This invention relates to apparatus for untangling wires secured to an article and more particularly to a device for untangling crossed wire springs of wire spring relay combs.

An object of this invention is to provide an improved device for lifting in triple sequence a plurality of wire springs of a wire spring relay comb to untangle them. Another object of this invention is to provide a device having a flat side member which lifts in triple sequence a plurality of wire springs of a wire comb to untangle them and which can be rotated to move the flat side into a position to provide clearance for the wire comb as it is moved into work position.

One embodiment of the present invention for untangling crossed wire springs of wire spring relay combs may include a rotor having a flat face or portion and a plurality of circumferential grooves in which triple lift cams are secured for flexing a plurality of wire springs of the wire comb in three different sequences to untangle them. An intermittently advanced conveyor moves the wire combs into operating position over the flat face of the rotor whereby, when the rotor is turned, the cams engage the wire springs to lift them in three different sequences to untangle them, and a clutch always stops the rotor with its flat face in a clear position for movement of the conveyor to feed another wire comb.

Other objects and advantages of the invention will become apparent by reference to the following detailed description thereof and the accompanying drawings illustrating a preferred embodiment of the invention, in which

Fig. 1 is a plan view of the device with a wire comb in work position and having portions of its wire springs broken away to show the flat face of the rotor;

Fig. 2 is an end elevation of the device showing the rotor in its normal inoperative position with its flat face in a horizontal position;

Fig. 3 is an enlarged fragmentary view of a portion of the rotor showing a plurality of wire springs being lifted by the triple lift cams;

Fig. 4 is a sectional view taken along line 4-4 of Fig. 1 with the rotor turned counterclockwise 90° from its normal stationary position to show the manner in which the wire springs are lifted; and

Fig. 5 is a fragmentary plan view of a wire comb with some of its wire springs crossed which are to be untangled by the device of the present invention.

Referring now in detail to the drawings a base 11 is shown supported by a bed plate 12 of a machine (not shown) for fabricating the ends of a plurality of wire springs 15, 16 and 17 of wire spring relay combs 19. The base 11 supports a pair of upright plates 20 which support a rotor 21 having a flat face 22 and a plurality of circumferential grooves 24, 25 and 26 (Fig. 3) for receiving the wire springs 15, 16 and 17, respectively, of the wire spring relay comb 19 to untangle them so that they can be fabricated. A plurality of cams 28, 29 and 30 (Fig. 3) are secured 120° apart in the grooves 24, 25 and 26, respectively, for engaging the wire springs 15, 16 and 17 to lift them in a triple sequence, the triple sequence enabling the device to untangle groups of three wires as the rotor 21 is rotated.

A motor 32 (Fig. 1) for actuating the rotor 21 drives a sprocket 33 through a clutch 34 of a well-known type which, when actuated, rotates the sprocket 33 through one revolution. A portion 36 (Fig. 1) of the fabricating machine engages the clutch 34 to actuate it as the machine is operated.

A driven sprocket 37 secured to a shaft 38 (Fig. 2) mounted on the upright plates 20 is connected to the sprocket 33 by a chain 40. An idle sprocket 41 secured to the base 11 is provided for adjusting the tension of the chain 40.

A large gear 42 secured to the shaft 38 meshes with a small gear 44 (Figs. 1 and 2) secured to the rotor 21 for driving it, the radius of the pitch diameters of the gears 42 and 44 being such that the rotor 21 turns through exactly three revolutions each time the clutch 34 is actuated and is stopped with the flat face in up position at the end of three revolutions.

When the rotor 21 is at rest its flat face 22 is uppermost to provide clearance whereby the wire comb 19 can be moved horizontally into alignment with the rotor 21. An intermittently advanced conveyor 45 mounted on a raised portion 47 of the base 11 (Figs. 1 and 4) moves the wire comb 19 into alignment with the rotor 21 (Fig. 1). A bar 46 (Fig. 2) positioned above and movable with the conveyor 45 cooperates with the conveyor to hold the wire comb 19 as it is being straightened. The clutch 34 is actuated by the portion 36 of the fabricating machine in synchronism with the conveyor 45 whereby the wire comb 19 is advanced into work position and the portion 36 actuates the clutch 34 to rotate the rotor 21 through three revolutions, thereby lifting the wire springs 15, 16 and 17 in sequence to untangle them. Both the conveyor 45 with its bar 46 and the fabricating machine are types which are conventional and well known.

In operating the device, the conveyor 45 is actuated by the fabricating machine in a well known manner to advance the wire comb 19 into alignment with the flat face 22 of the rotor 21 (Fig. 1) whereupon the portion 36 of the fabricating machine actuates the clutch 34 to rotate the sprocket 33 through one revolution. The sprocket 33 moves the chain 40 to rotate the driven sprocket 37 and the large gear 42 through one revolution, thereby rotating the rotor 21 counterclockwise (Fig. 4) through three revolutions.

As the rotor 21 is rotated the cams 28 engage the wire springs 15 to lift and lower them in the first of the three lifts of the triple sequence. After the cams 28 have cleared the wire springs 15, the cams 29 engage the wire springs 16 to lift and lower them in the second step of the triple sequence. The cams 30 then engage the wire springs 17 to lift and lower them in the final step of the sequence. Thus, the wire springs 15, 16 and 17 are lifted in combinations and lowered in that order for each complete revolution of the rotor 21. Since the rotor 21 turns through three complete revolutions each time the clutch is actuated, each of the wire springs 15, 16 and 17 is lifted and lowered three time thereby providing assurance that the untangling operation will be completed.

After three revolutions the rotor 21 is stopped by the clutch 34 (which is stopped to limit the sprocket 33 to exactly one revolution) with the flat face 22 of the rotor 21 uppermost. The fabricating machine actuates the conveyor 45 which advances to move another wire comb 19 into alignment with the rotor 21. The clutch 34 is actuated and the above procedure repeated.

Certain features of the present invention are disclosed and claimed in co-pending applications Serial No.
Spaced wires extending in the same direction from an article, a cylindrical member having a flat side parallel to the axis of said member, means for supporting the member for rotation about its axis, means for rotating the member and for stopping the member with said flat side in a predetermined position accessible for movement of the article into operative position relative thereto with the intermediate portions of the wires in overlying relation and close proximity to said flat side, said member having a plurality of parallel annular grooves in alignment with the wires of an article in operative position and for holding the article in said position, and a cam in each of said grooves in angularly spaced relation to one another for flexing the wires sequentially to effect the separation and untangling of the ends thereof.

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