(No Model.) 3 Sheets—Sheet 1.

# C. KOENIG.

## TRICYCLE.

No. 487,753. Patented Dec. 13, 1892.

*Fig. 1.*

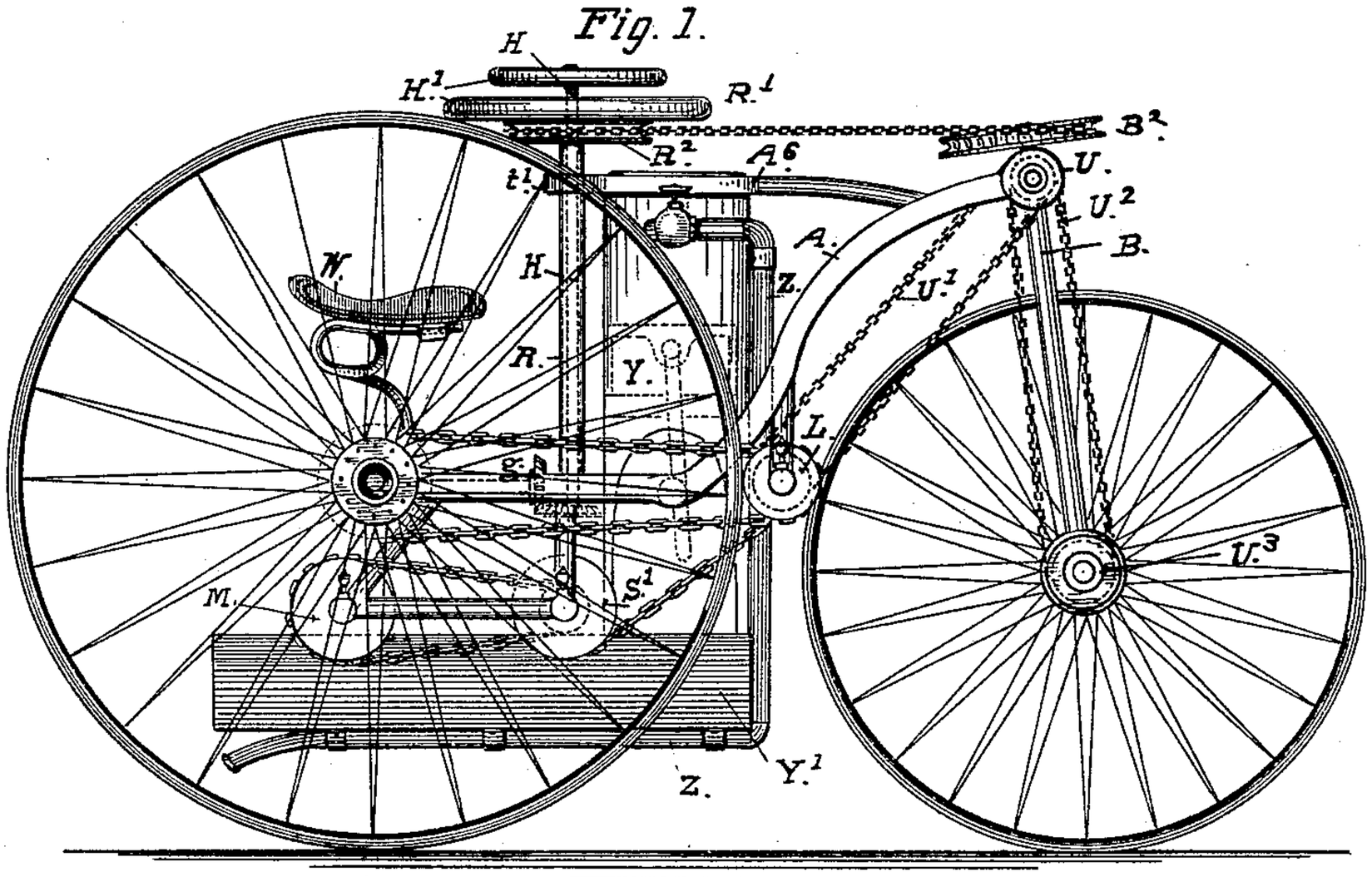


*Fig. 2.*

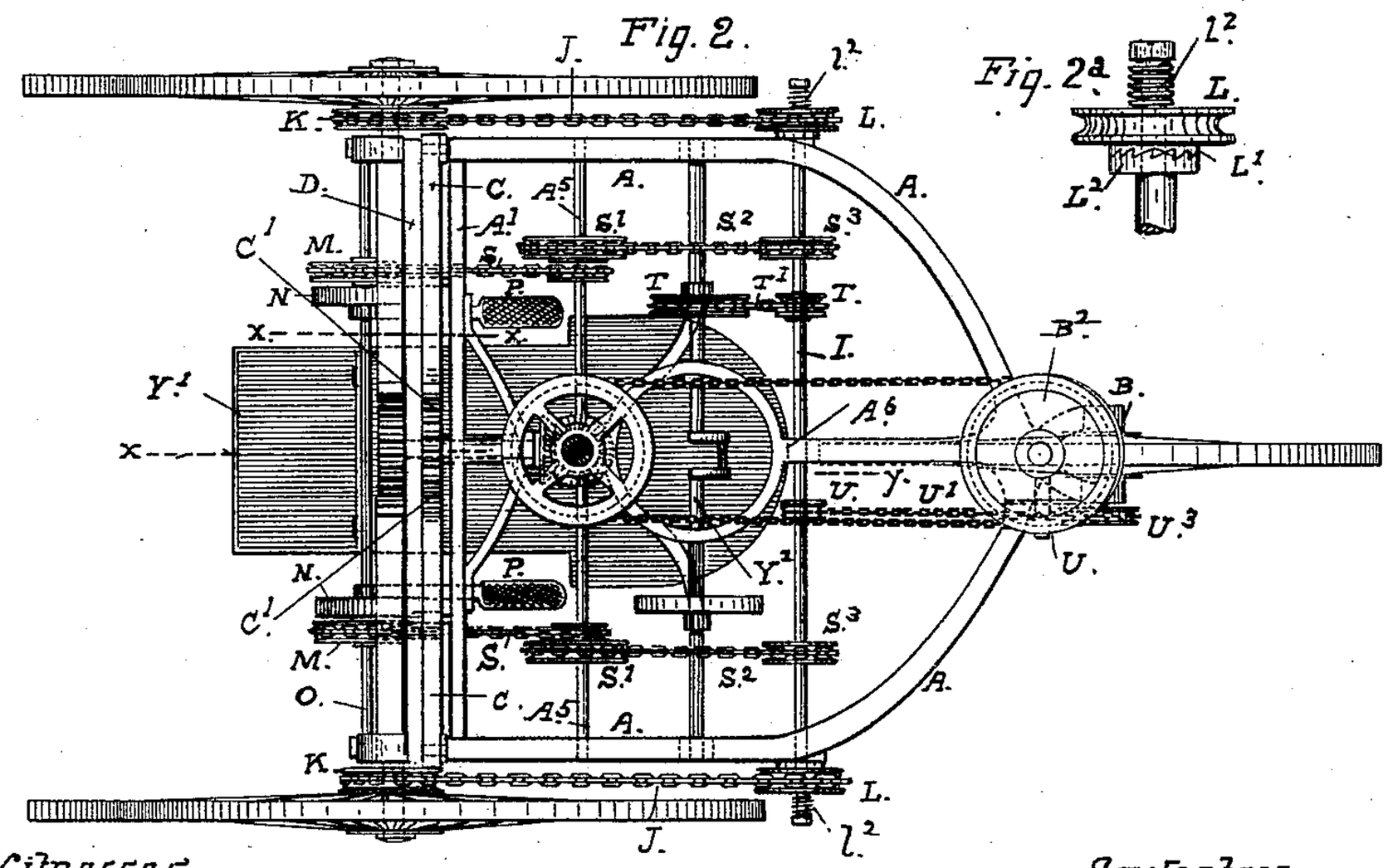


*Fig. 2a.*




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By Dewitt & Dorn Attys.

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## TRICYCLE.

No. 487,753. Patented Dec. 13, 1892.

Fig. 3.

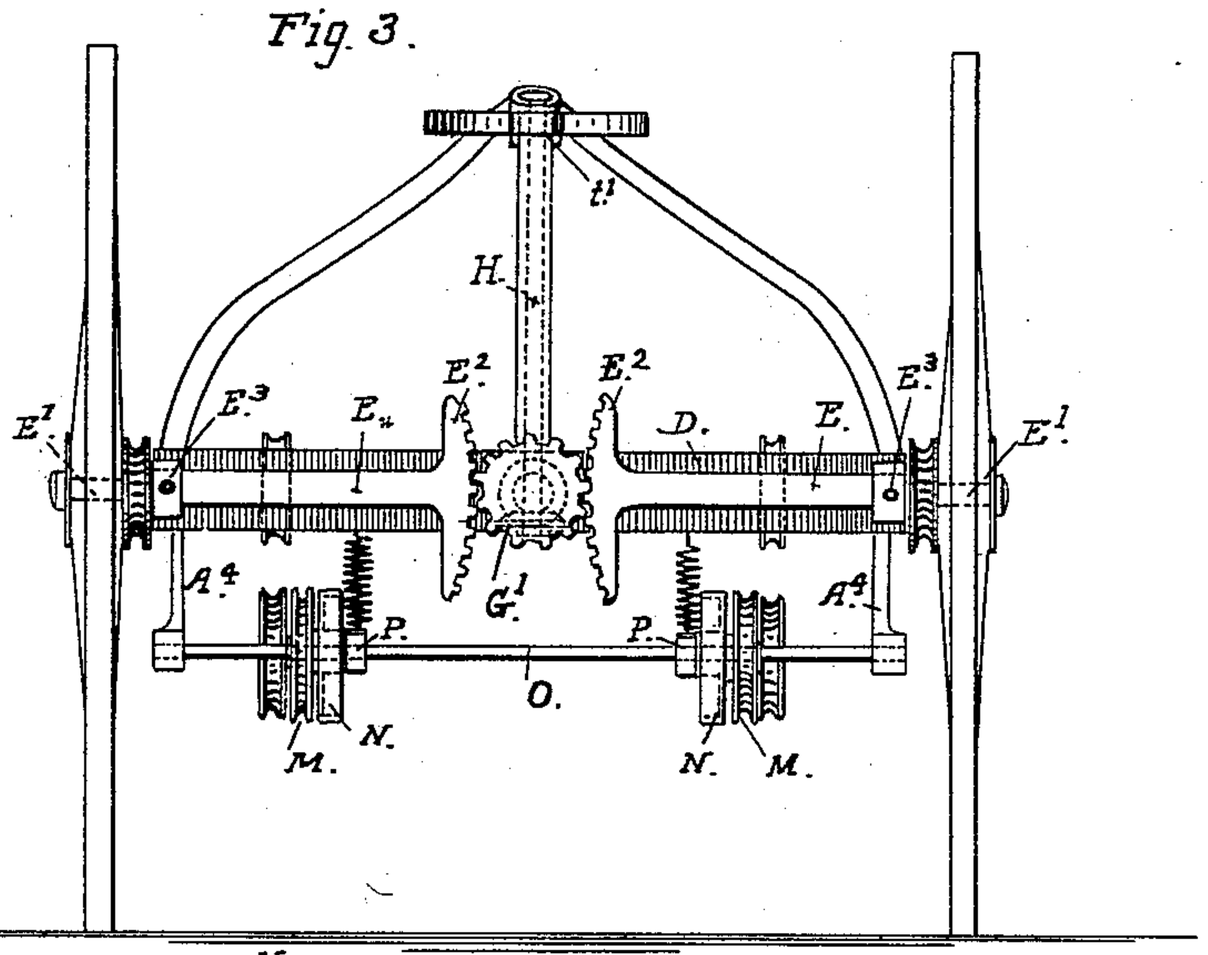
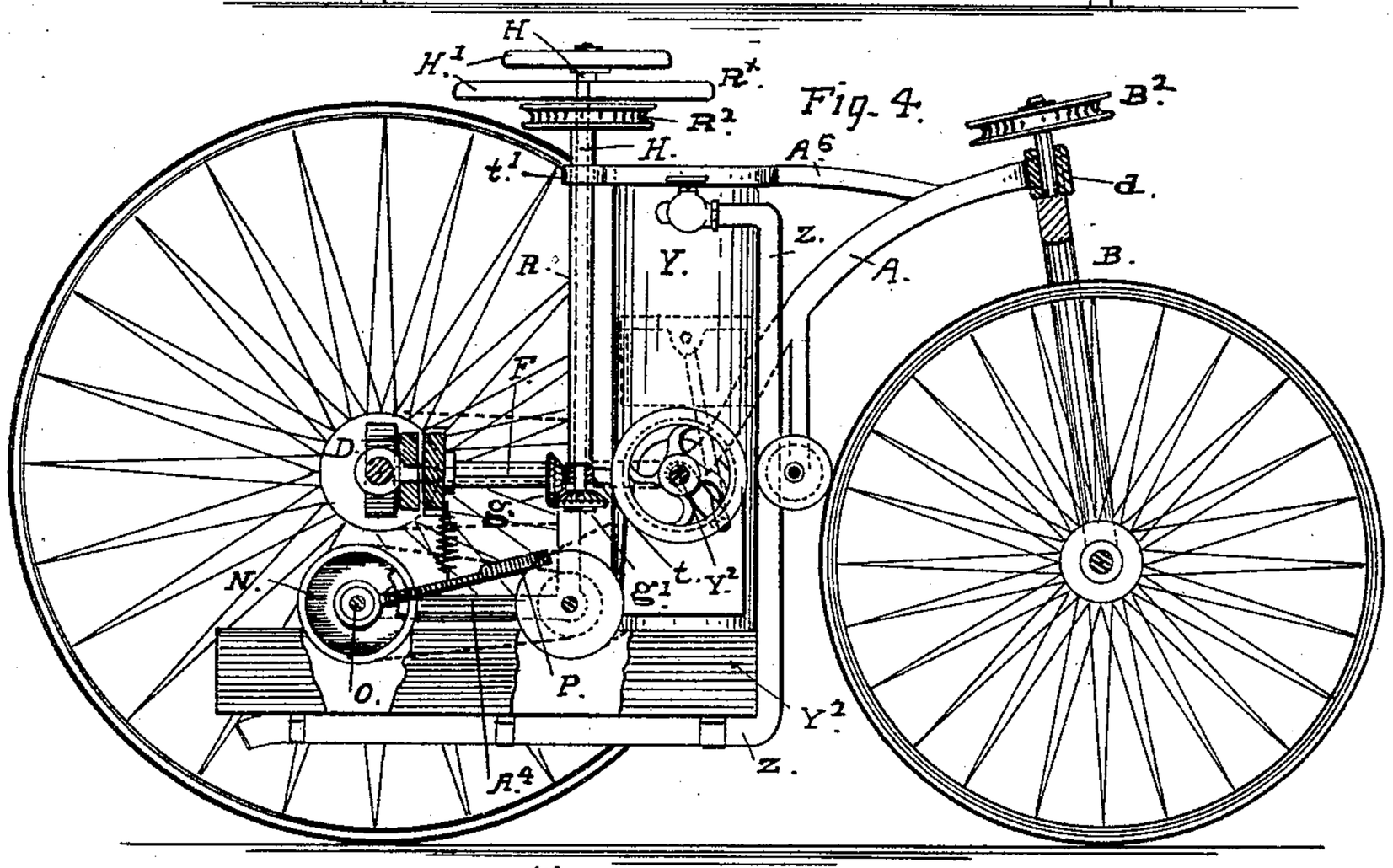



Fig. 4.



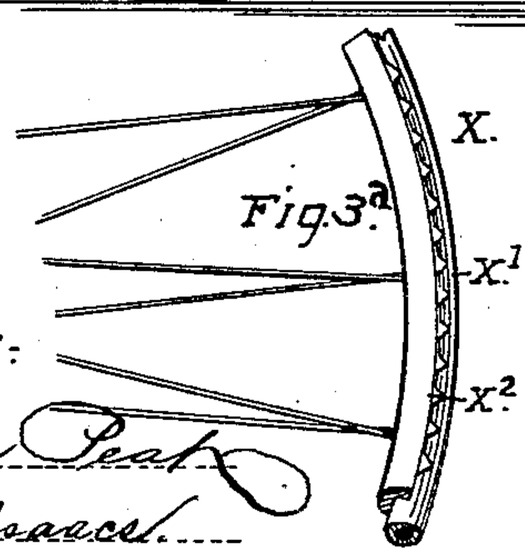




Fig. 3ª.

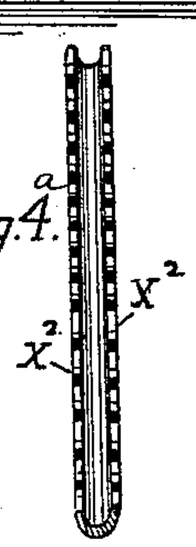



Fig. 4ª.

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# C. KOENIG.

## TRICYCLE.

No. 487,753. Patented Dec. 13, 1892.

Fig. 5.

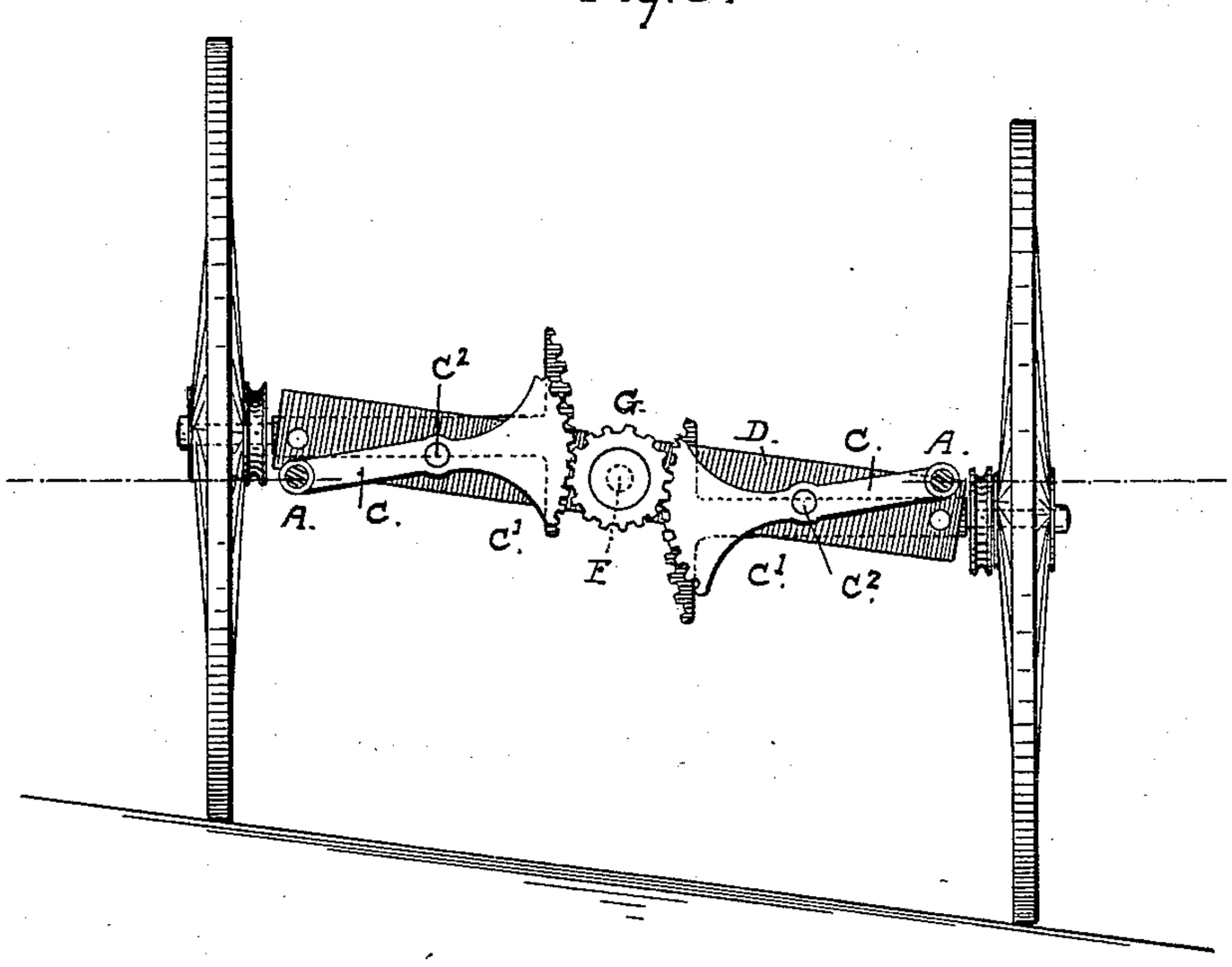
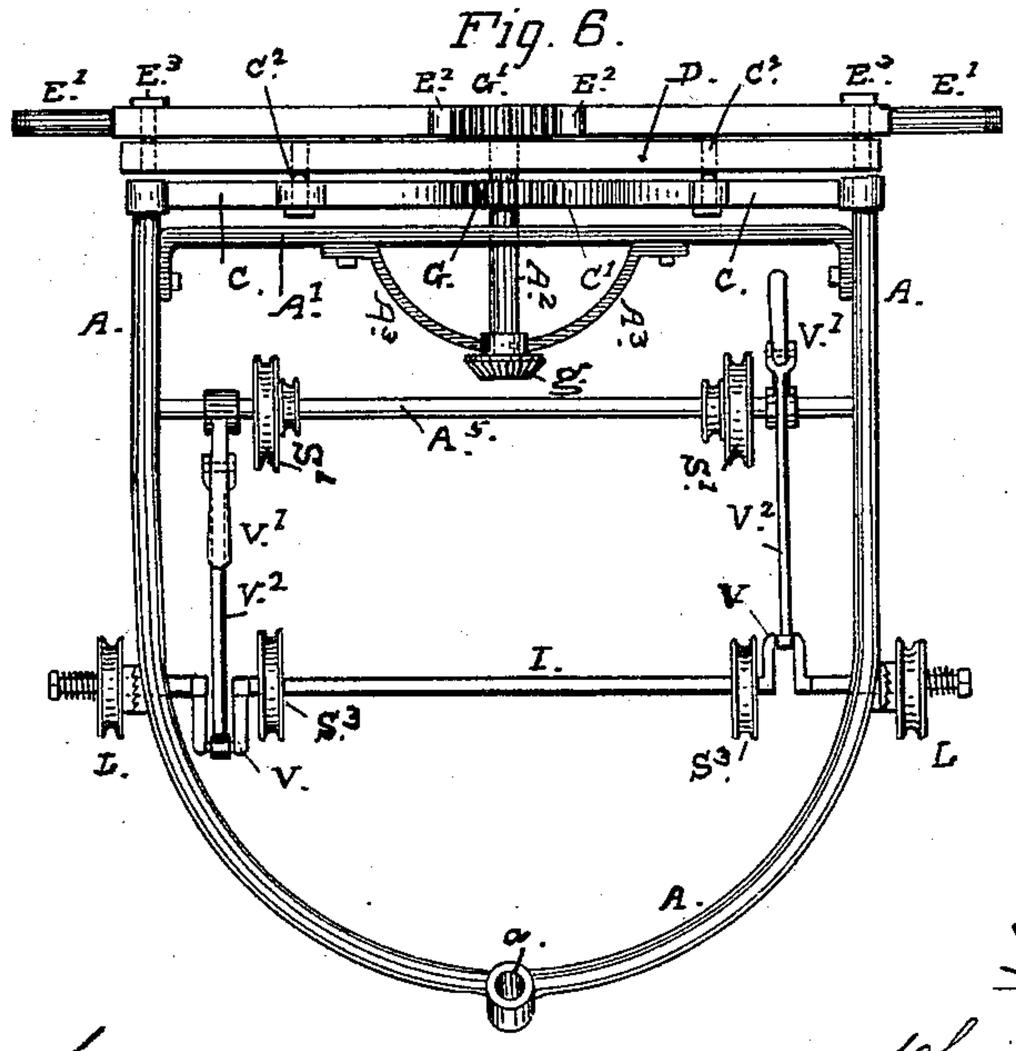



Fig. 6.




Witnesses:
John Peak.
L. B. Isaacs.

Inventor:
Christian Koenig.
By Smith & Brown
his Attys.

# UNITED STATES PATENT OFFICE.

CHRISTIAN KOENIG, OF STOCKTON, CALIFORNIA.

## TRICYCLE.

SPECIFICATION forming part of Letters Patent No. 487,753, dated December 13, 1892.

Application filed March 18, 1892. Serial No. 425,394. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTIAN KOENIG, a subject of the Emperor of Germany, residing in the city of Stockton, county of San Joaquin, and State of California, have invented an Improved Tricycle, of which the following is a specification.

My invention has for its object the production of an improved tricycle or three-wheel vehicle for long-distance traveling for the use of tourists, surveyors, prospectors, and explorers; and to such end it consists in the described construction and combination of parts and mechanism producing a vehicle to be worked by the rider himself, and having, also, means of working or propelling it by power as an adjunct to the foot or hand power to be brought into service at rough or difficult parts of the road and at heavy grades. There is included, also, as a part of the improvement a novel construction of running-gear and frame by which the axles are adjustable in vertical arcs and the frame and its load are kept in a substantially-horizontal position on slanting or sloping roads, side hills, and other similar grades.

I proceed to carry out my invention and produce my improved tricycle in accordance with the following description and the accompanying drawings, which form part of this specification.

In the said drawings, Figure 1 is a side elevation of my improved tricycle constructed and arranged to be worked by the feet of the rider or else by power supplied by a small upright engine that is mounted on the frame. Fig. 2 is a top view, with the engine and the rider's seat removed to expose to view parts that otherwise would be covered. Fig. $2^a$ is a detail view, on an enlarged scale, of one of the chain-wheels or sprocket-wheels on the driving-shaft. Fig. 3 is a rear elevation of the frame and hind wheels, showing parts of the adjusting-gear. Fig. 4 is a longitudinal section taken through the axles and adjacent parts at the line $x\,x$ and through the shafts and parts of the foot-power below the axle at the line $x\,y$ in Fig. 2. Fig. $3^a$ is a side view, on an enlarged scale, of a segment of the front wheel; and Fig. $4^a$ is a front view of the wheel-rim with the rubber tire removed. Fig. 5 is a front view of the hind wheels and the adjusting mechanism of the frame, showing the position of the parts when the wheels are running on a slanting road or on a side hill. Fig. 6 is a side view of the frame and the adjusting-gear of the frame and axles.

A is a light and strong frame consisting of two side bars curved inwardly and upwardly at the front and joined together at a socket $a$, in which the yoke B for the steering-wheel is swiveled. The side bars are joined together at the back by a cross-brace A′ and at the ends they are attached to two pivoted arms or levers C C, carrying on the inner ends toothed segment C′ C′. The ends of the side bars are secured to the outer ends of these levers and the centers $C^2$, on which the levers are set to swing in vertical arcs, are fixed in a bolster or back board D of the same breadth as the frame. On the back or rear face of this board are two arms or levers E E, having axles E′ on their outer ends and toothed segments $E^2$ on their inner ends, the pivots $E^3$, on which these last-mentioned levers are mounted for movement in in vertical arcs, being fixed in the board D near the outer ends. A shaft F, carrying two spur-wheels, is set in the middle of the board in position to bring the gears between the toothed segments of the levers, and a bevel-gear fixed on the inner end of this shaft connects it with an upright shaft H, having on top a hand-wheel H′ for turning it. One of the gears G sets between the toothed segments on the front of the board D and the other one G′ is placed on the back of the board to engage with the segments of the arms. A long tubular bearing $A^2$ is fixed in position by braces $A^3$ at the back of the frame to afford a steady bearing for the shaft F. As thus constructed the levers C C and E E are set at different inclinations of equal degrees—those of one set on the right of the center in the opposite direction to those on the left of the center—by turning the hand-wheel H′, and the result of such adjustment is to throw the hind wheels to the perpendicular when from the slant of the road they otherwise would stand at an angle. At the same time, also, the frame is brought into horizontal position and stands level whatever the slant of the road may be

Power is applied to both hind wheels from

a main driving-shaft I by endless chains J and sprocket wheels or pulleys L L on the outer ends of the shaft. Bearings are provided on the side bars of the frame for the shaft I, and the pulleys are connected to the shaft by spring-clutches L′ L², one part being fixed on the shaft and the other part of the clutch being formed on the pulley. A coil-spring $l^2$, bearing against the pulley, holds the parts of the clutch together and allows the pulley to slip when the wheels vary in their movements, as in turning curves.

Friction-clutches N N are connected to pulleys M M, and foot-levers P P are arranged under the frame in position to be reached and worked by the rider from the seat W. The shaft O is fixed in hanging brackets A⁴ on the frame and does not rotate; but the disks of the clutches and the pulleys which they operate are set to run loosely on the shaft. The foot-levers are provided with pedals on the front ends and are attached to the shaft O by a hub or collar on the rear end of each lever. The friction-dog or gripping-piece of the clutch is carried by the lever and is set to bite the flange of the disk on the downstroke of the lever, but to slip on the upstroke. A coil-spring $p^{\times}$ is attached to the lever and to the frame above to bring up the lever after each downstroke. Any form of clutch which converts the vibrations or reciprocations of a lever into rotating movement of a wheel or pulley can be employed for the foot-power in this machine, or a simple pawl and ratchet-wheel can be used, if desired; but the friction-clutch is preferred by me as the best for the purpose. I claim no novelty in the construction of this clutch in itself, as it is a well-known device for converting motion.

The pedals are set to work alternately in contrary directions, and the motion is transmitted from the pulleys M M by chain belts and pulleys to the main driving-shaft. The chains S S run to the pulleys S′ S′, and from these pulleys chain belts run to pulleys S³ S³ on the driving-shaft. The pulleys S′ are double pulleys, and the shaft A⁵ on which they set loosely is fixed in the frame. Directly over this cross-bar or fixed shaft is mounted an upright shaft R in bearings at top and bottom, the lower bearing *t* being carried by the fixed shaft A⁵ and the top bearing *t′* being formed on the top frame A⁶, which surrounds the upper end of the engine-cylinder, as seen in Figs. 1, 2, and 4. The shaft R is hollow and the shaft H of the tilting gear sets through it, so that the two hand-wheels R′ and H′—one on the hollow shaft and the other on the inner shaft—are brought into close relation and are easily reached and operated at the same moment of time, if necessary. A sprocket-pulley R² on the hollow shaft is connected by a chain belt with a pulley B² on the yoke of the steering-wheel, while the inner shaft is connected by bevel-gears *g* and *g′* with the shaft F of the tilting gear. In this construction sufficient space is afforded between the steering-shaft R and the main shaft I to allow a small engine Y to be mounted and connected to the main shaft for the purpose of furnishing power to propel the vehicle at times or in situations where it may be desired to relieve the rider. A small gas or gasoline engine can be thus mounted and arranged for operation to advantage, particularly as such type of engine does not require a considerable quantity of fuel to be carried and can be supplied from a tank and carbureting apparatus Y′, which is suspended under the frame and carried without difficulty. My construction affords ample room for a motor of this character, and when the same is properly set and connected to work the main shaft it will assist the rider without inconvenience or annoyance, even though it is necessarily quite close to the rider. I do not propose, however, to confine my construction to the combination of this particular type or character of motor, because other styles of engines—such as electric motors worked by storage-batteries, for example—could be mounted in the same position to work the main shaft; but I believe the gasoline-motor offers many advantages over other known styles or kinds of engines by reason of its simplicity, the ease and safety with which it is handled, and the cheapness and abundance of the motive agent in nearly all places and localities throughout the country.

The engine shown in the drawings is of the upright single-acting kind with a crank-shaft Y², to which the main shaft is coupled either by sprocket-pulleys and chain belt T T′, as shown, or by spur-gears.

The exhaust-pipe Z is carried from the cylinder downward to the bottom of the frame and turned behind to discharge backward or quite close to the ground, and in addition to these there are provided the necessary supply-valve and governor with air and gas supply-pipes. These parts are not illustrated in the drawings, as the construction of the motor forms no part of my invention, and the same is too well known to require special description. Any person familiar with the setting up and running of these engines can arrange the same for operating the main shaft without further description.

The connecting-gears or the sprocket-wheels that couple the main shaft to the crank-shaft of the engine should have a clutch of some kind by which to connect and disconnect the engine at will. This clutch is not shown in the drawings.

When this vehicle is not provided with an auxiliary motive power and is designed to be worked by hand, I construct the frame, as shown in Fig. 6, without the crank-shaft; but I attach hand-levers to cranks on the main shaft for the purpose of working the vehicle by hand-power and foot-power together. The cranks *v v* are placed in the main shaft at convenient points for attaching the hand-levers *v′ v′*, and those parts are centered on the

fixed shaft $A^5$, on which they are fitted to work forward and backward smoothly, and are connected to the cranks by rods $v^2$ with forked ends to take the levers $v'$. In this construction the main shaft is rotated by the combined power applied by the rider to the foot-levers and hand-levers.

The seat W for the rider is mounted on the back board D of the running-gear and the levers are arranged on either side of the center, to be easily worked by the rider.

Figs. $3^a$ and $4^a$ illustrate a construction of wheel-felly which is specially useful in vehicles of this kind upon slippery roads or on heavy grades to give greater traction. It is applicable to all styles of wheels having removable elastic tires. The rim X of the wheel is grooved all around to take the tire X', and the edge of the felly on each side of the tire is serrated or notched or is provided with sharp points $X^2$, set at short intervals apart all around the wheel. The tire stands out beyond these teeth or projections when it is in place in the groove, and they do not take hold on the ground when the tire is in the rim. By removing this tire, however, the wheel will run directly on the notched or toothed edge of the felly. Power is applied to this front wheel from the main shaft I by means of pulleys U and chain belts $U' U^2$. A double pulley U is set on the side of the steering-wheel yoke on the outside of the yoke, and a pulley $U^3$ on the axle of the wheel takes the chain from the pulley above.

It should be mentioned that I construct my tricycle with seats for two persons, in which case the single saddle in the middle of the bolster is replaced by two saddles set at proper distance apart on opposite sides of the center line of the machine. A set of pedal-levers and friction-clutches is also arranged on the shaft O for each seat, so that the two riders can work together and propel the machine.

From the foregoing description any person skilled in constructing and operating vehicles of this class can make and carry out my said improvements.

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

1. The combination of the frame A, bolster D, pivoted levers C C, having toothed segments, the pivoted levers E E, having axles E' E' on the outer ends and toothed segments on the inner ends, the spur-gears G G', shaft F, upright shaft H, having a hand-wheel, and the gears $g$ $g'$, constructed to operate as set forth,

2. The combination of the frame A, bolster D, carrying the hind wheels, the yoke B at the front, having the steering-wheel mounted in it, the main driving-shaft I, driving-pulleys L L, connected to the said shaft by clutches, driving-chains J J, pulleys K K, shaft O, friction-clutches N N, pedal-levers P, by which said clutches are operated to obtain rotary motion, pulleys M M, constructed with said clutches, and intermediate chain belts and pulleys arranged to transmit motion from the pulleys M M to the driving-shaft, substantially as described.

3. The combination of the frame A, bolster D, carrying the hind wheels, the yoke B at the front of the frame and the steering-wheel mounted in it, the main driving-shaft with pulleys L L, slip-clutches L' $L^2$, connecting said pulleys with the shaft, drive-chains J J, pulleys K K, the shaft O, clutches N N, pedal-levers P P, pulleys M M, and chain and pulleys transmitting motion from the pulleys M M to the main driving-shaft, said shaft having a crank for connecting it with an engine or motor on the frame, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

CHRISTIAN KOENIG. [L. S.]

Witnesses:
EDWARD E. OSBORN,
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