

No. 646,581.

Patented Apr. 3, 1900.

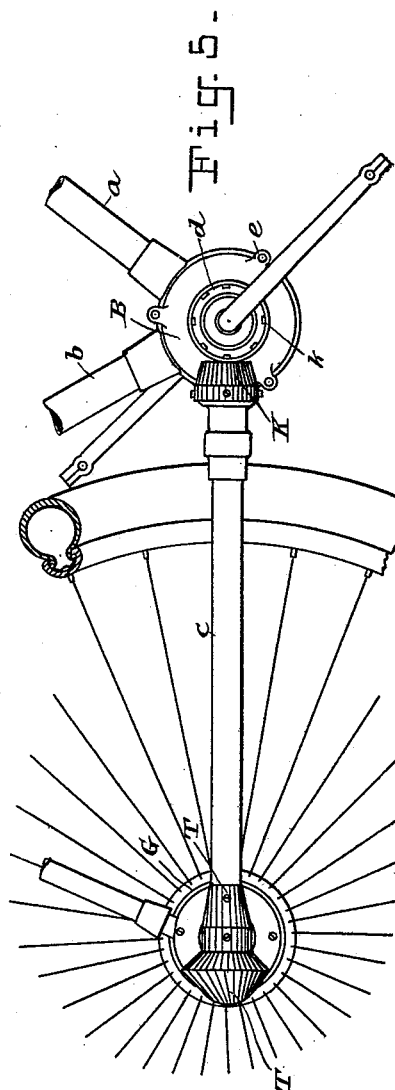
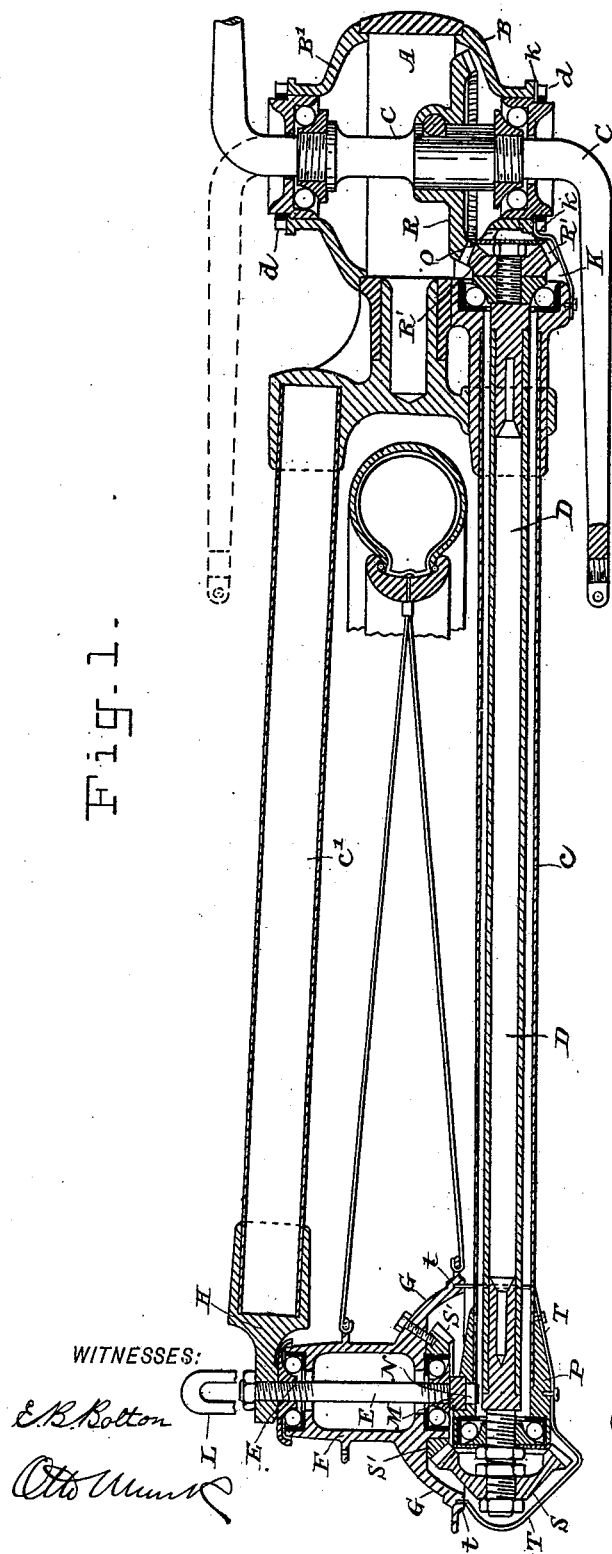
J. H. MANTEL.
GEARING FOR DRIVING CYCLES.

(Application filed Aug. 28, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

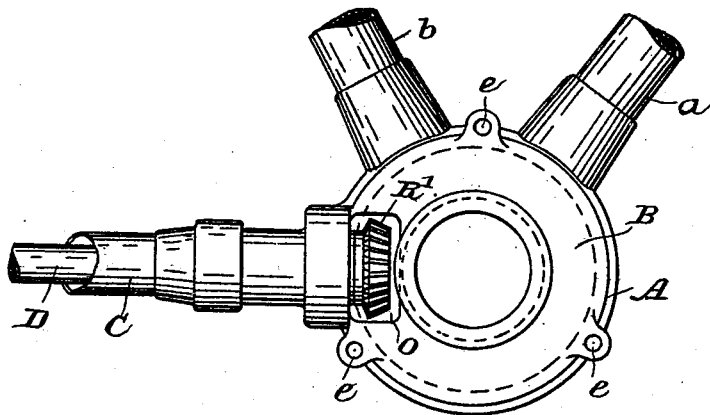


Fig. 2.

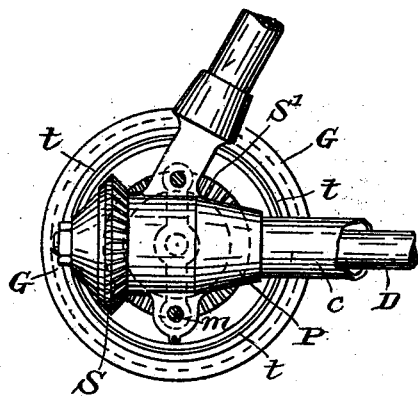


Fig. 3.

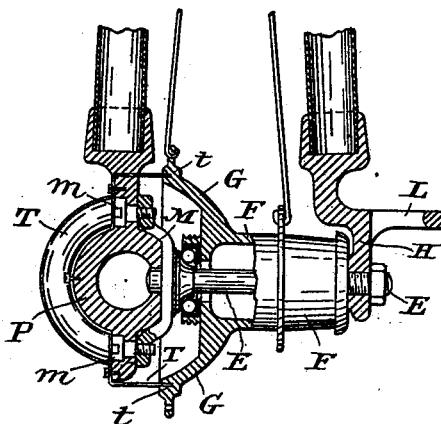


Fig. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JACOB HENDRIK MANTEL, OF VYFHUIZEN, NETHERLANDS.

GEARING FOR DRIVING CYCLES.

SPECIFICATION forming part of Letters Patent No. 646,581, dated April 3, 1900.

Application filed August 28, 1897. Serial No. 649,849. (No model.)

To all whom it may concern:

Be it known that I, JACOB HENDRIK MANTEL, a subject of the Queen of Holland, residing at Vyfhuizen, Haarlemmermeer Noord, Netherlands, have invented a certain new and useful Improvement in Gearing for Driving Cycles, of which the following is a specification.

My invention relates to gearing for rear-driving cycles and the like or what is known as the "chainless" system, that form usually designated the "Acatene" being the class of gearing to which my invention applies. Such form, as is well known, consists of an arrangement of bevel-gears on the crank-bracket and a similar arrangement at the back wheel, the two sets of gears being connected by a driving-shaft and inclosed in casings.

The objects of my invention are to provide an extremely compact and effective arrangement of the parts, including the dust-tight casings, and to equalize the strain on the bevel-gear to which the power is first applied.

In carrying out my invention I arrange the bevel-gear last referred to inside the crank-bracket in such a way that the power applied to the crank-shaft is taken equally by two sets of ball-bearings, which are placed outside the said gear. This arrangement is highly desirable not only in this form of driving by means of bevel-gears, but in sprocket-wheel and chain driving also, where the equal loading of both bearings is a point which has been much tried for. The arrangement also enables a very effective construction of crank-bracket to be obtained, such bracket almost entirely inclosing the gear with the assistance of the bearings, which are constructed as caps, the removal of which enables access to be had to the gear, while the construction also enables the cranks and the axle to be made in one piece and to be withdrawn together with the bevel-gear, if desired.

In the accompanying drawings, in which is illustrated one form of my invention, Figure 1 is a sectional plan of the gear as applied to a bicycle. Fig. 2 is an elevation of the crank-bracket alone. Fig. 3 is an elevation of the hub of the back wheel and driving-gear. Fig. 4 is an end view of same, partly in section. Fig. 5 is an elevation of a part of a bicycle

to show an exterior view of the gearing as cased in.

The crank-bracket is enlarged to form a narrow ring A, with which the tube *a*, the diagonal tube *b*, and the lower back fork-tubes *c c'* are connected, as shown. The ring A is inclosed on either side by covers B B', which carry the ball-bearings for the crank-axle C. The distance between the bearings is made as great as possible, and the bearings themselves are secured in the covers B B' by screw-threads and are locked therein by screw-rings or nuts *d*. The covers B B' are affixed to the ring A by means of three or more screws or pins *e*, Fig. 2, passing through suitable lugs on the covers.

Between the ball-bearings and on the crank-axle C is the large bevel-gear R, which is firmly affixed to the axle. This gear engages with a smaller gear R', which is secured to the end of the driving-shaft D, mounted in the back-fork tube *c*. This tube *c* carries a socket *c'* at the end, which is recessed for the reception of the ball-bearings of the shaft D, which shaft is preferably in the form of a tube. By mounting this shaft within the tube no moving parts are present on the outside of the machine, which prevents the working of dust into the parts.

At the point where the gears R and R' come in contact an opening O is formed, Figs. 1 and 2, in the cover B, and all that is necessary to render the entire bracket and the driving-gears at this point dust-proof is to cover this opening. This is effected by means of a cap K, of thin sheet metal, which for convenience of attachment is preferably made to inclose the ball-bearing on the driving-shaft, as shown, and is enlarged into a ring *k*, which is placed over one of the bearings and secured to same by means of the adjusting screws or nuts *d*. The crank moves freely past this cap K. It will be seen that after removing the covers B B' the crank C, with the bevel-gear R and even the pedals, can be taken out of the bracket, so that the crank-axle and cranks can be made all in one piece, if desired.

The diameter of the bracket A is regulated by that of the gear R. In ladies' cycles, which are not geared so high, usually, as men's, the part is correspondingly smaller

and but slightly exceeds in size the bracket of a chain-driven machine.

As the large gear R is arranged between the crank-bearings and therefore faces the other way to that usually employed, the gear s, mounted on the rear end of the driving-shaft D and engaging with the bevel-wheel S' on the back wheel must be situated behind the spindle E of the back wheel to secure a reversal of the motion.

The gear S is attached to the driving-shaft D by screwing it thereto, adjusting-nuts being employed to hold it in position, and to provide for the reception of these nuts and the ball-bearings of the shaft D it is dished or formed the shape of a bell, as shown.

The hub F of the back wheel revolves on the fixed spindle E and is provided with a set of ball-bearings on either side. To this hub is secured the other bevel-gear S', which is preferably constructed to surround the ball-bearings on that side and is arranged within a bell-shaped enlargement G of the hub, the outer periphery of which serves for attachment of the spokes at that side of the wheel. This bell or enlarged part G serves also for the attachment of the dust-cap covering the bevel-wheels.

The attachment of the back-wheel spindle E to the back-fork tubes *c c'* is effected as follows: The left-hand end is fastened merely by a screw and nut onto the end of the socket II of the tube *c'*, the step L being preferably fixed a little higher up on the socket II instead of on the spindle, so that the bending of the spindle, which sometimes occurs in mounting the machine, is avoided. The opposite end of the spindle E is provided with a yoke M and carries a centering-stud N, which fits into a corresponding hole in the socket P of the back-fork tube *c*, Figs. 1 and 4, or the spindle E may project through for this purpose. The upper and lower ends of the yoke M are bent around this socket and are secured thereto by means of screws *m m*, as shown. By this arrangement not only is the exact position of the spindle obtained, but it is also rigidly attached to the frame and is also prevented from turning when the ball-bearings are being adjusted.

The driving-gear is so arranged that the driving-shaft is situated at right angles to the crank-axle and the back spindle, so that the bevel-wheels stand at right angles to each other, which constitutes a great advantage both in the construction and mounting of the gear, while it enables the bevel-wheels themselves to be also conveniently and accurately adjusted.

The change of speed can be effected by means of the bevel-gear on the back spindle instead of those on the crank-axle, or the task may be distributed between the two sets.

The dust cap or casing T for the back bevel-wheel surrounds the socket P of the back-fork tube or casing *c* and the bevel-wheel S, and its edges engage in an annular groove *t* on the bell-shaped part G of the back wheel. It is fastened to the socket P by means of screws, so that its edges are kept pressed into the groove *t* and against the rotating part G, so as to be dust-tight.

In Fig. 5 only the two dust-caps K and T are shaded, so that their position on the machine is shown more plainly, the whole forming a practical and slightly method of such construction of the driving-gear.

What I claim is—

In combination with a cycle, a pedal-crank hanger comprising the central portion, the covers seated removably one on each side of the central portion and extending outwardly from said seats, the ball-bearings carried by the said covers, the crank-axle, the gear R thereon adapted to be removed through the openings left by the removal of the covers, one of said covers having an opening O and a cap or lid K fitting against the outer side of the cover, the frame-bars of the machine being secured to the hanger and the said covers being removable independent of each other and being independent of the frame-bars, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JACOB HENDRIK MANTEL.

Witnesses:

HENDRIK LOVESMITH KLENAN,
THOMAS HERMANN VERHAVE.