July 9, 1946. E. D. KNAB 2,403,443

IMPALING INSTRUMENT

Filed Jan. 13, 1945

FIG. 1.

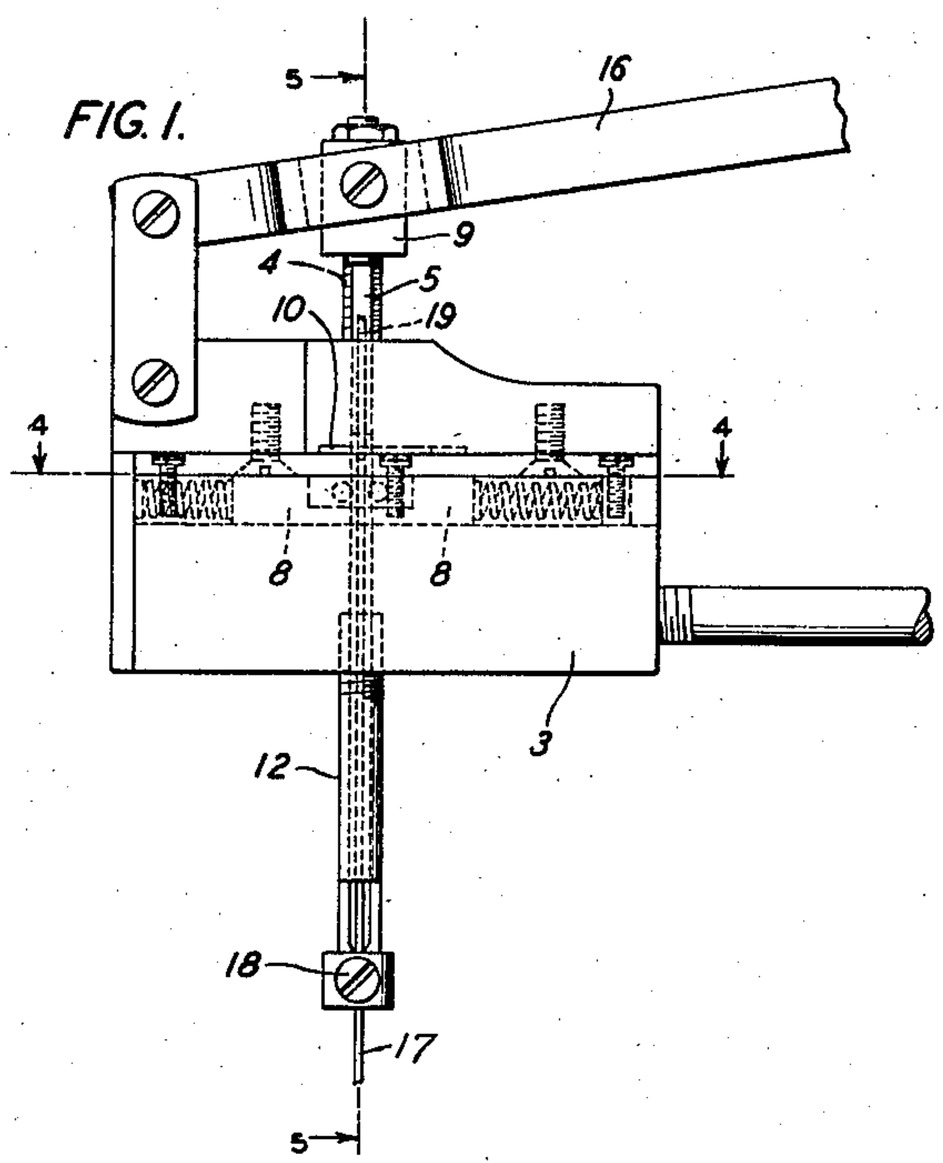



FIG. 2.

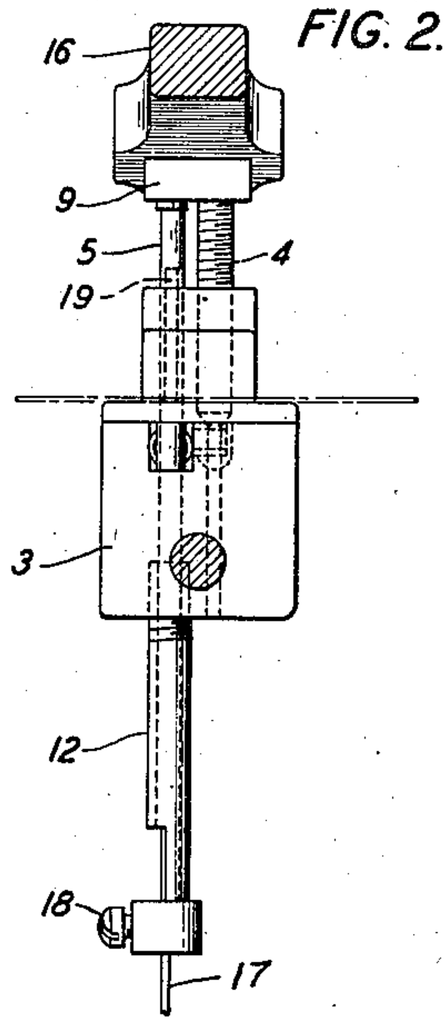



FIG. 3.

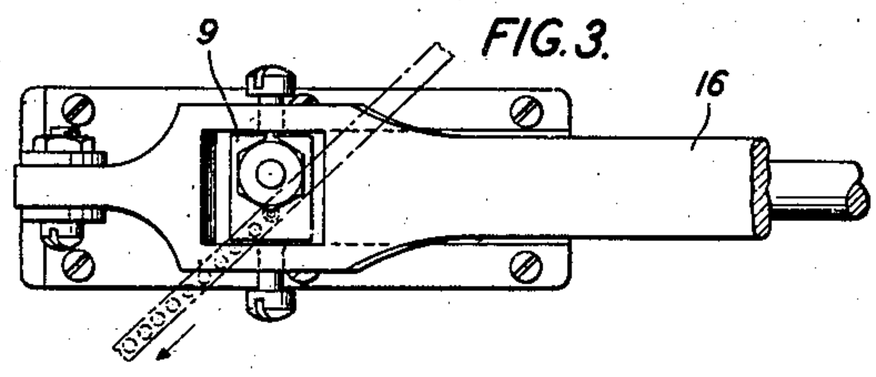



FIG. 4.

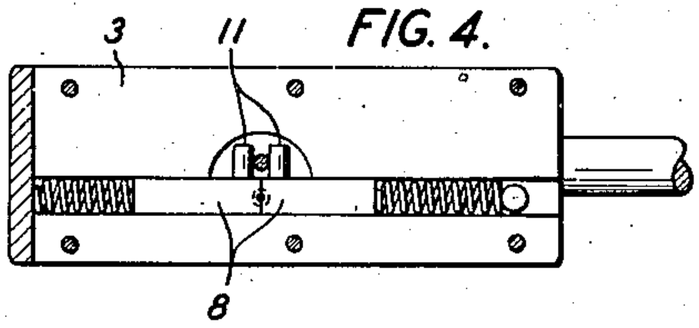



FIG. 5.

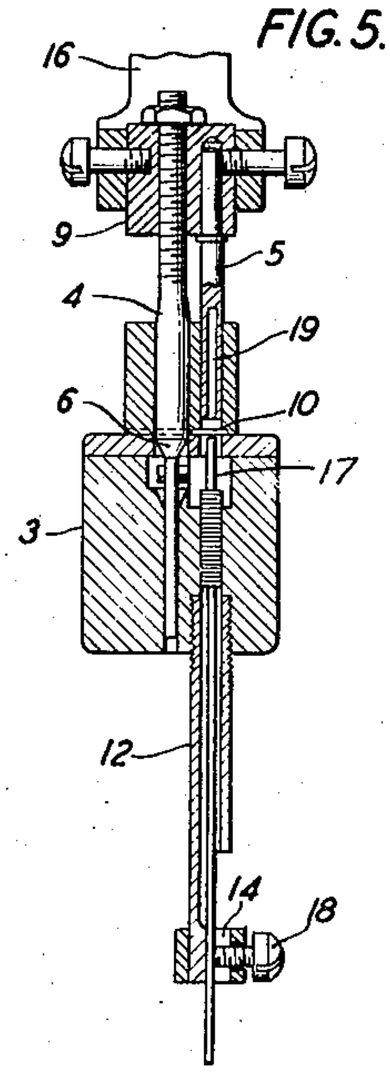
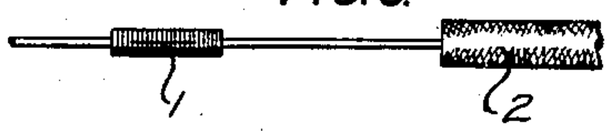



FIG. 6.

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2,403,443

# UNITED STATES PATENT OFFICE

2,403,443

## IMPALING INSTRUMENT

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Application January 13, 1945, Serial No. 572,692

1 Claim. (Cl. 164—86)

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This invention relates to a punching and perforating tool for mounting a succession of washers upon the central wire of a coaxial cable.

An object of the invention is to simultaneously cut and impale upon a wire a series of washers made from polythene sheet stock or similar material.

Another object of the invention is to provide means for and a method of more expeditiously constructing coaxial conductors.

The nature of an embodiment of the invention is set forth in detail in connection with the accompanying drawing in which:

Fig. 1 is a side view of an exemplary embodiment of the invention;

Fig. 2 is an end view thereof as viewed from the left with parts in section;

Fig. 3 is a top view showing a strip of sheet stock in the tool, from one end of which washers have been cut;

Fig. 4 is a section on the line 4—4 of Fig. 1, looking downward;

Fig. 5 is a section on the line 5—5 of Fig. 1; and

Fig. 6 is a view of a short coaxial line with washers bunched upon a piece of a central conductor which extends from the outer conductor.

In its exemplary embodiment, the invention comprises a hand-operated tool for simultaneously impaling washers and placing them upon the central wire of a coaxial cable.

A group of washers mounted upon the central wire of a coaxial conductor before they have been inserted in the outer circular conductor is indicated at 1 located in the positions in which they are applied to the wire by the tool; after application, the washers are distributed along the wire and thrust into the cylindrical outer conductor 2 along with the wire and serve to insulate the central wire therefrom. It is found in practice that the washers are impaled upon the wire rather tightly as a result of which considerable friction is offered along the movement of the central wire and after being distributed they remain in place within the outer cylindrical conductor 2 as they are distributed before being inserted therein.

The tool for impaling the washers consists of a base block 3 having perforations therethrough for two plungers 4 and 5. The plunger 5 performs the cutting and impaling of the washers whereas the plunger 4 comprises a guide and also has a camming surface 6 to separate two anvil blocks 8 which will be hereinafter referred to. The plungers are rigidly connected to a block 9 and the length of the plunger 4 is adjustable so that the camming surface 6 will be effective at the proper instant. A narrow flat strip of polythene is inserted in a diagonal guideway 10 which passes over the blocks 8. The blocks 8 are pushed together by springs and at their adjoining surfaces have small grooves which define an opening to receive the upper end of the wire 17 upon which the washers are to be placed.

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Let us now suppose that the operation of perforating and impaling washers is to be performed. The handle 16 of the tool is depressed enough so that the cam surface 6 slightly separates the blocks 8 by pushing upon extensions 11 thereof and a short straight length of wire is thrust upward through the barrel 12 and into an opening 13 in the plunger 5. The wire 17 is adjusted so that it is centered at the bottom end in a small groove 14 and clamped into place by a small clamping screw 18. The barrel 12 is of a diameter exactly equal to the outer diameter of the washers. The handle 16 is now raised which lifts the smaller plunger 5 upward away from the blocks 8 and the withdrawal of the larger plunger 4 allows the springs to press the two blocks 8 together upon the end of the wire which is centered in the opening defined in the two grooves of the abutting surfaces of the blocks. It is desirable that the upper end of the wire be adjusted to lie a very small amount above the upper surfaces of the blocks 8. The strip of polythene is now inserted and the handle depressed. The small plunger forces the wire through the strip, the end of the wire passing up into the bore 19 of the plunger 5, and at the same time the plunger cuts the washer out of the strip with an outer diameter of a size which just fits the bore 12. The entrance of the wire into the central hole of the washer is effected by lateral displacement of the material hence no chad or circular cuttings are taken out of the hole into which the wire fits nor does the tool require any means for disposing of such chads. The handle and plungers are then retracted, the strip moved along and the operation repeated over and over again until the bore 12 is approximately filled with washers; in the embodiment illustrated, it holds about forty to sixty washers. Although shown as hand-operated, it is quite within the scope of the invention to embody the operative elements of the device in power operated mechanism.

What is claimed is:

Washer making, impaling and mounting means comprising a set of normally adjacent but separable die blocks, means for mounting an elongated member with an end between the blocks, and a sheet of washer strip upon the die blocks, a hollow member for cutting, perforating, and impaling each washer upon a single stroke, means simultaneously operable to advance the hollow member against the blocks for cutting the washer, and means advancing with the hollow member to separate the die blocks whereby a washer is cut from the sheet, perforated and impaled upon the elongated member and advanced therealong in a single operation.

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