

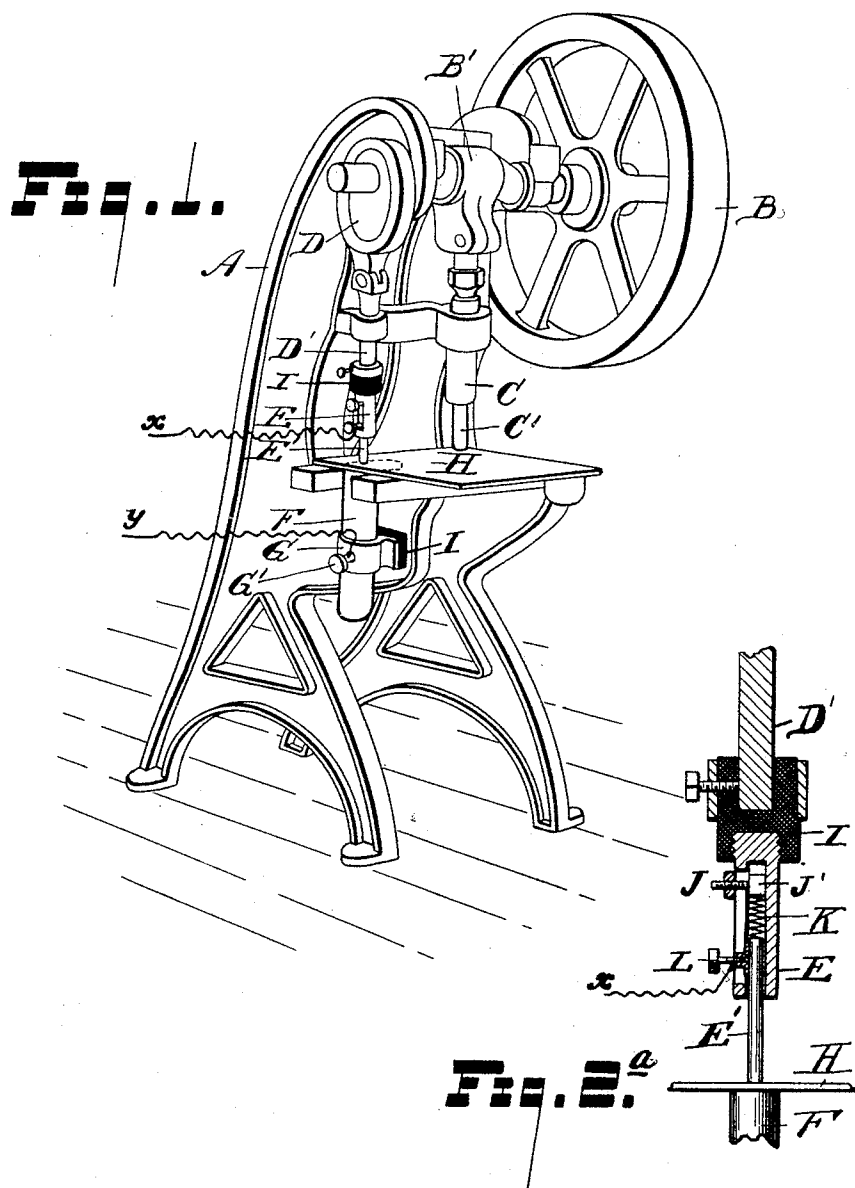
(No Model.)

2 Sheets—Sheet 1.

C. L. COFFIN.
APPARATUS FOR PUNCHING METAL.

No. 499,519.

Patented June 13, 1893.



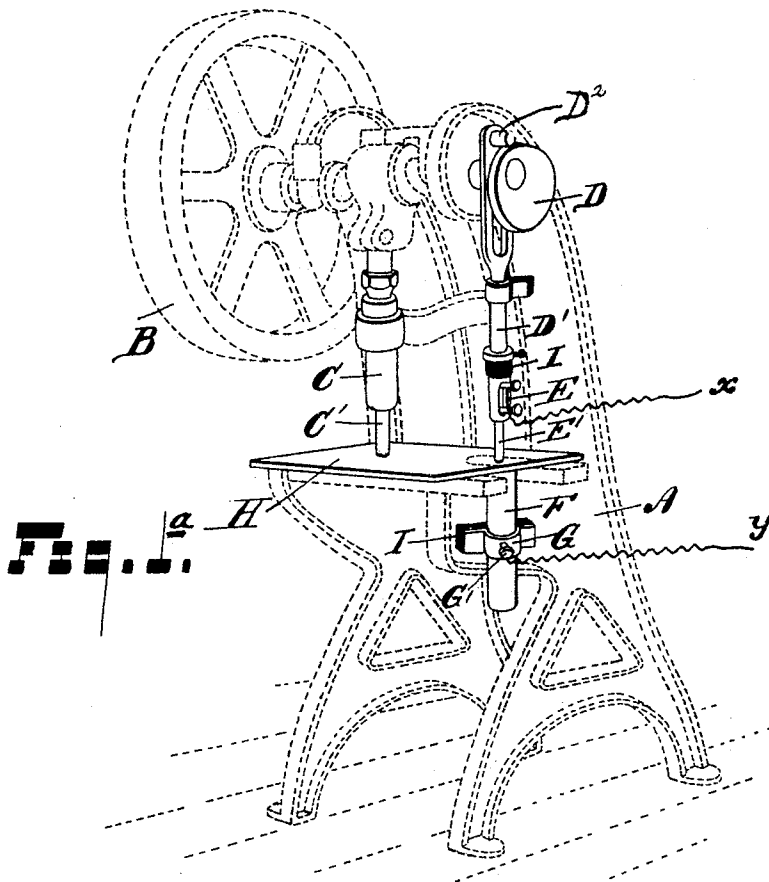
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UNITED STATES PATENT OFFICE.

CHARLES L. COFFIN, OF DETROIT, MICHIGAN.

APPARATUS FOR PUNCHING METAL.

SPECIFICATION forming part of Letters Patent No. 499,519, dated June 13, 1893.

Application filed February 28, 1893. Serial No. 464,132. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. COFFIN, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Apparatus for Punching Metal, of which the following is a specification.

My invention consists in an improved method of and apparatus for punching metal, hereinafter fully described and claimed.

Figure 1 is a perspective of the machine, and Fig. 1^a is an elevation of the heating and punching mechanism proper with the machine shown behind in dotted lines. Fig. 2^a is an enlarged central view of the movable carbon holder, and carbon partly in section as applied to heating by incandescence. Figs. 2, 3, and 4 are diagrammatic views of the different stages of the operation where the arc is used for heating.

The principle of my invention consists in electrically heating the next point in the metal where a hole is to be punched, while the punch is performing its work. This heating may be done either by applying an arc to the point to be heated, or by passing a heating current through said point, the apparatus shown in Figs. 1 and 1^a being intended for passing a heating current through the point to be punched, while the apparatus and diagrams of the other figure refer to heating by forming a voltaic arc at the point to be heated.

A represents the frame of a machine consisting of suitable legs and a table to support the material to be punched and a female die for punching; and a gooseneck to carry the eccentric or toggle-joint mechanism for operating the punch, all of which are so well known that I do not deem detail descriptions thereof necessary.

B represents a driving pulley mounted on a shaft journaled in the upper part of frame A, and carrying a crank or eccentric B', by which punch holder C and male punch C' are operated, the punch holder running through a suitable guide as indicated in the drawings. On the end of the same shaft which operates the punch holder C, I fix an eccentric D, the motions of which vary in accordance with that of the two methods of heating above named which is proposed to be adopted.

As shown in Figs. 1 and 1^a, the eccentric D

has on it an ordinary eccentric strap, to which is pivoted the upper end of a pitman D'. The lower end of this pitman is secured in any suitable way, as by a set screw, to a block of insulating material I, to which is also secured a carbon holder E. For heating without the arc the carbon E' is slipped loosely into carbon holder E, and is pressed down by a light spring K, whose tension may be regulated by a block J' provided with a screw threaded bolt and nut J.

L represents a clamp secured to the upper end of carbon E' and projecting through a slot in carbon holder E, and to this clamp is attached one end of a conductor x , by which the carbon E' is connected by one terminal of a generator of electricity.

G represents a clamp secured to the frame A of the machine through the medium of a block of insulating material I, and provided with a set screw G', by which a carbon F may be held in said clamp at any desired height, and this clamp G is connected by conductor y with the other terminal of a generator of electricity.

H represents the material to be punched, lying on the bed of the machine, and as shown in Fig. 1, it is fed from left to right, the punch C' being at the right of the carbon E'.

The operation of this part of my invention is as follows: A current being admitted to the conductors x and y and the pulley B being set in motion, the rotation of its shaft by means of the eccentric or other mechanism B', forces punch C' down into the female die adapted to receive it, and in doing which the punch passes through the material H, if that be in position. As the punch descends the eccentric D also forces carbon holder E downward until carbon E' comes in contact with material H, and then as carbon holder E descends the carbon E' rises therein against the resistance of spring K, if such spring be used, thus maintaining contact between carbon E' and the material H. This establishes a circuit through conductor x , carbon E', material H, carbon F which is in contact with the underside of material H, clamp G and conductor y back to the generator, thus heating that point of material H with which carbon E is in contact through the passing of a heating

current therethrough. As the punch C' rises, the carbon E' will eventually be raised off from material H, thus breaking the circuit. The material H is now fed to the right the
 5 proper distance to bring the point just heated by carbon E' beneath the punch C' when the next stroke of the machine will punch a hole at said heated spot and simultaneously heat another spot in the manner just described.
 10 If it be desired to use the arc for heating instead of a heating current, the arrangement is substantially the same with the single exception that the eccentric D is so arranged as to first bring the carbon E' into contact with
 15 the material H and then complete a circuit, then slightly lift said carbon from the material to establish an arc, as shown in Figs. 2 and 3, and finally withdraw said carbon to break the arc when the punch C' rises. This
 20 may be done in a number of ways known to skilled mechanics, the one which I have illustrated being to cause the eccentric D to act against a pin D² set in pitman D' and so form said eccentric or cam D that it will first lower
 25 carbon E' into contact with material H as the punch C' descends, as shown in Fig. 2, and will then raise it slightly to form the arc as shown in Fig. 3, while the punch C' continues to descend and finally will raise the carbon away
 30 from the material as shown in Fig. 4, when the punch C' is lifted. It is evident that the cam eccentric D may be so proportioned in either case as to give a comparatively long period of contact of such proximity as to form the arc
 35 between the carbon and the material and then retract the carbon with a quick motion when the punch C' is nearly at the upper end of its stroke. By this method I am enabled to punch metal with comparatively little power and with

little wear on the punch, and obtain the very
 great advantage that the strength of the metal
 around the hole punched is not reduced nearly
 as much as it is when the metal is punched
 cold, the strength approximating very closely
 to the strength of drilled holes. 45

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

1. The herein described mode of punching and heating metal consisting in simultaneously punching a hole and electrically heating
 50 the point at which the next hole is to be punched.

2. In an apparatus for punching metal the combination with a press and punch carried thereby, of a carbon adapted to make contact
 55 with the under side of the material, a carbon above the material actuated by the punching mechanism, to and from the material to be punched and connections between said carbons and the terminals of a source of electric
 60 energy, substantially as shown and described.

3. In combination with a punching press a carbon carried on said press and flush with the bed thereof, a connection between said carbon and one terminal of a generator of
 65 electricity, another carbon carried on the mechanism which actuates the punch, and connected with the other terminal of said electric generator and means substantially such
 70 as described for giving said upper carbon a motion to and from the material to be punched coextensive with but varying from the motion of the punch, substantially as shown and described.

CHARLES L. COFFIN.

Witnesses:

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