No. 636,639. Patented Nov. 7, 1899.

J. CRESSMAN.

BICYCLE.

(Application filed Apr. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

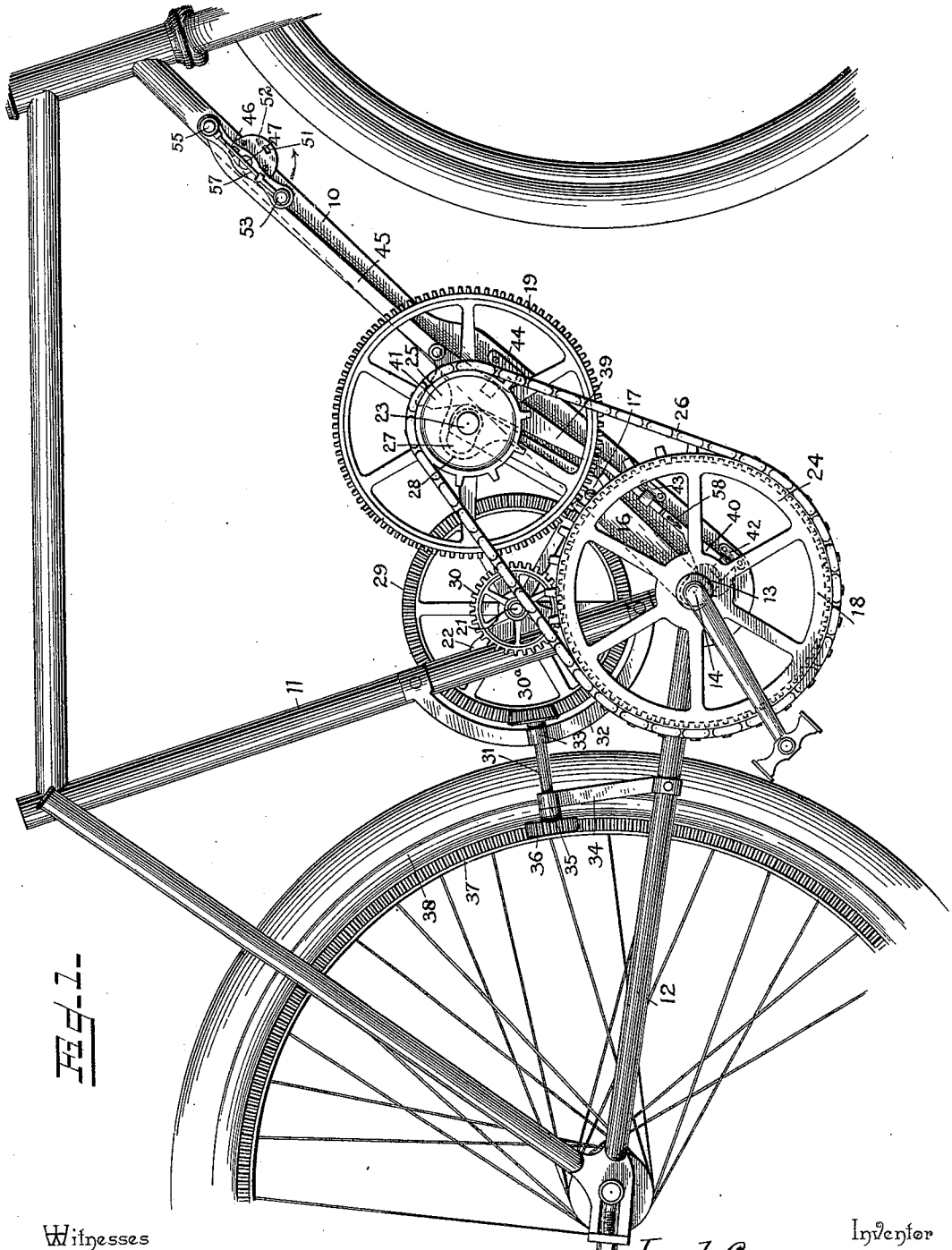

Fig. 1.

Witnesses

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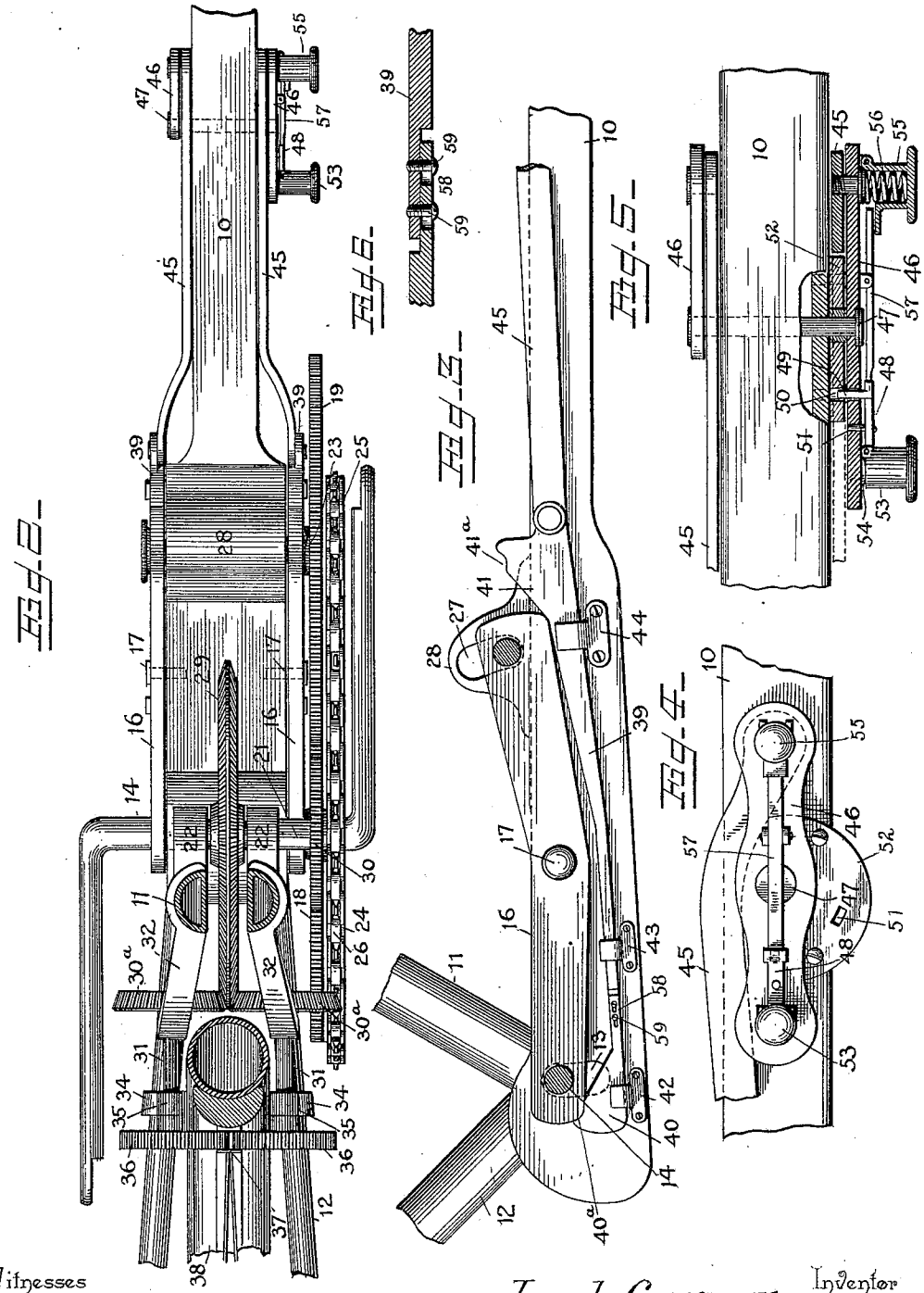

Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH CRESSMAN, OF WASHINGTON, NEW JERSEY.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 636,639, dated November 7, 1899.

Application filed April 28, 1899. Serial No. 714,836. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CRESSMAN, a citizen of the United States, residing at Washington, in the county of Warren and State of New Jersey, have invented a new and useful Bicycle, of which the following is a specification.

My invention relates to bicycles, and particularly to a multiple-gear driving mechanism whereby motion is communicated directly to the driving-wheel without the intervention of a drive-chain.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side view of a driving mechanism constructed in accordance with my invention, together with so much of a bicycle-frame as is necessary to illustrate the arrangement of the parts of said driving mechanism. Fig. 2 is a plan view of the driving mechanism, showing adjacent portions of the frame in section. Fig. 3 is a detail side view of the mechanism for shifting the gear. Fig. 4 is a similar view of the shifting-lever. Fig. 5 is a plan view, partly in section, of the same. Fig. 6 is a detail sectional view of a portion of the rocker-adjusting slide at a point adjacent to the joint.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The driving mechanism embodying my invention is shown applied to a diamond-frame bicycle, wherein the only essential departure from the ordinary construction consists in that of the front brace 10, of which the rear or lower portion is of cross-sectionally flattened or plane-sided form and is provided at its junction with the seat-post tube 11 and bottom run 12 with a segmental slot 13. The crank-shaft 14, to the extremities of which are attached driving-cranks of the ordinary or any preferred construction, is mounted in suitable bearings formed in a rocker 16, consisting of parallel levers fulcrumed, as at 17, at an intermediate point for swinging movement in a vertical plane or in the plane of the frame. The crank-shaft extends through the slot 13, and the swinging movement of the rocker causes the crank-shaft to traverse said slot.

Carried by the crank-shaft and fixed thereto to receive rotary motion therefrom is a main driving-gear 18, and mounted upon the other or front arm of the rocker is a second or auxiliary driving-gear 19, and by the tilting movement of the rocker either of these gears may be arranged in mesh with an intermediate or motion-communicating pinion 30, of which the spindle 21 is mounted in a bearing in the bracket 22, projecting from the seat-post tube 11 or other fixed portion of the vehicle-frame. The arrangement of the parts is such, however, that both of these driving-gears cannot be in mesh at the same time with the intermediate or motion-communicating pinion. Also carried by the crank-shaft 14 and the shaft or spindle 23 of the auxiliary driving-gear 19, and preferably fixed to or formed integral with the gears 18 and 19, respectively, are a chain or sprocket wheel 24 and a chain or sprocket pinion 25, connected by a chain 26, whereby in any position of the rocker speed-multiplied motion is communicated from the crank-shaft to the auxiliary driving-gear. To steady the motion of the rocker, the shaft or spindle 23 extends through a guide-slot 27 in a bracket 28, carried by the front brace 10, said slot being segmental and concentric with the fulcrum 17, as is the slot 13.

The spindle 21 of the intermediate or motion-communicating pinion carries an intermediate or motion-communicating gear 29, arranged in a bifurcation or fork in the lower end of the seat-post tube 3 and preferably constructed as a double-beveled gear, with the teeth at opposite sides of which engage bevel-pinions 30^a on driven shafts or spindles 31, mounted in suitably-fixed bearings supported by the vertical frame. In the construction illustrated the brackets 32 extend rearwardly from the arms of the fork or bifurcation of the seat-post tube and are provided with front bearings 33 for said driven shafts or spindles, and brackets or standards 34 rise from the side members of the bottom run 12 and are provided with rear bearings 35 for said shafts or spindles. At the rear ends of the shafts or spindles 31 are arranged pinions 36, which mesh with an annular op-

positely-toothed rack or driven gear 37, which is secured to the driving-wheel 38, parallel with and adjacent to its rim. Preferably this rack or driven gear is of open-toothed construction, wherein the spaces or intervals between the teeth extend through from one side to the other of the rack or gear to prevent the accumulation of dust and dirt in said spaces or intervals and insure an operative condition thereof, even should the spokes of the wheel cause the contact of dust and trash therewith. Owing to the arrangement of the driven pinions 30 and 36 with relation to the double-beveled gear 29 motion in opposite directions is communicated to the shafts or spindles 31, and hence the inner sides of the pinions 36, which mesh with the rack 37, move in a common direction to communicate motion to the driving-wheel, while the pressure in opposite directions of said pinions 36 serves to maintain the driving-wheel in proper alinement and prevent lateral vibration or straining thereof. When the parts are in the position indicated in Fig. 1, with the main driving-gear meshing with the intermediate or motion-communicating pinion 20, motion is communicated from said main driving-gear directly through the pinion 30 and gear 29 to the pinion-shaft 31, and thence to the driving-wheel. On the other hand, when the rocker is tilted to throw the main driving-gear out of mesh with the pinion 20 and the auxiliary driving-gear 19 intermeshes with said pinion motion is communicated from the main driving-gear through the chain 26 to the auxiliary driving-gear and thence through the pinion 30 and gear 29 to the shaft or spindle 31 for operating the driving-wheel. It is obvious that a greater multiplication of speed will be obtained through the medium of the auxiliary driving-gear than when motion is communicated directly from the main driving-gear to the intermediate or motion-communicating-gear, and therefore it is obvious that the direct communication of motion may be employed when resistance is offered to the propulsion of the machine, as in climbing hills, whereas upon level surfaces the auxiliary driving-gear may be brought into operation to multiply the speed. In practice I prefer to construct the number of the gearing of such relative sizes that when the direct communication is employed one revolution of the driving-wheel will be caused by one revolution of the crank-shaft; but owing to the fact that the rack or driven gear 37 is located near the rim of the driving-wheel this communication of motion can be accomplished with less strain to the operative parts and frame of the vehicle.

In order that the members of the gearing may be maintained in their adjusted positions and may be shifted from one position to the other with facility, I employ a shifting mechanism which in the construction consists of a shifting-slide 39, arranged in operative relation with the rocker, and means for communicating motion to this slide from a point within reach of the rider. I preferably construct the slide of two members, connected for simultaneous movement and arranged, respectively, under the members of the rocker, said rocker, as above described, consisting of laterally-spaced members arranged upon opposite sides of the cross-sectionally flat rear portion of the front brace 10. When this construction is adopted, each slide member is provided adjacent to its extremities with oppositely-disposed cams 40 and 41, spaced apart at an interval slightly in excess of their points of contact with the rocker, whereby when the slide is moved in one direction one of the cams operates upon the adjacent portion of one arm of the rocker to force said arm upward, while the motion of the slide in the opposite direction causes the other cam to coöperate with the second arm of the rocker, and thus reverse the position of the latter. Each cam also terminates in a shallow seat 40^a 41^a, in which the adjacent portion of the rocker is received to form a fixed rest when the rocker is in an adjusted position. The slide is mounted in suitable guides 42, 43, and 44, whereby it is held in position for linear movement and against lateral vibration, and in connection with the slide and guides, as in connection with the several bearings of the rotating elements of the gearing, may be employed antifriction-bearing devices, which, however, may be constructed in accordance with the ordinary practice in this connection, and hence require no specific description herein. Connected with the slide by means of a link or pitman 45 (which may, as illustrated, be duplicated for connection, respectively, with the members of the slide) is a shifting-lever 46, also preferably having members arranged at opposite sides of a vertical plane of the front brace 10 and connected to a common spindle or fulcrum-pin 47, which is mounted in the frame in any preferred manner. Obviously by swinging this shifting-lever in one direction or the other the cam-slide may be shifted longitudinally of the frame to vary the position of the rocker, and thus throw the required gear into operative position to obtain either a power or a speed arrangement of the elements. Also, in connection with the shifting-lever and as a means of securing the same in its adjusted positions, I employ a locking device including a latch, which consists of an intermediately-fulcrumed lever 48, provided upon one arm with a tongue, lug, or projection 49 to engage either of a pair of sockets 50 and 51, formed in a socket-plate 52, which is suitably secured to the frame of the vehicle. The other arm of said latch-lever carries a button 53, yieldingly held in its extended position to maintain the lug in engagement with a socket (or in any position to engage a socket) by a spring 54. By pressing inwardly or toward the plane of the machine-frame upon the button 53 and also downwardly to swing the shifting-

lever upon its fulcrum the parts may be operated to shift the gear. Pressure upon the button 53 will enable the shifting-lever to be turned until the lug 49 engages the socket 51, and in order to provide for returning the shifting-lever to its original position by forward pressure, which may be applied by the foot of the rider, I employ an auxiliary button 55, also pivoted for tilting movement and held in an extended position by means of a spring 56, and arranged in the path of the movable side of this button is one arm of a tilting lever 57, fulcrumed upon the shifting-lever 46 and arranged with the extremity of its other arm under the extremity of the lug-carrying arm of the latch-lever 48. Thus when the lever 46 is in an adjusted position inward and forward pressure upon the button 55 will tilt the lever 57, and thereby disengage the lug 49 from the socket 51 and cause the shifting-lever to swing around until said lug will engage the socket 50. Also, in order to provide for varying the relative positions of the cam-faces on the shifting slide, I construct each member thereof of sections connected by a sliding, preferably slotted, joint, as at 58, bolts 59 being employed to secure the extremities of the slide-sections in an adjusted position. It will be seen that when the cam-faces become worn they may be moved toward each other after loosening said bolts and may subsequently be secured in position to avoid lost motion.

Various changes in the form, proportion, size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. In a bicycle, the combination with a frame and a driving-wheel, of a double-faced, open-toothed rack or driven gear on the driving-wheel, a pinion journaled on a transverse axis and operatively geared to said rack, a rocker fulcrumed at an intermediate point, main and auxiliary driving-gears mounted upon the arms of the rocker for alternate engagement with the pinion, chain-gearing for communicating motion from the main to the auxiliary driving-gear, a rocker-shifting mechanism consisting of a cam-slide extending lengthwise of the rocker and provided with relatively-reversed cam-faced end portions adapted for alternately engaging the opposite ends of the rocker and actuating the same, and means for holding the slide in an adjusted position, substantially as described.

2. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a cam-slide extending lengthwise of the rocker and provided with relatively-reversed cam-faced end portions adapted for alternately engaging the opposite ends of the rocker and actuating the same, and means for holding the slide in an adjusted position, substantially as specified.

3. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a slide extending lengthwise of the rocker and having oppositely-disposed cam-faces at its extremities and concaved terminal seats, for alternate engagement with the opposite ends of said rocker, and means for holding the slide in an adjusted position, substantially as specified.

4. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a cam-slide extending lengthwise by the side of the rocker and provided with the relatively-reversed cam-faced portions at its opposite ends adapted for alternately engaging the opposite ends of the rocker, a shifting-lever mounted upon the frame and provided with locking devices, and connections between said shifting-lever and the slide, substantially as specified.

5. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a cam-slide extending lengthwise of the rocker, and provided with relatively-reversed cam-faced portions at its opposite ends adapted for alternately engaging the opposite ends of the rocker and actuating the same, a shifting-lever mounted upon the frame and having a link connection with the slide, and a latch mounted upon said shifting-lever for engagement with the frame to secure the lever in its adjusted positions, substantially as specified.

6. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the

arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a cam-slide mounted upon the frame, and provided with relatively-reversed cam-faced portions adapted for alternately actuating the rocker, a shifting-lever mounted upon the frame and having a link connection with the slide, and a latch consisting of a tilting lever provided with a lug or projection for engaging a socket in the frame and provided with a pressure-button, substantially as specified.

7. In a driving mechanism for bicycles, the combination with a frame and a pinion, of a rocker fulcrumed at an intermediate point for tilting movement, main and auxiliary driving-gears mounted respectively upon the arms of said rocker for alternate engagement with said pinion, chain-gearing for communicating motion from the main driving-gear to the auxiliary driving-gear, and rocker-shifting mechanism consisting of a cam-slide mounted upon the frame, and provided with relatively-reversed cam-faced portions adapted for alternately actuating the rocker, a shifting-lever mounted upon the frame and having a link connection with the slide, and a latch for securing the shifting-lever in its adjusted position, the same consisting of an intermediately-fulcrumed lever having an arm carrying a lug or projection for engagement with a socket in the frame, a pressure-button, and a return-spring housed within the button for holding the latch-lever in its normal position, substantially as specified.

8. In a driving mechanism for bicycles, the combination with a frame and a pinion, a rocker, gears carried by the rocker and adapted for alternate engagement with said pinion, means for communicating motion to the gears, and a shifting slide for the rocker, of a shifting-lever, a socket-plate traversed by the shifting-lever, a spring-actuated latch for engagement with said sockets and provided with a pressure-button, and a second pressure-button mounted for movement in a common direction with the first-named pressure-button, and operatively connected with the latch, substantially as specified.

9. In a driving mechanism for bicycles, the combination with a frame and a pinion, a rocker, gears carried by the rocker and adapted for alternate engagement with said pinion, means for communicating motion to the gears, and a shifting slide for the rocker, of a shifting-lever, a socket-plate traversed by the lever, a spring-actuated latch mounted upon the shifting-lever for alternate engagement with the sockets of the plate and provided with a pressure-button, a second or auxiliary pressure-button pivotally mounted upon said shifting-lever and having an actuating or return spring, and a tilting lever for communicating motion from the second-named or auxiliary button to the latch, substantially as specified.

10. In a driving mechanism for bicycles, the combination with a frame and a pinion, a rocker, gears carried by the rocker and adapted for alternate engagement with said pinion, and means for communicating motion to the gears, of a shifting slide arranged in operative relation with the rocker and provided with spaced oppositely-disposed cam-faces for engagement with said rocker, said slide being of sectional construction, with its sections connected by a sliding joint, means for securing the sections with the cam-faces of the slide at the desired interval, and means for operating the slide, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOSEPH CRESSMAN.

Witnesses:
A. G. RUSSELL,
GEO. B. BOWERS.