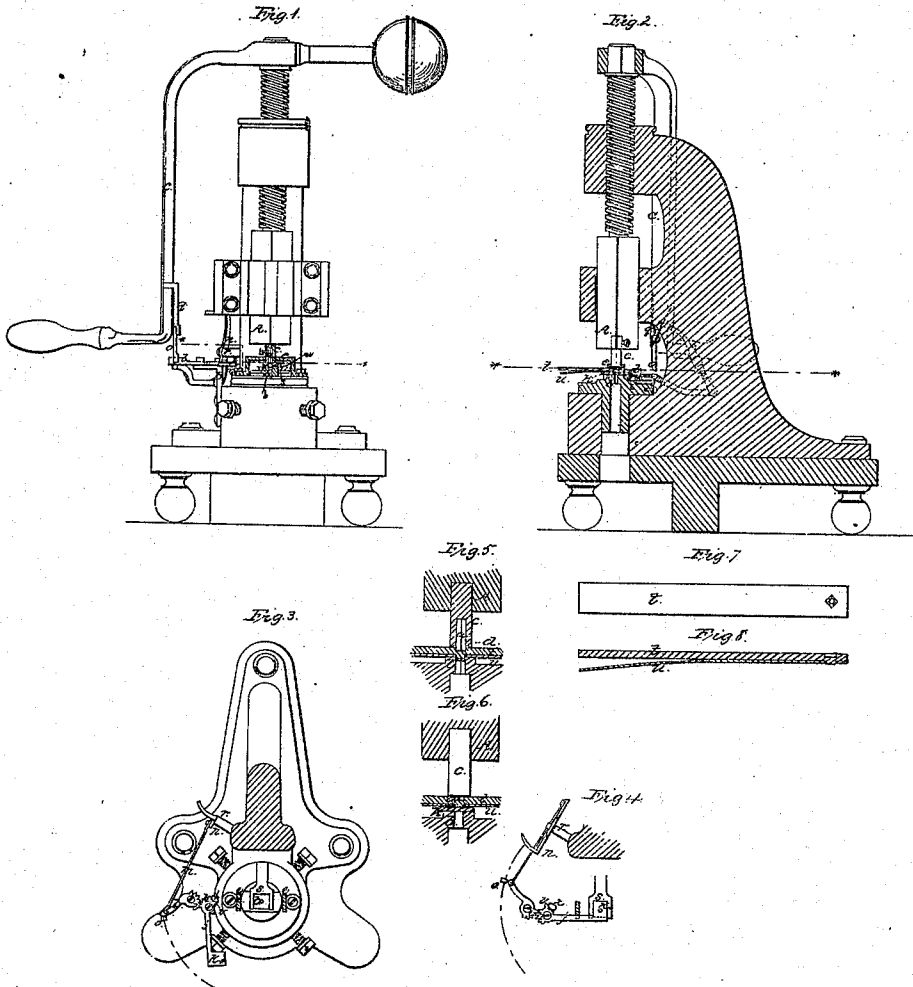


J. CARHART.
UNITING METAL PLATES.

No. 11,413.

Patented Aug. 1, 1854.



UNITED STATES PATENT OFFICE.

JEREMIAH CARHART, OF NEW YORK, N. Y.

MACHINE FOR UNITING PLATES OF METAL OF UNEQUAL THICKNESS.

Specification of Letters Patent No. 11,413, dated August 1, 1854.

To all whom it may concern:

Be it known that I, JEREMIAH CARHART, of the city, county, and State of New York, have invented certain Improvements in
5 Punching Apparatus for Uniting Plates of Metal of Unequal Thickness; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings,
10 forming part of this specification, in which—

Figure 1, is a front elevation, partly sectional, of a punching press constructed according to my invention. Fig. 2, is a vertical section of the same, at right angles to
15 Fig. 1. Fig. 3, is a horizontal section of the same, in the line (* *) of Figs. 1 and 2. Fig. 4, is a plan of the upset plate, and the mechanism by which it is operated. Fig. 5,
20 is a vertical section of the punch and die, on a larger scale than the former figures. Fig. 6, is a vertical sectional view of the die, punch and upset plate. Figs. 7 and 8 are a
25 face view and section showing two plates united by my invention.

Similar letters of reference indicate corresponding parts of the several figures.

This invention is for the purpose of uniting two plates or pieces of metal of unequal
30 thickness by placing them together, between a punch and die, with the thicker piece next the punch, and the thinner piece next the die, and then by pressure applied to the punch forcing a portion of the thicker plate
35 or piece through the thinner one.

It consists in a certain construction of the punch and die for driving one portion through the other; also in certain means of upsetting or rivetting that part of the
40 thicker plate which is protruded through the thinner one.

To enable those skilled in the art to make and use my invention, I will proceed to describe the manner in which it is to be per-
45 formed.

The press, which I have represented, is a screw press, of well known construction and therefore needs no particular description except of the punch, die, and other parts to
50 which my invention relates. Any punching press may be adapted to the purpose. The punch (*a*) may be of square or any other form most desirable. The die (*b*) is of a form corresponding with the punch, but instead of being like the die in the common
55 punching press, large enough to receive the

punch, it is just so much smaller than the punch as to prevent its entrance. Except the above described difference in their sizes, the punch and die are similar to those used
60 in the common punching press.

The punch is fitted and secured in an iron or steel stock (*c*), which is secured in the slide, A, of the press, and the face of this stock is made with a concave recess (*d*),
65 (see Fig. 5,) so that when it bears upon any surface it only bears with a small ring shaped surface around the edges. Above the die there is a fixed yoke (*e*), which serves the double purpose of guiding the
70 punch stock and of removing the plates or pieces of metal from the punch, as the latter rises, after having finished its operation.

At one side of the bed of the press there is an upright standard B, (see Fig. 1,) which carries the arbors (*f*) (*g*) of two
75 horizontal toothed segments (*h*) and (*i*), which gear with each other. The segment (*h*) carries an arm (*j*), at the end of which is a steel plate (*k*), which is capable of
80 moving to such a position as to cover the die, and may be termed the upset plate, which is intended to upset the part of the thicker plate or piece of metal which is protruded through the thin plate or piece, and
85 it has also a tooth (*v*) separate from the gearing teeth, and at such a distance therefrom as to allow the point of a spring (*x*) to fall between them and the said tooth (*v*). The other segment (*i*) carries an arm (*l*),
90 which is connected by a rod (*m*) with the lower end of a lever (*n*), whose fulcrum is a horizontal stud (*r*) secured to one side of the head of the press. The upper end of this lever is bent to a suitable form, to be
95 struck by the fly lever, C, of the press. The fly lever, C, carries a spring tongue (*o*) which is pivoted to it and hangs below it, so as to be capable of striking the arm (*l*) of the segment (*i*). The tongue (*o*) when the
100 part of the lever to which it is attached moves backward is brought to a rigid position when its point meets with any resistance, as its upper end is then forced into contact with a fixed pin (*p*) (see Fig. 2) in
105 the side of the fly lever, but when the tongue moves forward its spring (*q*) allows it to swing and pass any obstacle it may meet.

The press represented is particularly adapted to the manufacture of reeds for
110 musical instruments, and for the purpose of allowing the pieces of metal to be placed in

proper position there is a gage (*s*), which stands up on three sides of the punch. For some purposes a different gage would be required, and for others the gage might be altogether dispensed with. In other respects the same press would serve for articles of any form, and by describing its operation the application of my invention to various purposes, will be understood. Two pieces of metal (*t*) (*u*) are represented in the press in Figs. 1, 2, 5, and 6 and out of the press in Figs. 7 and 8, the thicker piece (*t*) in all the sections being colored to represent brass and the thinner piece (*u*) to represent copper, for the sake of distinction. The two pieces are placed together on the die, the thicker piece upward, to be acted on by the punch. The fly lever is then moved (I will suppose by hand, but it may be by power) to apply the pressure, and the punch acting on the upper surface of the plate (*t*) forces a quantity of metal from the under side of said plate down into the plate (*u*), the metal so forced down from (*t*) serving as a punch to drive a portion of (*u*) corresponding in size with the die (*b*) through the die, as represented in Fig. 5. The length of the entry of the punch is regulated by the face of the stock (*c*) coming in contact with the plate (*t*). During the punching operation the upset plate (*k*) is supposed to have been stationary in the position represented in Fig. 3, being so held by the spring (*x*); but as soon as the punching operation has been performed the left hand end of the fly lever is thrown back, and that raises the punch, and with it the pieces of metal (*t*) (*u*), which remain tightly attached to it and to each other sufficiently high to allow the upset plate to move under the lower piece (*u*) on to the die. The above motion given to the fly lever must be sufficient to bring the tongue (*o*), whose path is indicated in Fig. 3 by a red line, in contact with the arm (*l*) and to move back the arm (*l*) far enough for the segment (*i*) to move the segment (*h*) such a distance as is necessary for the tooth (*v*) to throw back the spring (*x*) and move past the center of the round end of the same, when the pressure of the spring toward the axis of the segment acting on the tooth (*v*) suddenly moves the segments far enough to throw the upset plate on to the die, when the spring (*x*) assumes the position shown in Fig. 4. The motion of the fly lever must now be reversed to depress the punch again, and the pressure thus given to the bottom of the hole in (*w*) by the punch and around the said hole by the ring shaped face of the punch stock (*t*) brings the part of the plate (*t*) which protrudes through (*u*) forcibly into contact with the upset plate (*k*), which has a firm bearing on the die, and upsets or rivets it. The left hand end of the fly

lever is again moved backward, and this time owing to the changed position of the arm (*l*) as may be seen in Fig. 4, where the path of the tongue (*o*) is represented by a red dotted line, the tongue (*o*) passes the arm (*l*) without touching it, and the motion of the lever is continued till it (the lever) comes in contact with the upper end of the lever (*n*), as shown in dotted lines in Fig. 2, and drives it back, driving the lower end of the lever and the arm (*l*) forward until by the action of the segment the tooth (*v*) is caused to pass the center of the rounded point of the spring (*x*) and the spring then throws the tooth suddenly forward and falls into the space between the tooth (*v*) and the gearing teeth, leaving the upset plate again in the position indicated in Fig. 3. The fly lever in moving back to the lever (*n*) turns the press screw sufficiently to bring the point of the punch to a level with the lower surface of the yoke (*e*) and thus the piece of metal (*t*) being arrested by the yoke as soon as the bottom of the punch stock is brought to the same height as the bottom of the yoke the punch is drawn from the metal, which falls on the upset plate and is thrown from the press as the upset plate moves from the position shown in Fig. 4 to that shown in Fig. 5. The press as soon as the upset plate is thrown forward is ready to repeat its operation, and in moving the fly lever for the next punching operation the tongue (*o*) swings over the arm (*l*) without moving it.

It will be understood that two movements of the punch are necessary to unite the plates, viz. one for the punching and another for the upsetting operation, and that after the first operation the fly lever only requires to move far enough to move the arm (*l*) and throw the upset plate over the die, and in the second it requires to move far enough to move the lever (*n*) to throw the upset plate forward.

I will here remark that although it is possible to perform the operation uniting two plates or pieces with a punch or die constructed like those in the common punching press, it is performed very imperfectly, as the punch has a tendency to separate that portion of the thicker plate which it drives toward and into the thinner plate; but when the punch is a little larger than the die, the metal is compressed around the edges of the die and the pin or portion forced out of its place by the punch remains solid. I will also remark that the concavity in the face of the punch holder (*c*) is made to allow the metal to be compressed toward the punch by the edges of the punch holder during the upsetting process. I will further remark that for some purposes the upsetting or riveting of the protruding part of the thicker plate or piece of metal, may in some

cases be dispensed with, as when the punch and die are properly constructed the part of the thicker plate or piece forced into the thinner one fits so tightly that the two can
5 only be separated by the application of very great force.

What I claim as my invention and desire to secure by Letters Patent is—

10 1. Making the punch and die of such relative sizes that the punch shall be incapable of entering the die at all, or of entering it with the same degree of freedom as would be necessary, in an ordinary punching operation, as herein set forth.

15 2. Making the punch holder (*c*) with a concave recess (*d*) in its face, or otherwise furnishing the back of the punch with a shouldered face, which shall bear upon the

face of the piece of metal, which is entered by the punch, only in a ring at a distance 20 from the punch, substantially as herein described.

3. The employment of an upset plate (*k*) placed as described after the punching operation, between the die, and that portion 25 of one plate or piece of metal, which is protruded through the other, so that by repeating the movement of the punch the said protruding portion may be upset or riveted. This I claim irrespective of any mechanism 30 that may be employed to carry the upset plate to and from the die.

JEREMIAH CARHART.

Witnesses:

S. H. WALES,

J. W. HAMILTON.