J. BECKER.

GEARING.

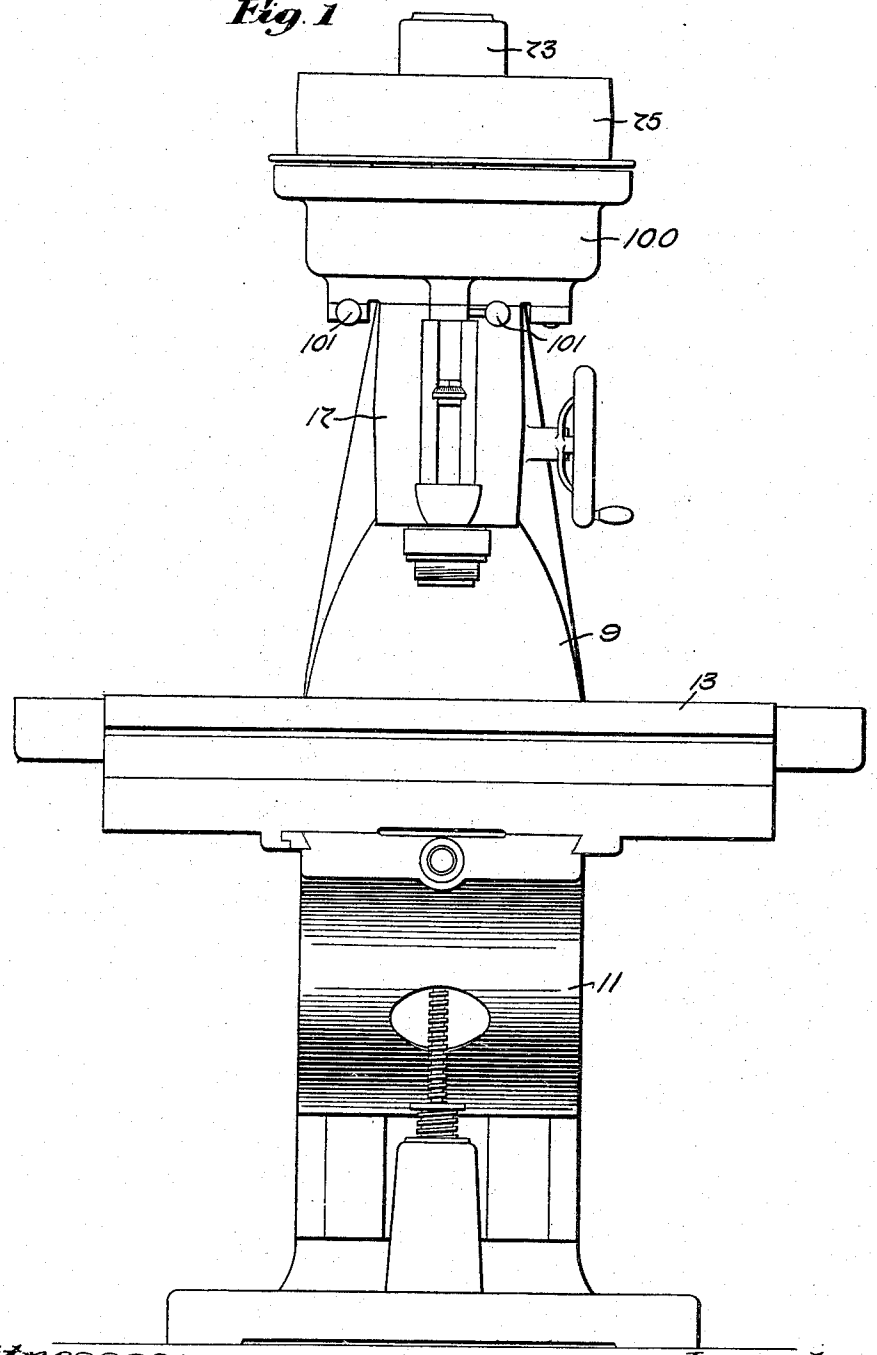
APPLICATION FILED DEC. 7, 1909.

1,192,491.

Patented July 25, 1916.

3 SHEETS—SHEET 1.

Fig. 1



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3 SHEETS—SHEET 2.

Fig. 2

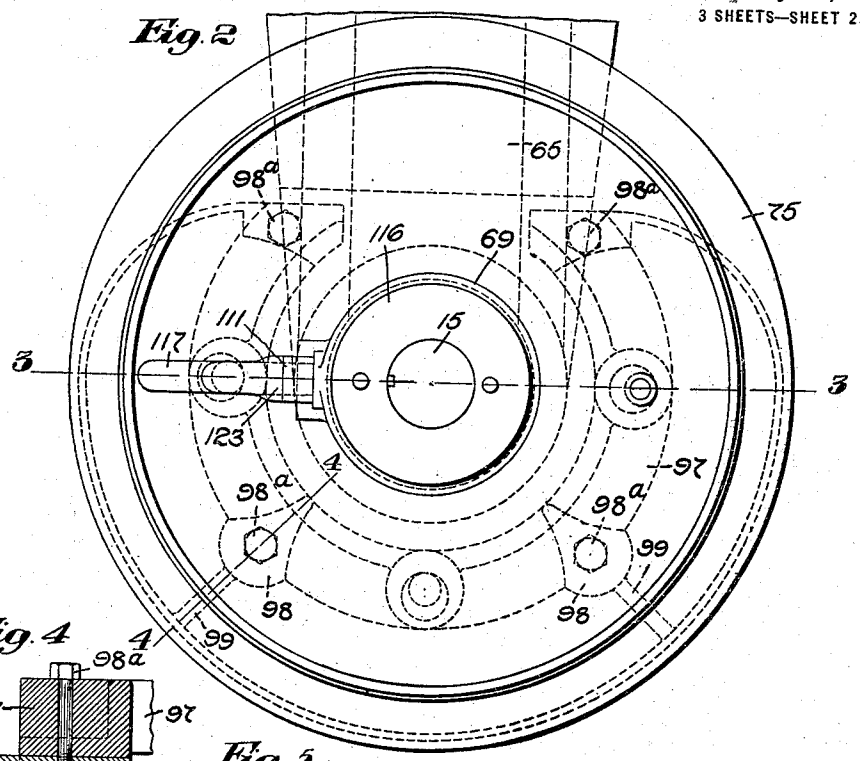


Fig. 4

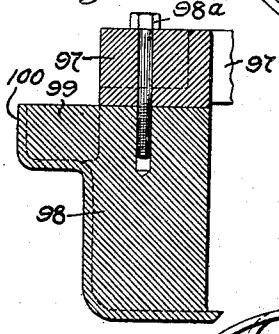
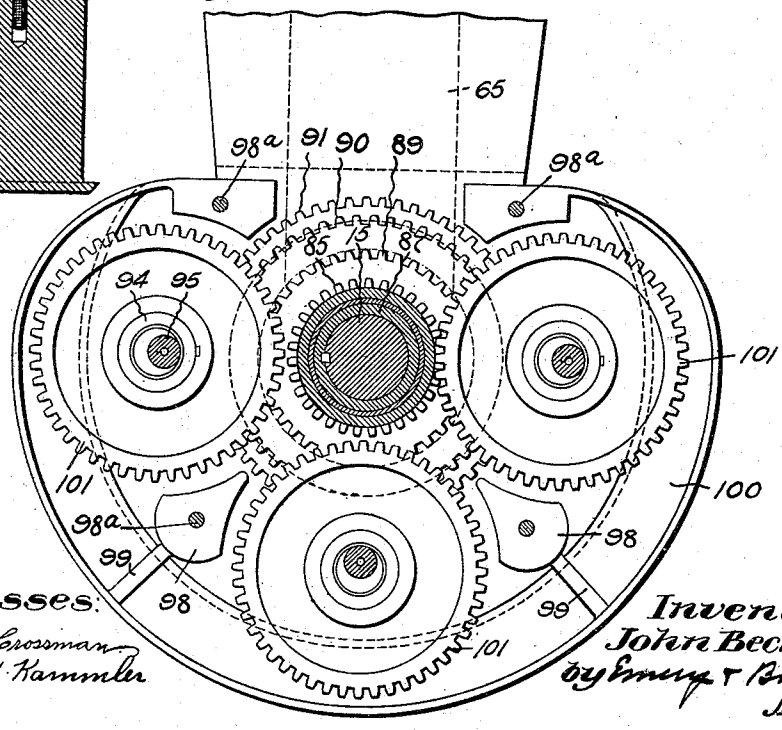


Fig. 5



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3 SHEETS—SHEET 3.

Fig. 3

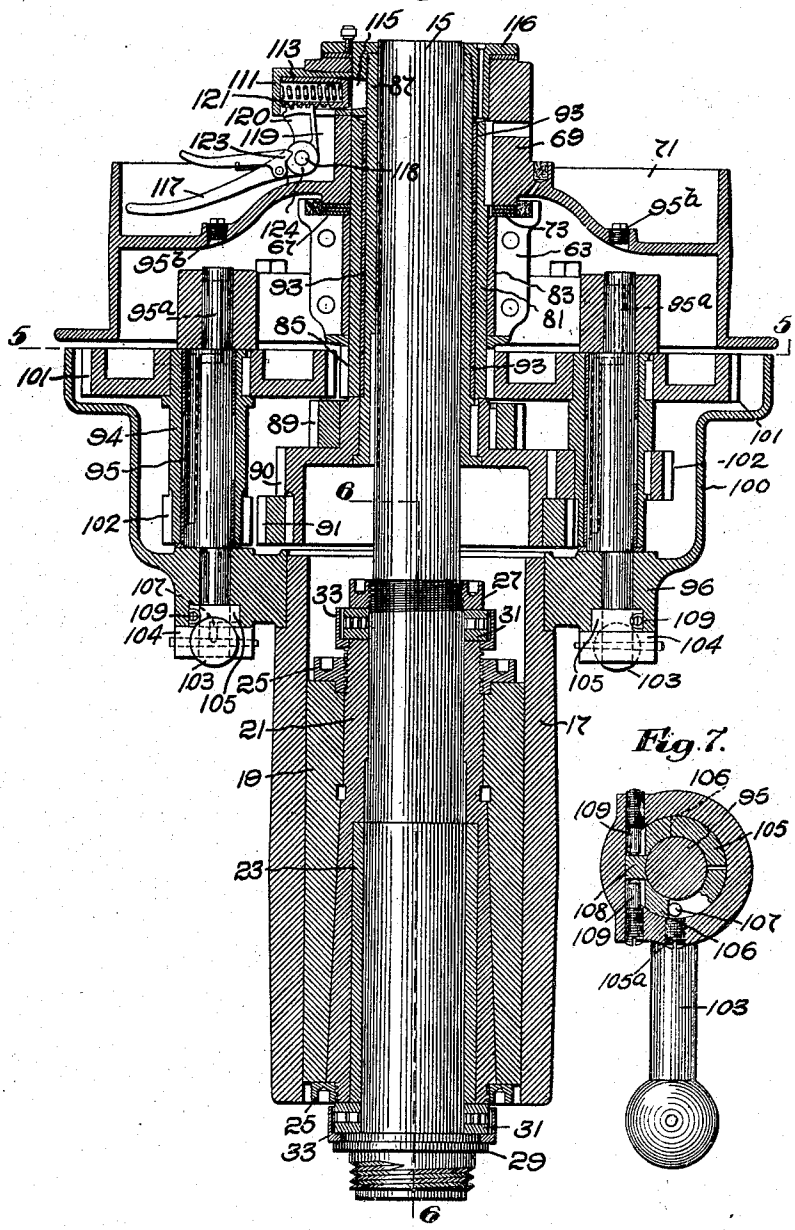
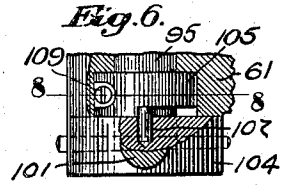


Fig. 7.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN BECKER, OF HYDE PARK, MASSACHUSETTS.

GEARING.

1,192,491. Specification of Letters Patent. Patented July 25, 1916.

Application filed December 7, 1909. Serial No. 531,779.

To all whom it may concern:

Be it known that I, JOHN BECKER, a citizen of the United States, and a resident of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Gearing, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to milling and like machines and relates more particularly to the mounting, driving and adjustment of the tool spindles of such machines.

For the purpose of disclosing my invention I have here illustrated it in connection with a typical vertical milling machine although it is to be understood that I have so disclosed my invention for illustrative purposes merely, the invention itself being applicable to a variety of other machines.

Referring to the drawings: Figure 1 is a front elevation showing in outline a vertical milling machine illustrating one embodiment of my invention; Fig. 2, on an enlarged scale, is a top plan of Fig. 1; Fig. 3 is a vertical section taken on line 3—3 of Fig. 2; Fig. 4 is a vertical section taken on line 4—4 of Fig. 2; Fig. 5 is a horizontal section taken on line 5—5 of Fig. 3; Fig. 6 is an enlarged sectional detail of parts shown in Fig. 3; and Fig. 7 is a section taken on the line 8—8 of Fig. 6.

In the drawings referring first to Fig. 1, the milling machine 9 is employed merely as typifying any machine or use to which my invention is adapted, said machine in the present instance being provided with the usual knee 11 and work table 13. The invention has special reference to the mechanism adjacent the tool spindle 15. This spindle is herein journaled in an overhanging head 17 carried by the machine standard. The spindle does not closely fit into said head, but is received by a barrel 19 (see Figs. 3 and 6) fitting into said head, said barrel in turn being spaced from said spindle by a suitable bushing 21 herein counterbored to receive a supplemental bushing 23 which may be readily replaced without necessitating the renewal of the bushing 21. To permit the latter to be tightly fitted into said barrel, each may be partially tapered and relative longitudinal movement prevented by upper and lower collars 25 threaded onto said bushing and adapted to bear against the ends of said barrel. Relative longitudinal movement between the spindle 15 and bushing 21 may be prevented by an upper collar 27 threaded on to said spindle and a lower collar 29 herein integral with the latter. To minimize the friction due to the longitudinal thrust of said spindle on said bushing suitable roller bearings 31 may be interposed between said collars and said bushing, and may be provided with oil cup housings 33.

My invention contemplates the provision of means, which I will now describe, adjacent the spindle for transmitting a variety of speeds thereto with simple and minimum adjustments. The upper end of the spindle projects through an auxiliary, two-part bearing 63 carried on the usual bracket 65 shown in outline in Figs. 2 and 5 and which may be adjusted in the usual manner to take up the wear on said spindle to insure the true running of the latter. This bearing is cupped at its upper end to form a bearing 67 (Fig. 3) for the end of the hub 69 of the spindle driving pulley 71, suitable washers 73 being interposed between said hub and bearing to reduce the friction between them. Said pulley is loosely mounted on said spindle and may transmit a variety of speeds thereto by a machanism which I will now describe. The pulley hub 69 is keyed or otherwise secured to a shell 81 rotating in the bearing 63 and is spaced therefrom by a suitable bushing 83. The lower end of said shell is provided with a driving gear 85 to be referred to. A sleeve 87, is keyed or otherwise secured to the spindle 15, and projects down beyond the shell 81 and carries herein three gears 89, 90, 91. This sleeve 87 is separated from the shell 81 by a suitable bushing, comprising a plurality of rings 93.

To transmit different speeds from the pulley gear 85 to the spindle gears 89, 90, 91, a plurality of sets of back gears are provided. Herein these gears are arranged radially at intervals about the spindle 15 and are fixed to sleeves or spools 94 on countershafts 95 having reduced lower ends journaled in bearings in the base of a ring-like support 96 on the upper end of the head 17 referred to, said countershafts having reduced upper ends journaled in bearings in a curved frame 97 secured by bolts 98^a on spaced posts 98 projecting upwardly from the base of said support 96 and strengthened by radial ribs 99 extending from their

sides to a cup-like casing 100 herein integral with said support. The pulley 71 may also desirably serve as a cap for said casing. The shafts 95 may be oiled through an irregular oil duct 95[a] extending longitudinally of said shafts and adapted to be supplied with oil through plugged openings 95[b] in the web of the pulley 71. Said back gears comprise upper gears 101, herein of uniform size, and lower pinions 102 of different sizes, the gears 101 being adapted to be thrown into mesh with the pulley gear 85 and the pinions 102 being adapted respectively to mesh with the spindle gears 89, 90 and 91. To this end the countershafts 95 are formed eccentric with their ends so that by turning said shafts their gears will be thrown into mesh with the spindle and pulley gears as desired. Each of these eccentric countershafts 95 may be turned by a suitable handle 103 (see Fig. 7) projecting from a ring 104 (see Figs. 3 and 6) fixed to its shaft. To vary the depth of mesh of the teeth of these gears for taking up wear and other purposes the lower end of each of the shafts 95 is provided with a split, handle limiting collar 105 (see Figs. 3 and 7) set into a counterbore in the bearing of each of said shafts. This collar is undercut to form abutments 106 adapted to coöperate with a pin 107 on the ring 104 to limit the rotative adjustment of the shafts 95. Herein the said shafts are adapted to be turned through 180°, the pin 107 passing from the position shown in Fig. 7 and at the left of Fig. 3 to a position diametrically opposite. By this adjustment the back gears may be moved to approach the pulley and spindle gears sufficiently to bring their teeth in engagement as desired. To hold the shaft 95 in its positions of adjustment a friction screw 105[a] may be threaded into the adjacent portion of said ring support 96 to bear against the periphery of the collar 105 and press the latter against said shaft. To secure said collar in position and vary the depth of the intermeshing engagement of the back gears with the pulley and spindle gears, the collar 105 is provided with a lug 108 (see Fig. 7) interposed between opposed stops 109 threaded into portions of the base of the support 96 adjacent the lower bearings of the shafts 95. It will be apparent that when the stops 109 are moved in or out they will engage the lug 108 and turn the collar 105 more or less to vary the positions of the abutments 106 of said collar.

By turning the handles 103 of the eccentric shafts 95, any one of said shafts may be adjusted to cause the drive to be transmitted from the pulley gear through such countershaft to the corresponding spindle gear, thereby obtaining herein three different speeds for the spindle. An additional speed of the spindle may be had by connecting it directly with said pulley. To this end, referring more particularly to Fig. 3, the pulley hub 69 is provided adjacent its upper end with a socket 111 containing a spring pressed coupling 113 tending to project into a lock slot 115 in a collar 116 threaded onto the upper end of the spindle sleeve 87 referred to. This coupling is held in the withdrawn position shown in Fig. 3 when the drive is through the back gears by a control handle 117 on a pin 118 fulcrumed in spaced webs 119 projecting from said hub, said handle being adapted to rock a toothed segment 120 which meshes with a rack 121 on the under side of said coupling. The handle 117 may be retained in the position shown by a spring pressed pawl 123 thereon adapted to engage a notch in a boss 124 on one of said webs 119. When the back gears are all thrown out the pulley may drive the spindle directly by releasing the pawl 123 to permit the spring of the coupling to project the latter into the slot 115.

Having described one embodiment of my invention without limiting myself thereto, what I claim as new and desire to secure by Letters Patent is:

1. A machine of the class described comprising, in combination, a shaft, a driving pulley loosely mounted thereon, means to couple said pulley to said shaft and a plurality of sets of back gears for transmitting different speeds from said pulley to said shaft.

2. A machine of the class described comprising, in combination, a plurality of gears, an eccentrically journaled shaft for one of said gears, a split collar loose on said shaft, a handle on the latter and means cooperating with said sleeve and handle to limit the movement of the latter.

3. A machine of the class described comprising, in combination, a plurality of gears, an eccentrically journaled shaft for one of the same, a handle for turning said shaft to throw one of said gears into or out of engagement with the other, a stationary collar loosely mounted on said shaft, abutments on said collar, and a pin on said handle adapted to engage said abutments to limit the adjustments of said handle.

4. A machine of the class described comprising, in combination, a gear, an eccentrically journaled shaft, its support, a gear on said shaft, a handle for turning the latter to throw one of said gears into mesh with the other, a collar loose on said shaft having a lug thereon, stops threaded into said support and engaging said lug for adjusting the position of said collar, and a pin movable with said handle and limited by said collar.

5. A machine of the class described comprising, in combination, a plurality of gears, an eccentric shaft for one of said

gears, means to turn said shaft to vary the depth of mesh of said gears, means to limit the turning movement of said shaft and means for holding said shaft in its position of adjustment.

6. A machine of the class described comprising, in combination, a shell; a shaft; driving means for said shell, a gear fast on said shell; different sized gears fast on said shaft; back gears for transmitting various speeds from said shell to said shaft; and means for connecting said driving means directly to said shaft.

7. The combination of a shell, a shaft therein having an end projecting beyond said shell, a gear on one of said members, different sized gears on the other closely adjacent said gear, sets of back gears, means for adjusting each of said sets of back gears toward and from the shaft for said different sized gears and into and out of mesh with the latter, a casing inclosing all of said gears, and a pulley fast on said shell for driving the latter and forming a cap closure for said casing.

8. The combination with concentric driving and driven shaft members 15 and 81, a gear 85 on one and a set of different sized gears 89, 90, 91 on the other adjacent said gear, sets of back gears 101, 102, means for adjusting each of said sets toward the axis of said concentric members and into mesh with said gears, a casing 100 inclosing all of said gears, and a disk-like element 71 on said driving member for applying power to the same and forming a cap closure for said casing.

9. The combination with concentric driving and driven shaft members, a gear on one and a gear on the other adjacent said gear, a set of back gears and a shaft therefor, a casing inclosing said gears, the shaft of the back gears projecting from said casing, means to manipulate said projecting end of the shaft arranged to move the back gears into and out from mesh with the gears on said shaft members, a disk-like element on said driving member for applying power to the same and forming a cap closure for said casing and means at will to couple said shaft members directly for revolution.

10. The combination with concentric driving and driven shaft members, a gear on one and a set of different sized gears on the other adjacent said gear, sets of back gears and shafts therefor, a casing inclosing said gears, the shafts of the back gears projecting from the casing, means to manipulate said projecting ends of the shafts arranged to adjust any of said sets into and out from mesh with the gears on said shaft members, and a disk-like element on said driving member for applying power to the same and forming a cap closure for said casing.

11. The combination with concentric driving and driven shaft members, a gear on one and a set of different sized gears on the other adjaecnt said gear, sets of back gears, means for adjusting each of said sets toward the axis of said concentric members and into mesh with said gears, a casing inclosing all said gears and a pulley on said driving member for applying power to the same including a web substantially of the same size as said casing and a flange mating with the edges thereof whereby said pulley forms a cap closure for said casing.

12. The combination with vertically disposed, concentric driving and driven shaft members, a gear on one and a set of different sized gears on the other adjacent thereto, spools each embodying a set of back gears arranged about said members, a casing inclosing all said gears, countershafts journaled in the base of said casing and having eccentric portions for adjusting said back gears into and out from mesh with the gears on said shaft members and means to adjust said countershafts.

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

JOHN BECKER.

Witnesses:
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EVERETT S. EMERY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."