

No. 702,736.

Patented June 17, 1902.

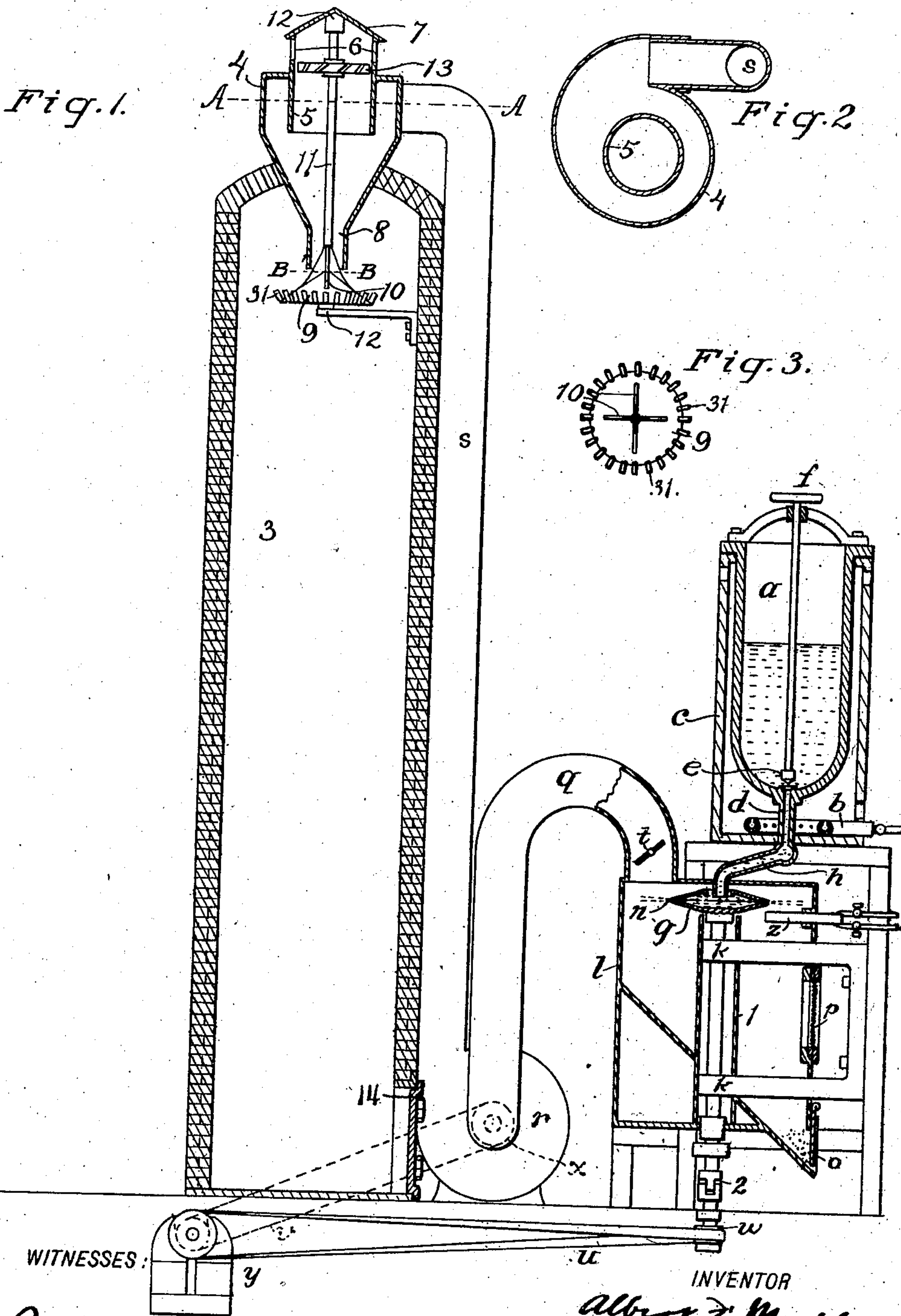
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APPARATUS FOR REDUCING FUSIBLE MATERIALS TO DUST.

(Application filed May 16, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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Fig. 5.

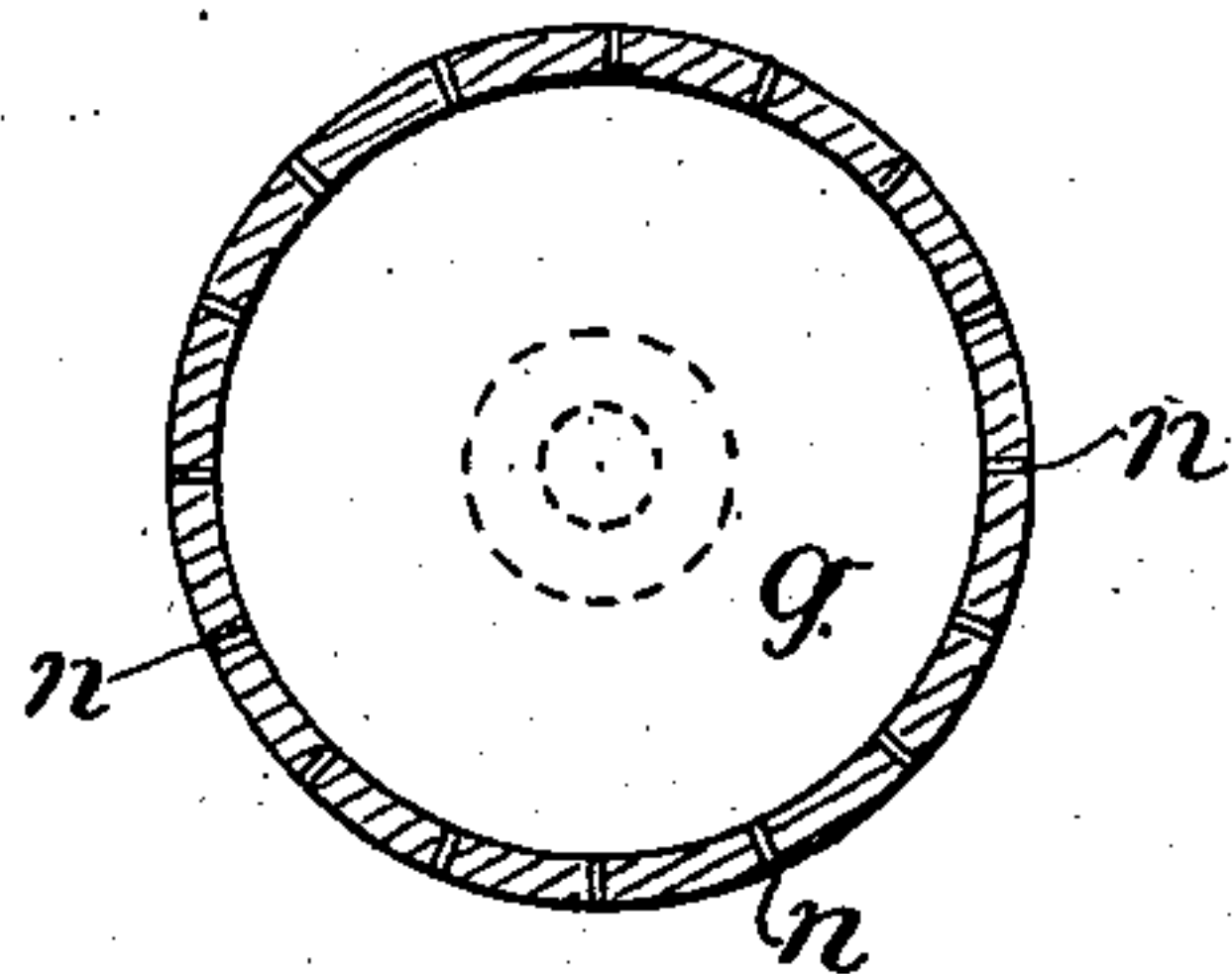
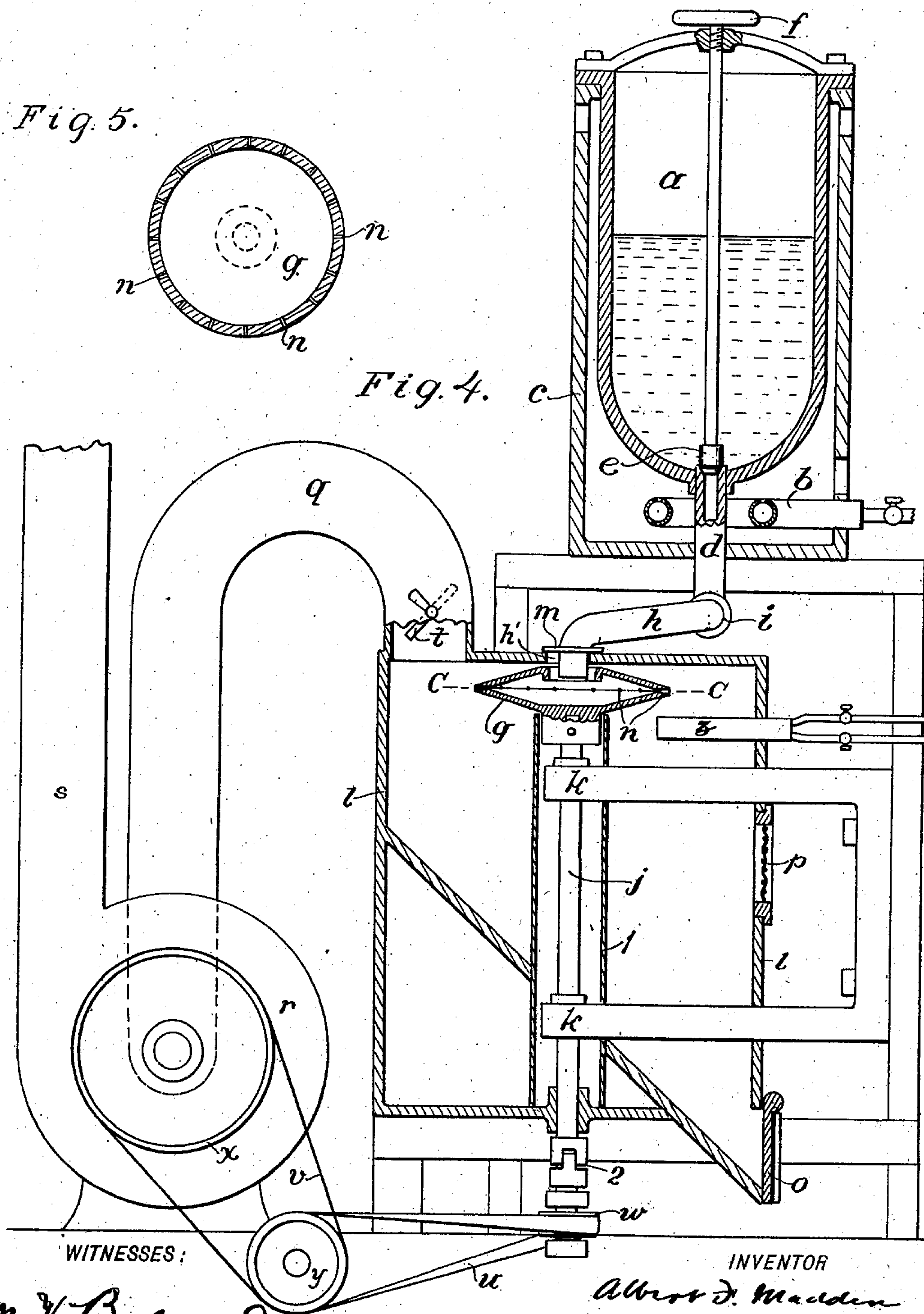


Fig. 4.



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APPARATUS FOR REDUCING FUSIBLE MATERIALS TO DUST.

SPECIFICATION forming part of Letters Patent No. 702,736, dated June 17, 1902.

Application filed May 16, 1899. Serial No. 717,028. (No model.)

To all whom it may concern:

Be it known that I, ALBERT F. MADDEN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Reducing Fusible Material to Dust, of which the following is a specification.

This invention relates to improvements in apparatus for reducing fusible material to dust.

The invention comprises a specially-constructed machine adapted for the reduction of a fusible substance, such as lead, to a state of extreme subdivision, so as to form an impalpable dust which is so finely divided that it is capable of being held in suspension in the air to form a smoke-like mixture. While this impalpable lead-dust is capable of a variety of uses, it is especially adapted to the formation of lead compounds, such as white lead.

My invention comprises apparatus adapted to perform the following operations: breaking up the lead while in a liquid state into a state of extreme subdivision by violent discharge or impact of portions of the liquid lead into or against a comparatively quiescent gaseous medium, drawing off or entraining the finer parts of the resulting lead-dust by suction or motion of the gaseous medium in which such dust particles are suspended, and separating this dust by any suitable means from the gaseous medium.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of an apparatus adapted to carry out my invention. Fig. 2 is a detail horizontal section on the line A A in Fig. 1. Fig. 3 is a horizontal section on the line B B in Fig. 1. Fig. 4 is a vertical section of the apparatus for reducing the lead or other fusible material to a state of dust. Fig. 5 is a detail horizontal section on the line C C in Fig. 4.

Referring to Figs. 1 and 4, *a* represents a tank for melting the lead, the same being heated by a gas-burner or other heater *b* and provided with an inclosing jacket-casing *c* to direct the heat from the burner into contact therewith, this casing also serving in conjunction with suitable supports or framing to sup-

port the tank. A tap or draw-off pipe *d* leads from bottom of tank *a* and may be closed or opened to any desired extent by a plug or valve *e*, operated by a hand-wheel or handle *f*.

A pulverizing or atomizing machine, comprising a rotating lead-spraying drum, receptacle, or vessel *g*, is arranged in position to enable the melted lead to flow into such vessel from the tank *a*, the liquid lead being conveyed from tap *d* by connecting-pipe *h*, leading into or communicating with such vessel, such pipe having a rotative joint at *i* (see Fig. 4) to enable it to be lifted away from the vessel *g* when desired. The vessel *g* is carried on a shaft *j*, preferably vertical, mounted to rotate in bearings *k k*. A casing *l* surrounds the rotating vessel *g*, the pipe *h* passing through an opening *h'* in this casing and having a flange *m*, adapted to effectually close this opening.

The vessel *g* is preferably of the double-cone form or lenticular form shown and is perforated at its outer edge or rim, as shown at *n*, there being any desired number of these perforations, according to the capacity or output desired. While a single perforation may suffice in some cases, it is desirable to provide more than one, so as to balance the machine. These perforations are quite small, but are much larger in diameter than the eventual size of the particles resulting from the operation of the machine. A door *o* is arranged in the lower part of casing *l* to enable removal of such material as falls to the bottom of said casing, and an opening *p*, preferably protected with a wire screen, is provided in the wall of the casing.

Leading from the upper part of the casing and preferably from the top of same on the side remote from opening *p* is a suction-pipe *q*, leading to a suction-fan, blower, or air-draft apparatus *r*, whose delivery or exit pipe is indicated at *s*. The pipe *q* may be provided with a regulating damper or valve *t*. The shaft *j* and the blower *r* are mechanically connected to any suitable source of power, being here shown as connected by belts *u v* and pulleys *w x* to a motor *y*. A gas-burner preferably provided with air-blast is arranged in casing *l* in such position that the flame issuing therefrom may be delivered against or under the vessel *g*. The shaft *j* is

shut off from the chamber inclosed by casing 1 by a jacket 1. A coupling 2 is provided for connecting the shaft *j* to the motor-pulley *u*, so as to transmit rotary movement, but not the endwise vibration.

The operation of the apparatus as so far described is as follows: The valve *e* being closed, the tank *a* is charged with lead, which is melted by means of the heater *b*. Burner *z* is also brought into action to heat the vessel *g* to a temperature above the melting-point of lead, said burner being then turned off. The liquid lead is then admitted through valve *e* and pipes *d* and *h* to the vessel *g*, and the shaft *j* being set in motion or having been already set in motion the melted lead is rotated with the vessel *g*. The speed of rotation of vessel *g* is such that the liquid lead is forced out through the holes *n* by centrifugal action and leaves these openings with a high velocity. The violence of its discharge or ejection is, in fact, so great that the portions of liquid lead so ejected are broken up by their impact with the atmosphere or gaseous medium surrounding the vessel *g*, thus effecting a spraying or atomizing action on the lead, so as to reduce it, or a part of it, to a state of impalpable dust which is capable of being held in suspension in air for a considerable length of time. The fan or blower *r* being also set in motion, a current of air is drawn through the chamber containing the atomizing-drum *g*, and the finer particles—that is, those held in suspension in the air or gaseous medium in such chamber—are drawn off or entrained with this current of air or gaseous medium through the pipe *q* and delivered through the pipe *s* to any suitable dust-separator, whether of the gravity, centrifugal, or other type. The valve *t* enables the force of the air-current to be regulated so as to draw off only the impalpably fine dust. The heavier dust settles to bottom of chamber *l* and may be withdrawn through door *o*. The lead-dust thus formed is adapted for various purposes; but it is especially applicable to the production of white lead and other lead compounds; but in any case it is desirable to separate the lead-dust from the entraining-air to permit of its suspension or settlement in a suitable chamber. For this purpose I arrange the apparatus as above described in connection with separating apparatus, as shown in Fig. 1. The pipe *s* from the blower *r* leads into a centrifugal dust-separator arranged at the top of a tower or separating-chamber 3. This separator comprises a casing 4, having the pipe *s* leading tangentially into same, and an inner tube 5, extending down from the top of the casing 4 and opening at its bottom into the separator-chamber formed by casing 4 and communicating at its upper end, as shown at 6, with the outer air. A hood 7 is provided for the tubular outlet 5. The casing 4 is extended down in the form of a funnel into the tower 3 and terminates in a contracted mouth or dust-outlet 8. As the dust-

laden air passes tangentially into the separator chamber or casing it takes up a vortical or rotary movement, and the dust is thereby separated, and, passing to the outer wall of the chamber, it falls down through the funnel and into the tower 3, while the air passes inwardly to tube 5 and upwardly in said tube to the outer air. It is desirable to maintain the air or gaseous medium in the tower or chamber 3 comparatively quiescent, so as to allow a slow and even settling or subsidence of the dust therein, and to insure this I prefer to provide means for breaking up the vortical or rotary movement at the mouth 8 of the separator-funnel. Such means comprises an obstructing-plate, deflector, or baffle-plate or device 9, arranged below or within such mouth. This device is shown as a downwardly-flaring cone with ribs 10 and teeth 31 and is adapted not only to break up the vortical air-current, but to distribute the dust more uniformly in the upper part of the tower. The vibration of this plate due to the air-currents may be utilized to shake the dust therefrom. In order to obtain a better distributing effect, the device 9 may be made to rotate on a vertical shaft 11, supported in bearings 12, and I prefer to rotate it in opposite direction to the vortical movement, the shaft 11 carrying a wind-wheel 13, located in the tube 5 and adapted to be rotated by the upward passage of air in such tube to propel the device 9 contrary to the vortical movement, and thus more effectually break up such movement at the mouth 8, while improving the distributing effect of the device 9.

The tower or chamber 3 may be of any suitable construction and is provided at or near its bottom with a door 14 to enable removal of the settled dust or of the product resulting therefrom. The dust of lead or other fusible material carried in with the air-current through pipe *s* and delivered from same by means of the separator 4 and the baffling device 9 to the top of the tower or chamber in a finely-uniform cloud or smoke of finely-divided dry lead or fusible material is allowed to fall slowly in the tower by its own gravity and may be allowed to settle and be removed unaltered or may be acted upon while in the chamber by any suitable chemical agent.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. A machine for converting fusible material into dust, comprising a rotary vessel having unobstructed peripheral openings, means for heating said vessel above the melting-point of the fusible material and means for rotating said vessel at a speed sufficient to spray the melted material from the peripheral openings into the form of dust.

2. An apparatus for converting a fusible material into dust, comprising a rotary vessel having unobstructed peripheral openings, means for heating the vessel above the melt-

ing-point of the fusible material, means for supplying the melted fusible material to the vessel and means for rotating said vessel at a speed sufficient to cause spraying of the melted material from such openings in the form of dust.

3. A machine for converting fusible material into dust, comprising a rotary vessel having unobstructed peripheral openings, means for heating said vessel, means for rotating said vessel at a speed sufficient to spray the melted material from the peripheral openings into the form of dust, and a casing surrounding said vessel.

4. A machine for converting fusible material into dust, comprising a rotary double-cone-shaped vessel, mounted on a shaft arranged in line with the cone-axis, and provided at its periphery with openings to permit passage of the fused material and having an axial opening through which such material may be supplied, means for heating said vessel, and means for rotating said vessel at a speed sufficient to spray the melted material from the peripheral openings into the form of dust.

5. An apparatus for converting fusible material into dust, comprising a rotary vessel perforated to allow of the discharge of melted material therefrom, means for supplying melted material to said vessel, means for heating said vessel, means for rotating said vessel to cause the melted material to be ejected through the perforations of the vessel at a sufficient speed to cause spraying of the same, an inclosing casing and means for passing a current of air or gaseous medium through said casing to entrain the dust particles suspended therein.

6. An apparatus for converting fusible material into dust comprising a rotary vessel perforated to allow of the discharge of melted material therefrom, means for supplying melted material in said vessel, means for rotating said vessel to cause the melted material to be ejected through the perforations of the vessel at a sufficient speed to cause spraying of same, an inclosing casing and means for passing a current of air or gaseous medium through said

casing to entrain the dust particles therein, and a dust-separator for separating the dust so entrained from the entraining-air.

7. An apparatus for converting fusible material into dust, comprising means for melting such material, spraying means for converting the melted material into impalpable dust, air-draft apparatus for producing a current of air to entrain the dust suspended in such air, a separator for separating the dust from the entraining-air, a chamber and means for discharging the separated dust into such chamber, and for breaking up the vortical air-currents to enable the dust to settle.

8. The combination with a machine for converting fusible material into dust, of air-draft apparatus for entraining the dust, a settling-chamber, a centrifugal dust-separator having a contracted mouth communicating with such chamber, and an obstructing device located in proximity to such mouth to break up the vortical movement of the air at such mouth.

9. The combination with a machine for converting fusible material into dust, of air-draft apparatus for entraining the dust, a settling-chamber, a centrifugal dust-separator communicating with such air-draft apparatus and having a contracted mouth communicating with such chamber, a rotatable obstructing device in proximity to such mouth, and means for rotating same, substantially as and for the purpose set forth.

10. The combination with a machine for converting fusible material into dust, of air-draft apparatus for entraining the dust, a settling-chamber, a centrifugal dust-separator communicating with such air-draft apparatus and having a contracted mouth communicating with such chamber, a rotatable obstructing device in proximity to such mouth, and means for rotating same, in opposite direction to the vortical movement in the separator, substantially as and for the purpose set forth.

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Witnesses:

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