July 12, 1927. 1,635,285

J. E. LOVELY

TAPER TURNING ATTACHMENT

Filed Oct. 16, 1922 5 Sheets-Sheet 1

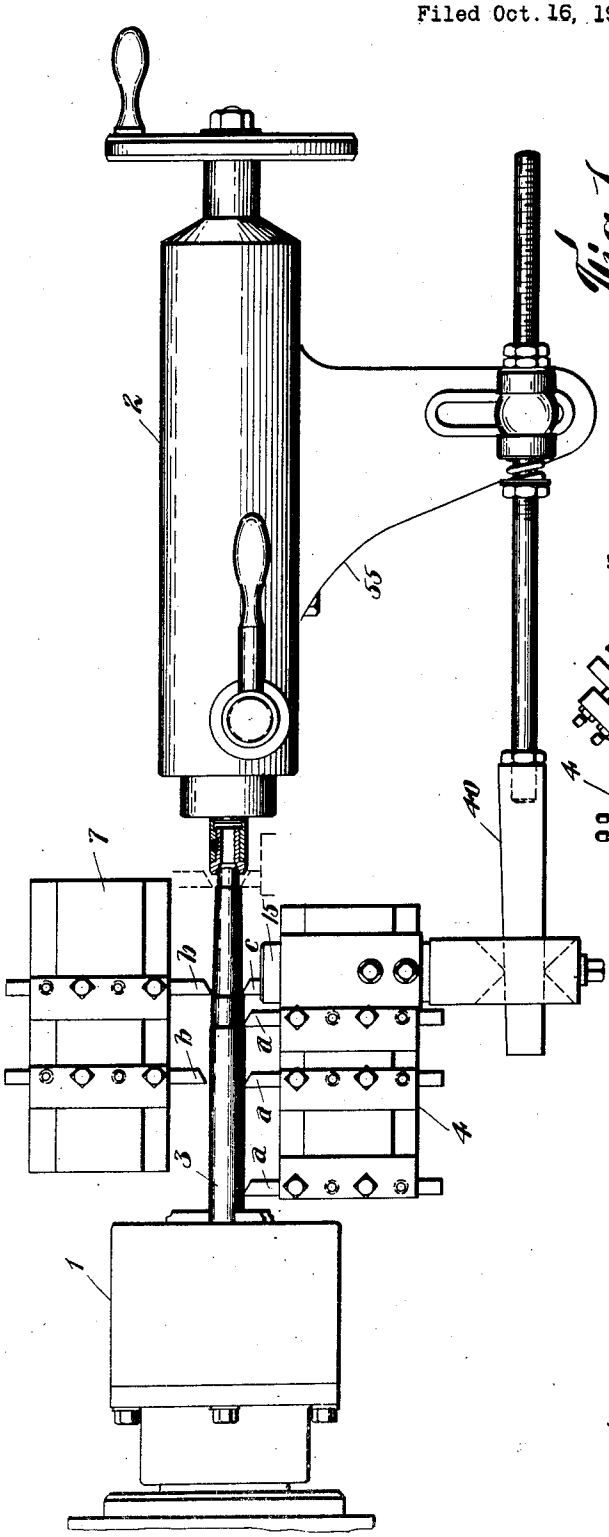


Fig. 1.

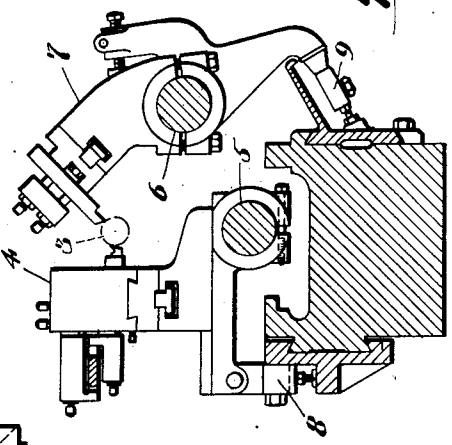


Fig. 5.

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TAPER TURNING ATTACHMENT

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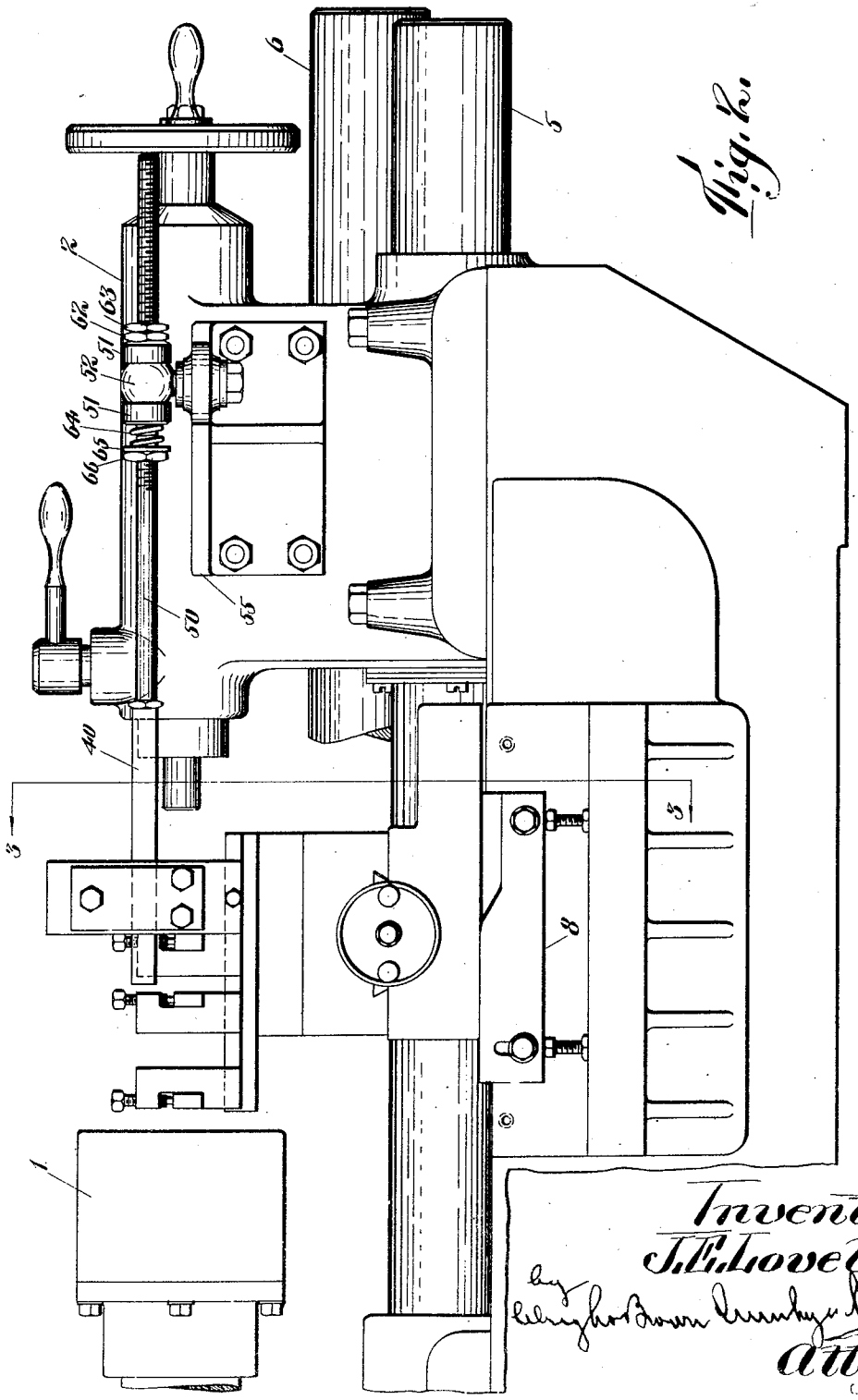


Fig. 2.

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TAPER TURNING ATTACHMENT

Filed Oct. 16, 1922 5 Sheets-Sheet 3

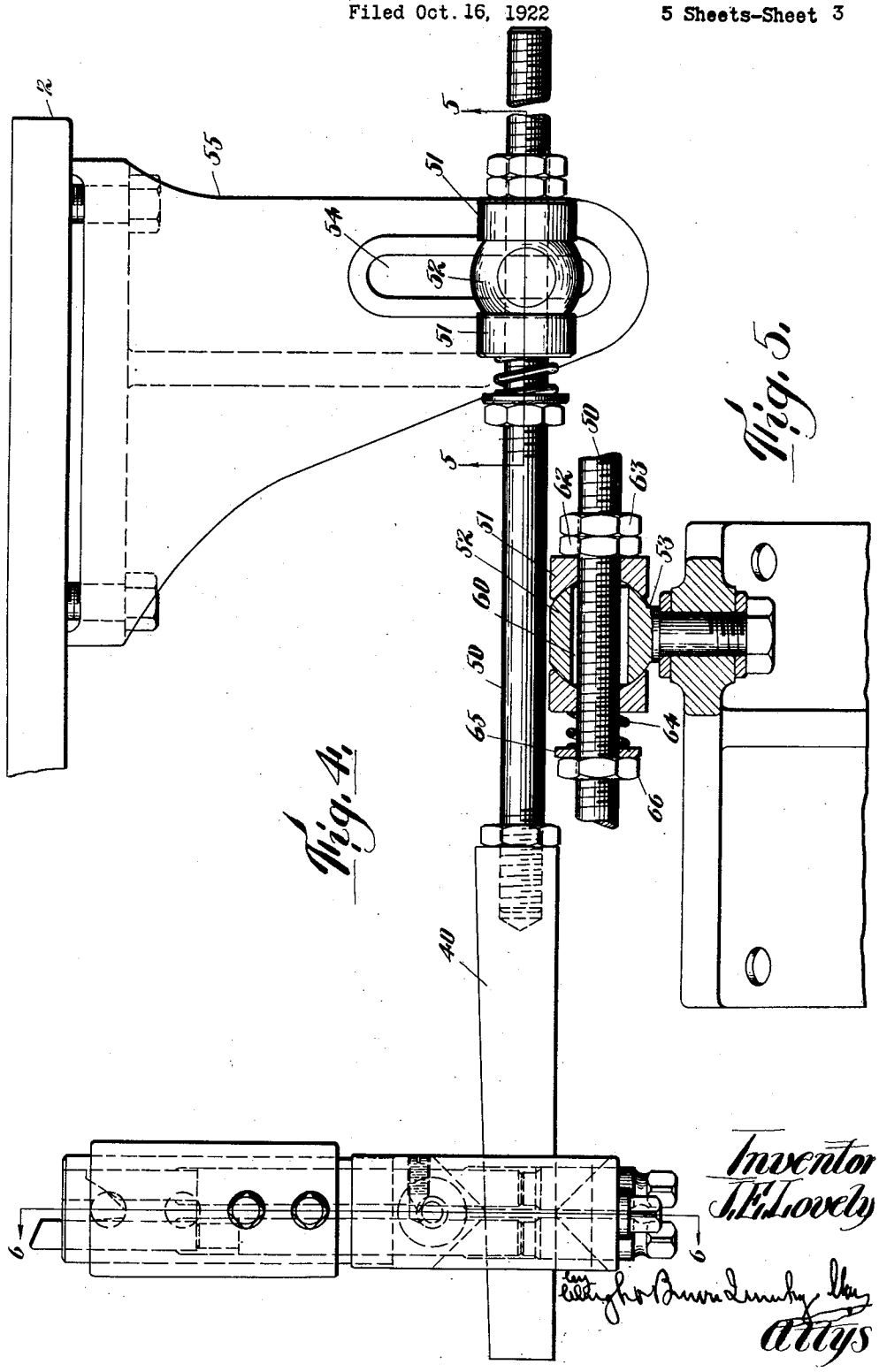


Fig. 4.

Fig. 5.

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TAPER TURNING ATTACHMENT

Filed Oct. 16, 1922 5 Sheets-Sheet 4

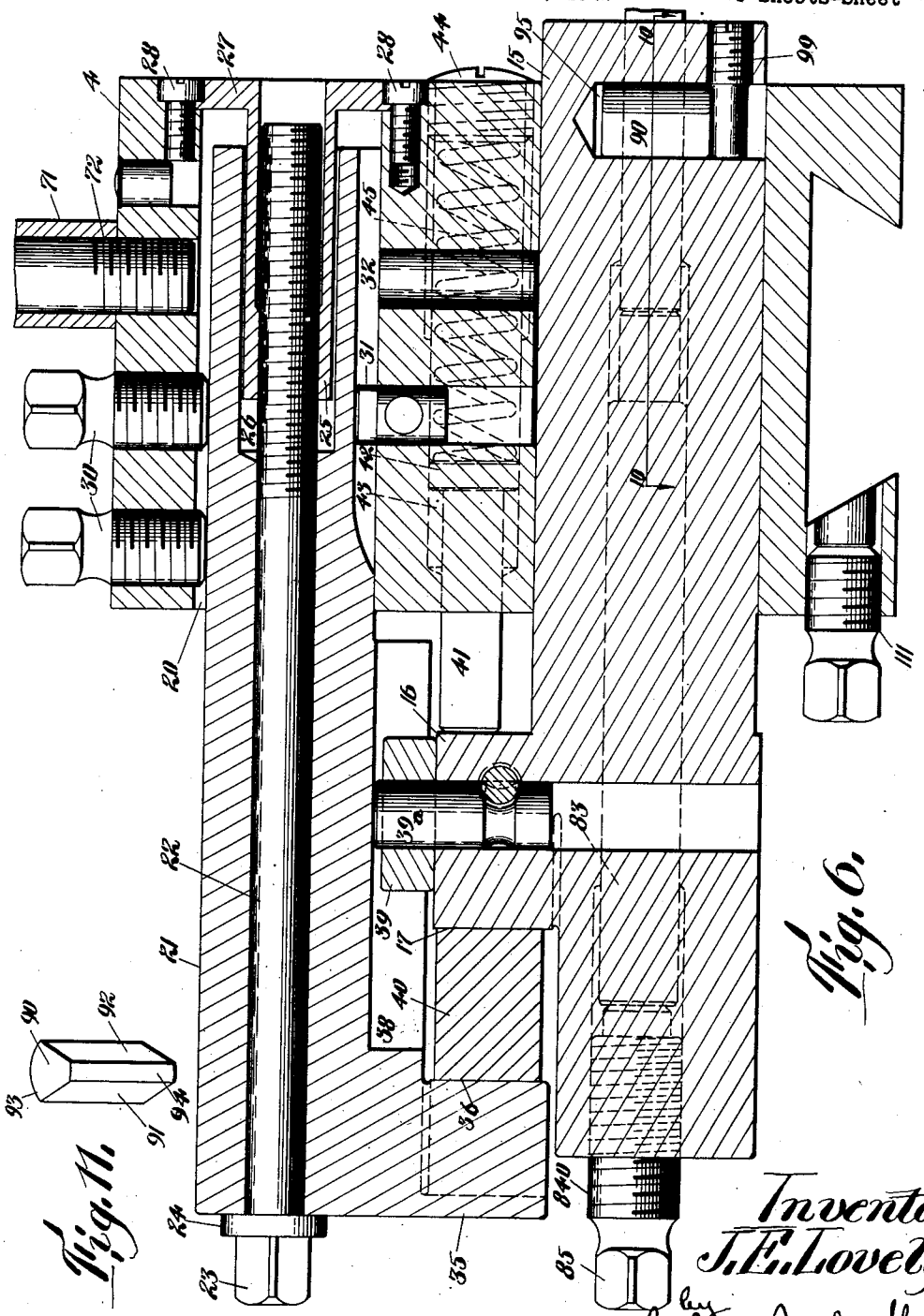


Fig. 6.

Fig. 11.

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July 12, 1927. 1,635,285

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TAPER TURNING ATTACHMENT

Filed Oct. 16, 1922 5 Sheets-Sheet 5

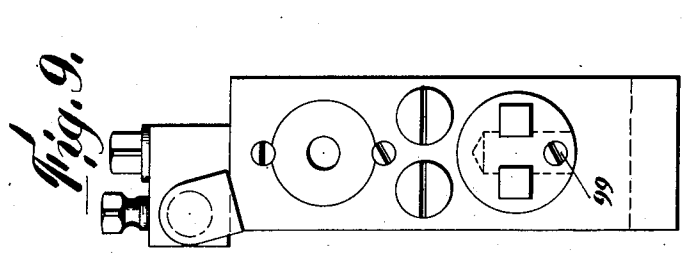


Fig. 9.

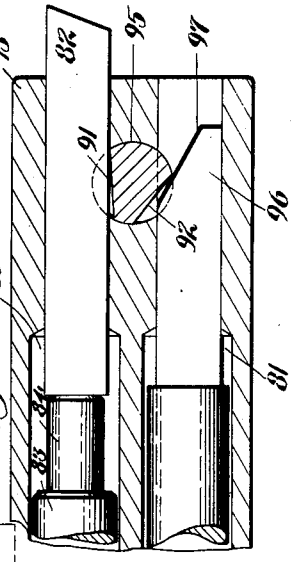


Fig. 10.

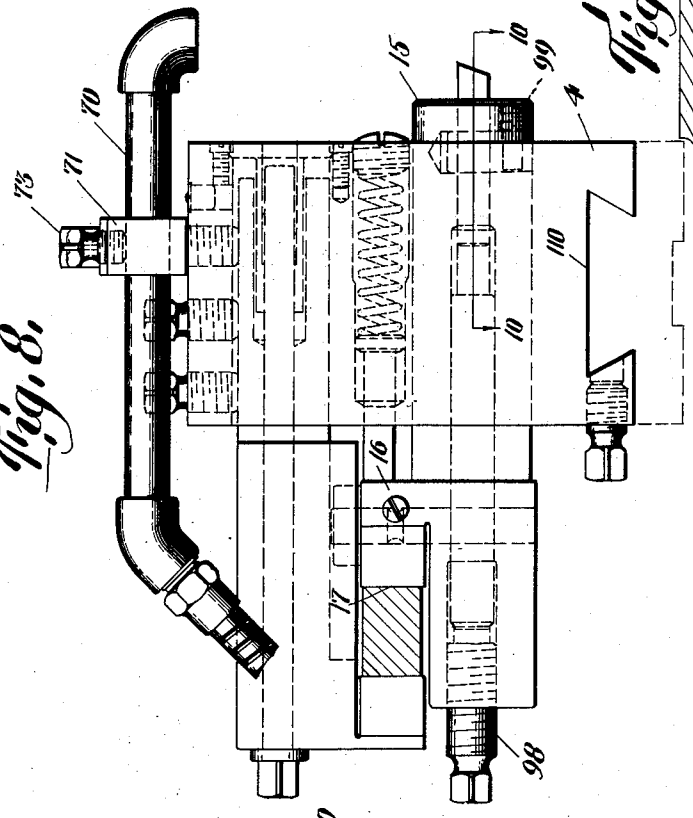


Fig. 8.

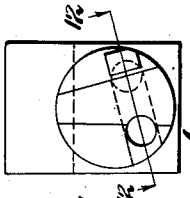


Fig. 13.

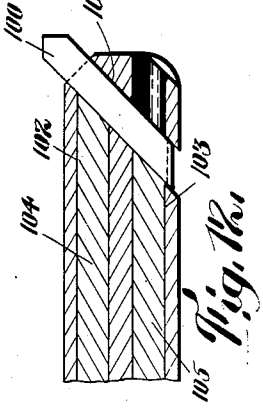


Fig. 12.

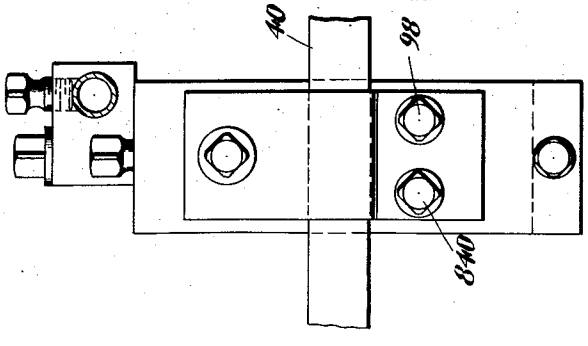


Fig. 7.

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Patented July 12, 1927. 1,635,285

UNITED STATES PATENT OFFICE.

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

TAPER-TURNING ATTACHMENT.

Application filed October 16, 1922. Serial No. 594,910.

This invention relates to taper turning attachments having been particularly designed for application to the well known Fay lathe.

In this type of lathe the tool carriage is fixed to a rockable and axially movable bar, the axial motion of the bar being effected by a rotary cam and the rocking motion being effected by a straight cam in operative contact with which the tool carrier moves during the axial movement of the bar. The axial movement of the bar causes the traverse of the tools across the work while the rocking motion effects their feed and withdrawal therefrom.

According to the present invention a tool is carried with capability of in and out movement on the tool carriage toward and from the work, and a cam bar effects and controls this motion as the carriage bar is moved axially. While the usual tool carriage of the Fay lathe may be so controlled that the tool or tools fixed thereto may cut a taper, this present construction permits the tool, movably mounted on the tool carriage, to be controlled additionally so that it may cut a straight cut or a different taper than the tools fixed to the tool carriage and simultaneously therewith.

For a more complete understanding of this invention, reference may be had to the accompanying drawings illustrating a preferred embodiment thereof, in which:

Figure 1 is a fragmentary plan showing the attachment applied to the machine.

Figure 2 is a fragmentary front elevation of the same.

Figure 3 is a section on line 3—3 of Figure 2.

Figure 4 is a view similar to a portion of Figure 1, but to an enlarged scale.

Figure 5 is a section on line 5—5 of Figure 4.

Figure 6 is a section on line 6—6 of Figure 4 to an enlarged scale.

Figure 7 is a front elevation of a movable tool carrier or plunger and related parts.

Figure 8 is a side elevation of the same.

Figure 9 is a rear elevation of the same.

Figure 10 is a fragmentary section on line 10—10 of Figure 8.

Figure 11 (sheet 4) is a detail in perspective of a locking block.

Figure 12 is a longitudinal cross section on line 12—12 of Figure 13 showing a modified construction of plunger tool mounting.

Figure 13 is an end elevation of the same.

Referring first to Figures 1, 2, and 3, 1 indicates the usual headstock on a Fay lathe and 2 the tailstock, the work being positioned therebetween in the usual manner at 3. At 4 is indicated a front tool carriage which is made fast in the usual manner to the actuating bar 5, which is arranged longitudinally of the machine and by axial motion of which the carriage 4 is moved parallel to the axis of the work and by rocking motion of which the tool carriage is moved toward and from the work. If desired there may also be provided a similar rocking and axially movable bar 6 carrying a rear tool carriage 7. The axial motion of the bars 5 and 6 is effected in any suitable manner as by means of the usual rotary cam at one end of the machine. The rocking motions of the carriages 4 and 7 may be effected by the straight cams or formers 8 and 9 on the upper edges of which the carriages ride. By suitably choosing the actuating cams for these bars 5 and 6, it is evident that either straight or tapered turning at various portions lengthwise of the work may be effected, as desired, by tools carried rigidly with these carriages, such tools being indicated for example as *a* on the front carriage and *b* on the rear carriage.

According to the present invention, however, an additional tool indicated at *c* is employed, this tool being so controlled as to make possible the turning of a different contour than any of the other tools fixed to the carriages. For this purpose, the tool *c* is carried at the inner end of a ram 15, which is mounted to slide in the carriage 4 at right angles to its direction of traverse. As shown, this ram is cylindrical and outwardly of the carriage 4 is provided with an upwardly-extending bearing member 16, the outer end of which terminates in an angle bearing portion or edge 17. Above the ram 15 and substantially parallel thereto is a perforation 20 through the carriage 4, within which is slidably mounted a bar 21. This bar 21 is axially perforated for the reception of a bolt 22 having a head 23 and a shoulder 24 bearing against its outer end face. The inner end of the rod 22 is threaded within a hollow sleeve 25 which passes within a counterbored portion 26 of the axial perforation.

The sleeve 25 terminates in a circular flange 27, which is seated within the outer end of the perforation 20 in a counterbored portion and is made fast to the carriage 4 by means of locking screws 28. By turning the head 23, it is therefore evident that the axial position of the bar 21 may be adjusted, turning of this head in one direction forcing the bar inwardly toward the flange 27, and turning it in the opposite direction permitting the bar to be pulled outwardly until stopped by the shoulder 24. It may be fixed in adjusted position by means such as the clamping screws shown at 30, which pass through threaded openings in the upper face of the carriage 4 and bear at their lower end against the bar 21. This bar is prevented from rotation relative to the carriage by means of a guide plug 31 projecting into the perforation 20 from beneath and into a keyway 32 in the bar 21.

Outwardly of the work carriage the bar 21 is extended downwardly, the outer end thereof forming a bearing member 35 having an angular face 36 presented opposite the face 17 of the bearing member 16 and in the same plane therewith. Above the bearing member 16 the bar 21 is provided with a slot 38, in which is adapted to ride a roller 39 journaled on a pin 39a fixed in the bearing member 16. By this means the plunger 15 is prevented from rotation but is permitted to move axially relative to the work carriage 4.

Between the bearing members 35 and 16 may be positioned a former bar 40, the mounting of which will be later described. The bearing member 16 is held against the inner face of this former bar, and for this purpose a pin 41 bears against the inner face of the bearing member 16 and has a head 42 slidably mounted in a socket 43 in the tool carriage above the ram 15. The inner end of this socket may be closed off by means of a threaded plug 44 and reacting between the inner face of this plug and the head 42 of the pin is a coil spring 45.

The former bar 40 above referred to, which is positioned between the bearing members 16 and 35, is so mounted as to cause the bearing members to ride therealong during the traversing motion of the tool carriage. As the tool carriage also has a rocking motion by the rocking of the bar 5, the former bar 40 must be allowed a certain freedom of motion in order to prevent cramping between it and the bearing members 16 and 35. As shown in Figures 1 and 4, the former bar therefore is fixed to a threaded rod 50 which carries thereon a pair of collars 51 having their opposed faces hollowed out to form substantially spherical concavities to receive between them a ball 52 forming the head of a bolt 53. This bolt is adjustably positioned within a slot 54 in the outer end of a bearing bracket 55, which is supported in a fixed position on the machine, as shown, this bracket being fixed to the tailstock 2. The substantially spherical head 52 is perforated at 60 for the reception of the rod 50, the perforation being considerably larger than the rod in order to permit sufficient universal relative motion between the head and the rod. One of the collars 51 bears against a nut 62 threaded on the rod 50 and a check nut 63 is provided to lock this nut in adjusted position. The other collar 51 has bearing on its outer face a spring 64 which reacts against a washer 65, against the outer face of which is positioned a nut 66 also threaded on the rod 50. This construction serves to take up wear between the collars 51 and the head 52 which provide a universal joint connection for the former bar 40 to a fixed point of the machine. The nuts 62 and 63 are positioned on the side of the head 52, away from which the work carriage is moved on its operative stroke so that the relative position of the former bar 40 and the tool ram may be held at the proper point, any wear between the parts being taken up by the movement of the opposite collar 51 as urged against the head by the spring 64. As illustrated, the operative direction of traverse of the tools is from right to left on Figures 1 and 4. The ends of the bearing members 16 and 35 are tapered as shown, in order to afford substantially line contacts on opposite faces of the former bar 40, which, in connection with the universal pivotal mounting of this bar, effectually avoids cramping of the parts.

A pipe, through which cooling fluid may be conducted to the various tools carried by the carriage 4, is indicated at 70, this pipe being preferably fixed to the tool carriage, as shown, this being accomplished by passing it through a guiding block 71 fixed by means of a stud 72 to the top of the carriage. A clamping plug 73 may be provided to fix the pipe in the proper position within the block.

In Figures 7, 9, and 10 is shown one method of mounting the tool in the ram 15, while Figures 12 and 13 show a modified mounting for this tool. Referring to Figures 7, 9, and 10, it is seen that the ram 15 is provided with a pair of holes 80 and 81 passing therethrough on either side of its longitudinal axis and parallel therewith. The inner ends of these holes 80 and 81 are preferably formed prismatic, as shown, both being square, this portion of the hole 80 being designed to receive a tool shown at 82. The rear end of this tool bears against the forward end of a rod 83, the forward portion of this rod being preferably reduced in diameter at 84 so that it may pass within the forward portion of the bore or hole 80. The rear end of this rod 83 (see Figure 6)

is engaged by the forward end of an adjusting plug 840 having a rectangular head 85, this plug being threaded in the outer end of the hole 80. By turning this plug, the amount to which the tool 82 projects from the inner end of the ram 15 may be adjusted. In order to lock the tool in adjusted position, a wedge-locking member shown detached in Figure 11 at 90 may be employed. This locking member is shown as provided with angularly-disposed side faces 91 and 92 terminating in cylindrical portions 93 and 94. This block may therefore be journaled within a circular perforation 95 between the perforations 80 and 81 which, however, are so near together that the more widely separated edges of the faces 91 and 92 project somewhat thereinto. By turning this block, either face may be pushed out of the corresponding hole 80 or 81 and the other face pushed into the other hole. The face 91 may therefore be forced into locking engagement with the tool by a locking rod 96 having a beveled end 97, the rod being slidable in the perforation 81 and the beveled end engaging the face 92 of the locking block. In order to move the rod 96 into locking position, a plug 98 (see Figure 8) is threaded in the rear end of the hole 81 and bears at its forward end against the rear end of the rod 96. The locking block is held in position by means of a pin 99 extending therebeneath and threaded into the end of the ram shown in Figures 6 and 9.

In Figures 12 and 13 is illustrated another form of tool mounting for the ram by which the cutting face of the tool may be brought closely adjacent the fixed tools in the tool carriage. According to this construction the tool 100 is mounted on an inclined perforation 101 and the ram is provided with a pair of longitudinal holes 102 and 103 positioned in a plane inclined to the horizontal and opening into the perforation 101. This inclination from the horizontal is in order to provide clearance for the tool, the tool being presented at the proper angle to the work for such clearance. Slidable within the holes 102 and 103 are a pair of rods 104, 105, each rod having a beveled end impinging on the side face of the tool 100. By forcing these rods against the tool, the latter is held in position by the ram. These rods may be forced into such position by plugs threaded in the rear ends of the holes 102 and 103 similar to the plugs 84 and 98 of the form shown in Figures 7 and 10.

If desired also the tool carriage may be adjustably related to the actuating bar 5, being connected thereto by a dovetail connection shown at 110 (Figures 4, 6, and 8) and being held in adjusted position by one or more threaded locking plugs 111 in the usual manner.

Having thus described certain embodiments of this invention, it should be evident that many changes and modifications might be made therein without departing from its spirit or scope as defined by the appended claims.

I claim:

1. A device of the class described, comprising a tool movable axially of and from and toward work, a second tool movable with said first tool axially of the work and from and toward the work independently of said first tool, and means for moving said tools toward and from the work as both tools move axially of the work.

2. A device of the class described comprising a tool having traversing and feeding movement relative to work, a second tool partaking of the traversing movement of said first tool and having feeding movement independently of said first tool, and means actuated by said traversing movement for effecting feed movement for both tools.

3. A device of the class described, comprising a traversing tool carriage, a bar carried thereby and axially adjustable thereon, a tool-carrying ram movable on said carriage toward and from the work, and a former bar engaged between said carriage bar and ram and traversed thereby as the carriage traverses for imparting feed movement to the tool carried by said ram.

4. A device of the class described, comprising a traversing tool carriage, a bar carried thereby and adjustable laterally of the direction of traverse, a tool-carrying ram movable on said carriage toward and from the work, a former bar engaged between said carriage bar and ram and traversed thereby as the carriage traverses, and a spring urging said ram against said former bar.

5. A device of the class described, comprising a tool carriage, a tool fixed to said carriage, means for imparting a relative traverse between said carriage and the work, means for imparting a relative in and out movement of the carriage and work during such traverse, a tool-holding ram movable on said carriage toward and from the work, and means for imparting such movement to said ram during the traverse of said carriage.

6. A device of the class described, comprising a tool carriage mounted for traversing an in and out movement relative to work, a tool fixed on to said carriage, a ram movable on said carriage toward and from the work and traversed relative to the work by the traverse of said carriage, a tool carried by said ram, and means for controlling the in and out position of said carriage and for moving said ram relatively to said carriage as the carriage traverses.

7. A device of the class described, comprising an axially movable and rockable

bar, a tool carriage fixed to said bar to be traversed relative to work by the axial movement of said bar and to be moved toward and from the work by the rocking of said bar, a tool fixed to said carriage, a ram slidably carried by said carriage and movable toward and from the work, a tool carried by said ram, and a former bar engaged by said ram and controlling its position on said carriage as said carriage is traversed.

8. A device of the class described, comprising an axially movable and rockable bar, a tool carriage fixed to said bar to be traversed relative to work by the axial movement of said bar and to be moved toward and from the work by the rocking of said bar, a tool fixed to said carriage, a ram slidably carried by said carriage and movable toward and from the work, a tool carried by said ram, and a former bar engaged by said ram and controlling its position on said carriage as said carriage is traversed, said former bar being so mounted as to permit the rocking of said carriage without causing binding between it and said ram.

9. A device of the class described, comprising an axially movable and rockable bar, a tool carriage fixed to said bar to be traversed relative to work by the axial movement of said bar and to be moved toward and from the work by the rocking of said bar, a tool fixed to said carriage, a ram slidably carried by said carriage and movable toward and from the work, a tool carried by said ram, and a former bar engaged by said ram and controlling its position on said carriage as said carriage is traversed, said former bar having a universal pivotal connection to a fixed point to permit the rocking of said carriage without causing binding between it and said ram.

10. A device of the class described, comprising an axially movable and rockable bar, a tool carriage fixed to said bar to be traversed relative to work by the axial movement of said bar and to be moved toward and from the work by the rocking of said bar, a tool fixed to said carriage, a ram slidable transversely of said carriage toward and from the work, a tool carried by said ram, a former bar against which the outer end of said ram bears and along which it rides as the carriage is traversed, a spring urging said ram against said bar, and a member carried by said carriage and bearing against the opposite face of said former bar.

11. A device of the class described, comprising an axially movable and rockable bar, a tool carriage fixed to said bar to be traversed relative to work by the axial movement of said bar and to be moved toward and from the work by the rocking of said bar, a tool fixed to said carriage, a ram slidable transversely of said carriage toward and from the work, a tool carried by said ram, a former bar against which the outer end of said ram bears and along which it rides as the carriage is traversed, a spring urging said ram against said bar, and a member carried by said carriage and bearing against the opposite face of said former bar, said former bar having a universal pivotal connection with a fixed point and the contact therewith of said ram and member being substantially linear whereby to prevent cramping between said former bar, ram, and member due to rocking of said carriage.

12. In a device of the class described, a tool carriage, a ram slidable axially in said carriage, a tool fixed in one end of said ram, a bearing member adjacent the other end of said plunger, a bar adjustably fixed to said carriage and having a bearing member, a former bar interposed between said bearing members, and a spring pin reacting against the opposite side of said ram-bearing member to hold said member in contact with said former bar.

13. In a device of the class described, a tool carriage, a ram slidable axially in said carriage, a tool fixed in one end of said ram, a bearing member adjacent the other end of said plunger, a bar adjustably fixed to said carriage and having a bearing member, a former bar interposed between said bearing members, a spring pin reacting against the opposite side of said ram-bearing member to hold said member in contact with said former bar, and interengaging guiding members carried by said plunger and carriage bar preventing relative rotation thereof.

14. A device of the class described, comprising a tool carriage, a cylindrical ram slidable in said carriage toward and from the work, a roll carried by said ram at one side of its axis, a guide in which said roll rides to prevent axial turning of said ram, and a former bar against which the rear end of said plunger rides.

15. In a device of the class described, a tool-carrying ram having a pair of holes therethrough parallel to its axis, one end portion of one of said holes being shaped to receive a tool, an abutment rod longitudinally adjustable in the remaining portion of said hole and against which the rear end of said tool may bear, a locking member for said tool projectable into engagement therewith through the side wall of said hole and a lock-actuating rod adjustably positioned in the other of said holes and operable to actuate said member.

16. In a device of the class described, a tool-carrying ram having a pair of holes therethrough parallel to its axis, one end portion of one of said holes being shaped to receive a tool, an abutment rod longitudinally adjustable in the remaining portion of said hole and against which the rear end of said tool may bear, a locking member for

said tool projectable into engagement therewith through the side wall of said hole, a lock-actuating rod adjustably positioned in the other of said holes and operable to actuate said member, and means accessible at the other end of said ram for adjusting said abutment and lock-actuating rods.

17. In a device of the class described, a tool-carrying ram having a pair of holes therethrough parallel to its axis, one end portion of one of said holes being shaped to receive a tool, an abutment rod in said hole against one end of which said tool may bear and adjustable longitudinally of said hole at the other end of said ram, a rotary plug having angularly-disposed faces mounted adjacent the tool-carrying portion of said hole, one of said faces being projected into locking engagement with said tool by rotation of said plug and the other face projecting into the other of said holes, a lock-actuating rod slidable in said other hole and having a beveled end riding on the other of said faces, and a threaded plug in said other hole at the other end of said ram engaging the other end of said lock-actuating rod.

18. A device of the class described comprising a traversing tool carriage, a tool holding ram movable on said carriage at an angle to the direction of traverse, an abutment adjustably fixed to said carriage, and a former bar between said abutment and ram for controlling the position of said ram as said carriage traverses.

In testimony whereof I have affixed my signature.

JOHN E. LOVELY.