(No Model.) 2 Sheets—Sheet 1.

H. SCHURIG.

PUNCHING MACHINE.

No. 493,791. Patented Mar. 21, 1893.

Fig:1.

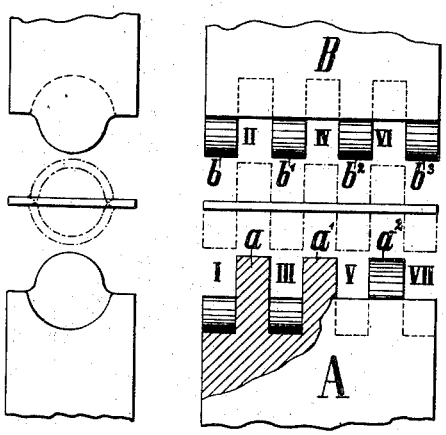


Fig:2.

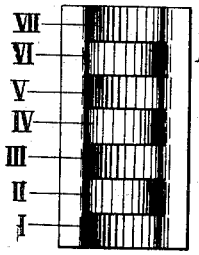


Fig:3.

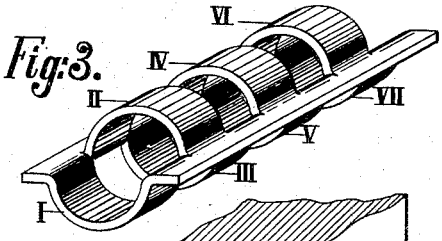


Fig:4

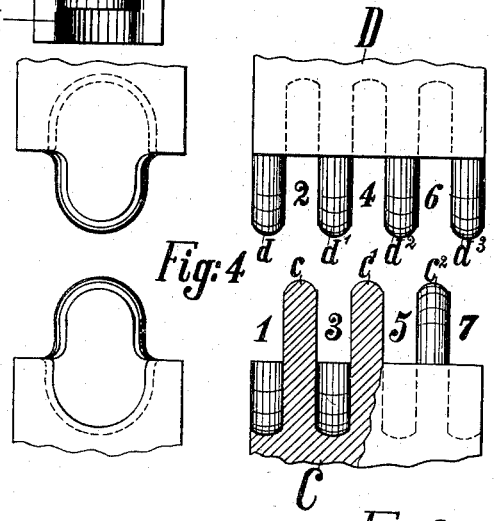


Fig:5.

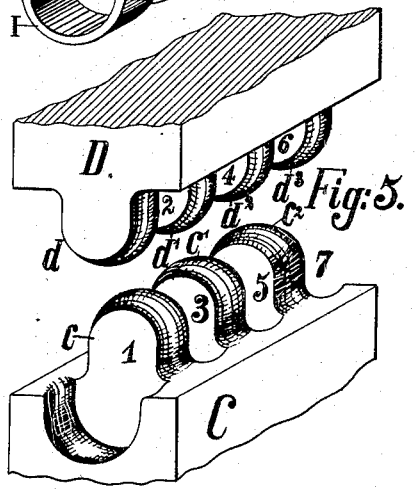
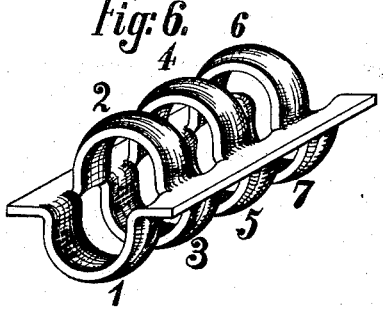


Fig:6.



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(No Model.) 2 Sheets—Sheet 2.

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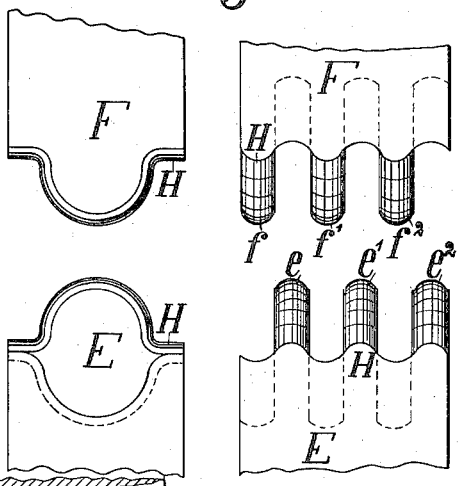
PUNCHING MACHINE.

No. 493,791. Patented Mar. 21, 1893.

Fig: 7.



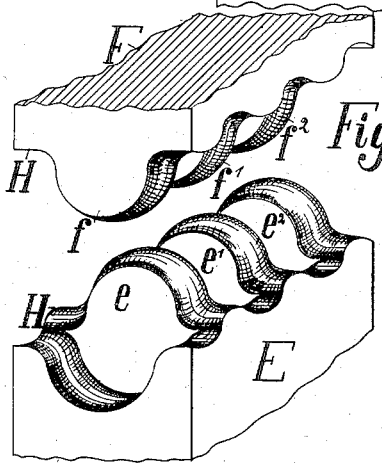


Fig: 8.

Fig: 9.

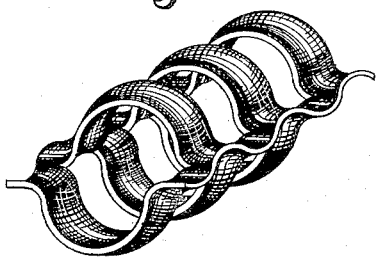
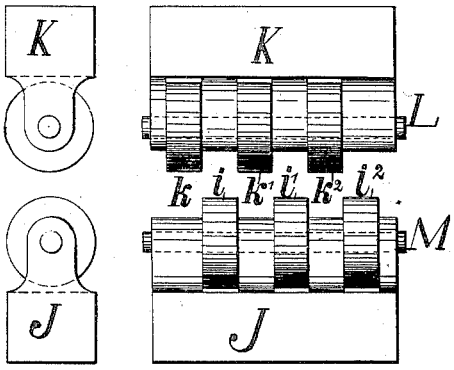


Fig: 10.



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UNITED STATES PATENT OFFICE.

HERMANN SCHURIG, OF OFFENBACH, GERMANY.

PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 493,791, dated March 21, 1893.

Application filed November 18, 1892. Serial No. 452,468. (No model.) Patented in Germany September 12, 1891, No. 64,383.

To all whom it may concern:

Be it known that I, HERMANN SCHURIG, a subject of His Majesty the Emperor of Germany, residing at Offenbach-on-the-Main, in Germany, have invented a new and useful Punching-Machine, (for which I have obtained a patent in Germany, No. 64,383, bearing date September 12, 1891,) of which the following is a specification.

My invention relates to improvements in punching machines by means of which a piece of sheet metal can be punched through at certain spaces in such a manner as to present perforations being covered by arched strips punched out of the metal and bent through. I attain this object by means of the devices shown on the annexed drawings and described hereinafter.

Figure 1 is the simplest manner of its construction consisting of a pair of plain stamps working together. Fig. 2 is the horizontal and vertical projection of a piece of plate shaped by the new tool. Fig. 3 is a perspective view of this plate. Fig. 4 shows the corresponding tools in front and side view shaped so as to serve at the same time for molding the cut out strips of plate in a special form. Fig. 5 is a perspective view of this shape of tool. Fig. 6 shows a piece of work produced by this tool. Fig. 7 is a form of the new tool by means of which the cut out strips as well as the side edges are stamped into special molds. Fig. 8 shows this tool in a perspective view. Fig. 9 is a view of the work produced by this tool. Fig. 10 is a design of my tool in which the steels are made of roller shape for the sake of being able to be rolled lengthwise upon the plate to be perforated.

The tool shown by Fig. 1 in front and side view consists of the two parts A and B acting against each other in the direction of the arrows shown, perforating and shaping the piece of plate or plates C put between them. The manner of approaching the two pieces A and B to each other depends upon the auxiliary mechanism to which they are attached. They may be fixed to a press or stamping machine moving in a straight line, or to a rotary press, that is to say to the circumference of a rotating roller or rollers or wheel in which case A and B approach each other in circular movement. One of the tools may be fixed, the other alone moving toward the first one without altering the manner of working or the work produced.

The characteristic items of my invention, which are all owned by the different forms of execution and shown in Figs. 1, 4, 7 and 10 2, 6 and 9 respectively are the following: First the shearing action of the comb like steels and secondly the shaping and molding of the cut out strips and thirdly molding at the same time the side edges. The first one is obtained in making each tooth like projection of the tool of exactly the same width as the space between two teeth of the other corresponding tool, so that in moving both tools toward each other their side edges touch each other and act like the cutting edges of shears. Thus the tooth a of the lower tool A has exactly the width of the opposite space II in the upper tool B between the teeth b', b^2 of the latter; b' is of exactly the same width as the open space III between the teeth a and a' of the lower tool and so on. The second action is obtained by making the two corresponding tools act together like the punch and the corresponding matrix of a stamping machine; the tooth (punch) in this case receives such a shape which corresponds exactly to the hollow space of the opposite tool the matrix or die. This may be a plain arch, as in Figs. 1 and 3, or it may be a more complicated design.

In Figs. 4, 5 and 6 is represented that form of the new tool by means of which the cut out strips at the same time as they are bent out to form an arch in vertical direction up and down alternately, they are provided with a molding in another direction, a channel shape crosswise to the length of the strip in the example shown. Thus the tooth c of the lower tool C has again exactly the width of the opposite space 2 between the teeth d and d' in the upper tool D and the tooth d' fits exactly between the two teeth c and c' of the lower tool C. At the same time however, as will be seen from Figs. 4 and 5 the projecting teeth c, c', d, d', of the tools C and D have received a curved shape crosswise to the main arch and of course the spaces 1, 3, 5 and 2, 4, 6, respectively between the teeth which

form the corresponding matrix or die are shaped accordingly in the bottom, so that when a plate is first cut out in strips which are at the same time bent out to form arches corresponding to the main shape of the teeth, these strips when coming to the bottom of the tool are finally molded or stamped into the form of the surface of the teeth.

The third action is obtained by providing the tools E and F at the same time with side edges G and H being shaped according to a certain design instead of being straight as in Figs. 1 and 4. This form of the tool is shown in Figs. 7 and 8 and the work produced therewith is represented by Fig. 9. The side edges G and H of the tools receive corresponding projections and moldings in both tools acting together like a punch and its corresponding matrix, in a similar manner as the projecting teeth and cutting tools, but of course without cutting the plates through and having a molding action only. From Figs. 7 and 8 it will be seen that these moldings in the example shown are undulated and therefore the plate produced has besides the double arched strips, the corrugated side edges, as shown by Fig. 9. Other designs of the stamping and shearing tools of course give otherwise shaped work. The strips can be stretched lengthwise when one of the tools is shifted in one direction so that it glides upon the perforated plate or also by pulling the latter along underneath the stationary stamping tool. In these cases a tool made according to Fig. 10 will be most suitable. Here the toothlike projections i, i', i^2 and k, k', k^2 are made in shape of little steel rollers fixed upon spindles L and M upon the bodies I and K and each roller fits into the corresponding space left in the other tool between its projecting rollers. In moving these tools to an fro less friction will be caused than with stationary projections, but otherwise the action of the tools is exactly the same as in the cases described before.

Having now particularly described and ascertained the nature of my said invention, I declare that what I claim is—

A combined shearing and punching tool consisting of two corresponding stamps (A and B) having toothlike projections ($a, a', a^2—b, b', b^2$ respectively) and corresponding depressions I, III, V—II, IV, VI into which the projections fit exactly like the punch and matrix of a punching machine, when the tools are moved toward each other, shearing off strips from a plate put between the tools, and molding the same at the same time, the alternate projections in each forming the punch for the corresponding depression or matrix in the other.

HERMANN SCHURIG.

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