No. 631,973. Patented Aug. 29, 1899.

H. TUTTLE.

BICYCLE.

(Application filed June 10, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig 1.

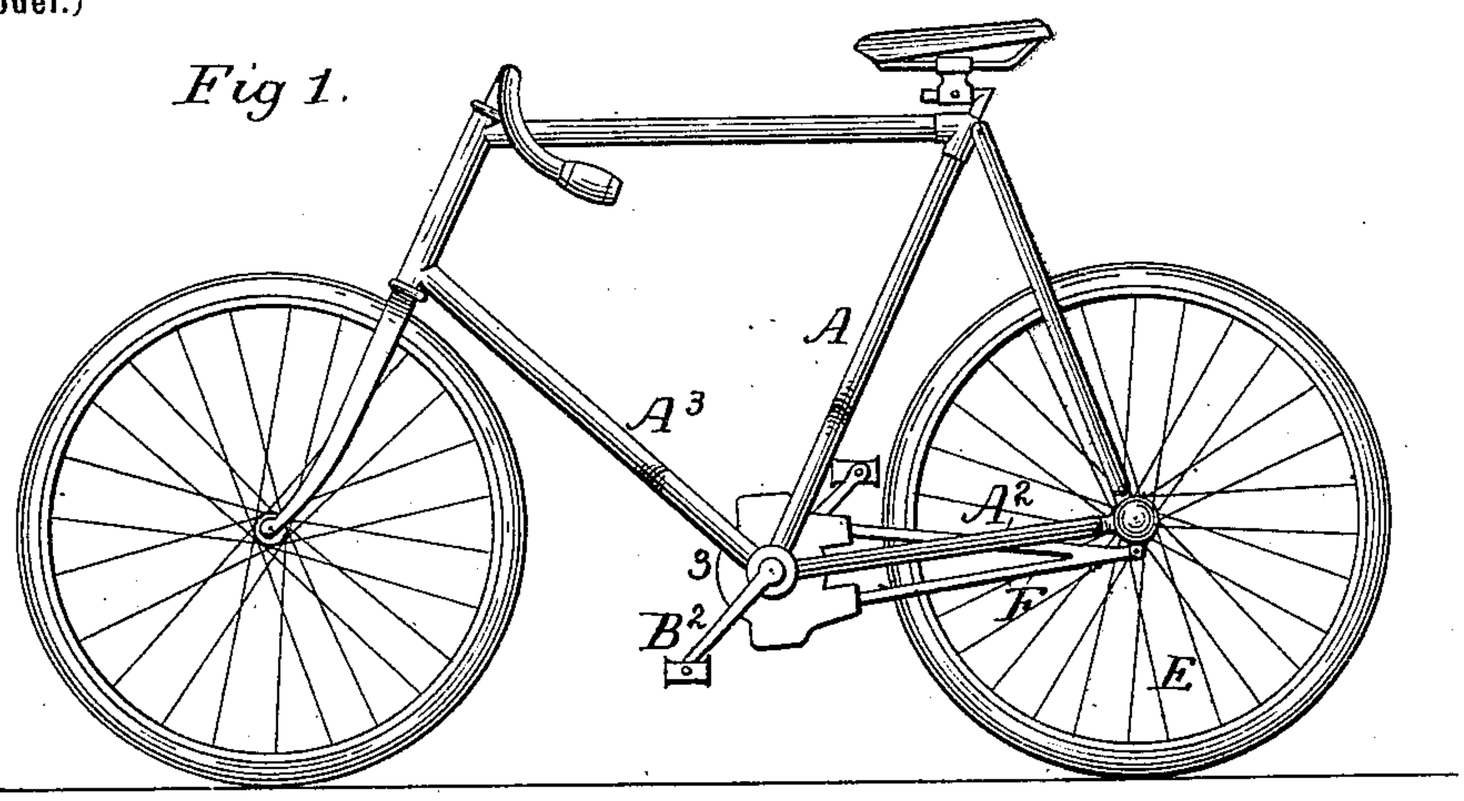
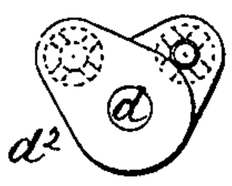


Fig. 2.

Fig. 11.



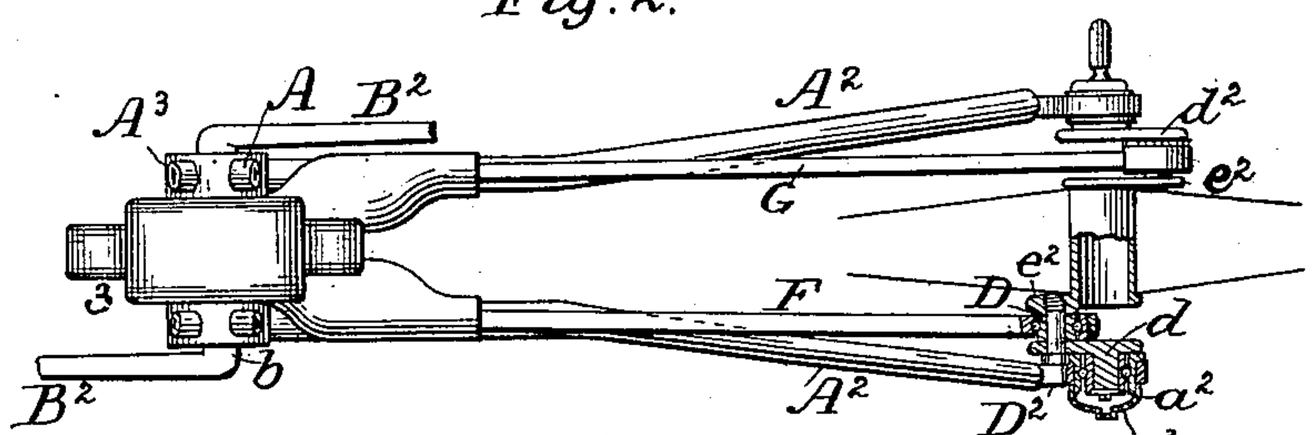
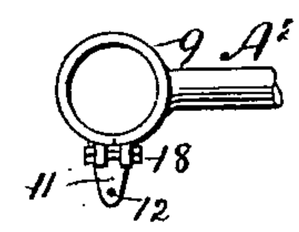


Fig. 3.

Fig. 12.



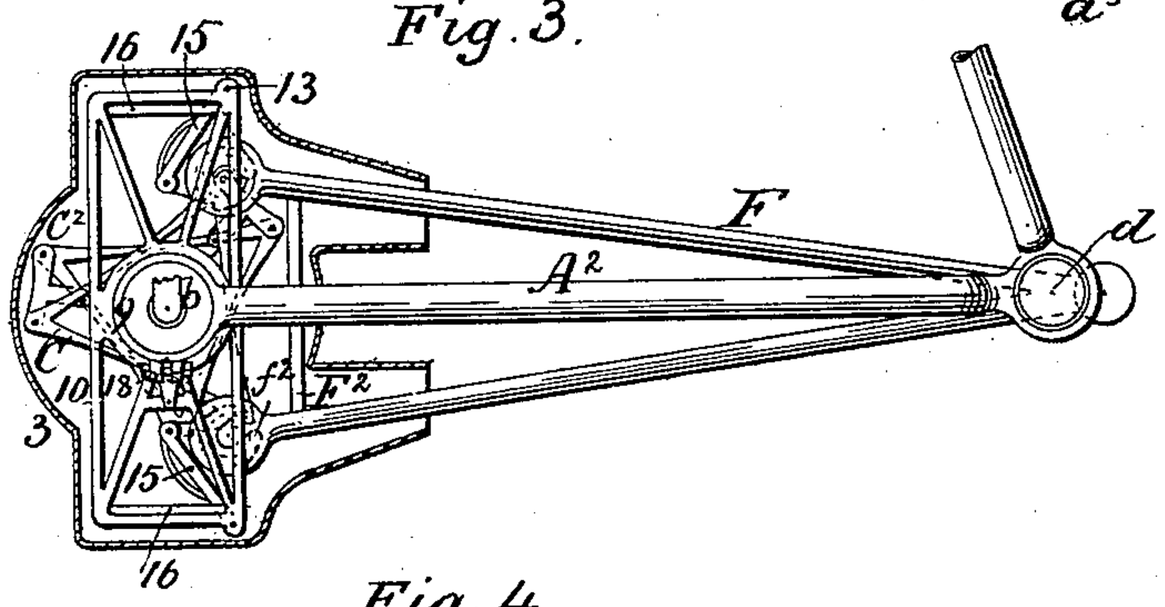
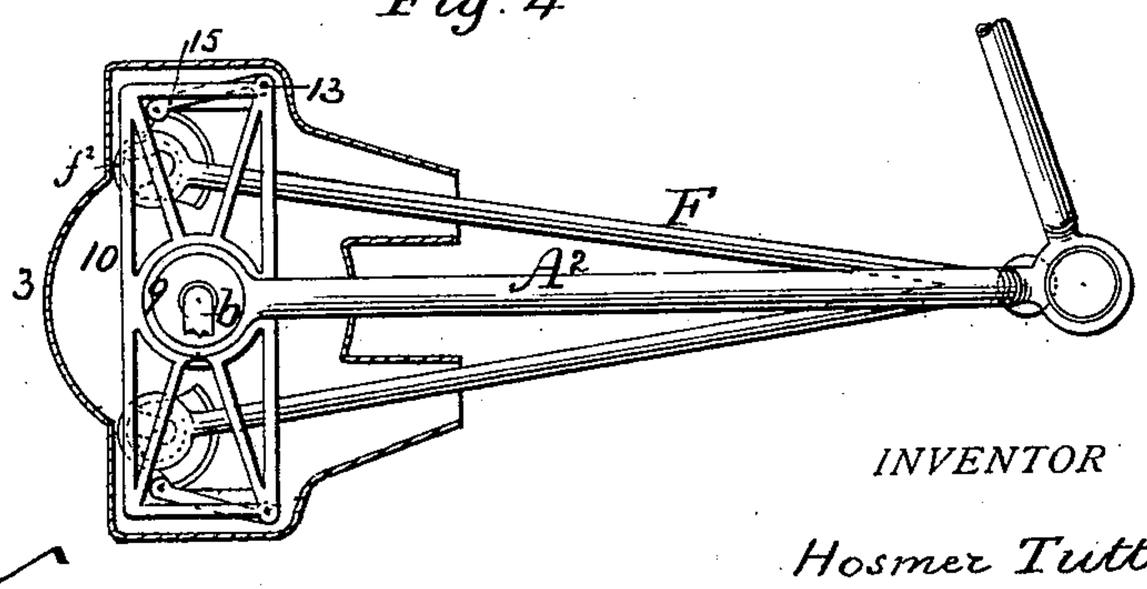


Fig. 4



WITNESSES

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No. 631,973. Patented Aug. 29, 1899.

H. TUTTLE.

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(Application filed June 10, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

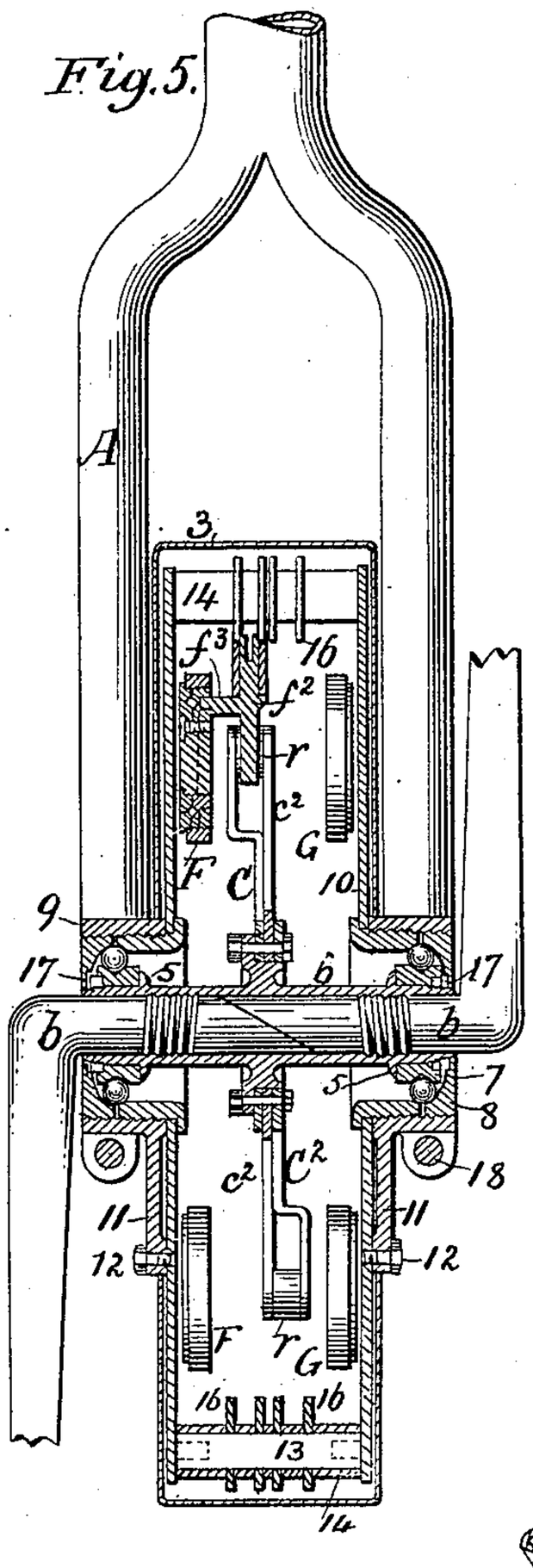


Fig. 6.

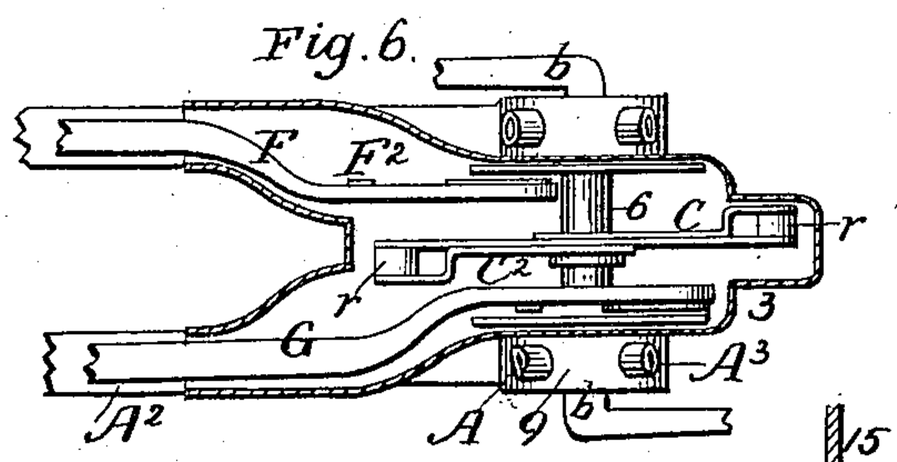


Fig. 7.

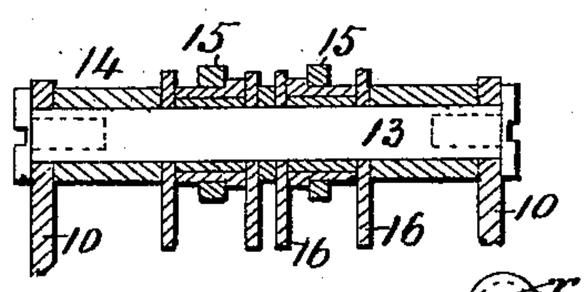


Fig. 8.

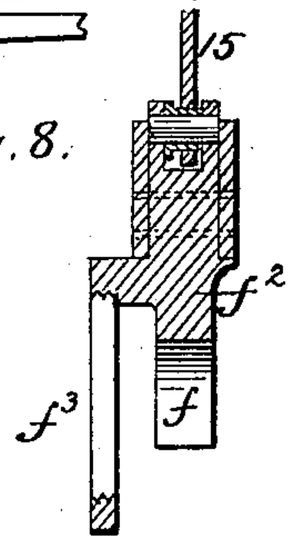


Fig. 9.

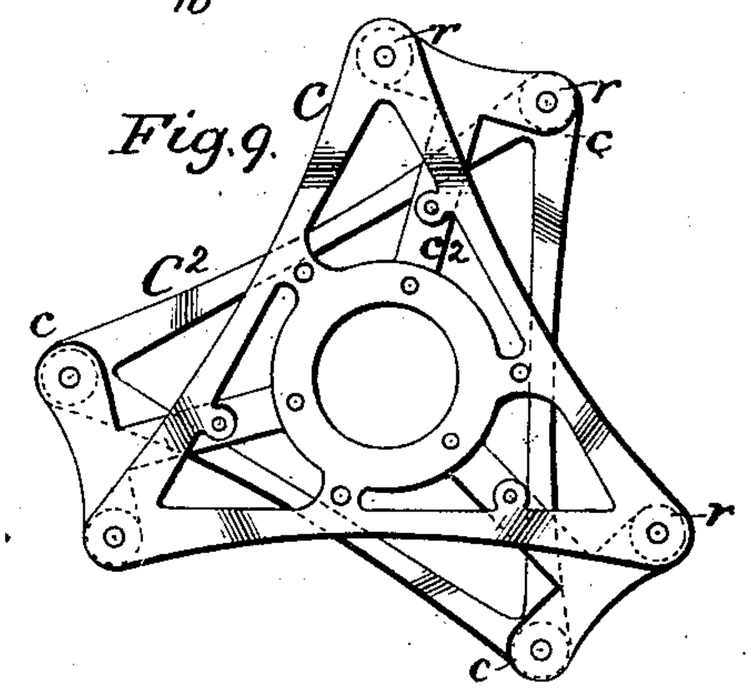
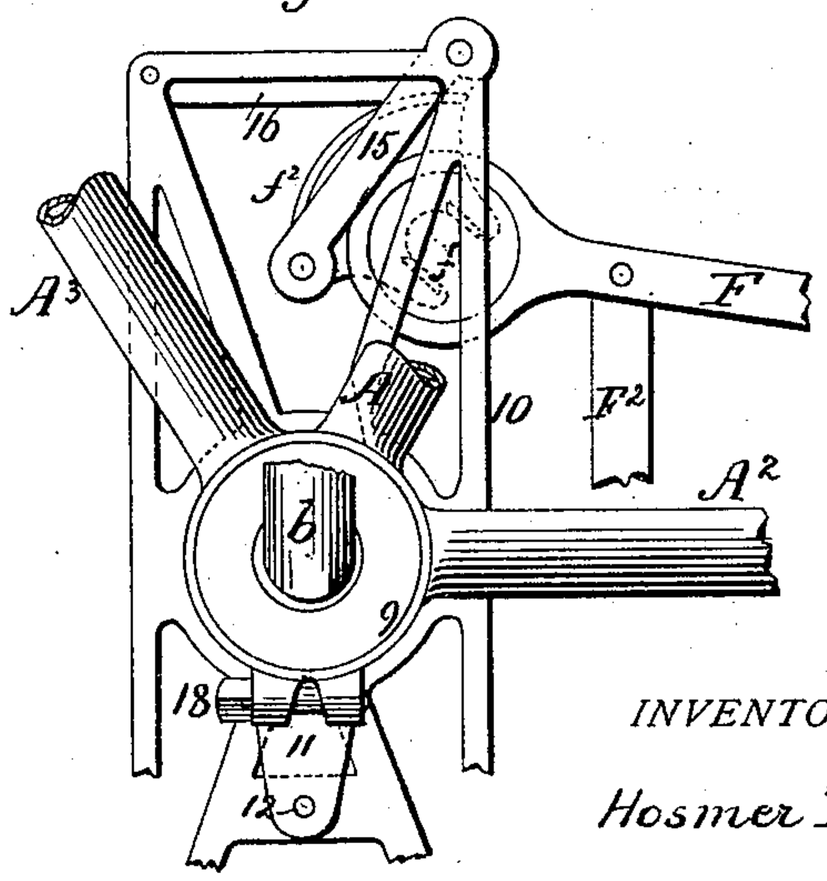


Fig. 10.



WITNESSES

A. B. Dyer

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UNITED STATES PATENT OFFICE.

HOSMER TUTTLE, OF CEDAR RAPIDS, IOWA, ASSIGNOR OF ONE-HALF TO SHELLEY TUTTLE, OF SALT LAKE CITY, UTAH.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 631,973, dated August 29, 1899.

Application filed June 10, 1898. Serial No. 683,103. (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 cranks and crank-pins on the axle of the hind wheel, sprocket-wheels on the axle of the pedal-shaft, and forked connecting-rods to unite said axles, as described in Patent No. 564,665, granted to me July 28, 1896; but in this improvement the location of the hind cranks is within the side frames, the interlocking sprockets are provided with antifriction-rollers, and the ends of the forked connecting-rods are provided with hooked or open-jaw connections adapted to rock in said ends, said hooked rocking connections having a segmental outer periphery adapted to roll back and forth upon plane horizontal surfaces of the frame acting as guides, the rocking of the connections facilitating the noiseless entrance of the sprocket-rollers into said hooked connections and their issue therefrom, and also to compensate for the inequalities of speed of the connecting-rods due to the rear crank's motion, and thus obtain uniform motion of the sprocket-wheel. Other new features will be described in connection with 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 connecting-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 mechanism on one side of the machine with the casing of the sprocket-wheel in section, the rear-wheel crank being in its rearmost position. Fig. 4 is a similar view with the sprocket-wheel omitted and the rear-wheel crank in its foremost position. Fig. 5 represents, on a larger scale, a transverse vertical section of the mechanism on a line passing through the crank-shaft. Fig. 6 is a horizontal section of the pedal-crank-shaft casing in a reversed position, showing a portion of the mechanism therein. Fig. 7 represents, on a still larger scale, the upper bolt of the inner frame carrying the links of the hooked or open-jaw connections of the forked connecting-rods. Fig. 8 is a section of one of the hooked or open-jaw connections. Fig. 9 is a side view of the two sprocket-wheels and their connecting hub, having T-headed arms to provide bearings for the friction-rollers, located on one side thirty degrees in the rear of the opposite side. Fig. 10 is an enlarged view of the upper half of Fig. 3. Fig. 11 is an end view of the cranks of the rear wheel. Fig. 12 is a side view of one of the split eye-bearings of the pedal crank-shaft and its clamping-bolt.

This construction is a modification of that shown in my copending application, Serial No. 685,865.

In said drawings, A represents the forked seat-carrying standard of the frame, and A^2 the braces between the crank-shaft *b*, carrying the pedals B^2 and also the sprocket-wheels C and C^2 and the crank-axle *d*, which is tubular in part and constitutes the hub for the hind wheel E. Said axle *d* has its ends received in ball-bearings a^2, mounted in the rear ends of the braces A^2 and protected by caps a^3, which serve also as a lock-nut for the ballways. Each end of the axle *d* has a crank-arm d^2, and each end of the hub of the wheel E has a similar crank-arm e^2; but the arms e^2 are set at an angle of ninety degrees to each other. The arms d^2 e^2 of each crank are united by a tubular crank-pin D, having four lugs provided with side faces that are not radial, but are parallel and at right angles to each other and are projecting from each one of its ends, that are received in corresponding grooves formed at right angles to each other in bosses on the arms d^2 e^2, and a bolt D^2,

passing through said arms and through the crank-pin, secures these parts together until it is desired to remove the wheel E for repairs. The pin D is grooved circumferentially to obtain a ball-bearing way to receive the inner face of the balls of the ball-bearing around it, and said balls are inclosed by the eye in the rear end of each forked connecting-rod.

The sprocket-wheels C and C^2 are located in the center of the length of the crank-shaft *b* of the pedals. Each sprocket-wheel consists of a skeleton triangular plate having its angular ends or sprockets *c* at equal distances apart; but the sprockets of one wheel are so timed relatively to the sprockets *c* of the other wheel as to be about thirty degrees in the rear of each one of them. Between each sprocket-wheel there is a carrying-hub c^2, having three T-headed arms, and the ends of said arms constitute one of the supports for the bearing-pin of each roller *r* of the sprocket-wheel, while the arms of the sprocket-wheels constitute the other support for the end of said bearing-pin, the ends of the arms of the sprocket-wheels being outwardly bent for the accommodation of the rollers *r*. The hubs of the sprocket-wheels C C^2 and of the middle hub-plate c^2 constitute together a compound sprocket-wheel, which is secured with bolts to a circular collar projecting from a sleeve 6, screwed on the inner ends of the two parts of the crank-shaft *b*. Said sleeve has secured upon each one of its ends the inner ring 7 of the ball-bearings, while the cones 8 of the outer ring of said bearings are screwed to the inner face of the eye or bearing-box 9, uniting the braces A and A^2. The outer portion of the bottom of said eye is split and its ends united together by a bolt 18 to clamp the cone-rings.

To the inner face of each eye 9 is secured a rectangular frame 10, of stout sheet metal, cut out of skeleton form for lightness, the means of attachment being an arm 11, extended radially from said eye 9, and a bolt 12, passing through said arm and screwed into the frame 10. The two frames 10 are connected to each other at each corner by means of bolts 13, passing through a series of short sleeves 14, upon which one end of links 15 are pivotally mounted. To the opposite end of each one of said links are pivotally attached the rocking jaws f^2, each one of which has a slot *f* to receive one of the rollers *r* of the sprocket-wheels.

To connect each rocking jaw f^2 with the front ends of each branch of the forked rods F or G, each front end has a large eye within which ball-bearings are placed, and to the circular inner cone of said bearing is secured an arm f^3, which is parallel with the jaw f^2 and integral therewith, but is at a short distance from said jaw to permit the edge of the sprocket-wheel to pass between them while its roller *r* enters into the jaw. Each rocking jaw is supported by a link 15, as above stated. The outer periphery of each jaw is in the form of a segment of a circle around which it rocks upon the edge of horizontal guide-plates 16. The ends of said plates are mounted upon the bolts 13, and the inner faces of each pair of guide-plates serve as guides for the sides of the jaw f^2. The rocking edges on the sides of each jaw f^2 are preferably made of hardened steel and are of slightly less diameter than the segmental body of the jaw, and thus the back of the jaw is well supported, both on its periphery and on its sides. For clearness only one jaw is shown in engagement with the sprocket-wheel in Fig. 5, and in practice there is only one or a portion of two jaws; but the construction of ball-bearings and jaws is repeated for each branch of the forked connecting-rods on both sides of the machine. The sides of the slot *f* of each rocking jaw are lined with hard-steel face-plates dovetailed in said sides.

The distance between the front ends of the branches of the forked rod F is maintained by a brace F^2, uniting said branches, and they are supported by the segmental back of the jaws f^2, and the latter by the links 15 and the guide-plate 16. The sprocket-wheel and the parts adjoining are inclosed in a casing 3 to keep out dust and dampness. Said casing may be of wood, metal, celluloid, or glazed leather, or may be of oil-cloth stretched over wires. Said casing has in its rear edge two openings on each side for the passage of the forked connecting-rods F or G, and said openings can be rendered dust-proof and damp-proof by means of flexible diaphragms of thin rubber or textile material which may be secured around each opening to the casing and its center made to clasp each branch of the forked connecting-rod. Surrounding the ends of the sleeve 6 of the pedal-shaft, within the outer cone-ring 8, felt washers 17 are placed to prevent the admission of dust at these points. Collars 5 upon the sleeve 6 prevent the ball-bearings from spreading.

The double-faced sprocket-wheel C C^2 is secured to the collar surrounding the sleeve 6 by means of three small bolts, and the three parts from which said wheel is made are bolted together at suitable points between the hub portion and the ends of the arms carrying the rollers *r*, the relative position of the arms on one side being about thirty degrees in the rear of each arm on the opposite side, and as the double-faced sprocket-wheel is completely built before mounting it on the shaft there is no danger of defect of adjustment relatively to its proper position on the shaft.

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

In the operation of the machine the rocking up and down and also longitudinally of the rear end of the connecting-rod F or G causes the jaw connections f^2 at their front ends to be rocked upon their guide-plates 16 and their slotted or jaw portions to be pre-

sented in the best positions to either receive one of the rollers r of the sprocket-wheel or to let one of said rollers escape from engagement with the sprocket-wheel, so that the engagement of the parts will be noiseless.

As there must necessarily be some moments in which the rollers of one of the sprockets on one side are not in working engagement with the slots of the rocking jaws f^2, (while entering and leaving them,) a duplication of the mechanism is required to actuate the rear crank-axle during these intermediate movements. As there is only a little more than one roller of the sprocket-wheel, or a portion of two rollers, in engagement with the rocking jaws on the ends of the forked connecting-rods, the friction is reduced to the minimum.

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

The advantage derived from having substantially only one sprocket-wheel, and that in the axial line of the machine, is that there is no possibility of having them dislocated relatively to each other at thirty degrees upon the shaft, the pull on them being alternate; and by having them on the axial line the pull and push is equal between the bearing-boxes, and only one casing is required to protect the parts from dust. As the sprocket-wheels are mounted on a sleeve having its ends bearing directly in a bearing-box, and it is in effect a solid piece with the cranks screwed therein, the danger of springing the crank-shaft is materially removed and also the danger of springing the sprocket-wheels.

Having now fully described my invention, I claim—

1. In a bicycle the combination of the axle of one of the carrying-wheels, two crank-pins carried by said axle, two branched connecting-rods mounted at one end upon each crank-pin and having at the opposite end two open-jaw connections pivotally mounted thereon a frame and links supporting said connection, each jaw connection having a segmental outer periphery, guide-plates having their edges serving as a track for the segmental periphery of the jaw to rock upon and a frame carrying said guide-plates, substantially as described.

2. In a bicycle the combination of the axle of one of the carrying-wheels, two crank-pins carried by said axle, two branched connecting-rods mounted at one end upon each crank-pin and having at the opposite end two open-jaw connections having a segmental outer periphery longer in its center than on its cheeks a frame and links supporting said connections, guide-plates having their inner faces guiding the sides of the jaw connections and their edges guiding the edges of the cheeks of the jaw connections, and a frame carrying said guide-plates, substantially as described.

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

HOSMER TUTTLE.

Witnesses:
LOUIS T. WEISS,
EDWD. N. ANDREWS.