May 22, 1962 L. A. FROHBACH 3,035,690

FORMS FOR PRINTED CIRCUIT USE OR THE LIKE

Filed June 28, 1961

FIG. 1

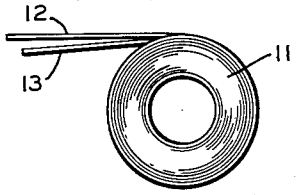


FIG. 2

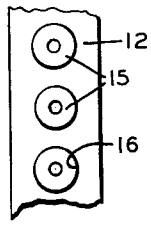


FIG. 3

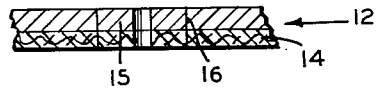


FIG. 4

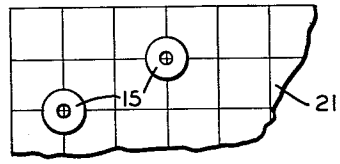


FIG. 5

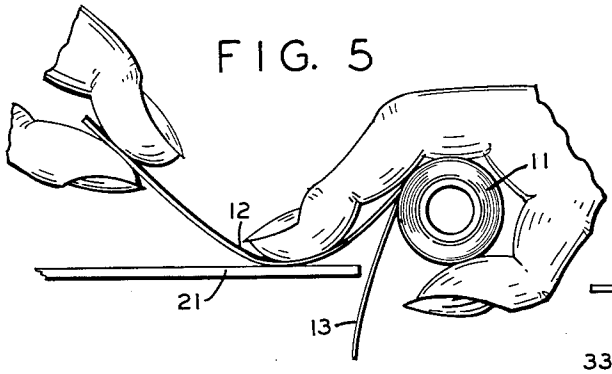


FIG. 6

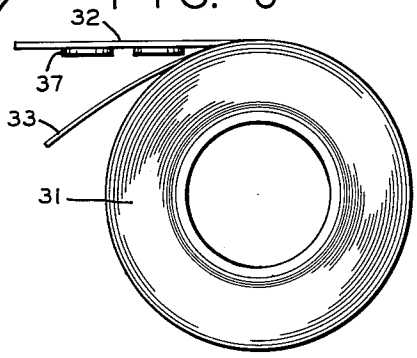


FIG. 7

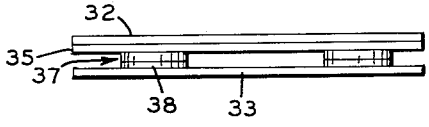


FIG. 8

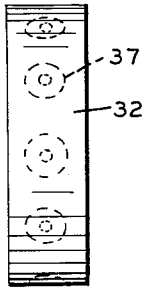
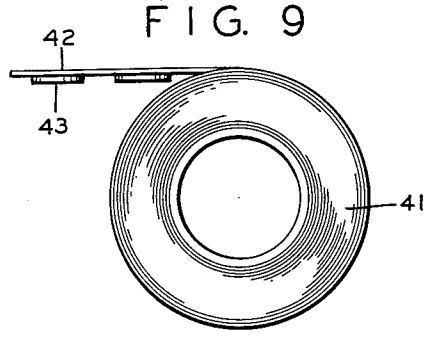


FIG. 9



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FORMS FOR PRINTED CIRCUIT USE OR THE LIKE

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5 Claims. (Cl. 206—56)

This invention relates to forms for printed circuit use or the like and means for dispensing such forms.

In providing what has been termed "printed" circuits, it is necessary to furnish layouts of electrical wiring on an enlarged scale, which layouts subsequently are reduced photographically. One of the important requirements is that the layout be sharp, of contrasting color, and of precise dimensions.

In order to avoid tedious and repetitious drawing and inking of eyelets, junction points, connector attaching areas and so forth, die cut forms (the word "form" being used hereafter as a generic term) of various sizes and shapes have become available, which have been termed sometimes also "pads," "pieces," etc. Each such form is coated on one side with a pressure sensitive adhesive layer for adhesion to the layout or drawing. Most forms are made of a paper type material, of dark or black color so as to present a good contrast to the camera and most commonly, are die-cut to exhibit sharp edges and be accurate in size. Typical forms available are for instance, elbows, ovals, double end teardrops, circles, annuli, etc.

Forms supplied commercially for preparing such drawings are furnished usually with their adhesive underside affixed to a temporary card or to a rolled strip from which the forms are removed one by one and then, by the use of tweezers or one or two hands, located above the correct spot of the drawing surface or layout sheet. Next, the form is affixed to the surface by applying relatively light pressure.

It will be apparent therefore, that one or more forms are attached with their adhesive underside to a temporary surface, that the forms must be lifted off such surface and subsequently must be re-affixed to the final drawing or layout. In stripping off a form from the temporary storage surface, manipulating the rather flimsy and adhesively coated form and in re-affixing the form, it is a common occurrence to damage the form, causing either wrinkles or tears which impair the final quality and accuracy of the completed drawing. Also, the manipulating of flimsy forms is quite disconcerting to the user.

The present invention overcomes the above described short-comings by providing forms so fastened to sheets or tapes, that the forms can be accurately positioned on the drawing or layout surface and directly affixed thereupon without intermediate manipulation. In this way, dimensional accuracy is maintained and no tools or instruments of any type are required or employed. The transfer of forms from a storage surface to the final drawing therefore, is a one-step operation, thus enhancing the accuracy and appearance of the circuit layout as well as simplifying the steps of making such printed circuit drawings.

One of the objects of this invention therefore is the provision of forms for printed circuit use, avoiding one or more of the limitations and disadvantages of prior art devices.

Another object of this invention is the provision of forms for printed circuit use which forms are mounted in such a manner as to enable transfer thereof directly to the final surface without intermediate manipulation or use of instruments.

Another object of this invention is the provision of a supply of forms for printed circuit use which forms are affixed in a new and novel manner to sheet or tape material.

A further object of this invention is the provision of adhesively coated forms for printed circuit use which forms are dispensable from a roll directly upon the final drawing surface and whereby the forms remain adhesively affixed to such surface.

A still further object of this invention is the provision of adhesively coated forms for printed circuit use whereby the forms are mounted in a manner as to remain dimensionally stable during use thereof.

Further and still other objects of this invention will be apparent from the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a side view of a roll of tape provided with typical forms;

FIGURE 2 is a top view at a portion of the tape provided with such forms;

FIGURE 3 is a longitudinal section through a portion of the tape;

FIGURE 4 is a plan view of a drawing surface with forms affixed thereto;

FIGURE 5 is a side view illustrating the preferred method of transferring the forms from the tape to the drawing surface;

FIGURE 6 is a side view of an alternative construction of a roll of tape provided with forms;

FIGURE 7 is an enlarged longitudinal view of the alternative construction per FIGURE 6;

FIGURE 8 is a top view of the roll of tape shown in FIGURE 6; and,

FIGURE 9 is a side view of a still further alternative construction.

Referring now to the figures and FIGURES 1 to 3 in particular, numeral 11 identifies a roll of tape which roll is formed by two superposed tapes or strips of material, numerals 12 and 13.

Tape 12, in a typical embodiment, is black crepe paper which at its underside is coated with a layer 14 of pressure sensitive adhesive material. The lower tape 13 is made of a material which will not adhere to any substantial degree to the adhesive coating 14, thus providing protection for the adhesive coating. Typical non-adhering material suitable for this purpose is a silicon coated release paper.

At regular intervals along tape 12 there are provided forms for printed circuit use, such as annular forms 15 which are produced by respective die-cut severance lines 16 in the tape material 12. These severance lines are of such depth and width in the tape that the annular forms are separated from the surrounding tape material, yet remain located therein by virtue of friction and the retention of the adhesive coating until such time that the forms are adhesively affixed to the drawing or layout surface.

FIGURE 4 shows a typical layout or drafting surface, usually a clear, transparent plastic sheet 21 incorporating grid lines for locating purposes. Two annular forms 15 are shown as affixed to the surface. In order to aid locating the center of the annular forms on the grid, a small circular portion has been cut out from the center of each form as clearly seen in FIGURES 2, 3 and 4.

The dispensing of the forms and affixing thereof to surface 21 is illustrated in FIGURE 5. The roll of tape is held in the palm of one hand, the lower release tape 13 is folded back and the free end of tape 12 is grasped by fingers of the other hand. A portion of tape with a selected form then is positioned accurately above surface 21, brought in contact therewith and the selected form pressed upon the selected part of surface 21. This affixes the form to the surface. Next, the free end of the tape and the roll are lifted from this particular spot on the surface whereby the form separates itself along severance line 16 from the surrounding tape material, while the form remains adhesively affixed to the surface. For the

sake of showing the roll of tape clearly, the thumb in FIGURE 5 is depicted as supporting the roll from underneath, although in practice it will be found that the thumb is placed most conveniently across the center of the roll.

As described hereinbefore, the form is transferred directly upon the final drawing or layout surface without intermediate handling, thereby improving accuracy and speed, and leaving the form itself free from distortion and wrinkling. The form which is quite flimsy, remains fully supported along its borders until it is affixed to the final surface which then retains all portions thereof securely.

In the event that top surface of tape **12** has relatively little adhesion with adhesive coating **14**, tape **13** may be omitted from the roll **11**.

Without deviating from the features described heretofore, it will readily be understood by those skilled in the art that, instead of annuli, other configurations may be provided, and that instead of rolls of tape, flat sheet material may be used, each sheet carrying one or more such forms.

FIGURES 6 to 8 show a further embodiment of the invention and illustrate an alternattive construction. Roll **31** is formed by two superposed layers **32** and **33** of tape material. Material **32** is a clear transparent tape, for instance a cellophane material, which is coated along its underside completely or partially, for instance in a zonal pattern, with a layer of pressure sensitive adhesive material **35**. At certain intervals along the tape, there are spaced from one another annular forms **37**, which in turn are provided along their respective undersides with a coating of pressure sensitive adhesive material **38**. The top sides of the forms adhere completely or with portions thereof to the adhesive material **35** so that the forms are held to the underside of strip **32**.

The underside of the forms and particularly the pressure sensitive coating thereof is protected by tape **33** which is material same or similar to tape **13**, FIGURE 1. This tape is folded back during dispensing of forms.

By virtue of the transparency of tape **32**, the forms are clearly visible therethrough and this tape can be brought into alignment with a selected spot on layout surface **21** as indicated in FIGURE 5. Upon exerting light finger pressure on a form through the top tape **32**, the respective form is adhesively affixed to the layout form. Upon subsequent removal of the tape from the respective spot, the form separates from the underside of tape **32** while remaining adhesively affixed however, to surface **21**.

In order to accomplish this separation successfully, it is necessary to select tape **32**, the adhesive coating **35** and its area or zone of application in conjunction with the form material in such a manner that the adhesion between tape **32** and forms **37** is of a lesser degree than the bond achieved between adhesive material **38**, the form material, and surface **21** respectively.

In practice the degree of adhesion measured on successful specimens has been approximately as follows: Adhesion of underside of form, 20 ounces per square inch; adhesion of underside of tape **32**, 5 ounces per square inch, using standardized steel test method. It will be apparent that these values are provided for illustrative purposes only and that other values or range of values may be chosen as long as there exists a sufficient difference in the degree of adhesion to cause separation of the form from its supporting tape before breaking the adhesive bond between the underside of the form and the layout surface or drawing.

Adhesion between the underside of the form and the protective release paper **33** has been determined at approximately one ounce per square inch for the typical sample values indicated above.

FIGURE 9 shows a further alternative embodiment. Roll **41** carries only a single tape material **42** which at its underside supports by adhesion thereto forms **43**. The underside of forms **43** is coated for adhesion to layout surface **21**, but in this construction, the top surface of tape **42** is impregnated or coated to have little adhesion with the coated underside of form **43**. In this manner, forms **43** do not adhere to the top side of tape **42** during juxtaposition on the roll. The use of rolls as shown in FIGURE 9 is identical with the description applicable to roll **31**, FIGURE 6.

It will be apparent that the constructions and arrangements described heretofore provide significant advantages. Complex shapes and contours of forms are not distorted during handling, but such forms remain fully supported during their transfer from the supply means to the final drafting or layout surface. Moreover, the above described means contribute greatly to producing improved printed circuit drawings and last but not least, the use of such forms is greatly simplified and expedited.

While there have been described and illustrated certain specific embodiments of the present invention and several alternative constructions, it will be apparent to those skilled in the art that various further changes and modifications may be made therein without deviating from the principle and intent of the present invention, which shall be limited only by the scope of the appended claims.

What is claimed is:

1. Means for dispensing forms for printed circuit use or the like upon a surface to which the forms are adhesively affixed comprising: strip material; a plurality of forms spaced relative to one another and adhesively fastened with one side to one side of said strip material; the other side of said forms being provided with a layer of pressure sensitive adhesive coating, and the adhesive characteristic of said coating being of such character with respect to the adhesive bond fastening the forms to the strip material that when said other side of a respective form is brought in contact with the surface to which the form is to be affixed and upon exerting relatively light pressure upon the area of contact between said form and surface, said form will remain affixed to said surface, yet will be released from said strip material upon moving said strip material away from the area on the surface with which the form has been brought in contact.

2. Means for dispensing forms for printed circuit use or the like upon a surface to which the forms are adhesively affixed comprising: transparent strip material; a plurality of forms spaced relative to one another; means adhesively holding the top side of said forms to one side of said strip material; the underside of said forms being provided with a layer of pressure sensitive adhesive coating, and said coating being of such character with respect to said means holding the forms to the strip material that when the underside of a respective form is brought in contact with the surface to which the form is to be affixed and upon exerting relatively light pressure upon the top side of said form through said strip, said form will remain affixed to said surface, yet will be released from said strip material upon moving said strip material away from the area on the surface with which the form has been brought in contact.

3. Means for dispensing forms for printed circuit use or the like upon a surface to which the forms are adhesively affixed comprising: a transparent strip; the underside of said strip provided with a layer of pressure sensitive adhesive coating; said coating adapted to support individual forms which adhere thereto with their respective top sides; the underside of each such form provided with a layer of pressure sensitive adhesive coating; and the bond between the underside of said strip and the top of said form being of such character that when the underside of a respective form is brought in contact with the surface to which it is to be affixed and upon exerting relatively light pressure upon the top side of said form through said strip, the form remains affixed to said surface, yet will be released from said strip relatively readily upon moving said strip away from the area on the surface to which the form has been affixed.

4. Means for dispensing forms for printed circuit use or the like upon a surface to which the forms are adhesively affixed comprising: a roll of transparent tape material; the underside of said tape material being provided with a layer of pressure sensitive adhesive coating; said coating adapted to support individual forms which adhere thereto with their respective top sides; the underside of each such form provided with a layer of pressure sensitive adhesive coating, and the bond between said tape and the top of each form being of such character that when the underside of a respective form is brought in contact with the surface to which the form is to be affixed and upon exerting relatively light pressure upon the top side of said form through said transparent tape material, the form will remain affixed to said surface yet will be released from said tape material relatively readily upon moving said tape material away from the area of the surface to which the form has been affixed.

5. Means for dispensing forms for printed circuit use or the like as set forth in claim 4 wherein a second tape material is provided to overlay on the adhesive coating of said forms for protecting said coating, and said second tape being a material with which the underside of said forms and coating thereon bonds to a lesser degree than the bond between the top side of said respective forms and the underside of said transparent tape material and its coating.

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