No. 650,906. Patented June 5, 1900.

E. PERKS.

MOTOR WHEEL.

(Application filed Feb. 5, 1900.)

(No Model.) 4 Sheets—Sheet 1.

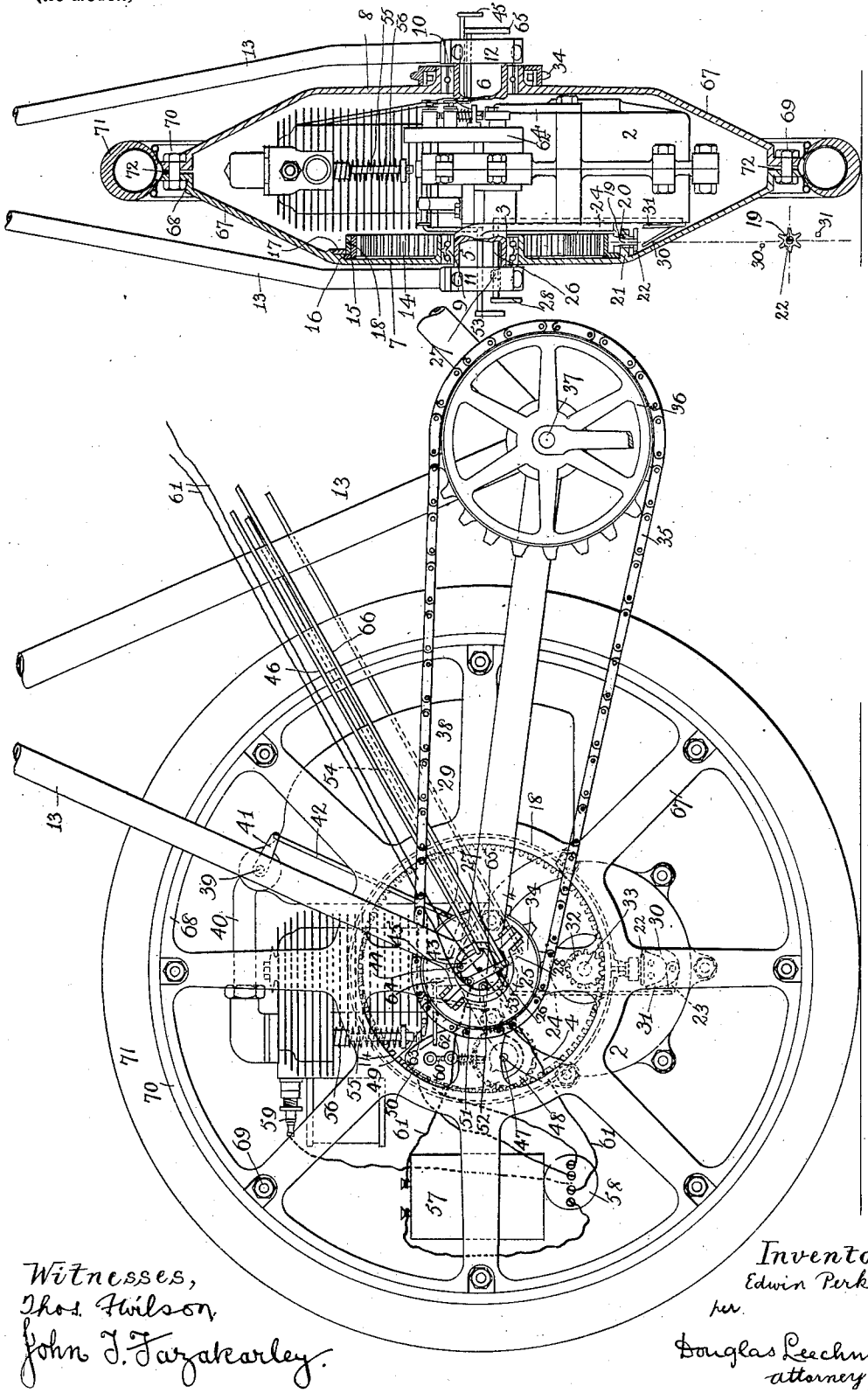


FIG. II.

FIG. I.

Witnesses,
Thos. Wilson.
John J. Fazakerley.

Inventor,
Edwin Perks,
per
Douglas Leechman
attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

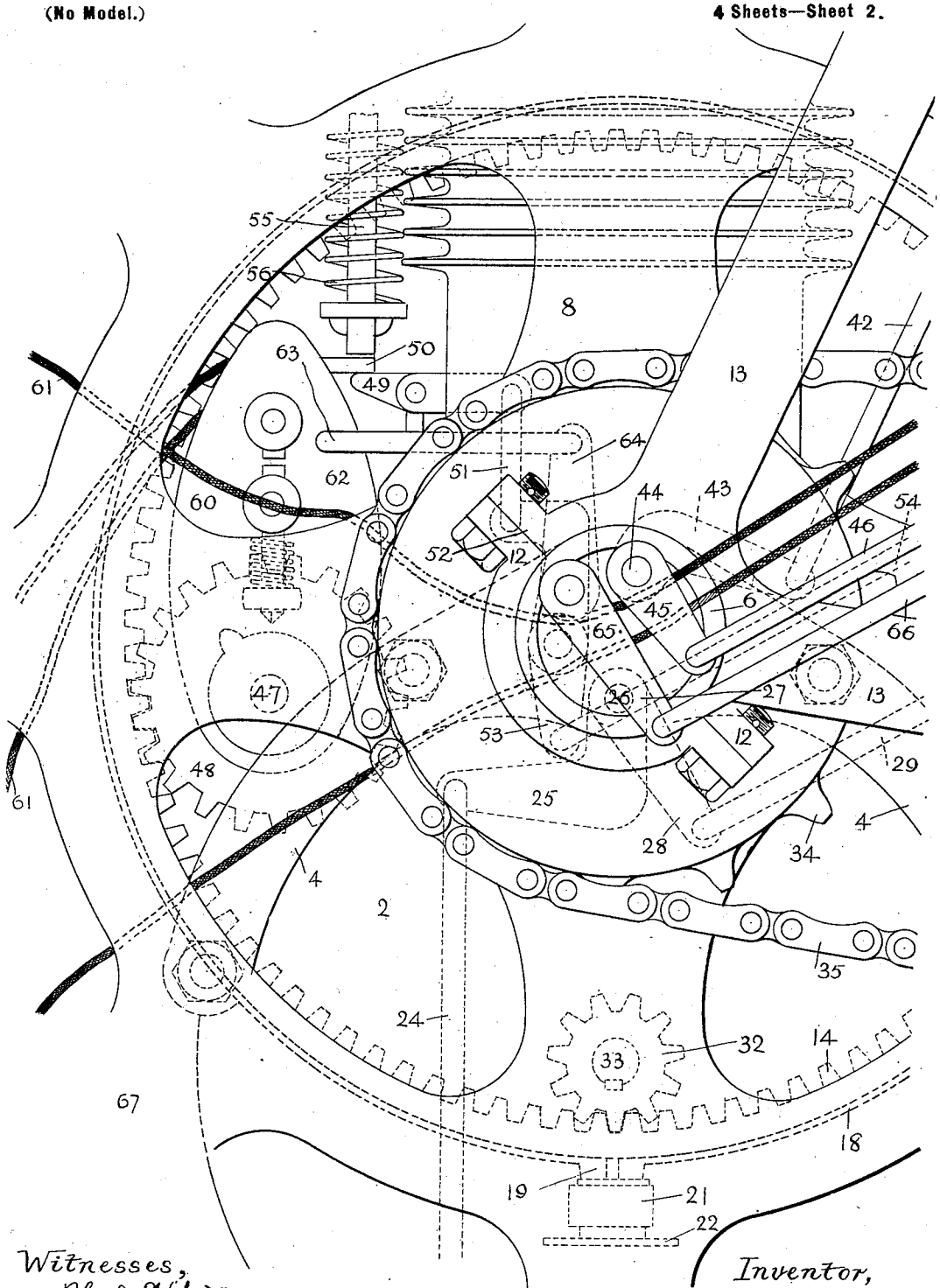
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(No Model.) 4 Sheets—Sheet 2.



Witnesses,
Thos. Gilson,
John J. Fazakerley.

FIG. III.

Inventor,
Edwin Perks,
per
Douglas Leechman.
attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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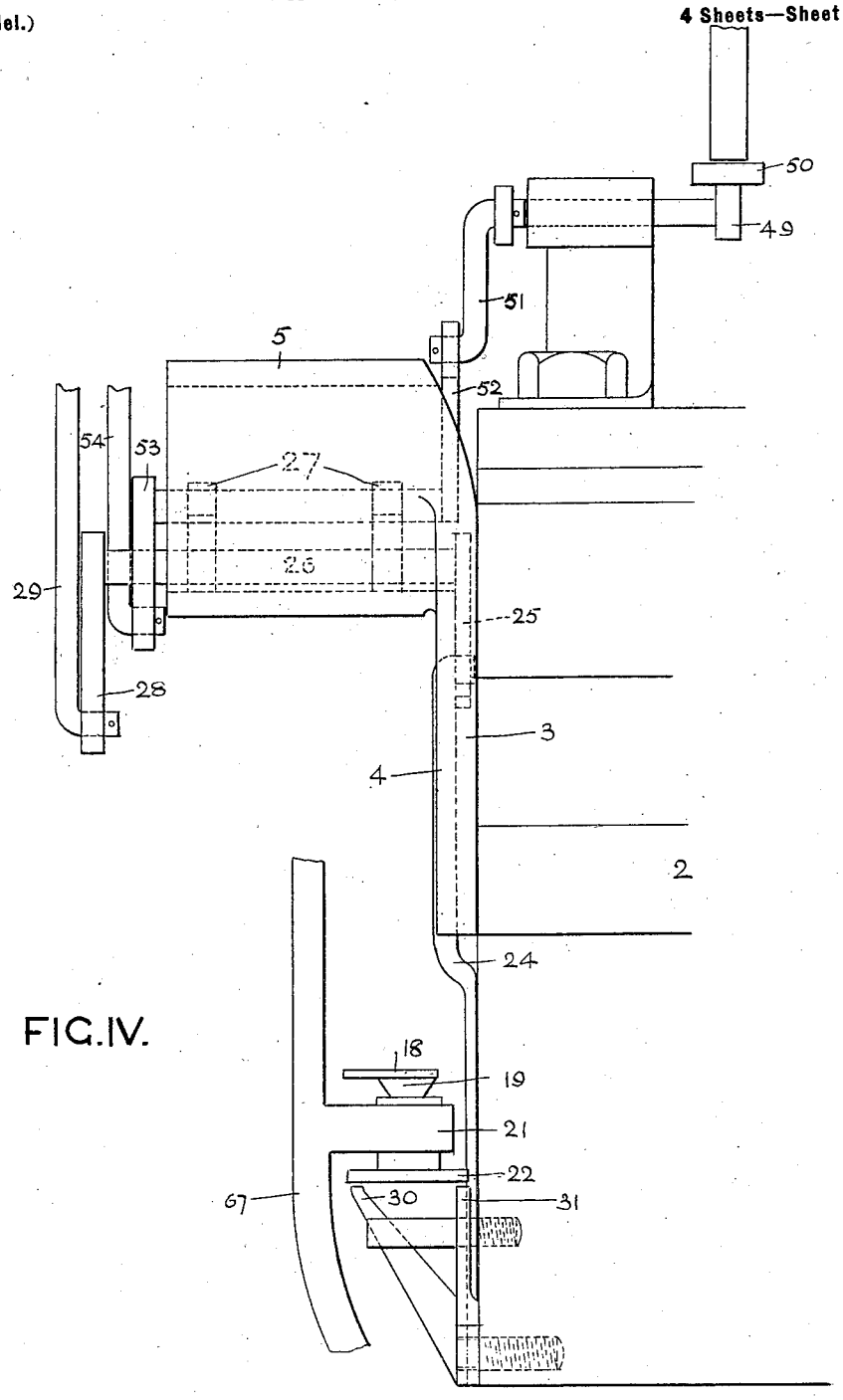


FIG. IV.

Witnesses,
Thos. F. Wilson,
John T. Fazakerley.

Inventor,
Edwin Perks,
per
Douglas Leechman
attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 650,906. Patented June 5, 1900.

E. PERKS.

MOTOR WHEEL.

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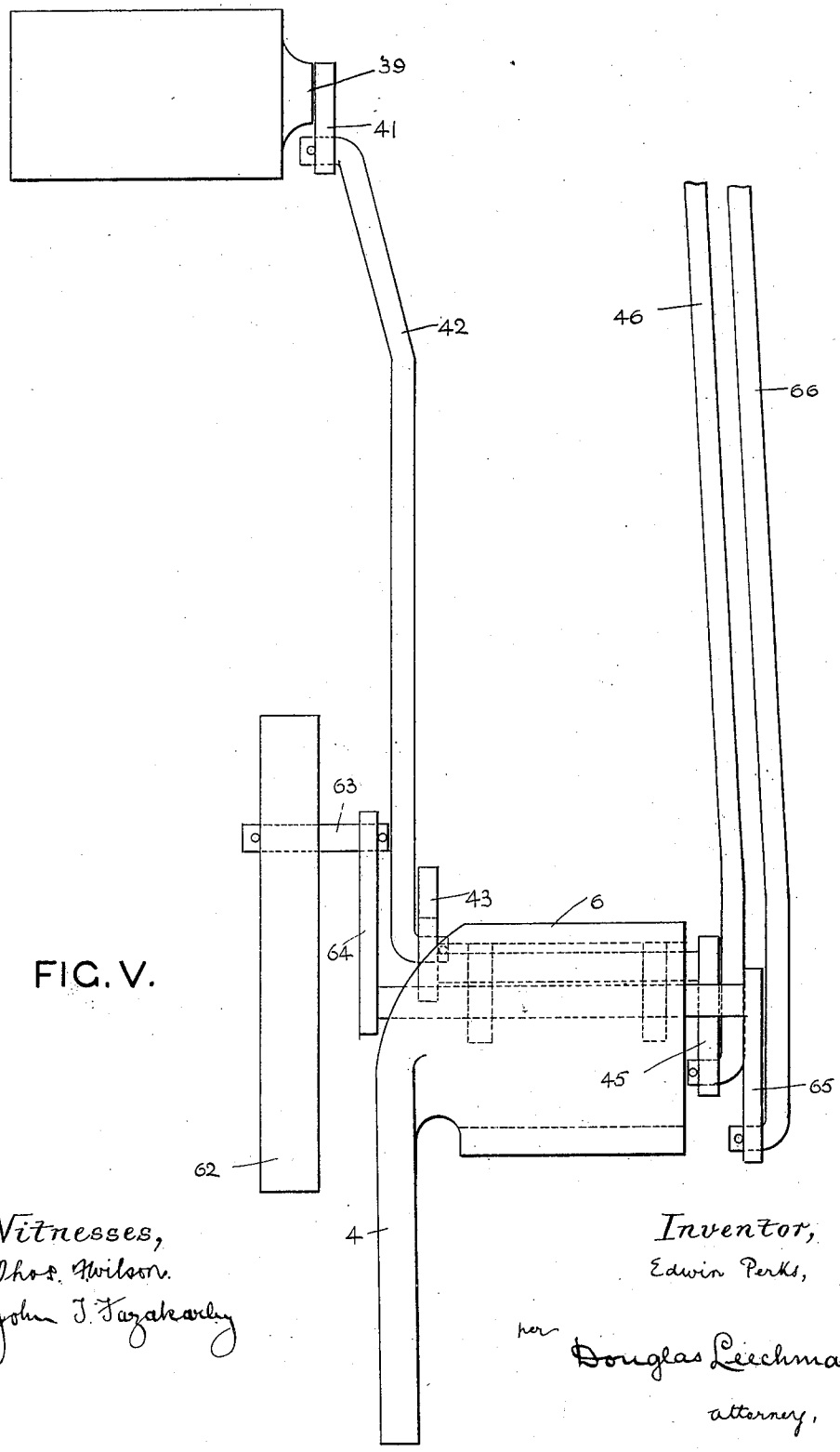


FIG. V.

Witnesses,
Thos. Wilson.
John J. Fazakerley

Inventor,
Edwin Perks,
per Douglas Leechman.
attorney,

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWIN PERKS, OF COVENTRY, ENGLAND.

MOTOR-WHEEL.

SPECIFICATION forming part of Letters Patent No. 650,906, dated June 5, 1900.

Application filed February 5, 1900. Serial No. 4,117. (No model.)

To all whom it may concern:

Be it known that I, EDWIN PERKS, a subject of the Queen of Great Britain, residing at Coventry, in the county of Warwick, England, have invented certain Improvements in Motor-Wheels, of which the following is a specification.

My invention relates to motor-wheels, and has for its principal object to provide a compact and self-contained motor-wheel in which the center of gravity coincides approximately with the central plane of the wheel; and my invention consists in mounting the motor within the wheel on trunnions, one or both of which is hollow for the passage of the controlling-gear and the like.

I will describe my invention, by way of example, as applied to a motor-wheel; adapted to serve as the rear driving-wheel of a motor-bicycle, for which purpose my invention is particularly suitable, though I wish it to be understood that wheels constructed according to my invention may be used for various other purposes—such, for example, as ordinary mill-gearing.

In the accompanying drawings, Figure I is a side elevation of the motor-wheel; and Fig. II is a rear elevation, partly in section. Fig. III is a side elevation; and Figs. IV and V are rear elevations, on an enlarged scale, showing the construction and relation of certain parts of the motor in detail.

The same numerals indicate the same parts in all the views.

For the purpose of my invention I prefer to employ a motor on the lines of the "De Dion;" but this is not essential. To each side of the crank-casing 2 I secure a bracket 3 4, of curved or other suitable form, and having an outwardly-projecting stud 5 6, both of which studs are preferably hollow and which constitute the trunnions before referred to. On each of these trunnions is mounted a vertical flange 7 8, preferably on ball-bearings 9 10. The parts of the trunnions projecting beyond these flanges are adapted to be secured, preferably detachably, by means of halved clips 11 12 to the bicycle-frame 13. An internal spur-wheel 14 is connected to the flange 7 preferably in such a way that it may be fixed or released rotatively, as required. This may be accomplished by providing the wheel 14 with a flange 15 and the flange 7 with a recess 16 and a keeper-ring 17. A friction-band 18 is passed around the exterior of the wheel 14, and the ends of the band are fitted with a divided conical screw-ended stud 19. A nut 20, adapted to engage the stud 19, is carried by a lug 21 on the flange 7 and is provided with a star-head 22. On the casing is pivoted a fork having an arm 23, connected, through the rod 24 and elbow 25, to a spindle 26, mounted in blocks 27, fixed in the trunnion 5. To the outer end of the spindle 26 is secured an arm 28, adapted to be operated by the rod 29. The said fork has the prong 30 set out, while the prong 31 is straight. When the rod 29 is moved forward, the prong 30 comes in contact with the star-head 22, and the nut is screwed onto the stud 19, drawing its parts together and contracting the band 18 around the wheel 14 and locking the said wheel to the flange 7. By moving the rod 29 back the prong 30 is engaged with the nut, so as to loosen the same on the stud 19 and release the band 18 from the wheel 14 and the said wheel from the flange 7. The fork is moved into a neutral position when the band has been tightened or loosened sufficiently, or the wheel 14 may be permanently fixed to the flange 7. The teeth of the wheel 14 are adapted to mesh with the teeth of the pinion 32 on the motor crank-shaft 33. The outer face of either flange, preferably 8, is provided with a chain-pinion 34, connected by a chain 35 with a sprocket-wheel 36 on the pedal crank-axle 37 or with other suitable gearing, so that the rider can start the bicycle and the motor by his feet in the usual way. Similarly, a clutch is introduced into the pedal driving-gear to allow of the motor-wheel overrunning the pedal crank-axle after starting. The carbureter 38 is preferably mounted within the motor-wheel, the admission-valve 39 to the feed-pipe 40 being controlled by connections 41, 42, 43, 44, and 45 from the rod 46, arranged similarly to those of the fork 30 31; or the carbureter may be carried on any suitable part of the bicycle, the feed-pipe then being led through one of the trunnions.

In order to reduce the width of the wheel, I prefer to arrange the two-to-one gear at the back of the motor instead of in the usual position at the side. I mount a transverse shaft

47 in suitable bearings and provide one end thereof with a toothed wheel 48 of twice the size of the pinion 32 and gearing with the wheel 14. The shaft 47 therefore rotates at half the speed of the crank-shaft 33, and I provide it with any suitable form of mechanism for operating the ignition-gear and for lifting the exhaust-valve. To relieve the compression when starting the motor, I provide a lever 49, one end of which lies under the tappet 50 of the exhaust-valve-lifting gear. This lever is operated through suitable connections 51 52 53, passing through the trunnion 5 from the rod 54. By pulling up the said rod 54 the lever 49 acts on the spindle 55 of the exhaust-valve through the tappet 50 and the compression is relieved. On releasing the rod the exhaust-valve spring 56 restores the parts to their normal position.

If electrical ignition be employed, as preferred, the battery 57 and coil 58 may be arranged behind the motor within the wheel, the connections to the ignition-plug 59 and contact-breaker 60 being arranged in the ordinary way, and one pair of wires 61, connecting the battery and coil, are led through one of the trunnions to the handle-bar or elsewhere, where they are provided with a suitable switch; but the battery or coil, or both, may be arranged on other suitable parts of the machine and the electrical connections passed through one of the trunnions to the ignition-plug contact-breaker. The mechanism of the contact-breaker is mounted on an insulated plate 62, mounted loosely on the half-speed shaft 47 and adapted to be moved about the shaft as a center, so as to advance or retard the ignition by means of the connections 63, 64, and 65, passing through the trunnion 6 and operated by the rod 66. Tube-ignition may be employed, if desired.

The flanges 7 8 are provided with spokes 67, connected with a two-piece rim 68. Bolts and nuts 69 connect the two parts of the rim, preferably at the end of each spoke; but they may be more or less numerous than the spokes, if preferred. The exterior of the rim 68 is grooved to receive a second rim 70, which receives the tire 71. The convex back of the rim 70 fits into the groove of the rim 68, there being a slight space 72 left between the two parts of the rim 68. By tightening the bolts and nuts 69 the groove is contracted and the rim 70 very firmly secured in position. By undoing the halved clips 11 12 and disconnecting the chain 35 the motor-wheel may be readily detached from the frame 13, and by removing the bolts 69 either or both sides of the wheel may be detached and the mechanism fully exposed.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination of a wheel, a motor mounted within the said wheel, a gear on the said wheel, means for fixing and releasing the said gear to and from the wheel, and a pinion on the crank-shaft of the motor adapted to mesh with the said gear, substantially as set forth.

2. The combination of a wheel, a motor mounted within the said wheel, a frame, means for attaching the motor to the frame, a gear on the wheel, a pinion of the crank-shaft of the motor adapted to mesh with the said gear, pedal-gearing for driving the wheel, and means for allowing the wheel to overrun such pedal-gearing, substantially as set forth.

3. The combination of a wheel, a motor mounted within the said wheel, a hollow trunnion on the said motor, a supply-tank within the said wheel, means for regulating the supply from the tank to the motor, and gear for controlling the said regulating means passing through the said trunnion, substantially as set forth.

4. The combination of a wheel, a motor mounted within the said wheel, a hollow trunnion on the said motor, an electrical ignition device mounted within the said wheel, and part of the electrical connections passing through the said trunnion, substantially as and for the purpose set forth.

5. The combination of a wheel, a motor mounted within the said wheel, a hollow trunnion on the said motor, an electrical ignition device comprising a generator and a sparking-plug whereof the generator is mounted outside the wheel, and an electrical connection passing from the generator to the sparking-plug of the motor through the said trunnion, substantially as set forth.

6. The combination of a wheel, a motor mounted within the said wheel, a hollow trunnion on the said motor, an electrical ignition device comprising a movable contact-breaker mounted within the said wheel, and gear for controlling the movement of the said contact-breaker passing through the said trunnion, substantially as set forth.

7. The combination of a wheel, a motor mounted within the said wheel, a gear on the wheel, a first pinion on the crank-shaft of the motor, adapted to mesh with the said gear, an exhaust-valve, a rotatable shaft, a second pinion mounted on the said rotatable shaft of twice the diameter of the first pinion and adapted to mesh with the said gear, and a device mounted on the said rotatable shaft for operating the exhaust-valve, substantially as set forth.

8. The combination of a wheel, a motor mounted within the said wheel, a gear on the wheel, a first pinion on the crank-shaft of the motor adapted to mesh with the said gear, an electrical contact-breaker, a rotatable shaft, a second pinion mounted on the said rotatable shaft of twice the diameter of the first pinion and adapted to mesh with the said gear, and a device mounted on the said rotatable shaft for operating the contact-breaker, substantially as set forth.

9. In a motor-wheel, the combination of a motor, trunnions on the said motor, flanges rotatable on the said trunnions, a two-piece

rim, spokes connecting the respective flanges with the respective parts of the rim, a circumferential groove in the periphery of the two-piece rim, a second rim seated in the said groove, and means for both regulating the dimensions of the said groove and for detaching the sides of the wheel, substantially as and for the purpose set forth.

10. The combination of a wheel, a motor comprising an exhaust-valve and mounted within the said wheel, a hollow trunnion on the said motor, a lever adapted to open the said exhaust-valve, gear for actuating the said lever passing through the said trunnion, and means for closing the said exhaust-valve, substantially as and for the purpose set forth.

EDWIN PERKS.

Witnesses:
THOS. F. WILSON,
JOHN T. FAZAKARLEY.