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Patented May 22, 1900.

H. TUTTLE.

MECHANICAL MOVEMENT FOR BICYCLES.

(Application filed Aug. 18, 1897.)

(No Model.)

2 Sheets—Sheet 2.

FIG. 4.

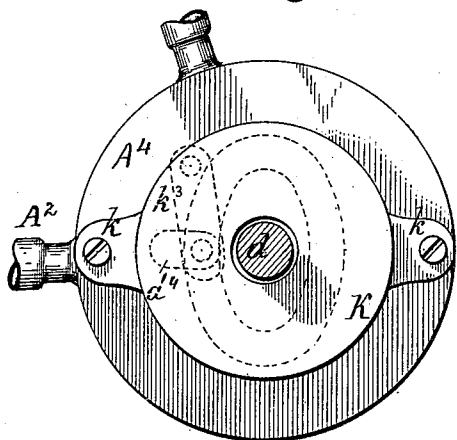


FIG. 7.

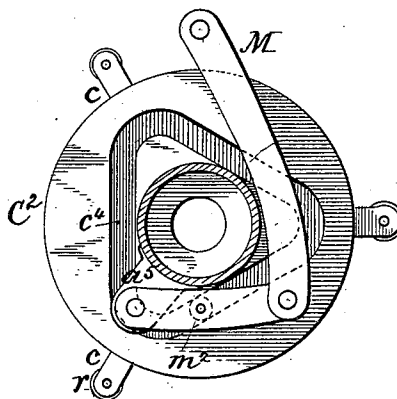


FIG. 5.

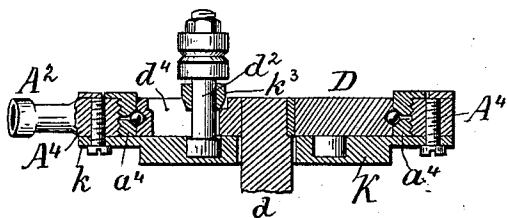


FIG. 8.

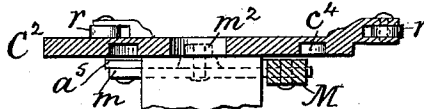


FIG. 9.

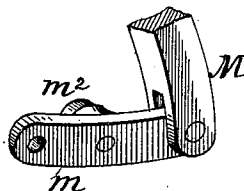
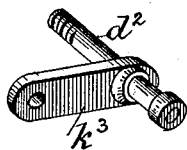


FIG. 6.



WITNESSES

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MECHANICAL MOVEMENT FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 650,344, dated May 22, 1900.

Application filed August 18, 1897. Serial No. 648,723. (No model.)

To all whom it may concern:

Be it known that I, HOSMER TUTTLE, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Mechanical Movements for Bicycles, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to mechanical movements intended mainly for the propulsion of bicycles to take the place of the chain now generally used on safety-bicycles, and thereby reduce the expense and the amount of friction.

Although the construction of the movement can be used in connection with other machines, it is shown in the drawings in connection with a bicycle, the frame of which may be of any suitable form. It comprises stationary cams and oscillating crank-pins connected with the axle of the hind wheel, sprocket-wheels and cams on the axle of the pedal-shaft, and forked connecting-rods to unite said axles, the latter being substantially as described in Patent No. 564,665, granted to me July 28, 1896; but in this improvement cams located upon the pedal-shaft are used in connection with levers having rollers operated by said cams and connecting-rods uniting said levers with the forked connecting-rods, and stationary cams are used to guide the crank-pins of the rear axle, the construction being shown in the accompanying drawings, in which—

Figure 1 represents a side view of a bicycle provided with a mechanism constructed in accordance with my invention, but showing only one of the forked rods. Fig. 2 represents, on a larger scale, a top view, partly in section, of the mechanism. Fig. 3 represents a side view of the same with the pedals and a portion of the horizontal frame and the upper frame removed. Fig. 4 is a side view of one of the ring-bearings of the rear wheel, having therein a disk carrying an oscillating crank-pin, and the cam attached to said ring-bearing to guide the crank-pin. Fig. 5 is a central horizontal section of the parts shown in Fig. 4. Fig. 6 is a perspective view of one of the crank-pins and its supporting-arm.

Fig. 7 is a side view of one of the cams mounted upon the pedal-shaft and connecting-rod used to elevate and depress the front end of the forked connecting-rods of the mechanism. Fig. 8 is a central horizontal section of Fig. 7. Fig. 9 is a perspective view of the roller-carrying arm and a portion of the vertical connecting-rod.

In said drawings, A represents the seat-carrying standard of the frame, and A² the braces between the crank-shaft *b*, carrying the pedals B² and also the sprocket-wheels C and C² and the axle *d* for the hind wheel E. Upon each end of the axle *d* there is keyed or otherwise secured a disk D, having its periphery provided with a grooved ballway. Said disk is received within the annular ball-bearing cones *a*⁴ of a ring A⁴, into which they are screwed. The periphery of said ring is secured to the inclined rear brace and to the side brace A² of the frame. To the inner face of the ring A⁴ is secured a cam K by means of side lugs *k* and screws passing there-through and entering the side of said ring. The groove in said cam is elliptical, with its long axis vertical, to increase the leverage of the crank-pin without increasing the diameter of the sprocket-wheel, as the power of said pin is exerted mainly when it reaches the top and bottom of its course.

To permit the crank-pin *d*² or its roller to follow the groove of the cam, said pin is carried by one end of an arm *k*³, the opposite end of which is pivoted to the face of the disk D. For the passage of the crank-pin to reach the groove of the cam said disk has a substantially-radial slot *d*⁴, that permits it to swing in and out while following the groove of the cam.

A simpler construction can be obtained by dispensing with the cam K and the crank-pin arm *k*³ and having the crank-pin welded upon the face of the disk, as in Patent No. 564,665 above mentioned.

The sprocket-wheel C has projecting from its periphery at equal distances apart three teeth *c*; provided on their ends with antifric-tion-rollers *r* to be received alternately into sprocket receivers or pockets *f*, placed on the front end of the lower branch of a forked connecting-rod F. A similar but inverted pocket

f^2 is placed on the front end of the upper branch of the forked connecting-rod F to interlock with one of the antifriction-rollers r .

The distance between the front ends of the branches of the forked rod F is slightly more, but about equal to, the diameter of the wheel C, with the addition of one of its sprockets or antifriction-rollers. Said distance is maintained by a vertical brace F^2 , uniting said branches, and diverged braces F' , uniting the pocketed end to said brace F^2 . The front portion of the connecting-rod may be suspended from the standard A by means of a link F^3 , as shown by dotted lines in Fig. 1, having its lower end pivoted to the vertical brace F^2 and its upper end pivoted upon a short shaft secured to the standard A; but other means are shown in Figs. 1, 2, 3, 7, 8, and 9. They consist of a camway c^4 , attached to or preferably forming part of each sprocket-wheel C and C^2 . Said camway is in the form of an equilateral triangle, the three sides corresponding with the three sprocket-teeth of the wheel. The portion of the frame constituting the journal-box A^5 for the pedal-axle is provided with radial lugs a^5 adjacent to the sprocket-wheels. To each lug is pivoted one end of a lever m , carrying pivoted on its opposite end a connecting-rod M, the upper end of which is pivoted to the upper branch of the forked lever and controls the up-and-down motion of the forward end of the latter. Intermediate of the two ends of the lever m there is mounted thereon a roller m^2 , that follows the camway c^4 .

The above description relates to the left-hand half of the driving mechanism; but the mechanism on the right-hand side is exactly similar and consists of the forked connecting-rod G, having the brace G^2 , carried by a similar lever and connecting-rod; but the three sprocket-teeth and the three sides of the cam are so timed relatively to the cam and sprocket-teeth of the wheel C as to be about thirty degrees in the rear of each of them.

The frame of the machine is provided with a forward brace A^3 , as usual.

In the operation of the mechanism the rocking up and down of the rear end of the connecting-rod F or G causes an inverse motion of the front end of said rod. In other words, when the left-hand crank-pin d^2 or the rear end begins to ascend and passes above a horizontal line passing through the center of the rear shaft its front end descends and its sprocket f^2 receives into engagement one of the uppermost sprocket-teeth, and said sprocket-tooth in its revolution pulls upon the rod F and continues to revolve the rear axle. When the crank-pin d^2 descends below the center of the shaft, the front end of the rod F ascends and its pocket f receives into engagement the bottom sprocket-tooth of the wheel C, and said sprocket-tooth pushes the connecting-rod F rearwardly and continues to revolve the rear axle. As there must necessarily be some moments in which the pockets of the rod

F are not in engagement with the antifriction-roller of either a top or a bottom sprocket-tooth the duplication of the mechanism is required to actuate the rear axle during these intermediate movements. The sprocket-teeth are preferably made to project slightly on one side of the sprocket-wheel, so that the body of the latter will not be in the way of the hooked ends of the connecting-rods, and thus said teeth can be made shorter. As there is only one tooth, or at the most a portion of two teeth, in engagement with the connecting-rods, and said teeth are provided with antifriction-rollers the friction is reduced to the minimum possible.

The diameter of the sprocket-wheels and the number of teeth they are to carry can be selected according to the speed of motion that may be desired.

Having now fully described my invention, I claim—

1. In a bicycle, the combination of a sprocket-wheel on the pedal-shaft, a forked lever having one end adapted to engage with said sprocket-wheel, and its opposite end provided with a journal-bearing to receive a crank-pin, the axle of the rear wheel, a disk mounted thereon, the frame of the machine carrying a ring receiving said disk and interposed ball-bearings, a cam secured to said ring and having an elliptical guideway, a crank-pin-carrying arm pivoted to the disk and a crank-pin passing through a slot in said disk and into the guideway substantially as described.

2. In a bicycle the combination of a sprocket-wheel on the pedal-shaft, a forked lever having one end adapted to engage with said sprocket-wheel and its opposite end provided with a journal-bearing to receive a crank-pin, the axle of the rear wheel, a slotted disk mounted thereon, an arm pivoted to said disk and carrying a crank-pin, a grooved cam fixed to the frame by which the end of the crank-pin is guided, the horizontal braces of the machine carrying a ring in the same plane as said disk and receiving the latter substantially as described.

3. In a bicycle, the combination of the axle of the rear wheel carrying a crank-pin, a forked lever having one end receiving said crank-pin and the opposite end provided with means to engage with a sprocket-wheel, said sprocket-wheel on the pedal-axle, a cam secured to the sprocket-wheel, the journal-bearing of the pedal-axle provided with external lugs, a lever pivoted to one of said lugs and carrying a roller for engagement with the cam and a rod connecting said lever with the forked lever substantially as described.

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

HOSMER TUTTLE.

Witnesses:

E. E. MASSON,
A. B. DEGGES.