

No. 651,967.

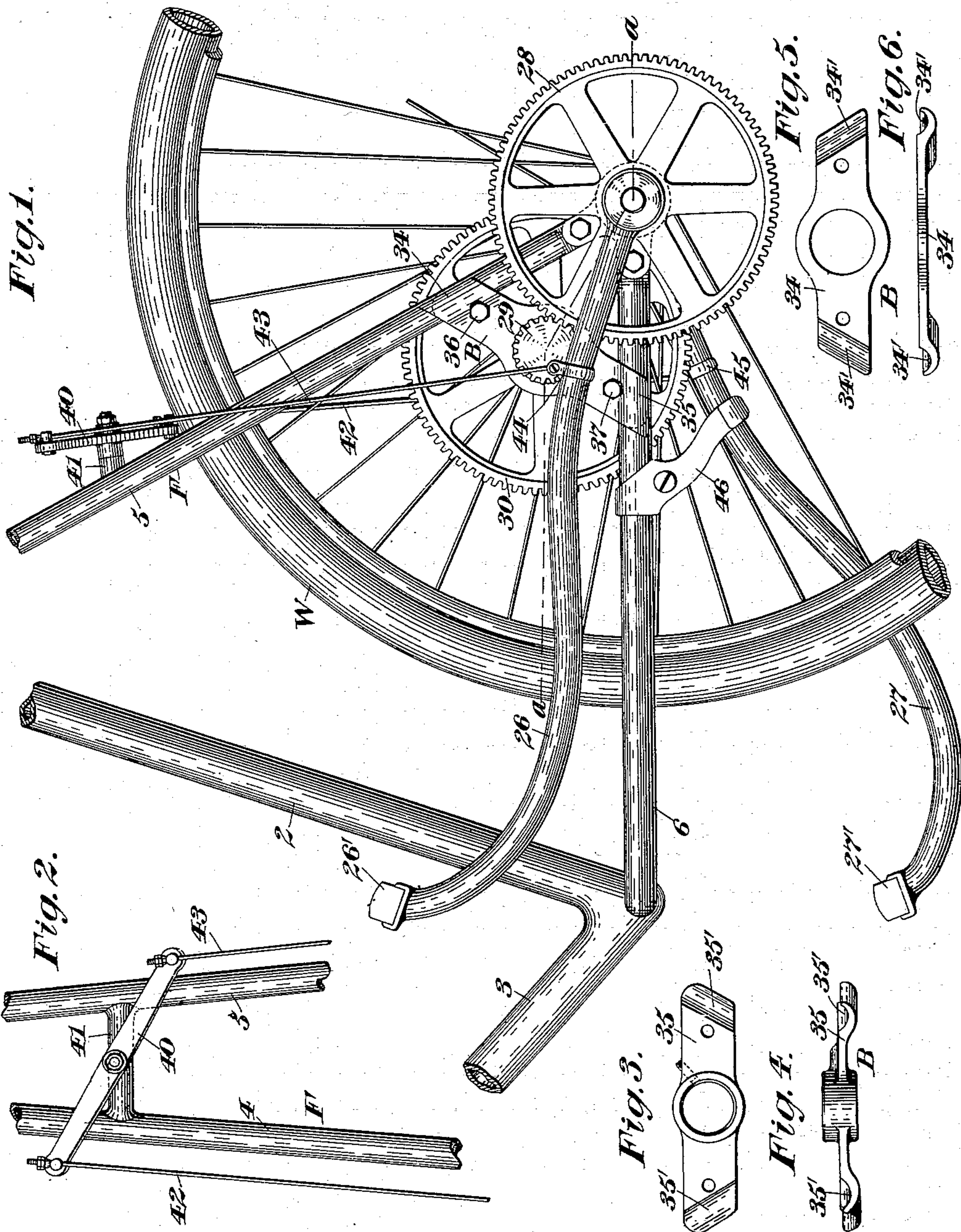
Patented June 19, 1900.

P. J. FREIZE.
CHAINLESS WHEEL BICYCLE.

(Application filed Nov. 12, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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R. B. Edwards Jr.

Inventor:
Peter J. Freize.
By his Attorney,
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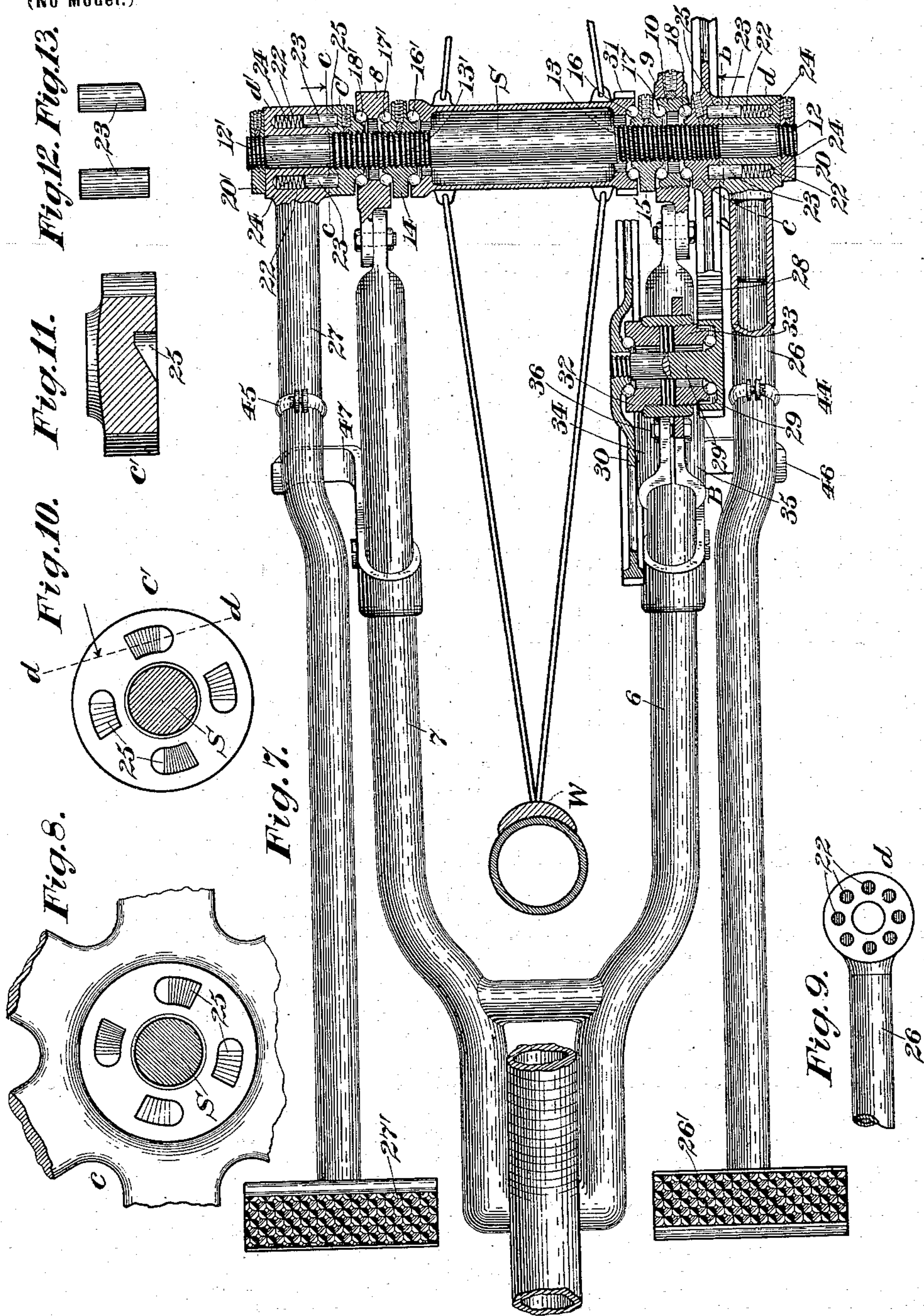
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UNITED STATES PATENT OFFICE.

PETER J. FREIZE, OF ROCKVILLE, CONNECTICUT.

CHAINLESS-WHEEL BICYCLE.

SPECIFICATION forming part of Letters Patent No. 651,967, dated June 19, 1900.

Application filed November 12, 1897. Serial No. 658,227. (No model.)

To all whom it may concern:

Be it known that I, PETER J. FREIZE, a citizen of the United States, residing in Rockville, in the county of Tolland and State of Connecticut, have invented certain new and useful Improvements in Chainless-Wheel Bicycles, of which the following is a specification.

This invention relates to that class of bicycles of the "chainless-wheel" type, one object of my present invention being to furnish, in connection with the driving-wheel of a bicycle, driving mechanism of an improved construction and organization, including reciprocal foot-levers and multiple-speed gearing operatively connecting said foot-levers with the driving-wheel, whereby reciprocal movement of said levers will impart to the driving-wheel a rotary movement of high velocity with a minimum expense of foot-power.

Further objects of my present invention are to furnish a geared bicycle of the "safety" type in which the driving-wheel is actuated through the medium of foot-levers and connected multiple-speed gears and to so construct and organize the constituent elements of the driving mechanism that the same will be subjected to the least possible friction and may be adjusted to take up wear, and also to provide, in connection with the foot-levers, means whereby an advancing movement of one lever will impart a retracting movement to the opposite lever.

In the drawings accompanying and forming part of this specification, Figure 1 is a side elevation of a portion of a safety-bicycle embodying my present improvements. Fig. 2 is a rear elevation of a portion of the rear fork, showing the walking-beam and a portion of the rods which connect the foot-levers. Figs. 3 and 4 are side and edge views, respectively, of one of the clip-plates of the gear-train-supporting bracket. Figs. 5 and 6 are side and edge views, respectively, of the complementary clip-plate of said bracket. Fig. 7 is a longitudinal section, partially in plan view, of that portion of the bicycle shown in Fig. 1, said section being taken on a line corresponding to the dotted line *a a*, Fig. 1, parts being broken away. Fig. 8 is a cross-sectional view, on an enlarged scale, taken on a

line corresponding with the line *b b*, Fig. 7, looking in the direction of the arrow and showing a portion of the driving-gear, clutch member, and the shaft, said figure showing the clutch-pin sockets in the outer face thereof. Fig. 9 is an inner side view, on a smaller scale, of a portion of the foot-lever and the clutch member in connection therewith. Fig. 10 is a cross-sectional view taken on a line corresponding to the dotted line *c c*, Fig. 7, and showing the clutch member fixed to this end of the power-wheel shaft, which clutch member corresponds to the one shown in Fig. 8, with the exception that it does not constitute a part of the driving-gear. Fig. 11 is a cross-sectional view of the clutch member shown in Fig. 10, said section being taken on a line corresponding to the dotted line *d d* in said figure looking in the direction of the arrow; and Figs. 12 and 13 are different side elevations of the clutch-pins which couple the two clutch members together.

Similar characters designate like parts in all the figures of the drawings.

In the drawings only so much of the bicycle is shown as is deemed necessary to fully illustrate the construction, organization, and mode of operation of my present improvements.

Inasmuch as my present invention relates more particularly to driving mechanism for velocipedes, including improved supporting means for the driving-wheel, and as the same is applicable to machines of various types, it will be understood that it is not limited to any particular form of velocipede.

That portion of the frame of the bicycle shown in the accompanying drawings comprises the seat-post 2, lower reach 3, rear fork F, and the lower brace F', the fork F consisting, as usual, of two vertically-disposed parallel tubes or arms 4 and 5, which in practice will be connected together and to the seat-post 2 in any suitable manner, and the lower brace F' comprises two horizontally-disposed parallel tubes or arms, as 6 and 7, which are secured to the lower ends of the arms 4 and 5 by brackets 8 and 9, one of which constitutes a duplex ball-bearing member, it being axially recessed and cupped to form raceways for balls, and the other of which is axially recessed and screw-threaded and is provided

with a duplex ball-bearing member 10, which is adjustably seated therein.

As a means for supporting the driving-wheel W, which may be of any suitable construction, I have provided a driving-shaft S, which extends through the duplex bearing members 8 and 10 and is screw-threaded, as at 12 and 12'; at the extreme outer ends thereof and also having intermediate screw-threaded portions 13 and 13'; two duplex take-up cones 14 and 15, adjustably secured to the intermediate screw-threaded portions 13 and 13' on the shaft between opposite ends, respectively, of the hub of the driving-wheel W and the adjacent faces of the duplex bearing members 8 and 10; two clutch members (designated in a general way by *c* and *c'*) respectively secured upon the screw-threaded portions 13 and 13' of the shaft, adjacent to the arms 6 and 7 of the frame; two sets of balls 16 and 16', disposed between opposite ends of the wheel-hub and the adjacent duplex take-up cones 14 and 15, respectively; two sets of balls 17 and 17', disposed between the outer cone-faces of the take-up cones and the adjacent faces of the ball-bearing members 8 and 10, respectively, and two sets of balls 18 and 18', disposed between said bearing members and adjacent clutch members, respectively.

For the purpose of actuating the driving-wheel I have provided in operative relation with the two clutch members *c* and *c'* two complementary clutch members *d* and *d'*, loosely mounted upon opposite ends, respectively, of the shaft F and held against movement longitudinally of said shaft, preferably by means of nuts 20 and 20', secured upon the opposite screw-threaded ends of said shaft. These clutch members are shown having a series of recesses 22 formed therein, which recesses are shown circular and concentrically disposed with relation to the axis of the shaft S and constitute seats or guide-ways for clutch-pins 23, which are seated therein and are normally projected outward beyond the inner faces of the clutch member by means of springs 24, bearing against the inner ends of said pins, the outer ends of the pins being preferably beveled and adapted to engage in clutch-pin sockets 25 in the adjacent face of the adjacent clutch member, which is fixed to the driving-shaft, as before described.

Secured to the clutch members *d* and *d'* are two foot-levers 26 and 27, respectively, at the outer forward ends of which are secured pedal-rubbers 26' and 27'. Carried upon one of the clutch members, as *c*, and preferably constituting an integral part thereof is a driving-gear 28, (shown as a spur-wheel,) and carried by the driving-shaft hub is a pinion 31, of relatively-small diameter. This pinion and driving-gear are operatively connected together by a speed-multiplying train of gears consisting of a pinion 29, meshing with the driving-gear 28, and a spur-wheel 30, car-

ried by the hub 29' of said pinion and meshing with the driven pinion 31 on the driving-wheel hub.

As a means for supporting the pinion 29 and spur-wheel 30 and facilitating an adjustment thereof to compensate for wear I have provided, in connection with the one arm of the rear fork F and one arm of the lower brace F', a train-supporting bracket (designated in a general way by B) which is clamped to said arm and is furnished with a fixed internally-screw-threaded sleeve, in which are adjustably screwed two oppositely-disposed cupped bearing members 32 and 33, located between and adjustable with relation to the pinion 29 and spur-gear 30, balls being disposed between opposite bearing members and the pinion 29 and spur-wheel 30 to support said spur-wheel and pinion, as illustrated most clearly in Fig. 7 of the drawings.

The spur-wheel 30 is shown adjustably mounted upon the screw-threaded rear end of the hub 29' of the pinion 29, and said spur-wheel and pinion serve as dust-guards for the bearing members 32 and 33. The bearing members 32 and 33 may be adjusted longitudinally of the pinion-hub to take up wear.

The bracket B is shown consisting of two clip members 34 and 35, having oppositely-inclined parti-circular grooves 34' and 35' at opposite ends, respectively, thereof for engaging around the brace-arm 6 and one arm of the fork F, the two clip members 34 and 35 being secured together preferably by bolts and nuts 36 and 37, as shown most clearly in Figs. 1 and 7 of the drawings.

As a means for facilitating a retractive movement of one foot-lever on the advancing movement of the other foot-lever I have provided, in connection with the rear fork F, a walking-beam 40, pivotally supported upon a curved bar 41, connecting the two arms of said fork, to opposite ends of which walking-beam are adjustably secured two depending rods 42 and 43, the lower ends of which are connected to straps 44 and 45, fixed to the two levers 26 and 27, respectively, the arrangement of the walking-beam and connecting-rods being such that when one of the levers is depressed the other lever will be elevated, and as a means for limiting the advancing movements of the two levers 26 and 27 I have provided, in connection with the two arms 6 and 7 of the lower brace, stop devices 46 and 47, respectively, which have arms intersecting the path of movement of the said levers 26 and 27.

From the preceding description it will be evident that my improved bicycle involves the combination, with a frame and a driving-wheel, of speed-multiplying gearing located only upon one side of the wheel, a pair of rocking levers mounted upon opposite sides of the wheel, means for positively connecting each of said levers with the gearing when on the downstroke thereof and for subsequently automatically disconnecting each of

said levers from said gearing when on the up-stroke thereof, by reason of which construction I can secure both power and speed and by the employment of a minimum number of
5 gears.

Having described my invention, I claim—

1. In a bicycle, the combination, with a frame, of a two-part bracket shaped at its ends to fit the same, one of the parts of said
10 bracket having an internally-threaded sleeve; ball-bearings threaded into said sleeve; a shaft passing loosely through said ball-bearings and having a pinion at one end and a large gear at the other end, said pinion and
15 gear serving as dust-guards for the bearings; a driving-shaft having a gear secured thereto which intermeshes with said pinion; pawl-and-lever mechanism for actuating said driving-shaft; a wheel having a hub loosely mount-
20 ed on the driving-shaft; and a pinion carried by said wheel-hub and intermeshing with the gear on the shaft mounted in the ball-bearings of the bracket.

2. In a bicycle, the combination, with the
25 rear-fork and lower brace thereof, of a two-part bracket clamped to said fork and an arm of said brace, one part of said bracket being provided with a fixed internally-screw-threaded sleeve; two oppositely-disposed cupped

bearing members threaded into said sleeve; 30
a shaft loosely mounted in said bearings and having a pinion at one end and a spur-wheel at the other end serving as dust-guards for said bearings; balls between said spur-wheel and pinion and the cupped bearing members; 35
a driving-shaft having a large spur-gear in intermeshing engagement with said pinion; a pedal-lever sleeved on said driving-shaft and provided with a series of recesses; clutch-
40 pins seated in said recesses and normally projected outward by springs therein, said pins being adapted to engage with corresponding sockets in the gear-wheel fixed to the driv-
ing-shaft; a second pedal-lever mounted on the driving-shaft and having similarly-ar- 45
ranged clutch-pins adapted to engage with sockets in a complementary clutch member fixed to the driving-shaft; a walking-beam and connections between the two pedal-le-
50 vers; a driving-wheel having a hub loosely mounted on the driving-shaft; and a pinion carried by said hub and intermeshing with the teeth of the spur-gear carried by the bracket.

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