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N. M. MARSILIUS

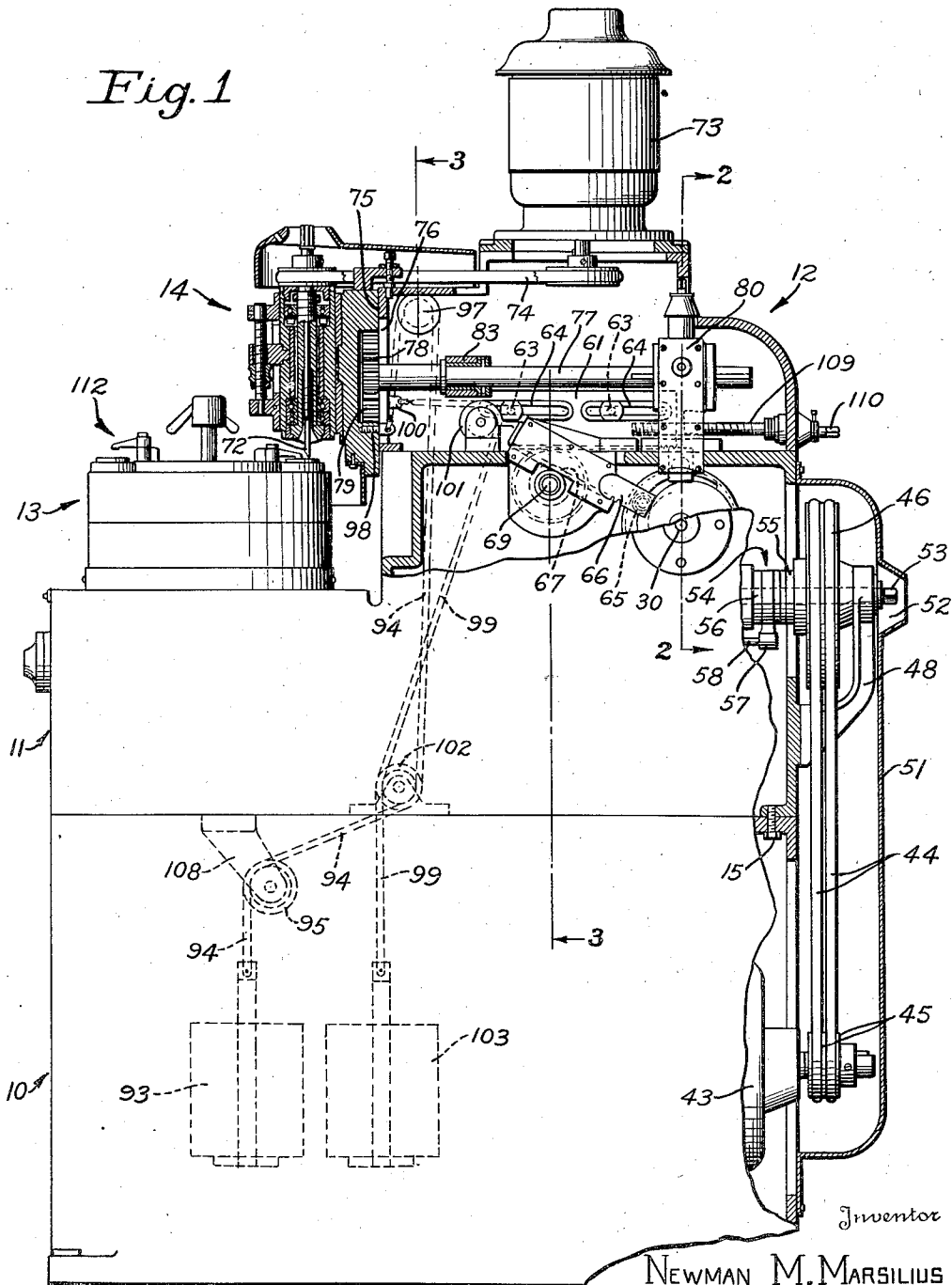
2,422,112

MILLING MACHINE

Original Filed Aug. 28, 1941

3 Sheets-Sheet 1

Fig. 1



Inventor

NEWMAN M. MARSILIUS

By

Johann Hauracher

Attorney

June 10, 1947.

N. M. MARSILIUS

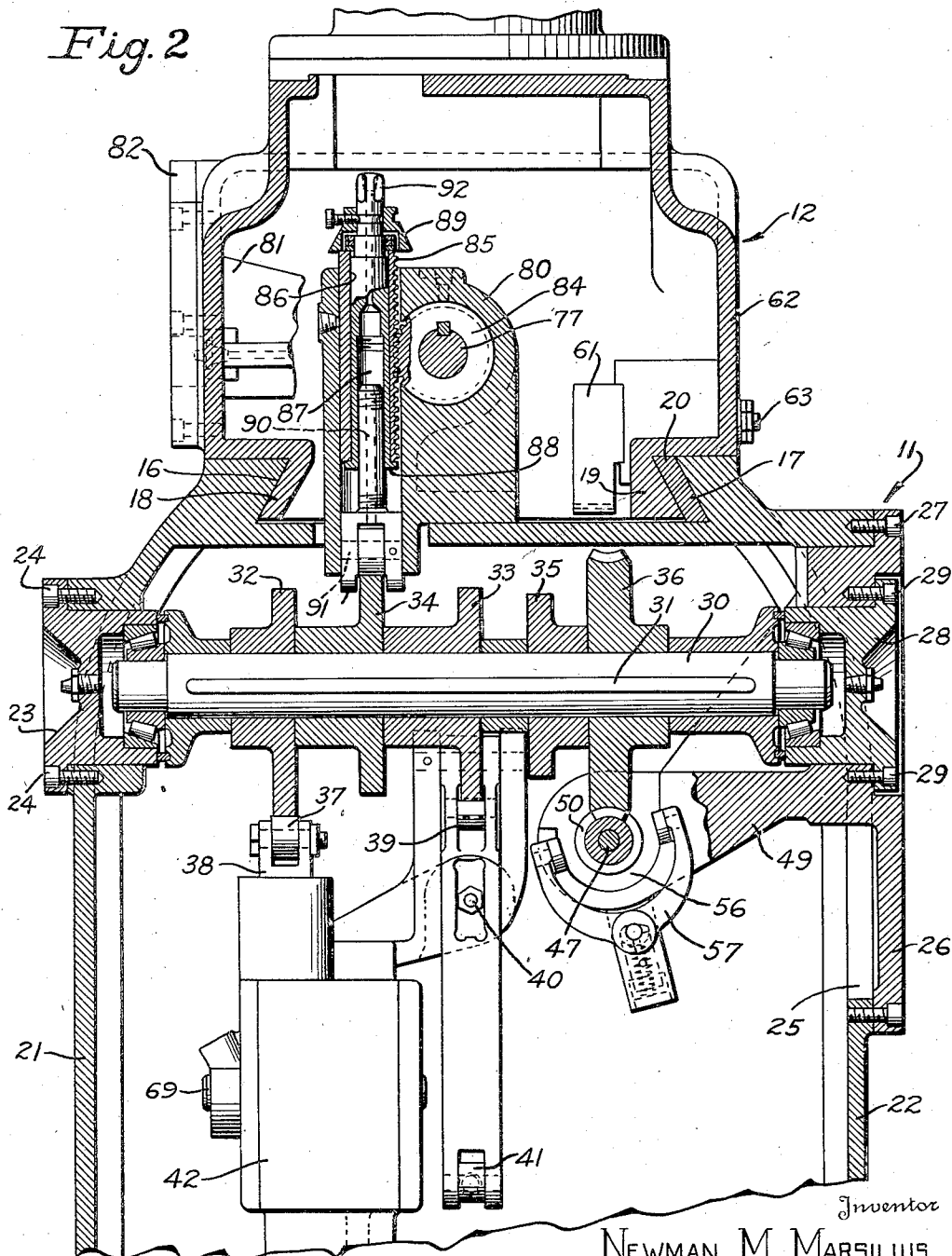
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Fig. 2



Inventor

NEWMAN M. MARSILIUS

By *John F. Kauraba*

Attorney

June 10, 1947.

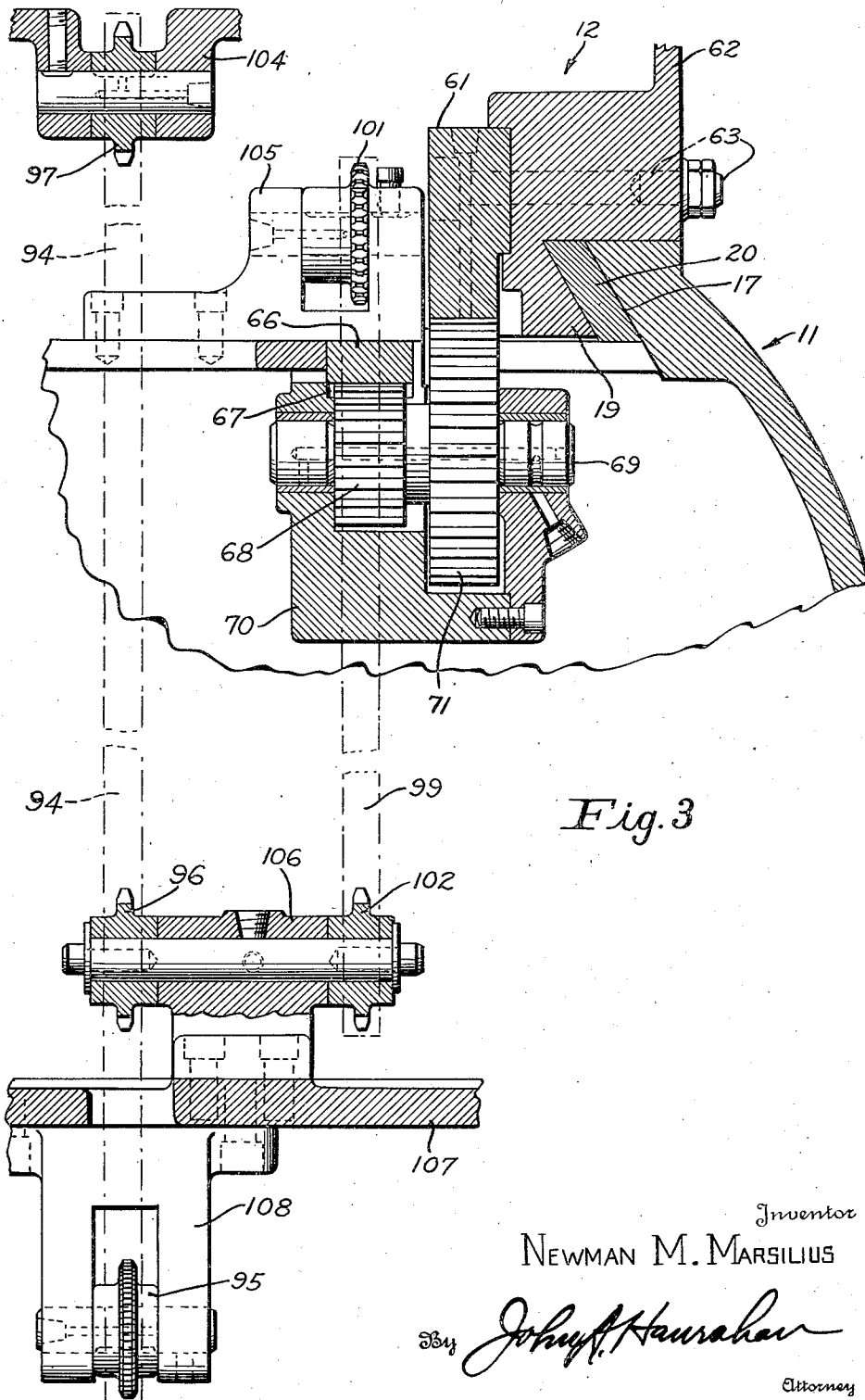
N. M. MARSILIUS

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UNITED STATES PATENT OFFICE

2,422,112

MILLING MACHINE

Newman M. Marsilius, Trumbull, Conn.

Original application August 28, 1941, Serial No. 408,580, now Patent No. 2,353,480, dated July 11, 1944. Divided and this application December 16, 1943, Serial No. 514,495

2 Claims. (Cl. 90—15.1)

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This invention relates to new and useful improvements in machines and has particular relation to milling machines.

The objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a view partly in side elevation and partly in longitudinal section showing a machine made in accordance with the invention;

Fig. 2 is an enlarged transverse sectional view taken as along the line 2—2 of Fig. 1; and

Fig. 3 is a detail sectional view on a large scale, the view being taken as along the line 3—3 of Fig. 1, but with parts omitted.

The present application is a division of my application Serial Number 408,580 filed August 28, 1941, now Patent No. 2,353,480 of July 11, 1944.

Referring in detail to the drawings the milling machine of the invention, as herein disclosed, comprises, generally, a base 10, a bed 11 on said base, a horizontal tool-head carrying slide 12 on said bed, and a work carrying turret 13 mounted on the bed at the forward end of the slide. Carried by the forward end of the slide 12 is a tool-head generally designated 14. The details of the construction and operation of this tool-head are given in my parent application above identified and since such details form no particular part of the present case they are not further considered herein. The present invention is concerned more particularly with the means for imparting horizontal movement to the slide 12.

Base 10, bed 11 and slide 12 are hollow, preferably castings, and while the slide is movable longitudinally on the bed the latter is secured to the base as by the bolts 15. At its upper side the bed 11 is provided with undercut ways 16 and 17 in opposing relation and the lower side of the slide 12 is provided with rails 18 and 19 operating on said ways. Preferably a gib 20 is employed between rail 19 and way 17 for adjustment to take up for wear. It will be clear that the rails or extensions 18 and 19 prevent any vertical movement of the slide on the bed but that the slide is supported by and movable longitudinally of the bed.

Bed 11 comprises side walls 21 and 22 of which the former removably supports a bearing 23

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secured as by bolts 24 while the latter has an opening 25 over which is bolted a combined plate and bearing bracket 26, secured in place as by bolts 27. Mounted on the bracket 26 and secured as by bolts 29 is a bearing 28 in alignment with the bearing 23. A main cam shaft 30 is rotatably mounted by the bearings 23 and 28. Bracket 26 may be removed along with bearing 28 for replacement of any part (hereinafter to be referred to) mounted on the shaft 30 or in fact for replacement of the shaft should that be desirable or necessary.

A key 31 secures to the shaft 30, for turning movement therewith, an indexing cam 32, a turret locking cam 33, a cam 34 for imparting vertical movement to the tool-head 14, a cam 35 for imparting horizontal movement to slide 12 and a worm wheel 36 through which the shaft is driven. The cam 32 operates against a roller 37 on the upper end of a rack bar 38 and the cam 33 operates against a roller 39 for imparting movements to parts 40 and 41 for locking the turret 13 in place and for releasing an indexing pawl (not shown) from indexing relation with the turret. The rack bar 38 operates in a housing 42. Cams 33 and 32 and the means operated and controlled by them form no particular part of the present claimed invention although they form parts of the machine shown. However, they and their purpose and mode of operation are fully set forth in my parent application above mentioned and it is therefore thought they need not be further considered herein.

In the machine base 10 is an electric motor 43. Belts 44 trained over pulleys 45 on the shaft of the motor are also trained over pulleys 46 turnable about a shaft 47 extending horizontally into the bed 11 of the machine from the rear thereof. Shaft 47 is mounted in outside bracket 48 and inside bracket 49 and within the bed 11 serves, as will appear, to drive a worm gear 50 meshing with the worm wheel 36 above mentioned. A sheet metal or other guard or casing 51 encloses the above mentioned pulleys and belts and has an opening 52 giving access to the faced end portion 53 of the shaft 47 whereby the latter may be engaged by a wrench or the like for manual turning while adjusting and tooling the machine for any particularly job.

Actually pulley 46 drives the shaft 47 through a clutch 54 one element 55 of which is secured to the pulley and the movable or shiftable element 56 of which is keyed or otherwise secured to the shaft 47 and is shiftable by a yoke 57 having an operating rod 58 secured thereto. The details of

this clutch mechanism are fully disclosed in my parent application and will not be repeated herein. However, it will be clear that on manipulation of the rod 58 the pulley 46 may be connected with and disconnected from the shaft 47 to start and stop the driving of said shaft and thus of the entire machine. The foregoing is true since on disconnecting or opening of the clutch the shaft 47 is no longer driven and the cam shaft 30 together with the cams thereon will be stationary as worm wheel 36 will not be driven.

A rack 61 having its teeth disposed downwardly is secured to a wall 62 of the slide 12 as by bolts 63. Preferably these bolts pass through horizontal slots 64 in the body of the rack whereby on loosening of the bolts the rack may be adjusted forwardly and rearwardly on the slide to vary the stroke of the latter as will be made to appear. Riding against the cam 35 is a roller 65 on the rear or inner end of a bar 66 having rack teeth 67 meshing with the teeth of a relatively small diameter gear 68 fixed to a short shaft 69 mounted by a bracket 70. Also fixed to the shaft 69 is a gear 71 of larger diameter, as of twice the diameter of gear 68, meshing with the teeth of the rack 61 fixed to the slide 12.

From the above it will be seen that as the high part of the cam 35 rides under the roller 65 the rack 66 will be advanced and meshing with the gear 68 will impart a rotary movement to the latter and to the larger gear 71. As the latter gear is in mesh with the teeth of the rack bar 61 secured to the slide 12 it will be clear that the slide and the tool-head 14 carried thereby will be advanced.

The intervening rack 66 and the gears 68 and 71 are employed in order that a slight rise in the cam 35 may be used to give a rather long stroke to the slide 12. For example, if the ratio of the gears 71 and 68 is two to one, a one inch rise on the cam will mean a two inch stroke to the slide. Thus without using a large cumbersome cam a substantial movement may be imparted to the slide. By adjusting the position of the rack 61 on the slide (as will be described) the effective movement of the slide by the cam 35, may be adjusted.

Tool-head 14 mounts a tool 12 driven from a motor 73 through a belt 74. All of these parts are mounted on the slide 12. The tool-head as a whole is vertically slidable on the forward end of the horizontal slide 12 and means are provided for moving the head on the slide. To this end, in its forward wall 75 the slide is provided with a vertical slot 76 through which extends a shaft 77 carrying a gear 78 the teeth of which mesh with the teeth of a rack bar 79 secured against a vertical edge of a recess in the head. With this construction it will be clear that as a turning movement is imparted to the shaft 77 the tool head 14 will have vertical movement imparted thereto.

It is to be understood that the shaft 77 is turned first in one direction and then in the opposite direction whereby the tool-head 14 is given movements in timed relation with other movements of the machine all as fully set forth in my parent application. For the most part shaft 77 is located within the slide 12 and is supported adjacent its rear end by a combined bracket and housing 80 and toward its forward end by a bracket 81 mounted on a removable plate 82 and carrying a bearing 83 in which the shaft is supported.

Shaft 77 is turned in opposite directions by different means. Thus on the rear portion of

said shaft within the bracket and bearing means 80 is a gear 84 meshing with the teeth of a vertically disposed rack 85 also located within said housing 80. Rack 85 has a tubular opening 86 therethrough and in which is located a sleeve 87 turnable in the rack but held against longitudinal movement relative thereto by a bottom flange 88 at the lower end of the rack and a cap 89 at the upper end of the rack. Threaded into the sleeve 87 is a stem 90 carrying a roller 91 riding against the cam 34 above mentioned. The upper end 92 of the sleeve 87 is faced to be engaged by a wrench or other tool for turning of the sleeve whereby its threaded engagement with the stem 90 will result in longitudinal adjustment of such stem relative to the rack 85 whereby to change the effective relation of the latter to the cam 34 and the gear 84.

It will be understood that as the high part of cam 34 rides under the roller 91 the rack 85 will be raised and meshing with the teeth of gear 84 the shaft 77 will be turned in a direction to operate through the gear 78 and rack 79 and lower the tool-head 14 to bring the tool 12 into engagement with work on the turret 13. As the high part of cam 34 recedes the tool-head 14 is raised to carry the tool away from the work and as this movement takes place the teeth of rack 79 rotate the gear 78 in the opposite direction and thus the shaft 77 is rotated in a direction to cause the gear 84 to feed rack 85 downwardly maintaining the roller 91 on the cam 34. The mentioned upward movement is imparted to the tool-head 14 by a weight 93 from which a chain 94 is carried over sprockets 95, 96 and 97 and then downwardly and attached to the tool-head as at 98.

By a means similar to that just described the return horizontal movement is imparted to the slide 12. Thus a chain 99 has one end attached at 100 to the forward wall 75 of the slide and such chain is carried downwardly over sprockets 101 and 102 and at its lower end attached to a weight 103. Fig. 3 shows how the sprocket 97 is mounted by a bracket 104 secured to the top wall of the slide 12, sprocket 101 is mounted by a bracket 105 on the top wall of bed 11, sprockets 96 and 102 are mounted by a bracket 106 on the top wall 107 of base 10 and sprocket 95 is mounted by a bracket 108 suspended from the top base wall 107.

From the above taken with the drawings it will be understood that as the rack 61 is advanced and carries the slide 12 with it the weight 103 is raised and that as the high part of cam 35 passes from under the roller 65 the weight serves to draw the parts in a return movement maintaining the roller on the cam. In connection with the adjustment of the rack 61 it is noted that when the bolts 63 have been loosened, and this is accomplished from the exterior of the machine as the heads of such bolts are exposed as shown in Figs. 2 and 3, the slide is adjusted from the exterior of the machine by turning an adjusting screw 109 the faced end 110 of which is exposed at the rear of the machine and the inner end of which is threaded into the rack 61.

The turret 13 carries a plurality of work holders each generally designated 112 and as fully disclosed in my parent application means are provided for indexing the turret to bring such holders to the work station adjacent the tool-head 14. When a piece of work is brought to the work station cam 34 raises the rack bar having the teeth 85 and through gear 84 rotates the

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shaft 77 in a direction to have its gear 78 operate on the rack 79 of the tool-head in a manner to lower the latter to bring the tool 72 against the work.

At this time cam 35 acting against roller 65 advances the rack bar 66 to rotate gear 68 and thus gear 71 to have the latter acting through the rack bar 61 move the slide 12 forwardly carrying the tool 72 across the work. When the cut has been made the high part of cam 34 recedes from under roller 91 and the weight 93 acting through chain 94 raises the tool-head 14 lifting the tool off the work and the high point of cam 35 receding from roller 65 the weight 103 acting through the chain 99 retracts the slide 12 and the tool-head 14 carried thereby, to their normal positions.

Having thus set forth the nature of my invention, what I claim is:

1. A tool actuating mechanism for a milling machine comprising a bed, a tool holding slide reciprocable on said bed, a rack secured to said slide, a first gear mounted in said bed and engaging said rack, a second gear integral and concentric with said gear and of lesser diameter, a rack reciprocatedly mounted in said bed and engaging said second gear, a cam movably mounted in said bed and engaging an end of said second mentioned rack, an actuating means for said cam, whereby actuation of said cam reciprocates said second rack, causing rotation of said second gear to effect rotation of said first gear for the purpose of reciprocating said first rack and said slide to an extent amplified by said gears so

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as to be greater than the extent of reciprocation of said second rack.

2. A milling machine comprising a bed, a reciprocable tool holding slide, a rack secured to said slide and having teeth facing said bed, a first gear rotatably mounted in said bed and engaging said slide, a second gear of smaller diameter than said first gear and concentric and integral therewith and adjacent thereto, a second rack slideably supported in said bed and engaging said second gear, a cam rotatably supported within said bed and disposed below said slide, said second rack having an end engaging said cam, and means for rotating said cam, whereby actuation of said cam reciprocates said second rack causing rotation of said second gear to effect rotation of said first gear for the purpose of reciprocating said first rack and said slide to an extent amplified by said gears so as to be greater than the extent of reciprocation of said second rack.

NEWMAN M. MARSILIUS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,303,152	Bamberger	May 6, 1919
1,860,840	Marsilius et al.	May 31, 1932
2,292,892	Marsilius	Aug. 11, 1942
1,959,435	Marsilius	May 22, 1934