(No Model.)

N. K. MORRIS.

METHOD OF AND APPARATUS FOR THE MANUFACTURE OF LEAD FIBER.

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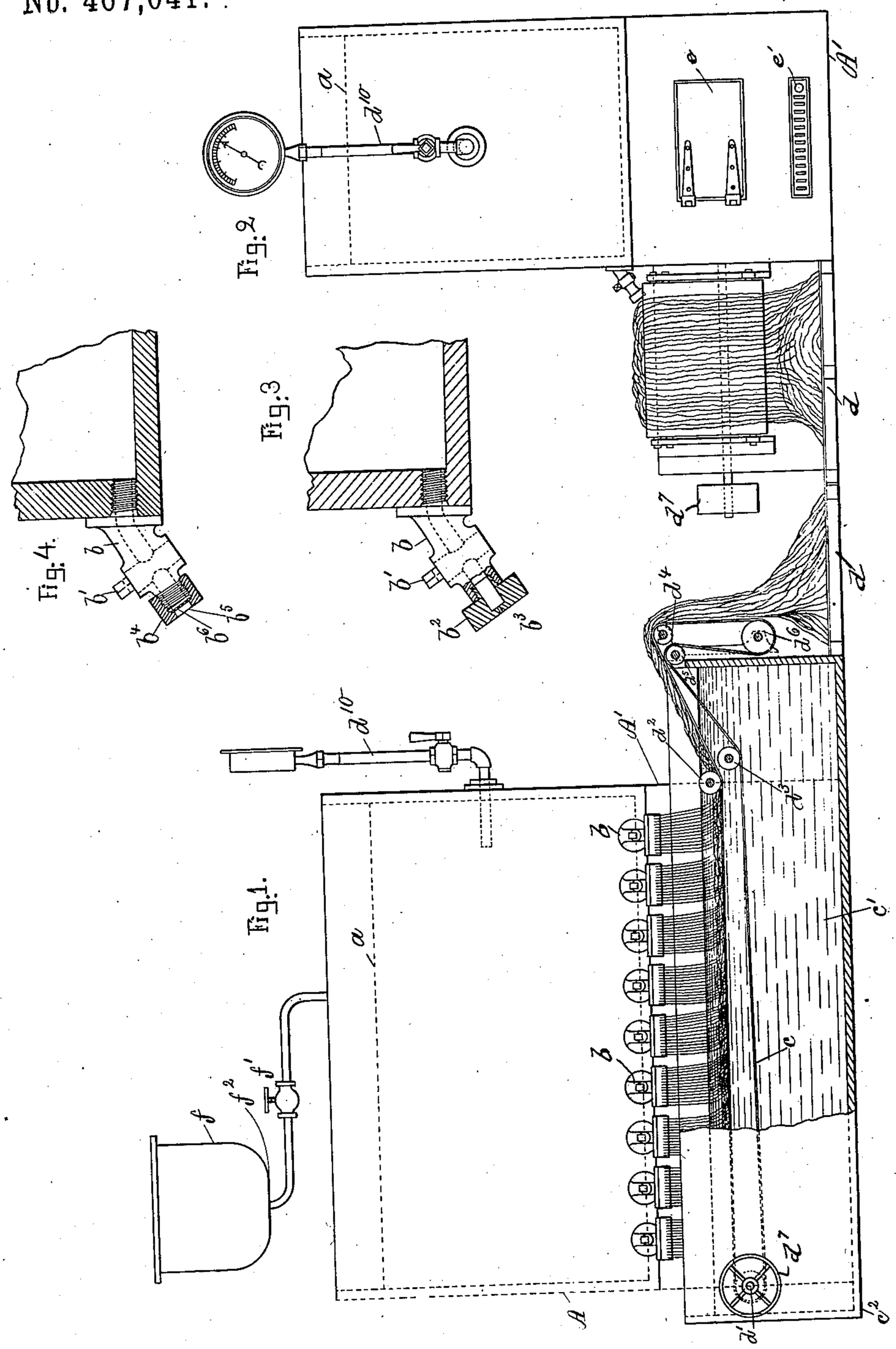

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METHOD OF AND APPARATUS FOR THE MANUFACTURE OF LEAD FIBER.

SPECIFICATION forming part of Letters Patent No. 467,041, dated January 12, 1892.

Application filed March 10, 1891. Serial No. 384,439. (No model.)

To all whom it may concern:

Be it known that I, NORMAN K. MORRIS, of Denver, county of Arapahoe, State of Colorado, have invented an Improvement in Methods of and Apparatus for the Manufacture of Lead Fiber, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel method and apparatus for the manufacture of lead fiber, especially adapted, among other things, to be used in the preparation of lead carbonate or white lead.

It has been demonstrated that a superior quality of white lead can be made in a shorter time when the metallic lead is in a finely-divided condition than when the lead is in large pieces or in a bulky condition. It has also been demonstrated that lead in a finely-divided condition is in the best form not only for the production of a superior carbonate or white lead, but also for convenience in handling and for supporting it in the most advantageous manner to permit of ready access to it of the corroding gas and vapor. The lead in fibrous form—that is, in fine string-like strips—is acknowledged to be the best form in which the lead may be put to obtain the best results.

I am aware that attempts have been made to manufacture lead fiber by means of machinery; but such attempts have not been practically and commercially successful, owing to the fact that peculiar conditions are present which cannot be fulfilled or met practically by means of machinery.

For the successful manufacture of lead fiber three main or principal conditions must be met, namely: First, the lead must be in a condition to flow, which is effected by heating the metallic lead to its melting-point; second, the molten lead in a finely-divided state should not be sufficiently hot to cause the said finely-divided lead or fiber to break up into shot or very small pieces, and I have found by practice that the lead should not be heated substantially above 800° Fahrenheit, and, third, a very considerable pressure is required to force the molten lead through one or more orifices sufficiently small to form lead fiber of the required thickness or diameter.

In accordance with my present invention the conditions required to be met for the successful production of lead fiber of a considerable or desired length are fulfilled in the following manner, namely: The lead is melted and maintained in a heated chamber at a temperature substantially near the melting-point, whereby the first and second conditions before referred to are met, and a sufficient depth or body of molten lead is maintained in the chamber or receptacle to obtain the pressure required to force the bottom layer of molten lead out through the discharge orifice or orifices.

The particular features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation, partially broken out, of an apparatus by which my improved method may be carried into effect; Fig. 2, an end elevation of the apparatus shown in Fig. 1, looking toward the left; Fig. 3, a sectional detail to be referred to, and Fig. 4 a modification in section to be referred to.

A represents a chamber or receptacle in which the lead to be made into fiber is maintained in a molten condition by means of heat, which may and preferably will be generated in a combustion-chamber or furnace A′, upon which the chamber or receptacle A may be supported.

The chamber or receptacle A and the furnace or combustion-chamber A′ may be made of iron or other suitable material, and the receptacle A may be of square, round, or of any other desired shape, but of sufficient height to contain a body or column of molten lead sufficient to obtain the pressure required to force the molten lead out of the chamber or receptacle.

In actual practice I have ascertained that for the best results a column or body of from about two and one-half to about three feet is required, and have represented the height of the said column by the dotted line *a*.

Owing to the very high specific gravity of lead (namely, 11.3) a column of molten lead of from two and one-half to three feet will exert a very considerable pressure, sufficient to force the said molten lead out through one or more discharge-nozzles *b*, provided, as herein shown, with a stop-cock *b′*, the said nozzle having, as shown in Fig. 3, a cap b^2, provided with one or more small orifices b^3, as desired,

through which the lower layer of molten lead is forced by the superimposed column of molten lead.

Instead of the perforated cap b^2 shown in Fig. 3, I may employ any other desired form—such, for instance, as shown in Fig. 4, wherein the pipe b has screwed upon it a cap b^4, provided with a substantially large opening or orifice b^5, and between which cap and the pipe b a perpendicular plate or screen b^6 is secured. The pipes b may be screwed or otherwise secured to the chamber A.

The molten lead as it issues from the orifices b^3 is preferably discharged upon an endless belt or web c, traveling through water or other cooling-liquid c', contained in a vat c^2, which in practice is made of a width corresponding to the height of the column of molten lead maintained in the chamber A; or the said vat may be substantially narrow and set at a distance from the discharge-orifice b^3 corresponding to the height of the column of lead in the chamber A, for as the column of molten lead increases in height the stream of molten lead discharged through the orifice b^3 will increase in length and will attain a considerable length before striking the water. In this manner the molten lead passes through a sufficient distance in air to enable it to "set," so that when it strikes the water the thin stream of lead will break up into fibers or pieces of considerable length, and not into small pieces, or what is practically called "shot," as would be the case if the thin stream of molten lead struck the water before becoming set.

I prefer that the lead fiber be discharged onto the endless belt c, so that the said fiber may be easily and quickly deposited upon a tray or suitable receptacle d, located outside the vat c^2, and which may be readily removed and a new or empty one substituted therefor.

The endless belt or web c is passed about a shaft or roller d', located at one end of the tank or vat c^2 below the water-line, and under rollers d^2 d^3, located below the water-line at the other end of the vat c^2, and then over rollers d^4 d^5, supported in suitable bearings outside the vat or tank, and then about a roller d^6, also supported in bearings outside the tank below the rollers d^4 d^5.

The endless belt c may be made to travel by means of a belt not shown, but which is passed about a pulley d^7 on the shaft or roller d'.

The chamber or receptacle A has connected to it a pyrometer d^{10}, of any usual or well-known construction, by which the temperature of the lead within the said chamber may be ascertained.

The furnace or combustion-chamber A′ may be provided with the usual door e and damper e', by which the draft may be regulated.

I have herein shown the chamber A as provided with nine discharge-pipes b; but I do not desire to limit myself to any particular number, as the same may be varied as desired.

In practice the lead fiber will preferably be about one foot in length for the best results.

The column of molten lead may and preferably will be maintained at a substantially constant level or height by a supply of molten lead from a ladle, crucible, or other melting-pot f, from which the molten lead may be discharged in a practically continuous stream through a discharge-pipe f', provided with a cock or valve f^2.

I claim—

1. The herein-described method for the manufacture of lead fiber, which consists in forcing molten lead through a substantially small orifice by the pressure of a column of the molten lead of a height or depth sufficient to obtain the pressure necessary to force the molten lead through the said orifice, substantially as described.

2. The herein-described method for the manufacture of lead fiber, which consists in heating the lead to a temperature substantially near its melting-point and below 800° Fahrenheit, forcing the lead thus heated through a substantially small orifice by the pressure of a column of the lead maintained at a height not substantially below two and one-half feet, and, lastly, cooling the lead discharged through the orifice, substantially as described.

3. The herein-described method for the manufacture of lead fiber, which consists, first, in heating the lead to a temperature substantially near its melting-point; second, forcing the lead thus heated through a substantially small orifice by the pressure of a column of the lead of a head sufficient to cause the molten lead to flow; third, permitting the lead forced through the orifice to become set, and, lastly, cooling the lead fiber after being set, whereby the lead fiber may be broken up into pieces of considerable length, substantially as described.

4. The combination, with a chamber or receptacle A to contain molten lead, a discharge-pipe therefor provided with a substantially small orifice, and a furnace or combustion-chamber A′, substantially as described.

5. The combination, with a chamber or receptacle A to contain molten lead, a discharge-pipe therefor provided with a substantially small orifice, and a furnace or combustion-chamber A′, and a vat or tank to contain a cooling-fluid, and a traveling belt or web in said tank below the level of the cooling-fluid, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORMAN K. MORRIS.

Witnesses:
WILLIAM ROBINSON,
WM. M. CHRISTIE.