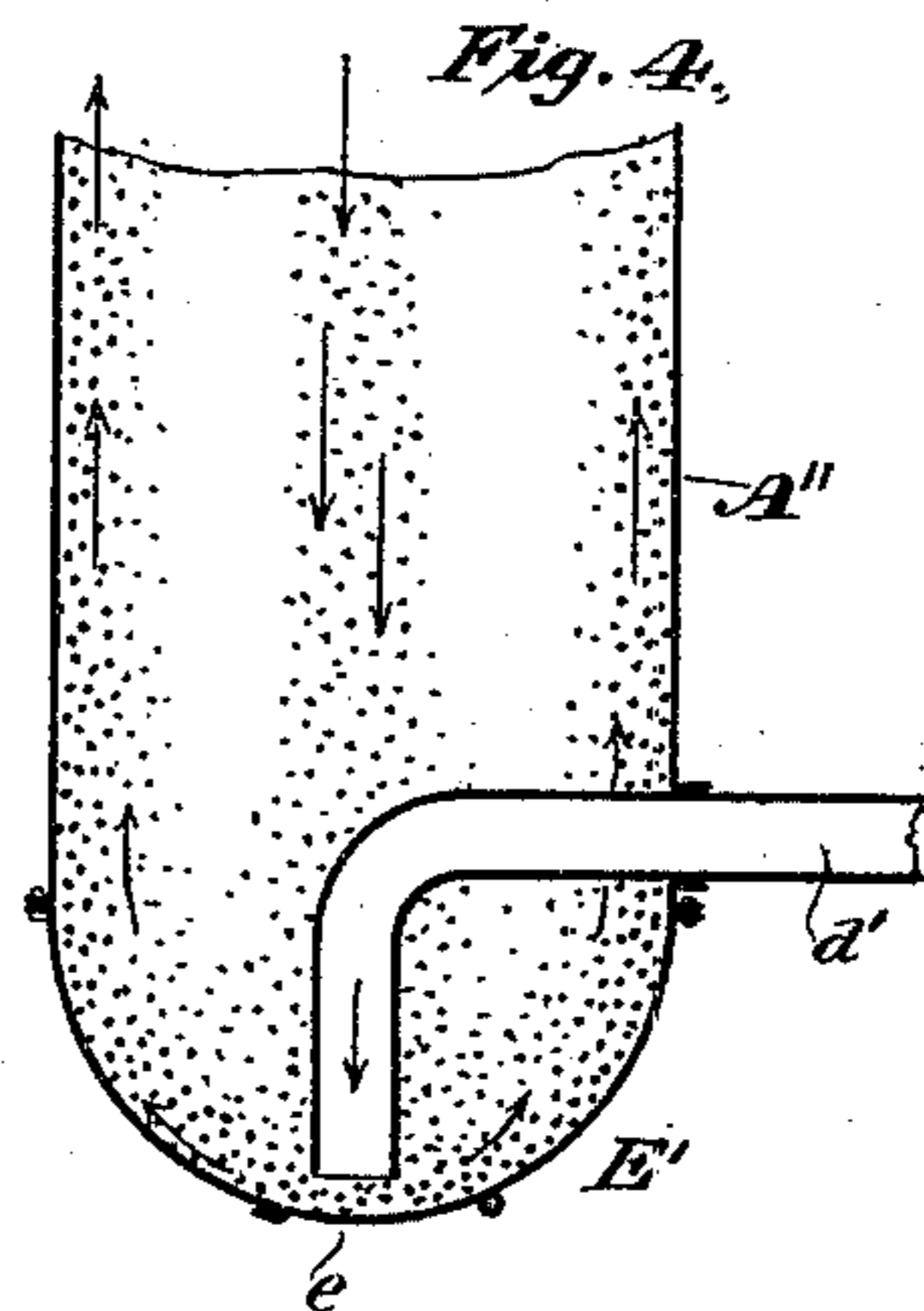
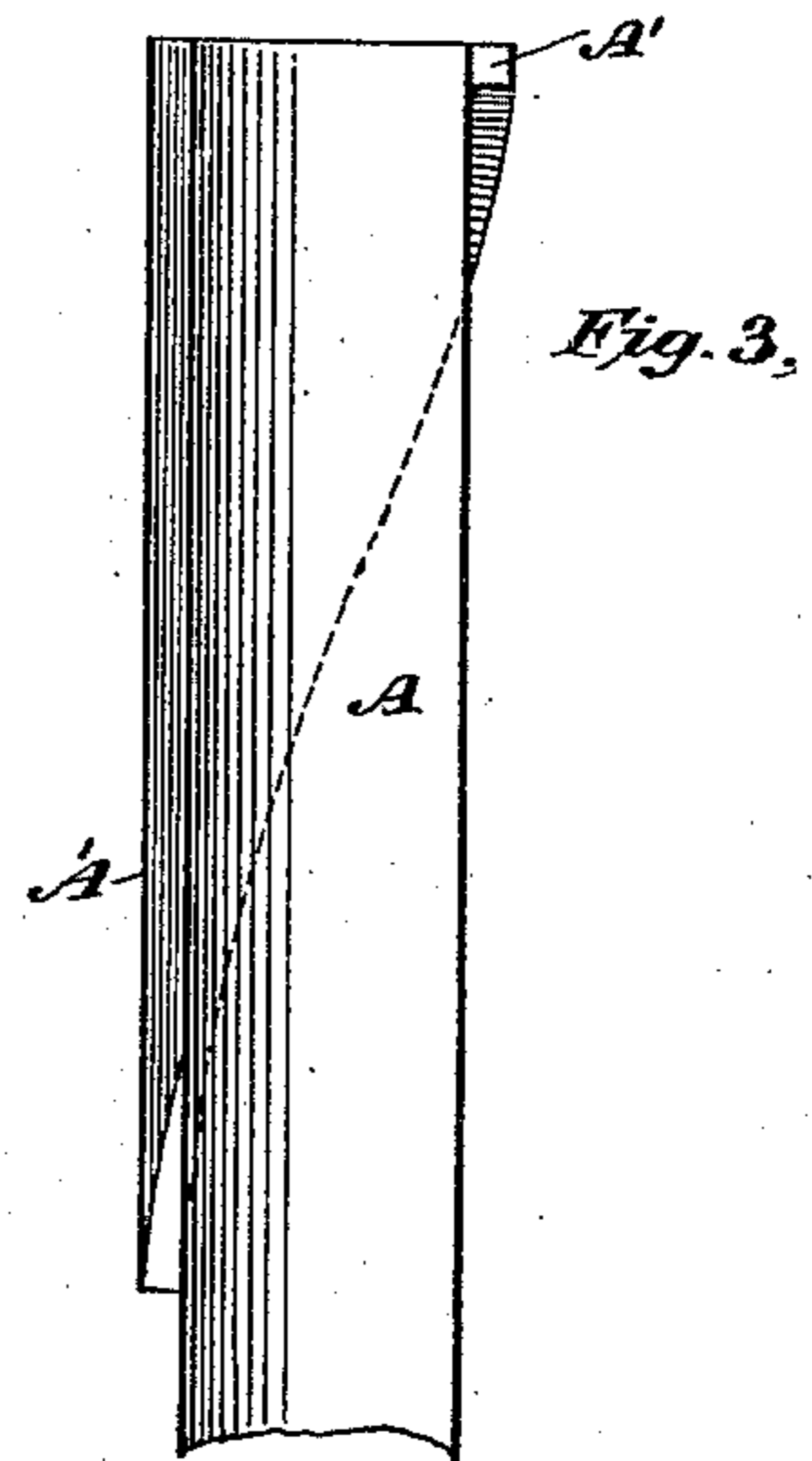
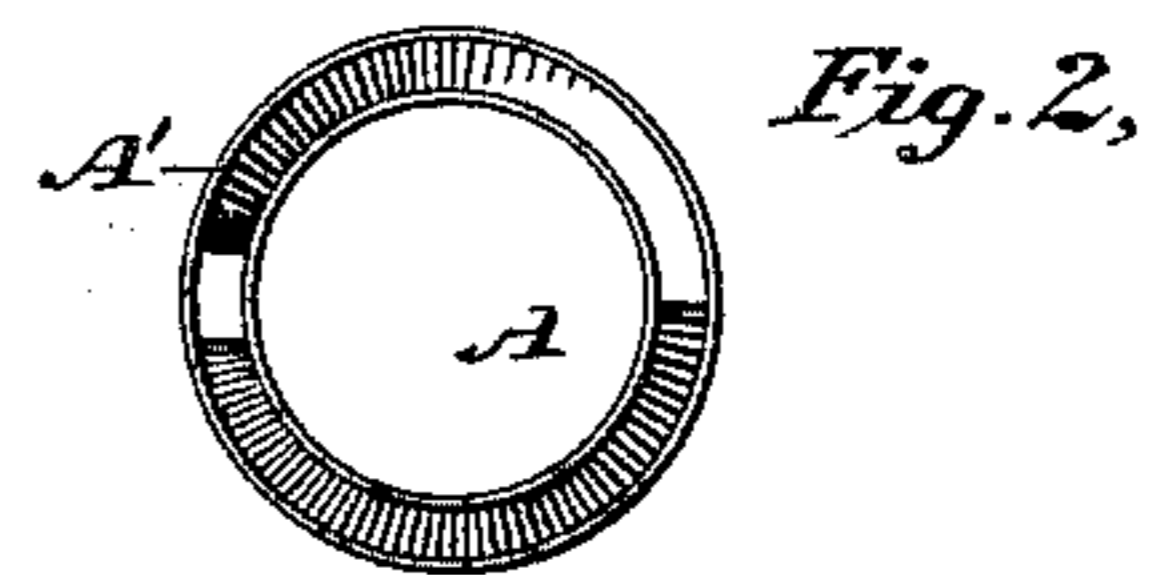
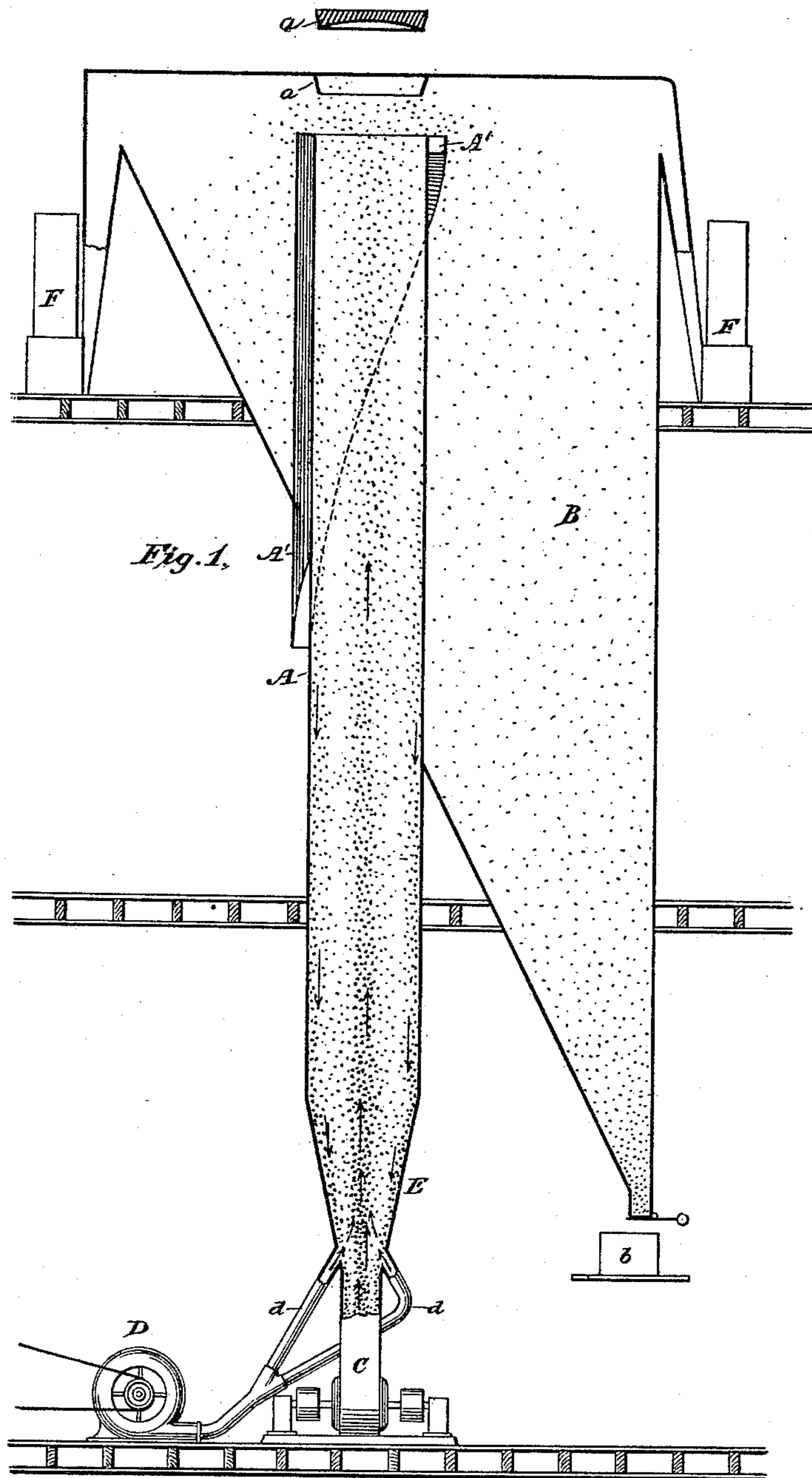


(No Model.)

E. F. WARD.
POWDER SEPARATOR.

No. 409,258.

Patented Aug. 20, 1889.



Witnesses
Geo. W. Breck.
John. Emmett.

Inventor
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By his Attorney
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UNITED STATES PATENT OFFICE.

EDWIN F. WARD, OF NEW YORK, N. Y.

POWDER-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 409,258, dated August 20, 1889.

Application filed October 24, 1887. Renewed February 25, 1889. Serial No. 301,164. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. WARD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Powder-Separators; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to apparatus for separating or sifting the coarse from the fine particles of any finely-ground material, such as pigments, cements, &c. This is accomplished by means which will be hereinafter more fully set forth in the specification, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of the apparatus; Fig. 2, a cross-section of the funnel attached to the air-shaft; Fig. 3, a side elevation of the air-shaft and funnel, and Fig. 4 a modified form of the bottom of the air-shaft.

It is well known that the presence of coarse material or grit in pigments or cements is objectionable. In the case of metallic pigments the presence of coarse material prevents a smooth surface when mixed with oil and applied as a paint and causes rough points to appear upon the applied surface. In the case of cement—such as hydraulic cement—the coarse material is inert and prevents intimate mixture of the finer particles, and therefore a decrease in breaking and crushing strains.

Ground pigments have been separated by sieves and by floating in water, and cements have been separated by sieves. These methods are found to be unreliable and expensive.

By my device I do away with all sieves and floating and use a column of air to separate the coarse and fine particles, and at the same time carry off the fine material.

Referring more particularly to the drawings, I have shown a pulverizer C of any suitable construction and capacity. One which generates a column of air by the rapid revolutions of the crushing-surface may be used,

or a column of air may be forced through the pulverizer. At the top of the pulverizer is placed a vertical cylinder or shaft A of a length and diameter according to the requirements of the material to be ground and separated. This shaft is extended upward and terminates in a bin or hopper B, forming a dust-chamber, where the fine material is collected. At either side of the hopper I place dust-collectors F of well-known construction. Instead of a hopper, the stack may terminate in a room and screw conveyers be used for carrying off the fine material as it settles. Near the bottom E of the shaft A, and at a point above the exit-shaft of pulverizer C, I introduce side currents of air by means of the pipes or hose *d*, leading from the fan-blowers D.

If a battery or pulverizers be used, they may have branch bottom shafts—such as *d*—leading to the central shaft, and the columns of air be brought in above the junction and the relations remain the same as in the single pulverizer.

Around the shaft A, and extending up to the top thereof, is a guard-funnel A', which serves to catch any material which, although quite light, is not sufficiently fine for the purpose required. This funnel is brought to one side of the stack A and terminates in an opening, which may have a receptacle for the material, or have an automatic gate. Such material may thus be removed and carried to the pulverizer for regrinding.

The operation of the device is as follows: The material as it is ground by the pulverizer is carried out and upward by the central or pulverizer air-column into the lower part E of shaft A. It is there met by the air-columns of tubes *d*. The coarse and fine particles are carried up together; but as they pass upward the tendency of the heavy particles is to fall back and they are forced outward toward the sides of the shaft, and finally fall to the pulverizer, where they are reground. The finer particles are carried up to the top of the shaft, and being driven out therefrom fall into the bin. The force of the air-currents may be regulated by the speed of the blower or by such inlets for air placed at any convenient point upon the shaft or cylinder A

as may be found necessary. The velocity of the upward current through the shaft may be unequal in different portions of its diameter—the stronger current carrying up fine and 5 coarse together, the coarser and heavier particles falling downward through the weaker current toward the pulverizer or receptacle for tailings, as the case may be. If the heavier particles are composed of many small ones 10 massed together, they will be separated from each other by falling against the upward current and ultimately be carried to the dust-chamber. The advantages of this method of separating are that with great rapidity and 15 by one operation it separates from the coarse the sufficiently fine particles, thus increasing the property of the fine product and consequently the value of the total product, while at the same time the rapidity of the process 20 and the avoidance of much handling both increase the amount and diminishes the cost of such total product.

To further prevent any coarse particles from escaping into the receiving-chamber at 25 the top of the shaft, I provide a deflector *a* above the top of the shaft. This deflector breaks the upward force of the air-currents, and the coarse particles, instead of falling outside into the bin, are deflected and brought 30 back into the line of the shaft and thence to the pulverizer. The bottom of the shaft *A* may be closed, as shown at *E'* in Fig. 3, and the pulverized material and air forced into or through the pipe *d'*, and the air-currents, 35 as before, will carry up the fine particles. The bottom is provided with a door to permit

the withdrawal of such material as may have accumulated.

Instead of air in the shaft, I may in some instances and for certain pigments use a col- 40 umn of water in the shaft *A*, the same action taking place as with air—the coarse particles falling and the finer being carried up and held in suspension. The chamber in this instance will preferably be divided and have over- 45 flows, so that the suspended material can settle for withdrawal.

It is evident that the foregoing methods are ones of rapidity and economy and have been found to be a practical way of overcoming 50 the objections referred to.

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

In a pigment-separator, the combination, 55 with the pulverizer and fan-blower, of a shaft above the exit-shaft of the pulverizer, said shaft having openings for the admission of air above the pulverizer-shaft, a continuous funnel surrounding same and brought to a 60 point at one side thereof, a receiving-chamber, and a deflector secured to the top of said chamber and having a surface, which reflects the coarser material into the shaft, located above the shaft *A*, as and for the purpose set 65 forth.

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

EDWIN F. WARD.

Witnesses:

WILLIAM MOLLOY,
I. H. MACDONALD.