No. 613,282. Patented Nov. 1, 1898.

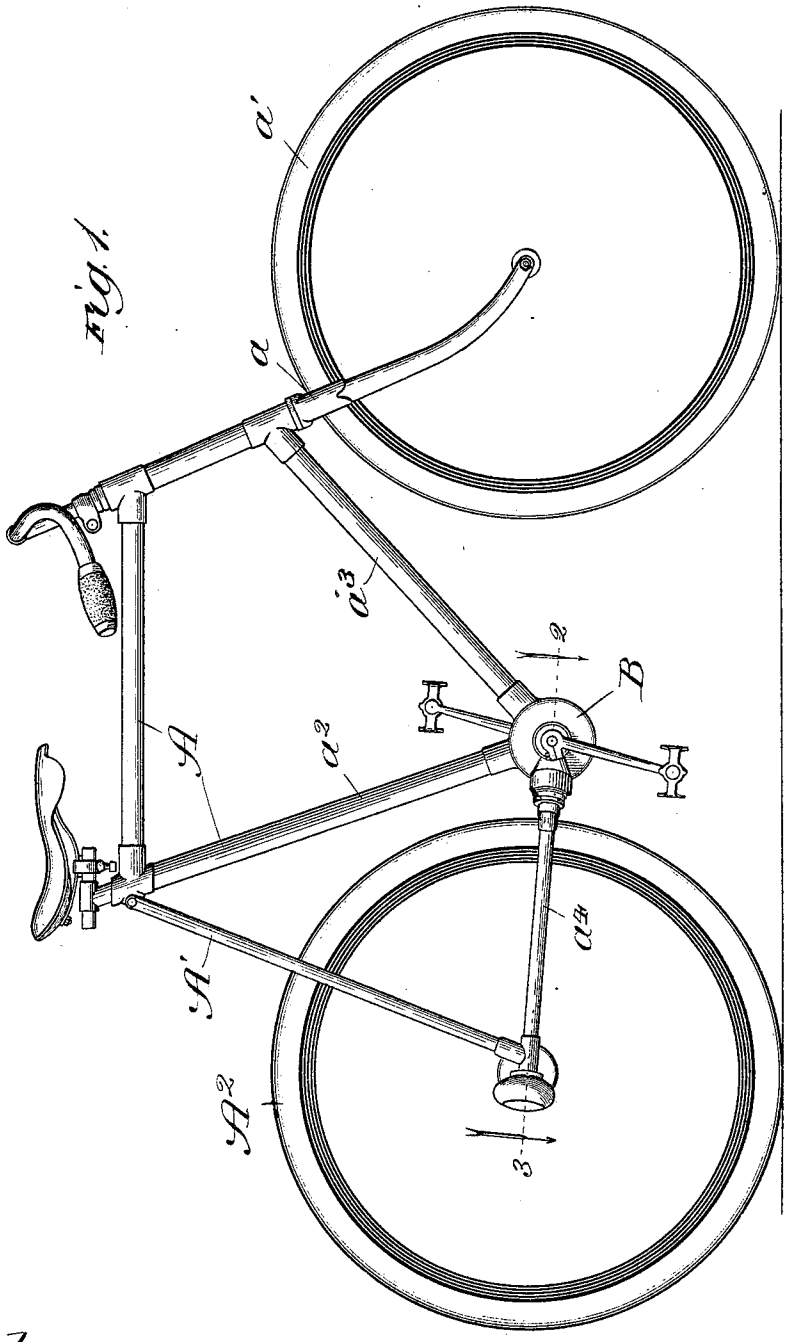
F. A. KERSHAW.

VELOCIPEDE.

(Application filed May 24, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

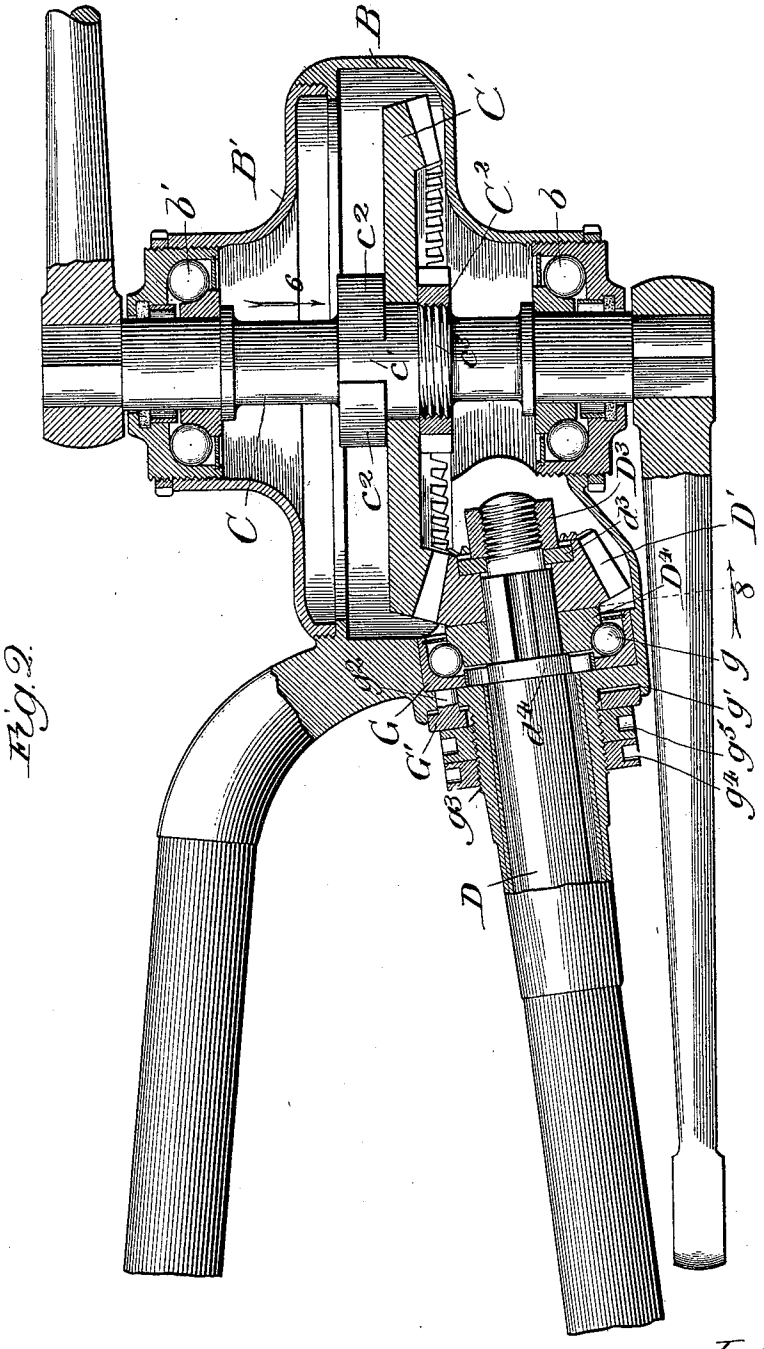

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

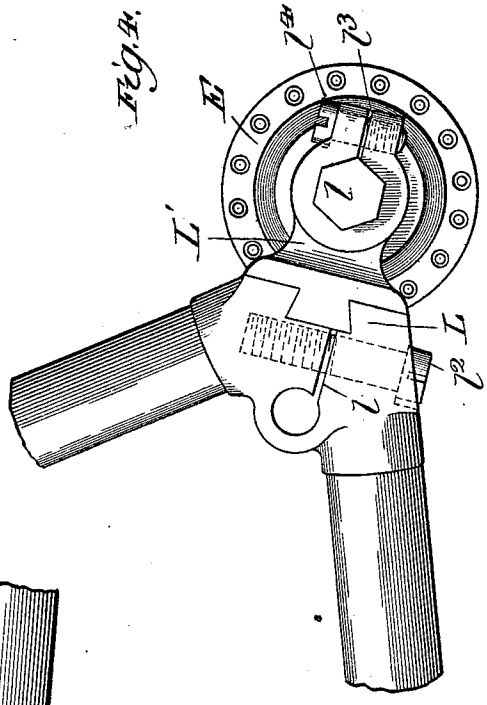
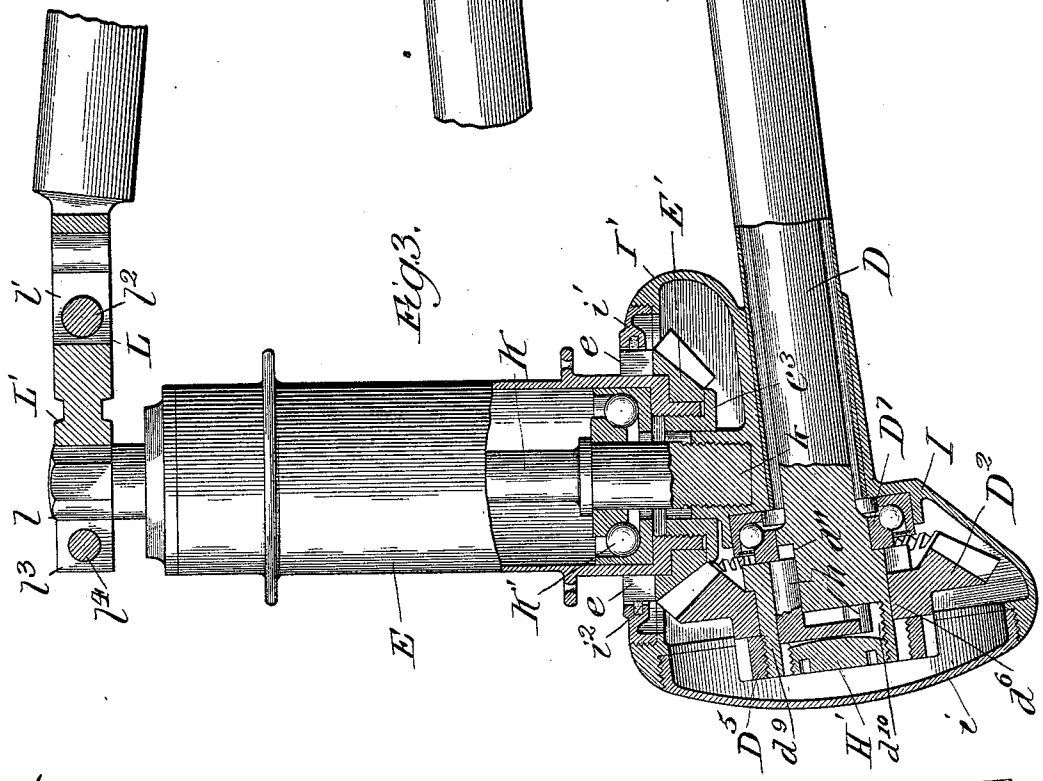


Fig. 3.



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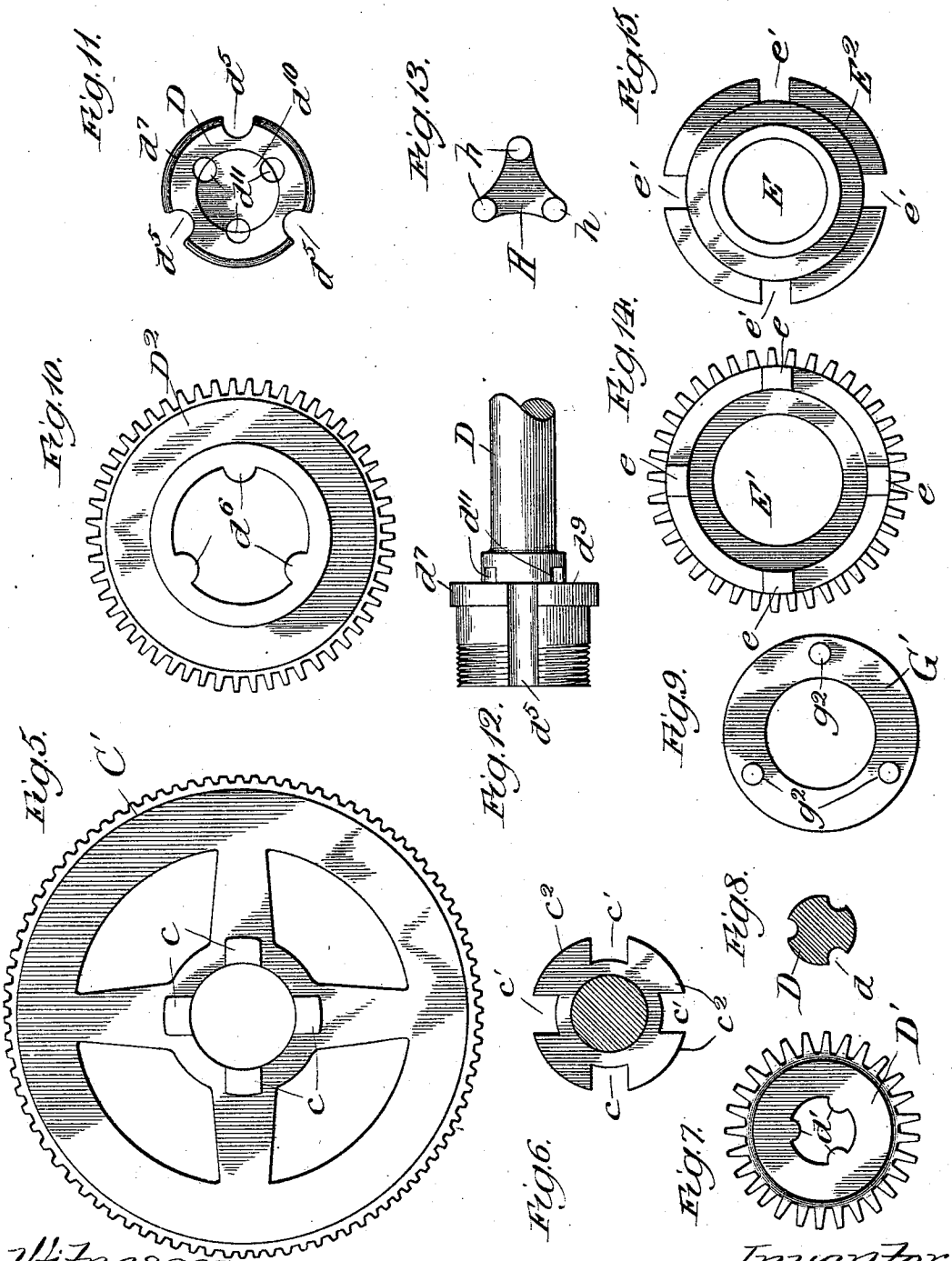
(No Model.) 4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

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VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 613,282, dated November 1, 1898.

Application filed May 24, 1897. Serial No. 637,888. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS A. KERSHAW, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented certain new and useful Improvements in Velocipedes, of which the following is a specification.

My invention relates to that class of velocipedes known as "bicycles," and particularly to that class known as "chainless" bicycles, in which beveled gears are used in connection with longitudinal shafts which transmit power and motion from the crank-shaft to the rear driven wheel.

The object of my invention is to provide simple, economical, and efficient gear mechanism for transmitting the power and motion of the crank-shaft to the rear or driven wheel.

A further object is to provide simple, economical, and efficient means for adjusting the bearing portions and positioning the gear mechanism; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a bicycle of the safety rear-driven type constructed in accordance with my improvements; Fig. 2, an enlarged longitudinal plan sectional view of a portion of the machine, taken on line 2 of Fig. 1, looking in the direction of the arrow; Fig. 3, a similar view taken on line 3 of Fig. 1, looking in the direction of the arrow; Fig. 4, an enlarged side elevation of a portion of one of the lower ends of the rear fork; Fig. 5, a side elevation of the rear side of the main driving-gear; Fig. 6, a transverse sectional view of the crank-shaft, taken on line 6 of Fig. 2; Fig. 7, a rear elevation of the intermediate driving-pinion shown in Fig. 2; Fig. 8, a cross-sectional view of the intermediate shaft, taken on line 8 of Fig. 2; Fig. 9, an end elevation of the adjusting-ring for the front bearings of the longitudinal shaft; Fig. 10, an end view of the intermediate driving-gear secured to the rear end of the longitudinal shaft as shown in Fig. 3; Fig. 11, an end view of the rear end of the longitudinal shaft; Fig. 12, a side elevation of the rear end of the longitudinal shaft; Fig. 13, an end elevation of the means for adjusting the rear ball-bearings of the longitudinal shaft shown in Fig. 3; Fig. 14, a rear end elevation of the driving-gear secured to the hub and the rear driving-wheel shown in Fig. 3, and Fig. 15 an end elevation of the hub for the rear driven wheel.

In constructing a bicycle and fitting it with my improvements I use a frame portion A of the desired size, shape, and strength to sustain and hold the front-fork portion a, which carries the steering-wheel a', the rear-fork portion A', which carries the rear driving-wheel A^2, and other usual parts. This main-frame portion is provided with a circular closed cup portion B, which is rigidly connected with, sustained, and held in position by means of the pillar-tube a^2, the front lower stay a^3, and the rear lower stays a^4. This circular cup portion practically forms the bearing-bracket and also a closure, as hereinafter described. It is preferably made so that one portion (the main portion) is secured rigidly to the frame above described, while the other portion B' is screw-threaded into one side of the main portion, both of such portions being provided with ball-bearings b and b', that form the bearings for the crank-shaft C.

To transmit power and motion from the crank-shaft to the rear driven wheel, the crank-shaft is provided with what I term a "main driving beveled gear" C', which is secured to the crank-shaft in the following manner: The hub of the driving-gear, as shown in Fig. 5, is provided with a number of projections c, and the crank-shaft with a flanged portion which is cut so as to form recesses c', into which the projections on the hub of the main driving-gear may enter, the solid portion c^2 of the shoulder on the crank-shaft acting as stops to limit the motion or position the gear on the shaft. A portion of the crank-shaft at c^3 is screw-threaded and provided with a threaded collar C^2, which impinges against the face of the main driving-gear to force it back against the shoulder of the crank-shaft and securely hold the same in position.

To form a portion of the power and motion transmitting mechanism, an intermediate longitudinal shaft D is provided, carrying on its front end an intermediate driving bevel-gear D' and on its rear end a second intermediate driving bevel-gear D^2. The front

intermediate driving-gear is secured to the shaft in the following manner: The shaft is provided with preferably three longitudinal circular grooves d and the bore of the intermediate gear with three semicircular longitudinal projecting lugs d', which fit into the recesses of the longitudinal shaft. A threaded collar D^3 engages with the threaded end portion of the longitudinal shaft and by means of the washer d^3 holds the gear back against the bearing portion D^4, which, resting against the shoulder d^4, positions and holds the first intermediate driving bevel-pinion. The rear intermediate driving bevel-gear, as shown in Fig. 3, is held in its engagement with the shaft by mechanism similar to that shown in connection with the front intermediate driving-gear and which is particularly shown in Figs. 10 and 11, the rear end of the shaft being grooved, as at d^5, and the bore of the gear being provided with a number of projections d^6 to fit the same, the face of the gear resting against the shoulder d^7, in which position it is held by means of the threaded collar D^5, which rests against the rear hub of the same.

The hub E of the rear driving-wheel is provided with a driven bevel-gear E', which is held thereon in the following manner: The hub of the wheel is provided with projections e, adapted to enter slots e' in a flange or shoulder E^2 on the hub portion and arranged to be held therein by means of an adjusting-thimble e^3, which is screw-threaded into the bore of one end of the hub portion, with its flange resting against the face of the driven bevel-gear, so as to position the same and effectually hold it against the shoulder of the wheel-hub. It will therefore be seen that the power and motion are transmitted from the crank-shaft by means of the main driving-gear C' and intermediate driving-gears D' and D^2, through the longitudinal shaft D, to the driven bevel-gear E', which rotates the hub E of the driving-wheel.

It is often necessary and advisable to position the intermediate beveled gears, which regulate the depth at which the intermeshing gears engage, as well as to take up the loose play in the ball-bearings. It is well known in this art that it is desirable to have this adjustment of the bearings as simple as possible and to so arrange it as to be accessible from the exterior of the machine without in any way interfering with its dust-proof qualities—that is, to prevent the entrance of dirt, dust, or foreign substances into the bearing portions. To accomplish this result, (see Fig. 2,) I provide the bearing-bracket with a cup-shaped bearing portion or ring G, which is movably fitted in a circular recess particularly adapted for the purpose. This bearing portion forms a portion of the race in which the balls g may operate. The bearing-bracket at its rear portion is provided with a second recess g', in which an adjustable collar G' is fitted, such collar being provided with a number of circular projecting pins g^2, which pass through suitable perforations in the bearing-bracket and contact the rear end of the bearing-cup. The forward portion of one of the rear lower stays is screw-threaded, as at g^3, and on the screw-threads are arranged ring-lock nuts g^4 and g^5, adapted to contact the adjustable collar or ring G' and force it, with the bearing-cup, inwardly to take up the slack in the ball-bearings. It will be noticed that the inner bearing portion D^4, with the front intermediate driving-pinion, is held rigidly against a collar on the longitudinal shaft, so that as the bearings are forced in against this its inner bearing portion the position of the intermediate driving-gear and its depth of engagement with the main driving-gear are regulated.

The rear ball-bearings of the longitudinal shaft are adjusted as follows: The shaft is provided with a shoulder portion d^9, on which is fitted a ring D^7, which forms a portion of the ball-race. This ring is movably held in engagement with the longitudinal shaft, and the end of the longitudinal shaft is bored or cupped out, as shown at d^{10} in Fig. 11, and provided, preferably, with three circular longitudinal perforations d^{11}. An adjustable piece H is provided, having three circular projecting pins h, which enter the perforations d^{11} and are arranged to contact the adjustable bearing portion, as shown in Fig. 3. The central bore of the shaft is screw-threaded, and with such screw-threads a threaded plug H' is engaged, so that by turning the plug in the right direction the adjusting portion is forced inwardly, forcing in the adjustable bearing and taking up the play in the ball-bearings, which of course takes up the end play in the longitudinal shaft and regulates the amount of engagement between the intermediate gears and the driving and driven gears. It will be noticed that the adjustments of the bearings are in opposition to each other, so that by adjusting one bearing more and the other less the position of each and both of the beveled gears may be changed as desired.

To inclose the rear driving and driven gears, the rear end of one of the lower rear-fork portions is provided with two cup-shaped portions I and I', arranged at right angles to each other. The cup-shaped portion I has a threaded cap i at its rear end, while the cup-shaped portion I' has a threaded ring i' at its inner side, between which and the hub of the driven gear is inserted a piece of felt i^2, which acts to prevent the dust and foreign substances from entering.

To insert, hold in, and remove the rear driven wheel and its hub from position, an axle K is provided, which has one end k screw-threaded into engagement with one of the rear-fork portions, as shown particularly in Fig. 3. The hub is provided with the usual bearings K', by which it rotates on the axle and which, together with the axle, form practically one portion, so that by unscrewing

the axle portion the hub, wheel, and axle are removed from the frame of the wheel, carrying at the same time the gear by which the rear wheel is driven. In order to provide for this, one of the rear-fork portions is dovetailed, as at L, (see Fig. 4,) and a removable piece L′ securely held therein. This removable piece is provided with a polygonal opening into which a hexagonal head *l* is fitted and prevented from rotating. The rear-fork end is split at *l′* and provided with a clamping-screw l^2 for holding the removable piece in position. The removable piece is also split at l^3 and provided with a clamping-screw l^4, which acts to clamp the end of and hold the axle from turning, as shown in Figs. 3 and 4. When the rear wheel and axle are in position, in order to remove the same it is necessary to loosen the clamping-screws l^2 and l^4. The end piece L′ may then be removed from engagement with the rear fork and the axle. By taking a wrench the axle can then be turned in the desired direction, so as to disengage its threaded portion from the opposite rear-fork portion, which at the same time removes the hub, wheel, and driven gear. A reversal of these operations is necessary in order to reinsert the wheel in position.

While I have described my invention with more or less minuteness as regards details and as being embodied in certain precise forms, I do not desire to be limited thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial elements, and the substitution of equivalents, as circumstances may suggest or necessity render expedient.

I claim—

1. In a machine of the class described, the combination of a longitudinal intermediate driving-shaft, a bracket portion in which it is held and mounted provided with longitudinal perforations, a bearing portion movably mounted in the bracket portion, an adjustable ring on the exterior of the bracket portion provided with projecting lugs inserted through the longitudinal perforations of the same and arranged to contact the bearing portion, and means for adjustably holding the adjustable ring in position, substantially as described.

2. In a machine of the class described, the combination of a main-frame portion, a rear-fork portion, a driving-wheel provided with an axle screw-threaded into one part of the rear-fork portion and with a polygonal head at the opposite end thereof, a removable piece dovetailed into and forming a continuation of the other rear-fork portion provided with a transverse perforation to fit the head of the axle and adapted to embrace the same and hold it in position, and means for clamping and holding the removable end of the rear-fork portion and thereby the axle in position, substantially as described.

3. In a machine of the class described, the combination of a main-frame portion, a rear-fork portion, a driving-wheel provided with an axle screw-threaded in the one part of the rear-fork portion and with a head portion at the opposite end thereof, a removable piece secured to and forming a continuation of the other rear-fork portion and provided with a transverse perforation to fit the head of the axle and adapted to embrace the same and hold it in position, and means for securing the removable end of the rear-fork portion and axle together, to prevent relative displacement, substantially as described.

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