

(No Model.)

W. COOP.

APPARATUS FOR MANUFACTURING LEAD SHOT OR BALLS.

No. 426,923.

Patented Apr. 29, 1890.

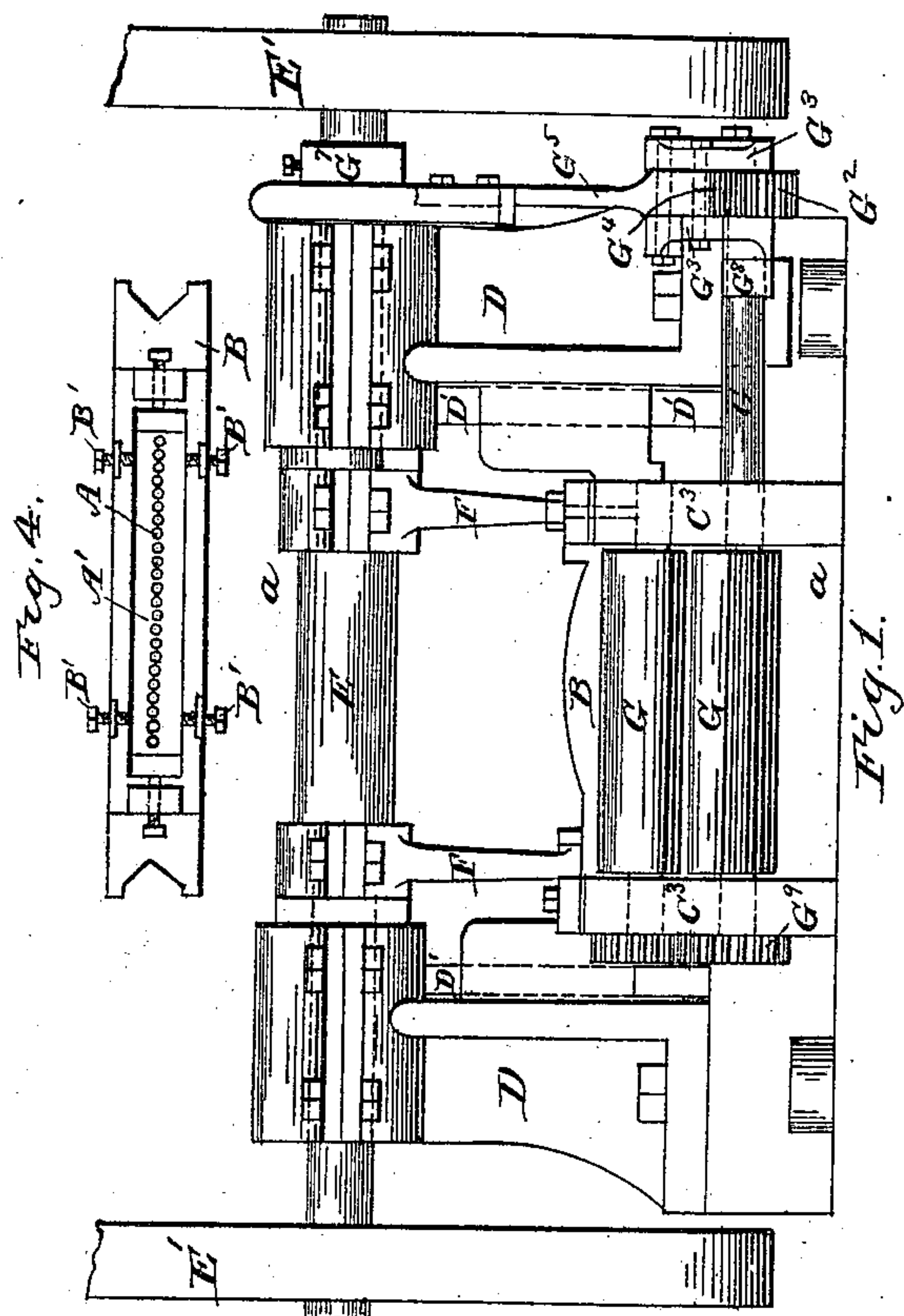


Fig. 1.

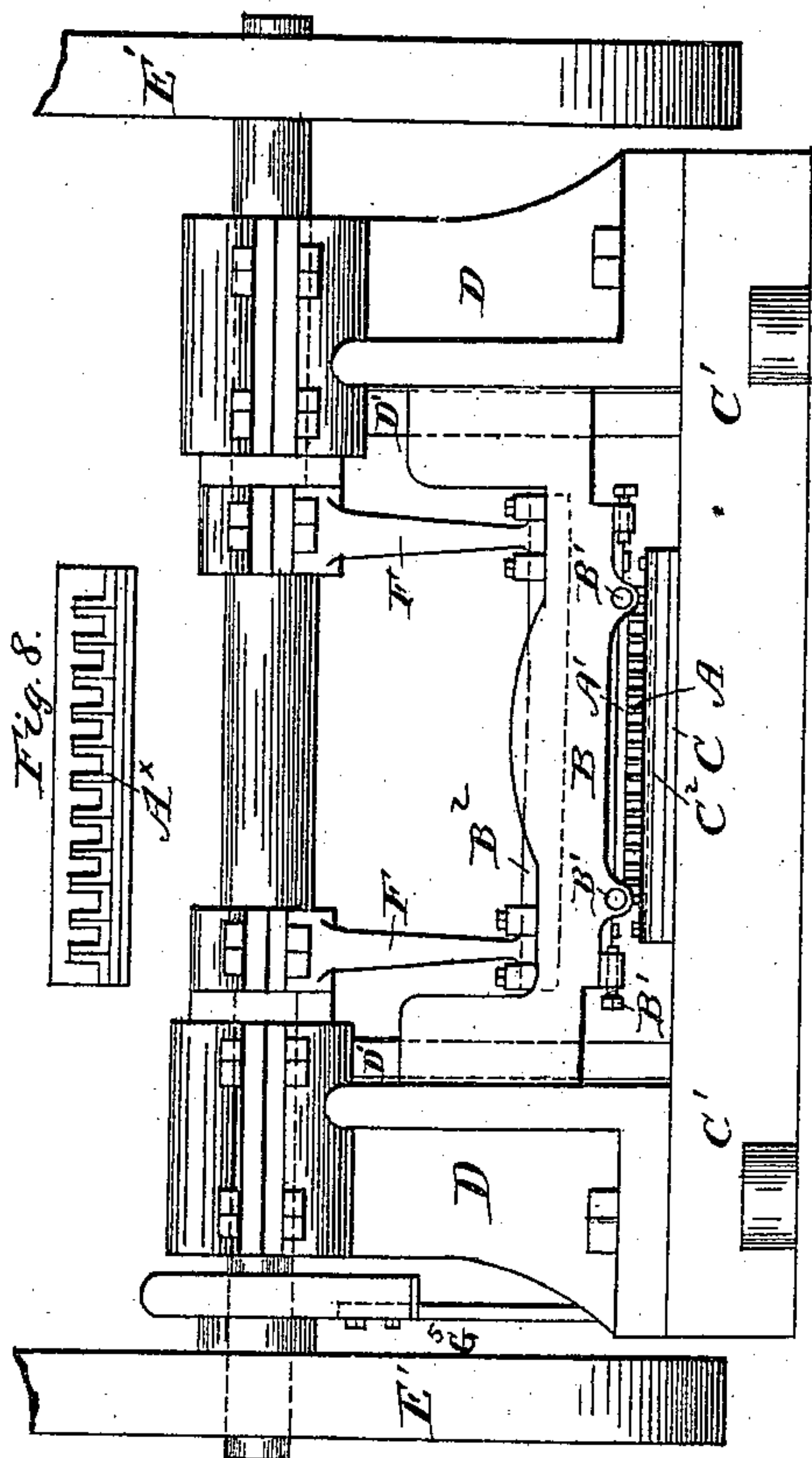


Fig. 2.

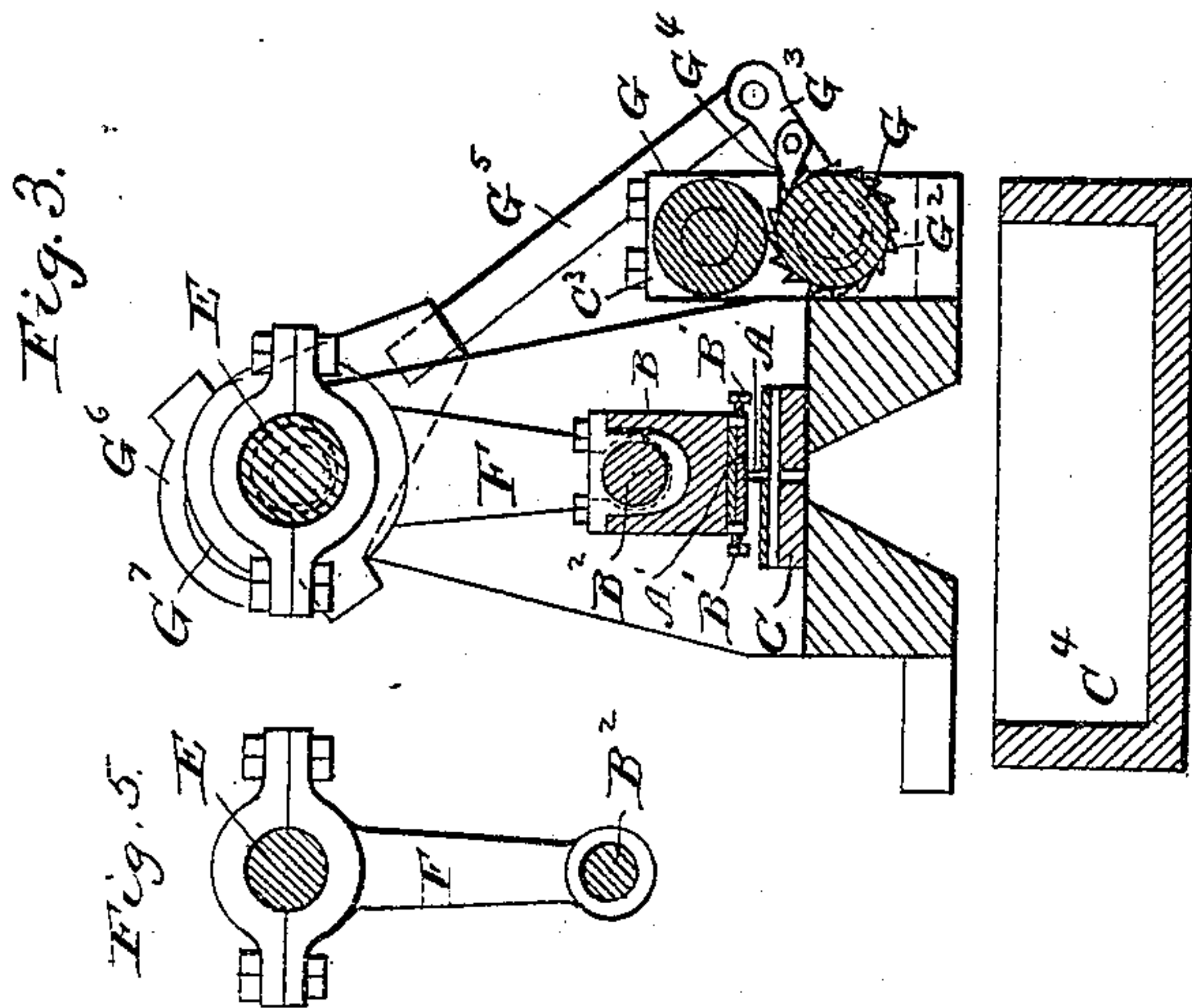


Fig. 3.

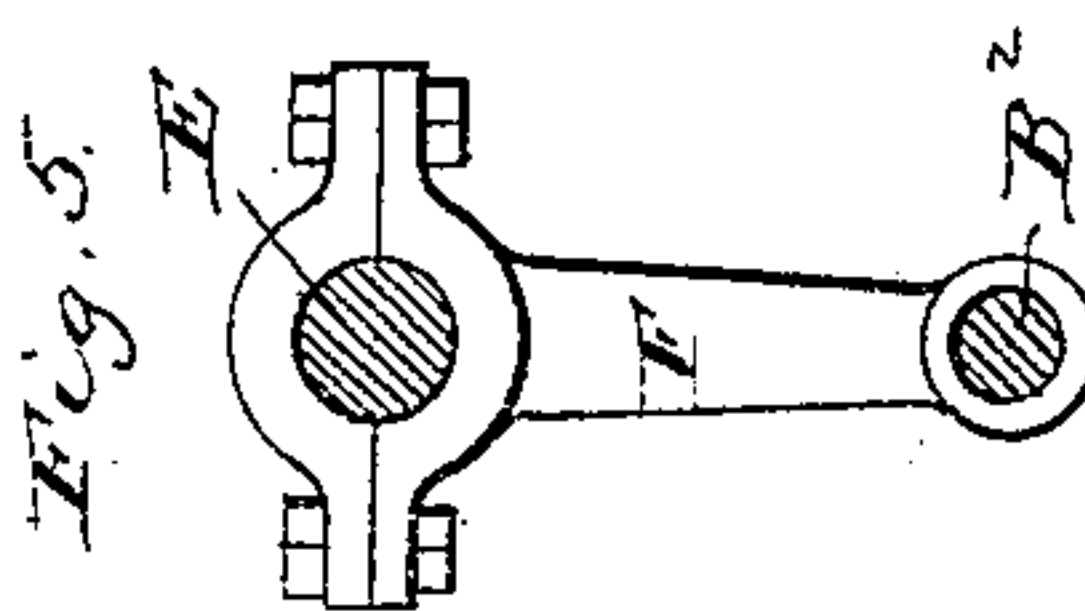


Fig. 5.

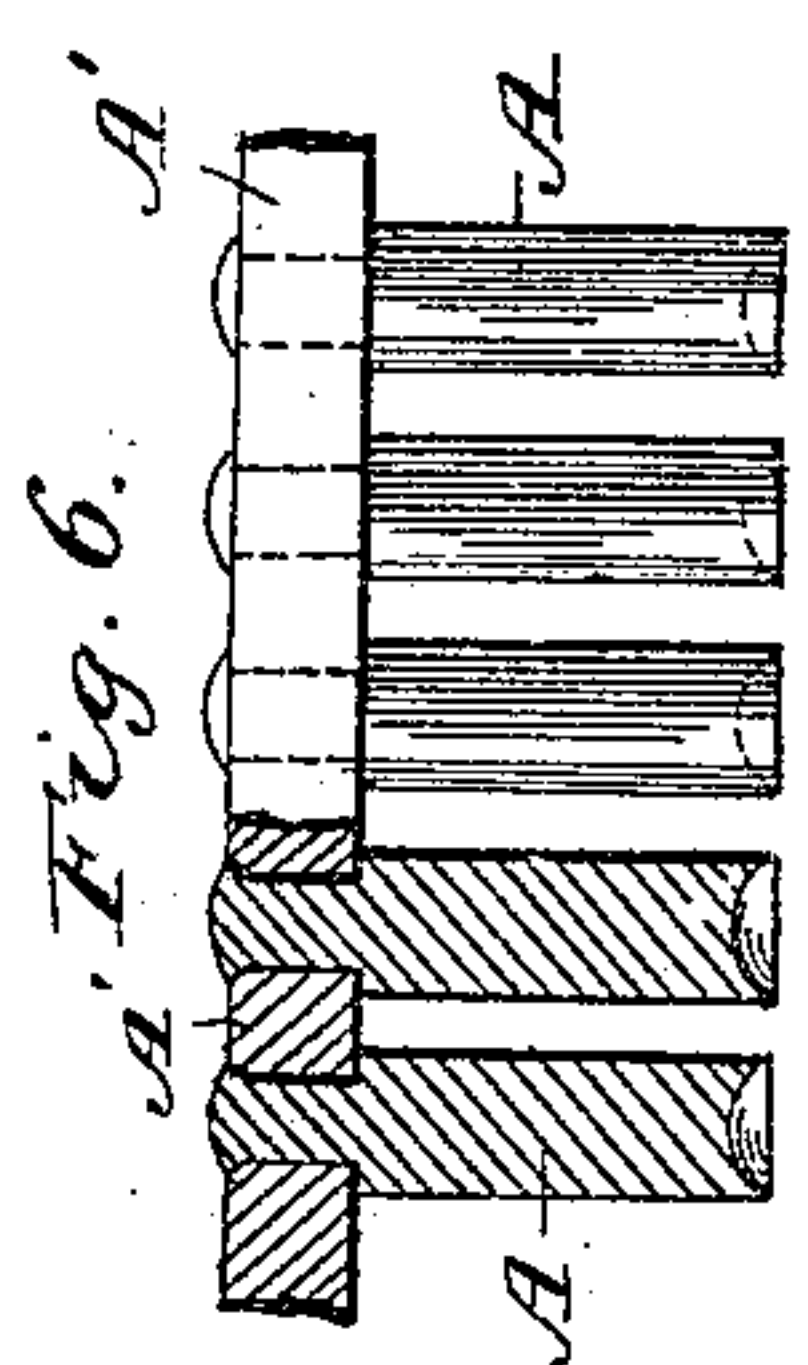


Fig. 6.



Fig. 7.

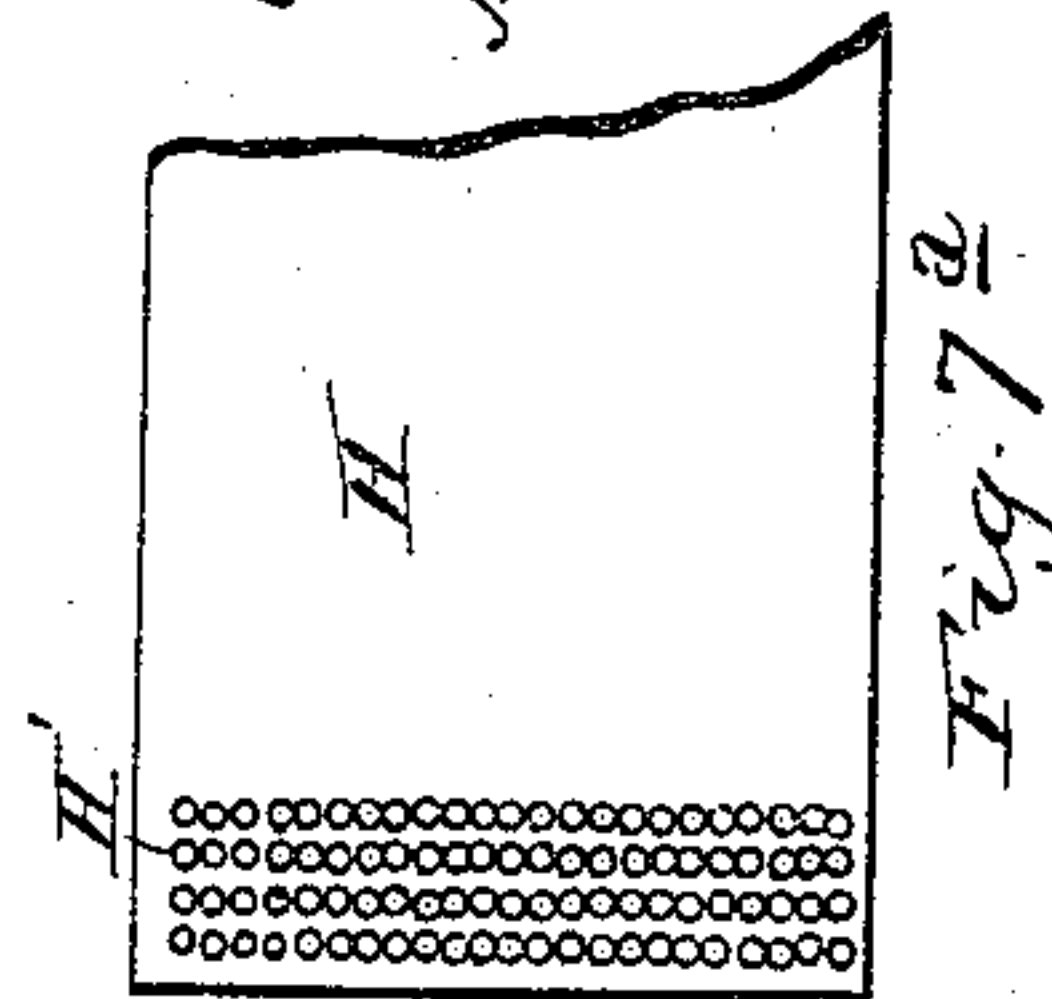


Fig. 7a.

Witnesses:  
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# UNITED STATES PATENT OFFICE.

WALTER COOP, OF MELBOURNE, VICTORIA.

## APPARATUS FOR MANUFACTURING LEAD SHOT OR BALLS.

SPECIFICATION forming part of Letters Patent No. 426,923, dated April 29, 1890.

Application filed December 6, 1888. Serial No. 292,858. (No model.) Patented in Victoria July 13, 1887, No. 5,177; in New South Wales October 31, 1887, No. 303, and in England May 14, 1888, No. 7,153.

*To all whom it may concern:*

Be it known that I, WALTER COOP, a subject of Her Majesty the Queen of Great Britain, residing at No. 41 Little Lonsdale Street, East, in the city of Melbourne, in the British Colony of Victoria, have invented an Improved Apparatus for Manufacturing Lead Shot or Balls, (for which I have obtained Letters Patent in Victoria, No. 5,177, bearing date July 13, 1887; also Letters Patent in New South Wales, No. 303, bearing date October 31, 1887, and I have also filed an application with provisional specification in Great Britain, No. 7,153, bearing date May 14, 1888,) the following being a specification of my invention.

This invention consists of an improved apparatus for manufacturing lead shot or balls from sheet-lead, instead of casting them, as ordinarily. Thus I take a sheet of lead of any convenient width and of a thickness fully equal to the diameter of the shot or balls to be manufactured, and this sheet of lead I feed to my improved punching-machine, which is furnished with one or more lines of steel punches and dies and with an intermittent feed motion which feeds the sheet of lead onward immediately the line of punches has in its upward stroke cleared each line of holes. The punchings or pieces of lead which are ejected through the dies are delivered to a box or receptacle underneath. The under end of the punches I form concave or semi-spherical, and so by this means during the process of punching they also compress or stamp the top end of the "punchings" into a semi-spherical form, while the bottom ends of the punchings are rounded by reason of their bulging out during the process of punching. These lead punchings may be then placed in a suitable finishing-machine—such as a metal barrel or cylinder having agitating-arms within it—and this barrel is rotated in one direction, while the spindle upon which it revolves, and which also has agitating-arms on it, is rotated in a reverse direction, so that the punchings therein are agitated and rubbed one upon the other until they are formed sufficiently spherical, when they are transferred to another plain rotating barrel, in which the shot or balls are sufficiently polished or brightened to complete their manufacture.

In order that my invention may be well un-

derstood, I will now describe it with reference to the accompanying sheet of drawings, which shows my improved apparatus used in manufacturing the shot or balls.

Figure 1 is an elevation of the feed-gear side of the punching-machine, and Fig. 2 an elevation of its opposite side, showing the line of punches. Fig. 3 is a sectional elevation looking from the line *a a*, Fig. 1, toward the feed-gear. Fig. 4 is a plan of the under side of the line of punches, showing it attached to its sliding block. Fig. 5 is a side view of the eccentric-rod for connecting the main shaft with the sliding block. Fig. 6 is an enlarged view of a few of the punches, showing them secured to their supporting-bar, and showing also the semi-spherical cavity at their lower ends. Fig. 7 shows one of the lead punchings as delivered from the punching-machine; Fig. 7<sup>a</sup>, a strip of sheet-lead, the one end of which has several lines of punchings taken from it. Fig. 8 shows a plan of a cutter which would cut the sheet-lead into cubical pieces in the one operation without its being previously cut into strips, such cutters also taking the place of the line of punches of the punching-machine.

In Figs. 1 to 7, which show the several views and details of the punching-machine, A are the punches, secured, as shown, to the bar A', which is held by the pinching-screws B' in position below the under surface of the sliding block B.

C is the die-plate for the line of punches secured to the bed-plate C'. The die-plate C has a guide-plate C<sup>2</sup> for the punches secured to it, with a space between them just sufficient to admit the thickness of sheet-lead which is to be punched. The punches A are hollowed out at their lower ends, as shown in Fig. 6, so as to press or stamp the top ends of the punchings into a semi-spherical form. The sliding block B is arranged at its ends on the vertical guides D', attached to the brackets D, the lower flanges of which are bolted to the bed-plate C'. The top part of each bracket D is furnished with bearings to receive the main shaft E, which has upon it the fly-wheels or pulleys E'.

F are eccentric-rods, the journals for which on the shaft E are formed sufficiently eccentric to give the necessary up-and-down stroke



to the sliding block B, which carries a spindle B<sup>2</sup>, to which the lower ends of the eccentric-rods are connected.

G are the feed-rollers supported in suitable bearings in the brackets C<sup>3</sup>, attached to the bed-plate C', and the lower of these rollers has an intermittent motion imparted to it, its spindle G' having secured at its end a ratchet-wheel G<sup>2</sup>, at each side of which is an arm G<sup>3</sup>, arranged loosely on such spindle, while a pawl G<sup>4</sup> is centered between them. The outer ends of arm G<sup>3</sup> bear a transverse pin for connection to the eccentric-rod G<sup>5</sup>, the strap G<sup>6</sup> of which is arranged on an eccentric G<sup>7</sup>, secured on the main shaft E.

G<sup>8</sup> is an outer bearing for the spindle G'.

G<sup>9</sup> are toothed wheels for communicating motion from the lower to the upper feed-roller.

H is a piece of sheet-lead having several rows of punched holes H' in it, and one of the punchings H<sup>2</sup> from which is shown to an enlarged scale in Fig. 7.

C<sup>4</sup> is a box or receptacle under the punching-machine, into which the punchings fall.

The mode of operation with the machine is as follows: The punching-machine being set in motion, a sheet of lead of the requisite width is fed between the rollers G G, which carry it forward intermittingly to between the line of punches and its die-plate, such feed-motion being intermittent to allow the sheet of lead to lie at rest while the punches are passing through it and until they rise in their upward stroke clear of its top surface. The pawl-and-ratchet feed-gear then rotate the feed-rollers sufficiently to carry the sheet of lead forward far enough to receive the punches in their next downward stroke. The ejected lead punchings H<sup>2</sup> fall into the box C<sup>4</sup> under the machine, their upper surface having been rounded by the concave end of the punches A. A sufficient quantity of these lead punchings is then placed in a suitable rounding-machine, that they may be thoroughly rubbed, beaten, or ground on one another until they are finally rounded or formed sufficiently spherical for the purpose. The now rounded shot or balls are removed from this machine and cleansed of all black-lead. Then they are placed in the polishing-machine, which is rotated until the shot or balls are effectually brightened or polished by rolling and rubbing upon each other, when they are removed and the manufacture of the shot or balls is completed.

Although I have described the shot or balls as being manufactured from punchings from sheet-lead, I may dispense with the punching-machine and make them from sheet-lead cut into cubical pieces of the requisite size and rounded in either of the types of rounding-machines; or I could take lead wire of the proper diameter and cut it into the desired lengths and place such lengths in the rounding-machine, and so by either of these means manufacture the shot or balls.

Having fully described my invention, what I desire to claim and secure by Letters Patent is—

1. In a machine for the manufacture of shot, the combination of a series of punches A, concaved upon their under ends, an opposing die-plate C, mechanism for reciprocating said punches toward and from the plate, the feed-rolls, and means connected with said mechanism for intermittently rotating the feed-rolls during the upward movement of the punches, substantially as set forth.

2. The combination of the parts forming the machine for producing the punchings, consisting, essentially, of a line of punches A, concaved on their under ends and arranged on a sliding block, the lateral securing-screws B', a fixed die-plate, and a pair of intermittent feed-rolls and their other appurtenant parts, substantially as herein set forth.

3. The combination, with the cutting devices adapted to reduce the lead to small pieces, of the shaft E and eccentric mechanism connected with and reciprocating a portion of the cutters, feed-rolls for supplying the lead in a direction at right angles to the plane of said reciprocation, a ratchet-and-pawl mechanism, which rotates the rolls in one direction to produce the feed, an eccentric G<sup>7</sup> on shaft E, and an eccentric-rod G<sup>5</sup> and arm G<sup>3</sup>, connecting the eccentric G<sup>7</sup> and said ratchet-and-pawl mechanism, substantially as set forth.

4. In a machine for the manufacture of shot, the combination of a series of punches concave upon their cutting ends, an opposing die-plate C, mechanism for reciprocating said punches toward and from the plate, the feed-rolls, and means connected with said mechanism for intermittently rotating the feed-rolls during the upward movement of the punches, substantially as set forth.

5. The combination, with a bar A', of a series of punches mounted thereon, an opposing perforated plate, guides D', engaging said bar, the shaft E, provided with eccentrics, rods F, connecting the latter with the punch-carrying bar, the feed-rolls geared together, a ratchet G<sup>2</sup>, connected with one of said rolls, a pawl engaging therewith, an arm G<sup>3</sup>, carrying the pawl, an eccentric G<sup>2</sup> on shaft E, and a rod G<sup>5</sup>, connecting the latter eccentric with the arm, substantially as set forth.

6. The combination, with the series of punches A, concaved upon their under ends, and the bar carrying the same, of an opposing perforated plate C, having the perforated guide-plate C<sup>2</sup>, and the feed-rolls adapted to pass the lead to the punches and between said plates, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WALTER COOP.

Witnesses:

BEDLINGTON BODYCOURT,  
W. H. CUBLEY.