W. A. BERNARD.

HAND TOOL.

APPLICATION FILED DEC. 31, 1914.

1,162,440.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

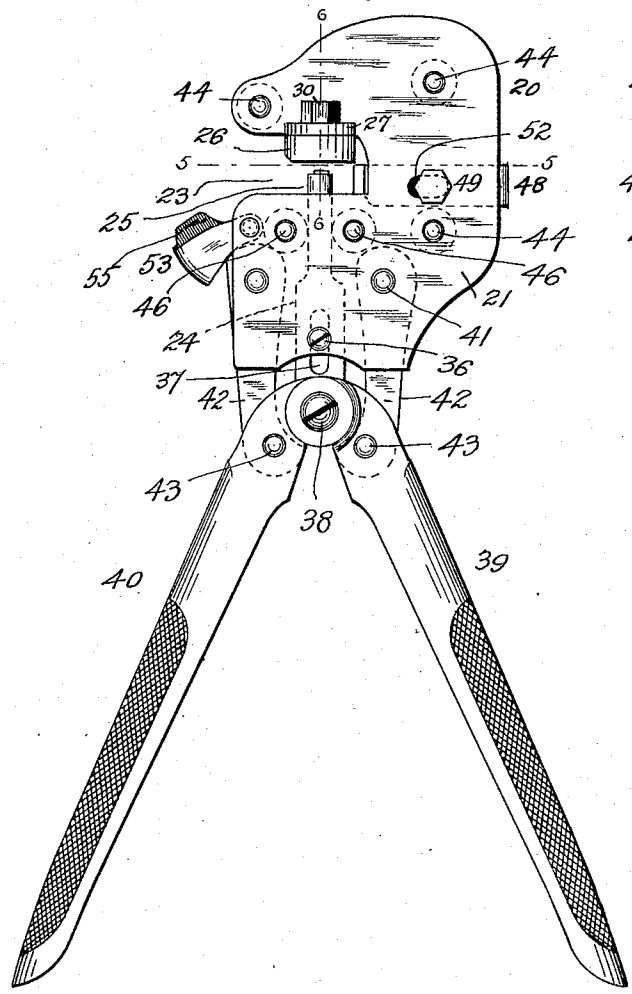


Fig. 3.

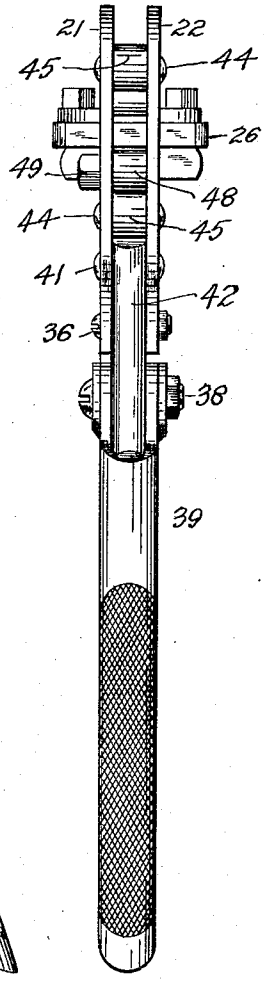


Fig. 5.

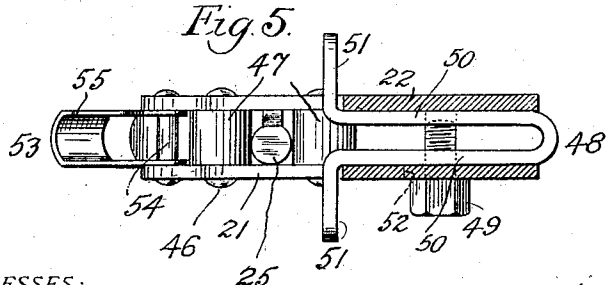
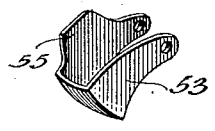


Fig. 7.



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2 SHEETS—SHEET 2.

Fig. 2.

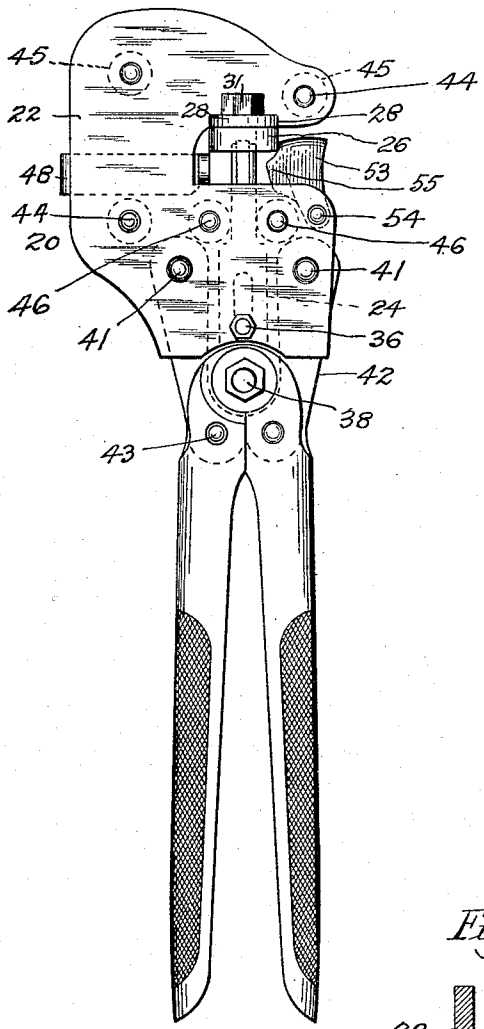


Fig. 4.

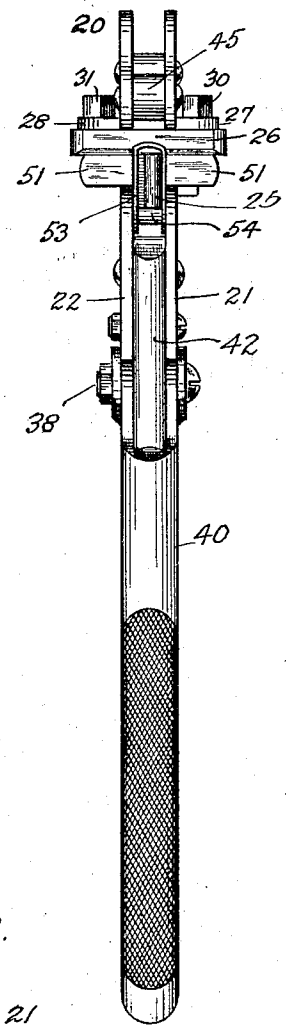
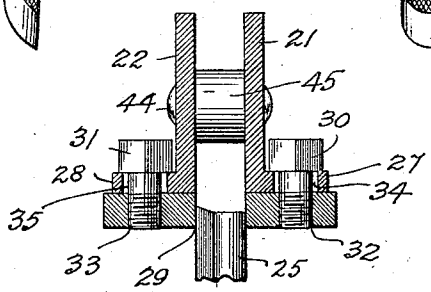


Fig. 6.



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HAND-TOOL.

1,162,440. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed December 31, 1914. Serial No. 879,882.

To all whom it may concern:

Be it known that I, WILLIAM A. BERNARD, a citizen of the United States, residing in the city and county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Hand-Tools, of which the following is a full, clear, and exact description.

This invention relates to hand tools, and more particularly to hand punches and similar tools of that type in which the device is operated to punch or stamp metal blanks and the like, by the manipulation of a pair of lever members or handles with which the tool is equipped.

I shall describe my improvements as applied to a hand tool designed for punching holes in metal conduits for electrical installations, but it will be apparent from the following description that certain features of the invention are applicable to tools and devices of other types.

The present case relates more especially to certain variations or modifications of the construction disclosed in my applications Serial Nos. 829,671 and 832,848, filed April 4, 1914, and April 18, 1914, respectively.

One of the primary objects of the invention is to provide simple and effective means for securing the abutment plate or die plate to the head of the tool in such a manner that it bears on the side plates in an edgewise direction relative to the latter, whereby the strain incident to the punching operation is effectively resisted.

Another object which I have in view is the provision of means whereby the die plate can be very readily centered relatively to the punch in an accurate manner.

Other objects of the invention are to furnish a device of the type indicated, in which the gage is mounted in an improved manner with respect to the head of the tool; to provide a stop for the work, which is of novel form, and is mounted in an improved manner with respect to the head of the tool; and to improve certain general and detail features in devices of the kind to which my invention relates.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front elevation of a hand tool constructed in accordance with my invention, with the lever handles separated to a certain extent, and the movable member of the punch mechanism retracted from the fixed member or die plate; Fig. 2 is an elevation of the tool taken from the opposite side, with the handles closed together; Fig. 3 is an edge view of Fig. 1, looking from the right; Fig. 4 is an edge view of Fig. 2, looking from the right; Fig. 5 is a section on line 5—5 of Fig. 1, looking down, with the handles omitted; Fig. 6 is a vertical section through a portion of the head of the tool on line 6—6 of Fig. 1 with the punch in a different position, and Fig. 7 is a detail of the swinging stop.

Referring to the drawings, 20 indicates generally the head of the tool, which forms a support for the various parts, and comprises parallel plates 21, 22, secured together in the manner hereinafter described. The plates 21, 22 are cut away at one side of the head to present an elongated recess or notch 23 for the insertion of the sheet metal or other material to be operated upon. Guided lengthwise of the head 20 at one side of the latter, and beneath the recess or notch 23 is a slide or plunger 24, which, in the form shown, carries a punch 25. This slide or plunger is guided between the plates 21, 22, and the punch 25 is movable across the notch 23, and coöperates with an abutment or die plate 26. This die plate 26 is located in the upper part of the notch 23, and is supported against those edges of the side plates which define the upper boundary of said notch. The die plate is secured to the head by means of lugs 27, 28 formed integral with the plates 21, 22 respectively, and extending laterally therefrom, as shown in Fig. 6. The lug 27 extends laterally from the head of the tool at one side, with its lower face substantially flush with the upper edge of the notch 23, and the lug 28 is correspondingly located at the opposite side of the tool. The die plate 26, which is provided with a die opening 29, is considerably longer than the distance between the side plates (outside measurement), and its end portions extend beneath the lugs 27 and 28, and are secured thereto by machine screws 30, 31 respectively. These machine screws pass downwardly through the lugs and the

die plate, and their heads, which are above the lugs, may be readily manipulated by a wrench, or the like. The screws 30, 31 engage tapped openings 32, 33 in the die plate, but the openings in the lugs 27, 28, however, are of appreciably greater diameter than the screws, as indicated at 34 and 35, in order to permit the die plate to be adjusted laterally in any direction relatively to the punch. In centering the die plate relatively to the punch, the clamping screws are loosened, so that the die plate has a certain amount of lateral play, the punch is then thrust into the die opening, and while the die plate is thus accurately held in the proper position with respect to the punch, the clamping screws are again tightened. Thus, when the punch is retracted from the die plate, the latter will maintain its alinement with reference to the punch.

The plunger 24 is guided between the side plates by means of a bolt 36 interconnecting the plates, and engaging a slot 37 in the plunger. The slot 37 in coöperating with the bolt 36 limits the movement of the plunger. The plunger extends rearwardly or downwardly beyond the side plates, and at its rearwardly projecting portion is provided with a perforation or opening which furnishes a bearing for a pivot member, illustrated as a bolt 38. The bolt 38 pivots the plunger at its rear end to the forward extremities of operating handles or levers 39, 40. These levers are preferably bent up from sheet metal in substantially U-shaped cross-section, and at their forward ends they are suitably cut away to receive the rear extremity of the plunger, which is straddled thereby. Pins 41, interconnecting the plates 21, 22 at the respective sides of the plunger, form pivots for links 42 pivoted between the plates. Each pin 41 extends through the forward or upward end of the corresponding link, and the rear end of such link is pivoted to one of the lever handles 39, 40 by a pin 43 at a point between the pivot bolt 38 and the opposite extremity of the handle.

It has been previously explained, that the side plates are interconnected by the bolt 36, and by the pins 41. Additional fastening members for the plates must be provided, however, and at suitable points I use fastening devices constituted by pins 44, passing through sleeves 45 set in between the plates and spacing them apart at the proper distance. The ends of the pins 44 are clenched or upset against the plates so as to form rivet heads, whereby the parts are rigidly fastened together. In addition to the pins 44, I also use similar pins 46, which interconnect the side plates on opposite sides of the plunger 24, near the upper end of said plunger. Around these pins 46 are sleeves 47, which not only act as spacers for the side plates, but also serve an additional function,—that of guiding the plunger in its lengthwise movement. The sleeves 47 contact with the respective side edges of the plunger, and hold the plunger firmly between them, so that it is properly guided in its movement toward and away from the die plate. By using the spacers 47 as guides for the plunger it is unnecessary to weaken the plunger by cutting a slot or slots for a plurality of guide pins or bolts that pass through the same.

I usually employ a gage in connection with the notch 23 to regulate the extent to which the metal blanks are inserted lengthwise of the notch. In the form shown, a gage 48, located between the side plates, is adjustably secured to the head of the tool by a set screw 49. The gage 48 is constructed of a piece of metal bent or cast in the shape of a U, the leg portions 50 of which are interposed between the side plates. At the free extremity of the U are lateral extensions 51 which are located in the notch 23 and, preferably, extend out beyond the faces of the head on the respective sides. The set screw 49 passes through a slot 52 in the plate 21, and into registering threaded openings in the legs of the U-shaped gage member. The head of the set screw 49 contacts with the outer face of the plate 21 above and below the slot 52. Thus, as the screw is screwed into the gage member, the screw is held against inward movement, and the gage, being held against rotation, travels toward the head of the screw until that leg 50 of the U-shaped member which is adjacent the screw head becomes tightly clamped against the inner face of the plate 21. Hence when the gage has been moved to the desired position lengthwise of the notch 23, it may be tightly clamped in place by screwing up the set screw 49. When it is desired to change the adjustment, the screw 49 is loosened, the gage is moved lengthwise again, and then clamped in the new position. The lateral extensions 51 on the ends of the U-shaped member form effective abutments to limit the insertion of the work into the notch in a direction lengthwise of the latter, as will be understood.

In some cases, it is desirable to limit the insertion of the work in a direction transverse to the notch. To this end, I provide a movable stop member which, in the form shown, is constituted by a member 53 pivoted between the plates at the entrance or mouth of the notch. The member 53 is preferably constituted by a sheet metal plate bent up into U-shape, and having its extremities pivoted between the plates on a pin 54, interconnecting the plates just below the notch. In Fig. 1, I have shown the stop member 53 swung down into inoperative position. When it is desired to use

said stop member, however, it may be readily pushed up into the upright position shown in Fig. 2, wherein a lip or extension 55, on one side of said member, will extend into close proximity to the punch. In this position, the lip or extension 55 will limit the insertion movement of a work piece of predetermined width into the notch, in a direction transverse to the latter, but will, nevertheless, permit the extremity of the piece of material to be operated upon, to overlie the punch to a greater or less extent (according to the purpose and design of the tool) so as to be operated on thereby. When the tool is being carried about by the workman, the movable stop 53 can be swung up into the notch, where it will be substantially within the lines of the head and out of the way.

The operation of the tool will be understood for the most part from the foregoing description. The lever handles being separated to a sufficient extent, the material to be punched is inserted into the notch 23 lengthwise of the latter, so that its edge abuts the lateral portions 51 of the gage, which has been previously set in the proper position. As the lever handles are forced together, they swing about the pivots 43, whereby the pivot 38 is moved forwardly, thereby forcing the plunger forwardly and causing the punch to compress the material and pass into the die opening. At the same time that the levers swing about the pivotal points 43, the latter move forwardly about the centers of the respective pins 41, each lever forming with its connecting link 42 a sort of toggle. The movement of the plunger is greatly retarded with respect to the movement of the handles as the pivotal points 43 almost reach a plane passing through the longitudinal axis of the plunger, and hence the power developed is so great that a large hole may be punched in a hard steel sheet of considerable thickness, with the expenditure of very little energy on the part of the operator.

Various changes in the details of the construction may be adopted without digressing from the scope of my invention as defined in the claims.

In the broad aspects of the invention, it is not essential that the head of the tool consist merely of the side plates and their connecting devices, because the side plates may be more or less extensive, as called for by conditions, and other elements can be substituted in part, or added if desired.

What I claim is:

1. In a hand tool, the combination of a head, including spaced parallel plates and having a notch at one edge, a plunger guided between said plates at one side of the notch, operating levers for moving said plunger across the notch, means for supporting said operating levers from said head, integral lugs extending laterally from the respective side plates at the other side of the notch, an abutment bridging said plates at such other side of the notch and resting against said lugs and adapted to coöperate with said plunger, and means for securing said abutment plate to said lugs; substantially as described.

2. In a hand tool, the combination of a head, including spaced parallel plates and having a notch at one edge, a plunger guided between said plates at one side of the notch, operating levers for moving said plunger across the notch, means for supporting said operating levers from said head, integral lugs extending laterally from the respective side plates at the other side of the notch, an abutment bridging said plates at such other side of the notch and resting against said lugs and adapted to coöperate with said plunger, and means for securing said abutment plate to said lugs, such that said abutment plate is adjustable in any lateral direction with respect to the plunger; substantially as described.

3. In a hand tool, the combination of a head, including spaced parallel plates, and having a notch at one edge, lugs extending laterally from the respective side plates at the upper side of the notch, an abutment plate bridging said side plates within the upper part of the notch, screws for securing the respective end portions of said abutment plate to said lugs, said screws passing through openings in the respective lugs with clearance in all directions, a plunger guided between said plates at the lower side of the notch, and coöperating with said abutment plate, operating levers for said plunger, and means for supporting said operating levers from said side plates; substantially as described.

4. In a hand tool, the combination of a head, including spaced parallel plates, and having a notch at one edge, a plunger guided between said plates at the lower or rear side of the notch, operating levers for said plunger supported from the lower or rear side of said head, lugs projecting integrally and laterally from the respective side plates at the other side of the notch, an abutment plate bearing on said lugs and adapted to coöperate with said plunger, each of said lugs having a perforation therein, and a screw passing through each of said perforations with a certain amount of clearance in all directions, and having a bearing on said lug, and a threaded shank engaging a tapped opening in the abutment plate; substantially as described.

5. In a hand tool, a head including spaced parallel plates, pins interconnecting said plates, sleeves surrounding said pins between the plates, a plunger interposed between and

guided by said sleeves, and means for operating said plunger; substantially as described.

6. In a hand tool, a head having a notch entering the same from one side, coöperating devices within the notch for operating on the material, and a stop pivoted to the head at the entrance or mouth of the notch, so as to be movable into and out of the latter; substantially as described.

7. In a hand tool, the combination of a head including spaced parallel plates, said plates having registering openings for the insertion of the material to be operated upon, means within the head for operating upon such material, and a movable stop mounted between said plates and coöperating with said means; substantially as described.

8. In a hand tool, the combination of a head including spaced parallel plates, said plates having registering openings for the insertion of the material to be operated upon, means within the head for operating on such material, and a pivoted stop mounted between said plates and coöperating with said means; substantially as described.

9. In a hand tool, the combination of a head including spaced parallel plates, said plates cut away to form a notch at one edge of the head, means within said notch to operate upon the material inserted into the latter, a pin connecting said plates, and a swinging stop mounted on said pin between said plates adjacent the mouth or entrance of the notch; substantially as described.

10. In a hand tool, the combination of a head including spaced parallel plates, said plates cut away to form a notch at one side of the head, means within said notch to operate upon the material inserted into the latter, a pin connecting said plates, and a U-shaped stop pivoted on said pin between said plates and having a lip or extension at one side adapted to swing into and out of the notch; substantially as described.

11. In a tool, the combination of a head including spaced side plates, said head having an opening for the insertion of the material to be operated upon, means for operating upon the material so inserted, and an adjustable gage confined between said side plates; substantially as described.

12. In a hand tool, the combination of a head including spaced side plates, said head having an opening for the insertion of the material to be operated upon, means for operating upon the material so inserted, and an adjustable gage confined between said side plates, said gage being of U-shape, and having a set screw passing through one of the side plates; substantially as described.

13. In a hand tool, the combination of a head including spaced side plates, said plates being cut away at one side of the head to form a notch for the insertion of the material to be operated upon, means for operating upon the material so inserted, and an adjustable gage having a U-shaped portion confined between said side plates back of the notch, and a set screw for said gage passing through a slot in one of the side plates and engaging a threaded opening in one of the legs of the gage; substantially as described.

In witness whereof, I have hereunto set my hand on the 30th day of December, 1914.

WILLIAM A. BERNARD.

Witnesses:
HENRY E. ROCKWELL,
M. OLIVE WILLIAMS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."