P. LANDRIN.

MANUFACTURE OF EXPLOSIVE MATERIALS.

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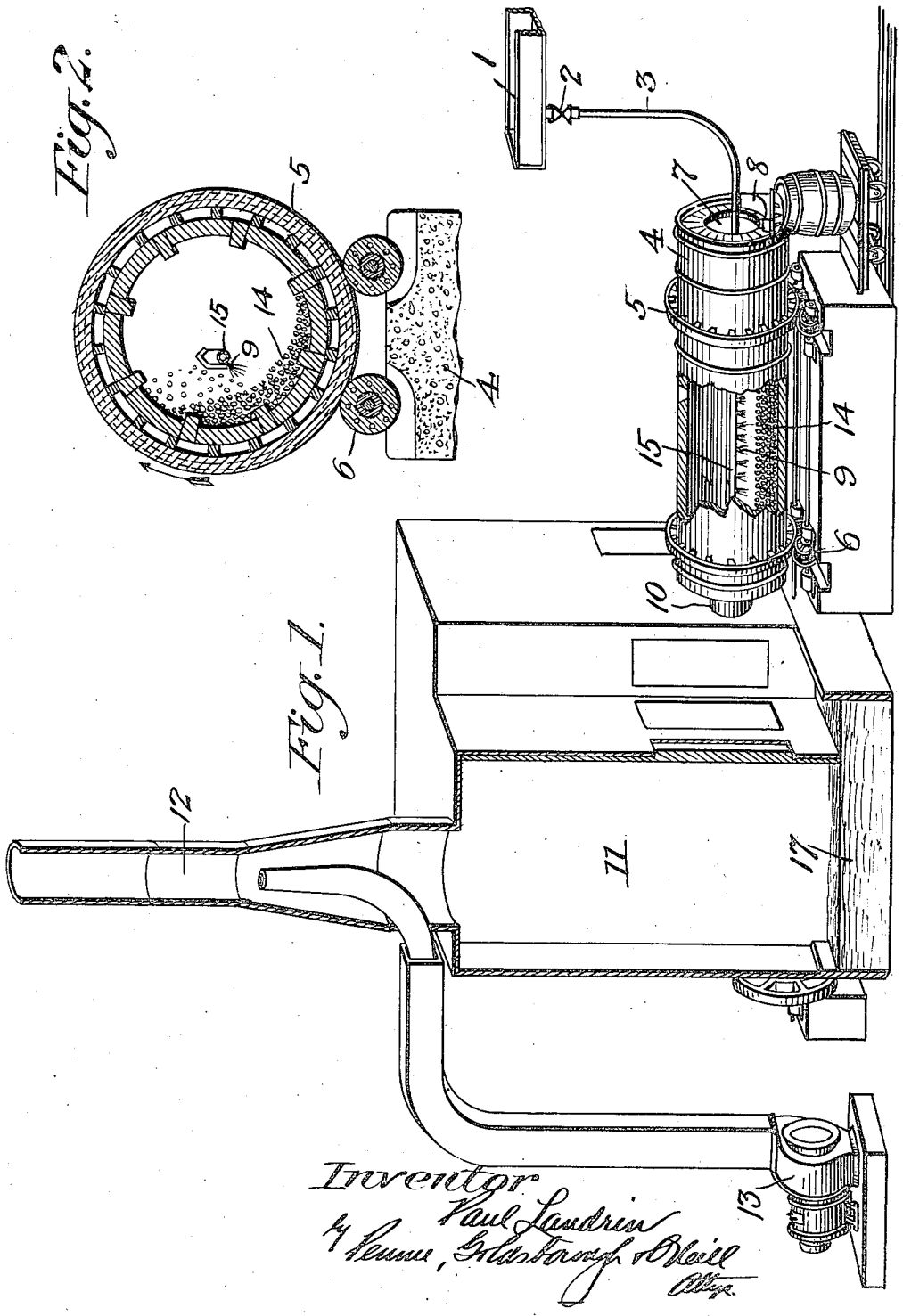
1,334,462. **Patented Mar. 23, 1920.**



UNITED STATES PATENT OFFICE.

PAUL LANDRIN, OF LYON, FRANCE.

MANUFACTURE OF EXPLOSIVE MATERIALS.

1,334,462. Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed January 31, 1918. Serial No. 214,651.

To all whom it may concern:

Be it known that I, PAUL LANDRIN, of 117 Rue Tronchet, at Lyon, Department of the Rhone, in France, citizen of the French Republic, have invented certain new and useful Improvements in or Relating to the Manufacture of Explosive Materials; 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.

For the charging of certain war projectiles, eutectic mixtures of nitrated explosives are used, having melted points sufficiently low for molten explosive to be easily able to be either poured into the projectile or cast into a form suitable for direct use.

The objects of the process hereinafter described are: (1) to put the molten explosive mechanically into a solid form, perfectly homogeneous and very compact, as favorable to re-melting as to direct use; (2) to act in such a way that there is no emanation in the factory so as to prevent the poisoning that arises from certain constituents of the explosives.

The invention consists in pouring the molten explosive obtained by the usual methods on to a bed of explosive in solid fragments kept in motion in a horizontal cylinder rotating about its axis and cooled by a current of air. These fragments are used for starting the apparatus and if one has not at his disposal a certain amount of previously granulated explosive obtained from any other apparatus, it is necessary to get them by breaking up by hand on a table or the like, some solid explosive. The size of the fragments may be from 3 to 10 millimeters in diameter, just as it is made by the old methods in order to solidify the molten explosive before it is sent to the shop where the shells are filled.

The fragments used at the beginning act as kernels for the spherical grains which are formed. When the apparatus has been working during several hours and produced a certain amount of explosive, the weight of which is several times the weight of the fragments put in, it is apparent that they have disappeared, but at the bottom of the cylinder, at the air-outlet end, very small grains are newly formed on account of the breaking up of the larger grains, which the heated air in this part has rendered more easily breakable. The small grains move slowly toward the exit where cold air is admitted, increasing them in bulk, for, as they get harder by cooling, they do not break down. The current of air must be regulated according to the temperature of the room so that the breaking up brings the grains to the desired size. If, through lack of knowledge, during cold weather, too large a quantity of air is admitted, or, if the explosive supplied is not hot enough, the result is that balls as big as the head of a man would be produced.

The temperature of the explosive put up in this apparatus must be as high as possible, taking into account the process of melting by steam at the atmospheric pressure, practically from 85° to 90° centigrade. The cooling temperature cannot be given exactly because the air current must be just sufficient, as stated above, to obtain a well-granulated product. Ordinarily, with the size of the apparatus used in practice, the granules are ejected at a temperature of about 35° to 45° centigrade. By suitably regulating the temperatures of the molten material that is being poured and of the solid material that is being agitated by the rotary movement a spontaneous and continuous disintegration of the explosive into granules is obtained. It is then found that the apparatus can be fed indefinitely without seeing any change in the mean dimension of the solid granules, which flow away in a continuous manner through one end of the cylinder in quantities equal to the quantities of molten mixture poured in.

In order that the invention may be clearly understood, reference is made to the accompanying drawings in which:

Figure 1 gives diagrammatically a general view of the apparatus.

Fig. 2 shows on an enlarged scale a cross section of the revolving drum in which the treatment is effected.

The apparatus as a whole comprises the following parts:

A trough 1 (Fig. 1) contains molten explosive, maintained at a suitable temperature by the means in ordinary use. A cock 2 enables the flow of the mixture, which passes through a tube 3 and then through a distributing tube 15, to be regulated. The

barrel or drum 4 in which the granulation is effected is mounted on circular roller tracks 5 supported by four rollers 6 mounted on two shafts carried by bearings. One of the shafts is driven by a motor and communicates motion to the drum. The other is loosely mounted in the bearings.

The drum is filled with granulated explosive 14 up to the level of the discharge cylinder 7. When the drum revolves the surface formed by the mass of granules forms almost a plane parallel to the axis. When the volume of the mass of the granules increases the latter come and flow away through a cylindrical passage 7 into a hopper 8 and then into a cask carried by a trolley. The tube 15 is pierced with holes 9 through which the molten explosive flows on to the mass of granulated explosive. A cylinder 10, placed at the other end of the drum puts it into communication with a dust chamber 11 the bottom of which is formed by a trough 17 full of water.

A draft produced by a fan or blower 13 and directed through a chimney 12 on the roof causes suction in the dust chamber and consequently in the drum. The air entering through the orifice 7 is thus caused to circulate and to cool the mass of granulated explosive.

There therefore remains in the work shop neither dust nor injurious emanations.

The granules of explosive are substantially spherical. Their diameter varies according to the temperature of the molten product and the velocity of the current of cooling air.

I claim:

1. A process for the formation of solid granules of explosive material consisting in pouring the material in a molten condition on to a bed of granulated explosive material while simultaneously agitating said granulated material and cooling the same by a current of air.

2. A process for the formation of solid granules of explosive material as claimed in claim 1 wherein the granulated explosive material is agitated by rotating its container.

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

PAUL LANDRIN.

Witnesses:

FRANCISCO JACOINET,

CHAS. P. PRESSLY.