United States Patent [19]

Pearman

[11] **3,734,289**

[45] **May 22, 1973**

[54] **APPARATUS FOR SEPARATING PRODUCTS**

[76] Inventor: **Lawrence Pearman,** Post Office Box 521 Ocilla Highway, Tifton, Ga. 31794

[22] Filed: **Aug. 24, 1971**

[21] Appl. No.: **174,362**

[52] **U.S. Cl.** **209/467,** 209/490, 209/502

[51] **Int. Cl.** **B03b 3/12**

[58] **Field of Search**.....209/466–469, 490, 502, 486, 506, 424, 426

[56] **References Cited**

UNITED STATES PATENTS

419,908	1/1890	Bagley	209/506 X
1,710,521	4/1929	Sutton et al.	209/467
1,813,303	7/1931	Lide	209/467
1,964,716	7/1934	Ater	209/506 X
2,404,414	7/1946	Sutton	209/486 X
2,928,545	3/1960	Forsberg	209/467

FOREIGN PATENTS OR APPLICATIONS

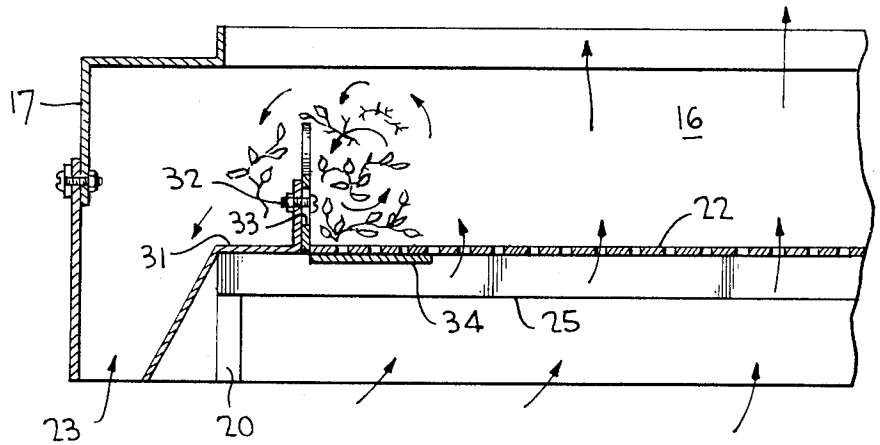
1,361,346	4/1964	France	209/467

Primary Examiner—Frank W. Lutter
Assistant Examiner—Ralph J. Hill
Attorney—Watson, Cole, Grindle & Watson

[57] **ABSTRACT**

Apparatus for separating light from heavier products lying on a shaking table wherein a vacuum pressure is applied to draw off the light products, the table including an air shelf disposed beneath a perforated table bed at the end thereof at which the light products are concentrated during vibration of the table, thereby insuring a complete separation at said end of the light from the heavier products whereby said light products may be conveniently drawn off from said table bed.

5 Claims, 6 Drawing Figures



3 Sheets-Sheet 1

FIG. 1

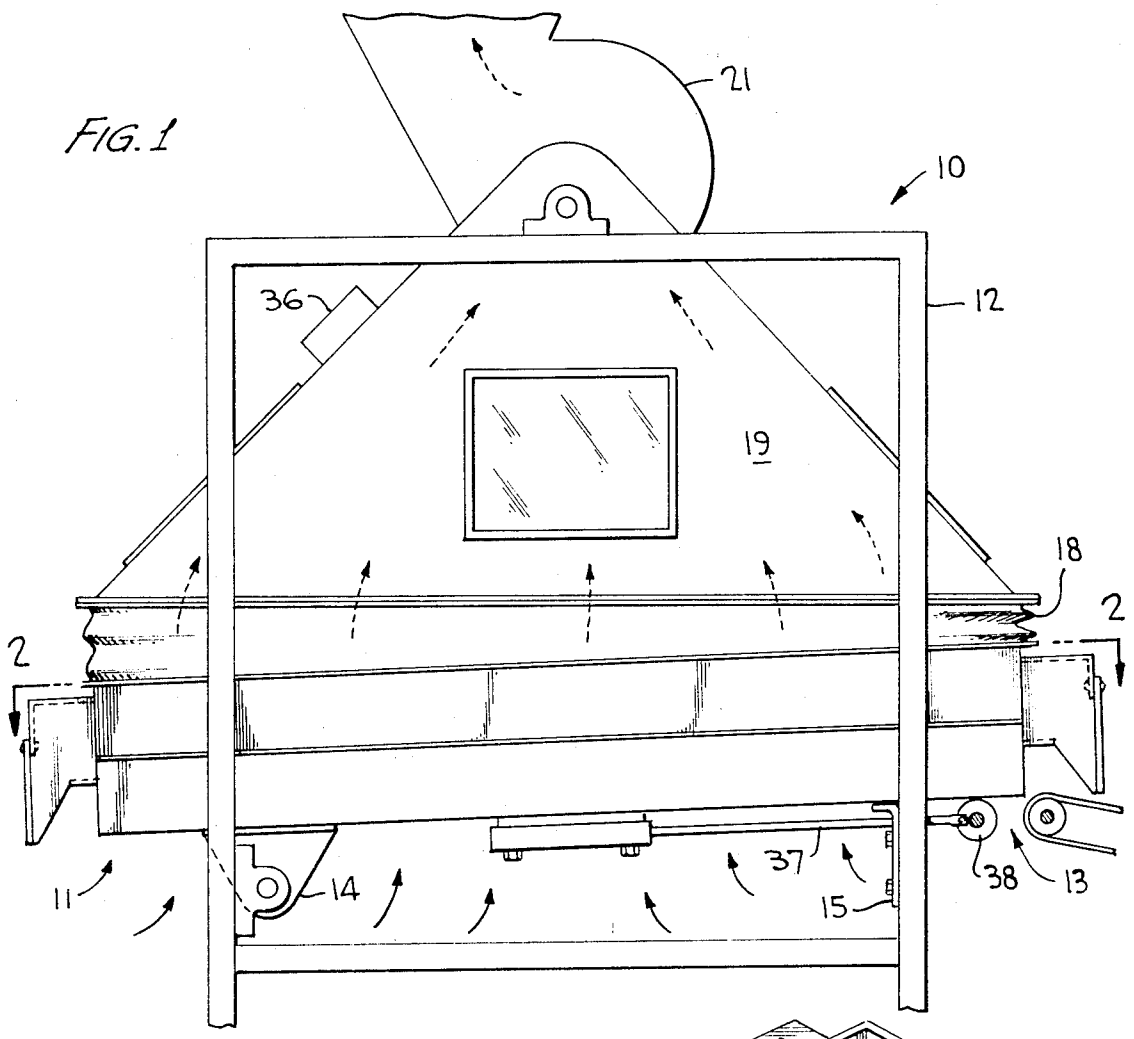
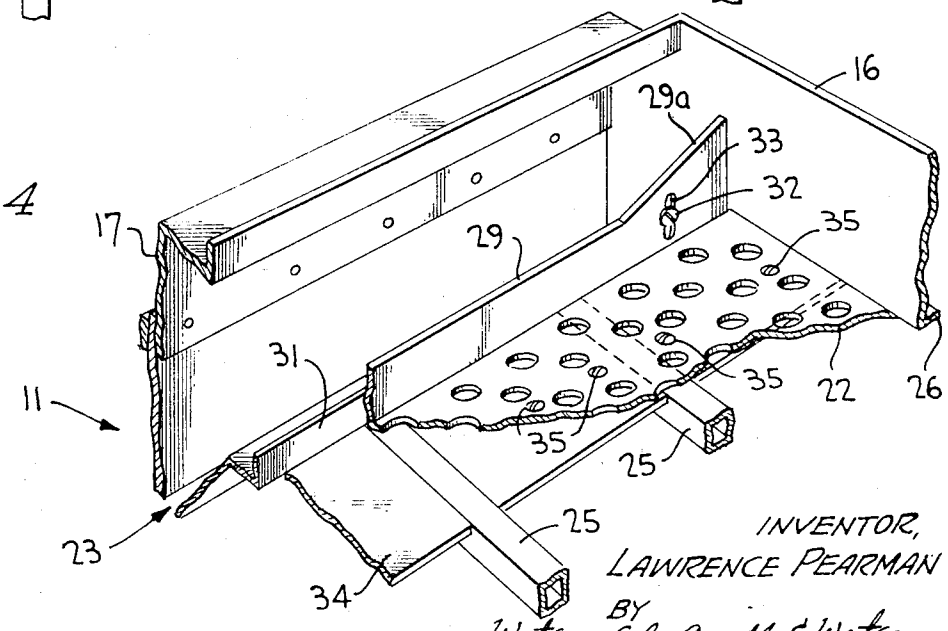


FIG. 4



INVENTOR,
LAWRENCE PEARMAN
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

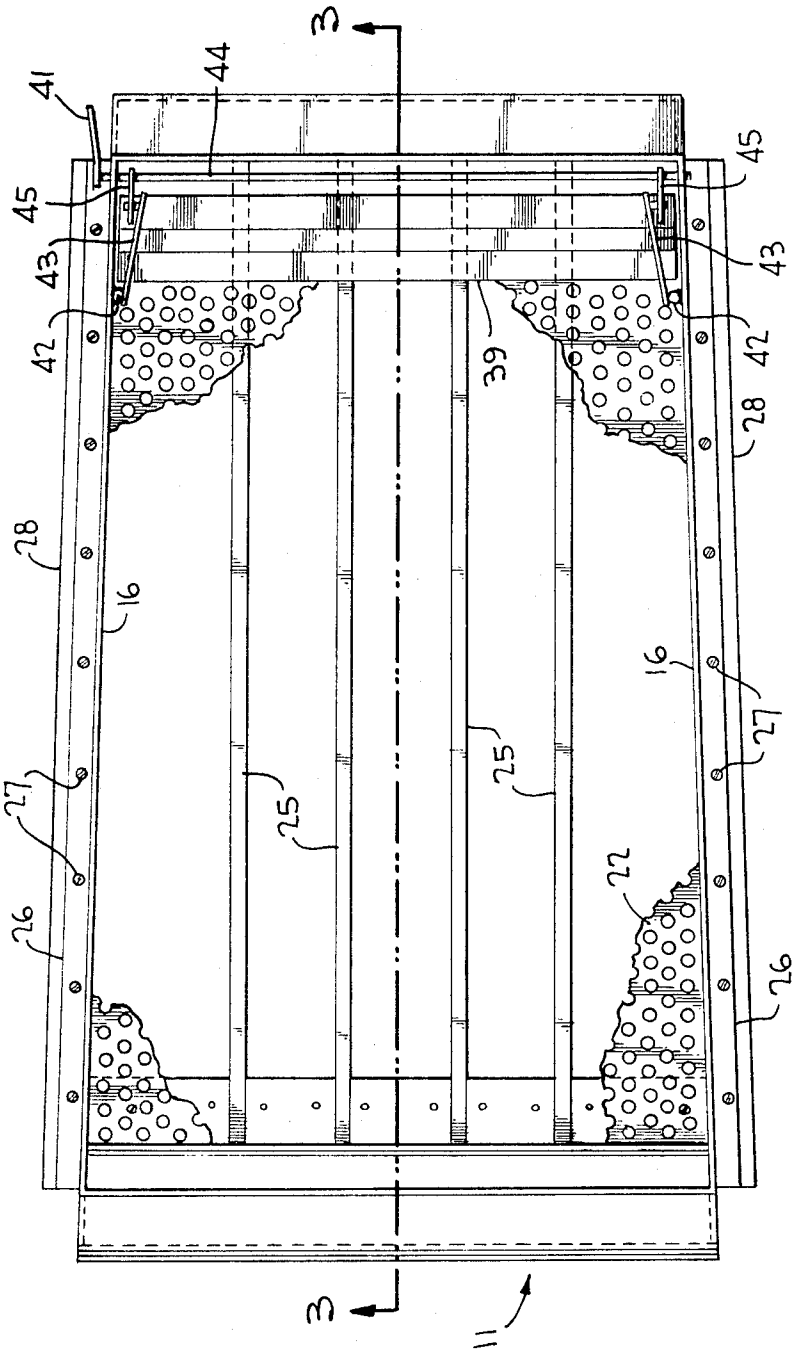


FIG. 2

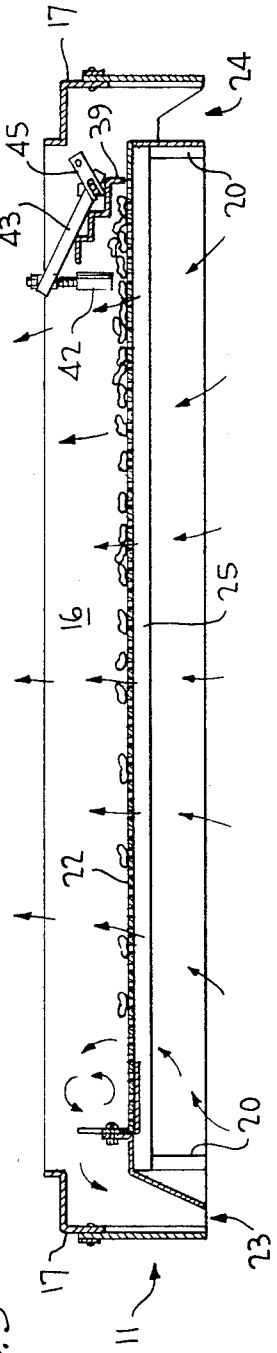


FIG. 3

INVENTOR,
LAWRENCE PEARMAN
BY Watson, Cole, Grindle & Watson
ATTORNEYS

FIG. 5

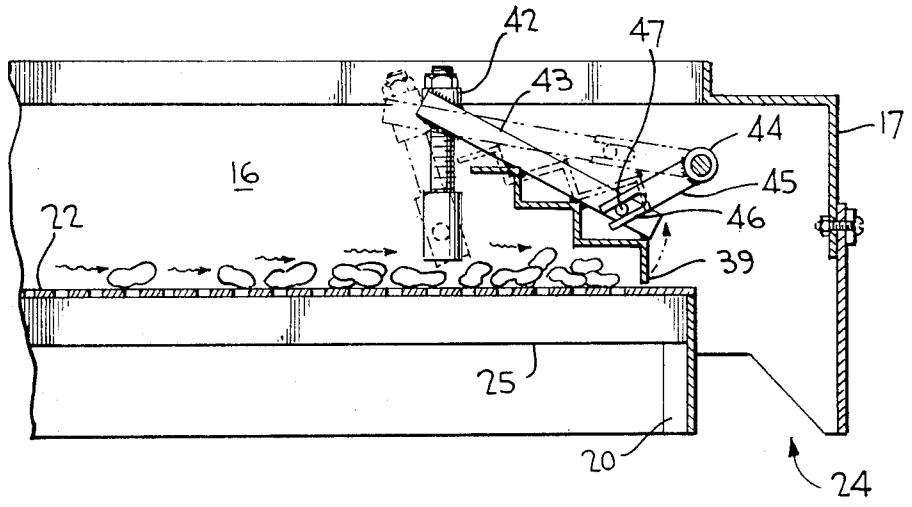
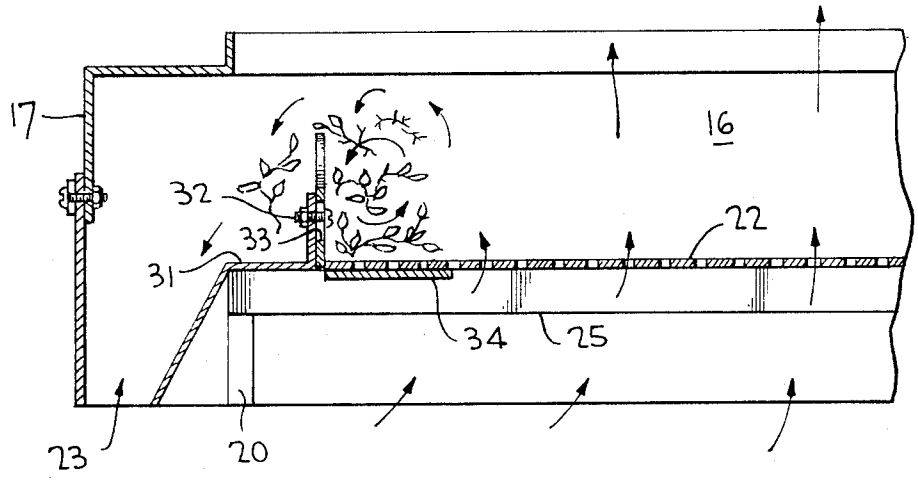


FIG. 6



INVENTOR,
LAWRENCE PEARMAN

BY Watson, Cole, Grindle & Watson
ATTORNEYS

APPARATUS FOR SEPARATING PRODUCTS

This invention relates generally to an apparatus for separating light from heavier products and more particularly to such an apparatus wherein a vacuum pressure and an air shelf is used to insure complete separation.

In those known separating machines for separating light from heavy products, such as, for example, shelled from unshelled peanuts, as well as splits and rots from the good shelled peanuts, and various other types of light products from heavier ones, it has been difficult to insure a full and complete separation of the light from the heavier products, thereby necessitating additional separating steps to be taken with a corresponding higher cost of operation. A shaking table of some specific design is normally employed for the purpose of moving the heavier products therealong toward a discharge opening as the table is made to vibrate. However, vibration alone, and even with the use of a blower or a suction means, has proven inadequate in separating the light from the heavier products without some quantity of unwanted products being moved into the discharge opening along with the desired products. An apparatus has therefore been devised for insuring the full and complete separation of light from heavier products with the use of a modified shaking table and a vacuum pressure. This is basically the object of the present invention.

Another object of this invention is to provide such an apparatus wherein a vertically disposed discharge plate is mounted at one end of a perforated table bed with means at said one end adjacent said discharge plate being provided for impeding the upward flow of air adjacent the discharge plate thereby concentrating the light products at said end, reducing the air velocity thereat, and causing a swirling air flow thereat whereby the light products are separated and moved upwardly from the heavy products by the upwardly moving air, the heavy products are made to move in contact with the table bed toward a discharge opening by the vibrating means normally provided for the shaking table, and the light products are discharged over the top of the discharge plate and into a light-product discharge opening by the swirling air flow.

A further object of the present invention is to provide such an apparatus wherein the air flow impeding means comprises an air flow plate mounted to the underside of the bed plate.

A still further object of this invention is to provide such an apparatus wherein the discharge plate is wider at its ends and slopes inwardly toward its center portion so that the light products will be more concentrated at said table plate one end near the discharge plate wider ends thereby further assuring that the heavier products, which normally move more slowly away from the forward corners of the shaking table, will be moved toward the heavier product discharge opening before the light products are discharged over the top of the discharge plate wider ends.

A still further object of the present invention is to provide such an apparatus wherein the discharge plate is mounted by means of an upstanding plate disposed rearwardly thereof, the discharge plate having vertically elongated mounting openings whereby the discharge plate may be adjusted vertically, depending on the amount of products to be separated.

A still further object of the present invention is to provide such an apparatus wherein a flap is disposed near the heavier product discharge opening and is movable toward and away from the perforated bed plate so as to regulate the amount of heavier-product flow into its discharge opening.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of the separating apparatus in accordance with the present invention;

FIG. 2 is a top view of a modified shaking table in accordance with the present design taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view of the modified shaking table taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a slightly enlarged perspective view showing in part the discharge plate, air shelf, light-product discharge opening and perforated bed plate of the modified shaking table;

FIG. 5 is a slightly enlarged view, similar to that of FIG. 3, showing the heavier-product discharge end of the apparatus, and

FIG. 6 is a slightly enlarged view, similar to that of FIG. 3, showing the light-product discharge end of the apparatus.

Turning now to the drawings wherein like reference characters refer to like and corresponding parts throughout the several views, there is shown in FIG. 1 an apparatus **10** for separating light from heavier products which comprises a shaking table **11** suitably mounted within a framework **12** so as to be adjusted upwardly at its heavier-product discharge end **13** by means of a pivotal connection as at **14** and a bracket support as at **15.**

As can be clearly seen in the remaining figures, the shaking table includes side walls **16** and end walls **17** along the upper periphery of which is mounted a flexible wall **18** to facilitate mounting, in any conventional manner, of a lightweight hood **19,** thereby completely enclosing the top of the shaking table along its side and end walls. Near the top of the hood, a suction means **21** is suitably mounted for the purpose of creating a vacuum pressure within the hood **19,** thereby drawing air upwardly from the exterior of the shaking table in the direction of the arrows shown in FIG. **1.**

The shaking table further includes a perforated table bed plate **22** extending between side walls **16** and at a slight distance from end walls **17** so as to define with these end walls a light-product discharge chute **23** and a heavy-product discharge chute **24.** The perforated plate **22** is supported by means of a plurality of hollow box beams **25** supported at their opposite ends on members **20.**

The plate **22** is disposed beneath outwardly extending flanges **26** of the side walls **16** which together are secured by bolts or screws **27** to side beam supports **28.**

Near the lightweight-product discharge chute **23,** or forward end of the shaking table, a vertically disposed discharge plate **29** rests against the top of plate **22** and is supported against an angle plate **31** by means of a pair of nuts and bolts **32** extending through vertically elongated openings **33** provided in discharge plate **29,** thereby permitting said plate **29** to be adjusted vertically toward and away from the perforated plate.

The key feature of this invention, in conjunction with the vertical discharge plate **29**, is the provision of a horizontally disposed air shelf plate **34**. The air shelf plate actually comprises, as can be clearly seen in FIG. **4**, a plurality of plate segments each disposed between beams **25** and between the beams **25** and side walls **16**, and each lying beneath the perforated plate **22** adjacent the discharge plate **29**. The plate segments are each being held in place by means of screws or bolts **35**.

After the products to be separated, i.e., shelled from unshelled peanuts, or undesirable foreign material from the unshelled peanuts, are introduced into the apparatus through any suitably provided inlet opening, such, generally, as shown at **36** in FIG. **1**, both the light and heavier products to be separated fall onto the perforated bed plate **22**. The table **11** is then shaken or vibrated by some suitably provided vibration means, which may simply comprise a pitman **37** connected at its free end to a crank or eccentric **38**. In such manner the back and forth shaking of the table, which is inclined slightly upwardly at its rearward end in the conventional manner, causes the heavier products to move rearwardly toward the heavier-product discharge end **13**. As is well known in conventional shaking tables of this type, the heavier products are caused to be shaken so as to move into contact with the top of the perforated bed plate. Because the weight of the upper lighter layers is less, and such particles tend to remain in a state of rest, the upper layers are not affected by the movement of the table to the same degree as the lower particles and, therefore, tend to lag behind as the heavier particles are gradually moved toward the discharge end **13** of the shaking table. The suction created by the vacuum or suction means **21** beneath the hood **19** causes air to flow upwardly through the openings of the perforated plate **22** thereby insuring a more equal distribution of air over the entire area of the plate **22** and, therefore, a more complete separation of the light from the heavier products. It should be noted that the suction through the perforated plate **22** is preferably of such a magnitude as to insure a more complete separation of the light from heavy products, while at the same time being not sufficiently strong to move said products upwardly through the suction means **21**.

The air flow through the perforated plate **22** is impeded somewhat near the inlet end of the apparatus by means of air shelf plate **34**, which causes the air to flow therearound, as shown by the arrows in FIG. **3**, and to cause a slight whirling motion in the vicinity of the air shelf. The discharge plate **29** permits a slight accumulation of the lighter material above the air shelf so as to give ample opportunity for the heavier products to be drawn downwardly against the plate **22** and toward the discharge end **13** during vibration of the table. After a sufficient amount of light material build-up, the swirling motion of the air will simply cause such lightweight material to be discharged over the top of the plate **29** and into chute **23**. This lightweight material, or trash, may then be simply blown onto the floor with blower or pressure-type separator (not shown), if desired.

Depending upon the amount of material introduced into the apparatus to be separated, the discharge plate **29** may be adjusted vertically upwardly so as to increase the accumulated amount of lightweight material in the vicinity of the air shelf. The separating feature of the invention may be, therefore, simply adjusted to accommodate a larger capacity of products to be separated. Moreover, it can be seen in FIG. **4** that the opposite ends **29***a* (only one shown) are each of a wider dimension as compared to the remaining width of the plate **29**. Such an added width for the discharge plate adjacent side walls **16** permits a higher accumulation of lightweight material near the corners of the bed plate since experience has shown that the heavier products at such corners require additional time before they drop through the lightweight material and onto the bed plate during vibration thereof. Therefore, the added accumulation of the lightweight material at these corners permits the heavier products to be moved downwardly in contact with the bed plate and toward the discharge opening before the lightweight material is moved over the top of wider ends **29***a* and into the lightweight discharge chute **23**.

In order to control the amount of heavier products discharged through the discharge chute **24**, a control plate **39** is provided capable of being pivotally moved toward and away from bed plate **22** by means of a lever **41**, shown in FIGS. **2**, **3** and **5** of the drawings. Stud supports **42** are secured as by welding to the inner surfaces of opposing side walls **16**, with bracket arms **43** secured as by welding to both the stud supports and to the control plate **39**. An elongated rod member **44** extends transversely of the bed plate **22** and through suitable openings in side walls **16**. The lever **41** is mounted at one end of rod **44** and arm members **45** are secured to the member, each arm member having a forked end **46** which mates with a laterally extending pin **47** on each bracket arm **43**. Turning movement of the lever **41**, therefore, rotates the rod **44** and its attached arm members **45** to thereby elevate arms **33** and the attached control plate **39** to a position away from the bed plate **22**, as shown in phantom in FIG. **5** of the drawings. The flow of heavier material into discharge opening **24** may therefore be conveniently and effectively controlled.

From the foregoing, it can be seen that a separating apparatus has been devised wherein a vacuum separator is used in combination with the standard vibrating means for a shaking table to conveniently and effectively separate light from heavy products. A clean operation insuring equal air distribution through the perforated bed plate is brought about by the separating apparatus having a higher capacity for separating light from heavy products with a more positive separation of these products and lending itself to a wider variety of uses. The vacuum-type separator has a higher capacity since the air drawn through the perforated bed plate can accommodate deeper and heavier layers of products with fewer heavier products being discharged as compared to many of the prior art devices. The presently designed separator apparatus will separate mature from immature peanuts in the shell, shelled from unshelled peanuts or foreign material from any other products.

The air shelf reduces the velocity of air through the perforated bed plate, and, therefore, reduces the action of the vacuum draw of the light products from the bed plate in the vicinity of the vertically disposed discharge plate **39** so as to permit a slight accumulation of the light products at the forward end of the shaking table and thereby provide additional time for the heavy products to be moved downwardly in contact with the top surface of the bed plate and toward the heavier-product discharge chute by action of the standard vi-

brating means. The slight swirling motion at this forward end of the shaking table thereafter causes the light products to be moved over the top of the discharge plate **29** and into the chute **23.** Since the heavier products normally tend to accumulate at the forward corners of the shaking table, the discharge plate **29** is designed as having wider ends at such corners so as to permit a higher accumulation of lightweight products before being discharged over the top thereof. Also, the discharge plate **29** is capable of being adjusted toward and away from the perforated plate **22,** depending on the amount of material to be separated by the apparatus.

Many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An apparatus for separating light from heavy products, comprising, a shaking table enclosed by means of a cover, a product inlet end on the apparatus for introducing products to be separated thereinto, said shaking table including a perforated horizontal table bed plate on top of which the products to be separated are disposed, a first discharge opening at one end of said table bed plate for discharging the light products from the apparatus after separation, a second discharge opening at the end of said table bed plate opposite said one end for discharging the heavier products from the apparatus after separation, means on said cover for creating a vacuum pressure so as to draw air upwardly through the perforations of said bed plate, means for vibrating said bed plate so as to cause the heavier product to be moved toward said second discharge opening, a vertically disposed discharge plate mounted at said bed plate one end for concentrating the light products at that end, means at said bed plate one end adjacent said discharge plate for impeding the upward flow of air adjacent said discharge plate and reducing the air velocity and causing a swirling air flow in the vicinity of said means whereby the light products are separated and moved upwardly from said heavy products by the upwardly moving air, the heavy products are made to move in contact with said table bed plate toward the second discharge opening by said vibrating means, and the light products are discharged over the top of said discharge plate and into first discharge opening by said swirling air flow.

2. The apparatus according to claim **1** wherein said air flow impeding means comprises an air flow plate mounted to the underside of said bed plate and extending a slight distance toward said table bed opposite end.

3. The apparatus according to claim **2** wherein said discharge plate is of a predetermined width having wider opposite ends sloping inwardly toward said predetermined width whereby the light products will be accordingly more concentrated at said table bed plate one end near said discharge plate wider ends, thereby further assuring that the heavier products, normally concentrated near said wider ends, will be moved toward said second discharge opening before the light products are discharged over the top of said discharge plate wider ends.

4. The apparatus according to claim **3** wherein said discharge plate is mounted by means of an upstanding plate disposed rearwardly thereof, said discharge plate having vertically elongated openings to facilitate mounting, whereby said discharge plate may be adjusted vertically depending on the amount of products to be separated.

5. The apparatus according to claim **4** wherein a control flap is provided near said second discharge opening and is mounted for movement toward and away from said bed plate for regulating the amount of heavier-product flow into said second discharge opening.

* * * * *