No. 751,385. PATENTED FEB. 2, 1904.

C. DAVIS.

POWDER CHARGE.

APPLICATION FILED JUNE 6, 1901. RENEWED SEPT. 3, 1902.

NO MODEL.

Fig. 1.

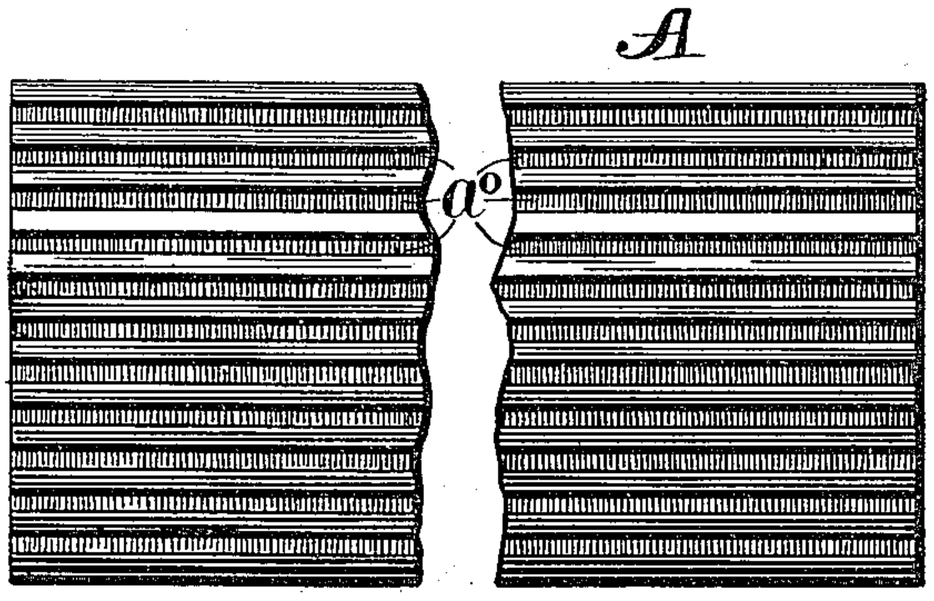
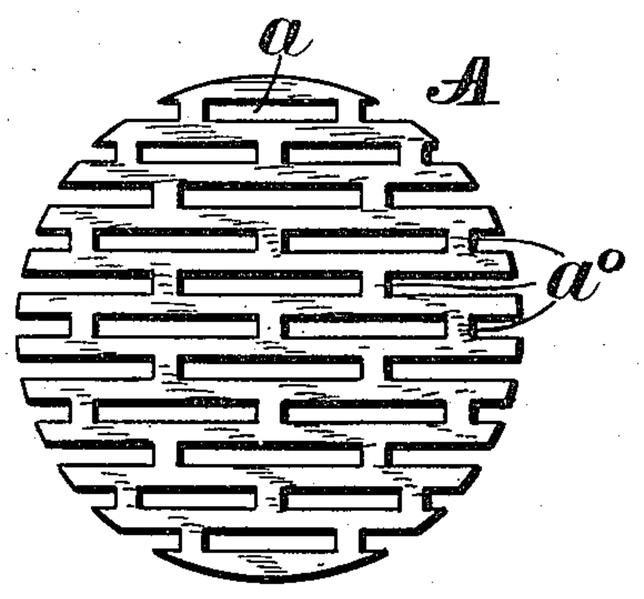


Fig. 2.



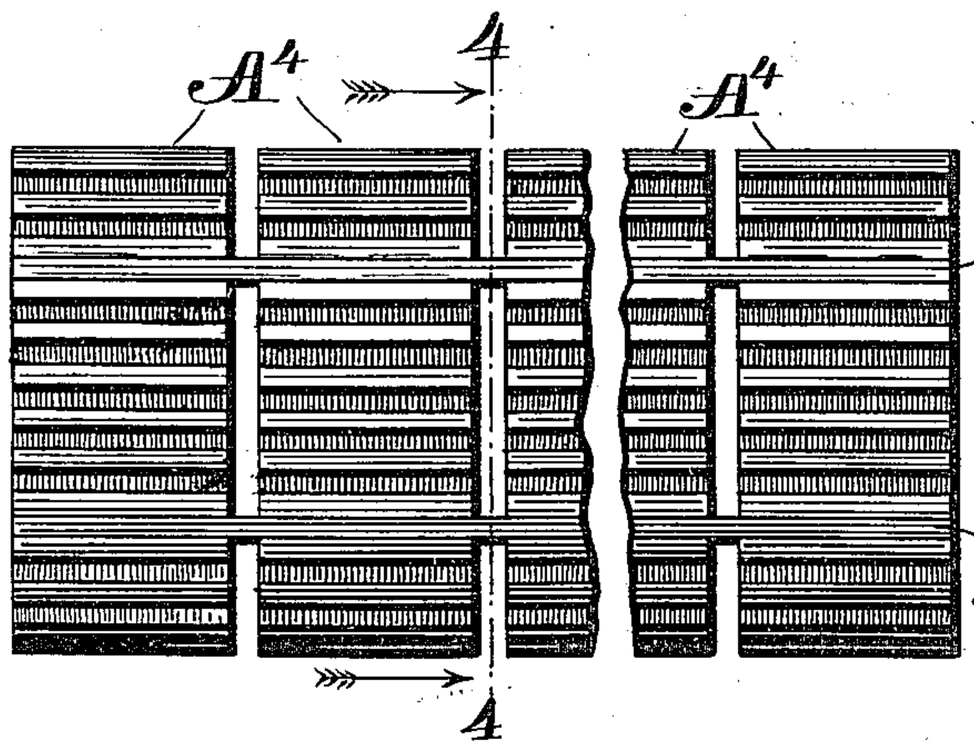


Fig. 3.

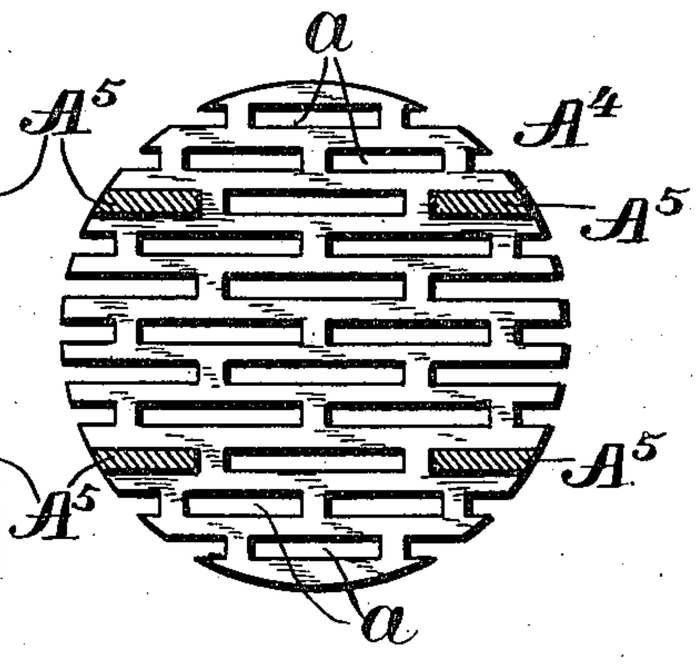


Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

CLELAND DAVIS, OF THE UNITED STATES NAVY.

POWDER CHARGE.

SPECIFICATION forming part of Letters Patent No. 751,385, dated February 2, 1904.

Application filed June 6, 1901. Renewed September 3, 1902. Serial No. 122,011. (No model.)

To all whom it may concern:

Be it known that I, CLELAND DAVIS, lieutenant in the United States Navy, stationed at Washington, in the District of Columbia, have invented certain new and useful Improvements in Powder Charges; 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 improvements in powder charges for use in guns, and it relates more especially to smokeless powder which is made of a tough colloid.

My invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 represents the powder charge made up of a single grain, which nearly or quite fills the powder-chamber of the gun. Fig. 2 is an end view of the single grain shown in Fig. 1. Fig. 3 represents the powder charge built up of a plurality of single grains similar to that shown in Figs. 1 and 2, but held together by strips of the colloid; and Fig. 4 represents a section along the line 4 4 of Fig. 3 and looking in the direction of the arrows.

The grain, it will be noted, is made up of a plurality of flat cakes of colloid joined together by ribs a^0, leaving axial passages a bounded by the cakes and ribs, which axial passages indent the outer surface of the grain, causing this surface to have an irregular contour. It will be seen that each one of these passages a is entirely independent of all of the other passages and that the number and position of the ribs a^0 may be varied at will, thus increasing or decreasing the density of loading. The ribs a^0 should preferably be of the same thickness as the flat cakes which they hold together.

In the form of device shown in Figs. 3 and 4 a plurality of the grains A^4, similar generally to those shown in Figs. 1 and 2, are bound together by longitudinal strips A^5 of the same colloid material of which the grains are composed. The position of these strips A^5 may be varied, and the number may be increased or decreased to meet the special conditions required. Again, the strips may be dovetailed or otherwise secured in the grains. These strips should preferably be of the same thickness as the cakes and ribs, so that between the grains they may be completely consumed simultaneously with the rest of the powder charge. It will be seen that these strips not only hold the powder-grains together, but also serve to increase the density of loading.

It is obviously desirable to have the ties for the various grains of the same material as the powder charge itself, for in this case no inert material is introduced into the charge, and the density of loading is therefore increased. It will also be obvious that the cakes and ribs need not form an integral mass, but may be built up and held together in any suitable way.

The function of the ribs a^0 is primarily to hold the cakes of powder apart and to form passages throughout the entire length of the charge, so that instantaneous ignition may take place, and to prevent the cakes from falling together before the combustion has been completed.

By having the powder cakes flat and supported by ribs the burning surface of the interior cells of the charge will uniformly increase as the combustion proceeds, while the decrease of the burning surface, due to the burning off of the outer contour of the charge, will be lessened by having this outer contour of indented or irregular form, as shown.

Among the advantages of this invention are that the charge is introduced into the powder-chamber in a single piece, or in a plurality of pieces which constitute a single unit; the rate of combustion of the charge will be substantially uniform, preventing irregularities of pressure in the bore of the gun; there will be no inert matter introduced into the gun along with the charge, taking up important space in the powder-chamber and lessening the density of loading, and, most important of all, each particle of the powder will maintain its relative position with regard to the other particles until the entire charge is consumed. Moreover, in modern guns the powder-chamber is ordinarily larger than the bore proper of the gun, and by making the powder charge in a single unit of approxi-

mately the diameter of the powder-chamber the powder charge will not be driven down the bore of the gun.

The outer edges of the flat cakes may be flat, but are preferably rounded, as shown in the drawings, so as to enable the charge to fit more snugly in the powder-chamber.

I am aware that it has been proposed to make powder charges of an integral mass having axial and radial perforations, and also that it has been proposed to wind up a ribbed sheet of colloid material into a powder charge, the ribs separating the adjacent portions of the sheet into passages; but in these cases the rate of combustion increases progressively until the charge is nearly consumed and the evolution of gas is not uniform, but increases from the moment of ignition until the charge is nearly consumed. By having a series of flat plates separated by a few ribs, as shown, the rate of combustion is substantially uniform, and the consequent evolution of the gases is substantially uniform until the entire charge is practically consumed. The ribs merely serve as spacers, and the number of these used should be merely sufficient to enable the charge to maintain its original shape until consumed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A powder-grain consisting of a plurality of flat plates separated from each other by thin longitudinal ribs, thus forming a cellular structure having shallow broad perforations therethrough, substantially as described.

2. A powder-grain composed of a plurality of flat plates separated from each other by thin longitudinal ribs, the said plates and ribs forming an integral mass, thus forming a cellular structure having shallow broad perforations therethrough, substantially as described.

3. A powder charge composed of one or more grains each formed of a plurality of plates of colloid material separated by thin ribs of the same material, thus forming a cellular structure having shallow broad perforations therethrough, substantially as described.

4. A powder charge composed of one or more grains each consisting of a series of plates of colloid material separated by thin longitudinal ribs, the said ribs and plates forming an integral mass, thus forming a cellular structure having shallow broad perforations therethrough, substantially as described.

5. A powder charge consisting of a plurality of grains held together by longitudinal strips of similar material, said strips projecting into recesses in said grains, substantially as described.

6. In a powder charge, the combination with a plurality of grains each provided with axial passages, of a plurality of strips of the powder material projecting into recesses in the several cakes or grains and binding the same firmly together, substantially as and for the purposes described.

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

CLELAND DAVIS.

Witnesses:
GUSTAVE R. THOMPSON,
FRED ENGLERT.