Dec. 10, 1946. J. S. STULL 2,412,459

TOOL GUIDING FIXTURE

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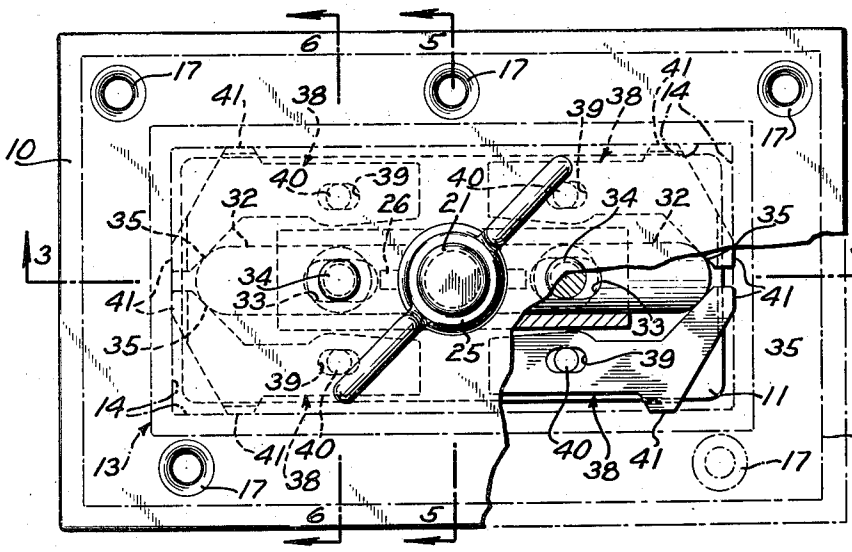


FIG. 1

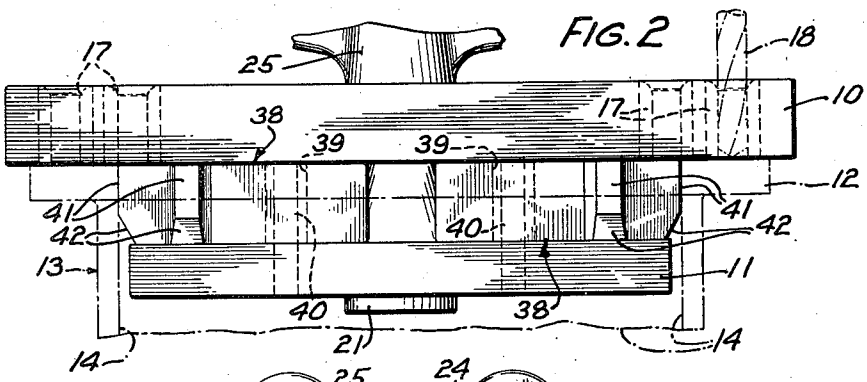


FIG. 2

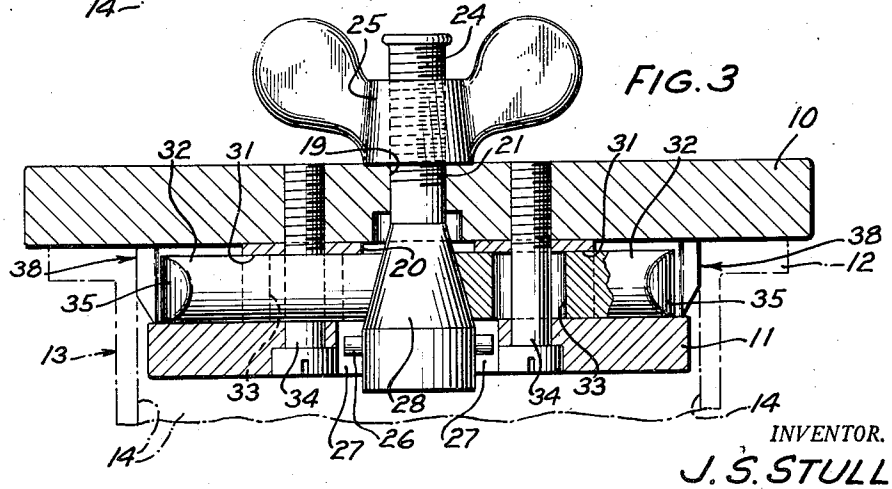


FIG. 3

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FIG. 4

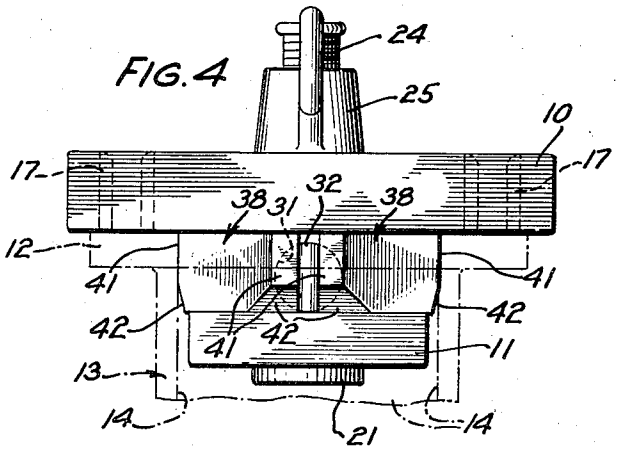


FIG. 5

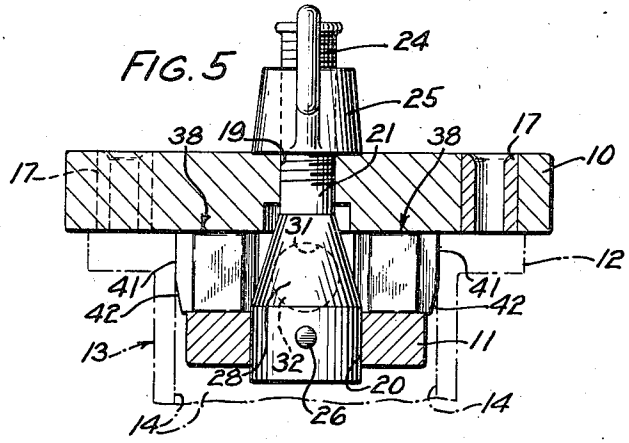
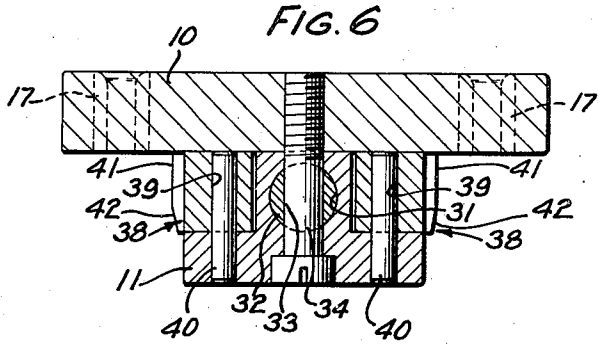


FIG. 6



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TOOL GUIDING FIXTURE

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2 Claims. (Cl. 77—62)

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This invention relates to tool guiding fixtures and more particularly to a combined template and tool jig.

An object of the present invention is the provision of a practicable combined template and tool jig for facilitating the locating of points to be worked in a face of a part in definite and uniform relation to the contour of the part so that the contours of similar parts, likewise drilled, will be accurately aligned when secured together.

In accordance with the above object, in one embodiment of the invention, particularly designed for use in drilling apertures in flanges of tubular parts of rectangular contour, there is provided a template, which rests on the part and has apertures corresponding in arrangement to the apertures to be drilled. Depending centrally from the template and freely receivable in the bore of the part is a plate carrying two aligned pairs of individually slidable positioning and clamping fingers each having two contact faces arranged to engage angularly disposed faces at each corner of the bore. The fingers are simultaneously and positively actuated by a pair of plunger-like members, one member for each pair of fingers, the members being simultaneously advanced outwardly equal distances to actuate each pair of fingers by a centrally located cam member actuated from a point above the template. Thus, by camming the members outwardly, the fingers are simultaneously actuated to engage their contact faces with the faces of the bore and due to the resultant equalizing action set up between the pairs of fingers, the template is centered with the bore and the jig clamped to the part.

Other objects and advantages of this invention will more fully appear from the following detailed description, taken in conjunction with the accompanying drawings, in which

Fig. 1 is a plan view, partly broken away and in section, of a combined template and drill jig embodying the features of the invention, the jig being shown in operative position upon a part to be drilled;

Fig. 2 is a fragmentary side view thereof;

Fig. 3 is a longitudinal vertical section taken on the line 3—3 of Fig. 1;

Fig. 4 is an end view of the jig; and

Figs. 5 and 6 are vertical sections taken on the lines 5—5 and 6—6, respectively, of Fig. 1.

Referring to the drawings, particularly to Figs. 1 and 3, a template of rectangular contour is indicated at 10 having attached to its bottom face and centralized therewith a plate 11 of inverted T-shaped cross section, the template being used

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in drilling a series of apertures in an outer end face of a flange 12 of tubular part 13 of rectangular cross section, which is indicated fragmentarily in broken outline. In the use of such tubular parts 13, which are abutted at their drilled flanges and secured by bolts, it is essential, in some applications thereof, that the inner contours of the parts formed by the walls 14 should be accurately and micrometrically aligned. Therefore, it is necessary that the drilled flange apertures of each part should have a definite and uniform relation to the inner contour thereof. Formed in the template 10 are a series of apertures in which are drive-fitted hardened bushings 17 which serve to guide drills, one of which is shown fragmentarily in broken outline at 18 (Fig. 2), into engagement with the flange during the drilling operation. After the template 10 is accurately positioned upon the flange 12 and clamped to the part 13 by means carried by the template 11 and in a manner which will now be described, the points of the flange 12 to be drilled are definitely located relative to the inner contour of the part.

Slidably and accurately guided in aligned vertical apertures 19 and 20 centrally disposed in the template 10 and plate 11, respectively, is a cam member 21 having a reduced upper end extending from the upper face of the template and screw-threaded, as indicated at 24, for receiving a thumb screw 25. An enlarged lower end of the member 21 carries a laterally extending pin 26 projecting therefrom at opposite ends and freely entered in slots 27 formed in the wall of the aperture 20 of the plate 11, the pin and slot arrangement serving to prevent rotation of the member 21, but permitting its longitudinal movement as the thumb screw 25 is rotated to draw it up or permit it to move down. Intermediate its ends, the cam member 21 is formed with a truncated-like cone-shaped portion which provides a circular cam face 28. Formed in the plate 11 are apertures 31, which, at their inner ends, communicate laterally with the vertical aperture 20 at diametrically opposite points thereof, the apertures being open at their outer ends. Slidably fitted in the apertures 31 are plunger-like members 32, having their ends, which engage the cam face 28 of the member 21, inclined to match the inclination thereof. Slots 33 of suitable length are provided in the members 32 through which extend screws 34 for attaching the plate 11 to the template 10, the arrangement being such that the members may freely slide but are prevented from rotating. The outer ends

of the members 32 are formed with oppositely inclined flat faces 35 for individually engaging template-positioning and clamping levers or fingers 38 arranged in pairs upon the plate 11 at each end thereof.

Each of the fingers 38 is longitudinally slotted at 39 and extending through the slot is a pin 40 fixed in the plate 11, the pins being similarly arranged radially from the axis of the cam member 21 and the slots are of such length that the fingers are capable of a combined sliding and rocking motion upon the plate. The outer ends of the fingers 38 are angularly directed and such ends of each pair of fingers at each end of the plate are oppositely arranged and terminate relatively close together adjacent each side of the longitudinal center line of the template 10, plate 11, and members 32, which line passes at right angles through the longitudinal axis of the cam member 21. Upon their angularly directed outer ends, each of the fingers 38 has two projecting flat contact faces 41 disposed 90° apart for engaging the walls 14 of the tubular part 13 at each corner of the bore thereof in a manner to be presently described. Each of the contact faces 41 of the fingers 38 is bevelled at 42 at their lower portions to facilitate the entrance of the jig portions depending from the template 10 into the bore of the tubular part.

In the drawings, the combined template and drill jig is shown in operative position upon the flange 12 of the tubular part 13, the template being centered with the bore of the part and the jig clamped thereto. To effect a release of the fingers 38 from centering and clamping engagement with the walls 14 of the tubular part 13, the thumb-screw 25 is rotated in a counterclockwise direction (Fig. 1), which permits the cam member 21 to move downwardly by the action of gravity, thereby withdrawing its cam face 28 from the opposed inclined faces of the plunger-like members 32 and releasing the contact faces 41 of the fingers 38 from the walls 14 of the part 13.

In the use of the combined template and drill jig above described and assuming that the thumb-screw 25 has been rotated to release the positioning and clamping fingers 38, as last described, the jig is mounted on the flange 12 of a tubular part 13, the bevelled faces 42 of the fingers 38 serving to guide the depending portions of the jig into the bore of the part. Thereafter, by rotating the thumb-screw 25 in a clockwise direction, the cam member 21 is drawn upwardly and its cam face 28 cams the plunger-like members 32 simultaneously outwardly, each member positively actuating its associated pair of fingers 38. It is assumed that the parts 13 to be drilled have similar inner contours within tolerable limits and that the pairs of side and end walls are parallel, respectively. Thus, for a given size of bore, the fingers 38 of each pair thereof will move equal distances to engage the walls 14 of the part 13. In another size of bore within the range of the fixture, it will be apparent that the movement of the fingers would be different, but each would move a similar distance. Any variation in the movement between the various fingers 38 will be micrometric, but due to the resultant equalizing

action set up between the fingers, the template 10, which is free to move on the flange 12 of the tubular part 13, will be centered relative to the inner contour of the part determined by the relative positions of the walls 14 and clamped thereto by the action of the cooperating cam face 28 of the member 21 on the plungers 32 which press outwardly upon the fingers 38. As thus positioned and clamped on the flange 12 of the part 13, drills, such as indicated at 18, may be guided into the bushings 17 carried in the template 10 to form apertures in the flange in definite and uniform relation to the inner contour of the part. Thus, when similar parts 13 are drilled in a like maner with the use of the template 10, the inner walls 14 will be accurately aligned when secured together by bolts entered in the drilled apertures.

It will be understood that the embodiment herein described is merely illustrative of the invention and one application thereof and that modifications can be made and it is capable of other applications.

What is claimed is:

1. A combined template and drill jig for use in locating points to be drilled in an end face of a tubular part relative to the bore thereof comprising a template for engaging an end face of a part, said template having apertures corresponding in arrangement to the points of drilling, means depending from said template adapted to freely enter the bore of the part, a plurality of angularly shaped positioning fingers arranged in pairs on said means for entering the bore and individually engageable with angularly disposed faces of the bore, the fingers of each pair being individually mounted for a combined sliding and rocking motion on said means, an individual actuator intermediate each of said pair of fingers for actuating the same, and a common control member intermediate said actuators effective to simultaneously operate said actuators to cause said pairs of fingers, upon being actuated, to centralize the jig relative to the bore of the part.

2. A combined template and drill jig for use in locating points to be drilled in an end face of a tubular part relative to the bore thereof comprising a template for engaging an end face of a part, said template having apertures corresponding in arrangement to the points of drilling, a plurality of positioning fingers arranged in aligned pairs on said template for freely entering the bore of the part and individually engageable with angularly disposed faces of the bore, the fingers of each pair being individually mounted for a combined sliding and rocking motion on said template, individual aligned reciprocable actuators each arranged intermediate each of said pair of fingers for actuating the same, a common cam member movable at an angle to the movement of and intermediate said actuators effective upon movement in one direction to simultaneously operate said actuators to cause said pairs of fingers to engage and centralize the jig relative to the bore of the part, and means operatively connected to said cam member at a point above said template for controlling the cam member.

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