

No. 773,875.

PATENTED NOV. 1, 1904.

P. LORILLARD.  
METHOD OF COMPACTING FINELY DIVIDED MATERIALS.

APPLICATION FILED JUNE 23, 1903.

NO MODEL.

Fig. 1.

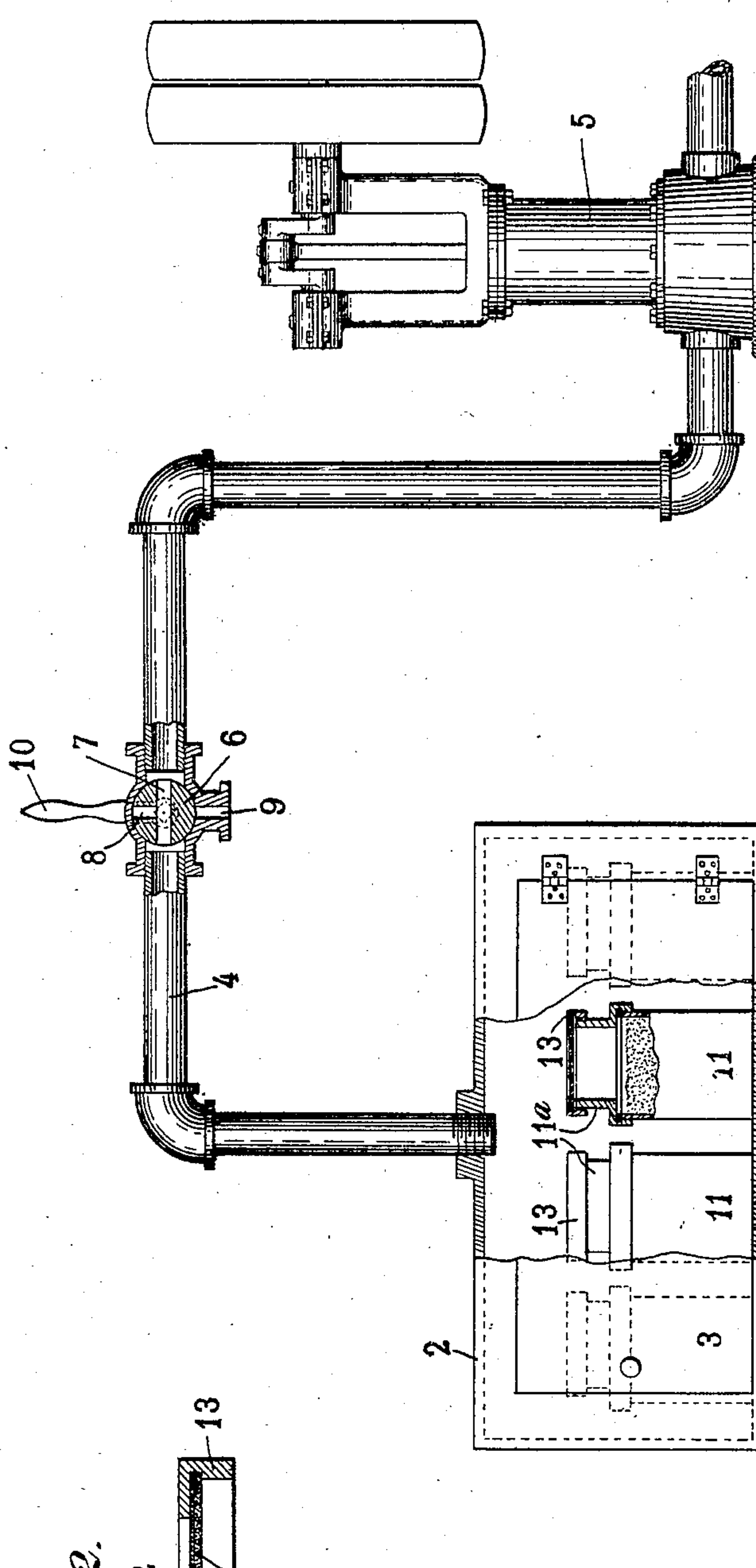
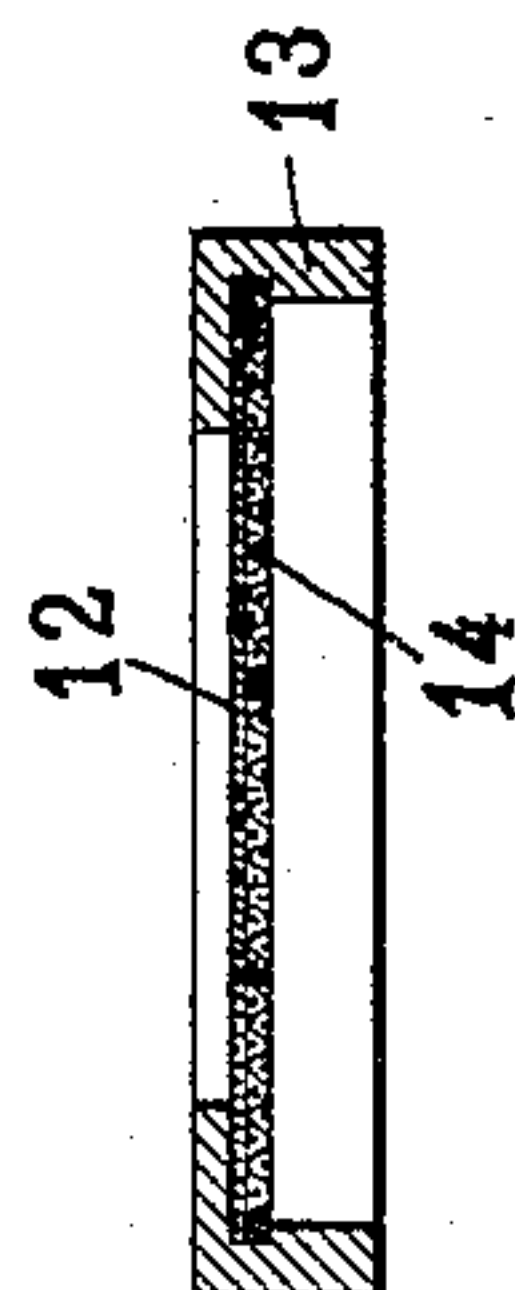


Fig. 2.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## METHOD OF COMPACTING FINELY-DIVIDED MATERIALS.

SPECIFICATION forming part of Letters Patent No. 773,875, dated November 1, 1904.

Application filed June 23, 1903. Serial No. 162,818. (No model.)

*To all whom it may concern:*

Be it known that I, PIERRE LORILLARD, a citizen of the United States, residing at Tuxedo Park, in the county of Orange and State of New York, have invented a new and useful Method of Compacting Finely-Divided Materials, of which the following is a specification.

In handling many kinds of finely-divided material, and particularly in the automatic weighing and packaging thereof, much difficulty has been experienced heretofore by reason of the fact that such materials become charged with air, and thus acquire an excessive bulk during the processes of manufacture or while being fed through a weighing or packaging mechanism, and hence each quantity of material delivered has to be settled or compacted before it can be introduced completely into a receptacle of a proper and sufficient size to hold it after it has been settled. This charged condition of the material is particularly troublesome in the case of fine and dry powders, of which baking-powder may be taken as a typical example, such a powder being caused to "blow," and thus to scatter and waste considerable quantities of the material by the action of the slightest force tending to compress it. It has been customary, therefore, to settle charges of material of this character by the slow and otherwise unsatisfactory process of jarring the receptacles into which they are finally delivered, the excess bulk being contained temporarily in risers or funnels applied to the tops of the respective receptacles.

My invention provides a novel method of settling or compacting a given mass of material of the character above referred to, which method consists, broadly, in the withdrawal of the air, or a sufficient portion thereof, with which the material is charged by establishing a differential pressure between the exterior and the interior of the mass of material, provision being made for the escape of the air from the material under the influence of the differential pressure referred to and for preventing the particles of material from being blown out with the escaping air. The sim-

plest way which I have devised for accomplishing this result consists in subjecting the mass of material to the action of a more or less perfect vacuum made effective through a strainer of such fineness as will permit the air to filter through it, but will prevent the passage of particles of material, the result being that as the pressure acting upon the surface of the mass of material is diminished the air within the material expands, and thus forces itself out from between the particles thereof and through the strainer.

An apparatus for practicing my method is illustrated in the accompanying drawings, in which—

Figure 1 is a side view, partly in vertical section and partly in elevation, showing the apparatus and a number of receptacles containing material which has been operated upon. Fig. 2 is an enlarged sectional view showing a strainer hereinafter described.

Referring to the drawings, 2 indicates a chamber which is made strong enough to sustain the external atmospheric pressure when exhausted of air and is provided with a door 3, which forms an air-tight closure for the chamber. From the chamber 2 leads a pipe 4, which is connected to any suitable device for exhausting air, such as an air-pump 5, and should be provided with a valve 6 for controlling the pressure in the chamber. The valve 6 is herein shown as a two-way valve, being provided with a passage 7, arranged to establish communication between the chamber 2 and the air-pump 5 when the valve is in the position illustrated and with a supplementary passage 8, arranged to establish communication between the chamber 2 and an inlet 9 whenever the operating-handle 10 is turned to the left through an angle of ninety degrees from the position shown. When the valve is in the former position, the inlet 9 will evidently be closed, and when the valve is in the latter position communication between the chamber 2 and the air-pump 5 will be cut off.

In using my apparatus a number of receptacles 11, each containing a quantity of ma-



terial to be compacted, are placed within the chamber 2 and the door 3 is then closed. When it is desired that the compacted mass of material shall fill the respective receptacles, as is commonly the case, each receptacle 5 will be provided before it is filled with a riser 11<sup>a</sup>, having a capacity sufficient to hold the excess of material before it is compacted, and in any case the exposed surface of the material 10 will be covered by a strainer of such fineness that it is pervious to air but impervious to particles of the material operated upon or practically so. The valve 5 is then operated to cut off communication between the chamber 15 2 and the inlet 9 and to establish communication between said chamber and the air-pump, whereupon air is withdrawn from said chamber and a more or less perfect vacuum is created and maintained therein. The result 20 is that as the pressure in the chamber 2 diminishes the air contained within the material in the receptacles expands and forces itself out of the material and through the strainer, and as the air thus escapes the material 25 settles in the receptacles under the action of gravity. After the material has thus been settled the valve 6 is operated to restore the normal atmospheric pressure in the chamber 2, thus permitting the door 3 to be opened 30 easily and the receptacles to be withdrawn from the chamber. For baking-powder a strainer such as above referred to is best made of a piece of bolting-cloth 12, which may be stretched over a suitable rim 13, 35 adapted to rest upon the top of a receptacle or riser. 14 represents a backing of wire-gauze which is preferably placed beneath the bolting-cloth. I have discovered that the bolting-cloth will permit air to pass through 40 it as it escapes from the material, but will hold back the material itself and prevent it from blowing out of the receptacle.

I have found that not only is the material settled and compacted by the withdrawal of 45 air from it, as above described, but that there is also in most cases a supplementary compacting effect produced when the normal atmospheric pressure is restored in the chamber 2. This supplementary compacting action is 50 due to the normal atmospheric pressure acting upon the exposed surfaces of the masses of material, the pressure in the interior of which has been reduced, and I have found that in the case of baking-powder especially the particles 55 of material act like valves to prevent air from permeating the mass when the atmospheric pressure is restored, thus causing said pressure to become effective to compress the material. This supplementary compacting 60 action may be relied upon, if desired, as an element in producing the total compacting ef-

fect required, or, in other words, a portion of the compacting action may be produced by the withdrawal of air from the material, and the remaining compacting action may be produced 65 by the readmission of air to the chamber 2.

I do not consider my invention to be limited to the use of any specific means or apparatus 70 for creating a difference between the pressures existing at the exterior and the interior of a mass of material, the apparatus shown in the drawings being merely illustrative of a simple and convenient means for practicing 75 my method.

I claim as my invention—

1. The method of compacting a mass of finely-divided material which consists in subjecting the interior and the exterior of the mass to different pressures and thereby removing 80 air from between the particles composing said mass, and filtering the air so removed to prevent the escape of particles of the material with it.

2. The method of compacting a mass of 85 finely-divided material which consists in subjecting an exposed surface of the mass to a less pressure than that existing at the interior of said mass, filtering the air thereby removed to prevent the escape of particles of the material 90 with it, and subsequently applying a compressing pressure to said mass.

3. The method of compacting a mass of finely-divided material which consists in subjecting an exposed surface of the mass to a 95 less pressure than that existing at the interior of said mass, filtering the air thereby removed to prevent the escape of particles of the material with it, and subsequently equalizing said pressures. 100

4. The method of compacting a mass of finely-divided material which consists in placing said mass in an open receptacle, covering the receptacle with a strainer which is pervious 105 to air but impervious to the material, and exposing said receptacle to a less than normal atmospheric pressure.

5. The method of compacting a mass of finely-divided material which consists in placing said mass in an open receptacle, covering 110 the receptacle with a strainer which is pervious to air but impervious to the material, exposing said receptacle first to a less than normal atmospheric pressure, and subsequently to the normal atmospheric pressure. 115

In testimony whereof I have hereunto subscribed my name this 17th day of June, 1903.

PIERRE LORILLARD.

Witnesses:

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