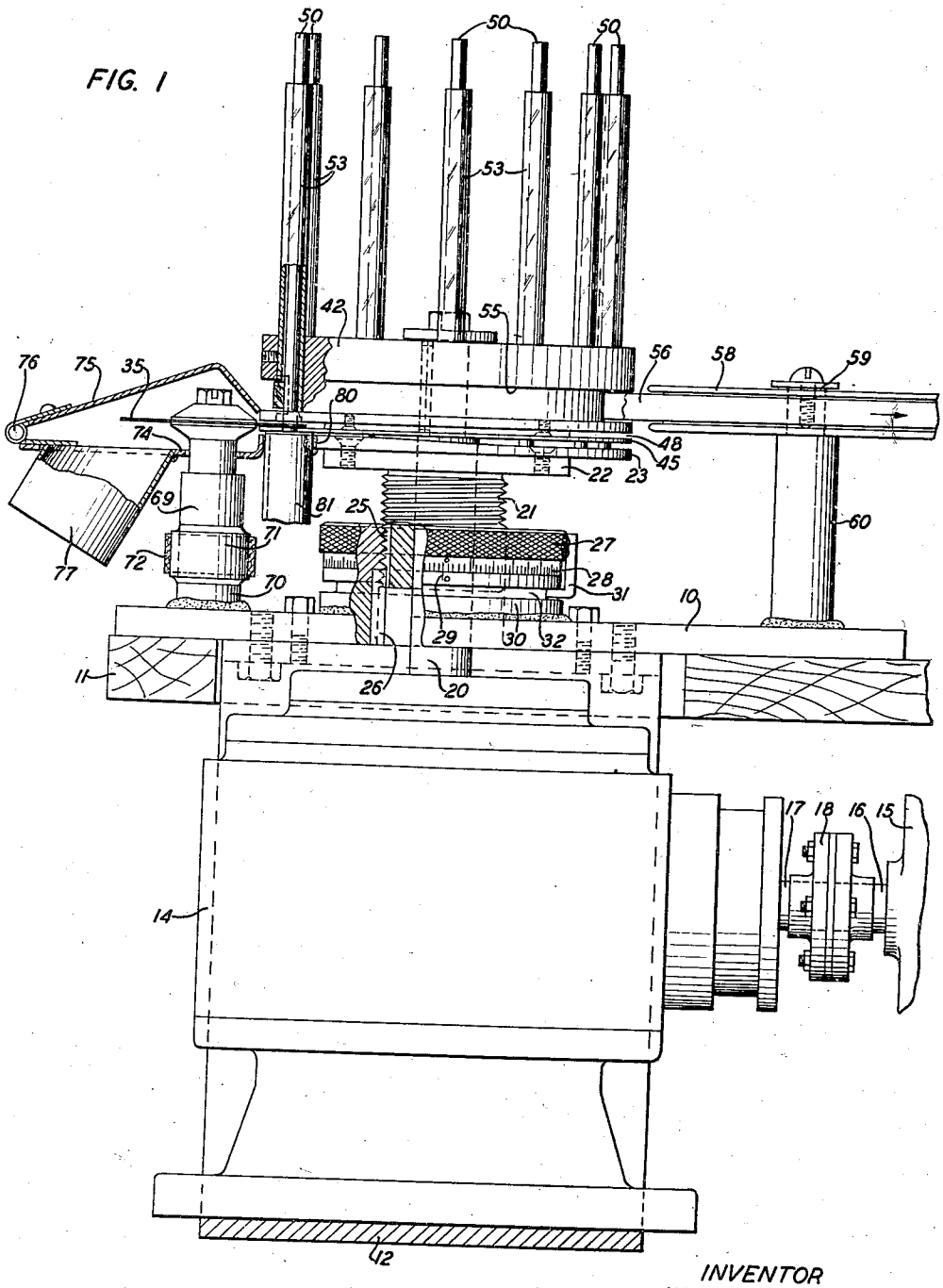
April 9, 1946. W. J. KELLER 2,398,230

CUTTING APPARATUS

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FIG. 1



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FIG. 2

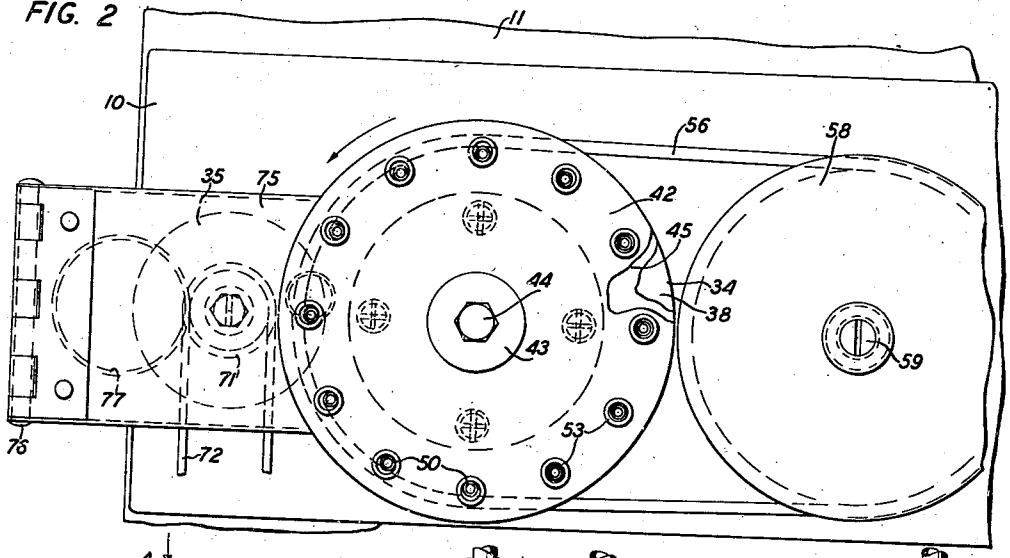
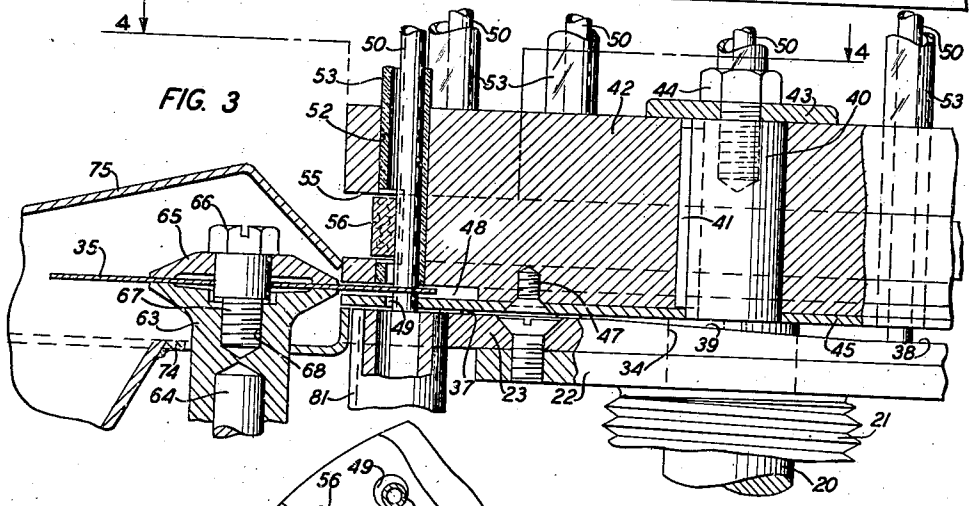


FIG. 3



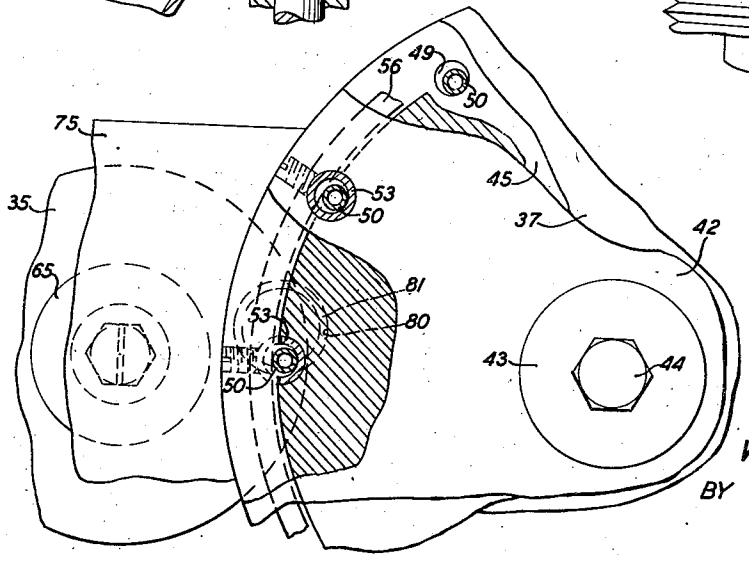


FIG. 4

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CUTTING APPARATUS

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Application March 31, 1944, Serial No. 528,912

6 Claims. (Cl. 164—61)

This invention relates to cutting apparatus, and more particularly to apparatus for cutting predetermined lengths from tubular or solid material.

In the communications arts insulating bushings are frequently employed as parts of electrical units. These bushings are frequently cut from tubes of the material desired, it being important, for accurate assembly of the bushings with the other parts of the units, that the bushings be accurate in length and that their ends, resulting from the cutting operations, be parallel with each other and at right angles with respect to their center lines.

An object of the invention is to provide a cutting apparatus which is simple in structure and highly efficient in successively and accurately cutting predetermined lengths from material.

With this and other objects in view, the invention comprises a cutting apparatus having a rotatable cutter and a work support adapted to repeatedly move supplies of material relative to the cutter to cause cutting of given lengths from the material, with intermediate means to advance the material given distances between each cutting operation.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a front elevational view of the apparatus, portions thereof being broken away;

Fig. 2 is a fragmentary top plan view of the apparatus, portions thereof being broken away;

Fig. 3 is an enlarged fragmentary vertical sectional view of the apparatus, and

Fig. 4 is a fragmentary detailed view taken substantially along the line 4—4 of Fig. 3.

Referring now to the drawings, attention is first directed to Fig. 1, where a base 10 is mounted upon a bench or other suitable support 11 and has a U-shaped bracket 12 fixed thereto for supporting a speed reducing unit 14. An electric motor 15, having its shaft 16 connected to an input shaft 17 of the unit 14 through a suitable coupling 18, may also be supported by a bracket similar to the bracket 12. An output shaft 20, of the unit 14, extends vertically through the base 10 and through a threaded member 21. The threaded member 21 has an annular flange 22 integral with its upper end upon which is mounted an annular cam 23. A keyway 25 is formed in the threaded member 21 and, through the aid of a key 26, the threaded member is held against rotation with the shaft 20 but is permitted to move axially of the shaft to vary the position of the cam 23 with respect to the base 10. A micrometer element 27, disposed concentric with the threaded member 21 and threadedly engaging the member, is adapted to cause axial movement of the member measured distances controlled by indications 28 upon the periphery of the element 27 movable relative to a zero position or point 29, the latter being disposed upon a fixed member 30 mounted upon the base 10. A finger 31, fixed to the element 27 and having a laterally projecting portion extending into an annular groove 32 of the member 30, serves to hold the element 27 against axial movement relative to the member 30.

The cam 23 is annular in general contour, centrally apertured at 34 for the shaft 20, and provided with an upper surface which has a high portion adjacent a cutting element 35, a diametrically opposed lower portion, and connecting intermediate diagonal portions. Thus approximately one-third of the upper surface area of the cam 23 adjacent the cutting element is termed high portion and is indicated at 37, while approximately another third of the upper surface, positioned away from the cutting element and diametrically opposite the high portion, is a low portion 38. Between these portions, at each side of the cam, are connecting diagonal portions 39. The complete functions of the cam will hereinafter be described.

Attention at this time is directed to the shaft 20, the upper end of which is reduced as at 40, where it is keyed, as at 41, to a work supporting element 42, the latter being centrally apertured, mounted upon the reduced portion 40 and there held in place by a washer 43 and a screw 44. An annular member 45, mounted also upon the reduced portion 40 of the shaft 20 and fixed to the element 42 as at 47, is spaced from the element near its periphery to provide an annular groove 48 for the cutting element 35. A plurality of work receiving apertures 49 is formed in the member 45 at spaced positions adjacent its periphery, to receive material or work 50, which in the present instance is tubular insulating material. Apertures 52 are also formed in the element 42 in alignment with the apertures 49 of the member 45, to receive transparent tubular material receiving members 53. These members 53 extend like distances above the element 42, to receive and support desired lengths of the material 50, their transparent nature allowing the operator to observe their remaining lengths of material in the tubes during the operation of the apparatus so that additional lengths of ma-

terial may be placed therein before the previous lengths have been spent. An annular groove 55 is formed in the element 42, this groove continuing into the tubular members 53 for approximately one-half the cross-sectional areas thereof for receiving a flexible element in the form of an endless belt 56. A sheave 58, rotatably supported at 59 upon a bracket 60, mounted upon the base 10, is grooved to receive the belt 56 and be rotated by the belt with the element 42.

The cutting element 35 may be of any desired structure, for example, a circular metal saw, disposed upon an internally threaded clamping element 63 of a shaft 64 and secured in place by a companion clamping element 65 centrally apertured for a shoulder screw 66 receivable in a central aperture of the cutting element. A threaded shank 67 of the clamping element 65, adapted for interengagement with a threaded aperture 68 of the clamping element 63, provides interconnection of the clamping elements to clamp the cutting element therebetween. With this structure it is possible to readily remove the cutting element 35 from the apparatus and replace it with another cutting element merely by removing the screw 66 and clamping element 65 from the element 63. The shaft 64 is journalled in suitable bearings 69 and 70 and carries a pulley 71 which is driven by a belt 72 connected to any suitable power means (not shown). A casing 74, including a cover 75 hinged thereto as at 76, jointly surround the cutting element, except the portion disposed in the groove 48, to receive the particles resulting from the cutting operation. An outlet 77 for the casing 74 may be connected to any suitable suction means (not shown) to remove the particles resulting from the cutting operations.

The cam 23 is apertured, at 80, adjacent the cutting element 35, to receive a chute 81, the upper end of which is disposed in the aperture 80 and fixed thereto by suitable means (not shown). The chute 81 is positioned to receive the portions or lengths severed from the material 50 and to direct them to a receptacle or other suitable receiving means (not shown).

Considering now the operation of the apparatus, let it be assumed that each of the transparent holders or tubular members 53 is provided with material 50, that the cutting element 35 is rotated, and that the motor 15 is energized to cause rotation of the shaft 20 through the actuation of the unit 14. The element 42 is then rotated in the direction of the arrow (Fig. 2), causing movement of the belt 56 therewith. To obtain a clearer understanding of the apparatus it is suggested that one of the work supplying stations be selected and followed through one complete cycle of the element 42.

Selecting, for example, the bottommost station in Fig. 2, the material at this station is about to be released by the belt 56, allowing the material 50 to drop by gravity onto the adjacent inclined portion 39 of the cam 23 and rest thereon, continuing to move downwardly until it reaches the low portion 39. The material will continue to move relative to the cam over the low portion 38 until it reaches the next tapering or diagonal surface 39, at which time it will start to move upwardly in its holder or tubular member 53. At substantially the mid point of the present diagonal surface 39 of the cam 23, this material will be moved into engagement with the belt 56 and will be forced by the belt into intimate engagement with the innermost surface portion of its holding or tubular member 53. This holding effect on the material continues for the next half cycle of the element 42.

Returning to the position where this holding means begins, adjacent the mid point of the present diagonal cam surface 39, the material is gripped and moved by the diagonal cam surface into a measured position upon the high portion 39 of the cam 23, to assure feeding of a measured length of the material to the cutting element 35. The material, as heretofore stated, continues to be held by the belt in its tubular member, as illustrated in Figs. 3 and 4, to thus firmly hold the material perpendicular with respect to the cutting element and against displacement during the cutting operation when the material is presented to the cutting element 35. By viewing Fig. 3, it is apparent that the member 45 supports the material beneath the cutting element, aided, of course, by the holding force of the belt 56. The desired length is severed from the supply of material by the time it reaches the chute 81, this length of material dropping down the chute and into a suitable receptacle. Continuing with this selected material, a length of which has just been severed therefrom, the material continues to be held in place by the belt until it reaches the selected starting position, after which the material is freed and lowered to drop upon its adjacent diagonal cam surface 39, where the material is again advanced to again prepare it for another feeding operation to the cutting element.

This same operation continues successively for each supply of material, the combination of the belt and cam assuring feeding of given lengths of the material to the cutting element, the belt further functioning, aided by the holding or tubular members 53 for the material and the member 45, to firmly hold the material so that accurate cuts may be made therein to assure parallel relationship of the ends of the lengths severed from the supplies of material.

The lengths of the portions severed from the supplies of material may be varied without varying the function of the apparatus, by raising or lowering the cam 23. This is brought about through the micrometer adjusting element 27, the rotation of which causes raising or lowering of the cam measured distances relative to the element 42.

Although specific improvements of the invention have been shown and described, it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. A cutting apparatus comprising a cutter, a support, an unpierced holder of transparent material for a material carried by the support, means to cause relative movement of the support and cutter to cause cutting of portions from the material, and means to hold the material against movement relative to the support during the cutting of the length therefrom.

2. A cutting apparatus comprising a cutter, an unpierced tubular support of transparent material for elongate material having a lateral opening therein, means to cause relative movement of the support and cutter to cause cutting of portions from the material, and means adapted to enter the opening of the support to hold the material therein against movement relative thereto during the cutting of the portion therefrom.

3. A cutting apparatus comprising a cutter, a

support for a material, means to cause relative movement of the support and cutter to cause cutting of portions from the material, a measuring element disposed beneath the support for the material to drop thereon by gravity for controlling the length of the portions cut from the material, and micrometer means actuable to vary the position of the element relative to the support to vary the lengths of the portions.

4. A cutting apparatus comprising a rotatable cylindrical turret having an annular groove in its outer periphery and spaced material receiving apertures extending through the turret and opening outwardly into the groove intermediate their ends, a cutting element disposed at a position adjacent the turret, a pulley disposed adjacent the turret at a position diametrically opposed that of the cutting element, a belt connecting the turret and the pulley, the latter holding the belt free of the materials in the apertures adjacent the pulley to free such materials for movement downwardly by gravity and to extend into the portion of the groove adjacent the cutting element and the adjacent apertures to cooperate with the walls of the other apertures to grip the materials therein during rotation of the turret relative to the cutting element, and an annular member held against rotation beneath the turret to support the materials dropped thereon by gravity and control the lengths cut therefrom by the element.

5. A cutting apparatus comprising a rotatable turret having an annular groove in its periphery and spaced material receiving apertures extending through the turret and opening into the groove intermediate their ends, a cutting element disposed at a position adjacent the turret, a pulley disposed adjacent the turret at a position diametrically opposed that of the cutting element, a belt connecting the turret and the pulley and extending into portions of the groove and apertures to free materials in the apertures adjacent pulley for movement by gravity and to cooperate with the walls of the other apertures to grip the materials therein during rotation of the turret relative to the cutting element, and a control member held against rotation and having a gaging surface portion disposed in a given plane adjacent the cutting element, a receiving surface portion disposed in a lower plane adjacent the pulley and an intermediate ramp portion connecting the surface portions to force the adjacent materials, which are held in their apertures by the belt, upwardly and onto the gaging surface.

6. A cutting apparatus comprising a rotatable turret having an annular groove in its periphery and spaced material receiving apertures extending through the turret and opening into the groove intermediate their ends, a cutting element disposed at a position adjacent the turret, a pulley disposed adjacent the turret at a position diametrically opposed that of the cutting element, a belt connecting the turret and the pulley and extending into portions of the groove and apertures to free materials in the apertures adjacent pulley for movement by gravity and to cooperate with the walls of the other apertures to grip the materials therein during rotation of the turret relative to the cutting element, an annular member held against rotation beneath the turret to support the materials dropped thereon by gravity and control the lengths cut therefrom by the element, and micrometer means actuable to vary the position of the control member relative to the turret to vary the lengths of the portions cut from the materials.

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