

May 28, 1940.

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2,202,425

HAND MILLING MACHINE

Filed Sept. 2, 1936

2 Sheets-Sheet 1

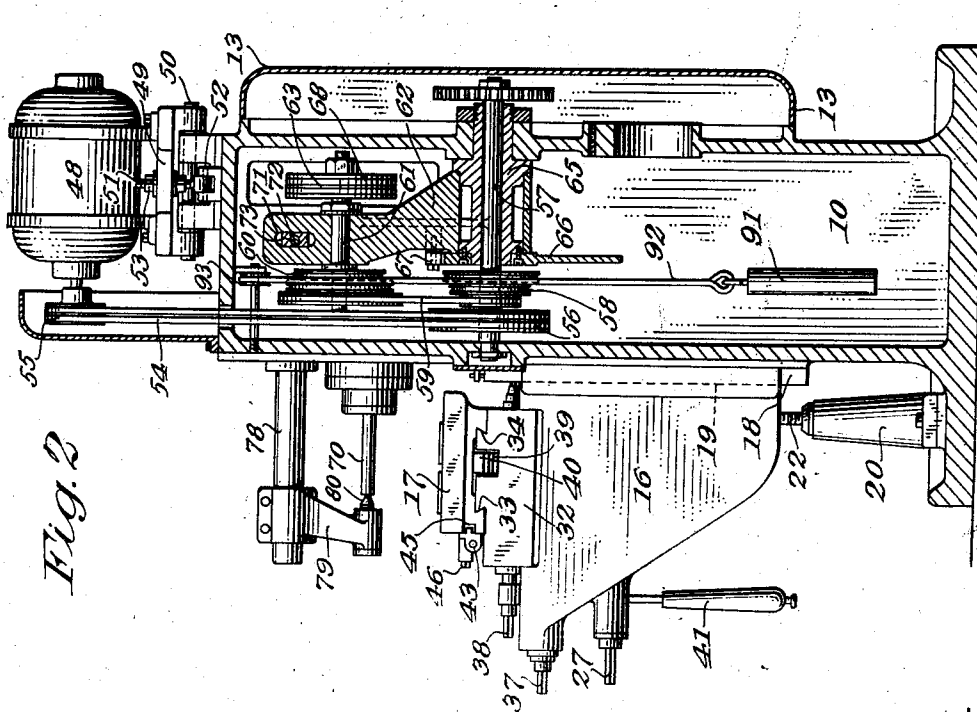


Fig. 2

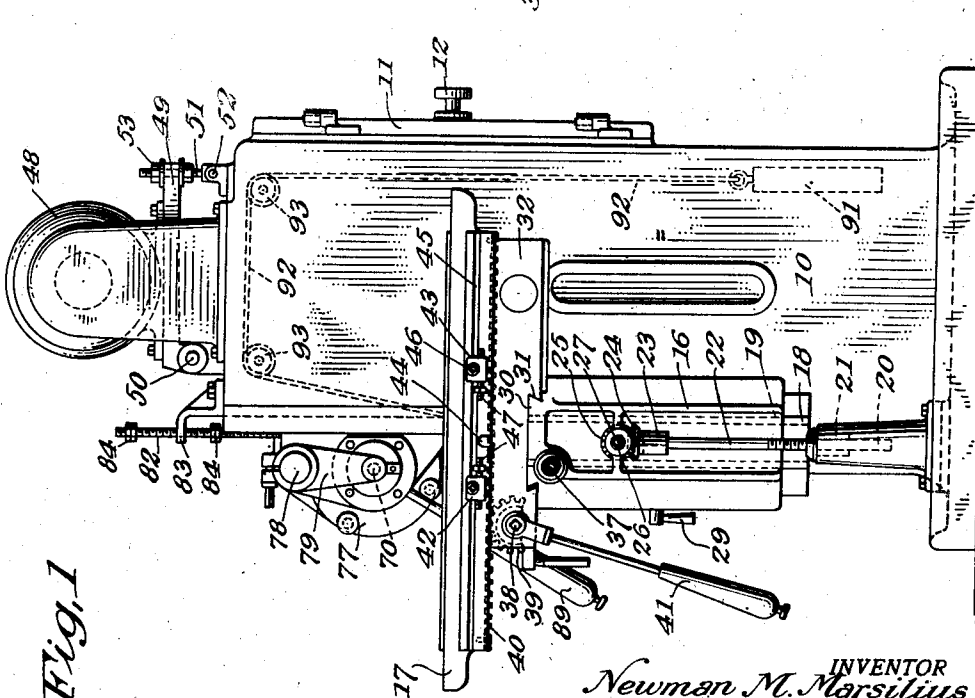


Fig. 1

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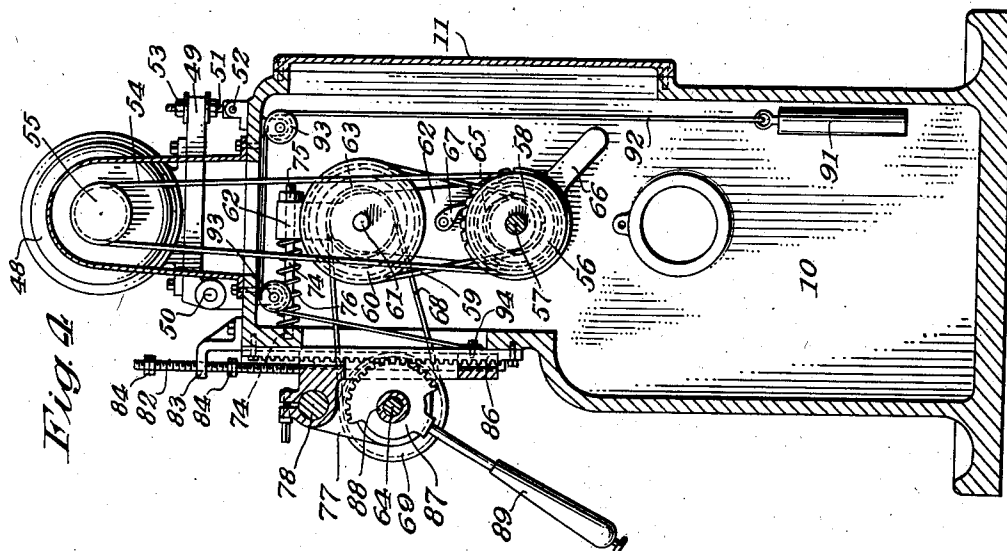


Fig. 4

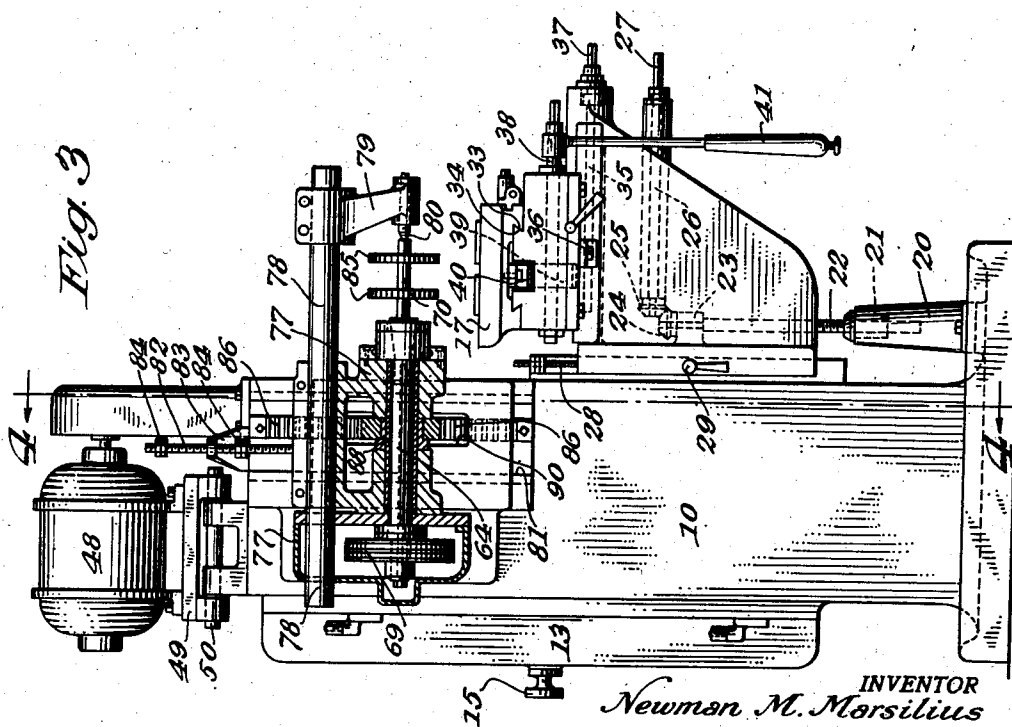


Fig. 3

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## UNITED STATES PATENT OFFICE

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## HAND MILLING MACHINE

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Application September 2, 1936, Serial No. 99,037

3 Claims. (Cl. 74-219)

My invention relates to new and useful improvements in milling machines, of the hand operated class, and of the type designed to be driven by power such, for instance, as an electric motor. The machine is designed for various kinds of relatively light milling operations and is adapted to use different kinds of commercial milling cutters, and while driven by power, is provided with hand feeding means as well as hand adjusting means for raising and lowering the work table and milling cutters one with respect to the others.

It is the purpose of my invention to improve upon this class of hand millers by providing novel driving connections and feeding means, as well as means for adjusting the driving shafts and spindles with relation to each other, whereby the belts connecting the cone pulley of the one spindle with those of the other, may be changed from one pulley to another as a means of changing the speeds.

Further to provide suitable spring means for insuring uniform tension upon the belt drives, to provide hand operating means for raising and lowering the cutter arbor to accommodate milling cutters of various diameters, as well as for determining the depth of the cut to be milled.

The invention further comprises the particular arrangement of the parts and gearing necessary to make the foregoing adjustments and to provide appropriate driving ratios, and the description herein given is to be regarded merely as an example of the manner in which the invention can be carried out without binding it to the specific details thereof.

In the accompanying drawings forming a part of this specification like characters will be found to designate similar parts throughout the several figures and of which:

Fig. 1 shows a front elevation of my improved hand milling machine.

Fig. 2 is a sectional elevation of the same as seen from the right of Fig. 1, the spindle bearings being shown in vertical section.

Fig. 3 shows a side view as seen from the left of Fig. 1, and

Fig. 4 shows a vertical sectional view taken on line 4-4 of Fig. 3 which more clearly illustrates the belt drives and novel means of adjusting the same.

Referring in detail to the characters of reference marked upon the drawings 10 indicates a hollow pedestal or column forming a frame and footing and having suitable openings in its side portions to accommodate different elements

of the machine. These openings upon one side are inclosed by a door 11 that is normally retained closed by a turn latch 12. This door and its opening permits access to the interior of the column for such purposes as and when necessary. 13 indicates a second door which is hingedly attached to the back of the machine and serves to inclose openings in the column and cover the exposed end of the driving shaft 57 which is sometimes used for gearing connections not shown. This door is also provided with a knob and turn latch 15 for holding it in a closed position.

The machine includes a table support 16 for carrying the work table 17 and its operating parts. Suitable guide ways 18 are formed on the side of the column to receive ways 19 of the table support to permit the same to be moved vertically with respect to the column.

The means for raising and lowering this table support vertically is shown in Figs. 1 and 3 and consists of a hollow post 20 carrying a threaded sleeve 21 that receives a screw 22 the upper end of which is mounted in a fixed bearing 23 and carries a bevel pinion 24 that meshes with and drives a similar bevel pinion 25 mounted upon the shaft 26. This shaft is journaled in suitable bearings of the table support and is provided with an exposed shouldered end portion 27 to receive an operating crank, not shown, whereby the shaft 26 and the screw 22 may be turned and the table support raised and/or lowered through the threaded screw connection and the fixed threaded sleeve 21.

A suitable gib 28 is provided for the table support, see Fig. 3, and also a pinch screw 29 which serves to retain the table support in its adjusted position.

The top side of this table support, see Fig. 1, is provided with dovetailed ways 30 to receive corresponding ways 31 in a bed 32 that extends out over opposite sides of the table support and is provided with dovetailed guide ways 33 running longitudinally of its top side to receive corresponding guide ways 34 formed in the underside of the longitudinal movable table 17.

The bed 32 is made adjustable upon the ways 30 through the medium of a screw 35 which is threaded to engage a threaded bracket 36 secured to the underside of the bed and is provided with an exposed shouldered head 37 upon which a crank may be applied for operating the screw for adjusting the bed with respect to the table support as may be necessary. A shaft 38 is journaled crosswise within the bed, carries a small

gear 39 mounted within a suitable opening of the bed and meshes with a rack 40 secured to the underside of the table and extending lengthwise thereof so that the table may be moved through the operation of the handle 41 and the rotary movement of the shaft 38. Suitable adjusting stops 42 and 43, see Figs. 1 and 2 are secured to the side of the table to limit the backward and forward movement of the tables. These stops are adjustably secured in spaced relation to each other and are designed to be operated with relation to a fixed stop 44 secured to the bed. 45 represents a T slot in the table in which the head of a T bolt 46 is slidably mounted. This T bolt as will be seen supports a block that carries an adjustable stop screw 47 which in practice serves to abut against the fixed stop 44 and thus limits the hand movement of the table, it being understood that by the adjustment of one or both of the stops the movement of the table may be lengthened or shortened as may be necessary to provide the required movement of the table and work piece when supported thereon.

The milling cutters and associated elements of the machine are operated from a motor 48 located upon the top of the column. This motor is mounted upon a platform 49 one end of which is hingedly connected as at 50 to the top of the bed while the other end is adjustably supported upon the bed through the medium of a screw 51 that is hingedly connected to a bracket 52 secured to the top of the column and extends up through the platform 49 and is provided with nuts 53 whereby the platform and its motor may be adjusted, raised and lowered with respect to the column, so that the belts 54 extending from the pulley 55 of the motor to the pulley 56 on the drive shaft 57 can be attached, removed and adjusted.

The drive shaft is journaled in opposite side portions of the column and in addition to the pulley 56 carries a driving pulley 58 that is connected by a belt 59 with a cone pulley 60 on a short shaft 61 journaled in an upright 62 and carrying a pulley 63 for driving the cutter spindle 64. The upright 62 is provided with a relatively large hole or bore therethrough to receive an eccentric 65 that is journaled upon the before mentioned drive shaft 57 and in a bearing of the column and is provided with an arm 66 secured to one end portion of the eccentric and whereby the same may be turned upon the shaft in a manner to slightly raise or lower the upright 62 for the purpose of tightening and loosening the belts 59 connecting the two cone pulleys and so that the said belts may be shifted from one set of pulleys to another. The periphery of the hub portion of the arm 66 is preferably provided with a series of small teeth that are engaged by a pawl 67 pivotally connected to the upright 62 and that serves to hold the arm and its eccentric in fixed positions with respect to the upright. A belt 68 connects the pulley 63 with the pulley 69 on the cutter spindle 64 for driving the same and its arbor 70.

The upper portion of the upright 62 is provided with a vertical slot 71 to accommodate a slide block 72 through which a guide rod 73 extends. One end of this rod is secured to the column as at 74 while the other end portion extends through the guide block 72 in the upright 62 and is provided with a nut 75 used for adjusting purposes. A spring 76 is carried by this guide rod and one end abuts against the inner wall of the column and the other upon the inner side of the upright 75 a way to tend to shove the upright 62 and its pul-

leys forward to normally retain a tension on the belt 68 which drives the pulley 69 on the cutter spindle 64.

The cutter spindle 64 is journaled in a housing 77 that is mounted for vertical adjustment on the side of the column and carries an adjustable extension rod 78 which in turn carries the arm 79 for carrying the centering pin 80 that supports the outer end of the cutter arbor 70. The housing is made adjustable by being provided with ways on its side, that engage corresponding ways 81 formed in the side of the column and is thus free to be moved vertically. In this connection it will be seen that a stop screw 82 that is carried by the housing extends up through a hole in a bracket 83 secured to the top of the column and is provided with adjustable nuts 84, one above the bracket and the other below, to limit the movements of the housing. The cutter spindle 64 is journaled in this housing 77 and carries belt pulley 69 upon one end that is driven through the belt 68 from the pulley 63 and upon the other end is a tapered socket to receive the tapered end of the cutter arbor 70 that carries the milling cutter 85. A vertically disposed rack 86 is secured to the side of the column and is engaged by a toothed segment 87 rockably mounted on a sleeve 88 carried by the housing 77 and surrounding the cutter spindle 64. This segment is provided with a handle 89 by means of which the segment can be turned on its bearing in a manner to ride on the teeth of the rack 86 and thus raise or lower the housing and the parts carried thereby. In this connection it will be observed that the toothed segment engages the rack through an opening 90 in the back of the housing. A counterbalancing means is provided for this housing and the load carried therewith which consists in a weight 91 suspended from a rope or chain 92 that passes over pulleys 93—93 and is attached to the housing as at 94. This obviously serves to reduce the resistance to the operation of the segments and allows the housing to be freely raised and lowered by the handle 89.

From the foregoing detailed description it will be seen that the machine as designed and built is driven from the motor which has been designated as 48. This is belted to the pulley 56 on the drive shaft 57. This shaft is journaled in the fixed bar of the frame and through a rotatable eccentric member supports an upright which in turn has the shaft journaled therein carrying pulleys upon its two end portions. A pulley 58 on the shaft 57, through the belt 59, drives a pulley 60 on the short shaft 61. The cutter spindle is connected by the belt 68 from the pulley 63 to the pulley 69 on the cutter spindle. The machine as will be seen is designed to be driven through V belts which are made up as one piece belts and therefore provision is made for adjusting the shafts and pulleys with respect to each other whereby the belts may be attached, removed or shifted from one pair of pulley faces to others. This adjusting as explained is done through the handle 66 on the eccentric in the one instance, and the handle on the segment and the compression of the spring 76 in the other. As a result of these improvements the machine is very much more desirable as a commercial and operatable proposition since it can be very easily operated by a single attendant and upon it most kinds of hand milling can be performed to advantage and more rapidly than has heretofore been accomplished.

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

1. The combination of a column, a drive shaft journaled in the column, an eccentric rotatably mounted upon the driving shaft, operating means for turning the eccentric upon the driving shaft, said driving shaft being provided with a driven and driving pulley, an upright carried upon the eccentric, a second shaft journaled in the upper portion of the upright, a driven and driving pulley mounted on said second shaft, a housing carried upon the column, a third shaft carried by the housing, belts connecting the pulley on the driving shaft with the pulley on the driven shaft and for connecting the driving pulley of the driven shaft with the pulley on the third shaft, means as between the column and the upright for providing a tension upon the belt driving the pulley on the third shaft, and means for adjusting said tensioning means.

2. The combination of a column, a drive shaft journaled in the column, an eccentric rotatably mounted upon the driving shaft, operating means for turning the eccentric upon the driving shaft, said driving shaft being provided with a driven and driving pulley, an upright carried upon the eccentric, a second shaft journaled in the upper portion of the upright, a driven and driving pulley mounted on said second shaft, a housing carried upon the column, a third shaft carried by the housing, means for raising and lowering the

housing and third shaft with respect to the upright, belts connecting the pulley on the driving shaft with the pulley on the driven shaft and for connecting the driving pulley of the driven shaft with the pulley on the third shaft, means as between the column and the upright for providing a tension upon the belt driving the pulley on the third shaft.

3. The combination of a column, a drive shaft journaled in the column, an eccentric rotatably mounted upon the driving shaft, operating means for turning the eccentric upon the driving shaft, said driving shaft being provided with a driven and driving pulley, an upright carried upon the eccentric, a second shaft journaled in the upper portion of the upright, a driven and driving pulley mounted on said second shaft, a housing carried upon the column, a third shaft carried by the housing, a rack secured to the column, a segment loosely journaled upon the third shaft and engaging the rack for raising and lowering the housing and third shaft with respect to the column, belts connecting the pulley on the driving shaft with the pulley on the driven shaft and for connecting the driving pulley of the driven shaft with the pulley on the third shaft, means as between the column and the upright for providing a tension upon the belt driving the pulley on the third shaft.

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