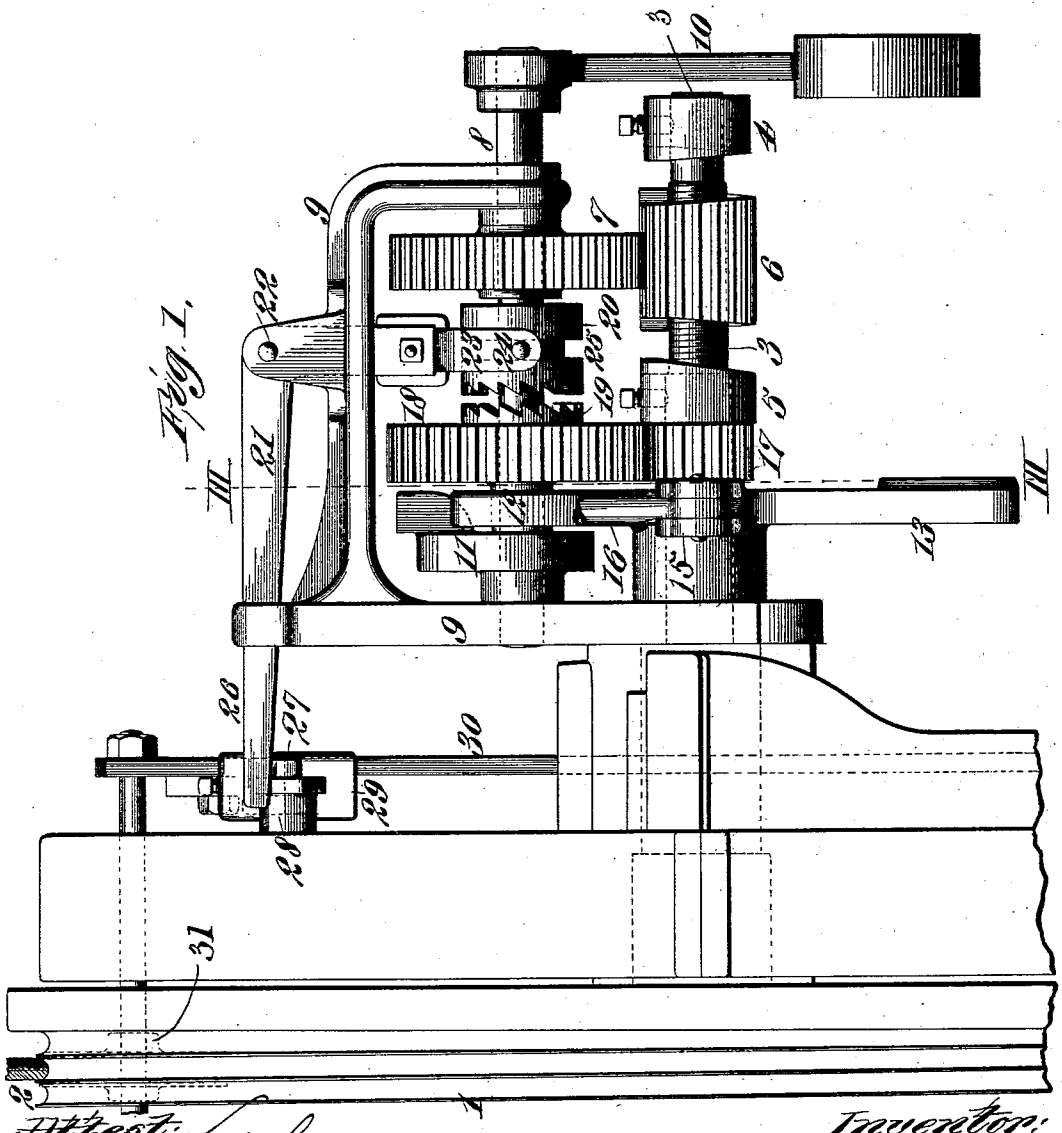
(No Model.) 3 Sheets—Sheet 1.

T. HILL.

LIMITATION STOP FOR ELEVATORS.

No. 563,036. Patented June 30, 1896.



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(No Model.) 3 Sheets—Sheet 2.

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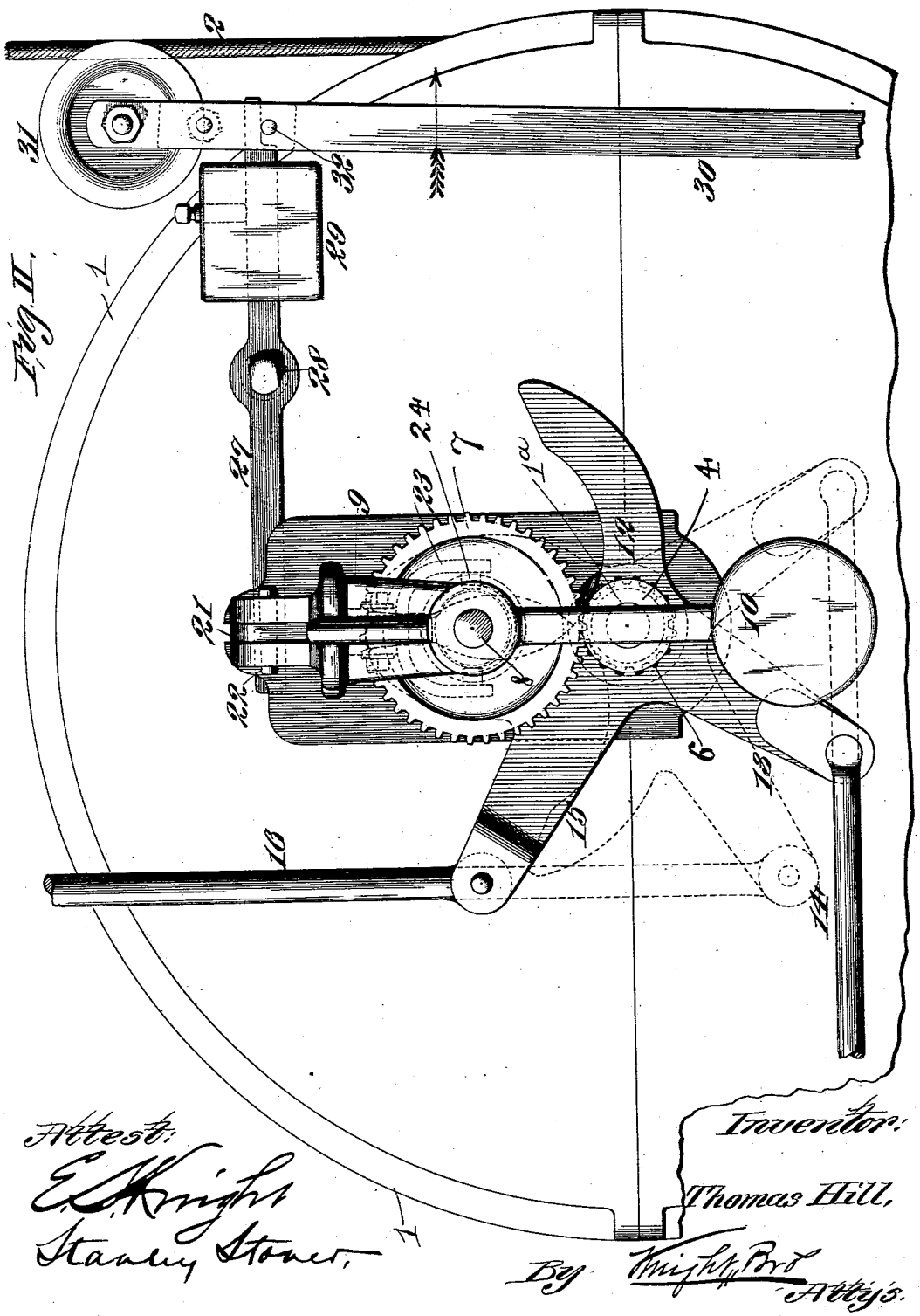

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(No Model.) 3 Sheets—Sheet 3.

T. HILL.

LIMITATION STOP FOR ELEVATORS.

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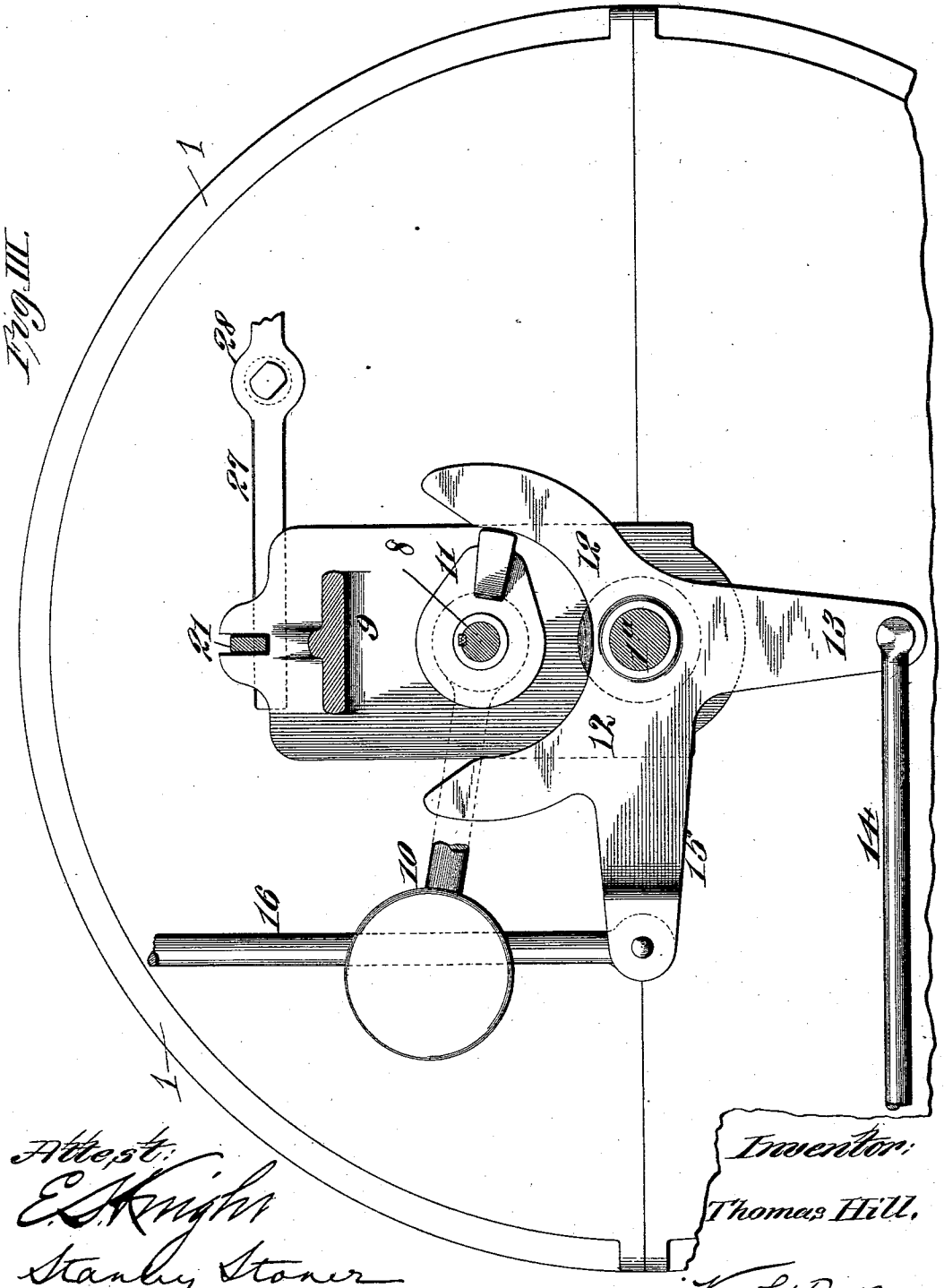

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UNITED STATES PATENT OFFICE.

THOMAS HILL, OF QUINCY, ILLINOIS, ASSIGNOR TO THE SMITH-HILL ELEVATOR COMPANY, OF SAME PLACE.

LIMITATION-STOP FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 563,036, dated June 30, 1896.

Application filed August 2, 1895. Serial No. 557,989. (No model.)

To all whom it may concern:

Be it known that I, THOMAS HILL, a citizen of the United States, and a resident of Quincy, in the county of Adams and State of Illinois, have invented a certain new and useful Improvement in Limitation-Stops for Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to provide a reliable limitation-stop for high-speed passenger-elevators and at the same time prevent the possibility of the operator starting the cab in the wrong direction at either the top or bottom of the elevator-shaft.

My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a side elevation illustrative of my invention. Fig. II is an end view; and Fig. III is a section taken on line III III, Fig. I.

Referring to the drawings, 1 represents the hoisting-drum, and 2 the hoisting-cable. The shaft 1^a of the drum has a threaded extension 3, to which are secured the adjustable stops 4 and 5. On the threaded extension 3 of the shaft is an elongated pinion 6, that meshes into a cog-wheel 7, rigidly mounted on a counter-shaft 8, journaled in a bracket or frame 9. On the outer end of the counter-shaft 8 is a weight 10, and on the inner end of the counter-shaft is a cam 11.

12 represents a yoke or fork mounted loosely on the drum-shaft 1^a, or on some other suitable support. The arms of the fork 12 are of curved form, so as to conform to the arc of the circle and to straddle the counter-shaft 8, as shown in Fig. III, so as to be operated upon by the cam 11 when the counter-shaft 8 is turned. The fork has an arm 13, to which is connected one end of a motor-controlling rod 14, extending to the switch or valve of a motor, (not shown,) that operates the elevator. The fork has also an arm 15, to which the shipping-rod 16 is connected.

The operation is as follows: As the cage moves up or down and turns the extension 3 of the drum-shaft, the pinion 6 will be moved longitudinally of the shaft until it comes against the stop 4 or the stop 5, according to the direction in which the cage is moving. The pinion comes against this stop when the cage reaches the limit of its downward and the limit of its upward movement. As the cage is moving up and down, the pinion 6 is held from revolving with the extension 3 by its engagement with the cog-wheel 7, which is held from movement by the weight 10, which is sufficient for this purpose. When the pinion 6 comes against one of the stops, its longitudinal movement is arrested, and it now turns the cog-wheel 7, revolving the counter-shaft 8 in opposition to the weight 10, and lifting the weight to the position shown in Fig. III. As the counter-shaft 8 is thus turned or revolved, the cam 11 comes against one arm of the fork 12 and follows the curve of the fork, moving the fork from the position shown in dotted lines, Fig. II, to the position shown in Fig. III, and this movement of the fork causes the movement of motor-controlling rod 14 and shuts off the motor and the cage will stop.

Supposing the cage to be at the top of the elevator-shaft, the operator will, through means of the rod 16, raise the arm 15 of the fork 12, which will turn on the motor and the cage will descend. It will be observed that the operator cannot at this time move the switch in a direction that would cause the cage to ascend, for the reason that the cam 11 is bearing against the arm of the fork 12, that will prevent the switch of the motor being moved in the direction that would cause the ascent of the cage. As the cage descends, the pinion 6 will move along the counter-shaft in the opposite direction from that in which it moved during the ascent of the cage, and as soon as the pinion leaves the stop against which it engaged when the cage reached the top of the elevator-shaft, the weight 10 will rock the counter-shaft 8, bringing the cam 11 to its normal position. When the cage reaches the bottom of the elevator extension, the pinion 6 comes against the other stop on the shaft 3, and the cam 11 will be rocked or moved in the opposite direction from that in which it was moved when the cage reached the top of the elevator-shaft, and the motor will be again turned off; and thus each time

the cage reaches the top or bottom of the elevator-shaft, the motor is automatically turned off and the operator cannot move the switch except in a direction that will cause the ascent of the cage if it is at the bottom of the elevator-shaft, or the descent of the cage if it is at the top of the elevator-shaft.

It will be understood that when the cam 11 is moved in one direction it comes against one arm of the fork 12, and when it is moved in the other direction it comes against the other arm of the fork 12.

An important feature of this construction is that should the elevator run beyond the stopping-point it will not break the stop, as it is clear that the cam 11, after throwing the fork to the central position shown in Fig. III, which turns off the motor, can continue to move in the circle of the fork without any obstruction until the elevator stops.

My arrangement is also provided with a "slack-cable stop," by which is meant an arrangement that will turn off the motor in case the movement of the cage is arrested without the motor being stopped and the hoisting-cable thus slackened. This is accomplished through means of a pinion 17, keyed to the drum-shaft 1^a, and which meshes into a cog-wheel 18, mounted loosely on the counter-shaft 8 and provided with a clutch member 19. On the counter-shaft 8 is a clutch member 20, caused to turn with the counter-shaft by means of a feather-and-groove or any suitable connection, but which is allowed to move endwise on the counter-shaft, so as to engage the clutch member 19 of the gear-wheel 18. 21 represents a bell-crank lever pivoted at 22 to the frame 9, and which has a lower bifurcated end 23, that straddles the clutch member 20, and which is provided with pins 24, that fit in the circumferential groove 25 of the clutch member 20. The other end 26 of the bell-crank lever rests on top of the inner end of a lever 27, pivoted at 28, and provided at its outer end with an adjustable weight 29.

30 represents a frame mounted at its lower end on a pivot, (not shown,) and which has on its upper end a grooved pulley 31, that rests against the hoisting-cable 2. The outer end of the lever 27 rests against a pin 32 in the frame 30, and thus the lever 27 is supported and held from being acted upon by the weight 29 as long as the cable 2 is taut and the frame 30 held in the position shown in Fig. II.

Should the cable become slack from any reason whatever, the frame 30 will move in the direction of the arrow, Fig. II, and be disengaged from the lever 27, when the weight 29 will operate upon the lever 27 and upon the bell-crank lever 26, causing the clutch member 20 to engage the clutch member 19 of gear-wheel 18, and by rocking the counter-shaft 8 will produce the same effect upon the fork 12, through means of the cam 11, as is produced by the pinion 6 coming against the stops 4 and 5, as explained.

The device as a whole is a simple and effective means of providing for both a reliable limitation-stop when the cage has reached the limit of its upward and downward movement, and for the shutting off of the motor in case of a slack hoisting-cable.

By making the stops 4 and 5 adjustable they can be set so that the motor will be turned off when the cage has reached any elevation desired.

I claim as my invention—

1. In a stop for elevators, the combination of a hoisting-drum shaft having a threaded extension, a pinion fitting on the threaded extension of the drum-shaft, stops for limiting the end movement of said pinion, a gear-wheel meshing into said pinion, a counter-shaft upon which the gear-wheel is mounted, a weight mounted on the counter-shaft, a cam secured to the counter-shaft, and a pivoted fork connected to the motor, and which is adapted to be operated upon by said cam, substantially as set forth.

2. In a stop for elevators, the combination of a hoisting-drum shaft having a threaded extension, an elongated pinion fitting on the threaded extension of the drum-shaft, stops mounted on the threaded extension of the drum-shaft for limiting the end movement of the pinion, a gear-wheel meshing into said pinion, a counter-shaft upon which the gear-wheel is mounted, a weight mounted on the counter-shaft, a cam secured to the counter-shaft, and a pivoted fork connected to the motor and which is adapted to be operated upon by said cam, substantially as set forth.

3. In an elevator-stop, the combination of a motor-controlling rod a drum-shaft, having a threaded extension, a pinion mounted on the threaded extension of the drum-shaft, stops for arresting the endwise movement of said pinion, and mechanism for controlling the motor located between said pinion and the motor-controlling rod, comprising a counter-shaft, a gear-wheel on the counter-shaft, a cam on the counter-shaft, and a fork having curved arms conforming to the arc of a circle within which the cam is adapted to pass and to rotate whereby, when the endwise movement of the pinion is arrested the motor is turned off while permitting the drum-shaft to cease to rotate of its own accord, substantially as set forth.

4. In a stop for elevators, the combination of a motor-controlling rod, a drum-shaft having a threaded extension, a pinion mounted on a threaded extension of the drum-shaft, stops mounted on the threaded extension for limiting the end movement of said pinion, and mechanism substantially as described, for controlling the motor while permitting the drum-shaft to cease to rotate of its own accord located between said pinion and the motor-controlling rod comprising a counter-shaft, a gear-wheel on the counter-shaft, a cam on the counter-shaft, and a fork having an arm connected with the motor-controlling

rod, and curved arms conforming to the arc of a circle within which the cam is adapted to pass and to rotate whereby when the end movement of the pinion is arrested, the motor is turned off, and whereby the motor can only be set in motion to cause the movement of the elevator-cage in a reverse direction from that in which it was moving when the movement of the pinion was arrested, substantially as set forth.

5. In a stop for elevators, the combination of a drum-shaft having a threaded extension, a pinion fitting on the threaded extension of the drum-shaft, stops for limiting the endwise movement of the pinion, a gear-wheel meshing into said pinion, a counter-shaft to which said gear-wheel is secured, a weight mounted on the counter-shaft, a cam secured to the counter-shaft, a fork straddling said counter-shaft, so as to be operated upon by said cam, and arms or projections on said fork, one of which is connected to the motor and the other to the shipping-rod of the elevator, substantially as set forth.

6. In an elevator-stop, the combination of a motor-controlling rod, a drum-shaft having a threaded extension, a pinion fitting on said threaded extension of the drum-shaft, means for limiting the endwise movement of the pinion, a gear-wheel meshing into said pinion, a counter-shaft to which the gear-wheel is secured, a weight secured to the counter-shaft, a cam mounted on the counter-shaft, a fork having semicircular arms straddling said counter-shaft so as to be operated upon by said cam which is adapted to rotate within the arms, and a connection between said fork and motor-controlling rod, substantially as set forth.

7. In a stop for elevators, the combination of a hoisting-cable, a frame having a pulley bearing against said cable, a pivoted lever having a weight and which is supported by said frame, a bell-crank lever against which the first-mentioned lever impinges, a counter-shaft, a sliding clutch member on the counter-shaft with which said bell-crank lever engages, a gear-wheel on the counter-shaft having a clutch member adapted to be engaged by said sliding clutch member, a cam secured to said counter-shaft, a fork straddling the counter-shaft and adapted to be engaged by said cam, and a connection between the fork and a motor, substantially as set forth.

THOMAS HILL.

In presence of—
GEO. P. BROWN,
H. A. SCURR.