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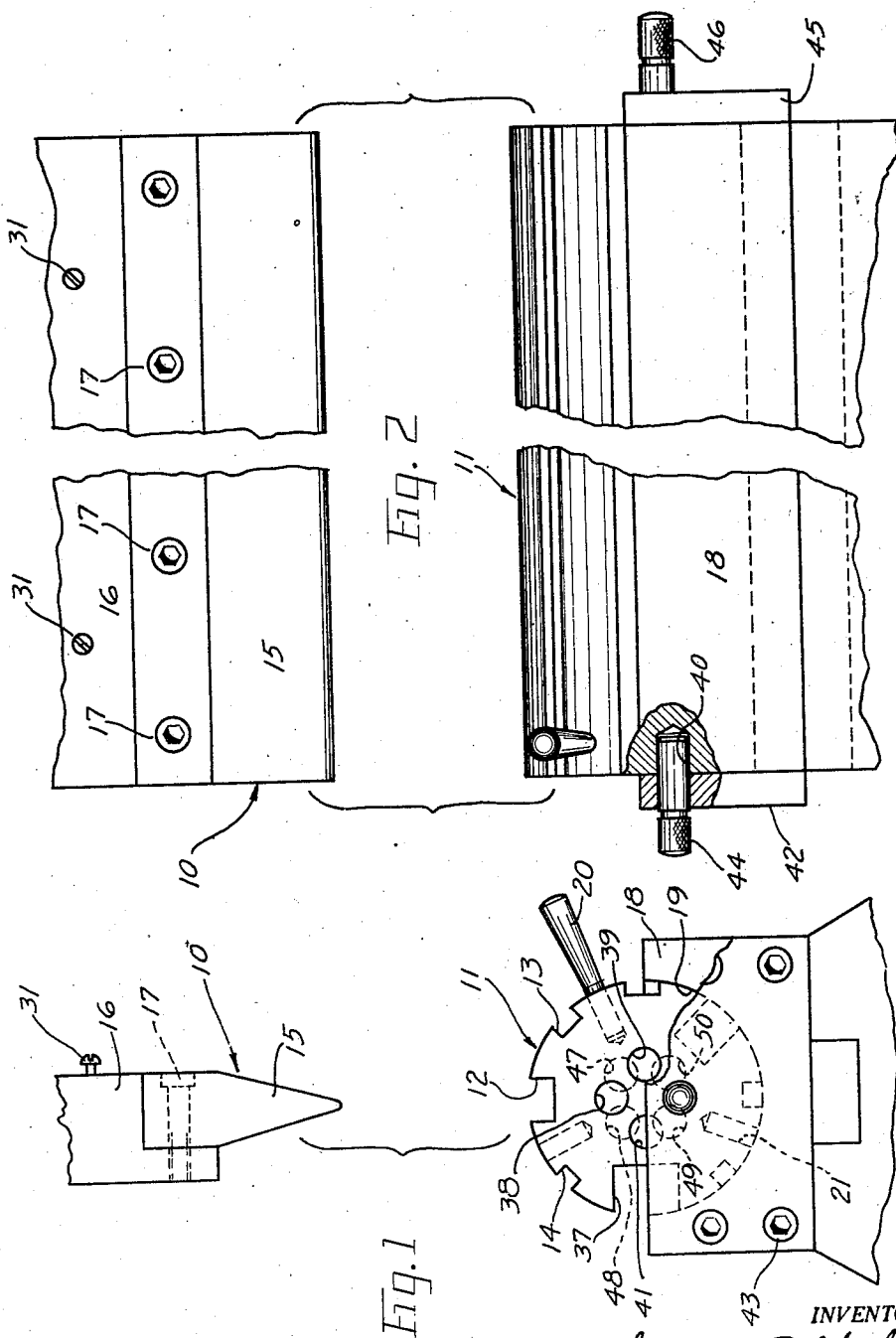
J. P. STEIBEL

2,456,749

BENDING MEANS

Filed Jan. 12, 1945

2 Sheets-Sheet 1



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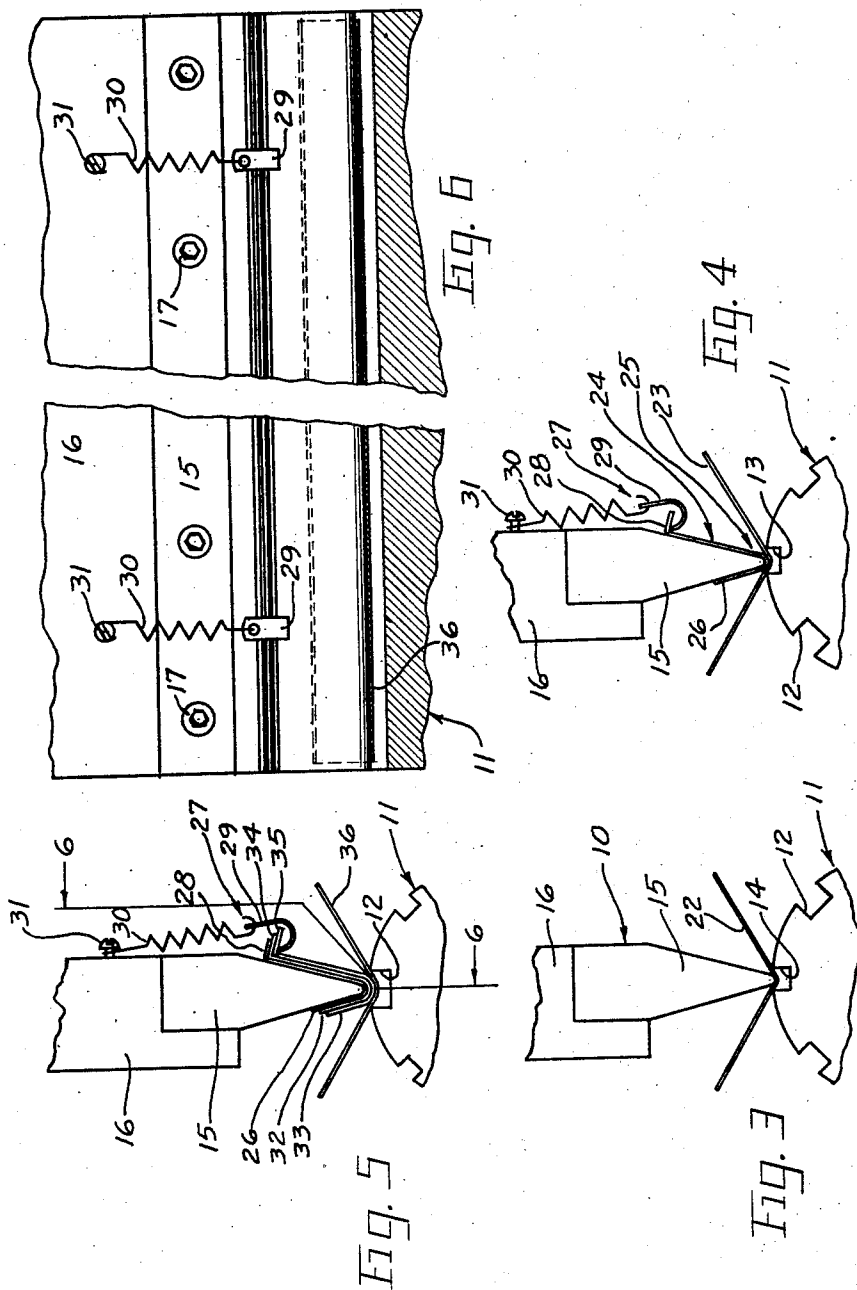
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BENDING MEANS

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9 Claims. (Cl. 153—21)

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The present invention relates to bending apparatus of fixtures or so called press brakes and an object of the invention is to generally improve the construction and operation of devices of this class.

In fabricating thin metal parts, it is often necessary to form a relatively sharp bend or crease in the work piece and this is commonly done by forcing the piece more or less into a grooved die by means of a punch in the form of a blade-like member which enters the groove a predetermined amount and causes the desired amount of bending in the sheet metal. The sharpness of the bending is largely dependent upon the width of the groove and the bluntness of the blade-like punch, in general the narrower the groove and the sharper the punch, the sharper the resulting bend.

The desired sharpness of bend varies from part to part so that when such sheet metal parts are being fabricated, it is often necessary to change the die and the punch when changing from one work piece to another. Consequently, when relatively short runs of work pieces of different characters are to be made, an inordinate amount of time is used in changing the dies on the press. Accordingly, the principal object of the present invention is to provide for changing the size of the groove and the sharpness of the punch in the least possible time.

A further object is to provide a die which can be readily adapted to the sharpness of bend required in the work piece.

A further object is to provide a punch in which the edge of the point can readily be changed to suit the work piece or the size of the groove in the die.

Further objects are to provide expedients for the accomplishment of the above objects.

Further objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention as herein expressed.

In the drawings

Figure 1 is an end view somewhat diagrammatic in character of a punch and die combination illustrating the invention.

Fig. 2 is a front view of the same.

Fig. 3 is a view similar to Fig. 1 showing cer-

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tain parts in a different position and in operation.

Fig. 4 is a similar view showing the device adjusted for a different radius of bending.

Fig. 5 is a similar view of the parts adjusted for bending a still larger radius.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Similar reference characters have been applied to the same parts throughout the drawings and specification.

As seen in Figs. 1 and 2, the device comprises a punch generally designated as 10 and a die unit generally designated as 11, die 11 providing a plurality of grooves 12, 13, 14 and the like, preferably of different sizes. Punch 10 comprises a blade-like element 15 carried on a ram or the like 16 and retained thereon by screws or the equivalent 17—17. Punch 10 may be caused to descend as seen in Fig. 1 by suitable means acting on ram 16 in well-known manner, member 15 in the position of the parts shown entering groove 12 a predetermined amount as is well-known.

Die member 11 in the present instance is substantially cylindrical in form and rests within a saddle portion 18 having a seating surface 19. Die 11 may be readily rotated as by means of a handle 20 to align any desired one of grooves 12, 13, 14 or others with blade-like element 15, handle 20 being removable while the press is in operation if it interferes with the placing of a work piece or if such removal is desirable for any other reason. A plurality of sockets as 21 are provided for the reception of handle 20 in different positions.

It the position of the parts shown in Fig. 3, member 15 has entered groove 14 which has been shifted to aligning position by means of handle 20 and a work piece 22 interposed between element 15 and groove 14 has been bent to the angle indicated.

If a bend of larger radius is required as indicated in Fig. 4, groove 13, for example, is moved into position to register with element 15, the wider groove in itself resulting in the desired larger radius. However, under many conditions, it is desirable to have blade-like element 15 also present an edge of larger radius to the work piece 23. Accordingly, in conjunction with the shifting of die 11, a shim or sheath member 24 having a curved nose or edge portion 25 conforming substantially with the contour of the edge of blade-like member 15 is placed about said edge portion to increase the thickness and radius of element 15 to the desired extent. A

portion 26 of sheath 24 extends upwardly a short distance on one side of element 15 and means 27 maintains sheath 24 in place. In the present instance, means 27 comprises an outturned flange 28 engaged by one or more hooks as 29 urged upwardly by spring 30 anchored to ram 16 by screws or the like 31. Since the reaction from the bending work piece 23 is always upwardly against the nose 25, hooks 29 and springs 30 need only to sustain the weight of sheath 24.

Obviously, die 11 can be shifted and sheath 24 placed on element 15 in a comparatively short time and it becomes unnecessary to substitute a different complete die and punch to change for example from the operation shown in Fig. 3 to that shown in Fig. 4.

Additional sheaths as 32 and 33 formed so as to nest together may be applied to member 15 to in effect enlarge the radius of the edge of element 15 to virtually any extent desired. This is shown in Fig. 5. Upturned portions 34 and 35 are provided the lowermost of which is engaged by above mentioned hooks 29, springs 30 thereby holding the plurality of sheaths in place without further complication.

In Fig. 5 the machine is shown bending a work piece 36 in cooperation with slot 12 in die 11.

It is desirable to avoid inadvertent shifting of die 11 since such displacement might possibly cause punch 15 to contact one or another of the lands between the various slots. Also, slight shifting of the die might possibly change the resultant bend on one or more work pieces before it was noticed. It is therefore desirable to provide some means for locating the die with the desired slot uppermost and in a stable manner. A series of sockets engaged by a locking pin would be a satisfactory solution of this problem but it will be noted that certain slots such for example as 37 remove a large amount of material from die 11 and consequently leave comparatively little room in the ends of the die for locating sockets. If it were attempted to place one locating socket for each die slot in die portion 11 there would not be room unless the sockets and accompanying pin were made too small to be of practical benefit. In the present instance, eight slots are formed in the periphery of die 11 while four openings or sockets 38, 39, 40 and 41 are formed in the end of die 11 to the left as seen in Fig. 2. The end of saddle 18 is provided with an enclosing plate 42 maintained in place as by screws 43—43 and a pin 44 is slidably arranged in plate 42 to be engaged manually or otherwise with a selected one of sockets 38 to 41 inclusive. This will locate die 11 with any of four selected grooves uppermost. The right end of saddle 18 as seen in Fig. 2 is provided with a similar plate 45 having a pin 46 which may be engaged with one or another of sockets 47, 48, 49 and 50 formed in the right end of die 11. The latter sockets, however, are displaced circumferentially of die 11 so as to locate any of the intermediate grooves as 13 and 14 uppermost. Thus by the use of either pin 44 or pin 46 as required, any one of the slots in die 11 may be definitely located in uppermost position.

The operation of the invention is thought to be clear from the above description, it being apparent that through the expedients disclosed, the bending fixture may be changed with very slight effort from a set-up for producing relatively sharp bends to one for producing relatively round bends including intermediate conditions where bends of varying degree are required.

When set up for any one of these conditions, the machine is stable in its adjustment and may be used for a large number of work pieces without further attention. On the other hand, if the number of pieces of any one kind is limited, the machine is readily changed so as to work on pieces having different characteristics.

Also, under certain conditions, different material for element 15 would be desirable for work pieces of different character. In this event, sheaths 24, 32, 33, etc., may be formed of material suitable for the work in hand and which material may differ substantially from that of element 15. Thus, if a particular degree of hardness, heat resistance, resistance to abrasion, or other special quality is desirable in the punch portion of the press, such quality may readily be provided by supplying a sheath of the proper material.

The above being a complete description of an illustrative embodiment of the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A sheet bending means comprising a base member having a seat therein at least in part circular in transverse cross section, a substantially cylindrical die member conforming to said seat and rotatably supported therein in imbedded relation, said die member having a plurality of longitudinal circumferentially-spaced slots, a punch member adapted to be brought into engagement with said longitudinal circumferentially-spaced slots so as to bend a sheet of material placed between said die and said punch, and means to selectively position said slots in working position relative to said punch.

2. A sheet bending means comprising a base member having a seat therein at least in part circular in transverse cross section, a substantially cylindrical die member conforming to said seat and rotatably supported therein in imbedded relation, said die member having a plurality of longitudinal circumferentially-spaced slots selectively adjustable to a working position, a punch member adapted to be brought into engagement with said longitudinal circumferentially-spaced slots so as to bend a sheet of material placed between said die and said punch, and means associated with said punch whereby the sharpness of said bend may be varied.

3. A punch for use in a press and having a relatively narrow edge portion, a sheath member formed to fit about said edge portion to increase the width thereof, said sheath extending away from said edge portion and having an outturned portion for fastening said sheath in place, a hook member engaging said outturned portion and spring means arranged to exert a yielding force on said hook member to maintain said sheath in place on said punch.

4. A punch for use in a press and having a relatively narrow edge portion, a plurality of interfitting sheath members, one of said sheath members being formed to fit about said punch member, said sheath members serving to increase the width of said edge portion, and said sheath members having outturned portions for holding said sheath members in place on said punch, a hook element engaged with the outmost of said outturned portions, and means exerting a force on said hook member so as to urge it in a direction to continuously maintain said sheath members in place on said punch.

5. A bending die for use in a press having a part cylindrical seat, said die comprising a rotatably

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supported substantially cylindrical element in imbedded relation in said seat and providing a plurality of longitudinal slots, rotation of said element providing for bringing any desired slot into working position, pin and socket means for retaining a desired slot in position, including a plurality of sockets at one end of said die corresponding to certain of said slots, a plurality of sockets at the other end of said element corresponding to the remainder of said slots and shiftable pin means at either end of said die positioned for engaging said sockets for retaining any of said slots in working position.

6. A sheet bending means comprising a part cylindrical seat, a die member in partially imbedded relation in said seat and having various work slots, said die member being rotatably supported in said seat for bringing any desired slot into working position, a punch member positioned to cooperate with said slots so as to bend a sheet of material supported on said die, means for retaining a desired slot in position including a plurality of sockets in said die and shiftable means supported in position for engaging said sockets for retaining any of said slots in working position.

7. A sheet bending means comprising a base member, a substantially cylindrical die member supported on said base in imbedded relation for rotation relatively thereto, said die member having circumferentially spaced slots arranged to be selectively placed in a desired position by rotation of said die member, and a punch member adapted to enter said slots a predetermined limited amount, said die member providing a plurality of sockets corresponding with said circumferentially spaced slots, and pin means shiftable relatively to said base members and engageable selectively with said sockets for maintaining said slots in said desired position.

8. A base member having a substantially part cylindrical open ended seat therein, a rotatable die member conforming to said seat, said die member having a plurality of circumferentially

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spaced slots so positioned as to be selectively brought into a desired location by rotation of said die member on said seat, said die member providing a plurality of sockets in one end thereof, a plate extending across the open end of said seat and forming a closure for said seat, and locking pin means slidable in said plate and engageable with said sockets for holding said die in position with said slots in a predetermined location.

9. A base member having a substantially part-cylindrical open ended seat therein, a rotatable die member conforming to said seat, said die member having a plurality of circumferentially spaced slots so positioned as to be selectively brought into a desired location by rotation of said die member on said seat, said die member providing a plurality of sockets at one end of said die corresponding to certain of said slots, and a plurality of sockets at the other end of said die corresponding to the remainder of said slots, a plate extending across each of the open ends of said seat and forming closures for said seat, and a locking pin slidable in each plate and engageable with the sockets in the adjacent end of said die member for holding said die in position with any of said slots in a predetermined working position.

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