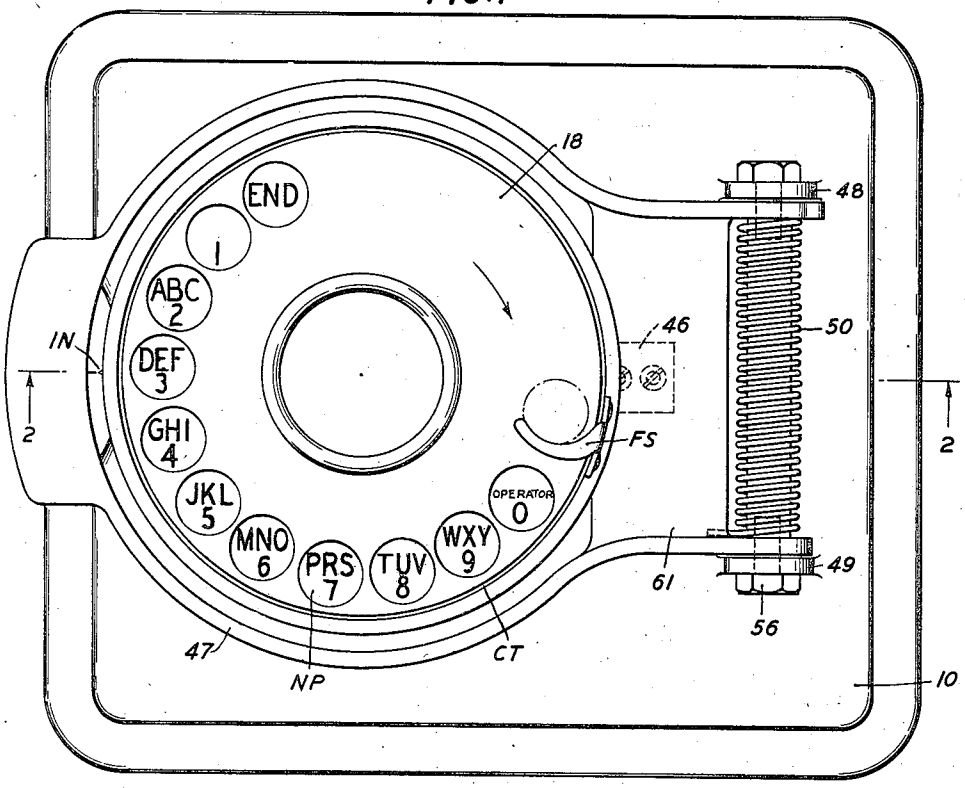
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CUTTING TOOL

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FIG. 1



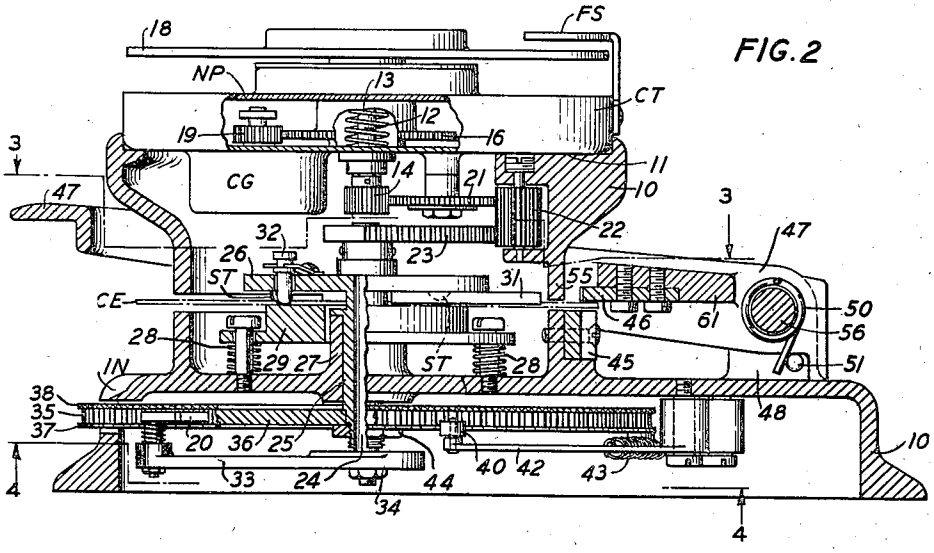




FIG. 2

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FIG. 3

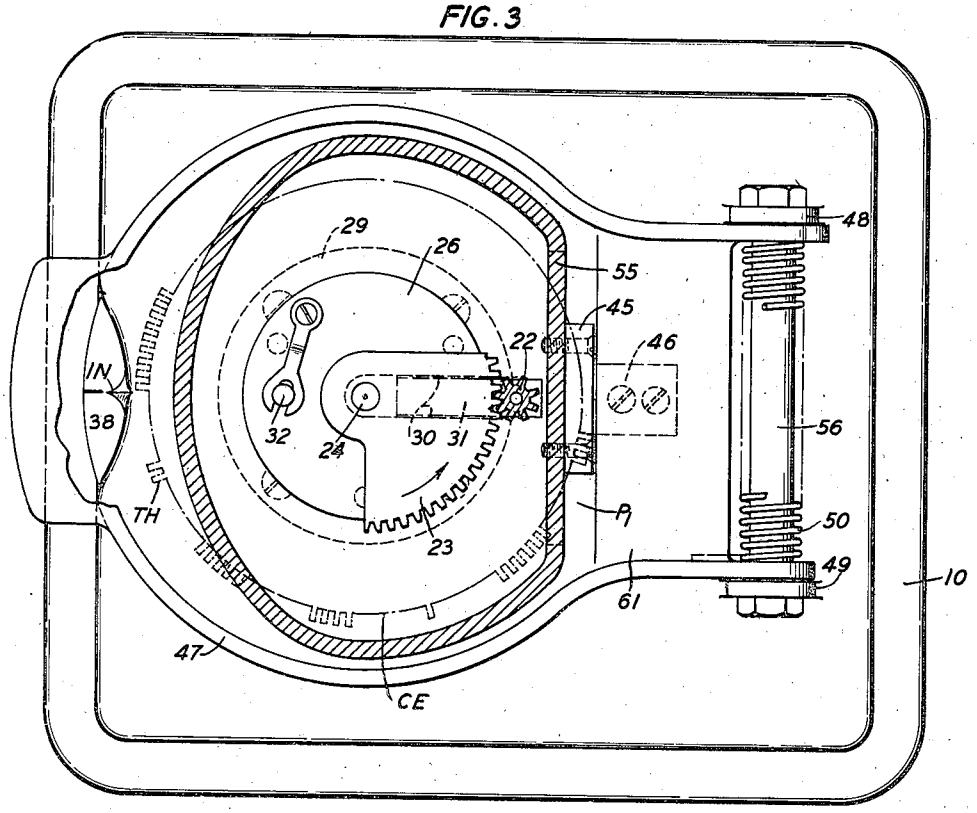
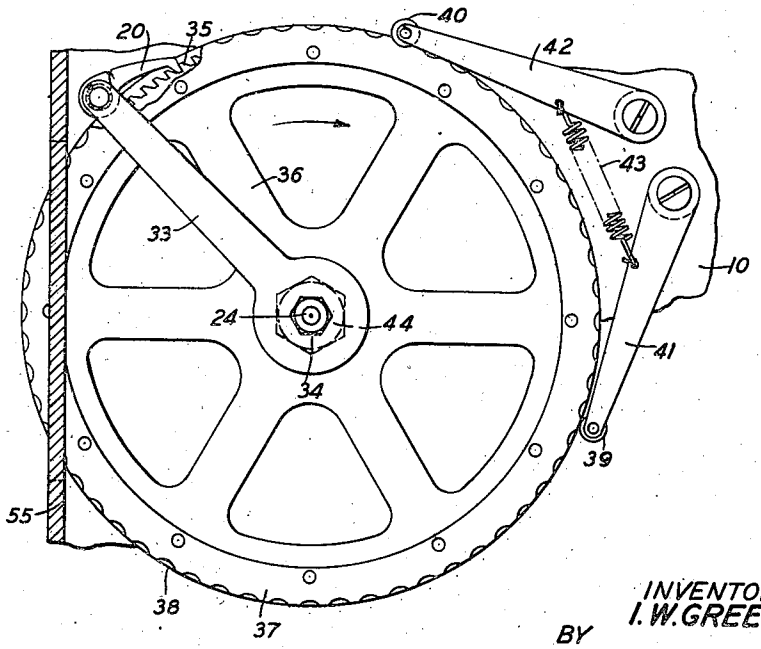



FIG. 4




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# UNITED STATES PATENT OFFICE

2,044,527

## CUTTING TOOL

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Application June 8, 1935, Serial No. 25,689

8 Claims. (Cl. 164—50)

This invention relates to tools and more particularly to a type of tool for use for cutting portions in the form of notches at the peripheries of disc members to form code elements as used, for example, in telephone call transmitters of the so-called repertory type.

In such call transmitters, as is well known, a member is positioned in operative relation with a code element in the form of a notched disc for operating shunting contacts which are provided for negativing predetermined operations of a continuously operating pulsing mechanism for transmitting sets of impulses according to the character or length of ridges formed at the periphery of the disc by the cutting of such notches. The portions thus removed from the periphery of the disc form the so-called interdigit spaces which are provided so as to obtain a certain interval of time between each digit transmitted for permitting the proper operation of the selector switches at the exchange, such digit being determined as above described by the angular distance of the ridge portions formed at the periphery of the disc by the cutting of the notches.

The object of the invention is to provide a tool with which the forming of such code elements may be effected in a convenient and accurate manner.

According to the tool of the invention the operation of a finger wheel for a selected digit appearing on a number-plate to a point determined by a finger stop is effective to rotate a gearing mechanism for actuating a ratchet device and thereby a circular plate having means for engaging a radial slot in the disc for rotating it an angular distance corresponding to the angular movement of the finger wheel. Means is provided for yieldably holding the code element in concentric relation with respect to its actuating circular plate and manually operable means is provided for actuating cooperating cutting members upon each operation of the finger wheel for forming a notch at that point. Means is provided for manually operating the wheel element of the ratchet mechanism independently of the operation of the finger wheel for rotating the circular plate and thereby positioning the code element and its operating mechanism in normal starting position for the removal of a completed disc and for the insertion of another code disc for a subsequent call designation forming operation, with means carried by the wheel of the ratchet mechanism cooperating with an index formed with the casing for indicating such starting position and means is provided for yieldably holding such a wheel in each of its operated positions during the return movement of the finger wheel under the tension of a motor spring, in turn, controlled by the operation of a one-way effective governor mechanism.

Other features and advantages of the invention will appear from the following description and by the claims appended thereto, reference being had to the accompanying drawings in which,

Figure 1 is a plan view;

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2; and

Fig. 4 is an underside view of Fig. 2 showing the base in section taken on line 4—4 of Fig. 2.

The tool of this invention consists of a base 10 which is provided with a shoulder portion 11 for mounting a casing CT provided with a number plate NP and in this casing is journaled a centrally disposed shaft 12 on which is securely mounted a finger wheel 18, a gear 16 and a pinion 14, shown in Fig. 2. The movement of finger wheel 18 in the direction indicated by the arrow in Fig. 1 is effective to tension a helical spring 13 and rotate the pinion 19 of a one-way effective centrifugal governor CG through its engagement with the gear 16, this governor being provided for controlling the return movement of finger wheel 18 to normal unoperated position and the actuating pawl of a ratchet mechanism under the tension of helical spring 12, as will be hereinafter described in detail.

On the underside of casing CT is loosely mounted an intermediate gear 21 which meshes with pinion 14 secured at the lower end of shaft 12 and with a pinion 22 loosely mounted on the base 10, this pinion engaging a gear sector 23 keyed on the top end of a spindle 24.

Spindle 24 is mounted in the hub portion 25 of a circular plate 26 which is, in turn, rotatably mounted in a bearing portion 27 formed with the base 10. On this base is mounted as on spring 28 a circular table member 29 for receiving the disc element CE shown in dotted lines in Figs. 2 and 3 to be formed with peripheral notches and having a slot 30 engaging a key member 31 secured to the underside of disc 26. The code element CE has an opening engaged by a spring pressed pin 32 for holding the disc in position concentric with respect to the plate 26, and this plate 26 carries at its underside a plurality of studs ST provided for holding this disc firmly on the table 29 through the tension of spring 28.

To the lower end of spindle 24 is secured as by a nut screw 34 an arm 33 which carries at its free end a spring-pressed pawl 20 disposed in operative relation with the teeth 35 of a ratchet wheel 36 having a notched ring 37 secured to its underside and a knurled ring 38, the latter being provided for manually rotating this wheel and thereby the circular plate 26 independently of finger wheel 18 for a purpose that will be hereinafter described in detail.

As shown in Fig. 4 the notched ring 37 is engaged by rollers 39 and 40, as the case may be, mounted at the free ends of arms 41 and 42, in turn, pivotally mounted on the base 10 and held in engaged relation with the notched ring 37 by a spring 43, this ring being mounted on the lower end of sleeve or hub 25 of plate 26 and is securely held thereby by nut 44.

The base 10 is provided with a straight portion 55 shown in Figs. 2, 3 and 4 provided for mounting a stationary cutting element 45 registering with a cooperating movable cutting element 46 carried by a manually operable lever member 47. This lever member is mounted on pivot 56 supported by lugs 48 and 49 projecting perpendicularly from the base 10 and a spring 50 having one end engaging a pin 51 carried by lug 48 and the underside of the spacer flange member 61 of lever 47 is provided for holding this lever in its unoperated position, as shown in Fig. 2, the effective portions of cooperating cutting elements 45 and 46 being substantially segment-shaped and of a width such as to cut a predetermined number of teeth, such as TH, or equivalent portion to form at the periphery of the disc CE an interdigit space which is equal to the movement of finger wheel 18 from the word END to the finger stop FS, as shown in Fig. 1.

In a typical code forming operation the disc CE which may be provided with a continuous row of teeth, such as TH, shown in Fig. 3 is inserted between the circular plate 26 and the circular table 29 with its slot 30 registering with the key 31 of plate 26 wherein the spring-pressed pin 32 engages with the opening in the disc for holding it in concentric relation with respect to the circular table 29 and rotatable plate 26 shown in Fig. 2, with the index IN registering with the mark inscribed on the knurled ring 38 carried by ratchet wheel 35 as shown in Fig. 3. A movement of the finger wheel 18 from digit 3, for example as indicated by the number plate NP to the position against the finger stop FS is effective to actuate pinion 14 for moving the gear sector 23 through the intermediary gears 21 and 22 and thereby the arm 33 and the pawl 20 carried thereby for operating the ratchet wheel 36 an angular distance corresponding to the ratio of gear 14 and 23, that is equal to nine teeth of this wheel which corresponds to nine teeth TH of the code element CE. The finger wheel 18 is then released to permit it to return to normal under the tension of spring 13 controlled by the governor CG, the ratchet wheel 36 remaining in its advanced position by the tension of spring 43 acting on arms 41 and 42, one of them engaging the notch in the ring 37 carried by the wheel 36. The manually operable lever arm 47 is moved downwardly against the resistance of its retractile spring 50 for cutting a number of teeth or equivalent portion from the code element corresponding to the width of the cutting members 45 and 46, that is, six teeth to form the interdigit portion P, thus leaving three teeth at the periphery of the disc of the nine teeth involved in this example of dialing operation. In a second operation of finger wheel 18, as above described, from digit 6, for example, as indicated by the number plate NP to the position determined by the stop FS is effective to actuate the arm 33 as to advance the wheel 35 twelve teeth wherein the operation of the cutting element 45 through the downward movement of lever 47 is effective to cut six teeth in the manner above described, thus leaving six teeth at the periphery of the disc and this operation is continued to the completion of the code forming operation which includes the cutting of the remaining teeth at the periphery of the disc which are not used in the formation to a particular code designation. The cutting operation of such remaining teeth is effected by moving the finger wheel 18 from the position indicated by the word "END" on the number plate against the finger stop and operating the lever 47 after each operation of the finger wheel, such angular movement being equal to six teeth of the disc and equal to the width of the cutting elements 45 and 46. In cases where a number of such operations position the mark on the ring 38 past the index IN formed with casing 10, the ratchet wheel 36 may be moved manually in the direction indicated by the arrow in Fig. 4 independently of the finger wheel 18 for positioning the plate 26 in the starting or normal position and thereby permitting the removal of the completed disc and the insertion of another disc.

What is claimed is:

1. A tool for cutting portions at the periphery of a disc member to form a code designation, said tool comprising a pair of clamping plates for receiving the disc, a number plate, a manually operable member having means registering with said number plate for actuating one of said clamping plates in a plurality of variable steps for moving said disc, and means for cutting a portion at the periphery of the disc in places determined by the extent of each of said steps as indicated by said number plate.

2. In a tool for cutting portions at the periphery of a disc to form a code element, a pair of cooperating segment shaped cutting members, a pair of clamping plates for yieldably holding the disc in cutting relation with said members, means defining a number plate, a finger wheel and a gear mechanism for imparting predetermined movements to one of said clamping plates for successively positioning the disc with respect to said members, and means for operating one of said members for cutting portions of the disc according to the formation of said members in each of the movements of the finger wheel with respect to said number plate.

3. In a tool for cutting portions at the periphery of a disc to form a code designation, a pair of circular clamping plates for operatively receiving the disc and having means for yieldably holding the disc in concentric relation therewith, cooperating cutting members disposed in overlapping relation on the peripheral portion of the disc, a number plate, a manually operable member having means registering with said plate for imparting variable step-by-step angular movements to one of said plates for positioning the disc with respect to said members whereby the operation of one of said members at the end of each step is effective to cut a portion of the disc to form a notch.

4. In a tool for cutting portions at the periphery of a disc member to form a code element, a pair of cutting members, a finger wheel, a number

plate, a finger stop, a pawl actuated by the movement of said finger wheel, a ratchet wheel rotated by the movement of said pawl, a mounting plate actuated by said ratchet wheel for operating the disc, cutting members, and a handle lever for actuating one of said members for cutting portions at the periphery of the disc upon each adjusting movement of said finger wheel.

5. In a tool for cutting portions at the periphery of a disc member to form a code element, a finger wheel, a number plate, a finger stop, a gearing mechanism actuated by said finger wheel from a selected point on said number plate to said finger stop, cooperating segmental shaped cutting members, a ratchet mechanism operatively connected to said gear mechanism, a clamping plate operated by said ratchet mechanism for rotating the disc with respect to said cutting members, manually operating means for operating one of said members for cutting a portion at the periphery of the disc as determined by the character of said members, a retractile spring for said finger wheel, and a governor for controlling the return movement of said finger wheel.

6. A tool for cutting portions at the periphery of a disc member to form a code element as used in call transmitters, said tool comprising a pair of cutting members, a mounting, a finger wheel, a number plate secured to said mounting, a supporting shaft for said finger wheel, a pinion carried by said shaft, a gear sector actuated by said pinion, a ratchet mechanism operable through the movement of said gear sector and advanced in one direction upon each adjusting movement of said finger wheel and a circular plate actuated by the operation of said ratchet mechanism for positioning the disc with respect to said cutting members, and means for actuating one of said members for cutting portions of the disc upon each adjusting movement of said finger wheel as indicated by said number plate.

7. In a tool for cutting portions at the periphery of a disc member used as a code element in call transmitters, said tool comprising a pair of cutting members, a rotatable wheel having a plurality of finger holes equally spaced in a portion of its circumference, a plate having code designations registering with the holes of said wheel, a finger stop for limiting the movement of said wheel from any one of said finger holes, a shaft for said wheel, a pinion carried by said shaft, a gearing and a ratchet mechanism operated by said pinion, means actuated by said ratchet mechanism for moving the disc member according to the successive manual operation of said wheel from said designations to said finger stop for positioning said disc with respect to said members and means for actuating one of said members for cutting portions at the periphery of the disc upon each operation of said finger wheel.

8. In a tool for cutting portions at the periphery of a disc member used as code elements in a repertory dial and having a radial slot, said tool comprising a pair of cutting members, a finger wheel, a number plate, a finger stop for limiting the movement of said finger wheel from points indicated on said number plate, a shaft for said finger wheel, a pinion carried by said shaft, a gear sector actuated by said pinion, a base having a bearing portion, a circular plate having a sleeve portion rotatably mounted in said bearing, another shaft for said gear sector disposed concentric to the first mentioned shaft, an arm carried by the second-mentioned shaft, a pawl carried by said arm, a ratchet wheel carried by said sleeve and engaged by said pawl, a key member carried by said circular plate engaging the slot in the disc for rotating it upon the operation of said ratchet wheel, a spring tensioned by the selective movement of said finger wheel for returning it to normal when released by the operator upon reaching said finger stop, a governor for controlling such return movement, means for yieldably holding the ratchet wheel and the disc in each adjusted position with respect to said cutting members, and manually operable means for actuating one of said members for cutting a portion at the periphery of the disc in each adjusted position as determined by the angular movement of said finger wheel from any number on said number plate.

IRVING WALTER GREEN.