No. 719,947. PATENTED FEB. 3, 1903.

W. S. MENDENHALL.

METAL PUNCH.

APPLICATION FILED OCT. 4, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

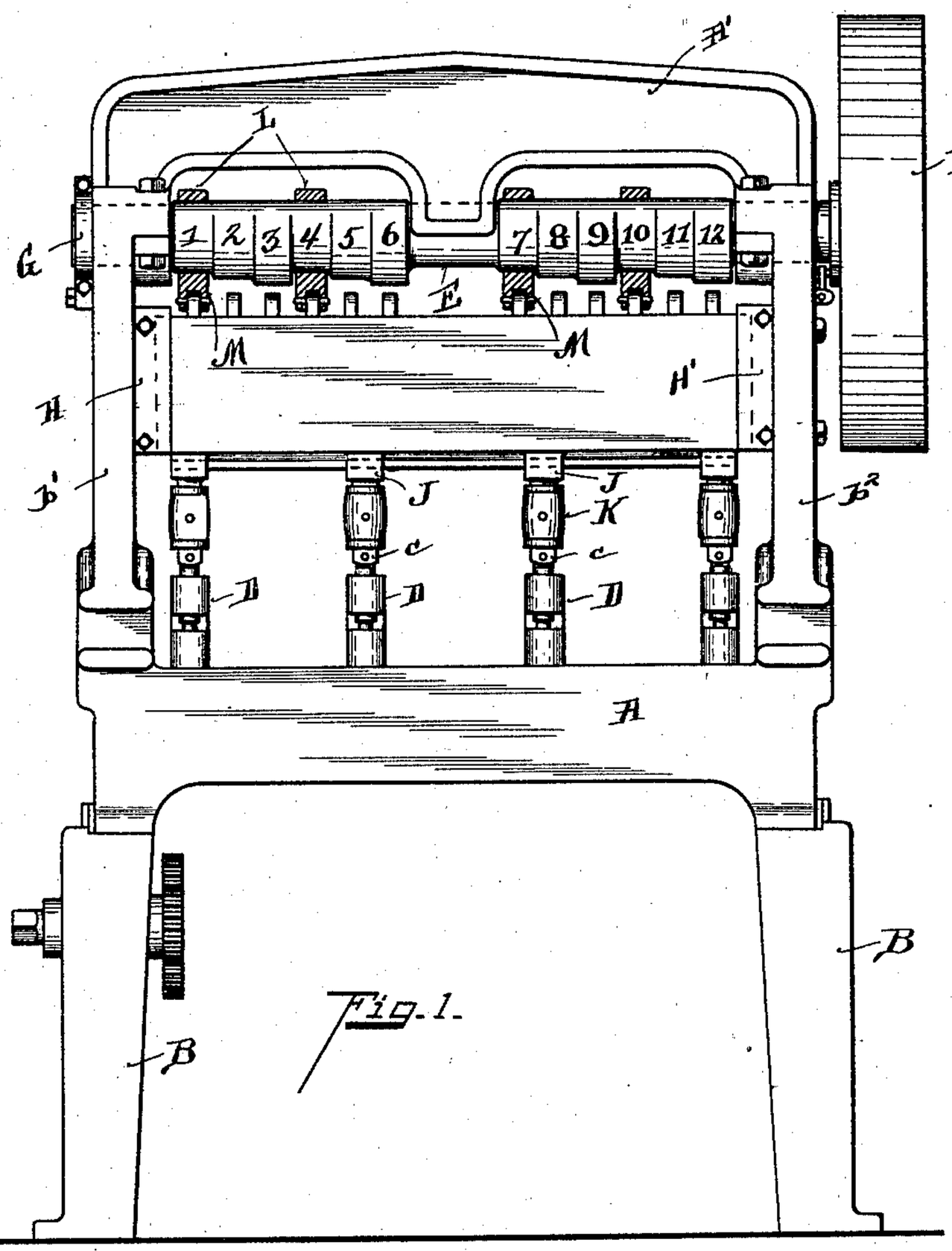

Fig. 1.

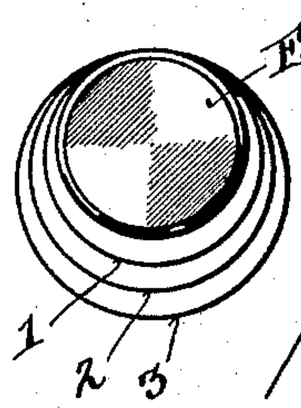

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

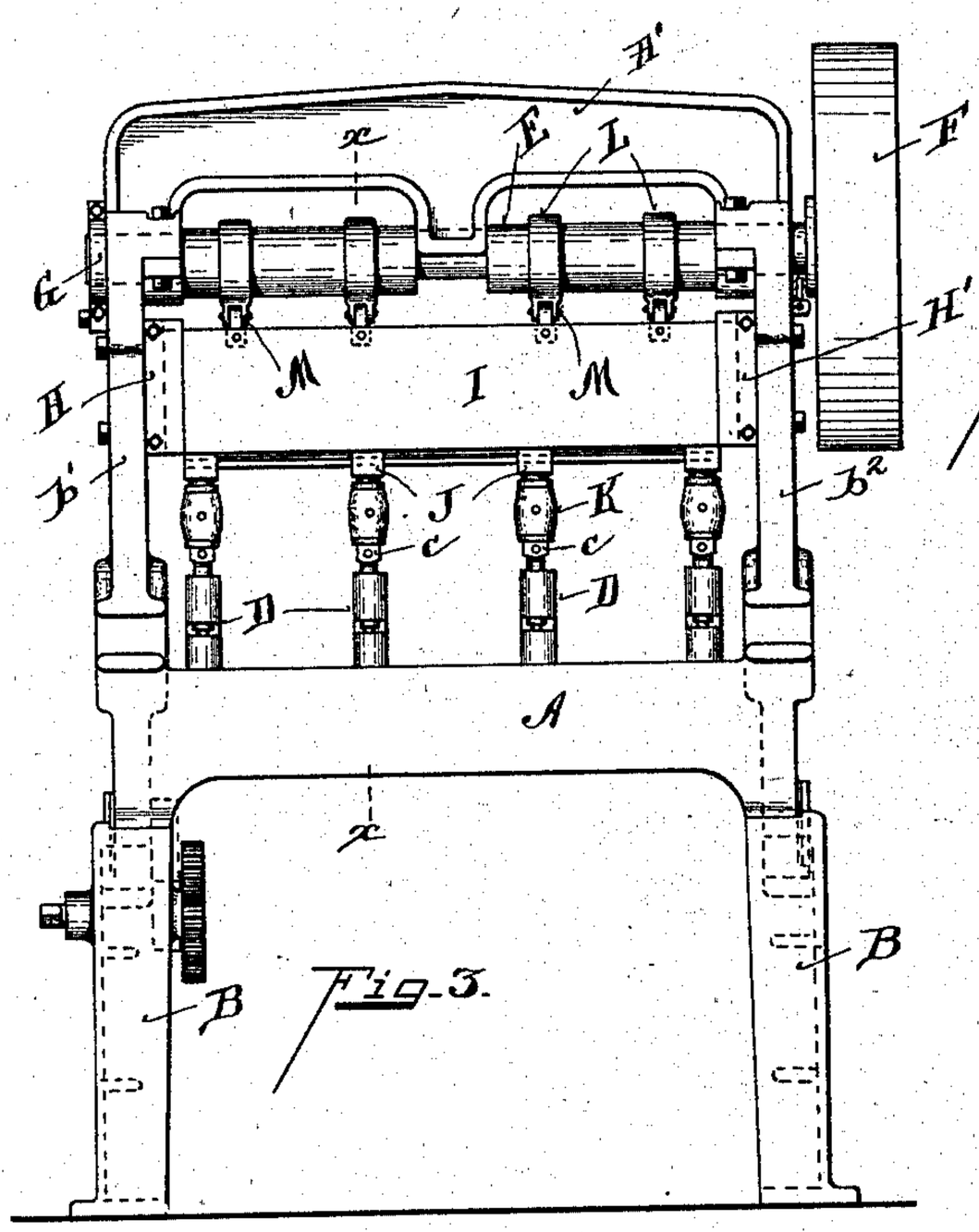

Fig. 3.

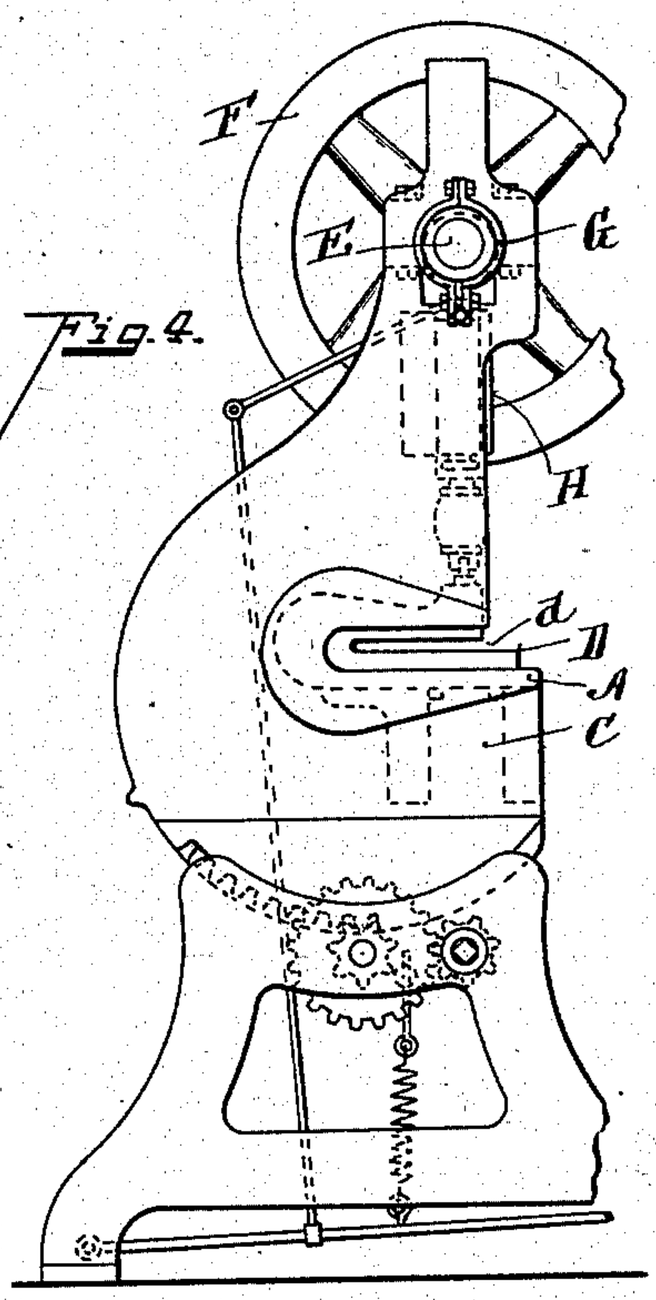

Fig. 4.

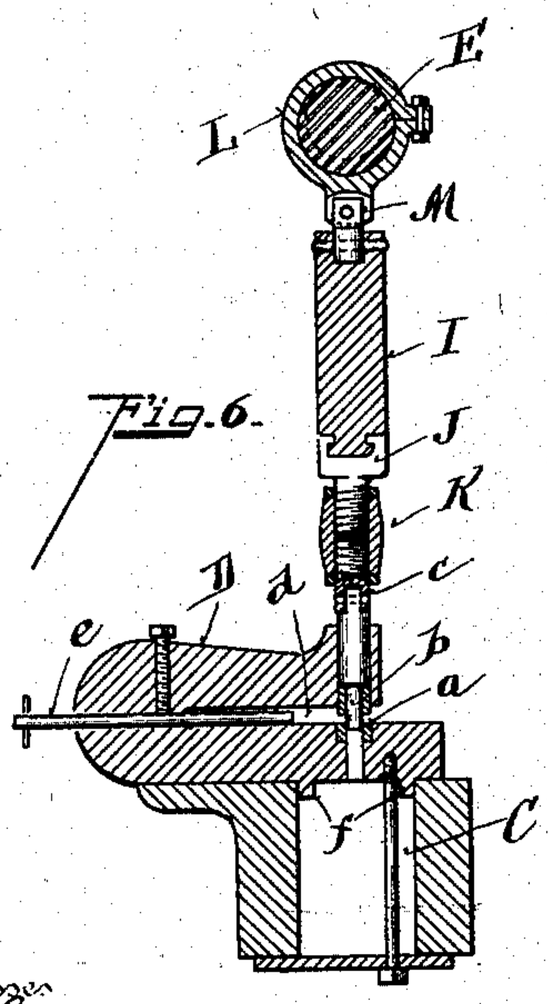

Fig. 6.

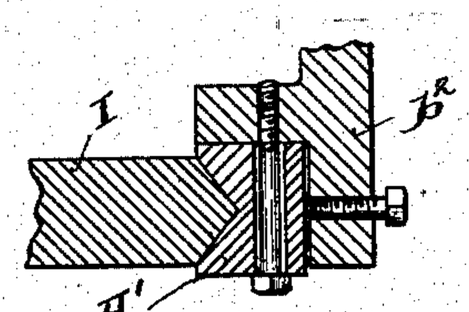

Fig. 5.

Fig. 7.

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UNITED STATES PATENT OFFICE.

WALTER S. MENDENHALL, OF NORWOOD, OHIO, ASSIGNOR TO THE SAMUEL C. TATUM COMPANY, OF CINCINNATI, OHIO, A CORPORATION.

METAL-PUNCH.

SPECIFICATION forming part of Letters Patent No. 719,947, dated February 3, 1903.

Application filed October 4, 1902. Serial No. 125,872. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. MENDENHALL, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Metal-Punches, of which the following is a specification.

My invention relates to an improvement on the apparatus shown and described in my prior patent, No. 647,272, granted April 10, 1900. My said prior invention relates to a perforator; and my present invention comprises certain modifications and improvements designed to give greater rigidity and power to the present device, together with more accurate and convenient means of adjustment, whereby it is adapted to perforate sheets of metal.

Another object of my invention is to provide a variable-power punch. The different work required of a sheet-metal punch renders it very desirable that the machine should possess a selective range of thrusts. This can only be accomplished by varying the eccentricity of the shaft which actuates the reciprocating punch members. This result is accomplished by my invention and in such a manner that with a given number of cases mounted on the machine the thrust selected from the range for a given work can be effected without the necessity of changing the cases or even altering their position on the machine, except as may be required in gaging the work at hand.

Figure 1 is a front elevation of my machine, partly in section. Fig. 2 is an end view of the eccentric shaft. Fig. 3 is a front elevation of a modification of my improved punch. Fig. 4 is an end elevation. Fig. 5 is an enlarged section of one end of the reciprocating head and guide therefor. Fig. 6 is an enlarged sectional elevation on line $x\ x$, Fig. 3. Fig. 7 is an enlarged sectional elevation of turnbuckle and connections.

A represents a table or support on the vertical standards B B, the said table being provided with a slot C, in which the sliding cases fit. D represents one of these cases, which, like the paper-perforator cases, is self-contained. These cases I term "self-contained punches"—that is, each case has integrally the die a and the punch member b, reciprocating in vertical guides formed in said case, and the horizontal gap or mouth d for the insertion of the sheets of metal, the horizontal gages e, adjustably secured in the mouth d, and any convenient means for clamping each case to the table. Each case is provided with depending feet or lugs f, fitting against the opposite sides of the table-slot C.

E represents the eccentric shaft, journaled between the standards b' b^2 above the table, projected beyond the vertical standard b^2, and provided with a fly-wheel F, loosely mounted on the end of said shaft. Any kind of clutch mechanism may be interposed between the said fly-wheel and the said shaft.

G represents a brake mechanism on the other end of the eccentric shaft, projected beyond the exterior of the vertical standard b'.

It will be observed that in Fig. 3 I have shown a punch with a shaft uniform in cross-section, which form, of course, is part of my invention. In Fig. 1, however, I have shown my preferred form. In this form it will be noticed that the eccentric shaft is shown with twelve steps 1 2 3 4 5 6 7 8 9 10 11 12, of which 1, 4, 7, and 10 are of the same diameter, making one length of thrust. Next, 2, 5, 8, and 11 are of a uniform diameter, but greater than the diameter of 1, 4, 7, and 10, making a second length of thrust. Then 3, 6, 9, and 12 are of uniform diameter, but greater in diameter than the steps 2, 5, 8, and 11, making a third length of thrust. Each one of these three eccentrics has an individual set of rings L, of uniform diameter, which fit upon the eccentric shaft in four different places across the shaft at regular intervals, thus evenly distributing the strain across the frame of the machine. Although only four of the rings are shown in Fig. 1, preferably all twelve of the rings are mounted on the twelve eccentric shoulders of the shaft and any four rings of the same diameter are connected to the reciprocating head which actuates the punch, according to the length of punch which is desired. As the self-contained punches slide on the table and as their reciprocating punch members are dovetailed in the reciprocating head I, it is obvious that when any one of the three lengths of thrust is selected and

the proper rings are connected with the head the proper length of thrust will be given to all the punch members mounted on the machine and that if a different length of thrust is desired all that is necessary is to uncouple the rings in use and couple up the rings belonging to the particular size in demand. Thus this selective range of variable thrusts is available without requiring the operator to give any attention to the punches themselves except properly gaging them to the work.

The mounting of a shaft and a reciprocating head between the table of the machine and the top frame-piece A′ makes a very powerful and compact machine. It is not subject to the lost motion and the inaccuracy found in machines in which the actuating-shaft is located at a distance from the metal-cutting instrumentalities. The impulse is imparted directly above the work in the shortest possible line and with the fewest possible number of transmitting elements intervening; but it is also obvious that a machine of the character herein described, but having an eccentric shaft differently located—say between the table and the base—might be made to accomplish the result of my machine, though less perfectly, and hence I do not desire to be limited to the location of the eccentric shaft except as specifically pointed out in the claims. It is also to be understood that I use the term "eccentric" in a generic sense as most aptly expressing the function; but there are many well-known mechanical equivalents not technically spoken of as an "eccentric shaft."

H H′ represent vertical guides formed on the inside face of the standards b' b^2. I represents a reciprocating head engaging the said vertical guides H H′.

J represents connecting-rods, the upper ends of which are gibbed onto the under face of the said reciprocating head I, so as to slide thereon horizontally.

K represents turnbuckles, which connect the said rods J with the upper end of the punch members *c* of the said cases. These turnbuckles are to adjust the said punch members *c b* into different vertical positions in their respective cases to take up for the wear incident to metal-working functions.

L represents the rings mounted on the eccentric shaft E and having pivotal connections M with the said reciprocating head I.

It is obvious that if the shaft is rotated through the said rings and pivotal connections a vertical reciprocation will be imparted to the said head I and to the male punch members *c b*.

Any number of cases of different designs or kind can be readily inserted or removed or adjusted upon the machine and they will always be perfectly true in vertical alinement. Also the reciprocation of the head and the gibbed engagement of the punches and the cases thereon give a powerful and short thrust to the punch members, with great rigidity and perfect vertical alinement of the transmitting members. The result is a metal-punch which is true, powerful enough for any requirement, and readily adjustable as to the number of holes to be punched and the relative interval between the punches.

Having described my invention, what I claim is—

In a metal-punch a frame, a table, one or more self-contained punches mounted on the table, a reciprocating head mounted in vertical guides in the frame, the male punch members being attached to the head so as to slide thereon, a shaft journaled in the frame above the head, the said shaft being provided with a plurality of shoulders of different diameter constituting a differential range of eccentrics, a ring fitted to each eccentric and means for connecting the rings of any selected eccentric to the head, whereby all the punches on the table may be given any one of a differential range of thrusts, according to which eccentric is connected to the reciprocating head, substantially as described.

In testimony whereof I have hereunto set my hand.

WALTER S. MENDENHALL.

Witnesses:
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IDA J. LUCAS.