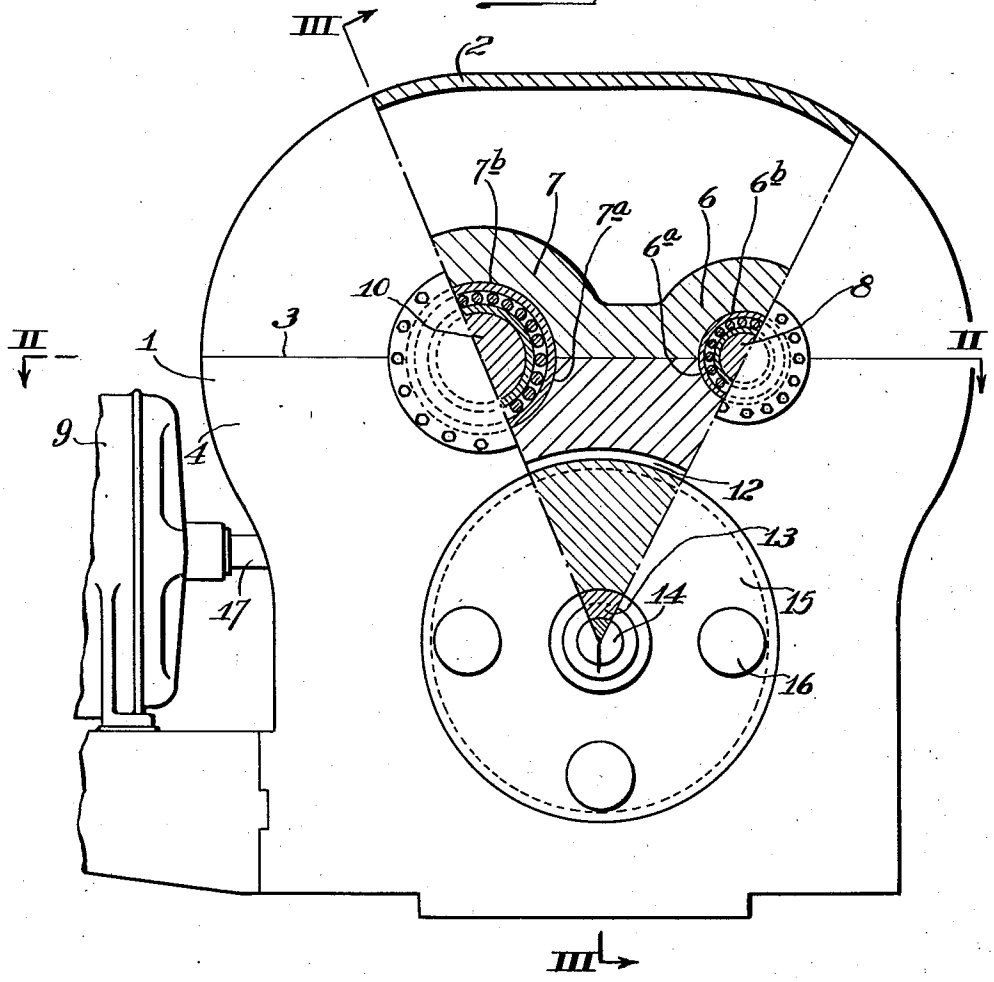
April 23, 1940. W. R. DUDA 2,198,003

ROLL LATHE HEADSTOCKS

Filed Nov. 17, 1938 3 Sheets-Sheet 1

Fig. 1.



WITNESSES

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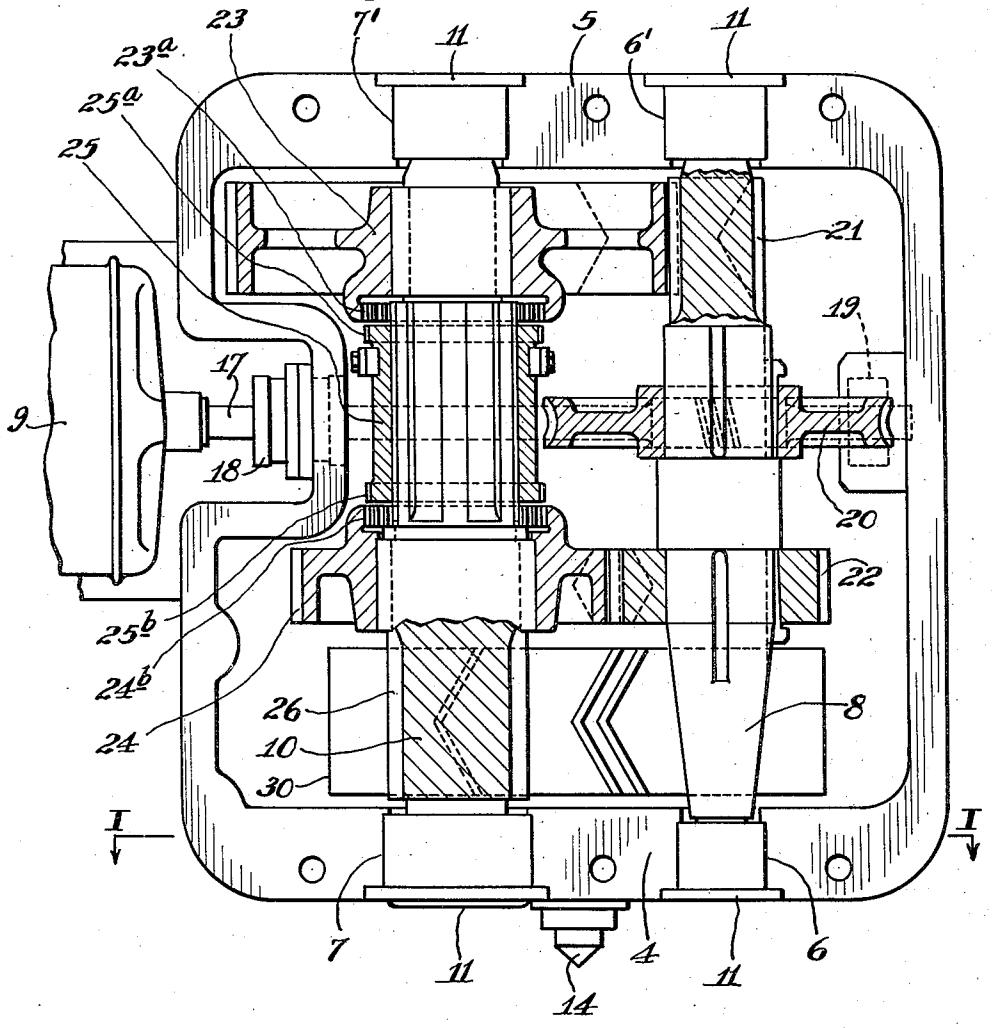
Fig. 2.



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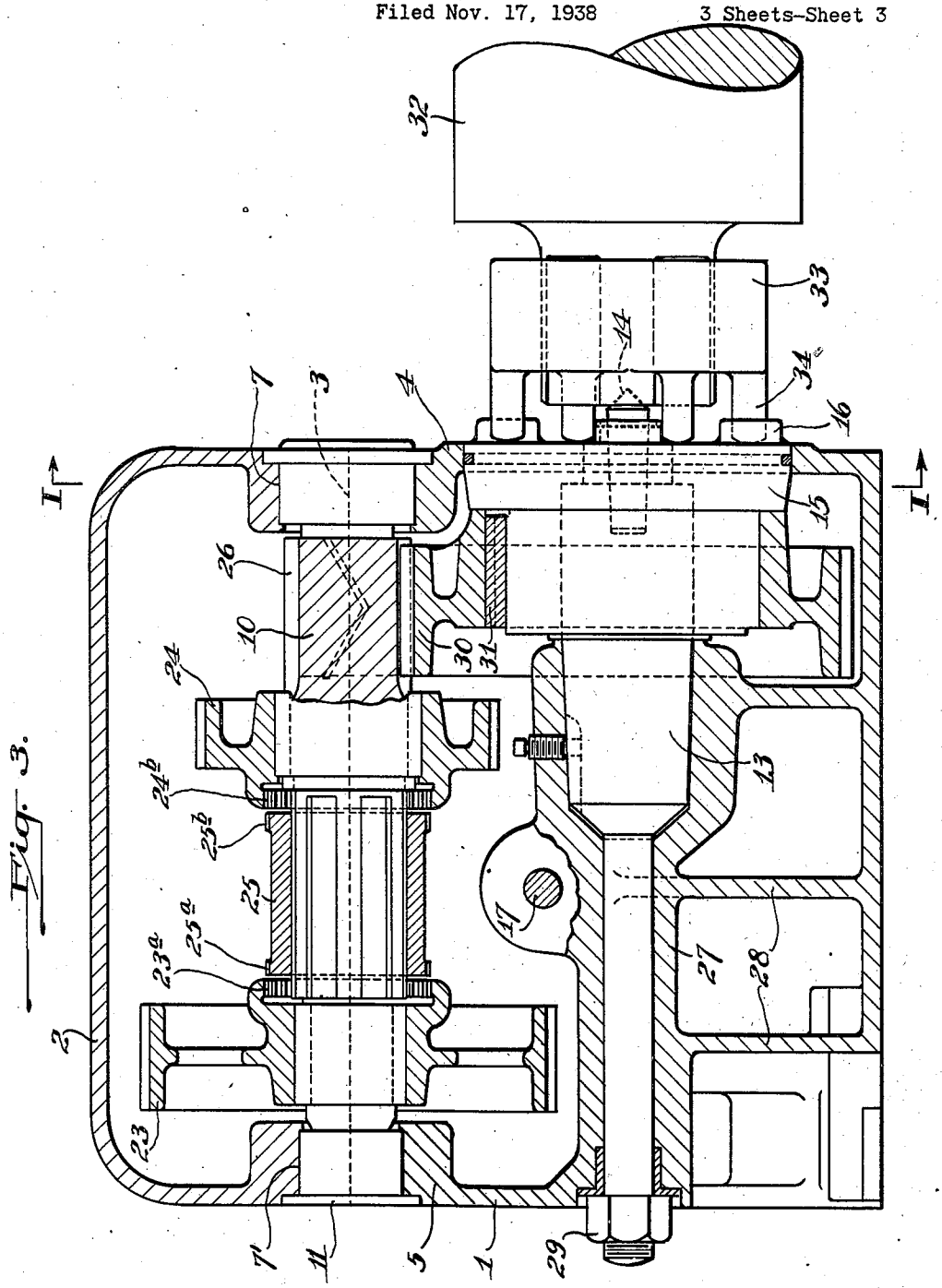

Fig. 3.

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UNITED STATES PATENT OFFICE

2,198,003

ROLL LATHE HEADSTOCK

Wentzel R. Duda, Mount Lebanon, Pa.

Application November 17, 1938, Serial No. 240,977

6 Claims. (Cl. 82—28)

My invention is concerned with lathe headstocks, and relates more particularly to improvements in the means used to rotate the work supported by the headstock.

Headstocks used to support and rotate steel rolls while turning, grinding or polishing them customarily support such rolls upon a dead or non-rotating center pin lodged either in a dead spindle or in a central portion of the frame. This dead spindle or central frame portion extends out from the main frame of the headstock toward the roll and, upon this protruding section, there is journaled a driven face-place wheel which is operatively connected to and rotates the roll. The face-plate wheel itself is provided at its periphery with a deep flange extending backwardly toward the main frame and upon the inner face of this flange there are placed internal gear teeth. Meshing with these teeth and driving the face-plate wheel there is commonly a pinion located upon the overhung end of a shaft also protruding out from the main frame, this shaft in turn being driven through a set of reduction gears.

Prejudicial consequences attend the use of such headstocks, because, among other things, it has always been the practice to turn down a roll by rotating its face across the cutting edge of a fixed tool. Since this cutting action is violent and occurs only at one point upon the roll face, jerky and vibratory reaction forces arise in the roll and are transmitted from it to the headstock. These forces cause the overhung shaft and driving pinion to buck and chatter and, by this action, to create new and greater forces which are transmitted back into the roll. Frequently these incidental forces are of such magnitude that the roll itself vibrates considerably and the turning down results in an uneven and rippling roll face. This result has naturally necessitated the doing of much additional finishing work and has in some cases ruined the roll. Moreover, such chattering and vibrating in the headstock has hastened the depreciation of its various moving parts.

Also various minor difficulties have been present in these headstocks. The protruding position of the face-plate wheel and driving pinion has made necessary their lubrication by hand rather than by force feed or splash methods. And the face-plate wheel, with its internal gear teeth, has been put in place only by sliding its teeth along the teeth of the pinion, so that the teeth of the two members have to be straight, rather than of some more advantageous shape, such as double helical.

In view of the foregoing, the primary object of my invention is to provide a lathe headstock which is so constructed that it overcomes the objectionable characteristics of those heretofore used.

Other objects will be fully disclosed by the ensuing description.

In the headstock provided according to my invention, the dead center pin and its supporting element may be the same as heretofore, and the driven face-plate wheel is journaled near the roll end of this element. The main frame of the headstock, however, is itself extended toward the roll to terminate in an end wall in a vertical plane passing in a general direction through the roll end of the dead element, and is snugly fitted about the periphery of the face-plate wheel. The pinion shaft is positioned beyond the periphery of the face-plate wheel and its roll end provided with a bearing section which is journaled in the above-mentioned end wall of the main frame. The driving pinion on this shaft is located between this bearing section and the customary bearing sections, so that it is no longer overhung. Finally, the teeth of the driving pinion mesh with and drive external gear teeth on the face-plate wheel.

The preferred embodiment of my invention is illustrated in the accompanying drawings, of which Fig. 1 is an elevation, partly in section, of the roll end of the headstock, the sectional portions being taken on the plane indicated by the line I—I on Figs. 2 and 3; Fig. 2 a sectional view along the horizontal plane II—II of Fig. 1; and Fig. 3 a sectional view along the oblique plane III—III of Fig. 1.

In the headstock as disclosed in these drawings, the main frame is essentially composed of two principal parts, a main or bed frame 1 and a cover frame 2 which is bolted or otherwise attached to the bed frame along a horizontal meeting plane 3. These frame members include an end wall 4 adjacent to the roll-engaging end of the headstock, and a wall 5 at the other end. In the meeting surface 3 of roll end 4 of bed frame 1 there are two semi-circular channels 6*a* and 7*a* which are opposed by two similar complementary channels 6*b* and 7*b* in the meeting surface 3 of cover frame 2, these pairs of complementary channels forming openings for two journal boxes 6 and 7 for the bearing sections of two rotating shafts. Likewise, openings for two journal boxes 6′ and 7′ are provided in rear end

wall 5, by the formation of semi-circular channels in meeting surface 3 of both cover frame 2 and bed frame 1. Supported in journal boxes 6 and 6' is a shaft 8 which receives power from a prime mover 9 and transmits it through a set of reduction gears, as will be hereinafter described. Between journal boxes 7 and 7' is a pinion shaft 10 which receives power from shaft 8 and transmits it through a driving pinion to the roll, as will be described. Cover plates 11 are bolted over the otherwise open ends of the journal boxes.

Roll end 4 of bed frame 1 is also provided with a circular aperture 12 through which extends one end of a dead spindle 13 which is rigidly supported in its central and rear sections by other portions of bed frame 1, as will be described.

A center pin 14 for supporting the work is wedged into a cavity in the roll end of spindle 13, and journaled upon said spindle is a driven face-plate wheel 15 which is integrally provided with a plurality of lugs 16 which engage turning means attached to the roll to rotate it.

Fig. 2 discloses more particularly the manner in which power is transmitted from motor 9 to pinion shaft 10. A shaft 17 driven by the motor passes through an aperture 18 in one side of bed frame 1 and extends beneath shafts 8 and 10 to a journal box 19 positioned in the opposite wall of bed frame 1. Shaft 17 is provided with a worm thread (not shown) which meshes with and drives a worm wheel 20 keyed or otherwise rigidly attached to shaft 8. Also keyed or otherwise operatively connected to shaft 8 are two pinions 21 and 22, pinion 21 being shown as integral with said shaft. These pinions mesh with and continuously drive external gear wheels 23 and 24, respectively, which are journaled upon and freely rotate about pinion shaft 10. Gear wheels 23 and 24 are each provided with a set of internal gear teeth 23*a* and 24*b*, respectively, each of which is capable of meshing with external gear teeth 25*a* or 25*b*, respectively, upon a sleeve 25 surrounding pinion shaft 10, which sleeve is movable longitudinally of the pinion shaft so that either teeth 25*a* may engage and be driven by gear teeth 23*a*, or teeth 25*b* may engage and be driven by gear teeth 24*b*. Sleeve 25 is also sufficiently short to be placed in an idling position out of engagement with either gear wheel 23 or 25. Sleeve 25 is in turn keyed or otherwise operatively connected to shaft 10, so that the two rotate together.

Also, upon shaft 10 I provide a driving pinion 26, which is shown integral with said shaft, though obviously operative connection between these two members might be effected in numerous ways.

Attention is now directed to Fig. 3. Rear wall 5 of bed frame 1 is provided interiorly with a sleeve 27, preferably cast integrally with the wall section and braced at several points by internal walls 28. Into this sleeve, dead spindle 13 is wedged and tightly secured, as by means of a nut 29. Upon the portion of spindle 13 which extends beyond sleeve 27, face-plate wheel 15 is freely journaled, the roll end of said spindle and wheel extending, as before mentioned, through aperture 12 in bed frame 1. An external gear ring 30 is operatively connected with the periphery of face-plate wheel 15, preferably by a key 31, as shown, though it may be cast integrally with said wheel, the gear ring 30 meshing with and being rotated by driving pinion 26. A roll 32 is shown in position with one end supported upon dead center pin 14. A collar 33 encircles and engages the wobbler section of said roll and is provided with a plurality of horizontal integral lugs 34 which extend toward face-plate wheel 15 and engage with lugs 16.

Thus, when motor 9 is operating and pinions 21 and 22 and gear wheels 23 and 24 are being rotated by shaft 8, sleeve 25 may be placed in operative connection with either of said gear wheels. When this is done, pinion shaft 10 is driven through said sleeve, and driving pinion 26, engaging gear ring 30, rotates face-plate wheel 15. Through the engagement of lugs 16 and 34, roll 32 is thus slowly turned about its axis.

It will be noted that driving pinion 26 is located between the two bearing sections of pinion shaft 10. Any vibratory forces transmitted to said pinion from roll 32 are successfully resisted and dissipated when the driving pinion is in this position, and whipping and chattering of the driving pinion and its shaft are minimized or eliminated. Consequently the creation of incidental forces is prevented, with the result that a smoother roll face results and deterioration of the headstock itself is slowed up.

Also with the headstock thus provided double helical gear teeth may be utilized throughout. The headstock is assembled by first installing spindle 13, face-plate wheel 15 and gear ring 30. Subsequently pinion shaft 10 and reducing shaft 8 are lowered into the semi-circular channels formed in the meeting surface 3 of bed frame 1, making possible the engagement of double helical gear teeth. This substitution results in quieter, smoother running, and it will be noted that all the gearing is within the main frame of the headstock, so that advantageous lubrication of the driving pinion 26 and gear ring 30 by force feed or splash methods is both possible and economic.

Clearly numerous variations may be made in this headstock without departing from my invention. Thus, for example, face-plate wheel 15 and gear ring 30 may be made in a single piece. Likewise, sleeve 27 may be extended further along dead spindle 13 until face-plate wheel 15 is journaled directly upon it rather than upon said spindle. And I desire it to be understood that my invention is equally applicable to a headstock in which the spindle and center pin rotate instead of remaining dead.

According to the provisions of the patent statutes I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A roll lathe headstock comprising a work-supporting stationary center pin, a face-plate wheel rotatable about the axis of said center pin, an external gear connected to said face-plate wheel and provided with helical teeth, a driven shaft provided with an external driving pinion having helical teeth meshing with said gear teeth, and bearings rotatably supporting said shaft at both sides of said driving pinion.

2. A roll lathe headstock comprising a closed housing having an end wall provided with a circular opening, a dead spindle within the housing and provided with a stationary centering pin pro-

jecting through the center of said opening, a face-plate wheel journaled upon said spindle and provided with means for rotating the work, said wheel being snugly received in said opening, an external gear connected to said face-plate wheel within the housing, a driven shaft in the housing provided with an external driving pinion meshing with said gear, and bearings rotatably supporting said shaft at both sides of said driving pinion.

3. A lathe headstock comprising a bed frame, a detachable cover frame joined to said bed frame, a face-plate and a driven pinion shaft provided with an external pinion for rotating the face-plate and having bearing sections upon either side of said pinion, said bearing sections being lodged in bearings which are received between said cover frame and said bed frame.

4. A lathe headstock comprising a bed frame, a removable cover frame joined to said bed frame, a rotatable face-plate wheel, an external gear connected to said face-plate wheel, a driven pinion shaft provided with an external pinion meshing with said gear and bearings rotatably supporting said shaft upon both sides of said pinion, said bearings being received between said bed frame and said removable cover frame, whereby said pinion may be meshed with said gear by lowering said pinion down upon said bed frame when the cover frame is removed.

5. A lathe headstock comprising a bed frame, a removable cover frame joined to said bed frame along a horizontal meeting plane, a rotatable face-plate wheel, an external gear connected to said face-plate wheel, a driven pinion shaft provided with an external pinion meshing with said gear and bearings rotatably supporting said shaft upon both sides of said pinion, said bearings being received between said bed frame and said removable cover frame, whereby said pinion may be meshed with said gear by lowering said pinion down upon said bed frame when the cover frame is removed.

6. A roll lathe headstock comprising a work-supporting stationary center pin, a face-plate wheel rotatable about the axis of said center pin, an external gear connected to said face-plate wheel and provided with helical teeth, and a driven shaft provided with an external driving pinion having helical teeth meshing with said gear teeth.

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