

March 2, 1954

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2,670,779

JOGGLE DIE

Filed Oct. 3, 1951

2 Sheets-Sheet 1

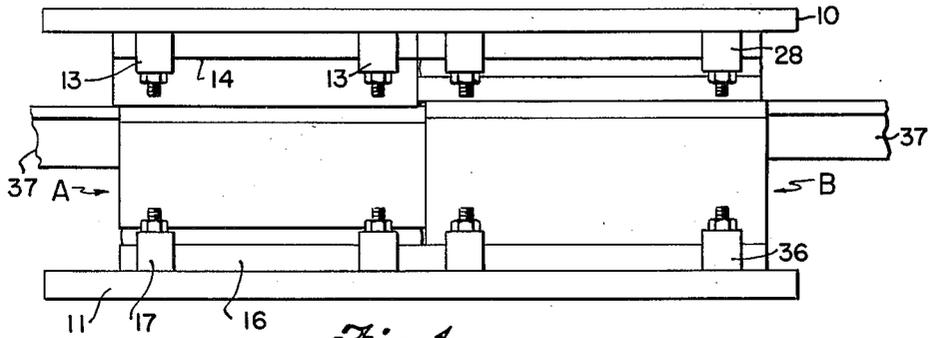


Fig. 1.

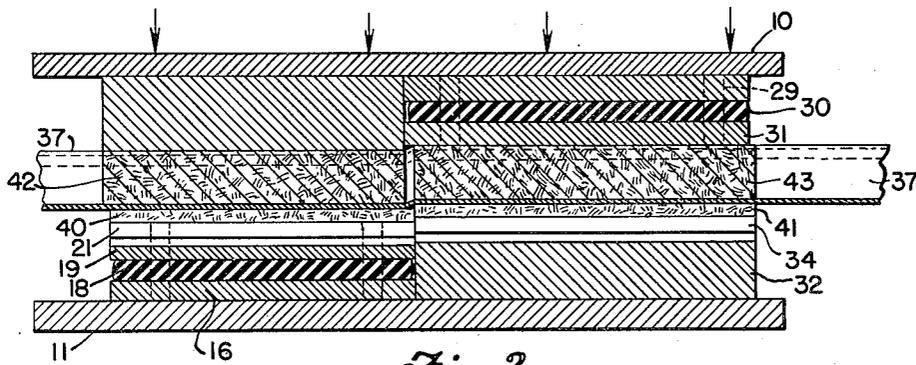


Fig. 2.

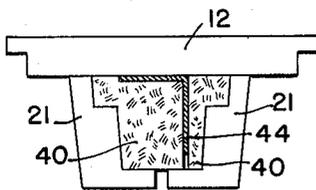


Fig. 5.

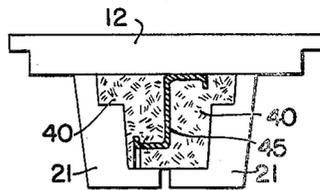


Fig. 6.

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2 Sheets-Sheet 2

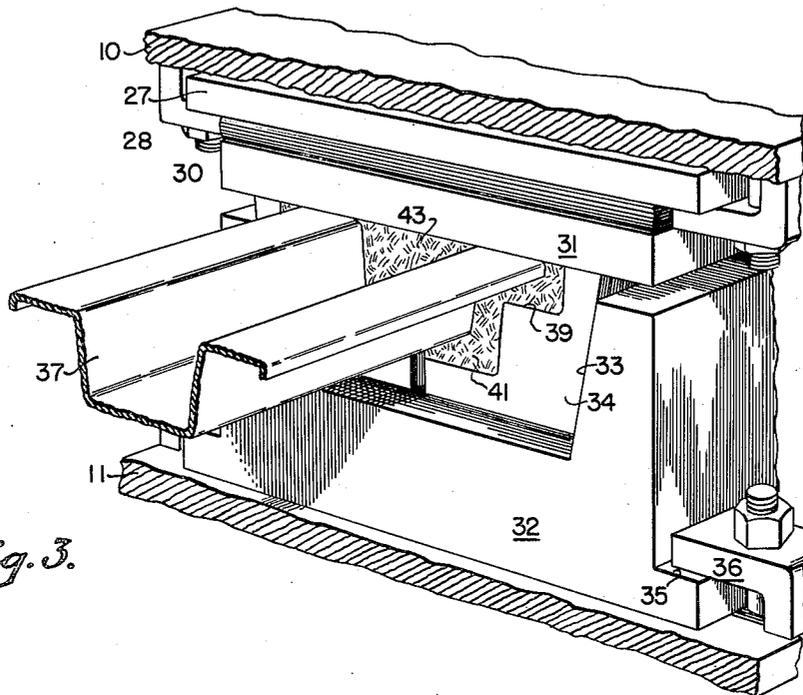


Fig. 3.

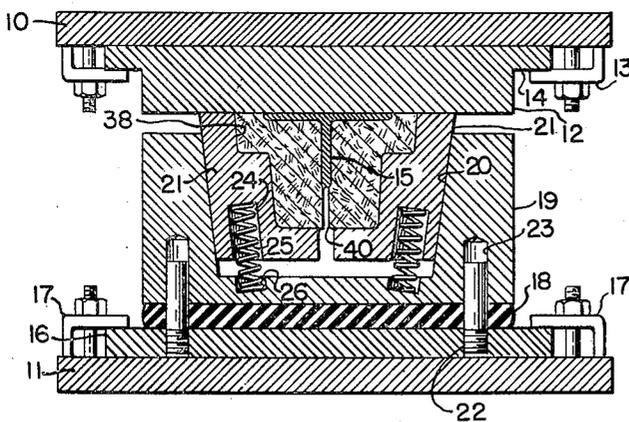


Fig. 4.

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2,670,779

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Application October 3, 1951, Serial No. 249,579

4 Claims. (Cl. 153--21)

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This invention relates to off-set or joggle dies such as those used in the construction of aircraft and other assemblies wherein matching parts are joined in a manner so as to provide a smooth continuous outer surface for supporting sheet metal skin or the like. It is to be understood that the invention is not limited to the foregoing use, but may be used for forming any joggle in a part wherein one surface thereof is to be offset to provide two surfaces in substantially parallel planes.

It has been the practice to machine special sets of blocks of steel or other hard metal to very exact dimensions for use in die sets for forming joggles. The machining was time consuming and the cost of materials was expensive. After the required number of production parts were made the steel blocks were scraped. Another disadvantage of the prior joggle sets was the limited use of the same for forming different joggles in parts having the same cross-sectional dimensions. It is also pointed out that the various production parts have different radii and other dimensions which make reuse of such block impractical in most cases.

An object of the invention is to provide a die for use in a punch press, press brake or the like, and wherein the punches and dies for the same may be made with very little machining, if any, of the punch and die.

Another object of the invention is to provide a joggle die wherein the joggle is draw formed and wherein wrinkling of the production part is eliminated.

Another object of the invention is to provide a joggle die wherein the depth and length of the joggle formed may be varied in any production part having the same cross-sectional dimensions without using different punches and dies.

A further object of the invention is to provide a die wherein the joggle formed may be at any angle and wherein both up and down joggles may be formed using the same punch and die.

A further object of the invention is to provide a joggle die for extrusions, rolled strip stock and other elongated parts of uniform cross-sectional area and wherein no stops are needed other than a mark on the length of the part to be joggled or on the die.

Figure 1 is a side elevation of a joggle die embodying the features of the present invention.

Figure 2 is a vertical longitudinal section of the joggle die illustrated in Figure 1.

Figure 3 is a broken perspective view showing a

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transverse section taken at approximately the center of the die illustrated in Figures 1 and 2.

Figure 4 is a transverse sectional view similar to the left portion of the die illustrated in Figures 1 and 2, but showing a different type of different production part received therein.

Figures 5 and 6 are end views of the punch holder and die holder having an arrangement and construction for joggling other types of production parts.

The form of the invention shown includes a punch plate 10 and die shoe 11, both of which may be modified for attachment to a punch press, press brake or the like, and which attachment is not, therefore, described in detail. The assembly, other than the referred to plate 10 and shoe 11, is comprised of two subassemblies A and B which, in effect, operate independently of each other insofar as the vertical movement is concerned. The best example of the left subassembly A is shown in Figure 4 wherein the punch holder 12 is detachably and adjustably secured to a lower surface of the punch plate 10 by means of clamps 13. Shoulders 14 are provided along the opposite sides of the punch holder 12 and whereby the latter may be longitudinally adjusted relative to the length of the production part 15 to be formed.

Similarly, there is a base 16 of approximately the same width as the extending shoulders 14 of the punch holder 12, and which base is also longitudinally adjustable with respect to the production part 15 to be formed, and is held in place by means of clamps 17 mounted on the shoe 11.

A resilient pad 18 is mounted on the base 16 and supports a die block 19 thereon. A wedge shaped channel 20, lengthwise of the assembly, is provided for receiving correspondingly shaped and oppositely arranged jaws 21 therein. Vertical guide pins 22 are secured in the base 16 and extend upwardly through the resilient pad 18 where they are slidably engaged in bored openings 23 in the lower surface of the die block 19. It is to be understood that the guide pins 22 and bored openings 23 are arranged on opposite sides of the wedge shaped channel 20. The jaws 21 are supported on spiraled compression springs 24, the ends of which are received within drilled openings 25 and 26 in the bottoms of the jaws 21 and the horizontal surface of the channel 20. The aligned drilled holes 25 and 26 are substantially parallel with the adjacent wedge shaped surfaces in the jaws 21.

The subassembly B shown on the right hand side of Figure 1 is in substance the same as the

first described subassembly A, but the resilient action is inverted with respect thereto. A longitudinally adjustable holding plate 27, which corresponds with the previously described base 16, is secured to the lower surface of the punch plate 10 by means of clamps 28 mounted in the latter. Downwardly extending guide pins 29, shown in Figure 2 only, are secured in the lower surface of the holding plate 27 and extend through a resilient pad 30 and are slidably received in bored holes, not numbered, in a punch holder 31.

The die block 32 for the subassembly B is provided with a wedge shaped channel 33 which is in alignment with and is of the same size as the first described channel 20, and is similarly provided with opposing jaws 34 therein, all in the manner as previously described and which jaws are provided with springs, not shown, in the same manner as the previously described springs 24. The sides of the die block 32 are provided with shoulders 35 which are engaged by clamps 36 mounted on the die shoe 11. By means of the last described clamping arrangement the die block may be longitudinally adjusted relative to the length of the production part 37 to be formed. Both sets of jaws 21 and 34 are longitudinally grooved so as to provide matching T-shaped channels 38 and 39 for receiving die inserts 40 and 41 which are of low temperature quick setting material. Similarly the punch inserts 42 and 43 are of the same last referred to material and are secured to the respective punch holders 12 and 31 of the subassemblies. The die inserts 40 and 41 are secured to their respective jaws 21 and 34 by any suitable means.

The die inserts 40, 41 and punch inserts 42 and 43 are made in a separate mold, not shown, and in which a length of the production part to be joggled is used as a pattern. The mold is shaped to form the lower part of the casting to fit the T channels 38 and 39 of the jaws 21 and 34. The upper surface of the pattern is at the top of the mold and provides for forming the punch inserts 42 and 43. After casting, the casting is transversely divided to form the separate punch inserts, last referred to, and the separate die inserts. The die inserts 40 and 41 are then longitudinally divided, ordinarily along their centers when the production parts are symmetrical along their longitudinal center lines, as in the referred to parts 15 and 37. It will be noted that a punch insert is not required for the T-section illustrated in Figure 4 as the punch holders 12 and 31 bear directly against the upper surface of the part to be joggled. In Figure 5 an angle section 44 is held between the divided die inserts 40, and the punch holders 12 and 31 bear against the horizontal side of the part so held. In Figure 6 an S-section is received between the die inserts 40 in the same manner as last described, but it will be noted that the inserts are divided beneath the lower flange of the S-section.

In operation, the angle and depth of the joggle to be formed are determined by the stroke of the press and the positions of the punch holders 12 and 31 relative to the positions of the die blocks 19 and 32. It is to be understood that the punch holders 12 and 31, and the die blocks 21 and 32 are preferably in end to end contact with each other, and that the length of the joggle is determined by the distance that the holders 12 and 31 are offset with respect to the die blocks 19 and 32 as shown in Figure 2. During the down stroke of the punches 42 and 43, or the punch holder 12 when no punches are used, the action of the same

on the jaws 21 is to cause the latter to firmly grip the part 15, 37, 44 or 45. On the up stroke, the springs 24 move the jaws apart, releasing the part held therein.

From the foregoing it will be apparent that various inserts may be interchanged and that such inserts require little if any machining. It will also be apparent that the stock may be fed into either end of the described assembly for forming either joggles. The material thus formed is drawn rather than compressed, with the result that the same does not wrinkle during the joggling operation. It is also pointed out that the insert material may be remelted and recast, thus effecting a substantial savings in material as compared with machined joggle blocks which must be discarded after the required number of specific joggles has been completed or the production item discontinued. Even though the die and punch inserts 40, 41, 42 and 43 are of relatively soft material, the same may be used for long production runs by cutting off the adjacent ends of the same after the corners thereof are worn, and then relocating the last parts to their previously described abutting positions.

The invention is not limited to the specific construction herein shown and described but may be made in many ways within the scope of the appended claims.

What is claimed is:

1. In combination with a die set including a die shoe and a vertically moveable punch plate thereabove, an off-set die assembly comprising: a pair of die blocks in end to end relation and having aligned channels therethrough, one of said die blocks being rigidly supported on said die shoe and the remaining said die block being resiliently supported thereon, cast inserts received within said channels of said die blocks, said inserts being shaped to fit at least two opposite surfaces of the production part to be acted upon, punch means rigidly supported by and beneath said punch plate and above said resiliently supported die block, and other punch means resiliently supported by and beneath said punch plate and above said rigidly supported die block, said channels in said die blocks being wedge shaped, jaws mounted for sliding contact with the sides of said wedge shaped channels, said cast die inserts being received within and supported by said jaws, and springs mounted on said blocks and arranged for moving said jaws upwardly along the referred to sides of said channels.

2. In combination with a die set including a die shoe and a vertically moveable punch plate thereabove, an off-set die assembly comprising: a pair of die blocks in end to end relation and having aligned channels therethrough, one of said die blocks being rigidly supported on said die shoe and the remaining said die block being resiliently supported thereon, cast inserts received within said channels of said die blocks, said inserts being shaped to fit at least two opposite surfaces of the production part to be acted upon, punch means rigidly supported by and beneath said punch plate and above said resiliently supported die block, and other punch means resiliently supported by and beneath said punch plate and above said rigidly supported die block, said die blocks and said punch means being respectively detachably secured to said die shoe and said punch plate by means of clamps attached thereto and arranged for longitudinally moving said die blocks and said punch means relative to the length of said channels.

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3. In combination with a die set including a die shoe and a vertically moveable punch plate thereabove, an off-set die assembly comprising: a pair of die blocks arranged in end to end relation and having aligned channels therethrough, clamp means longitudinally and adjustably securing said die blocks on said die shoe, one of said die blocks being rigidly secured to said die shoe and the remaining said die block being resiliently mounted thereon, cast inserts of low temperature melting metal received within said die blocks, said inserts being shaped to fit at least two opposite surfaces of the production part to be acted upon, punch means rigidly supported by and beneath said punch plate and above said resiliently mounted die block, and other punch means resiliently mounted on and beneath said punch plate and above said rigidly mounted die block.

4. A joggle die comprising a die shoe and a vertically movable punch plate thereabove, wedge shaped channels supported on said die shoe and arranged in end to end relation with respect to each other, pairs of wedge shaped jaws received within said channels, resilient means positioned between one of said channels and the die shoe,

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pairs of divided inserts shaped to engage opposite sides of the production part to be acted upon and respectively supported by said jaws, separate punches secured to said punch plate, said punches being positioned above the separate said pairs of jaws, and resilient means positioned between said punch and said punch plate in that portion of the die offset with respect to the first referred to resilient means.

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References Cited in the file of this patent
UNITED STATES PATENTS

Number	Name	Date
276,111	Wilbur -----	Apr. 17, 1883
1,697,947	Bunker -----	Jan. 8, 1929
1,749,184	Hansen et al. -----	Mar. 4, 1930
2,141,736	Castle -----	Dec. 27, 1938
2,310,498	Turton -----	Feb. 9, 1943
2,433,808	Cadman -----	Dec. 30, 1947

FOREIGN PATENTS

Number	Country	Date
22,998	Short et al. -----	of 1896