June 2, 1931. R. C. MITCHELL 1,808,728

GRINDING AND POLISHING LATHE

Filed May 9, 1924 2 Sheets-Sheet 1

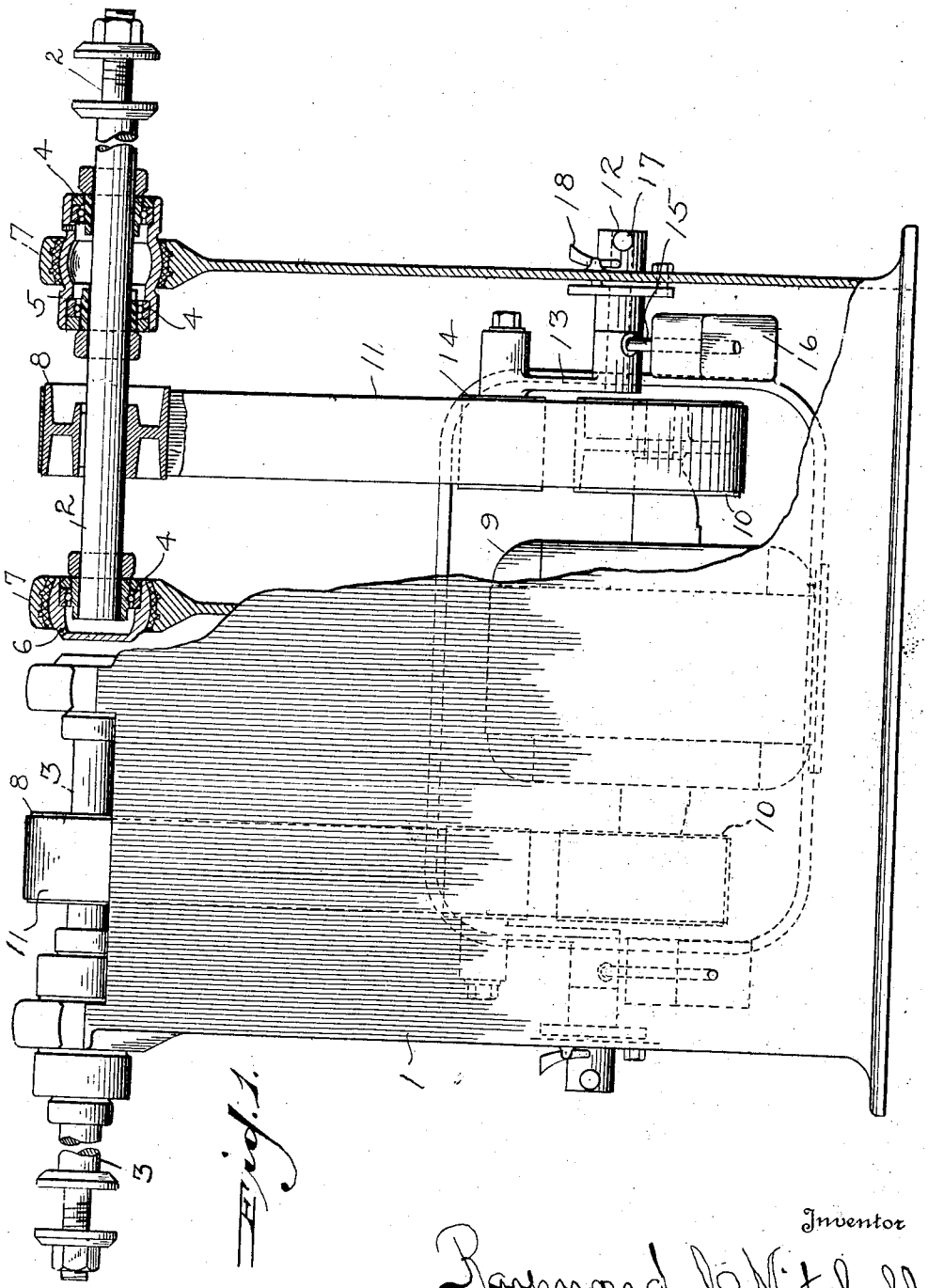



Fig. 1.

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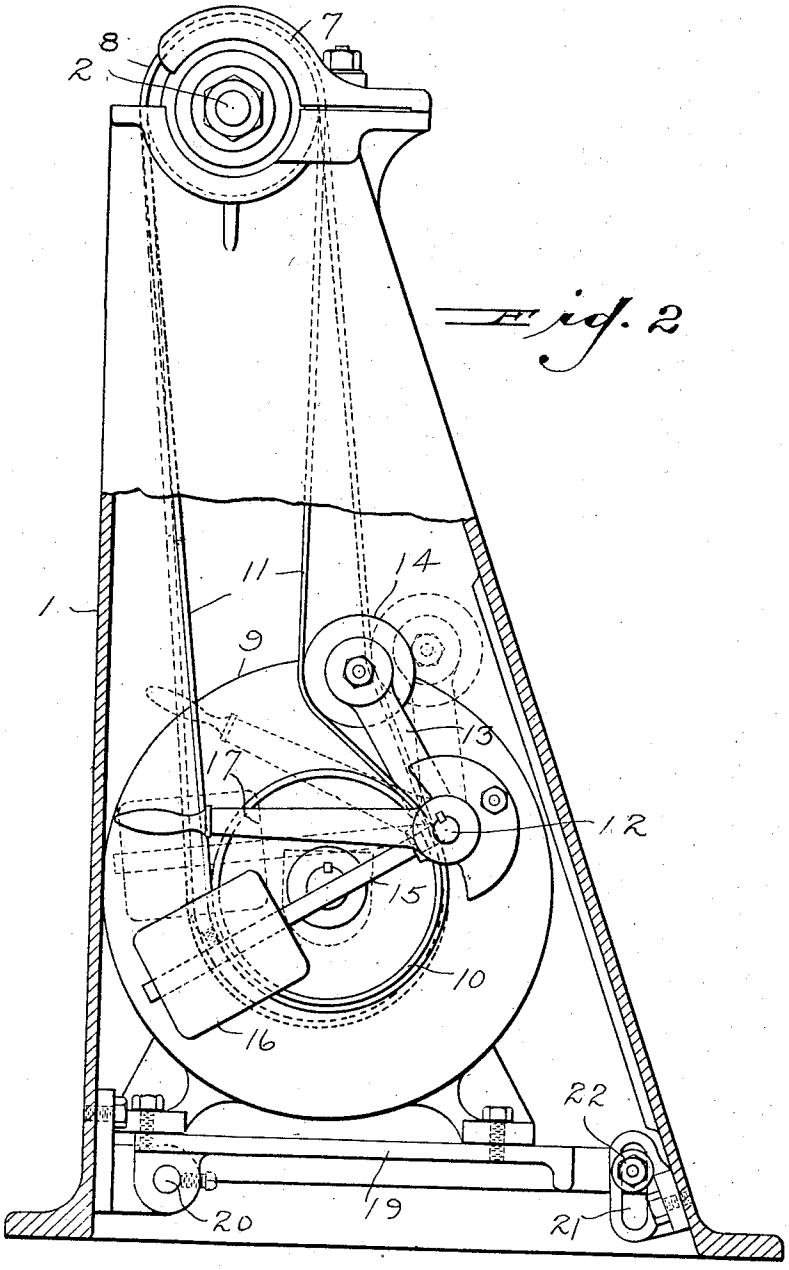



Fig. 2

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# UNITED STATES PATENT OFFICE

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## GRINDING AND POLISHING LATHE

Application filed May 9, 1924. Serial No. 711,987.

My invention relates to grinding and polishing lathes and more particularly to a self contained unitary duplex lathe employing two spindles independently driven from a single motor.

It has been customary heretofore to drive the spindles of such polishing and buffing lathes and grinding machines from an overhead line shaft, or from a motor or other source of power outside the lathe itself. In those lathes wherein the driving motor is embodied in the lathe as a single unit, the usual construction has been to employ the armature shaft of the motor as a spindle for mounting the grinder or buffing wheel. The objection to such construction is that the constant motor speed is not always the most desirable, nor most efficient speed for a buffing wheel, polishing wheels or grinder member. Moreover, in such construction wherein double spindles were employed to carrying different types of polishing or buffing wheels, or a grinder and a buffing wheel, it has been necessary to stop the motor in order to change elements upon either spindle.

In the present invention there is contemplated the unitary polishing, grinding or buffing lathe, having two independently mounted revoluble spindles, each separately driven by belted connection with a driving motor inclosed within the pedestal of the lathe. This driving motor is provided with a drive pulley at each end. Instead of employing clutches or fast and loose pulleys, the driving belts are made unusually long so that normally they will hang loosely about the pulleys without driving contact, and belt tighteners are employed to take up the slack in the belt, when the spindles are to be driven. The belt tighteners for the respective belts are independently operated so that either belt may be released or tightened independently of the other, and either spindle may be stopped for the interchange of driving or polishing wheels, without interfering with the operation of the other spindle.

The object of the invention is to simplify the structure, as well as the means and mode of operation of grinding and polishing lathes, whereby they will not only be cheapened in construction, but will be more efficient in use, positive in operation, uniform in action and unlikely to get out of repair.

A further object of the invention is to provide a self contained unitary lathe, wherein the driving power and interconnections are entirely housed or enclosed, thereby increasing the safety of operation.

A further object of the invention is to provide a duplex lathe, or one having two spindles, operable independently at will from a single motor, without the necessity of belt shifting or clutch mechanism.

A further object of the invention is to provide practical means for interconnecting and disconnecting the motor and the respective spindles by varying the tension of the drive belt.

A further object of the invention is to provide an improved form of belt tightener and to further provide a take-up means for varying the relation of the belt with the driving pulley independent of the belt tightener.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

In the accompanying drawings, wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention, Fig. 1 is a front elevation of the assembled duplex lathe forming the subject matter hereof, with a portion of the housing or pedestal broken away. Fig. 2 is an end elevation thereof, also having the housing broken away to disclose the location and relation of the driving motor, and belt control.

Like parts are indicated by similar characters of reference throughout the several views.

Due to the fixed and unalterable speeds at which alternating current motors operate, it is not possible to obtain the most desirable or correct spindle or wheel speed for all polishing and buffing operations, with direct

motor driven polishing lathes, wherein the grinding and polishing wheels are mounted upon extensions of the armature shaft. By the present motor driven unit, wherein the motor is mounted in the base of the machine, and belted to the wheel spindles, any desired spindle or wheel speed may be attained by varying the proportions of the driven and driving pulleys, irrespective of the speed of the motor. Moreover, this construction permits the starting and stopping of either spindle of a duplex lathe, independent of the other spindle, by means of hand levers on opposite sides of the machine controlling the engagement and disengagement of belt tightening devices. Change of polishing and buffing wheels is a frequent necessity. The present construction enables the stopping of either spindle for interchange or replacement of wheels, without the necessity of stopping the motor or interfering with the operation of other spindles. This is highly important and results in great decrease of production costs, particularly when two operations are assigned to the same machine. Otherwise the duplex construction enables different operations of grinding, buffing and polishing to be performed upon the same machine without the necessity of frequent change of wheels which may be driven at different speeds.

While the lathe spindles may be bench mounted, or the mounting may be in the form of a table or frame provided with legs, the preferred construction is an enclosed hollow pedestal 1, having at its top bearings for independent but axially alined spindles 2 and 3. These spindles project beyond the supporting pedestal 1, in opposite directions and are fitted and adapted to carrying the necessary grinding wheels polishing and buffing wheels or other elements to be rotated. The spindles 2 and 3 are mounted in ball bearing collars 4. The outer bearing upon which the greatest strain fails is preferably a double ball bearing, while the innermost bearings of the respective spindles may be single bearings. The ball bearing collars 4 are mounted in sleeves 5, and 6, having limited degree of universal or wobble adjustment. To this end the mounting sleeves 5 and 6 are provided with external spherical zones which seat within correspondingly concaved bearings in heads or split collars 7 upon the main supporting pedestal or frame. The interior surfaces of the heads or collars 7 may be machined or otherwise formed to conform closely to the exterior contour of the mounting sleeves 5 and 6. An economical method of forming such concave bearings, without the necessity of machine operation is described in my co-pending application Serial No. 554,119, filed April 17, 1922. This method consists in casting in situ within the bearing head or collar 7 an interliner of metal by employing the mounting sleeve as a core about which the interliner is cast and to which it is made to accurately conform. It is obvious that other methods of mounting the sleeves 5 and 6 for limited universal adjustment may be employed. Such universal adjustment or wobble movement of the sleeves 5 and 6 render the spindle bearings self alining. The spindles may thus be easily and cheaply assembled in their bearings without the usual necessity for great accuracy and moreover, such self alining bearings prevent any undue tightness or binding of the bearings upon the spindle. Each spindle being independent of the other is provided intermediate its bearings with a pulley 8. A driving motor 9 is preferably though not necessarily located within the hollow pedestal or frame of the machine. This motor 9 is provided with pulleys 10 on the opposite ends of its armature shaft. The driving pulleys 10 upon the armature shaft are interconnected with the driven pulleys 8 upon the spindles by driving belts 11. These belts 11 are of abnormal length, whereby when unsubjected to tension they will hang loosely from the driven pulley 8 around the driving pulley 10 but out of contact therewith. Thus due to the excessive slack in the belt 11, the motor will normally afford no driving effect. Pivoted at 12 in the main frame or pedestal is a belt tightener arm 13 carrying an idler pulley 14. The belt tightener 13 is interconnected through its pivotal shaft with a weight arm 15 carrying thereon a weight body 16, which operates by gravity to oscillate the idler 14 against the belt 11 to take up its slack and insure driving contact with the driving pulley 10. The weight 16 may be adjusted upon the arm 15 to and from the pivotal connection thereof to vary the belt tightening pressure. The shaft 12 of the belt tightener projects beyond the pedestal 1 and carries exteriorly thereof a hand lever 17, by which the weight 16 and with it the idler pulley 14 may be oscillated upwardly and rearwardly to relieve the tension pressure upon the belt and so release the belt from driving contact with the motor pulley 10. A pivoted latch 18 exteriorly disposed upon the pedestal 1 serves to hold the hand lever 17 in retracted position and the belt tightener pulley 14 and weight 16 in inoperative position. At such time the drive belt 11 hangs loosely about the pulley 10 due to the excessive slack. By disengaging the hand lever from the detent pawl 18, the idler pulley 14 tensions the belt under the influence of the weight 16 with sufficient pressure to afford the necessary driving engagement between the belt and driving pulley. This pressure can be regulated by adjusting the weight 16 upon the arm 15, to enable the belt to slip when undue resistance to rotation of the spindle is encountered. Thus the tensioning and release of the excessively loose driving belt by means of the belt tight-

ener performs the function of an adjustable driving clutch or fast and loose pulleys controlled by a belt shifter with the additional safety provision for the adjustment of the driving tension by variation of the weight 16 to cause the belt to slip when subjected to any undue driving resistance.

As a means of taking up undue slack in the belt independent of the belt tightener or compensate for stretching the motor 9 is mounted upon a base 19, hinged at 20, the opposite edge of which is adjustable vertically within the limits of the slot 21. The base may be clamped in any position of adjustment by the clamp bolts 22.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a construction of the character described a hollow supporting pedestal, a shelf mounted in the lower portion of said pedestal for oscillatory movement in a vertical direction, means for securing said oscillatory shelf in different positions of swinging adjustment, a motor mounted upon said shelf within the hollow pedestal, a spindle located at the top of said pedestal, drive and driven pulleys carried by the motor and spindle respectively, a belt having therein excessive slack connecting said driving and driven pulleys, automatic belt tightener means for taking up the slack of said belt, an operating lever located exteriorly of the pedestal and connected with the belt tightener means for retracting said belt tightener and relaxing the driving tension of the belt and a detent extending into the path of movement of said lever for engaging and holding said lever in retracted position.

2. In a grinding and polishing lathe or the like, a supporting pedestal, independently revoluble spindles carried thereby, a driving means common to said spindle, independent driving belts of excessive length connecting the respective spindles and driving means, and normally lacking driving contact therewith, automatically adjustable belt tightening means for tensioning either of the belts independent of the other into driving engagement, detent means for temporarily holding the belt tightening means in inoperative condition, and means for adjusting the tension of said belts in unison independent of the aforementioned independent belt tightening means.

3. In a grinding and polishing lathe or the like, a supporting pedestal, a pair of independently revoluble spindles mounted thereon, driving means therefor, drive belts of excessive length connecting the drive means and respective spindles, and lacking driving contact therewith when relaxed, an adjustable mounting for said means by variation of which the tension of the drive belts may be adjusted in unison, and independently operable belt tightening devices by which the tension of the respective belts may be independently varied additionally to such unison adjustment.

4. In a grinding and polishing lathe or the like, a supporting pedestal, a pair of independently revoluble spindles mounted thereon, a driving motor mounted within the pedestal, drive belts of excessive length connecting the drive motor and respective spindles, and lacking driving contact therewith when relaxed, independent gravity operated belt tightener means for the respective belts, means operable from the exterior of the pedestal for retracting the belt tightener means, and detents for temporarily holding the belt tightener means in inoperative positions.

5. In a grinding and polishing lathe, a supporting pedestal, independently revoluble spindles carried thereby, a single motor common to both spindles, independent drive belts of excessive length connecting the motor and respective spindles, which, when relaxed, lack driving contact therewith, an adjustable mounting for the motor whereby the tension of said belts may be adjusted simultaneously by the motor adjustment and independently operable belt tighteners one for each belt by which the belt tension may be adjusted independent of the motor adjustment and also independent of each other.

In testimony whereof, I have hereunto set my hand this 30 day of April A. D. 1924.

RAYMOND C. MITCHELL.