(No Model.)

# C. E. VAN NORMAN.

## MILLING MACHINE.

No. 588,510. Patented Aug. 17, 1897.

Fig. 1

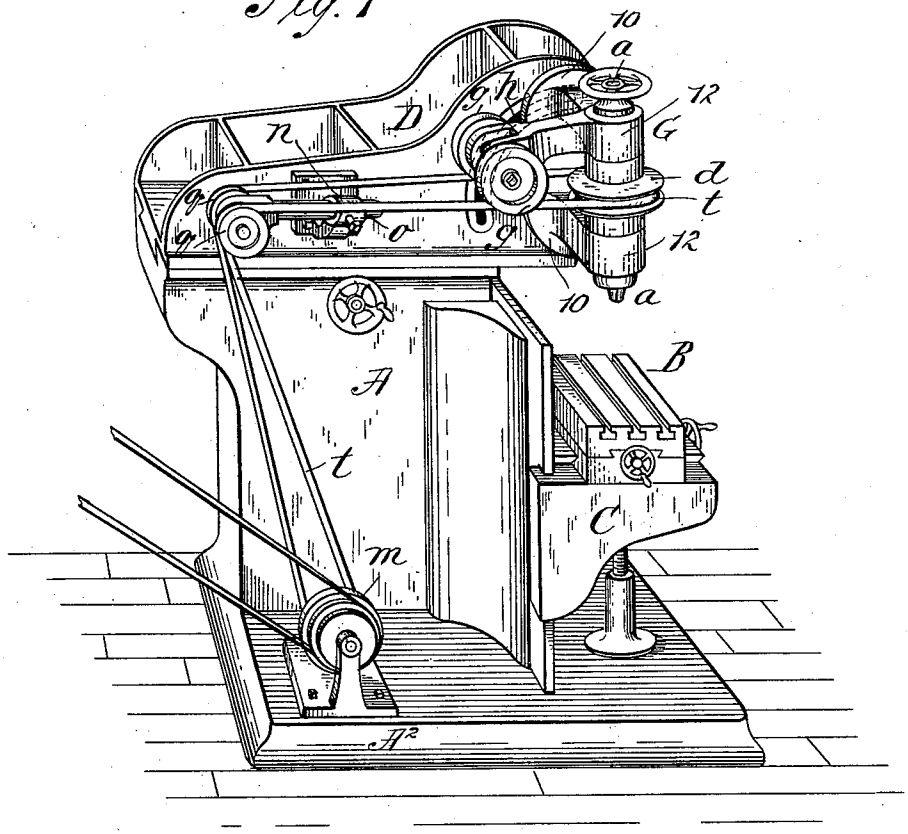



Fig. 2.

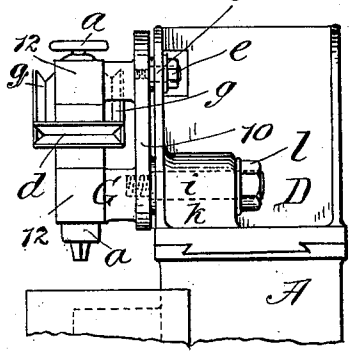
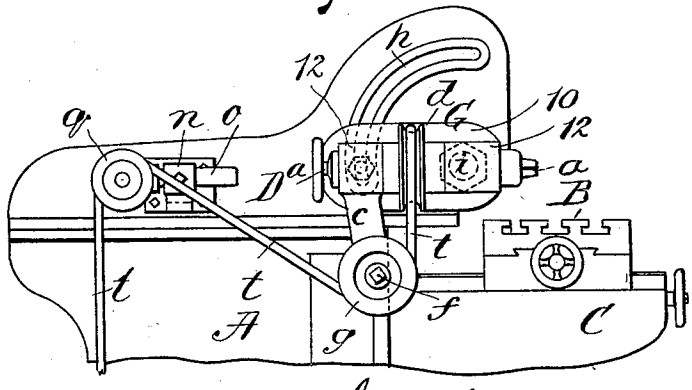



Fig. 3




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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

CHARLES E. VAN NORMAN, OF SPRINGFIELD, MASSACHUSETTS.

## MILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 588,510, dated August 17, 1897.

Application filed August 13, 1894. Renewed December 10, 1896. Serial No. 615,229. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. VAN NORMAN, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Milling-Machines, of which the following is a specification.

This invention relates to improvements in milling and other machines having a bed to support the work and a head which carries the rotary spindle for the tool which operates on the work supported by the bed.

The object of the invention is to devise improved mechanism which will enable the spindle-carrying head to be set and confined in a plane at right angles to the work-holding bed in any of a great number of positions and to enable the spindle-driving devices to operate as efficiently while the head is in one position as in another; and the invention consists in constructions and combinations of parts, all substantially as will hereinafter fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a perspective view of a milling-machine comprising the present improvements, the head being shown as in a position to vertically present the tool-carrying spindle. Fig. 2 is an end view of the upper part of the frame of the machine and of the head. Fig. 3 is a side elevation of the upper part of the machine, showing the head as changed to present the spindle axially horizontal.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A $A^2$ represent the supporting standard and base of the machine, having at its front the bed B, which is mounted for the longitudinal and transverse movements on the support C, which may be elevated and lowered, all as usual.

The standard has at its top the frame D, which may, if desired, be mounted as a slide to be moved longitudinally, so that its front extremity may have a greater or less extent of overhang above the bed. This frame, though movable, may be considered as a fixed part of the standard to all intents and purposes, so far as the present novel features are concerned, as it once having been moved so as to project sufficiently over the work-bed to best adapt the tool in the adjustably-rotatable head pivotally secured on said projection to the work it has to perform said frame D remains stationary until new work is laid out on the work-holding bed requiring a different location of said adjustably-rotatable head relative thereto.

G represents the head, by which is rotatably supported the spindle *a* for carrying the mill or other tool, said spindle being provided with the grooved pulley. This head is pivotally connected to a vertical wall lying in a plane coinciding with the line of movement of the frame D and constituting an integral part thereof, and it is usually applied to the wall forming one of the sides of said frame. The said head consists of a casting comprising the flat vertical part 10, to lie facewise against or in proximity to the flat side of the frame, and the two arms 12 12, extended outwardly at right angles from said part 10, which form the journals for the spindle, the driving-pulley *d* therefor being accommodated between the hub-like extremities of said arms 12 12; and said casting furthermore comprises the arm *c*, which projects at about right angles to and as a member of one of said arms, this arm *c* also having its direction of extension from the arm 12 about parallel with the side of the framing D. This arm *c* carries a stud or shaft *f*, on which are two guiding-sheaves *g g*, which rotate in planes at right angles to the plane of rotation of the spindle-driving pulley, and the location or arrangement of these sheaves relative to said spindle-pulley is such that no matter how much the position of the head may be shifted peripheral portions of these sheaves will be substantially at the plane of rotation of said spindle-pulley. It is not essential that the said arm C, having the sheaves *g g* thereon, should be supported on the said head or move as one therewith. The stud or shaft *j* may be, if desired, supported in the frame D in any convenient manner and be moved separately from the rotatable head when it is desired to change the position of the latter. The preferred construction, however, is that shown in Fig. 1.

The frame D has through the side wall the arc-slot *h*, which is concentric with the point

of pivotal connection at *i* of the head upon the frame.

The head has the stud *j*, which projects through the said arc-slot and receives at its screw-threaded projecting extension the clamping-nut *e*. The pivotal support for the head consists of the stud or bolt at *i*, extended through the widened part *k* of the framing and also receiving the confining-nut *l*.

It is obvious that if under certain conditions it should seem desirable to locate the slot *h* in the head G instead of the frame and to fix the bolt or stud *j* in the frame such a change can be effected.

When the nuts *e l* are loosened, the head may be swung around to carry the spindle always in a vertical plane, but to any angle of inclination to the bed or to a horizontal position parallel with the bed, and then to hold the head in its proper placement the nuts are set up.

On the base A² is the driving-pulley *m*, and on the side of the frame D thereabove is a fixture which comprises the horizontal and longitudinally-bored hub *n*, in which is movably fitted the bar *o*, which supports at its end the take-up or belt-tightening sheaves *q q*.

The endless driving-band *t* is passed around the driving-pulley *m* and the spindle-pulley *d*, the two courses thereof having guiding engagements with the idler-sheaves *g g* and also such engagements as to render them taut with the sheaves *q q*.

The swinging of the head to different positions will of course necessitate the endwise adjusting movements of the bar *o*, which supports the take-up sheaves *q q* to keep the driving-band at its proper tension, as will be manifest on an inspection and comparison of Figs. 1 and 3; and it will be seen that no matter how much the guiding-pulleys may deflect the courses of the driving-bands from the straight lines between the take-up sheaves and the opposite peripheral portions of the spindle-pulley *d* the courses of the band will always be maintained tangential to the peripheries of said spindle-pulley and in the plane of its rotation.

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

1. A milling-machine, the standard, the sliding frame placed on the top thereof, and provided with a slotted side wall; and the bed for the work, combined with a flat plate pivoted upon the side wall and provided with means for securing it in any desired position; the head extending outwardly from the plate, and carrying the spindle provided with a pulley, two guiding-pulleys journaled upon the arms which project from the head; the driving-belt, adjustable tightening-pulleys, and a driving-pulley for the belt, substantially as described.

2. The combination with the bed and the frame having a part which projects over the bed, provided with an arc-formed slot, of the head, in which the pulley-provided tool-carrying spindle is journaled, pivotally supported by the said framing at a point concentrically of the said arc-slot, and having a member comprising the threaded stud, *j*, which projects through said arc-slot and receives the confining-nut, *e*, to bear against the face of the framing adjacent said slot, and having the arm carrying the pair of guiding-sheaves, *g*, *g*, the peripheries of which are coincident with the plane of rotation of the pulley which is provided on the spindle, the driving-pulley, *m*, the bar, *o*, adjustably supported on the frame and carrying the paired take-up sheaves and the belt running around the driving-pulley and spindle-pulley, having a take-up engagement with the said idlers, and having a guiding engagement with the said sheaves, *g*, *g*, substantially as described.

3. In a milling-machine, the work-holding bed, combined with a frame having a vertical wall on a plane at right angles to the longitudinal movement of said bed, a flat plate pivoted upon said wall, a spindle supported in suitable bearings on said plate, a pulley on said spindle, a driving-belt therefor, an arm with guide-pulleys journaled thereon, adapted to be moved in a plane parallel with said plate, means for moving said belt, and means for securing said flat plate to said vertical wall in any desired position, substantially as described.

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