Jan. 4, 1966 E. FLOYD, JR 3,227,270

CLIP CARRIER TAPE AND CLIPS

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Fig. 1

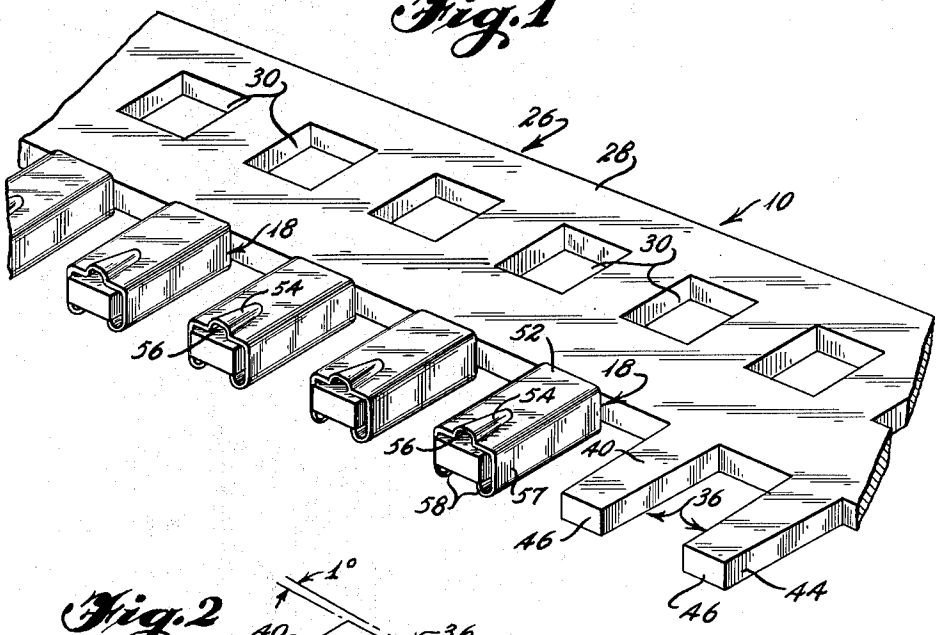


Fig. 2

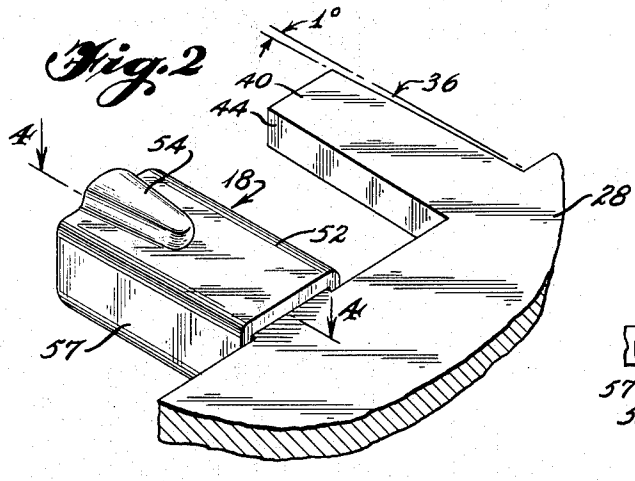
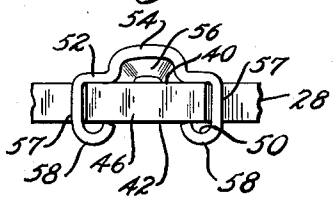


Fig. 3



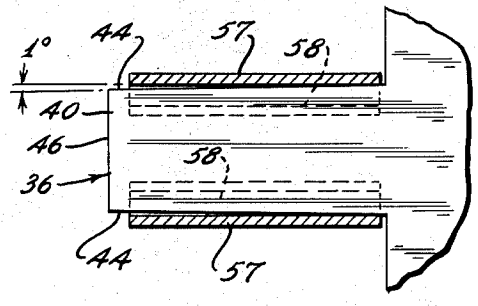


Fig. 4

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Fig. 5

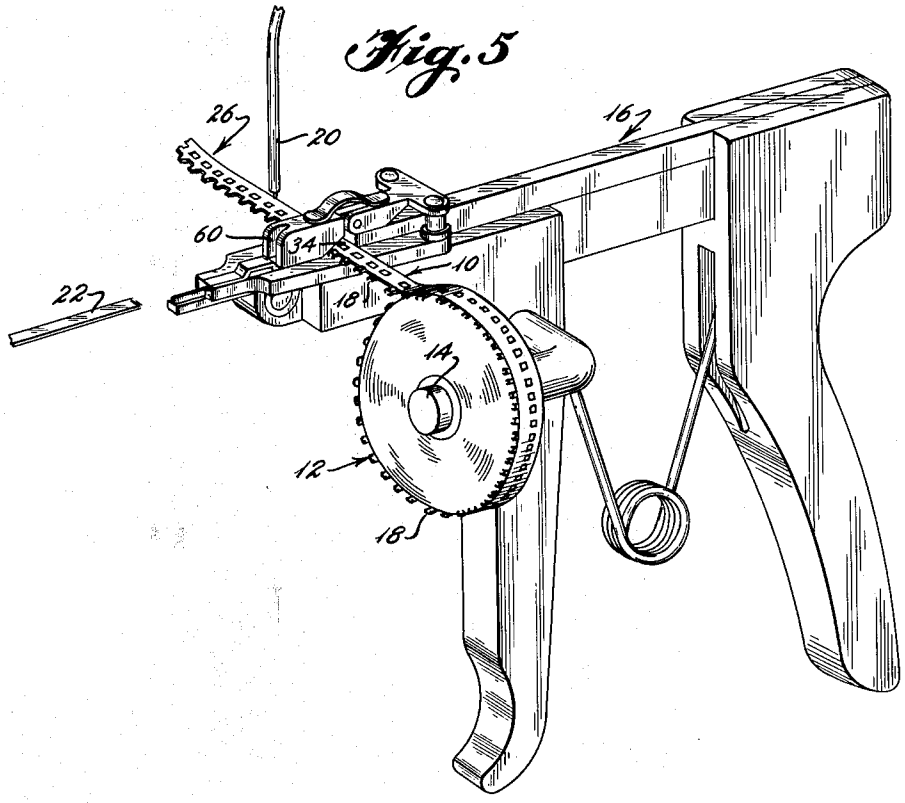
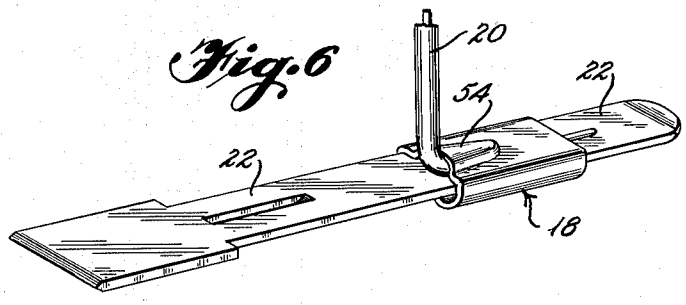


Fig. 6



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United States Patent Office 3,227,270 Patented Jan. 4, 1966

3,227,270

CLIP CARRIER TAPE AND CLIPS

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Filed Feb. 8, 1963, Ser. No. 257,133
2 Claims. (Cl. 206—56)

This invention relates to electrical connections. More particularly, this invention provides an improved system for uniting electrical leads with terminal posts.

Heretofore, electrical connections have been formed by clamping a clip around an electrical lead and a portion of an electrical terminal post so as to unite firmly the the three elements. Automatic and hand-held tools have been provided for positioning the clip around the lead and post to form the connection. In one prior process, the clips have been fed to the tool in continuous strip form, wherein the clips are directly united in end-to-end fashion, so that successive clips can be sheared or fractured off the strip. In another prior process, it has been known to feed the clips to the tool on a portion of sheet material wherein the clips are attached to the sheet material at spaced distances thereon.

The present invention resides in the concept of an improved feed material for carrying the clips to the tool and a method of forming electrical connections with the feed material.

In the feed material according to the invention, the clips are frictionally and releasably held on projections formed at spaced distances along the length of a carrier tape. The invention has various uses. It is particularly appropriate for the maintenance and repair of electrical equipment, and development of novel prototypes, wherein one or only a few connections need be formed at a given time. The strip material according to the invention can be employed with a simpler tool than is required when using clips directly attached to each other in strip form.

According to the invention, the clips are only frictionally held on the carrier tape, and thus a small force of the tool is required to remove the clip from the tape for subsequent uniting with the lead and terminal post. There is no requirement for the machine elements necessary to shear or fracture a clip from a continuous strip.

For a better understanding of the invention and its other objects, advantages and details, reference is now made to the presently preferred embodiment of the invention which is shown, for purposes of illustration only, in the drawings.

In the drawings:

FIGURE 1 is a fragmentary enlarged perspective of the feed material according to the invention;

FIGURE 2 is an enlarged perspective of a portion of the feed material shown in FIGURE 1;

FIGURE 3 is an elevational view looking into the outer end of one of the clips frictionally held on a projection of the carrier tape, as seen in FIGURE 1;

FIGURE 4 is a fragmentary transverse section on the line 4—4 of FIGURE 2;

FIGURE 5 is a perspective illustrating the method of the invention and showing a roll of feed material according to the invention being fed to an assembling or uniting tool; and,

FIGURE 6 is a perspective of an electrical connection formed according to the invention.

Briefly stated, the feed material of the invention includes a carrier tape and a plurality of clips removably carried on the tape. The tape has a plurality of spaced holes formed therein for engagement by the sprocket of an advancing wheel to feed the material to the tool. The tape has a plurality of spaced projections extending from one side thereof. Each projection is wedge-shaped. The clips are formed in a generally-tubular shape so as to surround and frictionally engage a projection of the tape.

According to the method of the invention, the feed material is moved in a step-by-step manner to the tool. An electrical lead is also fed to the tool. The tool is positioned adjacent an electrical terminal post. The tool is then actuated to slide a clip from one of the projections of the tape. Thereafter, the tool unites the lead and post by clamping the clip around them.

A portion of the feed material **10** is shown in FIGURE 1 and is employed rolled into a coil **12**, shown in FIGURE 5, rotatably supported on a shaft **14** of a tool **16** for uniting a clip **18** with an electrical lead **20** and a terminal post **22** to produce the electrical connection of the three elements shown in FIGURE 6.

The feed material **10** includes a carrier tape **26** and a plurality of the clips or connectors **18** releasably carried thereon. The carrier tape **26** is formed of flexible sheet material. Among the sheet materials which can be employed are paper, synthetic resin plastics, and the like. The carrier tape **26** includes a body portion **28** having formed therein a series of square-shaped holes **30** at uniformly-spaced distances for engagement by the teeth of a sprocket wheel formed on tool **16**, whereby the carrier tape **26** is advanced in a step-by-step fashion through a slot **34** in tool **16** during the connecting method.

For supporting the clips **18**, a plurality of projections or fingers **36** are formed on carrier tape **26** and extend at uniformly-spaced distances from one longitudinal edge of body portion **28**. Each projection **36** includes a top surface **40**, an opposite bottom surface **42**, two sides **44**, and an outer end face **46**. Each projection **36** has a general wedge-shape, its sides **44** converging away from the body portion **28**. The sides **44** form an angle of about 1 degree with planes perpendicular to the lengthwise dimension of body portion **28**.

Each clip **18** has a substantially uniform cross section along its length so as to frictionally engage the projection **36** upon which it is supported, and be readily removed therefrom by a small dislodging force applied by an element of tool **16**.

Each clip **18** is of generally-tubular shape with a bore **50** in the center. Each clip **18** includes a back plate **52** having a ridge **54** formed at the center of one end thereof. The ridge **54** is shaped to form a slot **56**, as seen in FIGURE 3, for receiving the end of the electrical lead **20** in the finished connection shown in FIGURE 6. Each clip **18** further includes two panels **57** joined to opposite edges of back plate **52**. Flanges **58** of curved form extend inwardly from the lower edges of the panels **56**. Except for ridge **54**, each clip **18** is of uniform cross section along its length.

In the method of the invention, the clips **18** are slid onto projections **36** of carrier tape **26** to form a releasable friction fit. The assembled feed material **10** is formed into a coil or roll **12** and mounted on the shaft **14** of tool **16**, as seen in FIGURE 5. The tool is actuated to advance the feed material **10** into slot **34**. An electrical lead **20** is fed down from above into groove **60** of the tool. The tool **16** is then positioned adjacent terminal post **22**, which will generally be mounted in a terminal board (not shown). The tool **16** is then actuated, whereby a clip **18** is pushed off of its projection **36** and moved to a position where the end of lead **20** is received in slot **56** and the terminal post **22** is received in the bore **50** of the generally-tubular clip **18**. The curved flanges **58** clasp or clamp the terminal post **22** in the bore **50** and firmly into electrical connection with the end of lead **20**.

The tool **16** is then withdrawn and is ready for a subsequent actuation to form another connection.

Thus it will be seen that the invention provides a feed material and a method for forming electrical connections with simplified procedures and apparatus.

While a presently preferred embodiment of the invention has been illustrated and described, it will be recognized that the invention can be otherwise variously embodied and practiced within the scope of the following claims:

I claim:

1. For use in sequentially feeding clips to a clip fastening tool, feed material including a carrier tape and a plurality of clips removably carried on said tape, said tape having a plurality of aligned square-shaped holes formed at uniformly-spaced distances along the length of said tape, said tape having a plurality of projections extending from one longitudinal edge of said body portion at uniformly-spaced distances, each said projections including a top surface, an opposite bottom surface, two sides, and an outer end face, each said projection having its opposite sides converging in the direction away from said edge of said body portion, each said side having a taper of about one degree, each said clip being frictionally and removably supported on a said projection; each said clip including a back plate engaging the top surface of a projection, two panels joined to opposite edges of said back plate and extending adjacent said sides of said projection, each said clip further including a pair of flanges each joined to a panel and engaging said bottom surface of said projection; whereby, said tape can be advanced step-by-step to said tool and said clips can be successively removed from their projections by said tool.

2. For use in sequentially feeding clips to a clip fastening tool, feed material including a carrier tape and a plurality of clips removably carried on said tape, said tape having a plurality of aligned holes formed at uniformly-spaced distances along the length of said tape, said tape having a plurality of projections extending from one longitudinal edge of said body portion at uniformly-spaced distances, each said projection including a top surface, an opposite bottom surface, two sides, and an outer end face, each said projection having its opposite sides converging in the direction away from said edge of said body portion, each said clip being frictionally and removably supported on a said projection; each said clip including a back plate engaging the top surface of a projection, two panels joined to opposite edges of said back plate and extending adjacent said sides of said projection, each said clip further including a pair of flanges each joined to a panel and engaging said bottom surface of said projection; whereby, said tape can be advanced step-by-step to said tool and said clips can be successively removed from their projections by said tool.

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