

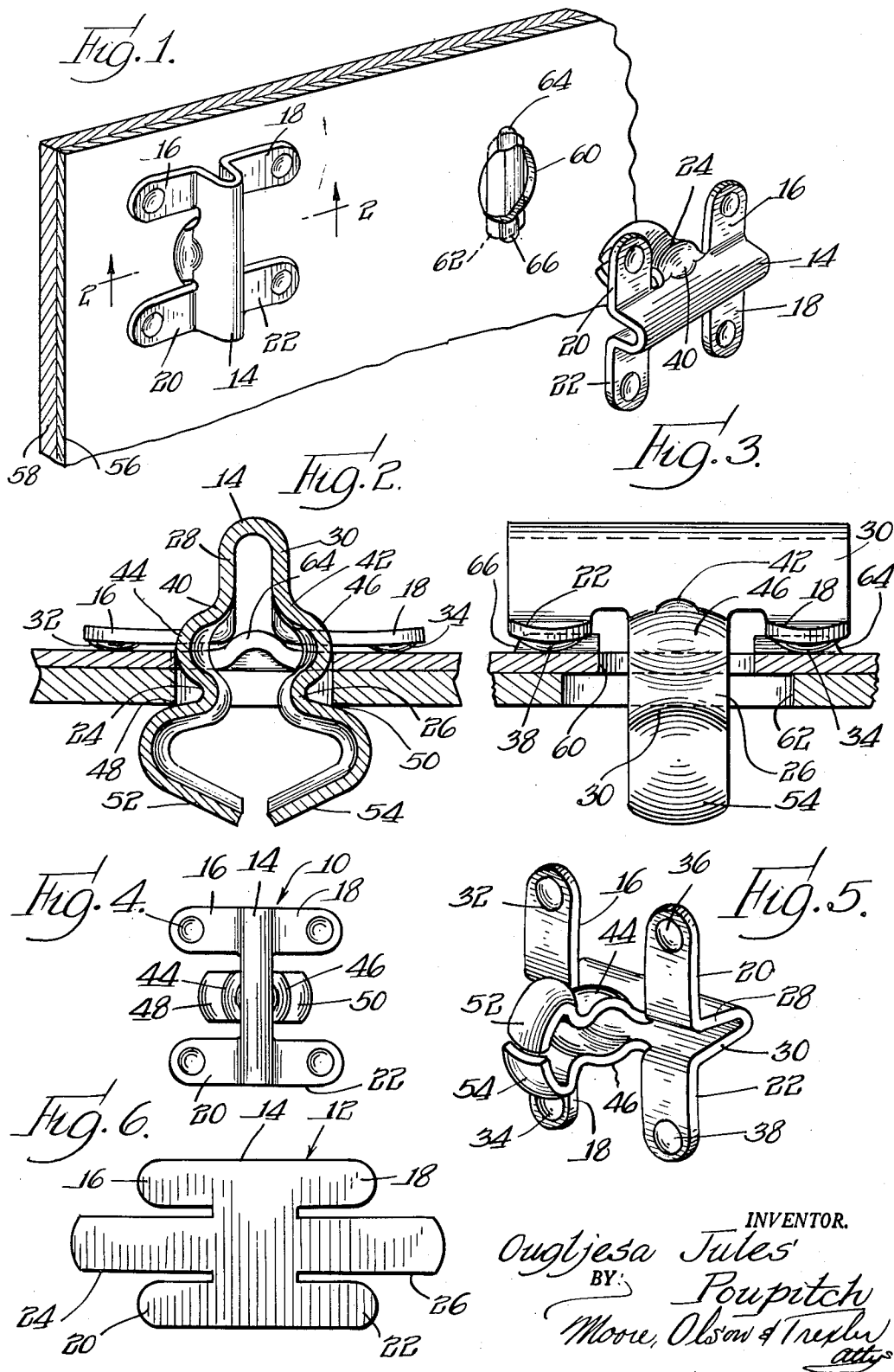
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RESILIENT ROTARY SHEET METAL FASTENER

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RESILIENT ROTARY SHEET METAL FASTENER

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3 Claims. (Cl. 85—5)

The present invention relates to a novel sheet material fastener for securing a plurality of panels together, and more particularly to a novel fastener of the type adapted to be inserted through apertures in a plurality of panels and rotated therein to clamp the panels between opposed surfaces of the fastener.

Various fasteners of the above described general type have been suggested in the past, but these prior art devices have been subject to several disadvantages. For example, some of the prior art devices must be assembled with the work pieces with the aid of special tools, and other devices are composed of a plurality of parts and are relatively complicated and expensive. Still other prior art devices are relatively difficult to assemble with the work pieces and/or are subject to loosening when the work pieces undergo certain stresses and vibrations.

An object of the present invention is to provide a novel one piece sheet material fastener of the above described general type which is of simple construction and may be easily and economically manufactured.

Another object of the present invention is to provide a novel sheet material fastener of the above described type which may be relatively easily applied to the work pieces without the aid of special tools or equipment.

Still another object of the present invention is to provide a novel sheet material fastener of the above described type which has improved holding power and will not loosen under repeated vibrations and shocks.

A more specific object of this invention is to provide a novel sheet material fastener of the above described type which is formed so that the ends thereof may be exposed without danger of injuring any persons accidentally coming into contact therewith.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, wherein:

Fig. 1 is a perspective view illustrating the manner in which a novel fastener embodying the principles of this invention may be used to retain a plurality of panels together and also the manner in which the novel fastener may be assembled with the panels;

Fig. 2 is a fragmentary cross sectional view taken along line 2—2 in Fig. 1;

Fig. 3 is a side view of a novel fastener embodying the principles of this invention applied to a plurality of panels;

Fig. 4 is a plan view of the fastener of this invention;

Fig. 5 is a perspective view of the fastener of this invention; and

Fig. 6 is a plan view of a sheet material blank utilized to form the fastener of this invention.

Referring now more specifically to the drawings, wherein like parts are designated by the same numerals throughout the various figures, a fastener 10 embodying the principles of this invention may be conveniently made from the sheet material blank 12 shown in Fig. 6. While any suitable sheet material may be used, spring steel is preferred. The blank 12 includes a central head section 14

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having a plurality of arms 16, 18, 20, and 22 extending therefrom. The blank also includes leg portions 24 and 26 which are adapted to be formed into the novel stud section described hereinbelow.

As shown best in Fig. 2, the head section 14 of the fastener 10 includes an inverted looped or generally U-shaped portion having opposed spaced walls 28 and 30. The arms 16 through 22 extend laterally from these walls and are normally disposed substantially perpendicularly thereto. The outer ends of the arms are deformed to provide protuberances 32, 34, 36, and 38, respectively, for the purpose described fully hereinbelow.

The stud legs 24 and 26 extend from the lower margins of the walls 28 and 30, respectively. As shown in the drawings, these stud legs are formed so that they have arcuate transverse cross sections, which arcuate formation of the legs 24 and 26 extends into the walls 28 and 30, as at 40 and 42, respectively (see Figs. 1, 2, and 3). This structure greatly increases the strength and rigidity of the stud section legs and also facilitates the application of the fastener to the panels, as described fully below. However, the legs may be collapsed together for assembly with the panels since they are connected by the relatively flexible wall of the U-shaped head section.

The stud legs 24 and 26, respectively, are provided with enlarged bulbous portions 44 and 46 having generally semi-spherical outer surfaces. Slightly spaced below these bulbous portions, the legs 24 and 26 are provided, respectively, with enlarged abutment means having generally semi-spherical surfaces 48 and 50. It is noted that the free ends of the legs 24 and 26 are inclined toward each other, as at 52 and 54, and are slightly spaced apart to permit the stud legs to collapse together during the application of the fastener to the panels.

The novel fastener of this invention may be used to secure a work piece or panel 56 to a panel 58, as shown best in Figs. 1 and 2. The panel 56 is preferably provided with a circular aperture 60 through which the stud legs may be snapped. In the embodiment illustrated, the aperture 60 has a diameter sufficiently small so that it is necessary first to insert one of the abutments 48 or 50 through the aperture and then spring the legs together in order to assemble the fastener. By this arrangement, it will be appreciated that if desired, a plurality of the fasteners of this invention may be first assembled with the panel 56 before the panel 56 is positioned for assembly with the panel 58. The turned end portions 52 and 54 of the stud legs provide cam surfaces greatly facilitating this insertion of the legs through the aperture 60. The work piece 58 is provided with an elongated aperture 62 of generally rectangular shape which has a length substantially equal to the distance between the outer surfaces of the enlarged abutments 48 and 50 of the stud legs, whereby the stud legs may be easily passed therethrough. The width of the elongated opening 62 is preferably substantially equal to or slightly less than the diameter of the aperture 60. Thus, after the stud legs are inserted through the aligned apertures 60 and 62, the fastener may be turned so that the abutments 48 and 50 engage the undersurface of the panel 58. It should be noted that the U-shaped portion of the fastener is readily engageable by a wrench or other suitable tool for turning the fastener. It should also be noted that the spaced walls 28 and 30 of the U-shaped portion are engageable with protuberances 64 and 66 formed on the panel 56, as illustrated best in Figs. 2 and 3, whereby the fastener will be positively and securely retained in its clamping position.

As shown best in Fig. 2, the bulbous portions 44 and 46 of the stud legs are preferably formed so that they are engageable with opposite surfaces of the panel 56

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provides cam surfaces greatly facilitating the rotation defining the opening 60. This structure in cooperation with the engagement of the abutments 48 and 50 with the panel 58 limits any possible relative sliding movement between the panels 56 and 58. As pointed out above, the bulbous portions and the abutment surfaces 48 and 50 are curved or generally semi-spherical, which in effect of the fastener relative to the panels, regardless of the direction of such rotation. It will be noted that the abutment surfaces 48 and 50 are inclined relative to the clamping arms 16 to 22 of the head section so that as the abutment surfaces are yieldably urged into engagement with the panel 58, the arms are drawn tightly against the panel 56. The protuberances 32 through 38 on these arms insure a predetermined and uniform flexing of the arms so that the desired clamping action is obtained. When the fastener is assembled, as shown in Fig. 2, it will be appreciated that the inturned and rounded end portions 52 and 54 of the stud legs and the rounded end of the U-shaped head portion present substantially smooth ends of the fastener, thereby greatly reducing any possibility of injury to a workman accidentally coming into contact with the fastener.

From the above description, it is seen that the present invention has provided a novel sheet material clip which may be easily and economically manufactured by simple stamping operations. In addition, it will be seen that the novel formation of the clip of this invention enables the clip to be readily applied to assembled work pieces and thereby securely and positively retained in clamping relationship with the work pieces. Furthermore, it is seen that the novel fastener of this invention not only is capable of clamping the work pieces together, but also is capable of preventing relative sliding movement between the work pieces.

While the preferred embodiment of the present invention has been shown and described herein, it is obvious that many changes may be made without departing from the spirit and scope of the appended claims.

I claim:

1. A sheet metal rotary fastener for securing a plurality of apertured panels together, and comprising a head section and a stud section depending therefrom, said head section being adapted to engage one of said panels and having an inverted substantially U-shaped portion with generally parallel elongated walls traversing the head section and extending beyond the stud section to present extended surfaces adapted to be engaged by a tool for turning the fastener, said head section also including a

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plurality of panel engaging arms extending laterally from the free bottom edges of the walls of said U-shaped portion and disposed on opposite sides of said stud section for resiliently impinging upon the adjacent panel; said stud section including a pair of opposed legs depending from the walls of said U-shaped portion, each said leg being transversely arched outwardly substantially throughout its length, each leg including an outwardly bulbous shoulder portion adjacent the free end thereof, the said shoulder portions of said legs being complementary and in opposition to one another and adapted for insertion through apertures in the complementary panels with the upper surfaces of said shoulder portions presenting cam surfaces engageable with the adjacent face of the blind panel upon rotation of the fastener to a clamping position, and each leg further including a second outwardly bulbous portion disposed between the head section and the bulbous shoulder portion adjacent the free end thereof of each said second bulbous portion being disposed in opposition to one another and cooperating to engage the aperture through the adjacent panel to resist relative sliding between the panels.

2. A sheet metal rotary fastener for securing a plurality of apertured panels together as claimed in claim 1, wherein the panel engaging arms are resilient to snap over protuberance means on the adjacent panel and wherein the bottom edges of the walls of the U-shaped portion of the head section are spaced apart to receive therebetween the protuberance means on the adjacent panel for positively restraining the rotary fastener against turning relative to the secured panels.

3. A sheet metal rotary fastener for securing a plurality of apertured panels together as claimed in claim 1, wherein the outwardly bulbous shoulder portion adjacent the free end of each leg presents a bulbous portion of greater lateral extent than the second outwardly bulbous portion.

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