

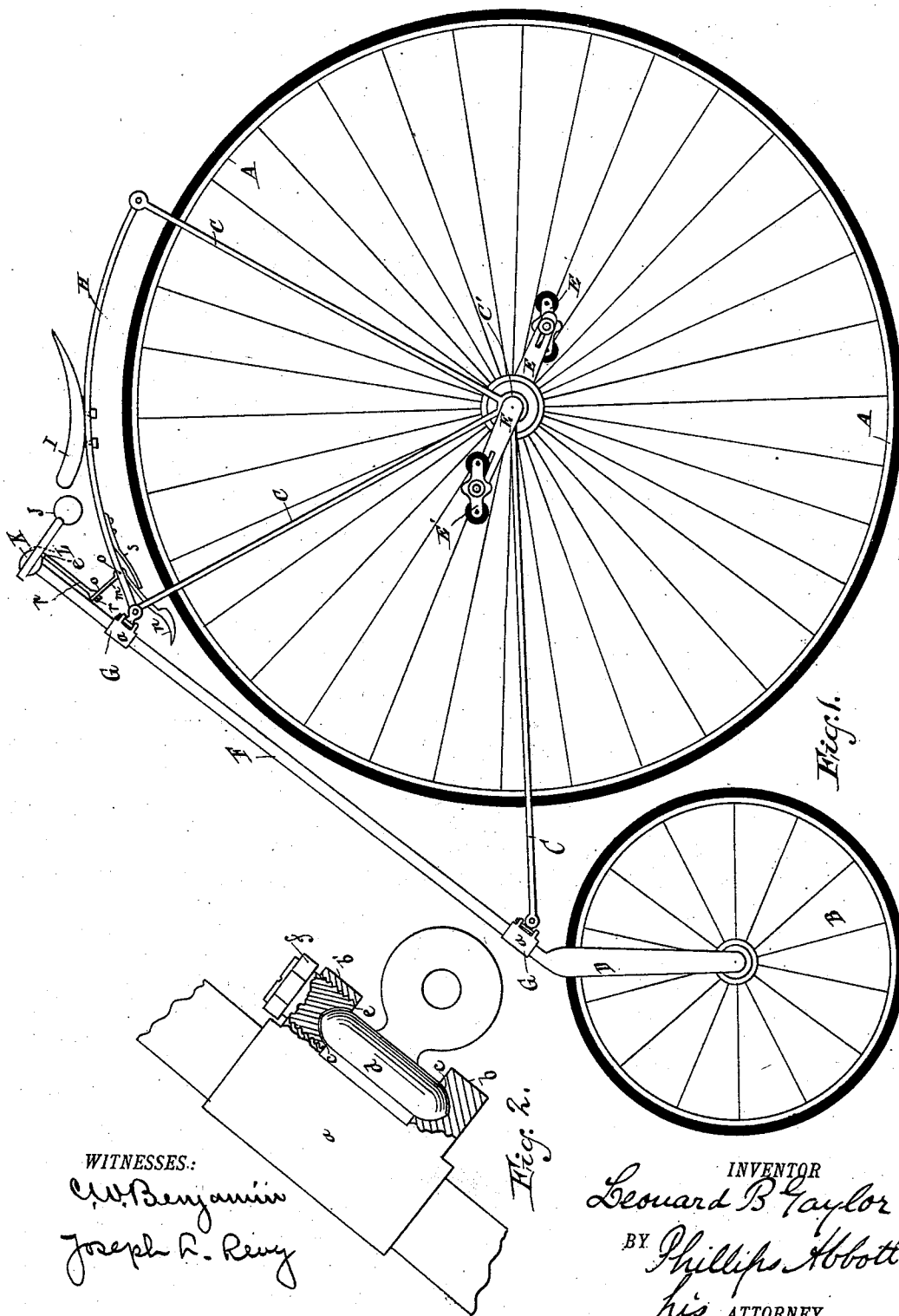
(No Model.)

2 Sheets—Sheet 1.

L. B. GAYLOR.
BICYCLE.

No. 361,280.

Patented Apr. 19, 1887.



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UNITED STATES PATENT OFFICE.

LEONARD B. GAYLOR, OF STAMFORD, CONNECTICUT.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 361,280, dated April 19, 1887.

Application filed October 28, 1886. Serial No. 217,472. (No model.)

To all whom it may concern:

Be it known that I, LEONARD B. GAYLOR, a citizen of the United States, and a resident of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Bicycles, of which the following is a specification.

My invention relates to improvements in that class of bicycles which are commonly known as the "Star" machine, the characteristic feature of which is a small steering-wheel placed in front of the main or driving wheel, both wheels being united in proper relation to each other by a suitably-constructed frame.

The invention, more particularly stated, consists in devices whereby the wear in the hinge or swivel device between the reach of the machine and the frame to which it is attached may be taken up to avoid rattling, and also to improvements in the construction of the frame and in the pedals or driving mechanism of the machine.

Heretofore all Star machines, so far as I am aware, have been driven by means of pivoted treadle-levers—such, for example, as are shown in the United States Patent No. 321,819, dated July 7, 1885—said levers being fulcrumed to some suitable part of the frame of the machine, and which engaged by suitable mechanical appliances with a clutch attachment, or its equivalent, located at or near the axis of the main wheel, thus avoiding complete revolution of the treadles and substituting therefor a reciprocating movement; and this construction was deemed essential, principally because of the fact that the saddle had of necessity to be placed somewhat forward of a vertical line through the axis of the main wheel in order to avoid tipping over backward, and this was supposed to render the use of ordinary crank-treadles impossible because of the distance between the feet of the rider and the foot-plate of the treadles during a part of their revolution. This belief I considered erroneous, and not only that it was erroneous, but that a Star machine was even better adapted to be driven by the ordinary crank-treadles than the rear steering-wheel machines; and after a number of experiments and practical demonstrations of the various lines of gravitation relative to the axis of the main wheel, result-

ing from the great variety of positions assumed by the body in riding, I have ascertained the fact that if the wheel be not too large, and if care be exercised when letting the wheel run on downgrades, that the Star machine can be driven with the ordinary crank-treadles better than with the pivoted lever-treadles. These reasons are principally as follows: While working the crank-treadles in the rear-steering machine, the body is always forwardly inclined. This position the rider assumes almost unconsciously, because he desires to get as far up on top of his wheel as he dares without danger of tipping over forward, in order that he may apply his own weight in direct lines on the treadles, instead of propelling the machine by a pushing action only. Now, inasmuch as the power for the purposes of propulsion is available only in the forward half of the circle described by the cranks, and practically only in the most forward one-third part of that circle, it follows that the best construction for a bicycle is that in which the body can be so placed that its weight may be most advantageously employed in that third part of the circle—in other words, forward of a vertical line through the axis of the wheel. This could not be done in a rear-steering-wheel machine, because it would immediately tip over forward; but in the Star machines this is the very position in which the body must rest in order to prevent tipping over backward. I have further found that there is no difficulty whatever in keeping the feet in contact with the foot-plate of the crank-treadles when used on the Star machine during its entire revolution, because the natural movement or action of the leg after making each tread is to elongate slightly and to flex rearwardly, mostly at the knee; and I have found by actual experiment that the above stated facts enable a skilled rider to use the ordinary crank-treadles on the Star machine with very satisfactory results, and the advantages resulting therefrom are not only greater power, but also a very considerable reduction in the weight, the cost and repair account of the machine, and in a more graceful and artistic appearance. I have also found that the swivel or hinge attachments now in use, which enable the reach of the Star machine to be oscillated relative to the main frame, are

peculiarly liable to wear, and when worn produce a very objectionable rattling noise.

My invention also extends to means whereby the wear of these parts may be taken up as often as desired, and also to improvements in brake devices to be used in connection with the swivel devices.

In the drawings like reference letters indicate like parts in all the figures.

Figure 1 illustrates a side plan view of the machine with the parts in position. Fig. 2 illustrates an enlarged view, partly in section, of the take-up swivel attachment. Fig. 3 illustrates an enlarged view, partly in section, of a modified construction of the take up swivel attachment. Fig. 4 illustrates my improved brake device used in connection with the take-up swivel attachment illustrated in Fig. 2. Fig. 5 illustrates another form of brake device used in connection with the swivel attachment illustrated in Fig. 3. Fig. 5* illustrates the brake detached. Fig. 6 illustrates a modified form of swivel attachment, shown in section.

A is the main or driving wheel. It is preferably of the usual suspension type.

B is the small or front steering-wheel.

C C C are the main frame. It is made double, or, in other words, like halves on either side of the main wheel A; but instead of coming together at a point somewhat above the axis of the wheel, as usual in the Star machine, all the inner ends of the frame-rods C C C come together directly at the center of the hub of this wheel, and the axle or shaft thereof passes through the flat disk-like part C', formed by the union of these several rods.

D is a frame, also made double, as usual, which incloses the small steering-wheel B.

E are the treadle-cranks. They are of the ordinary crank type and are attached directly to the ends of the axle of the main wheel A in any preferred manner. They are provided with any desired foot-plates E'.

F is the reach, preferably hollow, which connects the main wheel with the steering-wheel. The frame D is rigidly attached to the lower end of this reach. The reach is connected to the outer ends of two of the rods C C C, constituting the main frame, by two swivel or hinge connections, G G. These are composed of a collar-like part, *a*, (see Fig. 2,) which encircles the reach, and are rigidly attached to it. They are provided on one side with two projecting lugs, *b b'*, in the inside of one of which a suitable recess, *c*, is made, (shown conical in the drawings,) which is adapted to receive one end of the swivel coupling-piece *d*, which is rigidly attached to the ends of the appropriate rods C C C of the main frame. The other lug, *b'*, is bored out and threaded to receive a screw-plug, *e*, the inner end whereof is recessed similarly to the recess in the lug *b*, to receive the opposite end of the swivel coupling-piece *d*. The screw-plug is provided with a jam-nut, *f*, whereby the plug, after being properly adjusted, may

be set firmly in place. By means of these devices any wear on the ends of the swivel-piece *d* can be readily taken up by simply loosening the jam-nut *f*, screwing up the screw-plug *e* until all wear is taken up, and then setting up the jam-nut again.

H is the spring saddle-bar.

I is the saddle, attached to the saddle-bar in any preferred manner. It is set slightly forward of a vertical line through the axis of the main wheel.

J are the steering-handles, set on the ends of the handle-bar K, which is attached centrally to the upper end of the reach.

L is the brake-lever. It is fulcrumed to the handle-bar, and has a projecting end, *e'*, extending beyond the fulcrum and into line with the reach. *m* is the brake proper. It is made in the form of a substantially right-angled lever. One end terminates in the brake-plate *n*, and the other end, which turns upwardly toward the reach, terminates in an eye, *o*. The brake is pivoted at *o'* to the saddle-bar, or to some other suitable part of the machine. *p* is a connecting-rod, which is attached at one end by a pin, *q*, or its equivalent, to the end *e'* of the brake-lever, and at its other end by a swivel-joint, *r*, to the eye *o* on the upturned end of the brake. S is a spring, which normally throws the brake away from the wheel.

The eye *o* is located exactly in line with the center of the swivel-pieces *d d*, so that when the handle-bar is turned to oscillate the reach the connecting-bar *p* will turn in the eye *o*, and all the parts retain their proper positions without twisting or straining and still allow free action of the brake.

The operation is obvious. The action of the cranks requires no explanation, being well known. The actions of the brake, handle-bar, and reach are also well known and require no explanation, excepting to call attention to the fact that when the reach is oscillated by the handle to move the front wheel to the right or left, for the purpose of steering the machine, the reach does not oscillate on its own axis, but on the axis of the swivels *d* and *d*; and this construction, although having some advantages, has also some disadvantages. I have therefore devised a modified form of swivel attachment and brake, which are respectively illustrated in Figs. 3 and 5. As illustrated in these figures, the reach is cut away for about half its diameter, as seen at M, and a steel sleeve, N, is brazed on the reach at the point where it is thus cut away, to supply the necessary strength. A plug, O, is brazed in the hollow reach at the lower end of the cut-away portion, and at the upper end thereof, on the inside of the hollow reach, threads are cut which mesh into externally-cut threads on a screw-plug, P, which is adapted to be screwed into it, and a jam-nut, Q, is supplied for the plug P, whereby the same operation of parts for taking up wear is attained as in the other instance. Of course the recesses for receiving the ends of the swivel-piece R in these figures

is located centrally in the ends of the plugs O and P, respectively. The reach is cut away sufficiently to allow the needful oscillation of the reach, and also so that a wrench or other suitable tool may be introduced for tightening up the jam-nut and for manipulating the screw-plug. If preferred, the movable screw-plug may be the lower plug at the lower end of the reach, and the upper plug at the upper end thereof, and, being made long enough to extend to the respective ends of the reach, be manipulated from the outside thereof. Such construction I have illustrated in Fig. 6 as applied at the lower end, where the frame D for the small wheel is attached.

When the swivel attachment shown in Figs. 3 and 6 is used, the oscillation of the reach is on its own axis, since the axis of the swivel-pieces R and of the reach coincide, therefore a slight change has to be made in the connection between the brake and the brake-lever, and this is shown in Fig. 5. All the parts are the same as in Fig. 4, with the exception that the connecting-rod *p* does not engage with an eye, *o*, on the upper end of the brake; but, on the contrary, the rod *p* is connected at its lower end with a longitudinally-movable sleeve, *p'*, which slides on the reach, and is provided at its lower end with a flange, against which the bifurcated end of the brake rests, after the manner of a shipper and shipper-sleeve, so that as the sleeve is pressed downwardly by the brake-lever the power will be transmitted to the brake.

Instead of the form of spring shown at *s* in Fig. 4 for normally removing the brake from the wheel, a spiral spring (seen at *s'*) may be employed, coiled about the reach. If such a spring is used, a double flange had better be employed, on the end of the sleeve, as illustrated, and the upper end of the sleeve N be squared, or other suitable means supplied to act as a stop for the lower end of the spring.

Although I have described the construction of the several devices embodying my invention with some detail and have shown modified forms of certain parts thereof, still I wish it to be understood that I do not limit myself to such details, for it will be obvious to any one skilled in this art that many alterations may be made therein and still my invention be employed.

A machine made in accordance with my invention is light, cheap, and durable, and can be propelled with greater speed than an ordinary Star machine. In my machine I have arranged and combined a reach suitably secured to the frame, and cranks and pedals attached to the main wheel in such manner that one person can propel the machine by revolving the pedals, and at the same time have absolute control over the steering mechanism. This, so far as I am informed, has never been successfully or practically accomplished in a bicycle having the small steering-wheel in front.

I am aware that it is not new, broadly stated, to propel a Star machine, or one having the small steering-wheel in front, by cranks and pedals attached to the larger driving-wheel; and hence I do not claim such combination, broadly.

I claim—

1. The combination, in a bicycle having a smaller steering-wheel set in front of the main wheel, of a reach suitably secured to the frame and connected directly with the steering-wheel, whereby the same is operated, and crank-treadles attached to the axle of the main wheel, whereby the machine is propelled by complete revolutions thereof, substantially as set forth.

2. The combination, in a bicycle, of a steering-wheel set in front of the main wheel, the main frame, the seat supported thereon over and slightly forward of the vertical line through the axle of the main wheel, a reach carrying the steering-wheel frame and arranged to be oscillated relatively to the main frame, a steering-bar attached to the reach and arranged to be conveniently operated by the rider, and revolving crank-treadles attached to the axle of the main wheel, substantially as set forth.

3. The combination of the front steering-wheel, the rear driving-wheel, the main frame, an oscillating reach connected with the steering-wheel, swivel-joints having adjustable end bearings, and set-nuts interposed between the main frame and the reach and arranged with their axes coincident with the axis of the reach, and means for adjusting said swivel-joints to take up wear, substantially as set forth.

4. The combination, in a front-steering-wheel bicycle, of a recessed reach re-enforced by a sleeve fastened to the reach at the point of the recess therein, and endwise bearings for a swivel centrally located in the reach and on the axial line thereof, one of which bearings is movable toward and from the other bearing, whereby wear on the swivel may be taken up, substantially as and for the purposes set forth.

5. The described improvement in reaches for front-steering-wheel bicycles, consisting in swivel-joint connected to the main frame of the machine and located in a recess made in the lower end of the reach, and a downwardly-extending threaded bolt, which is recessed at its upper end to receive the swivel, and which is extended through the lower end of the reach and is accessible for adjustment between the frame-pieces of the steering-wheel, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 23d day of October, A. D. 1886.

LEONARD B. GAYLOR.

Witnesses:

JOHN H. IVES,

F. HAMMATT NORTON.