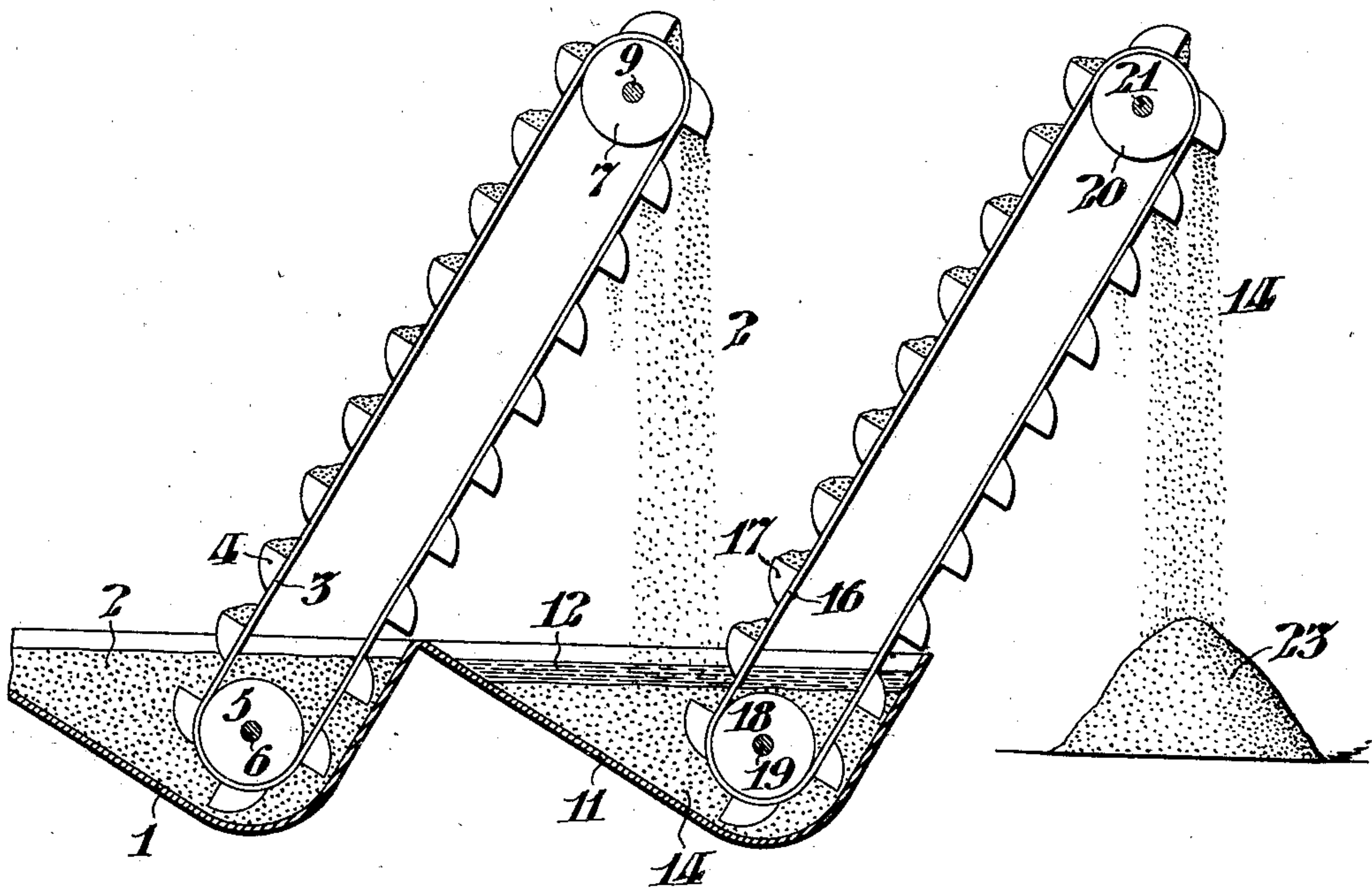


P. J. A. MAIGNEN.
METHOD OF WASHING FILTER SAND.
APPLICATION FILED OCT. 13, 1906.

924,682.

Patented June 15, 1909.



WITNESSES:

Clifton C. Hallawell
John C. Bergner

INVENTOR:

PROSPER JEAN AUGUSTE MAIGNEN,
by Paige, Paul & Haley,
Atty.

UNITED STATES PATENT OFFICE.

PROSPER JEAN AUGUSTE MAIGNEN, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF WASHING FILTER-SAND.

No. 924,682.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed October 13, 1905. Serial No. 282,569.

To all whom it may concern:

Be it known that I, PROSPER JEAN AUGUSTE MAIGNEN, of Philadelphia, in the State of Pennsylvania, have invented certain
5 new and useful Improvements in Methods of Washing Filter-Sand, whereof the following is a specification, reference being had to the accompanying drawing.

My invention may be employed with particular advantage in cleansing filter sand, although applicable to other comminuted materials.

Hitherto filter sand has been cleansed by several different methods, as follows:—
15 First:—A jet of water under pressure is directed from a hose, or otherwise, against a certain quantity of sand lying on an inclined plane; the sand being pushed back by spades or otherwise after it has flowed down with the
20 wash water. This method is not only slow and costly but it effects the stratification of the sand and the separation of the fine from the coarse particles. Second:—The sand is
25 sucked up by water flowing under high pressure in what is known as ejector-hoppers and made to travel in pipes, during which travel it is agitated and washed by the moving water. Sometimes the sand and the wash water are pumped up together and likewise
30 washed by the agitating motion of the flowing water. In these methods, the sand and the wash water are generally discharged together; the sand accumulating in heaps and the wash water flowing over it and carrying
35 the particles of sand to different distances according to the velocity of the discharged wash water and the size and specific gravity of the particles of sand, while some of the mud carried by the wash water flowing over
40 the sand, remains in the latter.

Third:—A series of ejector-hoppers are also employed, and, a strong jet of water meets an incoming quantity of sand and forces it to pass through pipes from one hopper to the other; the operation being repeated a certain number of times according to the degree of cleansing required. In this method a considerable quantity of the fine sand is washed away with the mud; some of
50 it is caught in catch-pits and although it may be rewashed and remixed with the coarser sand it cannot be restored to its original intimate relation, wherein the interstices between the coarse particles were filled by the
55 fine particles.

Fourth:—The sand is revolved in screens

or drums and is washed by a jet of water, or otherwise. In this case the screens are quickly worn out; and the power and water required are very considerable. 60

Fifth:—In certain so-called mechanical filters and certain sand washing machines, the sand is washed by water flowing upward; diverse forms of mechanical agitators or arrangements for the use of compressed air being employed to stir up the sand and wash it by upward current. Such devices also stratify the sand according to the size and specific gravity of the particles; the finer being lifted to the top and the heavier remaining at the bottom. Sand and other comminuted materials have also been washed by being agitated in water flowing in different directions. 70

In all of the methods of the prior art above specified, the wash water is made to move against, strike or agitate the sand or other comminuted material; the water is generally under pressure, and, a great quantity is always required; varying from 10 to 20 times the volume of the sand or other material to be washed. Such water is generally very costly, being not less than two cents, and in some instances as much as ten cents per thousand gallons. Moreover, in all said prior processes, there is a more or less marked stratification in accordance with the specific gravity of each particle. 80 85

It is the object of my invention to provide a method of washing sand and other comminuted materials without stratifying them; without loss of the finer portions thereof, and with the minimum expenditure of wash water. 90

To this end, my invention consists in raising the material which it is intended to wash, and discharging it so that it falls through space into a body of water. Such material may be either allowed to gravitate vertically or be forcibly projected vertically, obliquely or otherwise, and the water into which it falls may be at atmospheric pressure. However, in any case it is essential to the process herein claimed that the material under treatment shall have an uninterrupted fall through air to such an extent and in such a manner as to diffuse or separate its grains, so as to permit direct impact of each grain with the water, and thereby engender sufficient force to detach the adhering undesirable matter from the individual grains as the result of such impact. 100 105 110

It may be observed that the present

method is distinguished from those of the prior art above recited in that whereas hitherto the materials to be washed have been struck, conveyed or agitated by water, it is characteristic of my method that the materials themselves are made to strike the water. The materials are taken out of the water when the force of their impact therein has effected the desired cleaning operation, after which they are not redirtied, as is the case in other methods, by their contact with muddy water. There is no stratification of the washed materials because they are acted upon in small quantities and they are not at any time influenced by the laws of sedimentation or of currents which are effective with comminuted materials flowing in or with water. Moreover, the quantity of water required by my improved method aforesaid is not one-twentieth part of that ordinarily required by the methods of the prior art aforesaid, and, the small quantity of water is not required to be under pressure and is therefore less costly than that used in the other methods aforesaid.

In the drawing, I have shown a sectional elevation of a simple apparatus which may be conveniently employed to carry out my method aforesaid; comprising the receptacle 1, for the mass of dirty sand 2, and, the endless belt conveyer 3, provided with the buckets 4, supported in said receptacle 1, by the drum 5, on the shaft 6. Said conveyer 3, is supported above said receptacle 1, by the drum 7, on the shaft 9, so that it overhangs the receptacle 11, containing the body of water 12, into which the sand 2, falls as indicated. The mass of sand 14, in said receptacle 11, having been washed by striking the water 12, is uplifted by the endless conveyer 16, provided with the buckets 17, supported in said receptacle 11, by the drum 18, on the shaft 19. Said conveyer 16, is supported above said receptacle 11, by the drum 20, on the shaft 21.

The washed sand 14, may be discharged from said conveyer 16, to fall into the mass 23, as indicated, or may be otherwise disposed of.

Although I have shown belt conveyers as convenient means for elevating the comminuted material which is to be treated by my process, it is to be understood that any other means may be employed whereby the material may be lifted into space and made to fall into the water.

The water in which the washing takes place may be quiescent, that is to say, it may be used without being changed as long as may be desired, or, it may have a motion upwardly, laterally or downwardly and be renewed at intervals or constantly as may be found desirable.

It is to be understood that the term "space" herein employed to designate that through which the sand falls, is used in a descriptive and not in a restrictive sense, that is to say, said space may be filled with atmospheric air, steam, or gas. Moreover, it is to be understood that the term "water" is intended to include any liquid which may be employed as described.

I claim:

1. The process of washing comminuted material, which consists in causing the uninterrupted fall of the same into a body of liquid in quantities small enough and through space sufficient to permit such diffusion or separation of the grains during fall as to give direct impact with said liquid, and thereby engender sufficient force to detach the adhering undesirable matter by such impact.

2. The process of washing sand, which consists in causing the uninterrupted fall of the same into a body of water in quantities small enough and through space sufficient to permit such diffusion or separation of the grains during fall as to give direct impact with said liquid, and thereby engender sufficient force to detach the adhering undesirable matter by such impact.

3. The process of washing a mass of comminuted material by causing the uninterrupted fall of the same into a body of liquid, which consists in elevating said material and forcibly discharging it in successive quantities small enough and through space sufficient to permit such diffusion or separation of the grains during fall as to give direct impact of each grain with said liquid, and thereby engender sufficient force to detach the adhering undesirable matter by such impact.

In testimony whereof, I have hereunto signed my name, at Philadelphia, Pennsylvania, this 11th day of October, 1905.

PROSPER JEAN AUGUSTE MAIGNEN.

Witnesses:

ARTHUR E. PAIGE,
ANNA F. GETZFREAD.