No. 746,375. PATENTED DEC. 8, 1903.

F. I. DU PONT.

APPARATUS FOR MOLDING SMOKELESS POWDER.

APPLICATION FILED APR. 7, 1903.

NO MODEL.

Fig. 1

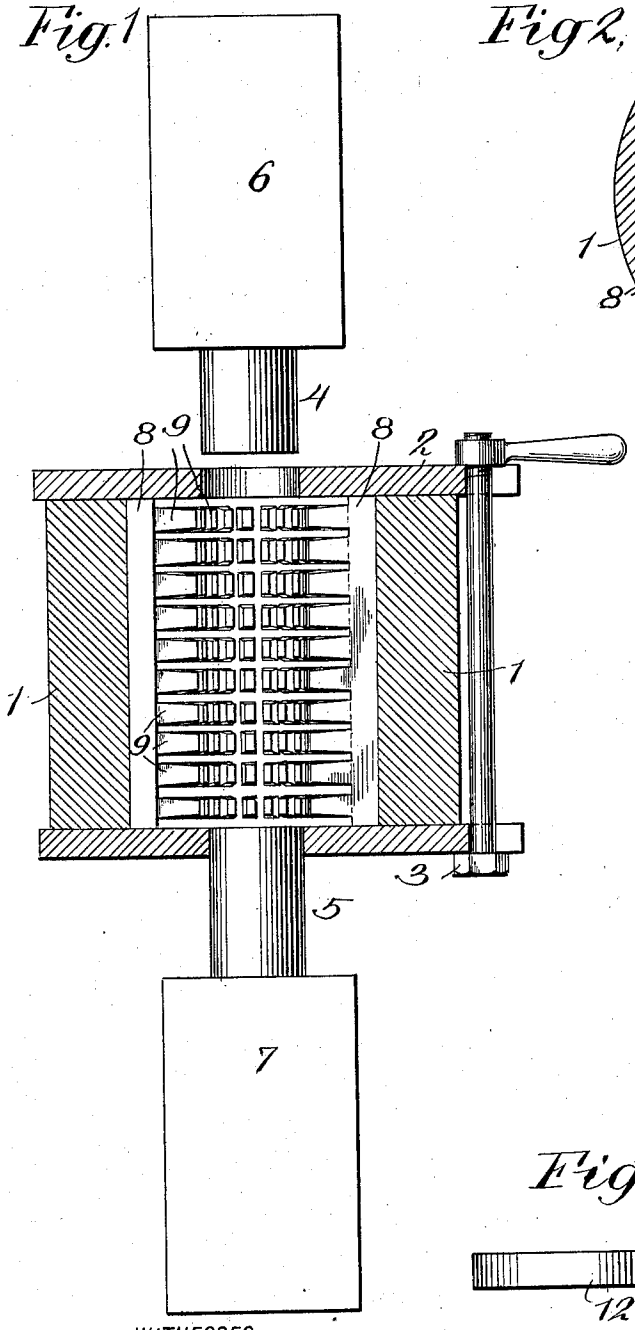


Fig. 2,

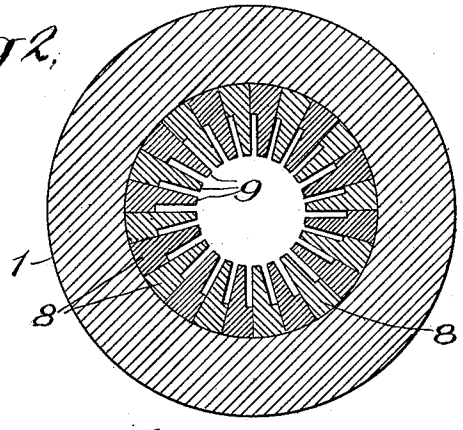


Fig. 4,

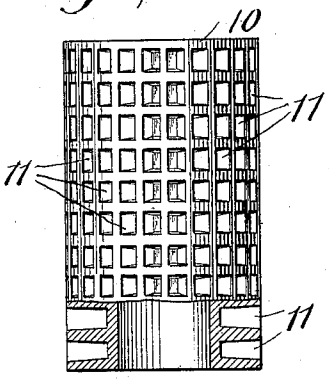


Fig. 5,

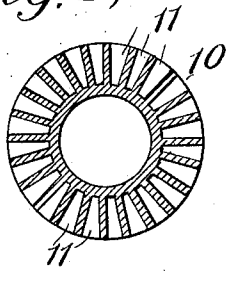


Fig. 3,

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No. 746,375. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

FRANCIS I. DU PONT, OF WILMINGTON, DELAWARE.

APPARATUS FOR MOLDING SMOKELESS POWDER.

SPECIFICATION forming part of Letters Patent No. 746,375, dated December 8, 1903.

Application filed April 7, 1903. Serial No. 151,443. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS I. DU PONT, a citizen of the United States, residing in the city of Wilmington, county of Newcastle and State of Delaware, have invented certain new and useful Apparatus for Molding Smokeless Powder; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to apparatus for molding smokeless powder; and it consists in a novel construction of press whereby hollow cylinders of smokeless powder having lateral perforations or recesses may be produced.

The apparatus herein illustrated and described is particularly intended for molding smokeless powder into shapes appropriate for use in the charges of large ordnance.

The objects of my invention are to facilitate the combustion of smokeless powder in the bore of the gun, to cause the grains to burn steadily and uniformly, and to make the apparatus for forming the grains simple, inexpensive, and easily operated.

I will now proceed to describe my invention with reference to the accompanying drawings, in which one form of apparatus embodying my said invention is illustrated, and will then point out the novel features in claims.

In the drawings, Figure 1 shows a central longitudinal section of the press-cylinder and the end plates thereof, the segmental lining of the cylinder being in place, and also shows the press-plungers and the cylinders for operating the same. Fig. 2 shows a transverse section of the press-cylinder, the segmental lining of which is shown in place. Fig. 3 shows an ejector-plate used for forcing out the finished powder grain. Fig. 4 shows a side elevation and partial longitudinal section of the finished powder grain. Fig. 5 shows a transverse section of the powder grain.

The press comprises a cylinder or chamber 1 of suitable strength having removable end plates 2 and 3 and press-plungers 4 and 5, moved by pressure-cylinders 6 and 7, said plungers adapted to enter the cylinder 1 through openings in the end plates 2 and 3.

The press-cylinder has a segmental lining composed of separable segments or staves 8, each provided with a series of inwardly-projecting points or fingers 9, constituting cores to form lateral perforations or recesses in the powder grain formed in the press.

A powder grain or cylinder such as will be formed in the press is shown in Fig. 4, and consists of a hollow cylinder 10 of smokeless powder, in the outer surface of which are a series of perforations or recesses 11, arranged radially. The thickness of the material forming the walls between adjacent recess is substantially uniform, and preferably is substantially equal to the thickness of material between the bottoms of the depressions and the internal bore of the cylinder. All portions of such a grain burn with equal rapidity and the grain retains its shape until completely consumed.

In order that the walls between the depressions of the powder grain may be of uniform thickness, the spaces between the points or cores 9 are uniform, and the sides of adjacent points are substantially parallel, the said points being of substantially rectangular section, as shown; but while it is preferable that the points or cores should have the form shown in order that the thickness of the walls of the grain may be uniform I do not limit myself to any particular shape or the core-points, or to a shape such that it will make the walls between the depressions of the grain of uniform thickness.

The diameter of the plungers 4 and 5 is such that they will enter the press-cylinder between the core-points of the segmental lining, and preferably the clearance between the plungers and the ends of the said core-points is substantially equal to the distance between adjacent core-points, so that the thickness of the walls between the bottoms of the depressions in the powder grain and the internal bore of the grain may be substantially equal to the thickness of the walls between adjacent depressions.

It is obvious that while the press-chamber is preferably circular in cross-section, as shown, it may have other cross-sections to adapt it to produce forms other than cylindrical, or the same result may be accomplished by suitably forming the segments or staves of the lining of the chamber.

The manner of using the press is as follows: The segmental lining of the cylinder and the end plates 2 and 3 being in place, a suitable quantity of the powder from which to form the grain is introduced into the cylinder through the openings in the end plates and the plungers 4 and 5 are advanced and caused to squeeze the said material into the spaces or interstices between the core-points of the cylinder. Preferably a slight excess of the material is introduced, this excess being permitted to escape around the sides of the plungers. The plungers are then withdrawn, the end plates 2 and 3 removed, and the ejector-plate 12 (shown in Fig. 3) is placed in front of one of the plungers, and that plunger is then advanced, the plate 12 forcing out of the cylinder the segmental lining carrying the finished powder cylinder. When the cylinder has been ejected, the segments of the lining are picked off from the cylinder and are replaced in the press-cylinder and the operation is repeated.

The plungers may be operated by any suitable power. The end plates may be secured to the cylinder by any suitable means which will permit their ready removal. In the drawings bolts and nuts are shown for this purpose.

What I claim is—

1. In a press for molding plastic material, the combination with a press-chamber, and a lining therefor comprising a plurality of separable sections provided with inwardly-projecting core-points, of means for pressing plastic material into the interstices between said core-points.

2. In a press for molding plastic material, the combination with a press-chamber, a lining therefor comprising a plurality of separable sections provided with inwardly-projecting core-points, and a plunger adapted to press plastic material into the interstices between said core-points.

3. In a press for molding plastic material, the combination with a press-chamber, and a lining therefor comprising a plurality of longitudinal strips or sections separable from each other and each having a plurality of inwardly-projecting core-points, of means for pressing plastic material into the interstices between said core-points.

4. In a press for molding plastic material, the combination with a press-chamber, and a lining therefor comprising a plurality of longitudinal strips or sections separable from each other and each having a plurality of inwardly-projecting core-points, of means for pressing plastic material into the interstices between said core-points, and means for ejecting the said lining with the molded article from the press-chamber.

5. In a press for molding plastic material, the combination with a press-chamber and a lining therefor comprising a plurality of separable sections, having inwardly-projecting core-points, the interstices between said core-points being of substantially uniform width, of means for pressing plastic material into said interstices.

6. In a press for molding plastic material, the combination with a press-chamber and a lining therefor comprising a plurality of separable sections, having inwardly-projecting core-points, the interstices between said core-points being of substantially uniform width, of a plunger for pressing plastic material into said interstices, the space between the said plunger, when the latter is within the chamber, and the ends of the said core-points being substantially equal to the width of the spaces between the core-points.

7. In a press for molding plastic material, the combination with a press-chamber, a lining therefor comprising a plurality of separable sections having inwardly-projecting core-points, and removable end plates, one of which plates is apertured to permit the entrance of a plunger, of a plunger for pressing plastic material into the interstices between said core-points.

8. In a press for molding plastic material, the combination with a press-chamber, of a lining therefor comprising a plurality of separable sections having inwardly-projecting core-points adapted to form depressions or recesses in the exterior surface of an article molded within said chamber.

9. In a press for molding plastic material, the combination with a press-chamber, of a lining therefor comprising a plurality of separable sections having inwardly-projecting core-points adapted to form depressions or recesses in the exterior surface of an article molded within said chamber, said lining being movable axially with respect to the cylinder.

In testimony whereof I affix my signature in the presence of two witnesses.

FRANCIS I. DU PONT.

Witnesses:
CLIFFORD V. MANNERING,
R. J. COYLE.