

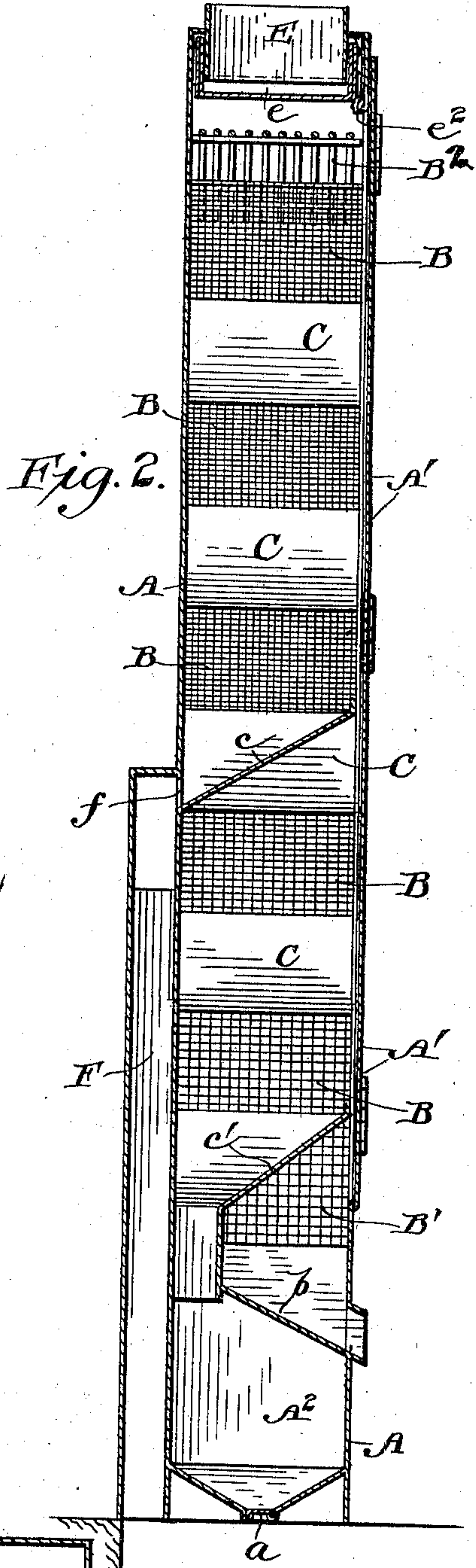
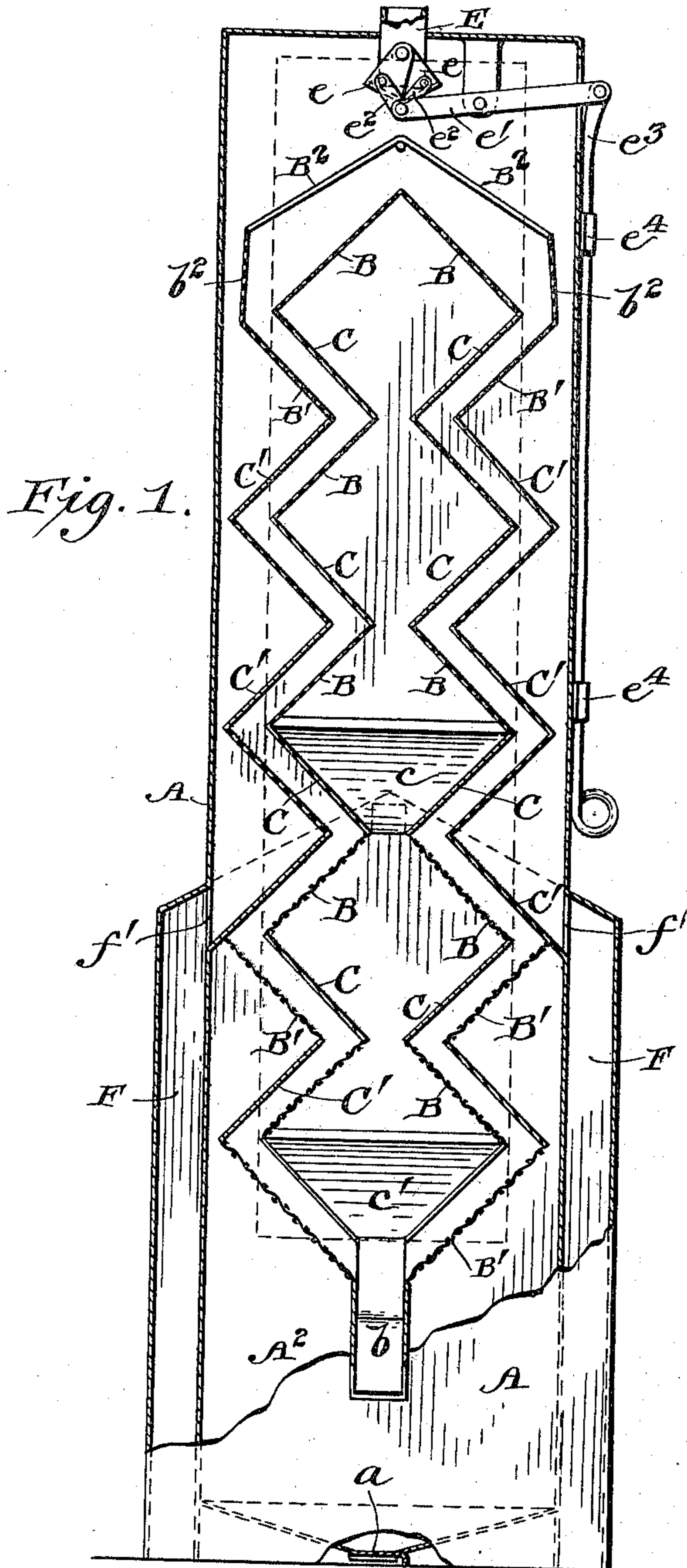
No. 612,650.

Patented Oct. 18, 1898.

A. R. PENPRASE.  
SEPARATOR.

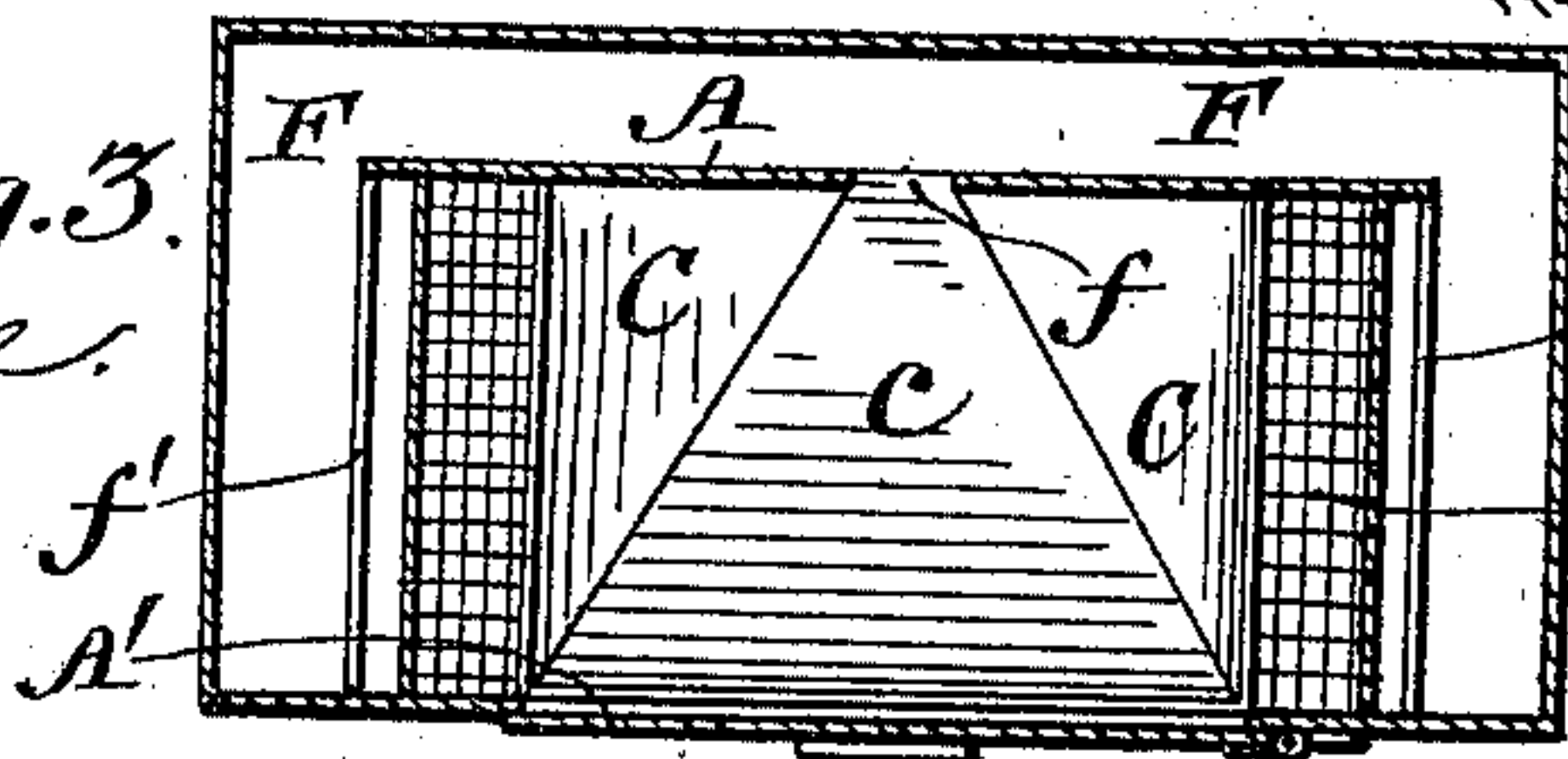
(Application filed Apr. 1, 1897.)

(No Model.)



WITNESSES

*Fig. 3.*  
*Geverance.*  
*J. P. Cliff.*



INVENTOR

*Albert R. Penprase*  
*by his Attor*  
*Wm. J. Munn*



# UNITED STATES PATENT OFFICE.

ALBERT R. PENPRASE, OF DULUTH, MINNESOTA, ASSIGNOR TO BYRON G. SEGOG, JOHN F. SEGOG, AND BASIL D. BROWN, OF SAME PLACE.

## SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 612,650, dated October 18, 1898.

Application filed April 1, 1897. Serial No. 630,323. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT R. PENPRASE, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Separators; 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 appertains to make and use the same.

My invention relates to separators, and more particularly to that class of separators which are adapted to separate grain.

The objects of my invention are, first, to secure compactness and to subject the material being treated to as many sieving operations as possible in such compacted space, and, second, to thoroughly separate the material into three compartments in the novel manner as will be hereinafter described and claimed.

The invention consists of certain novel constructions, combinations, and arrangements of parts, all of which will be hereinafter particularly described and claimed.

In the accompanying drawings, Figure 1 represents a vertical section of my improved separator. Fig. 2 represents a vertical section of the same, extending from front to rear of the separator at right angles to the plane of the section in Fig. 1; and Fig. 3 represents a horizontal cross-section of the device.

A in the drawings represents a casing; B, inner diverging screens; B', outer converging screens; C, inner converging floors; C', outer diverging floors, and E a feed-hopper.

The casing A is preferably of a generally rectangular shape and provided with a door A' upon its front side, through which access may be had to the interior of the separator for the purpose of cleaning the same or rectifying any difficulty which may occur therein.

The feed-hopper E is situated at the top of the separator, the lower discharging end of the said hopper extending into the separator. The discharge of said hopper is adapted to be regulated by the jaws *e e*, pivoted to the walls of the hopper and adapted when swung toward each other to partially or entirely close the lower end of the hopper. Pivotal-ly mounted in the separator is a lever *e'*, which is operatively connected at one end with each

jaw *e* by a short link *e<sup>2</sup>*. The other end of the lever *e'* extends outside the casing A and is connected to an operating-rod *e<sup>3</sup>*. The rod *e<sup>3</sup>* is movably held in place by guides *e<sup>4</sup> e<sup>4</sup>* upon the side of the separator and is provided with a handle at its lower end. An upward movement of the rod *e<sup>3</sup>* causes the end of the lever *e'* connected to the pivoted or toggle links *e<sup>2</sup>* to move downwardly, which causes the said links and the pivoted jaws *e*, to which the links are pivoted, to move toward each other and come together at the lower end of the feed-hopper and close the same. A downward pull upon the rod *e<sup>3</sup>* causes a reverse movement of the pivoted lever, links, and jaws and separates the jaws for the passage of material into the separator.

It will be seen from the above description that the discharge of the hopper may be regulated by moving the operating-rod *e<sup>3</sup>* up or down, thereby opening or closing the jaws *e e* to a greater or less extent, according to the amount of grain it is desired to admit to the separator.

Just below the feed-hopper E are arranged oppositely-diverging coarse-wire screens B<sup>2</sup>, preferably formed simply of parallel wires, which, while they allow the grain to drop through, collect straw or any large trash and convey it to either side, where it may drop into the dust or dirt compartment. The grain drops through the screens B<sup>2</sup> and falls upon the uppermost pair of inner diverging screens B B, which meet in the middle of the separator. Connected to the lower ends of the upper pair of inner diverging screens is a pair of inner converging floors, which do not meet at their lower ends, but form a central passage for the descent of dust. To the lower ends of the floors C are connected another pair of converging screens B, and to the lower ends of these screens are connected another pair of converging floors C, and the construction and arrangement are carried out to the extent desired. Outside of the inwardly-converging floors C and a suitable distance away from the same to form a passage for the descent of the grain a pair of converging screens B' are arranged, and to the lower ends of these screens diverging floors C' are connected, which are parallel with the inner diverging screens B, and this arrangement is continued to the ex-



tent desired. By this construction the sieves and floors can be very compactly arranged and a large amount of sieving-surface secured, and at the same time the dust is discharged centrally through the casing, as well as at the sides thereof. Each sieve is constructed so as to prevent dust from reëntering the grain, and two zigzag passages are secured.

The upper ends of the outer converging screens  $B'$  and the lower ends of the coarse diverging screens  $B^2$  are connected by vertical screens  $b^2$ , as shown in the drawings.

About midway the height of the separator and between two of the oppositely-inclined dust-floors  $C$  is an incline floor  $c$ , which is adapted to catch all the dust or foreign substances dropping down the central passage-way and direct them through an opening  $f$  in the rear wall of the casing  $A$  into the compartment  $F$ . The passage-ways on each side of the separator are also in communication with said compartment  $F$  by means of openings  $f'$   $f'$  in the sides of the casing  $A$ , the dust, straw, and foreign substances dropping down said passage-ways being directed through said openings  $f'$   $f'$  by the dust-floors  $C'$   $c'$ , which are just opposite the same, the said floors being extended to meet the sides of the casing  $A$  for this purpose. Below this point in the separator the grain is further screened and separated into two grades, the best grade being deposited by the last pair of oppositely-inclined screens  $B'$   $B'$  into an inclined trough  $b$ , which extends through the front of the casing  $A$  and delivers the clean grain into any desired receptacle. The rest of the grain and screenings pass a part down the sides of the casing into a compartment  $A^2$  in the lower end of the separator and a part into the same receptacle through an opening formed at the rear of the casing  $A$ , between the last pair of dust-floors  $C'$ , and an inclined floor  $c'$ , similar to the floors  $C'$ , being secured in place between the said dust-floors to more effectually secure a proper discharge of the said grain. The floor of this compartment  $A^2$  preferably converges toward the center, at which point is an aperture or door adapted to be closed by a slide  $a$ . The contents of the compartment  $A^2$  may be discharged into any suitable receptacle by pulling out the slide  $a$ .

It will be observed that the series of screens and floors form on each side a zigzag passage-way for the grain, each screen being adapted to deliver its contents to the next oppositely-inclined screen below and the dust-floors being adapted to catch the screenings from each screen and convey them to a proper place and prevent dust from falling onto the screen below.

The screens are preferably arranged at right angles to each other, for by this arrangement I am enabled to pass the grain over a great number of screens in a small space, and the angle gives a sufficient incline to make the grain fall easily.

While I have described my invention as adapted to the separation of grain, I do not wish to limit myself to that use, for it is apparent from the above description that my device may be used for separating ore, coal, and crushed rock or similar material without departing from the spirit of my invention.

It will be apparent that the material to be separated will be delivered in three different grades—that discharged into the compartment  $F$  being one, that discharged into the compartment  $A^2$  being another, and that discharged through the trough  $b$  being the third.

The screens below the openings leading into the compartment  $A^2$  are preferably of a larger mesh than the screens above, and they may be graded to suit the separation desired.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a separator and grader, the combination with a suitable casing, of two inner diverging screens, two inner converging floors connecting the said inner screens, two outer converging screens parallel with the said converging floors, two outer diverging floors connecting the said outer converging screens and parallel with the inner diverging screens, the inner floors and screens being so arranged as to discharge particles of dirt or waste material through a space centrally between them into a suitable receptacle, and the outer diverging floors to discharge waste material at the sides of the casing, the arrangement of the inner and outer floors also preventing the dust from reëntering the grain and also forming with the screens two zigzag passages for the descent of the grain, and an inclined floor located at a suitable point in the central dust-chute for conducting the dust to the dust-compartment, the said dust-compartment also connecting with the side dust passages or chutes, one set of the outer diverging floors being extended to meet the sides of the outer casing to form a screenings-compartment below the same and prevent the further descent of the dust into said compartment and also direct the dust in the side passages to the dust-compartment, the mesh of the screens below the said extended divergent dust-floors in the side dust-passages being larger than the mesh of the screens above said floors, and forming a grain-grader which permits small grain or screenings to pass through the large mesh, the construction and arrangement being such that the dust is conveyed to one compartment, screenings to another compartment, and good grain to a third compartment, substantially as described.

2. In a separator and grader, the combination with a suitable casing, of two inner diverging screens, two inner converging floors connecting the said inner screens, two outer converging screens parallel with the said converging floors, two outer diverging floors connecting the said outer converging screens and parallel with the inner diverging screens, the



inner floors and screens being so arranged as to discharge particles of dirt or waste material through a space centrally between them into a suitable receptacle, and the outer diverging floors to discharge waste material at the sides of the casing, the arrangement of the inner and outer floors also preventing the dust from reëntering the grain, and also forming with the screens two zigzag passages for the descent of the grain, a centrally-arranged inclined floor located at a suitable point in the central dust-chute for conducting the dust to the dust-compartment, the said dust-compartment also connecting with the side dust passages or chutes, one set of the outer diverging floors being extended to meet the sides of the outer casing to form a screenings-compartment below the same and prevent the further descent of the dust into said compartment and also to direct the dust in the side passages to the dust-compartment, the mesh of the screens below the extended dust-floors in the side dust-passages being larger than the mesh of similarly-arranged screens above the inclined dust-floors in the side dust-passages, so as to permit the small grain or screenings to pass through the large mesh of said screens, and another centrally-arranged floor located below the first-mentioned centrally-arranged floor in the line of the central dust-passages for conducting the centrally-discharged screenings into the screenings-compartment, the construction and arrangement being such that the dust is conveyed to one compartment, screenings to another compartment, and good grain to a third compartment, substantially as described.

3. In a separator, the combination with a suitable casing, of a feed-hopper, a feed-regulating device attached to said hopper, comprising two jaws *e e* pivoted to the walls of the hopper at the lower end of the same, links pivoted to said jaws, a lever pivoted in the casing and secured at one end to said links and an operating-rod arranged outside the casing and connected to the other end of the lever for operating the same to partially or entirely close or open the lower end of the hopper, a series of inner diverging screens, the top pair having its ridge or comb in line with and directly beneath the line of feed from the hopper, and a series of inner con-

verging floors connecting said screens, a series of outer converging screens parallel with the inner diverging screens, the inner floors and screens being so arranged as to discharge particles of dirt or waste material through a space centrally between them into a suitable receptacle, and the outer diverging floors to discharge waste material at the sides of the casing, the arrangement of the inner and outer floors also preventing the dust from reëntering the grain and also forming with the screens two zigzag passages for the descent of the grain, substantially as described.

4. A separator and grader comprising an outer casing provided with a dust-compartment, a screenings-compartment, and a good-grain compartment, the dust-compartment being arranged exteriorly of said casing and surrounding the same on three sides, two sets of zigzagly and parallelly arranged screens and floors arranged in the casing as described, forming a central dust-passage and side dust-passages, and a downwardly-inclined floor arranged in the central dust-passage for conducting the dust into the dust-compartment, one set of diverging floors below said centrally-arranged floor being extended to the sides of the casing and forming a screenings-compartment below them and preventing the descent of the dust into said screenings-compartment, the large grain passing into a separate compartment, substantially as described.

5. In a separator, the combination with a suitable casing, of a feed-hopper, and a feed-regulating device attached to said hopper, comprising two jaws pivoted to the walls of the hopper, links pivoted to said jaws, a lever pivoted in the casing and secured at one end to said links, and an operating-rod arranged outside the casing and connected to the other end of the lever for operating the same to partially or entirely close or open the lower end of the hopper, whereby the supply of grain to the separator can be uniformly regulated, and increased and diminished as desired, substantially as described.

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

ALBERT R. PENPRASE.

Witnesses:

JAMES T. WATSON,  
F. A. CURRIER.