

Aug. 18, 1936.

G. F. McCahey

2,051,097

BANDING APPARATUS

Filed April 13, 1933

5 Sheets-Sheet 1

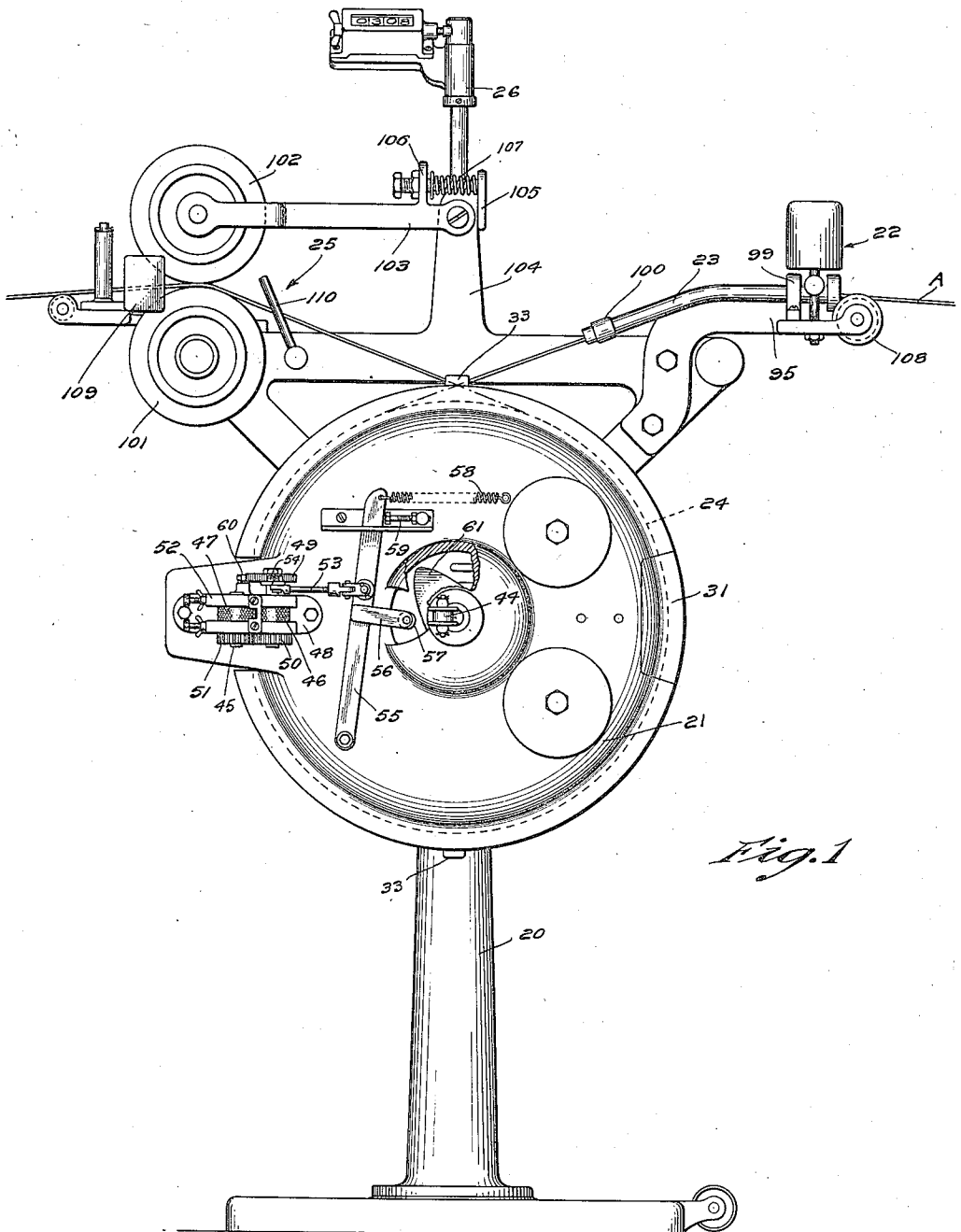


Fig. 1

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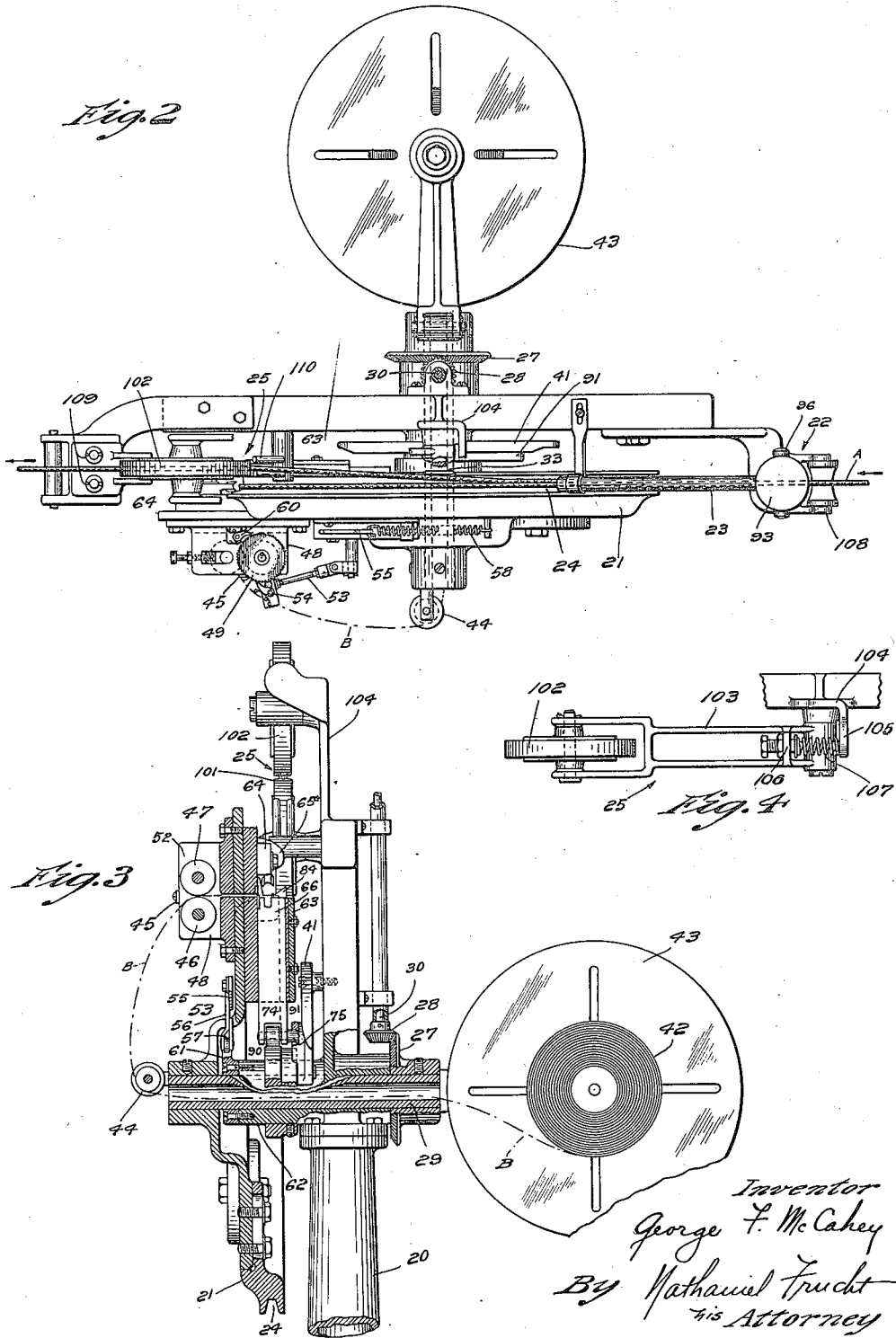
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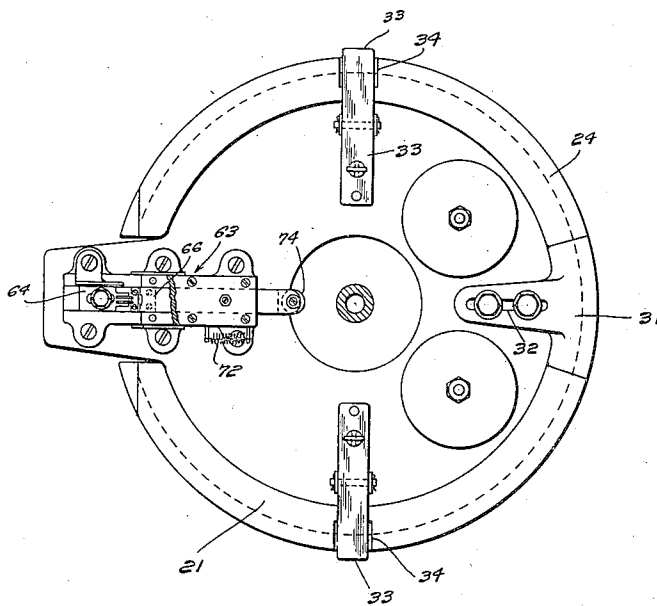


Fig. 5

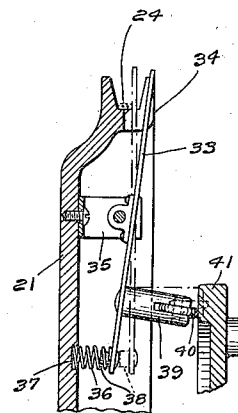


Fig. 6

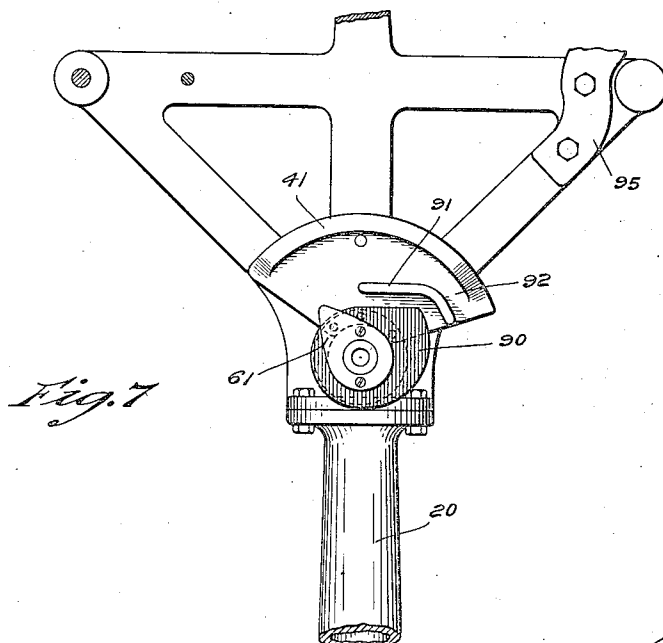


Fig. 7

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5 Sheets-Sheet 4

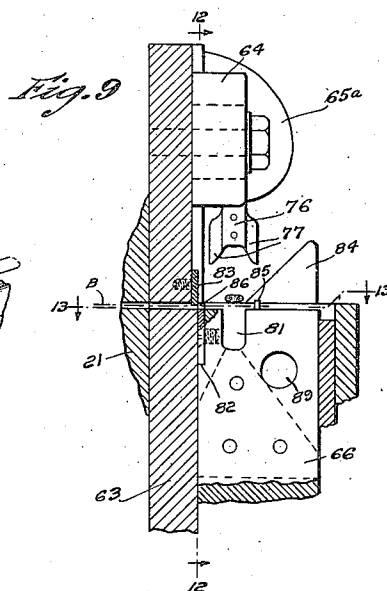
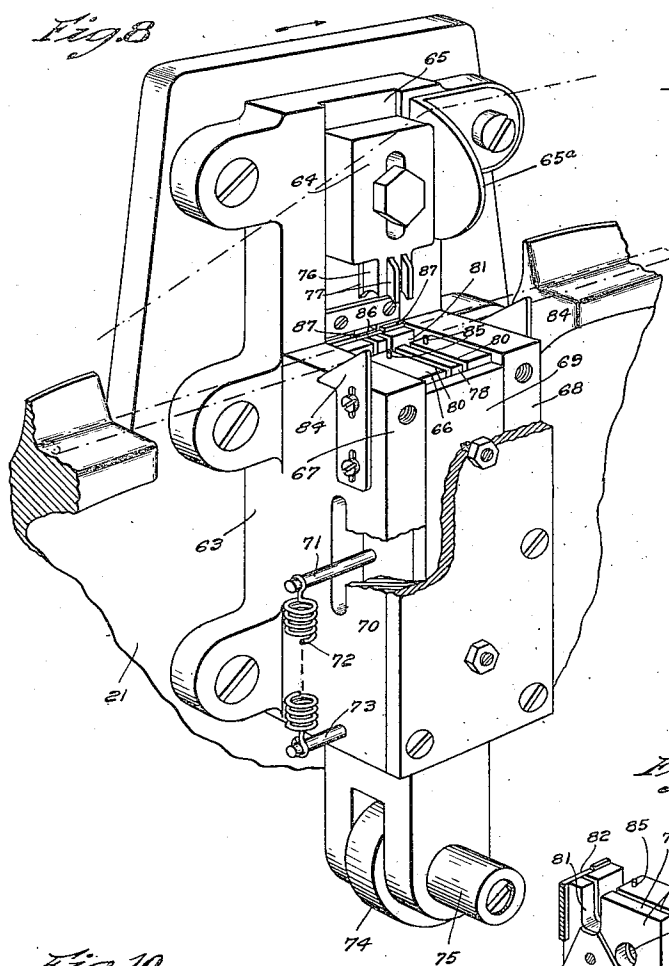


Fig. 10

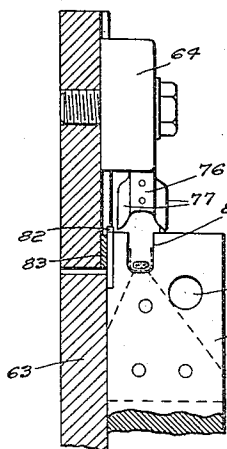


Fig. 11

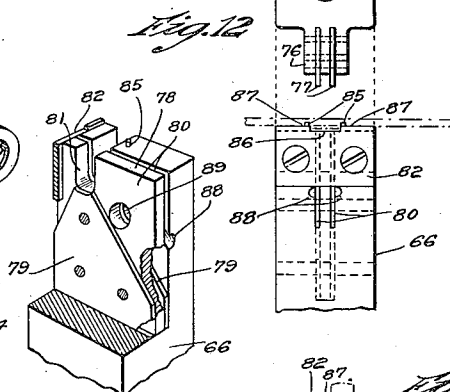
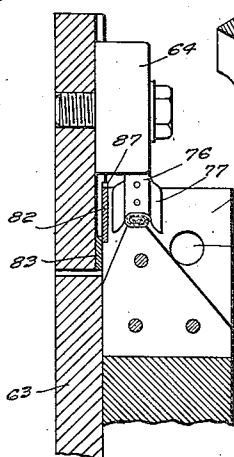
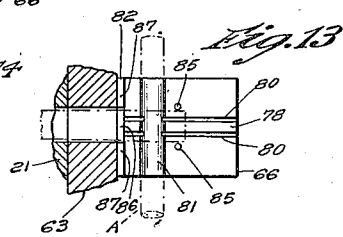


Fig. 13



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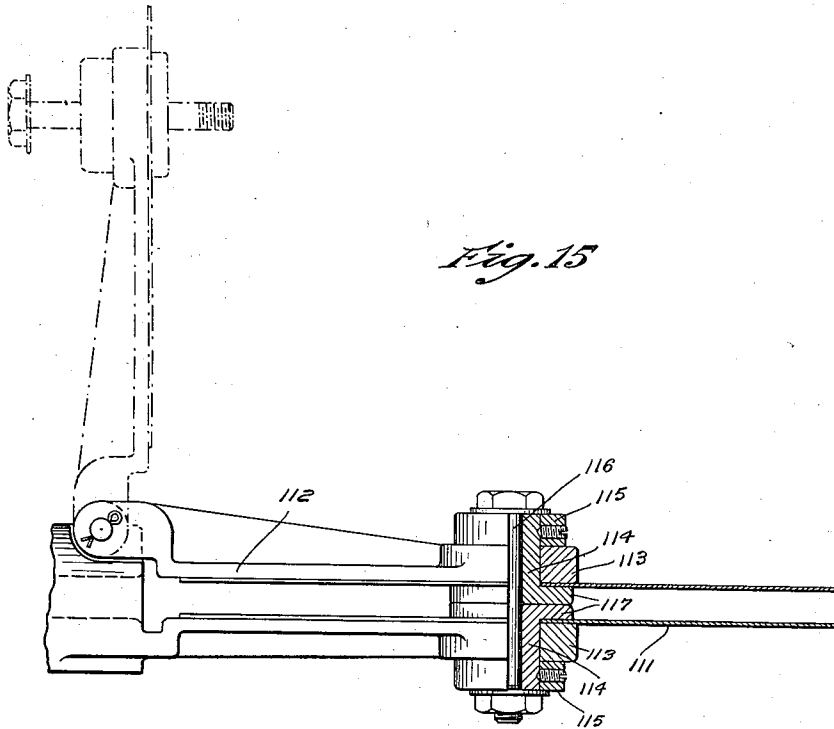


Fig. 15

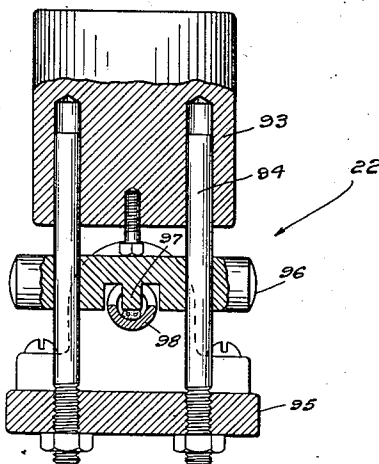


Fig. 16

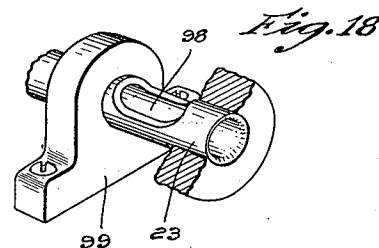
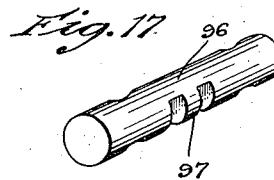


Fig. 18

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UNITED STATES PATENT OFFICE

2,051,097

BANDING APPARATUS

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Application April 13, 1933, Serial No. 665,947

14 Claims. (Cl. 153—1)

My present invention relates to apparatus for measuring lengths of wire, thread, and the like, and has particular reference to apparatus for marking off predetermined lengths by means of bands and the like.

It has been found desirable in manufacturing wire, cord, braided strips, and the like, and particularly insulated wire, to mark predetermined lengths in order to insure exactness in selling and in use. Although automatic apparatus has been devised for such marking, it has heretofore been necessary to provide separate power mechanism to insure accurate setting and clamping of the marking bands.

It is the principal object of my invention to provide an automatic marking apparatus which does not require separate power mechanism and is operated by the pull of the wire itself in passing from one reel to another, as from the supply reel to the finished reel.

The automatic devices heretofore utilized for length marking have operated at relatively low speeds, and it has been difficult to maintain their speed in timed unison to the speed of rotation of the other apparatus and the reels for the wire. It is a further object of my invention to provide an automatic apparatus which may operate at high speeds, and which preferably functions automatically in timed relation to the speed of the wire reels.

Moreover, automatic wire marking devices have not heretofore been portable, and have necessarily been closely and operatively connected to the wire and thread manufacturing mechanism, this close connection decreasing the availability and range of action of the marking devices and limiting the usefulness thereof. Another object of my invention is to provide a portable device which may be readily shifted wherever desirable and which may readily be adjusted to accurately measure and mark wire or thread of any thickness.

One type of marking apparatus heretofore used for this purpose includes a rotatable drum about which the wire is wound; it has heretofore been found necessary with rotatable drums of this nature to use axial slides and dies for periodically marking and banding the wire as it passes through the apparatus. Such axial slides and dies have entailed certain difficulties in that the axial members must be accurately set on the machine itself, and must be adjusted on the machine in order to function properly. It is a further object of my invention to utilize a rotating drum which is equipped with radial slides, these radial slides being removable as a unit so that they may

be adjusted on the bench and then locked in place on the rotatable drum.

Banding machines of the automatic type have not, heretofore, been suitable for banding materials of a non-circular formation. This has been due to the use of axial dies, which push the band material around the wire or thread, thus forcing the edge of the banding strip into a wire or thread if it has an oblong or other non-circular cross-section. It is a further object of my invention to provide an automatic banding or marking apparatus which will properly band wire or thread of any cross-section; and it is preferred to accomplish this object by positioning the material over the banding strip and then folding the ends of the strip over the material.

Banding and measuring devices of the type described have also been difficult to set and to maintain in proper adjustment, because it has heretofore been necessary to mount the banding material supply on the rotating drum. It is still another object of my invention to provide a central feed for the banding material, this banding material being intermittently and positively fed to the banding mechanism through the center of the rotation of the drum from a supply carried at the back of the drum.

With the above and other objects and various features in view, my invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto. In order to simplify the description, a specific embodiment of my invention suitable for banding and marking covered double wiring for electric circuits is described, but it is to be understood that the invention is not limited to the specific details described, and is suitable for marking and for banding thread, wire, cord, and other strip material.

Referring to the drawings:

Fig. 1 is a vertical elevation, partly in section, of the improved measuring apparatus.

Fig. 2 is a top plan view of Fig. 1, parts being broken away;

Fig. 3 is a vertical section, parts being broken away, showing the feed path of the banding material;

Fig. 4 is a plan view of the off-take tensioning means;

Fig. 5 is a back reverse view of the rotatable drum to show the construction thereof;

Fig. 6 is an enlarged sectional detail showing

the resilient fingers for maintaining the wire in proper alignment on the rotatable drum;

Fig. 7 is a detailed view showing the cams for controlling timing of the feeding and the banding mechanism;

Fig. 8 is a perspective view, partly broken away, showing the banding mechanism;

Figs. 9, 10 and 11 are diagrammatic views showing the position of the banding dies at various stages of the banding operation;

Fig. 12 is a view on the line 12—12 of Fig. 9, in the direction indicated by the arrows;

Fig. 13 is a plan view on the line 13—13 of Fig. 9;

Fig. 14 is a perspective view showing the construction of the lower die intermediate member;

Fig. 15 is a plan view, partly in section, of the supply reel for the banding material;

Fig. 16 is an enlarged detail, partly in section, of the intake tensioning mechanism;

Fig. 17 is a perspective view of the intake tensioning bar;

Fig. 18 is a perspective view, partly in section, showing the formation of the intake guide tube adjacent the tensioning bar position.

The apparatus in general

The marking and banding apparatus is preferably positioned between a supply reel and a finished product reel, as the speed is very high, a standard five foot machine preferably marking and banding five hundred feet of wire a minute. The apparatus is therefore preferably portable, and is made light in weight and small in size in order to be readily adaptable to the varying requirements of manufacturing plants.

The apparatus is therefore mounted on a portable base 20, see Fig. 1, and includes a rotatable drum 21 which carries the mechanism for feeding the banding material, for cutting it into banding strips, and for banding the wire with the strips. The incoming wire A is reeled off a supply reel, not shown, and first passes through a tensioning device 22, preferably of the gravity type, then through a guide tube 23, then is wound around the drum in the drum groove 24, where it is maintained in operating position by suitable guide devices, hereinafter described, then is marked at predetermined intervals with bands by the banding mechanism, is released from the drum groove, and then passes out through an off-take tensioning device 25 to the finished reel (not shown). There is no power mechanism, as the pull of the finished reel is sufficient to rotate the drum and cause the feeding and banding mechanism to function.

As the wire rotates the drum, a counter mechanism 26, of standard type, which is operatively geared to the drum by means of bevel gears 27, 28, which are respectively keyed to the hollow drum shaft 29 and to the counter shaft 30, see Fig. 3, indicates the length of the wire that has been marked and banded.

The drum 21 has an adjustable segment 31, see Figs. 1 and 5, which is secured to the drum body by a bolt and slot arrangement 32, and is radially adjustable to compensate for different thicknesses of wire, as the apparatus is designed to mark the wire once for each rotation, and therefore once for each length corresponding to the circumference of the groove 24. As the drum revolves the wire is kept against the outer edge of the groove by spaced fingers 33, see Figs. 5 and 6, which extend into slots 34 found in the inner edge of the groove, and are pivoted in supports 35 secured

to the inner surface of the drum, a spring or the like 36 which has one end set in a recess 37 in the drum surface and the other end engaging a centering pin 38 at the lower end of the finger 33 serving to resiliently urge the upper end of the finger inwardly in the slot. The lower end of each finger has a roller support 39 therein which carries a roller 40, the latter periodically engaging a fixed cam 41 on the standard 20 to press the lower end of the finger inwardly as indicated and thus release the wire to permit free passage from the drum groove.

The band material feeding mechanism

The band material feeding mechanism includes a reel of material which is rotatably mounted on the rear surface of the drum, and intermittently operated feeding devices which are secured to the front surface of the drum, the band material passing through an axial opening at the center of rotation of the drum.

As best shown in Fig. 3, the band material B, which is in strip form, is unwound from a supply roll 42 which is mounted in a reel arrangement 43, and is passed through the hollow drum shaft 29 and between the flanges of a guide roller 44, and is led upwardly through a stepped guide plate 45 and between two knurled feed rolls 46, 47. The lower feed roll 46 is rotatably mounted in a bracket 48 secured to the outer face of the drum, the shaft of the lower feed roll extending laterally from the bracket 48 to key with a ratchet wheel 49 at one end and a gear 50 at the other; the gear 50 meshes with the gear 51 of the upper feed roll 47, the latter being rotatably mounted in the upper portion of the bracket 52 and being vertically adjustable in the bracket 52 by suitable bearing blocks, adjusting bolts, and lock wing nuts to regulate the pressure pull of the two feed rolls on the strip of banding material.

The actuating mechanism for the ratchet wheel is shown in Figs. 1, 2 and 3, and includes a lever device 53 which is pivoted on the lower feed roll shaft and carries a ratchet pawl 54 at the upper end thereof, the lever being vertically reciprocable by a system of levers including a bar 55 pivoted at one end to the drum and carrying a central rod 56 with a cam roller 57 at the lower end thereof, the other end of the bar 55 being spring pressed inwardly by a tension spring 58 into stopping engagement with an adjustable fixed stop 59 mounted on the drum. The ratchet wheel 49 is locked against reverse movement by a lock ratchet pawl 60.

The cam roller 57 is periodically contacted by a cam 61 which is fixed on the stationary cam hub 62, see Fig. 3, in which the drum shaft 29 rotates, and which is part of the stationary support structure. The stationary support structure is preferably made in sections, as indicated in Fig. 3, to simplify manufacturing and assembly.

The banding mechanism

The banding mechanism is disclosed in Figs. 8 to 14, inclusive. The entire mechanism is mounted on an outer housing 63 which is detachably secured to the outer face of the rotatable drum, and includes an upper relatively fixed rectangular die 64 which is adjustably mounted in a die recess 65, and a lower reciprocable die 66 which is mounted between the guide walls 67, 68 and an adjustable spacing plate 69 in the lower portion of the housing, the face plate 70 being secured to the guide walls to lock the lower die in place. The

wall 67 is slotted to permit vertical movement of a pin 71 secured to the lower die, a tension spring 72 secured at one end to the pin 71 and at the other end to a pin 73 or the like mounted in the wall 67 serving to resiliently urge the lower die downwardly. The lower die carries a cam roller 74 and a laterally positioned cam roll 75 at the lower end thereof, for the purpose hereinafter explained. A guide plate 65a is positioned adjacent the upper die to ensure separation of the incoming and outgoing wire in the vicinity of the banding mechanism.

The upper die has a depending nub 76 with two forwardly and two rearwardly spaced fingers 77 or wings which extend downwardly as shown in Fig. 9. The lower die has a central plate 78 and two spacing plates 79 which are removably mounted in the die to provide spaced channels 80 into which the fingers 77 may enter, the three plates being shaped to provide a die pocket or recess 81 for the banding operation. The banding material is intermittently fed through a slot by the feed rolls, and a banding strip is periodically cut off upon each reciprocation of the lower die by the coaction of a cutting plate which is detachably secured to the lower die with a fixed cutting plate 83 which is secured to the housing. Two guide fingers 84 are mounted on the sides of the walls 67 and 68 to cooperate with the groove walls and maintain the wire over the die recess; the banding strip is guided between two guide pins 85 mounted on the upper face of the lower die block, and is received in a slot 86 formed in the lower cutter, see Fig. 12, this slot having projecting edges or blocks 87 to better center the banding strip. Clean out openings 88, 89 are provided in the lower die, to facilitate cleaning of the dies.

Referring now to Fig. 7, the stationary cam support 62 has a cam 90 thereon which actuates the cam roller 74 as the drum rotates, and also has a cam rib 91 which is formed on a plate 92, this cam rib being engaged by the cam roller 75 to positively return the lower die to its down position and thus ensure separation of the dies and the cutters.

The tensioning mechanism

The upper framework of the standard 20 is of generally triangular shape, see Fig. 7, the upper corners serving as supports for the intake and the off-take tensioning mechanisms. The intake tensioning mechanism 22 is shown in Figs. 16, 17, and 18, and comprises a block or weight 93 which is reciprocatably mounted on two spaced pins 94 secured to a support 95, see Fig. 1, the latter being bolted or otherwise attached to the right upper corner of the standard 20. The weight 93 has an adjustable bearing screw which rests on a bearing bar 96, this bar also being slidably mounted on the pins 94, and being slotted to provide a downwardly directed bearing finger 97 which extends into a cut-away portion 98 of the guide tube 23 to rest upon the wire as it passes to the drum. The guide tube 23 is rigidly held in position by a rear bearing 99 and a front bearing 100 which are respectively secured to the support 95 and the upper portion of the standard 20.

The out-take tensioning mechanism 25 is shown in Figs. 1 and 4, and includes a lower roller 101 rotatably mounted on the upper left hand corner of the standard 20 and a spring-tensioned upper roller 102 which is mounted at the end of a lever 103 pivoted to an upstand-

ing boss or arm 104 of the standard 20, the arm 104 and the lever 103 having parallel ribs 105 and 106 between which an adjustable tension spring 107 is mounted to resiliently urge the lever 103 and its roller 102 downwardly towards the roller 101.

Suitable guide rolls and pins, such as shown at the intake end by reference character 108, and at the out-take end by reference characters 109 and 110, are utilized wherever needed.

The banding material supply reel

It has been found advisable to provide a supply reel for the banding material which will not bind or jam, and which will facilitate insertion of the rolls of banding material. To this end, the supply reel includes a base plate 111 which is fixed to the drum, and a cover plate 112 which is hinged, as indicated in Fig. 15, each plate having a hub 113 in which a roll 114 is rotatably mounted; lock plates 115 are secured to the outer ends of each roll, and a bolt 116 is passed through the rolls to lock the assembly together. The rolls and the bolt are thus independently rotatable in the reel, and no binding or jamming can take place; the enlarged inner portions 117 of the rolls serve to facilitate setting and mounting of the banding material rolls in place.

The operation

The operation of the improved apparatus may now be explained:

The wire is first positioned in the apparatus, and the banding material is inserted in the banding material supply reel and is fed forwardly until it is gripped by the feed rolls. The finished reel now winds up the wire at any desired speed, and the pull of the wire on the drum rotates the drum. The drum movement produces a periodic movement of the feed rolls to feed the banding material into position into the banding mechanism, which operates periodically to cut off a strip of banding material, which strip is pulled down into the die recess by the wire and assumes a U-shape about the wire; the upward movement of the lower die then curls the ends of the U-strip over to securely band the wire. As the drum continues its rotation, the spring fingers holding the wire are released to permit free outward movement of the banded wire. The provision of an intake and an out-take tensioning mechanism keeps the wire taut within the drum groove, and thus ensures accurate measurement and banding.

General features

The improved apparatus is therefore simple in construction and in operation, requires no auxiliary or separate power, and does not interfere with existing manufacturing layouts, as it is adapted for insertion between the standard supply and finished reels.

The provision of initial and final tension mechanism, and of an adjustable drum section, ensure accuracy in measurement and in banding. The removability of the die support and its dies permit bench adjustment of the dies, and facilitate change of dies to accommodate different wires or strips, and different cross-section of wires or strips.

The use of radial dies provides an effective mechanism for banding wires or strips of any cross-section; since the ends of the banding strips are folded over the wire, tearing or gouging are eliminated. The improved reel construction for

the banding material supply and the passage of the banding material through the center of the drum simplify the feed arrangement and prevent delays due to jamming and the like.

While the elements of the novel apparatus are primarily designed to efficiently cooperate for the purpose of banding predetermined lengths of wire or strips, the several elements of the invention have broad applicability, as their usefulness is not restricted to banding machines. Their proportions, materials, shapes, and operation may be changed as required for different installations, and their cooperation may be modified, within the limits and the scope of the invention as defined in the appended claims.

I claim:

1. In a measuring and marking apparatus, a freely rotatable drum for receiving a wire or the like to be marked, and mechanism engageable with the wire mounted on said drum and actuated by rotation of said drum to mark predetermined lengths of the wire.

2. In a measuring and marking apparatus, a drum support, a freely rotatable drum mounted thereon for receiving a wire or the like to be marked, mechanism engageable with the wire and actuated by rotation of said drum to mark predetermined lengths of said wire, and tensioning mechanism on the drum support for the incoming and the outgoing wire.

3. In a measuring and marking apparatus, a freely rotatable drum for receiving a wire or the like to be marked, and mechanism mounted on said drum and operable upon rotation of said drum to band predetermined lengths of the wire.

4. In a measuring and marking apparatus, a freely rotatable drum for receiving a wire or the like to be marked, mechanism for supplying banding material to said drum, and mechanism for cutting strips of said banding material and folding said strips about the wire at predetermined lengths thereof.

5. In a measuring and marking apparatus, a freely rotatable drum for receiving a wire or the like to be marked, mechanism for supplying banding material to said drum, and mechanism for cutting strips of said banding material, periodically setting the wire in the center of the strips, and folding the ends of the strips over the wire.

6. In a measuring and marking apparatus, a rotatable drum for receiving a wire or the like to be marked, a supply device for banding material carried on the back of the drum, banding mechanism carried on the front of the drum, and means for conducting banding material from the supply to the banding mechanism.

7. In a measuring and marking apparatus, a rotatable drum for receiving a wire or the like

to be marked, a supply device for banding material carried on the back of the drum, banding mechanism carried on the front of the drum, and means for conducting banding material from the supply through the center of rotation of the drum and to the banding mechanism.

8. In a measuring and marking apparatus, a rotatable drum for receiving a wire or the like to be marked, a supply device for banding material carried on the back of the drum, feeding mechanism carried on the front of the drum, and means for conducting banding material from the supply to the feeding mechanism.

9. In a measuring and marking device, a rotatable drum having a groove for receiving a wire or the like to be marked, said drum having an adjustable section radially shiftable to compensate for different wire thickness.

10. In a measuring and marking device, a rotatable drum having a groove for receiving a wire or the like to be marked, slots in one wall of said groove, resilient fingers in said slots adapted to engage the wire and maintain it in alignment in said groove, and means for periodically releasing said fingers.

11. In a measuring and marking device, a tension regulator comprising a wire guide having an open groove portion, a tension bar slidably mounted above said guide and having a wire contacting finger in juxtaposition to the open groove portion, and a weight block slidably mounted above said bar and contacting said bar.

12. In a measuring and marking device, a supply reel for banding material having a fixed plate, a cover plate hingedly mounted and normally positioned parallel to the fixed plate, axially aligned rolls rotatably mounted in said plates, and a lock bolt passing through said rolls and rotatable therein.

13. In combination, a supply reel for wire or the like, a take-up reel, a power drive for said take-up reel, a freely rotatable drum positioned between said reels and engageable by the wire for rotating the drum by the pull of the wire from the take-up reel, and mechanism mounted on said drum and engageable with the wire and actuated by rotation of said drum to mark predetermined lengths of the wire.

14. In combination, a supply reel for wire or the like, a take-up reel, a power drive for said take-up reel, a freely rotatable drum positioned between said reels and engageable by the wire for rotating the drum by the pull of the wire from the take-up reel, and mechanism mounted on said drum and engageable with the wire and actuated by rotation of said drum to band predetermined lengths of the wire.

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