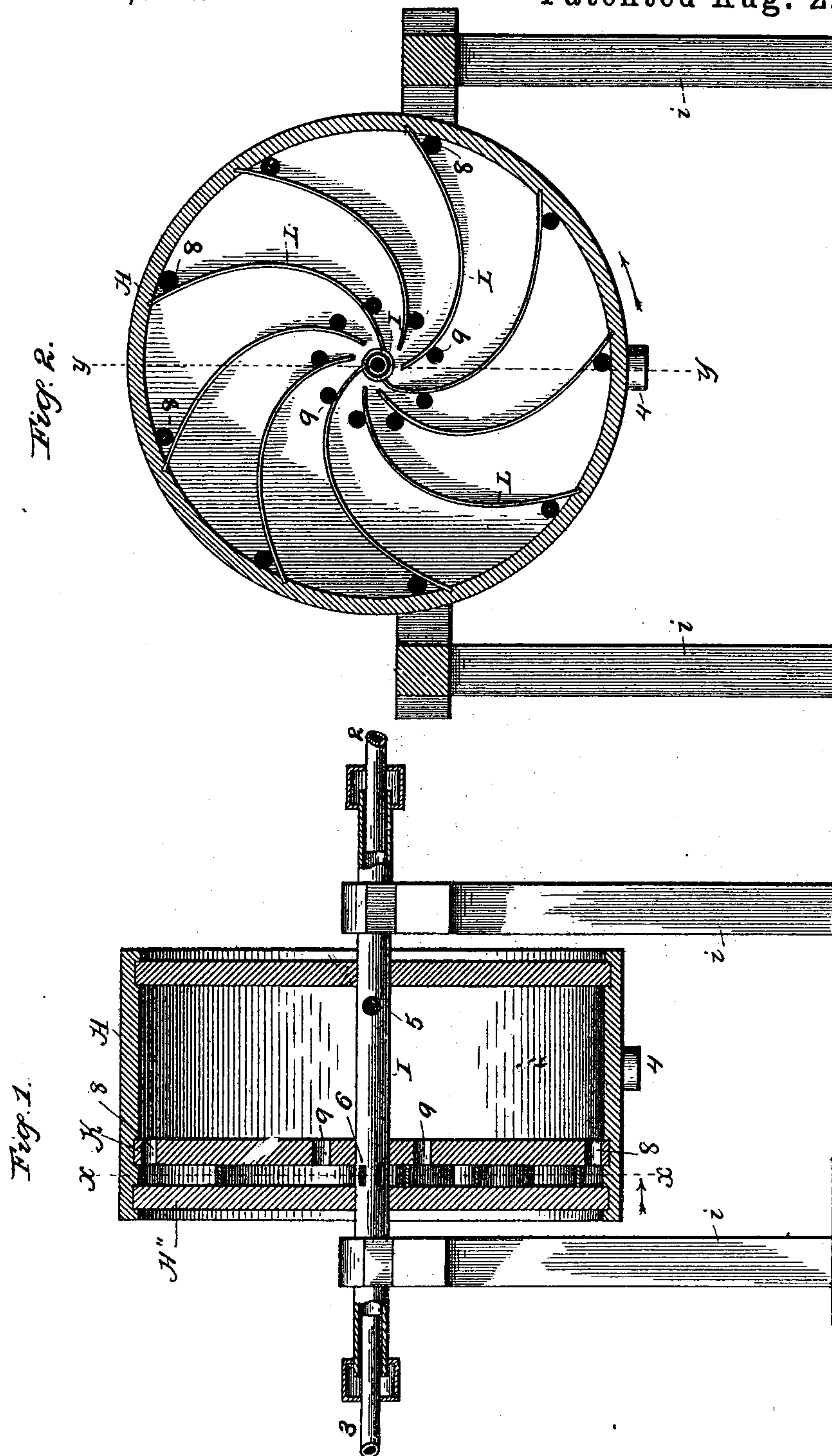


(No Model.)

F. G. DU PONT.
APPARATUS FOR PRODUCING SMOKELESS EXPLOSIVES.
No. 503,584. Patented Aug. 22, 1893.



Witnesses.
Victor J. Evans.
L. M. Marble.

Inventor.
Francis G. DuPont.

By *E. M. Marble*
Attorney.

UNITED STATES PATENT OFFICE.

FRANCIS G. DU PONT, OF WILMINGTON, DELAWARE.

APPARATUS FOR PRODUCING SMOKELESS EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 503,584, dated August 22, 1893.

Application filed December 30, 1892. Serial No. 457,154. (No model.)

To all whom it may concern:

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

My invention relates to an improvement in apparatus for producing smokeless powder, and it consists in an improved rotating barrel for separating both water and steam from the grains of explosive, which will be hereinafter fully described and particularly pointed out in the claims.

In the treatment of grains of smokeless explosive according to some processes, and particularly to the process of producing smokeless explosives described in the application of Francis G. du Pont and Pierre S. du Pont, filed December 20, 1892, Serial No. 455,901, it is found desirable to agitate the grains with removal of any volatile product which may be on the surface of the grains by rotation in an atmosphere of steam. It is also desirable to provide means for removing from the grains any water of condensation which may be formed by the steam, or otherwise, as also for removing the steam after it has circulated through the contents of the barrel.

The object of my invention is to provide means for removing from grains of explosive both water and steam, in an apparatus which will give the necessary agitation. To this end a rotating barrel, formed with a tubular axis provided with steam inlet and outlet openings, is provided with an inner bulkhead, placed in close proximity to one of the heads of the barrel, in which are formed two series of openings, one near its periphery for leading away the water of condensation, and one near its center for the escape of the steam. Between this inner bulkhead and the head of the barrel are arranged a series of cycloidal guides or chutes, which conduct both water and steam, received in the space between said inner bulkhead and the head of the barrel to steam outlet openings in the central axis.

My invention is fully represented in the drawings accompanying and forming a part of this application, in which the same reference letters and numerals refer to the same or corresponding parts, and in which—

Figure 1 is a section of the rotating barrel taken on the line *y y* Fig. 2, and Fig. 2 is a section of Fig. 1, taken on the line *x x* Fig. 1 and looking in the direction of the arrow, showing the inner bulkhead, the two series of apertures formed therein, and the cycloidal guides or chutes.

Referring to the drawings, H represents the rotating barrel, which is mounted on the tubular axis I, journaled in the supports *i i*, to which axis steam is admitted by the pipe 2, and from which steam is conveyed by the pipe 3.

K represents the inner bulkhead, and is placed in close proximity to the head H² of the rotating barrel. It is formed with two series of apertures, one 8 near its periphery, and one 9 near its center.

Between the bulkhead K, and the head of the barrel H², are arranged a series of cycloidal guides or chutes L, all of which converge toward the central axis.

In the operation of the barrel, the grains of explosive to be acted upon are placed in the barrel through the opening 4, and the barrel is set in rotation in the direction of the arrow Fig. 2, steam being admitted through the aperture 5 in the axis of the barrel. The steam, after circulating through the interior of the barrel, and becoming charged with any volatile product which may be present in the barrel, escapes through the openings 9 in the inner bulkhead K into the space between said bulkhead and the head H² of the barrel, and from thence passes out through the axis I and the pipe 3. The water, formed by condensation or otherwise, collects in the bottom of the barrel, and at the lowest stage of revolution passes out through the opening 8 in the inner bulkhead K into the space between said bulkhead and the head H² of the barrel. It is then conveyed by the guides or chutes L to the openings 6 in the central axis, and from thence out through pipe 3.

In order that the guides or chutes L may perform the function described, the rotation of the barrel must be in the direction indi-

cated by the arrow in Fig. 2. If the direction of rotation be reversed, the agitation of the grains of explosive will take place without removal of water or steam.

5 While I have described this barrel as applied to the treatment of the grains of smokeless powder, it is evident that it may also be used for separating water and steam from any other kinds of grains or substances of like nature, and I do not limit myself to its use in
10 treating smokeless powder. It is also evident that minor changes may be made in the construction from that herein indicated without departing from the spirit and scope of my in-
15 vention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a rotating barrel, the combination with the heads of the barrel and an inner bulkhead,
20 in which is formed a peripheral series of openings, placed near one of said heads, of a tubular axis having steam inlet and outlet openings, and means between said inner bulkhead and the head of the barrel for conveying wa-
25 ter of condensation to said steam outlet opening, substantially as described.

2. In a rotating barrel, the combination with the heads of the barrel and an inner bulkhead, placed near one of said heads and formed with
30 two concentric series of openings, of a tubular axis having steam inlet and outlet openings, and means between said inner bulkhead and the head of the barrel for conveying water of

condensation and steam to said steam outlet opening, substantially as described. 35

3. In a rotating barrel, the combination with the heads of the barrel, and an inner bulkhead placed near one of said heads and formed with a peripheral series of openings, of a tubular axis having steam inlet and outlet openings, 40 and a series of cycloidal guides or chutes arranged between said inner bulkhead and the head of the barrel, substantially as described.

4. In a rotating barrel, the combination with the heads of the barrel, and an inner bulkhead placed near one of said heads and formed with two concentric series of openings, of a tubular axis having steam inlet and outlet openings, and a series of cycloidal guides or chutes ar-
45 ranged between said inner bulkhead and the head of the barrel, substantially as described. 50

5. In a rotating barrel, the combination with the heads of the barrel and the inner bulkhead K, formed with the two series of apertures 8 and 9, of the tubular axis I, having steam in-
55 let and outlet openings 5 and 6, and the cycloidal guides or chutes L arranged between said inner bulkhead and the head of the barrel, substantially as described.

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

FRANCIS G. DU PONT.

Witnesses:

FRANCIS H. HOFFECKER,
THOS. J. BOWEN, Jr.