

E. A. FRANKLIN.
TAILING SEPARATOR.
APPLICATION FILED APR. 10, 1919

1,374,645.

Patented Apr. 12, 1921

4 SHEETS—SHEET 1.

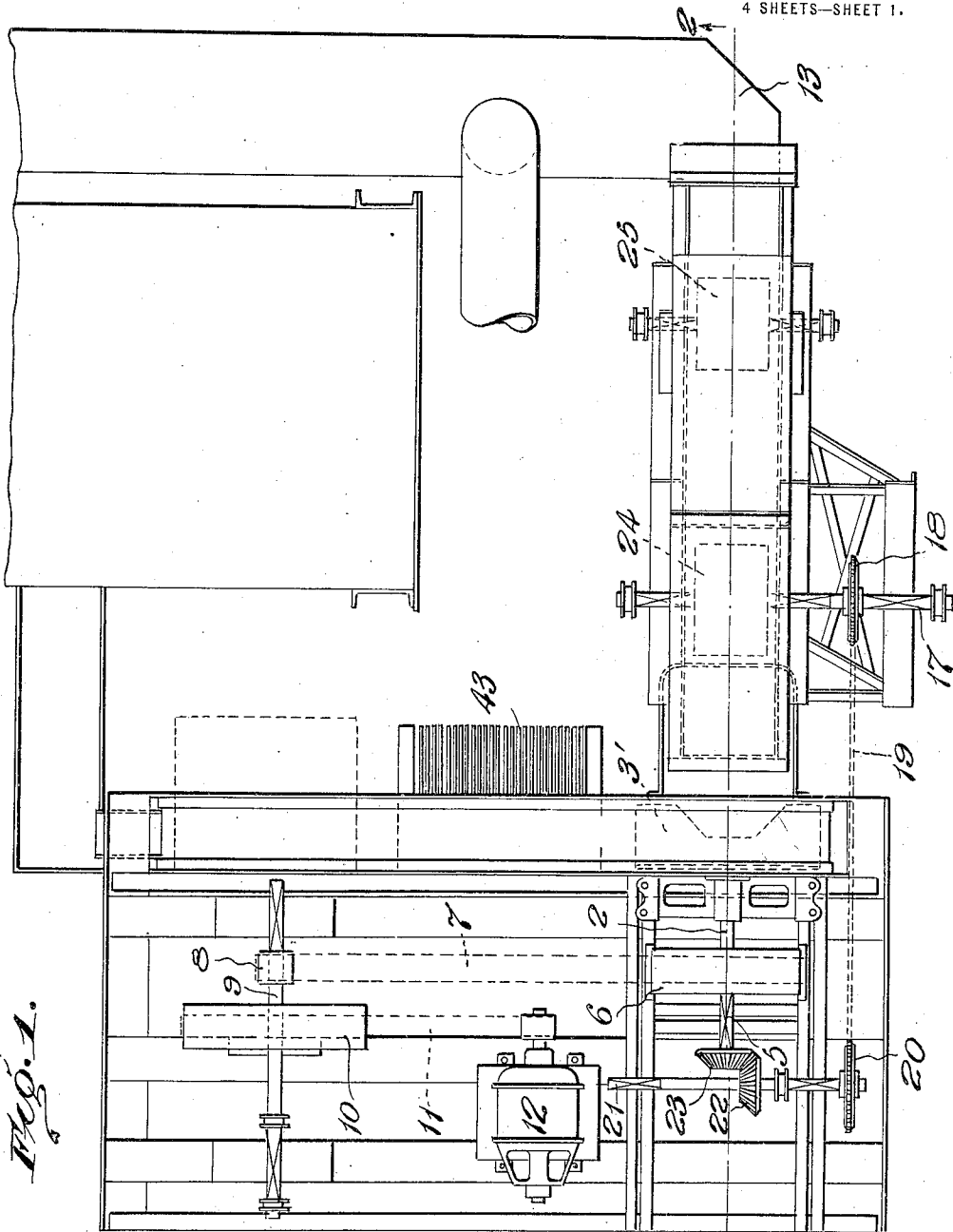


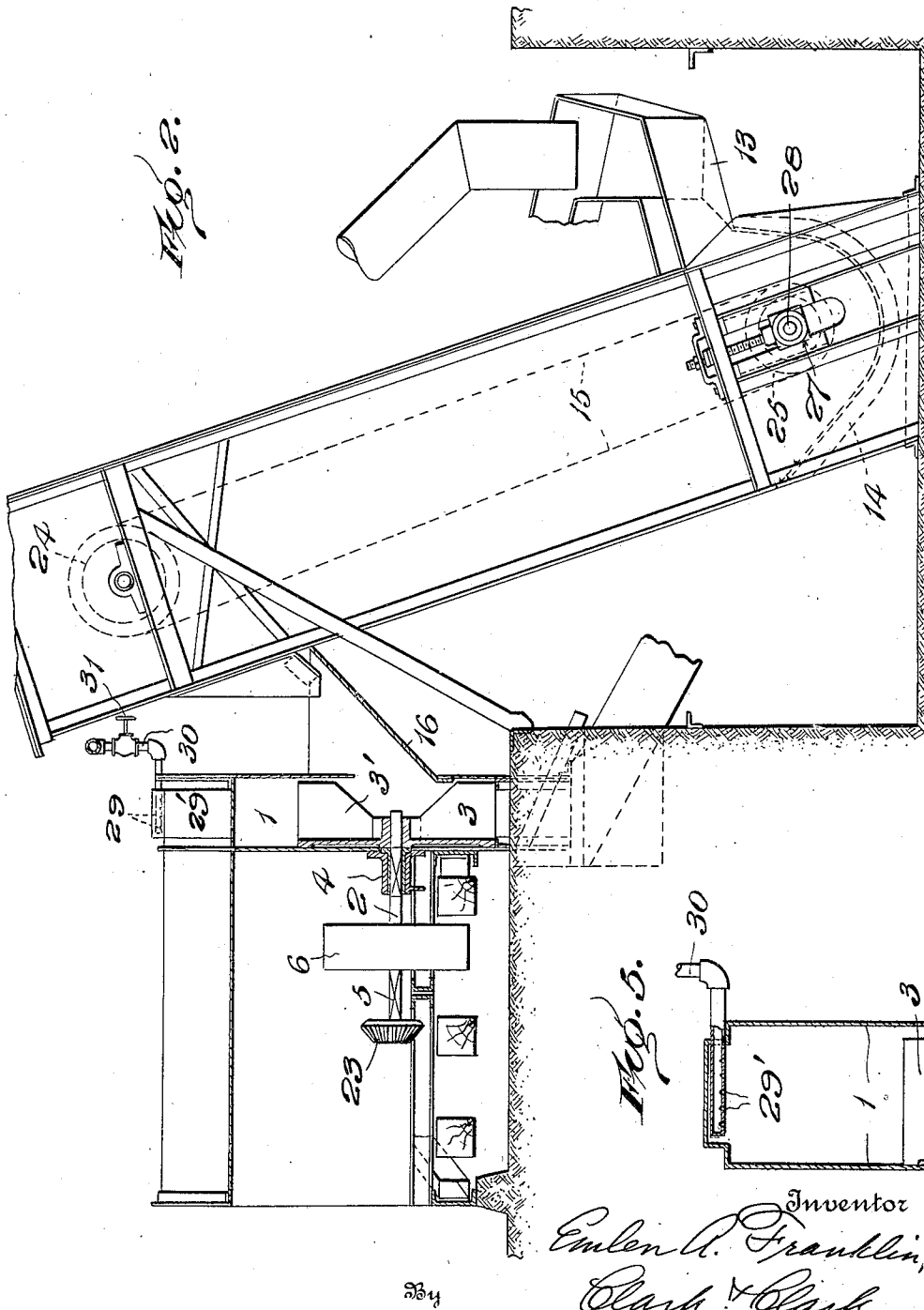
Fig. 1.

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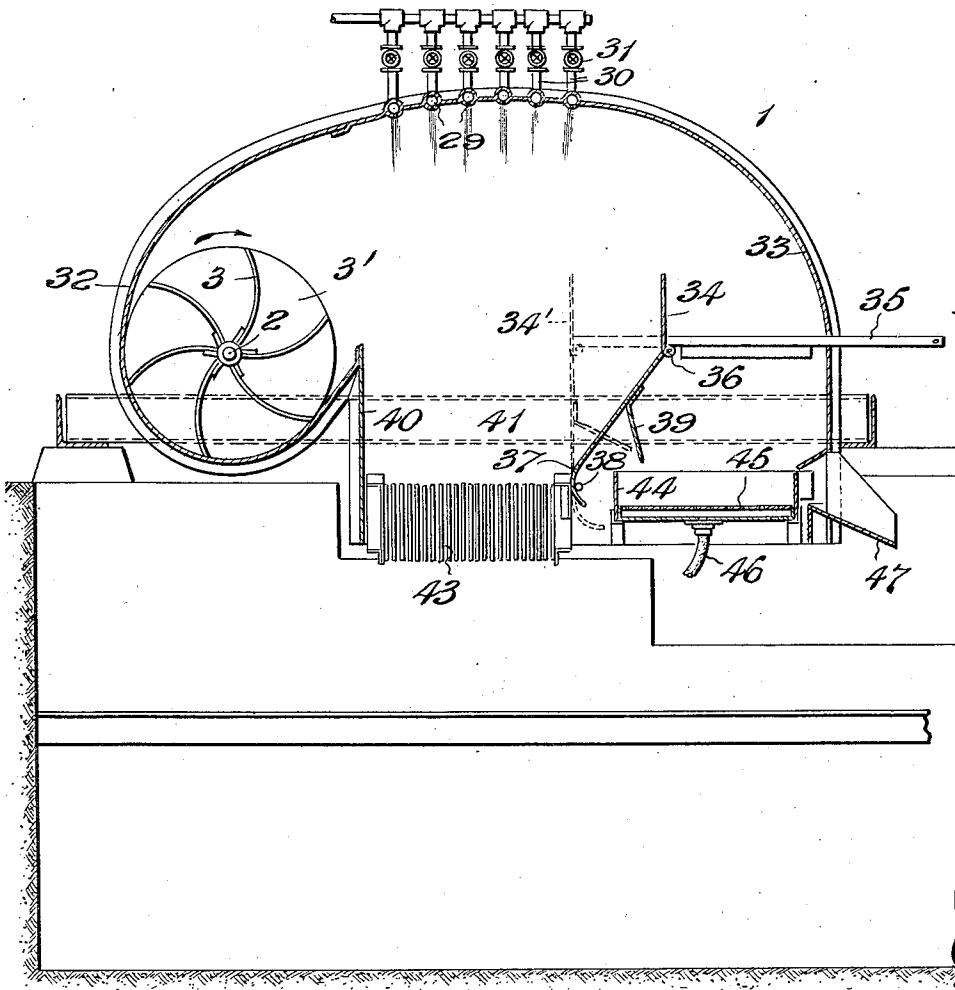
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Fig. 3.



By

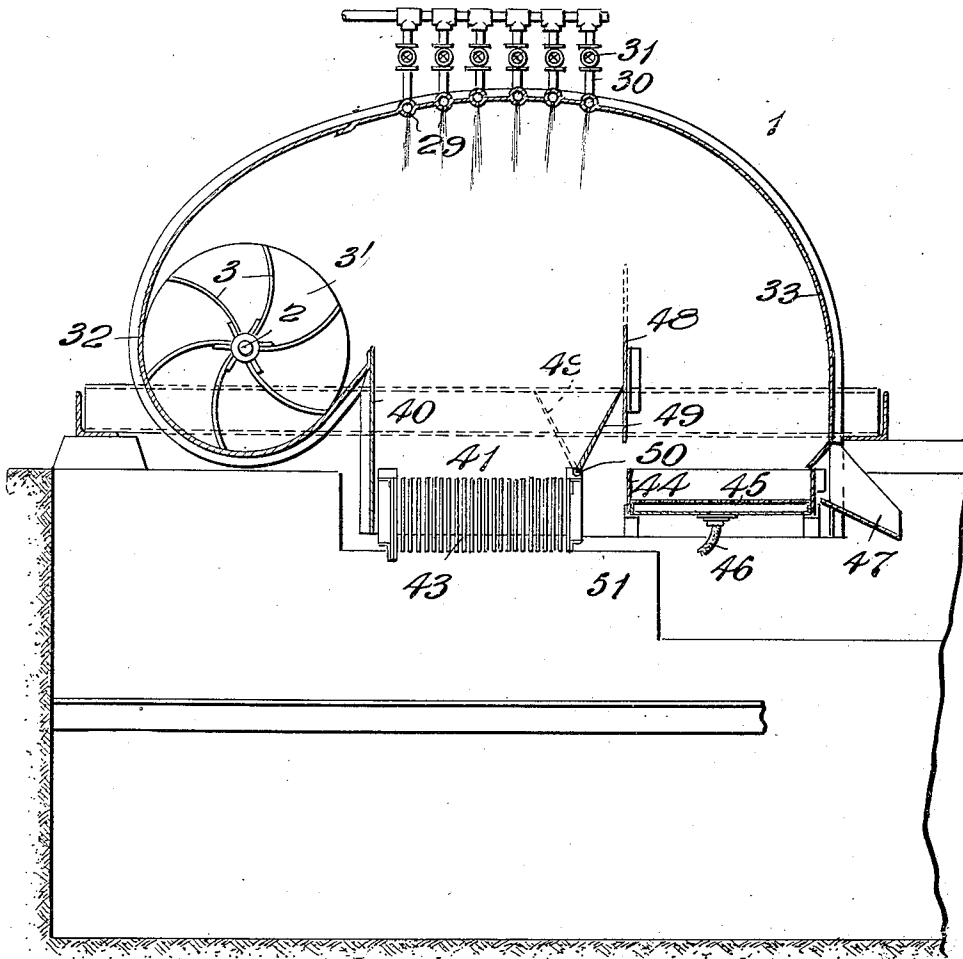
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Fig. 4.



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UNITED STATES PATENT OFFICE.

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TAILING-SEPARATOR.

1,374,645.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EMLEN A. FRANKLIN, a citizen of the United States, residing at Fort Collins, in the county of Larimer and State of Colorado, have invented new and useful Improvements in Tailing-Separators, of which the following is a specification.

My invention relates to a separator for separating particles of differing specific gravities and while capable of general application, is more particularly designed to separate beet sugar tailings from such foreign matter as rocks, weeds, stones, etc.

My invention comprises, broadly, means to project the tailings substantially horizontally, into a fluid screen, preferably water, of a density such that particles of higher specific gravity will pass there-through, while lighter particles, such as grass and weeds, will be screened out.

My invention further comprises means, preferably adjustable, located in the trajectory of the particles that pass through the screen, so located that a separation will be effected between the particles of differing specific gravities.

My invention further comprises a series of fluid screens, interposed successively across the trajectory of the particles so that foreign matter, of lower specific gravity will be screened out progressively, that is to say the first screen will take out the lighter particles, the next screen will take out the next heavier particles, and so on.

My invention further comprises means to regulate the density, that is to say, the screening out ability, of the several fluid screens.

My invention further comprises an improved form of casing for a separator in which tailings are projected horizontally, the contour of the casing being such that the projected particles, which leave the projecting means at a tangent follow around on the inside of the casing, pass through the series of fluid screens and then fall into further separating means positioned at the other end of the casing.

In the drawings, which are diagrammatic,

Figure 1 is a plan view of my improved tailings separator;

Fig. 2 is a side view, partly in section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view, in elevation, of the separator casing and cooperating parts;

Fig. 4 is a view similar to Fig. 3, of a modification; and

Fig. 5 is an enlarged view of one of the fluid screen forming elements.

Referring now to the drawings in which similar reference characters indicate similar parts, 1 indicates the separator casing which is curved as shown and which has positioned therein, toward one end, a projecting means for throwing the tailings across to the other side of the casing in a substantially horizontal path. This projecting means is here shown as a wheel mounted on the shaft 2, and provided with arms or blades 3, preferably slightly curved. The shaft 2 is mounted in bearings 4 and 5.

The shaft 2 has mounted thereon a pulley 6 around which engages a belt 7, the belt 7 in turn being driven by a pulley 8 mounted on shaft 9, said shaft 9 carrying a pulley 10 which is rotated by a belt 11 driven by a variable speed motor 12.

The beet sugar tailings, containing weeds, grass and stones are fed into a chute 13 from the pickings table. These tailings drop into a hopper 14 and are then carried upwardly by the belt conveyer 15 of any desired design and dumped into a feed chute 16 that feeds the tailings into the arms 3 of the projecting wheel, designated 3'.

The belt conveyer 15 may be driven from a shaft 17 provided with a sprocket 18, which in turn is driven by the chain 19 engaging with the sprocket 20 on shaft 21. Shaft 21 is driven by a gear 22 meshing with a gear 23 mounted on shaft 5. The conveyer belt 15 turns on suitable drums 24 and 25, the lower one 25 of which may be adjustable by the threaded shaft 26 engaging with the bearing 27 of the shaft 28, that carries the drum 25.

Extending transversely across the top of the casing 1 is a series of spray pipes 29. By transversely is meant at substantially right angles to the path of the horizontally projected particles that are thrown off by the wheel 3'. Water, air or other suitable fluid is fed to these spray pipes 29 through a series of pipes 30, each controlled by a valve 31, whereby it will be apparent that the density of each individual fluid screen may be regulated at will.

These spray pipes 29 are shown in more detail in Fig. 5 and while they may be made in several possible forms are here shown as

a pipe provided with a series of holes 29' drilled in the bottom thereof so as to form a downwardly directed spray.

This downwardly directed spray when interposed across the path of horizontally projected tailings is particularly efficient in removing foreign matter of lighter specific gravity, because the action of gravity aids the screening out of these lighter particles. The plurality of fluid screens the density of each of which is readily adjustable gives an apparatus which has a wide range of use, in that it may be regulated to handle tailings containing particles of widely varying specific gravity.

The wheel 3' is rotated in the direction of the arrow to throw the tailings in a substantially horizontal path into the fluid screens. The casing 1 is curved as at 32 to guide the particles as they leave the projection wheel 3' into the fluid screen. On the other side of the fluid screen the casing 1 is downwardly curved, as at 33, to guide particles that have passed through the screen into suitable receiving means located at the right hand side of the casing.

This receiving means comprises essentially a horizontally adjustable partition 34, carried by a frame 35 extending exteriorly of the casing. This partition is adjustable between the positions shown at 34 and 34'. The partition 34 has pivoted thereto a cooperating partition 35, the pivot being indicated at 36. Partition 35, at its lower end is curved, as shown at 37 to engage over a rod 38, so as to permit movement when the partition 34 is moved to the right or left. Partition 35 is provided with a guide plate 39.

The partitions 34 and 35 cooperate with a partition 40 to define between them a trash receiving space 41, into which space 41 particles of lesser specific gravities are carried by the screening out action of the several fluid screens. These lighter particles fall into a bin defined by the racks 42 and 43 and are conveyed away by any suitable means.

The particles that pass through the fluid screens have a greater or less trajectory depending on whether or not they have a high or low specific gravity. A separation of these particles according to their specific gravity is obviously effected by adjustment of the partitions 34 and 35.

The particles that fall to the right of the partition 34, when beet sugar tailings are being separated, commonly contain, in addition to beet particles, such undesirable foreign matter of higher specific gravity, such as stones, nails, and so on. This mixture falls into a flotation process separating box 44, of any conventional design provided with the usual perforated bottom plate 45 and a feed water pipe 46. The lighter particles are floated off by this flotation process

and pass down the feed chute 47. The bottom of the box may be hinged to dump out the stones and metallic particles from time to time.

The function of the plate 39 is to guide particles that have fallen to the right of the partition 34 into the flotation box 44. The operation of the device is now thought obvious. The use of a variable speed motor enables my separator to be used not only for beet sugar tailings but for separating uses in general, for by varying the speed of the motor particles of different specific gravities are readily separated. The series of fluid screens each individually adjustable, and each downwardly directed, and which may be formed by air, water or other fluid, enables my separator to be used to separate tailings which may contain particles that are relatively high or relatively low in specific gravities.

Referring now to the modification shown in Fig. 4, a somewhat different receiving means for the screened out particles and for the particles that pass through the fluid screen, are shown. A partition 48 is vertically adjustable, so that the particles of higher specific gravity will pass over it while those of lighter specific gravity will fall to the left of it into the bin 41. A plate 49 pivoted at 50 cooperates with the plate 48 to guide the particles into the space 41. By positioning the plate 49 in the position shown in dotted lines at 49', an additional separation may be had, the particles so separated out, called middlings, passing out into the chute 51. Otherwise this modification comprises the projecting wheel 3', the fluid screen forming pipes 29, flotation box 44 and cooperating parts. While I have illustrated possible embodiments of my invention, it should be understood that it may be carried out in other ways as defined in the following claims.

Having thus described my invention what I desire to secure by Letters Patent is:—

1. In a separator for separating vegetable tailings including roots, leaves, grass, and earthy material, a laterally extending substantially closed casing, means within and at one side of said casing to project such vegetable tailings toward the opposite side of said casing, and means associated with said casing to project a water screen penetrable by relatively heavy particles across the path of said tailings to remove from said path material which is comparatively light, such as leaves and grass.

2. In a separator for separating vegetable tailings including roots, leaves, grass, and earthy material, a laterally extending substantially closed casing, means within and at one side of said casing to project such vegetable tailings toward the opposite side of said casing, and means associated with said

casing to project a water screen penetrable by relatively heavy particles downward across the path of said tailings to remove from said path material which is comparatively light, such as leaves and grass.

3. In a separator for separating vegetable tailings including roots, leaves, grass, and earthy material, a laterally extending substantially closed casing, means within and at one side of said casing to project such vegetable tailings toward the opposite side of said casing, means associated with said casing to project a water screen penetrable by relatively heavy particles downward across the path of said tailings to remove from said path material which is comparatively light, such as leaves and grass, means beneath said water projecting means for catching the water and materials removed thereby, and separate means located toward the end of said casing opposite to said tailing projecting means for catching materials of relatively heavy weight and which have penetrated said water screen.

4. In a separator for separating vegetable tailings including roots, leaves, grass, and earthy material, a laterally extending substantially closed casing, means within and at one side of said casing to project such vegetable tailings toward the opposite side of said casing, means associated with said casing to project a water screen penetrable by relatively heavy particles downward across the path of said tailings to remove from said path material which is comparatively light, such as leaves and grass, means beneath said water projecting means for catching the water and materials removed thereby, and separating means located toward the end of said casing opposite the said projecting means for receiving and separating vegetable and earthy materials projected through said water screen.

5. In a separator, a laterally extending casing, means located within and toward one end of said casing to project vegetable tailings including vegetable material and earthy material adhering thereto toward the opposite end of said casing, means associated with said casing to form a liquid screen penetrable by particles of relatively heavy weight such as solid lumps of vegetation and earthy material, and washing and separating means located toward the end of said casing opposite the said projecting means for receiving vegetable material and earthy material and separating the same.

6. In a separator, means within said separator to project vegetable tailings including roots, leaves and grass, substantially horizontally, means to form a water screen interposed across the path of said tailings, and means adjustable to different positions to further separate the materials which pass through said water screen into separate por-

tions of relatively heavy and relatively light material.

7. In a separator, means within said separator to project vegetable tailings including roots, leaves and grass substantially horizontally, means to form a water screen interposed across the path of said tailings, vertically adjustable means to receive the materials that pass through said water screen, and laterally adjustable means to receive other additional materials that pass through said water screen.

8. In a separator, a laterally extending casing, means located within and toward one end of said casing to project vegetable tailings toward the opposite end thereof, the contour of said casing being such as to guide the materials discharged from said projecting means into a substantially horizontal path and to lead the heaviest particles into a container located at the side of the casing opposite to the end in which the tailing projecting means is located, and means to project a water screen across the path of said tailings.

9. In a separator for separating vegetable tailings including roots, leaves, grass, and earthy material, a laterally extending substantially closed casing, means within and at one side of said casing to project such vegetable tailings toward the opposite side of said casing, and means associated with said casing to project a water screen penetrable by relatively heavy particles across the path of said tailings to remove from said path material which is comparatively light, such as leaves and grass, said casing having a curved under contour extending upwardly from one side of said tailing projecting means and terminating in a downwardly curved surface.

10. In a separator for separating vegetable tailings including roots, leaves, grass and earthy material, rotary projecting means to project such vegetable tailings substantially laterally, a laterally extending substantially closed casing extending substantially tangentially from said projecting means, continuing as a flattened curved ceiling, and terminating in a downwardly extending curved surface, and means associated with said casing to project a water screen penetrable by relatively heavy particles across the path of said tailings to remove from said path material which is comparatively light.

11. In a separator for separating solid lumps of vegetation from leaves, grass and earthy matter, a substantially closed casing having a curved inner contour, a rotary tailing projector at one side of said casing and adapted to project materials against and along the inner surface of said casing, and means to discharge a downwardly projected fluid screen penetrable to particles

of relatively solid material across the path
of the tailings to remove the lighter parti-
cles, said casing extending substantially tan-
gentially from said rotary projector means
5 and having an inner contour substantially
conforming to the trajectory of the mate-
rials projected.

In testimony whereof I affix my signature
in presence of two witnesses.

EMLÉN A. FRANKLIN.

Witnesses:

V. L. AIKIN,
T. R. HADLEY.