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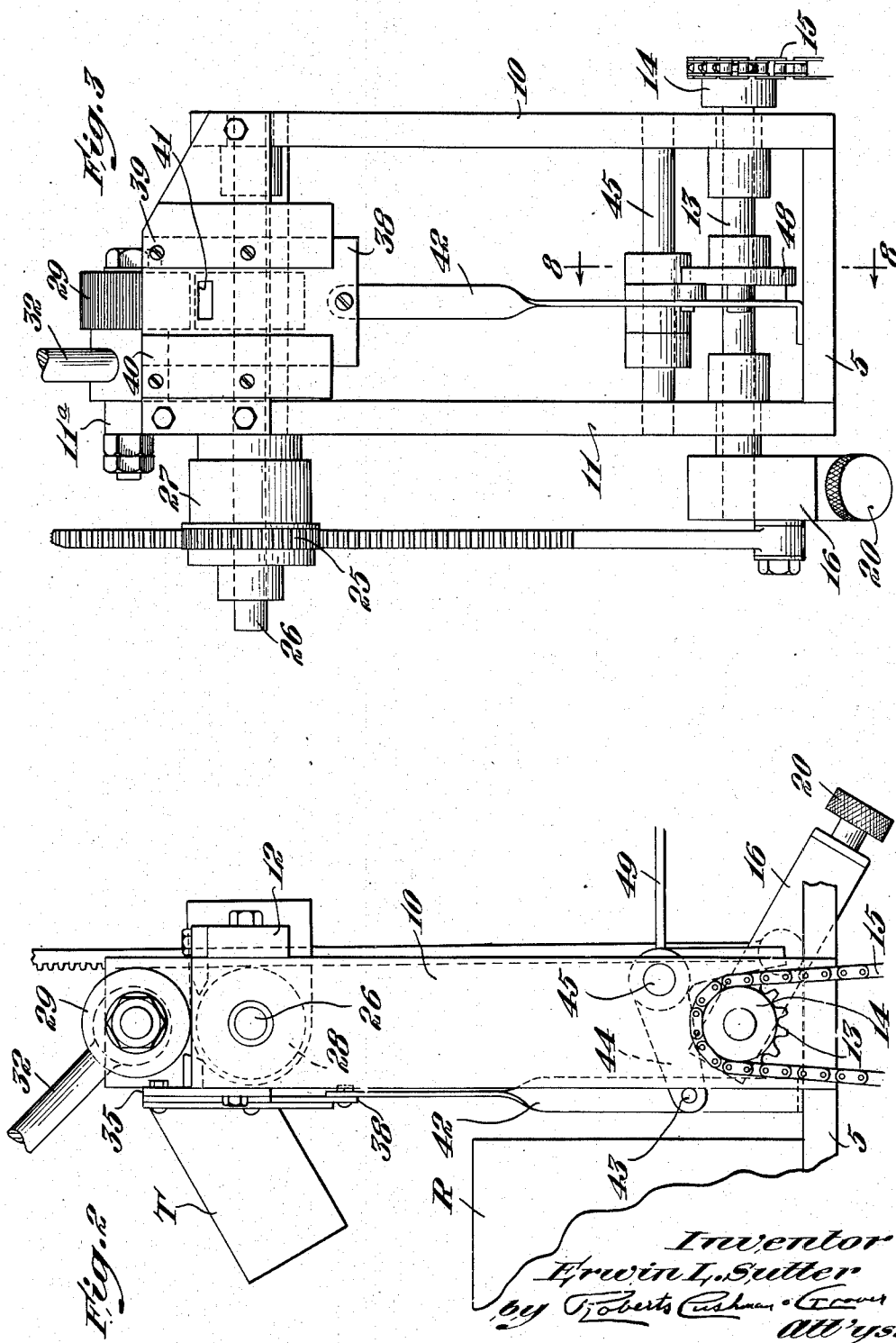
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CUTTING MECHANISM

Filed Sept. 30, 1943

3 Sheets-Sheet 2



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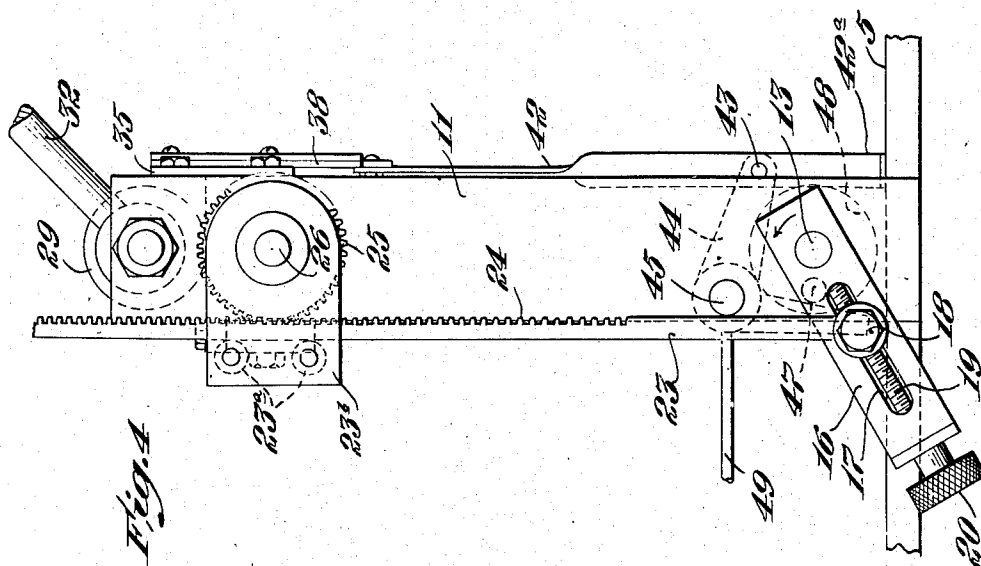
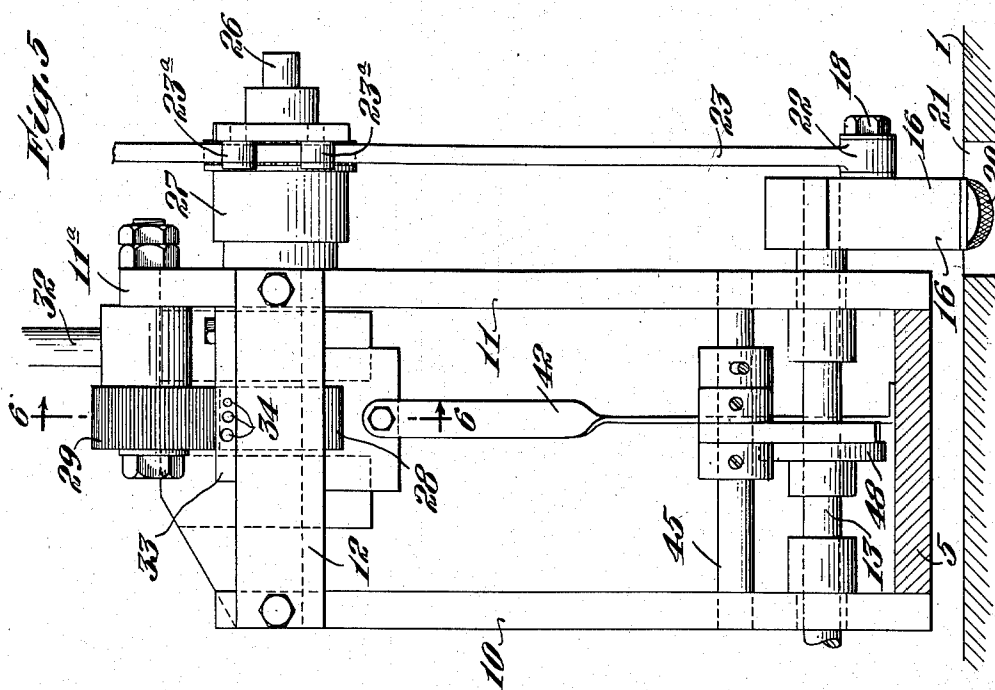
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CUTTING MECHANISM

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3 Claims. (Cl. 164—49)

This invention pertains to cutting mechanism and relates more particularly to apparatus operative automatically to cut strand material, for example wire, into uniform lengths. In the manufacture of electrical condensers, among other things, it is necessary to cut wire for leads into short uniform lengths, for example lengths of the order of from $1\frac{1}{2}$ to 3 inches, such lengths varying for condensers of different sizes. The principal object of the present invention is to provide a mechanism operative automatically to cut wire into such short uniform lengths and comprising means whereby the mechanism may readily be adjusted to cut different lengths within its range of capacity. A further object is to provide cutting mechanism capable of handling wires of different diameters and of severing the wire, whatever its diameter, with a clean smooth cut. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein

Fig. 1 is a diagrammatic side elevation to small scale, illustrating the apparatus of the present invention, certain parts being broken away;

Fig. 2 is a fragmentary side elevation to larger scale than Fig. 1, showing certain of the parts illustrated in Fig. 1;

Fig. 3 is a fragmentary rear view of the parts shown in Fig. 2, with certain parts omitted;

Fig. 4 is a view similar to Fig. 2, but showing the opposite side of the mechanism from that shown in Fig. 2;

Fig. 5 is a fragmentary front elevation of the mechanism shown in Fig. 2;

Fig. 6 is a fragmentary section substantially on the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary vertical section on the line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary vertical section substantially on the line 8—8 of Fig. 3.

Referring to the drawings, the numeral 1 designates a table, bench or other suitable support upon which the mechanism may be mounted. On this support rests a base plate 2 which supports spacer members 3 and 4 on which rests the bed plate 5 of the mechanism. Two parallel uprights 6 (Fig. 1) are secured at their lower ends to the opposite edges of this bed plate 5 and are provided at their upper ends with notches for the reception of a removable shaft or spindle 7 which carries a supply spool 8 for a coil of wire 9.

Vertical posts 10 and 11 (Fig. 5) are secured at their lower ends to the opposite edges of the

bed plate 5 and are rigidly united at their upper parts by a transverse plate 12 bolted to the forward edges of the posts 10 and 11.

At their lower parts the posts 10 and 11 are furnished with journals for the horizontal main drive shaft 13. This shaft projects out beyond the post 10 and has secured to its outer end a sprocket wheel 14 (Figs. 2 and 3) which receives a chain 15 driven by a motor M (Fig. 1) mounted on the plate 2. The shaft 13 projects at its opposite end beyond the post 11 (Figs. 4 and 5) and has secured to its outer end an elongate crank arm 16. This crank arm is provided with a slot 17 in which a crank pin 18 is adjustably mounted. This crank pin has at its inner end a block (not shown) having a screw-threaded opening which receives the threaded adjusting screw 19 having a knurled head 20 by means of which it may be turned. The crank pin may thus be moved lengthwise of the slot 17 and held in adjusted position.

The head 22 (Fig. 5) of a rack bar 23 is pivoted on the crank pin 18. This bar 23 has rack teeth 24 (Fig. 4) which always mesh with the teeth of a pinion 25 mounted on a shaft 26 journaled in bearings in the upper parts of the posts 10 and 11. Rolls 23^a engage the outer surface of the rack bar 23 so as to guide it in its up and down movements and to keep it always in mesh with the pinion 25. The pinion 25 is connected to the drive element of a uni-directional clutch 27 (of conventional type) concentric with the shaft 26, and whose driven element is fixed to the shaft 26. The arrangement is such that as the rack bar rises it turns the pinion 25 so as to rotate the shaft 26 in the wire feeding direction. However, while the rack bar 23 moves downwardly, the shaft 26 remains stationary.

A rigid feed roll 28 (Fig. 6) is secured to the shaft 26 at a point between the plates 10 and 11. This driven feed roll 28 cooperates with a second feed roll 29 which is arranged to turn freely on an eccentric stud 30 (Fig. 7) carried by a part 30^a having an integral, threaded stud 31 which extends through an opening in an upward extension 11^a of the post 11 and which is normally held against free rotation by a nut 31^a. A handle 32 projecting from the part 30^a constitutes means whereby the part 30^a may be turned about the axis of the stud 31 thereby shifting the position of the axis about which the roll 29 turns. It is thus possible, by manipulation of the handle 32, to vary the normal spacing between the peripheral surfaces of the rolls 28 and 29. These rolls are rigid and have knurled pe-

ripheral surfaces and to permit them to be used with wires of different diameters without crushing the wires it is requisite that the rolls be adjustable toward and from one another.

The plate 12 supports a member 33 which has a plurality of horizontal guideways 34 (Figs. 5 and 6) of different diameters respectively, said guideways terminating very close to the bite of the rolls 28 and 29, thus confining and directing the wire as it is advanced toward the bite of the rolls. A plate 35 is secured to the upper portions of the rear edges of the posts 10 and 11. This plate 35 is provided with a part 36 which is directed toward the bite of the feed rolls, and which is furnished with guide passages 37 aligned with the guide passages 34, respectively, and which are designed to receive the wire as it is delivered by the feed rolls and to conduct the wire, while keeping it confined, until it emerges at the vertical, plane, outer surface of the plate 35. A cutter 38 slides in contact with the outer plane surface of the plate 35, the cutter being guided for vertical movement and held firmly in contact with the outer surface of the plate 35 by a pair of guide plates 39 and 40 respectively (Fig. 3). This cutter 38 is provided with a horizontal slot 41, the horizontal edge of the slot constituting a moving cutter blade which cooperates with the horizontal edge of the passage 37 to sever a wire protruding from said passage into the path of the cutter.

An actuating rod 42 is pivotally secured at its upper end to the cutter 38 and is connected by a pivot pin 43 (Fig. 8) to one arm 44 of a bell-crank lever which is pivoted to rock on a shaft 45 secured at its opposite ends in openings in the posts 10 and 11, respectively. This bell-crank has a second arm 46 and the arms 44 and 46 are arranged for alternate engagement by a pin, roller, or equivalent element 47, carried by a disk 48 and revolving about the axis of the drive shaft 13, the disk 48 being fixed to said shaft. The actuating rod 42 is extended down below the pivot pin 43 as shown at 42^a, thereby to provide a limiting stop for engagement with the bed plate 5.

A tension arm 49 (Fig. 1) is pivoted at its rear end upon the shaft 45 and at its forward end is furnished with a loop or eye 50 through which the wire 9 passes on its way from the spool 8 to the guide passage 34. A spring 51 constantly urges the free end of the tension arm 49 downwardly, thus keeping the wire 9 under tension.

Preferably a trough T (Fig. 1) is arranged to receive the lengths of wire after they are severed by the cutter 38 and to guide them into a suitable receptacle R which may be placed upon the bed plate 5.

In the operation of the machine the wire 9 is drawn off from the spool 8 and passed beneath the tension loop 50 and then introduced into that guideway 34 which is of the proper diameter to receive it. The upper feed roll is adjusted to correspond to the diameter of the wire and the motor M is started by manipulation of a suitable switch S (Fig. 1). The drive shaft 13 turns in the direction of the arrow (Fig. 4) and each time it rotates, the crank 16 is turned through 360°, thus moving the rack bar 23 up and down. During the upward stroke of the rack bar 23 the lower feed roll 28 is advanced through a definite angle thus drawing off wire from the supply spool and projecting it through the passage 37 and through the slot 41 in the cutter 38. During this advance movement of the wire the cutter is substantially stationary with its slot 41 opposite the

passage 37. While the rack bar 23 is moving downwardly the feed roll 28 is stationary. During this period the pin 47, by engagement with the arm 44 of the bell-crank lever, moves the cutter upwardly so as to sever the protruding length of wire. As the pin 47 continues to revolve it engages the arm 46 of the bell-crank lever, thus rocking the lever in the opposite direction and pulling the cutter 38 downwardly until the part 42^a engages the plate 5, thus positioning the cutter blade with the slot 41 opposite to the passage 37 in readiness for the delivery of another length of wire to be cut.

When it is desired to change the length of the piece which is thus cut off, it is simply requisite to turn the thumb-screw 20 in the proper direction thereby to adjust the crank pin 18 and vary the effective throw of the crank. If desired the crank 16 may be provided with graduations corresponding to the lengths of wire which will be cut at any given setting of the crank pin.

While one desirable embodiment of the invention has been disclosed by way of example, it is to be understood that the invention is not necessarily limited to this precise embodiment, but is to be regarded as broadly inclusive of all equivalent constructions falling within the terms of the appended claims.

I claim:

1. Strand cutting apparatus of the kind having a pair of feed rolls, means for turning one at least of said rolls intermittently, always in the same direction, a reciprocable cutter, a cutter actuating rod, and cutter actuating means for moving the rod alternately in opposite directions characterized in that said cutter actuating means includes a bell crank lever having rigidly connected arms disposed in substantially the same plane, a rotating shaft and a part carried thereby arranged to revolve in the plane of the arms of the lever and so located as first to engage and then to disengage one of said arms and thereafter to engage and then to disengage the other arm, the bell crank being free to move during the intervals between said successive engagements, the movement of the rod in one direction causing the cutter to perform its severing operation and reverse movement of the rod restoring the cutter to idle position, and means carried by the rod to limit movement of the latter in the reverse direction so as to insure return of the cutter to a definite predetermined idle position.

2. Strand cutting apparatus of the kind which comprises a pair of rigid feed rolls, means operative to drive one of said rolls intermittently, always in the same direction, an eccentric support for the other roll, and means for turning said support thereby to adjust the latter roll toward and from the first to accommodate strands of different diameters, characterized in that the guide means includes rigid parts disposed respectively at opposite sides of the bite of the rolls, each of said parts having a plurality of guide passages of graduated diameters, corresponding passages in the two parts being axially aligned, the passages at the delivery side of the rolls terminating at a plain surface of the part in which said passages are formed, a cutter guided to slide vertically in contact with said plain surface, the cutter having therein a transverse slot whose horizontal edge constitutes the cutting element, and means for moving the cutter comprising a bell crank lever having two rigidly connected arms arranged substantially 90° apart, and a

rotating shaft carrying an actuating element which revolves in the plane of said arms and which is so located in the angle between the arms that it completes successive operative contacts with the respective arms in substantially less than a half revolution, contact of said element with one arm causing the cutting to perform its severing movement and contact of said element with the other arm reversing the motion of the cutter, and stop means operative positively to limit movement of the cutter in the reverse direction thereby to insure registration of the slot in the cutter with the delivery guide passages during the feeding of the wire.

3. A strand-cutting apparatus comprising in combination a pair of feed rolls, means for turning at least one of said rolls intermittently, al-

ways in the same direction, guide means providing a plurality of passages of graduated diameter designed respectively to confine and direct strands of corresponding diameters as they approach the bite of the rolls, guide means providing similar passages for confining the strands as they emerge from between the rolls, said latter passages each terminating at a plane surface in a rigid part, a cutter sliding in contact with said plane surface, said cutter having a slot of a length such that it may register at the same time with all of said passages, one edge of the slot constituting the cutting element and means for actuating the cutter thereby to sever a strand protruding from any one of said passages.

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