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[54] SHIFTABLE PRESS BRAKE DIE

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[51] **Int. Cl.** **B21j 13/02**

[58] **Field of Search** 72/448, 389, 380, 385, 386, 72/413, 470, 473, 462

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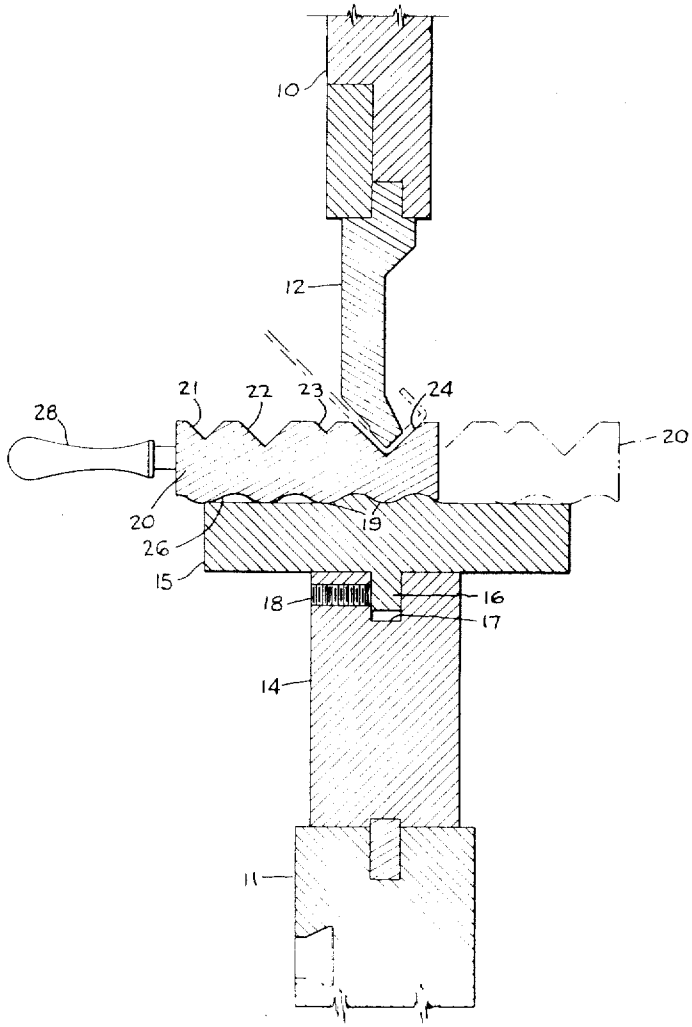
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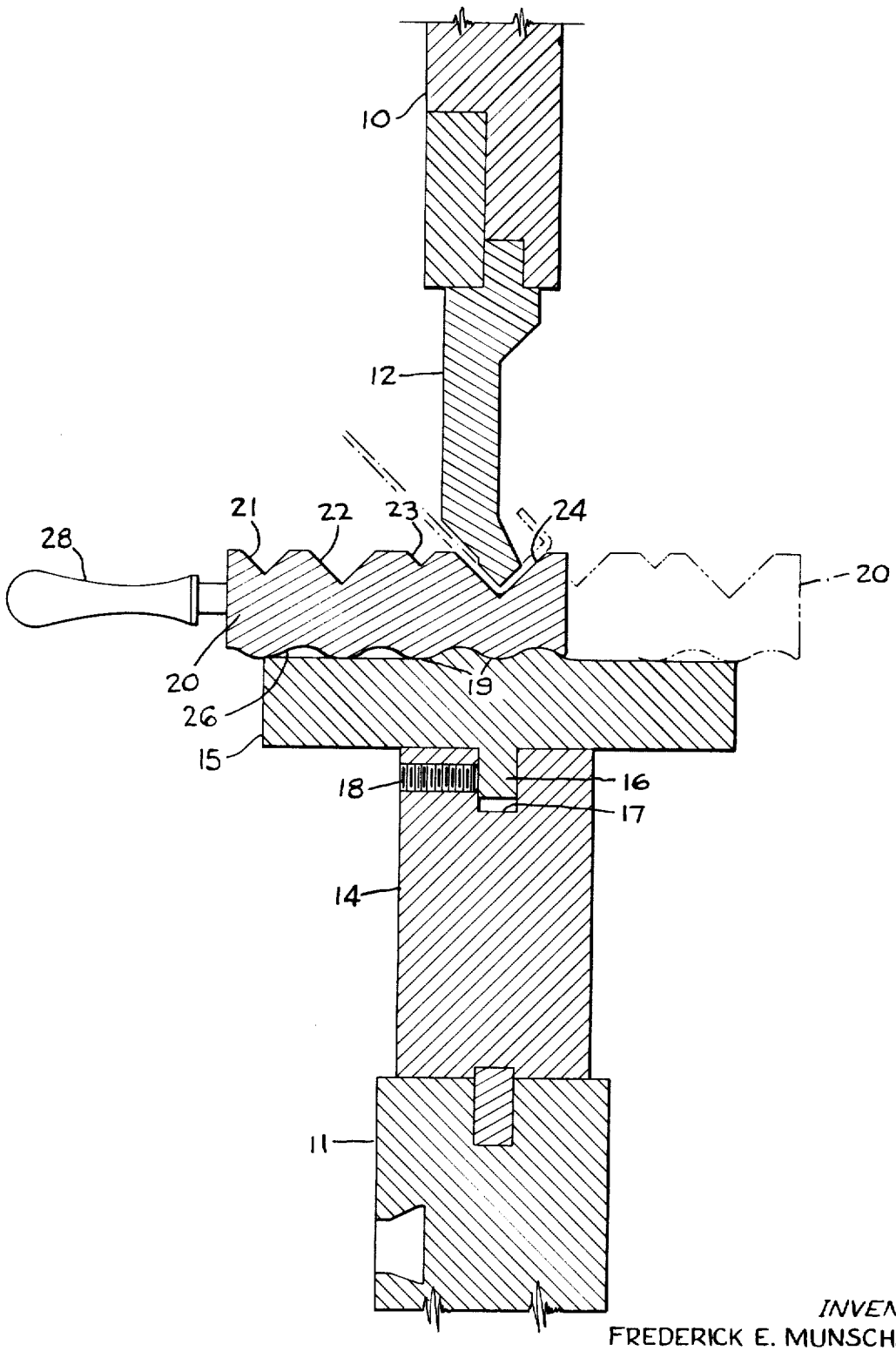
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[57] **ABSTRACT**

A press brake die for forming right angle bends in metal sheets wherein the die has several longitudinal parallel V-grooves of various depths to adapt the same for forming bends in sheets of various thicknesses. The under surface of the die and the upper surface of the die support have longitudinal complementary corrugations of a pitch equal to the spacing of the V-grooves of the die whereby the corrugations of the die and support may be interfitted with the die in various transverse positions to register any selected V-groove thereof with the punch carried by the ram of the press brake.

7 Claims, 1 Drawing Figure





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SHIFTABLE PRESS BRAKE DIE

BACKGROUND OF THE INVENTION

This invention relates to dies for press brakes and more particularly to a novel die arrangement wherein the die structure may be quickly and easily shifted with respect to its support so as to adapt the same to various types of sheet bending operations.

In press brake operation the simplest and most frequently occurring job is the formation of right angle bends in sheet metal. While the punches and dies employed for this purpose comprise simple V-shaped male and female parts, the V-groove in the die must be deeper for relative thick sheets than for thin sheets.

If a relatively narrow V-groove is used for bending a heavy sheet the tonnage load on the press brake becomes too high. On the other hand, if a light sheet is formed in a relatively wide V-groove a sharp bend is not produced. It is generally accepted that the horizontal width of a V-groove in a press brake die for right angle bends should be approximately eight times the metal thickness of the work sheet.

This presents a considerable problem in small shops or wherever short runs and frequent job changes are encountered. The choice is between frequent cumbersome die changes, excessive press brake loads, or imperfectly formed bends. Since dies of this type weigh in the hundreds of pounds, die changing is not simple, and furthermore individual dies for various metal thicknesses must be kept on hand.

SUMMARY OF THE INVENTION

The present invention provides a press brake die which obviates the foregoing difficulties. The die surface is provided with several spaced parallel V-grooves of varying width and depth so as to be particularly suitable for forming metal sheets of various thicknesses. The die means is corrugated longitudinally at its bottom surface to fit complementary corrugations in the upper surface of the die support. Thus the die is shiftable laterally on the support to match the corrugations of the die and support in such position as to present a desired V groove of the die in proper registry and alignment with the punch carried by the ram of the press brake.

Relatively shallow corrugations are preferably provided so that the die means may readily be shifted transversely. Furthermore, excepting in dies of relatively short length, the die may be in several end-to-end sections so that a single operator, using handles provided on the die sections, may readily shift the individual sections. It is found that mere end-to-end abutment of the die sections, without fastenings or other fitments, operates in a very satisfactory manner.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE of the drawing is a transverse sectional view of a press brake ram and bed showing one form of die and die support constructed in accordance with the principles of the present invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENT

In the drawing the numerals **10** and **11** designate, respectively, the ram and bed of a conventional press brake. The ram **10** carries a conventional punch **12** of the type commonly employed in producing right angle bends in metal sheets. In the illustrated instance, punch **12** is of the type usually referred to as a goose-neck punch.

Referring now to the novel die structure, a filler block or holder **14** is positioned on bed **11** and a die support or locater **15** is attached thereto, as by means of a tongue **16** on support **15** which fits into a groove **17** in the upper surface of holder **14**. The support **15** may be retained by setscrews **18** in holder **14**.

In the particular form of the invention illustrated in the drawing by way of example the upper surface of support **15** has a pair of longitudinally extending bead formations **19** which are curved to present a smoothly undulating surface.

The die itself comprises a series of end-to-end blocks **20**, one of which is shown in the drawing as having a series of ninety degree V-shaped grooves **21** through **24** of varying depth. The bottom surface of each die block **20** is corrugated as at **26** to complement the undulating bead formations **19** of support **15**. The pitch of the corrugations or undulations **19** and **26** is the same as the center to center spacing of the V-grooves **21** through **24** so that one or another of the V-grooves in the die block automatically registers with punch **12**.

In the drawing die block **20** is shown in full lines in its most forward position which in the present instance presents groove **24** for forming the heaviest sheets of those provided for in the present embodiment and the dot and dash lines show the die block in its most rearward position, thus registering groove **21** with punch **12** for forming bends in sheets of intermediate thickness.

Since press brakes of the type here under consideration are made in sizes up to 14 foot capacity, the weight of a solid die would be too great to permit shifting in accordance with the present invention by a single operator. Accordingly, it is preferred that the die be provided in a series of abutting end-to-end sections, the individual sections being, for example, 2 feet long. To further facilitate shifting dies each section is provided with a pair of horizontally spaced handles as at **28** in the drawing. The ends of the individual blocks are precision formed to abut squarely and closely with adjacent blocks and it is found that the blocks, when placed in abutment on the corrugations **19** of support **15**, retain their closely abutting positions without other means for maintaining close abutment.

It will be noted from the drawing that the ridges of the corrugations **26** of die blocks **20** coincide with the center lines of the V-grooves **21** through **24** whereby the die blocks are of maximum strength within desired dimensional limits.

While reference is had herein to forming right angles in work sheets due to the common incidence of such angles in sheet metal working, it is believed obvious that the principles of the present invention may be employed in forming other angles in work pieces of differing thicknesses.

A preferred embodiment of the present invention has been described and illustrated herein to illustrate the principles of the invention but it is to be understood that numerous modifications may be made without departing from the broad spirit and scope of the invention.

We claim:

1. In a press brake having a relatively fixed bed and a reciprocating ram, a V-shaped punch carried by said ram for producing angular bends in metal sheets, and die structure for cooperation with said punch, said die structure comprising a support carried by said bed and having uniformly spaced longitudinal corrugations in its upper surface extending parallel to said V-shaped punch, and die means having complementary interfitting corrugations in its under surface, a series of parallel V-grooves in the upper surface of said die means spaced at the same pitch as said corrugations whereby the several V-grooves register with said punch in various transverse positions of said die means on said support.

2. Apparatus according to claim **1** wherein the corrugations of said support and said die means comprise uniform continuously curving undulations.

3. Apparatus according to claim **1** wherein the ridges of the corrugations in the under surface of said die means coincide with the centers of the V grooves in the upper surface of said die means.

4. Apparatus according to claim **2** wherein the ridges of the corrugations in the under surface of said die means coincide with the centers of the V grooves in the upper surface of said die means.

5. Apparatus according to claim **1** wherein said die means comprises a series of blocks in end-to-end abutment whereby the die means is shifted transversely from one operating position to another by serially shifting said blocks.

6. Apparatus according to claim **2** wherein said die means comprises a series of blocks in end-to-end abutment whereby the die means is shifted transversely from one operating position to another by serially shifting said blocks.

7. Apparatus according to claim 5 wherein each block has handle means at its forward longitudinal face to facilitate shifting said blocks transversely.

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