(No Model.) 3 Sheets—Sheet 1.

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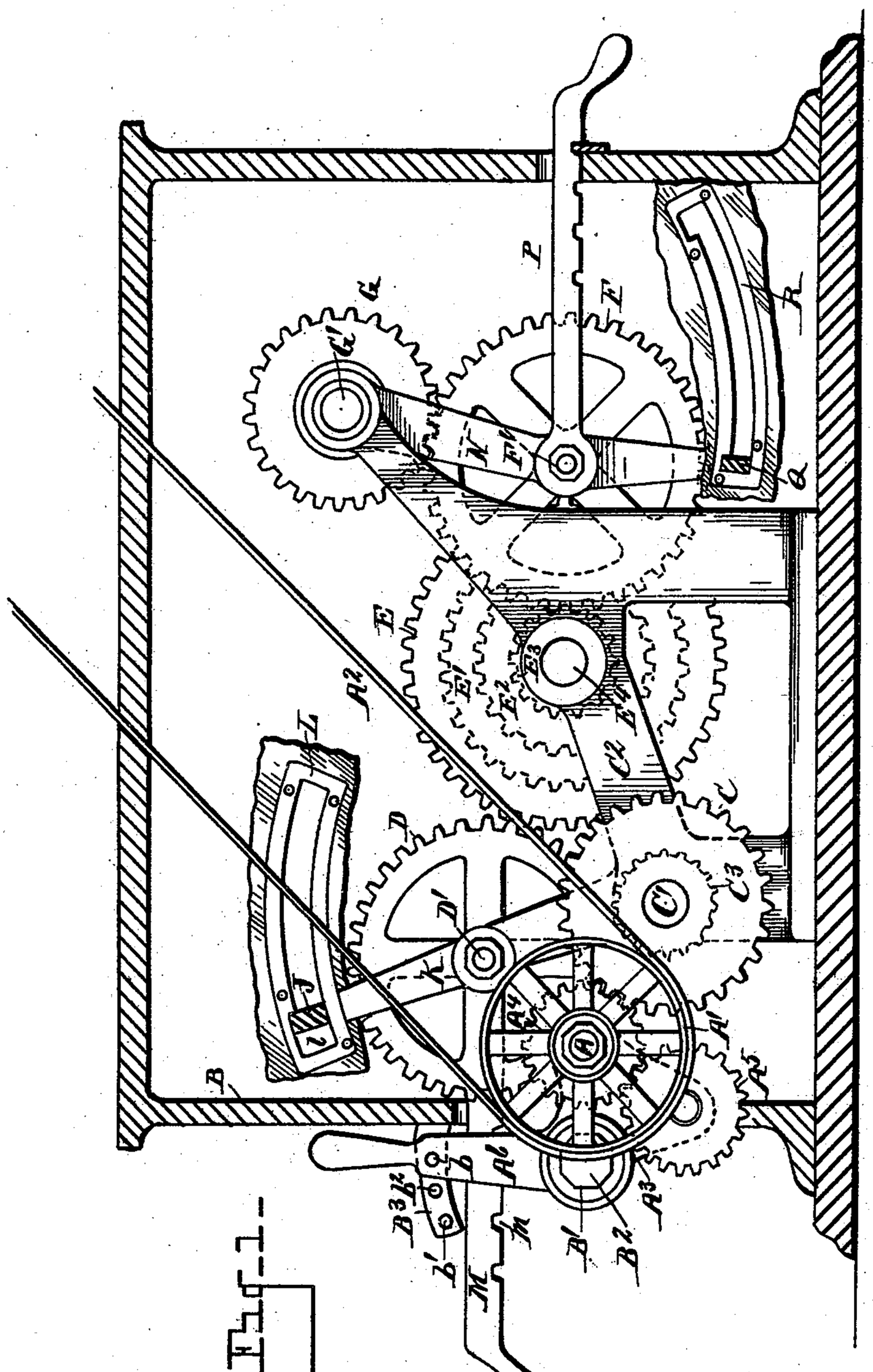
FEED DRIVING MECHANISM.

No. 548,167. Patented Oct. 15, 1895.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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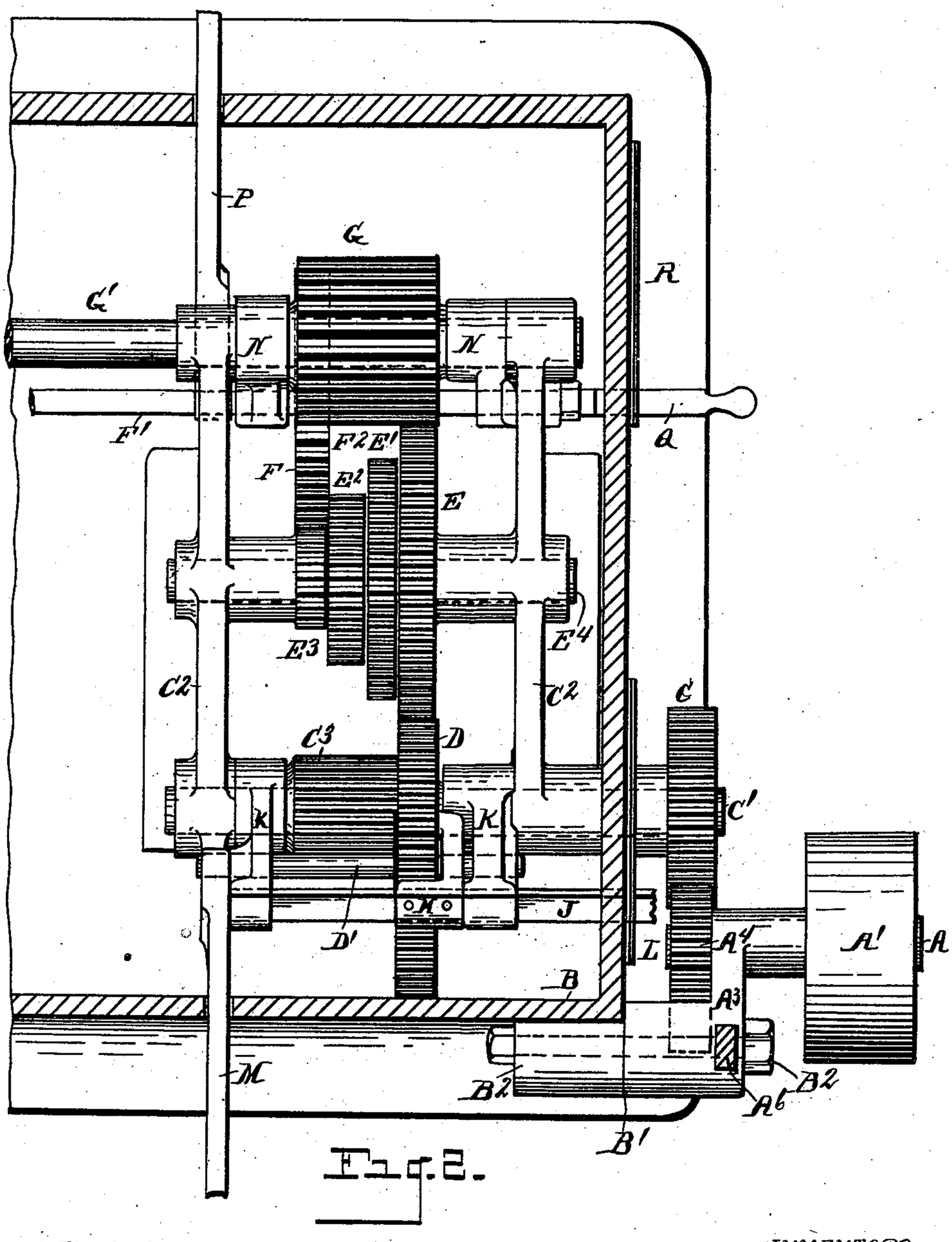

Fig. 2.

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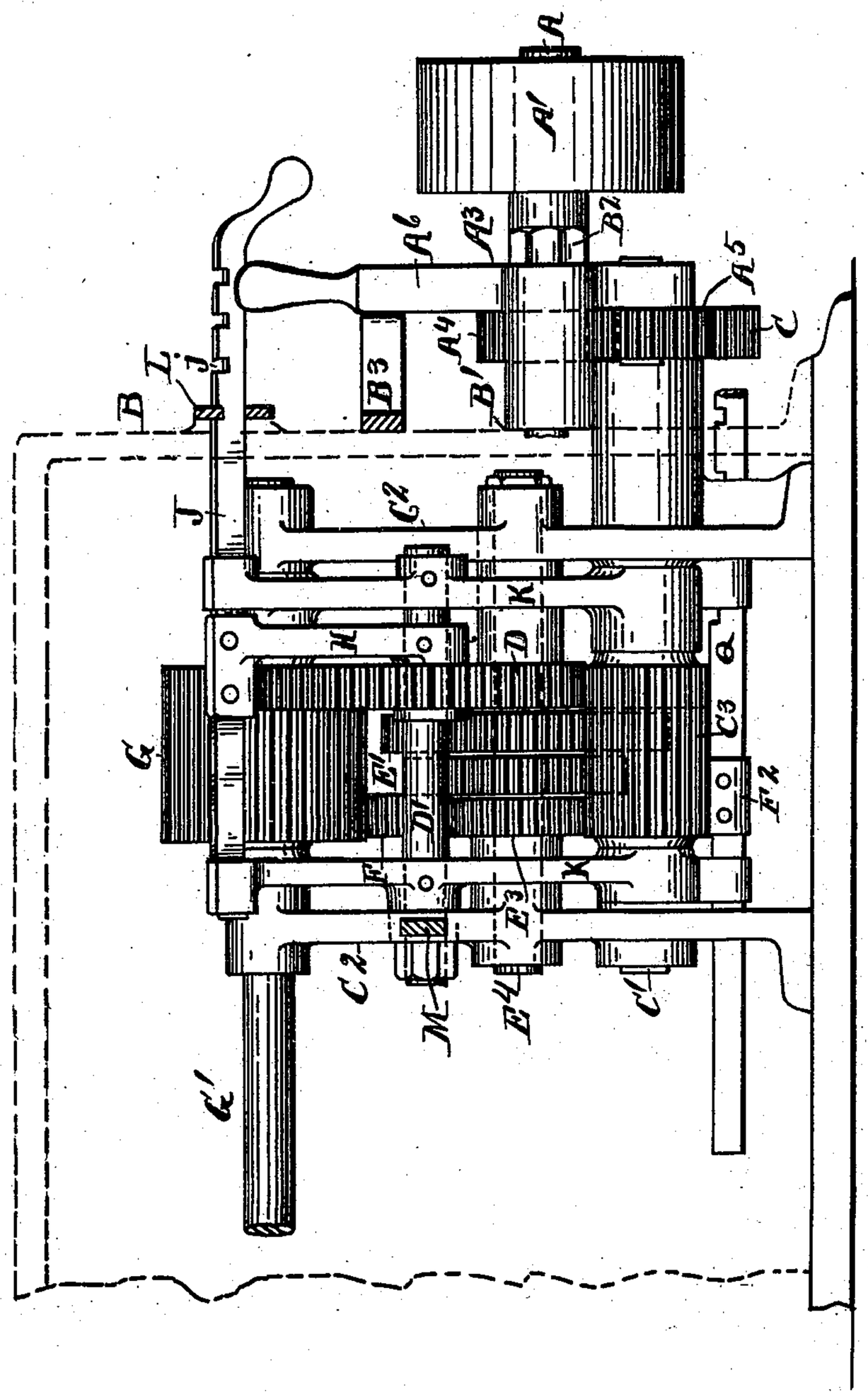
Fig. 3.



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UNITED STATES PATENT OFFICE.

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FEED-DRIVING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 548,167, dated October 15, 1895.

Application filed March 25, 1895. Serial No. 543,025. (No model.)

To all whom it may concern:

Be it known that we, HENRY M. LELAND and HERBERT W. CHENEY, citizens of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Feed-Driving Mechanism; and we declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Our invention has for its object novel mechanism for driving the feed or carriage of a milling-machine and for analogous uses, our purpose being to provide a great variety of speeds, together with a great variety of powers, by which the feed mechanism of such a machine may be driven. Obviously it is of much importance in machines of this class to provide devices whereby the feed mechanism may be given considerable varieties of speed to suit different kinds of work and whereby a large variety of powers may be readily applied to drive the feed mechanism. A milling-machine provided with such devices is adapted to a wide variety of work, whereas a machine without such provisions would be necessarily limited in the scope of the work which could be done thereby. Heretofore cone or speed pulleys have been employed to accomplish these results in a measure. These, however, have been found deficient and unsatisfactory for this purpose, inasmuch as the belt is liable to slip, and of necessity the face of each pulley of different diameter has necessarily been so limited as not to provide for a belt of sufficient width to give the requisite power desired.

Our invention therefore proposes a novel construction, combination, and arrangement of gears and other devices to accomplish the results above mentioned in a superior and more efficient manner, as hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an end elevation showing the case and certain other parts in section. Fig. 2 is a plan view with the case in section. Fig. 3 is a side elevation at right angles to Fig. 1, the case being indicated in dotted lines and showing parts in section.

We carry out our invention as follows: A denotes the main driving-shaft, provided with a pulley A′, belted to the line-shafting by a belt A^2. The shaft A is journaled in an adjustable bracket or bearing A^3 and is also provided with a pinion A^4. Upon the bracket A^3 is journaled a gear A^5, meshing with the pinion A^4. The bracket A^3 is jointedly connected with the casing B, as indicated at B′, in any suitable manner. As shown, this jointed engagement is accomplished by means of a bolt B^2. It will be seen that the pinion A^4 and gear A^5 are journaled upon said bracket to one side of the jointed connection of said bracket with the case B, the joint at B′ being eccentric to the shafts of the pinion A^4 and gear A^5. The bracket A^3 is provided with an adjusting lever A^6.

B^3 is a perforated bar attached to the case B to hold the lever A^6 in any desired position, said lever being provided with a pin, as at *b*, to engage any desired perforation in bar B^3.

C is a gear mounted upon a shaft C′, journaled in a suitable framework C^2, supporting certain parts of the gear mechanism.

As shown in Fig. 1, the pinion A^4 is in direct mesh with the gear C, which would, of course, give a corresponding direction to the rotation of the gear C. It will be seen, however, that by means of the adjusting-lever A^6 the bracket or bearing A^3, carrying the pinion A^4 and gear A^5, may be so adjusted as to throw the pinion A^4 out of mesh with the gear C and to throw the gear A^5 into mesh with the gear C instead. To do this, it would simply be necessary to engage the lever A^6 in the perforation *b′* of the bar B^3. This would lift the pinion A^4 out of engagement with the gear C and carry the gear A^5 into mesh therewith. The effect would obviously be to reverse the direction of the gear C from that where the pinion A^4 meshes directly therewith. Midway between the extremities of the arm B^3 may be provided a perforation b^2 to hold the lever A^6 in a position to prevent either the pinion A^4 or the gear A^5 being in mesh with the gear C.

Our invention contemplates any suitable mechanism for driving the gear C direct or

indirect, so as to reverse the motion of said gear.

The shaft C′ is provided with an elongated pinion C^3, meshing with the gear D, having an adjustable or movable engagement upon a shaft D′.

E E′ E^2 E^3 represent speed-gears forming a cone gear mounted upon a shaft E^4, the drawings submitted herewith showing four speed-gears of different diameters upon the shaft E^4; but we would have it understood that we do not limit ourselves to any particular number of speed-gears upon said shaft, simply, as any desired number may be employed within the scope of my invention.

The gear D is arranged, in a manner hereinafter described, to be brought into mesh with any one of said speed-gears E E′ E^2 E^3, as may be desired.

F represents another gear having an adjustable or movable engagement upon a shaft F′ and arranged, as hereinafter set forth, to be brought into mesh with any one of said speed-gears, whereby the motion imparted to the speed-gears by the gear D will be transmitted to the gear F through any one of the speed-gears, as may be desired.

G is an elongated pinion mounted upon a shaft G′, meshing with the gear F. The shaft G′ drives the carriage or feed mechanism of the machine. The feed mechanism, in itself constituting no feature of our invention, is not shown herewith, but will be readily understood by any one skilled in the art and may be of any desired construction.

The gear D is moved or adjusted upon its shaft to mesh with any one of the speed-gears E E′ E^2 E^3 in the following manner: The gear D is journaled upon a bracket H, sleeved on the shaft D′ and having a sliding engagement thereupon. The opposite end of the bracket H is rigidly engaged with a shifter J.

K K denote crank-arms pivotally engaged at one extremity upon the shaft C′ and fulcrumed upon the shaft D′ intermediate their extremities. Through their opposite ends the shifter J is movably engaged, so that the shifter can be longitudinally reciprocated therethrough. The shifter J extends through a sector L upon the case, the case being constructed with a corresponding arc-shaped slot. The shifter J is shown constructed with a series of transverse slots *j* to receive the corresponding edge of the sector, as indicated in Fig. 3. The slot of the sector is, however, enlarged at one extremity, as indicated at *l*, Fig. 1, to permit the shifter J being longitudinally reciprocated therethrough.

M is a lever engaged with one of the crank-arms K, said lever M being longitudinally reciprocatory, by which movement, it will be perceived, the gear D may be drawn out of mesh with any of the speed-gears, said lever being provided with a series of notches *m*, whereby the lever may be locked in a given position.

When it is desired to change the engagement of the gear D with the speed-gears, the lever M is first pulled outward, thereby tilting in corresponding direction the crank-arms K K, whereby the gear D is lifted out of mesh with a corresponding speed-gear. Then by throwing the shifter J over into the enlarged portion *l* of the sector L, the gear D may be moved laterally upon the shaft D′ to bring it opposite any desired speed-gear of a given diameter. The lever M is then forced inward to bring the gear D into mesh with the corresponding speed-gear, and the shifter J is moved in a reverse direction to hold the gear D from lateral movement on the shaft D′. In this manner the gear D may be moved into mesh in a ready manner with any desired speed-gear of the series. The gear F is adjusted in an analogous manner.

N N denote crank-arms pivotally engaged upon the shaft G′, the arms N N being analogous to the arms K K.

P represents a longitudinally-movable lever engaged with one of the arms N, whereby on pulling out said lever the gear F will be lifted out of mesh with any given speed-gear of the series into position where the gear F may be adjusted laterally into position opposite any given speed-gear of the series, as may be desired.

Q represents an additional shifter corresponding to the shifter J, engaged with a sliding bracket F^2 upon the shaft F′ and extended through a sector R, constructed in a manner analogous to the sector L, whereby when the lever P, analogous to the lever M, has been drawn outward, thereby moving the gear F out of mesh with a corresponding speed-gear, a longitudinal movement of the shifter Q may move the gear F laterally to correspond in position to that of any given speed-gear of the series.

The operation of the device will now be understood. The rotation of the driving-shaft A transmits its motion through the pinion A either directly to the gear C or indirectly thereto through the gear A^5, as may be desired, the motion of the gear C being transmitted through the elongated pinion C^3 to the gear D, which may be adjusted into mesh with any given speed-gear of the series, in the manner described, the corresponding speed-gear transmitting motion to the gear F, which may be adjusted to mesh with any speed-gear of the series, the gear F transmitting its motion to the pinion G upon the feed-driving shaft G′ By means of the pinion A^4 and the gear A^5, arranged as above described, motion may be given to the gear C in either direction, as may be required. Where a set of four speed-gears of different diameters is employed, as illustrated in the accompanying drawings, it will obviously be possible, by the adjustment of the gear D and of the gear F, provided for as hereinbefore described, to obtain corresponding changes of speed with a corresponding change of power in every case. In consequence of the different ratios

of the gears in this manner we provide, as hereinbefore set forth, for a great variety of speed and powers in a machine of this class. By adding more speed-gears to the series obviously the range of varieties of speed and power might be proportionately increased.

The improved devices and methods for handling the shifting-gears hereinbefore mentioned are important features, inasmuch as we are enabled thus to handle the shifting-gears directly by two levers projecting through the casing. In this manner we are enabled to place the gears inside the base of the machine and handle the shifting-gears with as much ease and rapidity as could be done if there were no casing.

Although we have shown and described the mechanism embodied herein especially with reference to driving-feed mechanism of a milling-machine, we would also have it understood that our invention contemplates its use for any purpose to which it may be found adapted.

What we claim as our invention is—

1. In a driving mechanism, the combination of a casing, a cone gear provided with a series of speed gears of varying diameters, a shaft D′, a bracket H sleeved upon said shaft and having a sliding movement thereupon, a gear D journaled upon one end of said bracket, a shifter rigidly engaging the opposite end of said bracket, a rotatable shaft C′ provided with an elongated pinion C^3 meshing with the gear D, crank arms K K pivotally engaged at one end upon a shaft C′ and carrying intermediate their extremities the shaft D′, one end of said shifter having a reciprocatory engagement with the opposite ends of said crank arms and having its opposite end projecting through said casing, and a lever M projecting through the casing to operate said crank arms, substantially as set forth.

2. In combination, a casing provided with an arc shaped slot enlarged at one extremity thereof, a series of speed gears of varying diameters, a shaft, a bracket having a sliding engagement upon said shaft, a gear journaled upon one end of said bracket, and an oscillatory crank arm, and a shifter constructed with a series of transverse slots upon one edge thereof, said shifter rigidly engaged with the opposite end of said bracket and having a reciprocatory engagement with said crank arm, and a lever to actuate said crank arm having a reciprocatory movement through said casing, the shifter connected with said bracket having a reciprocatory and oscillatory movement in said arc-shaped slot of the casing, substantially as set forth.

In testimony whereof we sign this specification in the presence of two witnesses.

HENRY M. LELAND.
HERBERT W. CHENEY.

Witnesses:
N. S. WRIGHT,
O. B. BAENZIGER.