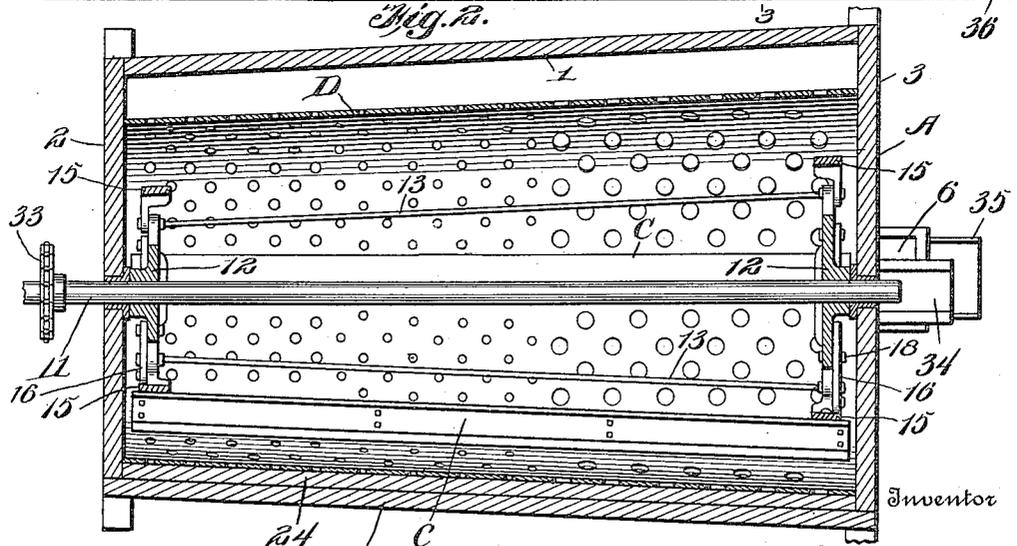
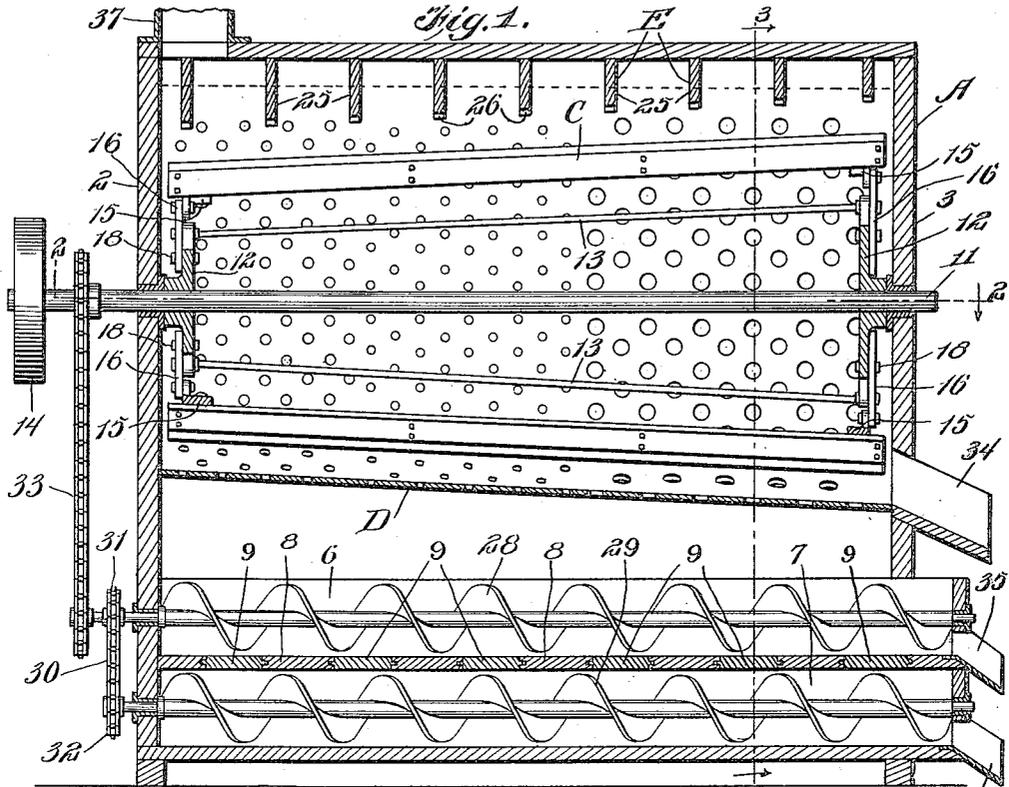


H. E. HAWK.
 SEPARATING AND MOTE CLEANING MACHINE.
 APPLICATION FILED MAR. 7, 1913.

1,151,876.

Patented Aug. 31, 1915.

3 SHEETS—SHEET 1.



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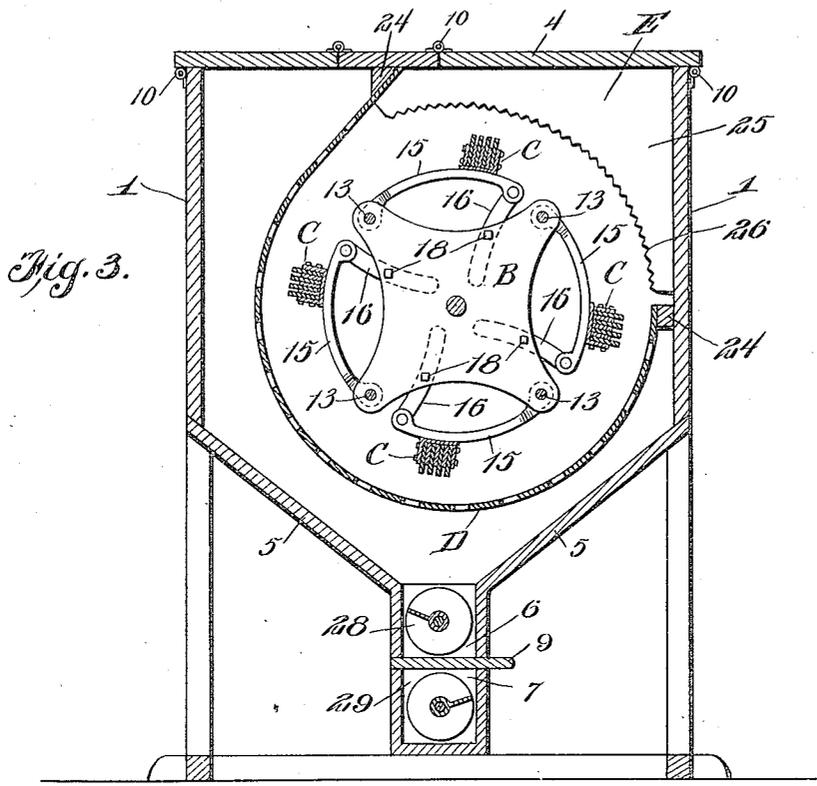


Fig. 3.

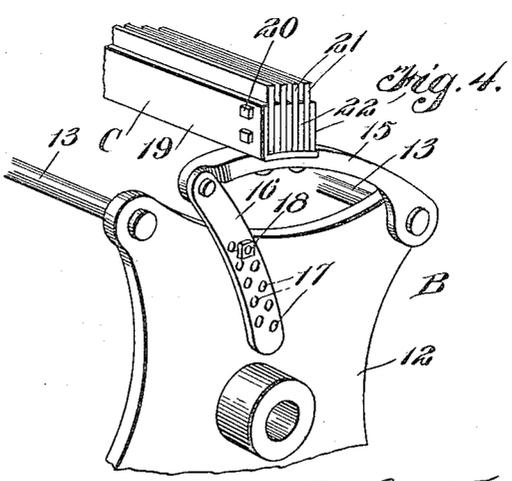


Fig. 4.

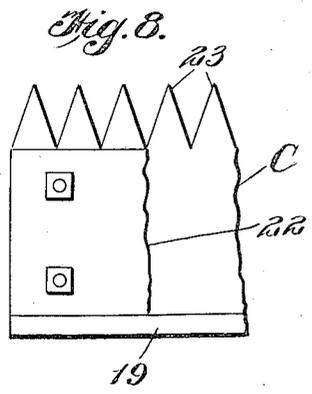


Fig. 5.

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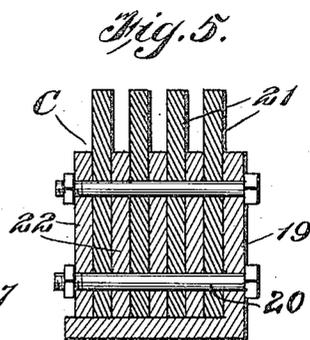
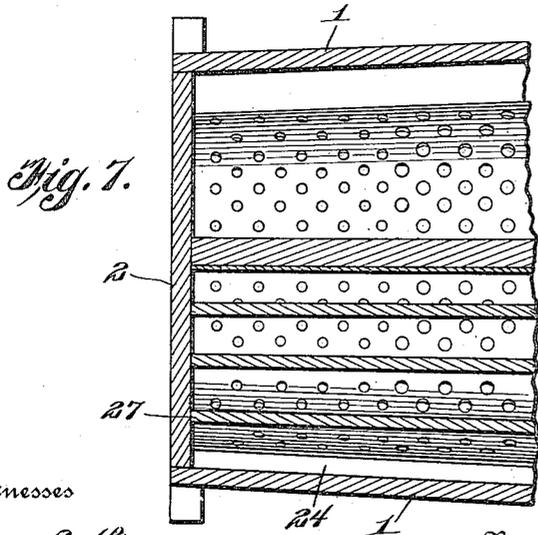
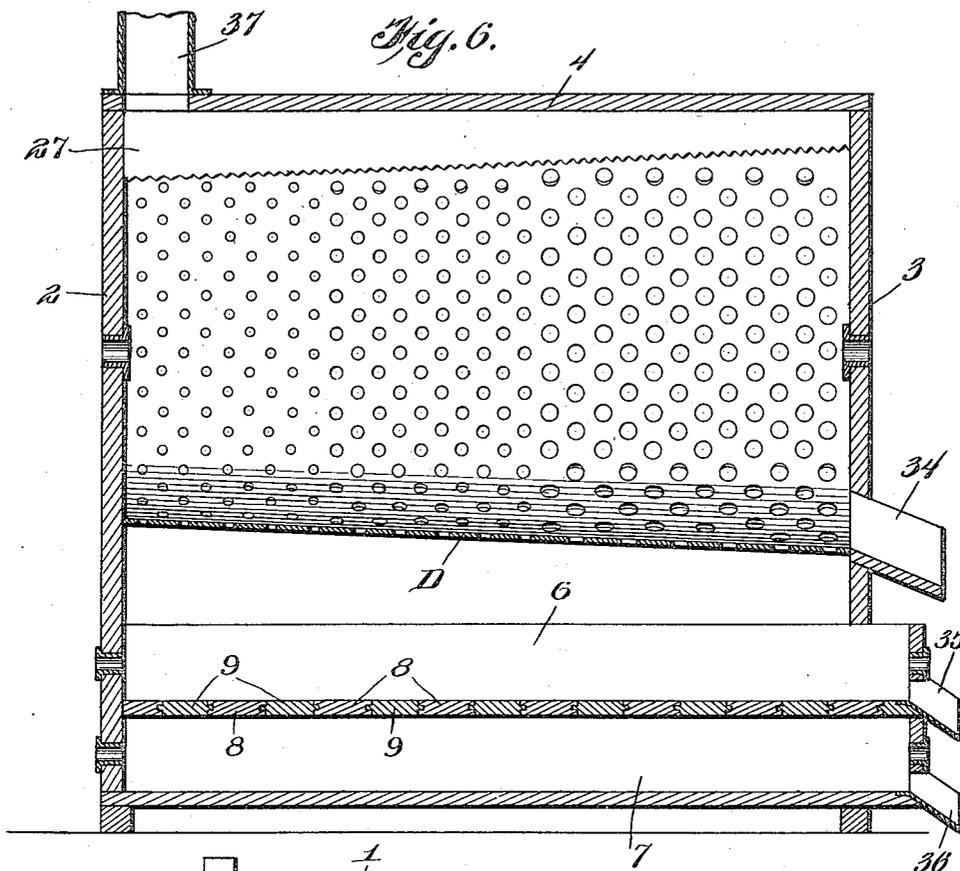
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UNITED STATES PATENT OFFICE.

HALE E. HAWK, OF WEST POINT, MISSISSIPPI.

SEPARATING AND MOTE-CLEANING MACHINE.

1,151,876.

Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed March 7, 1913. Serial No. 752,695.

To all whom it may concern:

Be it known that I, HALE E. HAWK, a citizen of the United States, residing at West Point, in the county of Clay and State of Mississippi, have invented new and useful Improvements in Separating and Mote-Cleaning Machines, of which the following is a specification.

This invention relates to separating machines, and it has particular reference to machines used for separating cotton seed products at various stages, such as the lint and motes from the seeds before crushing or hulling and the hulls from the meats after the seeds have been crushed or hulled; it being understood that by slight alterations, such as the substitution of one form of screen for another, the same machine structure may be used in the performance of the various acts of separation.

One object of the present invention is to simplify and improve the construction of the separator casing with the end in view of rendering the operation thoroughly effective.

A further object of the invention is to increase the efficiency of the operation by the provision of disintegrating members to act upon the stock as the latter is being agitated by a revoluble beater or agitator.

A further object of the invention is to simplify and improve the construction of the beater or agitator and to provide simple and efficient means for effecting adjustment of the brushes which are included in the construction thereof.

A further object of the invention is to provide in connection with a separator embodying the structural features hereinbefore referred to, superposed conveyers for the purpose of conveying the separated products to points of discharge and means whereby material in transit may be transferred from one conveyer casing to another.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts which will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited,

but that changes, alterations and modifications within the scope of the claims may be resorted to when desired.

In the drawings,—Figure 1 is a longitudinal vertical sectional view showing a simple and preferred embodiment of the invention. Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 in Fig. 1. Fig. 3 is a vertical transverse sectional view taken on the line 3—3 in Fig. 1. Fig. 4 is a perspective detail view showing a portion of the beater or agitator to illustrate the particular construction thereof. Fig. 5 is a sectional detail view, enlarged, of one of the brush members of the beater. Fig. 6 is a longitudinal vertical sectional view with the beater and conveyers removed of a casing embodying certain modifications, mainly with respect to the structure of the screen. Fig. 7 is a sectional detail view showing a portion of a casing equipped with disintegrators of a modified construction. Fig. 8 is a detail view in elevation of a portion of a beater brush of a slightly modified construction.

Corresponding parts in the several figures are denoted by like characters of reference.

The casing A of the improved separator includes side walls 1 which diverge in the direction of the tail end, as will be clearly seen in Fig. 2, the front wall of the structure being designated by 2 and the rear or tail wall by 3. The top wall member 4 of the casing which is substantially level, is disposed substantially at right angles to the side wall members 1, and the bottom of the casing is formed by the downwardly inclined cant boards 5 which communicate with the upper conveyer casing 6 which is disposed directly above the lower conveyer casing 7; the partition 8 between said upper and lower conveyer casings being provided with numerous slides 9, whereby communication may be established between the two conveyer casings to permit material to gravitate from the upper into the lower casing at various points through the length thereof.

I would have it understood that the casing may be constructed and assembled in any manner that will make access to the interior of said casing convenient at all times, and with this end in view the side walls, as well as the top wall member, have each been shown as being constructed of several parts joined together by hinges 10, similar hinges being employed if desired at the intersection

of the side walls with the top wall member, but the particular construction illustrated in the drawings is merely suggestive and does not need to be absolutely adhered to.

5 The front and rear end walls 2 and 3 are provided with bearings wherein a shaft 11 is supported for rotation, said shaft carrying the beater B. In the preferred construction of said beater I mount on the shaft 11 adjacent to the inner faces of the front and rear end walls of the casing heads 12, preferably of the shape of four-pointed stars, as clearly seen in Figs. 3 and 4, said heads being connected together by longitudinal rods 13 with which the heads are suitably connected. The heads are mounted on the shaft 11 for rotation therewith, said shaft being adapted to receive motion from a suitable source of power through the medium of a pulley 14. The heads 12 are of different sizes, the larger being disposed adjacent to the tail end wall 3 of the casing, and by reason of the difference in the sizes of said heads, the connecting rods 13 will be disposed in the plane of a conical frustum. Pivotaly mounted on the ends of the rods 13 adjacent to the heads 12 are arms 15, said arms being terminally connected with links 16, each of said links having a plurality of perforations 17 for the passage of a fastening member, such as a bolt 18, whereby it may be rigidly connected with the proximate head 12, thereby serving to secure the arm 15 in position at various adjustments. The arms 15 connected with the heads 12 serve to support the brush members C of the beater. Each of said brush members, as will be best seen in Fig. 5, is composed of an L-bar 19, one flange of which is bolted, riveted or otherwise secured on a pair of arms 15, associated with the heads 12; the other flange of the angle bar is apertured for the passage of fastening members, such as bolts 20, whereby a plurality of flexible strips 21 are secured in position, said flexible strips alternating with fillers 22, the latter being strips of rigid material, such as wood or iron, while the flexible strips may be made of leather or any other material that may be deemed suitable for the purpose. When desired, the projecting working edges of the flexible strips may be serrated, as shown at 23 in Fig. 8. It will be readily seen that by proper relative adjustment of the links 16 and the fastening members 18, the arms 15 may be swung outward or inward with respect to the axis of the shaft 11, thereby varying the distance between the working faces of the brush members and the axis of the shaft. It is also evident that the working faces of the brush members will be disposed in the plane of a conical frustum, the larger diameter of which is at the tail end of the machine.

A surface to cooperate with the brush members of the beater is formed by a screen

D which is preferably constructed of perforated sheet metal of suitable gage, although other material may be substituted. The lower portion of the screen or concave as it may appropriately be termed, as will be best seen in Fig. 3, is of substantially semi-circular cross section, while the upper portion of the screen or concave is substantially tangential with respect to the lower portion. The screen or concave may be mounted and supported in any suitable and convenient manner; cleats 24 have been shown along which the longitudinal edges of the screen or concave are secured, but other and additional supporting means may obviously be employed. The screen or concave is made tapering to correspond with the taper of the side walls of the casing and the beater, the diameter of said concave being increased toward the tail end of the machine, thus preserving the opposed working faces of the brush members on the beater C and of the concave in substantial parallelism throughout.

For cooperation with the beater and the concave, there are provided a plurality of partition members E, known as disintegrators, said members being positioned within the casing in the space between the free edges of the screen or concave and the top of the beater. Under the construction shown particularly in Figs. 1 and 3, the disintegrators consist of transversely disposed partition boards 25 having concaved serrated working edges 26 which are substantially concentric with the shaft 11 and which are equidistantly spaced from the working faces of the brush member C. Under the modified construction illustrated in Figs. 6 and 7, the partition members 27 that constitute the disintegrators are disposed longitudinally of the casing, and the working edges of said disintegrators are disposed in a plane, the distance between which and the working faces of the opposed brush members of the beater is substantially equal throughout.

The upper and lower conveyer compartments 6 and 7 contain conveyers 28, 29 of the spiral type, the shafts of said conveyers being connected by a driving chain 30 guided over sprocket wheels 31, 32. One of the conveyers is driven from the main shaft 11 by means of a chain 33. Other well known means of transmitting motion may be used, if preferred. The casing is provided at its tail end with a chute 34 over which material may be discharged from the tail end of the concave. The conveyer casings 6 and 7 are likewise provided with discharge spouts 35, 36. The top of the casing is provided near the front end with an inlet spout 37.

As stated at the outset of this specification, the machine may with slight variations be utilized for the separation of cotton seed

and cotton seed products at various stages. The main difference resides in the particular structure of the foraminous concave or screen, or rather in the varying dimensions of the apertures thereof. Thus, for instance, when the machine is to be used for separating the meats from the hulls of hulled cotton seed, a screen or concave may profitably be used, as illustrated in Fig. 1, by reference to which it will be seen that a portion of the screen near the inlet or receiving end of the casing is provided with apertures of, say, $\frac{1}{8}$ of an inch in diameter. An intermediate portion of the concave is provided with slightly smaller apertures, say, of $\frac{3}{32}$ of an inch in diameter. A portion of the concave adjacent to the tail end is provided with apertures larger than any of the previous ones of, say, $\frac{1}{2}$ inch diameter. When the concave is thus constructed and the machine is in operation, substantially pure meats will be discharged through the apertures at the head end of the machine. As the intensity of the operation increases (as will be hereinafter set forth) toward the tail end of the machine, meats in an almost pure state will be forced through the smaller apertures of the intermediate portion of the casing, but these meats will be accompanied by small portions of hulls. The larger apertures adjacent to the tail end of the casing will admit of the passage of the remaining meats, but these will be accompanied by an increasing quantity of hulls, constituting, therefore, a second grade product. Owing to the presence of the slides throughout the length of the partition between the upper and the lower conveyer casings, the pure meats may be permitted to pass at any desired point from the upper to the lower conveyer casing, said meats which constitute the first grade product being discharged over the spout 36 at the tail end of the lower conveyer casing. By opening a slide at the proper point, to be determined by experimentation, any desired portion of the product passing through the intermediate small apertures of the concave may be permitted to pass along with the first grade product, while the remainder will be permitted to pass along with the second grade product which is discharged over the chute 35 of the upper conveyer casing. The tailings will pass over the discharge spout 34, and I am thereby enabled to separate the products in the most efficient manner to obviate as far as possible all necessity for further separation. When, on the other hand, the machine is to be used for separating lint and motes from the seed, a screen or concave, as illustrated in Fig. 6, is preferably used, said screen being provided with small apertures adjacent to the head of the casing, with large apertures adjacent to the tail of the casing, and with medium sized

apertures intermediately between the small and the large apertures; or, in other words, the diameter of the apertures increases progressively from the head toward the tail end of the machine. When this screen is used for separating lint and motes from the unhulled seed, the sand and dirt will pass through the perforations near the head end of the machine and may be permitted to pass from the upper to the lower conveyer casing to be discharged as tailings or waste material over the chute 36. The delinted seeds passing through the large apertures will be discharged over the spout 35 of the upper conveyer casing, while the lint will be discharged at the tail end of the concave manipulation of the stock may obviously be made by the operator of the machine.

In the operation of the machine, the material that is to be separated is introduced through the spout or hopper 37 at the head of the machine, said material passing into the space between the beater and the concave, under the centrifugal action of the beater the material is thrown upwardly in the direction of the disintegrators above the beater where the material will be cut up or agitated and separated and then thrown by the centrifugal action of the beater against the screen or concave. By this action the finer particles will be forced through the apertures of the concave, and the beater will serve to constantly break up the inflow of stock and also to carry, rub or wipe the stock over the concave to assist in forcing the fine particles through the apertures therein. It will be obvious that by the primary action of the beater, the stock is thrown forcibly against that portion of the concave which extends upwardly and which may be described as being disposed tangentially with respect to the lower portion of said concave, the separating action being thereby greatly accelerated and improved. As the stock passes into the lower portion of the concave, it will naturally travel in the direction of the tail end of the machine, this being due to the tapering shape of the concave, whereby the lower portion of said concave is inclined downwardly in the direction of the tail end of the machine. As the stock thus travels in the direction of the tail end of the machine, it is repeatedly engaged by the brush members of the beater, thrown upwardly in the direction of the disintegrators and the angular top of the casing, and thence as it drops by gravity against the tangential portion of the concave, to be subsequently rubbed or wiped over the latter, the action being repeated until the tail end is reached. The stock will thus in its passage through the machine be subjected to a plurality of distinct separating actions, the number of which will vary according to the speed at which the beater

is rotated. The several grades of stock resulting from the repeated separating actions will be discharged over the chutes at the tail end of the concave and at the tail ends of the respective conveyers, thus accomplishing the purpose of the invention in an extremely efficient and satisfactory manner.

It will be noted that owing to the fact that the top wall member of the casing is level while the brush members of the beater are rearwardly divergent, the distance between the opposed faces of said brush members and the top wall of the casing gradually decreases toward the tail end of the machine. Hence, in order to preserve equal distance between the faces of the disintegrators E and the opposed faces of the brush members, the said disintegrators must be of various dimensions, gradually decreasing in width from the intake to the tail end of the machine, as clearly seen in Fig. 1. As a result of this construction it follows that as stock travels toward the tail end of the machine, the action to which it is subjected progressively increases in violence owing to the increase in leverage of the brush members, and the decrease of the distance that the stock requires to be thrown in order to pass between the partition members that constitute the disintegrators and to strike or impinge upon the top wall of the casing. For this reason I find that in the separation of the meats from the hulls of cotton seeds, the pure meats will pass through the concave first practically without any admixture of hulls, while as the operation progresses the meats, as well as the hulls, are broken up so that while separation will take place therebetween, the meats will not be unaccompanied by portions of hulls. The particles, however, will be broken up and loosened so that by subjecting the second grade stock to a subsequent separating operation, practically all the pure meats may be saved. It is obvious that separation of the second grade stock may be repeated as often as may be found necessary in order to extract all the values and to make the final separation as thorough and complete as possible.

As stated at the outset, this machine may be utilized with excellent results for separating materials of different kinds at various stages of production and into various grades, the grades being capable of being further varied by the manipulation of the slides which separate the upper from the lower conveyer casing.

Under some circumstances, the conveyers may be dispensed with, that is to say, when separation into only two grades is desired, one grade may be discharged over the tail end of the concave and another grade be hopped directly from the concave over the cant boards 5 and to a place of deposit. The direction of rotation of the conveyers

may be reversed so as to cause delivery to be made at either end, and other changes and alterations which are clearly within the scope of the appended claims may be made when desired.

Having thus described the invention, what is claimed as new, is:—

1. In a separating machine, a casing having side walls, a substantially level top wall and inclined bottom members, a concave consisting of a sheet of foraminous material having one edge secured adjacent to the top wall and another edge secured adjacent to a side wall of the casing, the lower portion of said concave being of substantially semi-circular contour and the upper portion of said concave being substantially tangential to the lower portion, said concave being flared in the direction of the tail end of the machine, a beater supported for rotation concentric with the lower portion of the concave, said beater having brush members, the working faces of which are substantially parallel with the opposed bottom face of the concave, and a plurality of disintegrating members mounted within the casing intermediate the side edges of the sheet constituting the concave.

2. In a separating machine, a casing having side walls, a substantially level top wall and inclined bottom members, a concave consisting of a sheet of foraminous material having one edge secured adjacent to the top wall and another edge secured adjacent to a side wall of the casing, the lower portion of said concave being of substantially semi-circular contour and the upper portion of said concave being substantially tangential to the lower portion, said concave being flared in the direction of the tail end of the machine, a beater supported for rotation concentric with the lower portion of the concave, said beater having brush members the working faces of which are substantially parallel with the opposed bottom face of the concave, and a plurality of disintegrating members mounted within the casing intermediate the side edges of the sheet constituting the concave; said disintegrating members having serrated arcuate working edges concentric with the axis of the beater.

3. In a separating machine, a casing having side walls, a substantially level top wall and inclined bottom members, a concave consisting of a sheet of foraminous material having one edge secured adjacent to the top wall and another edge secured adjacent to the side wall of the casing, the lower portion of said concave being of substantially semi-circular contour and the upper portion of said concave being substantially tangential to the lower portion, said concave being flared in the direction of the tail end of the machine, a beater supported for rotation concentric with the lower portion of the concave, said

beater having brush members the working faces of which are substantially parallel with the opposed bottom face of the concave, and a plurality of disintegrating members 5 mounted within the casing intermediate the side edges of the sheet constituting the concave; said disintegrating members having serrated arcuate working edges concentric with the axis of the beater, and said disintegrating members being of gradually decreasing 10 width from the intake toward the discharge end of the machine.

4. In a separating machine, a casing, a concave and a disintegrator within said casing, and a beater supported for rotation be-

tween the concave and the disintegrator, said beater comprising star-shaped heads, rods connecting the points of the star-shaped heads, arms pivoted on the rods externally of the heads, links adjustably connecting the 20 free ends of the arms with the heads, and brush members each mounted on a pair of arms associated with the two heads.

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

HALE E. HAWK.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."