No. 676,645. Patented June 18, 1901.

P. A. ARNOLD.

SCREENING AND SEPARATING APPARATUS.

(Application filed Jan. 14, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. I.

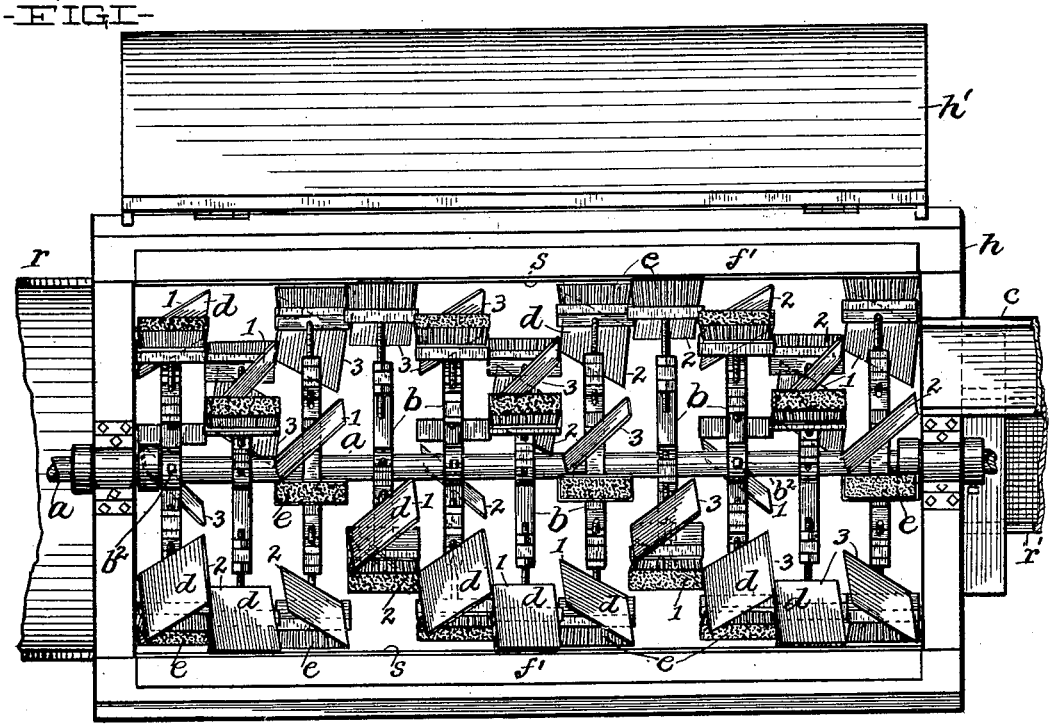
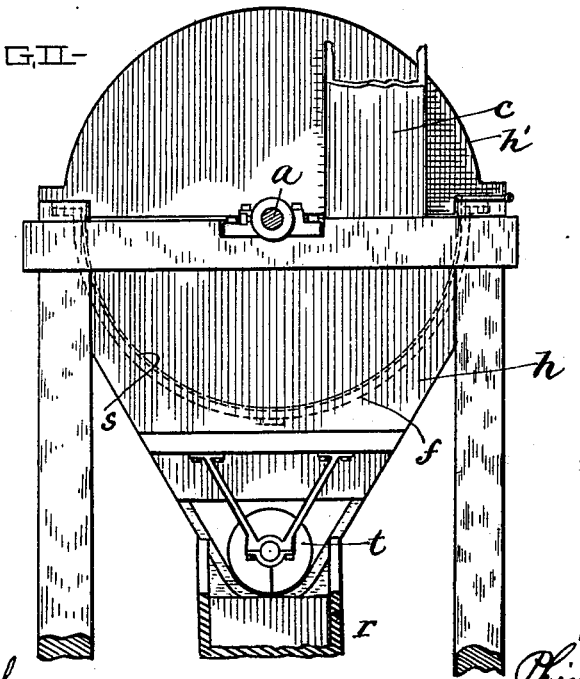


FIG. II.



WITNESSES:

Daniel E. Daly

A. H. Parratt

INVENTOR

Phineas A. Arnold

BY

Lynch, Dorey & Donnelly

his ATTORNEYS

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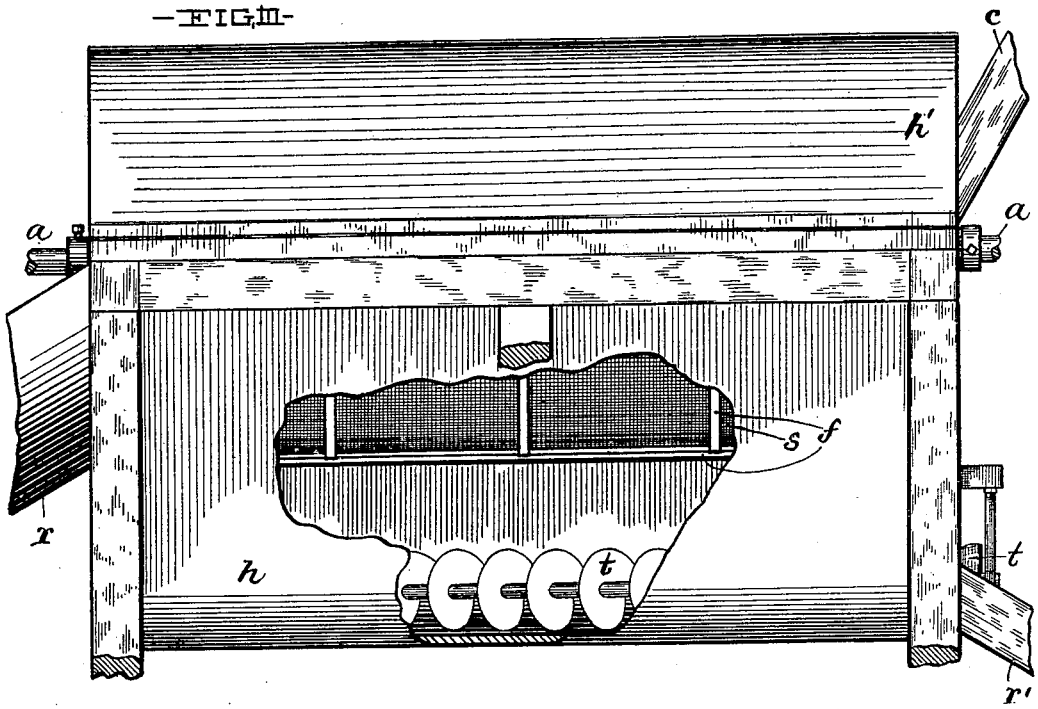
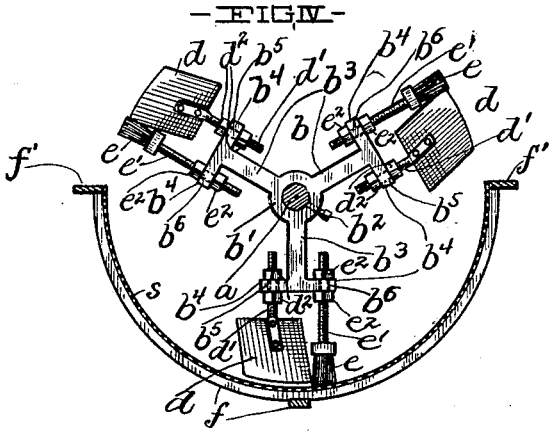
—FIG. III—



—FIG. IV—



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UNITED STATES PATENT OFFICE.

PHINEAS A. ARNOLD, OF CANAL DOVER, OHIO.

SCREENING AND SEPARATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 676,645, dated June 18, 1901.

Application filed January 14, 1899. Serial No. 702,173. (No model.)

To all whom it may concern:

Be it known that I, PHINEAS A. ARNOLD, residing at Canal Dover, Ohio, have invented certain new and useful Improvements in Screening and Separating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in separators more especially designed for screening or separating the fine material from the coarser material of argillaceous earth, mineral-bearing earth, seeds, &c.

One object of this invention is to provide apparatus of the character indicated that comprises a stationary screen arranged concentrically of the lower side of a suitably-operated shaft provided with spirally-arranged series of blades.

Other objects of the invention are to clean the screen from end to end and from side to side during each revolution of the blade-bearing shaft, to so construct and arrange the parts that the floor-space required and the amount of power necessary for operating the machine are reduced to a minimum, to render all of the parts of the machine easily accessible, to render the operation of the machine comparatively noiseless and dustless and avoid jarring or vibration of the building containing it, and to provide a machine that is simple and durable in construction and has an exceedingly large capacity.

With these objects in view and to the end of realizing other advantages hereinafter appearing the invention consists in certain features of construction and combinations of parts, hereinafter described, and particularly set forth in the claims.

In the accompanying drawings, Figure I is a top plan of a separator embodying my invention, and in this figure the hood of the separator is swung back, so as to illustrate the arrangement of the shovels and brushes of the separator. In this figure the mesh of the screen is not shown or shaded, to avoid confusion in the drawings. Fig. II is an end elevation of the separator; but in this figure the hood is shown in its closed position. Fig. III is a side elevation of the separator, and in this figure the machine's hood is shown in its closed position and portions are broken and in section to more clearly show certain features of construction. Fig. IV is a transverse section of the screen and shows one of the spiders that carry the shovels and brushes and shows also the portion of the shaft that bears the said spider.

Referring to the drawings, h designates an oblong hopper that is provided with a screen s, that is preferably semicylindrical or arc-shaped in end elevation and is arranged within and extends from end to end of the hopper h. The said screen is reinforced, preferably, by a correspondingly-shaped metallic frame f, that forms a seat for the screen, and at its upper end is provided with laterally-projecting external flanges f', that overlap and rest upon the hopper h. It will be observed, therefore, that the frame f and its load (the screen) can, upon removing the device or devices employed in shoveling and feeding the material over the screen, be removed upwardly from the aforesaid hopper.

The inclined chute c is arranged to discharge upon one end of the aforesaid screen and forms the passage-way for supplying the material to be treated to the aforesaid screen. The fine material descends through the screen into the hopper h, below the screen, and the coarser material is fed, as will hereinafter appear, along the screen to the latter's rear end, where it is discharged into a hopper, receptacle, or passage-way r, provided for its reception. The material that is received by hopper h is preferably conveyed forwardly by a screw conveyer t, arranged within and extending longitudinally of the said hopper below the screen and having its discharging end arranged to deliver to a hopper or receptacle r'. To enable the screw conveyer to feed all of the material received in hopper h, the hopper's sides converge downwardly into close proximity to opposite sides, respectively, of the conveyer.

The apparatus employed for distributing and feeding the material received by the aforesaid screen comprises a suitably-driven and suitably-supported horizontally or approximately horizontally arranged shaft a, that is arranged at the top and centrally and longitudinally of the screen, and I would here remark that the form of the screen in end ele-

vation should be concentric of the aforesaid shaft. A series of spiders b are mounted upon the shaft at suitable intervals lengthwise of the shaft. The spiders b are arranged, preferably, about six inches apart. Each spider, in the case illustrated, has a hub b', that embraces the shaft a and is provided with a set-screw b^2 for attaching the spider to the shaft. Each spider b has three arms b^3 b^3 b^3, arranged radially and equidistant apart circumferentially of the spider's hub, and each of the said arms at its outer end has two lugs or flanges b^4, arranged transversely of the axial line of the spider and formed upon opposite sides, respectively, of the arm, and each of the said lugs or flanges is provided with a perforation b^5, arranged parallel with the arm. The forward hole of each arm—that is, the hole in the forward lug of each arm (and the forward lug of each arm is that lug that projects from the arm in the direction in which the arm revolves during the rotation of the shaft)—is engaged by the shank d' of a blade d, and the said blade is adjustable toward and from its support and is secured in the desired adjustment by two nuts d^2 d^2, mounted upon the correspondingly-threaded shank of the blade at opposite ends, respectively, of the perforation b^5, that is engaged by the said shank. The other lug of each arm of the spider b—that is, the arm's rear lug, that projects from the arm in a direction opposite to the direction to which the arm revolves during the rotation of the shaft—is provided with a perforation b^6, that is arranged parallel with the arm and engaged by the shank or stem e' of a brush e, that is adjustable toward and from its support and secured in the desired adjustment by two nuts e^2 e^2, mounted upon the correspondingly-threaded shank of the brush at opposite ends, respectively, of the perforation b^6, that is engaged by the said shank. The brushes are arranged, preferably, longitudinally of and parallel with the screen and have such adjustment relative to the screen's inner or upper side as will enable them to sweep the screen during their revolution. I would here remark that instead of providing a brush at the rear of each blade one brush only may be employed upon each blade-carrying spider. The blades have such arrangement relative to the screen's inner or upper side that their sweep shall extend into close proximity to the upper or inner side of the screen, so that they shall move the material upon the screen during their revolution. The blades have, furthermore, such arrangement as will enable them not only to distribute the material received upon the screen, but also to feed the material toward the rear end of the screen, so that the coarser material, that does not descend through the screen into hopper h, will be conveyed rearwardly along the screen, and thence into receptacle r. In the case illustrated, therefore, each blade is arranged diagonally of the shaft and so as to face not only in the direction in which the shovel revolves during the shaft's rotation, but also in the direction of the rear end of the screen and inclines rearwardly from its shank. The blades of each spider have such arrangement relative to the blades of the remaining spiders as will place each blade of each spider in a path extending spirally around the shaft, and it will be observed that in the case illustrated there are three spiral series of blades and each series comprises one of the blades upon each of the shovel-bearing spiders. To facilitate the observation of the different spiral paths in Fig. I, the blades in one of the said paths are marked 1, the blades in another spiral path are marked 2, and the blades in the remaining spiral path are marked 3. I would remark, also, that the hopper h is provided, preferably, with a hood or cover h' for closing the same from above, and thereby covering the shaft a and the latter's attachments.

By the construction hereinbefore described the noise and dust occasioned by a revolving screen is effectually avoided, and as the screen is stationary the power required in the operation of the shaft is reduced to a minimum. The stationary screen, in combination with the peculiar arrangement of shovels, results in the operation of the said parts to the best advantage, especially so far as a large capacity of the machine is concerned, and the brush or brushes of each spider of the blade-revolving shaft are independent of the brush or brushes of the remaining spiders, so that each brush of each spider can extend somewhat into the sweep of the brush or brushes of the adjacent spiders, as shown in Fig. I, and not only avoid interference with the other brushes or members of the machine, but operate to the best advantage in thoroughly cleaning the screen during each rotation of the shovel-bearing shaft.

What I claim is—

1. An apparatus of the character described, comprising a screen, a shaft, spiders mounted on said shaft, blades on said spiders, said blades having a rearward inclination from a radial line, whereby the blades will not lift the material from the screen in their rotation, and brushes on said spiders substantially as described.

2. An apparatus of the character described comprising a screen, a shaft, spiders mounted on said shaft, blades carried by said spiders, said blades being inclined from a line parallel with said shaft and being also inclined rearward from a radial line, whereby the blades will not lift the material from the screen in their rotation but will gradually feed the same longitudinally of the screen, and brushes carried by said spiders, substantially as described.

3. The combination of a screen, a shaft, spiders mounted on the shaft and having arms provided at their outer ends with oppositely-extending flanges, a shovel having a

shank secured to one flange of each arm, and brushes having shanks secured to the opposite flanges of the arms, substantially as described.

4. In apparatus of the character indicated, an approximately horizontally arranged shaft, a stationary screen arranged concentrically of the lower side of the shaft and extending longitudinally of the shaft, the spiders secured upon the shaft and having radially-arranged arms, a flange formed upon each arm and projecting in the direction in which the arm revolves during the rotation of the shaft, a shovel borne by each arm and having a shank arranged longitudinally of the said arm and extending through the aforesaid flange and screw-threaded externally, the nuts engaging and securing the said shank in the desired adjustment, and a brush supported from each spider independently of the brushes of the remaining spiders.

5. In an apparatus of the character described, a horizontally-arranged shaft, a screen arranged concentrically of the lower side of the shaft, spiders secured upon said shaft, shovels supported by said spiders, and a separate brush on each spider, the brushes on the several spiders being arranged at different points circumferentially of the shaft and being of a length as great as the longitudinal distance between the planes of the ends of the brushes on the alternate spiders, whereby the entire surface of the screen shall be swept during each rotation of the shaft, substantially as described.

6. The combination, with a stationary screen *s*, of the shaft *a*, spiders *b* adjustably secured upon the shaft and having each of their arms provided, respectively, with two flanges b^4 and b^4, the shovels *d* and the brushes *e*, all arranged and operating substantially as shown, for the purpose specified.

7. The combination with the stationary screen *s*, and the shaft *a*; of the spiders *b* secured upon the shaft, each spider having three radial arms, b^3 b^3 and b^3, provided, respectively, with the two flanges b^4 b^4 perforated as at b^5 and b^6, respectively; the shovels *d* having the screw-threaded shanks *d'*; the nuts d^2; the brushes *e* having the threaded shanks *e'*, and the nuts e^2, all arranged and operating substantially as shown, for the purpose specified.

Signed by me at Cleveland, Ohio, this 27th day of December, 1898.

PHINEAS A. ARNOLD.

Witnesses:
C. H. DORER,
A. H. PARRATT.