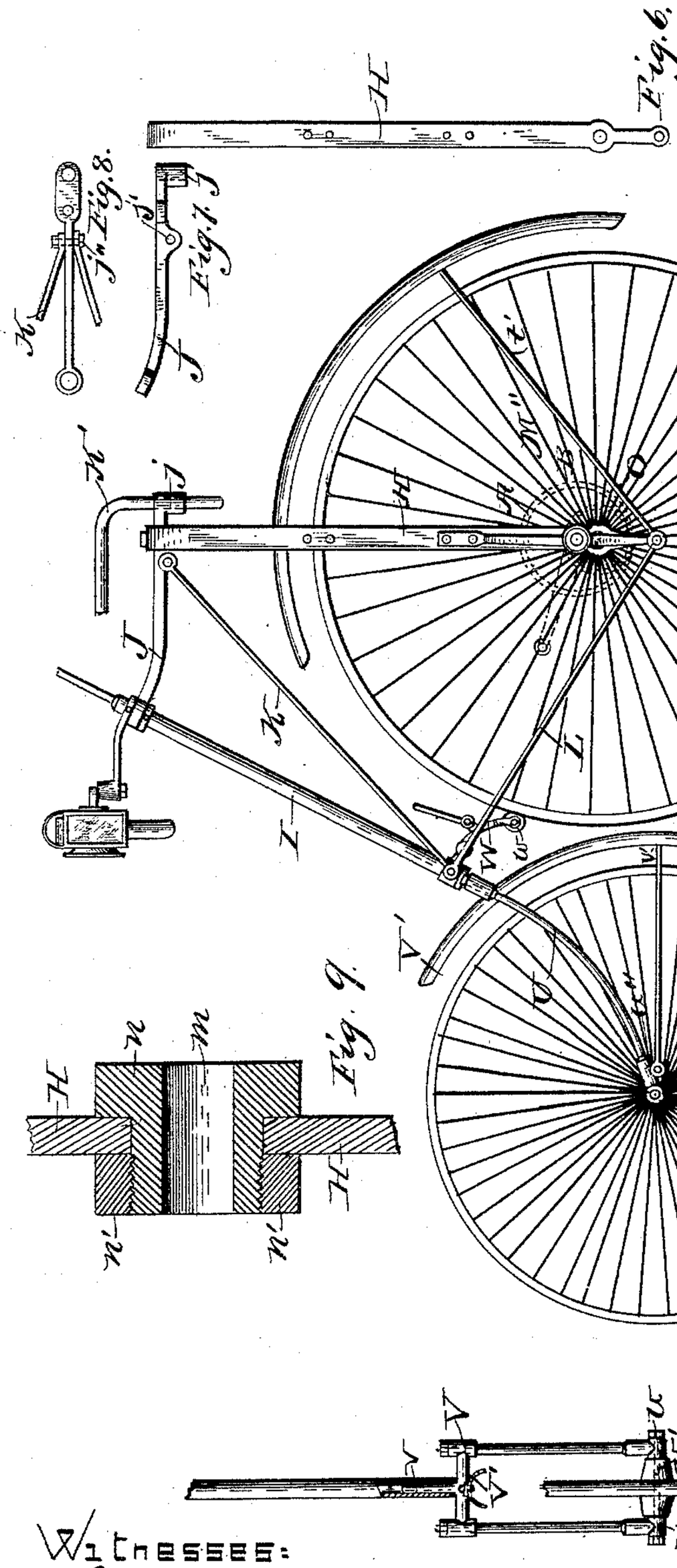
(No Model.) 3 Sheets—Sheet 1.

C. W. SALADEE.

VELOCIPEDE.

No. 486,055. Patented Nov. 8, 1892.



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(No Model.) 3 Sheets—Sheet 2.

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VELOCIPEDE.

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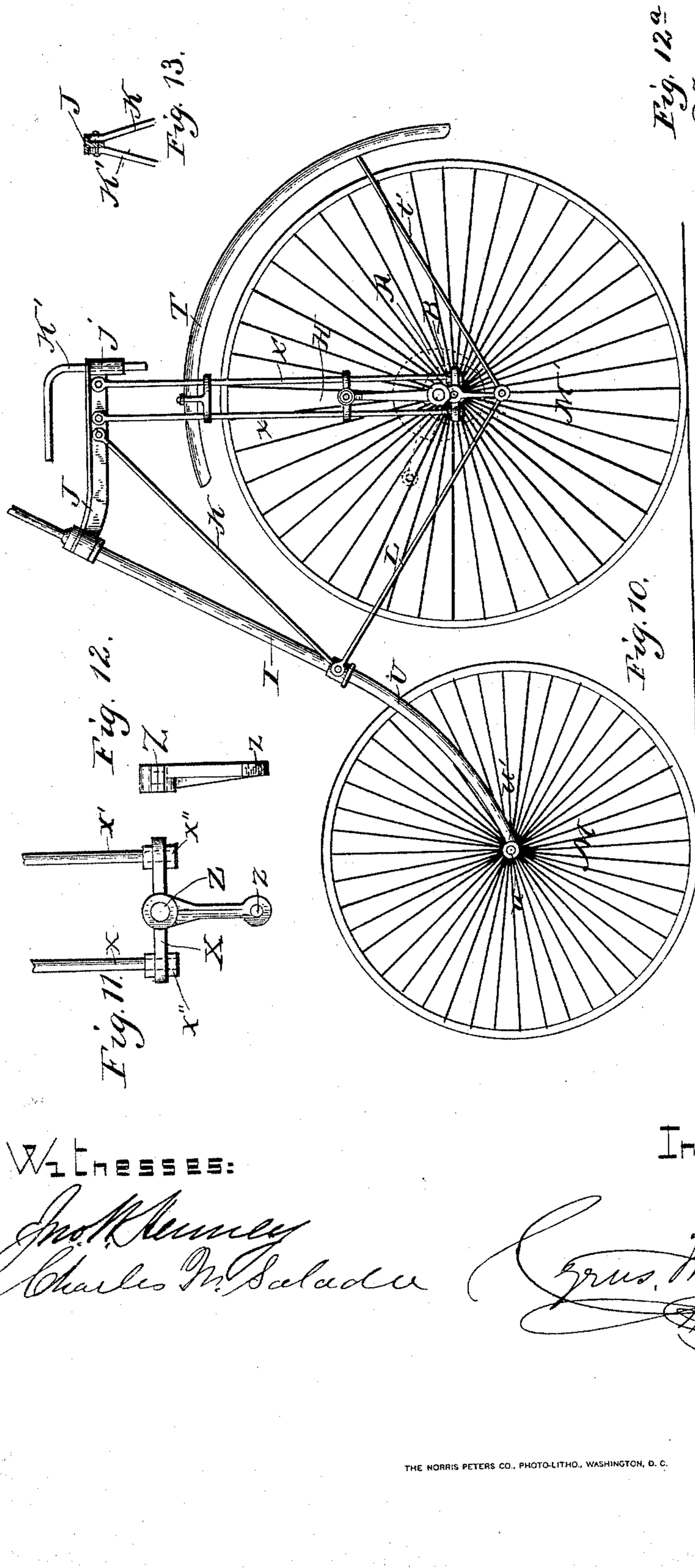

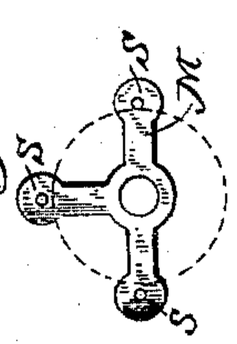

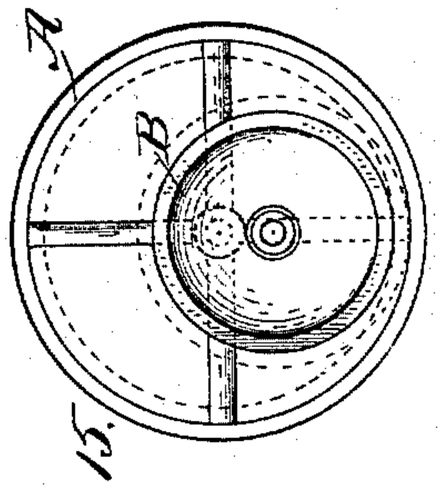

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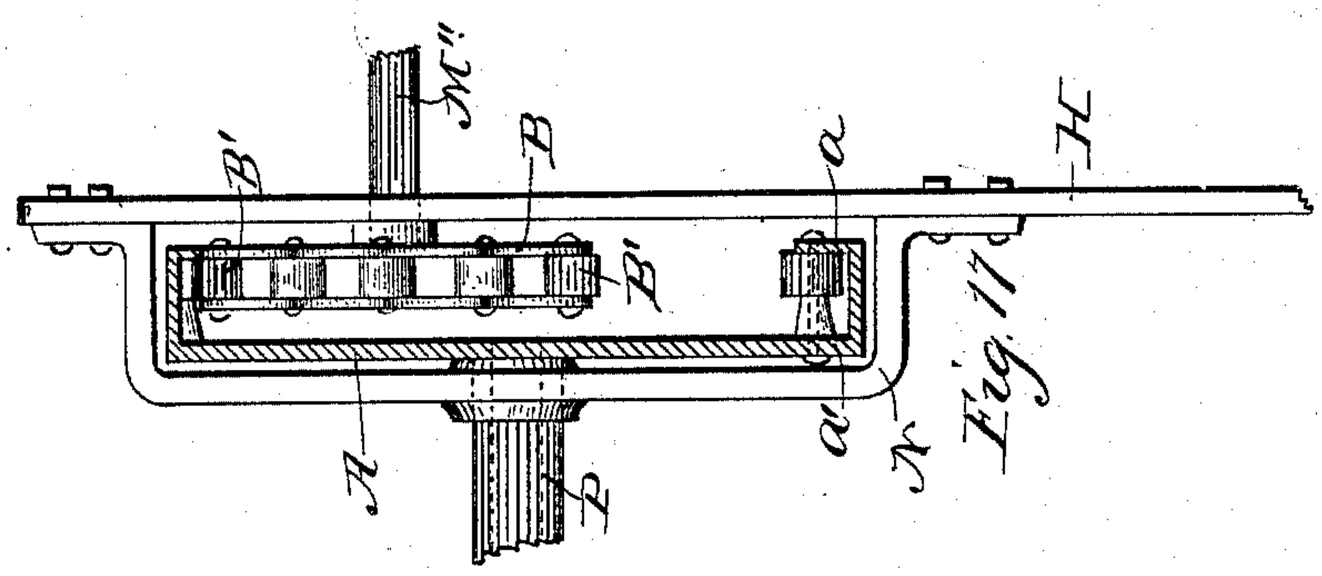
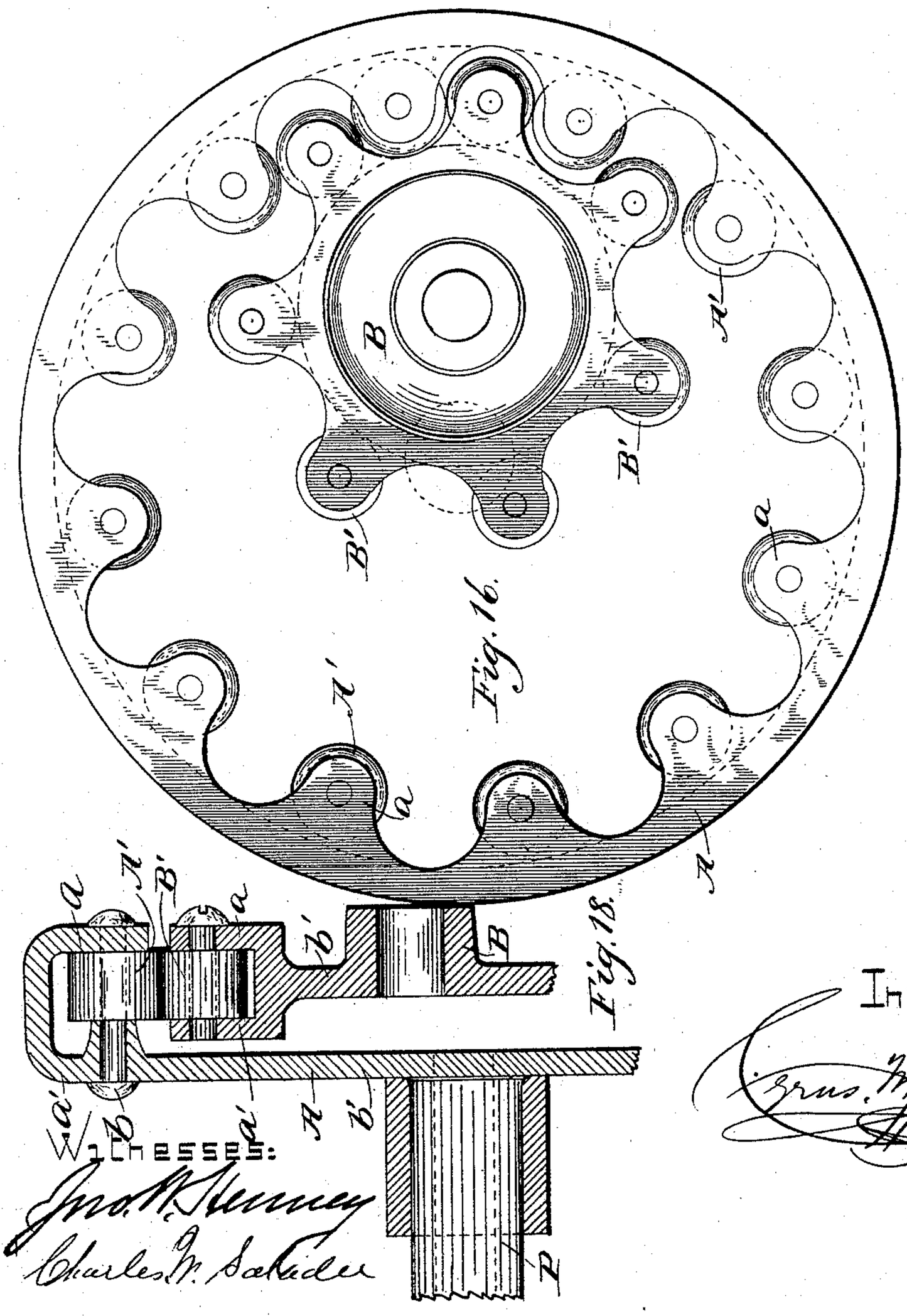
(No Model.) 3 Sheets—Sheet 3.

C. W. SALADEE.

VELOCIPEDE.

No. 486,055. Patented Nov. 8, 1892.





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UNITED STATES PATENT OFFICE.

CYRUS W. SALADEE, OF CLEVELAND, OHIO, ASSIGNOR TO WILLIAM N. WOODRUFF, OF HARTFORD, CONNECTICUT.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 486,055, dated November 8, 1892.

Application filed October 10, 1891. Serial No. 408,297. (No model.)

To all whom it may concern:

Be it known that I, CYRUS W. SALADEE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Cycle-Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in cycle-vehicles, particularly of the class known as "safety-bicycles;" and the objects are, first, to lighten, simplify, and improve the general construction of the frame of the machine, and second, to provide an improved propelling mechanism adapted to transmit increased motion to the driving-wheel and to diminish the friction and wear on the contacting parts.

With these ends in view the invention consists in the novel combination of devices and peculiar construction and arrangement of parts, which will be hereinafter fully described, and pointed out in the claims.

The accompanying drawings fully illustrate my invention, in which—

Figure 1 is a side elevation of a bicycle constructed on the general plan of my invention. Fig. 2 is a rear elevation of a part of the machine shown in Fig. 1. Fig. 3 is a detail view, in front elevation, of the front wheel and the steering-fork associated therewith. Fig. 4 is a detail view, in plan, showing the bearing for connecting the front ends of two of the inclined braces or bars of the frame to the steering-post. Fig. 5 is an edge view, in rear elevation, of the bracket and a part of the vertical frame or fork for supporting the axle or shaft of the driving-wheel. Fig. 6 is a detached view of the vertical fork or standard in side elevation. Fig. 7 is a detached view, in side elevation, of the backbone which connects the standard or vertical fork and the upright inclined steering-post. Fig. 8 is a plan view of the backbone shown in Fig. 7, showing a portion of the braces between the backbone and the steering head or post. Fig. 9 is an enlarged detail view, in transverse section, of one of the bearings for the axle or shaft of the rear driving gear-wheel. Fig. 10 is a side elevation of a bicycle constructed on the general plan of the machine shown Fig. 1, but varying in the detailed construction of its frame, particularly the vertical standard or fork. Fig. 11 is an enlarged detail view, in side elevation, of the axle-bearing employed with the construction of vertical fork shown by Fig. 10. Fig. 12 is a detached detail in side elevation of the bearing shown in Fig. 11; and Fig. 12[a] is another form of the bearing for the short stub axle or shaft carrying the crank, showing means for connecting the lower bars or braces of the frame. Fig. 13 is a detail view, in end elevation, of the modified form of backbone adopted with the form of fork shown in Fig. 10. Fig. 14 is a detail view, in top plan, of the steering-fork shown in Figs. 1 and 10. Fig. 15 is a view in side elevation of the preferred form of propelling mechanism employed in my safety-machine. Fig. 16 is a side elevation, on an enlarged scale, of the propelling mechanism shown in Fig. 15. Fig. 17 is a view, partly in cross-section, of the devices shown in Fig. 16, also illustrating a part of the vertical fork or standard, the shafts or axles of the power and driving gears, and the bracket for supporting the shaft of the power-gear. Fig. 18 is a detached view, on an enlarged scale, of part of the power-wheel and driving-gear of the propelling mechanism.

Like letters of reference denote corresponding parts in all the figures of the drawings.

As the propelling mechanism is one of the most important parts of my improved cycle-vehicle, I will first proceed to describe the same and follow it with a description of the preferred form of frame or general construction of the machine, having special reference to that form of cycle-vehicle popularly known as the "safety-bicycle."

To secure safety by preventing the rider from being thrown over the head of the machine, a low wheel is requisite, and to make the machine of this class keep pace with the high-wheel machines having a direct crank-motion a propelling mechanism must be employed to transmit increased motion to the driving-wheel, and thus secure increased speed. A sprocket-wheel, chain, and pinion have heretofore been the usual means employed in the low wheel to secure such de-

sired increased speed; but while attaining the prime object sought after the common form of propelling mechanism is open to the objection of great loss in power applied to the propulsion of the vehicle. To remedy this defect, I propose in my preferred form of propelling mechanism to discard the chain mechanism and employ propelling mechanism which acts directly on the shaft of the rear driving-wheel.

My preferred form of propelling mechanism is shown in Figs. 1, 10, 15, 16, 17, and 18, and it consists, essentially, of the power or master gear-wheel A and the driving-pinion B, together with the necessary supports therefor. The power or master gear-wheel is preferably of the form known as an "inverted" gear—that is to say, it has its cogs or bearings on the inside of the rim of the wheel instead of on the outside of the rim. In lieu of the usual rigid or stationary fork of cog-gearing I employ oscillating or rotating cogs A′, which are loosely mounted in the wheel A, so as to rotate or turn on their axes, and which operate to diminish the friction and wear on the parts in contact. The driving-pinion B is arranged within the periphery of the power-wheel A, and likewise provided with oscillating or rotating cogs B′, which mesh or engage with the cogs A′ on the interior of the power or master gear-wheel A, all as clearly shown in the drawings. To properly support the oscillating or rotating cogs in the wheels A B, I form the same with projecting flanges *a a′*, which are arranged in pairs and each pair spaced or arranged apart for a suitable distance to receive the roller or cog between themselves, a shaft or bolt *b* passing through the flanges and the cog to support the same loosely in the bearings thus provided. The periphery of each wheel A B is somewhat wider than the face of the ordinary sprocket-wheel or pinion, and in practice I may make the broad tread formed by the flanges and rim integral with a web or face-plate *b′*, as shown in Figs. 17 and 18. To the web of the power-gear A is rigidly secured a central shaft or axle P, adapted to carry a treadle-crank for the application of foot-power to rotate or propel the wheel. The driving-pinion B is "keyed" or otherwise rigidly secured on one end of the shaft or axle of the rear driving-wheel of the machine, and the two gears A B are mounted or supported in the frame of the bicycle in a manner which will be hereinafter fully described. The shaft or stub-axle P of the power-wheel A is necessarily out of alignment with the rear axle or shaft on which the driving-pinion B is mounted in the inverted or internal form of propelling-gear just described, and the propelling-gear in a vehicle of the bicycle variety is arranged on both sides of the vertical fork of the machine and the rear driving-wheel to secure an equal application of power by the two feet of the rider.

I attach importance to the use of the intermeshing power-wheel and driving-pinion, each having on its periphery rotating cogs or bearings arranged to contact with the other wheel and to apply power to a driving-wheel of a cycle-vehicle, as I have found by practical experiments that very good results are obtained by this combination of parts, among which increased power and speed are secured for the propulsion of the vehicle with greatly-reduced friction and wear of the working parts of the propelling mechanism.

I will now proceed to a detailed description of the frame and general construction of the machine, reference being had more particularly to Figs. 1 to 14, inclusive, of the drawings.

The frame in general consists of the vertical fork or standard H, the steering bar or head I, the backbone J, the upper vertically-inclined bars or braces K K′, and the lower inclined bars or braces L L′, which are arranged and joined substantially as indicated in Figs. 1 and 10 of the drawings.

As is usual in low-down or safety bicycles, the front steering-bar is inclined rearwardly from its lower end toward its upper end, and the steering-head carries the front steering-wheel M, while in the lower end of the vertical standard or fork H is journaled the shaft of the rear driving-wheel M′. This vertical standard or fork H may be constructed in either of two ways, the simpler of which is indicated in Figs. 1, 2, and 6, while the modified form of standard or fork for the better class of vehicles is shown in Figs. 10 and 11. In the simpler and cheaper form of bicycle I prefer to make the vertical fork or standard of one piece of flat or round bar metal, which is bent or doubled upon itself, as indicated more clearly in Fig. 2, to form two vertical legs or members joined by an arched top. Between the vertical legs or members of the vertical fork or standard is arranged the rear driving-wheel M′ of the machine, and near its lower end said fork or standard is provided with two aligned bearings *m m′* for the reception and support of the axle or shaft M″ of the rear driving-wheel. The form of the bearings *m m′* is shown in detail in Fig. 9 of the drawings, and it consists of the plain spool-bearing having an enlarged flange *n* at one end and an external screw-thread at its other end to receive a nut *n′*. The spool-bearing is pierced with a longitudinal passage for the reception of one end of the shaft M″.

In adjusting the bearing to the fork or standard H a hole is formed therein, after which the threaded end of the spool is slipped through the hole, so that the flange bears against the inner side of the fork or standard, and the nut is now screwed on the threaded outer end of the spool, so as to hold the bearings firmly in place. The ends of the rear shaft M″ of the driving-wheel M′ project or pass through and beyond the bearings *m m′* in the fork H, and on these protruding ends of said shaft are rigidly fastened the driving-pinions B of the propelling-gearing. In bi-

cycles of the safety class I provide brackets N N′ and bearings O O′ for the proper support of the short stub axles or shafts P P′ of the power-wheels A A, which are arranged to mesh with the driving-pinions B B of the rear axle M′. The brackets N N′ are applied to the outside of the members or legs of the vertical fork and suitably secured thereto in a rigid and firm manner, and between the brackets and the members of the fork are arranged the driving-pinions B B and the power-wheels A A, said brackets being provided with the bearings O O′ above the bearings *m m′* of the rear axle M′ for the support of the short stub axles or shafts of the power-wheels A A. These short stub axles or shafts are projected or extended through the bearings O O′, and on the outer ends thereof are secured the cranks Q Q′, which are detachably fastened in any suitable manner to said shafts or axles, each crank carrying a foot-pedal *q* of any approved construction.

The steering-head I may be, and preferably is, composed of an inclined tube, through which passes the spindle of the steering device; but I prefer to provide a jointed head or bearing R for connecting the braces K K′ and L L′ to the steering-head. This bearing R is shown in detail in Fig. 4 of the drawings, and the meeting ends of the braces are joined to the head or bearing by common trunnions *r*, which pass through the ends of the braces and into the bearing in a manner to secure a firm connection of the meeting ends of the two sets of braces to the steering-head and at the same time enable the steering-head to have sufficient movement around its axis to facilitate the turning of the steering-wheel, and consequently facilitate the steering or guiding of the machine, which is very desirable.

The backbone J of the frame is suitably joined at its front end to the upper end of the bearing for the steering-spindle, and the rear end of this backbone passes between the legs of the vertical fork or standard H, said backbone being rigidly united or secured to the upper end of the fork or standard (see Fig. 2) and terminating at its rear extremity in a vertical socket *j* for the reception and support of the saddle-post K′. The backbone is flattened or enlarged at its rear part where it is united or secured to the vertical fork and receives the saddle-post, as indicated in Fig. 8; but in Fig. 7 I show the backbone provided with a perforated ear or lug *j′* to receive the bolt *j″*, which passes through the upper ends of the vertically-inclined bars K K′ and the backbone to secure the parts together in a firm and rigid manner. The frame of the machine thus consists, essentially, of a substantially-vertical fork or standard rising from the axis of the rear driving-wheel, an inclined steering-head, a substantially-horizontal backbone, and two sets of inclined braces or bars united, respectively, to the backbone, the steering-head, and the vertical fork, the fork and braces forming nearly a triangle. This particular arrangement of parts may, however, be varied somewhat in the disposition of the fork or standard H, and in some instances I prefer to arrange the fork or standard in the vertically-inclined manner indicated by dotted lines in Fig. 1 of the drawings, the upper end of the standard being united to the upper end of the steering-head in any approved manner and the vertically-inclined braces or bars K K′ serving to support the backbone and the saddle. The lower end of the legs or members of the vertical fork or standard are extended or projected below the bearings *m m′* of the rear shaft M′ of the driving-wheel, as shown in Figs. 1, 2, and 5, and the lower ends of the brackets N N′ are likewise extended below the bearings O O′ of the short stub-axles for the pedal-cranks, and in said extended ends of the fork and brackets are secured the rear ends of the lower braces L L′ by transverse bolts or other suitable fastenings. I may, however, dispense with the extensions below the bearings *m m′* and O O′ and provide the arms *s s′*, as seen in Fig. 12ª, and connect the ends of the braces to said arms in the manner indicated in said figure.

T is the segmental fender to the rear driving-wheel of the machine, and the upper end of this fender is rigidly secured to a curved plate *t*, which is arranged between and fastened to the members or legs of the vertical fork or standard H, while the lower end of the rear fender is supported and braced by inclined rods *t′ t′*, which are suitably fastened to the fender and to the lower extended ends of the fork and brackets or the arms *s s′*, as shown in Fig. 12ª.

The front steering-wheel M of the machine has a transverse short axle or shaft *u*, which is journaled in suitable bearings *u′ u′*, arranged on opposite sides of the wheel, and said bearings are further provided with inclined sockets *u″*, in which are firmly secured the lower ends of the vertically-inclined rods U U of the front steering-fork, which are made of elastic or yielding metal to give the rods considerable "spring," and thus form a yielding or spring fork for the steering mechanism. These spring-rods are curved longitudinally, as shown in Figs. 1 and 10, and the upper threaded ends of the rods are passed or extended through the tubular right-angled ends of a cross-head V, which has a central stem *v* made integral therewith or rigidly united to the same, said stem *v* being rigid or integral with the lower end of the spindle of the steering mechanism to cause the cross-head, the spring-rods forming the front fork, and the steering-wheel journaled in said fork to turn with the steering-head in guiding the wheel. This is a very substantial and durable construction, and it possesses the further advantage of yielding under stress when the front wheel strikes an obstruction, thus easing the jar and vibration of the handle-bars.

The steering-fork further carries a front fender V′, which extends beyond the parallel spring-rods and has its upper end firmly secured to the cross-head V, while the lower end of the front fender is sustained and braced by means of the pair of rods *v′*, which are secured to the bearings *u′ u′* and to the lower end of said fender. The steering-head carries a brake-lever W, which is pivotally secured to a pair of lugs on the bearing R, to which the lower braces L L′ are connected, and the rear end of this brake-lever has a frictional contact-roller *w*, which rides on the periphery of the rear driving-wheel. The brake can be operated by means of a rod or pitman running from a suitable operating-lever on the steering bars or handles of the machine.

In the modified form of machine shown in Figs. 10, 11, 12, and 13, Sheet 2, of the drawings I employ a vertical fork or standard which is different in construction from the standard shown in Figs. 1 and 2, and the horizontal backbone J is also somewhat different, as it is made substantially T-shaped in cross-section. The improved form of vertical standard or fork comprises a plurality of light tubular steel rods or bars *x x′*, two of which are arranged on each side of the rear driving-wheel, thus making the standard consist of four rods or bars. The upper ends of the four rods or bars forming the vertical standard or fork are rigidly secured by transverse bolts or rivets to the web of the backbone J, and the lower end of the rods or bars comprising each pair are joined together by a transverse bearing-plate X, said lower ends of the rods or bars being screw-threaded and receiving the nuts *x″* above and below the bearing-plate. Said bearing-plate carries a bearing Z, which may be integral with or secured to said plate for the support of the rear shaft of the driving-wheel M′, and said bearing-plate is further provided with a depending arm *z*, to the lower end of which the rods L L′ and *t′ t′* for the rear fender are secured in the usual manner.

Although I have shown and described the inverted form of gearing as the propelling mechanism adapted to my improved construction of bicycle, because this form of propelling mechanism is of a compact arrangement applicable directly to the rear driving-wheel of the machine, yet I do not wish to be understood as limiting myself to the exact form of frame and construction herein shown and described as an embodiment of my invention, nor to the use of the inverted gearing as the means for propelling the same, as it is obvious that the frame may be so proportioned that the propelling mechanism shown in either Fig. 19 or 22 can be used to advantage, although, as a rule, I prefer to use this mechanism in the propulsion of tricycles and vehicles other than bicycles.

I would also have it understood that I do not limit myself to the form and proportion of parts and details of construction herein shown and described as an embodiment of my invention, as I am aware that modifications therein can be made without departing from the spirit or sacrificing the advantages of my invention.

What I claim as new is—

1. In a cycle-vehicle, the upright and side braces carrying the bearings for the pedal-shafts and the axle of the driving-wheel, in combination with the pedal-shafts journaled in said side braces and carrying the pedals at their outer ends, the wheel within said upright and carried by the rear axle, the inverted power-wheels rigid with the pedal-shafts and arranged between the upright and the side braces, and the pinions rigid with the rear axle and meshing with the inverted power-wheels, one or both of the power-wheels and pinions having pivoted roller-cog bearings, substantially as and for the purpose described.

2. In a cycle-vehicle, the frame comprising the upright and its lower side braces, the horizontal backbone to which said upright is secured, and the diagonal braces connected to the upright and the steering-head, combined with the rear axle journaled in said upright, and the propelling devices arranged outside of the upright and having its pedal-shafts journaled therein, and its side braces, substantially as and for the purpose described.

3. In a cycle-vehicle and in combination with the propelling mechanism thereof, the axle of the rear wheel supported in suitable bearings between the driving mechanism and the ends of the hub of said rear wheel, and the brackets secured to the outside of the machine-frame and provided with journal-bearings adapted to receive the stub axles or shafts of the pedal-cranks.

4. In a bicycle, the combination of the steering post or head, the upright fork or standard, and the braces arranged diagonally to the fork or standard and steering-head and united to the steering-head and to the upright standard at or near its opposite ends, as set forth.

5. The combination of a vertical fork or standard adapted to carry the rear driving-wheel of a bicycle, a steering-head, the backbone united to the steering-head and the upright standard, and the braces between the backbone, the steering-head, and the upright standard, substantially as described.

6. In a safety-cycle vehicle, the combination of an upright fork or standard, a steering-head, a backbone adapted to sustain a saddle-post and united at its ends to the steering-post and the upright fork, and the diagonal braces, substantially as described.

7. The combination, with an upright fork and a steering-head, of a horizontal backbone detachably connected to the steering-head and fork, and suitable braces, as set forth.

8. The combination, in a bicycle, of the vertical fork or standard carrying the axle-bearing, the brackets rigid with the fork or stand-

ard and having bearings for the power-wheel of a propelling mechanism, and the lower braces secured to the lower ends of the fork or standard below the bearing and to the fender and steering-head, substantially as described.

9. The combination, with a standard or fork and the steering-head, of the backbone connected at its front end to said steering-head and rigidly secured at its rear end to the standard or fork and adapted to carry a saddle-post, the frame of the vehicle being braced by the inclined rods, the upper ends of which are attached to the backbone and having their lower ends connected to the steering-post, as set forth.

10. The combination, in a bicycle, of the vertical fork or standard, the rear fender over the driving-wheel having its front end supported by the vertical fork and its rear end sustained by rods extending from the fender to the lower end of said vertical fork.

11. In a bicycle, the combination, with a vertical fork made of flat or bar metal, as described, of the hollow spool-bearing having its reduced portion fitted in an aperture in the standard or fork, with its flange bearing against the inside of the fork and its threaded end receiving a fastening-nut, said spool-bearing having a transverse passage for the reception and support of the rear axle of the driving-wheel.

12. In a bicycle, a spring-fork adapted to carry the steering-wheel and comprising the curved spring-rods which carry the axle-bearings at their lower ends, the cross-head having the upper ends of the spring-rods rigidly secured thereto and the stem united to the steering-spindle, as set forth.

13. In a bicycle, the spring-fork comprising the curved elastic rods threaded at their upper ends, the front axle-bearings to which the lower ends of said rods are secured, and the cross-head adapted for connection to the steering-spindle and having the sockets to receive the threaded upper ends of the rods and nuts to fasten the parts together.

14. In a bicycle, a vertical fork or standard adapted to sustain the rear driving-wheel, comprising the vertical bars and transverse bearing-plates rigidly fastened to the lower ends of said bars, combined with a backbone to which the upper ends of said bars are fastened.

15. In a bicycle, the combination, with the vertical rods forming a vertical standard or fork, of the transverse bearing-plates rigid with the lower ends of said rods and each having a bearing for the support of the wheel-axle, and the braces to the fender and steering-head fastened to said bearing-plate.

16. In a bicycle, the combination, with the vertical rods forming a standard or fork, of the bearing-plates rigid with the rods and adapted to receive the axle of the driving-wheel, said plates provided with the rigid depending arms, and the braces secured to said depending arms.

17. In a bicycle, the vertical fork or standard having the brackets and the separate bearings for the rear axle and the pedal axles or shafts, combined with the braces held between the fork and brackets and adapted for connection to a fender and the steering-head.

18. In a bicycle, the T-shaped backbone and the vertical rods or tubes attached to the vertical web of said backbone, the lateral projections on the backbone lying over the attached ends of said rods or tubes, said back being adapted to engage the steering-post and a saddle-post.

19. In a cycle-vehicle, the combination, with the steering post or head, of a backbone adapted to support the saddle-post, said backbone having its front end suitably connected to the steering post or head and its rear end detachably secured to or between the upper ends of side braces which extend obliquely from said backbone to the frame engaging the rear axle of the machine.

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

CYRUS W. SALADEE.

Witnesses:
MICHAEL STOSKOPF,
LEONARD STOSKOPF.