No. 835,210. PATENTED NOV. 6, 1906.

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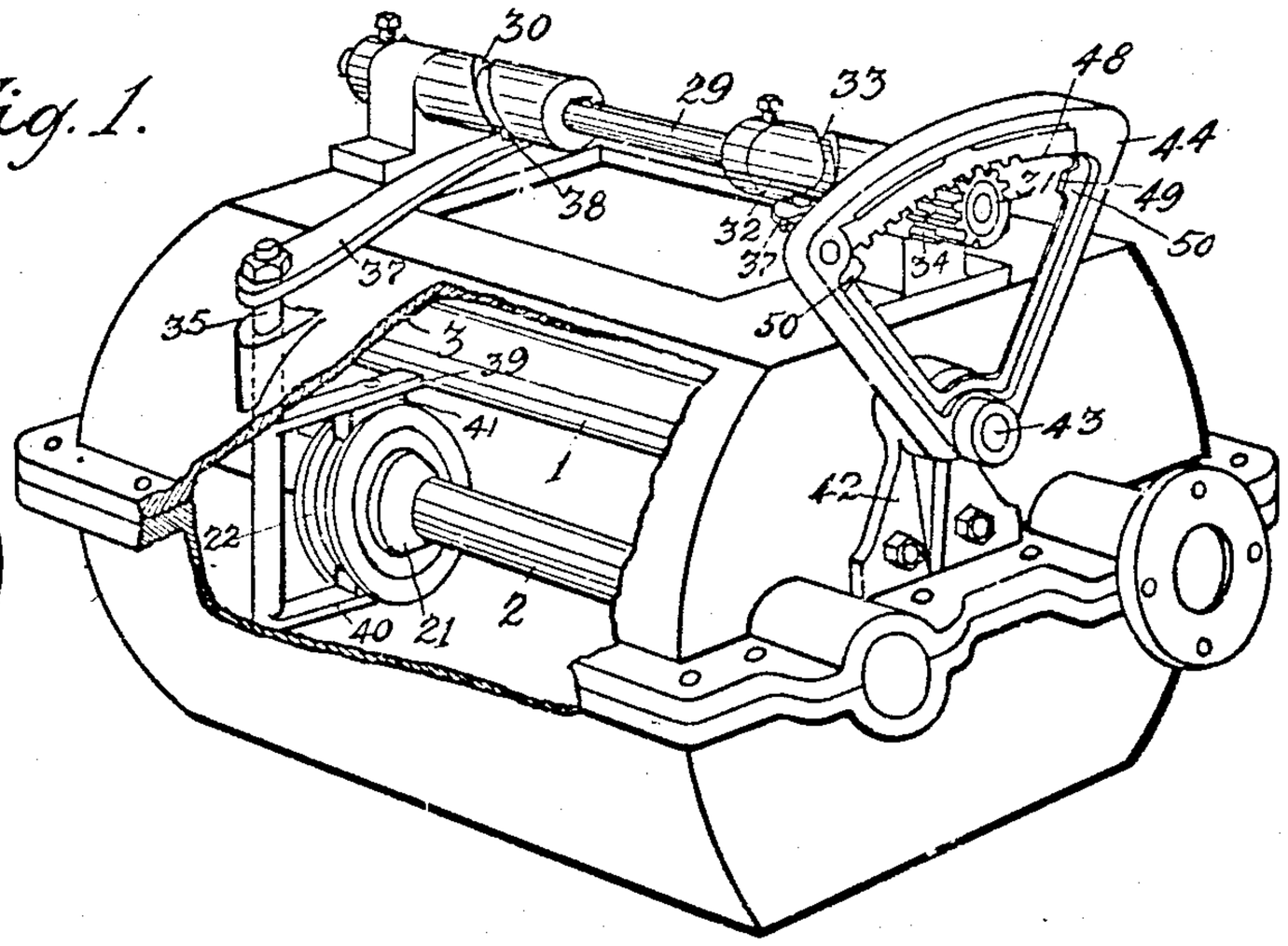
CONTROLLING DEVICE FOR SPEED CHANGING MECHANISMS.

APPLICATION FILED OCT. 3, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



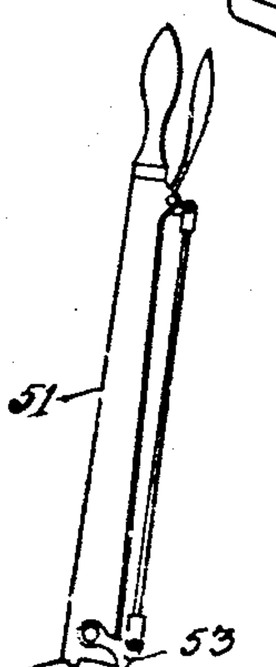


Fig. 4.

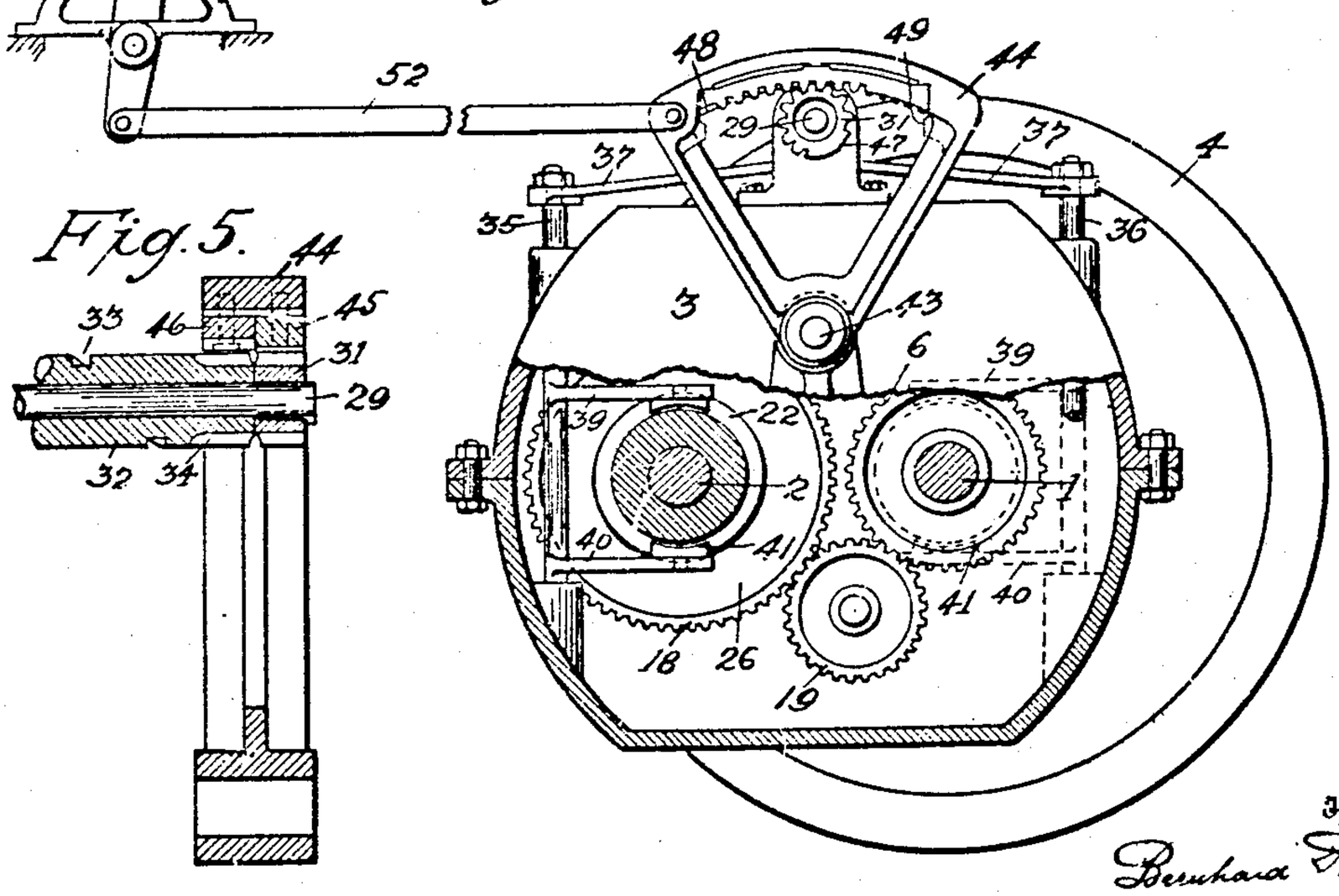


Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 3.

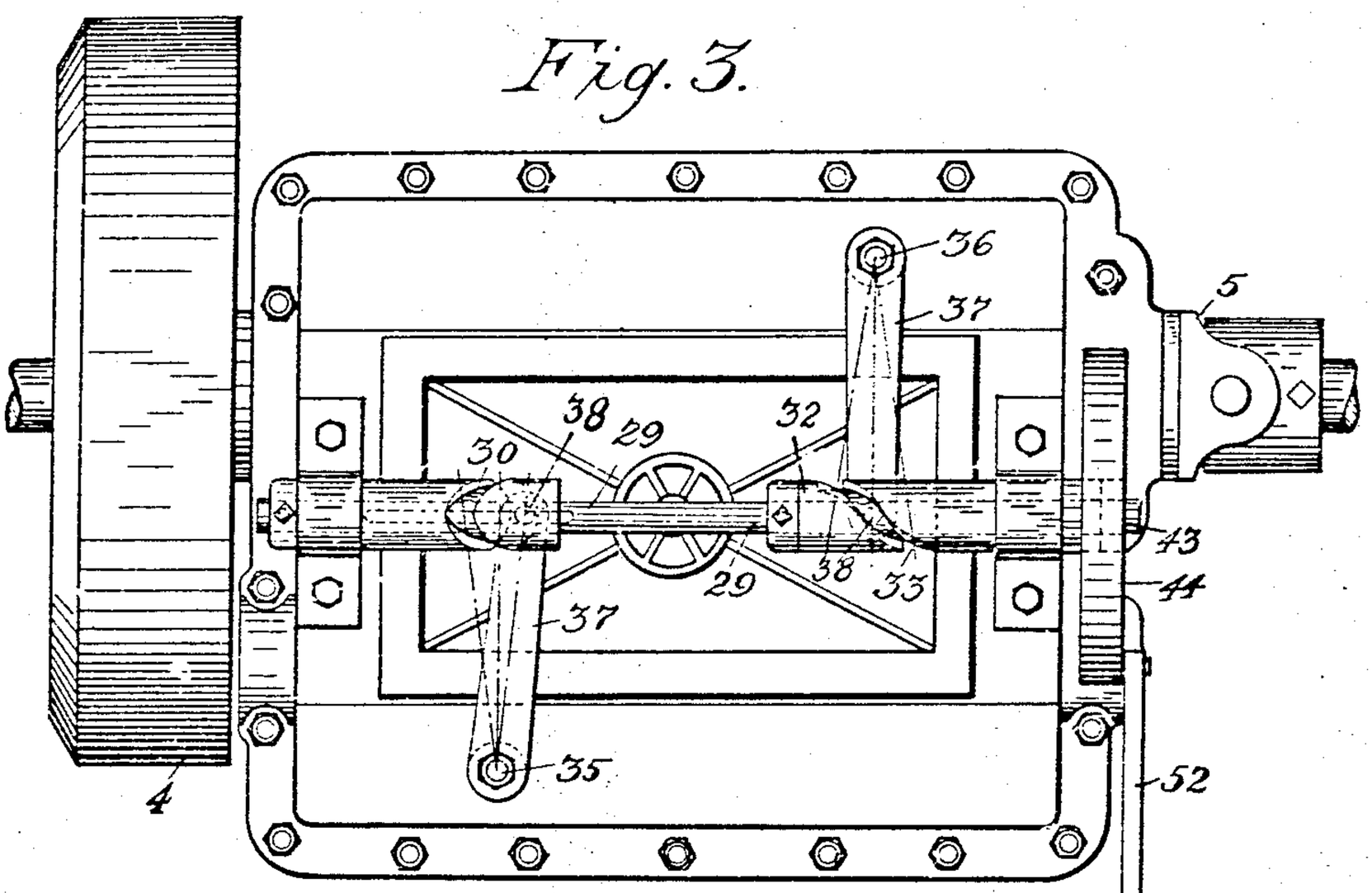
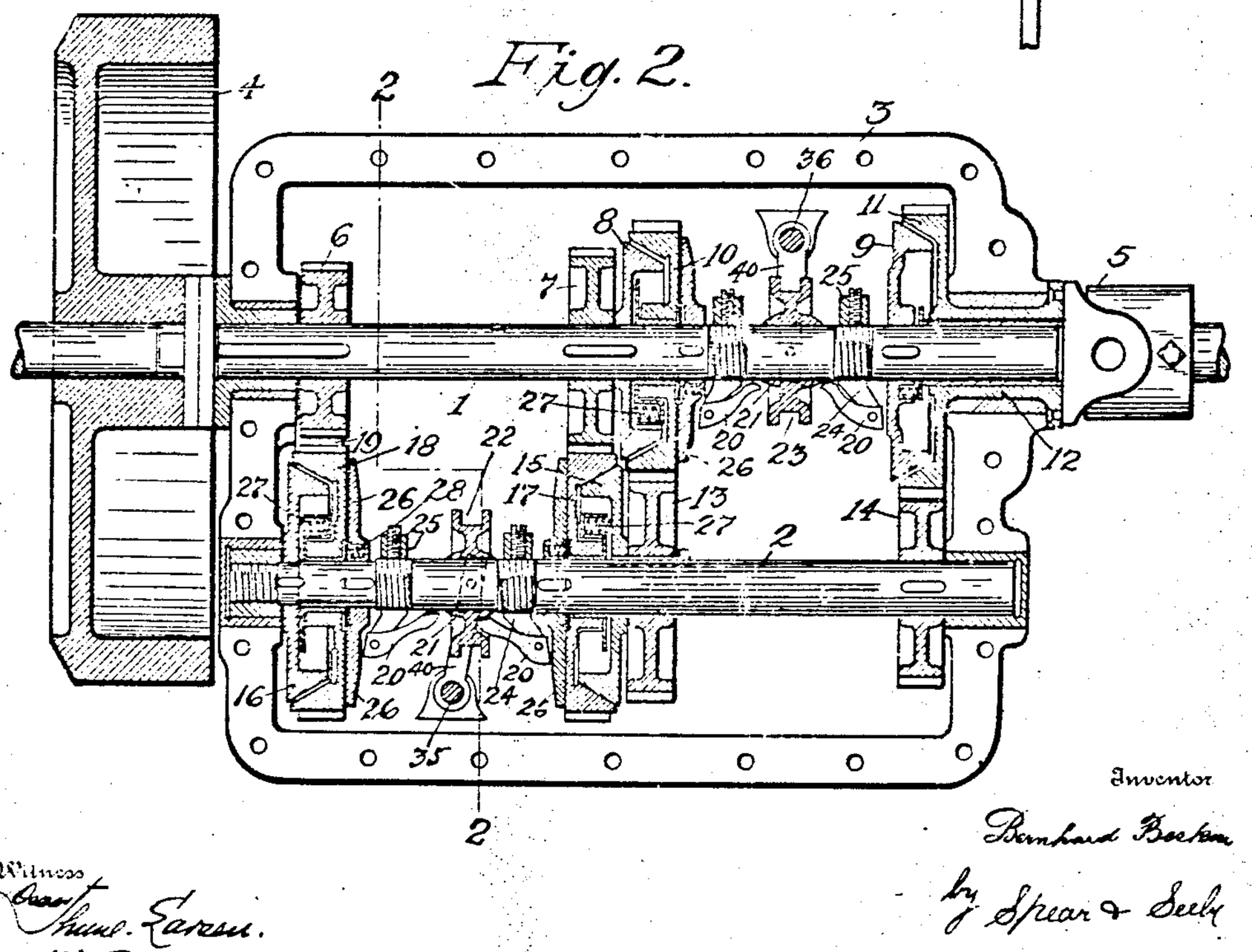


Fig. 2.



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CONTROLLING DEVICE FOR SPEED-CHANGING MECHANISMS.

No. 835,210. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed October 3, 1905. Serial No. 281,171.

To all whom it may concern:

Be it known that I, BERNHARD BESKOW, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Controlling Devices for Speed-Changing Mechanisms, of which the following is a specification.

My invention relates to controlling devices for speed-changing mechanism, and more particularly to those used in automobiles, traction-engines, and the like.

The object of the invention is to provide a controlling device, operated by a single lever, by means of which a motor may be caused to run the machine backward or forward and to run it at variable rates of speed.

As distinguished from prior devices which require a plurality of levers, my lever when drawn back as far as it will go will cause the motor to run the machine backward; but when the said lever is pushed forward beyond a certain limit it will cause the motor to run the machine forward at the slowest rate of speed, and thereafter as its position is forwardly changed it will bring about an increase in the rate of speed at which the machine will be moved until the highest rate of speed is reached. The mechanism for accomplishing this is a very compact and simple device and is embodied in the accompanying drawings, in which—

Figure 1 is a broken perspective view of one form of mechanism adapted to be used in connection with an automobile. Fig. 2 is a horizontal section through the main and counter shafts of the driving-gear. Fig. 3 is a top plan view of the controlling-shaft and the levers actuated thereby. Fig. 4 is a broken end elevation, the section being along line 2 2, Fig. 2. Fig. 5 is a vertical section through the controlling-quadrant.

Referring more particularly to the drawings, 1 indicates the main shaft and 2 the counter-shaft, which are mounted in the ordinary boxing or casing 3 in the usual manner. One end of the main shaft is connected with any suitable motor (not shown) and provided with a fly-wheel 4. At the other end of the shaft is a universal joint 5, which is connected with the driving-axle (not shown) in the ordinary manner. Fixed upon the driving-shaft 1 are two pinions 6 and 7 and two clutch members 8 and 9, and loosely mounted on said shaft are two clutch members 10 and 11, the latter of which is provided with a sleeve 12, which extends through the shaft-bearing and is connected with the universal joint 5.

Fixed upon the counter-shaft 2 are two pinions 13 and 14 and two members 15 and 16, and loosely mounted on said counter-shaft are two clutch members 17 and 18. Engaging with the pinion 6 and the clutch member 18, which is provided with gear-teeth upon its periphery, is an idle pinion 19, by means of which the clutch member 18 is caused to rotate in the same direction as the main shaft 1 to reverse the driving mechanism, whereas the pinion 7 and clutch member 17, pinion 13 and clutch member 10, and pinion 14 and clutch member 11 are respectively and directly engaged, which will cause the shafts to operate in the direction opposite to each other to propel the driving mechanism forward.

Adjacent to the clutch members 9, 10, 17, and 18 are dogs or cam-levers 20, which are adapted to force their respective members into engagement with their companion members whenever the free ends of said levers are moved outward, as by the insertion of the inclined faces 21 of annular jaws or wedge members 22 and 23.

The dogs are pivotally mounted in the arms 24 of adjustable collars 25, so as to revolve with the respective shafts, and between their operative ends and their respective clutch members, except member 9, is preferably placed a disk 26. Each clutch member is normally held separated from its companion by a spring 27, and the disks 26 are normally held separated from their clutch members by springs 28.

Mounted upon suitable bearings on the casing 3 is a shaft 29, one end of which is preferably enlarged or provided with a hub in which is formed a cam-groove or track 30, and at the other end it is provided with a segmental pinion 31. Loosely mounted upon the intermediate portion of the shaft is a sleeve 32, one end of which is provided with a cam-groove or track 33 and the other end is formed into or provided with a segmental pinion 34, which is similar to and adjacent

to the pinion 31. Vertically mounted in suitable bearings on opposite sides of the casing 3 are two rock-shafts 35 and 36, each of which is provided at its upper end with an arm 37, which is provided at its free end with a roller 38, which rollers engage, respectively, with the cam-grooves 30 and 33.

Secured to the portions of the shafts within the casing are two yokes, preferably formed with upper and lower arms 39 and 40, respectively, which arms are provided with projections 41, that fit in annular grooves formed in the peripheries of the wedge members 22 and 23, respectively.

Secured between one end of the casing 3 and the free end of a bracket 42 is a bolt 43, upon which is mounted a quadrant 44. Rigidly secured to the inner face of the curved portion of the quadrant are two segments 45 and 46, each of which is provided for a portion of its length with gear-teeth for engaging with the pinions 31 or 34, as the case may be, while the remaining portion is flat or smooth for engaging with a flat face 47, formed upon each of said pinions. The two segments are secured to the quadrant side by side, but with their flat and toothed portions arranged opposite to each other. The toothed portion of each segment is a trifle longer than one-half the length of the segment, so that said toothed portions will slightly overlap each other at the center of the quadrant.

The pinions are of such size that the teeth formed upon a portion of the periphery of each will substantially equal the number of teeth of its segment, whereby each pinion will be given only a partial revolution by the movement of the quadrant a certain distance, for each pinion is so arranged relative to its segment that the last tooth of the segment engages with the last tooth of the pinion, and the further movement of the quadrant in that direction will cause the flat or smooth portion 48 of the segment to engage with the flat face 47 of the pinion, and thereby permit of the movement of the quadrant without further rotation of the pinion. When the quadrant is moved in the opposite direction, said pinion will remain stationary until its teeth are engaged by the toothed portion of the segment, which will cause its rotation until the opposite end of the segment is reached, when the pinion will have been rotated as far as it can go and its flat face 47 will have been brought into engagement with the flat face 49 of a projection 50 at the inner angle of the quadrant. By arranging the two segments opposite to each other, as heretofore described, and arranging the two pinions to correspond therewith it is evident that when one of the pinions is being actuated by the teeth of its segment the other pinion will be locked against rotation by its flat portion being engaged at the flat portion of its segment, except for a very short distance at the center of the quadrant, when each pinion will be in engagement with the teeth of its segment at that point and both pinions will be rotated by the movement of the quadrant in either direction.

The quadrant 44 may be moved back and forth in any suitable manner; but I have shown it as being connected with an ordinary lever 51 by means of a rod or link 52. The lever 51 is provided with the ordinary detent 53, which is adapted to engage with a toothed quadrant 54 in the usual manner, there being as many notches as there are changes of speed and the lever being located at any convenient point, preferably adjacent to the side of the engineer or chauffeur.

From the foregoing description it will be seen that when the quadrant is moved in either direction by means of the operating-lever the pinions and cam-grooves actuated thereby will be rotated in one direction or the other, according as the lever is moved forward or back. In the drawings the parts are shown in the position they occupy when the lever is set to drive the machine forward at its slowest rate of speed. In this position motion is transmitted from the shaft 1 to the shaft 2 through the pinion 7 and clutch members 15 and 17 and from the shaft 2 to the sleeve 12 through the pinion 14 and clutch member 11 and from the sleeve to the driving-axle through the universal joint 5 in the usual manner, and the machine is driven forward.

If the lever should be moved backward from said position, the quadrant would be drawn over to the limit of its movement in that direction, which would cause the hub on the shaft 29 to be given a half-revolution, which would cause the roller at the end of that lever 37 to move to the other end of said groove, which would carry the lever as far as it could go in that direction, as shown in dotted lines in Fig. 3. This would cause such a rotation of the rock-shaft 35 and movement of its arms 39 and 40 as to slide the wedge member 23 out of engagement with the dogs upon the side adjacent to the clutch member 17 and force it under the dogs adjacent to the clutch member 18, thereby causing the member 18 to engage with the clutch member 16 and rotate the shaft 2 in the same direction as the rotation of shaft 1, which rotation would be transmitted through the pinion 14 and sleeve 12 to the driving-axle through the universal joint 5, and thereby drive the machine backward; but if the lever should be moved forward instead of backward the segment 45 would cause the pinion 31 to complete its revolution in that direction, which

will rotate the shaft 29 so as to cause the intermediate portion of the groove 30 to hold the arm 37 at its neutral point, or in a position in which the wedge member 23 is out of engagement with both of the dogs or levers with which it is adapted to engage. At the same time that the pinion 31 has completed its revolution the pinion 34 would be given a partial rotation, which would cause the sleeve 32 to make one-quarter of a revolution, which would move its lever 37 from the neutral position of engagement with the cam-groove 33, as shown in the drawings, to one end of the said groove, which would rotate the rock-shaft 36 sufficiently to cause its arms 39 and 40 to throw the wedge member 23 under the dog 21, and thereby force the clutch member 10 into engagement with the clutch member 8, which would transmit motion to the shaft 2 through the pinion 13, which motion would be transmitted through the pinion 14 and sleeve 12 to the driving-axle in the same manner as heretofore described.

If it should be desirable to drive the machine at a still greater rate of speed, the lever 51 would be moved forward another notch, which with the present construction would be as far as it would go and which would move the quadrant to its limit in that direction, which in turn would rotate the sleeve 32 and its hub so as to move the lever 37 to the opposite end of the cam-groove 33, and thereby cause the clutch member 9 to engage with the clutch member 11 and drive the sleeve at the same rate of speed at which the shaft 1 is rotating, or at its highest rate of speed. At any point at which the lever 51 stands to drive the machine at a certain rate of speed a movement of the lever to a position intermediate to said rate of speed and the next higher or lower rate will rotate the pinions so as to cause the arms 37 to stand at their neutral points and permit the main shaft to be rotated without transmitting movement to the driving-gear in either direction.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a controlling device for speed-changing mechanism, two independently-movable toothed members, and a toothed actuating member in constant engagement with and adapted to control the movements of said members, one of said members being locked against movement while the other is being actuated.

2. In a controlling device for speed-changing mechanism, two independently-rotatable members having a common axis, and a movable member adapted to rotate either of said members during a portion of its movement and to simultaneously lock the other member against rotation.

3. In a controlling device for speed-changing mechanism, two independently-rotatable members, each provided with a cam-surface, shifting mechanism adapted to be operated by said cams, and an actuator adapted to rotate either of said members during a portion of its movement and to simultaneously lock the other member against rotation.

4. In a device of the character described, two independently-rotatable members, one of which is in the form of a sleeve and fits upon the other, a cam and a pinion on each member, shifting mechanism connected with each cam, and an oscillatory member in engagement with the pinions adapted to rotate either pinion and to simultaneously lock the other one against rotation.

5. In a device of the character described, two independently-rotatable members, each of which is provided with a cam, a pinion for each member, shifting mechanism in engagement with each cam, and a quadrant provided with two partially-toothed segments for engaging with said pinions and rotating either one of them and simultaneously locking the other against rotation.

6. In a controlling device for speed-changing mechanism, two independently-rotatable members, each provided with a cam, a segmental pinion for each member, one of said members forming a sleeve that fits upon the other member and has its pinion adjacent to the pinion of said other member, shifting mechanism engaging with each cam, and a quadrant provided with two partially-toothed segments for engaging with said pinions, each pinion provided with a flat portion for engaging with the smooth portion of the segments, said segments being arranged to rotate one of said pinions while the other is locked against rotation.

7. In a controlling device for speed-changing mechanism, two independently-rotatable members, means for rotating either of them and simultaneously locking the other one against rotation, transmitting-gearing, and shifting mechanism connected with said members and said gearing.

8. In a device of the character described, two independently-rotatable members, each provided with a cam, means for rotating either of said members and simultaneously locking the other against rotation, transmitting-gearing provided with clutch mechanism, and rock-shafts, each provided with an arm for engaging with one of said cams and with means for actuating a portion of the clutches.

9. In a device of the character described, two independently-rotatable members, each provided with a cam, means for rotating either of said members and simultaneously locking the other against rotation, transmit-

ting mechanism including a main shaft and a counter-shaft, pinions, clutch members, and wedge members on said shafts, transmitting mechanism connected with one of the clutch members, two rock-shafts, each provided with an arm for engaging with one of the cams and a yoke for engaging with one of the wedge members.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 20th day of September, 1905.

BERNHARD BESKOW.

Witnesses:
M. R. SEELY,
W. S. BOYD.