Grandy & Osgood,

Shot Machine,

No. 1,965. Patented Feb. 3, 1841.

Fig. 3

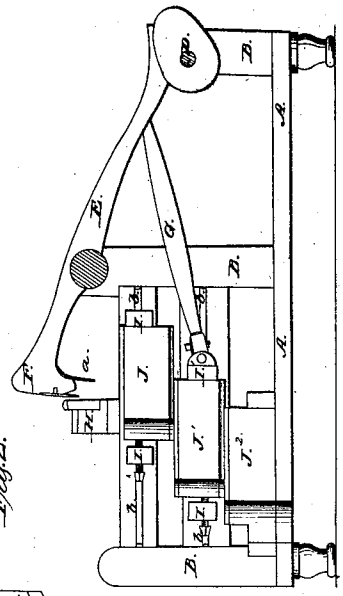

Fig. 2.

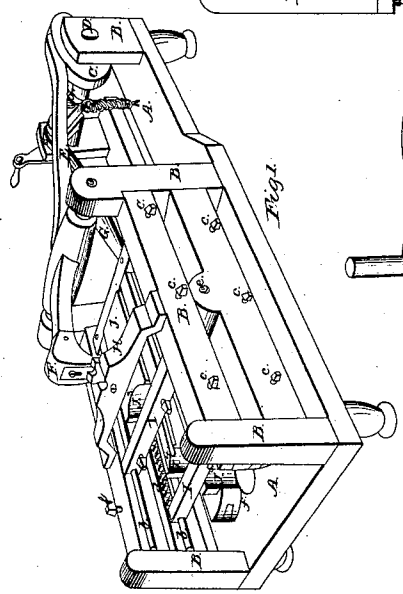

Fig. 1.

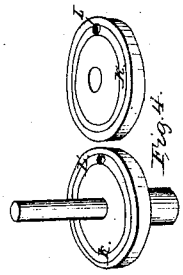

Fig. 4.

UNITED STATES PATENT OFFICE.

LEWIS GRANDY AND THOMAS OSGOOD, OF TROY, NEW YORK.

MACHINE FOR MANUFACTURING CANNON-BALLS AND OTHER KINDS OF SHOT FROM MALLEABLE IRON, LEAD, &c.

Specification of Letters Patent No. 1,965, dated February 3, 1841.

To all whom it may concern:

Be it known that we, LEWIS GRANDY and THOMAS OSGOOD, of the city of Troy, in the county of Rensselaer and State of New York, have invented a new and useful Machine for Manufacturing Cannon-Balls, Bullets, and other Kinds of Shot from Malleable Iron or other Metal; and we do hereby declare that the following is a full and exact description thereof.

The metal from which the ball, or bullet, is to be made by means of our machine, is first to be formed into round bars of a size adapted to the kind of shot to be formed. When these are to be made of malleable-iron, the metal must, preparatory to its being passed into the machine, be brought to a degree of heat nearly equal to that requisite for welding, in a suitable forge, or furnace, prepared for that purpose. When the balls, or bullets, are to be made from lead, or other soft metal, the heating process is omitted. The machine consists of suitable cutters for cutting off the proper quantity of metal from the bar to form a single ball, or shot, and of an apparatus for receiving the piece so cut off, and rolling it into the spherical form. The rolling is effected by means of channeled pieces of cast-iron, or of steel, which we will denominate swages. The channels in these, when the swages are made straight, are semi-cylindrical, and by placing such swages in pairs, one over the other, with their channels coinciding, a cylindrical cavity is thereby formed. These swages may be either straight, or circular; and to one, or to both, of each pair a longitudinal reciprocating, or a revolving, motion, as the case may be, must be communicated by suitable machinery.

In the accompanying drawing, Figure 1, is a perspective view of our machine, furnished with straight swages; and Fig. 2, is a longitudinal vertical section thereof from end to end.

In each of the figures, where like parts are represented they are designated by the same letters of reference.

A, A, is the bed plate, or foundation, of the machine, which, as well as the frame generally, we make of cast-iron; B, B, are the standards and frame work, which may be made in any form calculated to sustain the working parts of the machine.

C, is a cam on a main driving shaft D, which shaft is to be made to revolve by any adequate power. The cam C, operates upon the lever E, and thereby raises and lowers a cutter at its end F, by which the metal to be rolled into balls is separated from the bar. The shaft D, has on it, also, a crank G, from which a reciprocating motion is to be communicated to the frames which contain the swages, through the intermedium of the connecting rod, or shackle bar, G′. The cutter in the head F, of the lever E, acts against a corresponding cutter fixed in the crosshead H, which extends across the frame, from side to side of the machine; these cutters are fixed in place by screws, or wedges, in a manner well known to machinists; *a*, is a gage plate, which may be adjusted in its distance from the cutters; the end of the bar to be cut bears against this plate as it is fed into the machine.

I, I, are two swage frames which contain the swages, and slide back and forth on guide tongues *b*, *b*, affixed within the main frame, and regulated by set screws *c*, *c*, *c*. On the lower sides of the swage frame I, and on the upper sides of I′, there are racks as shown at *d*, and these racks are geared together by intermediate pinions, one on each side of the main frame, revolving on fixed gudgeous, the end of one of which gudgeons is shown at *e;* by this arrangement, when the swage frame I, is moved in one direction by the shackle bar G′, the frame I′, will be moved in the contrary direction. In the arrangement, as shown in the drawing, J, is the upper, J′, the middle, and J², the lower swage. In Fig. 3, I have shown the middle swage J′, and its carriage separate from the other parts of the machine.

The piece to be rolled is cut off from the bar of metal at the time when the upper swage J, is nearest to the rear end of the machine, and it falls through a space J‴, formed by making a hollow in the fore end of the swage, which space is then directly under the cutters. The cut piece falls upon the swage J′, near its rear end, and by the motion given to the two swages J, and J′, it is rolled along in the cylindrical channel between them. This channel is not actually cylindrical along its whole length, but is rimmed out, or enlarged, in the part where the piece to be rolled first enters it, so as to be what may be denominated bell-mouthed, for the purpose of causing it the more read-

ily to reduce the asperities upon the cut piece of metal.

The swage J′ is a double swage, having a semi-cylindrical hollow along its lower, as well as along its upper, side; and below it is the fixed swage J″, resting upon the bed plate A, A. The rolled ball when it reaches the fore end of the swage J′, drops through an opening J‴, similar to that on J, marked J‴, and it falls on to the rear end of the fixed swage J″, where it receives its final rolling, and is delivered at its fore end J^5, and falls in a finished state through a hole *f*, in the bed plate.

We sometimes vary the form of our machine by using circular swages, either in whole or in part. A pair of such swages is shown in Fig. 4; these may take the place of the fixed swage J″, and its corresponding half, on the lower side of J′. There are to be on the faces of these circular swages, hollows K, K, the cross section of which is a semicircle. The ball may, in this case, drop from the upper reciprocating swages through an opening L, and be received in the hollow K, K, somewhat enlarged at the part into which the ball first passes. To one, or both, of these circular swages, a revolving motion is to be given by toothed gearing, in any of the ordinary modes of communicating such motion; and when rolled round the balls fall out through the opening L′. This plan of using circular swages has the advantage of changing the position of the ball in all directions, as it is rolled round, thereby giving to it a more perfect finish than could be given with straight reciprocating swages alone. There may be two pair of such revolving swages, instead of the two pair of reciprocating ones; the principle of action, and the result attained, being the same, as it is only the mode of gearing that is changed, in order to meet the change in the form of the swages.

Having thus fully described the nature of our machine for manufacturing ball and shot, and shown the manner in which the same operates, we do hereby declare that we do not claim either of the separate parts thereof as of our invention; nor do we intend to limit, or confine, ourselves to the particular manner of connecting, or of giving motion to, the respective parts, but to use any of the devices, or means, for effecting these objects known to machinists; but—

What we do claim as constituting our invention, is—

The manner in which we have combined the cutting apparatus for separating the pieces of metal from the bars, with the reciprocating straight swages, or with revolving swages, or with straight and revolving swages combined, in such manner as that the pieces of metal cut off and to be rolled into balls, shall pass successively between two, or more, pair of swages, in a machine constructed and operating substantially in the manner of that herein described and represented.

LEWIS GRANDY.
THOMAS OSGOOD.

Witnesses:
COLLINS PECK,
H. V. W. MARTIN.