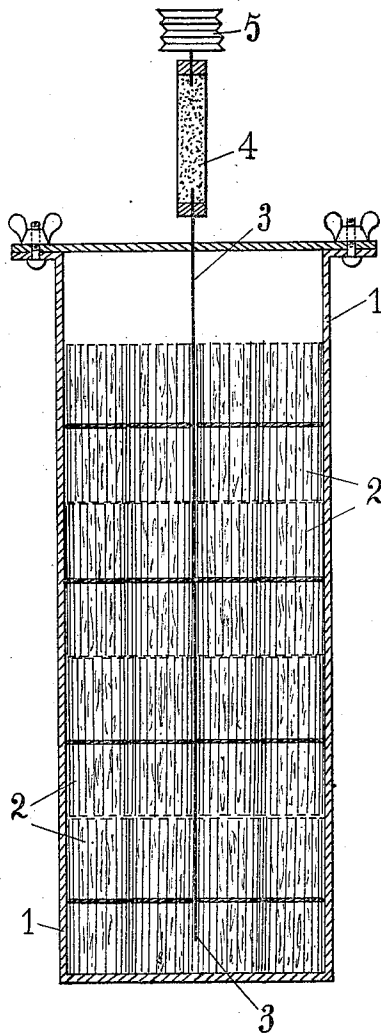


E. BOUCHAUD-PRACEIG.
 DEVICE FOR DETECTING DECOMPOSITION OF EXPLOSIVES.
 APPLICATION FILED MAY 20, 1908.

934,500.

Patented Sept. 21, 1909.



WITNESSES

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UNITED STATES PATENT OFFICE.

EDOUARD BOUCHAUD-PRACEIG, OF PARIS, FRANCE.

DEVICE FOR DETECTING DECOMPOSITION OF EXPLOSIVES.

934,500.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed May 20, 1908. Serial No. 433,946.

To all whom it may concern:

Be it known that I, EDOUARD BOUCHAUD-PRACEIG, engineer, citizen of the French Republic, residing at Paris, in the Department of the Seine and Republic of France, have invented certain new and useful Improvements in Devices for Detecting Decomposition of Explosives, of which the following is a specification.

The present invention has for its object an indicator designed to give a warning of the spontaneous decomposition of and consequently to prevent the sudden explosion of smokeless powders and other nitrated explosives when they are inclosed in closed compartments where it is not possible to get at them or mix them with protective materials which is the case with most charged ammunition. It is naturally only a question relative to ammunitions of a certain size such as those employed in artillery seeing that there is with ammunition of small caliber little fear of explosion consequent on spontaneous decomposition. Although this decomposition will be always possible yet the temperature of the interior of a small cartridge of which the powder is being decomposed, is not raised high enough, (owing to the large surface relative to the heat discharged) to attain the desired degree of temperature for deflagration or explosion. For large ammunition on the contrary, there is a serious need to provide against the sudden explosions which can be brought about by spontaneous decomposition because then the heat of decomposition of a given quantity of powder has less proportional dissipating surface as the shell increases in size. It follows that the risk of rise of temperature in the interior and consequently the risk of explosion becomes proportionately greater and it is known unfortunately that it is impossible to say that the known powders having nitrated bases do not some day or other become decomposed. But, is it possible at least to provide before hand against explosion? Such is the object of the present invention, the object of which comprises the decomposition warning device of which the description follows. Between the warnings given by the device at the beginning of the decomposition, and the eventual explosion, a long enough time passes for taking the necessary precautionary measures.

In effect, the decomposition of nitro-cellulose matters can be fairly compared to that

which obtains in the oxidation of tin plate: till the appearance of the first point of rust, everything is all right; but once the first point of rust is produced, some time after two appear, then very soon four, ten, twenty and so on following more and more quickly. In other words at the beginning the alteration is relatively rather slow and in the case of nitro-cellulose the danger only becomes imminent, at the moment, remote enough, when the acceleration of the decomposition becomes such that it causes an elevation of temperature dangerous to the parts still sound, which alone, are able to explode, and it is conceivable in these conditions that a warning device capable of operating from the start of the decomposition will be an efficacious means of protection against explosions which could be producible months after.

My invention consists in furnishing each shell or receptacle with a tube or bulb of glass, of the size for example of an ordinary test tube containing a porous granulated material, that is to say permeable, such as white saw-dust for example, colored in such a way (as for instance by turnsol or certain anilin dyes) that the tint undergoes a marked change of appearance under the influence of nitrous vapors. These observation bulbs or tubes communicate at one end with the atmosphere and at the other by means of a suitable tube of small diameter (one millimeter is sufficient) with the chamber containing the explosive, passing through a hole disposed in any suitable part of the shell or receptacle, said hole being easily stopped later on. It will be understood that what will happen if spontaneous decomposition is set up is that the nitrous vapors disengaged in traversing the porous colored sensitive material will alter the original color, producing thus optical and permanent proof of the stability or alteration of the explosive inclosed in the shells or receptacles furnished with the indicator. It will be advantageous to close the free end of the observation tube by a chamber of variable capacity, such as a flexible bulb or bellows, in order to keep the receivers absolutely air and water-tight, and that, without prejudice to the good working of the warning device.

This apparatus is represented diagrammatically by way of example in the drawing accompanying this specification.

In the drawing 1 is the receiver, case, shell

or cartridge containing the nitrated substance 2 and with which is connected by means of the capillary tube 3 the warning tube 4 which contains the sensitive colored substance. At the open extremity of the tube 4 is placed the chamber or bellows 5 with flexible or extensible and impermeable walls, for example india-rubber, impermeable tissue or any other appropriate material. The observation tube and its bellows 5 are thus in constant relation with the interior of the receiver 1 and form a perfectly closed body, that is to say no entrance of air or humidity from the exterior is possible. It is easy to see that, to each oscillation of the barometer, for example, there will correspond a variation of volume of the chamber or bellows 5, said bellows swelling up when the barometer is depressed, and flattening when the barometer rises. Thus, it will be understood, that, to each oscillation of the barometer, there will correspond a to-and-fro motion of the air confined in the receiver 1, through the tube 4, and that, this tube containing colored matter (either in granules or flakes) sensitive to nitrous vapors, these latter, when they are produced, as such is the case when the matter becomes damaged, these latter then, will, owing to the continual barometric oscillations, alter the tint of the colored matter, thus giving a warning. Another equally continual cause of to-and-fro motion in the indicator tube, lies in the temperature oscillations which are produced naturally (diurne-nocturne oscillation) and that which can be produced artificially (refrigeration, ventilation of the magazines) so that, it is possible to assure that, a single day will not pass without this to-and-fro motion taking place many times, and consequently, any disengagement of nitrous vapors in the interior of the receiver will be immediately revealed by the colored tube 4, faithful, watchful warner of the damage to which is related the said disengagement of nitrous vapors. It can be

noticed that the warning tube 4 can be carried to any distance from the shell, since the metal tube which is connected to it, need be no larger than an electric wire, and can be of any length whatever. It follows that a certain number of these colored tube warning devices 4 can be fixed, arranged and numbered on same table or board, thus permitting an attendant to see, at any moment, in a single and rapid glance, the state of a whole stored supply, and finally, that such tables can be photographed, giving the possibility of having for communication and keeping documentary photographs of incon- testable utility.

Having now particularly described and ascertained the nature of my said invention, I declare, that what I claim is:

1. The combination with a body of nitrated explosive, of a device for detecting the decomposition of the same, consisting of a transparent receptacle, a filling therefor composed of a material adapted to change color when subjected to nitrous vapors, means connecting said receptacle with said body of explosive, and automatic means for causing said vapors to traverse said receptacle.

2. The combination with a body of nitrated explosive, of a device for detecting the decomposition of the same, consisting of a transparent receptacle, a filling therefor composed of a material adapted to change color when subjected to nitrous vapors, a tube connecting one end of said receptacle with said body of explosive, and a chamber connected with the other end of said receptacle and provided with impermeable flexible walls.

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

EDOUARD BOUCHAUD-PRACEIG.

Witnesses:

HENRY DANZER,
LUCIEN CRESPIN.

It is hereby certified that the name of the patentee in Letters Patent No. 934,500, granted September 21, 1909, for an improvement in "Devices for Detecting Decomposition of Explosives," was erroneously written and printed "Edouard Bouchaud-Praceig," whereas said name should have been written and printed *Edouard Bouchaud-Praceig*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D., 1909.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.