

Sept. 20, 1932.

J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 1

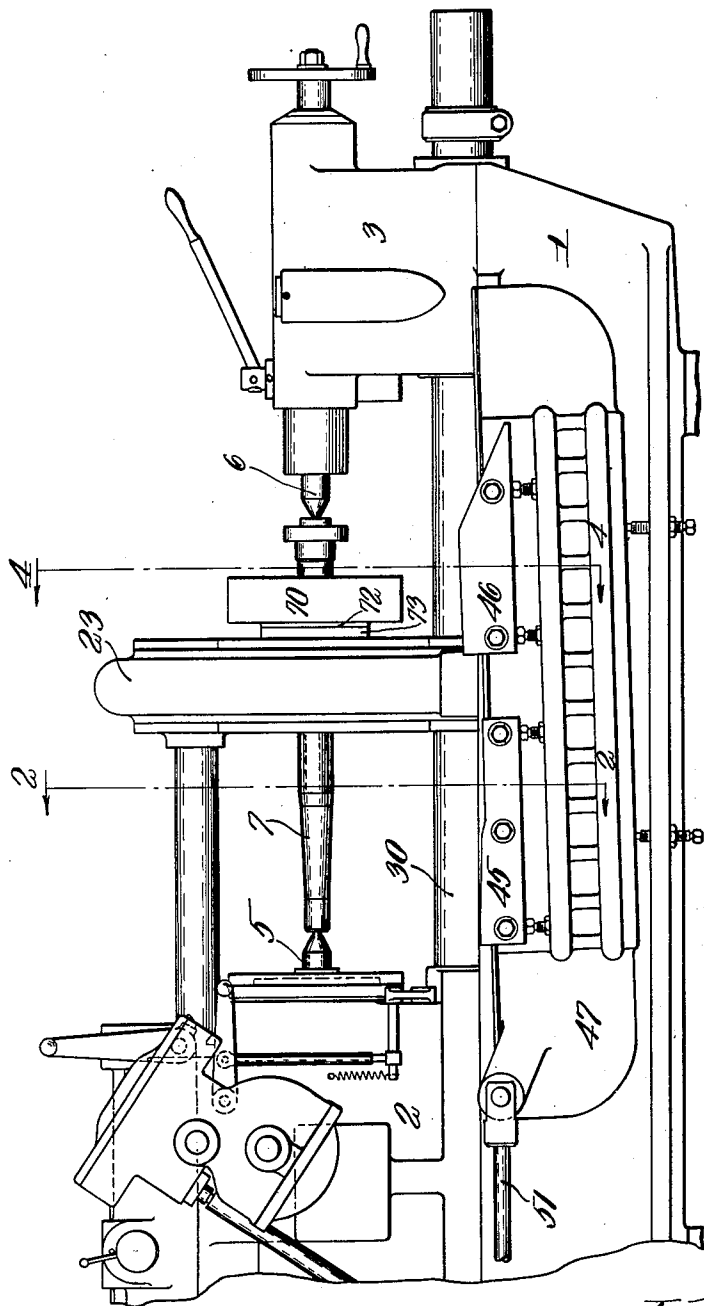


Fig. 1.

Inventor
John E. Lovely
by *Wright Brown Quincy May*

Attys.

Sept. 20, 1932.

J. E. LOVELY

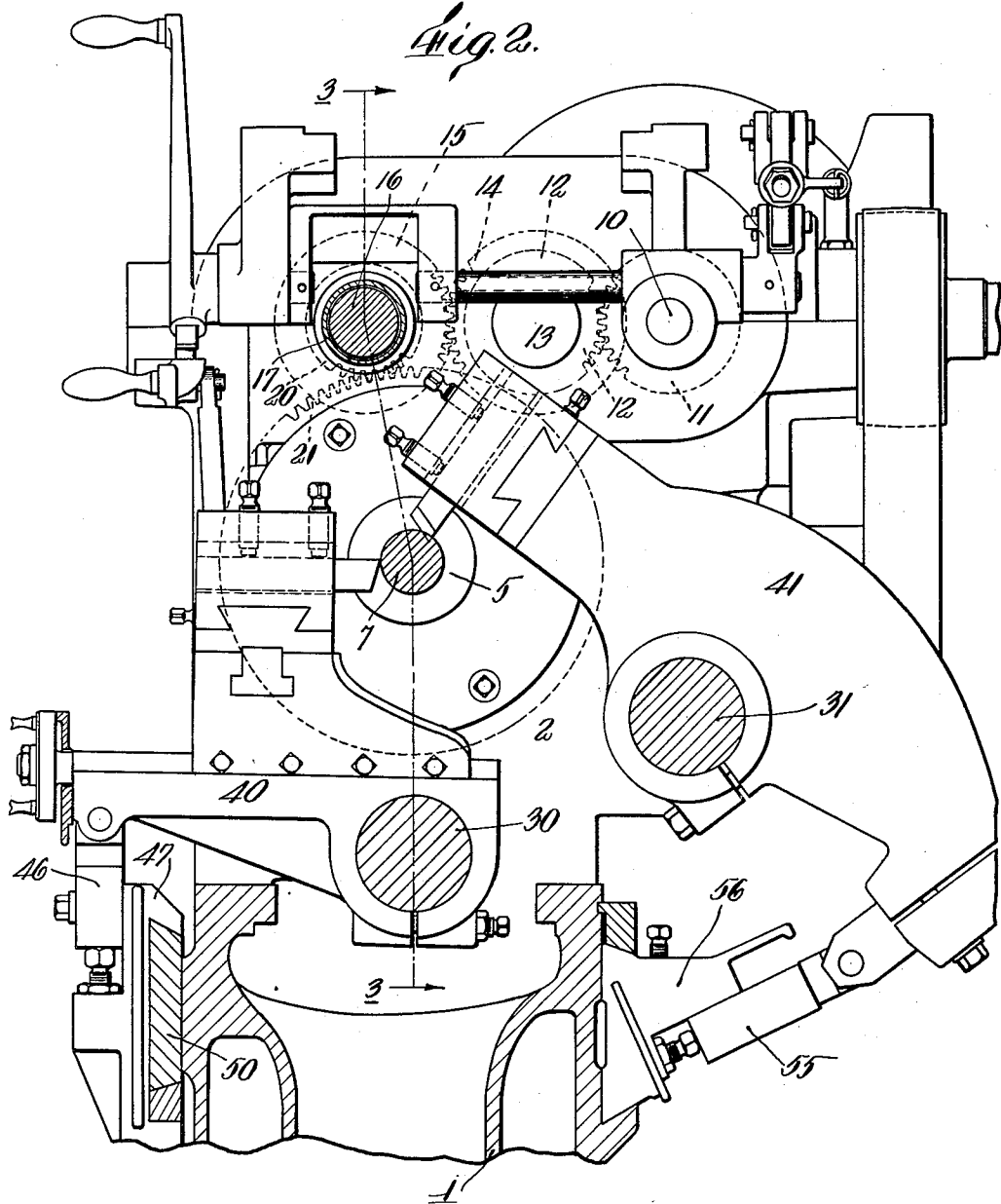
1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 2

Fig. 2.



Inventor
John E. Lovely
by *Hight Brown Pinckney May*

Attys.

Sept. 20, 1932.

J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 3

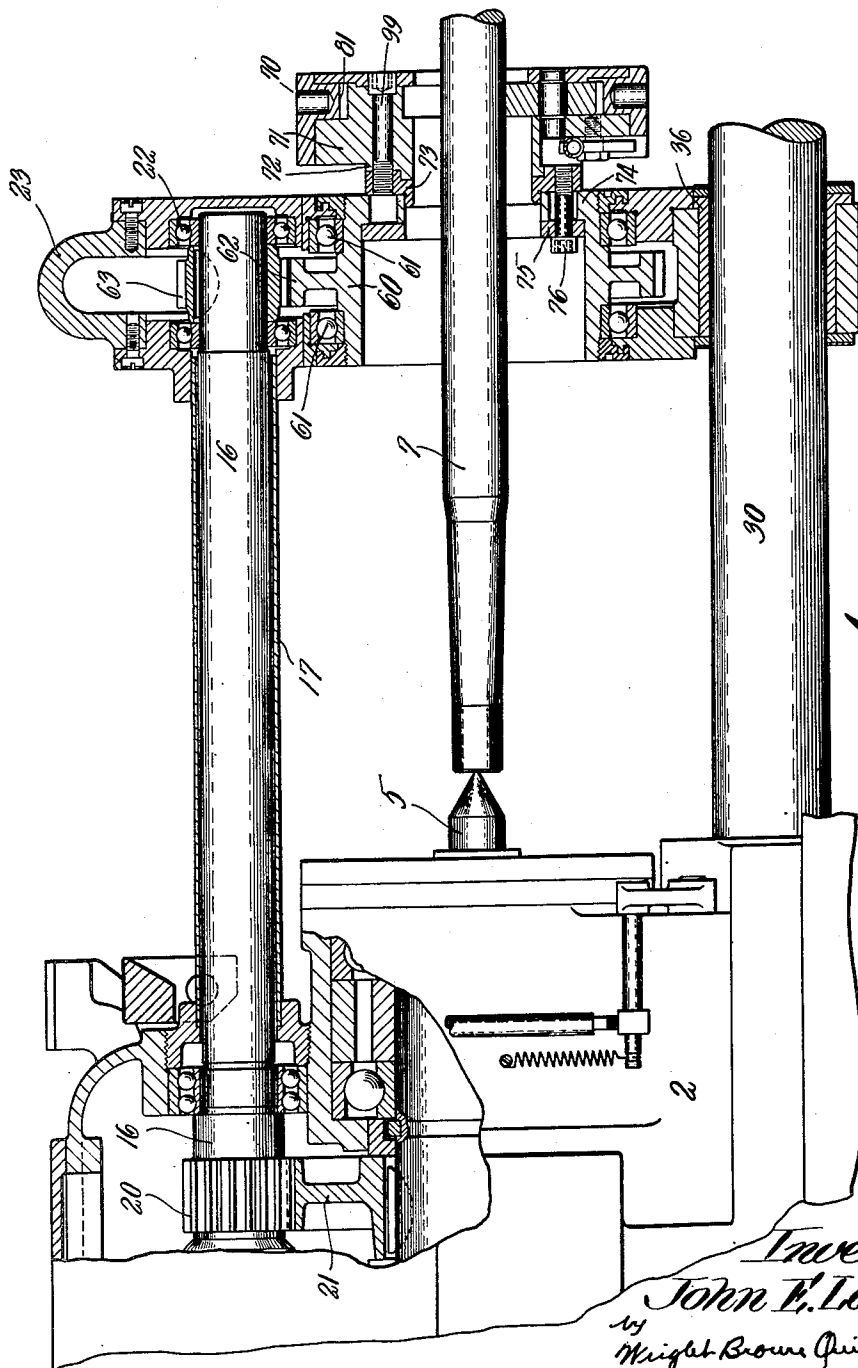


Fig. 3.

Inventon
John E. Lovely
by Knight Browne Quincy Valley
Utah.

Sept. 20, 1932.

J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 4

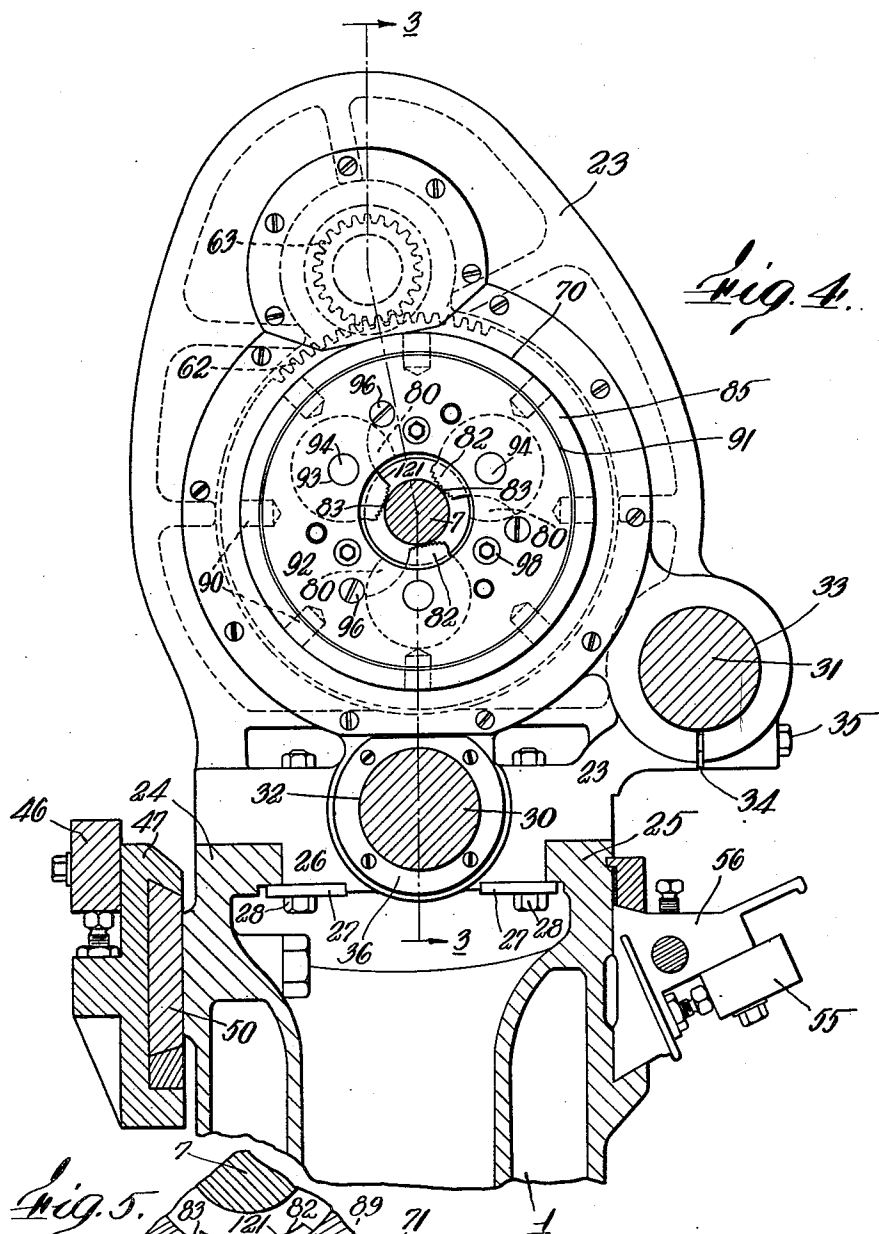


Fig. 4.

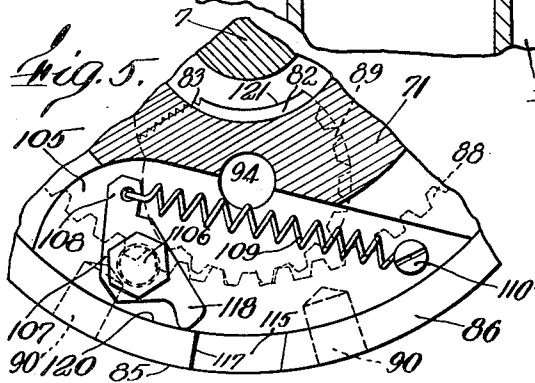


Fig. 5.

Inventor
John E. Lovely
by
Wright Brown Quincy May
Attys.

Sept. 20, 1932.

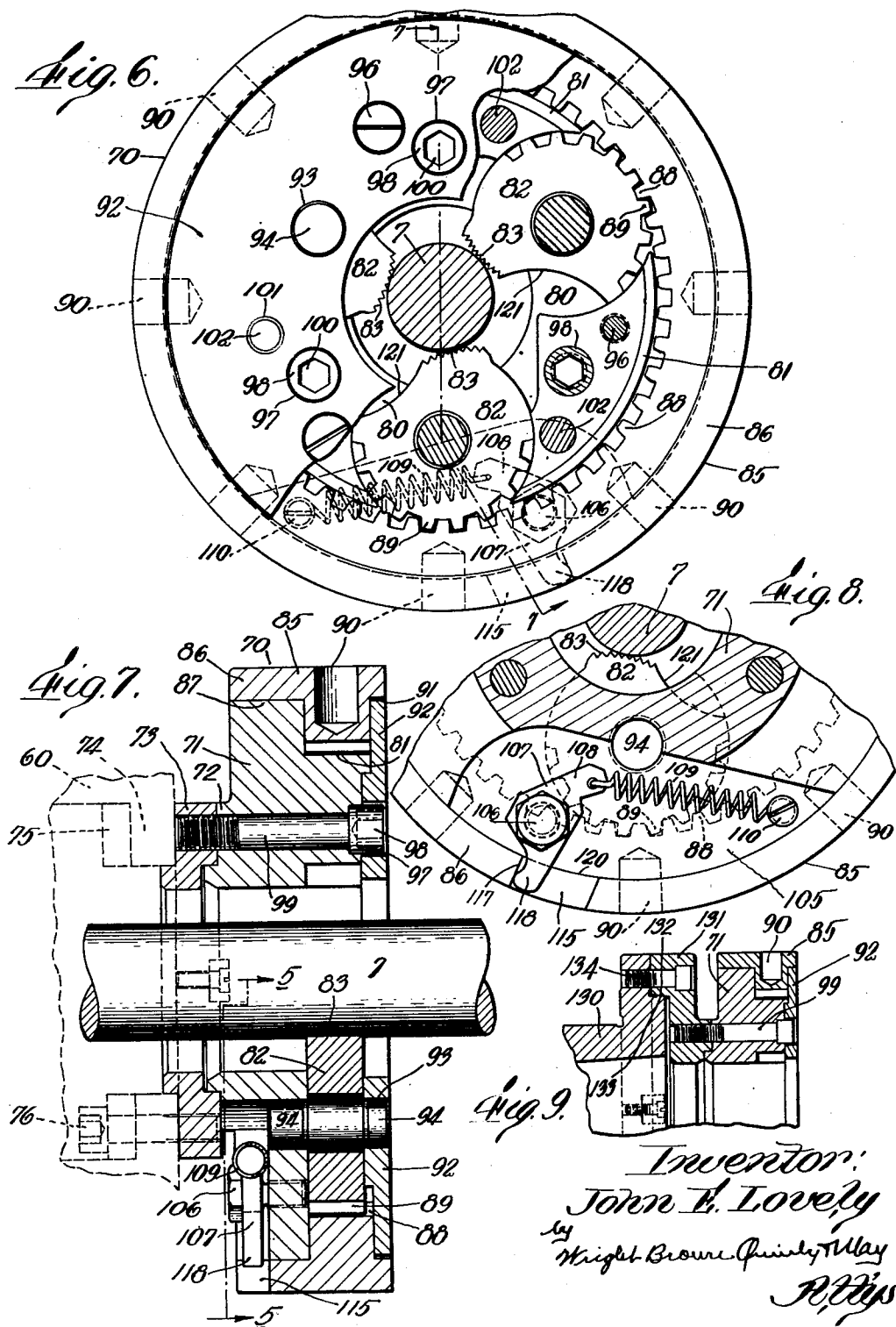
J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 5



Inventor:
 John E. Lovely
 by Wright, Brown, Quincy & May
 Attys.

Sept. 20, 1932.

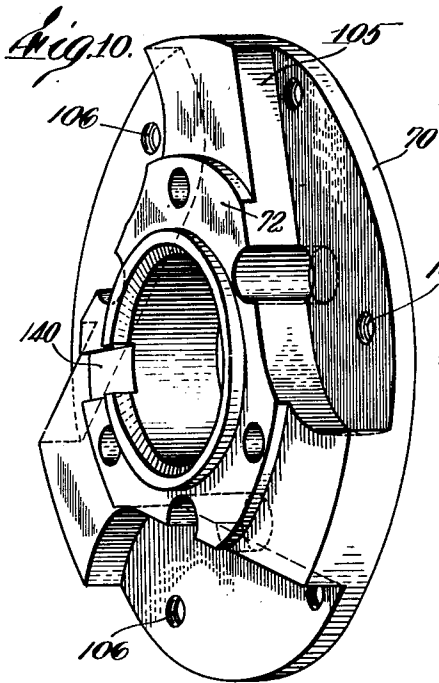
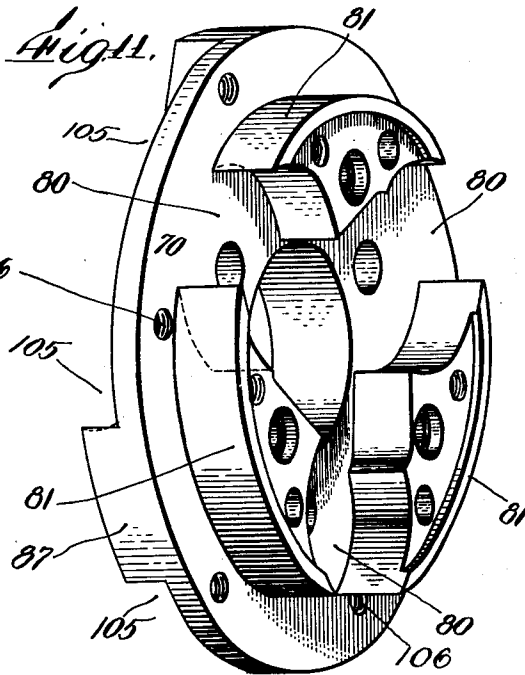
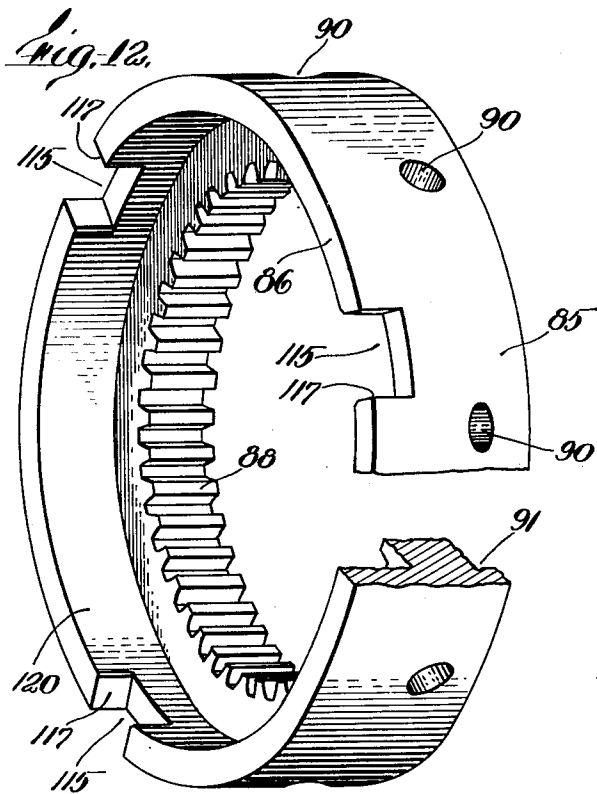
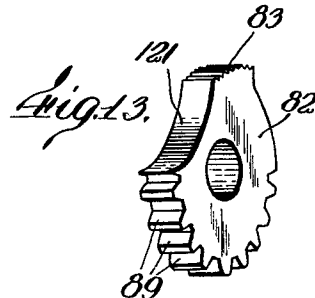
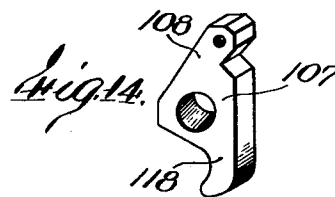
J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 6



Inventor
John E. Lovely
by *Wight Brown Quincy & Co.*
Attys.

Sept. 20, 1932.

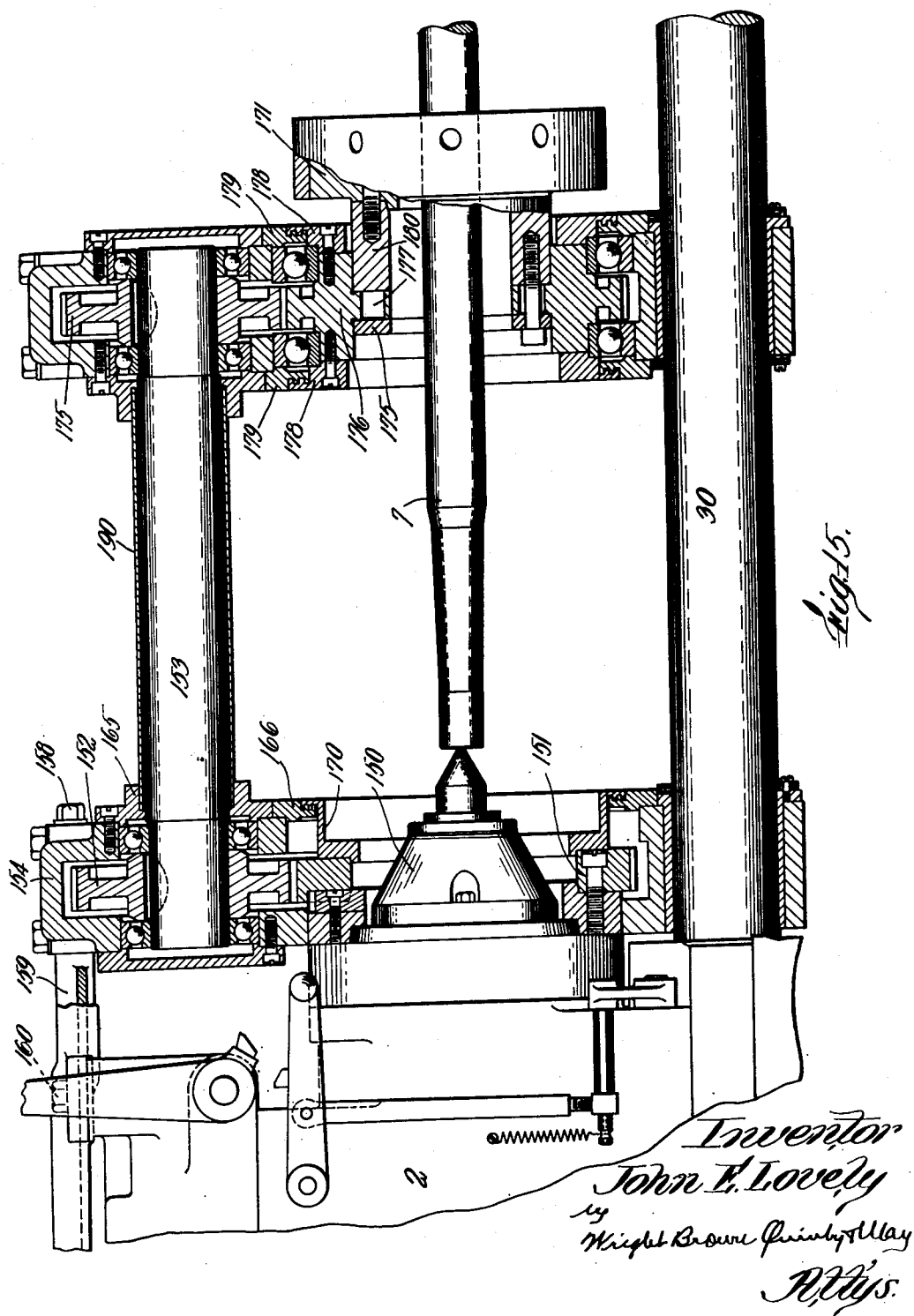
J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 7



Sept. 20, 1932.

J. E. LOVELY

1,877,922

LATHE WITH CENTER DRIVE

Filed Jan. 31, 1931

8 Sheets-Sheet 8

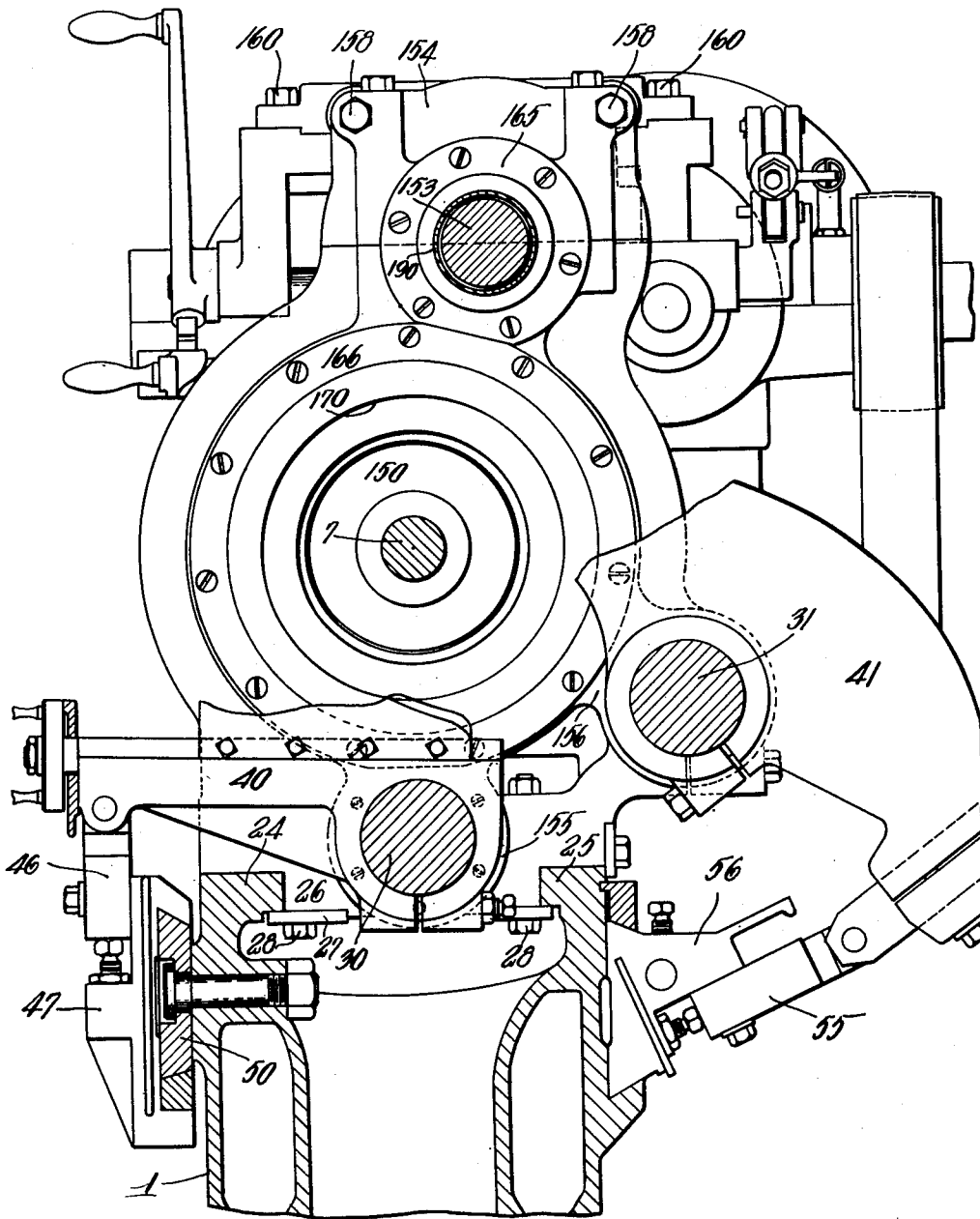


Fig. 16.

Inventor:
John E. Lovely
by Wright-Brown Quincy & May
Atty's.

UNITED STATES PATENT OFFICE

JOHN E. LOVELY, OF SPRINGFIELD, VERMONT, ASSIGNOR TO JONES & LAMSON MACHINE COMPANY, OF SPRINGFIELD, VERMONT, A CORPORATION OF VERMONT

LATHE WITH CENTER DRIVE

Application filed January 31, 1931. Serial No. 512,582.

In turning work where the machine operations are to be performed at some distance from its ends, particularly where the work is relatively slender, undesirable torsional stresses may be imparted to the work where the driving effort is transmitted to its end portion. The present invention, therefore, has for an object to apply the driving effort to the work at a distance from its ends and as close as possible to the location of the machining operations.

A further object is to so drive the work that its ends may be free to have machining operations performed thereon.

15' This invention relates to the machine construction by which this drive may be effected and also to the means for engaging the work to impart driving effort thereto.

It relates further to such a machine construction applicable to lathes of the Fay type.

For a more complete understanding of this invention reference may be had to the accompanying drawings in which

25 Figure 1 is a fragmentary front elevation of a Fay lathe embodying this invention.

Figure 2 is a fragmentary vertical cross section on line 2—2 of Figure 1.

Figure 3 is a fragmentary longitudinal section on line 3—3 of Figures 2 and 4.

Figure 4 is a fragmentary vertical section on line 4—4 of Figure 1.

Figure 5 is a detail section on line 5—5 of Figure 7, but showing the parts in work-released position.

Figure 6 is an end elevation partly broken away of the work driving fixture.

Figure 7 is a section on line 7—7 of Figure 6.

40 Figure 8 is a detail section similar to Figure 5 but showing the parts in work gripping positions.

Figure 9 is a detail section similar to a portion of Figure 7 but illustrating a modification.

Figures 10 and 11 are perspectives showing opposite faces of one member of the driving fixture.

50 Figures 12, 13 and 14 are perspectives of other parts of the work driving fixture.

Figures 15 and 16 are views similar to Figures 2 and 3, respectively, but showing the drive mechanism as an attachment for a standard Fay lathe.

Referring first to the mechanism shown in Figures 1 to 4, at 1 is indicated the bed of a lathe of the well known Fay type. At 2 and 3 are shown the head and tailstocks, respectively, supported on the bed 1 in suitable spaced relation. The headstock supports the usual rotatable work spindle having a live center 5 and the tailstock carries the usual dead center 6 for supporting work such as 7 therebetween. At 10 in Figure 2 is shown the main drive shaft of the machine which may be rotated by any suitable means such as a motor, which is commonly supported on the top of the headstock. This drive shaft 10, in accordance with the usual practice, has a gear 11 thereon meshing with a gear 12 on an intermediate shaft 13 and a gear 14 is driven from the shaft 13 and is in meshing relation to a gear 15 on a shaft 16. This shaft 16, as shown in Figures 2 and 3, extends outwardly of the headstock in parallel relation to the axis of the work 7 and within this headstock it carries a gear 20 meshing with a gear 21 on the headstock spindle so that this spindle is rotated, this spindle carrying the center 5 as hereinbefore described. The outer end of the shaft 16 is journaled in suitable bearings 22 in a support 23. The shaft 16 lies within a stationary tubular casing 17 extending from the headstock to the support 23.

As shown best in Figure 4 the support 23 rests on the front and back rails 24 and 25 of the bed 1 and has a portion 26 projecting therebetween to which portion are secured the clamping plates 27, which through means such as bolts 28 clamp the support firmly to the top of the bed and intermediate the head and tailstocks. This support, as will later appear, carries a work driving fixture for engaging the work 7 between its ends which are supported on the live and dead centers. Lathes of the Fay type are equipped with rockable and axially movable tool bars such as 30 and 31. The bar 30 is positioned between the front and back frame portions 24 and 25 and beneath the work while the bar

31 is positioned above and to the rear of the portion 25. Both of these bars are supported in the head and tailstocks, and as shown in Figure 4, they also extend through suitable bearing openings as at 32 and 33, respectively, in the support 23. The opening 33 for supporting the bar 31 may be formed split, being cut through as at 34, a bolt 35 being employed to draw the split portions together so as to take up wear and to provide for the desired firmness of holding of the bar 31. The bar 30 may extend through a removable bushing 36 carried by the support 23. The tool bars 30 and 31 have fixed thereto the front and rear tool carriers 40 and 41, respectively, which tool carriers may be of any suitable type, the standard tool carriers for a machine of the Fay type being illustrated herein. The angular position of the carrier 40 is shown as controlled by former cams such as are shown at 45 and 46 in Figure 1, it being quite feasible, if desired, to employ a pair of tool carriers one at each side of the support 23 so that the tools thereon may operate at opposite ends of the work, one of the former cams controlling the angular position of each tool carrier when that particular carrier is in operative relation to the work. The former cams are shown as supported on a sliding carriage 47 mounted in ways on guide 50 which may be angularly adjusted with reference to the bed 1 in the well known manner in machines of this description. The carriage 47 may have its lengthwise position controlled from a suitable cam drum on the machine in the well known manner, the rod 51 extending to the cam being illustrated in Figure 1. Similarly the angular position of the back tool carrier 41 may be controlled by a former cam 55 on a carriage 56. It is slidable along the back face of the bed 1, its position being controlled from cams on the cam drum in the usual manner. The axial position of the tool bars may also be controlled from cams on the cam drum as is also usual for machines of this type.

It will thus be seen that the tool bars are supported not only by the head and tailstocks of the machine, as is usual in machines of this type, but is also supported by the intermediate support 23, the end portions of the work at either side of the support 23 being accessible for machining operations. The support 23, as shown best in Figure 3, is annular in form and has journaled therein an annular member 60 through which the work 7 passes, ball bearings 61 being shown interposed between the member 60 and the inner face of the support. This member 60 is provided with a central portion 62 of enlarged diameter provided with gear teeth which mesh with teeth on a gear 63 keyed to the outer end of the shaft 16. By this means the member 60 may be rotated and by forming the gear member 60 and the gear 21 of the same pitch diameter

and also forming the gears 20 and 63 of the same pitch diameter, the member 60 is driven at the same rate of rotation as the spindle. This permits, if desired, a work driving fixture to be attached to the spindle in the usual manner to engage the end of the work carried by the spindle, in the manner shown in Figure 9, if desired, so that the work may be driven from one end as well as from the support 22.

The member 60 is provided with means for keying thereto a work driving fixture indicated generally at 70. This fixture, as shown best in Figures 3 and 5 to 11, comprises an annular member 71 shown detached in Figures 10 and 11, provided with a hub portion 72 at one face which may be secured for rotation with the member 60. As shown in Figure 7 it is keyed to an intermediate ring 73 which is in turn keyed and clamped to an internally extending flange 74 at one end of the member 60. A clamping ring 75 positioned inwardly of this flange 74, as shown in Figure 3, is secured to the ring 73 as by means of the bolts 76. The annular member 71 thus extends spaced from the adjacent end of the support 23, this facilitating access to the mechanism for releasing the work from driving engagement, as will later appear. The member 71 is provided in one face with a plurality of recesses 80 and outwardly thereof it has a peripheral portion 81 of reduced diameter with which each of the recesses communicates. Within each of these recesses is pivotally mounted a work clamping jaw 82, shown detached in Figure 12, each of these jaws having a work gripping, preferably serrated face 83, eccentrically disposed to the pivotal axis of the jaw. These jaw elements are similar to each other and are so disposed in the recesses that rocking of each about its pivot in the same direction will cause gripping or releasing movement of the jaw face with respect to the work 7. Journaled on the outer periphery of the member 71 is a ring member 85, shown detached in Figure 11, having a flange portion 86 overlying the portion 87 of larger diameter of the member 71. It also has an inwardly directed flange portion 88 formed as an internal gear which rides on the portion 81 of reduced diameter. The teeth of this internal gear mesh with teeth such as 89 on each of the work clamping jaws so that by rocking of the ring member 85 about its axis the jaws are rocked in unison so that they may be brought into or out of gripping relation to the work. The ring 85 may be provided with axial openings 90 on its periphery for the reception of a suitable tool by which rocking of this ring member may be effected. The outer face of the ring member 85 is shown as having a concentric depressed portion 91 within which is positioned the outer edge portion of an annular cover plate 92. This cover plate may,

as shown, be provided with journal openings 93 to receive the pivot portions 94 at one side of each of the jaws 81, the opposite end portions 95 of the pivots being shown as journaled in openings in the member 71. The cover plate may be fixed to the member 71 as by the screws 96, and may be provided with openings 97 to rotatably receive the heads 98 of bolts 99 which pass through the member 71 and are threaded into the ring 73 to secure the member 71 to this ring. The heads 98 of these bolts may be provided with polygonal sockets 100 for the reception of tools by which they may be manipulated. The cover plate 92 may also be formed with one or more openings such as 101 for the reception of locating pins 102 projecting outwardly from the member 71 by which the proper angular position of the cover plate may be readily determined.

In the face of the member 71 opposite to the recesses 80 may be provided cut away portions as at 105, shown best in Figure 9. Within each of these portions may be pivotally mounted as at 106 (see Figures 5 and 8) a lever 107 shown detached in Figure 14, to one end of 108 of which may be secured a spring 109, the opposite end of which is fixed as to a screw 110. The ring 85 within its flange portion 86 is slotted out as at 115, one end of each of these slots forming a shoulder 117 against which the arm 118 of one of the levers 107 is pressed by the spring, when the ring 85 is in such angular position. as shown in Figure 8, that the lever arm 118 is permitted to extend into the slot. In this position of the parts the springs 109 tend to move the ring 85 angularly in a direction to close the jaws 81 onto the work. When, however, the ring is turned in the opposite direction to a sufficient extent, as shown in Figure 5, the inner face 120 of the flange 86 rides under the arm 118 of each lever 107 so that pressure exerted by the spring 109 on the lever merely presses the arm 118 against this face 120 and has no component of motion tending to rock the ring 85. In this position of the parts the jaws are fully retracted from the work, each jaw presenting then toward the work a concaved face 121. Thus when the jaws are in fully open position they tend to so remain, but when they have been partially closed against the work, the springs 109 tend to complete this closure. In Figure 9 is shown one manner in which a driving fixture as thus described and as shown in Figures 5 to 8, may be secured to a standard spindle nose 130 of a lathe. Keyed to this standard spindle nose is the ring 131 which has a tapered internal annular shoulder 132 mating the tapered external shoulder 133 of the nose. This ring 131 may be fixed to the spindle nose as by the bolt 134 and it may be formed to receive the screw 99 of the work fixture similarly to the ring 73 shown

in Figures 3 and 7. The member 71 of the fixture may be keyed to the ring 131 in the same manner that it may be keyed to the ring 73, a transverse keyway 140 being shown in the member 71 in Figure 9.

In Figures 15 and 16 a modified construction is shown in which the drive fixture is shown as an attachment to a standard Fay lathe. Referring to Figure 15 at 150 is shown the end of a spindle and to this is secured an annular gear 151. This gear meshes with a gear 152 carried at the inner end of a shaft 153 which is mounted in suitable bearings in a holding frame 154. This frame 154 has extensions 155 and 156 having openings for the slidable reception of the tool bars 30 and 31 and at its upper portion it may be secured as by bolts 158 to an anchor plate 159 secured as by bolts 160 to the top of the head stock. Cover plates 165 and 166 may be secured to the forward face of the frame member 154 surrounding the bearing opening for the shaft 153 and the outer face of the gear 151. To the cover plates 166 may be secured annular flanged guard members 170 for preventing access of dirt or other foreign matter to the active portions of the annular gear 151. The outer end of the shaft 153 may have fixed thereto the gear 175 similar to the gear 152 which in turn meshes with the annular gear 176 of the fixture. This gear 176 in order to facilitate its removal and the dismantling of the attachment from the machine may be provided with removable annular end plates 178 which may cooperate with other plates 179 to prevent entry of dirt or other foreign materials into the bearings for the member 176. To this member may be secured the driving fixture as through the ring 180 to which the fixture member 71 is secured, the clamping ring 175 engaging on the opposite face of the flange 177 of the ring gear 176. In this construction it will be seen that the shaft 153 is driven from the work spindle instead of being a continuation of the work spindle shaft 16 as is shown in Figure 3. As shown the shaft 153 is enclosed within the tubular casing member 190. It will be understood that the headstock contains the usual speed control and stop mechanisms with which machines of this type are commonly provided, the speed controlling mechanism being interposed between the shaft 13 and the spindle driving shaft which, in the construction of Figures 1 to 4 is the shaft 16.

Certain embodiments of this invention having thus been described, it should be evident to those skilled in the art that various changes and modifications may be made therein without departing from the spirit or scope of the invention as disclosed in the accompanying specification and drawings.

I claim:

1. A machine of the class described, comprising a bed, a headstock and a tailstock car-

ried by said bed, a support carried by said bed between said head and tailstocks, a work driving fixture carried by said support for driving work supported between said head and tailstocks, tool bars supported by said head and tailstocks and by said support, one of said bars being positioned beneath the work carried by said head and tailstocks, tool carriers on said bars, a drive shaft extending from said headstock to said support above the work, driving connections from said shaft to said fixture, and driving connections to said shaft at said headstock.

2. A work driving fixture comprising an annular member having recesses in one face, an eccentric work engaging jaw pivotally mounted in each recess, said member having an end peripheral portion of reduced diameter communicating with said recesses, a ring journaled on said member and having an internal gear portion riding in said reduced diameter portion, said jaws having toothed portions meshing with said gear, an end plate covering said recesses and retaining said ring on said member and spring means tending to hold said ring in jaw closed position including an element for holding said spring means inoperative when said ring is in position to hold said jaws fully retracted.

3. A work driving fixture comprising an annular member, work engaging jaws pivoted to said member and having work engaging faces eccentric to their pivots, a rockable element operatively engageable with said jaws to move them simultaneously to work gripping or retracted angular positions, and spring means including an element for rendering said spring means operative only when said jaws are out of fully retracted angular positions tending to move them in directions to grip work extending through said angular member.

4. A work driving fixture comprising a member having an opening for receiving work, work engaging jaws pivoted to said member at points spaced around said opening, said jaws having work gripping faces arranged eccentric to their pivotal axes, an element rockably carried by said member and in operative engagement with said jaws to move them simultaneously to grip or release the work, said element having a face concentric with its axis and a shoulder, a lever pivoted to said member adjacent to said element and having an arm riding on said face when said element is in position to hold said jaws in fully released positions and in other angular positions of said element engageable with said shoulder, and a spring for holding said arm against said element to press said element toward jaw work engaging positions when said arm engages said shoulder and ineffective to rock said element when said arm rides on said face.

5. A work driving fixture comprising an

annular member having recesses in one face and a peripheral end portion of reduced diameter with which said recesses communicate, work engaging jaws pivotally mounted in said recesses and having eccentric faces for engagement with work extending through said member, a ring surrounding said member and having an internal gear portion riding in said peripheral portion, said jaws having teeth meshing with the teeth of said gear, said member having a cut away portion in the face opposite to said recessed face, said ring having a slot therein at said cut away portion, a lever pivoted in said cut away portion and having an arm riding on the inner face of said ring when said ring is in the angular position where said jaw faces are fully retracted and engageable with one end of said slot when said ring is in position for said jaw faces to be out of fully retracted positions, and a spring acting on said lever to cause said lever to press on said edge to close said jaws when said ring is out of jaw retracted position.

In testimony whereof I have affixed my signature.

JOHN E. LOVELY.