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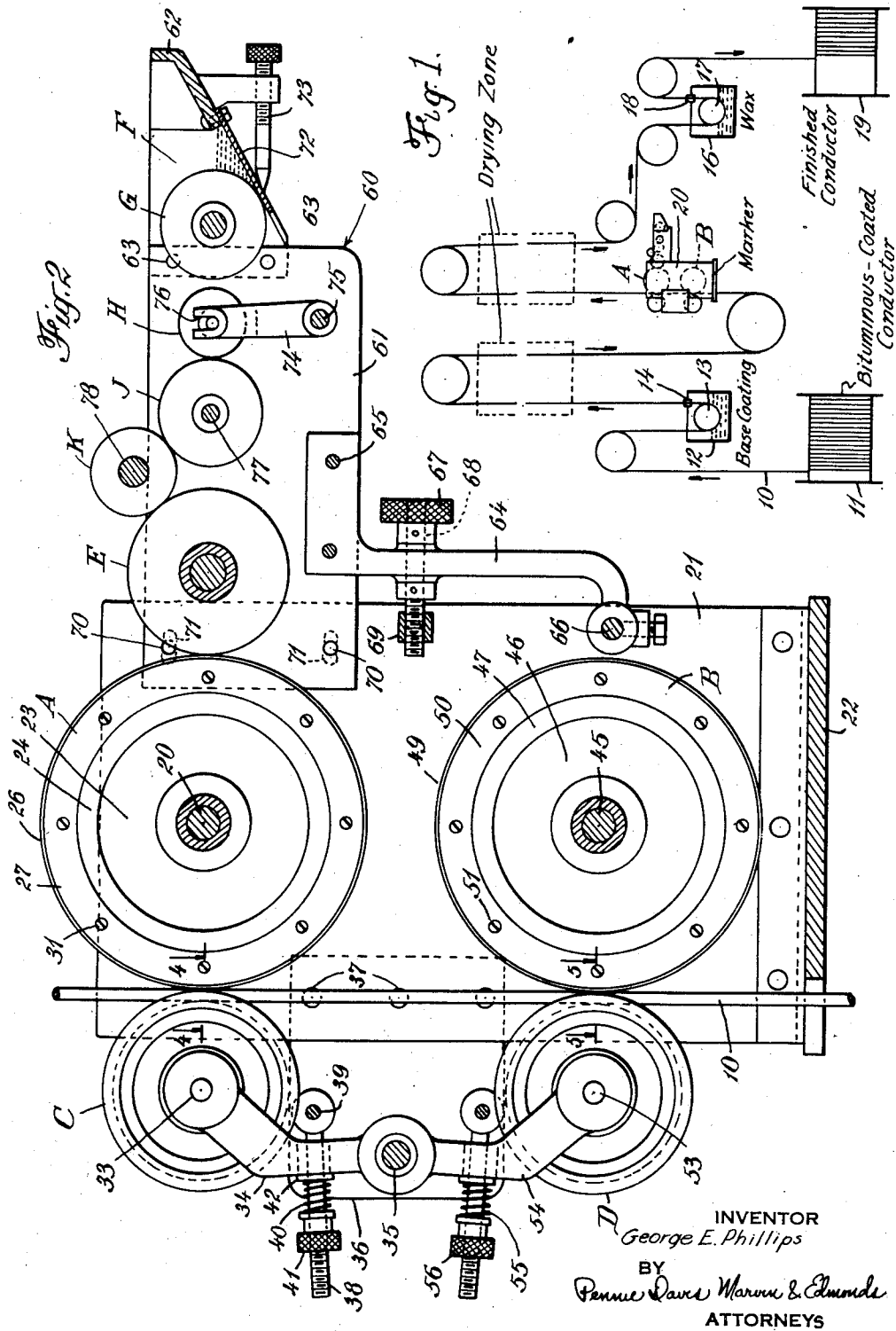
G. E. PHILLIPS

2,186,555

MEANS FOR MARKING ELECTRICAL CONDUCTORS

Filed May 3, 1937

3 Sheets-Sheet 1



Jan. 9, 1940.

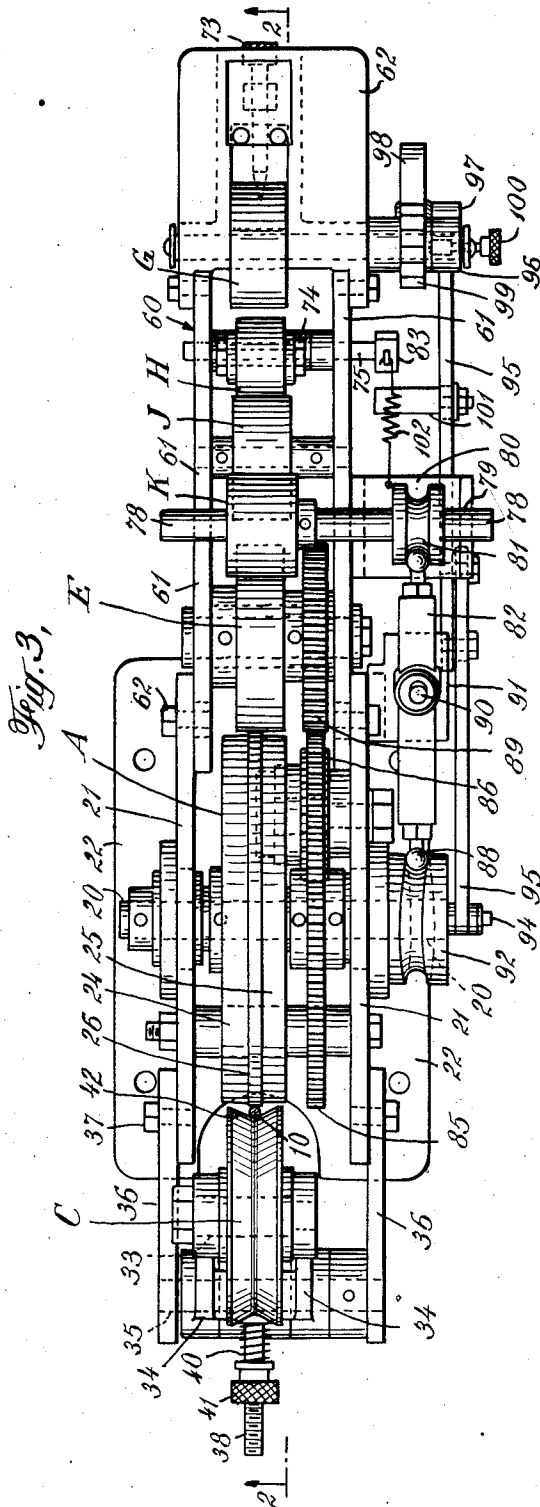
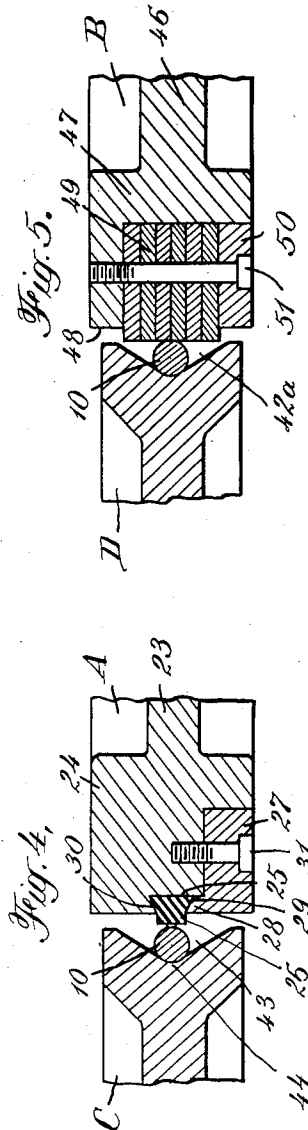
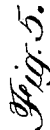
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MEANS FOR MARKING ELECTRICAL CONDUCTORS

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3 Sheets-Sheet 2



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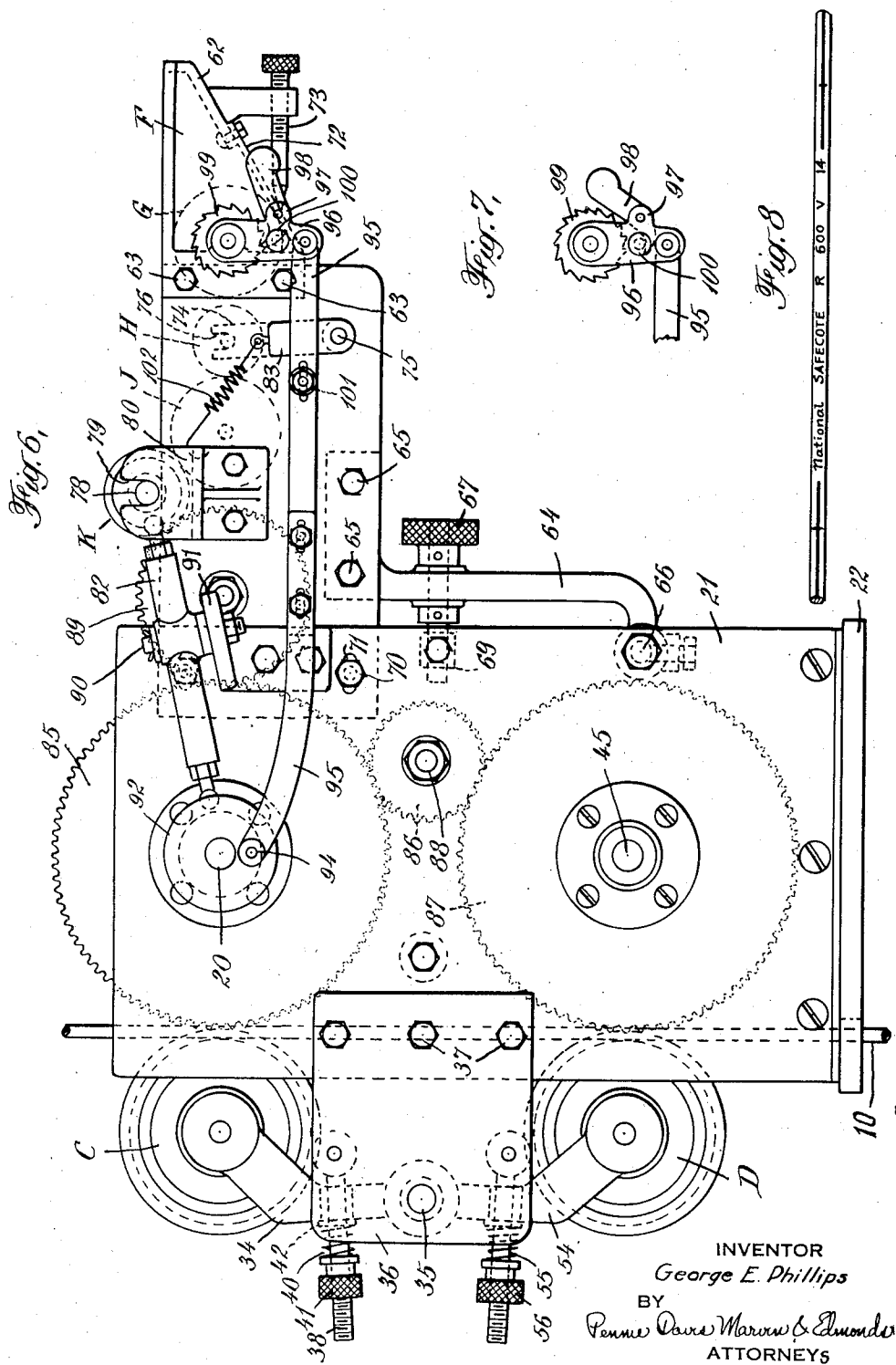
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MEANS FOR MARKING ELECTRICAL CONDUCTORS

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UNITED STATES PATENT OFFICE

2,186,555

MEANS FOR MARKING ELECTRICAL CONDUCTORS

George E. Phillips, Leedsdale, Pa., assignor to
National Electric Products Corporation, Pitts-
burgh, Pa., a corporation of Delaware

Application May 3, 1937, Serial No. 140,346

16 Claims. (Cl. 101—36)

This invention deals with a means for marking insulated electrical conductors. In some, although not all of its aspects, it has to do in particular with the marking of electrical conductors previously coated with a bituminous material.

There is a need for marking electrical conductors in order that they may be identified as to type, size, voltage and other qualities, and also as to origin. It is important that the marking be superficially visible and that it appear at frequent intervals throughout the length of the conductors so that the marking may be seen even though short lengths only are accessible.

It is the object of this invention to make it possible to mark insulated electrical conductors, including bituminous-coated conductors, in such a manner that the marks will appear at short intervals throughout the length of the wire and will be visible upon superficial examination; and to do this in the course of finishing the wire, without impeding the finishing operation. It is an object also to improve upon existing marking mechanisms by simplifying the construction and by making them capable of marking, with greater certainty and clarity, a wide range of sizes of conductor.

The preferred embodiment of the invention is described in the following with reference to the accompanying drawings. In the drawings,

Fig. 1 is a schematic illustration of the method of marking a pitch coated conductor;

Fig. 2 is a view in elevation of the interior of the preferred marking apparatus, substantially as it would appear from the section indicated by the lines 2—2 on Fig 3, showing the novel arrangement of the drive roll, marking roll and inker rolls;

Fig. 3 is a top plan view of the same apparatus;

Fig. 4 is a partial view, in horizontal cross section on the line 4—4 of Figure 2 through the marking roll and its co-operating press roll at the point of their engagement with a conductor;

Fig. 5 is a similar view, on the line 5—5 of Figure 2, at the point at which the conductor engages the drive roll of the marking mechanism and its co-operating press roll;

Fig. 6 is a side elevation of the marking apparatus, with the gear train illustrated and also the operating mechanism for the inker parts;

Fig. 7 shows a detail of the ratchet and pawl for intermittently turning the pick-up roll at the ink well, illustrating the action of the pawl stop pin; and

Fig. 8 shows an electrical conductor marked in a manner illustrative of that contemplated by this invention.

It has been found difficult, if not entirely impracticable, to print directly upon a conductor coated with bituminous material such as stearin pitch, blown asphalt, or the like, as many conductors are. The stickiness of the bituminous coating introduces a difficulty in the marking itself and a mark directly applied to the bituminous material tends to become less distinct in time. I have found however that if the bituminous coating is first covered with a material which, when dried, forms an adherent film that is flexible but hard surfaced and that does not work into the bituminous material, it is possible thereafter to apply a mark with success both from the standpoint of the marking operation itself and from the standpoint of endurance in use. The coating thus applied as a base for the marking may also serve to give the conductor its proper color for circuit identification, the marking being in some contrasting color.

This coating to which the mark is applied may be of a number of different compositions. Preferably, it should consist of a base such as gum, resin, nitrocellulose or the like, which is soluble in, or otherwise carried by, a liquid which does not dissolve the bituminous coating but evaporates, leaving the base as a discrete, hard film sufficiently flexible to withstand, without material cracking, such bending as the conductor itself encounters. An example is the compound disclosed in United States Patent No. 1,765,000 of H. N. Bockus.

The product thus made is characterized by having a bituminous coating overlaid with a superficial, hard, flexible, adherent film, of the sort described, to which is applied an ink marking designating certain qualities of the conductor, and over which is a coating of transparent waxy material.

The marking of a bituminous-coated conductor in this manner is illustrated in Fig. 1.

The bituminous-coated conductor 10 is led from the reel 11, or from the previous coating operation, to a station 12 at which there is applied the base coating. This may be applied in any suitable manner, the illustration in Fig. 1 being of a conventional bath in which the conductor passes around a roller 13 and from which it emerges through a wiper 14. The conductor then passes through a drying zone 15, preferably afforded by drying towers of known type. When the coating is well dried, the conductor is then passed to

the marking apparatus, the details of which are described below. This apparatus is designed to mark the wire continuously as it passes through, at whatever speed is selected with reference to the other parts of the finishing operation, the marker being driven by the conductor itself through engagement of the conductor with the drive wheel B. The marking wheel A, driven and supplied with ink in a manner to be described, engages the conductor continuously.

After passing through the marker, the conductor goes again through a drying zone, again preferably in the form of drying towers, in order to dry the ink with which it is marked. After drying, it passes directly to a waxing station 16 where a transparent wax or wax-like material is applied to the wire as it passes. Any suitable procedure may be used, for example, the conventional scheme of passing the conductor through a wax bath around a roller 17 and thence through a wiper 18; or, if available, use may be made of a wax spraying apparatus of the sort described in the United States Patent No. 1,944,823 of N. C. Lamont. The wax coated wire passes directly to a wind-up reel 19.

The waxy material serves to give the conductor a slick finish, facilitating handling and fishing into conduits, and also protects the mark and the color coating while leaving them clearly visible upon superficial examination of the conductor.

The marking apparatus embodying the improvements of the present invention may be used in the system just described for marking a bituminous-coated conductor or may be used for marking conductors otherwise coated and presenting a suitable surface for receiving the mark. The principal elements of this apparatus are (see Figs. 2 and 3) a marking roll A, a drive roll B, two spring actuated idler press rolls C, D, mounted opposite the drive roll and marking roll respectively, so as to press the conductor against the latter as it passes through the device, and an inker assembly comprising the inking roll E and the series of rolls which transfer the ink or other marking liquid from the well F to the inking roll. The mechanism by which the marking roll and inking roll are driven from the drive roll, and the mechanism for actuating the ink pick-up roll and the spreader roll are shown in Figures 3 and 6 and are described at a later point.

Considering the several main parts of the device individually, the marking roll A is secured to a spindle 20 which is mounted in bushings in the side plates 21 of the main frame of the apparatus. These side plates are erected on a base plate 22. The means of securing the marking roll to the spindle and of mounting the spindle are conventional. The marking roll A consists of a disc 23 having a wider rim 24 which is cut away at one side, as shown in Fig. 4, to form the shoulder 25 on which the type band 26 is located. The rim is further cut away on that side to form a recess for a retaining ring 27 which has a flange 28 that overlies the shoulder 25. The inner face 29 of this flange and the inner face 30 of the side wall of the rim at the shoulder 25 are undercut, as illustrated, to form inclined surfaces which engage the correspondingly outwardly inclined side walls of the type band 26, thus holding the latter securely in place. The retaining ring 27 is held in place by a series of bolts 31 which thread into tapped holes in the rim 24 of the marking roll.

The type band 26 is of rubber having the desired type character embossed on its outer face. The press roll C which holds the conductor

against the marking roll as the conductor passes through the apparatus is secured to a short shaft 33 mounted in bushings at the forward end of a rocking frame 34 which is pivoted on a fixed shaft 35 secured to and extending between two side brackets 36 bolted at 37 to the side plates 21 of the main frame. This press roll is urged toward the marking roll by an adjustable spring pressure device consisting of a pin 38 pivoted at one end to the press roll bracket 36, as at 39, and extending through the rocking frame 34, together with a spring 40 surrounding this pin and held between an adjusting nut 41 and a washer 42 which bears against the press roll frame 34. This spring 40 is relatively light, as slight pressure is needed to hold the conductor against the marking roll, especially when use is made of the particular configuration, described below, which is given to the rim of the press roll for the purpose of affording stable support to the conductor. The adjusting nut 41 permits the spring pressure to be regulated and also permits the press roll to accommodate itself to a wide range of sizes of conductor.

As shown in Fig. 4, the rim of the press roll C has the shape of a shallow V-groove 43. With the larger sizes of conductor, this gives a two point support which, in conjunction with the point of support afforded by the type band 26 on the marking roll A, holds the conductor against twisting or lateral movement that would be inimical to effective marking. Preferably the apex 44 of the groove is rounded to a curvature on the order of that of the smaller sizes of wire, the purpose being to provide a substantial supporting area for the smaller conductors.

The drive roll B is mounted on a spindle 45 located directly below the spindle 20 of the marking roll A and mounted in a similar manner to turn in bushings in the side plates 21. This drive roll has the same diameter as the marking roll and the two are connected together by a gear train, described later, by which the marking roll is driven in unison with the drive roll as the latter is rotated by the conductor 10 which is drawn through the apparatus. The drive roll (see Fig. 5) consists of a steel disc 46 widened near its rim 47 and there provided with a flange 48 against which there rests a group of flat leather rings 49. A locking ring 50 holds these leather discs securely against the flange 48, being held in place by a series of bolts 51 which extend through holes in the leather rings and thread into tapped holes in the flange 48. The discs are deeper than the flange and therefore extend beyond it, presenting their end grain to the conductor 10 which is led between the drive roll B and its co-operating press roller D.

The press roll D is identical with the press roll C which co-operates with the marking roll. Its periphery has a similar shallow V-groove, 42a. This press roll D is mounted in the same manner as the upper press roll C, being rotatable on a short shaft 53 which is supported in a rocking frame 54 pivoted on the same shaft 35 on which the upper press roll frame is pivoted. This lower press roll likewise is spring pressed, but in this case the spring 55 is considerably heavier in order to cause the press roll D to exert a greater force in holding the conductor 10 against the leather face of the drive wheel, thus to provide an effective driving connection whereby the drive roll is rotated as the conductor moves past. The adjusting nut 56 permits the spring pressure to be

regulated and also permits the press roll to accommodate different sizes of conductor.

The inking roll E, and the entire assembly of parts which serve to supply ink to it for transference to the type band 26 on the marking roll A, are mounted in a supplemental frame 60 formed by two parallel plates 61 which are adjustably secured to the side plates 21 of the main frame of the apparatus. This assembly consists of the ink well F provided by a removable housing 62 bolted (63) to the inker frame members 61, a pick-up roll G, a first transfer roll H, a second transfer roll J and a spreader transfer roll K. This general series of ink supplying rollers is not new. What is new in the present apparatus is their arrangement and the provision for adjustment of the inking roll E with respect to the marking roll A.

The inking roll E is mounted on a shaft which turns in the side members 61 of a separate inker frame 60. Its axis is in substantially the same horizontal plane as the marking roll axis. In this relation, the adjustment of the inking roll is obtained by adjusting the inker frame 60 horizontally, or substantially so, it being unnecessary to have the adjustment exactly in the plane of the two roller axes. The frame 60 is adjusted by means of a depending bracket 64 bolted (65) to the inker frame plates 61 and pivoted at its lower end on a shaft 66 that is supported on the main frame plates 21. There is an adjusting screw 67, the shank 68 of which projects through the bracket 64 and threads into a block 69 pivotally mounted between the main frame plates 21. Additional support for the inker frame 60 is provided by pins 70 which project through the side plates 21 of the main frame and into elongated holes 71 in the end portions of the inker frame plates 61 where they overlap the main plates 21.

Owing to the length of the inker frame bracket 64, the fact that it is pivoted makes no material difference in the relation between the inker roll and the marking roll in different positions of adjustment, and this arrangement provides a simple and effective adjusting means, easily accessible.

The ink well housing 62, at the outer end of the inker frame 60, has an inclined bottom, a portion of which 72 is hinged and is adjustable by means of an adjusting screw 73 in relation to the pick-up roller G which is mounted between the side walls of the ink well. This pick-up roll is intermittently rotated by a pawl mechanism to be described later. This ink well and pick-up roll are of known construction. Similarly, the mounting of the rubber faced transfer roll H on oscillating arms 74, pivoted in the inker frame (at 75) and having U shaped recesses 76 to hold the roller shaft, is similar to known mechanisms for the purpose. The same is true of the second transfer roll J, which is rubber faced and mounted on a shaft 77 in the inker frame.

The improved arrangement here provided consists in locating the steel spreader roll K above the axes of the transfer roll J and the inker roll E so that it is readily removable. This is accomplished by so arranging the parts that the spreader roll rests on the transfer roll J and the inker roll E, so that it is supported by them and is free to turn with the positively driven inker roll and transmits rotation to the transfer roll J. The shaft 78 of the spreader roll is extended at one side beyond one side plate of the inker frame and is supported at the end by a U-shaped recess

79 in a bracket 80 bolted to the side plate 61 (see Figs. 3 and 6). This end of the spreader shaft 78 carries an annularly grooved member 81 designed to receive the end of an oscillating lever 82 which causes the spreader roll assembly to move axially back and forth over the surfaces of the inker roll E and the transfer roll J to spread the ink uniformly.

The drive for the entire mechanism is taken from the drive wheel B which is rotated by the moving conductor. The marking roll A is driven (see Figs. 3 and 6) by a gear train consisting of a large pinion 85, secured to the marking roll shaft 20, which is driven through an idler 86 by a similar large pinion 87 secured to the shaft 45 of the drive wheel B. The idler is mounted on a stud 88 secured to one of the side plates 21 and has a suitable bushing. The inking roll E is driven from the marking roll pinion 85 which engages a smaller pinion 89 secured to the shaft of the inking roll E. The other rolls which transfer the ink to the inking roll are not positively driven but are rotated by reason of their peripheral engagement with one another, the initiating movement coming from the engagement of the spreading roller K with the inking roller E.

The lateral axial reciprocation of the spreader roll K is brought about by the rocking lever 82 which is pivoted about a stud 90 mounted on a bracket 91 bolted to the outer side of the inker side plate 61. At each end of this rocking lever 82 is a ball head, one for engaging the groove of the member 81 on the shaft of the spreader roll K, the other engaging the groove of a cam 92 which is secured to the shaft 20 of the marking roll outside of the side plate 21. Each rotation of this cam causes a complete reciprocation of the spreader roll.

On the side face of the same cam member 92 on the marking roll shaft, is a pin 94 which is eccentric with respect to the axis of the marking roll shaft and acts as a crank to operate the pawl and ratchet for turning the pick-up roll G. Secured to this pin is a long lever or connecting rod 95 which extends horizontally to a point near the extreme end of the inker frame 60, where it is connected to a short vertical link 96 pivoted at its upper end on the shaft of the pick-up roll G. Thus, upon each rotation of the marking roll this lever is reciprocated. There is a lug 97 at one side of the vertical link 96 on which is pivoted a pawl 98 counter-weighted to cause it to bear against the teeth of a ratchet wheel 99 secured to the shaft of the pick-up roll. Each forward reciprocation of the horizontal lever 95 therefore causes the pawl to turn the pick-up roll a short distance, while on the backward stroke the pawl rides over the ratchet teeth. There is a pin 100 extending through the vertical link 96 and capable of being moved in or out. When moved in, this pin serves to hold the pawl out of engagement with the ratchet so that the supply of ink may be interrupted when desired. (See Fig. 7.)

The horizontal pawl actuating arm 95 carries a laterally extending pin 101 at a point adjacent an upright arm 83 secured to the shaft 75 of the rocking arms 74 at its extremity outside of the inker frame, the location of the pin 101 being such that upon the rearward stroke of this lever the transfer roller H is moved over against the pick-up roll G. Then, on the forward stroke of the horizontal pawl arm, the transfer roll is drawn back against the second transfer roller J by a spring 102 secured at one end to the rocking lever 83 and at the other end

to the bracket 80 supporting the shaft of the spreader roll K.

Ink picked up by the roll G is applied to the roll H when the latter is moved into engagement with it. Upon return of the transfer roll H to engagement with the roll J, the rotation of the latter causes the first transfer roll H to rotate and thereby apply the ink to the roll J, which then transfers it to the spreader roll K for application to the inking roll E. This maintains a steady supply of ink to the type band on the marking roll A.

A wire marked in this manner is shown in Figure 8. The marking includes the maker's name, the trade-mark, the symbol R600V, indicating 600 volt rubber covered wire, and the numeral 14 indicating that it is size 14. The stripe is also a part of the trade-mark indicating the origin. At regular intervals, there may be placed a mark, such as a line at right angles, by which the wire may be measured, the intervals being some convenient unit of measure.

By reason of the improved arrangement and design of the marking roll and drive roll, and their co-operating press rolls, this or similar marking can be successfully accomplished. Slipping, turning or shifting of the wire or cable with respect to the type band is avoided to a degree which permits clear and accurate marking. The mechanism is simpler than those now available in addition to having a wider range and greater degree of effectiveness.

The foregoing describes the preferred embodiment of the invention. Modifications of it are possible within the scope of the following claims.

I claim:

1. Apparatus for marking electrical conductors comprising a driving roll and co-operating press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, said press rolls being driven solely by frictional engagement with the conductor.

2. Apparatus for marking electrical conductors comprising a driving roll and co-operating press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, said press rolls being spring pressed toward their respective co-operating rolls and driven solely by frictional engagement with the conductor.

3. Apparatus for marking electrical conductors comprising a driving roll and co-operating press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the drive roll and marking roll being so arranged that the conductor passes in a straight line tangent to both.

4. Apparatus for marking electrical conductors comprising a driving roll and co-operating press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating idler press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the said mark-

ing roll having a rubber type body mounted on its periphery.

5. Apparatus for marking electrical conductors comprising a driving roll adapted to be turned by the conductor, in combination with a marking roll and co-operating idler press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the said marking roll having a rubber type body mounted on its periphery, and its co-operating press roll having a shallow V groove in its periphery.

6. Apparatus for marking electrical conductors comprising a driving roll and co-operating idler press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the said drive roll having a leather face.

7. Apparatus for marking electrical conductors comprising a driving roll and co-operating idler press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the said drive roll having a leather face, and its co-operating press roll having a shallow V groove in its periphery.

8. Apparatus for marking electrical conductors comprising a driving roll and co-operating press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating press roll adapted to receive the conductor between them, after passing the drive roll, an inking roll for applying ink to said marking roll, ink supplying means for said inking roll and a gear connection from said drive roll to said marking roll and from the latter to the inking roll.

9. Apparatus for marking electrical conductors comprising a driving roll and co-operating yieldably biased press roll adapted to receive the conductor between them, in combination with a marking roll and co-operating yieldably biased press roll adapted to receive the conductor between them after passing the drive roll, an inking roll for applying ink to said marking roll, ink supplying means for said inking roll, and a pinion arranged to turn with each of said driving, marking and inking rolls, the inking roll pinion being in mesh with the marking roll pinion and the latter being driven through an idler from the drive roll pinion.

10. Apparatus for marking electrical conductors comprising a driving roll and cooperating idler press roll adapted to receive the conductor between them, in combination with a marking roll and cooperating idler press roll adapted to receive the conductor between them after it passes the drive roll, and means by which the marking roll is driven from the drive roll.

11. Apparatus for marking electrical conductors comprising a driving roll and a marking roll driven therefrom, and an idler press roll yieldably biased toward each of said rolls to hold against them a conductor passing through the apparatus.

12. Apparatus for marking electrical conductors comprising a driving roll and a marking roll driven therefrom, and an idler press roll yield-

ably biased toward each of said rolls to hold against them a conductor passing through the apparatus, the press roll cooperating with the driving roll being biased with a greater force than
5 is the other press roll.

13. Apparatus for marking electrical conductors comprising a driving roll adapted to be turned by a conductor drawn through the apparatus, in combination with a marking roll driven
10 from said driving roll, and an idler press roll yieldably biased toward the marking roll to hold the conductor against the latter, the said marking roll having a rubber type body mounted on its periphery and its cooperating press roll having
15 a shallow V groove in its periphery.

14. Apparatus for marking electrical conductors comprising a driving roll and an idler press roll yieldably biased toward said driving roll to hold the conductor against the latter, in combination with a marking roll and co-operating
20

press roll adapted to receive the conductor between them after passing the drive roll, and means by which the marking roll is driven from the drive roll, the said drive roll having a leather face, and its co-operating press roll having a
5 shallow V groove in its periphery.

15. Apparatus for marking electrical conductors comprising a driving roll and a marking roll driven therefrom, and an idler press roll yieldably biased toward said driving roll to hold
10 the conductor against the latter, the said press roll having a shallow V groove in its periphery.

16. Apparatus for marking electrical conductors comprising a driving roll and a marking roll driven therefrom, and an idler press roll yield-
15 ably biased toward said marking roll to hold the conductor against the latter, the said press roll having a shallow V groove in its periphery.

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