Dec. 29, 1931. L. R. WILDER 1,838,973

GROMMET SETTING DEVICE

Filed Feb. 17, 1930

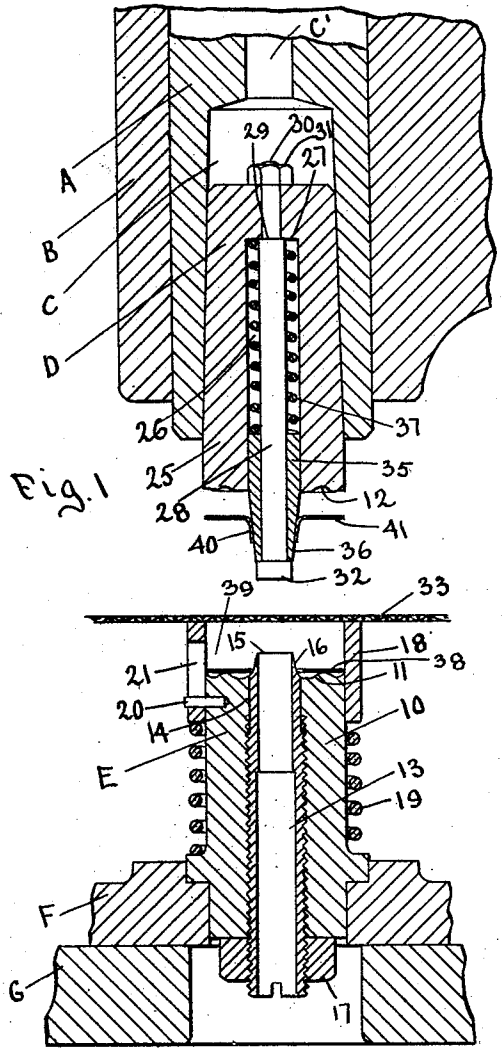


Fig. 1

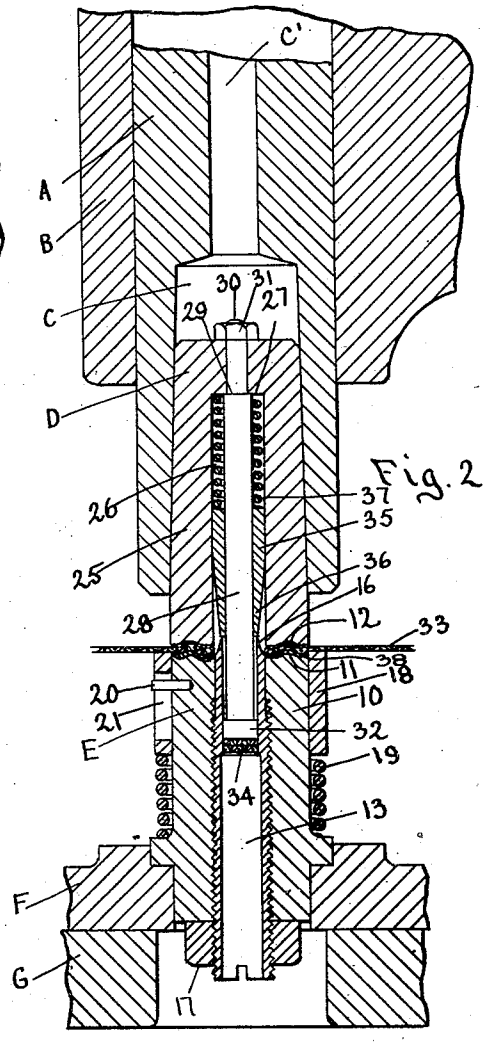


Fig. 2

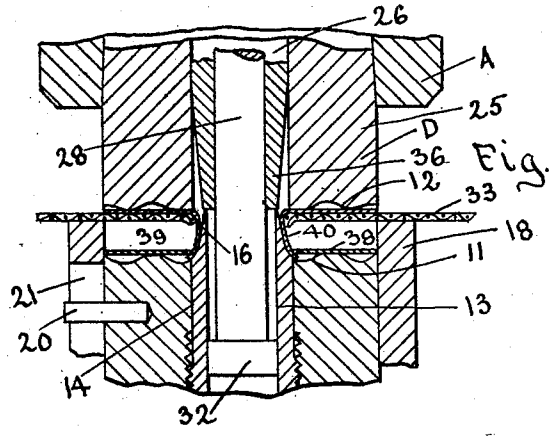


Fig. 3

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GROMMET SETTING DEVICE

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My invention relates to devices for attaching grommets to sheet material such as canvas awnings, sails and the like.

Devices for this purpose now in use include in common, certain elements such as a punch and die for perforating the sheet material, cooperating with elements for setting the tubular head and the washer of a grommet in the sheet material, to form a reinforcing eye. While these elements are old in the art per se, various modifications and additional elements are employed in combination to produce results. One object of my invention is to provide a device for the purpose stated, in which the punch and die elements may be replaced at a relatively low cost of manufacture, or loss of time.

A second object is to provide such a device, in which the die element is adjustable relative to its corresponding setting element, and is formed to cooperate therewith to form and set the head element of the grommet when the device is operated to set the grommet in the sheet material.

My invention consists in the novel combination of elements which I employ to secure the above stated objects in an efficient manner, in either a hand or power operated device.

From an extensive experience in the use of devices for the purpose stated, particularly with those operated by power, I have found that often one or the other of the grommet elements are misplaced in operating, resulting either in defective setting of the grommet, or more often the breakage or marring of either the punch or the die. In the latter case, if either or both the punch and die elements are integral with its corresponding setting element, a completely new member is required entailing a relatively high cost for replacement.

This adds materially to the cost of production, and as it is usual to employ unskilled labor in the operation of such devices, such accidents frequently occur entailing not only expense for replacements, but loss in productive use of the device.

In my invention I provide a device of simple construction, in which the punch and die are replaceable at a relatively low cost and little loss of time, and one which may be efficiently operated without undue care of the operator.

In the accompanying specifications and the drawings forming a part thereof, I have described and illustrated a preferred form of my invention, adapted for use with a power press, but I do not confine myself to this form, as modifications may be made within the scope of the claims for adapting the invention to devices for either manual or power operation.

In the drawings,

Fig. 1 is a sectional elevation of a device of the character described, embodying my invention, showing the parts in position ready for the operation of setting the grommet.

Fig. 2 is a similar sectional elevation showing the operation as the grommet is set and before the parts are returned to initial position.

Fig. 3 is an enlarged fragment showing the manner in which the grommet head is formed by the die element preliminary to the action of the setting elements.

In the drawings, A indicates the plunger of a power press, slidable in the head B, and formed axially with the socket C.

The device comprises a pair of cooperating members which will hereinafter be referred to as the anvil and the setter.

The setter D is adapted to engage with the socket C and to be reciprocated to cooperate with the anvil E for the purpose stated. I have shown the anvil as rigid with a shoe F which may be secured in any suitable manner to the bed of the press G. The press is operated in the usual manner and the means shown or described for securing the setter and the anvil are typical and may be varied according to circumstances.

In the drawings the shank of the setter is shown as tapered to be held by friction in the socket C, and a passage C′ may be provided through which a rod may be passed to engage the end of the shank and loosen it when it is to be removed from the press.

The anvil member E comprises a holder 10, the upper end of which is provided with

a formed surface 11 adapted to cooperate with a similar surface 12 formed on the setter, to complete the setting of the grommet, as will be presently explained. The holder 10 is formed axially with a passage threaded in part to engage with a correspondingly threaded tubular die element 13, which is adjustable in the passage being secured in adjusted position by a check nut 17.

The element 13 functions not only as a die for cutting the sheet material in which the grommet is to be set, but its external surface is formed to cooperate with the surface 11 to expand and set the tubular grommet head. The upper portion 14 of the passage in the holder 10 forms a bearing in which the element 13 is slidable, the upper end 15 projecting upwardly above the surface 11 of the holder. The projecting end 15 is formed with a cutting edge to form a die for removing a section of the sheet material as will be explained.

From this cutting edge, the walls of the element 16, are so formed that, as the tubular portion of the grommet head engages therewith, it is guided through the hole punched in the sheet material, and the hole in the grommet washer, the surface at its lower end being adjusted to merge with the formed surface 11 to provide a continuous formed surface, in contour such that the tubular portion of the grommet head will be expanded and set with the washer in the sheet material.

To secure these results, the element 13 is threaded into the holder 10 and is axially adjustable, and when so adjusted, is secured in position by a check nut 17. The element may thus be removed for sharpening the die edge 15, and if this die edge is chipped or broken or worn down by repeated sharpening, it may be renewed at a nominal cost, and with little delay in production. This is a particularly valuable feature of my invention, as the die portion of any grommet setting device is the part most often chipped, broken or worn and a minimum cost of renewal is essential for economical operation of any such device. In addition to this feature, the cooperative surface of the element, and its adjustability to function with the setting element, is another feature of material value. Slidable on the holder 10 is a sleeve 18, yieldingly supported by the spring 19, to project upwardly beyond the holder and to serve as a support for the sheet material and as a stripper as will be presently explained, its upward limit of movement being controlled by any suitable means, here shown by the pin 20 engaging the slot 21.

The setter member of my invention, D, comprises a chambered holder 25, which in the form here shown is adapted to engage the socket B of the press plunger as explained. The chamber 26 is formed at its end with a wall 27 through which extends a passage of reduced diameter, and the exposed end of this element is formed at 12 with a surface adapted to cooperate with the surface 11 on the anvil member, to set the grommet.

A punch element is formed with a stem 28, shouldered at 29 to abut the wall 27, the reduced end 30 extending through the wall and threaded to be secured rigidly to the element 25 by the nut 31. The exposed portion of the punch element is formed with a head 32 which projects beyond the formed surface 12 for the purpose of engaging the sheet material 33 supported on the sleeve 18, and cooperating with the die 15, to punch a circular hole, the punched disc 34 being discharged through the tube and openings through the shoe F and the press bed G. A sleeve 35 formed with a conical end 36 is slidable on the stem 28 and within the chamber 26, and is yieldingly pressed axially against the punch head 32, by a spring 37, when the device is in initial position for operation, serving as a holder for the head element of the grommet.

In operation, a grommet washer 38 is placed in the chamber 39 formed by the sleeve 18, and is supported by the formed surface 11 on the anvil member 10. A grommet head 40 is then placed on the conical portion 36 of the sleeve 35, and is pressed with sufficient force to be held thereon by friction. The sheet 33 in which the grommet is to be set, is then adjusted to the required position, and the press being started, the setter element is reciprocated, the punch head 32 engaging the sheet 33, operating to depress the sleeve 18 until the sheet material bears on its lower surface on the die element 13 at its cutting edge 15.

Continuing the cycle, the sheet material is punched and the grommet head is pressed through the punched hole by the spring action on the sleeve 36, until the end of the sleeve engages the die edge 15, the action of the spring 19 cooperating on the sleeve 18 to this end. As the operation proceeds, the formed end 12 engages the flange 41 of the grommet head, and the tubular portion is expanded on the walls 16 as shown in Fig. 3, the head being released from the sleeve 36 as the element 25 continues its movement and the sleeve 36 remains stationary, the spring 37 being compressed. As the operation approaches completion, the tubular end of the head is forced through the hole in the washer, and the head and washer are clinched on the sheet material between as the formed surfaces 11 and 12 cooperate to set the grommet, the flange of the head and the washer being at the same time formed to efficiently grip the sheet material to form a reinforcing eye. As the press returns to normal or initial position, the action of the spring 19

presses the sleeve 18 upwardly, and the sheet with its set grommet is released from the surface 11, in readiness to be moved to set successive grommets.

Having thus described my invention, I claim:

1. In a grommet setting device having a pair of setting members and cooperative punch and die elements detachably secured to the respective setting members in cooperative relation with the setting faces thereof, the combination therewith of a sleeve axially slidable relative to, and yieldingly pressed toward the operating end of the punch, and formed to support the head element of the grommet and to guide the tubular end thereof through the hole in the sheet material formed by the punch and die in cooperation.

2. In a grommet setting device having a pair of setting members and a punch and die cooperative therewith, a die element axially adjustable in relation to its setting member, having a surface adapted to coincide with the surface of the setting member at the line of junction, to form a continuous profile for the purpose of expanding and setting the tubular element of the grommet; and means for adjusting the die element axially to insure coincidence of the surface of the die element with the setting surface.

3. A grommet setting device comprising in combination, a pair of setting elements; independent punch and die elements secured to and in cooperative relation with the respective setting elements and detachable therefrom; means for adjusting the relation of the engagement of the punch and die to the engagement of the setting elements; means for supporting the head and washer elements of the grommet in operative relation; and means integral with the die element for expanding the tubular portion of the grommet head, and, in conjunction with the respective surfaces of the setting elements, means for forming and clinching the grommet head and washer on opposite sides of sheet material as the setting elements are caused to function.

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