Oct. 5, 1954 M. F. RICE 2,690,608

UNDERCUTTING ATTACHMENT FOR LATHES

Filed Jan. 5, 1954 3 Sheets-Sheet 1

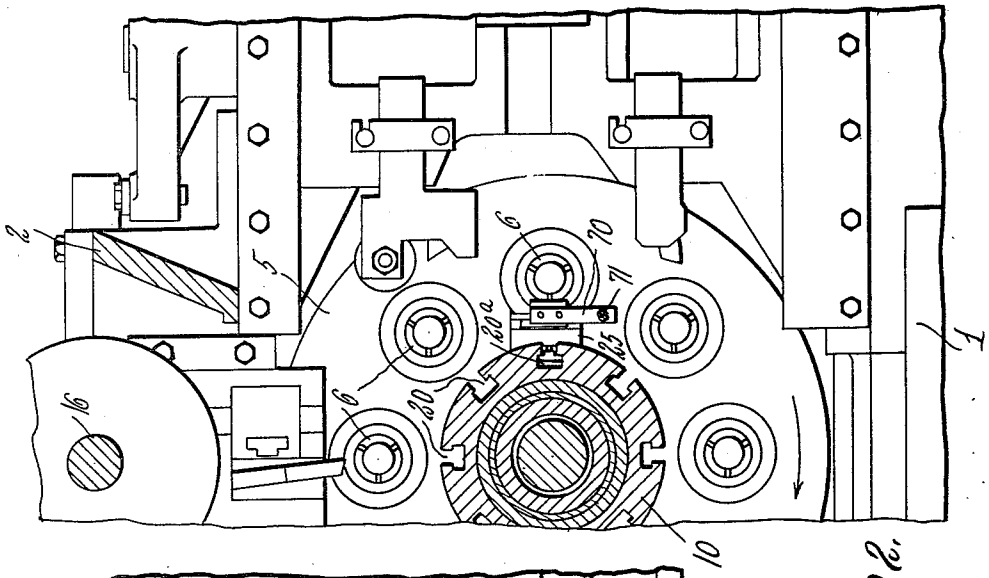


Fig. 2.

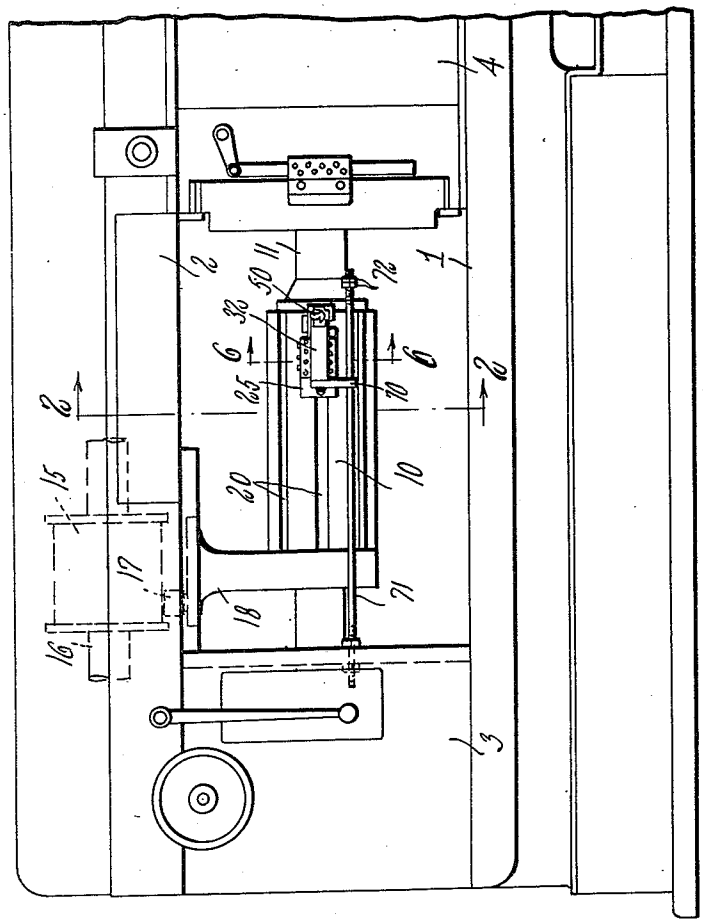


Fig. 1.

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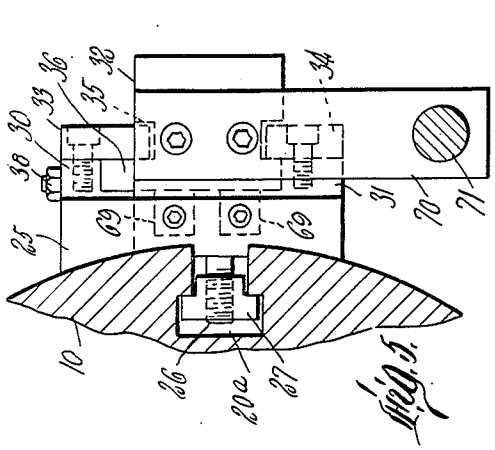


Fig. 5.

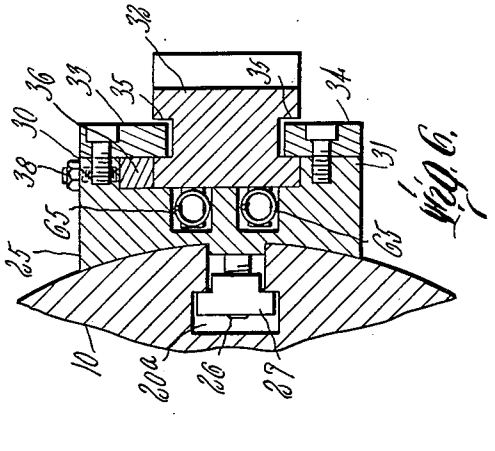


Fig. 6.

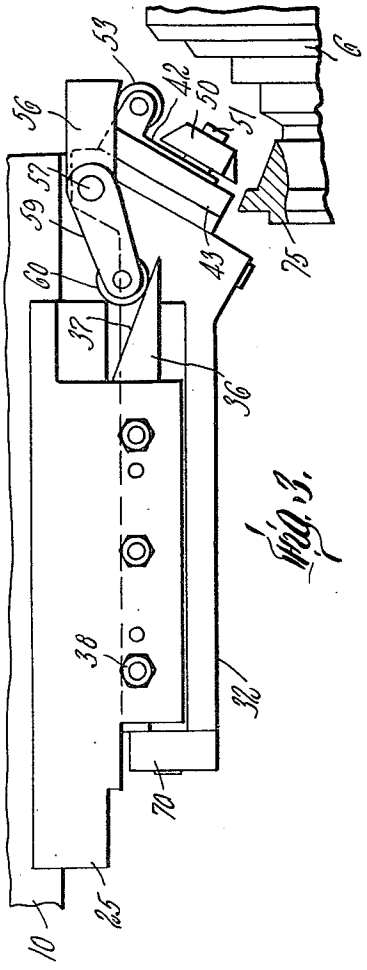


Fig. 3.

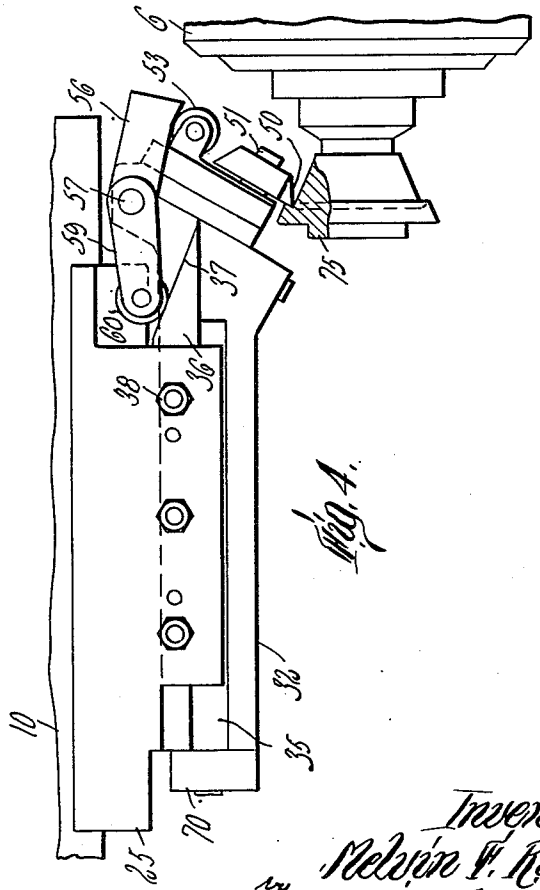


Fig. 4.

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UNDERCUTTING ATTACHMENT FOR LATHES

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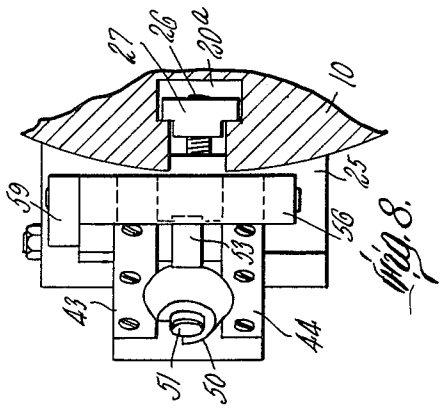


Fig. 8.

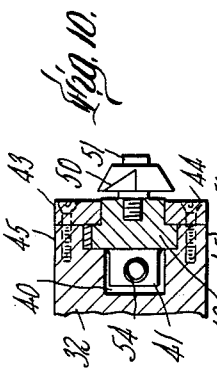


Fig. 10.

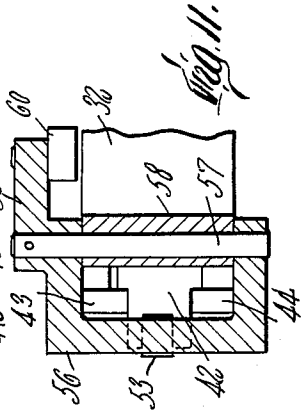


Fig. 11.

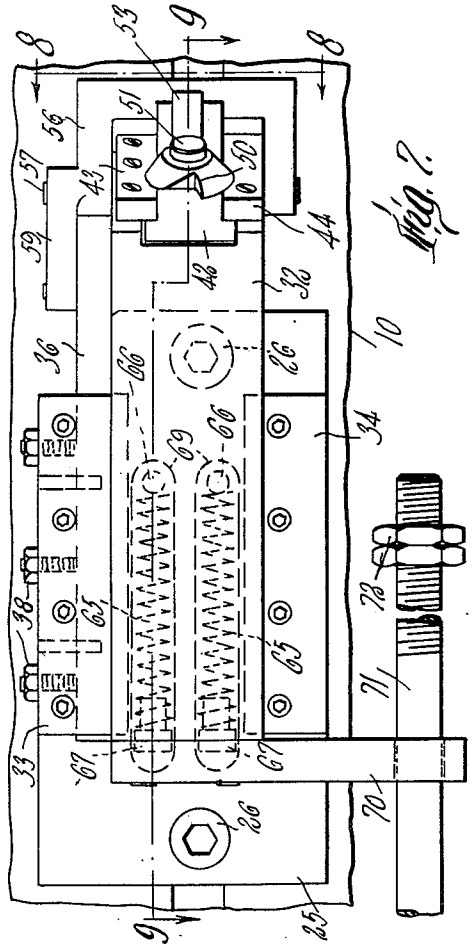


Fig. 7.

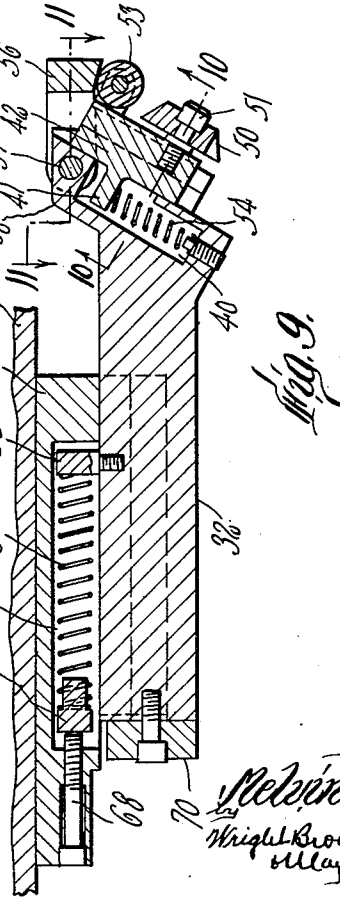


Fig. 9.

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2,690,608

UNDERCUTTING ATTACHMENT FOR LATHES

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Application January 5, 1954, Serial No. 402,328

3 Claims. (Cl. 29—57)

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This invention relates to mechanisms for producing an undercut on work carried by lathes and more particularly to an attachment for lathes for performing this operation, and it has for an object to provide such an attachment which is operated entirely by motion of a tool carriage which moves substantially parallel to the axis of the rotary work-carrying spindle. Such an attachment is applicable to a multiple spindle lathe or screw machine and is illustrated herein as applied to such a machine of the general type shown in the United States Letters Patent to Miller No. 2,130,809 granted September 20, 1938, for Multiple Spindle Automatic Lathe.

Referring to the drawings,

Figure 1 is a fragmentary rear elevation of a multiple spindle lathe embodying the invention.

Figure 2 is a detail sectional view to a larger scale on line 2—2 of Figure 1.

Figure 3 is a fragmentary top plan view of the attachment and related parts, the undercutting tool being shown retracted.

Figure 4 is a view similar to Figure 3, but showing the tool in cutting position.

Figure 5 is a view similar to a portion of Figure 2, but to a larger scale.

Figure 6 is a detail sectional view to a larger scale on line 6—6 of Figure 1.

Figure 7 is a view similar to a portion of Figure 1 but to a larger scale.

Figures 8 and 9 are detail sectional views on lines 8—8 and 9—9, respectively, of Figure 7.

Figures 10 and 11 are detail sectional views on lines 10—10 and 11—11, respectively, of Figure 9.

Referring first to Figures 1 and 2, there is illustrated a multiple spindle lathe having a lower bed 1 and an upper bed 2 spaced by end columns 3 and 4. An indexing drum 5 is mounted between the upper and lower beds 1 and 2 and within the column 4, this drum 5 carrying a plurality of rotary work carrying spindles 6 arranged in parallel circular array about its central axis.

The drum is indexed by any suitable means well known in the art to bring the several spindles successively into the same tooling station. As shown there are eight spindles and the undercutting action is effected at station #7, though it might be done at any other desired station. These stations are numbered, beginning at the bottom as shown in Figure 2 and progressing clockwise, so that station 7 is in horizontal alinement with the central axis of the drum 5.

A tool carriage 10 is arranged for sliding motion on a central shaft 11 which is coaxial with

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the drum 5. This carriage 10 is movable axially toward and from the drum 5, and as shown this is accomplished by suitable cams (not shown) on a cam drum 15 mounted on a cam shaft 16 journaled in the upper bed 2 and in parallel relation to the indexing drum 5 and the shaft 11. Thus as shown in Figure 1, the cams on the cam drum 15 act upon a follower 17 extending upwardly from a slide 18 fixed to the outer end of the carriage 10. This carriage 10 may be provided with longitudinally extending T slots 20, as shown in Figure 2, for the attachment of suitable end working tools which may operate at various index stations by reason of the axial motion of the carriage 10. At one of these slots 20, there is secured the attachment by which the undercutting is effected in accordance with this invention. The particular slot employed, as shown herein, is the slot 20a opposite to index station 7. It is understood that various other cams may be carried by the cam shaft 16 by which other operations and controls of the machine may be effected, these, however, being immaterial to the subject matter of the present invention.

The attachment, as shown best in Figures 3 to 11, comprises a block 25 having an inner face concaved to fit the outer face of the carriage 10 and having suitable means by which it may be clamped to the carriage 10 as through bolts 26 having T headed nuts 27 thereon which engage in the slot 20a. The block 25, as shown best in Figure 6, has a pair of spaced outwardly extending side walls 30 and 31 forming between them a guideway for a holder slide 32. Retaining strips 33 and 34 are secured to these walls 30 and 31 and extend into opposed side grooves 35 of the slide 32. The retaining strip 33 also fixes adjustably to the block 25, a bar 36 which is provided at the end nearest to the drum 5 with a cam face 37 as shown best in Figures 3 and 4. The bar 36 may have bearing thereon adjusting studs 38 by which the axial position of the bar 36 with reference to the block 25 may be adjustably fixed.

The slide 32 is provided at one end with a way 40 (see Figure 9) inclined to the length of the slide 32 so as to have a component transverse to the axis of the work carrying spindle at station 7 and a component lengthwise of this axis. This way 40 receives a lug 41 extending inwardly from a second holder or slide 42 which is mounted to move lengthwise of the way 40 and is held in position by retaining strips 43 and 44. This holder 42 may carry an undercutting tool 50 secured thereto as by a stud 51 threaded into

the holder 42, and the outer end of this holder 42 carries a cam follower roll 53. A spring 54 seated in the way 40 bears between the closed outer end of the way and the lug 41 and normally presses the holder 42 with its follower roll 53 against one end portion of a lever 56. This lever 56 has a looped portion as shown in Figure 11 against which the follower roll 53 bears, and it is secured to a pivot pin 57 extending through a bearing 58 formed in an extension from the holder 32. This lever 56 has an arm 59 provided with a cam follower 60 which may bear against the cam face 37 of the bar 36.

The holder 32 may move relative to the block 25, but is normally held to move therewith by a pair of springs 65 (see Figure 9) each engaging a stop 66 secured to the holder 32 and reacting between the stop 66 and an abutment 67 adjustable axially by the adjustment of a screw 68. Each of these springs 65 is housed within a longitudinal passage 69 in the block 25 as shown best in Figure 6.

The holder 32 has fixed to its outer end a bar 70 which extends outwardly and slidably receives therethrough a stop rod 71 having a pair of check nuts 72 threaded on its inner end. This stop rod 71 is fixed to a stationary wall of the machine as at the column 3 as shown in Figure 1.

In operation, as the carriage 10 is moved toward the work piece it carries with it the block 25 and the holder 32 until such time as the motion of the holder 32 is stopped by reason of the engagement of the check nuts 72 on the bar 70. Further inward motion of the carriage 10 after the stopping of the motion of the holder 32 therewith acts to project the cam face 37 into engagement with the lever 56 at the cam follower 60, and rocks this lever in a direction to move the tool-carrying holder 42 inwardly and backwardly, bringing the tool 50 against the inner face of the work piece 75 from the position shown in Figure 3 to that shown in Figure 4, so that the tool 50 produces the desired undercut in the work piece.

On retraction of the carriage 10 thereafter, the spring 54 acts to withdraw the tool from contact with the work piece to its position of Figure 3, whereupon further retraction of the carriage permits the springs 65 to return the holder 32 to its normal relation to the cam face 37 shown in Figure 3, whereupon further retracting motion of the carriage 10 removes the tool from the work piece axially to the position shown in Figure 1 so that the spindles may be indexed to bring a succeeding work piece into station 7, while that containing the undercut work piece is moved to the succeeding station 8.

From the foregoing description of an embodiment of this invention it should be evident to those skilled in the art that various changes and modifications may be made therein without departing from its spirit or scope.

I claim:

1. In combination with a lathe having a rotary work carrying spindle and a tool carriage movable substantially lengthwise of said spindle, of a main holder carried by said carriage and movable relative thereto substantially axially of said

spindle, a second holder mounted on said first holder for motion relative thereto in a direction having components parallel and transverse to the axis of said spindle, a lever pivoted to said main holder and having a portion engageable with said second holder to move said second holder as said lever is swung, means for stopping the motion of said first holder with said tool carriage at a predetermined point, a cam fixed to said tool carriage and engageable with said lever for moving said lever by continued motion of said carriage after motion of said holder with said carriage has been stopped, and a tool carried by said second holder for operating on work held by said spindle during the continued motion of said tool.

2. An undercutting attachment for a lathe having a rotary work carrying spindle and a carriage movable substantially lengthwise of said spindle, which attachment comprises a main holder carried by said carriage and mounted for sliding motion relative to said carriage substantially lengthwise of said spindle, a second holder movably carried by said main holder in directions having a component transverse to said axis and a component lengthwise of said axis, a tool carried by said second holder, a cam fixed to said tool carriage, means limiting the motion of said main holder with said tool carriage at a predetermined position of said tool carriage, and operative connections to said second holder actuated by said cam on continued motion of said tool carriage after the motion of said main holder has been stopped for moving said second holder in a manner to cause said tool to undercut a work piece carried by said spindle.

3. An undercutting attachment for a lathe having a rotary work carrying spindle and a carriage movable substantially lengthwise of said spindle, which attachment comprises a main holder carried by said carriage and mounted for sliding motion relative to said carriage substantially lengthwise of said spindle, a second holder movably carried by said main holder in directions having a component transverse to said axis and a component lengthwise of said axis, a tool carried by said second holder, a cam fixed to said tool carriage, means limiting the motion of said main holder with said tool carriage at a predetermined position of said tool carriage, and operative connections to said second holder actuated by said cam on continued motion of said tool carriage after the motion of said main holder has been stopped for moving said second holder in a manner to cause said tool to undercut a work piece carried by said spindle, said operative connections including a lever pivoted to said main holder having a follower engaged by said cam and operatively engaging said second holder.

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