

No. 803,971.

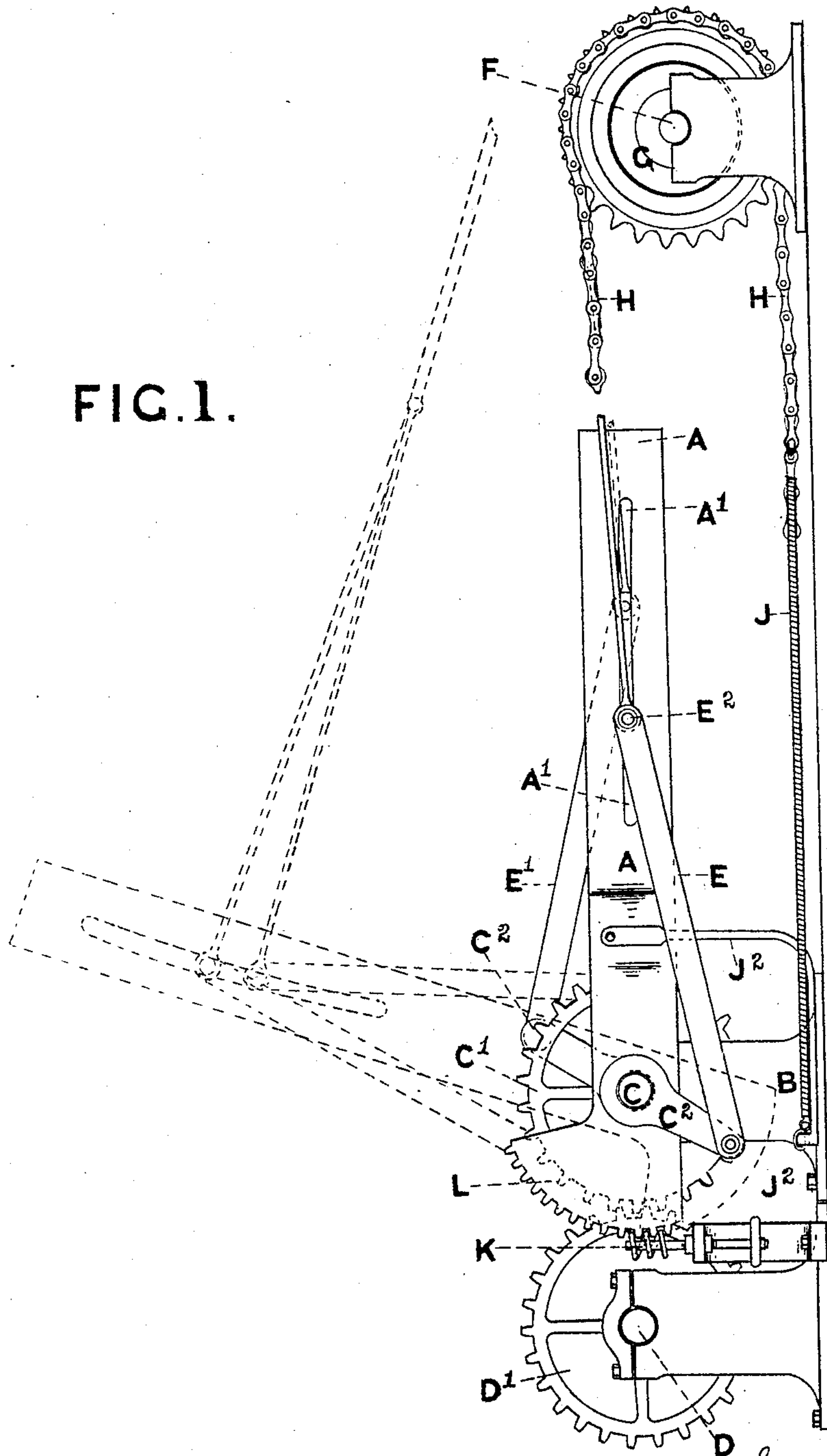
PATENTED NOV. 7, 1905.

W. BAXTER & E. C. CALEY.
CHANGE SPEED MECHANISM.

APPLICATION FILED MAR. 14, 1905.

3 SHEETS—SHEET 1.

FIG. 1.



Witnesses.
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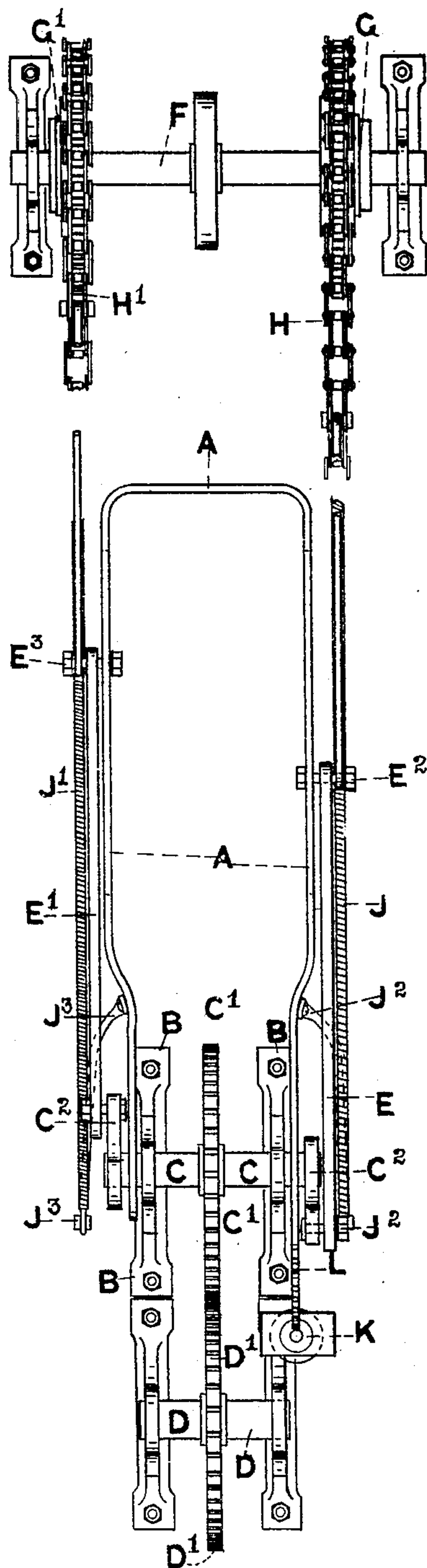
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3 SHEETS—SHEET 2.

FIG. 2



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3 SHEETS—SHEET 3.

FIG. 3

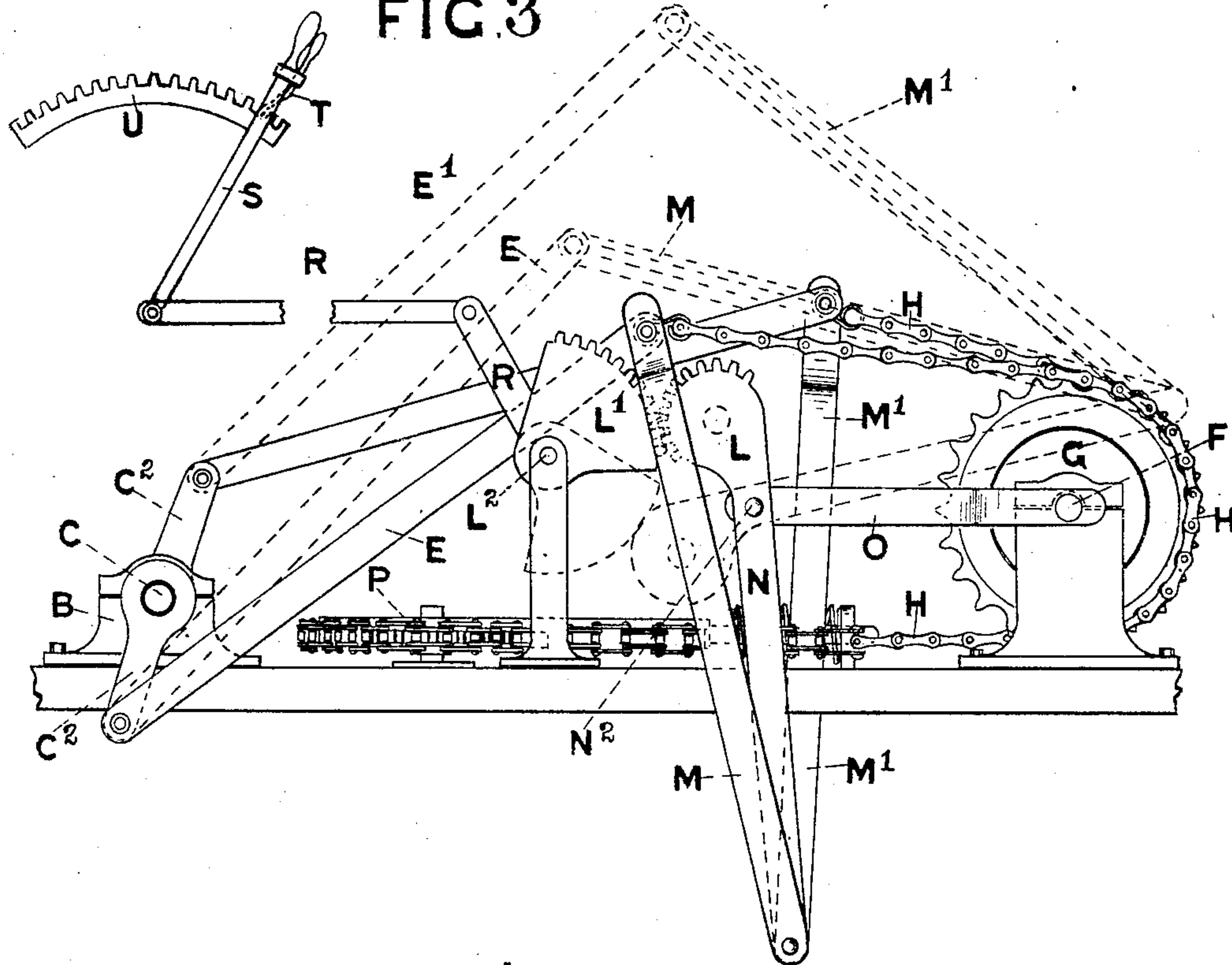
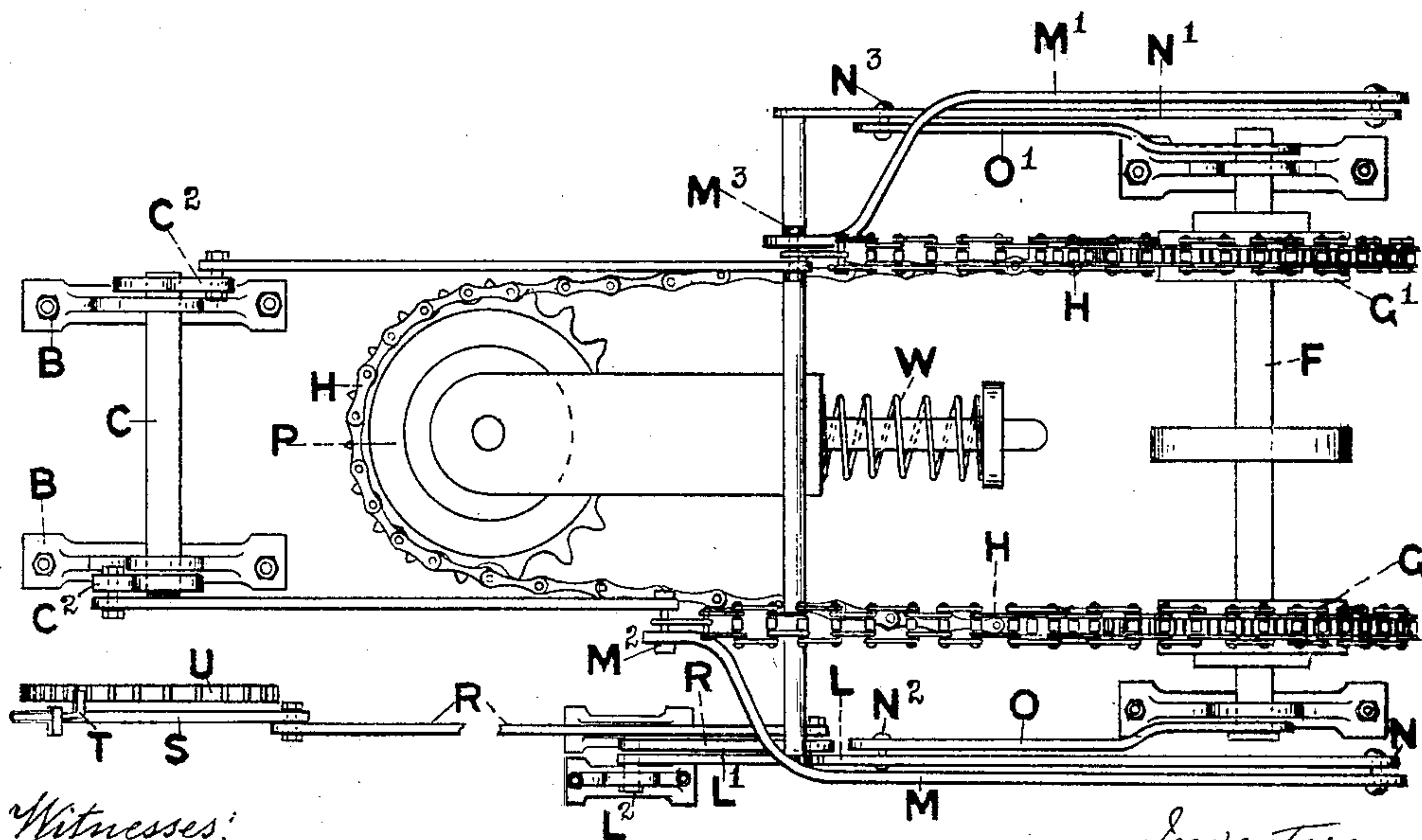


FIG. 4.



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UNITED STATES PATENT OFFICE.

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CHANGE-SPEED MECHANISM.

No. 803,971.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed March 14, 1905. Serial No. 250,107.

To all whom it may concern:

Be it known that we, WILLIAM BAXTER, residing at Sunny Bank, Spring Bank West, Hull, and EDWARD CORNELL CALEY, residing at Burton Pidsea, near Hull, in the county of York, England, subjects of the King of Great Britain, have invented new and useful Improvements in or Relating to Change-Speed Mechanism for Motor-Vehicles, Shafting, Machinery, and the Like, of which the following is a specification.

Our invention has reference to change-speed mechanism for motor-vehicles, shafting, machinery, and the like, the speed of which is required to be changed from time to time; and the object of our said invention is to provide means whereby we can obtain various changes of speed from simply that of starting the vehicle, machinery, or the like to that of the greatest speed capable of being imparted by the engine without a multiplicity of gears, as have heretofore been necessary, and also to allow of the speed being changed without there being any shock while the change is being made, a further object being to dispense with the engine friction-clutches and yet retain a free engine and a free wheel on all speeds, thus enabling the engine to be constantly run at a given speed, and of the speed of the motor-car, machinery, or the like being entirely controlled by our improved change-speed mechanism. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 shows in side elevation one form of our improved change-speed mechanism. Fig. 2 is a plan view of same. Fig. 3 is a similar view to Fig. 1, but shows a slightly-modified form of apparatus; and Fig. 4 is a plan view of same in the position shown in dotted lines.

Similar letters refer to similar parts throughout the several views.

For the purpose of our invention, assuming our improved change-speed mechanism to be applied to a motor-car, for instance, we employ a suitably-shaped frame A, which is articulated or movably mounted in any suitable position—as, for instance, in brackets B on the car-frame, which support the crank-shaft C, which is in gear with the engine driving-shaft D through the medium

of, say, for instance, a gear-wheel C', mounted on the crank-shaft C, and a similar gear-wheel D', mounted on the engine driving-shaft D. This frame A has guides, preferably in the form of radial slots or holes A', in its sides, and the crank-shaft C is provided with cranks, crank-arms, or the like C², set opposite each other, such cranks or the like having connecting-rods E E', which have each at a suitable point thereon a stud, projection, or the like E² E³, the stud or the like on one connecting-rod working in the slotted guide in one side of the frame A, the stud on the other connecting-rod working in the slotted guide on the other side of the frame as the cranks to which such connecting-rods are connected rotate.

Upon the shaft or axle F of the traveling wheel or wheels which constitute the driven shaft of the car or the like (or upon an additional or intermediate shaft gearing therewith) we mount preferably two free-wheel clutches G and G' of any suitable type or their equivalent, and we employ chains H H' or connecting-rods or their equivalent for making connection with the studs E² E³ on the connecting-rods E E', which are connected to the cranks C² or the like of the crank-shaft C by means of the crank-pins. When chains are employed, they run from the studs E² E³ on such connecting-rods E E', each one over one of the free-wheel clutches, being brought back preferably underneath, where each is connected at its free end to a spring J J' or the like, each spring or the like being in turn connected at its free end to any suitable point on the movable frame A or to arms J² J³, connected to such frame; but any other suitable means of driving such free-wheel clutches or the like may be employed.

The frame A, which is the medium through which the speed is changed, may be moved to suitable positions by being turned on its pivot-pin or fulcrum by means of a worm K, gearing with a worm-wheel or toothed quadrant L at the fulcrum end of the frame, or by any other suitable means which will effect this object.

In the modified form of apparatus shown at Figs. 3 and 4 we dispense with the frame with the slotted sides, and in place thereof we pivot the connecting-rods E E' each to one of the ends of two rocking levers M M',

which rocking levers are in turn pivoted at their opposite ends each to one end of two other levers or rods N N', which are in turn pivoted at their other ends to brackets O O',
 5 fixed in any suitable position and from which they swing.

One chain H only need be employed, this chain being connected at one of its ends to the pivot-pin M², by which the connecting-rod
 10 E is pivoted to the rocking lever M at one side and runs over one free-wheel clutch G, around a horizontal chain-wheel P, back over the other free-wheel clutch G', the other end being connected to the pivot M³, by which
 15 the connecting-rod E' is pivoted to the rocking lever M' at the other side.

The rods N N' are swung over on their pivot-pins N² N³ and raised and lowered or caused to turn to any suitable position for
 20 changing the position of the rocking levers, and so altering the direction of the stroke of the connecting-rods, by any suitable means, one means consisting of providing one end of one or both of the rods N N' with a toothed
 25 quadrant L, which gears with a second toothed quadrant L', working on a pivot-pin or cross-shaft L², said quadrant L' being operated by levers or rods R through the medium of a pull-over lever S, provided with a
 30 catch T, which lever S can be set in any suitable position by means of a toothed quadrant U, with which the catch T engages; but any other suitable means of effecting this purpose may be employed.

35 By moving the position of the pivot-pin or fulcrum of the rods N N' dead-centers of the cranks C' are entirely obviated, and the throw of the connecting-rods can be considerably increased.

40 The horizontal wheel P is capable of a limited horizontal movement, which is controlled by a spring W or its equivalent, which keeps the various movable parts in tension and obviates shock to a great extent.

45 Although we have shown two free-wheel clutches and the other parts of the mechanism in duplicate, we would have it understood that we do not limit ourselves to this arrangement, which is only described and
 50 illustrated by way of example, and that a single clutch only may be employed and the number of other necessary parts be correspondingly decreased, or the number of the clutches and the other necessary parts may
 55 be increased without departing from the principle of our invention, and, further, although we have only described our invention in its application to a motor-driven vehicle, it will be obvious that its application to
 60 motor-cycles, shafting, machinery, and the like to be run at variable or different speeds is substantially the same; also, that in place of an intermediate crank-shaft being employed the ordinary engine driving-shaft
 65 may be provided with cranks and that the

arrangement of the device may be modified to suit the construction of the car, engine, machinery, or the like to which it is applied.

The mode of operation of the device illustrated at Figs. 1 and 2 of the accompanying
 70 drawings is as follows: Assuming that the engine is running at a speed which propels the vehicle at, say, ten miles per hour, (independent of our change-speed mechanism,) the connecting-rods connected to the cranks
 75 or the like of the engine driving-shaft or the supplementary shaft, as the case may be, are oscillating or moving in the manner common to connecting-rods, and as one rod moves forward it tightens the chain which passes over
 80 its free-wheel clutch or its equivalent and pulls such chain forward, so turning the said free wheel, which turns the shaft of the driven wheel or wheels, so imparting motion to the vehicle. The other connecting-rod making its
 85 backward stroke at the same time slackens its chain, and its wheel runs free until such connecting-rod makes its forward stroke, when such chain is tightened and the free-wheel clutch turned, so continuing the rota-
 90 tion of the shaft, each connecting-rod at each forward stroke continuing the driving of the vehicle. If it is desired to increase or decrease the speed of the vehicle, the frame which really controls the change of speed by
 95 varying the direction or angle of the stroke of the connecting-rods is raised or lowered, as the case may be, such frame being capable of being moved to such a position that the full stroke of the connecting-rods can be em-
 100 ployed for imparting motion to the shaft or the like to be driven, so that the speed can be accelerated to the highest speed capable of being imparted by the engine, or the stroke of the connecting-rods can be in exact
 105 radius with the driving-clutches or the equivalent thereof and the speed be thus reduced to zero, so that the engine can be run free and yet the vehicle remain at a standstill, the stroke of the connecting-rods being such
 110 that there is no tightening or pulling of the chains or their equivalent, and therefore no turning of the free-wheel clutches or their equivalent or of the shaft or axle which drives the traveling wheel or wheels of the vehicle,
 115 the maximum speed being obtained when the frame is moved to such a position that the slots therein point in the direction of the clutches and cause the connecting-rods to move in that direction, the full stroke of the connect-
 120 ing-rods being then utilized, the movement of the chains or their equivalent being then equal to the diameter of the circle made by the revolution of the cranks, the speed being decreased by moving the frame on its pivot
 125 or fulcrum so that the slots become more in radius with the clutches, until when the frame is moved to such a position that the slots are in exact radius with the clutches the connecting-rod ends work in this radius, and
 130

consequently there is no turning motion imparted to the clutches, the studs on the connecting-rods being the same distance from the clutches during the whole length of their stroke, and therefore there is no forward-and-backward movement of the chains or their equivalent for driving the clutches, and the engine can thus run free, the vehicle remaining stationary.

10 The mode of operation of the modified form of apparatus illustrated at Figs. 3 and 4 of the drawings is the same as the foregoing, with the exception that the direction of movement is changed by means of the rocking levers and the rods which move such
15 rocking levers and that in place of two chains being employed and two springs for pulling such chains back one chain only (which passes around a spring-controlled chain-wheel) is employed, its two ends being at-
20 tached to the two studs on the connecting-rods.

The mode of operation above described with reference to motor-vehicles is substantially the same in the case of machinery and the like.

The drive by our change-speed mechanism being always in one direction, reversing-gear of any suitable kind may be employed for ob-
30 taining driving in the opposite direction.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a driving-shaft provided with a crank, of a connecting-rod
35 pivoted to the said crank at one end, a driven shaft, a wheel driving the said driven shaft in one direction, a flexible driving connection engaging with the said wheel and at-

tached to the other end of the said connect-
ing-rod, an adjustable guide for changing the
normal angle between the said connecting-
rod and driving connection, and means for
keeping the said driving connection taut. 40

2. The combination, with a driving-shaft provided with a crank, of a connecting-rod
45 pivoted to the said crank at one end, a driven shaft, a wheel driving the said driven shaft in one direction, a flexible driving connection engaging with the said wheel and at-
50 tached to the other end of the said connect-
ing-rod, a guide for the said connecting-rod pivoted on the said driving-shaft, means for holding the said guide at various angles to
vary the speed of the driven shaft, and means
for keeping the said driving connection taut. 55

3. The combination, with a driving-shaft provided with two cranks, of connecting-rods pivoted at one end to the said cranks, a
driven shaft, wheels driving the said driven
shaft in one direction, flexible driving con-
60 nections engaging with the said wheels and attached to the free ends of the said connect-
ing-rods, means for guiding the free ends of
the said connecting-rods and for changing
the normal angles between the said connect-
65 ing-rods and driving connections, and means
for keeping the said driving connections taut.

In testimony whereof we have signed our names to this specification in presence of two subscribing witnesses.

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EDWARD CORNELL CALEY.

Witnesses:

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