

No. 660,568.

Patented Oct. 30, 1900.

E. GATHMANN.

PERFORATED POWDER ROD FOR ORDNANCE.

(Application filed Feb. 10, 1900.)

(No Model.)

Fig. 1.

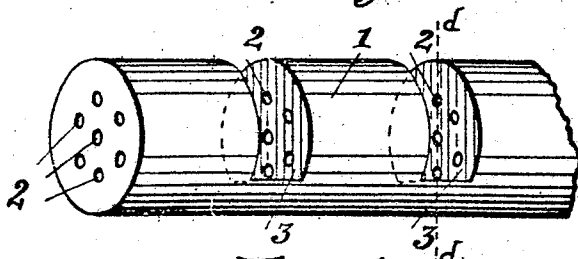


Fig. 2.

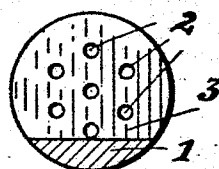


Fig. 3.

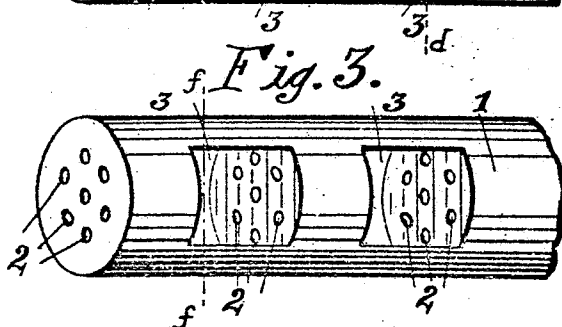


Fig. 4.

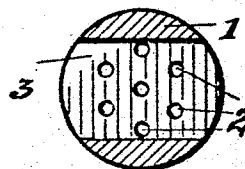


Fig. 5.

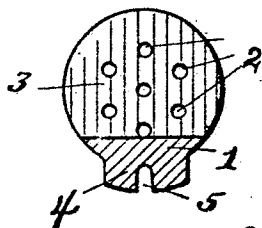


Fig. 6.

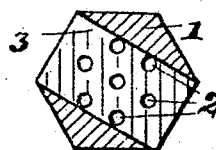


Fig. 7.

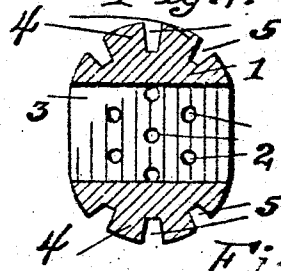


Fig. 8.

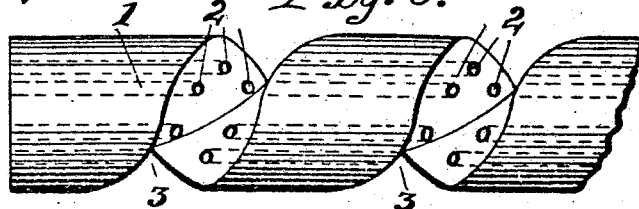
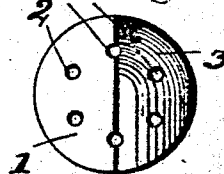


Fig. 9.



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UNITED STATES PATENT OFFICE.

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PERFORATED POWDER ROD FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 660,568, dated October 30, 1900.

Application filed February 10, 1900. Serial No. 4,737. (No specimens.)

To all whom it may concern:

Be it known that I, EMIL GATHMANN, of Washington, in the District of Columbia, have invented certain new and useful Improvements in the Shapes of Powder Rods or Grains for use in Ordnance, of which the following is a specification.

My invention relates to powder shaped in rods or grains for use in ordnance, and is more particularly applicable to those powders in which the principal ingredients are nitrocellulose or a mixture of nitrocellulose, and has for its object to provide for a uniform distribution of the charge of rods or grains in the powder-chamber of the gun, having such a construction of the rods or grains forming the charge that they will resist the tendency to fly into small fragments during the combustion of the charge, thereby causing a sudden rise in the pressure, and for the rapid and uniform ignition of the entire charge by such construction as will allow the flames of the priming or ignition to have unobstructed passage to every portion of each unit or grain of which the charge is composed.

To these ends my invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a portion of rod or unit of which a charge may be composed. Fig. 2 is a transverse sectional view taken on line *d d* of Fig. 1. Fig. 3 is a perspective view of a portion of another form of rod or grain embodying my invention. Fig. 4 is a transverse sectional view of the same, taken on line *f f* of Fig. 3. Figs. 5, 6, and 7 are transverse sectional views of rods or grains, showing modification of cross-sections of rods or grains embodying my invention. Fig. 8 is a perspective view of another form of rod or grain embodying my invention. Fig. 9 is an end view of rod shown in Fig. 8.

I have determined from numerous experiments that an efficient powder charge which will develop a high velocity accompanied by relatively low bore-pressure should possess the following requisites: first, a form of grain or rod that will insure a uniform distribution

of the charge in the powder-chamber of the gun; second, such a construction of the rods or grains which form the charge as will prevent any tendency to fly into small fragments during the combustion of the charge, thereby occasioning a sudden rise in pressure, and, third, such a construction of the charge as will insure a rapid ignition thereof in its entirety by allowing the flame of the priming or ignition charge to have a free and unobstructed passage to every portion of the elements of which the charge is composed.

To obtain these ends, I employ powder in the form of rods, having not only longitudinal perforations, but also radial perforations, these rods being constructed of a suitable colloid explosive material having preferably a maximum toughness. In the particular embodiment of my invention illustrated in Figs. 1 and 2 of the drawings these rods, which are indicated at 1, are provided with a plurality of longitudinal perforations 2, extending through said rods from end to end. In rods thus constructed, but without any provision other than longitudinal apertures, just referred to, for permitting the ignition-flames to communicate with the more distant portions of the rods, the gases are generated within the longitudinal apertures in such great volume that these passages cannot accommodate their flow, and the rods are therefore burst open and broken into fragments, thereby increasing the velocity of combustion by presenting a greater surface of powder material, which increased velocity of combustion will cause a sudden and dangerous rise in the pressure in the bore of the gun and the consequent liability of injuring or even bursting the gun. In order to obviate this difficulty, I provide radial as well as longitudinal perforations, cuts, or apertures, and in the particular construction shown in Figs. 1, 2, and 5 these radial apertures are in the form of cuts or grooves, extending from the periphery of the rod radially inward. It will be observed that these apertures or grooves intercept all the longitudinal perforations 2 at stated intervals. These intercepting cuts or grooves will be of such dimensions and number, according to the varying conditions of loading

required and the varying size of the powder-chambers, as to give ample vent to the gases generated in the longitudinal perforations of the rods, thereby allowing free flow of these gases and insuring even and rapid combustion of each rod, and consequently of the entire charge, and giving a reliable and even pressure in the powder-chamber and bore of the gun. In making up a charge of this powder a plurality of rods of the proper character are placed with their axes parallel with each other in such a way as to form a fagot or bundle, and the fagot or bundle is held in permanent form, so as to facilitate handling, by means of flexible ties or cord or the like surrounding the same at suitable intervals. Powder charges of this class are usually composed of a great number of comparatively short pieces or blocks, which are placed promiscuously within a suitable inclosing bag or envelop, so that uniformity of distribution or arrangement of the charge is lacking, while at the same time the bag or envelop, being constructed of silk or other similar material in order that it may be readily destroyed by the combustion of the charge, is extremely expensive. Not only is this expense done away with by the construction above described, but regularity and uniformity of the distribution and arrangement of the charge within the powder-chamber of the gun are insured and handiness in loading of such charges obtained, as the rods when tied in fagots make a stiff and easily-handled charge.

The particular form and arrangement of the radial apertures may obviously be varied without departing from the principle of my invention, and in Figs. 3, 4, 6, and 7 of the drawings I have shown a form of rod in which the apertures or perforations 3 extend entirely through the rod from side to side thereof, being shown in this instance as substantially square in cross-section and of such dimensions as to intercept in each case all of the longitudinal perforations of the rod.

In Figs. 5 and 7 ribs 4 are shown as reinforcing the longitudinal strength of rods to compensate for material taken from rods by perforations or cuts 3. As these ribs obviously increase thickness of powder material, longitudinal grooves 5 of suitable size are provided.

Fig. 6 shows rod of hexagonal cross-section, which section may be of advantage when

close packing or great density of charge is desired.

In Figs. 8 and 9 of the drawings I show a multiperforated rod in which the longitudinal perforations are intercepted by a continuous spiral groove or cut having a depth equal to one-half the diameter of said rod. A complete turn of said spiral will therefore intercept all longitudinal perforations.

By varying the size of the transverse, radial, or spiral apertures or cuts of the rods according to the weight of charge required and the capacity of the powder-chamber I am enabled to build up a fagot or bundle charge which will evenly and uniformly distribute a charge of the proper size and weight throughout the entire powder-chamber. In this way the three requisites hereinbefore referred to are fulfilled, since the proper charge is uniformly distributed throughout the powder-chamber, the tendency of the rods to fly into small fragments is prevented, and the flames of the priming charge have free and ready access to every portion of the powder charge, and an even combustion of this latter is assured. Besides fulfilling the three abovenamed requisites the handiness of loading ordnance with charges built of rods of this description is greatly superior to charges wherein small grains are placed in bags, as will be readily understood by all those versed in the art.

Without limiting myself to the precise details of construction and arrangements hereinbefore described, I claim—

1. A powder rod provided with multilongitudinal perforations and with transverse cuts, each one such transverse cut intercepting all of the longitudinal perforations.

2. A colloid powder rod provided with multilongitudinal perforations and with transverse cuts, each one such transverse cut intercepting all of the longitudinal perforations.

3. A multilongitudinally-perforated rod of colloid explosive material of the character used as a propelling agent, in ordnance, provided with transverse cuts, each such cut intercepting all of the longitudinal perforations.

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