

No. 702,842.

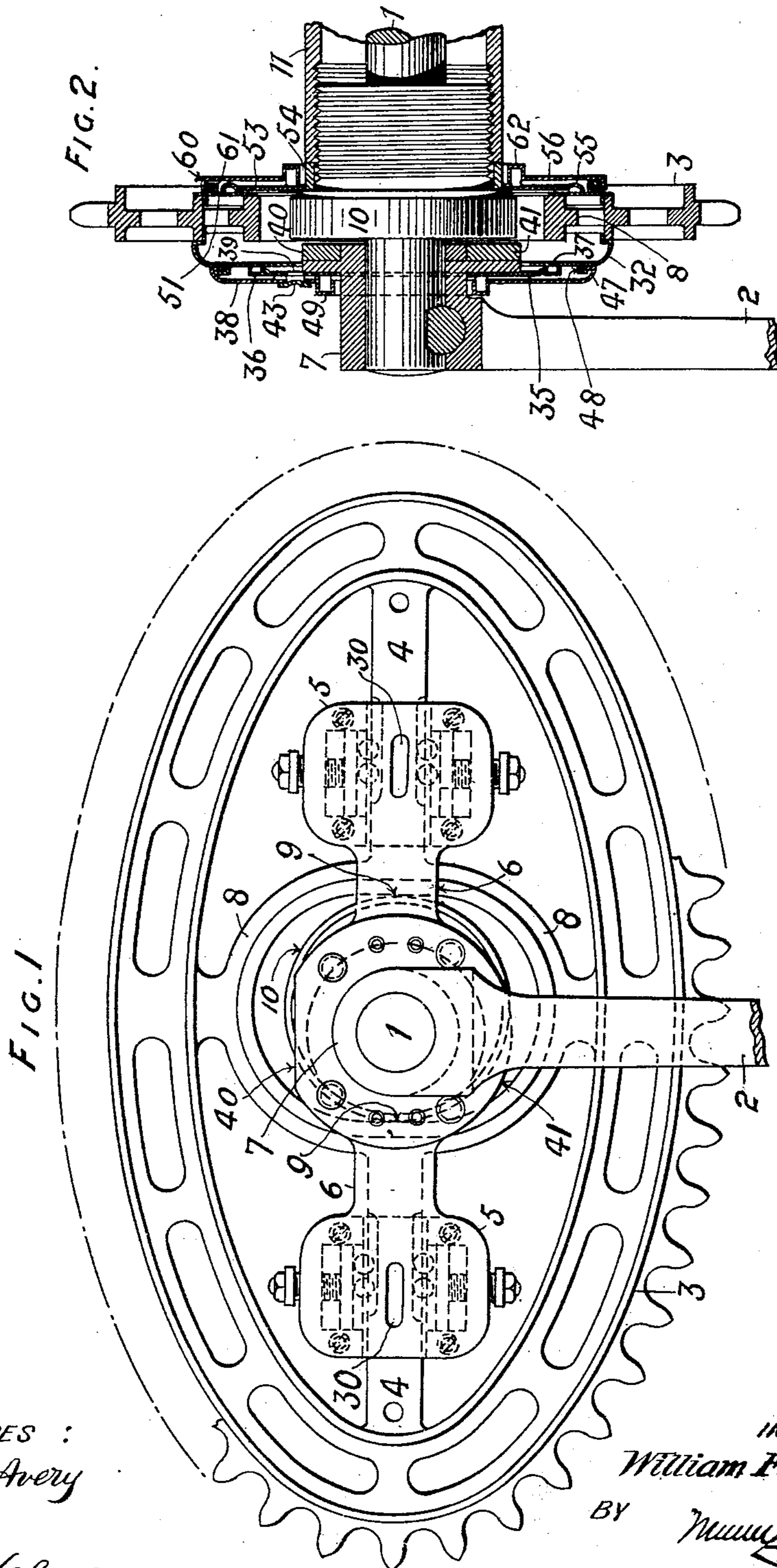
Patented June 17, 1902.

W. F. WILLIAMS.
ELLIPTIC CHAIN DRIVING GEAR.

(Application filed Jan. 15, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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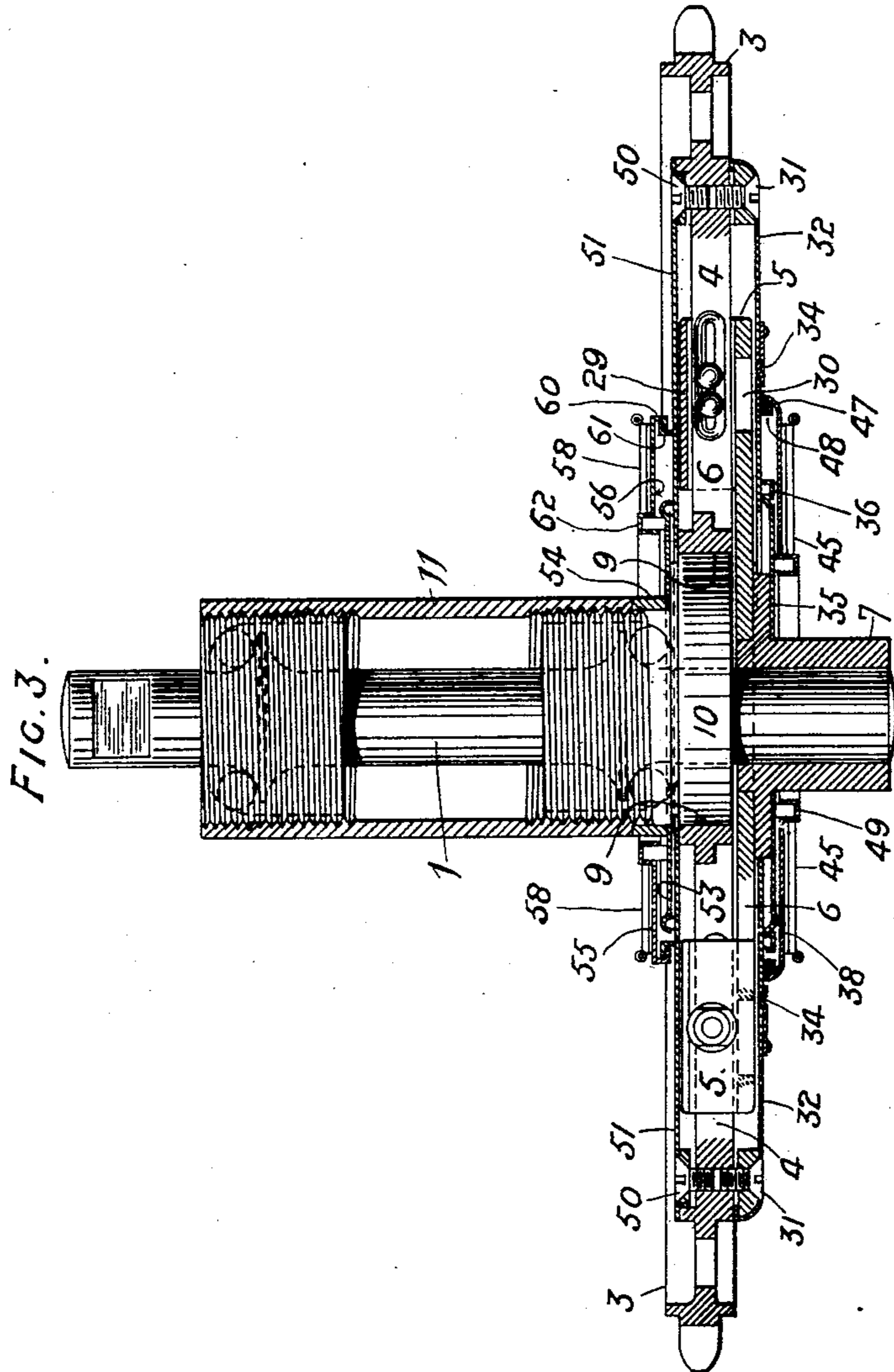
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FIG. 5.

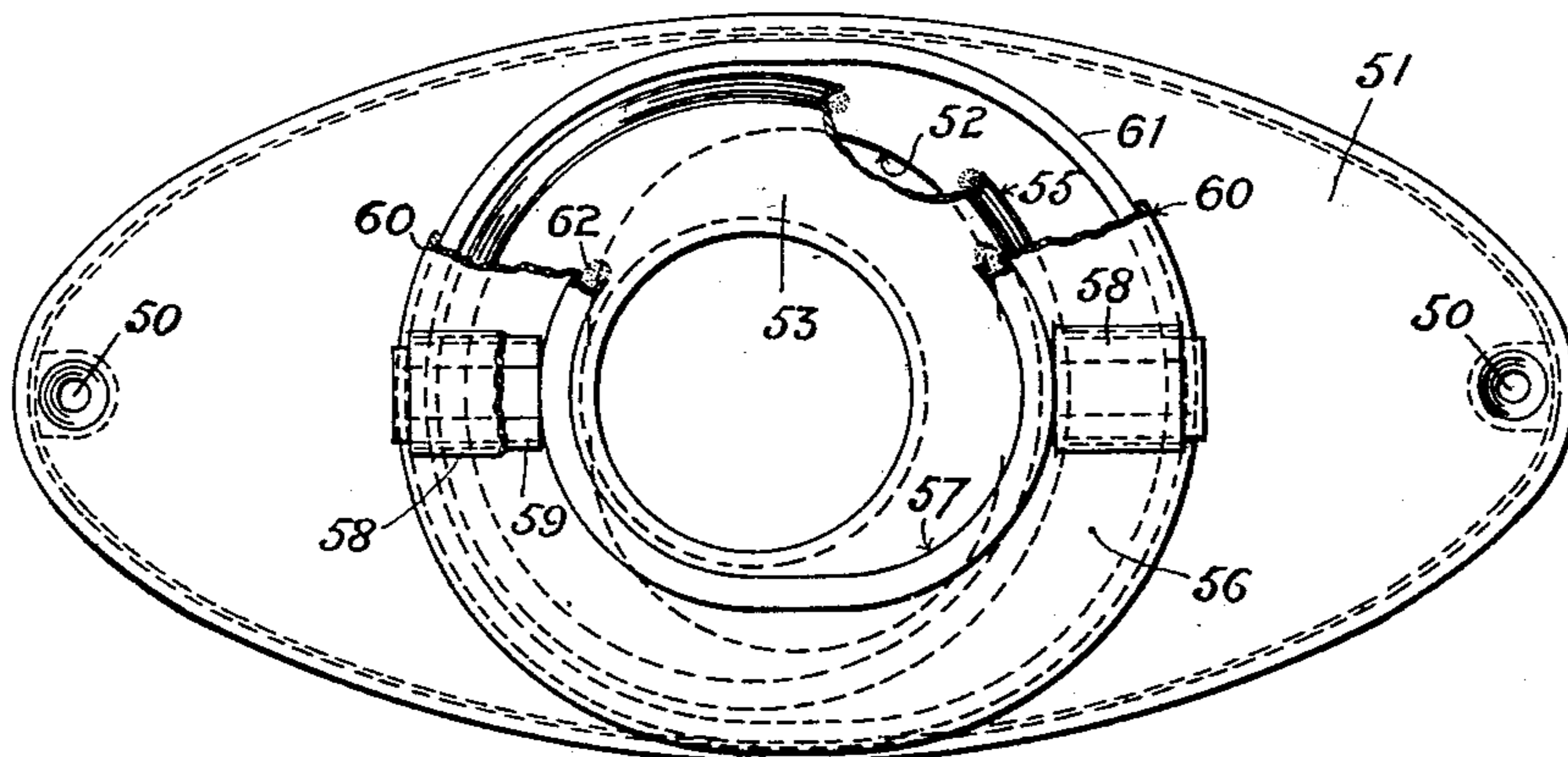
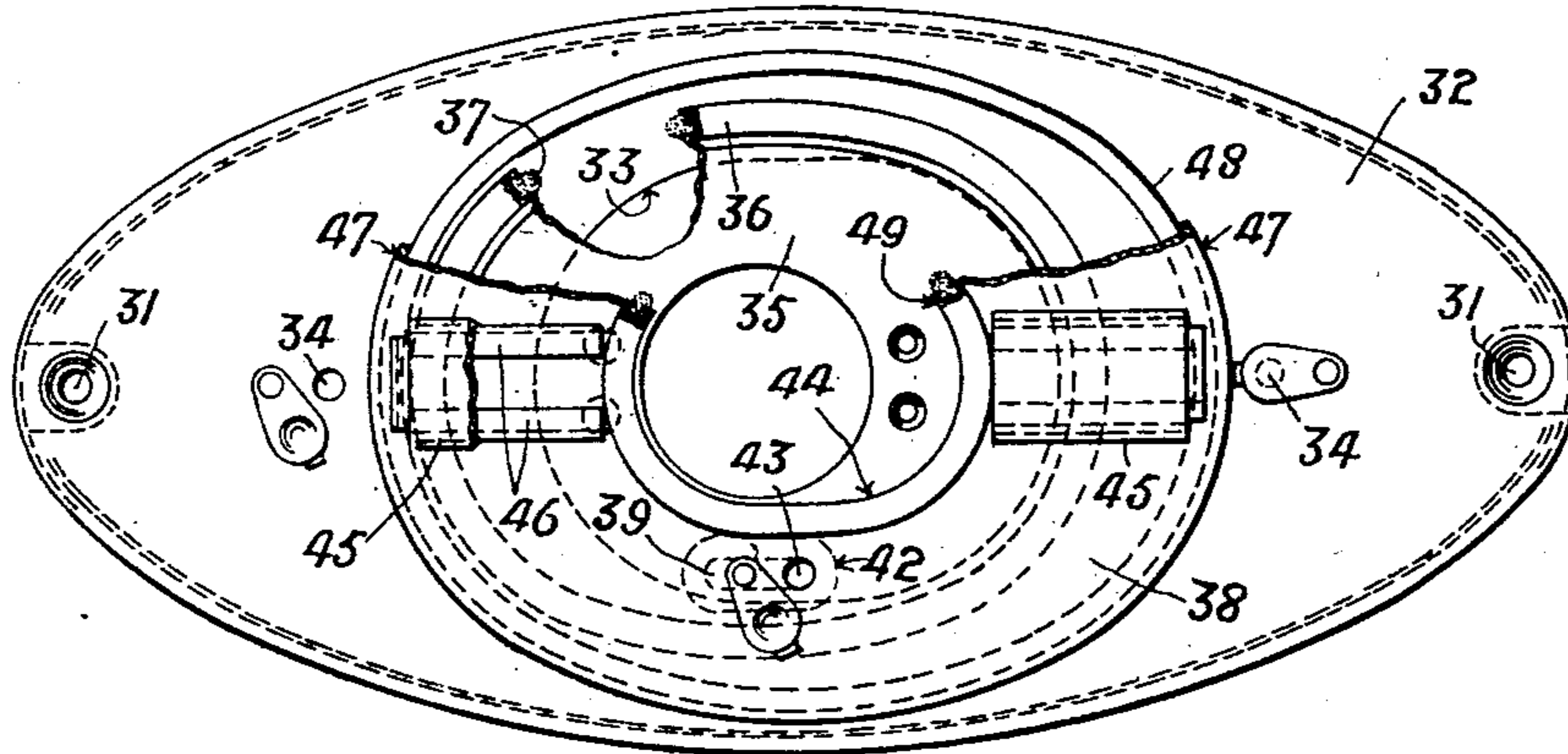


FIG. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM FREDERICK WILLIAMS, OF LONDON, ENGLAND.

ELLIPTIC CHAIN DRIVING-GEAR.

SPECIFICATION forming part of Letters Patent No. 702,842, dated June 17, 1902.

Application filed January 15, 1901. Serial No. 43,333. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FREDERICK WILLIAMS, a subject of the Queen of Great Britain, residing at 17 and 18 Great Pulteney street, Golden Square, London, England, have invented new and useful Improvements in Elliptic Chain Driving-Gear, of which the following is a specification.

My invention relates to improvements in elliptic chain driving-gear of bicycles and tri-cycles of the kind for which previous Letters Patent were granted to me, dated the 15th day of February, 1898, No. 599,211, wherein the ratio of the gearing is varied during each stroke of each pedal by the use of an elliptic sprocket-wheel for the driving-chain and wherein the sprocket-wheel is shifted in the direction of its own plane by the action of a stationary eccentric, so as to accommodate itself to suit the varying length of chain required at different angular positions of the elliptic wheel.

My present improvements have for object to provide means whereby to exclude dust without interfering with the shifting movement of the elliptic sprocket-wheel.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is an outside face view of the elliptic sprocket-wheel with the dust-excluding covers removed. Figs. 2 and 3 are transverse sections taken on the minor and major axes of the wheel, respectively, the dust-excluding covers being shown. Figs. 4 and 5 are face views of the dust-excluding covers at the outer and inner faces, respectively, of the elliptical sprocket-wheel, parts being broken away and the covers (of which there are more than one at each side of the wheel) being shown in the positions which they would relatively occupy when the sprocket-wheel is in the position relatively to the fixed eccentric shown in Fig. 1.

Similar reference-numerals denote like parts in all the figures.

1 is the crank-axle.

2 is one of the pedal-cranks.

3 is the elliptic sprocket-wheel, connected with the crank-axle 1 (so as to turn therewith, but adapted to move in its own plane in the direction of its major axis relatively to

the crank-axle) by the sliding engagement of arms 4, situated on the major axis, with guide-bearing brackets 5, carried by a pair of arms 6, fast with the boss 7 of the pedal-crank 2. The arms 4 may be stayed, as at 8, by transverse arms or curved brackets from the rim of the wheel, as shown, and the arms 4 terminate at their inner ends in abutment or guide surfaces 9, parallel to and equidistant from the minor axis of the wheel, these surfaces embracing between them the periphery of a stationary eccentric 10, fast with the bracket 11 of the machine-frame, in which the crank-axle has its bearings, as usual. By the revolution of the sprocket-wheel about the stationary eccentric the sprocket-wheel will be caused to receive a to-and-fro traversing motion in its own plane toward and away from the other wheel to be driven by the chain.

In order to prevent the relatively moving parts being clogged with dust, I provide at each face of the elliptic wheel cover-plates made of thin sheet metal and adapted to so inclose the working parts as to exclude dust, while permitting of the relative movement of the wheel 3 and its operative means. To this end there are provided on each side of the wheel three covers coöperating as described, the covers at the two faces of the wheel being slightly different for constructional reasons, as hereinafter explained. To the outer face of the wheel is fixed by screws 31 a main cover 32, fitting closely against the flanged rim of the wheel. This cover has a large central aperture 33 of oblong form extending lengthwise in the direction of the major axis, so as to clear the boss 7 of the pedal-crank, with allowance for the to-and-fro movement of the elliptic wheel relatively to the crank-axle 1. This cover 32 also has oil-holes 34, closed, preferably, by pivoted spring-covers, as shown, the holes coinciding with the oiling-slots 30 in the front walls of the boxes 5. The aperture 33 is closed by a second or intermediate cover 35, fixed tightly to the boss of the pedal-crank, this cover being for convenience of attachment made in halves which may be fixed to the flange of the boss 7 by screws, as shown. The cover 35, which is of oval form, extending lengthwise in the direction of the major axis of the wheel, is

made so much larger than the aperture 33 as to cover the latter in all relative positions of the parts and is adapted to carry a marginal packing, whereby to insure a dust-tight joint 5 between the relatively sliding surfaces of the covers 32 and 35. For this purpose the cover 35 has a groove 36 stamped up around the margin of its inner face, in which groove is secured (by cement or otherwise) a packing 10 37, of fibrous material, consisting, preferably, of cotton-wool, which projects from the groove and bears lightly against the surface of the main cover 32, so as to be as frictionless as possible, there being no direct contact between the two covers. As, however, the joint 15 thus formed might not afford by itself a sufficiently reliable dust-proof closure, this joint is in turn protected by a third cover 38.

To enable the working parts of the eccentric 20 10 before described to be lubricated, an oiling-slot 39 is formed in the cover 35 alongside of a flat 40 on the periphery of the flange 41 of the pedal-crank boss 7, this flat being for the purpose of allowing the nose of an 25 oil-can to be introduced within the space wherein the eccentric works. Around the slot 39 is cemented or otherwise secured a packing-ring 42, of fibrous material, adapted to make with the inner face of the external 30 cover 38 a rubbing joint around an oil-hole 43 in that cover, the hole 43 being closed, preferably, by a pivoted spring-cover. The external cover 38 is also of oval form, extending lengthwise in the direction of the major axis 35 of the elliptical wheel, and has an oblong central aperture 44 to give clearance to the boss 7 of the pedal-crank. The cover 38 is made in halves divided, preferably, along its major axis, as shown, the halves being united by 40 dovetail clips 45, embracing and making a sliding engagement with pairs of dovetail gibs 46 on the back of the cover. This cover 38 is cupped and inwardly flanged around its outer edge, as at 47, and this inwardly-turned flange 45 makes an interlocking engagement with an outwardly-flanged oval rim 48 of corresponding shape formed or fixed on the outer face of the main cover 32, the rim 48 being of such dimensions as to afford clearance for the in- 50 termediate cover 35 in all relative positions of the parts. The inner margin of the external cover 38 around the oblong central aperture 44 is stamped up of grooved form, as shown at 49, and in this groove is cemented 55 a fibrous packing similar to that before referred to, which projects from the inner face of the external cover 38 and makes a light rubbing dust-proof joint with the outer face of the intermediate cover 35.

60 To the inner face of the wheel is fixed by screws 50 a main cover 51, fitting closely against the flanged rim of the wheel. This cover has a central aperture 52 of oblong form extending lengthwise in the direction 65 of the minor axis of the elliptical wheel, so as to clear the fixed eccentric 10 in all angular positions of the wheel relatively thereto.

The aperture 52 is closed by a second or intermediate cover 53 of circular form, having a circular central hole fitting over the cylin- 70 drical screwed portion 18 of the ball-bearing cup of the bearing-bracket 11 of the machine, whereby the cover 53 is supported in position, a distance-collar 54 being interposed between the outer face of the bracket 11 and 75 the back of the cover 53. The diameter of this intermediate cover 53 is sufficient to enable it to cover the aperture 52 in the main cover 51 in all relative positions of the parts, and the cover 53 is adapted to carry a mar- 80 ginal packing, whereby to insure a dust-tight joint between the relatively sliding surfaces of the covers 51 and 53. For this purpose the cover 53 has a groove 55 stamped up around the margin of its inner face, in which groove 85 is secured (by cement or otherwise) a packing of fibrous material, as before described, which projects from the groove and bears lightly against the surface of the main cover 51, there being no direct contact between the 90 two covers. Lest, however, the joint thus formed should not by itself afford a sufficiently-reliable dust-proof closure, this joint is in turn protected by a third cover 56 of 95 oval form extending lengthwise in the direction of the major axis of the elliptical wheel and having an oblong central aperture 57 to give clearance to the distance-collar 54. The cover 56 is made in halves divided, preferably, 100 along its major axis, as shown, the halves being united by dovetail clips 58, embracing and making a sliding engagement with pairs of dovetail gibs 59 on the back of the cover. This cover 56 is cupped and inwardly flanged 105 around its outer edge, as at 60, and this inwardly-turned flange makes an interlocking engagement with an outwardly-flanged oval rim 61 of corresponding shape formed or fixed on the external face of the main cover 51, the 110 rim 61 being of such dimensions as to afford clearance for the intermediate cover 53 in all relative positions of the parts. The inner margin of the cover 56 around the oblong central aperture 57 is stamped up of grooved form, as shown at 62, and in this groove is 115 cemented or otherwise secured a fibrous packing similar to that before referred to, which projects from the internal face of the cover 56, so as to make a light rubbing dust-proof joint with the external face of the intermedi- 120 ate cover 53.

I claim—

1. In a pedal-operated driving-gear in which an elliptic sprocket-wheel is movable in its own plane relatively to its axle but main- 125 tained in driving connection therewith, the combination with the opposite faces of the sprocket-wheel of sets of cover-plates cooperating to exclude dust, and comprising for each set a plate fixed to the wheel and apertured 130 to give clearance for the axle and attached parts relatively to which the wheel is transversely movable, a second or intermediate cover not movable transversely of the axle

and adapted to cover the aperture in the first plate and to make light rubbing contact with said plate, and a third cover-plate attached to the first, adapted to inclose the joint between the first and second plates, apertured to give clearance to the axle and attached parts and adapted to make light rubbing contact with the second or intermediate plate, substantially as specified.

10 2. In a pedal-operated driving-gear the combination with a sprocket-wheel movable in its own plane relatively to the axle, of a set of superposed cover-plates whereof the one is attached to the sprocket-wheel and movable
15 therewith relatively to the other, and is apertured to clear the said axle and attached parts in all positions of the wheel, and of a dust-excluding packing surrounding the aperture of the movable plate, and formed of fibrous
20 material attached to and projecting from the face of the one cover and pressing against the adjacent surface of the other cover-plate, substantially as specified.

25 3. In a pedal-operated driving-gear the combination with a sprocket-wheel movable in its own plane relatively to its axle, of a set of superposed cover-plates whereof the one is attached to the sprocket-wheel and is movable
30 therewith relatively to the other, and is apertured to clear the said axle and attached parts in all positions of the wheel, and of a dust-

excluding packing surrounding the aperture of the movable plate, and formed of fibrous material held in and projecting from a groove formed in the one plate and projecting there- 35 from so as to press against the adjacent surface of the other cover-plate, substantially as specified.

4. In a pedal-operated driving-gear the combination with a sprocket-wheel movable in its own plane relatively to its axle, of a series of three superposed cover-plates comprising a plate attached to the wheel and apertured to clear the axle and attached parts in all positions of the wheel, an intermediate plate at- 45 tached to the axle-hub and covering the said aperture, an outer cover-plate apertured to clear the axle, overlapping the margin of the intermediate plate and in interlocking connection with the first plate so as to move there- 50 with, and fibrous packings respectively surrounding the said apertures, said packings being respectively attached to and projecting from the face of the one of two adjacent plates and bearing against the other plate, so as to 55 make a dust-excluding sliding joint between the two adjacent plates as described.

WILLIAM FREDERICK WILLIAMS.

Witnesses:

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C. G. CLARK.