

UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF SMALL TUBULAR STRINGS OF POWDER.

SPECIFICATION forming part of Letters Patent No. 773,844, dated November 1, 1904.

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To all whom it may concern:

Be it known that I, HENRY C. ASPINWALL, a citizen of the United States, and a resident of Pompton township, in the county of Passaic and State of New Jersey, have invented a new and useful Apparatus for the Manufacture of Small Tubular Strings of Powder, of which the following is a specification.

My invention relates to apparatus for the manufacture of small tubular strings of powder, with the object in view of providing a uniform perforation in the grain, and thereby insuring a regularity of pressure from charges of corresponding weights.

In order to produce a small perforated grain by means of forming the powder into tubular strings having a diameter corresponding to diameter of the grain and subsequently cutting the strings into lengths desired, there is a tendency when the strings are made with sufficient rapidity to warrant their production on a practical scale for the walls of the strings to collapse as they pass from the core, due to some extent, at least, to the formation of more or less of a vacuum in the immediate neighborhood of the end of the core, because of the frictional retarding of the air-current through a long opening of such minute proportions as is required for the manufacture of a small grain.

In using the term "small grain" it is to be understood that I am differentiating my present invention from those inventions relating to the formation of cannon-powder where the rods and their perforations are sufficiently large to maintain their forms as they issue from the mold and which cannot be properly considered as within the limits of what are recognized as capillary tubes or perforations so small as to exert a material hindrance to the passage of air-currents at any considerable speed under ordinary pressure. In short, my present invention belongs to the art of manufacturing sporting and rifle powder or powder for small-arms, as distinguished from the art of manufacturing cannon-powder.

The apparatus which forms the subject-mat-

ter of my present application is arranged to overcome this tendency of the walls of the string of powder to collapse, thereby rendering it practicable to form the string with great rapidity and so cheapen the cost of the output, while at the same time rendering its structure uniform.

In the accompanying drawings, Figure 1 represents in vertical section, partly in elevation, so much of a pneumatic cylinder and piston working therein as is sufficient to show the location of the die and its support, to which my present invention is particularly directed. Fig. 2 is an enlarged view of the die in side elevation. Fig. 3 is a top plan view of the same. Fig. 4 is a vertical central section through the die, the core-holder, the core, and the strainer-plate. Fig. 5 is a horizontal section along the line 5 5 of Fig. 4. Fig. 6 is a bottom plan view. Fig. 7 is a top plan view with the strainer-plate removed; and Fig. 8 is a top plan view of the die with the core-holder, core, and strainer-plate removed.

In practice the die, which contains the core-holder, core, and strainer-plate, is screwed into the head *a* of a cylinder A, in which a piston or plunger B is reciprocated by any suitable power—such, for example, as hydraulic—for the purpose of forcing the material placed within the cylinder through the die screwed into the head *a*. The tubular string of powder escaping from the die is intended to pass through an opening *c* in a suitable support C, on which the cylinder A is mounted. The particular mechanism for driving the piston B and the particular arrangement of the cylinder A and its support form no part of my present invention and may be of any well-known or approved construction. The die is denoted by D and has its upper exterior portion screw-threaded at *d* for the purpose of screwing into the head *a* of the cylinder and its lower portion *d'* made polygonal for the purpose of conveniently receiving a wrench to screw it into and out of position.

The die D is made hollow, the lower por-

tion being made funnel-shaped, as shown at d^2 , Fig. 4, terminating in an opening d^3 , having a diameter corresponding to the extreme diameter of the string of powder as it leaves the die.

The upper portion of the interior of the die D is preferably made slightly taper, for the reception therein of the core-holder E. The core-holder E is of skeleton formation, consisting of a hub e and spokes e' radiating from the hub e and connecting with a continuous rim portion e^2 .

The core (denoted by F) has its upper portion f exteriorly screw-threaded, by means of which it is screwed into the hub e of the core-holder, and its lower portion within the funnel-shaped opening d^2 of the die is made tapering toward the opening d^3 in the die, the extreme end f' of the core extending centrally through the opening d^3 in the die to a point in proximity to the outer face thereof. The core has a central perforation f^2 extending longitudinally therethrough, terminating at its upper end in an enlarged opening f^3 , closed at its top by a screw f^4 . The enlarged opening f^3 in the core communicates, by means of radial passages f^5 through the wall of the core, with an annular groove f^6 , (see Fig. 5,) surrounding the core within the hub e of the core-holder. The annular groove f^6 in the exterior wall of the core communicates, by means of passage-ways e^3 in the spokes e' , with an annular groove d^4 in the inner wall of the die D, and the annular groove d^4 in turn communicates with the exterior atmosphere by means of passage-ways d^5 , leading from the groove d^4 through to the outer wall of the die, preferably at points intermediate of the screw-threaded and polygonal portions of the die.

The inner end of the die D is provided with a strainer-plate G, provided with manifold perforations g , through which the material

from within the cylinder A is forced, in order to remove any foreign substance or lumps of any considerable size from the material before it is forced through the opening in the die around the end f' of the core.

The structure is such that as the material is forced out of the opening d^3 in the die and around the end f' of the core a supply of air will be fed or forced through the several channels, hereinabove indicated, from the atmosphere into the interior of the tubular string as fast as the latter is formed and escapes from the end of the core, thereby effectually preventing the tendency to form a vacuum and the consequent tendency of the walls of the string to collapse.

What I claim is—

1. Apparatus for forming a small tubular string of powder comprising a perforated core, a skeleton core-holder provided with one or more air-perforations in communication with the perforated core, an annular air-chamber in communication with said perforations through the skeleton core-holder, one or more air-passages through the die in communication with said annular chamber and means for forcing the material through the die around the perforated core, substantially as set forth.

2. Apparatus for forming a small tubular string of powder comprising a die, a core, a strainer-plate, means for forcing the material through the strainer-plate and thence through the die around the core and means for supplying air to the interior of the string as it leaves the core, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of April, 1900.

HENRY C. ASPINWALL.

Witnesses:

FREDK. HAYNES,
EDWARD VIESER.