No. 800,470. PATENTED SEPT. 26, 1905.

E. J. McCLELLAN.

MILLING MACHINE.

APPLICATION FILED MAR. 10, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

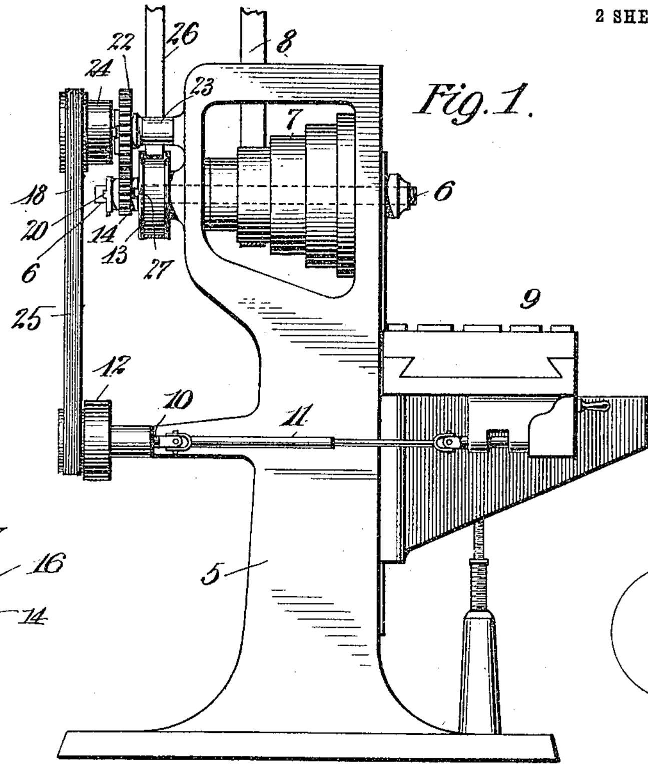


Fig. 4.

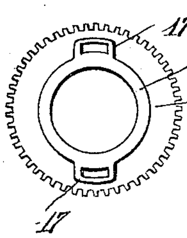


Fig. 5.

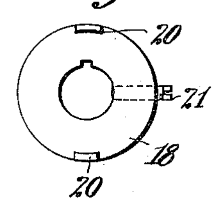


Fig. 3.

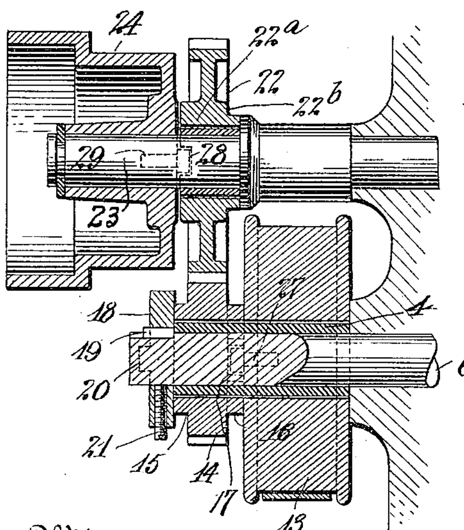
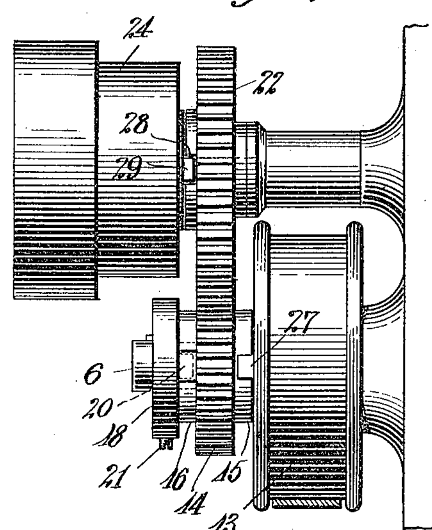


Fig. 2.



Witnesses

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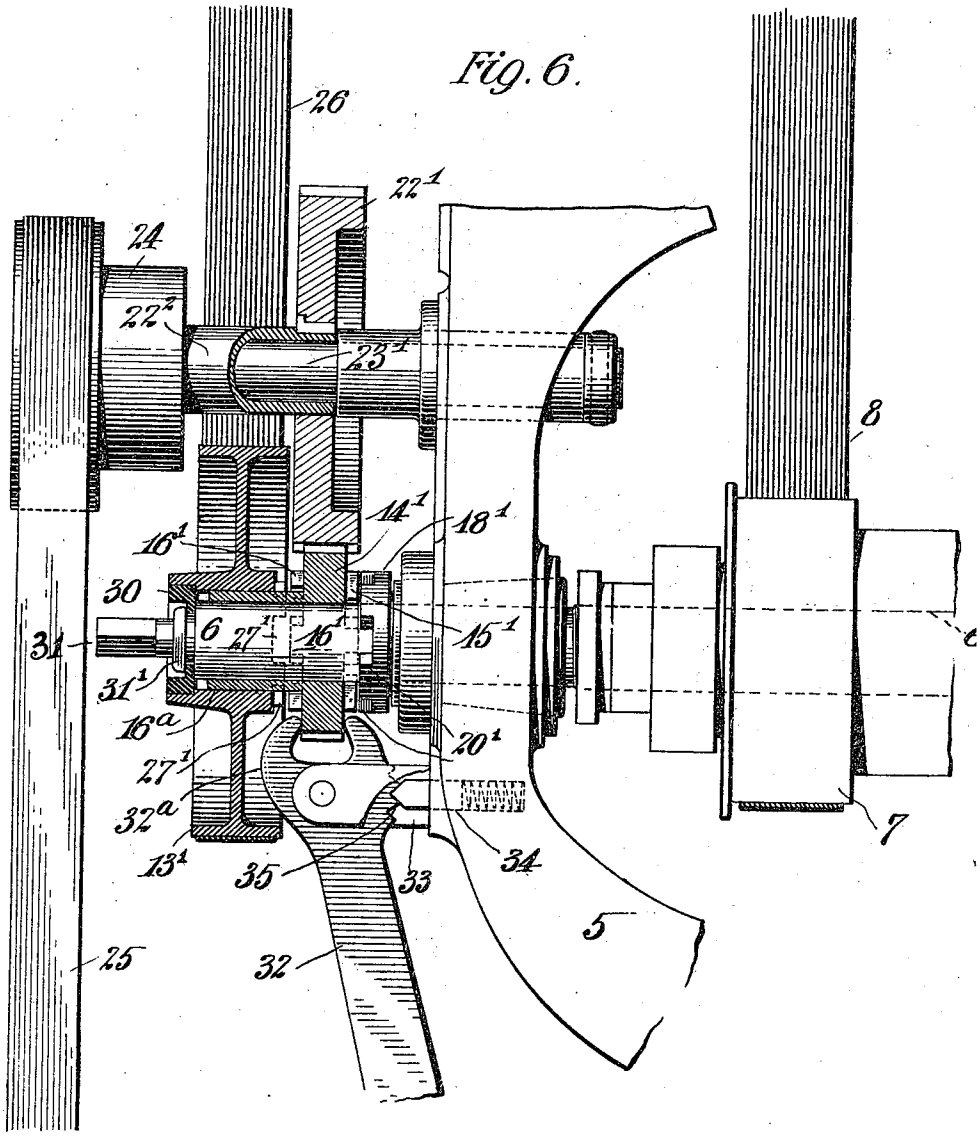
Fig. 6.



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UNITED STATES PATENT OFFICE.

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MILLING-MACHINE.

No. 800,470. Specification of Letters Patent. Patented Sept. 26, 1905.

Application filed March 10, 1905. Serial No. 249,385.

To all whom it may concern:

Be it known that I, EDWARD J. McCLELLAN, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Milling-Machines, of which the following is a full, clear, and exact description.

This invention relates to and has for an object to provide improved variable speed for feed-tables in machine-tools.

In machine-tools, and more especially those machines in which there is a main spindle for operating a cutting or other tool and a feed-table for carrying the article to be operated upon, which is driven from the main spindle, the latter driving means includes speed-changing devices, whereby the table can be fed at a number of different speeds relative to that of the main spindle; but it is sometimes necessary to obtain a certain speed of the work-table relative to that of the main spindle different from any that can be obtained by such speed-changing devices provided on the machine; and the object of my invention is to provide means for obtaining such additional speed supplementary to those provided by the speed-changing devices.

According to my invention I provide an arrangement by means of which at the will of the operator the usual speed-changing device operating the table-feed can be disconnected from the main spindle and the table-feed driven from a source of power independent of the main spindle and also means in the nature of a clutch device by which the table-feed mechanism can be driven either from the main spindle or from a source of power independent of the main spindle.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation of a milling-machine illustrating the embodiment of a form of my invention. Fig. 2 is an elevation of the details of the feed-table-driving means, the parts being arranged for the main spindle to drive the table-feed shaft. Fig. 3 is a vertical axial section of the parts shown in Fig. 2, the parts being arranged for driving the table-feed from a source of power independent of the main spindle. Fig. 4 is a face view of a pinion as seen from the left in Fig. 2. Fig. 5 is a face view of the collar 18; and Fig. 6 is an enlarged view, partly sectional, of another form of mechanism for carrying out my invention.

The frame 5 of the machine is shown as having a main spindle 6, carrying a cone 7, driven by belt 8 from a source of power. (Not shown.) The feed-table 9 is operated from a shaft 10 by any suitable means, (not shown,) connected with the shaft 10 by a universally-jointed extensible shaft 11. The shaft 10 is driven by a cone 12, which is fast upon it.

I provide a member driven from a source of power independent of the main spindle 6 and provide means whereby the shaft 10 can be driven either from the main spindle 6 or from this said member at the will of the operator. This said member in the present form of my invention is a pulley 13, loose upon the projecting rear end of the main spindle 6. A pinion 14 is also loose on the spindle 6 and has hub extensions 15 16, the latter having recessed ears 17 17, in the present illustration diametrically opposite. (See Fig. 4.) A sleeve 4 may be mounted loose on the spindle and loosely carry the pulley 13 and pinion 14 to reduce friction. A collar 18 is mounted on the end of the main spindle 6 and is caused to rotate therewith by a key 19, fitted in a slot in the spindle 6 and also a slot in the bore of the collar, but the fit of which key is loose enough to permit longitudinal movement of the collar on the spindle. The collar is provided with a pair of detents or lugs 20 20 (see Fig. 5) on one face that are so disposed as to enter the recesses 17 17, respectively, when the parts are assembled, as shown in Fig. 2. The collar is secured in position by a set-screw 21, which holds the said lugs in the recesses, and thus through the key 19 the pinion 14 will be caused to rotate with the spindle 6. The pinion 14 meshes with a gear 22, loose on a counter-shaft, (here shown as stud-shaft 23,) which shaft also carries a cone-pulley 24. A belt 25 transmits power from pulley 24 to the pulley 12, fast on the table-feed shaft 10. The pulley 13 is driven by belt 26 from a source of power (not shown) at a speed which may be different from any of those of the spindle produced by the cone-pulley 7. The pulley 13 carries on its side adjacent the pinion 14 a pair of detents or lugs 27, arranged similarly to the lugs 20 on the

collar 18, and hence adapted to engage the recessed pieces 17 on the pinion 14. The diameter of the hub 15 is less than the diameter of the lugs 27, and said hub can rotate freely between them, as shown in Fig. 2. The pinion 14, and hence the table-feed shaft, can be driven from this pulley 13 by loosening the screw 21, removing the collar 18, and then the pinion 14, reversing the pinion and replacing it, and then reversing the collar and replacing it and securing it by the set-screw. The recesses 17 will now be engaged by the lugs 27, causing the pulley 13 to drive the pinion 14, the latter being now free from the collar and shaft, as the lugs 20 will be outside thereof. By this arrangement the belt on the pulley 13 does not have to be disturbed, nor the belt on the pulley 7, nor the usual speed-changing gear adjusted; but by the mere reversal of the pinion 14 and the collar 18 the table-feed shaft 10 may be driven from the pulley 13 instead of from the main shaft or spindle.

Two more changes of speed may be obtained without additional driving members by making the gear 22 and pinion 14 interchangeable. The gear 22 is shown having a hub 22^a, similar to the hub 16 of pinion 14, having notches 28 engaged by lugs or pins 29 on the pulley 24, and the hub 22^b corresponds to the hub 15 of the pinion 14. When pinion 14 is put on the shaft 23, the lugs 29 will enter its recessed pieces 17 and the notches 28 of the gear 22 will either engage the lugs 20 or the lugs 27, according to the manner in which the gear is put on the main spindle 6.

In Fig. 6 is shown another form of my invention, in which I provide a clutch device by which the counter-shaft may be driven either from the main spindle 6 or from a pulley driven independent of the main spindle. A gear 22′ is fixed on a sleeve, loose on the stud-shaft 23′, and meshes with a pinion 14′, loose on the spindle 6, the teeth of the gear being wider than those of the pinion, so that the latter may be slid along the spindle 6 to within a certain range, yet not sufficiently to be thrown out of gear. The pinion 14′ has lugs 15′ on one side which engage notches 18′ of a collar 20′, fast on the spindle next to the pinion 14′, when the pinion is moved toward it from its intermediate position with respect to the gear, as shown in this view. Retained in this position the pinion will be driven by the spindle 6, and thus drive the gear 22′ and counter-shaft 22^2. On its opposite side the pinion 14′ has lugs 16′, which engage the notched hub 27′ of the pulley 13′ when the pinion is shifted in that direction from its said intermediate position. The pulley 13′ is loose on the main spindle 6 and may rotate on a sleeve extension 16^a of the pinion 14′. Endwise movement of the pulley is prevented by a flanged collar 30, secured to the pulley and engaged by a shoulder 31′ of a bolt 31, tapped into the end of the main spindle 6. Therefore when the pinion 14′ is moved from its intermediate position toward the pulley 13′ it will engage its hub and be rotated thereby and drive the gear 22′ and the counter-shaft 22^2. To shift the pinion 14′ axially and retain it in position, a lever 32 is pivoted in ears 33 on the machine-frame and has a forked end 32^a loosely engaging the sides of said pinion. Rocking this lever will obviously move the pinion to engage either the collar 20′ or the pulley 13′ or else lie in an intermediate position out of engagement with either, as shown. The lever is yieldingly retained in each position by a spring-pin 34 on the frame engaging three notches 35 in the lever. Therefore by the mere rocking of a single lever the table-feed-operating mechanism is caused to be driven either from the main spindle or from a source of power independent of the main spindle or held in an idle condition.

Having described my invention, I claim—

1. In a machine-tool, the combination of a spindle having means thereon arranged to carry the cutting-tool, a work-carrying feed-table and operating mechanism therefor adapted to impart feeding movement to said table when actuated, a driving member independent of the spindle and having connections to said feed mechanism and a clutch whereby the spindle or the independent driving member can be connected at will to drive the feed-table-operating mechanism.

2. In a machine-tool, the combination of a main spindle, a table-feed, and operating mechanism therefor adapted to impart feeding movement thereto when actuated, a member driven from a source of power independent of the main spindle, and a shiftable power-transmitting device, and connections from said power-transmitting device to said feeding mechanism and spindle arranged to cause the table-feed mechanism to be driven from the main spindle when said device is in one position and from the said independently-driven member when said device is in another position.

3. In a machine-tool, a main spindle having operative connections to a source of power, a work-holding table and driving connections therefor independent of said power source, a shiftable power-transmitting device, and means for throwing said device into operative engagement with the driving connection for the work-table, said device being arranged to simultaneously disengage from the main spindle.

4. In a machine-tool, a main spindle having operative connection to a source of power, a work-holding table and driving connections therefor independent of said power source whereby said table can be driven from a second source of power entirely independent of said first-named source, and devices intermediate said table and spindle for shifting said

table and spindle into operative connection with one another or with said separate power sources.

5. In a machine-tool, the combination of a main spindle, a table-feed mechanism, a counter-shaft arranged to drive the table-feed mechanism, a driven member fixed on the counter-shaft, a driving member loose on the main spindle for driving said driven member, and a second driving member loose on the main spindle and rotated from a source of power independent of the main spindle, means for securing the first driving member to the second driving member, thus causing the table-feed mechanism to be driven independent of the main spindle, and means for securing the first driving member to the main spindle and thus causing the table-feed mechanism to be driven from the main spindle.

6. In a machine-tool, the combination of a main spindle, a table-feed mechanism, a counter-shaft arranged to drive the table-feed mechanism, a driven member mounted on the counter-shaft to rotate therewith, a driving member loose and shiftable on the main spindle and arranged for driving said driven member in any of its shifted positions, a second driving member loose on the main spindle and rotated from a source of power independent of the main spindle, connecting means arranged to cause the first driving member to be driven by the second driving member when the first driving member is in a certain position on the main spindle, and connecting means arranged to cause the first driving member when moved on the main spindle from said certain position to another to be driven from the main spindle.

7. In a machine-tool, the combination of a main spindle, a table-feed-operating mechanism, a counter-shaft arranged to drive the table-feed mechanism, a gear mounted on the counter-shaft to rotate therewith, a pinion slidable on the main spindle and meshing with said gear on the counter-shaft in adjusted position, a pulley loose on the main spindle and driven from a source of power independent of the main spindle, means for securing the pinion when in a certain position to the main spindle, and means for securing said pinion when shifted on the main spindle, to said pulley.

8. In a machine-tool, the combination of a main spindle, a table-feed-operating mechanism, a counter-shaft arranged to drive the table-feed mechanism, a gear fixed on the counter-shaft, a pulley loose on the main spindle and driven from a source of power independent of the main spindle, the pulley having notches in its hub on one side, a collar fixed on the main spindle and having notches on one side, a pinion slidably mounted on the main spindle between said pulley and said collar thereon, and having detents on one side arranged to engage the notched collar when the pinion is slid in one direction, and also having detents on its other side arranged to engage the notched hub of said pulley when the pinion is moved in the opposite direction, the pinion meshing with said gear on the counter-shaft in both said positions, means for shifting the pinion to said engaging positions and means for locking the pinion in such positions against axial movement.

In witness whereof I subscribe my signature in the presence of two witnesses.

EDWARD J. McCLELLAN.

Witnesses:

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CHAS. T. LUTHER.