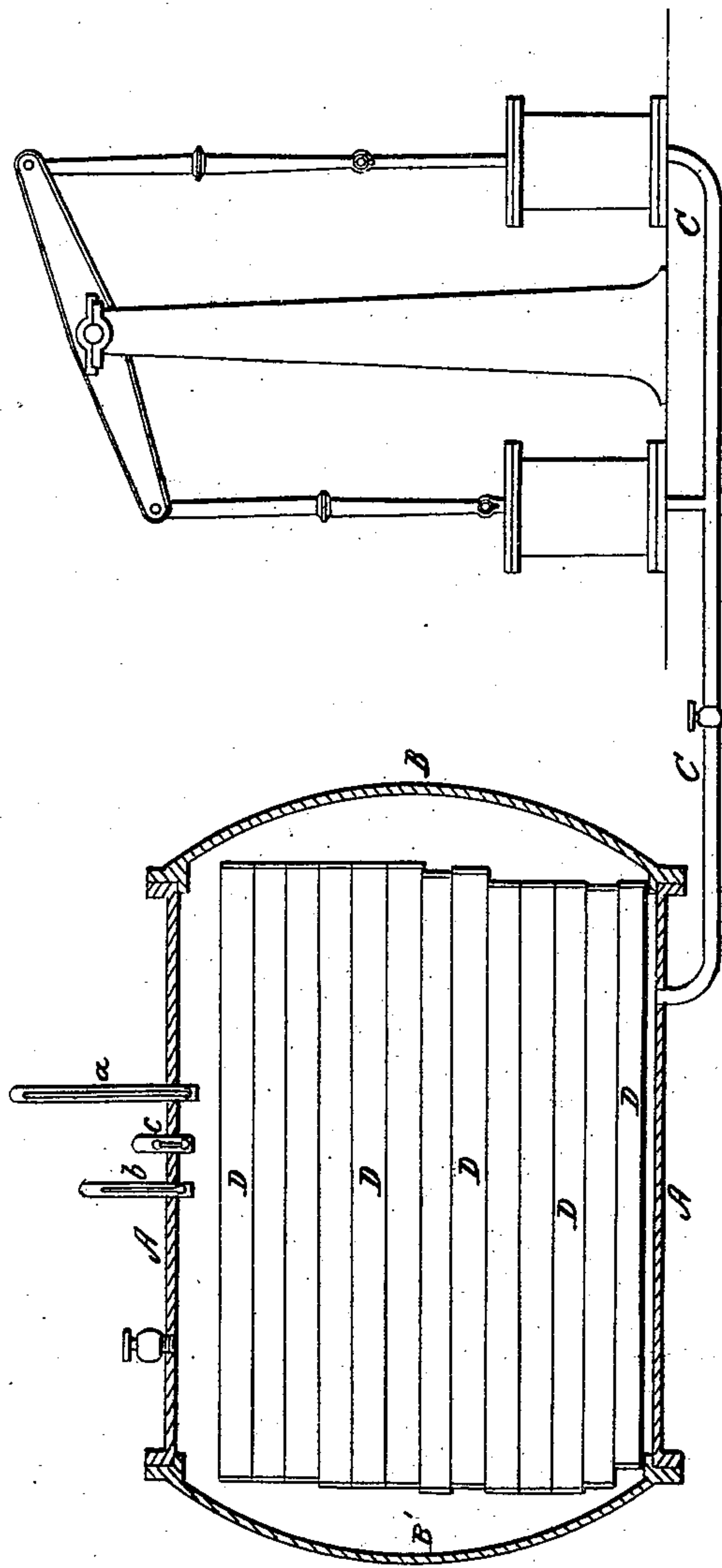


E. E. HENDRICK.
Method of Drying Gunpowder.

No. 71,004.

Patented Nov. 19, 1867.



Witnesses:
R. T. Campbell.
Edw. Schafer.

Inventor:
E. Hendricks.
by his agents
Mason, Hewick & Lawrence.

UNITED STATES PATENT OFFICE.

E. E. HENDRICK, OF CARBONDALE, PENNSYLVANIA.

IMPROVED METHOD OF DRYING GUNPOWDER.

Specification forming part of Letters Patent No. 71,004, dated November 19, 1867; antedated November 9, 1867.

To all whom it may concern:

Be it known that I, E. E. HENDRICK, of Carbondale, in the county of Luzerne, State of Pennsylvania, have invented a new and Improved Method of Desiccating Gunpowder; and hereby declare the following to be a full, exact, and clear description thereof, reference being had to the accompanying drawings, making part of the specification, in which—

Figure 1 is a view of one form of the apparatus conducting the process of drying.

The object of this invention is to facilitate the drying of gunpowder, blasting-powder, and the powder ingredients necessary to be dried in the process of manufacture, by exposing the same *in vacuo*, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

It is a well-known fact that water evaporates much more rapidly when the atmospheric pressure is removed from it. For instance, water boils at from 70° to 72° Fahrenheit in a vacuum; hence, for purposes of evaporation, 72° *in vacuo* is equal to 212° in the open air, and for drying purposes it is much more effectual than 212° in open air, for the reason that with hot air matter can only be made as dry as the air surrounding it, and in moist weather the process of drying powder is much retarded by reason of the air being already heavily charged with moisture. And, in consequence of the danger of keeping large quantities of powder in the dry-house, manufacturers are often obliged to remove it from the dry-house before desiccation is perfectly complete. Some manufacturers dry their powder by steam, at a temperature of about 200°; but it is said that this process injures the powder by causing a hard shell to form on the surface of the grains, and leaves the inside imperfectly dried. Moreover, in consequence of the inevitable expansion and contraction of the steam-pipes, great difficulty is experienced from leaks occurring in the joints, admitting steam into the drying pan or room, which is fatal to perfect desiccation.

To obviate these and other difficulties in the way of rapid and perfect desiccation of gunpowder, I construct an air-tight chamber,

A, of suitable capacity and strength, and of a cylindrical form, for convenience. This chamber is provided with concavo-convex heads B B', one of which, B', is made removable, so as to afford access to the interior of said chamber. The chamber may be made of any other form or shape, provided it is made air-tight and possesses the required strength. A pipe, C, leads from chamber A to an air-exhausting pump of any suitable construction, for the purpose of exhausting the air, or as much of it as practicable, from said chamber after it has been supplied with moist powder and hermetically sealed. The trays D D D are provided with canvas bottoms, so as to allow free exit to the air and vapor. These trays are made of suitable size and shape to fill, as nearly as practicable, all the space in the chamber by placing them one on the top of the other, and can be easily removed from the chamber when its door or head B is open, for charging them with powder or material to be dried, and for removing the dried powder. When the trays are supplied with powder to be dried, and introduced into the chamber, and the head B tightly closed, the air is exhausted from the chamber by operating the air-pump, and the vacuum thus obtained is maintained throughout the process by continuing to operate the air-pump, or else by condensing the vapor in some manner. The degree of exhaustion will be indicated by the barometer *a*, and the temperature by the thermometer *b*, and the hygrometer *c* will indicate the moisture present at every stage of the process, and also show when all the moisture has been exhausted.

This process of desiccating powder is free from all danger of explosion, as it can be conducted at a very low degree of temperature; it is exceedingly simple, as there is nothing required but an air-tight chamber and an air-pump; it is also economical; which reasons alone entitle it to strong claims to superiority over others. But the great reason why this process is certainly in the highest sense paramount to all others is the result of its operations—the effect produced, viz, the entire and certain expulsion of all the moisture from powder treated by it, which is the object always sought in drying powder, but which is seldom attained, as I have proved by taking a fair

sample of the powder found in this market, and, submitting it to this process, have expelled from it in a short time seven-tenths of one per cent. of water. Now, inasmuch as a small amount of moisture renders powder quite inexplosive and valueless, it is evident that the drier it can be made the more explosive it will be, and the more valuable; hence the great importance of this invention is apparent.

Having described my invention, what I

claim as new, and desire to secure by Letters Patent of the United States, is—

The desiccation of gunpowder by submitting the same *in vacuo* to a removal of the atmospheric pressure, for the purpose and in the manner substantially as described.

E. E. HENDRICK.

Witnesses:

ROLLIN H. SMITH,

J. B. TOOMBS.