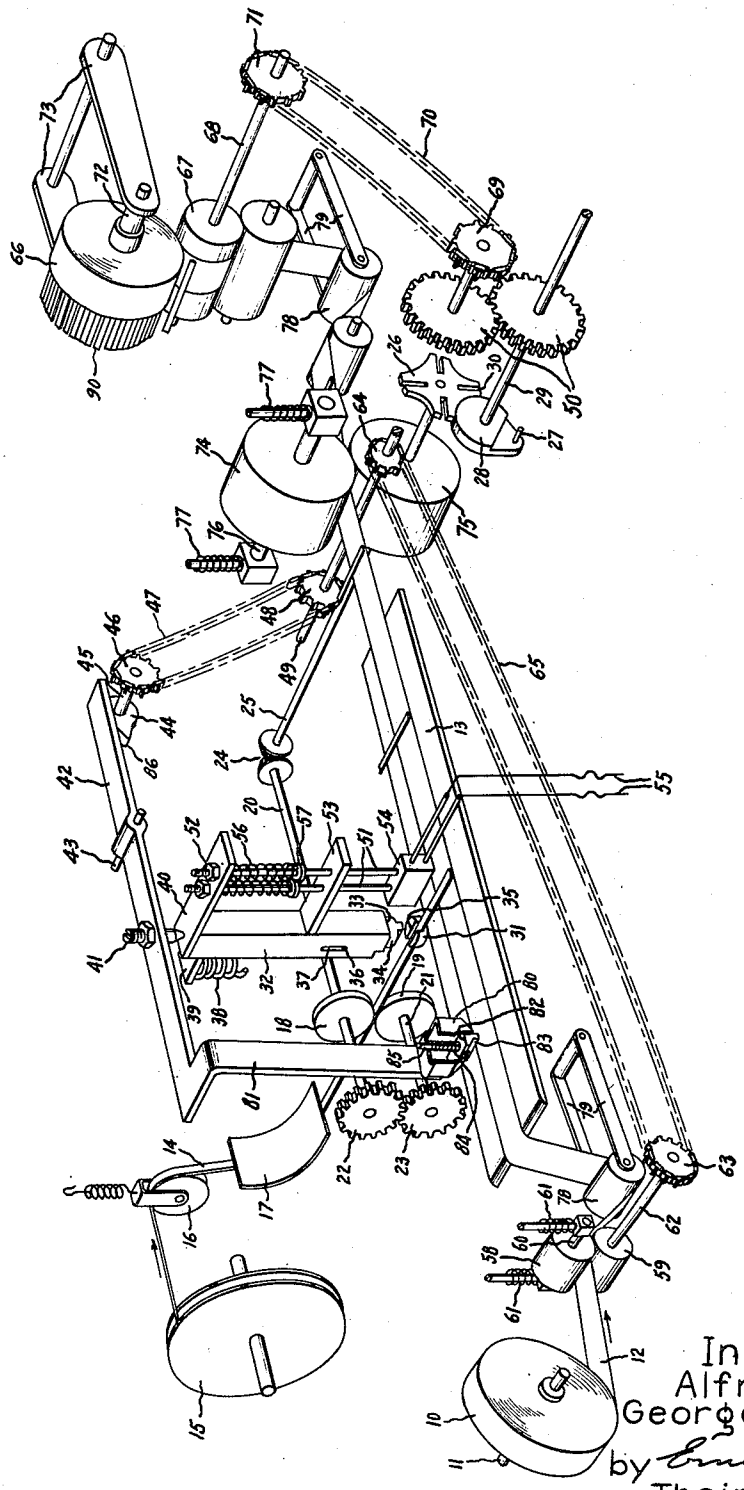
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APPARATUS FOR AFFIXING CONDENSER TAP STRAPS TO MOUNTING STRIP MATERIAL

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APPARATUS FOR AFFIXING CONDENSER TAP STRAPS TO MOUNTING STRIP MATERIAL

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1 Claim. (Cl. 154—1.6)

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The present invention relates to an apparatus for attaching a plurality of strips of material, at spaced and equal intervals, to another strip of material. More particularly, the invention relates to an improvement over the apparatus for transversely affixing a plurality of conducting tap straps to a wider strip of insulating mounting material disclosed in the copending applications of Raney, Serial No. 41,804, filed July 31, 1948 and Serial No. 116,346 filed September 17, 1949, each assigned to the same assignee as the instant application. The broad aspects of any features disclosed in these copending applications and common to the instant application are to be regarded as prior art with respect to this present application which is directed to a particular combination of elements not disclosed in these prior art applications.

As was pointed out in the Raney application, Serial Number 41,804, to employ this combination of tap straps affixed to a longitudinal strip of mounting material in the manner disclosed in the copending Hogue et al. application Serial No. 18,104, filed March 31, 1948, now Patent No. 2,547,644, it is essential that the longitudinal strip of insulating material 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 strap project out of the finished condenser roll. It was moreover indicated that since each tap strap is intended to eventually be in good electric contact with a conducting foil or plate within a condenser roll it is important that an entire surface thereof be free of any contamination or form of insulating material.

However, to permit the best electrical connection with the external terminals mounted on the capacitor case, it is equally as important and desirable that both surfaces of the projecting portion of each tap strap be free of any contamination such as, for example, adhesive material employed to bond the tap straps to the mounting strips. In fact, so as not to in any way impair the winding or, subsequent unwinding of the finished roll of mounting material with tap straps affixed thereto, it is desirable that adhesive be applied only to such portions of the mounting strip or tap strap which will be contiguous once adhesively affixed to each other.

It is therefore an object of this invention to provide an improved apparatus for automatically affixing, at spaced and equal intervals, a plurality

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of conducting tap straps to a mounting strip of insulating material.

It is also an object of this invention to provide an apparatus for applying adhesive material to the mounting strip whereby only such surfaces of the mounting strip or tap strap as will be in engagement after affixing to each other will have adhesive applied thereto.

This 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 this 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. To feed the conducting strip 14 transversely toward the mounting strip, feed means is employed 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 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 im-

part 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 electric 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 lower-most 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 keyed 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 pivotedly 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 rolls 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 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 idler rolls 78 each pivotally mounted on a pair of radius arms 79 pivotally mounted on the apparatus framework. The apparatus as thus far described is substantially identical to the apparatus disclosed and described in the above mentioned copending application of Raney, Serial No. 41,804.

However, in accordance with the present invention, the necessity of employing a supply strip 14 of conducting material one surface of which had been pre-coated with adhesive material is eliminated. Instead, a combination liquid adhesive reservoir and applicator 80 is provided which is rigidly mounted on a downwardly projecting arm 81 integral with beam 42. The bottom of reservoir 80 is provided with sloping sides the lowermost edges of which are spaced from each other to form a rectangular opening or slot in the bottom of the reservoir. Normally this

opening is closed liquid tight by a movable valve 82 having an adhesive applicator bar 83 integral therewith projecting below the terminating sides of the reservoir and slidable within the slot. To maintain the valve in the closed position, a coil spring 84 is interposed between the valve and reservoir cover and mounted around valve guide stem 85 which is fixed to the valve and slidable within an opening in the reservoir cover. The cover may be bolted or clamped to the reservoir body in any suitable manner to permit removal for filling of the reservoir with liquid adhesive material. Adhesive applicator bar 83 has a width slightly less than the width of the strip of conducting material 14, a length slightly less than the width of mounting strip 12 and the reservoir 80 is so mounted on downwardly projecting arm 81 that the applicator bar is transverse to the longitudinal axis of the mounting strip and the lowermost surface thereof is spaced from the mounting strip when beam 42 is in the position shown by the drawing.

To operate the 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 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 on our 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 whereby a relatively narrow strip of liquid adhesive material, previously applied transversely on the mounting strip as will be described hereinafter, is brought into alignment with die slot 35. Simultaneously conducting strip feed rolls 18 and 19 rotate to feed the conducting supply strip through the die slot 35 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 86 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 elements 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 to press it on to the relatively narrow adhesive strip previously applied to the mounting strip. Inasmuch as block 54 is hot by virtue of the heating element therein, this engagement between block and conducting strip tends to drive off volatile matter in the adhesive. Since reservoir 80 is rigidly mounted on the downwardly projecting portion 81 of beam 42, this counterclockwise motion of the beam lowers the reservoir and the applicator bar 82, with a previously metered amount of adhesive along the bottom

edge thereof, into engagement with the mounting strip 12 whereby a narrow strip of adhesive is transversely applied thereto. Additional rotation of cam 44 results in further counterclockwise rotation of beam 42 and 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 adhesive material, to the mounting strip. Simultaneously, this additional counterclockwise rotation of beam 42 will lower reservoir 80 in relation to valve 82, further downward movement of which is prevented by engagement of applicator bar 83 with the mounting strip, whereby a quantity of adhesive is permitted to run between the V surfaces of the valve and the edges of the reservoir slot.

Thereafter, the constant rotation of shaft 49 and cam 44 driven thereby will permit clockwise rotation of beam 42 and upward motion of reservoir 80 whereupon valve 82 will be forced into the closed position by the biasing action of spring 84 and the applicator 83 will be raised out of engagement with mounting strip 12. The liquid adhesive previously released from the reservoir and which, in the interim has been slowly flowing down the side surfaces of the applicator will eventually collect along the bottom edge thereof where it will remain available for the next application. This clockwise rotation of beam 42 will simultaneously permit 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 the adhesive strip thereon into alignment with die slot 35 while conducting strip feed rolls 18 and 19 will be simultaneously rotated to feed another portion of conducting strip 14 transversely over the mounting strip.

Thus, a new and improved means has been provided whereby a tap strap of conducting material 90 having a predetermined portion projecting beyond or exterior a longitudinal edge of a strip of mounting material is automatically affixed thereto at spaced and equal intervals in such a manner that both surfaces of the projecting portion of each tap strap are entirely free of any insulating material such as the adhesive employed to bond the tap to the mounting strip. Moreover, in accordance with this improved means the surface of the mounting strip intermediate the spaced tap straps affixed thereto is left free of any such adhesive material.

While we have, in accordance with the patent statutes, shown and described a particular embodiment of out invention, modifications therein will be obvious to those skilled in the art and we, therefore, aim in the appended claim to cover

all such changes as fall within the true spirit and scope of our invention.

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

In a machine for fixing a conducting tap strap to a strip of mounting material at spaced and equal intervals thereon from a supply strip of conducting material, a platform for supporting said strip of mounting material, a first pair of rotatable cooperating feed rolls for moving said conducting strip therebetween, a knife movable normal to and across the path of movement of said conducting strip and positioned between said feed rolls and said mounting strip, a second pair of rotatable cooperating feed rolls for moving said mounting strip therebetween and across said platform, a tamper movable normal to and engageable with said mounting strip and transversely positioned thereover above and in alignment with the direction of feed of said conducting strip, and adhesive applicator movable normal to and engageable with said mounting strip and positioned transversely thereover at a distance equal to said spaced and equal interval from said conducting strip, and drive means to rotate said first and second pair of feed rolls to feed an end of said conducting strip toward and transversely over said mounting strip and said platform and to move said mounting strip longitudinally across said platform a distance equal to said spaced and

equal interval said drive means including a Geneva mechanism to simultaneously stop the rotation of said first and second pair of feed rolls for a momentary period of time, said drive means operable during said momentary period to actuate said tamper to press against said mounting strip the portion of said conducting strip transversely moved thereover, to actuate said applicator to apply a narrow strip of adhesive material transversely on said mounting strip and thereafter to actuate said knife to transversely sever a portion from said conducting strip fed over said mounting strip.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,088,533	Cameron	Feb. 24, 1914
2,029,922	Heckel	Feb. 4, 1936
2,250,533	Hanson	July 29, 1941
2,284,563	Dillman	May 26, 1942
2,350,887	Goff	June 6, 1944
2,437,022	Fritzinger	Mar. 2, 1948
2,467,565	Owens	Apr. 19, 1949