No. 708,949. Patented Sept. 9, 1902.

E. A. WRIGHT.

MOTOR VEHICLE.

(Application filed Dec. 13, 1900.)

(No Model.)

4 Sheets—Sheet 1.

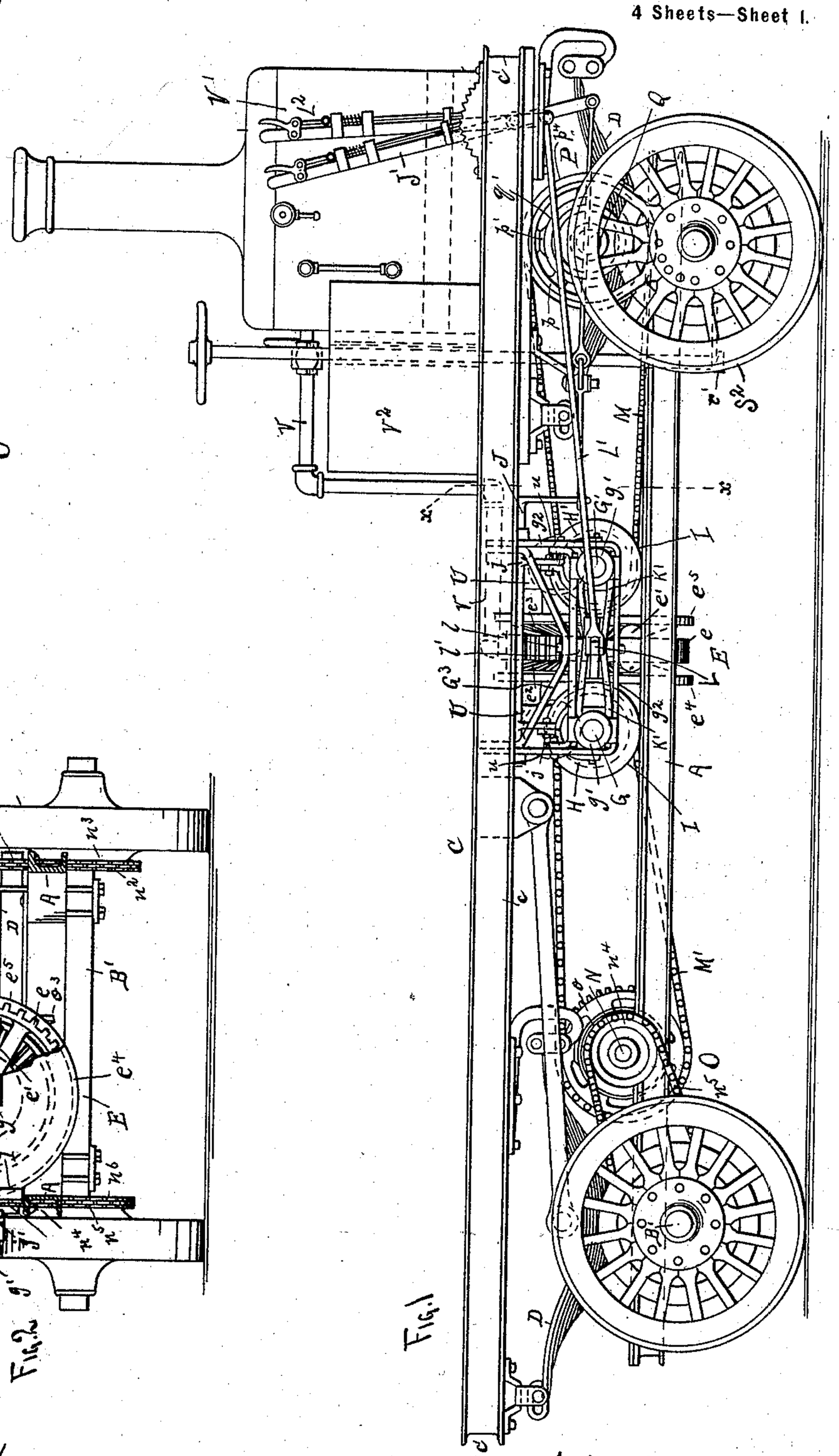

FIG. 1.

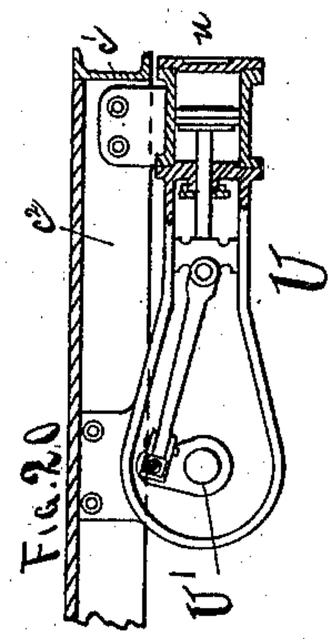

FIG. 2.

FIG. 2a.

Witnesses.
C. M. Woodward.
N. Curtis Lammond.

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(No Model.) 4 Sheets—Sheet 2.

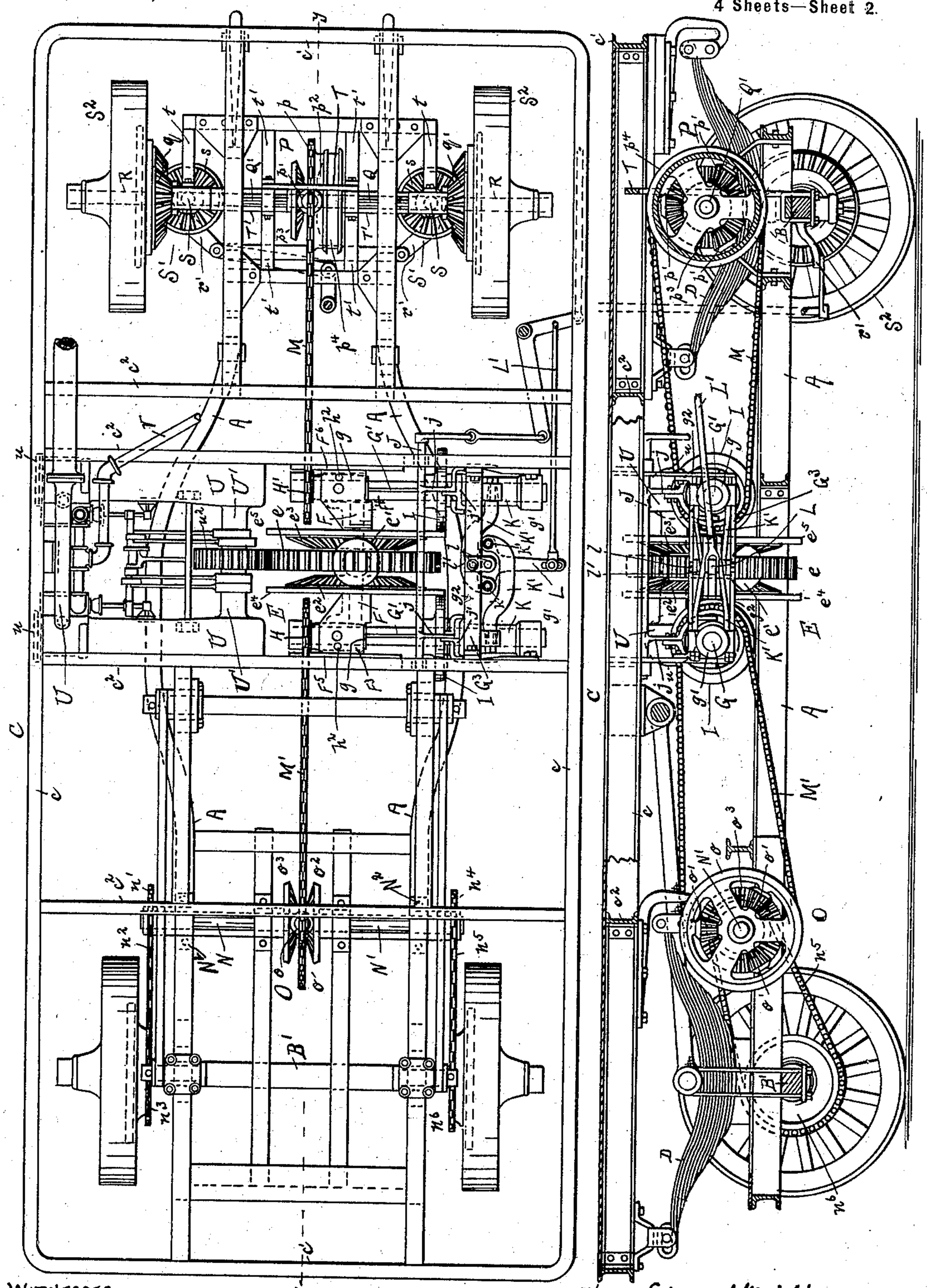

Fig. 3.

Fig. 4.

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(No Model.) 4 Sheets—Sheet 3.

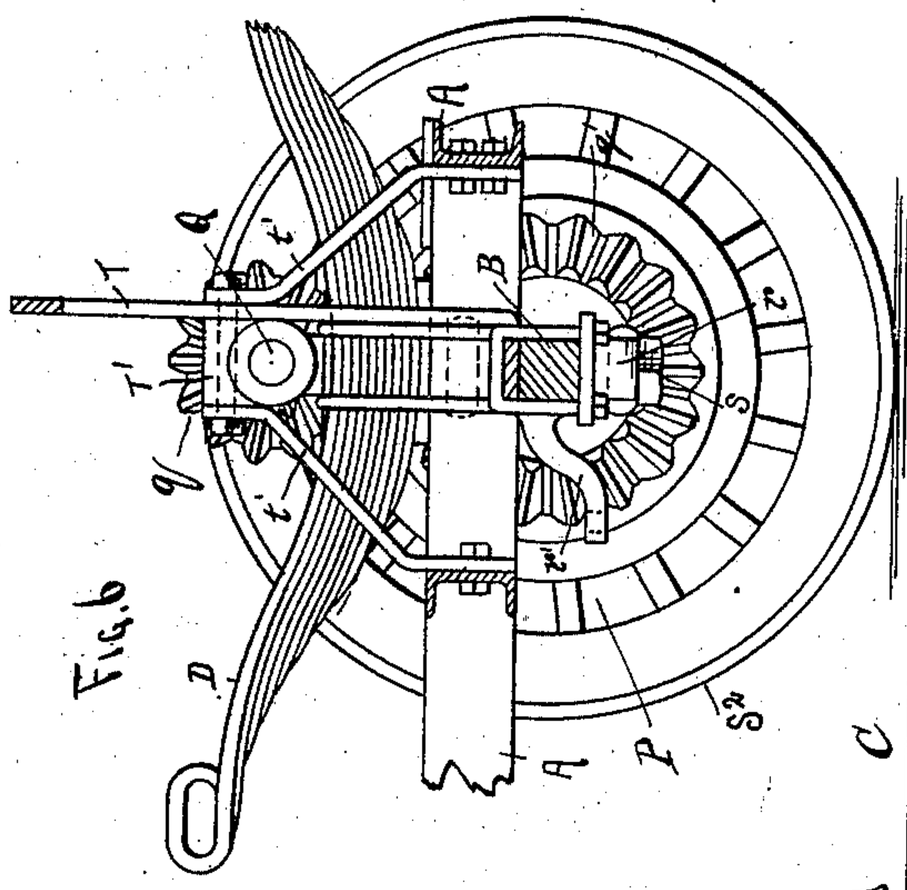

FIG. 6

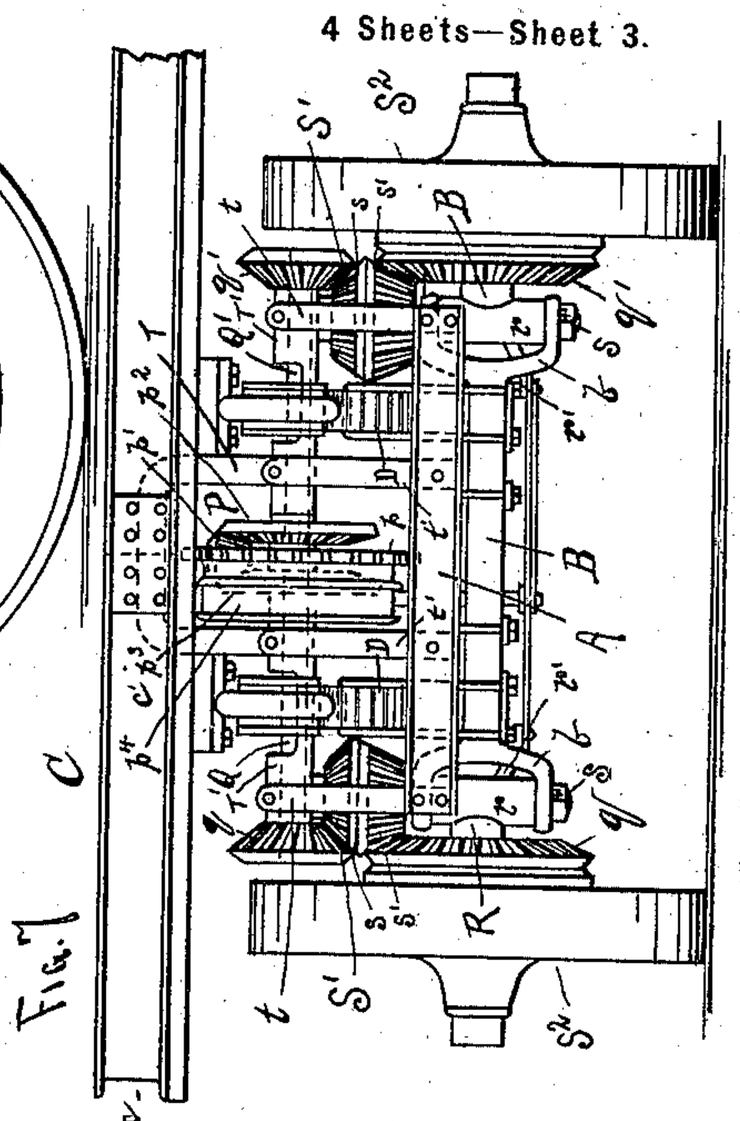

FIG. 7

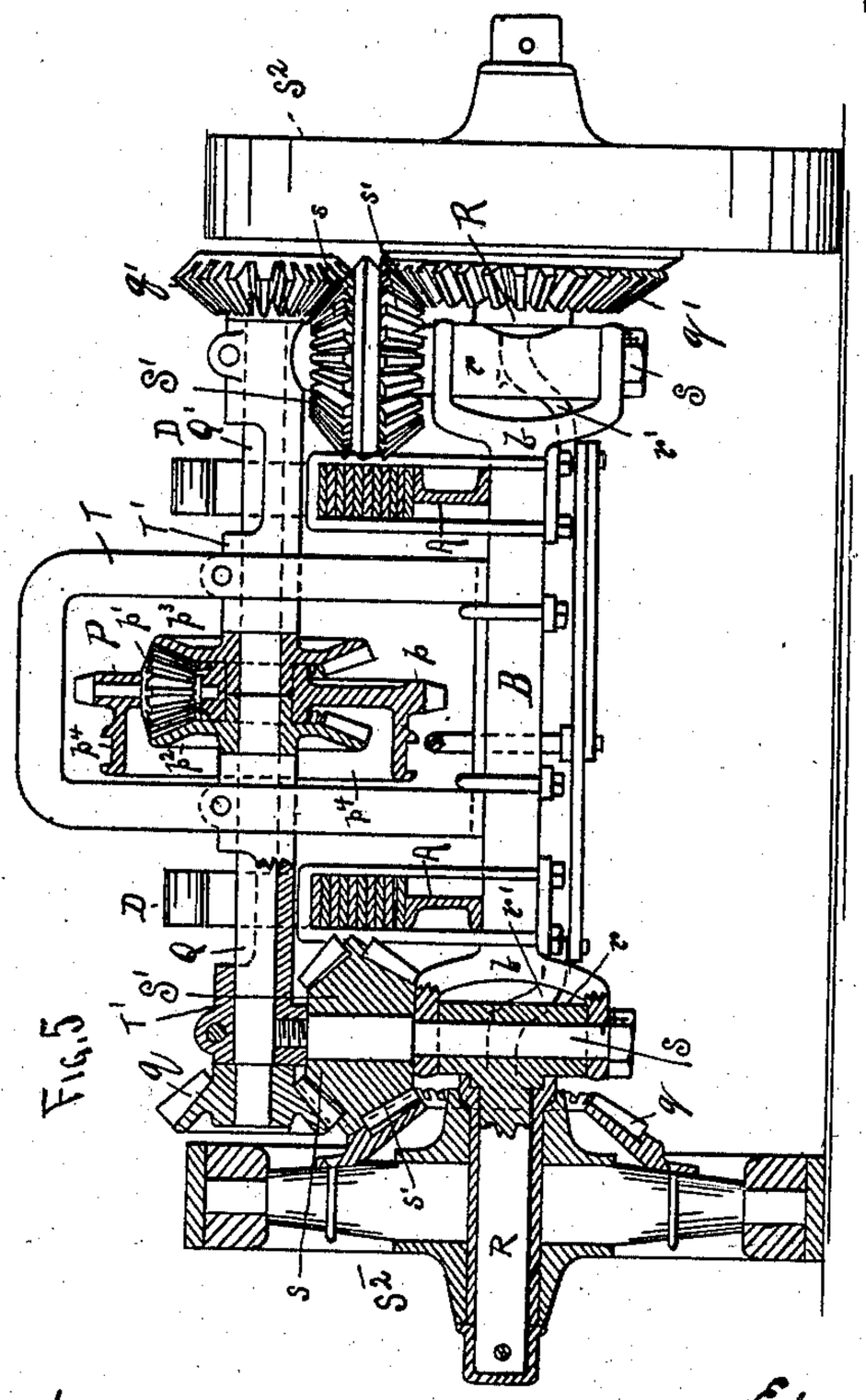

FIG. 5

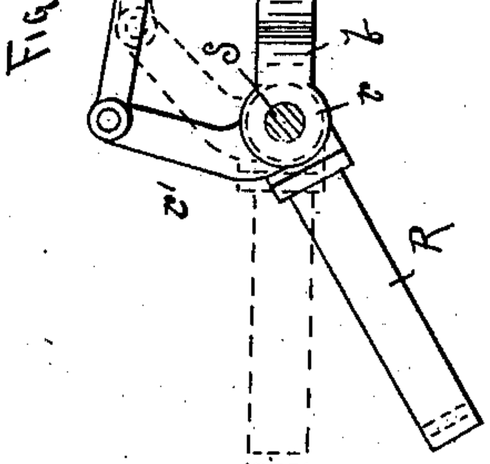

FIG. 8

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No. 708,949. Patented Sept. 9, 1902.

E. A. WRIGHT.

MOTOR VEHICLE.

(Application filed Dec. 13, 1900.)

(No Model.)

4 Sheets—Sheet 4.

Fig. 8

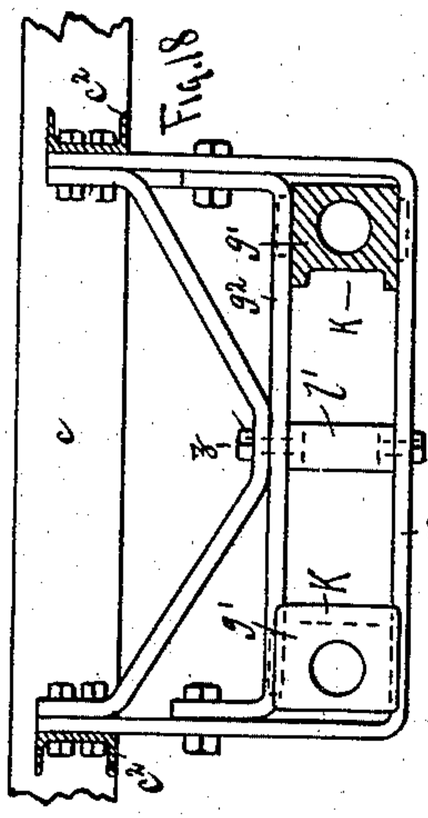


Fig. 9

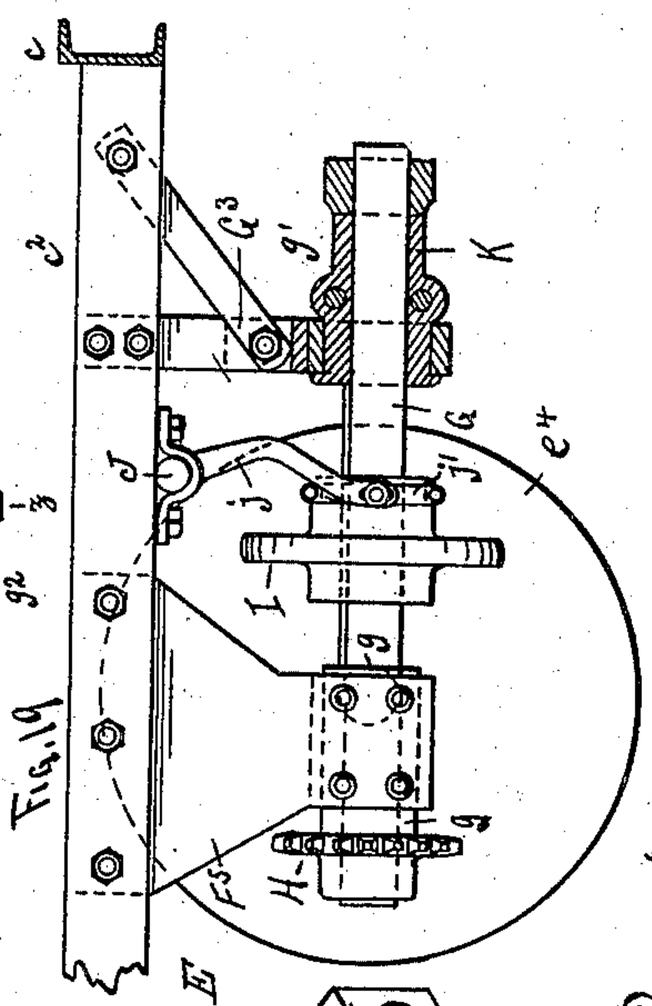


Fig. 12

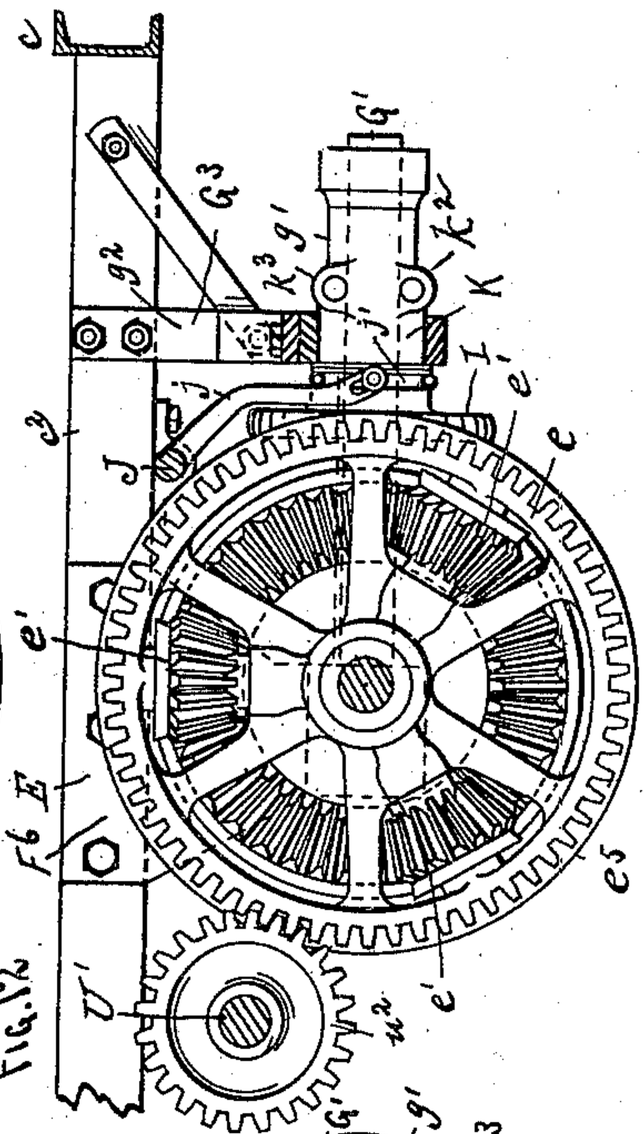


Fig. 11

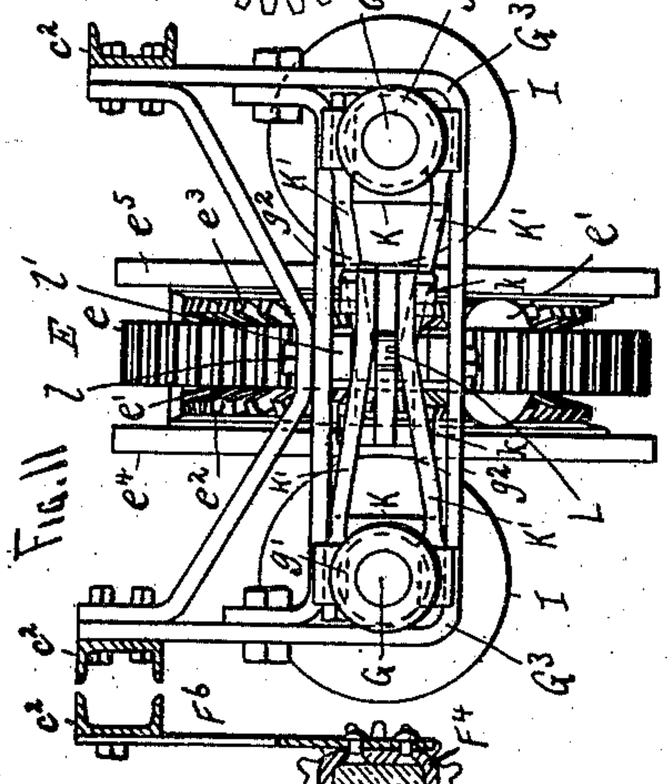


Fig. 13

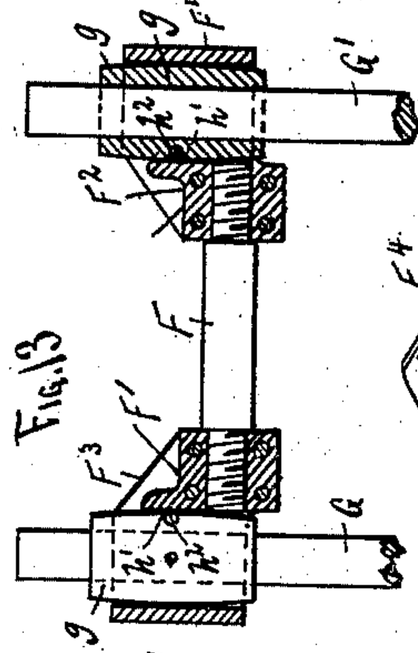


Fig. 14

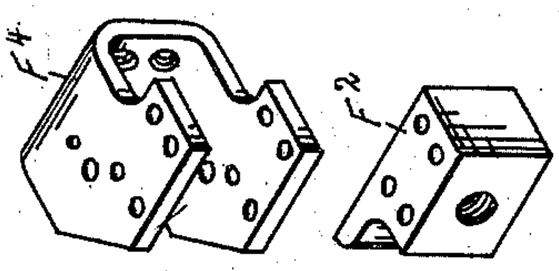


Fig. 15

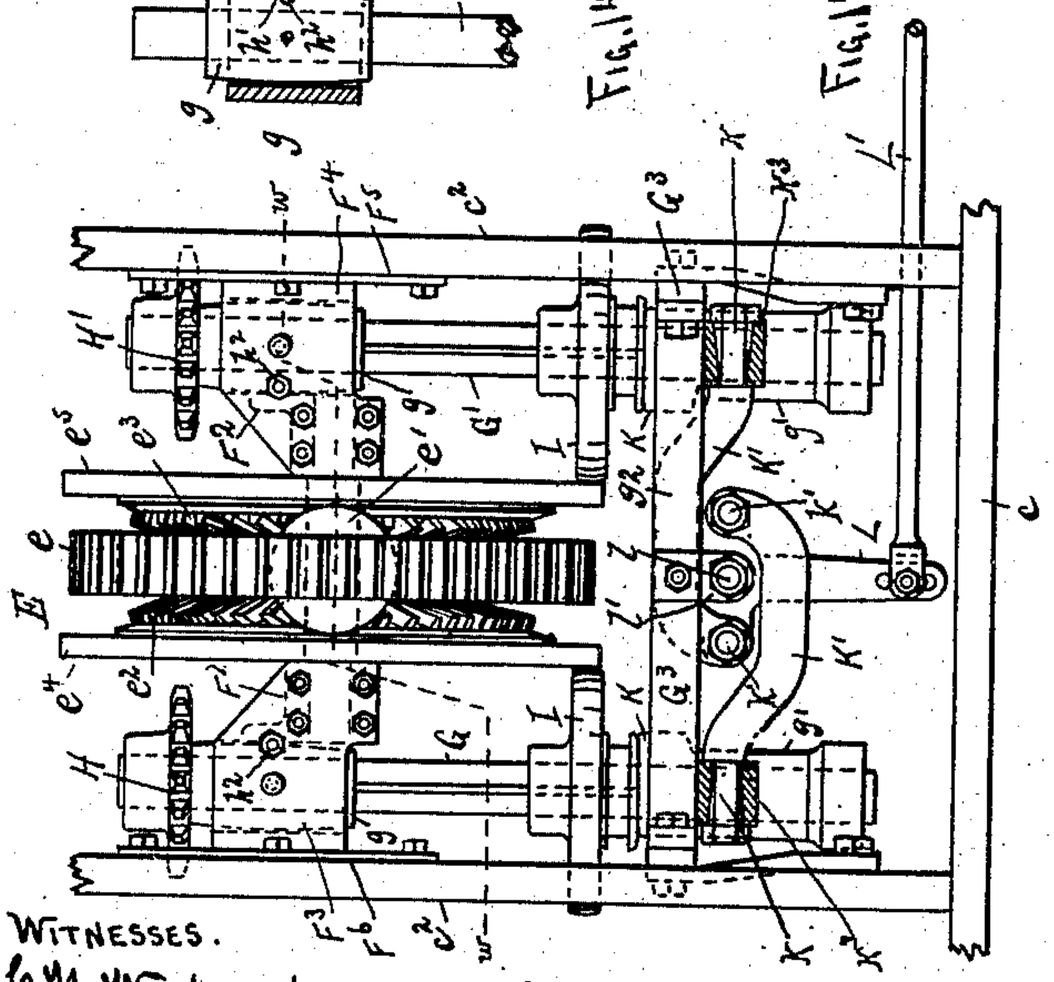


Fig. 10

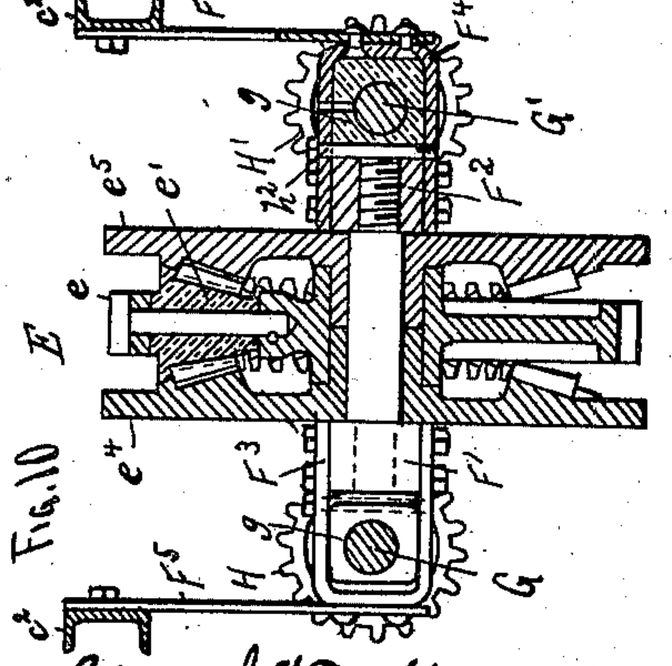


Fig. 16

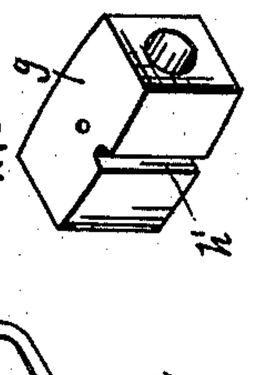
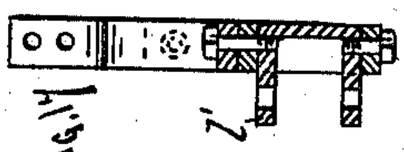


Fig. 17



Witnesses.
W. N. Woodward.
V. Curtis Lammond

Edgar A. Wright Inventor
By H. A. Blair Attorney.

UNITED STATES PATENT OFFICE.

EDGAR A. WRIGHT, OF CANTON, OHIO, ASSIGNOR TO THE AULTMAN COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 708,949, dated September 9, 1902.

Application filed December 13, 1900. Serial No. 39,772. (No model.)

To all whom it may concern:

Be it known that I, EDGAR A. WRIGHT, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Motor-Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in motor-vehicles, the object being to provide mechanism by which the power can be applied more efficiently and economically than it can be in any vehicles of this class with which I am acquainted. I so construct and arrange the parts that I can apply power to each of the four ground-wheels, and thus make available the entire tractive efficiency of those wheels; secondly, apply the power to the wheels of the front pair equally at all times, though they are moving at different speeds and in paths of different radii, and, thirdly, apply the power to the rear wheels in such way that they also shall be furnished with an equal degree of power although moving with different peripheral speeds, and, fourthly and particularly, apply the power to the rear pair of wheels and to those of the front pair in such way that the two pairs can move in different curves without interference from cramping or binding and without requiring that any wheel should slip in relation to the others.

The invention also relates to matters of detail incident to what I at present regard as the best form of machine for carrying out the purposes above set forth.

Figure 1 is a side elevation of a motor-vehicle embodying my improvements. Fig. 2 is a cross-sectional view on the line *x x* of Fig. 1 looking toward the rear of the machine. Fig. 3 is a plan view with the flooring of the platform-frame removed. Fig. 4 is a side elevation with the front and rear portions in longitudinal section on the line *y y* of Fig. 3. Fig. 5 is an elevation of the forward truck, partially in section. Fig. 6 is a sectional detail view of a portion of the forward axle and one of the traction-wheels, illustrating the manner for supporting the forward axle-driving mechanism. Fig. 7 is a front elevation of the machine as shown in Fig. 4. Fig. 8 is a detail view of the forward axle, illustrating the construction of the steering mechanism. Fig. 9 is a plan view, enlarged, of the central driving mechanism. Fig. 10 is a longitudinal section on the line *w w* of Fig. 9. Fig. 11 is a side elevation of the parts shown in Fig. 9. Figs. 12 to 20 show details.

The vehicle illustrated is shown as having a truck-frame and a body-frame. The truck-frame is formed of side bars A A, shaped, preferably, as shown, to have the outwardly-swelled central part and the narrower end parts. This frame is secured rigidly to the two transverse axles B B′, the side bars resting directly on the axles and being rigidly secured thereto.

The body-frame is indicated by C, it having the side bars *c* and the end bars *c′*, together with suitable cross-girths, as at c^2. The body-frame is supported on the truck-frame by means of springs D, preferably arranged as shown, but which can be of any suitable form. The body-frame supports the motor or engine. At present I prefer to employ, and below describe, a steam-engine, parts of which will be referred to. But it will be understood that as concerns the power-transmitting parts of the present construction use may be made of any other suitable engine or motor.

The engine or motor drives directly a compensating gearing, (indicated as a whole by E.) The form of gearing shown comprises the power-receiving wheel *e*, carrying the bevel-pinions *e′*, which mesh with the bevel gear-wheels e^2 e^3, adapted to revolve loosely on a shaft F, this shaft F being placed longitudinally of the vehicle—that is, so that the receiving-wheel *e* and the main bevel-wheels e^2 e^3 rotate in transverse planes—whereby the mechanism as a whole is greatly simplified. The bevel-wheels e^2 e^3 are formed integrally with or have secured to them friction-disks e^4 e^5. The ends of the shaft F are secured in blocks F′ F^2, the latter in turn supported by straps F^3 F^4, the straps being extended beyond the blocks and forming sockets for shaft-boxes, as hereinafter shown. The straps F^3 F^4 are connected rigidly to two of the trans-

verse girths c^2 by hangers F^5 F^6, as shown, the whole forming a firm support for the shaft F, as shown more clearly in Figs. 10 and 13.

G G′ are shafts mounted transversely of the vehicle and journaled by their inner ends in boxes at g g, which are supported in the sockets in the straps F^3 F^4. The boxes g g are flat at top and bottom, with curved sides, as shown in Fig. 16, (which represents one of the boxes detached,) which fit closely by their upper and lower surfaces in the sockets in the straps, the curved sides permitting a longitudinally-vibrating motion to the shafts G G′. Each box is provided with a recess h', in which a bolt h^2, passing downward through the straps, passes to insure the retention of the boxes in their proper places in the sockets. This arrangement permits the outer ends of the shafts G G′ to swing slightly laterally toward and from the adjacent friction-wheels e^4 e^5. Upon the outer ends of the shafts G G′ are mounted other boxes g', each formed square or oblong at one point and fitting slidably at these parts in guideways in a hanger-frame G^3, suspended from the cross-girths c^2, as shown more clearly in Figs. 11, 17, and 19. Each of these shafts G G′ carries a sprocket-wheel, (one indicated by H and the other by H′,) these wheels being preferably situated in the central longitudinal vertical planes of the vehicle. Power is transmitted to these shafts G G′ from the friction-wheels, above referred to, through friction-pulleys I I, each arranged to contact peripherally with one of the friction-wheels e^4 e^5. These pulleys are feathered to the shafts G G′ and can be moved longitudinally thereof toward and from the center of its friction-driver, this action permitting the variation of its speed and a corresponding variation in the transmitted power. The devices for thus moving the friction-pulleys consist of a rock-shaft J, having arms j, which loosely engage with the rings j', each fitting in a groove in the hub of the friction-pulleys e^4 e^5. The rock-shaft J is actuated by a lever J′ within reach of the driver and connected to the rock-shaft by suitable links J^2, as shown in Figs. 1 and 3. The friction-pulleys can be each moved out from or into engagement with the friction-driver by means of arms K′, two for each box. Each arm K′ is secured to its box g' by a threaded spindle k at its outer end, the inner ends of the arms of each pair being joined by bolts k', which also connect them to a T-lever L. The T-lever is pivoted at l to the frame G^3, a bracket l' on the latter serving to support the pivot and lever. L′ is a rod pivoted by one end to the T-lever and connected by its other end to a lever L^2 near the driver's seat or platform. When the T-lever L is moved in one direction, the boxes g' are caused to move inward, which draws the shafts G G′ toward each other, causing the friction-pulleys I to approach and press against the friction-drivers e^4 e^5, the opposite movement of the lever separating the friction elements and stopping the transmission of power. The spindles k of the arms K′ are journaled in lugs k^2 k^3, the holes for the spindles being elongated on their inner ends to permit the necessary flexibility of movement caused by the motion of the shorter ends of the T-lever L.

When the engine or motor and the main gearing E are in action and the pulleys I I are engaging with their drivers, the sprocket-wheels H H′ will be rotated. These wheels respectively transmit the power by chains M M′ to the rear ground-wheels and to the front ground-wheels, and as these chains are actuated by the different elements of the principal compensating gear they can transmit equal amounts of power although traveling at different speeds. The chain M′ extends to a line of counter-shafting at N N′, the parts N N′ being in alinement transversely and supported by bearings N^2 on the frame A, and driven by a second supplemental compensating gear, (shown as a whole at O.) This comprises the receiving sprocket-wheel o, the bevel-pinions o', carried thereby, and the bevel-wheels o^2 o^3. The wheel o^2 is keyed to the part N′ of the shaft, and the wheel o^3 is keyed to the part N of the shaft. The part N of the shafting is connected to one of the rear ground-wheels by the sprocket-wheels n' n^3 and the chain n^2. The other part N′ of the shafting is connected to the other rear wheel by the sprockets n^4 n^6 and the chain n^5. The other chain M connects the other element of the main compensating gear with the front driving-wheels, these also having two sets of driving devices, one for each ground-wheel, with a third supplemental compensating gearing interposed between them, said gearing being indicated as a whole at P. The chain M engages with the receiving sprocket-wheel p, which carries the bevel-gears p', the latter meshing with the bevel-wheels p^2 p^3. The bevel-wheel p^2 is secured to the part Q of the transverse shaft, and the wheel p^3 is secured to the other element Q′ of the transverse shaft, the two parts of the shaft being in alinement transversely. Upon the outer ends of the two-part shaft Q Q′ bevel-wheels q q' are secured. The front axle B supports the wheel-spindles R of the front ground-wheels. Each spindle has at the inner end a pivot-bearing r. Preferably the axle is forked, as at b, the pivot-bearing r being between the ends of the fork. Each spindle carries a crank-arm r', by which the spindles and wheels can be adjusted relative to the vehicle, as in steering, and the crank-arms of the two spindles can be actuated by devices at the driver's platform in any well-known or suitable way. On the axis of the pivot S, which joins the spindle to the axle, and preferably upon an upward extension of the pivot itself, is mounted a bevel-wheel S′, it being double or formed of two wheels s s', secured together. The upper part s meshes

with the aforesaid wheel q or the wheel q' on the transmitting-shafting. The lower part s' meshes with a bevel-wheel on the front ground-wheel S^2. The chain M, it will be seen, can drive the two front wheels, in whatever position they may be adjusted, with equal power, even though they be rotating with different peripheral speeds.

The front shafting Q Q′ is mounted in a framework consisting of a rectangular standard T, rising from and bolted to the axle, the legs of this frame carrying boxes for the transverse shafting and the rectangular opening therein being sufficient to permit the mounting of the compensating gearing P. The outer parts of the shafting at Q Q′ are supported in boxes T T′, which extend to points near the bevel-pinions q, and these boxes are held by uprights and braces t at their outer ends. The upright T is supplementally braced by braces t'.

The engine illustrated is indicated by U, it comprising two cylinders u, with its pistons and rods connected to the crank-shaft U′, having the gear-pinion u^2, which engages with the power-receiving wheel e and the above-described compensating gearing at E.

The steam is supplied by piping V from the boiler V′, which is preferably located upon the platform at the forward end, as shown in Fig. 1. V^2 is the water-tank, which may also be utilized as a seat for the driver.

The gear p is provided with a brake-surface p^4, upon which a brake mechanism of any approved construction may be arranged to "brake" the machine.

What I claim is—

1. The combination of the truck-frame, the steering-wheels, the pivoting devices connecting the steering-wheels with the truck-frame, the power-transmitting devices at the axis of the said pivoting devices for actuating the steering-wheels, and a motor situated between the front and rear wheels operating in lines transverse to the vehicle and connected with said power-transmitting devices, substantially as set forth.

2. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, a motor situated between said front and rear wheels and operating in planes transverse to the vehicle, power-transmitting devices extending longitudinally of the vehicle for transmitting power to said rear traction-wheels and to said front traction-wheels and power connections between the motor and said power-transmitting devices to actuate the same.

3. In a motor-vehicle the combination of rear traction-wheels, front traction-wheels, a differential or compensating power device rotating in planes transverse to the vehicle, a motor situated between the front and rear wheels, operating in planes transverse to the vehicle and connected with said differential power device, and power-transmitting devices extending longitudinally of the vehicle for transmitting power from said differential power device to said rear traction-wheels and to said front traction-wheels.

4. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, two friction-wheels, capable of different rotation, situated below the main frame of the vehicle, a motor for actuating said wheels, supplemental friction-wheels adapted to engage the first friction-wheels, and power-transmitting devices extending longitudinally of the vehicle for transmitting power from one of said supplemental wheels to the rear traction-wheels and from the other of said supplemental wheels to the front traction-wheels.

5. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, two friction-wheels capable of different rotation and turning in planes transverse to the vehicle, a motor for actuating said wheels, supplemental friction-wheels engaging said first friction-wheels and turning in planes longitudinal of the vehicle, and power-transmitting devices extending longitudinally of the vehicle from said supplemental wheels to said front and rear traction-wheels respectively.

6. The combination of the vehicle-frame, the two steering-wheels adjustable relative to the frame, the two ground-wheels fixed in relation to the frame, the compensating gear having its two elements stationary relative to the vehicle-frame, and having its two elements respectively connected to the steering-wheels, the second compensating gearing having its two elements respectively connected to the fixed ground-wheels, and the intermediate compensating gearing turning in planes transverse to the vehicle and having its two elements respectively connected to the driving parts of the aforesaid compensating gearing, substantially as set forth.

7. The combination of the axles, the two wheels on each axle, the truck-frame, the body-frame, the engine on the body-frame operating in planes transverse to the vehicle, the engine-gearing comprising a compensating gear having two driven elements turning in planes transverse to the vehicle, the power-transmitting devices interposed between the engine-gearing and the two front driving-wheels, and comprising a supplemental compensating gearing and the driving devices for the two rear wheels comprising a compensating gearing, substantially as set forth.

8. The combination of the axles, the two wheels on each axle, the truck-frame, the body-frame, the engine connected to the body-frame and having its main driving-shaft longitudinal of the vehicle, the compensating gearing actuated by the engine turning in planes transverse to the vehicle and supported from the body-frame, the independent power devices for the front ground-wheels, the compensating gearing between said power de-

vices, the two sets of driving devices for the rear ground-wheels, the compensating gearing between said devices, and two transmitting devices respectively connecting the first aforesaid compensating gear with the last two compensating gears, substantially as set forth.

9. The combination of the axles, the two driving-wheels on each axle, the truck-frame, the body-frame, the engine on the body-frame, the compensating gearing driven by the engine two friction-wheels driven by the compensating gearing, two sets of driving devices, one for each front wheel, the compensating gearing interposed between said driving devices, friction-driven power-transmitting devices connecting one of the aforesaid friction-wheels to the said compensating gearing two sets of driving devices for the rear ground-wheels, a compensating gear interposed between them, friction-driven power-transmitting devices connecting the last said gearing with the second aforesaid friction-wheel, substantially as set forth.

10. The combination of the truck-frame, the front pair of ground-wheels, the rear pair of ground-wheels, the engine or motor, the compensating gearing driven by the engine and mounted on a shaft longitudinal of the vehicle, the friction-wheels driven by the compensating gearing, the friction-pulleys on shafts transverse to the vehicles, and power-transmitting devices connecting one of the said transverse shafts with both of the front ground-wheels, and transmitting devices connecting the other transverse shaft with both of the rear ground-wheels, substantially as set forth.

11. The combination of the truck-frame, the two shafts mounted thereon, the pair of ground-wheels mounted in fixed positions relative to the truck-frame, a pair of ground-wheels adjustable on the truck-frame for steering, the two sets of compensating gears, one connected to the two fixed wheels and one connected to the two adjustable wheels, the intermediate compensating gearing, comprising transverse friction-wheels and longitudinally-turning friction-wheels, I, power devices for actuating the intermediate gearing, and two trains of power-transmitting devices, one connecting each of the aforesaid sets of compensating gears with the intermediate compensating gearing, substantially as set forth.

12. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, a differential or compensating power device rotating in planes transverse to the vehicle and situated between said front and rear wheels, a motor for actuating said differential power device, longitudinally-turning chain-wheels, H, H′, operated by the separate power elements of said differential power device respectively, and longitudinally-extending chains, M′, M, for driving said rear and front traction-wheels.

13. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, a differential or compensating power device rotating in planes transverse to the vehicle, situated between said front and rear wheels and having friction wheels or surfaces, e^4, e^5, friction-wheels, I, turning in longitudinal planes, chain-wheels, H, H′, shafts, G, G′, connecting the wheels, I, with the chain-wheels, and longitudinally-extending chains, M′, M, for actuating the rear and front traction-wheels respectively.

14. In a motor-vehicle, the combination of the vehicle-frame, bearings g pivotally supported thereby, shafts supported in said bearings, movable bearings carrying the other ends of said shafts, means for moving the latter bearings, a compensating gearing between said shafts, having driving-wheels, driven wheels on said shafts, front and rear traction-wheels driven from said shafts, and means for actuating the compensating gearing.

15. In a motor-vehicle, the combination of the vehicle-frame, the traction-wheels, a compensating gearing comprising pinions and driving elements or wheels at the sides of said pinions, said pinions and wheels having intermeshing gear-teeth and also having curved surfaces engaging by a smooth rolling contact limiting the depth of engagement of said teeth, a motor for actuating said gearing, and means for driving the traction-wheels from said gearing.

16. In a motor-vehicle, the combination of the vehicle-frame, straps F^3, F^4, supported thereby, a compensating gearing, having a shaft supported in the inner parts of said straps, bearings supported in the outer parts of said straps, shafts at the sides of the compensating gearing driven thereby, and having journals in said bearings, traction-wheels driven from said shafts, and means for actuating the compensating gearing.

17. In a motor-vehicle, the combination of front steering and traction wheels independently mounted by vertical pivots, gear-wheels on said traction-wheels, double-faced pinions, S′, mounted in vertical line with said pivots, the lower face of said pinions engaging the gear-wheels of the traction-wheels, and means for engaging and driving said pinions on their upper faces, said pivots being extended and forming journals for said pinions.

18. In a motor-vehicle, the combination of a steering truck-frame, a transverse axle carrying the same, steering and traction wheels mounted on vertical pivots at the ends of said axle, transverse frame-bars forming a part of the truck-frame, an upwardly-extending frame carried by said axle, a transverse driving-shaft on said upwardly-extending frame, means whereby said traction-wheels are driven from said shaft, and braces extending from the upwardly-extending frame to said transverse frame-bars.

19. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, a

compensating gearing, E, a motor for driving the same, shafts, G, G′, means by which said shafts are driven frictionally from said gearing, oscillatory boxes, *g*, forming bearings for said shafts, bearings, *g′*, also supporting said shafts, a lever, L, means for operating the same, and connections between said lever and said bearings, *g′*.

20. In a motor-vehicle, the combination of rear traction-wheels, front traction-wheels, a compensating gearing operating in planes transverse to the vehicle and between said front and rear wheels, friction wheels or surfaces carried by the driving elements of said gearing, transverse shafts movable toward and from said friction-surfaces, supplemental friction-wheels longitudinally movable on said shafts and turning in planes longitudinal of the vehicle, means for moving said shafts toward and from said gearing to engage and disengage the supplemental wheels, and means for moving the latter wheels longitudinally on their shafts, substantially as set forth.

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

EDGAR A. WRIGHT.

Witnesses:

W. R. BAXTER,

PRIMUS PHILIPPI.