F. W. BRITTON.

ROTARY ROUTER AND BORING MECHANISM.

APPLICATION FILED JUNE 24, 1919.

1,329,501.


2 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.

INVENTOR.

Franklin W. Britton

By

Carroll M. Crowe

ATTORNEYS.
To all whom it may concern:

Be it known that I, FRANKLIN W. BRITTON, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented new and useful Improvements in Rotary Router and Boring Mechanism, of which the following is a specification.

This invention relates to improvements in routing and boring mechanism.

In ship building and many other lines of craft the difficulties of boring an opening of a diameter from five to twenty-four inches is well known and understood. Especially is this true in portholes and like work where it is desired to provide a circular flange-supporting ledge on the periphery of the hole. Augers are only feasible for diameters of great reduction comparable to the foregoing and it is impossible to shape a peripheral flange on a bore with an auger. Furthermore, augers, like all other fixed diameter-boring tools present the necessity of an equipment co-extensive in sizes with the various diameters of holes to be bored.

Now it is the object of this invention to provide an extensible or adjustable boring mechanism whereby a device of a given size may be readily adjusted to bore holes or rout rings of any diameter within the range of limitation of a given size mechanism. The device of my invention is capable of performing any operation of circular routing and therefore if a hole is to be bored and provided with a peripheral flange-supporting leg, the device of my invention is capable, in its initial adjustment, of first forming the ledge as a router, and then boring or forming the hole as a boring mechanism.

My invention, in the full realization of the adjustable features noted, employs a routing tool in following relation with a foot plane having suitable cutting knives or spurs to describe the path to be routed, and in this connection, it is a special feature of my invention to floatingly or freely connect the routing tool with the foot plane in such a manner that the routing tool will automatically and unrestrainedly assume proper and accurate tracking relation with said knives as a result of the pulling stress applied to said tool.

A further novel feature of my invention resides in gage means whereby the mechanism may be initially set to rout a circle of a predetermined depth.

A further novel feature of my invention resides in a quadrant foot plane having an arcuate inner and outer edges struck from centers sufficiently complemental with respect to the minimum and maximum radial limitations of the tool, which together with the adjustable mounting of the foot, and sometimes in the absence of such adjustment, will permit the foot to operate in connection with a relatively wide range of “set” of the tool and still retain all the stabilizing advantages flowing from a quadrant foot.

My invention has many other features of novelty and advantage which will be more fully described in connection with the accompanying drawings and which will be more particularly pointed out in and by the appended claims.

In the drawings:

Figure 1, is a view in elevation looking in the direction of arrow a of Fig. 2, showing a mechanism embodying my invention in one stage of a routing operation, the board being partly in section to more illustrate the mechanism.

Fig. 2, is a plan view thereof with one part in section.

Fig. 3, is a view in elevation looking in the direction of arrow b of Fig. 2.

Fig. 4, is a bottom view looking in the direction of arrow c of Fig. 3.

Fig. 5, is a plan view similar to Fig. 2 showing the routing or boring operation as just having been started and also on a radial adjustment much shorter than that shown in Fig. 2.

Fig. 6, is a detail view of the foot looking in the direction of arrow 6 of Fig. 1 to illustrate my improved gage device.

Like characters of reference designate similar parts throughout the different figures of the drawings.

As illustrated, 1 may designate a board, deck, flooring or other material in which a routed ring is to be formed or through which a hole is to be bored. The material 1 is first provided with a hole 2 at the center of the circular routing ring or larger hole to be bored.

The device of my invention includes a centering shaft 3, the lower section of which is preferably cylindrical and peripherally
smooth for controlled or centering engagement with the material to be operated upon, as by means of the hole 2, for instance. This provides for not only studying the mechanism but also readily advancing the feed thereof during operation. Said shaft 3, or rather its lower section, will be proportioned to fairly snugly fit any selected standardized hole. Midway of the shaft 3, an enlargement 4 is provided having a passage 5 extending therethrough at right angles to the longitudinal axis of said shaft. The upper section 6 of said shaft will be proportioned or designed to have applied thereto any desired form of prime mover, such as an air-motor. A swepparm 7, preferably rectangular in cross section, is adapted for adjustment into and through said passage 5 to locate the tool-carrying end of said rod at the desired radial distance from said shaft. Means such as a set screw 8, may be employed, to hold said rod in its adjusted position. The present illustrated device, which is half-size, is designed to afford a routing or boring range of from ten inches to twenty-four inches diameter. The tool-carrying end of said rod is provided on one side with an enlargement 9 which is provided a bore 10. The remaining side 11 of said rod 7, is flat and straight, as clearly shown in Fig. 2.

A foot plane is employed in my improved device and the same is shown as comprising a quadrant foot portion 12, a rounded heel 13 and an upright section 14, preferably of polygonal cross section. Formed integral, as shown with section 14, is a cylindrical post 15 adapted to extend through the bore 10. A set screw 16 provides for locking the post 15 in any longitudinal depth or rotary diameter adjustment to which the post may be adjusted. When the head passes through stock which is much less in thickness than the height of the upright section 14, or in any degree less, the height or depth adjustment shown in Fig. 1, would be made. However, in boring through excessive thicknesses, and where the boring operation is not carried out or can not be carried out from both sides of the material, then the foot post 15 would be lowered in the rod 7. The arcuate edge 17, or in other words, the inside edge of the foot section 12 is struck on a radius complementary to the maximum radial adjustment of the rod 7, which in this instance would be twelve inches. The outside arcuate edge 18 is struck from a five inch radial center. Thus the inner edge will have a sweeping arc which will not wedge in the smallest diameter of routing groove and the more intensive arc of the outer edge 18 cannot wedge or obstruct in the largest diametrical groove. This difference in the arcs of the inner and outer edges is provided, in addition to the taper of the foot section toward the front end 19, so that for a considerable range of radial adjustment of the rod 7 no rotary adjustment of the foot will be necessary. However, for anything like an extreme adjustment of the rod 7 from maximum to minimum, or vice versa, rotary adjustment of the foot will be necessary and such adjustment may be readily effected with the greatest facility.

In advance of the routing tool, laterally disposed cutting knives 20, are provided, for describing the width of the routing circle to be cut. These knives project slightly downwardly below the foot section 12 and the sides of the latter are suitably recessed so that the outer faces of the knives will be flush therewith. Said knives are preferably formed integral with a slotted plate 21 which is adjustable on the forward face of the upright section 14, by means of a screw 22. The width of the foot section 12 near its heel, and between the knives 20, will be practically the width of the circle to be routed.

In trailing or tracking relation with said foot section is a routing knife 23 which curves downwardly and forwardly so that its cutting edge 24 will extend underneath the heel 13 and in very close relation with the bottom portion 25. Said routing tool is provided with a post 26, preferably cylindrical, and which is adapted to be vertically disposed, as shown, during all adjustments of the routing tool. A routing tool arm 27 is divided at one end to provide forked portions 28 adapted to straddle the outer end of arm 7. The forked portions are bored for passage therethrough of post 15 and said arm 27 is adapted to freely swing on said post to any position that it may be set. When the arm 27 is in its retracted state the outer edges 29 of the arm 27 provide stops 30 and 31, adapted for engagement with rod 7 to limit outward and inward radial swinging movement of said arm 27, respectively. It is most essential that an outward stop be provided because of the tendency of the arm 27 to swing outwardly during the first forming motions or revolutions before the routing tool takes hold on the material. It is a feature of my invention to arrange the stops 30 and 31 with respect to the maximum range or capacity of the material so that the outward stop 30 will limit outward movement of the arm 27 to the maximum diameter and the stop 31 will limit inward radial movement of the arm to the minimum diameter. The rear or remaining end 32, of the arm 27, is bored to receive the post 26. Means such as a set screw 33 serves to hold the routing tool to any depth or rotary adjustment to which it may be set. The arm 27 is curved inwardly between its ends so as to afford am-
ple clearance for the shavings thereby preventing clogging.

Now it will be seen by reference to Fig. 2 that the routing tool is arcuate in form and that rotative adjustment of the posts 15 and 26 may readily be made corresponding to the diameter of groove to be routed or hole to be bored. The pivotal connection of arm 27 also permits of the routing tool freely taking a following position in tracking alignment with the space between the slits cut by the knives 20 in any of the radial adjustments.

When it is desired to rout out a circular groove of a predetermined depth, my improved gage may be employed as shown in Figs. 1 and 6. This gage comprises a base 34 adapted to rest upon the top of the material when the required depth has been reached. The gage includes a slotted plate 35 through which a screw 36 extends to secure the gage in adjusted positions on the inside face of section 14. When it is desired to bore, the gage is removed entirely.

In my patent issued December 28, 1897, No. 596,420, the routing tool is in fixed relation to the foot plate and is not free to assume the position to which it may be impelled by the pulling thrust exerted thereon.

It is believed the advantages and utility of my invention will be clearly understood from the foregoing description and while I have herein shown and described one specific embodiment I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:

1. In a plano routing and boring mechanism, a driven center shaft adapted to rotatively fit a previously bored center hole in the material, a tool-carrying sweep rod longitudinally adjustable on said shaft for varying the radial location of the tool-carrying end of said rod, a foot plane having a post projecting through the carrying end of said rod and provided with laterally disposed cutting knives, means securing said post in said arm in different positions of rotary and depth adjustments, a router carrying arm forked on the end of said rod and swiveled on said post for free movement about the latter as an axis, a router tool having a post adjustable in said arm and having a cutting edge in close following relation between the tracks of said knives, and means for holding said router post in depth and rotary adjusted positions in said arm.

2. In a plano routing and boring mechanism, a center shaft adapted for controlled engagement with the material to be bored or routed, a tool-carrying sweep rod adjustable on said shaft for varying the radial location of the tool-carrying end of said rod to accommodate for maximum and minimum diameter routing and boring operation, a quadrant foot plane secured to said rod and provided with an inside arcuate edge struck from a center or corresponding to the radial maximum of the boring or routing operation and having an outside arcuate edge struck from the minimum radial dimension of the routing or boring operation, a router tool in tracking relation with said foot plane, and means pivotally connecting said router tool with said sweep arm.

3. In a plano routing and boring mechanism, a center shaft adapted for controlled engagement with the material to be bored or routed, a tool-carrying sweep rod adjustable on said shaft for varying the radial location of the tool-carrying end of said rod, a foot plane secured to said rod and provided with cutting knives, a router-carrying arm pivotally connected with said rod for lateral following movement behind said rod, and a router tool secured to said arm and having a cutting edge in close following relation with said knives.

4. In a plano routing and boring mechanism, a center shaft adapted for controlled engagement with the material to be bored or routed, a tool-carrying sweep rod adjustable on said shaft for varying the radial location of the tool-carrying end of said rod, a quadrant foot plane adjustable on said rod and provided with material cutting knives, an arcuate router tool, and pivotal means connecting said tool with said rod to advance said tool in following relation with said foot plane.

5. In a plano routing and boring mechanism, a center shaft having a smooth periphery and adapted to rotatively fit a previously bored center hole in the material, a tool-carrying sweep rod disposed at right angles to and adjustable longitudinally through said shaft for varying the radial location of the tool-carrying end of said rod, a foot plane having a post longitudinally and rotatively adjustable in said rod, said foot plane being arcuate, means carried by said rod and engaging said post for holding the latter in rotary and depth adjustment whereby said arcuate foot plane may traverse a circular path corresponding to the path to be routed, a router arm forked on said rod and having its forked portions freely and rotatively connected with said post for free and unrestrained movement of the free end of said arm into varying angular relations with said rod, said arm having a stop engaging said rod to limit radial outward swinging movement of said arm beyond a predetermined extent or position, an arcuate router tool having a post rotatively and longitudinally adjustable in said arm, means for holding said tool post in rotary and longitudinal adjustments in said arm comparable to the adjustment of said foot plane.
in said rod whereby the pulling thrust of said arm will drag said router tool in tracking relation between the cuts of the foot plane knives, said router tool being curved downwardly, forwardly, and arcuately toward the butt of said plane and having a cutting edge in close following relation with respect thereto whereby within predetermined maximum and minimum radial adjustments of said rod said foot plane and router tool may be operated. In testimony that I claim the foregoing as my own, I hereby affix my signature.

FRANKLIN W. BRITTON.