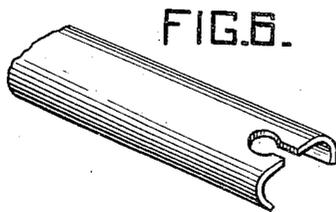
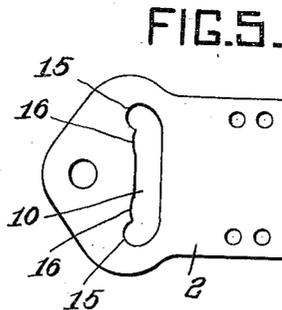
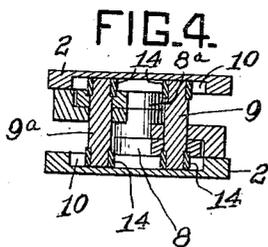
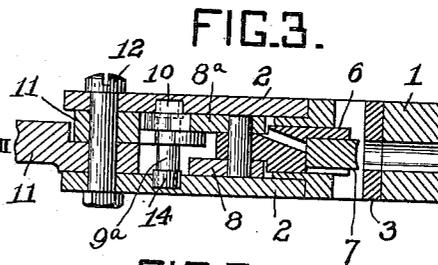
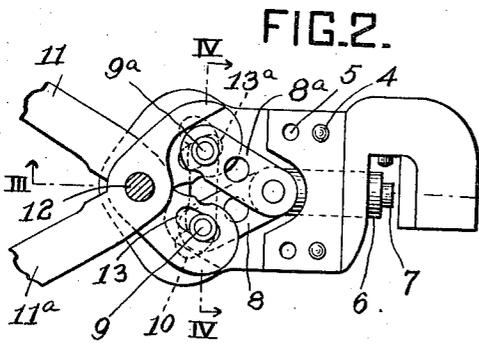
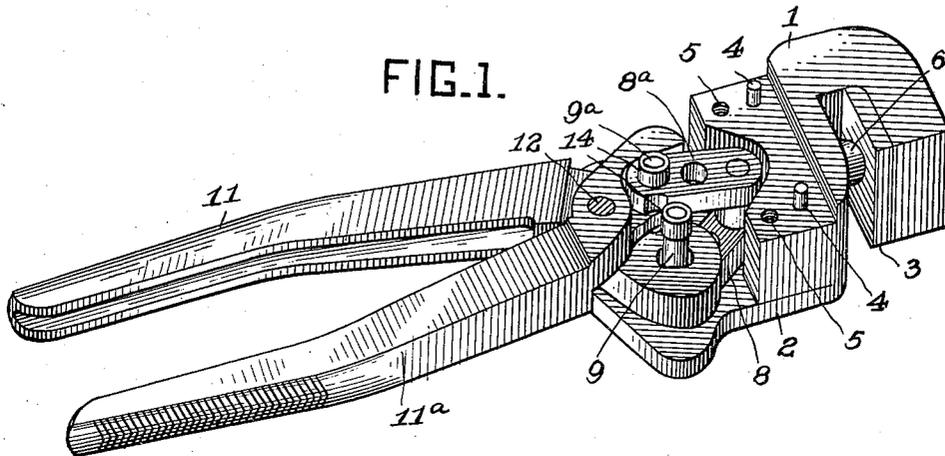


H. R. GILSON.  
 TOOL OPERATING MECHANISM.  
 APPLICATION FILED JUNE 27, 1913.

1,090,471.

Patented Mar. 17, 1914.



WITNESSES:

*Francis J. Tomasson*  
*Paul M. Critchlow*

INVENTOR

*Henry R. Gilson*  
 by *Chitty and Chitty*  
 Atty's

# UNITED STATES PATENT OFFICE.

HENRY R. GILSON, OF BADEN, PENNSYLVANIA, ASSIGNOR TO NATIONAL METAL MOLDING COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## TOOL-OPERATING MECHANISM.

1,090,471.

Specification of Letters Patent.

Patented Mar. 17, 1914.

Application filed June 27, 1913. Serial No. 776,047.

*To all whom it may concern:*

Be it known that I, HENRY R. GILSON, residing at Baden, in the county of Beaver and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Tool-Operating Mechanism, of which improvements the following is a specification.

The object of my present invention is to provide a means for operating a tool whereby a very powerful stroke may be effected through a relatively small range of movement with the application of a minimum amount of power.

While my invention is not limited to any specific use, it finds particular application in a hand punch for punching holes in metal articles, such as metal conduits and fittings for electrical installations, it being understood that such conduits are cut and fitted at the site of installation where the use of cumbersome tools is prohibitive.

In the accompanying drawing, which forms part of my specification, I have illustrated an embodiment of my invention in the form of a hand punch for metal conduits.

Figure 1 is a perspective view of the punch, a side plate being removed to show the tool-operating mechanisms; Fig. 2 is a top plan view of the punch as seen in Fig. 1; Figs. 3 and 4 are sectional views taken on the lines III—III and IV—IV, respectively, of Fig. 2, both side plates being shown in position in these figures; Fig. 5 is a view of the inside of a side plate; and Fig. 6 is a perspective view of a section of metal conduit which may be punched by the particular punch.

In the several figures like numerals are used to designate like parts.

In the practice of my invention I mount a member for reciprocatory movement, and I connect pivotally thereto an obliquely extending link provided with a pin which moves through a path extending transversely of the line of action of the reciprocatory member, there being suitable means provided for moving such pin through its path. By such an arrangement of operating parts I am enabled to get a powerful short stroke of the reciprocatory member by the application of relatively small force.

Referring to the embodiment of my invention illustrated in the drawing, the punch

operating mechanism is all operatively mounted in a frame comprising a head 1 and side plates 2, which are preferably removable. The outer end of the head 1 is of U-form, adapted to receive a conduit strip to be punched, and is provided with a die block 3; while the inner end is provided with pins 4 and screw-holes 5 for the attachment of the plates 2. A plunger in the form of a cylindrical member 6 is mounted for a reciprocatory movement in said head, and is provided at its outer end with a punch 7. A pair of links 8, 8<sup>a</sup> are pivotally connected to the inner end of the plunger 6, and extend rearwardly and obliquely therefrom. The opposite ends of said links are provided with pins 9, 9<sup>a</sup>, which extend into guideways 10, transversely disposed with relation to the line of reciprocation of the plunger 6, and suitably formed by cutting slots on the inner surfaces of the plates 2.

The reciprocation of the plunger 6 is effected by applying lateral pressure to the links 8, 8<sup>a</sup>, which cause their outer end to approach the line of action of the plunger, it being understood that the pins 9, 9<sup>a</sup>, being engaged by the guideways 10, fix the path of movement of the links, and that such guideways resist practically all of the reactionary strain of the plunger. This movement, in the present embodiment of my invention, is effected by means of a pair of hand levers or pliers 11 and 11<sup>a</sup>, pivoted to the plates 2 by means of the bolt 12, and at their inner ends slidably engaging the rounded end of the links 8, 8<sup>a</sup>. The pins 9, 9<sup>a</sup> preferably extend through slots 13, 13<sup>a</sup> in the levers 11, 11<sup>a</sup>, such slots holding the pins in their proper positions. In order to facilitate the movement of the pins in the guideways 10, rotatable sleeves 14 may be loosely mounted on the outer ends of the pins.

In punching metal conduits, such as that illustrated in Fig. 6, it is desirable first that the range of movement of the plunger 6 be such as to permit the curved sides of the conduit to pass between the punching tool 7 and the die block 3; secondly that the initial movement of the plunger in bringing the tool 7 in contact with the plane faced portion of the conduit be accompanied with a small angular movement of the handles 11, 11<sup>a</sup>; and thirdly that the movement of the tool 7 during the actual punching stroke be

practically proportional to the angular movement of the handles at that time. To such ends the transverse guideway slots 10 are preferably formed, as shown particularly in Fig. 5, with rearwardly curved ends 15, and with slightly curved portion 16 adjacent thereto. By such a configuration of the slot it will readily be seen that the initial angular movement of the handles from their wide-open position will cause the pins 9, 9<sup>a</sup> to move rapidly from the slot ends 15, and thus impart a correspondingly rapid movement of the plunger 6; and that the further angular movement of the handles will cause a uniform advance of the tool through the metal. The end of the punching stroke is accelerated by the rising portions of the curve 16 near the center of the slot.

The reactionary strain produced by punching is supported by the pins 9, 9<sup>a</sup> resting in the guideways 10 so that practically all working pressure is sustained by the side plates 2, the slotted hand levers 11, 11<sup>a</sup> acting only to force the outer ends of the links 8, 8<sup>a</sup> toward the center thereby causing the plunger 6 to move forward at a speed and stroke regulated by guideways 10.

The operation of my improved tool operating mechanism will be clearly understood from the foregoing description.

It will be understood that my invention may be employed for various purposes; and that many changes may be made in the details of construction by those skilled in the art without departing from the spirit of my invention as defined in the appended claims.

I claim herein as my invention:

1. A tool operating means comprising in combination, a reciprocatory member having a tool operatively connected thereto, a link pivotally connected at one end to said member and extending obliquely therefrom, a pin engaging said link at its other end, a guideway transversely disposed with relation to the line of action of said reciprocatory member and immovable with relation thereto, said pin being engaged and its path of movement fixed by said guideway, and means for moving said pin through such path.

2. A tool-operating means comprising in combination, a reciprocatory member having a tool operatively connected thereto, a link pivotally connected at its inner end to said member and extending obliquely therefrom, a guideway transversely disposed with relation to the line of action of said reciprocatory member and immovable with relation thereto, the outer end of said link being engaged and its path of movement fixed by said guideway, and means for moving the outer end of said link through such path.

3. A tool operating means comprising in

combination a reciprocatory member having a tool operatively connected thereto, a pair of links pivotally connected to said member and extending obliquely from opposite sides thereof, a pin extending through each of said links, a guideway transversely disposed with relation to the line of action of said reciprocatory member, said pins being engaged and their path of movement fixed by said guideway, and means for moving said pins through such path.

4. A tool operating means comprising in combination, a reciprocatory plunger having a tool operatively connected thereto, a link pivotally connected at one end of said plunger and extending obliquely therefrom, a pin engaging said link at its opposite end, a guideway transversely disposed with relation to the line of action of said plunger, said pin being engaged and its path of movement fixed by said guideway, and a pivoted operating lever one arm thereof having sliding engagement with said link.

5. In a hand tool, the combination of a frame comprising a head and side plates, a plunger mounted for reciprocatory movement in said head and fitted with a tool, a pair of links pivotally connected to said plunger and extending obliquely from opposite sides thereof, a pin extending through each of said links, a pair of pin-receiving guideways transversely disposed with relation to the line of reciprocation of said plunger and formed in said frame plates, and a pair of operating arms pivoted to said frame and adapted to move said pins through said guideways, whereby said plunger is reciprocated.

6. In a hand tool, the combination of a frame comprising a head and side plates, a plunger mounted for reciprocatory movement in said head and fitted with a tool, a pair of links pivotally connected to said plunger and extending obliquely from opposite sides thereof, a pin extending through each of said links, a pair of pin-receiving guideways transversely disposed with relation to the line of reciprocation of said plunger and formed in said frame plates, and a pair of operating arms pivoted to said plates, one end of each of said arms being provided with a slot adapted to receive one of said pins and further provided with an extended bearing surface adapted to engage an end of a link.

In testimony whereof I have hereunto set my hand.

HENRY R. GILSON.

Witnesses:

PAUL N. CRITCHLOW,  
FRANCIS J. TOMASSON.