To all whom it may concern:

Be it known that I, William A. Bernard, of the city and county of New Haven and State of Connecticut, have invented new and useful Improvements in Pliers, Punches, and Similar Tools, of which the following is a full, clear, and exact description when taken in connection with the accompanying drawings, which form a part thereof, and in which—

Figure 1 represents a side elevation of pliers embodying my invention; Fig. 2, a longitudinal vertical section through the same; Figs. 3 and 4, transverse vertical sections on lines 3.3 and 4.4, respectively, of Fig. 2; Fig. 5, a plan view of a blank from which one of the levers of the pliers is constructed; Fig. 6, a transverse vertical section of the blank of the handle portion of one of the levers when partially formed into shape, and Figs. 7 and 8 similar views showing successive stages in the operation of forming the blank into the handle.

In all figures similar letters of reference represent like parts.

This invention relates to pliers, punches, and similar tools, and has for its object the production of a novel form of tool constructed of sheet metal in which increased strength and efficiency is obtained, particularly in the handle portions of the levers. Handles have hitherto been formed of sheet metal by curving the outer surfaces to form convenient gripping-surfaces for the operator.

One of the improvements of the present invention consists in curving inward the lateral edges of the handle portions on the under side of the gripping-surfaces, so that they may meet each other and form a substantially hollow tubular handle, by which means the handle portions are strengthened and there is less liability of their bending or twisting under pressure. Moreover, a convex smooth surface may be thus produced on the under side of the gripping portions which gives a convenient surface against which the fingers of the operator may press in forcing the levers apart.

In the particular form of the invention illustrated in the drawings the handle and jaw portions of the levers are shown integral, (though the invention is not intended to be limited to such a construction,) and the jaws (of sheet metal) are formed hollow by bringing the lateral edges together to similarly obtain the increase of strength in the jaw portions.

To these and other ends the invention consists of the several combinations and improvements set forth and claimed hereinafter.

Referring to the drawings for a more particular description, the parts designated by the letters A and B represent the handle portions of two levers. One or both of the levers

5 are shown slotted or mortised in front of the handle portions, so that two parallel plates a and b are formed at the forward ends of the handle portions, through which the fulcrum-pin C is inserted to pivotally connect the two levers. In front of the pivot-pin C jaws D and E are shown formed integral with the attaching-plates a and b. A disk or washer K may be inserted between the attaching-plates of the inner lever, so that when the fulcrum C is headed the disk K will prevent the attaching-plates from being forced together.

The lateral edges a' and b' of the handle portions A and B are turned inward and meet on a longitudinal line on the under side of the gripping-surfaces a" and b", so that in the cross-section, Fig. 3, the handle portion shows a substantially tubular body with a smooth convex surface above and below.

The operation of forming the handle portions into the desired construction may be as follows: F designates a blank of sheet metal from which the lever may be formed, substantially in the form shown in Fig. 5. Near the forward end of the blank is a slot or mortise G. The lateral edges of the blank are bent on the dotted lines H, Fig. 5, whereby there is obtained a handle portion A or B, with a mortise G and a forward jaw portion D or E. At the fulcrum-point on either side of the mortise are the parallel side plates a or 5. In the handle portions the lateral edges L of the blank are prolonged, as more particularly shown in Fig. 6, so that by means of a die M, Fig. 7, the edges may be curved toward each other, and by means of another die N, Fig. 8, the edges L may be forced in contact with each other along a longitudinal seam on the under side of the handle, and the handle portion assumes substantially a tubular form with an axial hollow bore extending substantially the entire length of the handle.
By this means the handle gains the strength coincident with a tubular construction and a convenient gripping-surface for opening as well as closing the levers is obtained with a minimum expenditure in manufacture. The outer edges of the jaws may be formed in substantially similar manner by having the lateral edges \( d \) and \( e \) projecting away from the meeting surfaces forced toward each other and united along a longitudinal seam on the outer surface of the jaw, so that the jaws are also substantially tubular in form, as shown more particularly in Fig. 4.

I am aware that pliers have been made with handle and jaw portions formed of sheet metal, and I therefore do not claim, broadly, such a construction; but

What I claim, and desire to secure by Letters Patent, is—

1. In pliers, punches, and similar articles, the combination with two members pivotally united, a jaw at the forward end of each member, and the rear portions of the said members constituting handles each having its edges bent inward transversely to form smooth inner surfaces, and each being bent longitudinally to constitute substantially convexed surfaces.

2. In pliers, punches and similar articles, the combination with two members pivotally united, a jaw at the forward end of each member, the rear portions of the said members having different cross-sectional areas and having inturned edges to constitute smooth inner surfaces, and the said portions being bent longitudinally, substantially as described.

3. In pliers, punches and similar articles, the combination of two members pivotally united, a jaw at the forward end of each member and the rear portions of the member being formed into handles and having their edge portions bent inwardly in substantially straight lines to form flat smooth inner surfaces, substantially as described.

4. A curved sheet-metal handle for pliers and the like, of substantially semitubular cross-section, said cross-section being closed or continuous throughout the gripping-surface of the handle, and larger in one dimension at the middle of said gripping-surface than at either end thereof.

In witness whereof I have hereunto set my hand on the 29th day of April, 1905.

WILLIAM A. BERNARD.

Witnesses:

WILLIAM R. PITKIN,
SAMUEL H. FISHER.