Feb. 24, 1959 J. P. THOR 2,874,666

SHEET CLIPPING TOOL

Original Filed July 16. 1954

FIG. 1

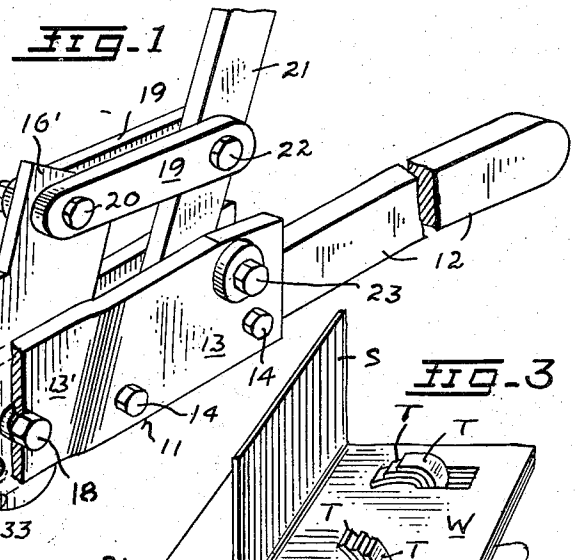


FIG. 2

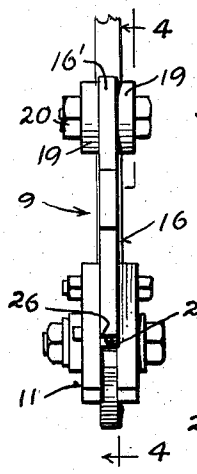


FIG. 3

FIG. 4

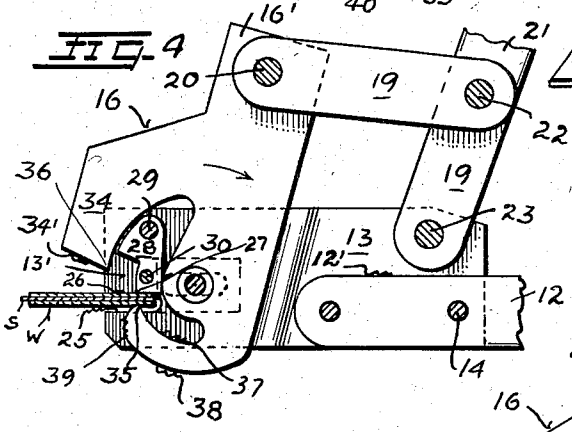


FIG. 6

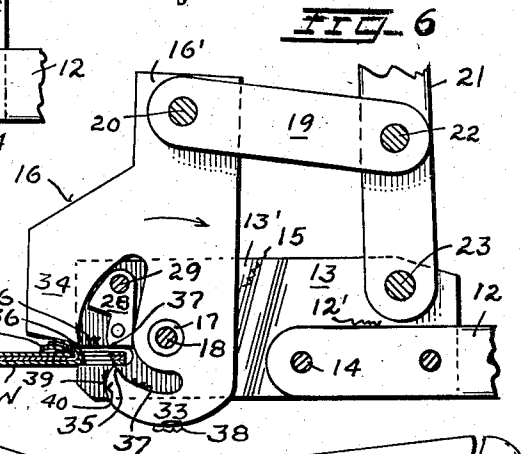
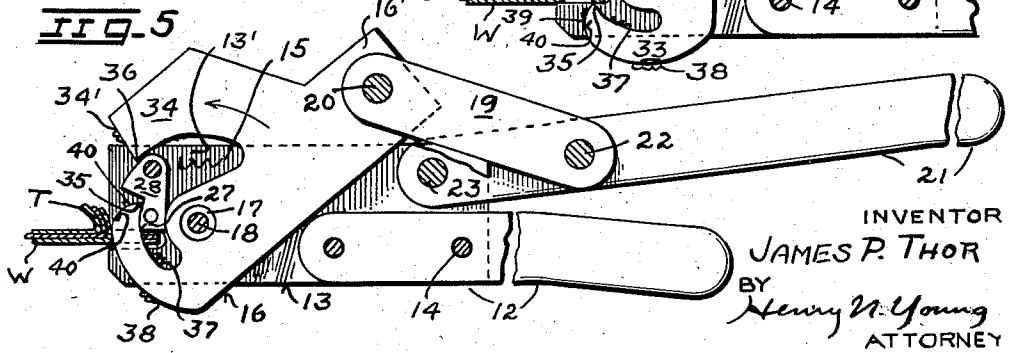


FIG. 5



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SHEET CLIPPING TOOL

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Continuation of abandoned application Serial No. 443,752, July 16, 1954. This application May 2, 1956, Serial No. 582,257

3 Claims. (Cl. 113—1)

The invention relates to a tool which utilizes solely sheet portions to clip or rivet together transversely engaged sheets in a laminated assembly thereof, and the present application comprises a continuation of my prior application Ser. No. 443,752, filed July 16, 1954, and since abandoned.

An object of the invention is to provide an improved sheet-clipping tool of the character described which is arranged for its manual application by actuating relatively swingable handle elements thereof.

Another object is to provide a tool of the character described which may operate on a fixedly positioned workpiece assembly of sheets for performing successive tongue-cutting and riveting operations therewith without requiring a shifting of the tool with respect to the work.

A further object is to provide a sheet-clipping tool having a high mechanical advantage in its use and a particularly sturdy structure for its weight.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment thereof, and in the accompanying drawings, in which,

Figure 1 is a perspective view of a sheet-clipping tool embodying my invention, portions of the structure being broken away.

Figure 2 is a front end view of the tool of Figure 1.

Figure 3 is a perspective view showing a typical workpiece having outstanding clip tongues as initially provided by a cutting application of the tool and as finally disposed by the tool in riveting relation to the sheets.

Figure 4 is a side elevation of the working-head parts of the tool taken in a stepped plane at the broken line 4—4 in Figure 2, the head parts being relatively positioned for receiving a workpiece.

Figure 5 is a view similar to Figure 4 but showing the tool head parts disposed at the end of a tongue-cutting operation therewith.

Figure 6 shows the structure of Figure 4 during a riveting operation therewith.

As is particularly brought out in Figures 3 to 6 inclusive, the sheet-clipping tool 9 embodying my invention is particularly adapted for clipping together transversely engaged portions of a workpiece comprising sheets S extending from a common edge S' to points thereof at which the outer sheets are extended transversely from the central sheet, the engaged sheet portions comprising a workpiece W with respect to the tool. A first operation of a tool 9 on the workpiece is arranged to produce outstanding tongues T which extend together from the same side in a turned-back relation thereof opposite one side of the sheet assembly comprising the workpiece W, and a final operation of the tool is arranged to press and flatten the tongues T toward the sheets for riveting the sheets together, the sheets being of a sufficiently malleable material to permit the stated operations. While particularly shown as applied to a workpiece comprising a three-sheet assembly, the present tool 9 is generally operative for clipping together a plurality of sheets to a limiting number imposed only by the size and shearing strength of the tool and the gauge and toughness and pliability of the sheets to be clipped together, said sheets being metallic or non-metallic.

Essentially, a tool 9 embodying the features of my invention includes a head assembly 11 provided at the forward end of an elongated handle member 12 and comprising spaced opposed complementary plates 13 fixed to and against opposite sides of the forward handle portion by bolts 14 engaged transversely through the plates and handle to provide a uniform space 15 extending forwardly of the handle extremity and laterally of a longitudinal handle edge 12'. As shown, forward portions 13' of the side plates 13 are transversely offset toward each other forwardly of the forward handle extremity to space the parallel opposed faces of the plate portions thereof in accordance with the desired width of tongues T to be cut out from a sheet or sheets, the greater spacing at the rear portion of the plates accommodating the thicker handle portion fixed therein by the bolts 14. It will be understood that the unitary plate-and-handle assembly 11 thus provided comprises, for descriptive purposes, a head element at the forward end of a rigid lever of the tool assembly.

A flat head element 16 is hingedly mounted on a plate-spacing sleeve 17 clampedly engaged between the forward side plate portions 13' and secured in place by a bolt 18 extending intermediately through it and the plates 13 for functioning as a hinge pin connecting the head 16 to the head 11. A stem portion 16' of the element 16 is hingedly secured to and between like links 19 disposed at opposite sides thereof and secured to it by a hinge bolt 20. Rearward ends of the links 19 swingably receive an intermediate portion of an elongated operating handle element 21 between them and are hingedly attached to the element by a hinge bolt 22, and the handle element 21 extends from a hinge bolt 23 engaged with and between corresponding rearward points of the side plates 13 opposite the edge 12' of the handle member 12, whereby a swinging of the element 21 in its plane and with respect to the handle 12 is operative to rock the plate element 16 between the side plates 13 of the head assembly 11. While the hinge connections of the plates 13 with the member 16 and the links 19 and the handle element 21 are disclosed as being provided by bolts, it will be understood that these connections might be provided by rivets or removable pins, and generally comprise hinge pins.

It will now be particularly noted that the head member 11 and the head member 16 provide the parts of the present tool which are directly cooperative as a cutting die means to effect the shearing of a tongue T from an appropriately positioned workpiece W and to press and flatten the displaced tongues against the opposed sheet of the workpiece to provide the desired tongue-riveted locking of the workpiece sheets S together. As shown, the plates 13 of the head 11 are provided with slots 25 extending into them from their forward ends in a common plane which is parallel to the bottom-edge plane of the plates and to a point which is slightly forward of the sleeve 17 on which the head element 16 is hinged, the width of said slots generally determining the maximum thickness of a workpiece which may be operated upon by the tool. The mutually inner corners 26 defined by the coplanar upper slot faces and the inner faces of the plates 13 are arranged to be utilized in the manner hereafter described as shear edges of a die plate in the cutting free of the sides of tongues T from the sheets of a workpiece portion disposed in and between the slots.

A shear edge 27 is provided by a member 28 which is fixedly fitted and secured in the space 15 as a spacer

between the plates 13 and above the slots 25 by means of a bolt 29 and transversedly extending pins 30 engaging complementary bores in the plates. The lower end face of the member 28 adjacent the pins 30 lies in the plane of the upper edges of the slots 25, and terminates at its forward end in the shear edge 27 which is more or less spaced from the line of the rearward ends of the slots 25 and from the forward end of the plates 13, it being noted that the member 28 extends away from the slot side at its end whereby a forward edge face of the member 28 is cooperative with said member end face to provide the shear edge 27. It will be understood that the member 28 comprises a fixed part of the working head 11 including the plates 13, whereby the shearing edge 27 of the member 28 and the shearing edges 26 of the plates 13 jointly provide a U-shaped shearing edge of a tongue-cutting die orifice which has its open side at the forward ends of the plates.

It will now be noted that the head member 16 comprises a plate element of uniform thickness which is transversely recessed from its forward end to provide generally opposed shearing point and pressure point portions 33 and 34 respectively. The shearing point 33 comprises a punch which terminates in a transverse shear edge 35 for coaction with the shear edge 27 of the head element 28 when a sheet or sheets are engaged between the edges for a tongue-cutting action thereon, and for a relative movement of said edges past each other as shearing is effected thereat. An end face 34' of the pressure point 34 extends from a rearward acute-angled edge 36 and obliquely away from the plane of the slots 25 while the edge 36 is disposed thereat. The arrangement is essentially such that when the shear edge 35 of the punch 33 is substantially at the plane of the bottom faces of the slots 25, the inner edge 26 of the pressure point 34 is substantially at the plane of the top of the slots, the relation then being that shown in Figure 6.

The shearing punch 33 of the head 16 is bounded on its side toward the hinge pin 18 by a cylindrically concave face 37 extending from its terminal shearing edge 35 and having its axis of curvature at the pin axis. An outer edge face portion 38 of the punch 33 is cylindrically convex about a center of curvature at the pin axis and has a spirally convex edge face portion 39 extending to it from the shearing edge 35; the edge faces 38 and 39 of the element 16 cooperatively define the forward end of the member 16 thereat. Shearing edges 40 are provided at the sides of the edge face 39 of the punch 33 for coaction with the shear edges 26 of the side plates 13 of the head 11 as the shearing punch 33 is advanced through the U-shaped die orifice cooperatively defined by the shear edges 26 and 27 of the head 11.

It will now be particularly noted that the punching out of a tongue T from a workpiece W is arranged to be effected by operating the shearing punch 33 against the workpiece while the same is disposed in the slots 25, as shown in Figure 4, the cutting action being effected by the swinging of the handle 21 toward the handle 12. As the shearing punch 33 is progressively applied to the workpiece, the increasing radial thickness of the punch at its edge face 39 is arranged to progressively cut out and force back tongues T to generally overlie the plates outwardly of the opening provided by the punch 33 whereby the struck-out tongues extend obliquely forwardly from the point at the end of the cutting action of the tool which is formed at the juncture of the punch edges 28 and 29. The movement of the punch 33 through full tongue-cutting and return strokes thereof is provided for by suitably recessing the member 16 transversely therethrough and laterally of its work-receiving opening to freely receive the fixed member 28 of the head 11 at the pivot side of the punch 33 and the point 34.

Having tongues T turned back by the tool in the manner brought out in Figures 3 and 5, pressure against their extremities will operate to press the tongues in more or less flat condition against the sheets from which they have been struck out for riveting the sheets together by the tongues, as indicated in Figures 3 and 6. In the use of the present structure, a mutual separation of the handles 12 and 21 is arranged to bring the end face 34' of the pressure point 34 progressively against the outstanding tongues to effect their bending against the adjacent imperforate part of the immediately opposed sheet, to thus complete a clipping operation with the tool. Particularly if a forward swinging of the handle 21 is inconvenient or impossible during a particular application of the present tool, upstanding and turned-back tongues T may be flattened against the appropriately backed sheet assembly of their origin by the direct application of a hammering tool in lieu of using the pressure point 34; in such a case the unit comprises solely a clip-cutting tool. On the other hand, the present tool may sometimes be advantageously applied as a clip-riveting device against clip tongues provided by some other means than the present tool.

In order that the present hand tool may be as light as possible, it is preferred that the operating handles and the links 19 be of a lightweight material, such as an aluminum composition, with the unitary head assembly 11 (13–28–13) and the head 16 formed of a harder and more rigid material, as steel. Also, the present tool is understood to be adaptable for its use as a "bench tool" to which a workpiece is brought and applied, by suitably fixing one of its heads to a fixed support; the head 12 would usually be the one secured for such a use of the tool.

From the foregoing description taken in connection with the accompanying drawings, the utility and structural advantages of the present tool will be readily understood by those skilled in the art to which the invention appertains. While I have described the principle of operation, together with a form of my invention which I now consider to comprise a preferred embodiment thereof, I desire to have it understood that the showing is primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In a tool for punching clip tongues from corresponding portions of a plurality of transversely engaged form-retaining bendable sheets, first and second cooperative working heads, means hingedly connecting said heads for relative rotation about a common axis which is fixedly related to the heads, the first said head comprising fixedly spaced opposed plates formed with mutually aligned and transverse sheet-receiving slots directed generally toward said axis from the outer end of the head and providing coplanar shearing edges in the mutually inner edges of corresponding first sides thereof and connected by a forwardly directed shearing edge forwardly of their inner ends and in their plane and cooperative therewith to provide a U-shaped cutting die orifice which is open at the outer head end, the second said head being guidedly and complementarily engaged by and between said plates for a relative rocking of the heads about their axis of mutual hinging and providing a die punch having a tapered cutting point cooperative with said cutting die orifice of the first head to transversely and progressively shear arcuately curved tongues of material from a sheet assembly engaged in the slots and to dispose said tongues to extend forwardly and outwardly from the forward ends of the sheet openings from which they have been struck out, and the second head also being provided with a flat edge transverse to its plane and opposite said cutting point thereof in spaced relation thereto and arranged for its forcible engagement with the struck-out tongues to positively flatten them against the sheet assembly while the same is jointly backed by the second sides of the plate slots.

2. In a tool for punching and mutually clinching at-

tached clip tongues from a unitary assembly of transversely engaged sheets of bendable form-retaining material, directly cooperative shearing heads, means mutually hinging said heads for their relative rotation about a common axis, a first said head comprising fixed spaced opposed portions having transversely opposed faces perpendicular to said axis and being formed with mutually aligned and transverse sheet-receiving slots directed generally toward said axis from a forward end of the head to receive an edge portion of the sheet assembly, said first head providing a forwardly open U-shaped cutting die at and in the plane of corresponding sides of the slots and including a forwardly-directed cutting edge defining its rearward ends, the second said head being movably and guidedly engaged by and between said head portions and providing a die punch having an arcuately tapered cutting point cooperative with said cutting die of the first head to transversely and progressively shear tongues of material from a sheet assembly in the slots and to dispose said tongues in outstanding turned-back relation to extend away from the edge of the engaged portion of the sheet assembly when the cutting point of the second member is rocked against and through the sheet assembly from the side thereof opposite said U-shaped die, and a part of the second head providing a face directly and solely and positively operative transversely against the struck-out tongues to flatten the same against the sheet assembly by and upon a reverse actuation of the second head with respect to the first head while the sheet assembly is engaged in the slots of the first said head.

3. In a tool for punching and mutually back-clinching attached clip tongues from a workpiece comprising a unitary assembly of transversely engaged sheets of form-retaining bendable material, cooperative working heads, means directly hinging said heads for their relative rotation about a common axis, a first said head comprising fixed spaced opposed portions having opposed faces perpendicular to said axis and being formed with mutually

aligned and transverse sheet-receiving slots directed generally toward said axis from a forward end of the head, said first head providing a forwardly open U-shaped cutting die orifice utilizing the opposed edges of corresponding sides of the slots as a part thereof and including a forwardly-directed cutting edge defining its rearward ends, the second said head being movably and guidedly engaged by and between said head portions and providing a die punch having an arcuately tapered cutting point cooperative with the cutting edges of said cutting die of the first head to transversely and progressively shear tongues of material from a sheet assembly inserted in the slots and to dispose said tongues in forwardly directed turned-back relation to the sheets when the cutting point is rocked against and through the sheet assembly from the side thereof opposite said U-shaped die, handle members associated with said heads for swinging toward each other to strike out tongues from the inserted workpiece, and means of the second head solely operative upon a subsequent swinging apart of the handles to directly engage and flatten the struck-out tongues against the underlying sheet of the workpiece disposed in said slots of the first head.

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