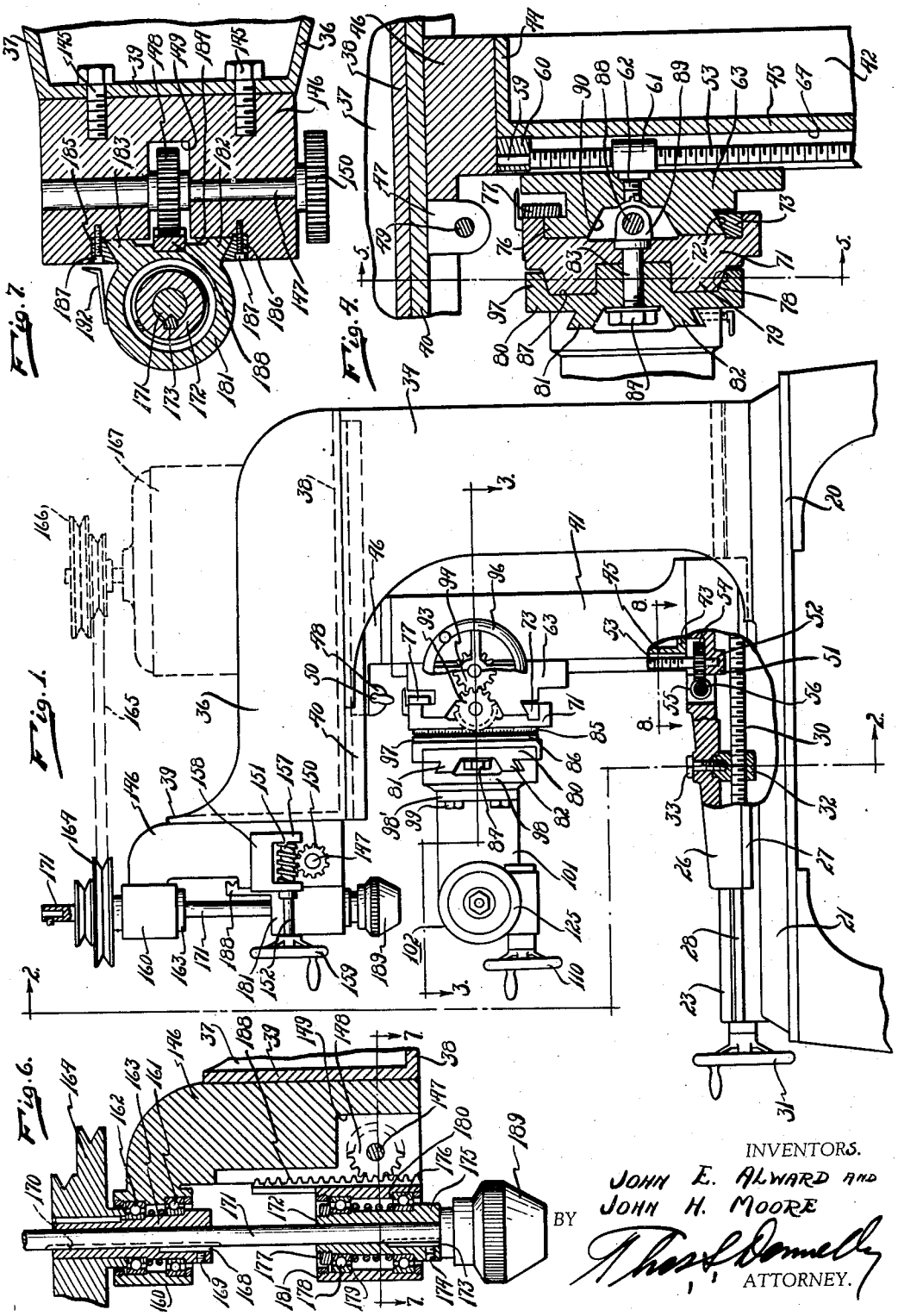
May 24, 1938. J. E. ALWARD ET AL 2,118,063

ROUTERING MACHINE

Filed Aug. 15, 1935 3 Sheets-Sheet 1



INVENTORS.
JOHN E. ALWARD AND
JOHN H. MOORE
BY
ATTORNEY.

May 24, 1938. J. E. ALWARD ET AL 2,118,063

ROUTERING MACHINE

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Fig. 3.

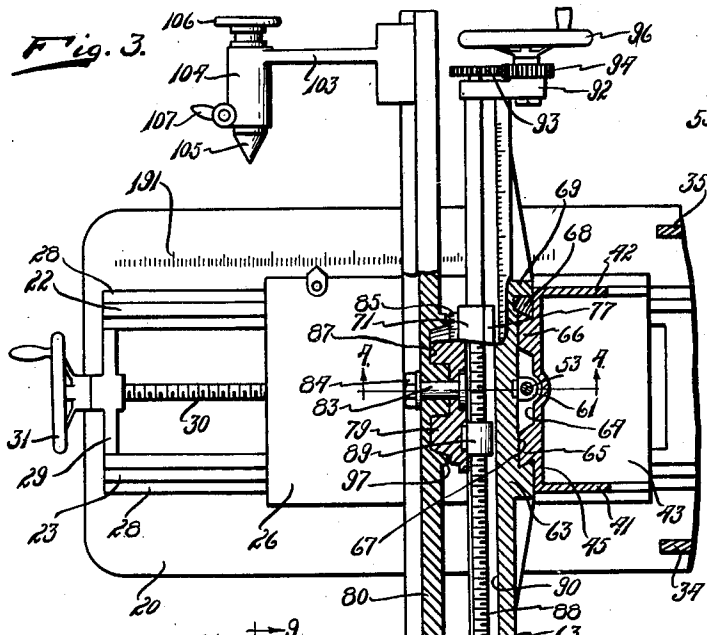


Fig. 8.

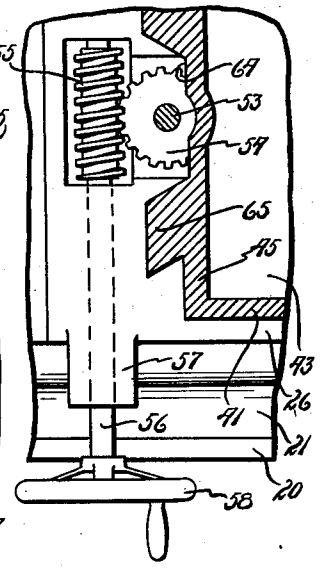


Fig. 9.

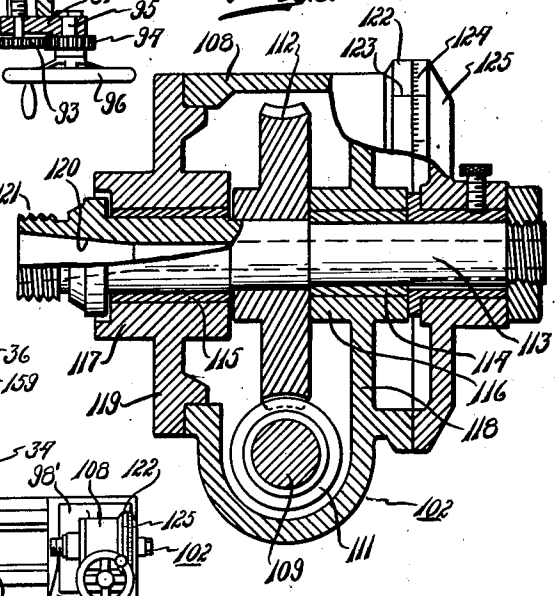
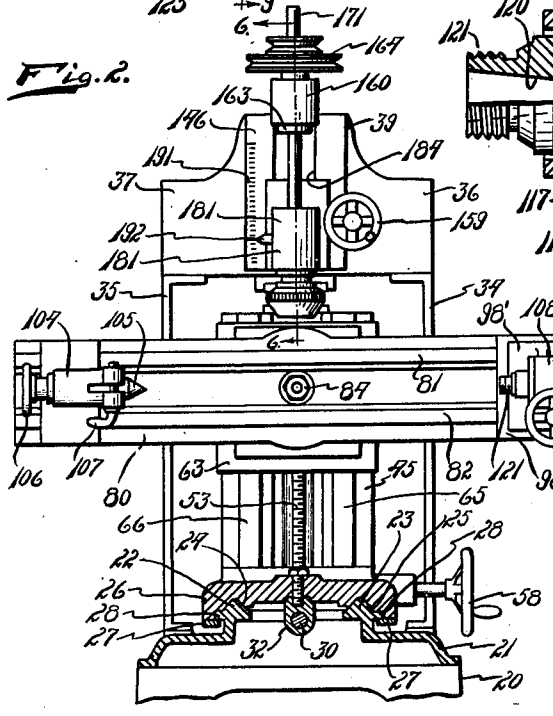


Fig. 2.



INVENTORS.
JOHN E. ALWARD AND
JOHN H. MOORE
BY
Thos. J. Donnelly
ATTORNEY.

May 24, 1938. J. E. ALWARD ET AL 2,118,063

ROUTERING MACHINE

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Fig. 5.

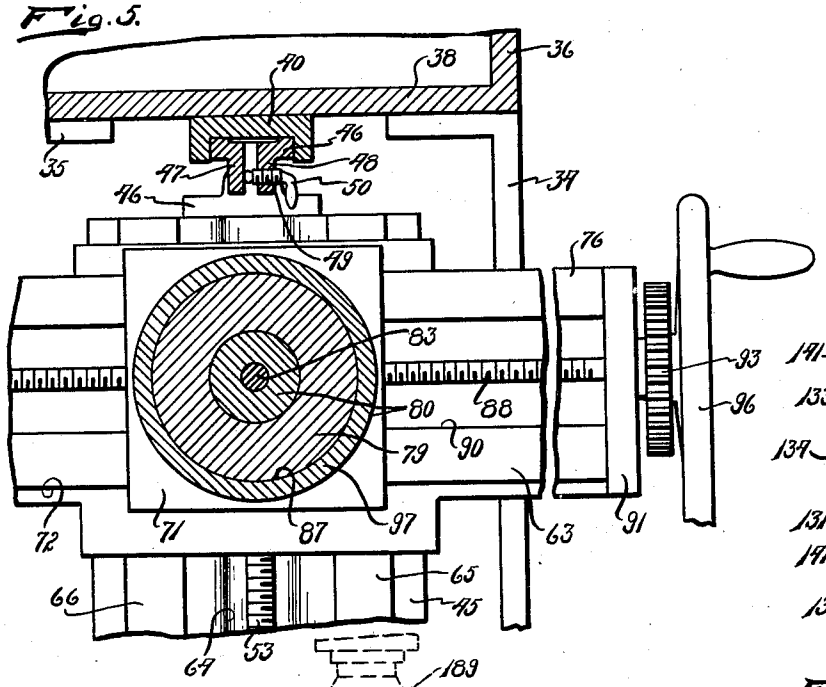


Fig. 12.

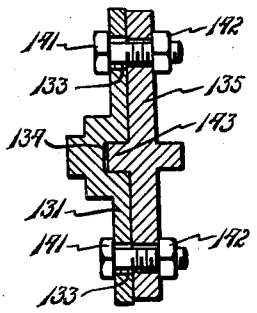


Fig. 10.

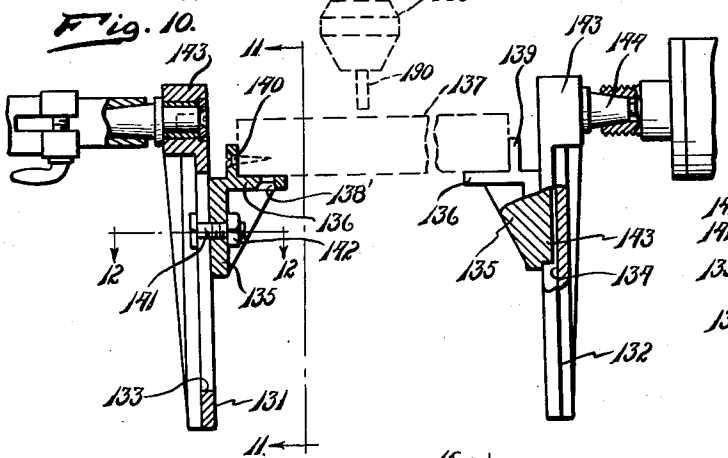


Fig. 11.

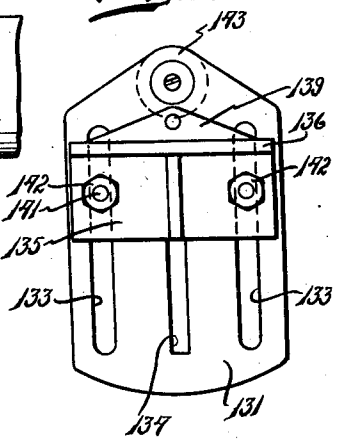


Fig. 14.

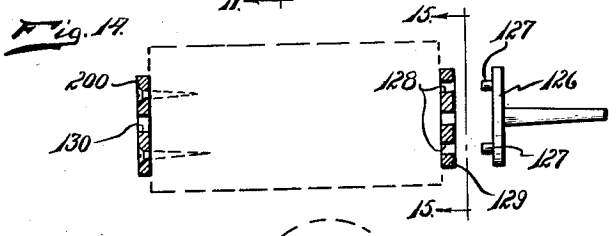


Fig. 13.

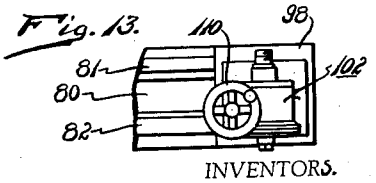
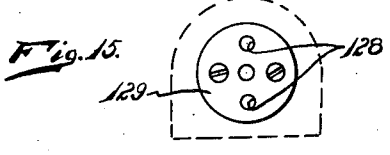


Fig. 15.



INVENTORS.
JOHN E. ALWARD AND
JOHN H. MOORE
BY
ATTORNEY.

Patented May 24, 1938

2,118,063

UNITED STATES PATENT OFFICE

2,118,063

ROUTERING MACHINE

John E. Alward and John H. Moore, Detroit, Mich.

Application August 15, 1935, Serial No. 36,304

9 Claims. (Cl. 144—134)

Our invention relates to a new and useful improvement in a routering machine. While this term "routering machine" is especially applicable to machines intended for operating on wood for the primary purpose of making patterns, the name has been used for the lack of a better term, as the invention relates to a machine which may be used for operating upon wood and metal with equally satisfactory results.

It is an object of the present invention to provide a machine in which speed and accuracy may be obtained in the fabrication or forming of a work-piece to pre-determined sizes, shapes and formations.

Another object of the invention is the provision of a machine of this class so constructed and arranged that the parts which hold the work-piece may be moved in various directions, horizontally and vertically, and tilted to various angles so that the work-tool may be brought into operation upon the work-piece with a resultant of variation so as to effect the formation of the various shapes desired.

Another object of the invention is the provision of a work-tool adapted for rotating on its axis and so positioned relatively to the work-piece holder, that the work-piece may be moved into various positions relatively thereto and brought into contact therewith at these various positions.

Another object of the invention is the provision of a method of forming a work-piece into various shapes and formations which consists in rotating the work-piece upon different axes which are extended therethrough, which is generally accomplished by mounting the work-piece on different centers for rotation during different periods of operation in the formation of the device.

Other objects will appear hereinafter.

The invention consists in the combination and arrangement of parts hereinafter described and claimed.

The invention will be best understood by a reference to the accompanying drawings, which form a part of this specification, and in which:

Fig. 1 is a side elevational view of the invention with a part broken away and a part shown in section.

Fig. 2 is a view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary, sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary, sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary, sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary, sectional view taken on line 6—6 of Fig. 2.

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6.

Fig. 8 is a fragmentary, enlarged, sectional view taken on line 8—8 of Fig. 1.

Fig. 9 is an enlarged, sectional view taken on line 9—9 of Fig. 3.

Fig. 10 is a sectional view through an attachment used with the invention.

Fig. 11 is a view taken on line 11—11 of Fig. 10.

Fig. 12 is a view taken on line 12—12 of Fig. 10.

Fig. 13 is a front elevational view of a part of the invention showing the head stock extended vertically instead of horizontally.

Fig. 14 is a semi-diagrammatic view of the work-engaging plates shown in cross section and partly in side elevation.

Fig. 15 is a view taken in line 15—15 of Fig. 14.

The invention comprises a supporting table 20 on which is mounted a slide bed 21 having ribs 22 and 23 projecting upwardly therefrom. These ribs engage in the V-shaped grooves 24 and 25, respectively, which are formed on the under surface of the carriage 26. Plates 27 are secured to the carriage so as to embrace the outwardly projecting flanges 28 which are mounted on the slide bed 21. Projected through the forward end 29 of the bed 21 is the rotatably mounted screw 30 on which is fixedly mounted the hand-wheel 31 whereby a rotation of this screw may be effected. This screw 30 is threaded through the nut 32 which is secured by the bolt 33 to the carriage 26 whereby the carriage may be moved back and forth on the bed 21. This hand-wheel 31 is manually rotated and, thus, there is provided a means for reciprocating the carriage on the bed which serves as its support.

Fixedly mounted on and projecting upwardly from the rear end of the bed 21 are the spaced supporting standards 34 and 35, which serve to support and which are secured to the bed-forming member comprising the side walls 36 and 37 which are secured throughout their length by the bed plate 38 and at their forward ends by the cross plate 39. Fixedly mounted on and depending from the under surface of the bed plate 38 is the channel-shaped guide strip 40.

Mounted on and secured to and projecting upwardly from the carriage 26, at its rear end, is a supporting post embodying the side walls 41 and 42, the bottom plate 43, the top plate 44 and the front wall 45. Mounted on the upper surface of the plate 44 is a block 46 which engages in and is adapted for slidable movement in the channel 40. A pair of forwardly projecting lugs 47 and 48 extend from the forward end of the block 46 and threaded through the lug 48 so as to engage at its inner end the lug 47 is a screw 49 having the handle 50 whereby a rotation of the same may be manually effected. These lugs are normally in such close relation as not to engage the side walls of the channel 40 with sufficient friction to resist slidable movement therein. However, when the walls are spread apart by rotating the screw 49 this frictional en-

gagement may be increased to such an extent that the block 46 will be locked against slidable movement in the channel 40. The bed 26, when reciprocated by rotation of the screw 30, will, of course, carry with it the supporting post and the various parts mounted thereon.

Journalled in a boss 51 formed on the carriage 26 is the reduced lower end 52 of a screw rod 53. Fixedly mounted on the lower end of this rod 53 is a pinion 54 which meshes with the worm 55 mounted on the transversely extended rod 56 which projects outwardly from one side of the carriage 26 through the bearing 57. Mounted on the outer end of this rod 56 is a hand wheel 58 whereby a rotation of the same may be effected. The upper reduced end 59 of this screw rod 53 is journalled in the block 60 which is attached to the wall plate 45 and the block 46 as shown in Fig. 4. The screw rod 53 projects through the nut 61 which is attached by means of the screw 62 to the transversely extending plate 63. As shown in Fig. 3, the forward face of the wall 45 is recessed at 64 to accommodate the screw rod 53 and the nut 61. This face 45 is also cut away to provide the outwardly projecting ribs 65 and 66 which engage in the recess 67 and form a dovetailed slidable connection with the plate 63. A separate strip 68 is positioned between the portion 69 carried by the plate 63, and the rib 66 by means of screws not shown. This strip may be forced inwardly against the rib 66 to vary the resistance of the same to slidable movement upwardly and downwardly. It is thus believed obvious that upon a rotation of the screw rod 56, which will effect a rotation of the screw 53, the plate 63 may be reciprocated vertically. Slidably mounted on the plate 63 is a block 71. The lower end of the plate 63, at its forward side, is cut away as at 72 and in this recess engages a loose adjusting strip 73 which may be adjusted as to pressure on the recess 72 by means of the set screws not shown which thread through the plate 71. The upper edge of the plate 63 is cut away to provide the flange 76, engaging behind which is a plate 77 which is secured to the block 71. The forward face of the block 71 is cut away as at 78 to provide the circular boss 79 having the inclined peripheral surface formed at the cut away portion 78. Engaging over the portion 79 is a circular recess 87 formed in the plate 80 having the guide and supporting ribs 81 and 82 projecting outwardly from the outer face and extended horizontally. The bolt 83 which projects through the member 71 of the member 80 serves to connect these parts together and by loosening of the nut 84 the member 80 may be rotated relatively to the member 71 on the bolt 83 as an axis. Upon tightening the nut 84 these parts may be locked in fixed relation. Graduations are formed on the periphery of the member 71 at 85 which cooperate with graduations formed on the member 80 at 86 so that the degree of rotation of the member 80 relatively to the member 81 may be indicated.

The member 71 is adapted for slidable movement transversely on the member 63 and this slidable movement is effected by rotation of the screw rod 88 which is threaded through a nut or lug 89 projecting rearwardly from the member 71 and engaging in the recess 90 which is formed in the outer face of the member 63. As clearly shown in Fig. 3 this screw rod 88 extends from end to end of the plate 63 and is journalled at its opposite ends in plates 91 and 92. Upon each end of the screw rod 88 is fixedly mounted a pinion 93 which engages with a pinion 94 fixedly mounted on the shaft 95 on which is fixedly secured the hand wheel 96. Thus by rotating the hand wheel 96 at either side of the device, a reciprocation of the plates 71 transversely of the carriage is effected, this plate, of course, moving in unison with the member 80. As clearly shown in Fig. 5, the plate 80 is provided with a circular flange 97 which embraces the circular cut away portion 79 of the block or plate 71. Thus, we have provided a means for moving the plate 80 upwardly and downwardly by moving the plate 63 upwardly and downwardly. We have also provided a means for moving the plate 80 transversely of the carriage by means of the screw rod 88. Moreover, the plate 80 is tiltably mounted so that it may be tilted to various angles relatively to the horizontal and this angle of tilt will be indicated by the graduations formed at 86 and 85. It is thus obvious that a substantially universal movement of the plate 80 is possible.

Slidably mounted on the guide and supporting ribs 81 and 82 at one side of the plate 80 is a plate 98 to which is secured by means of the bolts 99 a supporting bracket 101. This supporting bracket serves as a support for a head stock 102.

Slidably mounted on the plate 80 at the opposite side is a bracket 103 which carries a tail stock 104 having the movable center 105 which may be moved inwardly and outwardly by means of the hand wheel 106 and clamped in its various positions by means of the screw handle 107. The method for moving the center 105 of the tail stock inwardly and outwardly, of itself, forms no part of the present invention and, therefore, forms no part of the detail.

The head stock 102 comprises the housing 108 into which extends the shaft 109 rotatable by the hand wheel 110 and on which is mounted the worm 111 meshing with the gear 112 which is fixedly mounted on the shaft 113. This shaft 113 extends through the bushings 114 and 115 which are mounted in bearings 116 and 117, respectively, formed on the walls 118 and 119 of the housing. The outer end of the shaft 113 is formed hollow with a taper 120 to receive a suitable collet or the like for carrying a center point. This center point may be threaded on the threaded portion 121.

On the flange 122 formed on one side of the housing 108 is a zero mark 123 which is adapted to cooperate with the graduations 124 formed on the periphery of the disk 125 which is secured to the shaft 113 and adapted to rotate therewith.

In general practice, there is mounted on the head stock the plate 126 projecting outwardly from which are the studs 127. These studs are adapted to engage in holes 128 formed in the supporting or centering plate 129. It will be noted that one plate 129 has a center hole 130. In use, these plates would be secured by screws to the work-piece at the proper center line. This center line would, of course, be determined from the nature of the article which it was intended to form. Thus, when these center plates are mounted on the work-piece and the work-piece is engaged between the head stock and the tail stock, a rotation of the shaft 109 would effect a rotation of the work-piece on the determined axis of rotation. When the proper amount of operation on the work-piece has been accomplished on one center line the plates may be removed and reattached at a different center line so that we have thus provided a method whereby

a work-piece may be operated upon by a working tool while the work-piece is rotated upon an axis which may be easily and quickly varied, thus making it possible to rotate the work-piece on various axes for operation by the working tool.

It is, of course, obvious that the line determined by the center of the head stock and the tail stock lies in the same plane as the axis of the bolt 83 so that the work-piece, when rotated, will be centered relatively to the rotation or tilting of the plate 88.

However, in some instances, it will be impossible to so mount the work-piece as to maintain this "centering" and to this end we have provided the attachment shown in Fig. 10. This comprises a pair of supporting arms 131 and 132, each of which is provided at opposite sides with a slot 133 and with a center slot 134. A supporting bracket 135 is provided with the table portion 136 on which the work-piece 137 may rest and to which it may be secured by a screw which may be projected through the opening 138'. Each bracket is also provided with the upstanding flange 139, between which flanges the work-piece will engage and to which the same will be secured by the screw 140. The bracket 135 is secured to the supporting arms by the bolts 141 which project through the slots 133. A nut 142 is threaded on the bolt 141 so that these brackets 135 may be locked in their various positions of vertical movement. A guide rib 143' engages in the central slot 134 to guide these brackets 135 on their upward and downward movement. The upper end of each of these supporting arms is provided with a head 143 to which is attached the spindle 144 adapted to engage either the head stock or the tail stock depending upon which arm is referred to.

Mounted by means of the screws (as shown in Fig. 7) 145 on the plate 39 is a supporting block 146, projecting through which is a shaft 147 carrying intermediate its ends the pinion 148 which is fixedly mounted thereto and which engages in the recess 149 formed in the block 146. A pinion 150 is mounted fixedly on the outer end of the shaft 147 to engage the worm 151 which is carried by the shaft 152. This shaft is journalled in the lugs 157 which depend from the bracket arm 158 projecting outwardly from the block 146. A hand wheel 159 is fixedly mounted on the outer end of the shaft 152 to provide means for rotating the same.

Formed on the upper end of the block 146 is the bearing 160 in which are mounted the roller bearings 161 and 162 through which project the sleeve 163 which is rotatable therein. Fixedly mounted on this sleeve 163 is the pulley 164 which is driven through the medium of the belt 165 of the pulley 166 by means of the electric motor 167. A key 168 is secured by the set screw 169 on the lower end of the sleeve so as to engage in the keyway 170 formed in the shaft 171 which projects through the sleeve 163. This shaft 171 is slidable longitudinally in the sleeve 163 and rotates in unison therewith.

The shaft 171 extends through the sleeve 172 and is keyed thereto by means of the key 173 which is held in position by the set screw 174. The lower end of this sleeve is provided with a head 175 which is retained in engagement with the bearing 176 by means of the collar 177 which is threaded on the upper end of the sleeve 172 and threaded into engagement with the bearing 178. These bearings engage shoulders 179 and 180, formed in the bearing head 181, which is provided with the ribs 182 and 183 engaging in a recess 184. Formed in the supporting block 146, separate strips 185 and 186 are retained by the screws 187 to lock the bearing head 181 in position. This bearing head is provided on its inner face with the rack bar 188, the teeth of which meshes with the pinion 148. The lower end of the shaft 171 carries a suitable chuck 189 in which is mounted a suitable work tool 190 shown in Fig. 10. It is thus obvious that upon a rotation of the shaft 147, the work tool may be raised and lowered as desired.

On the face of the block 146 there is secured a rule 191 bearing graduations which cooperate with the pointer 192 carried by the bearing head 181 so that the degree of vertical movement of the work tool in response to the rotation of the shaft 147 may always be indicated.

It is, of course, obvious that the head stock and the tail stock may be moved toward and away from each other by sliding the brackets 103 and 101 toward or away from each other.

In Fig. 13 we have shown the head stock mounted in vertical position relatively to its carrying bracket 101 and when used in this position the work-piece also extends vertically, being connected by the center plate to the head stock.

With a machine constructed in this manner, the work-piece may be moved to any desired position relatively to the operating tool. These movements are all indicated and may be tabulated if desired in operating upon the work-piece so that it will be a simple matter to reproduce exactly the piece fabricated on this machine. To this end the movement of the carriage inwardly and outwardly would be indicated on the graduations 191 which are formed on the bed 20. Similarly, the transverse movements of the plate 30 may be indicated by suitable graduations. Consequently, an operator working from a working drawing will be able to construct a pattern or form a various-shaped article out of a work-piece in strict conformance with the drawing, accurately, without any variations. Moreover, with a machine of this kind, it becomes possible to construct patterns and various-shaped articles out of a single piece of metal, whereas, under the present form of construction, these articles are made from various parts and then glued or otherwise stuck together.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a machine of the class described, a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; a supporting standard projecting upwardly from said carriage; means for moving said carriage rearwardly and forwardly of said table; a supporting member mounted on said standard and extending transversely of said table; means for moving said supporting member upwardly and downwardly on said standard; a work piece supporting mechanism; means for mounting said work piece supporting mechanism on said supporting member; and means for moving said work piece supporting mechanism on said supporting member transversely of said table.

2. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; means for sliding said carriage rearwardly and forwardly of said table; a supporting standard projecting upwardly from said carriage

and movable in unison therewith; a supporting member mounted on said standard; means for moving said supporting member upwardly and downwardly on said standard; a work piece supporting mechanism; an attachment mounted on said supporting member; means for moving said attachment on said supporting member transversely of said table in either direction; means for mounting said work piece supporting mechanism on said attachment for rotation about a horizontal axis; and means for locking said mechanism against rotation on said axis.

3. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; a supporting standard projecting upwardly from said carriage; a supporting member mounted on said standard and movable vertically thereof; means for moving said supporting member vertically of said standard; a work piece supporting mechanism; means for mounting said work piece supporting mechanism on said supporting member for rotation about a vertical axis and for slidable movement transversely of said table on said supporting member; means for moving said work piece supporting mechanism transversely of said table; means projecting upwardly from said table and overhanging said carriage and extending to a position normally forwardly of said supporting standard; and means for mounting a work tool on said projecting means adjacent the forward end thereof for operating upon a work piece carried in said work piece supporting mechanism.

4. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; a supporting standard projecting upwardly from said carriage; a supporting member mounted on said standard and movable vertically thereof; means for moving said supporting member vertically of said standard; a work piece supporting mechanism; means for mounting said work piece supporting mechanism on said supporting member for rotation about a vertical axis and for slidable movement transversely of said table on said supporting member; means for moving said work piece supporting mechanism transversely of said table; means projecting upwardly from said table and overhanging said carriage and extending to a position normally forwardly of said supporting standard; means for mounting a work tool on said projecting means adjacent the forward end thereof for operating upon a work piece carried in said work piece supporting mechanism; and means for moving said tool mounting means vertically relatively to said table.

5. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; means for sliding said carriage rearwardly and forwardly of said table; a standard projecting upwardly from said carriage; means projecting upwardly from adjacent the rear of said table and projecting forwardly thereof and overlying said carriage; and means cooperating with said projecting means and said standard for guiding the upper end of said standard upon the slidable movement of said carriage relatively to said table.

6. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; means for moving said carriage rearwardly and forwardly of said table; a supporting standard projecting upwardly from and movable in unison with said carriage; a supporting member mounted on said standard; means for moving said supporting member vertically of said standard; a work piece supporting mechanism mounted on said supporting member; and means carried by said table for engaging the upper end of said standard for guiding the same in its movements rearwardly and forwardly of said table.

7. In a machine of the class described, a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; a supporting standard projecting upwardly from said carriage; means for moving said carriage rearwardly and forwardly of said table; a supporting member mounted on said standard; means for moving said supporting member upwardly and downwardly on said standard; a work-piece supporting mechanism; means for mounting said work-piece supporting mechanism on said supporting member; and means for moving said work-piece supporting mechanism on said supporting standard transversely of said table.

8. A machine of the class described, comprising: a supporting table; a carriage mounted on said table and slidable rearwardly and forwardly thereof; means for sliding said carriage rearwardly and forwardly of said table; a supporting standard projecting upwardly from said carriage and movable in unison therewith; a supporting member mounted on said standard; means for moving said supporting member upwardly and downwardly on said standard; a work-piece supporting mechanism; an attachment mounted on said supporting member; means for moving said attachment on said supporting member transversely of said table in either direction; and means for mounting said work-piece supporting mechanism on said attachment for rotation about a horizontal axis.

9. A machine of the class described, comprising: a supporting table; a standard projecting upwardly from said table and slidable rearwardly and forwardly thereof; means for sliding said standard rearwardly and forwardly of said table; means projecting upwardly from adjacent the rear of said table and projecting forwardly thereof and overlying said standard; and means cooperating with the upper portion of said standard and with said projecting means for guiding the upper end of said standard upon the slidable movement of the same relatively to said table.

JOHN E. ALWARD.
JOHN H. MOORE.