No. 647,835. Patented Apr. 17, 1900.

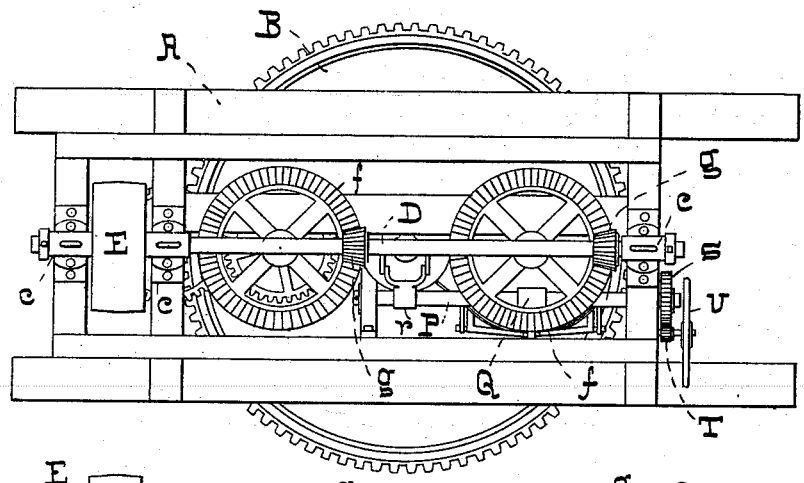
# E. U. HOLTON.

## APPARATUS FOR MIXING FERTILIZERS.

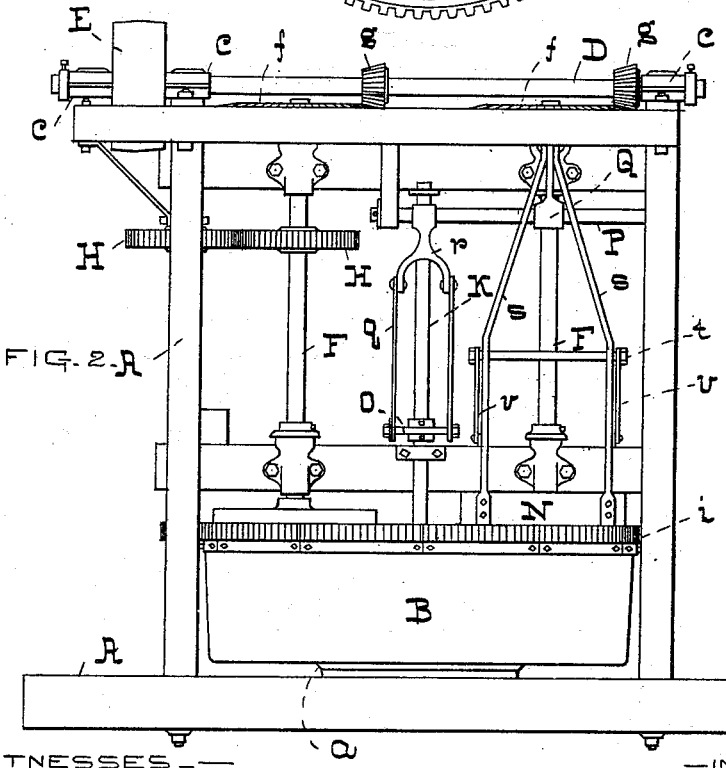
(Application filed June 15, 1899.)

(No Model.) 3 Sheets—Sheet 1.

— FIG. 1. —




— FIG. 2. —




—WITNESSES.—

Finis D. Morris

Harry E. Fee.

—INVENTOR.—

Edward U. Holton,

by Geo. W. S. Howard,

Atty.

No. 647,835. Patented Apr. 17, 1900.

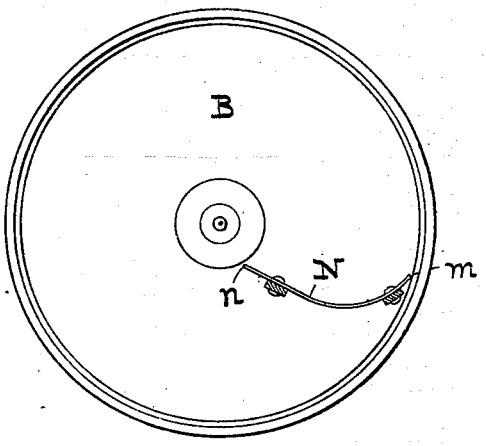
# E. U. HOLTON.

## APPARATUS FOR MIXING FERTILIZERS.

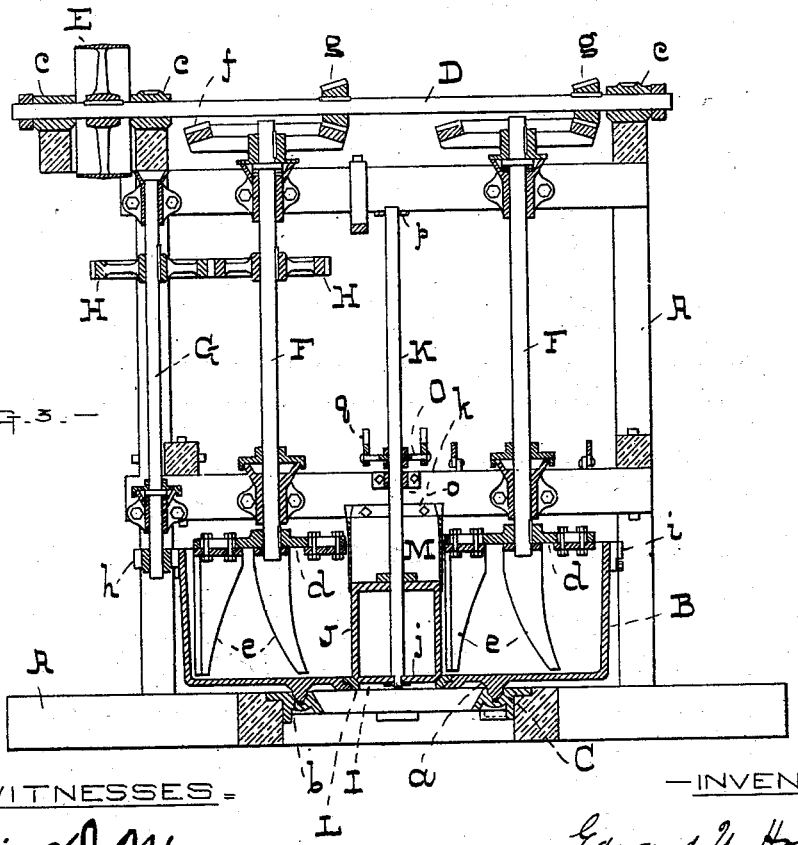
(Application filed June 15, 1899.)

(No Model.) 3 Sheets—Sheet 2.

— FIG. 4. —




— FIG. 3. —




WITNESSES:

Louis D. Morris

Harry E. Fee.

INVENTOR:

Edward U. Holton

by Geo. W. T. Howard,

atty.

No. 647,835. Patented Apr. 17, 1900.

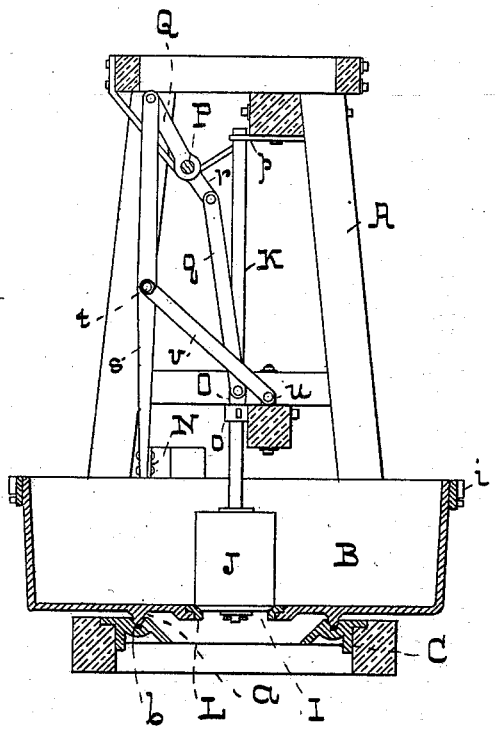
# E. U. HOLTON.

## APPARATUS FOR MIXING FERTILIZERS.

(Application filed June 15, 1899.)

(No Model.) 3 Sheets—Sheet 3.

— FIG. 5. —




—WITNESSES—

Francis D. Morris

Harry E. Fee.

—INVENTOR—

Edward U. Holton

by G. H. & W. T. Howard

Attys.

# UNITED STATES PATENT OFFICE.

EDWARD U. HOLTON, OF BALTIMORE, MARYLAND.

## APPARATUS FOR MIXING FERTILIZERS.

SPECIFICATION forming part of Letters Patent No. 647,835, dated April 17, 1900.

Application filed June 15, 1899. Serial No. 720,651. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD U. HOLTON, of the city of Baltimore, in the State of Maryland, have invented certain Improvements in Mixing Apparatus, of which the following is a specification.

This invention relates to certain improvements in an apparatus especially adapted for the mixing of ground phosphate rock and sulfuric acid in the manufacture of fertilizers known as "acid phosphates," but which may be used for a variety of other purposes, as will hereinafter fully appear.

In the further description of the said invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is an exterior plan of the improved mixing apparatus. Fig. 2 is an exterior front elevation. Fig. 3 is a central sectional elevation. Fig. 4 is a plan of the mixing-pan, together with certain parts of the apparatus situated therein. Fig. 5 is a sectional side elevation of certain parts of the apparatus.

Referring now to the drawings, A is the frame of the apparatus, which is generally constructed of timber properly tied together with bolts.

B is a circular rotary mixing-pin having a bearing-ring *a* on its under surface which rests in a circular groove *b* in an annular plate C, supported by the lower part of the frame A, as shown in Fig. 3. The upper edge of the mixing-pan is provided with teeth, so that it may be rotated by spur-gearing, as hereinafter described.

D is the main or primary shaft, driven by a belt (not shown) through the medium of the pulley E. This shaft is supported in suitable bearings *c*, situated at the top of the frame A.

F F are vertical rotary shafts carrying the mixing-heads *d* and their plows *e* within the pan B. The rotary mixers are of common construction and form no part of the present invention.

The vertical shafts F are driven from the horizontal main shaft D by means of the beveled gears *f* and pinions *g*.

G is another vertical rotary shaft having a pinion *h* at its lower end in mesh with the teeth *i* on the circumference of the rotary mixing-pan B, (see Fig. 3,) and the said shaft is driven from one of the shafts F by the spur-gears H.

From the foregoing description it will be understood that when the driving-shaft D is in motion the mixers are rotated on their axes and the pan revolved about them.

The bottom of the pan B is provided with a discharge-hole I, susceptible of being closed by a hollow plug J, having a conical face or edge which fits the beveled edge of the hole. (See Fig. 3.) The lower end of the plug J is open, except that it has one or more cross-bars *j*, to which the vertical lifting-bar K is attached in such manner that the plug may turn with the pan without communicating motion to the said bar. The plug is made hollow in order that its gravity may be increased by the introduction therein of suitable weights (not shown) for a purpose hereinafter described.

In the mixing of acid phosphates the pan, which is made of cast-iron, is subject to corrosion, which gradually destroys the conical surface around the discharge-hole I. I therefore make the discharge-hole in a removable plate L, which may be easily renewed when materially injured, and the plug when similarly affected is taken out and a new one substituted therefor.

As will be understood, the discharge-hole I is disclosed by the elevation of the plug J, and in order that the plug may be cleared of adhering matter it is surrounded by and fits closely within a fixed cleaning-cylinder M, secured to the frame A by means of a cross-bar *k*. (See Fig. 3.)

N is a curved scraper (see particularly Fig. 4) having one vertical edge *m* in contact with the inner circumference of the mixing-pan and the other, *n*, near to the discharge-plug J. Consequently when the said plug is elevated, so as to disclose the discharge-hole I, and the scraper brought down to the bottom of the rotating pan the contents of the pan are guided to the hole I and rapidly discharged.

It is desirable that the plug J and the scraper N should move simultaneously, but in opposite directions, one being elevated as the other is lowered. I therefore connect them by devices hereinafter described and make one of them counterbalance the other. If the plug

is lighter than the scraper, weights are introduced into the former until an equilibrium is established.

The non-rotative lifting-bar K slides in the bearings *o* and *p* and has fastened thereto a cross-head O, the ends of which are united by links *q* to a bifurcated arm *r* tight on the horizontal rocking shaft P. (Shown in Figs. 1, 2, and 5.) To this rocking shaft is also fastened an arm Q, which extends in an opposite direction to the one *r* and is connected at its ends by means of the branched rod *s* to the scraper N.

In order to overcome to some extent lateral motion of the scraper caused by the arm Q describing an arc of a circle, and thereby make the scraper move in a practically-vertical line, so that one edge will be kept closely in contact with the inner surface of the pan, I pivotally unite the branched rod *s* at *t* to lugs *u* on the frame (see Figs. 2 and 5) by means of links *v*, which are longer than the arm Q. It will be seen that the links *v* serve to modify the departure of the scraper from a vertical line without affecting the extent of its vertical movement.

The rocking shaft P is operated by means of the gear-wheel S and pinion T, the latter being keyed to a rotary stud, to which a hand-wheel U is secured.

It will be understood that during the mixing process the plug is in the discharge-hole in the bottom of the rotating pan and the scraper elevated sufficiently to clear the materials in the pan. Upon the completion of the mixing process the hand-wheel U is turned, so as to lift the plug and lower the scraper, when the discharge of the contents of the pan is rapidly effected.

When the pan is entirely empty, the hand-wheel is turned in an opposite direction until the plug is again seated and the scraper elevated to its original position. The apparatus is then ready for another charge of unmixed materials.

I claim as my invention—

1. In a mixing apparatus, the rotary pan thereof having in its bottom a discharge-hole, combined with a plug adapted to close the hole, a cylinder which surrounds the plug, and means to elevate the plug to disclose the discharge-opening and at the same time clear the ascending plug from adhering matter, substantially as specified.

2. In a mixing apparatus, the rotary pan thereof having a central discharge-hole in its bottom, and a cylinder situated above the discharge-hole, combined with a plug adapted to revolve with the said pan when seated in the discharge-hole thereof, and within the said cylinder, and means to elevate the plug within the cylinder whereby, at one operation, the discharge-hole is opened and adhering matter removed from the surface of the plug, substantially as specified.

3. In a mixing apparatus, the rotary pan thereof having in its bottom a discharge-hole, and a cylinder situated over the hole, a plug which is guided by the said cylinder, and when in its lowest position, serves to close the discharge-hole, a scraper situated within the pan, mechanism to connect the plug and scraper whereby they are held in reversed positions, and hand-operated devices whereby the said plug and scraper are jointly moved, substantially as specified.

4. In a mixing apparatus, the combination of a rotary pan having in its bottom a discharge-hole, a vertically-moving plug adapted to close the said discharge-hole, a vertically-moving scraper within the pan, a rocking shaft situated above the plug and scraper, carrying cross-arms one of which is connected to the plug and the other to the scraper, whereby in the movement of the rocking shaft, the plug and scraper are moved in opposite directions, substantially as specified.

5. In a mixing apparatus, the combination of a rotary pan, a scraper within the pan, a shaft carrying an arm which is connected to the scraper by means of a link, and a second arm which is longer than the first, which pivotally connects the link at a point between the scraper and the rocking arm, to some stationary point whereby the vibration of the first arm is to some extent counteracted, and the scraper made to move in a practically-vertical line, substantially as specified.

EDWARD U. HOLTON.

Witnesses:
WM. T. HOWARD,
HARRY E. FEE.