(No Model.) 2 Sheets—Sheet 1.

E. JOHNSON.

MILLING MACHINE.

No. 565,992. Patented Aug. 18, 1896.

Fig. 1.

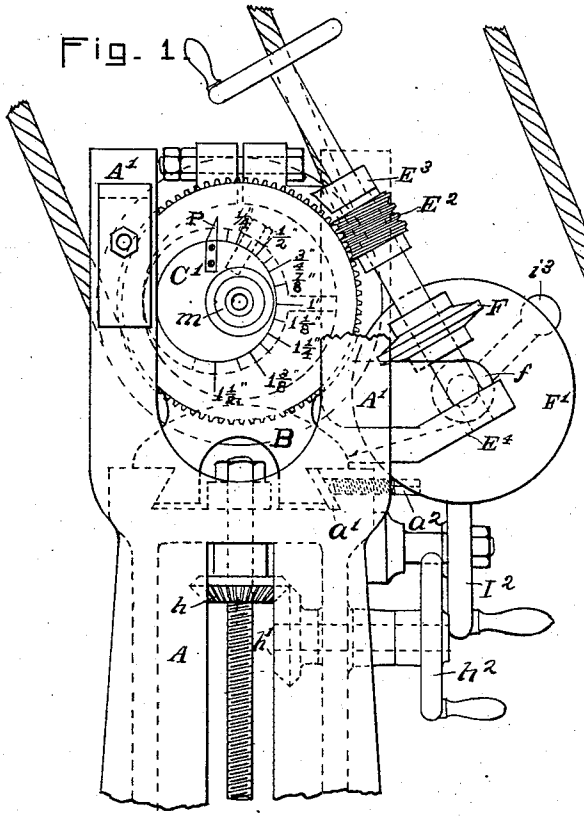
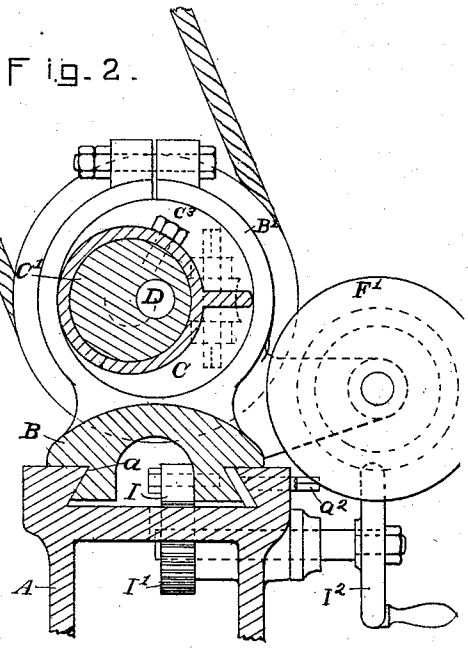


Fig. 2.



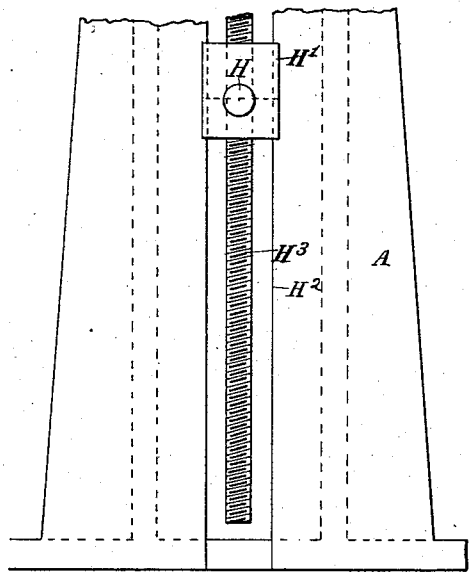
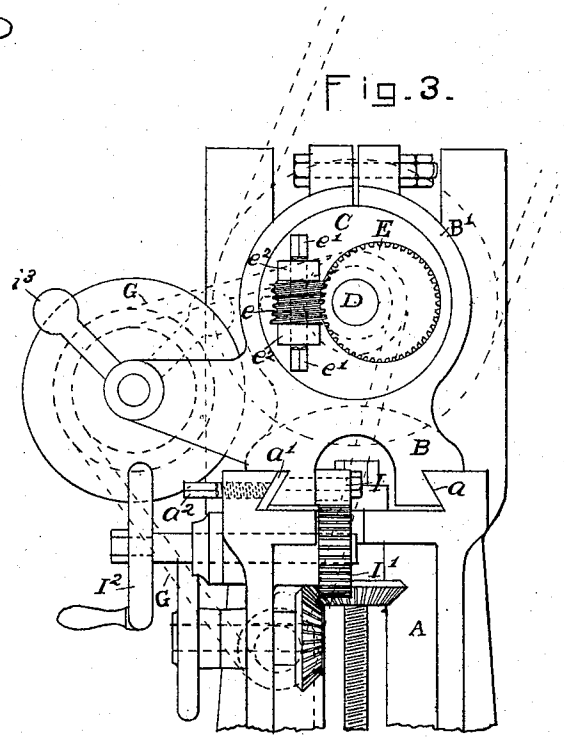


Fig. 3.



Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

E. JOHNSON.

MILLING MACHINE.

No. 565,992. Patented Aug. 18, 1896.

Fig. 4.

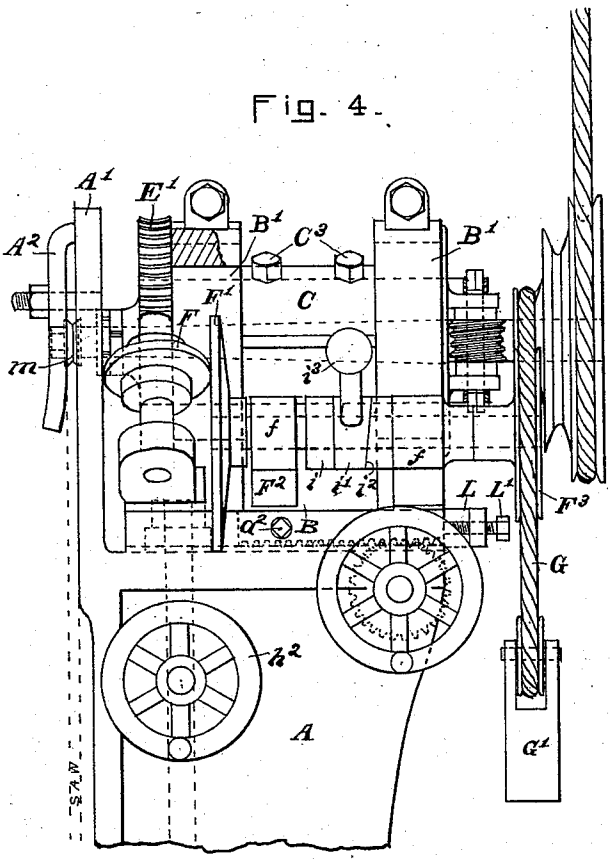
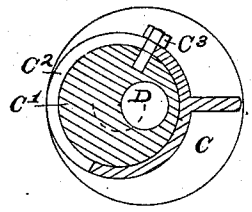


Fig. 5.



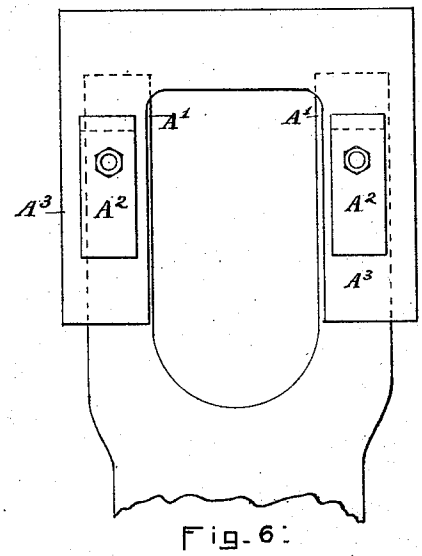
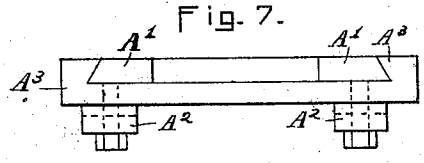
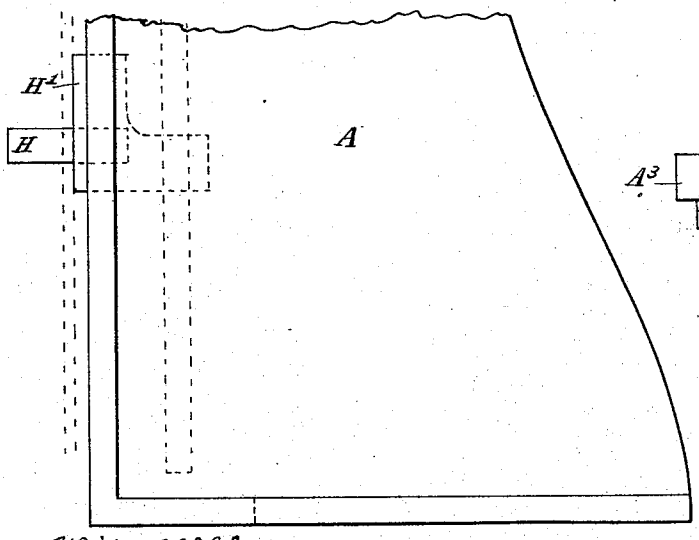


Fig. 6.

Fig. 7.





Witnesses.
G. T. Kelsey Jr.
H. E. Southworth

Inventor.
Eric Johnson,
by H. L. Reynolds,
his atty.

UNITED STATES PATENT OFFICE.

ERIC JOHNSON, OF SEATTLE, WASHINGTON.

MILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,992, dated August 18, 1896.

Application filed November 27, 1895. Serial No. 570,305. (No model.)

To all whom it may concern:

Be it known that I, ERIC JOHNSON, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Milling-Machines; and I do hereby 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.

My invention relates to that class of milling-machines especially designed for milling out the circular recesses in the rims of one variety of inserted-tooth circular saws and by which the teeth are held in place.

Figure 1 is a front elevation of my milling-machine; Fig. 2, a front sectional elevation taken just back of the front band or strap for the eccentric on the outer sleeve, but with the driving friction-disk in place. Fig. 3 is a rear elevation with the driving-pulleys and rope removed, but shown in dotted lines. Fig. 4 is a side elevation. Fig. 5 is a cross-section of the two eccentric sleeves, taken through one of the slots in the outer one. Figs. 6 and 7 are elevation and top plan of a device to be put on the clamping-face, so that a radial slot may be milled in the saw.

In milling the circular recess in the rim of circular saws preparatory to inserting teeth therein the mill must be smaller than the circle and the mill and saw have a circular travel relative to each other. I accomplish this by having the cutter-shaft mounted eccentrically in a sleeve, which is also eccentrically mounted in a second sleeve, and by rotating the sleeves and thus carrying the mill about a center while at the same time it rotates on its shaft.

The frame A has a dovetailed way *a* upon its upper end, upon which slides the head B, carrying all the working parts. This has on its lower side flanges to fit the ways *a* on the frame A and at each end straps or bands B′ for holding the outer eccentric sleeve C. This sleeve consists of a cylinder having eccentrics on each end, which eccentrics turn in the straps or bands B′. This sleeve has within it the cylinder C′, which has an eccentric hole for the cutter-shaft D.

The eccentricities of the two are the same. It is obvious that in the position shown in the drawings the cutter-shaft will have no travel about its center no matter how much the sleeves are rotated, as the eccentricity of one sleeve balances the eccentricity of the other. If, however, the inner sleeve be rotated in the outer, the center of the cutter-shaft will move in the dotted semicircle shown in Figs. 2 and 5. In this way the two sleeves may be set so that the shaft will travel in a circle whose radius may be anything from nothing to the combined eccentricities of the two sleeves. A pointer P on the end of the inner sleeve and a scale on the worm-gear E′, which is fixed to the outer sleeve, indicate the amount of the eccentricity.

The outer sleeve has a couple of circumferential slots C^2 extending a trifle over half-way around and entirely through the shell of the cylinder. Clamping-bolts C^3, extending through these and into the inner cylinder, serve to lock the two in any position when set. To enable the two to be easily rotated and accurately set, a worm-wheel E is fixed to the outer rear end of the cylinder C′ and a worm *e* mounted in lugs e^2 on the end of the outer cylinder. The worm-shaft *e′* is squared at both ends and may be turned by applying a socket-wrench thereto.

Upon the front end of the outer sleeve is fixed the worm-gear E′, which is rotated by the worm E^2, whose shaft is supported in brackets E^3 upon the front band or strap B′. The worm-shaft carries a friction-wheel F, which engages with a friction-disk F′. This disk is mounted on the shaft F^2, which turns in lugs *f* upon the sliding head B and carries on its opposite end the driving-wheel F^3. A rope belt G passes over this wheel and one on the cutter-shaft and has suspended on its lower side, by a pulley, a weight G′. This provides for the differences in the distances between the cutter-shaft and shaft F^2, due to the cutter-shaft moving about a center while the shaft F^2 is stationary.

The friction-wheel F may be moved on its shaft so as to engage the friction-disk F′ at different distances from the center and vary the rate of feed. Rotating the worm-gear E′ will rotate the sleeves and cause the cutter to be carried about in a circle in the manner before described.

To throw the friction driving device into or

out of engagement, the shaft is made longitudinally movable and carrying a collar i keyed thereto. Surrounding the shaft is the collar i', having handle i^3 and a cam-surface i^2 on one side engaging a similar cam-surface on the projecting boss on the lug f. When this handle is thrown over to one position, it will force the disk upon the wheel F and rotate it, while when thrown to the other position it will release the pressure and the feed will stop.

The saw is supported on the pin H, projecting from a block H', which is carried on the screw H^3 and slides in ways H^2 on the frame. The screw H^3 is revolved to raise or lower the block through the bevel-gears h and h' and wheel h^2. The screw is supported from its upper end.

The front face of the frame is continued up as two parallel bars, forming a U-shape support which straddles the mill and to which the saw is clamped by the bars A^2. The mill is shown at m.

To enable the head as a whole to be moved on its guideways, a rack-bar I is fixed to the head and is engaged by the pinion I' upon a shaft which is journaled in the frame, and carries upon its outer end the wheel I^2, by which it may be revolved. The head is clamped in place by the set-screw a^2, which presses upon the gib a'. A stop to limit the forward motion of the head and insure its return to the same place is shown in Fig. 4. This consists of an arm or lug L, fixed to the rear end of the movable head and projecting beyond a portion of the frame. A set-screw L' passing through it will engage the frame and limit its forward motion. This will insure its accurate return to the same point.

To enable my machine to be used for milling in a vertical straight line, I have provided the attachment shown in Figs. 6 and 7. This consists of an inverted-U-shaped casting having bevel-guideways planed in the back side of the vertical legs, which fit over similar bevel-guides on the outer edges of the arms A' of the frame. In using this the saw would be clamped to its front face by the usual clamps A^2, and the eccentric disks set so that their eccentricities are balanced or the moving of the cutter-bar prevented by stopping the feed. The saw is then fed to the work by using the screw H^3, the plate moving by reason of its attachment to the screw.

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

1. The combination in a milling-machine, with a cutter-spindle and means for rotating it, of an inner eccentric sleeve surrounding the cutter-shaft, an outer eccentric sleeve surrounding the inner sleeve, means for locking the sleeves to each other in any position and means for rotating said sleeves, substantially as shown and described.

2. The combination in a milling-machine, with a cutter-spindle and means for rotating it, of an inner eccentric sleeve surrounding said shaft, an outer eccentric sleeve surrounding the inner sleeve, means for locking the two sleeves to each other in any position, a worm-wheel attached to one of the sleeves, a worm attached to the frame, and means for rotating said worm, substantially as shown and described.

3. The combination in a milling-machine, with a cutter-spindle and means for rotating it, of an inner eccentric sleeve surrounding said shaft, an outer eccentric sleeve surrounding the inner sleeve, means for locking the two sleeves to each other in any position, a worm-wheel attached to one of the sleeves, a worm attached to the frame, and automatic means actuated from the cutter-shaft for rotating said worm, substantially as shown and described.

4. The combination in a milling-machine, with a cutter shaft or spindle, and means for rotating it, of an inner eccentric sleeve surrounding said shaft, an outer eccentric sleeve surrounding the inner sleeve, means for locking the two sleeves to each other in any position, a worm-wheel attached to one of the sleeves, a worm attached to the frame, a friction-wheel attached to the worm, a friction-disk adapted to engage said friction-wheel and means for rotating said disk from the cutter-shaft, substantially as shown and described.

5. The combination in a milling-machine with a cutter shaft or spindle, and means for rotating it, an inner eccentric sleeve surrounding said shaft, an outer eccentric sleeve surrounding the inner, of a worm-wheel fixed to the inner sleeve and a worm fixed to the outer sleeve, substantially as shown and described.

6. The combination in a milling-machine, with a cutter shaft or spindle and means for giving it a motion of rotation upon its axis and of revolution about a center, of means for adjusting the diameter of the circle of revolution at any amount from nothing to the maximum amount, substantially as shown and described.

7. The combination in a milling-machine, with a cutter shaft or spindle and means for giving it a motion of rotation upon its axis and of revolution about a center, of means for adjusting the diameter of the circle of revolution at any amount from nothing to the maximum amount, and means for moving said cutter-shaft longitudinally, substantially as shown and described.

8. The combination in a milling-machine, of a cutter shaft or spindle, double eccentric sleeves surrounding the same and means for rotating them, with a head movable longitudinally the cutter-shaft and having bearings for the eccentric sleeves to rotate in, substantially as shown and described.

9. The combination in a milling-machine of a cutter-spindle, double eccentric sleeves of equal eccentricity surrounding the same, means for locking the sleeves to each other

at any position, and means for rotating them, with a head having journals for said eccentric sleeves and a guideway longitudinal the cutter-shaft, a guide for the same and means for moving the head therein, substantially as shown and described.

10. The combination in a milling-machine, of a cutter-spindle, an inner eccentric sleeve surrounding the cutter-shaft, an outer eccentric sleeve surrounding the inner sleeve, means for adjusting the sleeves upon each other and for locking them in any position, means for rotating the eccentric sleeves, with a head having bearings for the eccentric sleeves and guides longitudinal the cutter-bar, a support having guideways for said guides, and means for moving the head in said guideways, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

ERIC JOHNSON.

Witnesses:
JOSEPH JOHNSON,
H. L. REYNOLDS.