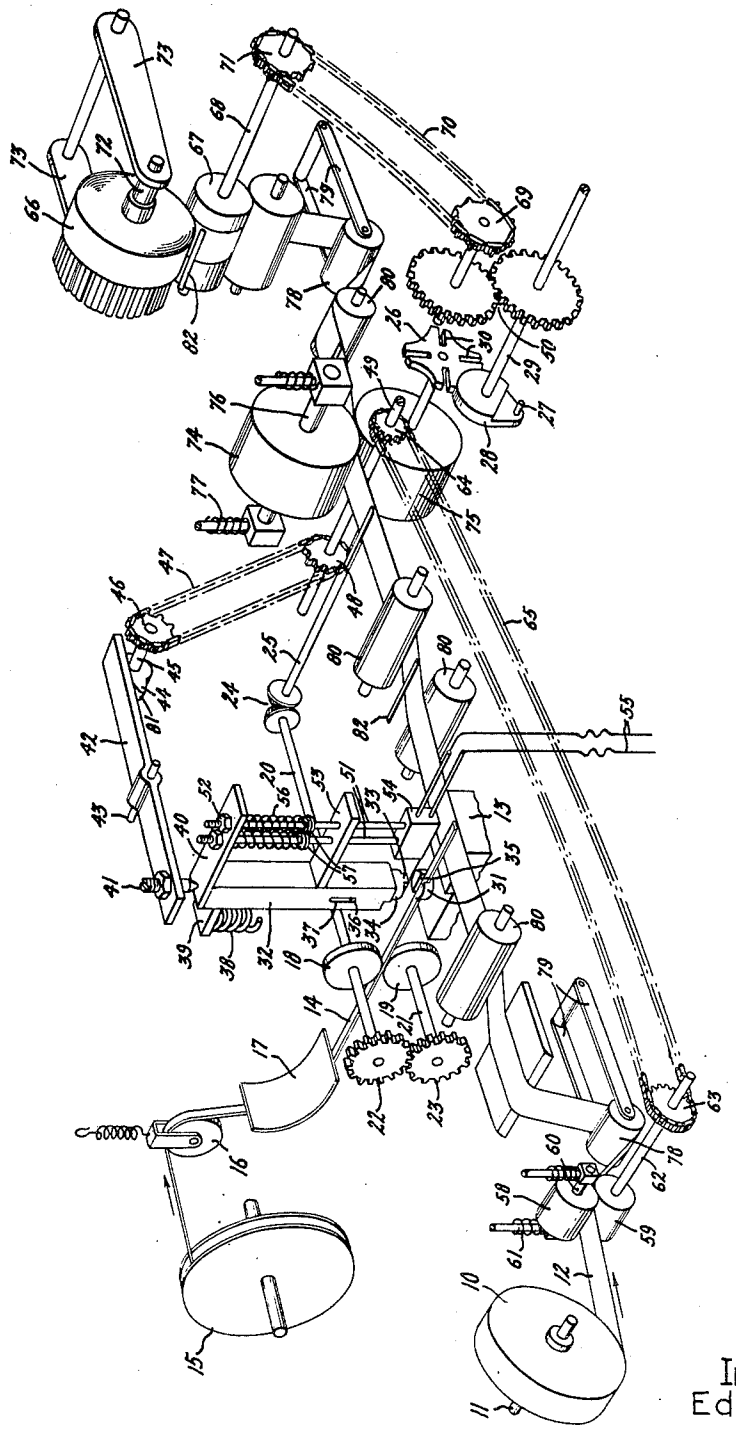
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METHOD OF AFFIXING CONDUCTING TAP STRAPS TO A PAPER MOUNTING STRIP

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METHOD OF AFFIXING CONDUCTING TAP STRAPS TO A PAPER MOUNTING STRIP

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1 Claim. (Cl. 154—80)

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My invention relates to a method for affixing or attaching a plurality of strips of material, at spaced and equal intervals, to another strip of material. More particularly my invention relates to transversely affixing a plurality of conducting tap straps, employed as terminals in electric condensers, at spaced and equal intervals to a strip of mounting material such as a longitudinal strip of insulating paper which combination was disclosed in a copending application for "Capacitors Including Method and Apparatus for Tap Strap Insertion Therein," Serial No. 18,104, filed March 31, 1948, now Patent No. 2,547,644, and assigned to the same assignee as the instant application. This application is a division of copending application entitled "Apparatus for Affixing Conducting Tap Straps to a Paper Mounting Strip," Serial No. 41,804, filed July 31, 1948, and assigned to the same assignee as the instant application.

To be employed in the manner disclosed in the aforementioned copending application, Serial No. 18,104, now Patent No. 2,547,644, the longitudinal strip of insulating paper must have the conducting tap straps affixed thereto not only at spaced and equal intervals but a portion of each tap strap must extend a predetermined distance laterally beyond a longitudinal edge of the mounting strip approximately equal to the distance it is desired to have the tap straps project out of the finished condenser roll. Also, since the longitudinal edges of the mounting strip are eventually aligned with the longitudinal edges of the dielectric material between the conducting foils in the finished condenser, each tap strap must obviously be affixed at an angle with respect to the longitudinal edges of the mounting strip commensurate with the desired angle of projection from the finished roll. Moreover, since each tap strap is intended to eventually be in good electric contact with a conducting foil or plate within a rolled condenser it is important that an entire surface thereof be free of any contamination or form of insulating material. Finally, to comply with economic demands it is imperative that a supply roll of mounting material with conducting tap straps affixed thereto be quickly and automatically prepared in accordance with the desired requisites as hereinbefore indicated.

It is therefore an object of my invention to provide a method for affixing, at spaced and equal intervals a plurality of conducting tap straps to a mounting strip of insulating material.

It is also an object of my invention to provide

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a method for automatically affixing such tap straps, from a longitudinal supply strip of conducting material, to a supply strip of insulating mounting material.

My invention will be better understood from the following description when taken in connection with the accompanying drawing the single figure of which perspectively and diagrammatically illustrates an apparatus embodying my invention, the scope of which will be pointed out in the appended claim.

In the accompanying drawing, 10 represents a supply roll of insulating mounting material rotatably mounted on spindle or shaft 11 which in turn is supported by a stationary framework, not illustrated in the interest of simplicity. As supply roll 10 is unwound, by drive means to be described hereinafter, the longitudinal strip of mounting material 12 therefrom is directed toward the right in the direction of the arrow and during this rightward passage passes over and is temporarily supported on support platform 13 also rigidly supported by the stationary framework.

A supply strip of conducting material 14 is fed from a supply roll or reel 15 over tension pulley 16 and under guide 17 in the direction of the arrow toward and transversely over the platform 13 and the longitudinal supply strip of mounting material 12. The lower, or the surface of the conducting strip 14 adjacent the platform, has been previously coated with a thermo-setting adhesive material. To feed the conducting strip 14 transversely toward the mounting strip, I employ feed means comprising a pair of cooperating feed rolls 18 and 19 fixedly mounted on shafts 20 and 21 respectively which are positively interconnected by spur gears 22 and 23 respectively. Shaft 20 is driven counterclockwise, as viewed, by bevel gear set 24 and shaft 25 which is in turn intermittently driven by a conventional Geneva motion comprising an escapement disk 26 keyed on the end of shaft 25 and a constantly rotated escapement pin 27 mounted on an arm 28 keyed to drive shaft 29 which is constantly driven counterclockwise by a pulley or chain sprocket mounted thereon but not shown which in turn may be driven by a belt or chain from a motor neither of which are illustrated. Escapement disk 26 may have a number of radial recesses or notches 30 in its periphery, in this case four. Escapement pin 27 is adapted to enter and exit from recesses 30 as drive shaft 29 rotates to impart intermittent rotation to shafts

25 and 20 and conducting strip feed rolls 18 and 19.

Between feed rolls 18 and 19 and platform 13 at a predetermined distance therefrom and the adjacent longitudinal edge of mounting strip 12 is supported a conducting strip severing means or knife comprising a die and strip support 31 rigidly fixed to the apparatus framework and punch or knife housing 32 slidably mounted for vertical movement at the rear, but not shown, on the framework. The forward lower end 33 of housing 32 is formed or machined to a knife edge the purpose of which will be explained hereinafter. Conducting strip holding element 34 is mounted for vertical movement within housing 32, biased downward by a spring therein and aligned for engagement with die slot 35 which has a width and is so aligned as to slidably accommodate conducting strip 14 as it is fed toward mounting strip 12. The downward travel of holding element 34 under its spring bias is limited by the engagement of a pin 36 affixed thereto with the lower edge of a slot 37 in the side wall of knife housing 32. Normally, holding element 34 is biased out of engagement with die slot 35 by spring 38 interposed between plate extension 39, fixed to housing 32, and the framework. Upward thrust of spring 38 is resisted by the engagement of top plate 40, suitably fixed to housing 32, with the rounded end of an adjustment screw 41 threadedly mounted in a beam or lever 42 rotatably pivoted on pivot pin 43 fixedly mounted on the apparatus framework. Clockwise rotation thus imposed by spring 38 on lever 42 is resisted by engagement of the opposite end thereof with the contact surface of a cam 44 mounted on shaft 45. Cam 44 and shaft 45 are rotated by sprocket 46, chain 47 and sprocket 48 keyed to shaft 49 which is positively driven by drive shaft 29 through spur gear set 50. Top plate 40 is provided with an overhanging extension containing a pair of spaced openings which serves to slidably accommodate a pair of vertical rods 51 each of which has an adjustment nut 52 threaded on the upper end thereof. Vertical rods 51 extend downwardly respectively through a pair of spaced openings, having a diameter slightly larger than the diameter of the rods, in horizontal guide plate 53 fixed to the side wall of housing 32. At the lower ends of vertical rods 51 is fixedly mounted a combination tamper and heater block 54 containing an electrical heating element energized by circuit conductors 55. Normally, tamper and heater block 54 is biased in a downward direction by a pair of coil springs 56 respectively mounted around the vertical rods 51 and interposed between collars 57 integral therewith and the overhanging extension of housing top plate 40. Normally, the lowermost position of block 54 under the biasing action of springs 56 is limited and controlled by the position of nuts 52 on the threaded upper ends of rods 51.

Longitudinal mounting strip 12 is continuously unrolled from supply roll 10 by a pair of feed rolls 58 and 59 between which the mounting strip is directed in its travel toward support platform 13. Roll 58 is an idler roll the shaft 60 of which is biased downwardly by springs 61 so that the mounting strip 12 is pulled frictionally between rolls 58 and 59. Roll 59 is mounted on rotatable shaft 62 on an extension of which is keyed a sprocket wheel 63 which is driven by drive shaft 29 through spur gear set 50, shaft 49, sprocket 64, mounted thereon and chain 65 interconnecting

sprockets 63 and 64. Longitudinal mounting strip 12, with tap straps affixed thereto is also continuously rewound as indicated at 66 representing a partially rewound reel of mounting material in rolling engagement with friction roll 67 keyed to shaft 68 which is also driven by drive shaft 29 through spur gear set 50, shaft 49, sprocket 69 heyed thereto, chain 70 and sprocket 71 keyed to shaft 68. Mounting strip 12 is rewound on a core sleeve mounted on reel up shaft 72 which is supported on a pair of radius arms 73 which are in turn pivotally mounted on the apparatus framework. The mounting of shaft 72 on the pivoted radius arms results in constant rolling engagement of the reel being rewound with friction drive roll 67 regardless of the amount of mounting material that has been rewound into a finished reel.

In its travel from support platform 13 toward friction roll 67, mounting strip 12 is directed between another pair of feed rolls 74 and 75. Roll 74 is an idler roll the shaft 76 of which is biased downwardly by springs 77 so that the mounting strip 12 is pulled frictionally between rolls 74 and 75. However, since drive feed roll 75 is mounted on intermittently driven shaft 25, the mounting strip will only be moved intermittently by this pair of feed rolls, although it is continuously unwound from supply roll 10 and rewound, once the apparatus has been started. Feed rolls 74 and 75, escapement disk 26 and the radius arm of pin 27 are so proportioned and related to the balance of the apparatus, hereinbefore described, that rotation of roll 75, while pin 27 is in engagement with a slot 30, feeds mounting strip 12 toward friction roll 67 at a much greater linear speed than it is being wound thereby on reel 66. Thereafter, when pin 27 becomes disengaged from a slot 30 in disk 26, there is no further movement of rolls 74 and 75 nor of mounting strip 12 over platform 13 for a momentary period during which pin 27 is making a part of a revolution before engaging with the next adjacent slot in disk 26 and friction roll 67 is rewinding the excess mounting strip previously and quickly fed forward by the feed rolls 74 and 75. During this momentary period, continuous rotation of feed rolls 58 and 59 unwinds an excess of mounting material from supply roll 10 which excess is quickly taken up by the next increment of rotation of feed rolls 74 and 75. Excess mounting material unwound from supply roll 10 during the momentary period when feed rolls 74 and 75 are stationary and excess mounting material fed forward by rotation of these rolls is controlled and tension is maintained therein by rolls 78 each pivotally mounted on a pair of radius arms 79 pivotally mounted on the apparatus framework.

Between tension rolls 78, are positioned a number of spaced idler rolls 80 which serve to guide mounting strip 12 in its travel from feed rolls 58 and 59 to friction roll 67.

To operate my apparatus hereinbefore described, an end of mounting strip 12 is first manually fed between feed rolls 58 and 59 pulled over support platform 13, between guide rolls 80 and feed rolls 74 and 75 as shown and attached to the core sleeve on shaft 72 and an end of conducting strip 14 is manually directed between conducting strip feed rolls 18 and 19. Then the drive motor, not shown, which turns drive shaft 29 is started. Thereafter, all the steps of my invention are executed automatically. Mounting strip feed rolls 74 and 75 quickly pull mounting

strip 12 over platform 13 from an excess previously unwound by feed rolls 58 and 59 off of supply roll 10. Simultaneously conducting strip feed rolls 18 and 19 rotate to feed the conducting supply strip through the die slot 31 toward and transversely over mounting strip 12. Thereafter, pin 27 on arm 28 becomes disengaged from a slot 30 in escapement disk 26 to momentarily stop both the movement of mounting strip 12 over platform 13 and the feed of conducting strip 14 thereover. The various elements of the apparatus are interconnected as hereinbefore described and so synchronized that during this momentary period the periphery portion 31 of rotating cam 44, having the greatest radius, begins to roll into engagement with the beam 42 turning it counterclockwise about its pivot 43 to force housing 32 downwardly against the upward bias of spring 38 and the lower end of holding element 34 into die slot 35 and engagement with conducting strip 14. Since tamper and heater block 54 is supported through rods 51 and nuts 52 on top plate 40 fixed to housing 32, this downward motion also lowers block 54 into engagement with the conducting strip 14 previously fed over mounting strip 12. Inasmuch as block 54 is hot by virtue of the heating element therein, this engagement between block and conducting strip soften the thermo-setting adhesive coating on the under-surface thereof. Additional rotation of cam 44 results in further downward and slidable motion of housing 32 relative to holding element 34, which having engaged stationary die slot 35 and strip 14 remains stationary, whereby the knife edge 33 of housing 32 passes through and severs conducting strip 14. Obviously, this additional downward movement of housing 32 is not only against the biasing action of spring 38 but also against the biasing action of the holding element spring within the housing whereby additional holding pressure is imposed on the strip 14 during the severing thereof, since block 54 has already been lowered into contact with the conducting strip 14 prior to the severing thereof. This additional downward movement of housing 32 also lowers guide plate 53 and top plate 40 relative to block support rods 51 to compress springs 56 whereby block 54 imposes considerable pressure on the severed conducting strip to affix it firmly, by the softened thermo-setting adhesive material to the mounting strip.

Thereafter, the constant rotation of shaft 49 and cam 44 driven thereby will permit clockwise rotation of beam 42 and upward motion of housing 32 and block 54 subsequent to which feed rolls 74 and 75 will be rotated another increment to advance mounting strip 12, and conducting strip feed rolls 18 and 19 will be simultaneously rotated to feed another portion of the conducting strip 14 transversely over the mounting strip.

Thus, I have provided a method whereby a conducting tap strap 82 having a predetermined portion projecting beyond or exterior a longitudinal edge of a strip of mounting material, equivalent to the distance therefrom to a severing means, is automatically affixed to the mounting strip at spaced and equal intervals thereon. It will be apparent that the angle between the tap straps and a longitudinal edge of the mounting strip may be controlled by changing the direction of feed of conducting strip 14 with respect to the direction of movement of the mounting strip and the projecting portion of the tap strap including projection beyond both longitudinal edges of the mounting strip may be changed by obvious modification in the elements of the apparatus.

While I have, in accordance with the patent statutes, described a particular method of operation for carrying out my invention; other changes will be obvious to those skilled in the art, and I, therefore, aim in the appended claim to cover all such changes as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

The method of affixing a conducting tap strap to a moving supply strip of mounting material at spaced and equal intervals thereon from a supply strip of conducting material, one of said strips having adhesive material applied to a surface thereof, which comprises the steps of feeding the end of said conducting strip toward and transversely over said mounting strip so that the surface of one of said strips having adhesive applied thereto will be adjacent to said other strip, stopping the feed of said conducting strip, simultaneously stopping the movement of said mounting strip, pressing the portion of said conducting strip moved transversely over said mounting strip against said strip of mounting material and then transversely severing said conducting strip while both of said strips are stopped, at a predetermined distance exterior of a longitudinal edge of said mounting strip.

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