

No. 754,617.

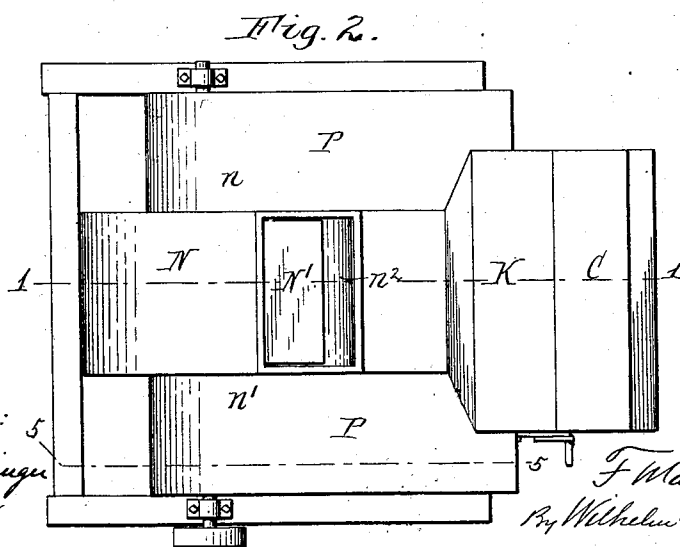
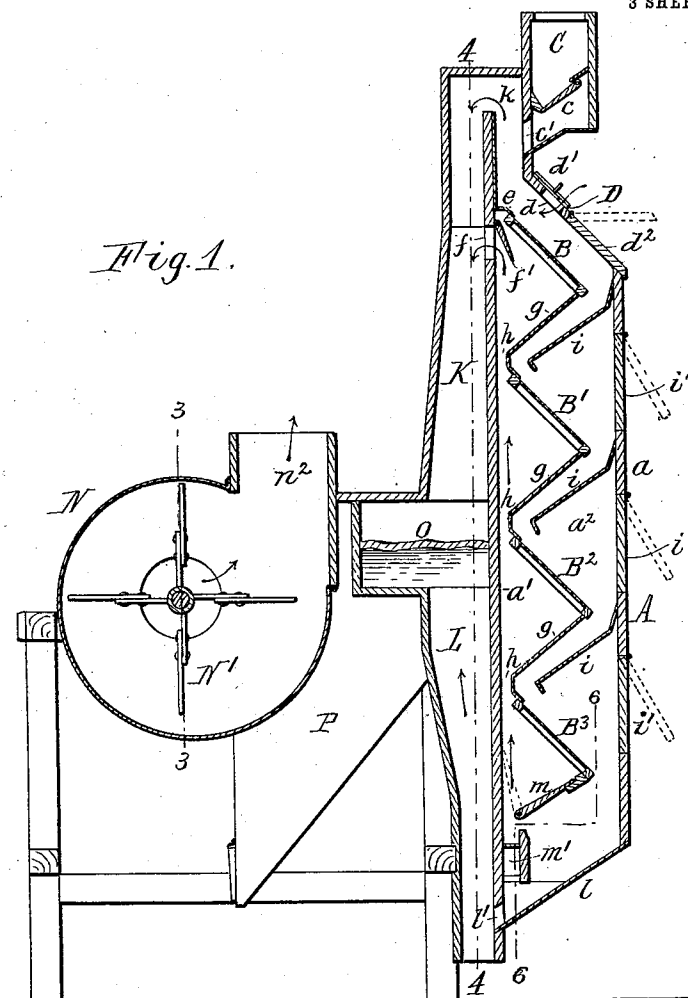
PATENTED MAR. 15, 1904.

F. M. SMITH.
GRAIN SEPARATOR.

APPLICATION FILED JULY 12, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

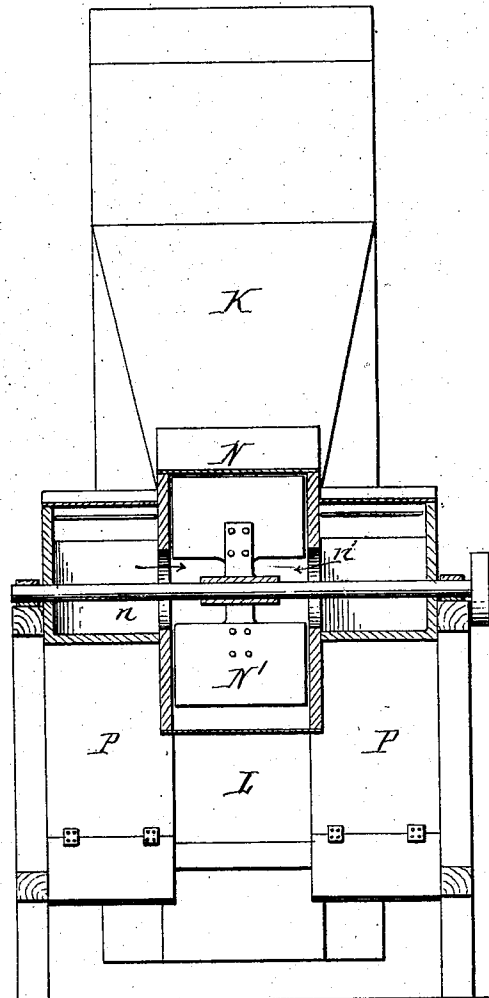
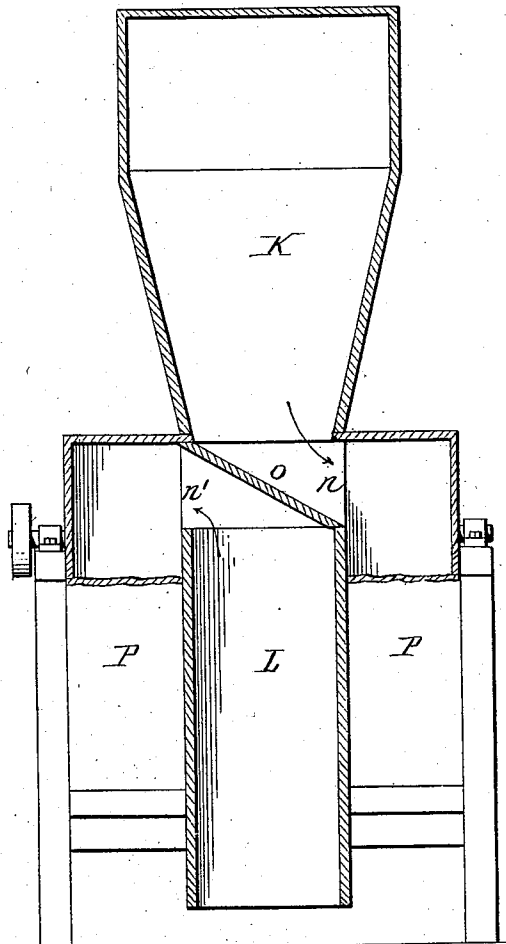


Fig. 4.



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3 SHEETS—SHEET 3.

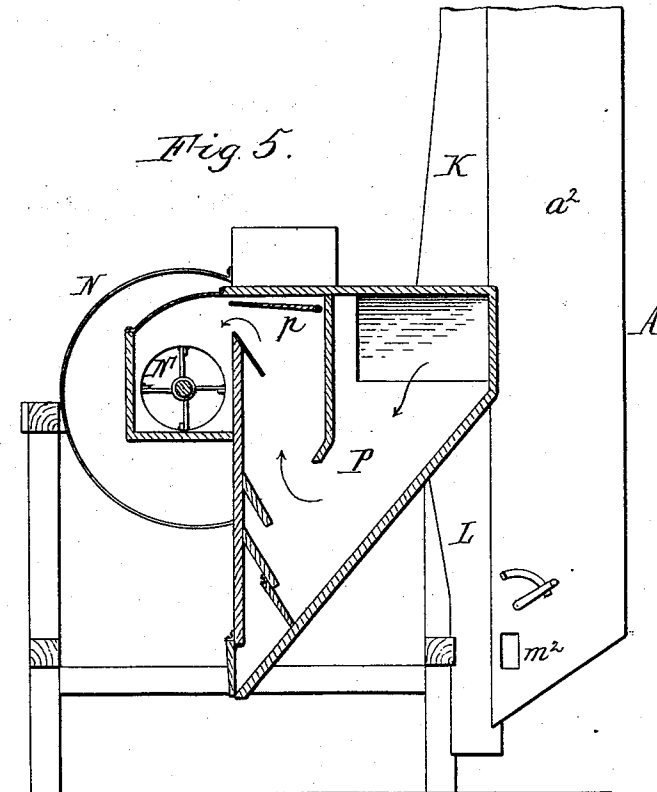
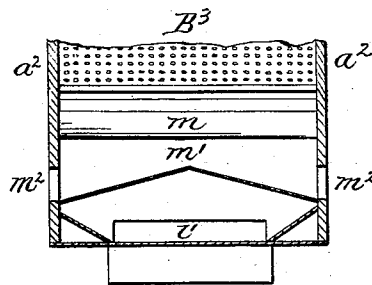


Fig. 6.



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UNITED STATES PATENT OFFICE.

F MARION SMITH, OF NASHVILLE, MICHIGAN, ASSIGNOR TO HUNTLEY MANUFACTURING COMPANY, OF SILVERCREEK, NEW YORK.

GRAIN-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 754,617, dated March 15, 1904.

Application filed July 12, 1901. Serial No. 67,992. (No model.)

To all whom it may concern:

Be it known that I, F MARION SMITH, a citizen of the United States, and a resident of Nashville, in the county of Barry and State of Michigan, have invented a new and useful Improvement in Grain-Separators, of which the following is a specification.

This invention relates to that class of grain-separators which contain a vertical series of inclined stationary screens and intermediate conveying-plates so arranged that the grain which is fed upon the head of the uppermost screen flows by gravity necessarily from the tail of one screen to the head of the next lower screen.

The object of this invention is to produce a machine of this kind which is especially suitable for separating hulled rice. In hulling and scouring rice the material coming from the hulling and scouring machines contains mixed with the plump hulled kernels some broken kernels and fragments and grits of different sizes, which are used by brewers and known as "brewers' stock," some fine flour, coarse and fine fragments of bran, and some dust. It is desirable to separate the fine matters, such as flour and bran, completely from the plump kernels and the brewers' stock; but this is difficult, because the heat and moisture which are liberated in hulling and scouring rice causes the flour and other fine matter to adhere to a considerable extent both to the hulled kernels and to the clothing of the separating-reels, causing the meshes of the latter to fill up to such an extent that it is not possible to effect a satisfactory separation.

In my improved separator the fine matter adhering to the kernels is thoroughly detached from the latter by the screening operation, which is carried on in the presence of copious air-currents, whereby the moisture and heat are carried off and the refuse and other light material is separated from the plump kernels, broken kernels, grits, and other valuable matter.

In the accompanying drawings, consisting of three sheets, Figure 1 is a longitudinal sectional elevation of my improved grain-separator in line 1 1, Fig. 2. Fig. 2 is a top plan

view of the same. Fig. 3 is a vertical transverse section in line 3 3, Fig. 1, looking toward the screen-case. Fig. 4 is a vertical transverse section in line 4 4, Fig. 1, looking toward the fan. Fig. 5 is a longitudinal sectional elevation in line 5 5, Fig. 2. Fig. 6 is a cross-section through the lower part of the separating-case in line 6 6, Fig. 1, looking toward the rear of the separating-case.

Like letters of reference refer to like parts in the several parts.

A represents the upright separating-case, which contains a vertical series of inclined screens $B\ B'\ B''\ B^3$, which extend across the case from side to side and which may be of different mesh.

a represents the front wall, a' the rear wall, and a'' the side walls of the separating-case. The screens are arranged with their upper or head ends near the rear wall of the case and incline toward the front wall of the case.

C is the feed-hopper, mounted upon the separating-case and provided with a feed valve or gate c of any suitable construction. This hopper is provided in its rear wall with an opening c' , through which the material passes to the head of the uppermost screen B.

D represents the sloping top of the separating-case arranged below the feed-hopper and provided with an air-inlet opening d , which is controlled by a slide or damper d' . The lower part of this top may be formed by a hinged door d'' , which can be opened when a more copious inflow of air is required at this point.

The uppermost screen B is arranged at a suitable distance below the top D and is secured at its head to the rear wall a' of the case by a tight plate e , Fig. 1. The rear wall a' extends upwardly above this screen and above the opening c' , through which the grain enters the separating-case, and is provided below the head portion of this screen with an opening f , which is controlled by a hinged valve f' , as shown in Fig. 1, or by a slide or other suitable device.

g represents a rearwardly-inclined conveying-plate which extends from the lower end of each screen above the lowermost screen to the head of the screen next below. This plate

receives the material which passes through the meshes of the screen above and conveys such material rearwardly and delivers the material to a passage h between the head of the next lower screen and the rear wall a' of the case.

i represents a rearwardly-inclined conveying-plate which is arranged below and in front of the tail of each screen above the lowermost screen. This plate receives the material which tails off from the next upper screen and conveys this material to the head of the next lower screen. The rear conveying-plates g are preferably secured to the side walls of the case, while the front conveying-plates i are secured to the side walls and also to the front wall of the case. This front wall is provided above each of these front conveying-plates with a hinged door i' , through which access can be had to the screens and which can be opened, more or less, for admitting air to the case in front of the screens.

K represents a descending air-trunk which is arranged on the rear side of the upper portion of the rear wall a' of the case and which communicates at its upper end by a passage h with the space above the uppermost screen B . The opening f below the uppermost screen opens into the upper portion of this air-trunk.

L represents an ascending air-trunk which is arranged on the rear side of the lower portion of the rear wall a' and which is open at its lower end.

l is the rearwardly-inclined bottom of the case, which receives the material which tails off from the lowermost screen and conveys this material into the lower portion of the ascending air-trunk through an opening l' in the rear wall of the case, Fig. 1.

m is a rearwardly-inclined conveying plate or board which is arranged underneath the lowermost screen and which conducts the material passing through this screen to a spout m' . The latter slopes laterally in opposite directions, Figs. 1 and 6, and delivers the material through openings m^2 in the side walls of the case.

The two air-trunks connect with eyes n n' in opposite sides of a case N , in which a fan N' is arranged. This fan draws air-currents downwardly through the upper descending air-trunk K and upwardly through the lower ascending air-trunk L . The connection of these air-trunks with the eyes of the fan-case can be made in any suitable manner. As shown in the drawings, the lower end of the upper air-trunk is separated from the upper end of the lower air-trunk by an oblique partition O , Figs. 1 and 4, so that the lower end of the upper air-trunk communicates with the eye n and the upper end of the lower air-trunk with the eye n' . Each air-trunk is provided near the fan with a settling-chamber or chess-hopper P of any suitable construction for intercepting the heavy valuable material

which is carried on the air-currents. Each air-trunk is provided with an adjustable valve p for regulating the strength of the air-current flowing through the trunk.

In the operation of the machine the hulled or scoured rice in falling from the feed-opening c' to the head of the uppermost screen B falls through the air-current which flows upwardly above this screen to the upper end of the descending air-trunk K . This ascending air-current effects a preliminary air separation, whereby the fine and light material—such as flour, fine bran, and dust—is removed. The material in passing over the screens and from one screen to another is subjected to the action of air-currents which are drawn rearwardly through the meshes of the screens and upwardly through the zigzag passage between the front sides of the screens and the conducting-plates. The material which tails off from the lowermost screen and which consists mainly of plump hulled kernels passes from the inclined bottom l into the lower air-trunk L , where it is subjected to an ascending air-current which flows through this trunk and removes the coarse bran mixed with this material. The fine grade of heavy material or brewers' stock which has passed through the meshes of the screens and which consists mainly of fragments of kernels, grits, &c., is subjected to the action of the air-current which ascends along the front side of the rear wall a' of the case to the opening f below the uppermost screen, whereby all light and fine material—such as flour, fine bran, and dust—is removed from this stock and conducted on the air-current to the upper air-trunk K . The material or brewers' stock which has passed through the screens is finally discharged through the spout m' .

The conveying-plate m underneath the lowermost screen is hinged at its lower end, as shown, or otherwise made movable, so that it can be either placed to receive the material passing through the lower screen and direct it to the spout m' , as shown in full lines in Fig. 1, or can be swung up against the rear wall a' , as shown in dotted lines in Fig. 1, in which position this plate directs all of the material which has passed through the screens upon the bottom plate l , where it joins the plump kernels and passes with the latter to the ascending air-trunk, in which the final air separation is effected.

The heavier grade of the light material which is separated by the air-currents is deposited in the chess-hoppers, while the light dust is discharged with the blast through the spout n^2 of the fan-case.

My improved separator is very simple in construction, requires no power for its operation, frees the kernels thoroughly from adhering fine matter while the kernels pass over the screens, prevents clogging of the meshes of the screens as the separation is carried on

in the presence of copious air-currents, and effects a complete separation of the different grades of material in a very simple manner.

While the machine is particularly useful for separating hulled rice, it may also be used for separating other grains or materials.

I claim as my invention—

1. The combination of an upright separating-case, an upright series of inclined screens arranged in the same, front conveying-plates which convey the material tailing off from one screen to the head of the next lower screen, rear conveying-plates receiving the material which has passed through the screens and extending from the lower end of one screen to the upper end of the next lower screen, an upright imperforate wall arranged in rear of the screens and rear conveying-plates and forming therewith an ascending air-passage having a contracted throat at the lower end of each rear conveying-plate, through which throat an air-current flows upwardly, and a suction-fan connected with the upper end of said ascending passage, substantially as set forth.

2. The combination of a separating-case, an upright series of inclined screens arranged in the same, front conveying-plates which convey the material which tails off from one screen to the head of the next lower screen, rear conveying-plates which receive the material passing through the screens, an ascending air-passage arranged behind the several screens and rear conveying-plates and receiving the material from the latter, a fan connected with the upper end of said ascending air-passage, an ascending air-trunk connected with said fan and having an air-inlet at its lower portion only, and means for conveying the heavy material which tails off from the screens into said ascending air-trunk, substantially as set forth.

3. The combination of an upright separating-case, an upright series of inclined screens arranged in the same, front conveying-plates which convey the material tailing off from one screen to the head of the next lower screen, rear conveying-plates receiving the material which has passed through the screens and extending from the lower end of one screen to the upper end of the next lower screen, an upright imperforate wall arranged in rear of the screens and rear conveying-plates and forming therewith an ascending air-passage having a contracted throat at the lower end of each rear conveying-plate, through which throat an air-current flows upwardly, a feed-hopper arranged above the screens, a feed-passage leading from said hopper to the uppermost screen, an air-inlet for said passage,

and a suction-fan connected with the upper end of said ascending passage and also with the upper end of said feed-passage, substantially as set forth.

4. The combination of a separating-case, an upright series of inclined screens arranged in the same, front conveying-plates which convey the material which tails off from one screen to the head of the next lower screen, rear conveying-plates which receive the material passing through the screens, an ascending air-passage arranged behind said screens and rear conveying-plates and receiving the material from the latter, a fan, a feed-hopper arranged above said series of screens, an air-inlet arranged in the upper part of the case below the feed-passage leading from said feed-hopper to said screens, an air-trunk which connects said fan with the upper end only of said ascending air-passage and with the case above said feed-passage, and an ascending air-trunk which is also connected with said fan and which is provided with an air-inlet only at its lower portion, and means for conveying the heavy material which tails off from the screens into said ascending air-trunk, substantially as set forth.

5. The combination of a separating-case, an upright series of inclined screens arranged in the same, an ascending air-passage arranged between the rear sides of the screens and the rear wall of the case, front conveying-plates which convey the material which tails off from one screen to the head of the next lower screen, rear conveying-plates which receive the material passing through the screens and deliver the same to said ascending air-passage, a feed-hopper arranged above the screens, an air-inlet arranged in the upper part of the case below the feed-passage leading from the feed-hopper to the screens, a descending air-trunk arranged behind the upper portion of said case and connecting at its upper end only with the upper end of said ascending passage below the uppermost screen and with the case above said feed-passage, an ascending air-trunk arranged behind the lower portion of the case and which is provided with an air-inlet only at its lower portion, means for conveying the heavy material which tails off from the screens into said ascending air-trunk, and a suction-fan connected with the lower end of said descending air-trunk and the upper end of said ascending air-trunk, substantially as set forth.

Witness my hand this 4th day of July, 1901.

F MARION SMITH.

Witnesses:

EDWARD MARSHALL,
B. M. CALLENDER.