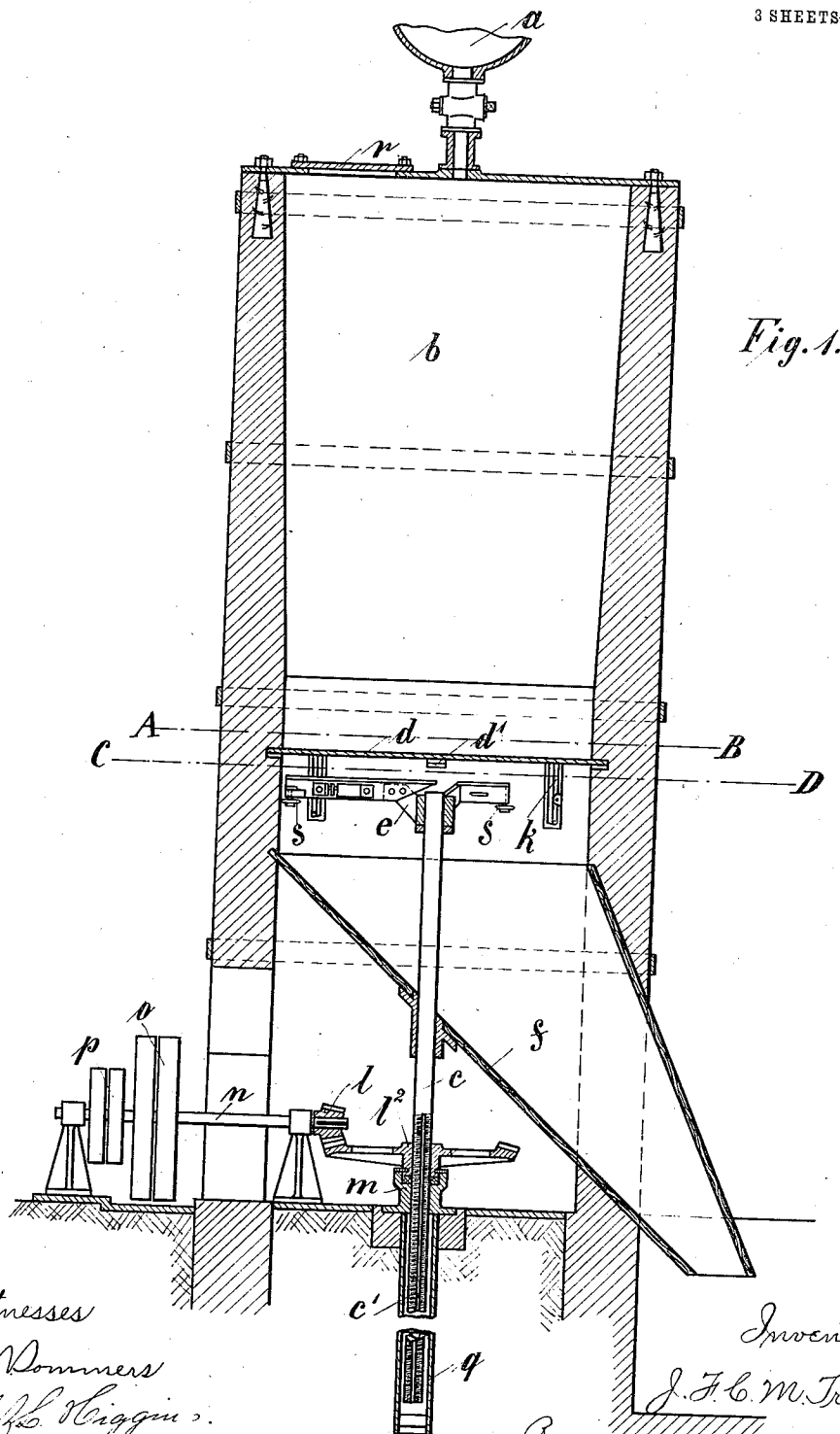


J. F. C. M. TRÖBS.
 SUPERPHOSPHATE CHAMBER AND MEANS FOR EMPTYING SAME.
 APPLICATION FILED AUG. 11, 1910.

1,013,334.

Patented Jan. 2, 1912.
 3 SHEETS—SHEET 1.

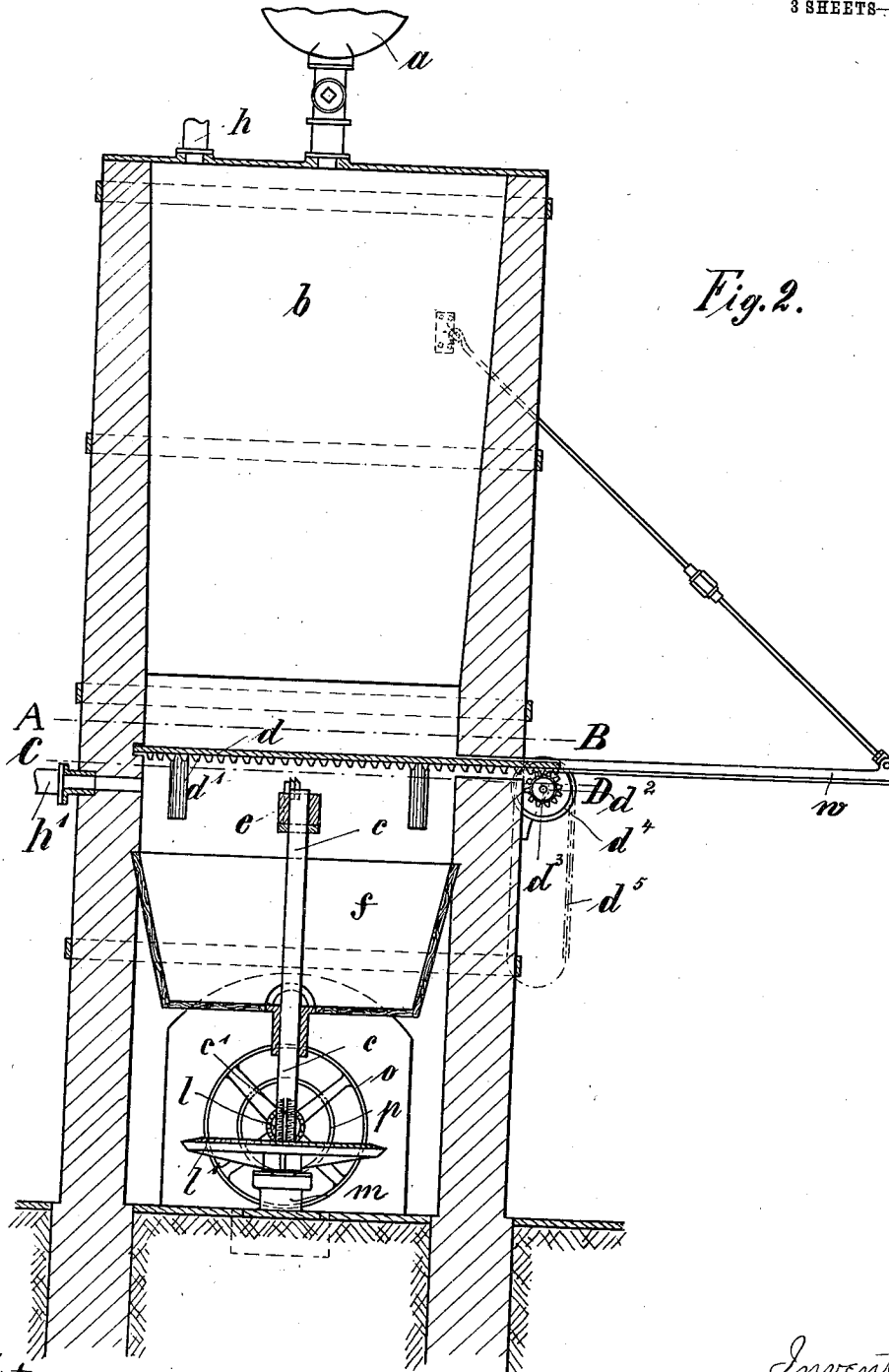


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Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

C-D

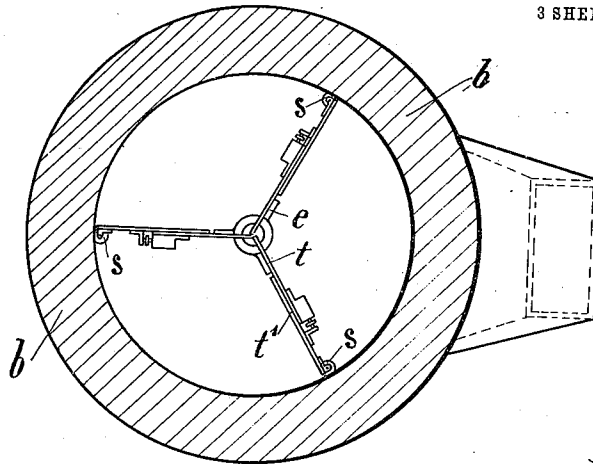


Fig. 9.

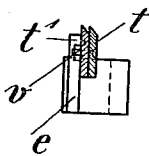


Fig. 6.

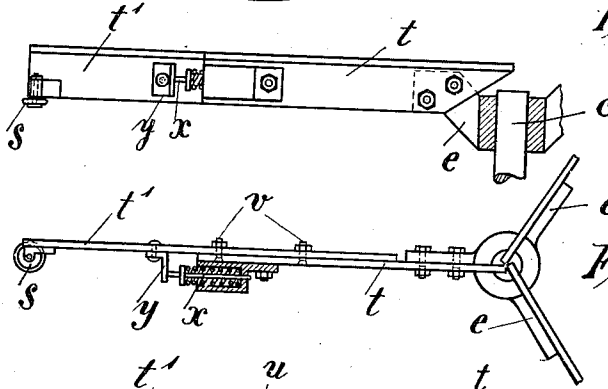


Fig. 7.

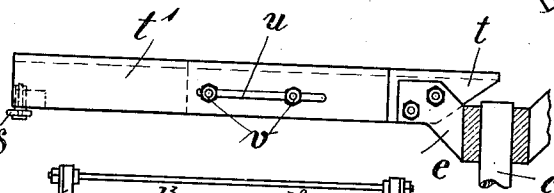


Fig. 8.

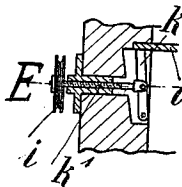


Fig. 5.

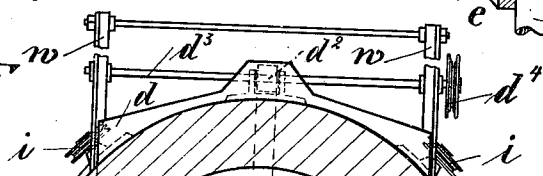
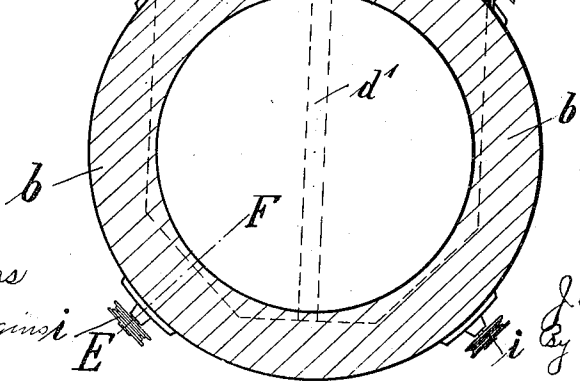


Fig. 4.

A-B



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UNITED STATES PATENT OFFICE.

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SUPERPHOSPHATE-CHAMBER AND MEANS FOR EMPTYING SAME.

1,013,334.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed August 11, 1910. Serial No. 576,752.

To all whom it may concern:

Be it known that I, JOHANN FRIEDRICH CARL MARTIN TRÖBS, a subject of the German Emperor, and resident of Harburg-on-the-Elbe, Germany, have invented certain new and useful Improvements in Superphosphate-Chambers and Means for Emptying Same, of which the following is a specification.

10 In superphosphate chambers as constructed hitherto and provided with mechanical emptying means the removal of the superphosphate has generally been effected in such a manner that the separated portions of the
15 superphosphate, before falling out of the chamber, is dragged for a greater or shorter period, along the upper surface of the solid material or along the walls of the chamber. The immediate effect thereof is that, part of
20 the sulfuric acid contained in the separated portions of the mass is pressed out, the latter consequently becomes damp, and forms into lumps and emerges from the chamber in this condition; thereby necessitating later on the
25 use of separate grinding or pulverizing machines.

It has been proposed to remove the superphosphate by hand operated cutting appliances starting from beneath the usual rectangular phosphate chambers being employed and only a relatively small strip of the bottom being exposed. It has also been proposed to employ cylindrical superphosphate chambers provided with mechanical means
35 for operating on the mass, but in this case the axis of the cylindrical chamber was however arranged horizontally and the tools operated upon one of the end surfaces. The particles were consequently exposed to the
40 beforementioned disadvantages and to avoid the latter a construction has been effected in which the block is pushed out of the cylindrical chamber in order to present a free end. This necessitates employing powerful machinery and great force and is therefore
45 costly, besides being difficult of execution, while at the same time the mass is subjected to the injurious pressing action which it is desirable to avoid. It is moreover known to
50 employ horizontal drums against the contents of which after a front surface has been removed, a rotating and forward moving knife-carrying head presses. A slot is provided at the bottom of the cylinder to per-

mit of the discharge of the powdered mass. 55
This construction does not however achieve the results which are the object of the present invention.

The object of the present invention is to remedy the above defects by preventing the
60 particles after being scraped off from coming into contact with the surface of the block or with the walls of the chamber, thus insuring that a powder is produced, which requires no subsequent treatment, and from
65 which no sulfuric acid has been abstracted.

A further object of the invention is to effect the drying of the particles as they fall down and this can moreover be assisted by mechanical means, such as an air blast or the
70 like.

The present invention consists in a superphosphate chamber provided with mechanical emptying means in which the entire bottom plate upon which the solid mass rests
75 can be withdrawn, the walls of the chamber being constructed slightly tapering in the downward direction in order to support the mass when the bottom plate is removed, the knives being adapted to act from beneath on
80 the superphosphate thereby permitting the particles to freely fall clear of all obstructions.

In carrying the invention into effect the following points must be borne in mind. 85

1. The chamber must be arranged so that when the bottom is removed the entire area thereof is exposed. The walls of the chamber must therefore be relied upon to support the solidified mass. If this cannot be
90 effected by a cylindrical chamber then in that case the chamber must be constructed with a slight downward taper.

2. The knives must act upon the block of material from beneath and must be adapted
95 to permit each particle immediately it is separated from the block, to fall freely downward between the knives. The knives may be removed relatively to the chamber or vice versa although from a practical point
100 of view the former is preferable, since less power is required. If the area of the chamber increases as the work proceeds upward, care must be taken by a suitable construction of the knives, that the entire surface is still
105 uniformly operated upon.

Reference will now be made to the accompanying drawings in which:—

Figures 1 and 2 represent vertical sections, taken at right angles to each other, of the chamber. Figs. 3 and 4 are horizontal sections on the line C—D and A—B respectively of Figs. 1 and 2. Fig. 5 is a sectional view on the line E—F of Fig. 4. Figs. 6-9 are detailed views on a somewhat larger scale illustrating the arrangement of the scraping knives.

Similar letters of reference refer to like parts.

The chamber preferably consists of a concrete shaft *b* tapering slightly toward the bottom; the latter being formed by a base plate *d* adapted to be moved in or out in a lateral direction in guide grooves traversing the wall of the chamber and on L-shaped guide bars *w* attached in a suitable manner to the outer wall of the chamber *b*. The movement of the plate *d* may be effected by means of a pinion *d*² engaging a rack *d*¹ at the bottom side of the plate *d*. The pinion is fixed on a shaft *d*³ journaled in flanges of the guide bars *w* and adapted to be operated by a chain wheel *d*⁴ and chain *d*⁵. The plate *d* when in its inner or closing position is carried by supporting levers *k* which may be actuated or swung outward each by means of a bolt *k*¹ upon the threaded outer end of which is provided a chain wheel *i* operated preferably by means of a chain not shown. This arrangement enables the plate *d* to be lowered somewhat from the superphosphate resting thereon, after the latter has stiffened, so that the plate *d* is thereby separated and relieved from the material and can be more easily withdrawn out of the chamber into its outer position on the guide bars *w*. The cone shaped block of superphosphate will now be supported solely by the inner cone shaped walls of the shaft, which is at its upper end provided with a filling device *a*, an observation aperture *r*, and a pipe *h* for exhausting injurious vapors arising from the mass when solidifying.

The part of the chamber situated beneath the sliding plate *d*, is cylindrical and provided at the sides with suitable openings. In the interior of this chamber is journaled a spindle *c* symmetrical with the vertical center axis, the lower part of the spindle being provided with a screw thread. A bearing *m* forms or contains a rigid or stationary nut for the said screw part of the spindle which is provided with a longitudinal groove *c*¹ adapted to engage with a rib provided in the otherwise plain inner wall of the hub *l*² of the bevel wheel *l*¹ resting loosely upon the nut *m*, so that when the wheel *l*¹ is rotated it turns also the spindle *c* which thereby screws itself up or down in the nut *m* according to the direction of the rotation of the wheel *l*¹. Rotation may be imparted to the wheel *l*¹ by the bevel wheel *l*, the shaft *n* and the belt pulleys *p*

or *o*. By the simultaneous rotational and axial movement to be imparted to the spindle *c* the latter may be raised or lowered at will. Below the nut *m* and sunk in the foundation is provided a casing or sleeve *q* into which passes down the screw threaded end of the spindle being thus protected. At the upper end of the spindle is provided the star shaped or spider member *e*, to which are fastened the scraping knives operating on the material. The knives are constructed each of two parts *t* and *t*¹ slidably connected with each other in radial direction for example by arranging the part *k*¹ with a slot *u* on guide pins *v* of the part *t*. The outer part *t*¹ being normally pressed outward by a spring bolt *x* suitably held and attached to the knife part *t* and acting against a shoulder *y* of the knife part *t*¹ whereby the outer end of the latter always rests with its roller *s* against the wall of the chamber, thereby insuring the entire bottom surface of the mass block being acted upon, although this surface may vary in size by reason of the conical construction of said chamber.

The mode of operation is as follows:—The reaction mixture is poured into the chamber *b* through the device *a*, the mass is then allowed to cool and solidify, whereupon the slide plate *d* is slightly lowered by tilting its supporting levers *k*, being thereby separated and relieved from the weight of the solidified mass. The slide plate is then withdrawn, the entire bottom surface of the mass block being now free and adapted to be operated upon by the knives *t t*¹, which are rotated and gradually raised by means of the spindle *c*. The material scraped off by the rotating knives and being in the form of a powder falls into the chute *f* and is thence led or taken away by any suitable means. Any noxious acid vapors formed during the scraping off of the material can be withdrawn by suction through the pipe *h* and safely carried away.

I claim:—

1. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, means to subsequently remove the bottom, the interior wall of said chamber tapering toward said bottom, whereby when said mass solidifies the latter is sustained by said wall.

2. In a superphosphate chamber, a removable bottom therein to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidifies.

3. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidi-

fies and means to lower the bottom from its normal position to free it from the charge when the latter solidifies.

4. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidifies, means to lower the bottom from its normal position to free it from the charge when the latter solidifies and means to remove the bottom after lowering the latter.

5. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidifies, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to remove the bottom after lowering the latter, and means beneath said bottom adapted to cut the solidified material when the bottom is removed.

6. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidifies, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to remove the bottom after lowering the latter, revolving cutters mounted beneath the bottom adapted to engage the end surface of the mass when the bottom is removed, and means to raise and lower said cutters.

7. In a superphosphate chamber, a removable bottom to support an unsolidified charge in the chamber, said chamber comprising means independent of the bottom to support the mass when the latter solidifies, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to remove the bottom after lowering the latter, revolving cutters mounted beneath the bottom adapted to engage the end surface of the mass when the bottom is removed and means to gradually raise the cutters during their

8. A superphosphate chamber, compris-

ing a shaft having downwardly converging interior walls, a removable bottom in said shaft, supporting members for said bottom, means to actuate said members to lower the bottom and means to withdraw the latter from the supporting members.

9. A superphosphate chamber comprising a shaft having downwardly converging interior walls, a removable bottom in said shaft, levers to support the bottom in the shaft, means to swing the levers to lower the bottom, and means to withdraw the bottom laterally from the shaft.

10. A superphosphate chamber, comprising a shaft having downwardly converging interior walls, a bottom in the shaft to support an unsolidified charge in the latter, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to withdraw the lowered bottom, a rotatable vertically mounted shaft beneath the bottom and horizontally mounted cutters on the shaft.

11. A superphosphate chamber comprising a shaft having downwardly converging interior walls, a bottom in the shaft to support an unsolidified charge in the latter, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to withdraw the lowered bottom, a rotatable vertically mounted screw-shaft beneath the bottom, horizontally mounted cutters on the shaft and means to rotate and raise the shaft simultaneously.

12. A superphosphate chamber comprising a shaft having downwardly converging interior walls, a bottom in the shaft to support an unsolidified charge in the latter, means to lower the bottom from its normal position to free it from the charge when the latter solidifies, means to withdraw the lowered bottom, a rotatable, vertically mounted screw-shaft beneath the bottom, horizontally mounted cutters on the shaft and means to radially extend the cutters automatically.

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