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PACKAGING FOR SMALL UNIFORM ARTICLES

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Fig. 1.

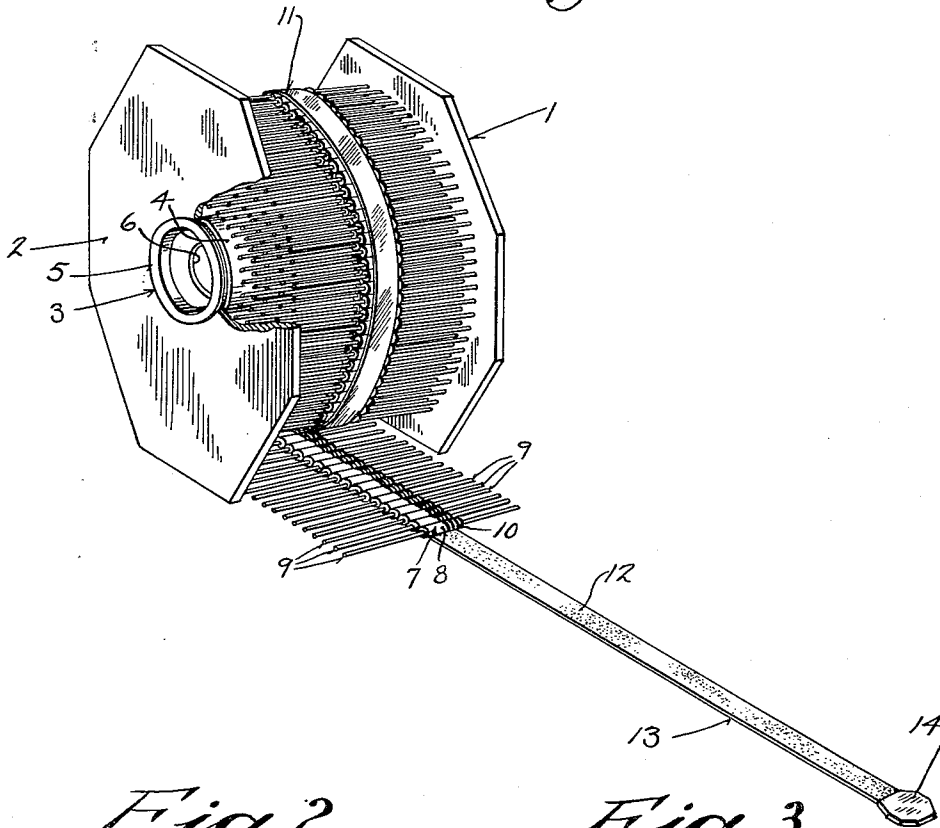


Fig. 2.

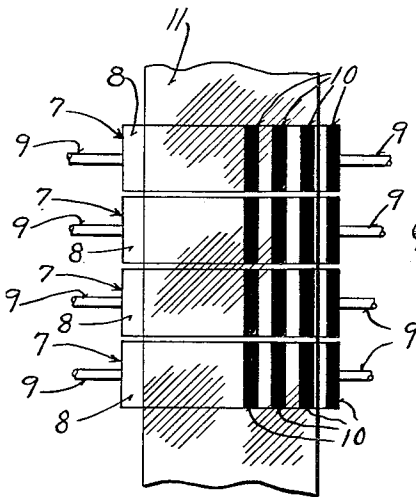
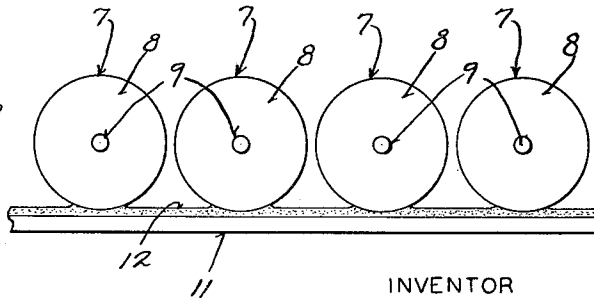


Fig. 3.



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PACKAGING FOR SMALL UNIFORM ARTICLES
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This invention relates to convenience packaging means for small uniform articles for example, electrical circuit components and the like, and it specifically resides in packaging having a pliant mounting strip with an adhesive coating on an attachment face to which is adhered a succession of uniform articles disposed uniformly on the strip, the strip and articles adhered thereto being wrapped about a central spool in helical turns, each turn being closely adjacent the preceding turn.

In the manufacture of radio, television and other electronic equipment small circuit components must be handled in bulk. For example, in the mass assembly of numbers of a particular apparatus large quantities of fixed resistance units of a single resistance value are assembled into circuit networks within a short time period. The circuit network of such apparatus includes a variety of units and it is desirable to provide packaging whereby large quantities of components may be compactly packaged in a manner permitting rapid removal from the packaging for efficient manufacturing.

In the instance of resistor units, each is quite small and the leads emerging from the body has easily bent or deformed. Individual handling of large numbers when either packaging, or removing from a package, is unsatisfactory since undue amounts of time will be consumed and the possibility of deforming the leads is quite great. For adequate protection of resistor unit leads during shipment it has been customary to employ cellular packaging providing a compartment or individual support for each unit. Such package constructions call for a precise placement of each unit, upon packaging, and obviously this is a difficult task to perform whether by machine or hand. In the present invention individual protective packaging is not required for each resistor unit, thus there is a reduction in the complexity of the packaging and the handling of units may be facilitated.

It is an object of this invention to provide packaging for circuit components that facilitates ease and rapidity of handling the components in bulk.

It is another object of this invention to provide packaging for circuit components that protects the components, while packaged, from damage or bending of the leads.

It is another object of this invention to provide packaging for circuit components wherein the components may readily be removed from the packaging by an unwinding of a conveying belt to which the individual components are attached.

It is another object of this invention to provide packaging for circuit components wherein the components are adhesively attached to a belting and may be easily and quickly stripped from the belting as it is led from the packaging.

It is another object of this invention to provide packaging for circuit components that lends itself to packaging, unpackaging and assembling the components in completed articles by mechanical means.

It is another object of this invention to provide packaging for circuit components in which the components function to support one another in aligned positions for adequate protection of the leads.

It is another object of this invention to provide packaging for circuit components that not only adequately protects the components but requires a minimum of materials, so that upon removal of the components from a

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package there is a minimum of packaging material to constitute refuse.

It is another object of this invention to provide packaging for circuit components in which the color coding employed upon the components may be discerned to advise one of the contents of the package.

The foregoing and other objects and advantages of this invention will appear in the description to follow. In the description reference is made to the accompanying drawing which forms a part hereof and in which there is shown by way of illustration and not of limitation a specific form in which the invention may be embodied.

In the drawing:

FIG. 1 is a view in perspective with parts broken away and in section of a packaging for fixed resistor units in which this invention is embodied,

FIG. 2 is a plan view of a number of fixed resistor units attached to a fragmentary portion of an adhesive coated strip forming a part of the packaging of the invention, in which is illustrated the transparency of the strip, and

FIG. 3 is an end view of a number of fixed resistor units attached to a fragmentary portion of the adhesive coated strip.

Referring now to the drawing, there is shown a pair of shroud plates 1 and 2 of thin stiff material that are mounted at opposite ends of a spool 3. The spool 3 comprises an inner cylindrical hollow core 4 that acts as a spacer between the plates 1 and 2, and inserted in each end of the core 4 is a dished hub 5 that has a peripheral rim holding the associated plate 1, 2 against the adjacent end of the core 4. Each dished hub 5 has a central opening 6 through which a mandrel or shaft may be extended, for rotating the spool 3 to conveniently wind on and unwind from the core 4 a plurality circuit components, which are illustrated in the drawing by resistor units 7.

The resistor units 7, shown in the drawing, are so-called fixed composition resistors and each comprises a circular cylindrical body 8 of molded resin through the central part of which is dispersed conductive carbon particles. Embedded in each end of a body 8 is the head end of a terminal lead 9 that is in intimate electrical contact with the dispersed carbon particles. The exposed shank of each lead 9 extends axially from the body 8, for providing a means of convenient connection with other circuit components, and the major length of each resistor unit 7 is comprised of the leads at each end. Resistor units 7 are each commonly color coded to indicate the fixed electrical resistance of the individual unit. As shown clearly in FIG. 2, the color coding comprises a series of bands 10 of colored enamel encircling the body 8 of a unit 7. The bands 10 are of varying color, with each color of the first three bands designating a particular cipher that is indicative of the resistance value and the last band indicating tolerance within which the resistance value falls.

The length of a resistor unit 7, from the tip of one terminal lead 9 to the opposite tip of the other terminal lead 9, is slightly less than the spacing between the inner faces of the two shroud plates 1 and 2. The units 7 may then be stacked between the plates 1 and 2 parallel to the core 4 of the spool 3 with a fairly close fit between the lead ends and the plates 1 and 2 to prevent axial shifting of the leads, as shown in FIG. 1. To achieve this manner of arrangement of the units 7, successive units 7 are placed closely adjacent one another upon a thin narrow pliable strip or belt 11, that is preferably of transparent material. One face, called the attachment face, of the belt 11 is coated with a permanently tacky pressure sensitive adhesive 12.

The term pressure sensitive adhesive is herein em-

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ployed in its common meaning, that is as designating an adhesive substance with substantial permanent tackiness but with cohesiveness exceeding its tackiness so that a smooth, hard body such as a resistor, when brought into contact with it will adhere but may be separated without any substantial amount of adhesive clinging to it.

The resistor bodies 8 are affixed to the belt 11 by being pressed against the adhesive 12 and the adherent contact thus made retains each resistor unit 7 in the position desired. The resistor units 7 extend transversely of the belt 11 so that one end of the belt 11, continuing beyond the first of the succession of units 7, may be wrapped about the central portion of the spool core 4 and anchored thereto by the adhesive 12. If desired, a supplementary attachment means such as a staple may be employed for the purpose of anchoring the end of the belt 11. The belt 11 is then wound about the spool core 4 in spiral fashion, the resistor units 7 being wound upon the spool 3 in successive helical layers. The units 7 are compactly confined in parallel relation to one another and the spool core 4, and are between the protective shroud plates 1, 2 to house the terminal leads 9 in a manner to prohibit bending and deformation of the same.

To facilitate the wrapping of the belt 11 together with the successive closely spaced resistor units 7 about the spool core 4, each unit 7 is spaced slightly apart from the units to either side thereof, as is clearly shown in FIG. 3. Then, as the belt 11 is wound about the spool 3 the resistor units 7, which lie on a circle of smaller diameter than the supporting belt 11 are brought toward one another and there need be no stretching of the belt 11 to accommodate the wrapping of the units 7 in helical layers.

As shown in FIG. 1, the units 7 and belt 11 are wound about the spool 3 with the adhesive coated attachment face on the radially inner side. Consequently, the units 7 are also on the inner side, and the belt 11 tightly holds each unit 7 tightly against the back of the belt 11 in the preceding layer. This manner of construction places the outermost layer of units 7 to the inside of the outer layer of belting, and hence the units 7 are not susceptible to being peeled or dislodged from position. There need be only one strip of belting for mounting the units 7, it not being necessary to dispose each unit 7 between a pair of beltings before wrapping about the spool 3 in order to retain them in position. Adequate adhering of each unit 7 upon the belt 11 is attained, even though only a minor fraction of the surface of a unit 7 is in adhesive contact with the belting 11. To retain the units 7 in position, the body 8 of each is brought to bear tightly against the preceding layer, so that each is in mutual supporting relation with the adjacent units 7. The mutual support eliminates the need of individual cellular packaging for the units 7. Consequently, the packaging material required is at a minimum and upon removing the units 7 from a package there is only a minor amount of refuse.

The spacing between successive units 7 should be kept close. The number of units 7 that may then be packaged within a given space will increase with closer spacing between units, and the adhesive 12 will be closed off by closely spaced units to prohibit the possibility of foreign or extraneous matter contacting the adhesive. Also, the tendency of the belt 11 to wrap about the individual units 7 is lessened by a close adjacency, and the extent of attachment area between each unit 7 and the adhesive 12 may thus be kept within limits. This is a factor of importance upon removing the units 7 from the belt 11 by automatic means, and for the purposes of this paragraph it has been found desirable to retain the distance between centers of adjacent units 7 within one and one-half times the diameter, or width, of a unit.

The belt 11 continues beyond the last of the succession of resistor units 7, as shown in FIG. 1, to present a wrapping strip end 13 adhesively coated on its attachment face, similarly as the rest of the belt 11. Upon wrapping the

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units 7 about the spool 3 the end 13 is wrapped about all or a portion of the outermost layer of units 7, to thereby securely anchor the outer end of the belt 11 by adhesive contact. The resistor units 7 will then be held in tight layers between the shroud plates 1 and 2 in mutually supporting relation. A release tab 14, without any adhesive coating, is attached at the terminus of the end 13 of the belt 11, which may be readily grasped to peel the end 13 off the succeeding layer of the belt 11 for removal of the units 7.

The present invention lends itself to both automatic packaging and automatic removal of the resistor units 7 from the package. The units 7 may be placed upon the adhesively coated attachment face of the belt 11 rapidly and quickly by automatic machinery, and the belt 11 with the succession of units 7 may be led upon the spool 3, and wrapped thereabout, all by automatic means requiring only a minimum of handling. Upon desiring to make use of the packaged units 7 the end 13 of the belt 11 may be peeled off by grasping the tab 14 and led to apparatus that unwinds the belt 11 and dislodges the resistor units from the belt 11 as needed. Such apparatus need not be complicated, and from this point the units 7 can be readily transferred by machine operation to a point of assembly. In another contemplated form of apparatus a given number of units 7 are removed from the packaging at a time, by unwinding a length of belt 11 and severing. The severed portion, with the resistor units 7 attached thereto, is then fed to a point of assembly.

The invention provides a supply of a very large number of units that may be fed to a machine adapted for automatic assembly of circuit networks. Automatic assembly requires a steady feed of components. When units are packaged in groups of small numbers the feeding of a machine requires frequent attention. But, by placing components on a strip or belt of extended length the feed of the components may be continual for several thousand components, thus automatic assembly may be enhanced through use of the present invention.

To further facilitate the use of the packaging of this invention, and the handling of the resistor units 7, visibility of the bands 10 of color coding is retained by employment of a transparent material for the belt 11. The resistor bodies 8 are then readily observed and the contents of the packaging is identifiable. The adhesive 12 is selected, to not obscure the transparency of the belt 11.

I claim:

1. Packaging for a plurality of like circuit components having cylindrical bodies and thin, deformable lead wires of a small cross section that is a minor fraction of that of the bodies which extend from the ends of the bodies and comprise the major part of the length of the components, which packaging comprises a central spool, a pair of parallel end plates attached to and extending normal to the spool that are disposed a distance from one another slightly greater than the length of a component whereby a plurality of components may be placed parallel both to the spool and one another between said plates with the ends of the components being adjacent the plates to have a close fit prohibiting any substantial axial shift of the components, a pliant belting of a width no greater than the length of a component body having a coating of pressure sensitive adhesive permanently fixed on one face, said adhesive being permanently tacky and with cohesiveness exceeding its tackiness, said belting having one end attached to said spool and extending from said attached end to permit spiraling about the spool with the adhesive coated face disposed inwardly, a succession of said components mounted transversely of said belting with the bodies thereof extending across the belting in cleanly separable adhering contact with the adhesive coating, and the belting and components being tightly spiraled about the spool to have bearing pressure between the radially inner sides of the components and the back of the preceding turn of the belting whereby the components are held tightly in a position disposed lengthwise between said

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plates and parallel to one another with the deformable lead wires held at spaced distances from one another.

2. Packaging for a plurality of like circuit components having cylindrical bodies and axially disposed thin, deformable lead wires extending from the ends of the bodies which are of a cross section that is only a minor fraction of that of the bodies and which comprise the major length of the components, which packaging comprises a central spool, a pair of parallel end plates attached to and extending normal to the spool that are disposed a distance from one another slightly greater than the length of a component whereby a plurality of components may be placed parallel to one another between said plates with the ends of the components being closely adjacent the plates to have a fit prohibiting any substantial axial shift of the components, a pliant belting of a width approximately the same as the length of the component bodies having a coating of pressure sensitive adhesive permanently fixed on one face, said adhesive being permanently tacky and with cohesiveness exceeding its tackiness, said belting having one end attached to said spool and extending from said attached end to permit spiraling about the spool with the adhesive coated face disposed inwardly, a succession of said components mounted upon said belting with the bodies thereof extending across the width of the belting in cleanly separable adhering contact with the adhesive coating and the bodies being spaced from one another with a spacing between centers of adjacent components being no more than one and one-half times the width of a component in a direction along the belt, the belting and components being tightly spiraled about the spool to have a bearing pressure between the radially inner sides of the components and the back of the preceding turn of the belting whereby the components are held tightly in a position disposed lengthwise between said plates and parallel to one another with the deformable lead wires held at spaced distances from one another, and said belting continuing beyond the last of the succession of components to form an attachment end fixed to the preceding turn of the belting to retain the components in compact spiraled turns.

3. Packaging for a plurality of like circuit components having cylindrical bodies with bands of color encircling the same comprising a code definitive of component value

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and axially disposed, thin, deformable lead wires extending from the ends of the bodies which are of a cross section that is only a minor fraction of that of the bodies and which comprise the major length of the components, which packaging comprises a central spool, a pair of parallel end plates each attached to and extending normal to the spool that are disposed from one another at a distance to accommodate a component there between with a close fit prohibiting any substantial axial shift of the components, a pliant transparent belting of a width less than the length of the component bodies having a coating of pressure sensitive adhesive permanently fixed on one face, said adhesive being permanently tacky and with cohesiveness exceeding its tackiness, said belting having one end at said spool and extending from such end to permit spiraling about the spool with the adhesive coated face disposed inwardly, a succession of said components mounted transversely of said belting with the portion of the bodies thereof carrying the color coding pressed against the adhesive coating for cleanly separable adherent contact with the belting whereby said color coding is visible through the belting, said component bodies extending across the full width of the belting and being spaced from one another with the spacing between centers of adjacent components being no more than one and one-half times the width of a component in a direction along the belt, and the belting and components being spiraled about the spool with the radially inner sides of the components bearing against the back of the preceding turn of the belting whereby the components are disposed between said plates parallel to one another in tightly spiralled array to hold the components in position parallel to one another with the deformable lead wires held at spaced distances from one another.

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