Nov. 27, 1945. G. J. KENNEDY 2,389,783

CUTTING AND COUNTING MACHINE

Filed Jan. 29, 1944 3 Sheets-Sheet 1

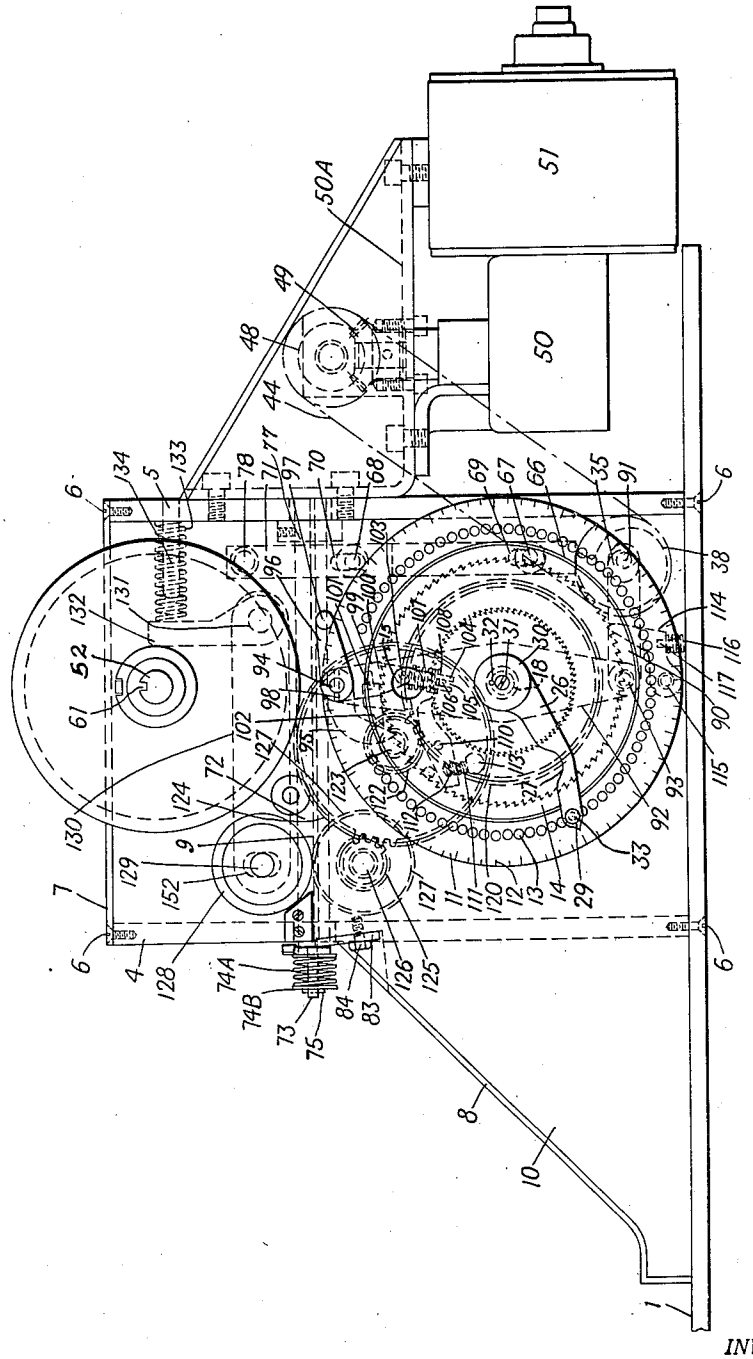


Fig. 1

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Filed Jan. 29, 1944 3 Sheets-Sheet 2.

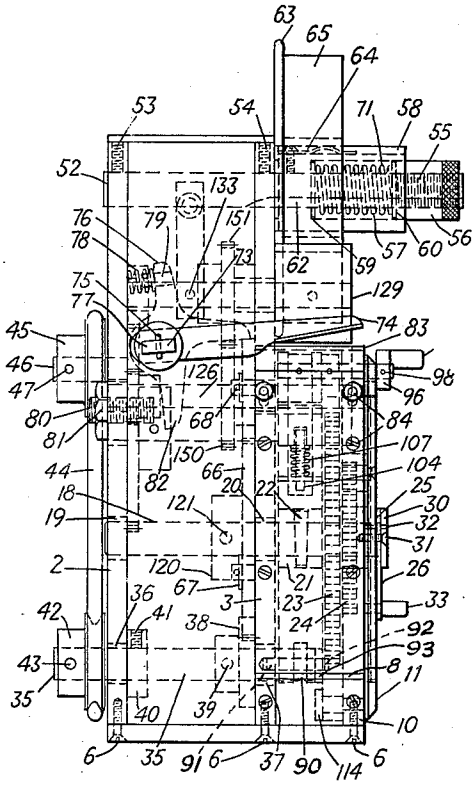


Fig. 2

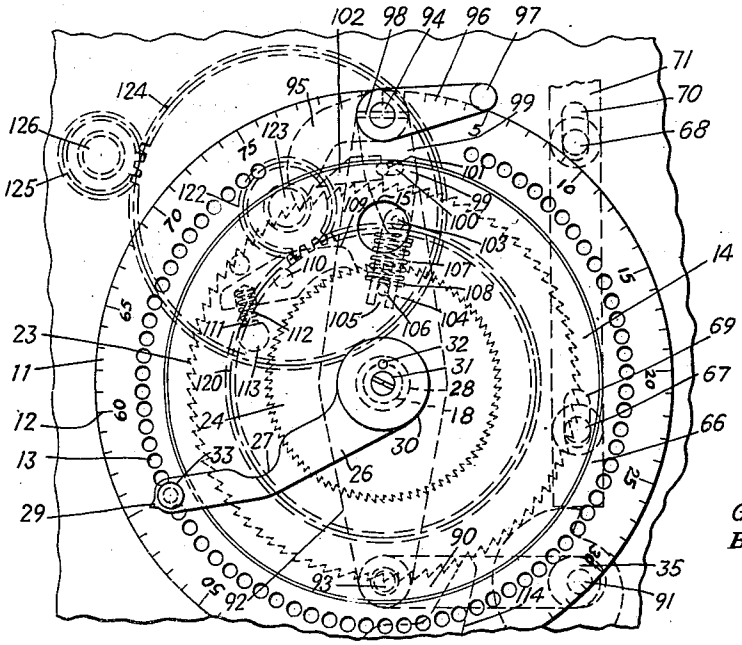


Fig. 4

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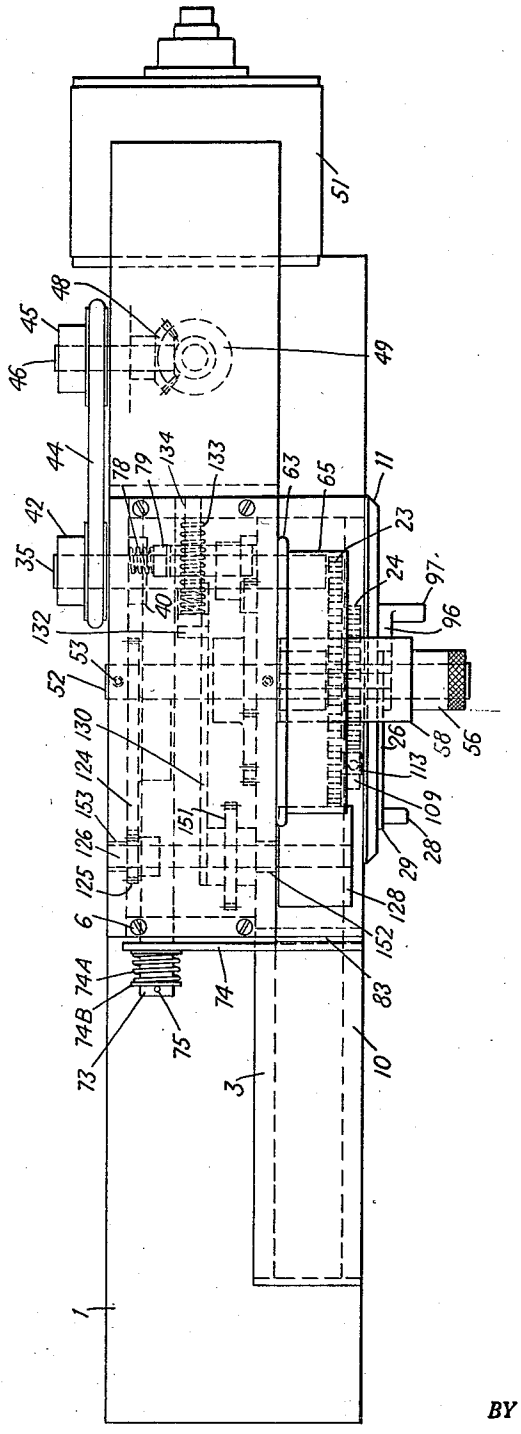


Fig. 3

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Patented Nov. 27, 1945

2,389,783

UNITED STATES PATENT OFFICE

2,389,783

CUTTING AND COUNTING MACHINE

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Application January 29, 1944, Serial No. 520,355

6 Claims. (Cl. 164—42)

This invention relates to a new and useful automatic measuring, cutting and counting machine.

An object of this invention is to provide a simple and efficient automatic measuring, cutting and counting machine.

Another object of this invention is to provide an improved means for measuring, cutting and counting of thin strips of metal or wire for use with electrical apparatus, such as, for example, metal foil for electrical condensers.

A feature of this invention is the arrangement of an improved dial setting mechanism synchronized with a movable measuring feed and cutter by means of which a predetermined number of pieces may be measured, cut and counted.

By means of this invention, an operator can set the machine in operation and go about doing other condenser building operations and then return to the machine when a desired number of parts will be found cut and counted.

This invention will best be understood by referring to the accompanying drawings in which:

Fig. 1 is a front view of the measuring, cutting and counting machine of this invention,

Fig. 2 is a side elevation of Fig. 1,

Fig. 3 is a top elevation of Fig. 1, and

Fig. 4 is a front view of the index ring and dial.

Referring now in detail to the drawings, upon base 1 there are mounted upright support plates 2 and 3 and 10, and end plates 4 and 5 which are fastened together by means of a plurality of flat headed screws 6. A top plate 7 serves as a cover plate. Plates 4 and 5 are secured to support plates 2 and 3. An inclined surface member 8 is secured to plates 4 and 10 and is arranged to serve as a chute for guiding the strips of metal foil to a suitable container (not shown) after they have been severed. An intermediate cover plate 9 is fastened to upright plates 3 and 10. In front of cover plate 10 there is located an index fixed dial ring 11 of metal which is divided into any number of suitable graduations 12, for example, from zero to eighty-two, as shown in the drawings. Adjacent the graduations from five to seventy-five are arranged a plurality of index pin engaging holes 13. Concentric with the index fixed dial ring 11 there is located a movable dial plate 14 which has located therein a small aperture 15 in which the operator's finger is placed for manually setting the machine in operation for cutting a predetermined number of metal strips. A dial shaft 18 is arranged to rotate in bearings 19 and 20 which are located in plates 2 and 3. A large ratchet wheel 23 having a hub portion 21 is arranged to rotate with shaft 18 by means of a tapered pin 22 passing through the hub. A small ratchet wheel 24 is riveted to the large ratchet wheel 23 and has its slanting teeth opposed to the slant of the teeth in ratchet 23. The movable dial 14 is located just forward of the small ratchet wheel 24. Forward of dial ring 11 stop arm 26 is located. Stop arm 26 has a depressed portion 27 and an aperture 28 located at the inner end thereof. The shaft 18 projects through the aperture 28. The extreme outer end of stop arm 26 is shaped to serve as a pointer 29. A collar 25 spaces arm 26 from the movable dial 14. Stop arm 26 is restrained from coming off the forward end of dial shaft 18 by means of a washer 30, a flat headed screw 31 and pin 32. The stop arm 26 can be set at any position on the fixed dial ring 11 and locked by means of a movable pin index 33 engaging holes 13. A cam shaft 35 is arranged to rotate on bearings 36 and 37 in plates 2 and 3. A cam 38 is pinned to cam shaft 35 by means of a pin 39 in a position adjacent to plate 3. A collar 40 is located adjacent to plate 2 and is secured to shaft 35 by means of a set screw 41. On the other side of plate 2 there is located a driving pulley 42 which is pinned to a cam shaft 35 by means of a set screw 43. A belt 44 drives cam shaft 35 by means of a second pulley 45 which is secured to a drive shaft 46 by means of a set screw 47. Shaft 46 is driven by means of bevel gears 48 and 49 which in turn are rotated by means of gear reduction unit 50 and electric motor 51, the arrangement being such that the shaft 46 rotates approximately seventy to eighty revolutions per minute.

A support frame 50A is secured to plate 5 for supporting motor 51 and gear reduction unit 50 to the machine. Directly above dial shaft 18 there is located a shaft 52 which is secured to plates 2 and 3 and retained in position by means of securing screws 53 and 54. The forward end of shaft 52 is threaded at 55 for adjusting nut 56 which is arranged to adjust the tension on the roll of stock to be cut by applying tension by means of spring 57 to a removable hub 58, the tension being applied between washers 59 and 60. Washers 59 and 60 each have an inwardly projecting portion 61 which is arranged to slide in a slot located in the forward end of shaft 52. A roll foil backing plate 63 is concentrically arranged around shaft 52. The hub 58 has a flat tension spring 64 for providing frictional engagement to the roll of foil 65 which is to be meas-

ured and cut by means of the machine of this invention.

The metal foil is cut by the actuation of a cam actuated push rod 66 which is secured to plate 3 by means of guide pins 67 and 68, the rod 66 being slotted at 69 and 70 to permit the rod to move up and down in a vertical position. A spring arm 76 is pinned to a shaft 72 and is actuated by up and down motion of rod 66. The shaft 72 is flattened at 73 to receive a movable knife blade 74, the knife blade 74 being secured in place by means of spring 74A, a washer 74B, and a removable pin 75. The spring arm 76 is secured at 77 to shaft 72. The spring arm 76 and shaft 72 are both mounted for movement on the upper portion of plate 2. A helical extension spring 78 is interposed between the inner surface of plate 2 and arm 76, the spring being retained in proper alignment by means of a stud 79. The amount of the opening and movement of movable knife blade 74 is governed by means of a threaded bolt 80 which is threaded into plate 2 and locked in position by means of a thin nut 81, the bolt 80 being positioned directly below spring 78 on an extension portion 82 of arm 76. The fixed knife plate 83 is secured to plates 3 and 10 by means of a plurality of bolts 84. With the above mentioned cutting mechanism, it will be noted that the knife blade 74 opens and closes with one complete rotation of cam 38. Therefore, the knife is always moving to cut the foil. However, the foil will not be cut unless the strip is fed by the feed rollers. The feed rollers will not rotate until the plate 14 is set in motion.

The proper measured length and number of predetermined strips are obtained by means of having a link 90 coupled eccentrically to and offset $\frac{1}{16}$'' on cam 38 by means of a pivot pin 91. An oscillating arm 92 is arranged to freely rotate around pawl shaft 18 and is connected by a pivot stud 93 to a link 90 at the lower portion thereof. The upper portion of oscillating arm 92 is slotted to retain an over center spring device which oscillates with arm 92. Arm 92 is provided with a stud 94 to which is fastened a ratchet pawl 95 and is positioned so as to normally engage the teeth of the large ratchet wheel 23. The forward end of stud 94 has located thereon an operating arm 96 having an operating handle 97. The operating arm 96 is secured to stud 94 by means of a pin 98. Also pinned to stud 94 is a toggle link member 99 which is slotted at 100 for a stop pin 101 driven into 92. A ratchet knock-off member 102 is arranged to be an integral part of movable dial plate 14, and it is located so that the under side of member 102 just clears the top of the teeth of the large ratchet wheel 23. To the lower portion of toggle 99 there is linked by means of pin 103 an arm 104 which is slotted at 105 to receive a pin 106. A helical compression spring 107 surrounds arm 104 and is retained in a compressed position by means of a washer 108. The small ratchet wheel 24 is riveted to a large ratchet wheel 23. The spring 107 acts as an over center spring, holding pawl 95 either in engagement with ratchet wheel 23, or when thrown the other side of center by manually moving ratchet knock-out member 102 by means of dial plate 14, to which it is attached definitely out of engagement until returned to engagement by movement of handle 97. A second pawl 109 is pivotally secured by means of a pin 110 to movable dial plate 14 and serves to couple dial plate 14 with ratchet wheel 23 and thus with foil feeding means when pawl 95 is engaged with ratchet wheel 23. Dial plate 14 is free to move in counter clockwise motion for setting purposes only but is restrained from moving in clockwise direction by pawl 109. A helical compression spring 111 is recessed at 112 in one end of pawl 109, the spring 111 being compressed by means of a stud 113 which is also secured to movable dial plate 14, the arrangement being such that the pawl 109 engages the teeth of the small ratchet wheel 24. A third pawl 114 is pivotally secured by means of a pin 115 to plate 10. A helical compression spring 116 retains pawl 114 in proper position to prevent a backward movement of large ratchet wheel 23. The lower portion of spring 116 rests upon the base 1 and is guided in position by means of a stud 117.

The synchronizing cycle of operation between the movable knife blade 74 and the movable dial plate 14 is governed by a train of gears located on the inside surface of plate 3. The train of gears includes a large gear 120 which has its hub pinned to the dial shaft 18 by a taper pin 121. The large gear 120 meshes with a pinion gear 122 which rotates freely on a gear shaft 123. Secured to pinion 122 and for continuous rotation therewith is a second large gear 124 which meshes with a second pinion gear 125. Pinion gear 125 is fastened to a feed roller shaft 126 which has bearings in both plates 2 and 3. A gear 150 is mounted for rotation on shaft 126 and meshes with a similar gear 151 which is secured to a shaft 129. The forward extension portion of feed roller shaft 126 has located thereon a hard rubber roller 127. The arrangement of the train of gears is such as to give a 16:1 ratio so that $\frac{1}{32}$ movement of the ratchet wheel 23 will move the strip to be cut off $\frac{1}{16}$ of an inch long. The $\frac{1}{16}$ of an inch eccentricity of the drive oscillates pawl 95 slightly more than $\frac{1}{32}$ part of the ratchet to make certain that the pawl will engage. Thus the lengths of the foils when they are cut off are $\frac{1}{16}$ of an inch long. It is to be understood, of course, that this ratio may be changed by selecting a different set of gears having a different number of teeth to give any desired ratio of length of the feed roller to movement of link 90, or by having larger or smaller diameter rollers. A slight tension is provided between the feed roller 127 and the strip to be cut by means of a second hard rubber feed roller 128 mounted on shaft 129, the roller tension being provided by means of having shaft 129 secured to a U-shaped bearing arm 130 which is pivoted by means of a shaft 131. The U-shaped bearing member 130 is provided at the central portion thereof with a forward extending arm 132 which is fastened to shaft 131 by means of a pin 133, tension being provided for the feed roller 128 by means of a helical compression spring 134 which is interposed between plate 5 and the arm 132. The spring 133 is retained in position on plate 5 by means of a stud 134. Support plates 2 and 3 are slotted at 152 to retain shaft 129 in position.

In the operation of this device, the operator first sets the motor 51 in rotation, next the stop arm 26 is set in position to give a desired number of pieces of foil to be measured and cut by means of placing movable pin 33 in the index pin engaging holes 13. As shown in Figs. 1 and 4 of the drawings, the stop arm 26 is set to cut 55 pieces. The operator then places a finger in the small aperture 15 and rotates dial plate 14 in a counter-clockwise direction until the finger is

stopped by means of a depressed portion 27 on stop arm 26. The operating handle 97 is moved to the top position, as shown in Fig. 4 of the drawings, and in this position the toggle 99 is moved to the right and pawl 95 then engages the teeth of the large ratchet wheel 23. The forward movement of the oscillating arm 92 causes ratchet pawl 95 to rotate dial shaft 18 counter-clockwise. The dial shaft 18 in turn rotates the train of gears and thus causes a movement of shaft 126 to rotate feed rollers 127 and 128. The feed rollers are both driven by gears to measure out the strip material to a length of $\frac{15}{16}$ of an inch, as mentioned above, for each advance movement of the teeth of the large ratchet wheel 23. By the movement of knife 74 the strips are cut in the desired lengths during the time the ratchet is making the backward motion before picking up the next tooth. This operation is continued until the desired number of pieces of metal strips or foils are cut, which in this case is 55. The operation of cutting the strips is terminated by means of ratchet knock-off member 102 which is an integral part of dial plate 14, reaching a position such that pawl 95 cannot engage with ratchet 23. Pawl 95 then only oscillates between the last tooth then reached and the top of knock-off 102. When this position is reached the feed rollers stop feeding, although the motor continues to operate the cutting operation by knife blade 74. The operator in resetting the machine again moves the dial plate 14 counter-clockwise. The ratchet knock-off 102, being an integral part of dial plate 14, throws the pawl 95 definitely out of engagement with ratchet 23. The over center spring toggle device then moves to the left and holds the ratchet 95 up in the disengaged position until the operator, after resetting the machine, moves the handle 97 up towards the top of the machine. The ratchet 95 then again drops and engages the pawl 23 and the machine starts to measure and feed the foil as mentioned before and the cycle is repeated.

While I have indicated and described a system of my invention, it will be apparent to one skilled in the art that my invention is by no means limited to the particular devices shown and described, but that many modifications may be made without departing from the scope of my invention.

What I claim is:

1. An apparatus for measuring, cutting and counting metal strip, comprising a manually rotatable dial plate, an index ring surrounding said dial plate, a cam having a rotatable cam shaft, means for operating said cam shaft, a knife operated by said cam and cam shaft to cut the strip, means synchronizing said rotatable dial plate with the operation of said knife, means associated with said index ring to obtain a predetermined setting of said dial plate, and ratchet means operating said dial plate for measuring the strip and presenting it to the knife and to control the knife to cut a predetermined number of pieces of said metal strip.

2. A device for measuring, cutting and counting strip material comprising in combination upper and lower feed rollers through which said strip material is measured as it passes therethrough, a knife located adjacent said rollers for cutting said strip, an index ring, and means including two ratchet wheels and pawls to rotate said index ring, feed rollers, and operate knife for measuring and cutting a predetermined number of pieces of said strip material.

3. An apparatus for measuring, cutting and counting metal strip, comprising a manually rotatable dial plate, an index ring surrounding said dial plate, a cam having a rotatable cam shaft, means for operating said cam shaft, a knife operated by said cam and cam shaft to cut the strip, means synchronizing said rotatable dial plate with the operation of said knife, means associated with said index ring to obtain a predetermined setting of said dial plate, and ratchet means including a train of gears operating said dial plate for measuring the strip and presenting it to the knife and to control the knife to cut a predetermined number of pieces of said metal strip.

4. An apparatus for measuring, cutting and counting metal strip, comprising a manually rotatable dial plate, an index ring surrounding said dial plate, a cam having a rotatable cam shaft, means for operating said cam shaft, a knife operated by said cam and cam shaft to cut said strip, means synchronizing said rotatable dial plate with the operation of said knife, means associated with said index ring to obtain a predetermined setting of said dial plate, ratchet means operating said dial plate for measuring the strip and presenting it to the knife and to control the knife to cut a predetermined number of pieces of said metal strip, and a device to stop the movement of strip when the predetermined number of strips are cut.

5. A device for measuring, cutting and counting strip material comprising in combination upper and lower feed rollers through which said strip material is measured as it passes therethrough, an oscillating knife located adjacent said rollers for cutting said strip after passing through said feed rollers, means synchronizing the rollers with the operation of said knife, an index ring and a dial plate, and ratchet means including an oscillating arm operating said dial plate with respect to fixed positions on said index ring to move said knife for measuring the strip and presenting it to the knife and to control the knife to cut a predetermined number of pieces of said strip material.

6. An apparatus for measuring, cutting and counting metal strip, comprising a manually rotatable dial plate having a finger opening for manipulation thereof, an index ring surrounding said dial plate, a cam having a rotatable cam shaft, means for operating said cam shaft, a knife operated by said cam and cam shaft to cut said strip, means synchronizing said rotatable dial plate with the operation of said knife, means associated with said index ring to obtain a predetermined setting of said dial plate, and synchronized linkage and ratchet means operating said dial plate for measuring the strip and presenting it to the knife and to control the knife to cut a predetermined number of pieces of said metal strip.

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