

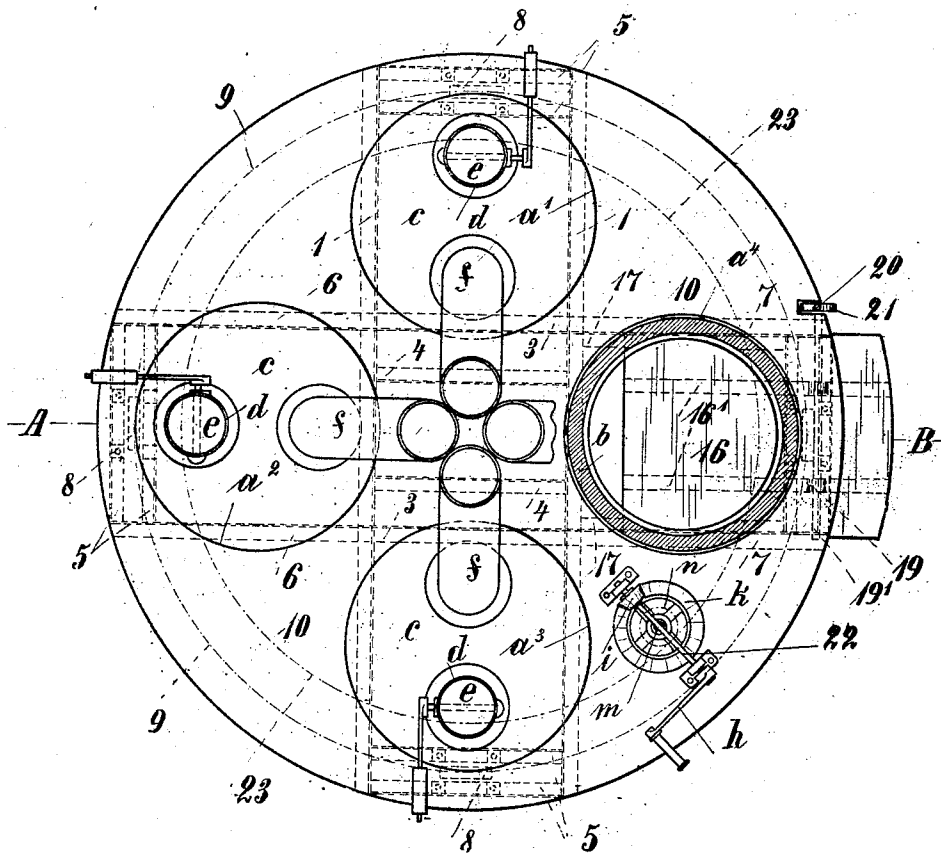
H. P. C. FREUDENTHAL.
 SUPERPHOSPHATE CHAMBER.
 APPLICATION FILED JAN. 9, 1911.

1,037,464.

Patented Sept. 3, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

H. Darg
N. H. Darg

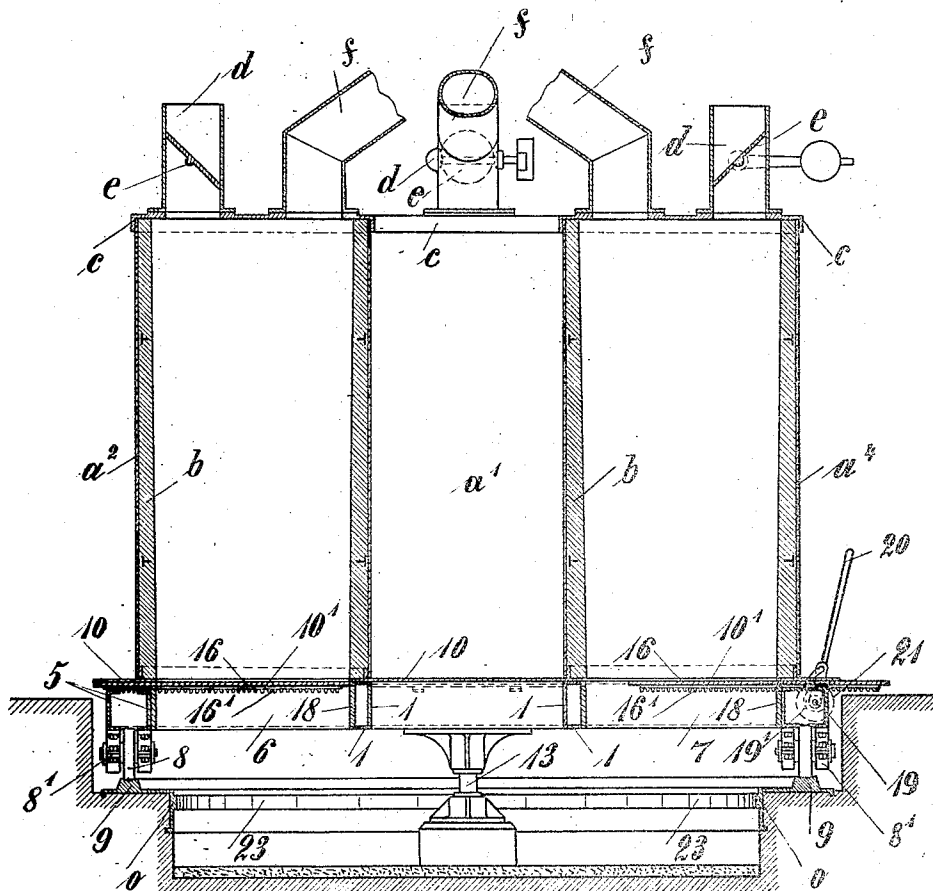
Inventor

H. P. C. Freudenthal
N. H. Darg atty.

1,037,464.

3 SHEETS--SHEET 2.

Fig. 2.



B. Sommers
M. H. Darg

Heinrich P. C. Freudenthal
By Henry Roth at

Atty.

H. P. C. FREUDENTHAL.
 SUPERPHOSPHATE CHAMBER.
 APPLICATION FILED JAN. 9, 1911.

1,037,464.

Patented Sept. 3, 1912.
 3 SHEETS—SHEET 3.

Fig. 3.

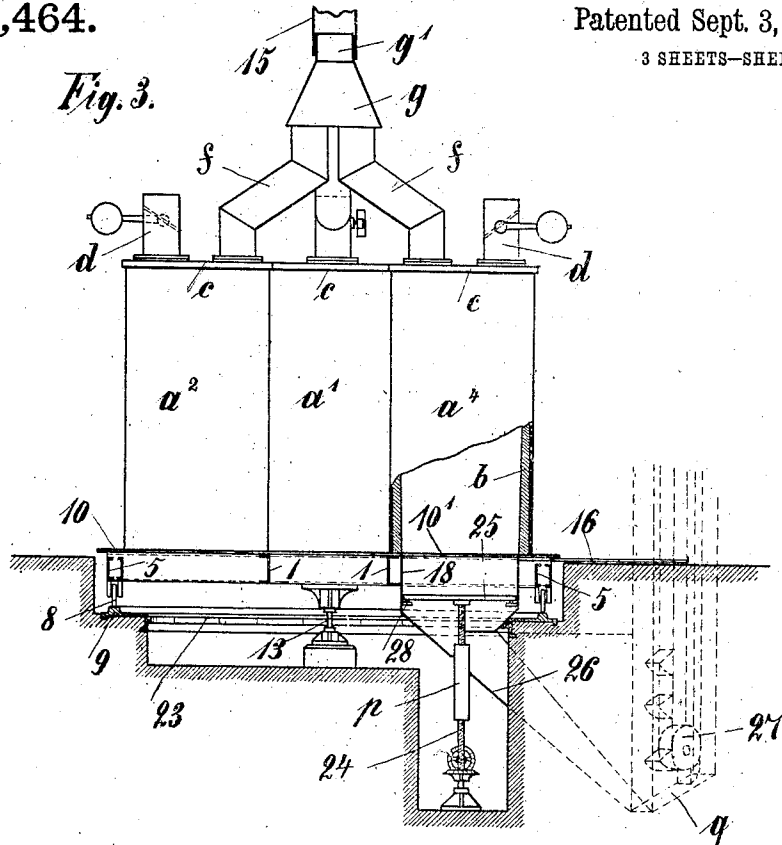
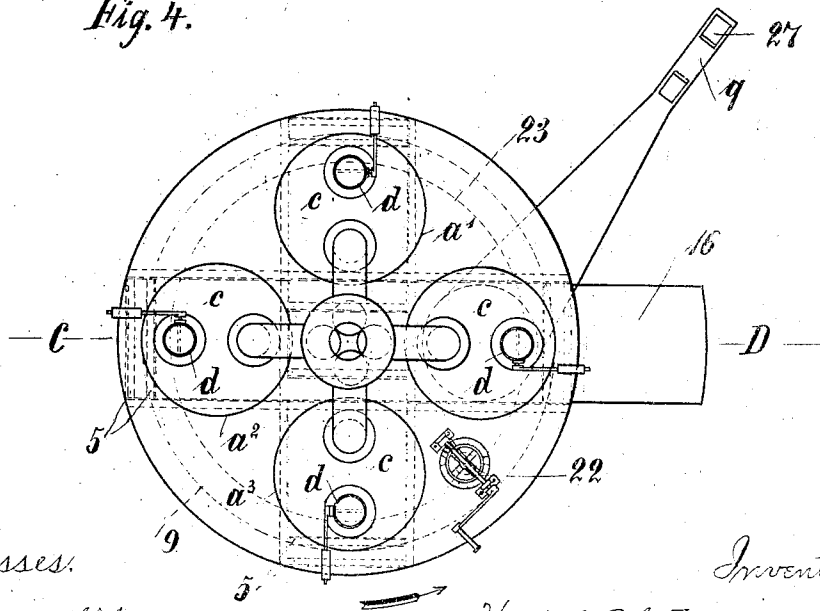


Fig. 4.



Witnesses:
 B. W. Sommers
 M. H. Darg

Inventor:
 Heinrich P. C. Freudenthal
 By Henry Orth atty

UNITED STATES PATENT OFFICE.

HEINRICH PETER CHRISTOPH FREUDENTHAL, OF HAMBURG, GERMANY.

SUPERPHOSPHATE-CHAMBER.

1,037,464.

Specification of Letters Patent.

Patented Sept. 3, 1912.

Application filed January 9, 1911. Serial No. 601,554.

To all whom it may concern:

Be it known that I, HEINRICH PETER CHRISTOPH FREUDENTHAL, a subject of the German Emperor, and resident of Hamburg, Germany, have invented certain new and useful Improvements in and Relating to Superphosphate-Chambers, of which the following is a specification.

The present invention refers to improvements in and relating to superphosphate chambers.

The discharging of superphosphate chambers is effected at present almost exclusively by mechanical means. For this purpose the chambers have been constructed variously in the form of horizontal or vertical vessels, and a reducing device, for example, a scraping tool has been employed to act upon the front, top or bottom of the mass or block of material so as to cause the superphosphate to pass out of the chamber in the condition of fine powder. These phosphate chambers have been arranged hitherto with the disintegrating vessel above the chamber, and the phosphate mixed in the latter with sulfuric acid and water passes after the reaction is completed, in a pasty condition into the chamber below wherein the mixture solidifies. The reducing apparatus is arranged in front of, below, or above the chamber to be discharged according to the construction of the latter. In all constructions however the arrangement is always such that the disintegrating vessel, the superphosphate chamber and the reducing and discharging device constitute always a connected whole, so that in the case of a number of chambers each chamber must have its own disintegrating vessel and its own reducing and discharging device. Consequently each chamber must be charged, left till its contents have become solidified, and then be discharged before it can be charged anew.

Now according to the present invention a group of superphosphate chambers can be served by one common disintegrating vessel and one common reducing and discharging device in such a manner that while one chamber is being charged, another chamber can be discharged, while the contents of the intermediate chambers are solidifying. This advantage is attained by arranging the superphosphate chambers on a turntable, symmetrically to its center, in such a manner that as the turntable rotates, the charging openings of the chambers can all travel

in the same circular path and can be brought in succession underneath the spout of the common disintegrating vessel which is situated above the turntable and which serves all the chambers in turn, and so that while the charging opening of one chamber is situated underneath the said spout, another chamber is situated opposite the common reducing and discharging device by which its contents are being removed, and meanwhile the contents of the intermediate chambers are being allowed to solidify.

This invention is particularly suitable for vertical cylindrical phosphate chambers which are discharged from below by means of cutters mounted in well known manner radially on a revolving axle having the form of a screw that rises as it revolves. One adaptation of this invention to such chambers is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a plan partly in section, and Fig. 2 is a sectional elevation according to the line A—B of Fig. 1 of a group of four chambers. Fig. 3 is a sectional elevation according to the line C—D of Fig. 4, and Fig. 4 is a plan of an entire installation drawn to a smaller scale.

The turntable consists of two J-shaped wrought iron girders 1, 1 connected together by cross girders 3, 3, 4, 4 and 5, 5. Riveted thereto are two pairs of girders 6, 6 and 7, 7 which are likewise connected together at their front ends by cross girders 5, 5. Brackets 8¹ are fixed to the undersides of the girders 5, 5 for supporting the rollers 8 which run on a circular rail 9. Upon the frame or skeleton formed by the said girders is placed a platform composed of cast iron plates 10. The platform or iron plates 10 have at the places where the four chambers a^{1-4} are erected circular perforations or openings 10¹ of the size of and registering with the lower openings of the said chambers. The chambers consist each of a cylindrical casing a^1 , a^2 , a^3 and a^4 , respectively, of sheet metal having a concrete lining b the internal diameter of which slightly increases toward the top. The chambers a^{1-4} are closed at the top by cast iron lids c having charging necks d with closing flaps e . The centers of the charging necks are all equally distant from the center of the pivot 13 of the turntable. Each lid c carries also a pipe f . All the pipes f having their upper ends brought close together equally distant from

the center line of the turntable (Fig. 3) and opening into the bottom of a funnel-shaped vessel g having a neck g^1 that opens into a pipe 15. The pipes f serve to convey away the gases and acid vapors liberated from the reaction mixture in the chambers a^{1-4} , and this arrangement of the pipes enables the turntable to be rotated without impeding the conveying away of the gases and vapors.

The circular openings in the bottom plate or platform 10, are closed during the charging of the material into the chambers a^{1-4} by slides 16 sliding in suitable guide ways 17 between the bottom plate 10 and a tube piece 18 attached to the adjoining girders of the frame and adapted to form, as it is, a continuation of the chamber shaft. The slides 16 are provided at their lower side with racks 16¹ with which engage pinions 19¹ on a shaft 19. The slides can be drawn forward in radial direction with respect to the platform 10 to uncover the openings 10¹ by means of a detachable pawl lever 20 and a ratchet wheel 21 fixed on the said shaft 19. A set of these operating devices 20, 21 must be provided for each shaft 19 of each chamber. Only one of these sets is shown in Fig. 2.

It is assumed that the disintegrating vessel is situated in an invariable position above the charging neck d of the chamber a^1 and the turntable is to be rotated in the direction of the arrow shown in Fig. 4, by means of a suitable rotating mechanism (Fig. 1) which for example comprises a horizontal shaft 22 with crank-handle h and bevel wheel i engaging a bevel wheel k on a vertical shaft m carrying on its lower end a pinion n gearing with a stationary ring of teeth 23 of the basement or foundation-wall o (Fig. 2). On this assumption the reducing and discharging device must occupy an invariable position at the place which the chamber a^4 occupies with relation to the chamber a^1 in Fig. 4.

The reducing and discharging apparatus comprises a screw spindle 24 (Fig. 3) which is adapted to be rotated and raised at the same time by a suitable toothed wheel gearing for example such as described in the prior application of J. F. C. M. Trobs, Ser. No. 576752, filed Aug. 11th, 1910, and assigned to me by deed of assignment recorded August 11, 1910, in Liber D 85, page 32. The screw spindle 24 carries at its upper end radial cutters 25 with arms composed of two parts connected elastically together so that the outer arms have a constant tendency to be forced outward, as fully explained by the said prior application. In its lowest position the screw spindle which is guided in a socket p provided in the wall of the hopper or funnel 26 underneath the chamber to be emptied, extends or is sunk in a tube situated in direction underneath the said

screw spindle, whereas the cutters 25 are inside the upper cylindrical portion of the funnel 26, Fig. 3. When a chamber to be discharged for example the chamber a^4 is situated over the funnel 26, the slide 16 under this chamber is drawn out or opened by means of the corresponding pawl and ratchet mechanism, and the driving mechanism is started to move the screw spindle 24 upward. The screw spindle then rises with its cutters which first enter the annular part 18 forming the continuation of the chamber shaft as already above explained. This part 18 forms a closed connection without a gap, between the upper cylindrical extension of the funnel 26 and the interior of the overlying phosphate chamber in which the cutters finally enter, and attack the block of phosphate situated over them. The phosphate which is removed from the block by the cutters in the form of powder falls into the funnel 26 which allows the superphosphate to fall into a pit q from which it is removed by a conveyer 27.

The cutters 25 are guided by rollers 28 which bear against the inside wall of the phosphate chamber or ring 18. When the chamber has been emptied the driving mechanism of the screw spindle 24 is caused to rotate in the opposite direction and at a higher speed until the cutters have returned within the upper cylindrical part of the funnel 26. The turntable can now be turned through 90 degrees after the slide 16 of the chamber a^4 has been closed again, so that the now empty chamber a^4 will come into the position previously occupied by the chamber a^1 (Fig. 4). At the same time the chamber a^1 which has occupied this position until now, and has been charged in the meantime, comes into the previous position of the chamber a^2 , while the chamber a^2 comes in the position of the chamber a^3 and the chamber a^3 comes over the reducing and discharging device. The contents of the chambers have sufficient time to solidify while these chambers travel in steps from the filling position to the discharging position of the apparatus.

It is obvious that the invention is applicable also to cylindrical phosphate chambers having their longitudinal axes horizontal, in which the cutters revolve in vertical planes against the front end of the block of phosphate contained in the chamber.

An arrangement in which the phosphate were arranged to run, say, on wheels on straight rail track to-and-fro between a charging place and a discharging place, would not give the advantages possessed by an apparatus according to the present invention, because points (switches) and turntables would be necessary in such an arrangement which would occupy a great deal of space.

A group of chambers arranged according to the present invention occupies a comparatively very small space and can be operated by one or at most two workmen.

I claim:

1. In superphosphate chambers, the combination of several superphosphate chambers, a turntable carrying said chambers, means for rotating said turntable, means for charging and discharging said chambers, means for placing each of said chambers into alinement with the charging and discharging means, respectively, and slides for opening said chambers at their bottoms.

2. In superphosphate chambers, the combination of several superphosphate chambers, a turntable carrying said chambers, means for rotating said turntable, means for charging and discharging said chambers, means for placing each of said chambers in alinement with the charging and discharging means, respectively, slides for opening

said chambers at their bottoms, and a cutting device in connection with the discharging means, said cutting device adapted to be rotated and to be raised into the chamber which is in alinement with the discharging means.

3. In superphosphate chambers, the combination of several superphosphate chambers, a turntable carrying the chambers, means for rotating said turntable, means for charging and discharging said chambers, and means for placing each of said chambers into alinement with the charging and discharging means, respectively, said chambers having outlet pipes for vapor, the ends of which are arranged in a circle near the axis of the turntable, and a common exhaust pipe into which said ends open.

HEINRICH PETER CHRISTOPH FREUDENTHAL.

Witnesses:

MAX F. A. KUEMPFF,

MAX A. G. LEMCKE.