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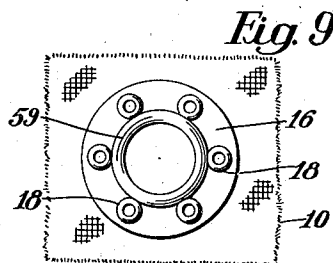
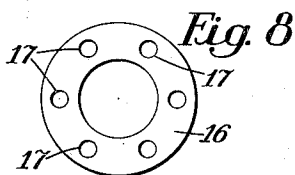
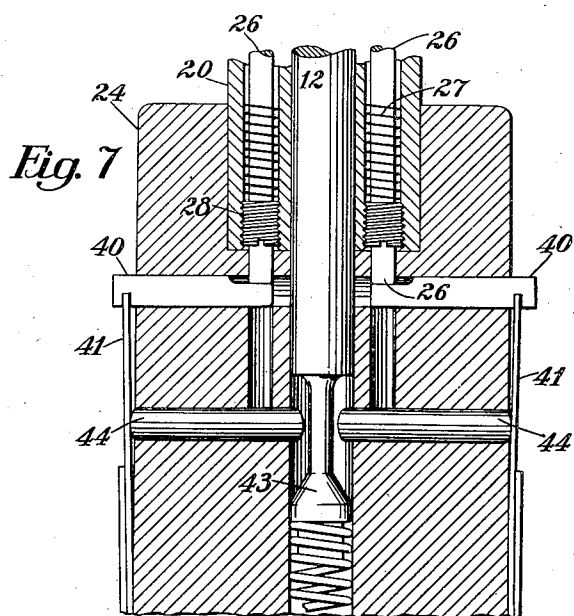
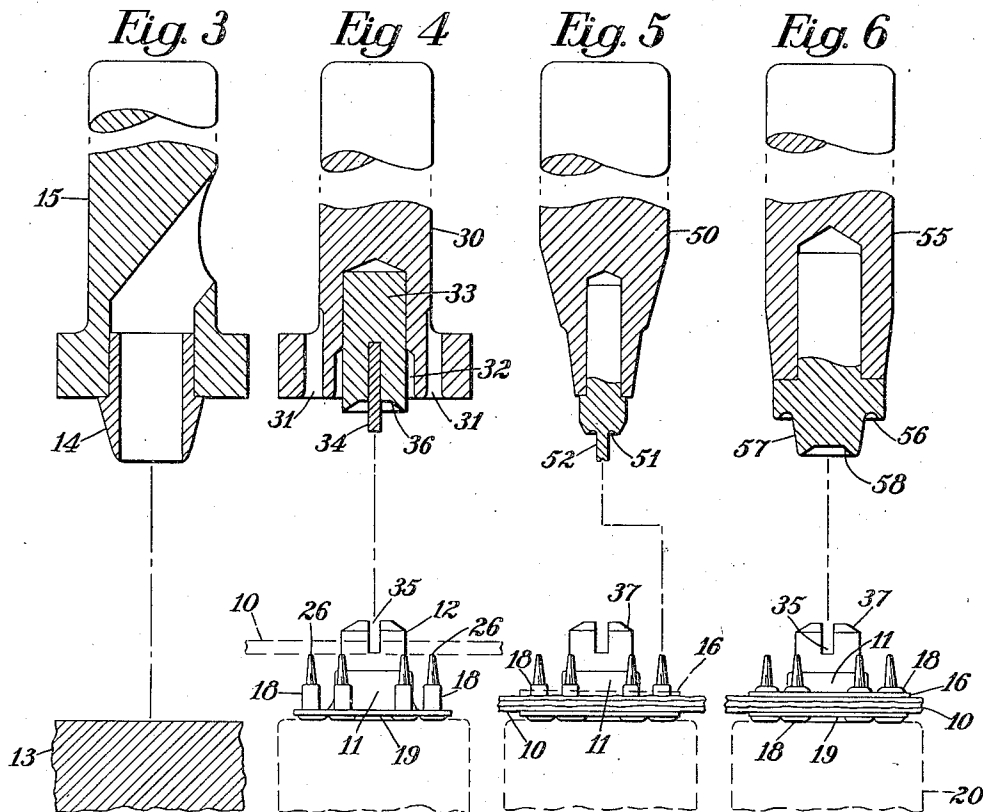
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GROMMET AND EYELET SETTING APPARATUS

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GROMMET AND EYELET SETTING
APPARATUS

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The purpose of the present invention is to provide improved apparatus for piercing sheet material and installing eyelets therein. One utility of the invention provides for installing grommets of the type in which eyelets are used to supplement and reinforce the anchorage afforded by the barrel of a grommet. A grommet-and-eyelet assemblage of that type constitutes the subject matter of my application for United States Letters Patent Serial No. 503,565, filed September 23, 1943, now Patent Number 2,393,984, granted February 5, 1946.

The apparatus disclosed herein is designed to install grommets and eyelets in tarpaulins, tents and other canvas products too large and heavy to be readily presented to a machine mounted on a bench. It is more convenient to spread such products on a floor and shift the installing apparatus to the various localities where the grommets and eyelets are to be situated. Accordingly, for such work the apparatus hereinafter described comprises a portable anvil assemblage, four hand-stocks each provided with a different tool, and a portable cutting block for one of the tools.

An essential feature of the invention is concerned with the problem of impaling the canvas on the barrels of the eyelets without cutting holes in the canvas to receive them. For this purpose one of the four hand-stocks is a pressing tool having holes corresponding in size and arrangement to the barrels of the eyelets seated on the anvil and located thereon by pointed spindles that extend through them and project above their entering ends to spread the strands of the canvas as it is being pressed down. At this stage the pointed spindles must be rigidly supported to pierce the canvas and spread the strands thereof nearly, if not quite, to the size of the entering ends of the eyelets, but thereafter, when another tool is used to upset and clench the eyelets still seated on the anvil, the pointed spindles must yield downwardly to permit that tool to do its work. For this reason the anvil is provided with one of the features of the invention, namely, means for locking the spindles in their raised positions when the canvas is about to be pressed down on them.

Preferably, and as herein exemplified, the locking mechanism is organized to derive its locking effect from the initial pressing movement of the pressing tool transmitted from the latter by a spring-biased plunger that normally projects far enough above the level of the points of the spindles to extend through a hole previously cut in the canvas for the barrel of the grommet. This

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plunger is telescopically related to the anvil and keyed thereto to prevent its turning about its axis. Moreover, its upper end and the pressing tool are provided with cooperative counter-partal surfaces arranged to index that tool with regard to the holes formed therein for the reception of the eyelet barrels surrounding the pointed spindles.

Other features of the invention are hereinafter described and claimed, and are illustrated in the drawings, of which

Fig. 1 is a sectional elevation of an anvil assemblage of which the movable parts stand in their initial positions;

Fig. 2 is a top plan view of the anvil assemblage, portions of the base being broken away;

Fig. 3 is a vertical section including a tubular cutter, portions of a hand-stock and a fragment of a wooden cutting block to be used for cutting a hole in canvas to receive the barrel of a grommet;

Fig. 4 is a sectional elevation including a grommet-and-eyelet assemblage seated on the anvil below a hand-stock designed to impale the canvas on that assemblage;

Fig. 5 is a sectional elevation including the grommet-and-eyelet assemblage with canvas impaled thereon and a hand-stock provided with a tool for clenching the eyelets one at a time;

Fig. 6 is a sectional elevation including a hand-stock provided with a tool for clenching the barrel of the grommet, the eyelets having been clench against a washer lying on the upper surface of the canvas;

Fig. 7 is a sectional elevation of a portion of the anvil assemblage in which the pointed eyelet spindles are locked in their raised positions;

Fig. 8 is a face view of a washer designed to mate a grommet of the type under consideration; and

Fig. 9 is a face view of a fragment of a canvas work-piece provided with a completed grommet-and-eyelet assemblage.

The first step in the procedure to be described is to cut a hole in a canvas work-piece 10 to receive the barrel 11 of a grommet, but the hole need not be as large as the outside of the barrel because it can be dilated to some extent by the latter. Preferably, the hole will be of the same size as a plunger 12 adapted to slide easily through the barrel 11 and to engage the internal surface thereof. The area of canvas to be provided with a grommet may be supported initially by a portable cutting block 13 (Fig. 3) while a hole is being cut by a tubular cutter 14 affixed

to a hand-stock 15. One blow of a maul is sufficient to cut a hole through all the layers of canvas commonly included in a margin to be provided with grommets. Three layers are represented in Figs. 5 and 6, but some reinforced margins of canvas comprise four layers.

When the hole has been cut the block 13 may be removed and replaced by an anvil assemblage embodying some of the novel features of the invention. The drawings represent a portable anvil assemblage designed to support six eyelets 18 and a grommet to be installed in a mated washer 16 having six holes 17 to receive the eyelets. Such a washer is represented individually in Fig. 8. The corresponding holes in the grommet are formed in the flange 19 thereof.

Referring to Figs. 1 and 2, the anvil includes an upper section 20 and a base section 24 rigidly related to each other. The plunger 12 is telescopically related to the anvil and is normally raised by a compression spring 21. A key 22 in the section 20 projects into a groove 23 in the plunger to prevent rotation of the latter about its axis. The section 20 is nested in the base 24 and secured thereto by a setscrew 25. Six pointed spindles 26 are also telescopically related to the anvil and are individually movable, each being arranged in an individual bore and normally raised by an individual compression spring 27. The lower ends of the spindles extend through and project below bushings 28 by which the springs 27 are maintained under initial compression.

Before placing a perforated canvas work-piece 10 on the plunger 12 the operative will place six eyelets 18 on the six spindles, their flange ends seated on the anvil (Fig. 4), and will place a grommet flange down on the plunger 12 and on the eyelets. The flange of the grommet will then be seated on the flanges of the eyelets, the pointed ends of the spindles will project above the barrels of the eyelets, and the plunger 12 will project not only above the barrel 11 of the grommet but also above the level of the points of the spindles. Now, the canvas work-piece may be placed on the plunger 12 as indicated in dotted lines, the hole cut by the tool 14 enabling the plunger to project slightly above the canvas and to be engaged by the pressing or impaling tool 30 included in Fig. 4.

The tool 30 is designed to be held in one hand and struck with a maul to force the work-piece 10 down to the flange 19 of the grommet, but for this step of the procedure it is necessary to lock the spindles 26 in their raised positions where their tapered portions will be effective to puncture the canvas and spread the strands thereof nearly, if not quite, to the size of the barrels of the eyelets. Since the entering ends of the latter are rounded in the process of their manufacture they will complete the spreading of the strands as the canvas slides down on them. The entering end of the grommet barrel 11 is likewise rounded and will dilate the hole cut by the tool 14.

The impaling tool 30 is provided with a flat pressing portion having six holes 31 to receive the eyelet barrels and the pointed ends of the spindles 26, and with a circular cavity 32 to receive and provide clearance for the barrel 11 of the grommet. This cavity is partially occupied by a circular pilot 33 of the same diameter as the plunger 12, and the pilot carries a flat coupling key 34 diametrically related thereto and of a width equal to the size of the hole cut by the tool 14. A groove 35 is formed in the plunger to receive the key 34, and the related parts are so organized that when

the key is inserted into the groove and into the hole in the work-piece the holes 31 will be indexed thereby to register with the eyelets lodged on the spindles 26. To maintain this indexed relation when the blow is struck to impale the work-piece, without depending on the work-piece during the period of impact, the abutting ends of the pilot 33 and the plunger 12 are provided with counterpart seats 36 and 37, one cupped and the other domed.

When a work-piece 10 has been placed as indicated in Fig. 4 it will rest on the points of the spindles 26. The operative will place the pilot 33 on the plunger 12 and drive it down with a blow to depress the work-piece to the flange 19 of the grommet (Fig. 5), thus impaling the work-piece on the barrels of the eyelets and on the barrel of the grommet. The pilot 33 depresses the plunger 12 before the work-piece receives the force of the blow, and this initial movement of the plunger results in locking the pointed spindles in their raised positions.

The locking mechanism comprises six stops or locking pins 40 arranged to slide endwise in radial bores in the base 24 and each arranged to be projected into the path of the lower end of a corresponding spindle (Fig. 7). The pins are normally (not initially) shifted to their locking positions by individual leaf-springs 41 anchored to the base by screws 42, but are initially retracted by a conical cam 43 which may be an integral portion of the plunger 12 and is so shown, but the integral construction is not essential. When the cam is raised by the spring 21 (Fig. 1) it engages the inner ends of six radially arranged follower pins 44 two of which appear in the drawing. The outer ends of these pins abut the corresponding leaf-springs 41 and deflect them outwardly except when the cam is depressed. The free ends of the leaf-springs have tongue-and-notch connections with the locking pins 40 which are effective to retract the latter as well as to shift them to their locking positions. Now, although the leaf-springs normally shift the locking pins to their locking positions, their aggregate applied force derived from their own resilience is inferior to the counterforce derived from the compression spring 21 and the cam 43. The essential considerations due to this locking mechanism are that the pointed spindles are initially unlocked, for a reason hereinafter explained, but become locked in consequence of depressing the plunger 12.

The locking pins are cylindrical but their inner portions are reduced to provide flat lands 45 to be engaged by the lower ends of the spindles which are also flat. On this score the tongue-and-notch connections of the leaf-springs and the locking pins are designed to prevent the latter from turning about their axes and to maintain the flat lands in a plane normal to the axes of the spindles. Accordingly, the free ends of the leaf-springs are straight and arranged to engage the bottoms of the notches 46 which are also straight.

After the impaling tool 30 has depressed the work-piece 10 to the flange 19 of the grommet (Fig. 5) that tool is removed, and since the plunger 12 will then be restored to its raised position by its spring 21 the locking mechanism will automatically unlock the spindles. The operative will now place a washer 16 on the upper surface of the impaled work-piece (see dotted representation thereof in Fig. 5), and the upper portions of the eyelet barrels will project through

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the holes 17 in the washer and above the latter to be upset and clenched by the tool affixed to the hand-stock 50. This tool is provided with an annular upsetting surface or shoulder 51, a tapered pilot 52 projecting therefrom, and a pit in the lower end of the pilot to receive the point of a spindle 26.

At this stage the operative will place the pilot 52 on the spindles successively and strike a blow on the stock 50 for each eyelet, thus clenching the eyelets with the result represented in Fig. 6. This operation will not depress the plunger 12 but will depress the spindles individually to enable the upsetting shoulder 51 to be brought down to the washer without damaging the points of the spindles. In this operation the pit in the lower end of the pilot 52 enables the spindles to guide the pilot into the barrels of the eyelets. If desired, the upper surface of the anvil may be provided with shallow annular depressions to receive the flanges of the eyelets, in which event the flange 19 of the grommet may touch the anvil instead of being supported solely by the flanges of the eyelets.

After all the eyelets have been clenched the operative will upset and clench the barrel 11 of the grommet with the tool affixed to the hand-stock 55. This tool is provided with an annular upsetting surface or shoulder 56, a tapered pilot 57 projecting therefrom, and a pit 58 in the lower end of the pilot to mate the domed form of the upper end of the plunger 12. One or more blows struck on this hand-stock will upset and clench the barrel 11 against the washer, with the result shown in Fig. 9 in which the clenched portion 59 of the grommet is represented as rolled without being split into segments. This operation completes the installation of a grommet.

Broken lines in Fig. 1 represent a casing 60 for enclosing the leaf-springs 41 and the outer ends of the locking pins 40, and a handle 61 for carrying the anvil assemblage. The handle is affixed to the casing, and the latter may be secured to the base 24 with setscrews.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for installing eyelets in pierceable sheet material comprising an anvil for supporting an eyelet standing on its flange end, a pointed spindle telescopically related to the anvil to extend through the eyelet, a spring by which the point of the spindle is normally raised above the upper end of the eyelet, and means for locking and unlocking the spindle in its raised position while the anvil remains at a constant level.

2. Apparatus for installing eyelets in pierceable sheet material comprising an anvil for supporting an eyelet standing on its flange end, a pointed spindle telescopically related to the anvil to extend through the eyelet, a spring by which the point of the spindle is normally raised above the upper end of the eyelet, a plunger also telescopically related to the anvil, means operable by said plunger for locking and unlocking the spindle in its raised position, and a spring by which the plunger is normally moved to unlock the spindle.

3. Apparatus for installing eyelets in pierceable sheet material comprising an anvil for supporting an eyelet standing on its flange end, a pointed spindle telescopically related to the anvil to extend through the eyelet, a spring by which the point of the spindle is normally raised above the upper end of the eyelet, a plunger also tele-

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scopically related to the anvil and arranged in parallel relation to the spindle but spaced side-wise therefrom, a spring by which the plunger is normally raised, and means operable by the plunger to lock the spindle in its raised position when the plunger is depressed.

4. A tool for cooperating with an anvil assemblage, said tool comprising a portion having a work-pressing surface provided with a cavity to receive and provide clearance for the barrel of a grommet projecting from a work-piece and with a hole adapted to receive the barrel of an eyelet likewise projecting, and a pilot rigidly related to said portion and located in said cavity but projecting ahead of said surface to occupy the barrel of a grommet entering the cavity.

5. Apparatus for installing a group of eyelets in pierceable sheet material comprising an anvil for supporting the eyelets standing in group formation on their flange ends, a group of pointed spindles telescopically related to the anvil and arranged to project upwardly therefrom through the eyelets respectively, the spindles being individually movable up and down, springs by which the points of the spindles are normally raised above the upper ends of the eyelets, and means arranged to lock and unlock the spindles collectively in their raised positions while the anvil remains inactive.

6. Apparatus for installing a group of eyelets in pierceable sheet material comprising an anvil for supporting the eyelets standing in group formation on their flange ends, a group of pointed spindles telescopically related to the anvil and arranged to project upwardly therefrom through the eyelets respectively, the spindles being individually movable up and down, springs by which the points of the spindles are normally raised above the upper ends of the eyelets, means arranged to lock and unlock the spindles collectively in their raised positions, and a spring by which the locking means is normally moved to unlock the spindles.

7. Apparatus for installing a group of eyelets in pierceable sheet material comprising an anvil for supporting the eyelets standing in group formation on their flange ends, a group of pointed spindles telescopically related to the anvil and arranged to project upwardly therefrom through the eyelets respectively, the spindles being individually movable up and down, springs by which the points of the spindles are normally raised above the upper ends of the eyelets, a plunger telescopically related to the anvil and arranged to project upwardly therefrom adjacent to the spindles, a spring by which the plunger is normally raised, and means operable by the plunger to lock the spindles when the plunger is depressed and to unlock them when it is raised.

8. A tool for cooperating with an anvil assemblage, said tool comprising a portion having a work-pressing surface provided with a cavity to receive the barrel of a grommet projecting from a work-piece and with a plurality of holes each adapted to receive the barrel of an eyelet likewise projecting, and a pilot portion located in said cavity but projecting ahead of said surface to occupy the barrel of a grommet entering the cavity, said pilot portion having indexing means at its tip end adapted to cooperate with counterpart means of the anvil to register said holes with the eyelets.

9. Apparatus for installing a group of eyelets in pierceable sheet material comprising an anvil for supporting the eyelets standing in group formation on their flange ends, a group of pointed

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spindles telescopically related to the anvil and arranged to project upwardly therefrom through the eyelets respectively, the spindles being individually movable up and down, springs by which the points of the spindles are normally raised above the upper ends of the eyelets, a plunger cam telescopically related to the anvil and movable up and down therein, a spring by which the cam is normally raised, a group of followers arranged to be actuated by the cam, and means operable by the followers respectively for locking and unlocking the spindles respectively.

10. Apparatus for installing a group of eyelets in pierceable sheet material comprising an anvil for supporting the eyelets standing in group formation on their flange ends, a group of pointed spindles telescopically related to the anvil and arranged to project upwardly therefrom through the eyelets respectively, the spindles being individually movable up and down, springs by which the points of the spindles are normally raised

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above the upper ends of the eyelets, spring-biased means of minor power arranged normally to lock the spindles in their raised positions, and spring-biased means of greater power arranged normally to retract the locking means and thereby counteract its locking effect.

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