No. 884,243. PATENTED APR. 7, 1908.

V. J. WAHLSTROM.

MILLING MACHINE.

APPLICATION FILED AUG. 2, 1906.

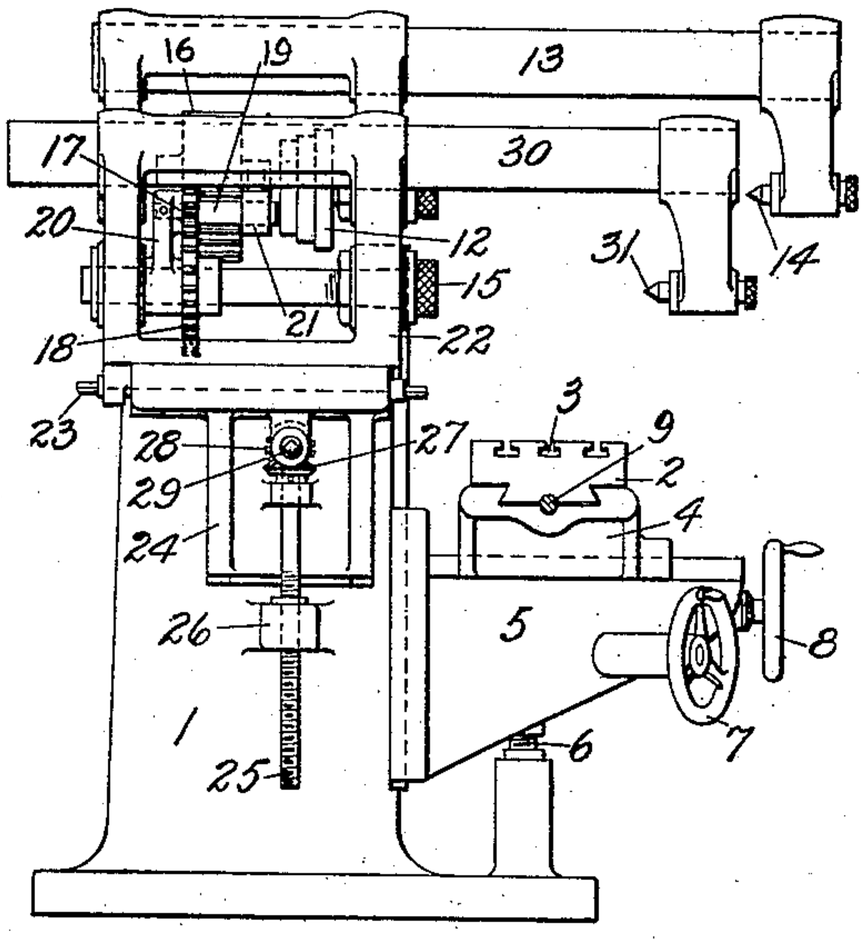


Fig. 1

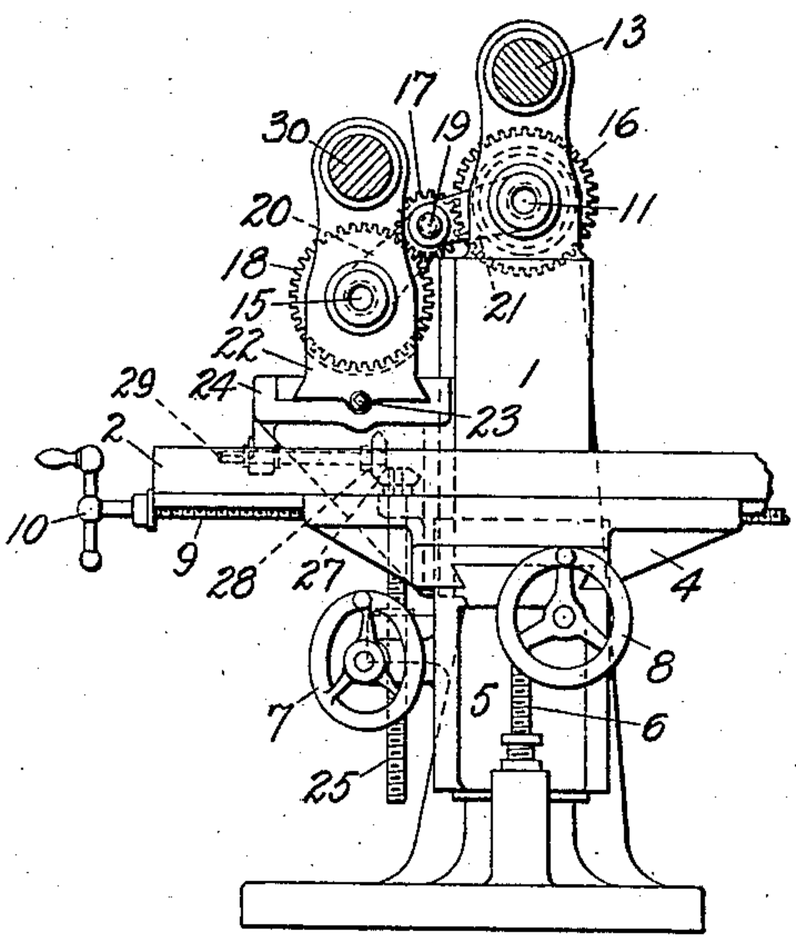


Fig. 2

Fig. 3

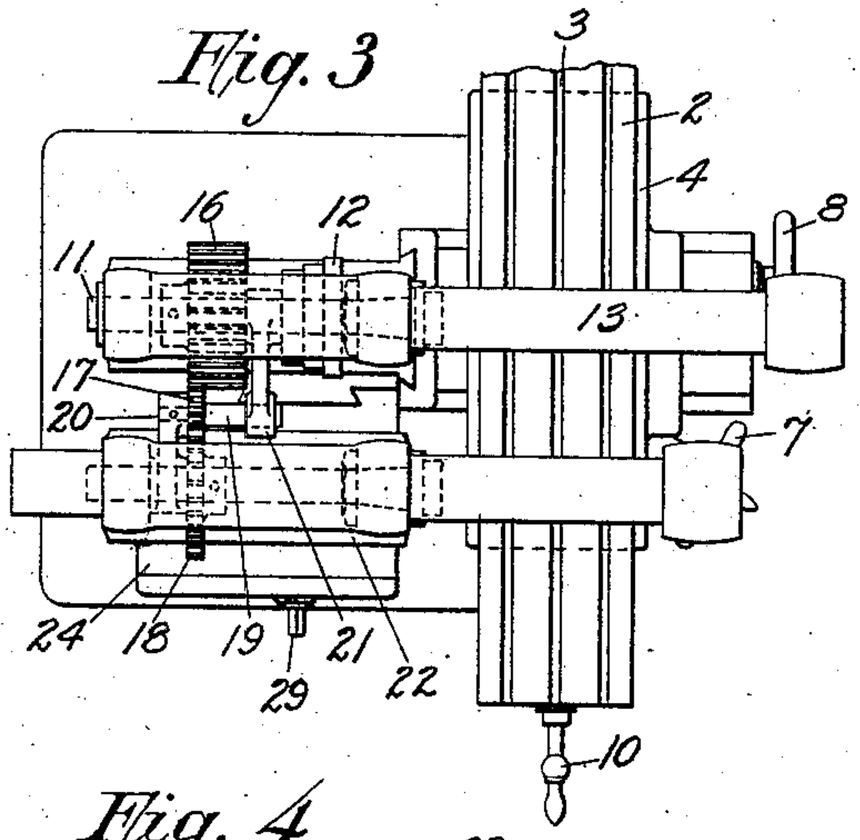
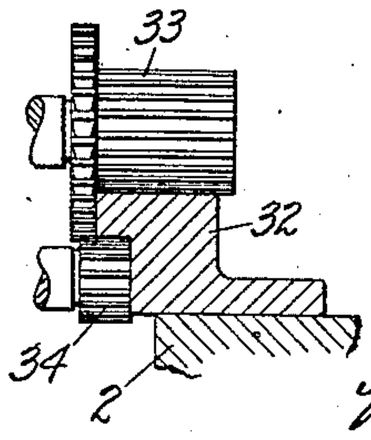


Fig. 4



Attest

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MILLING-MACHINE.

No. 884,243. Specification of Letters Patent. Patented April 7, 1908.

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To all whom it may concern:

Be it known that I, VERNER J. WAHLSTROM, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Milling-Machine, of which the following is a specification.

This invention relates to an improved milling-machine.

Heretofore, in metal-working operations where milling-machines were used and where a number of surfaces in different planes were to be milled, it was necessary, in many cases, to re-set the work on the table of the milling-machine when different cuts were to be made on the work. The time consumed in thus re-setting the work added to the cost of the finishing operations.

It is one of the objects of this invention to provide a device in which the work may be finished, or more nearly finished, without re-setting, thereby saving the time formerly expended in this way and reducing the cost of the milling operation.

Another object is to provide a device having a plurality of milling cutters, with means for adjusting the work with respect to one cutter, and for adjusting the other cutter to the work, thereby insuring great accuracy in the relative positions of the faces finished by the cutters.

With this and other objects in view, the invention consists in certain constructions and combinations which will be hereinafter fully described, and then specifically set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a side elevation of so much of a milling-machine embodying the invention as is necessary to an understanding of the same; Fig. 2 is a front elevation of the structure illustrated in Fig. 1; Fig. 3 is a plan view of the structure illustrated in Fig. 1; Fig. 4 is an enlarged detailed view of a pair of cutters used with the device, and illustrating one of the many finishing operations the device is adapted to make.

In the device selected to illustrate the invention, 1 indicates a column of the usual type, and which may be varied widely in form and construction. The column, as is usual in milling-machines, carries a work-table, and this work-table may be of any suitable construction. As shown, the work-table, marked 2, is in the form of a plate provided with a series of T-slots 3 in which bolts and dogs are used for the purpose of clamping the work thereto. The table 2 is mounted upon a support 4 which in turn is mounted upon a knee 5 supported on one side of the column. As shown, the knee is raised and lowered by means of a screw 6 operated by a hand-wheel 7. The support 4 is moved horizontally by means of a screw operated by a hand-wheel 8. The table 2 is traversed on the support 4 by means of a screw 9 operated by a handle 10. This being the usual construction of the work-table in milling-machines, a more detailed description is deemed unnecessary and is omitted in the interest of clearness and brevity. It may be remarked, however, that the object of these adjustments is to position the work with respect to the milling cutter, and to feed the work to the cutter during the milling operation.

The device is provided with a milling spindle 11, which may be of any suitable construction, and which is mounted in the column 1 at one side of the table 2. As shown, the spindle 11 is provided with a cone pulley 12 of the usual construction, whereby the spindle is driven.

The device is, or may be, provided with an overhanging arm 13 which carries a centering point 14 for supporting one end of an arbor carrying a milling cutter, and which is driven by the spindle 11.

The structure so far described is that of the ordinary milling machines now in use.

The device is, or may be, provided with a plurality of tool-carrying spindles located side by side at one side of the table, and as shown, there are two of such spindles. While these spindles might be otherwise mounted; and be independently driven in the best constructions, they will be mounted in parallelism, and be intergeared, so that the motion will be transmitted to the second spindle through suitable gearing from the main spindle which derives its motion from a line shaft.

In the best constructions and as shown, a second tool-carrying spindle 15 is mounted parallel to the spindle 11, and intergeared therewith. The spindle 11 is provided with

a broad-faced gear 16. This gear 16 is in mesh with an intermediate pinion 17 which in turn is in mesh with a gear 18 fast on the spindle 15, before referred to. The intermediate pinion 17 is loosely mounted upon a rod 19, one end of which is carried in an arm 20 loose on the spindle 15, before referred to. The other end of the rod 19 is slidably mounted in an arm 21 loosely mounted on the spindle 11. The object of this construction will be hereinafter explained.

Where a piece of work is to have two or more finished faces in different parallel planes, it is necessary to produce an accurate relative adjustment of the cutters. While this adjustment might be otherwise made; as shown, a first adjustment is made by moving the table 2, carrying the work, into proper position with respect to the cutter carried by the spindle 11, and a second adjustment is made by moving the cutter carried by the second spindle 15, to the work. The second spindle 15 is therefore so mounted that it may be moved in directions at an angle to each other or through a path which is the resultant of these two movements. To effect this result, the spindle 15 is mounted in a head 22, which may be moved by means of a screw 23 in a direction parallel to the axis of the spindle, thus producing a longitudinal movement thereof. During this movement the intermediate pinion 17 slides along the broad-faced gear 16, remaining in mesh therewith. Means are provided for moving the spindle 15 in a direction at right angles to that just described, and as shown, the spindle may move vertically, the longitudinal movement of the spindle 15 being, in the structure illustrated, in a horizontal plane.

As shown, the spindle-head 22 is mounted upon a knee 24 which is slidably mounted upon one side of the column 1, the side adjacent to that upon which the knee 5 is mounted. The knee 24 is raised or lowered by means of a screw 25 threaded in a boss 26 projecting from the column 1. The upper end of the screw 25 is provided with a miter gear 27 which is in mesh with a miter gear 28 on one end of a shaft 29, one end of which is squared so that it may be turned by a suitable handle. The head 22 may be provided with an overhanging arm 30 carrying a centering point 31 for the purpose of supporting one end of a cutter arbor driven by the spindle 15.

It will readily be understood that owing to the construction of the arms 20 and 21 which support the rod 19 upon which the intermediate gear 17 is mounted, that the two spindles will be geared together and the second one driven from the first, irrespective of the relative positions of the same.

Referring to Fig. 4, which illustrates one application of the two-spindle construction, 32 indicates a piece of work supported upon the table 2. Four faces of this piece of work are to be finished. It will be seen that the two upper faces at the extreme left are finished by the flanged cutter 33 carried by the spindle 11. The work is adjusted to this cutter by the table-positioning mechanism hereinbefore described. The second cutter 34 carried by the spindle 15, under-cuts the work and finishes the remaining two faces as the table is traversed. By suitably adjusting the knee 24 carrying the second spindle 15, the thickness of the overhanging portion of the work is accurately determined, and by means of the longitudinal movement of the spindle 15, the length of the overhanging portion of the work is accurately determined, without re-setting.

Changes and variations may be made in the structure by means of which the invention is carried into effect, and the invention therefore is not to be restricted to the precise details of construction herein shown and described.

What is claimed is:

1. In a milling machine, the combination with two tool-carrying spindles, of means for adjusting the relative longitudinal position of the spindles, means for producing a relative adjustment of the spindles in a direction at an angle to the axis of one of the spindles, and a work-table traveling in a direction at an angle to the axes of both spindles.

2. In a milling machine, the combination with two tool-carrying spindles, of means for adjusting one of the spindles longitudinally, means for adjusting the same spindle in a direction at an angle to its axis, and a work-table traveling in a direction at an angle to the axes of both spindles.

3. In a milling machine, the combination with two parallel tool-carrying spindles, of means for adjusting one of the spindles longitudinally, means for adjusting the same spindle in a direction at a right angle to its axis and in parallelism with the axis of the other spindle, and a work-table traveling in a direction at an angle with the axes of both spindles.

4. In a milling machine, the combination with two horizontal tool-carrying spindles, of means for adjusting the relative longitudinal position of the spindles, means for producing a relative adjustment of the spindles in vertical planes, and a work-table traveling in a direction at an angle to the axes of both spindles.

5. In a milling machine, the combination with a column, of a vertically adjustable knee mounted on one side of said column, a horizontally adjustable work-table mounted on said knee, a tool-carrying spindle mounted on said column, a second vertically adjustable knee mounted on an adjacent side of said column, a spindle-head mounted on said second knee and horizontally adjustable at

right angles to the adjusting movement of the work-table, a second tool-carrying spindle mounted in said head, means for driving the spindle mounted in the column, and gearing transmitting motion to the second spindle, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

VERNER J. WAHLSTROM.

Witnesses:
J. D. H. BERGEN,
DE HART BERGEN.