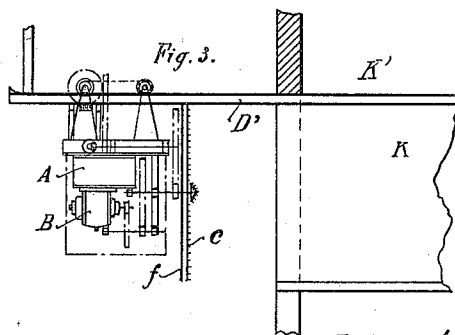
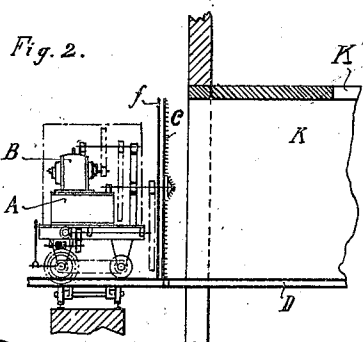
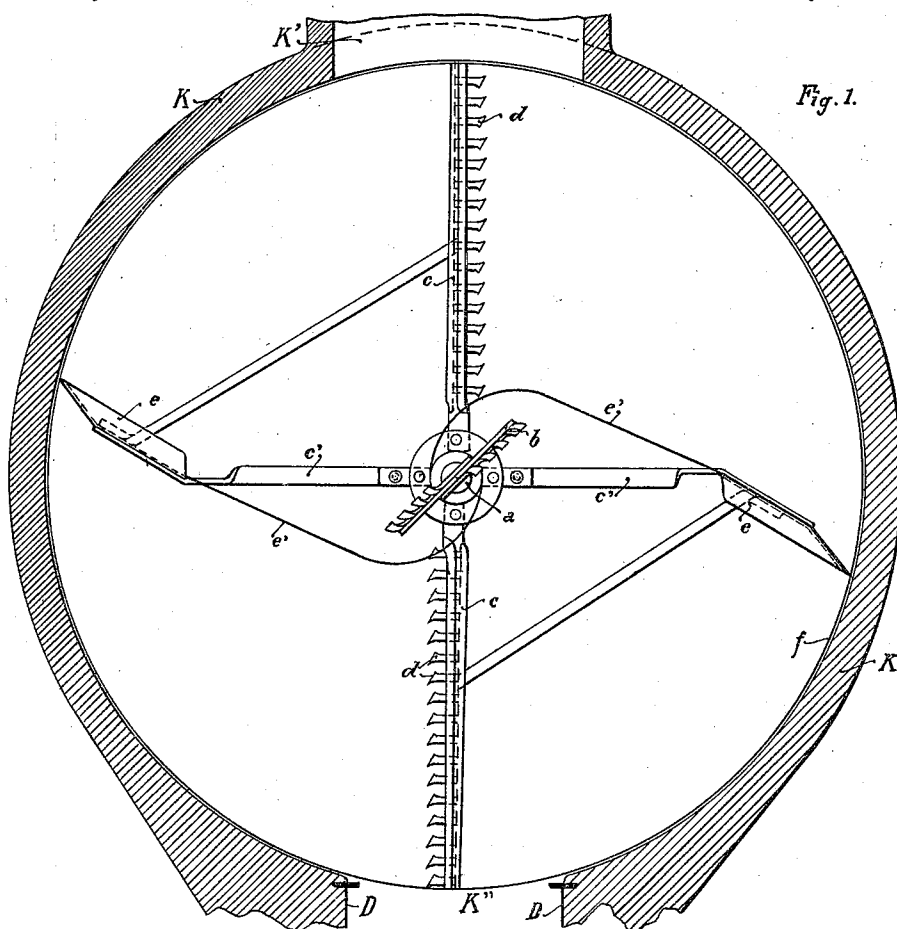


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 APPARATUS FOR MECHANICALLY EMPTYING SUPERPHOSPHATE CHAMBERS BY MEANS OF
 REVOLVING KNIVES.

1,033,854.

APPLICATION FILED MAR. 21, 1912.

Patented July 30, 1912.



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Specification of Letters Patent.

Patented July 30, 1912.

Application filed March 21, 1912. Serial No. 685,338.

To all whom it may concern:

Be it known that I, EMIL WENK, a citizen of the Swiss Confederation, residing at Basel, Switzerland, have invented certain new and useful Improvements in Apparatus for Mechanically Emptying Superphosphate-Chambers by Means of Revolving Knives, of which the following is a specification.

Most of the mechanical devices for emptying receptacles filled with superphosphate masses which have become known, and particularly such devices where rotating cutting knives are used, are constructed with a view of getting the superphosphate out of the receptacles in as finely divided a state and as dry as possible, that is to say, so that it forms a material ready for use and which does not require any further treatment such as grinding and drying. In order to realize this it has been hitherto necessary to make the cutting knives revolve with a comparatively slow speed and consequently to slowly advance the knives toward the mass of superphosphate or vice-versa. Experience has proved that the speed with which the knives advance must not exceed 1 to 1.5 millimeters per revolution of the knives if a material is to be obtained which is ready for use.

The reason why the number of revolutions of the knives can be low only or the speed of revolution can be only slow is, that the surface to be cut of the mass of superphosphate which is hot and moist has to be continuously cooled and dried during the cutting if the layers cut off or scraped off have to crumble so as to form a material ready for use. When cutting or scraping off the superphosphate, one has to try to expose as many pores as possible as these pores contain hot and acid water vapors and gases. The cooling and drying of the surface to be cut have hitherto been effected by continuously drawing off the hot acid vapors and gases which develop during the cutting or scraping of the superphosphate, and by drawing in fresh air. Owing to the slow revolving speed of the knife the output per hour is comparatively small, for example, 4 to 5 tons of ready material with a scraping knife of 2½ meters diameter and with 15 to 20 revolutions per minute.

The present invention has for its object to increase this efficiency of the apparatus by augmenting the circumferential speed of the knife either owing to an increased speed or

to a greater length of the knife, the ventilation of the chamber being the same as has been the case with the devices of known construction.

When the circumferential speed is increased, the speed with which the cutting knife advances is increased correspondingly at the same time; care has to be taken however to continuously drying in a sufficient manner the surface to be cut of the superphosphate block if the material cut off in thin slices has to disintegrate so that it forms a material ready for use.

According to this invention the cooling as well as the drying of the surface to be cut is obtained in the most perfect manner even with a five times greater cutting speed than hereinbefore mentioned and this is the case owing to the particular construction of the cutting device proper. This cutting device is constructed so as to act, on the one hand, as a scraper and, on the other hand, as a fan. The cutting device is mounted in a chamber formed between the surface to be cut of the superphosphate block, and a disk closing that end of the superphosphate chamber at which the knife is inserted, fresh air being drawn into the said chamber in such a manner that this air flows along the surface to be cut of the superphosphate block. By means of paddles connected with the cutting device an intense whirling movement is communicated to the fresh air flowing into the chamber from below so that this air draws along the acid and hot gases which emanate from the superphosphate during the scraping, said gases being forced through the outlet at the upper end. The ventilating paddles further serve for sweeping the scraped off material which drops from the block to the right and left of the outlet at the bottom of the chamber into the said outlet avoiding thus that this material is drawn along in said chamber and gets smeared.

In the accompanying drawings two forms of construction of the invention are shown by way of example.

Figure 1 is a front elevation of the cutting device. Figs. 2 and 3 are lateral elevations illustrating the emptying device on a smaller scale than shown in Fig. 1.

K is a cylindric fixed superphosphate chamber which has at its upper end a longitudinal slot K' communicating with the outflow channel for the gases, said slot serv-

ing further for the admission of the superphosphate into the chamber. In the bottom of the chamber a longitudinal slot K'' is arranged which, according to Figs. 1 and 2, has at either side a profile iron D—D and which serves as outlet for the material scraped off the block. The profile irons D—D which, according to Figs. 1 and 2 are arranged in the outlet slot K'' or according to Fig. 3 in the opening K' serve as rails for a truck A which carries the device for producing the revolving motion and the advance of the cutting device by means of an electro-motor B. Upon a shaft driven from said electro-motor B and directly connected by means of a transmission with one of the axles of the truck A (driving axle) a head *a* is mounted which carries a knife *b* composed of small blades and arranged in front of said head, and further four rods *c*, *c* and *c'*, *c'*, which stand at right angles with regard to the axis of the superphosphate chamber and which form a cross, said rods being secured in their position by means of transverse rods *h*. The rods *c*, *c*, carry small oblique cutting blades *d* which are arranged at uniform distance apart the one from the other, the rods *c'*, *c'*, serving for fixing the paddles *e* which with regard to the knife carrying rods *c'*, *c'*, have a determined inclined position as can be seen from the drawing. These paddles can have, as will be explained hereinafter, a loop-shaped extension *e'* reaching to the head *a*. The cutting device which thus partly forms a scraper and partly a fan, is separated from the truck A by means of a disk *f* which closes the chamber K and which is fixed upon the frame of the truck A. The space between the block of superphosphate and the disk *f* thus serves as a ventilating chamber into which, during the scraping, cold air is continuously drawn through the opening K'' said air being strongly agitated by means of the paddles *e* and forced out through the opening K' into the outflow channel for the gases together with the hot and acid vapors and gases. Owing to this particular manner of scraping and of simultaneously ventilating, the material scraped off the superphosphate block as well as the

surface to be cut of said block are rapidly cooled and dried whereby the cutting speed of the knives is considerably increased as well with regard to the revolving motion as with regard to the advance so that the output of finished material can be greatly increased in comparison with the process used at present. With plants where phosphates are treated which are poor in carbonate of lime such as pebble or hard rock phosphates the paddles *e* have loopshaped extensions *e'* connected with the knife head *a* and along which the scraped off material slides before it can drop out of the chamber. This arrangement is necessary in order to reduce the speed of said scraped off material as this material has to be handled more delicately than the other material.

It is of no importance whether the truck A is arranged as shown in Fig. 2, standing upon the rails, or as shown in Fig. 5 suspended. The construction Fig. 2 is however preferable as the gases escape through the upper end of the apparatus.

I claim:—

Apparatus for mechanically emptying receptacles filled with superphosphate with the aid of revolving cutting knives comprising in combination with the driving shaft of the revoluble knives, a disk of the same diameter as the chamber for closing said chamber, a knife head fixed upon the end of said shaft, two radial knife-supports fixed upon said shaft in front of said disk, small oblique cutting blades fixed upon said supports, two radial supports fixed upon said shaft at right angles with the knife supporting rods, obliquely bent ends of said supports, paddles fixed to said ends for agitating the air drawn into the chamber for cooling the cutting surface and for sweeping out of the lower outlet the material scraped off the block by the knives, substantially as described and shown and for the purpose set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

EMIL WENK.

Witnesses:

GEORGE GIFFORD,
CARL JONES.