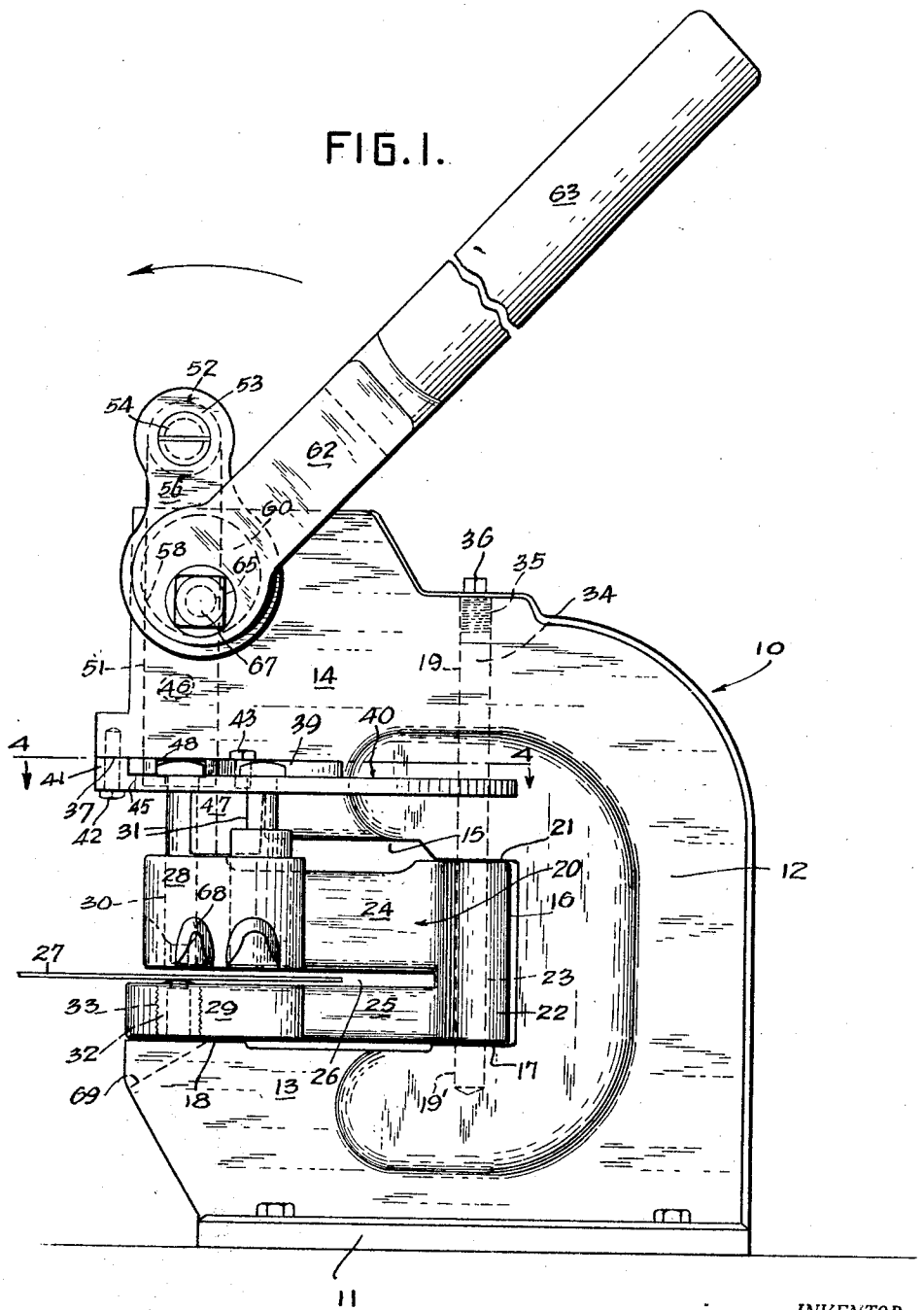
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PUNCH

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FIG. 1.



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FIG. 2.

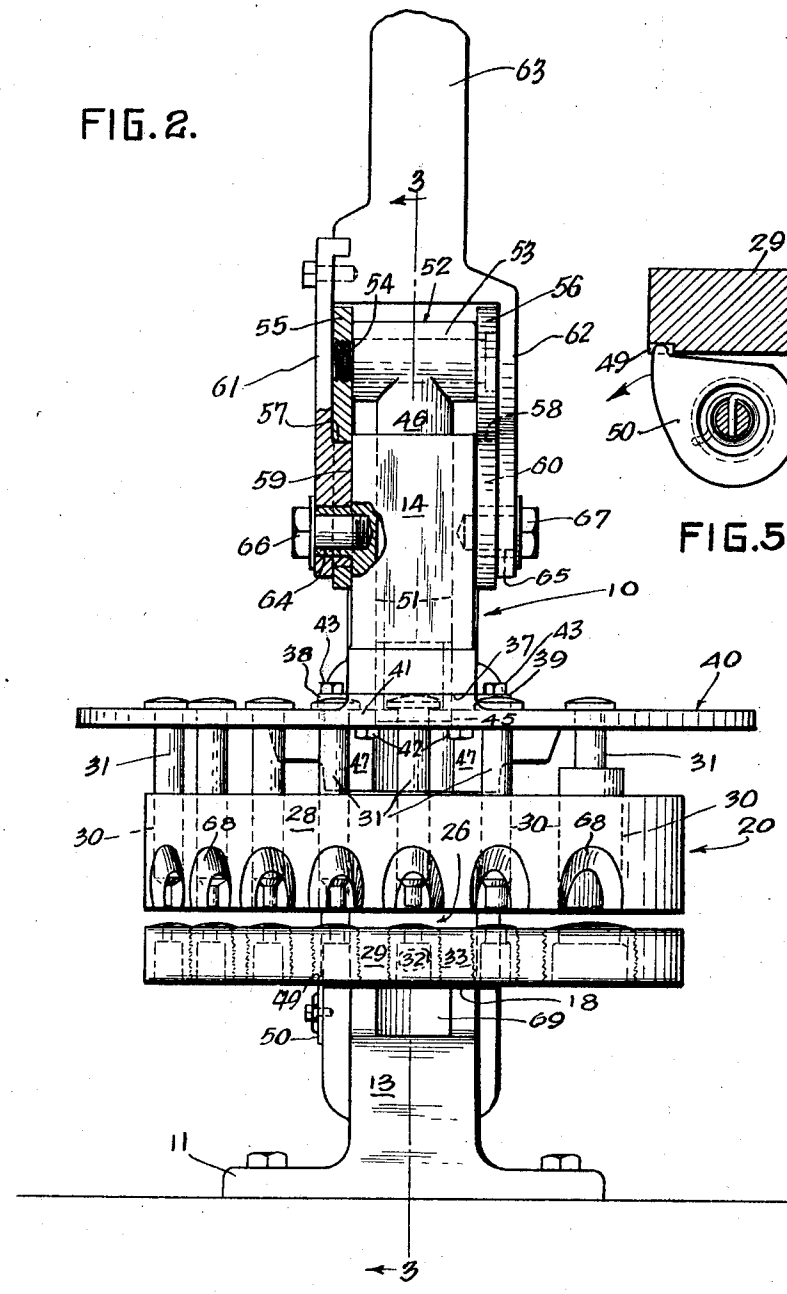


FIG. 5.

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FIG. 3.

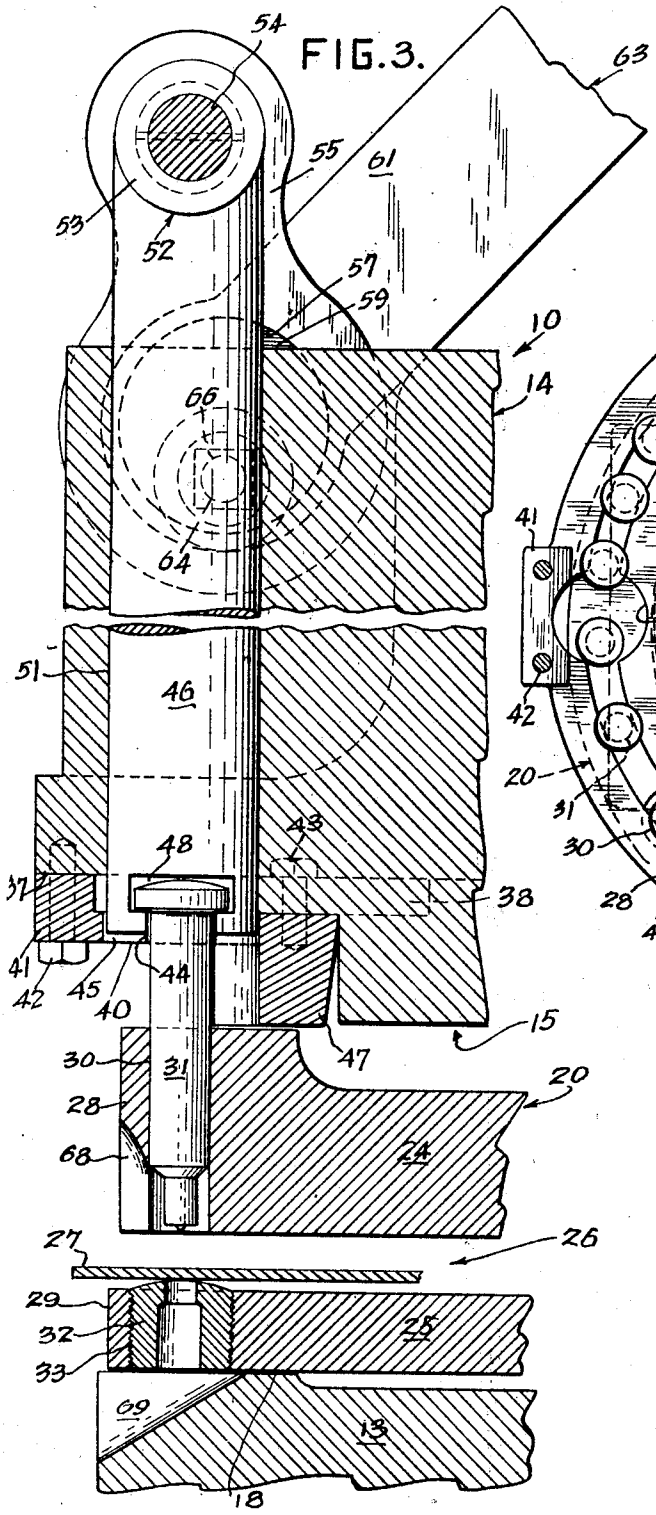
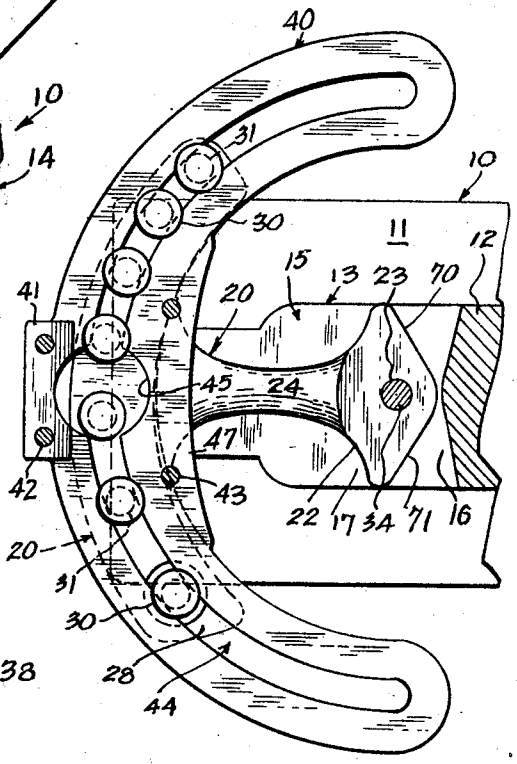


FIG. 4.



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UNITED STATES PATENT OFFICE.

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PUNCH.

Application filed April 6, 1927. Serial No. 181,454.

This invention relates to improvements in punches and in particular to hand-operated punches most suitable for punching holes in comparatively thin material, such as sheet iron for example.

Various punches to my knowledge have been devised for light work, but none of these have utilized the novel principles involved in my present invention. The most important feature is the embodiment of a rotatable punch holder in the construction and which holder is mounted in the frame and supported by a fixed pivot upon which it is adapted to swing to position any one of its several punches. These punches preferably vary in size from, say, $\frac{5}{32}''$ to $\frac{3}{4}''$ in diameter, and are concentrically arranged in the holder relative to its fixed pivot and are adapted for selective positioning to align any selected punch with the punch actuating mandrel.

Another novel feature of the invention is the peculiar construction and arrangement of the punch actuating mandrel and its correlated actuating means. This actuating means consists of an eccentric and link mechanism, so designed and arranged as to increase the leverage transmitted thereto by the hand operating lever of the device, and in turn to transmit such power to the mandrel and selected punch.

The primary object of my invention is to provide a hand-operated punch of the class designated that embodies in its construction a rotatable punch holder, so arranged relative to its support as to bring any selected one of a plurality of punches of varying sizes into axial alignment and engagement with the punch actuating mandrel of the apparatus.

Another object of the invention is to provide a punch that embodies in its construction a novel means for positioning and locking the punch holder in position with one of its punches in operative engagement with the punch actuating mandrel.

Still another object of the invention is to provide a punch of the class designated that employs in its construction, a punch actuating mandrel having novel punch engaging means formed for the reception of the punch heads as they are brought into alignment therewith through the adjustment of the punch carrier or holder.

Ancillary to the foregoing objects is the provision of a punch having a novel actuating means in the form of links and eccentrics which are combined with an operating handle in such manner that the leverage of the handle is considerably increased, thus greatly adding to the operating efficiency of the apparatus.

Other objects and adantages of my invention will be apparent with reference to the detailed description which follows:

A structure which is a preferred embodiment of my invention is illustrated in the accompanying three sheets of drawings, forming a part of this application, in which:

Figure 1 is a side elevation showing a punch constructed in accordance with the principles of my invention;

Figure 2 is a front view of the same showing a punch positioned under the mandrel and ready for use, a portion of one pair of operating eccentrics and links being broken away to show their construction and arrangement relative to the operating handle and punch actuating mandrel of the apparatus;

Figure 3 is a greatly enlarged vertical sectional detail taken on the line 3—3 of Figure 2 and illustrating in detail the operating handle, punch actuating mandrel and rotatable punch holder;

Figure 4 is a horizontal sectional detail taken on the line 4—4 of Figure 1 and illustrates the arcuately arranged fixed punch guiding frame and the punch holder which is mounted for rotatable movement immediately thereunder; and

Figure 5 is a sectional detail of the punch holder retaining means which prevents movement of the punch holder after it has been properly positioned.

Referring in greater detail to the drawings, the numeral 10 designates a rigid support which is preferably constructed of cast material and consists of a base 11, upright support 12, lower jaw 13, upper jaw 14 and intermediate clearance section 15. The intermediate arched section 16 formed between the jaws 13 and 14 is provided with a finished base 17 of horizontal disposition, and the table section 18 of the lower jaw is provided with a finished upper face disposed in a common plane with that of the base 17.

A vertical bore 19 extends through the rear portion of the upper jaw 14 and this bore is continued into the lower jaw 13 in the form of a blind bore 19′. A punch holder 20, Figs. 1, 2 and 4, is mounted between the base 17 and upper inner face 21 of the arched section 16, and consists of a supporting section 22

having a vertical bore 23, an integrally formed upper jaw 24 and a lower jaw 25 forming therebetween a slot 26 of sufficient width and depth to receive metal sheets 27 to be punched. The upper jaw 24 terminates in an arcuately disposed member 28 and the lower jaw 25 terminates in a member 29 of like disposition. The upper jaw is provided with a plurality of vertically and arcuately disposed bores 30 of varying diameters which are adapted to receive a plurality of punches 31 corresponding in diameter to their respective bores, and which punches are adapted for limited reciprocation within said bores as hereinafter described.

The lower jaw 25 is provided with a plurality of dies 32 which are arranged in axial alignment with their corresponding punches 31, and are tapped into openings 33 formed in the jaw 25 for their reception, as clearly shown in Figure 3

The entire punch holder 20 is mounted for rotatable movement about a fixed pin 34 which is set tightly in the bores 19 and 19' and projects through the bore 23 of the supporting section 22 thereof. The bottom face of the section 22 of the holder rests upon the finished base 17 of the lower jaw of the frame, and the under face of the section 29 thereof slidingly contacts the table section 18 of the frame.

The pin 34 is threaded adjacent its upper end and the upper end of the bore 19 is correspondingly threaded as indicated at 35, and the upper end of the pin is provided with a squared portion 36 providing means for tightly seating the pin in place.

The under face of the upper jaw 14 of the supporting frame 10 is finished to form a horizontal planar surface 37, and the sides of said jaw are provided with laterally disposed and integrally formed supporting flanges 38 and 39.

An arcuate tool guide frame 40 having a centrally disposed lug 41 is rigidly bolted to the planar surface 37 of the upper jaw 14, by the bolts 42, and is additionally bolted to the supporting flanges by the bolts 43, Figs. 1, 2 and 4. Said guide frame is provided with an arcuate slot 44 extending from end to end thereof and is concentrically arranged relative to the pivot pin 34 of the tool holder 20. The shanks of the punches 30 are adapted to travel in the slot 44 and the heads thereof to slidingly contact the upper face of the guide frame as the tool holder 20 is rotated upon its pivot 34.

The central section of the guide frame is provided with an enlarged opening 45, Figs. 3 and 4, of slightly larger diameter than the mandrel 46 and the slot 44 formed in the guide frame merges into this opening.

A depending lug 47 is integrally formed on the rear underside of the guide frame and extends into close proximity to the upper section 28 of the tool holder 20, but has sufficient clearance to allow of the free movement thereunder of said tool holder and acts as a brace to prevent cramping of the punches in their bores when they are withdrawn from the work by the mandrel 46.

The mandrel 46 is provided at its lower end with an inverted U-shaped slot 48 normally disposed as shown in Figure 3 and adapted to receive the heads of the punches as they are carried from the guide slot 44 of the guide frame by the revoluble movement of the tool holder Any punch may be brought into position under the mandrel and into engagement with the mandrel slot 48, by moving the tool holder 20 until the selected punch has been properly positioned, at which point one of a series of radially positioned notches 49 formed on the underside of the section 29 of the tool holder is engaged by the spring controlled retaining dog 50, which dog is pivotally mounted upon the side of the lower jaw 13 of the support 10, as shown in Figures 2 and 5. The dog 50 tends to normally lock the tool holder against movement and when it is desired to select another punch this dog may be tripped manually by pulling it down against the spring urge in the direction of the arrow Figure 5.

The mandrel 46 is mounted in a bore 51 of vertical disposition which is formed in the upper jaw 14 of the support and said mandrel is adapted for limited reciprocal movement therein. The upper end of the mandrel is in the form of a T 52, and said T is provided with a transverse bore 53 through which a pin 54 extends.

A pair of depending links 55 and 56 are pivotally secured to the pin 54 and lie flush against the side faces of the upper jaw 14 of the support, and are provided at their lower ends with openings 57 and 58 which are adapted to receive inwardly projecting circular lugs 59 and 60 formed, respectively, on the arms 61 and 62 of the operating handle 63.

The lugs 59 and 60 are provided with aligned openings 64 and 65 which are positioned eccentrically therein relative to their true centers, and cap bolts 66 and 67 are inserted through these openings and tapped into opposite sides of the jaw 14, as shown in Figure 2, and form fixed pivot points about which the lugs 59 and 60 are rotated by pulling the handle 63 toward the operator of the punch.

When the operating handle 63 is swung toward the operator as described, until the limit of the "throw" of the lugs 59 and 60 has been reached, the mandrel has been forced downwardly and carries with it a positioned punch, the shearing edge of which cuts through the material 27 and enters the die 32 in the ordinary manner.

The operating handle 63 is manually returned to normal position, as shown in Figs.

1 and 3, and the operation is repeated with the same punch in the mandrel or a new punch is selected as desired.

The punch bores 30 are each provided with notches 68 formed in the front portion of the section 28 of the tool holder and are flared outwardly to provide sight openings through which the operator is enabled to see the point of the punch to facilitate the positioning of the same upon the material to be punched.

A notch 69 is cut in the front upper edge of the table 18 and forms a discharge chute for the cut material which is forced through the dies by the punches.

The heads of the punches are round as shown in Figure 4 and readily slide through the slot 48 formed in the mandrel, although as shown in Figure 3, it is desirable that said slot 48 should be somewhat larger than these heads to insure proper registration.

The slot 44 in the guide frame extends laterally on both sides of the device and is of sufficient length on each side to accommodate all of the punches when swung to any particular side by lateral swinging movement of the tool holder, the limit of this movement being gauged in either direction by the angularly disposed rear faces 70 and 71 of the supporting section 22 of the tool holder.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made, when desired, as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent of the United States the following:

1. In a punch of the class described, a U-shaped frame having the legs thereof horizontally disposed, one of said legs serving as the base, a U-shaped tool holder of integral construction disposed horizontally between the legs of said frame, one of the legs of said tool holder having a segment integral therewith at the end thereof containing a plurality of dies, the other leg of said tool holder having a corresponding segment provided with a plurality of passages in which are positioned headed tools for cooperating with said dies, a pivot pin extending at right angles to the legs of said U-shaped frame and located in the crotch of said U-shaped frame, said U-shaped tool holder having a passageway located in the crotch thereof through which said pivot pin passes in order to allow said tool holder to pivot with relation to said frame, a segmental holding and guiding member for said headed tools secured at the center thereof to the end of the upper leg of said frame and having a continuous slot therein located in alinement with said dies and passages in the tool holder with which the heads of said tools cooperate, a mandrel, means on said mandrel to receive a selected tool from said holding and guiding member, a hand lever pivoted about a fixed axis in the upper leg of said frame, an eccentric rotated by said handle and a link connected to said eccentric and mandrel for reciprocating said mandrel.

2. In a punch of the class described, a U-shaped frame having the legs thereof horizontally disposed, one of said legs serving as the base, a U-shaped tool holder of integral construction disposed horizontally between the legs of said frame, one of the legs of said tool holder having a segment integral therewith at the end thereof containing a plurality of dies, the other leg of said tool holder having a corresponding segment provided with a plurality of passages in which are positioned headed tools for cooperating with said dies, a pivot pin extending at right angles to the legs of said U-shaped frame and located in the crotch of said U-shaped frame, said U-shaped tool holder having a passageway located in the crotch thereof through which said pivot pin passes in order to allow said tool holder to pivot with relation to said frame, a segmental holding and guiding member for said headed tools secured at the center thereof to the end of the upper leg of said frame and having a continous slot therein located in alinement with said dies and passages in the tool holder with which the heads of said tools cooperate, a mandrel, means on said mandrel to receive a selected tool from said holding and guiding member, a hand lever pivoted about a fixed axis in the upper leg of said frame, an eccentric rotated by said handle, a link connected to said eccentric and mandrel for reciprocating said mandrel and sight openings disposed in the upper leg of said tool holder to enable the operator to properly center the work operated upon.

In testimony whereof I affix my signature.

MEDARD F. BOLLAERT.