May 13, 1952 R. E. RICHARDS 2,596,867

TUBULAR ROUTER

Filed July 14, 1949 3 Sheets-Sheet 1

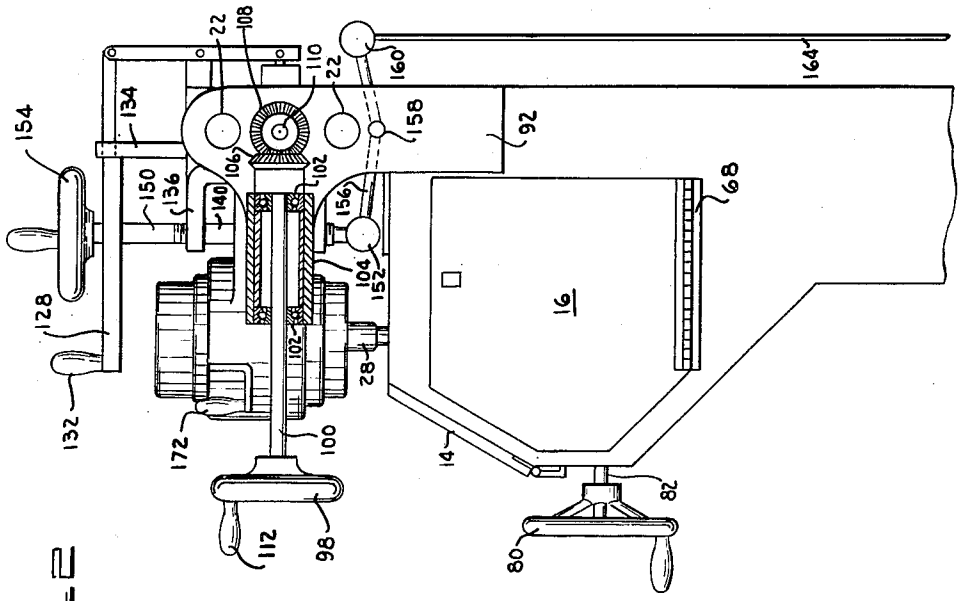


FIG. 2

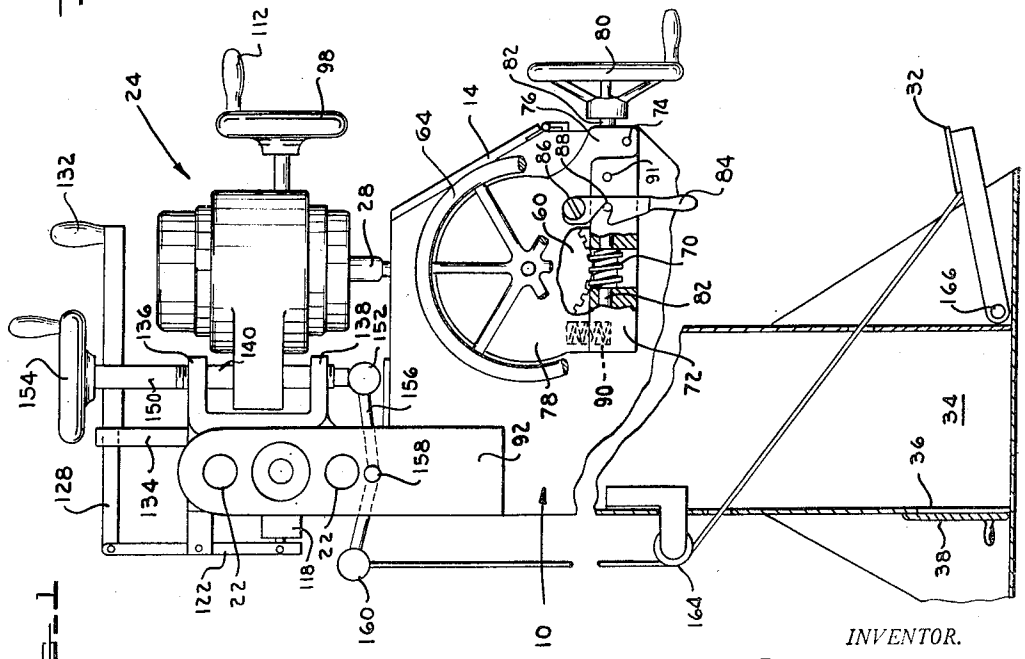


FIG. 1

INVENTOR.
ROBERT E. RICHARDS
BY
E. J. Ballmy
ATTORNEY

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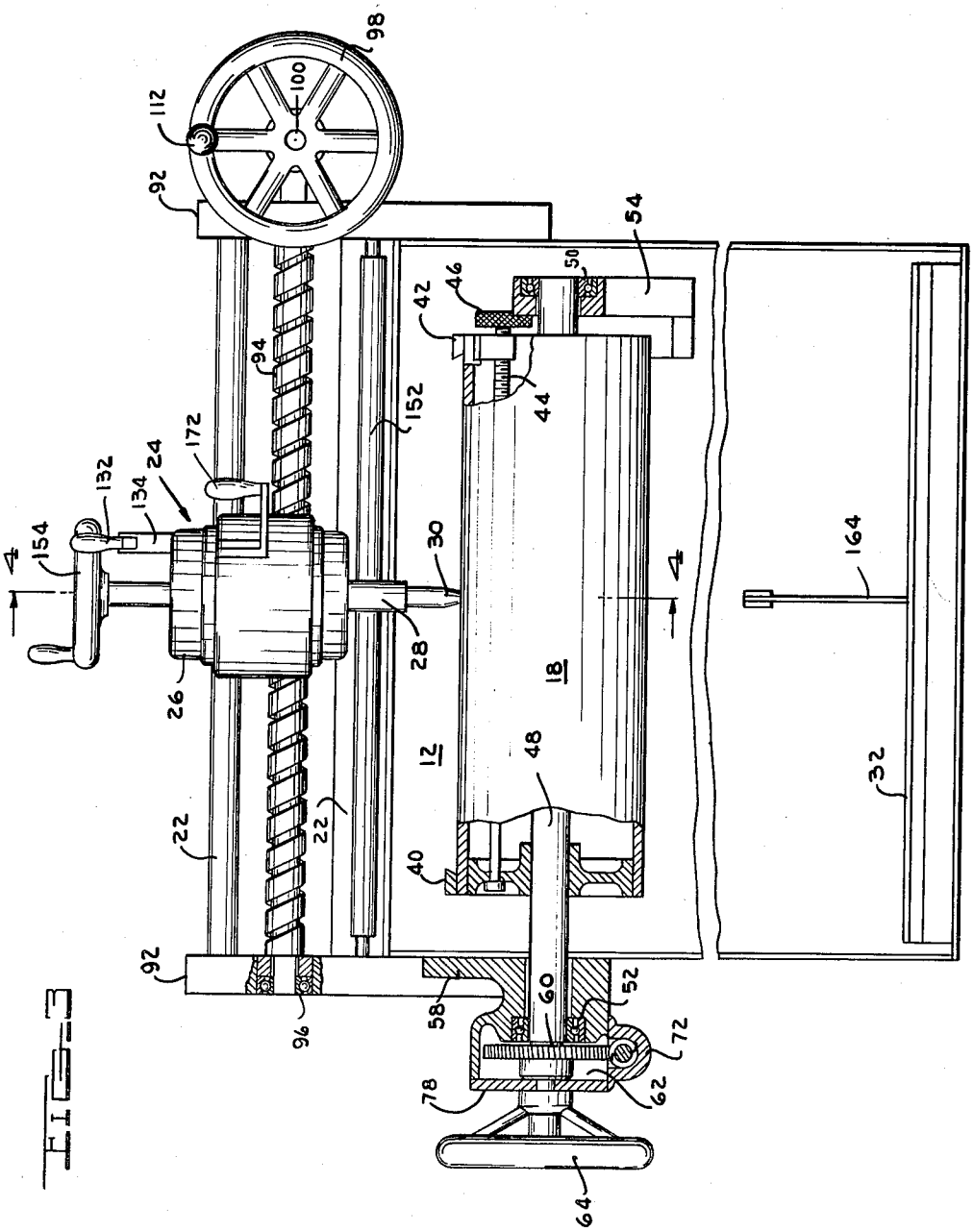


FIG. 3

INVENTOR.
ROBERT E. RICHARDS
BY
E. J. Ballentine
ATTORNEY

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FIG. 4

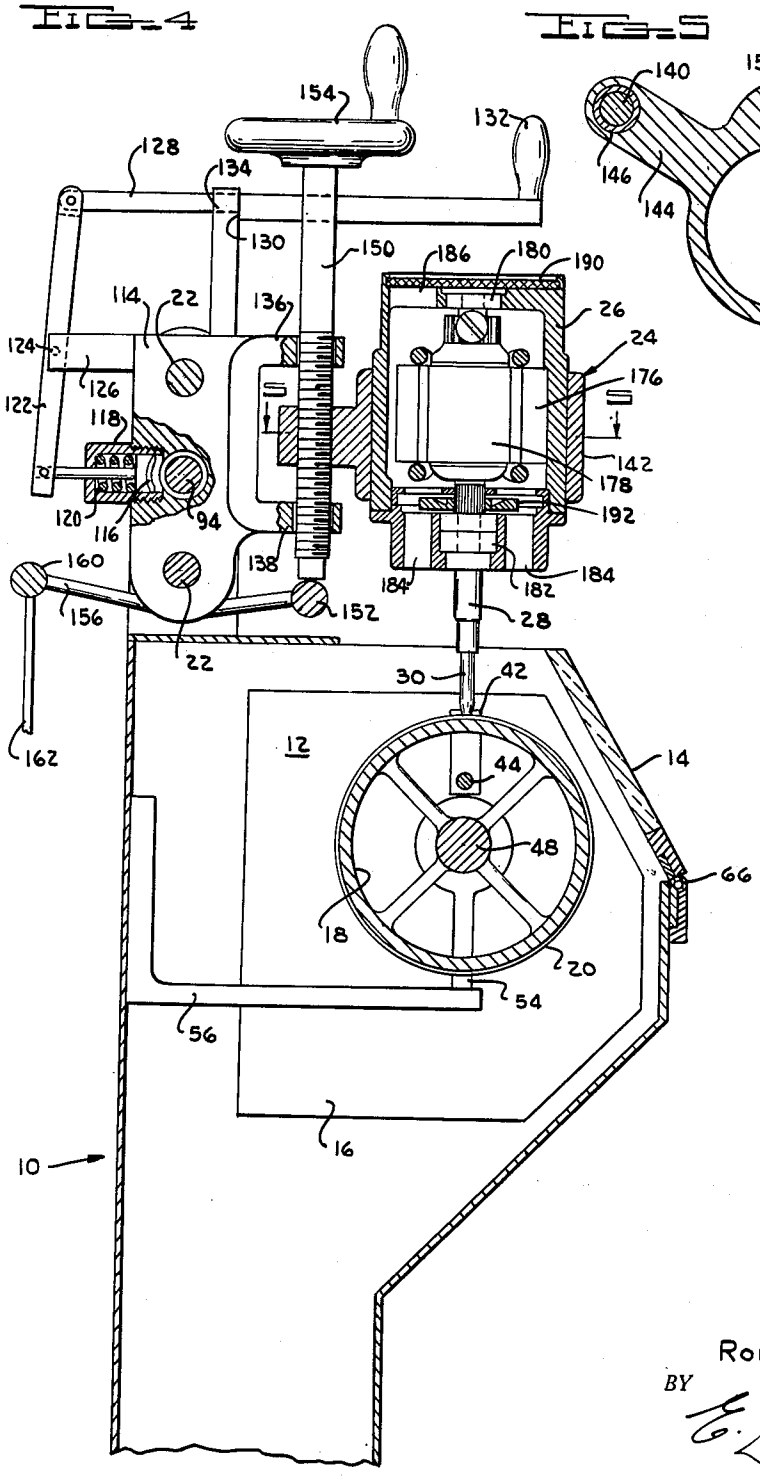
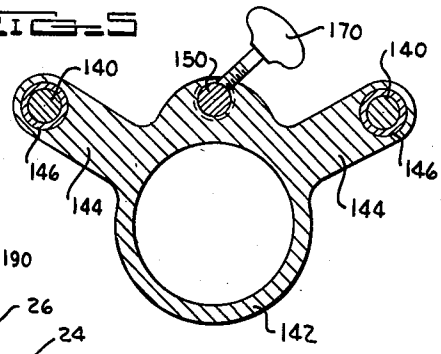


FIG. 5



INVENTOR.
ROBERT E. RICHARDS
BY
E. J. Ballouf
ATTORNEY

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UNITED STATES PATENT OFFICE

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TUBULAR ROUTER

Robert E. Richards, Kalamazoo, Mich., assignor to J. A. Richards Company, Kalamazoo, Mich., a partnership

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4 Claims. (Cl. 90—15)

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This invention relates to routers for routing printing plates, and has particular reference to a routing machine which is constructed and arranged for routing curved or tubular plates.

Principal objects of the invention are to provide:

A new and improved router;

A new and improved routing machine which is particularly adapted for use in connection with curved or tubular plates;

A new and improved routing machine of the character described which is easier to use and more efficient in operation in that it saves time in doing the work and it also makes it possible to recover the metal routed out from the plate.

Other and further objects of the invention will be apparent from the following description and claims and will be understood by reference to the accompanying drawings, of which there are three sheets, which by way of illustration show a preferred embodiment and the principles thereof and what I now consider to be the best mode in which I have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a side elevational view, partly broken away, of a machine embodying the invention;

Fig. 2 is a fragmentary side elevational view with parts broken away of the opposite side of the machine;

Fig. 3 is an enlarged fragmentary front elevational view of the machine with parts broken away;

Fig. 4 is a sectional view taken generally along the lines 4—4 of Fig. 3, looking in the direction of the arrows; and

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 4.

As illustrated in the embodiment of the invention selected for purposes of illustration, a routing machine comprises in general a housing 10 defining a work chamber 12 which is closed at the sides and open at the top. The housing includes a hinged transparent panel 14 at the front and a hinged panel or door 16 at the side. Work supporting means in the form of a rotary drum 18 is arranged in the chamber and adapted to hold a curved or tubular plate 20 on which routing is to be done.

Motor supporting means in the form of horizontal guides 22 extend along the back of and above the chamber and parallel to the drum 18. A motor unit indicated generally at 24, is supported by said guides above the chamber 12 and the drum 18 and for movement lengthwise of the drum. The unit 24 includes an electric motor 26 having a drive shaft 28 depending into the chamber 12 in close proximity to the top of the drum 18. A routing tool indicated generally at 30 is detachably secured to the lower end of the drive shaft 28 and is operable upon rotation of the drive shaft for routing the plate carried by the drum 18. The motor unit 24 is vertically adjustable relative to the guides 22, as will be described in detail hereinafter, and a treadle 32 extends along the front of the machine for raising and lowering the motor unit 24 and the tool 30 relative to the drum 18.

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The housing 10 at its lower end forms a hopper 34 which is in communication with the lower end of the chamber 12 for receiving cuttings from the plate 20 and collecting such cuttings which may be removed through the opening 36 normally closed by the cleanout door 38.

The drum 18 is provided with a stationary dog 40 and a movable locking dog 42 between and by which the plate 20 is clamped on the drum 18. The movable locking dog 42 is carried by the threaded shaft 44 and is adjusted by the knurled wheel 46. The drum 18 is mounted on the shaft 48 which is journalled in bearings 50 and 52, the bearing 50 being carried by an arm 54 supported on a bracket 56 within the chamber 12, while the bearing 52 is supported in a bearing block 58 mounted exteriorly of the chamber 12. The shaft 48 has a worm wheel 60 affixed thereto for rotation therewith and arranged in a chamber 62. A hand wheel 64 is also connected with the shaft 48 so that by turning the hand wheel 64 the drum 18 will turn therewith. In this manner the plate may be turned relative to the routing tool 30.

The front of the chamber is closed by the hinged transparent panel 14 through which the plate 20 is clearly visible. The panel 14, however, may be swung about its hinge 66 in a clockwise direction (Fig. 4) so as to open the front of the chamber 12 when desired. The panel or door 16 is hinged at 68 to swing outwardly and provide an opening at one end of the chamber 12 through which the tubular plate may be inserted into the chamber 12 and arranged on the drum and removed therefrom.

As shown in Fig. 1 there is provided a worm 70 journalled in a bearing block 72 which is pivotally mounted at 74 in a bifurcated extension

76 of the cover 78 for the chamber 62. A hand wheel 80 is affixed to the shaft 82 on which the worm is secured so that the worm 70 will turn upon rotation of the hand wheel 80. The teeth of the worm 70 mesh with the teeth of the worm wheel 60 for turning the wheel 60 and thereby the shaft 48 and the drum 18, but at a relatively low rate of speed as compared with the speed with which the drum 18 may be turned by means of the hand wheel 64.

A lever 84 pivoted at 86 is provided with a slot which engages a pin 88 on the bearing block 72 for holding the teeth of the worm 70 in mesh with the teeth of the gear 60. By swinging the handle of the lever 84 in a counterclockwise direction so as to disengage the lever 84 from the pin 88, a spring 90 confined in a recess in the bearing block 58 and the bearing block 72 will bias the bearing block 72 in a counterclockwise direction about its pivot so as to separate the teeth of the worm 70 from the teeth of the gear 60 at which time the hand wheel 64 may be turned so as to turn the drum at a relatively fast rate of speed as compared with that which may be obtained by turning of the hand wheel 80 when the teeth of the worm wheel 70 are engaged with the teeth of the gear 60. Obviously, the hand wheels 80 and 64 may be turned in either direction. With the parts arranged as shown in Fig. 1, the teeth of the worm 70 meshing with the teeth of the gear 60 lock the drum 18 against rotation. The pin 91 limits the counterclockwise pivoting of the lever 84.

The guides 22 may comprise round bars which are secured in standards 92 which project upwardly from the housing 10 at the sides thereof. A screw or worm 94 is journalled in bearings 96 carried by the standards 92 and a hand wheel 98 is arranged for turning the worm 94. The hand wheel 98 is mounted on a shaft 100 mounted in bearings 102 in a housing 104 carried by one of the standards 92. The shaft 100 has a bevel gear 106 thereon, the teeth of which mesh with the teeth of the bevel gear 108 which is carried by a shaft extension 110 of the worm 94 which projects beyond the standard 92. The hand wheel 98 and the other hand wheels may be provided with a handle, such as 112. The worm wheel 94 may be turned in either direction by the hand wheel 98 and forms a means for moving the motor unit 24 lengthwise of the guides 22.

The guides 22 extend through bearings mounted in a bracket 114 so that the bracket 114 is freely slidable along the guides 22 from one end thereof to the other. The worm 94 extends freely through an opening in the bracket 114. A dog or tooth 116 slidably arranged in a housing 118 connected with the bracket 114 is engageable with the teeth of the worm 94 so that upon rotation of the worm 94 the tooth 116 will travel along the thread of the worm 94 and shift the bracket 114 lengthwise of the guides 22. The tooth 116 is shown in Fig. 4 separated from the thread of the worm 94 which permits the bracket 114 to be shifted freely along the guides 22 without rotation of the worm 94. A spring 120 reacting against the tooth 116 biases the same into engagement with the thread of the worm 94. However, as shown in Fig. 4, it is held in its disengaged position by means of a lever 122 pivoted at 124 to an arm 126 on the bracket 114.

The upper end of the lever 122 has connected to it a link 128 having a shoulder 130 and a handle 132. The shoulder 130 is engageable with a shoulder on the bifurcated guide 134 for

holding the tooth 116 separated from the thread of the worm 94. By lifting the handle 132 slightly, the shoulder 130 may be disengaged from the shoulder on the bifurcated guide 134, in which event the spring 120 will cause the tooth 116 to reengage the thread of the worm 94, in which event rotation of the worm 94 by means of the hand wheel 98 will cause the bracket 114 to travel in one direction or the other along the guides 22, depending upon the direction of rotation of the hand wheel 98. When the worm 94 is stationary and the tooth 116 is engaged therewith, the bracket 114 is locked against movement relative to the guides 22. The bracket 114 is provided with a pair of vertically spaced, horizontally extending arms 136 and 138. These arms carry a pair of vertical guides 140 which are stationary.

The motor unit 24 includes a sleeve or ring 142 having arms 144 provided with bearings 146 through which the vertical guides or rods 140 extend, whereby the motor unit 24 is guided for vertical movement by the guides 140 between the arms 136 and 138 of the bracket 114.

A threaded shaft 150 extends freely through aligned openings in the arms 136 and 138 and its lower end rests upon a bar 152. The threaded portion of the shaft 150 is threaded through an opening in the sleeve 142. The upper end of the shaft is provided with a hand wheel 154. By turning the hand wheel 154 the threaded connection between the shaft 150 and the sleeve 142 will raise or lower the ring 142, causing the same to slide upwardly or downwardly on the guides 140. The bar or rod 152 extends parallel to the guides 22 and between the standards 92 and is carried by levers 156, each of which is pivoted at 158 to a standard 92.

Another bar 160 connects the other ends of the levers 156, and a cable 162 is connected to the center of the bar 160 and extends down over an idler pulley 164 and is connected to the treadle 32, the side arms of which are pivoted at 166 to the base of the housing 10. The weight of the motor unit 24 is carried by the threaded shaft 150, which in turn is supported by the bar 152. A suitable means (not shown) may be provided for limiting the downward movement of the bar 152. By stepping on the treadle 32, the operator of the machine may cause the bar 152 to move upwardly, thereby elevating the motor unit 24 and the tool 30 away from the plate 20.

A thumb screw 170 carried by the sleeve 142 is engageable with the shaft 150 for locking the shaft 150 against rotation. The motor unit 24 is provided with a handle 172 so that when the tooth 116 is in its released position, as shown in Fig. 4, the operator may freely slide the motor unit 24 lengthwise of the guides 22.

The motor 26 includes a casing in which the field 176 and the armature 178 are arranged, the armature shaft being supported in suitable bearings 180 and 182, and the shaft 28 of the motor projects downwardly into the chamber 12 where the routing tool 30 is detachably secured thereto by any conventional means. The casing of the motor is provided with a series of air outlets 184 disposed around the bearing 182, and a series of air inlets 186 spaced around the upper bearing 180. Fig. 4 shows only one of the inlets since the section line is taken through one of the arms of the spider which supports the bearing 180. A filter 190 extends across and covers the openings 186.

The interior of the motor casing provides air

circulating passages over the field and armature of the motor so that air may be circulated through the motor casing and discharged downwardly through the outlets **184** in order to dissipate the motor heat.

In order to effect the circulation of air downwardly through the motor casing and downwardly from the outlets **184**, a fan **192** is carried by the armature shaft and is arranged to draw air downwardly through the casing and to discharge it through the outlets **184**. The motor **26** is a high speed motor and may operate at speeds of 14,000 R. P. M. and over, and the fan **192** is arranged to deliver a sufficient amount of air through the outlets **184** so as to discharge an air blast on the plate **20** around the routing tool **30** in order to dislodge the metal routed out of the plate by the tool **30** and cause such metal to be removed from the plate **20**. The metal removed from the plate **20** falls through the chamber **12** into the hopper **34**, where it is collected and from which it may be removed from time to time through the opening **36** previously described.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A router comprising a housing defining a work chamber, a rotary drum arranged in said chamber and adapted to hold a curved plate on which routing is to be done, horizontal guides above said chamber and parallel to said drum, a bracket slidably mounted on said guides, a motor unit supported by said bracket for movement therewith lengthwise of said drum and having a routing tool depending therefrom, a worm arranged parallel to said guides and extending freely through said bracket, means for rotating said worm, tooth means movably mounted on said bracket and spring means biasing said tooth means into engagement with said worm so that said bracket and motor unit will move along said guides upon rotation of said worm, a lever pivoted on said bracket and connected to said tooth means and operable for moving said tooth means out of engagement with said worm so as to permit free shifting of said bracket and motor unit along said guides independently of rotation of said worm, means on said bracket cooperable with said lever for holding said tooth means out of engagement with said worm, a shaft rotatable with said drum, a worm wheel on said shaft, a worm engageable with said worm wheel, means for rotating said worm so as to rotate said shaft and drum, means for disengaging said worm from said worm wheel so as to permit rotation of said drum independently of rotation of said worm, and a hand wheel on said shaft for rotating said drum independently of said worm.

2. A router according to claim 1 wherein said motor unit includes a vertically arranged shaft secured thereto, said shaft being arranged for vertical movement relative to said bracket, and a lever engageable with said shaft and operable for moving said shaft and motor unit vertically relative to said drum, and a treadle connected to said lever for operating the same.

3. A router comprising a housing defining a work chamber, a rotary drum arranged in said chamber and adapted to hold a curved plate on which routing is to be done, horizontal guides above said chamber and parallel to said drum, a bracket slidably mounted on said guides, a motor unit supported by said bracket for movement therewith lengthwise of said drum and having a routing tool depending therefrom, a worm arranged parallel to said guides and extending freely through said bracket, means for rotating said worm, a tooth mounted on said bracket for movement therewith axially of said worm and movable relative to said bracket into and out of engagement with said worm, spring means for biasing said tooth into engagement with said worm so that said bracket and motor unit will move along said guides upon rotation of said worm, a lever pivoted on said bracket and connected to said tooth for moving said tooth out of engagement with said worm so as to permit sliding movement of said bracket and motor unit along said guides independently of rotation of said worm, a shaft rotatable with said drum, manually operable feed means associated with said shaft for rotating said shaft and drum at a relatively slow rate, means for disconnecting said feed means from said shaft, and a hand wheel connected to said shaft for rotating said shaft and drum independently of said feed means and at a rate materially higher than that permitted by the feed means associated therewith.

4. A router according to claim 3 wherein said motor unit is slidably mounted on said bracket for vertical movement relative thereto, and including a vertically arranged threaded member secured thereto and extending freely through said bracket, said threaded member upon rotation thereof providing for vertical adjustment of said motor unit relative to said drum, and a manually operable lever cooperable with said threaded member for moving said motor unit vertically relative to said drum independently of relation of said threaded member.

ROBERT E. RICHARDS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
143,626	Huntington	Oct. 14, 1873
327,856	Blake	Oct. 6, 1885
544,010	Spalckhaver	Aug. 6, 1895
622,832	Wesel	Apr. 11, 1899
964,752	Cartwright	July 19, 1910
1,882,586	Haynes	Oct. 11, 1932
1,983,438	Cushman	Dec. 4, 1934
2,280,481	Cushman	Apr. 21, 1942
2,322,129	Hawkins	June 15, 1943
2,343,875	Schwartz	Mar. 14, 1944