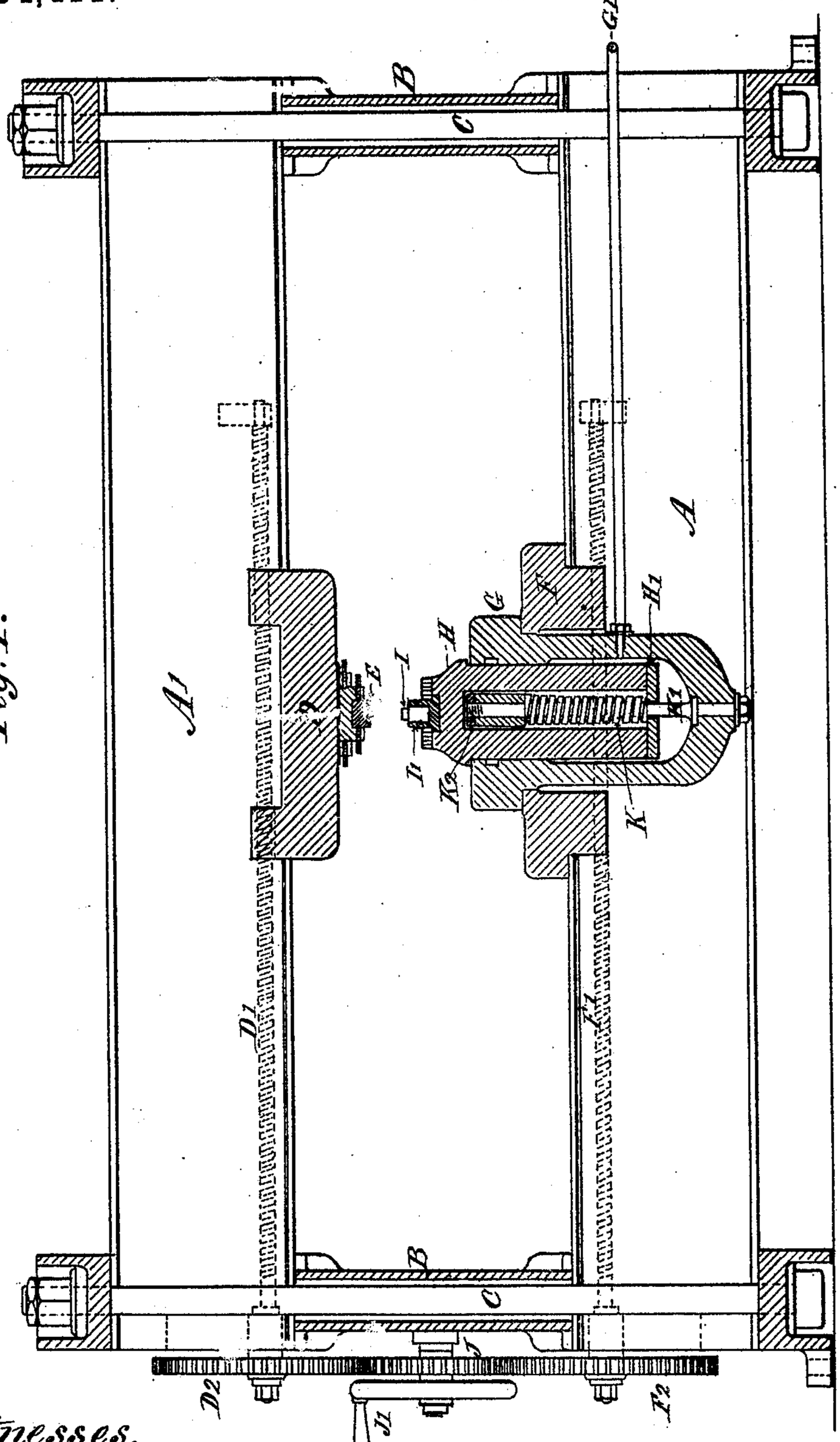
(No Model.) 2 Sheets—Sheet 1.

R. A. HARDCASTLE.

MACHINE FOR FORGING, CUTTING, OR PUNCHING METAL.

No. 354,411. Patented Dec. 14, 1886

Fig. 1.



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2 Sheets—Sheet 2.

No Model.)

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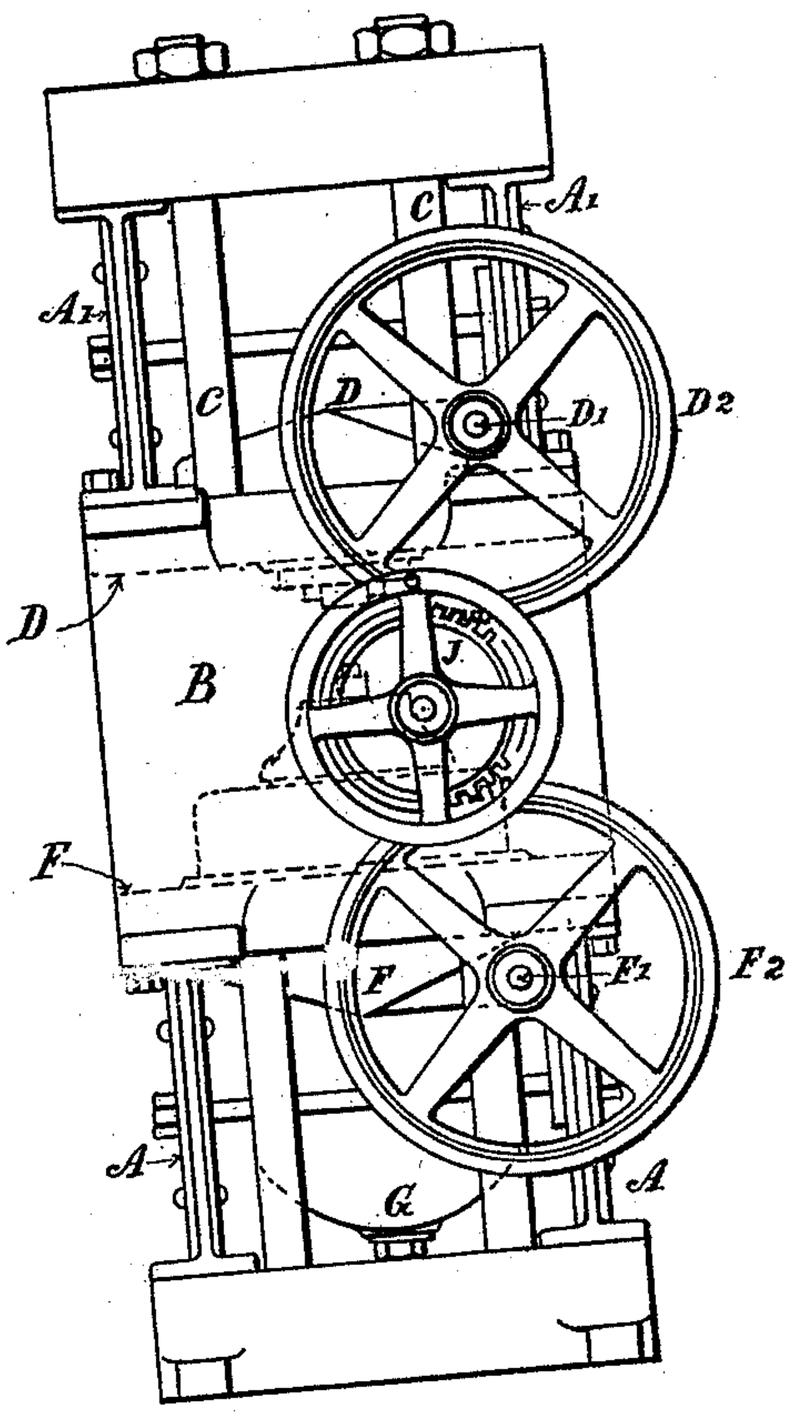
Fig. 2.



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UNITED STATES PATENT OFFICE.

ROBERT ANTHONY HARDCASTLE, OF LEEDS, COUNTY OF YORK, ENGLAND.

MACHINE FOR FORGING, CUTTING, OR PUNCHING METAL.

SPECIFICATION forming part of Letters Patent No. 354,411, dated December 14, 1886.

Application filed June 29, 1886. Serial No. 206,570. (No model.)

To all whom it may concern:

Be it known that I, ROBERT ANTHONY HARDCASTLE, a subject of the Queen of Great Britain and Ireland, residing at Leeds, in the county of York, Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Machinery or Apparatus for Punching, Embossing, or Shearing Metallic Plates, of which the following is a specification.

This invention relates to a machine for punching and embossing or shearing metallic plates of various kinds for various purposes, and may be used with advantage to perforate and emboss boiler-plates to receive tubes or stays.

The machine comprises upper and lower beds or gauntries rigidly connected together, with a space between them, a saddle able to slide on each, a hydraulic cylinder on one saddle, with ram that carries one die or part die or tool, the corresponding die or part die or tool being mounted on the other saddle, and means whereby said saddles can be traversed simultaneously or otherwise along their respective beds or gauntries.

Figure 1 of the annexed drawings is a sectional elevation of the machine; Fig. 2, an end elevation.

A is a lower bed or gauntry; A′, an upper one. They are shown as made of I I malleable girder iron or steel, but, if desired, may be of other material or construction. Between these, at the ends, are columns or uprights B B, the whole being bound firmly together by bolts C C C C, as shown, or in any equivalent manner.

D is a saddle on the under side of the upper gauntry, A′, to which is fixed a suitable tool, as shown. This tool is a cupped die or matrix, E, such as described and claimed in my other specification of same date for Letters Patent of the United States, Serial No. 206,569, filed June 29, 1886.

F is a saddle on the lower bed or gauntry, A. This carries in the example illustrated a hydraulic cylinder, G, and ram H. (The saddle F and cylinder G may be in one piece, if desired.) On the ram H is or are mounted a tool or part or parts corresponding to that or those on saddle D. As illustrated, there is a flat-ended punch, I, with its hub or carrier I′, as described and claimed in my other specification above referred to.

It will be evident the arrangement might be reversed, the cylinder and ram being then carried by saddle D.

The two saddles D and F are capable of movement along their respective beds when operated by means of screws D′ and F′, respectively, and gear-wheels D^2 and F^2, which are connected by means of the intermediate gear-wheel, J, to which is attached the handle J′, so that the two saddles with the tools can be moved simultaneously along the gauntries A and A′ to suit the positions of the required embossments or operations on a plate under treatment. When it is required to change or adjust the tools, the intermediate wheel, J, is moved out of gear with the wheels D^2 and F^2, so that the screws D′ and F′ can be moved independently of each other for the adjustment or change required, after which the wheel J may be replaced into gear with wheels D^2 and F^2.

K is a spiral spring connected to the cylinder G by the rod K′, for accelerating the recession of the ram H, (after effecting an embossment.) Said ram is made hollow to admit the said spring and rod, and is provided with a plate, H′, at its lower end for the spring K to act upon while returning the plunger or ram, the upper end of the spring taking a bearing against the nut K^2 on the rod K′.

If the saddles be connected with the punches and the embossing-matrix or other tools coaxial, the two saddles can evidently be simultaneously moved along their respective beds or gauntries by means of the screws and gearing provided for the purpose, so that they can be traversed from one end of the machine to the other—that is to say, across a plate under treatment—thus commanding all such parts of such plate in the direction of the required line of embossments or other operations, and the plate can be moved longitudinally to bring it into position for each embossment or other operation by hand or otherwise.

In adjusting the tools to each other, or in changing or replacing either of them, the above-described saddles may be disengaged from each other, moved separately, and afterward be reconnected. For actuating the hydraulic ram in the direction required for punching, embossing, or shearing, either an accumulator or a

hand or power hydraulic pump may be employed, the recession of the ram after each forward stroke being effected by the recoil of the spring.

The punches and dies or other tools may be applied either singly or otherwise, so as at one operation to produce either one or a series of holes and embossments or other work.

If an ordinary punch and die be substituted for the embossing punch and matrix, the machine will do ordinary punching, the pitch of the holes produced being determined by the traverse screws and gearing in connection with the movable saddles. If shear-blades be used, the machine can be employed for trimming the edges or otherwise parting of plates.

What I claim is—

1. A machine for punching, embossing, or shearing metallic plates, comprising in combination an upper and a lower bed or gauntry, connected together so as to form a compact frame-work, a movable saddle on each bed or gauntry, means for moving them simultaneously or separately, and on one of said movable saddles a hydraulic cylinder and a ram on which can be mounted required tools, whereby the said cylinder and ram are movable to any point within the range of the machine, substantially as described, and for the purpose specified.

2. A machine for punching, embossing, or shearing metallic plates, comprising an upper and a lower bed or gauntry, connected together so as to form a compact frame-work, a saddle on each bed or gauntry, a hydraulic cylinder and ram, and a spiral spring within said hydraulic cylinder and ram for causing the rapid recession of said ram after a punching, embossing, or shearing has been effected, substantially as described.

3. A machine for punching, embossing, or shearing metallic plates, comprising in combination an upper and a lower bed or gauntry, connected together so as to form a compact frame-work, a sliding saddle on each bed or gauntry, the screws and gears for moving said saddles along said beds or gauntries, and a hydraulic cylinder and ram carried by one of said saddles, whereby the line of action of the tool or tools is always on the center of said cylinder, substantially as described.

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