These shoes are 10 adapted to engage the inner sides of the gear-rings a' , as shown most clearly in Figs. 3 and 6.

U² and U³, Figs. 1, 3, 5, 6, and 7, are foot-levers respectively made fast to the inner ends of the shafts U and U'. To the upper 15 end of each lever a treadle u^4 is attached, and the lower end u^5 of each of said levers preferably projects below the shaft to which it is attached. To the inner ends of the shafts M and M' in front of and below the levers U² 20 and U³ fast pulleys U⁴ and U⁵ are attached, and over each of these bands u^6 and u^7 pass. The ends of one of these bands are attached to the lever U and the ends of the other to the lever U'. One end of each is attached to 25 its lever above the shaft to which such lever is fastened and the other to the lower end u^5 of the lever below the shaft, and farther from it than the point of attachment of the other end. This method of attachment makes it 30 possible to tighten the band around the pulley over which it passes by pushing the treadle of the lever to which the band is attached forward and loosen it by the spring u^8 moving the treadle backward. By tightening both 35 bands when the vehicle is in motion the speed with which the shafts M and M' and parts thereto attached revolve may be lessened, and, if desired, the motion of said shafts may be stopped, in which case the belts will slide 40 on the fast pulleys if the motion of the motor continues.

The same motion of the levers U² and U³ above described also operates the brake-shoes u^2 and u^3 , as will be obvious, the forward 45 movement bringing the shoes into contact with the gear-rings and the backward movement disengaging them. Inasmuch as the brake-shoes u^2 and u^3 are attached to separate shafts and the shafts to which the pulleys 50 U⁴ and U⁵ are respectively attached revolve independently, it will be evident that by depressing only one of said levers the speed of the wheel A on one side can be made slower, or the wheel stopped entirely, while the other 55 continues to revolve at the same speed as before, or, while the brakes are applied to both wheels, they may be applied more forcibly to one than the other, and by adopting either course the vehicle can be very readily turned 60 and be made to make very short turns if desired. It will also be obvious that though I have combined two methods of braking together, so as to cause them to cooperate, either method can be used alone without the 65 other and the levers and brake-shoes, on the one hand, or the levers, fast pulleys, and

bands on the other alone relied upon in constructing the machine.

V V are arms or brackets extending forward from near the corners of the front end 70 of the platform, to which they are attached, and V' V' are similar arms or brackets attached to the rear end of the platform and extending backward. Each of these arms has a vertical bearing v formed in its outer 75 end, through which projects upward the spindle v' of a curved stock V² of a caster-wheel v^2 . Each spindle, as shown, terminates at its lower end in a shoulder v^3 , and between this shoulder and the arm V or V', which sup- 80 ports the wheel, a coiled spring v^4 , which surrounds the spindle, is shown. The downward movement of the spindles of the stocks V² V², &c., may be limited by means of pins v^5 v^5 , &c. The front caster-wheels are 85 designed to rest upon the ground when the vehicle is at rest, the center of gravity of the vehicle and load being in front of the spindles upon which the wheels A A turn. The positions of the caster-wheels at such times 90 are shown in dotted lines in Fig. 1. In the same figure they are represented in full lines in the positions which they preferably occupy when the vehicle is in motion. They are not 95 intended to touch the ground when the vehicle is in motion, except for a moment in starting, or when the character of the road suddenly becomes worse, or the driver is about to stop, or in descending steep hills. When 100 they are suddenly brought into contact with the ground, the springs v^4 prevent any jolt being felt.

W and W', Figs. 1 and 5, represent front and rear seats for the driver and passengers. 105 They are shown placed back to back. Each seat has attached to it an independent back w and a foot-rest w' , both of which move with it, and said seats rest upon and are attached to springs w^2 w^2 , &c., by which they are sup- 110 ported and which are in turn in the arrangement shown attached to and supported by the A-stands C C, &c., and the axle B. Such an arrangement may be used, but I prefer the sliding seat w^3 . (Represented in Figs. 15 115 and 16.) This seat rests and slides in guides w^4 w^4 , shown attached to a cross-piece w^5 . This cross-piece preferably rests upon and is attached to the springs w^2 w^2 , &c., which are attached to the A-stands and the axle B, as 120 above stated. Where this form of seat is used, a foot-rest w^6 , detached therefrom and attached to and supported by the A-stands C C', &c., is preferred. As will be obvious, there is no obstacle in the way of seating pas- 125 sengers back to back on such a sliding seat, if desired. This form of seat is preferred for the reason that it enables the driver to trim the load by moving the seat forward or back- 130 ward, so as to compensate for changes in the level or character of the road or in the speed at which the vehicle is driven.

X, Fig. 1, represents a canopy which may

be used to shade riders from the sun. It is supported by means of a central rod x , rising from the part b' of the axle to which it is attached, and rods $x' x'$, springing from said rod and extending to the front and rear. This form of canopy is of a known form, and is not for that reason more particularly described.

It will be observed that the arrangement of parts above described is one which throws the center of gravity of the vehicle and driving mechanism in front of a vertical plane passing through the central axial line of the spindles of the axle B. The weight supported by the spindles should preferably be great enough and so disposed as to cause the force of gravity tending to tilt the front end of the platform D down out of a horizontal position to substantially equal the power required to turn the main wheels of the vehicle when it is running at a desired speed over the road on which it is to travel, in order that the tendency of the movement of the pinions to tilt the front end of the vehicle-body upward and carry it around the gear-ring may be counterbalanced and the platform D and the seats kept substantially level. Of course some slight oscillation is unavoidable, because no road is exactly even, and such oscillations will be greatest when the weight carried by the vehicle is so arranged that it cannot be moved forward or back, as in the form of vehicle represented in Fig. 1, in which the seats are stationary and there is no part movable forward and backward by means of which the effects of changes in the speed or the character of the road can be counterbalanced. In that form of my vehicle the bent form of the axle and placing the center of gravity low down is chiefly relied upon to keep the vehicle steady, where the weight is distributed as shown, with the heavier portion beneath the axle. The power required to lift the front end of the platform is greater than where the axle is straight, and constantly increases as the front end of the platform is lifted higher until a point is reached at which the platform assumes a vertical position.

In the form of vehicle shown in Fig. 1 the weight placed on the front and rear seats should preferably be equal, so that a vertical plane passing through the central axial lines of the spindles of the axle B will pass through the center of gravity of the passengers when their seats are level and they are seated upright substantially as it would pass through that of a single passenger if he were seated upon or over the axle, so that his center of gravity came over its center. As will be obvious, however, the weight of one or more persons seated either on the front or rear seats may be counterbalanced by baggage instead of other passengers, and the weight of any one seated on the front seat may be counterbalanced by means of articles placed upon the rear end of the platform D, if desired. Where through any cause the platform D is tipped far enough, the caster-

wheels at its lower end strike the ground, so that the variation from a horizontal can never be great.

The difficulties experienced in balancing my improved vehicle may be entirely overcome by means enabling a portion of the load to be readily moved forward or backward, such as the sliding seat hereinbefore described. When such a seat is used, the weight of the parts supported by the axle may be so arranged that when the passenger is seated directly over the axle the motion of the vehicle at a given speed over an ordinary level road will keep the seat level, and when less power is required to propel the vehicle the seat may be moved backward, and when the road becomes worse or the speed is increased the seat may be moved forward. I prefer to extend the front of the seat beyond the guides, as shown, and make them fit its edges snugly, so that the weight of the rider will clamp it in position, but this is not essential.

In starting my vehicle, especially where the road is bad, the front end is apt to be raised high enough to cause the rear caster-wheels to strike the ground, but their springs prevent any disagreeable jolt, and as momentum is acquired they leave the ground and the platform D assumes a horizontal position, if the weight is distributed as preferred. On the other hand, in stopping, the front end of the vehicle descends and the front caster-wheels come in contact with the ground.

I have described certain combinations and forms of parts which may be used and stated which of these I prefer, but, as will be obvious, all the parts described are not essential, and for those which are necessary other equivalent parts or combinations of parts may be substituted without departing from the essence of my invention. For instance, as will be obvious, the exact number of caster-wheels shown is not essential, nor is it essential that they should be used at both ends of the vehicle, though it is desirable. Where two are shown, a single one could be substituted, or more than two could be used, though I prefer the arrangement shown.

It is not essential that the exhaust-pipe E' and branch e^2 should ever be entirely closed by their respective valves. All that is necessary is that on the one hand when the whistle is to be blown enough of the exhaust gas or steam shall be turned into the branch pipe to do the work and that on the other hand at other times means shall be used preventing enough of the exhaust from passing through the branch pipe to blow the whistle.

Where in my claims I speak of the "vehicle-body," I do not wish to be understood to confine myself to a body of any particular construction. As will be obvious, many different forms may be used without departing from the essence of my invention. The one shown is, however, a good one.

I claim—

1. The combination in a vehicle of two main

wheels; a body portion; means supporting it between said wheels; a driving-shaft turning in bearings attached to said body; four fast pulleys on said shaft of two different sizes
 5 two of the larger size and two of the smaller; two other shafts parallel to the first, both turning in bearings attached to said body, two loose pulleys on each of the latter shafts one on each shaft opposite one of the larger
 10 driving-pulleys and one opposite one of the smaller; means by which the two loose pulleys opposite the smaller driving-pulleys may be simultaneously made fast; to their shafts; means by which the two loose pulleys oppo-
 15 site the larger driving-pulleys may be simultaneously made fast to their shafts; means transmitting motion from the driving-pulleys to the pulleys opposite them and means attached to each of the shafts carrying loose
 20 pulleys transmitting motion from such shaft to the main wheel next it, substantially as described.

2. The combination in a vehicle of two main wheels; a body means by which it is swung
 25 between said wheels; two shafts turning in bearings attached to said body; means communicating motion to said shafts, means transmitting motion from one of said shafts to one wheel, and from the other shaft to the other
 30 wheel; a fast pulley on each shaft; a band passing partly around each pulley and means by which said bands are separately lightened substantially as, and for the purposes de-
 scribed.

3. The combination in a vehicle of two main supporting-wheels; an axle connecting them, springs supported by said axle parallel guides supported by said springs and a seat sliding
 35 backward and forward in said guides substantially as described.
 40

4. The combination in a vehicle of a pair of main supporting-wheels; a pair of gear-rings, one attached to each wheel, and each smooth on its inner side, and having out-
 45 wardly-projecting teeth; a body swinging between said wheels concentric with their axis, means by which it is connected to said wheels, two brake-shafts turning in bearings; at-
 50 tached to said body, a brake-shoe attached to each shaft, one extending within one of said rings and the other within the other ring a lever attached to each brake-shaft; two
 55 other shafts in front of said brake-shafts, bearings attached to said body, in which the two last-named shafts turn; means communicating motion to the latter shaft; a pinion at the outer end of each of said shafts which meshes in with the teeth of the gear-ring at-
 60 tached to the adjoining wheel; a fast pulley on each of said shafts, one of said pulleys being located in front of each of said brake-levers; a brake-band attached to each of said levers and passing over the fast pulley in front of it and all operating substantially as
 65 described.

5. The combination of the wheels A, A,

gear-wheels a and a' thereto attached, a bent axle having spindles upon which said wheels turn; a body attached to said axle, swinging concentric with the centers of said wheels;
 70 and having a platform beneath the axle; a motor carried on said platform below the axle; shafts M and M'; bearings attached to said body in which said shafts turn; pinions R, R, attached to said shafts and meshing in
 75 with said gear-rings, means transmitting motion from said motor to said shafts and pinions and through them to said wheels, caster-roller stops attached to said platform before and behind said axle; and the weight of all
 80 parts being so proportioned and distributed that the center of gravity of all parts carried by said wheels is lower and farther forward than said axle when the vehicle is at rest and causes the front end of the body of the vehi-
 85 cle to rest upon the front casters when the vehicle stops, substantially as described.

6. The combination in a vehicle of two main wheels; a body portion; means supporting it between said wheels; a driving-shaft turning
 90 in bearings attached to said body; four fast pulleys on said shaft of two different sizes, two of the larger and two of the smaller; two driven shafts parallel to the driving-shaft, both turning in bearings; means for trans-
 95 mitting motion from one of the latter shafts to one wheel, and from the other shaft to the other wheel; two loose pulleys on each driven shaft, one on each shaft, opposite one of the larger driving-pulleys; and one opposite one
 100 of the smaller; means by which the loose pulleys may be made fast to their shafts; a belt running from each pulley on the driving-shaft to the loose pulley opposite it; and a belt-tightener for each belt, substantially as
 105 described.

7. The combination in a vehicle; of two main wheels; a body portion; means support-
 110 ing it between said wheels; a driving-shaft turning in bearings attached to said body; four fast pulleys on said shaft of two different sizes, two of the larger size and two of the smaller; two driven shafts parallel to the driving-shaft, both turning in bearings at-
 115 tached to said body; two loose pulleys on each driven shaft; one on each shaft opposite one of the smaller driving-pulleys; and one opposite one of the larger; means transmitting motion from the driving-pulleys to the loose
 120 pulleys; clutches for making the loose pulleys fast to their shafts; the lever Q; means pivotally attaching said lever to the body of the vehicle; a rocking bar Q^2 , engaged by said lever Q; levers q^1 , q^1 , connected at their up-
 125 per ends, to the ends of the rocking bars; means pivotally connecting the lower ends of the levers q^1 , q^1 , to said body; and means connecting said levers q^1 , with said clutches, and enabling the operator to make either the
 130 loose pulleys opposite the larger driving-pulleys, or the loose pulleys opposite the smaller pulleys fast, by throwing the lever Q to one

side or the other; and, to allow the loose pulleys to run loose, by allowing the lever Q, to stand upright, substantially as described.

5 8. The combination of a pair of supporting-wheels, running side by side; a bent axle connecting said wheels, and upon which they turn, and which axle has the horizontal portion b' having arms b^2 , projecting forward and back therefrom; A-shaped stands sup-

ported by the axle and each resting upon a pair of said projecting arms; and a platform D supported by said A-shaped stands, substantially as described.

JOSEPH J. KULAGE.

Witnesses:

STORY SIDEBOTHAM,
BENJ. F. REX.