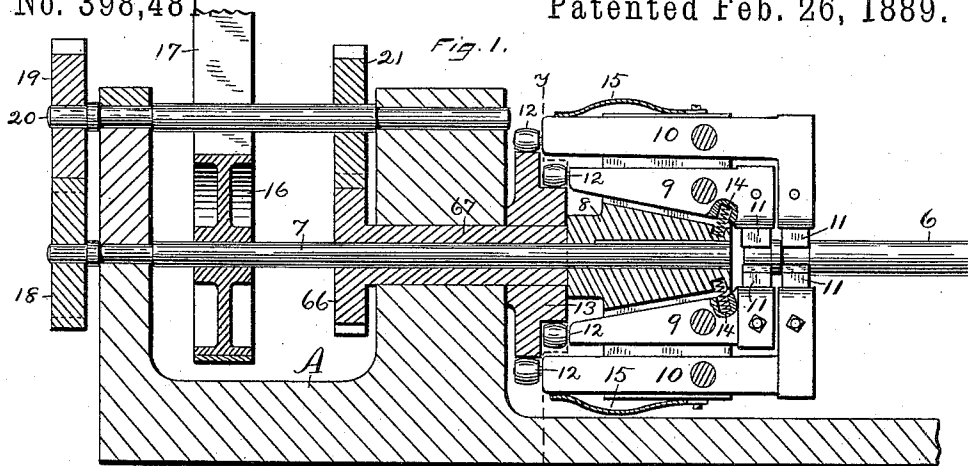
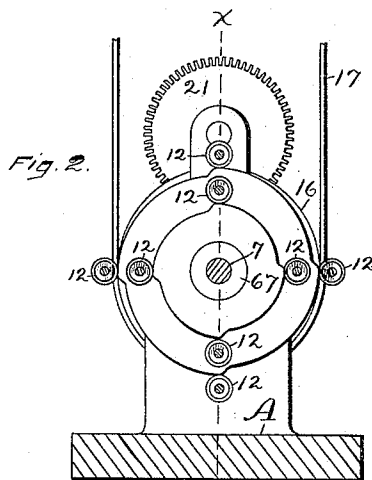
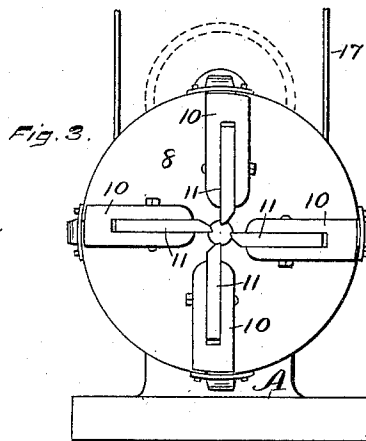
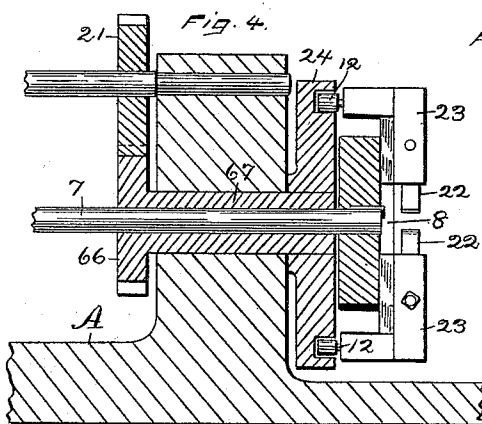
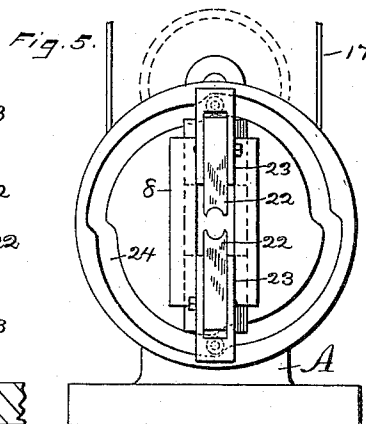


(No Model.)

P. A. WHITNEY.
MEANS FOR IMPARTING A RADIAL MOVEMENT TO THE CUTTING TOOLS
OF A ROTARY HEAD.

No. 398,481

Patented Feb. 26, 1889.



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UNITED STATES PATENT OFFICE.

PARDON A. WHITNEY, OF SOUTHTON, CONNECTICUT.

MEANS FOR IMPARTING A RADIAL MOVEMENT TO THE CUTTING-TOOLS OF A ROTARY HEAD.

SPECIFICATION forming part of Letters Patent No. 398,481, dated February 26, 1889.

Application filed October 26, 1888. Serial No. 289,202. (No model.)

To all whom it may concern:

Be it known that I, PARDON A. WHITNEY, a citizen of the United States, residing at Southington, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Milling-Machines, of which the following is a specification.

My invention relates to improvements in milling-machines of the class in which the tools move radially and cut from the periphery of the work inward in contradistinction to that class of machines in which the tools cut from the end of the work and move lengthwise thereon.

The object of my invention is to render the action of the feeding mechanism automatic and regular.

In the accompanying drawings, Figure 1 is a longitudinal section, partly in elevation, of my milling-machine on line *xx* of Fig. 2. Fig. 2 is a transverse section thereof on line *yy* of Fig. 1. Fig. 3 is a front elevation of said machine. Fig. 4 is a longitudinal section, partly in elevation, of a portion of my machine, showing a modification; and Fig. 5 is a front elevation thereof.

6 designates a piece of work illustrated in Fig. 1 as being milled by my machine; but I have not illustrated the chuck for holding the work, as it may be held and advanced to the milling-tools by any known mechanism.

A designates the frame of my machine, having mounted within suitable bearings the main shaft 7, to the front end of which is attached the head 8. This head is of an ordinary construction, and, as shown in Figs. 1 and 3, is provided with four radial slots, in each of which are arranged an outer and inner pair of lever-jaws, 9 and 10, the outer ends of which jaws are provided with radially-moving milling-tools 11, of any ordinary construction. The tools within the inner lever-jaws, 9, are adapted to mill a tenon on the end of the work, and the tools in the lever-jaws 10 are adapted to mill a groove at another point of the work, leaving a shouldered portion of a larger diameter between the milled portions, as illustrated in Fig. 1. The rear ends of the lever-jaws 9 10 are provided

with friction-rollers 12, which are acted upon by the cam 13 to throw the rear ends of the jaws outward and their front ends inward. The lever-jaws are thrown in the opposite direction by means of springs 14 and 15.

16 designates a pulley on the main shaft, which is driven by the belt 17, as in ordinary milling-machines.

At the rear end of the main shaft 7 there is a gear-wheel, 18, which meshes into a like gear-wheel, 19, on the counter-shaft 20, which shaft has also attached another gear-wheel, 21, that meshes into a gear-wheel, 66, on the rear end of the sleeve 67. The cam 13 is attached to the outer end of said sleeve, so as to revolve therewith. The main shaft 7 extends through said sleeve; but they are not keyed together and are therefore capable of revolving on a common axis at different speeds. The differential gear-wheels which drive the sleeve and cam are so timed as that the cam revolves either a little slower or a little faster than the main shaft, whereby the lever-jaws will be operated by said cam to move the tools 11 inward at regular intervals while the cam and head are both revolving, but at slightly varying speeds. The relative speed of the cam and the head will vary according to the work to be performed.

As illustrated, there are sixty-five teeth in each of the gear-wheels 18, 19, and 21 and sixty-six teeth in the wheel 66. Thus it will be seen that the cam loses one revolution for every sixty-six revolutions of the main shaft, and therefore a four-lift cam, as shown, will operate to move the lever-jaws four times for every sixty-six revolutions of the main shaft or once for every sixteen and one-half revolutions. When it is desired to have the cam lose or gain one revolution for a less number of revolutions of the main shaft, the differential gear-wheels may be differently timed—as, for instance, the gear-wheel 18 may be provided with seventeen teeth, the gear-wheel 19 with nineteen teeth, and the gear-wheels 21 and 66 with some like number of teeth—as, for instance, eighteen each—and then the cam will lose about one revolution for every ten revolutions of the main shaft. These two examples of timing the differential gear-

wheels are believed to be all that is necessary to illustrate the general plan of their operation.

I have illustrated the cam as a double cam
5 for acting upon an outer and inner set of lever-jaws; but it is obvious that a single cam might be employed for acting upon a single set of jaws; or, in other words, when jaws for acting upon one point of the work only are
10 desired the jaws for acting upon another part of the work may be omitted without making any difference in the operation of the jaws which remain. It is also evident that the cam may have any desired number of shoulders or "lifts," as I have called them, instead
15 of being a four-lift cam, as shown, the number of lifts being determined by the character of the work to be done. I have also illustrated the head 8 as carrying four tools, 11, in each
20 set of lever-jaws; but the number of tools and jaws for acting upon any one point of the work is not essential.

In Figs. 4 and 5 I show only one pair of tools, 22, approaching the work from opposite
25 sides. Instead of mounting these tools in lever-jaws I arrange them in sliding jaws 23, which move diametrically within the head 8 in a dovetailed slot or way, and said sliding jaws are provided with friction-rollers 12, to
30 be acted upon by a cam, as before described. If desired, instead of moving the jaws inward

by a spring a grooved cam, 24, may be employed, as shown in Figs. 4 and 5, so that the tools may be moved both outward and inward by the cam instead of being moved inward by a cam and outward by a spring, as
35 first described. In both forms of the machine the milled work is to be taken from between the milling-tools and new work replaced in the machine when the cam and springs or the
40 grooved cam have moved the milling-tools outwardly. With the lever-jaws as in Figs. 1, 2, and 3, the milling-tools are thrown out when the rollers 12 are resting on the lowest points of the cam, while with sliding jaws, as in Figs.
45 4 and 5, the milling-tools are thrown out when the rollers 12 are on the highest points of the cam.

I claim as my invention—

The combination of the main shaft, the
50 head secured thereon and carrying radially-moving milling-tools, the cam for moving said tools, mounted to revolve on a common axis with said shaft and head, and the differential gear-wheels for driving said cam at a different
55 rate of speed from that of said shaft, substantially as described, and for the purpose specified.

PARDON A. WHITNEY.

Witnesses:

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