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(54) APPARATUS FOR MOUNTING ELECTRICAL COMPONENTS HAVING
 TWO ALIGNED WIRES ON A BELT

(71) I, THOMAS WERESCH, a citizen of the Federal Republic of Germany, of Greschbachstrasse 19, D-7500 Karlsruhe 41, Federal Republic of Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an apparatus for applying electrical components having two aligned connection wires to a belt formed from two pairs of adhesive bands between each pair of which the ends of the connection wires are located, the adhesive bands being wound on supply bobbins, the apparatus consisting of at least two toothed wheels arranged next to each other and which receive the electrical components in aligned tooth gaps therein and a roller adjacent each toothed wheel to support a respective first adhesive band and a second adhesive band in superimposed disposition relative thereto, there being two pressing devices each pressing on a pair of superimposed bands with the connection wires interposed therebetween.

Such arrangements are known and used for making belts of such electrical components as resistances, condensers and diodes which are led to the apparatus by means of a separate guide. At the end of the guide they are located in the toothed transport wheels by engagement of the connection wires of the components with tooth gaps in such toothed wheels. The toothed wheels are arranged on a common shaft with their adjacent rollers and are located at a fixed, predetermined distance from such rollers. The rollers are disposed outwardly of the toothed transport wheels. A first adhesive band fed from a supply bobbin thereof is guided around each roller meeting such roller generally tangentially, which adhesive band is advanced by the roller. The ends of the connection wires of the electrical components lie on these two first adhesive bands. From two other supply bobbins

second adhesive bands are guided, each to a pressing device associated with one of the rollers, the adhesive side of each such second band overlying and being pressed into contact with the respective first adhesive band. In this way the ends of the connection wires of the components are firmly fixed between the two adhesive bands present on each roller.

This known apparatus has the drawback that with the use of electrical components of different size the supply bobbins which provide a pair of cooperating adhesive bands must be adjusted separately on both sides of the electrical component so that such bands will be disposed in overlapped relationship with the connection wires located therebetween. In addition, are the facts that the width of the rollers must be adapted to accommodate the largest and shortest lengths of the connection wires of the components to be processed and the distance of the two rollers from one another must be adapted to the length of the largest body of the components. There thus results the drawback that for making into belts such components which have a minimum length from the two ends of the connection wires, after having processed components having the maximum body length, an exchanging of the whole shaft carrying the toothed transport wheels and the rollers for another adapted to the smaller components is necessary. The exchanging and adjusting of the supply bobbins is tedious and requires, at least with this apparatus, skilled personnel, so that the adjustment of the machine cannot be carried out by unskilled labour.

The invention is based on the problem of designing an apparatus of the above mentioned type such that it can be erected rapidly by unskilled labour and simply according to the components to be used.

This problem is solved, according to the invention, in that the toothed transport wheels and the rollers are axially adjustable on a common shaft and in that the pair of supply bobbins for each pair of adhesive

bands to be superimposed upon one another are mounted on a common carrier and the two carriers are adjustable in respect of one another in a direction parallel to the axis of the shaft.

With constructional apparatus according to the invention therefore, all sizes of electrical components can be accommodated without exchanging the shaft with the toothed transport wheels and the rollers, and the pair of supply bobbins for each pair of cooperating adhesive bands, each mounted on a common carrier, are adjusted by simple adjustment of the carrier according to the respective component, without a pair of cooperating adhesive bands being able to get into a non-overlapping position. Adjustment of each individual supply bobbin as is required in the prior art is dispensed with. Thus the apparatus of the invention may be adjusted rapidly and easily using unskilled labour.

According to a preferred embodiment each carrier is formed from two carrier arms arranged substantially at right angles to one another and there is arranged on each end of these carrier arms the supply bobbins, one of the adhesive bands from each carrier being led approximately tangentially to the roller, whilst the other adhesive band from that carrier is guided, to approach the roller substantially in the same direction as the first adhesive band, by the pressing device through an obtuse angle.

In order to facilitate the insertion of the adhesive bands, it is further provided that each pressing device has a lever with a pressure roller arranged on its end, which pressure roller is pivotally hinged on the carrier. In an advantageous further construction of the invention there is linked to the hinge point of the first lever a second lever on the end of which is disposed a second guide roller and the second lever fits detachably in the pressing position by means of a handle and a spring is disposed between the two levers. The force of the spring is suitably adjustable.

The invention will now be described further, by way of example only, with reference to the accompanying drawings illustrating one embodiment thereof and in which:—

Fig. 1 is a front elevation of apparatus constructed in accordance with the invention, parts of the apparatus being omitted in the interests of clarity;

Fig. 2 is a section on line II—II of Fig. 1; and

Fig. 3 is a section through the pressing device and a roller of Figs. 1 and 2, but drawn to a larger scale.

The apparatus indicated generally in Fig. 1 by the reference numeral 1, includes an engine and gear box 2 at one side thereof,

whilst the opposite side of the apparatus comprises a housing plate 3. A shaft 4 is rotatably mounted between the box 2 and the housing plate 3, shaft 4 being driven by means of a motor (not shown) located within box 2.

Two rollers 5 are provided in spaced apart disposition on and secured to the shaft 4, the inwardly facing ends of the rollers being formed with respective toothed flanges having teeth 6 thereon, the teeth 6 on the respective flanges being in alignment in the axial direction of the shaft. Between the rollers 5, the shaft 4 further carries two toothed, transport wheels 7, the wheels 7 being secured to the shaft by screws 9 which engage an axial groove 10 in the shaft, such groove likewise receiving screws 8 whereby the rollers 5 are secured to the shaft for rotation therewith. As will readily be appreciated, the rollers 5 and the transport wheels 7 are adjustable axially of the shaft 4. A frame rod 11 is provided beneath the shaft 4, such rod 11 being carried by and extending between the gear box 2 and the housing plate 3. Two carrier arms 12 are mounted on the frame rod 11 for adjustment axially thereof. Each carrier arm 12 is of L-shape when viewed in side elevation, the end of each limb 13, 14 thereof carrying a respective supply bobbin 15, 16 wound with adhesive band (the rear supply bobbins 16 are for reason of visibility not shown in Fig. 1). At the junction of the limbs 13, 14 of each carrier arm 12 there is provided a pressing device 17 which is movable into the "load" position shown in Fig. 2 by means of a locking lever 17 which pressing device can be hinged forwardly from the position shown in Fig. 2 to that as shown in Fig. 1, for insertion of the adhesive bands.

Each pressing device 17 consists of two levers 18, 19 pivotably mounted on the carrier 12, each such lever 18, 19 having a respective guide roller 20, 21 at its remote end for guiding an adhesive band 29. A pressure roller 22 is provided on each lever 18 and below guide roller 20, there being an adjustable spring means comprising a spring 23 and an adjusting device 24 extending between and supported by each pair of levers 18, 19 for varying the loading applied to lever 18, and hence to pressure roller 22, (the adjusting device 24 are omitted in Fig. 1 for the sake of visibility). That end of each lever 19 hinged on a carrier 12 has a nose piece 25 having a flat underside portion 26 which, in the pressing position as shown in Fig. 2, bears on an arresting pin 27 of the release device of the pressing device 17 fixed on the frame 12.

The apparatus 1 is made ready for operation in that, with the pressing devices 17 in the retracted position shown in Fig. 1, the

bands 28 of the supply bobbins 16 are placed on the roller 5, whilst the adhesive band 29 of the other supply bobbin 15 are looped around guide rollers 20, 21 of the pressure device 17 and also around the corresponding guide rollers 20, 21 of the pressing devices 17 are moved into the operative position shown in Fig. 2 and are locked in such position by means of the handles 17¹ and the arresting pins 27. By virtue of springs 23, levers 18 are resiliently loaded (in a clockwise direction as shown in Fig. 1), and thus pressing rollers 22 are spring-loaded into contact with roller 5. If the components 31 are fed to the device 1 in the direction of the arrow 30, (Fig. 3), with their connection wires 32 engaged with aligned tooth gaps of the transport wheels 7 and of the lateral teeth 6 of the rollers 5, the ends of the connection wires 32, on rotation of the shaft 4, are moved in the direction of the arrow 33 and onto the adhesive bands 28 at a position in advance of the pressure rollers 22. The guide rollers 20 each have a peripheral groove 34 therein to receive an adhesive band 29 and to locate such band in alignment with the other cooperating adhesive band 28. Upon further rotation of the rollers 5, the adhesive bands 29 are pressed into contact with the corresponding adhesive band 28 by means of the pressure rollers 22, the ends of the connection wires 32 thereby being stuck between the two pairs of superimposed and mutually adhering bands 28, 29. The resultant belt 35, that is to say, the superimposed bands 28, 29 and the components 31 secured thereto, may proceed directly to some further processing operation, for example, cut and packed into pre-selected lengths, or may be wound on to a winding bobbin 36 (Fig. 1) mounted between the housing plate 3 and the motor and gear box 2 and driven therefrom via a slip clutch (not shown).

For adjustment of the packing density, that is the distance between the electrical components on the belt, a cam disc 37 (Fig. 1) mounted on shaft 4 outwardly of the housing plate 3 and which controls, via a control cam (not shown), the delivery of the components to the apparatus may be exchanged for another having a different number of cams. Hereby in a simple manner the packing density of the components to be formed into a belt can be adjusted.

WHAT I CLAIM IS:—

1. An apparatus, for applying electrical components having two aligned connection wires, to two pairs of superimposed adhesive bands, between each pair of which a respective connection wire is located, to

form a belt having components arranged in spaced disposition longitudinally thereof, the adhesive bands being wound on supply bobbins, such apparatus consisting of at least two toothed transport wheels arranged next to one another to receive the electrical components in tooth gaps therein, a roller adjacent each transport wheel to support a first adhesive band, and a pair of pressing devices each for applying a second adhesive band to each first band in superimposed disposition thereon, characterised in that the toothed transport wheels and the rollers are axially adjustable on a common shaft and in that the pair of supply bobbins for each pair of adhesive bands to be superimposed upon one another are mounted on a common carrier and in that the two carriers are adjustable in respect of one another in a direction parallel to the axis of said shaft.

2. An apparatus according to claim 1 characterised in that on each of said carriers is also mounted one of said pressing devices.

3. An apparatus according to claim 1 or claim 2, characterised in that each carrier is formed having two carrier arms arranged substantially at right angles to one another and on the remote end of each carrier arm a supply bobbin is arranged and in that one of the adhesive bands from each carrier is led approximately tangentially to the corresponding roller, the other adhesive band from said carrier being guided by the pressing device through an obtuse angle to approach the roller from substantially the same direction as the first adhesive band.

4. An apparatus according to any one of claims 1, 2 or 3, characterised in that the pressing device has a pressure roller arranged on a pivotal, spring-loaded lever.

5. An apparatus according to claim 4, characterised in that the said lever further carries a guide roller at the free end thereof.

6. An apparatus according to claim 4 or 5, characterised in that said lever is pivotally linked to a second lever, on the free end of which is arranged a second guide roller.

7. An apparatus according to claim 6, characterised in that the second lever is movable into the pressing position by means of a handle and a spring is disposed between the two levers.

8. An apparatus according to claim 7, characterised in that the loading applied by the spring to said spring loaded lever is adjustable.

9. An apparatus according to any one of claims 1 to 8, characterised in that on the said shaft and outwardly of a housing plate in which one end of such shaft is rotatably

mounted an exchangeable cam disc is fixed which via a control cam, controls a feed device for the electrical components.

- 5 10. Apparatus substantially as herein-
before described with reference to and as
illustrated in the accompanying drawings.

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