

Nov. 6, 1928.

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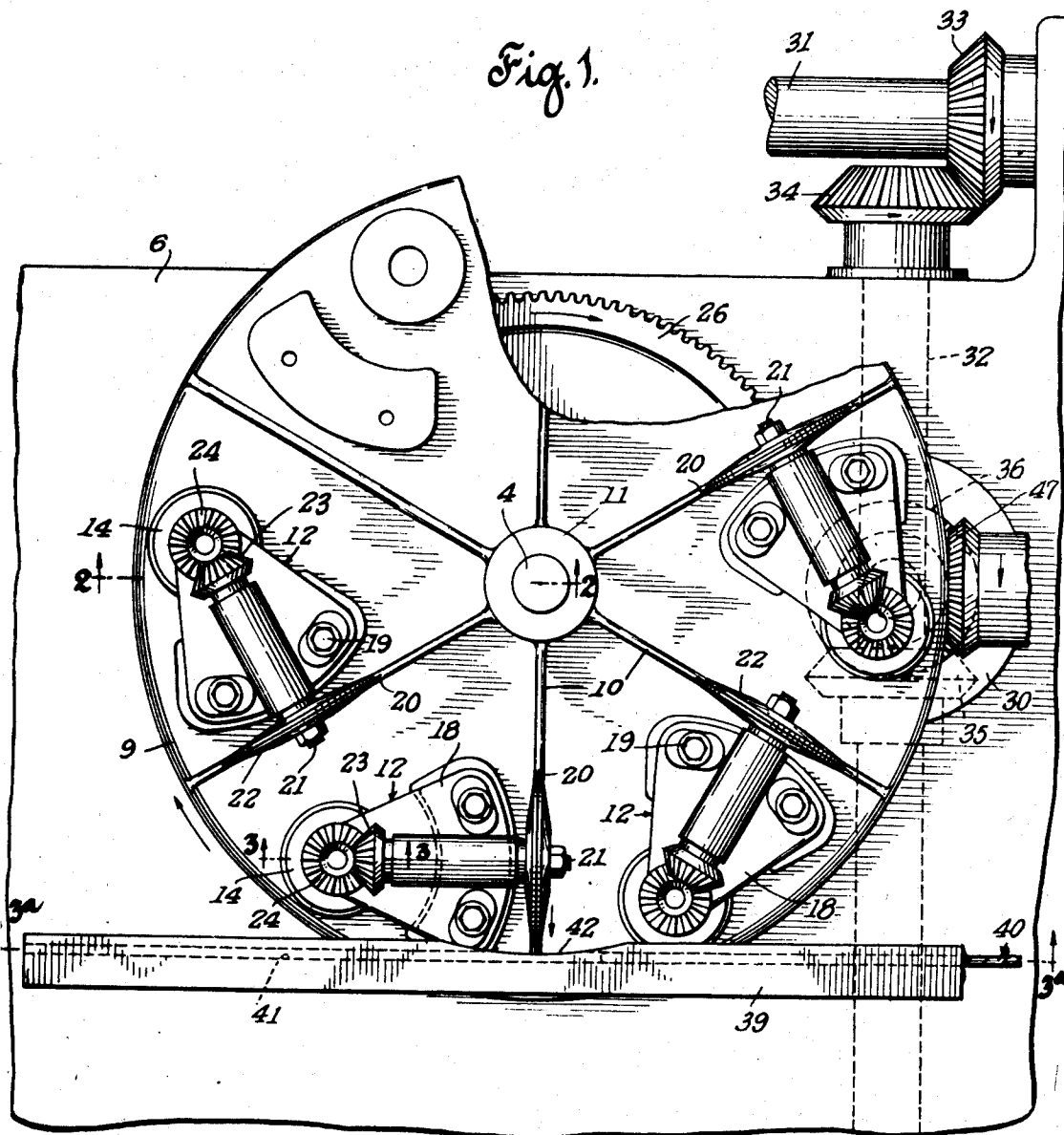
C. F. SMITH

TUBE SEVERING MACHINE

Filed Oct. 1, 1926

3 Sheets-Sheet 1

Fig. 1.



INVENTOR
Charles F. Smith
BY Wilbur M. Stone
his ATTORNEY

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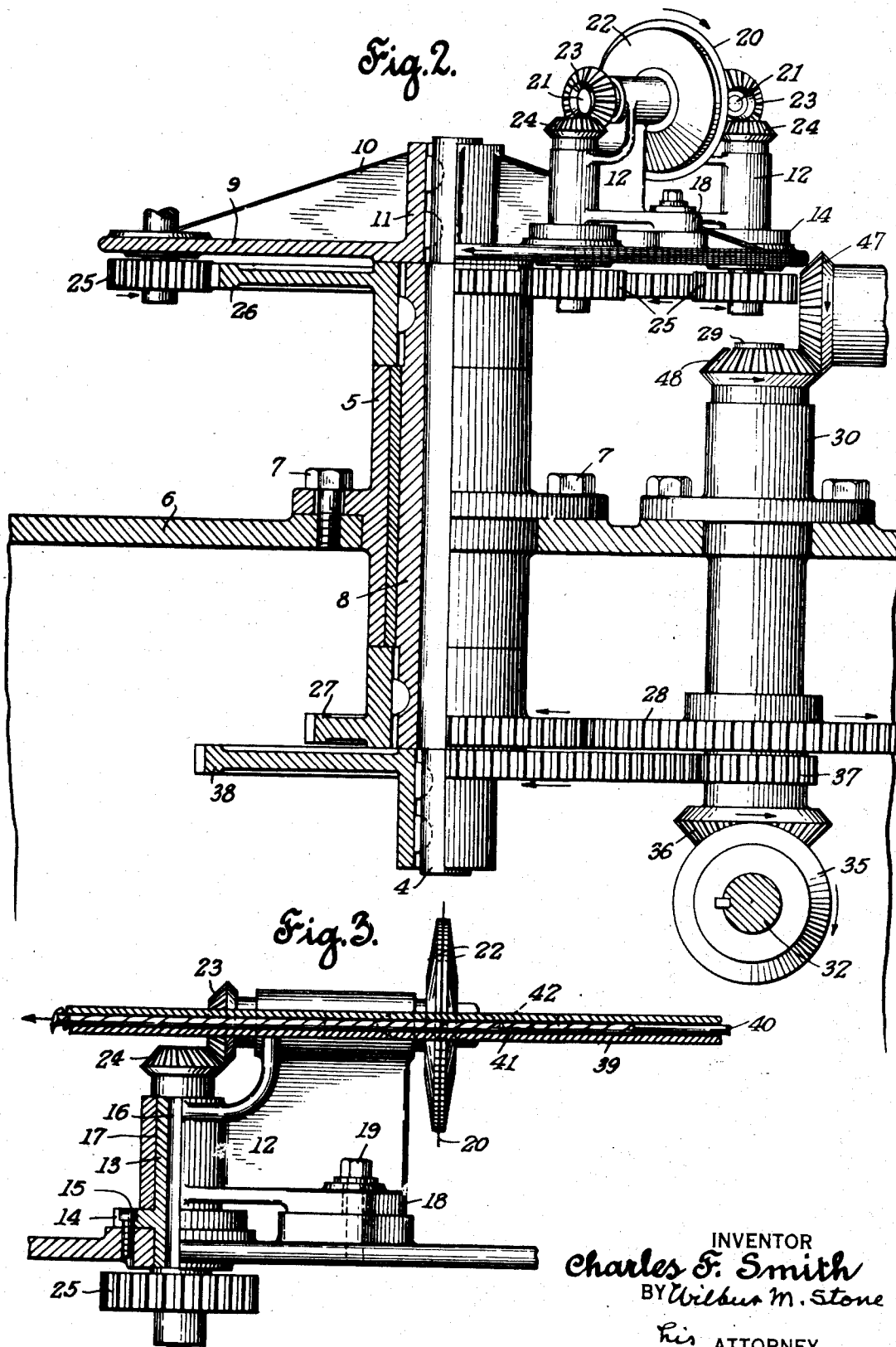
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INVENTOR
Charles F. Smith
BY *Wilbur M. Stone*
His ATTORNEY

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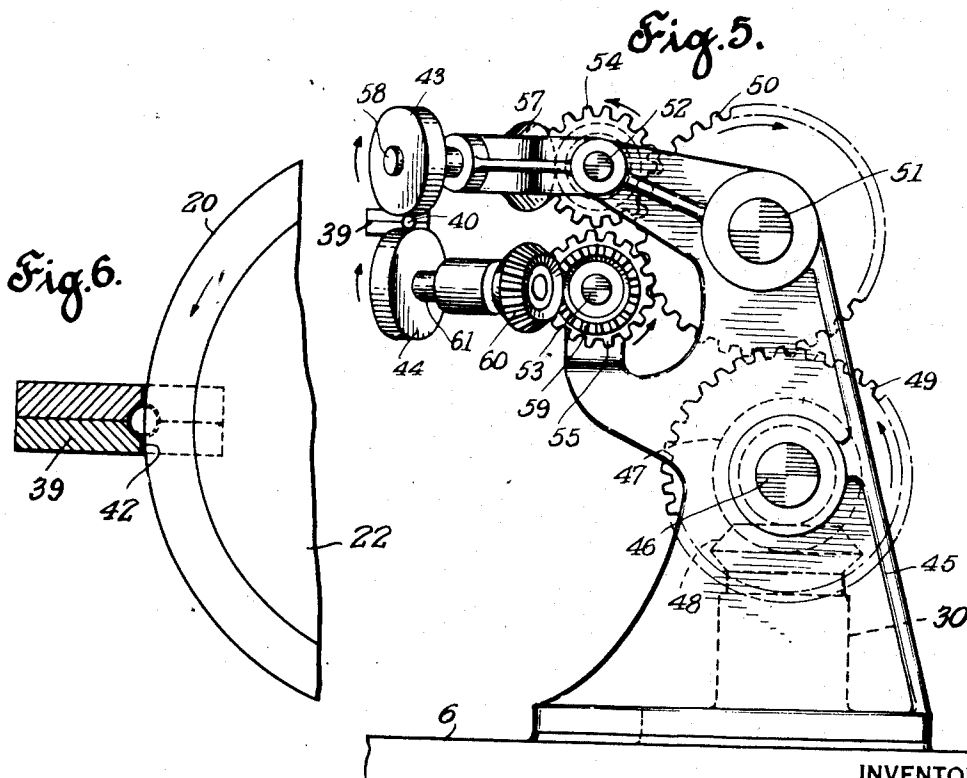
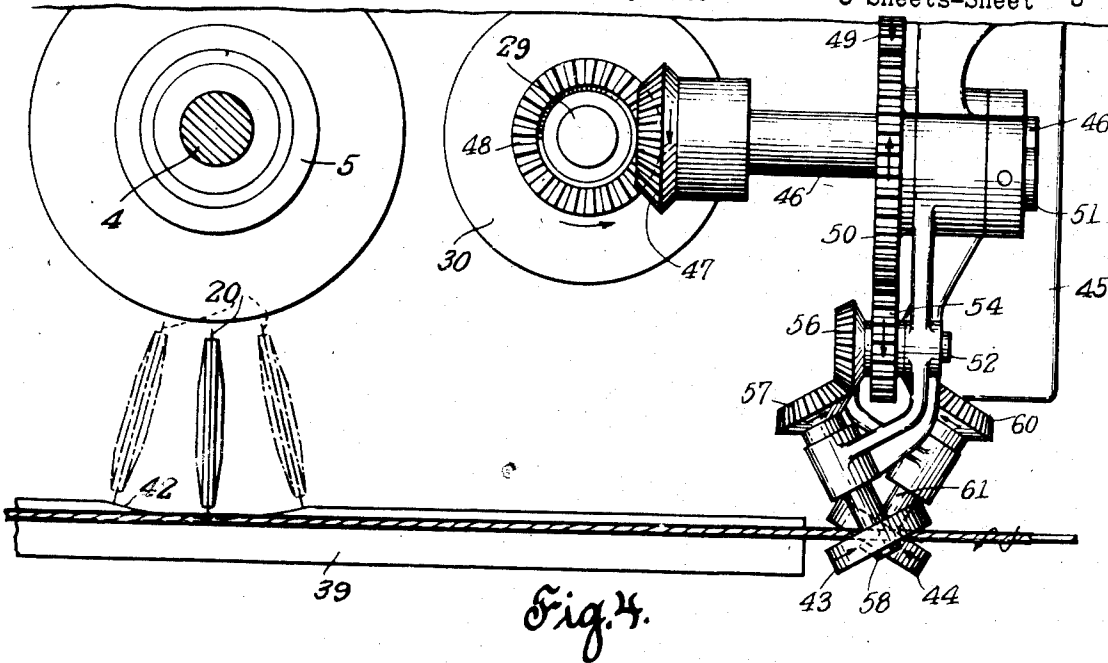
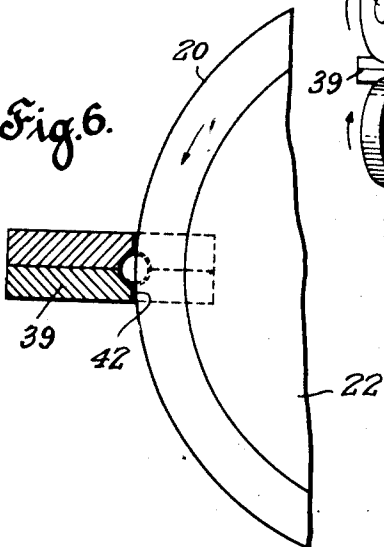


Fig. 6.



INVENTOR
Charles F. Smith
BY William M. Stone
his ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES F. SMITH, OF BROOKLYN, NEW YORK, ASSIGNOR TO PUBLIC SERVICE CUP COMPANY OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

TUBE-SEVERING MACHINE.

Application filed October 1, 1926. Serial No. 138,817.

This invention relates to tube severing machines and has for its object to provide a machine of the class specified, simple in construction, accurate in operation and of general high efficiency. Other objects will be pointed out more particularly herein.

With these ends in view my improved machine comprises features shown in the accompanying drawings and which drawings embody the present preferred form of my improvements. Therein Figure 1 is a plan view with some parts broken away to show what is below. Fig. 2 is front elevation with those parts to the left of the vertical center line in section on line 2—2 of Fig. 1. Fig. 3 is a fragmentary front elevation partly in section on line 3—3 and partly in section on 3^a—3^a, Fig. 1. Fig. 4 is a plan view of one embodiment of tube feeding means. Fig. 5 is an end elevation looking from the right in Fig. 4. Fig. 6 is a fragmentary sectional elevation showing a cutter in severing engagement with the tube. Figures 1, 2, 4 and 5 are to one scale; Fig. 3 is about one and one half times larger and Fig. 6 is about four times larger.

Vertical shaft 4 is mounted for rotation within sleeve 8 which in turn is rotatably mounted in lined bearing box 5 secured to frame 6 by the usual bolts 7, 7. To the upper end of said shaft 4 is fixed cutter carrier 9. This carrier preferably comprises a circular plate having ribs as 10, 10 radiating from its hub 11 toward the periphery of said carrier. Uniformly spaced on said carrier and near its periphery are a plurality of cutter heads as 12, 12 each of which is adjustable about the axis of its vertical driving shaft. While the essential principle of my improvements would be served by the use of one cutter and head on carrier 9, in which case said carrier might be of less diameter, I preferably employ a set of six cutters as shown, the distance from the point of operation of one cutter to that of either adjacent cutter, measured on an arc of a circle being equal to the length of each tube portion severed by two successively acting cutters.

Directing attention now to any one of said cutter heads 12, see Fig. 3, bearing sleeve 13 is secured by its flange 14 to carrier 9 by the usual screws as 15. Said sleeve projects downwardly through said carrier and the axial bore therethrough serves as a bearing for vertical shaft 16, the outside of the upstanding portion 17 of said sleeve serving as

a bearing about which said head is adjustably swiveled. Outreaching foot 18 of head 12 may be secured in adjusted position on carrier 9 by bolts as 19. This adjustability of said head about the axis of shaft 16 is efficient for moving cutter 20 toward and from its work.

In the upper portion of head 12 horizontal shaft 21 is rotatably mounted and on its outer end carries cutter 20. Said cutter is preferably a thin disc of steel with a sharp cutting periphery and said cutter may be sustained between the usual collar plates 22, 22. To the inner end of shaft 21 is fixed miter gear 23 meshing with and driven by similar gear 24 fixed to the upper end of shaft 16. To the lower end of shaft 16 is fixed spur gear 25 meshing with and driven by large gear 26 fixed to the upper end of sleeve 8. To the lower end of said sleeve is fixed spur gear 27 meshing with and driven by gear 28 fixed to vertical auxiliary shaft 29 which has its bearing in flanged sleeve 30, secured to and projecting downwardly through the floor of frame 6.

Shaft 29 is driven from main horizontal shaft 31 through horizontal shaft 32 at right angles to said shaft 31 by gearing as follows: Miter gear 33 is fixed to shaft 31 and meshes with and drives similar gear 34 fixed to the rear end of shaft 32. Adjacent vertical shaft 29, miter gear 35 is fixed to shaft 32 and meshes with and drives similar gear 36 fixed to the lower end of said vertical shaft 29.

For rotating cutter carrier 9 small spur gear 37 is fixed to vertical shaft 29 between bevel gear 36 and spur gear 28, and meshes with and drives large spur gear 38 fixed to the lower end of carrier shaft 4. The tube 40 to be severed into uniform lengths is provided with supporting and guiding means comprising transverse tubular bar 39, preferably made up of two members, Fig. 6, for convenience of access to the tube, when required. Said bar 39 has lengthwise bore 41 therethrough for the passage of said tube. Said bar 39 may be supported in the path of cutters as 20 as they are rotated in planetary movement on cutter carrier 9 by known means not shown. While said bar may be located in reference to the circular path of the cutters about shaft 4, to permit said cutters to penetrate said tube its full diameter, I preferably arrange the axis of bore 41 of said bar tangential to the circular path of the peripheries of

the cutters, for reasons which will presently appear. About midway its length and contiguous to the circular path of the peripheries of the cutters, bar 39 is cut away at 42 in a curve concentric with said cutter edge path to permit the cutters to engage the tube as those cutters revolve in planetary movement about the axis of shaft 4, Fig. 4.

Tube 40 may be fed from right to left through the bore of bar 39, Figs. 1, 3, 4 and 6 by means of feed rolls 43, 44, in engagement with opposite portions of said tube, adjacent the right hand end of bar 39. While, in case cutters, as 20, are of a diameter to entirely pass through said tube as they move in their planetary path, said feed rolls may be arranged on axes normal to the direction of tube feed, but when said cutters are arranged to penetrate to only about the middle of said tube, as shown, then said feed rolls are mounted with their axes angularly disposed so as to impart a rotary movement as well as an advancing movement to said tube.

The direction of rotation of said tube is counter-clockwise, Figs. 5 and 6, and the speed of rotation is preferably at a rate which will give the tube at least one complete rotation during its cutting engagement with the cutter.

The cutters, as 20, are rotated in clockwise direction, Figs. 2 and 6, thereby engaging the tube in a direction opposite to the direction of rotation of said tube at their point of engagement therewith, whereby the rotation of the tube constantly presents an uncut portion of tube periphery to the cutter. Also cutter carrier 9 is rotated in clockwise direction, Fig. 1, and at a speed to cause the cutting edges of the cutters to move in a circular path about the axis of shaft 4 at the same speed as that of the advance of the tube from right to left as described.

It will be observed that the lengths of the sections or portions into which the tube is severed is fixed and predetermined in the construction of the machine and is measured on the circular path of the cutting edges of the cutters, the length of a section of tube being the distance on said circular path between any two adjacent cutters.

For rotating feed rolls 43, 44 the following means are provided: Bracket 45, upstanding from frame 6 has horizontal shaft 46 revolvably mounted therein. To said shaft is fixed bevel gear 47 meshing with and driven by bevel gear 48 fixed to the upper end of auxiliary shaft 29. Also to shaft 46 is fixed spur gear 49 meshing with and driving spur gear 50 thereabove on shaft 51 having a bearing in bracket 45.

On parallel horizontal shafts 52, 53, one above the other, are fixed spur gears 54, 55 respectively, meshing with and driven by gear 50. To shaft 52 is fixed bevel gear 56 meshing with and driving similar bevel gear

57 fixed to skewed horizontal shaft 58. To the outboard end of skewed shaft 58 is fixed feed roll 43 for engagement with the upper portion of tube 40. To lower shaft 53 is fixed bevel gear 59 meshing with and driving similar bevel gear 60 fixed to lower skewed horizontal shaft 61. To the outboard end of skewed shaft 61 is fixed feed roll 44 for engagement with the under portion of tube 40.

The operation of the machine will be readily understood from the foregoing description, therefore suffice it to state that the tube, being fed from the right through bar 39 and rotated as described, the successive cutters in their planetary movement approach the tube in opening 42 of bar 39 from the right, Figs. 1 and 4, pass into cutting engagement with the tube and completely sever it when the cutter reaches a position normal to the axis of the tube. The cutter then passes on to the left, pushing the severed section of the tube onward in bar 39. After said cutter has passed from contact with said severed portion, the main right hand portion of the tube, in its further advancement pushes the severed section onward to the left and eventually discharges it from bar 39.

I claim:

1. In a machine of the character described the combination of a rotatable cutter carrier, a cutter head on said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier, said cutter being disposed approximately radially on said carrier, means for rotating said carrier, means for rotating said cutter and a cutter head mounted for adjustment about a fixed vertical axis, a cutter fixed to a horizontal shaft in said cutter head, means for adjusting said head for moving said cutter toward and from the axis of rotation of said carrier.

2. In a machine of the character described the combination of a rotatable cutter carrier, a plurality of cutter heads uniformly spaced adjacent the periphery of said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier in each of said heads, said cutters being disposed approximately radially on said carrier, means for rotating said carrier, means for rotating said cutters and a plurality of cutter heads mounted for adjustment about fixed axes respectively, a cutter fixed to a horizontal shaft in each cutter head, means for adjusting said heads for moving said cutters toward and from the axis of rotation of said carrier.

3. In a machine of the character described the combination of a rotatable cutter carrier, a cutter head on said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier, said cutter being disposed approximately radially on said carrier, means for rotating said carrier,

means for rotating said cutter, a cutter head mounted for adjustment about a fixed vertical axis, a cutter fixed to a horizontal shaft in said cutter head, means for adjusting said head for moving said cutter toward and from the axis of rotation of said carrier, means for supporting and guiding a tube to be severed, in a path tangential to the circular path of the cutter.

4. In a machine of the character described the combination of a rotatable cutter carrier, a plurality of cutter heads uniformly spaced adjacent the periphery of said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier in each of said heads, means for rotating said carrier, means for rotating said cutters, means for supporting and guiding a tube to be severed, in a path tangential to the circular path of the cutters and means for advancing and rotating a tube in said supporting and guiding means, the rates of advancement of said tube and of the cutting edge of the cutter about the axis of said carrier being synchronized.

5. In a machine of the character described the combination of a rotatable cutter carrier, a cutter head on said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier, means for rotating said carrier, means for rotating said cutter, means for supporting and guiding a

tube to be severed, in a path tangential to the circular path of the cutter and means for advancing and rotating a tube in said supporting and guiding means, the rates of advancement of said tube and of the cutting edge of the cutter about the axis of said carrier being synchronized.

6. In a machine of the character described the combination of a rotatable cutter carrier, a cutter head on said carrier, a cutter mounted for rotation on an axis in a plane normal to the axis of rotation of said carrier, said cutter being disposed approximately radially on said carrier, means for rotating said carrier, means for rotating said cutter, a cutter head mounted for adjustment about a fixed vertical axis, a cutter fixed to a horizontal shaft in said cutter head, means for adjusting said head for moving said cutter toward and from the axis of rotation of said carrier, means for supporting and guiding a tube to be severed, in a path tangential to the circular path of the cutter and means for advancing and rotating a tube in said supporting and guiding means, the rates of advancement of said tube and of the cutting edge of the cutter about the axis of said carrier being synchronized.

In witness whereof, I hereby affix my signature, this 29th day of September, 1926.

CHARLES F. SMITH.