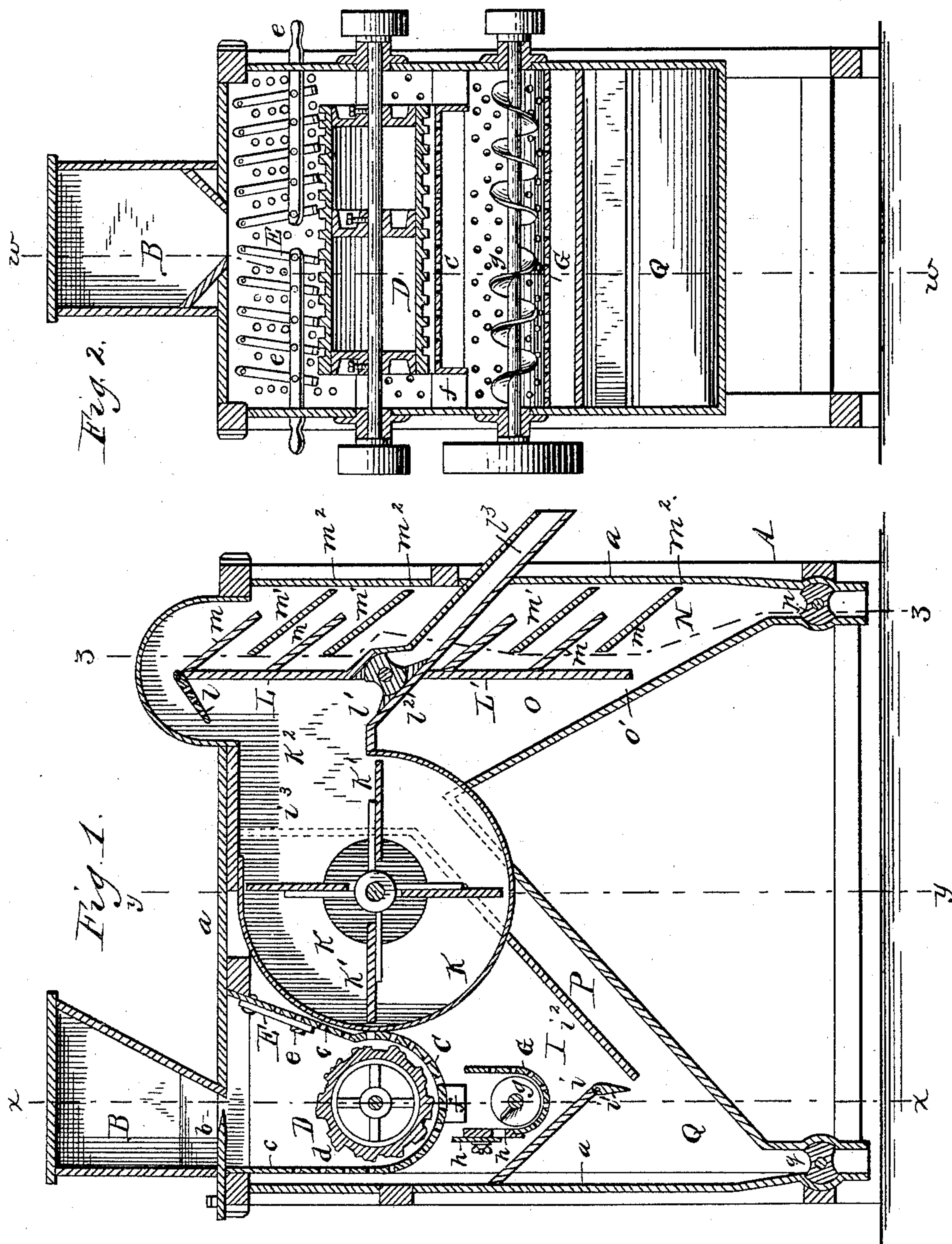


A. HEINE.
GRAIN CLEANER.

No. 485,845.

Patented Nov. 8, 1892.



Witnesses:

Chas. F. Burkhardt.
Emil Neuhart

Aug. Heine Inventor
By Wilhelm Bonner
Attorneys.

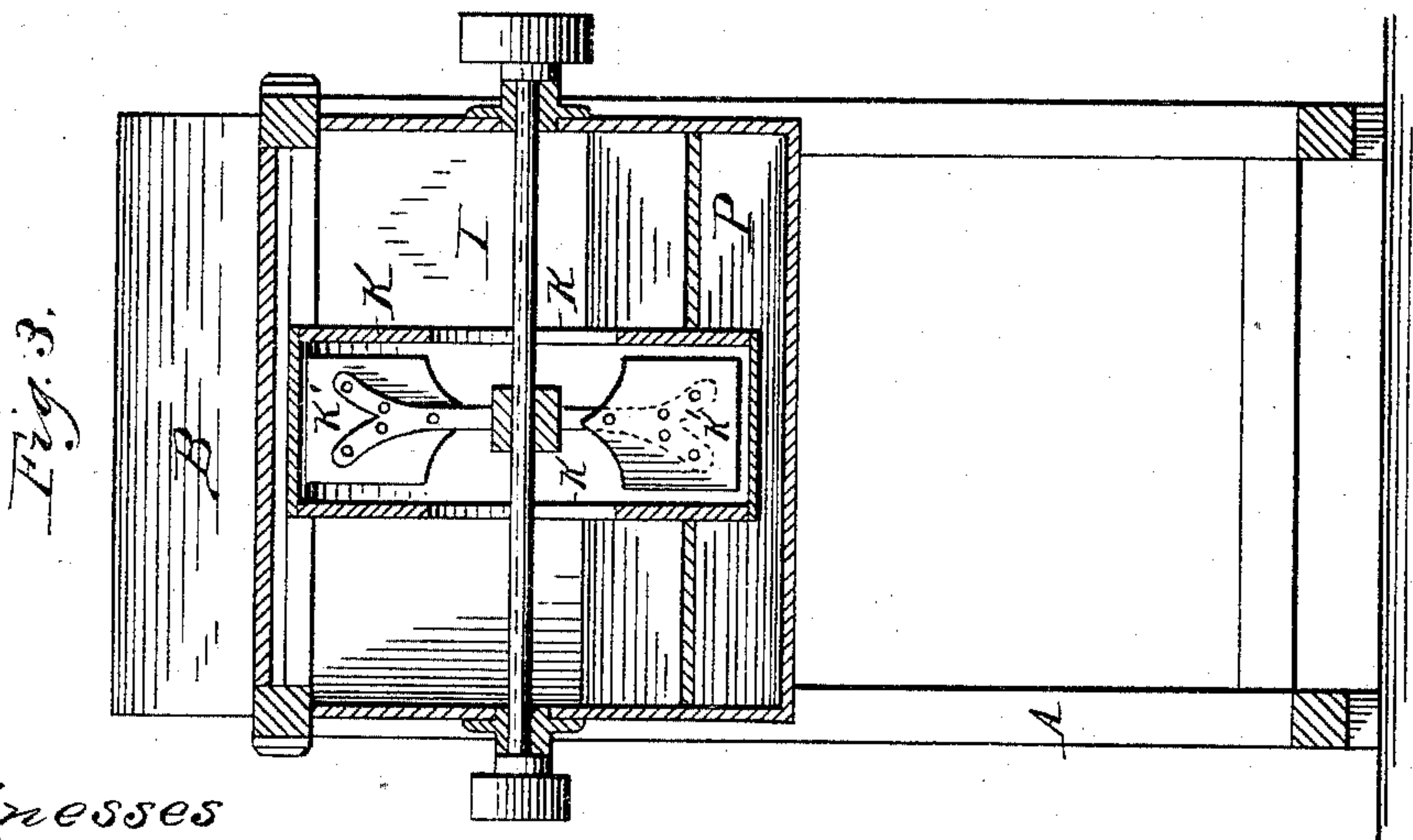
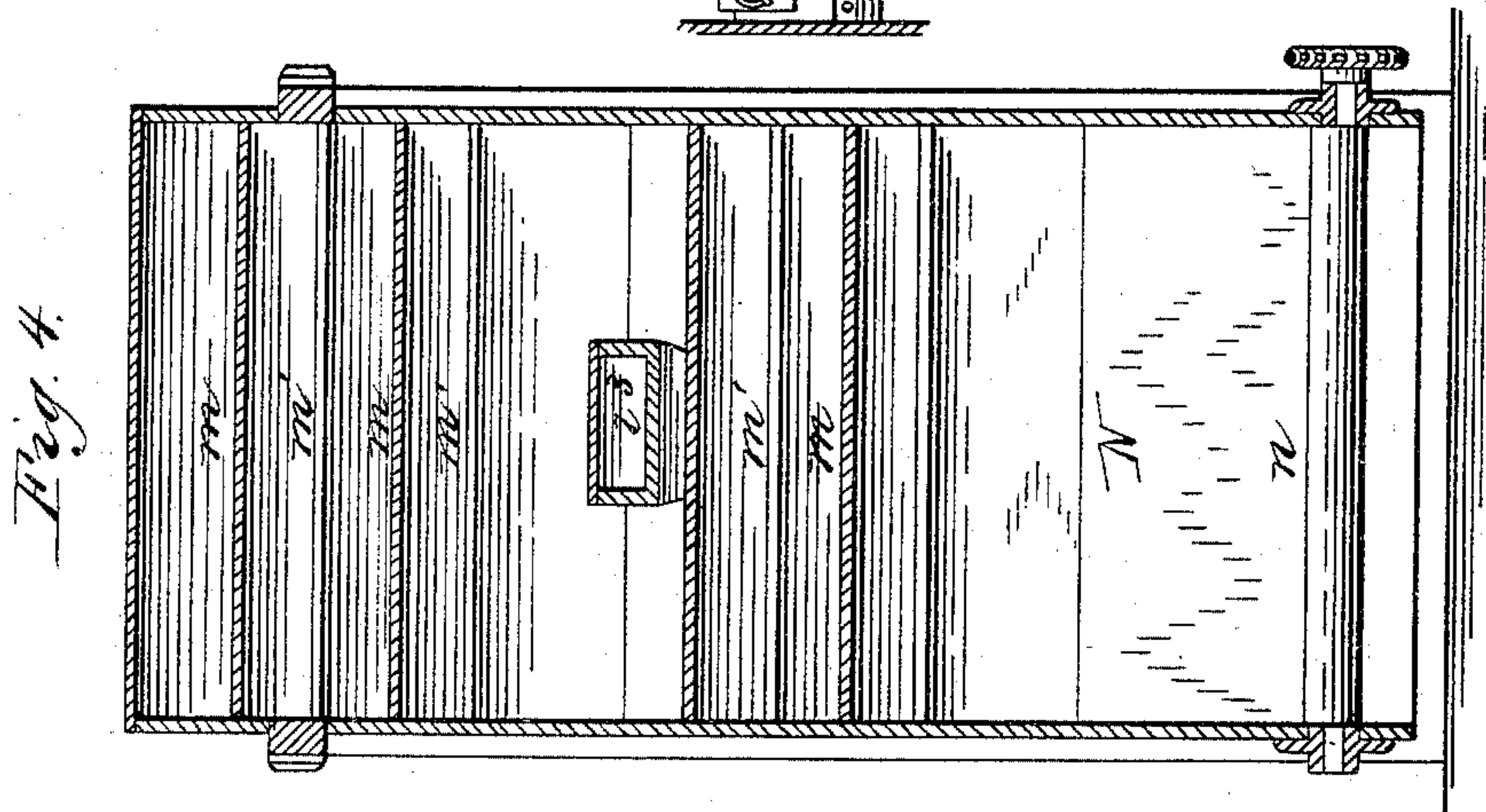
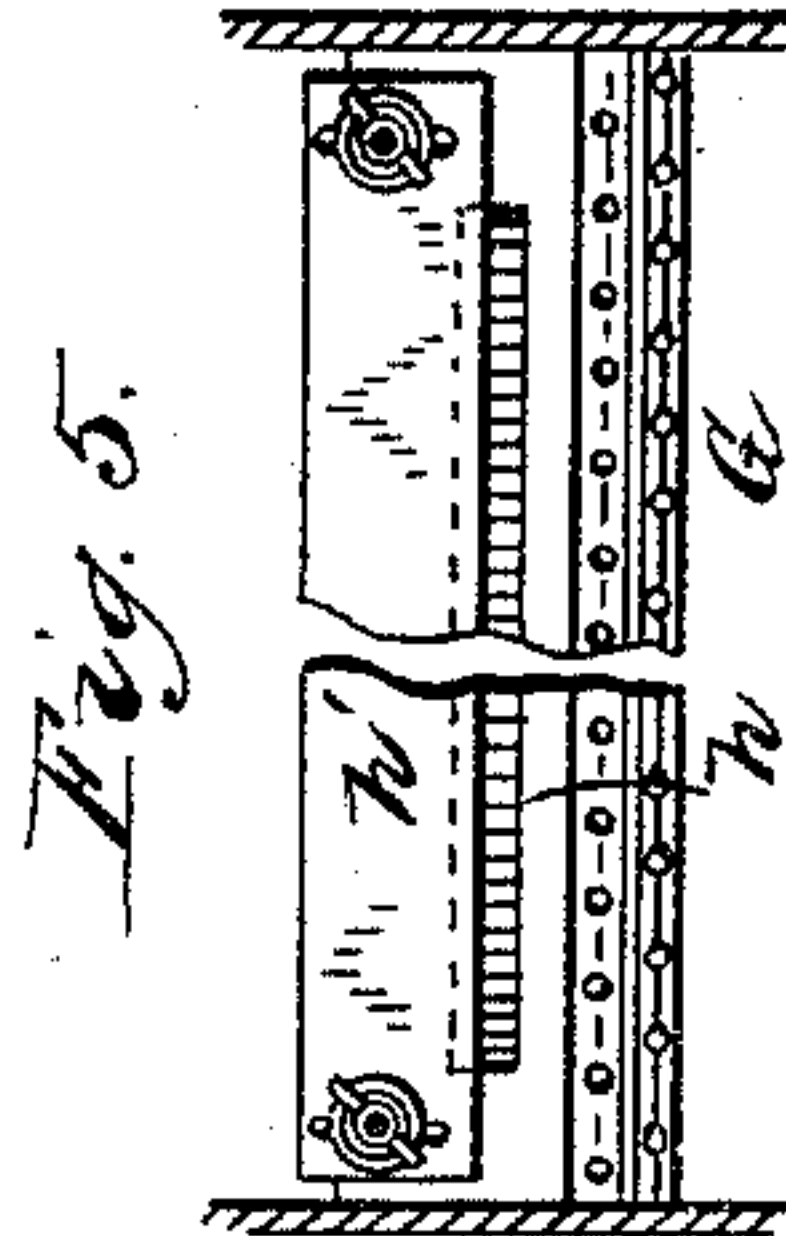
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

AUGUST HEINE, OF SILVER CREEK, NEW YORK.

GRAIN-CLEANER.

SPECIFICATION forming part of Letters Patent No. 485,845, dated November 8, 1892.

Application filed January 25, 1892. Serial No. 419,166. (No model.)

To all whom it may concern:

Be it known that I, AUGUST HEINE, a citizen of the United States, residing at Silver Creek, in the county of Chautauqua and State of New York, have invented new and useful Improvements in Grain-Cleaners, of which the following is a specification.

This invention relates to that class of grain-cleaners which combine a scouring mechanism with a separating mechanism, by which the 10 scoured grain is subjected to the action of an air-current and the light material which is carried off by the air-current is recovered therefrom.

The objects of the invention are principally 15 to improve the scouring mechanism and to produce an efficient air-separator in which a continuous circulation of air is maintained, so that practically no air is discharged from the machine, thereby rendering the machine dust- 20 less.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of my improved grain-cleaner, 25 the section being taken in line *ww*, Fig. 2. Fig. 2 is a vertical cross-section through the end of the machine in which the scouring mechanism is located, the section being taken in line *xx*, Fig. 1. Fig. 3 is a similar section 30 through the middle portion of the machine in line *yy*, Fig. 1. Fig. 4 is a similar section through the tail portion of the machine in line *zz*, Fig. 1. Fig. 5 is a fragmentary front elevation of the conveyer underneath the 35 scouring mechanism, showing the discharge-opening of the conveyer.

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

A represents the stationary frame, in which 40 the several parts of the machine are supported, and which is provided with an inclosing case *a*.

B represents the feed-hopper, arranged over the front portion of the machine and provided 45 at its lower end with a feed-slide *b*.

C represents the scouring-case, arranged within the inclosing case *a*, underneath the discharge-opening of the feed-hopper, and D represents the scouring-cylinder, arranged 50 within the semicylindrical portion of the scouring-case. The latter is trough-shaped and has its front wall *c* arranged vertically

and extending upwardly to the top or deck of the inclosing case *a*. The rear wall *c'* of the scouring-case extends obliquely to the deck 55 of the inclosing case and is provided on its upper side with two sets of deflectors *E*, by which the movement of the grain toward both ends of the scouring-case can be regulated. These deflectors are pivoted with their upper 60 ends to the rear wall *c'* of the scouring-case and have their lower portions connected by horizontal shifting-bars *e*, by which each set of deflectors is adjusted and which project with their outer ends through the sides of the 65 inclosing case *a*, so as to be in convenient reach.

The scouring-cylinder is provided with teeth or projections *d*, whose faces are serrated or otherwise shaped, as may be most desirable to thoroughly scour the particular 70 kind of grain operated upon. This scouring-cylinder rotates in such a direction that the upper half of its periphery moves toward the inclined rear wall of the scouring-case, as indicated by the arrow in Fig. 1, thereby throwing the grain upwardly and upon the inclined 75 surface of the rear wall, from which it flows back into the lower trough-shaped portion of the scouring-case. As the grain flows back it is 80 deflected toward the ends of the scouring-case by the deflectors *E*. The scouring-case is perforated, so that the dust which is detached from the kernels of grain by the scouring mechanism can pass from the interior of the 85 scouring-case through these perforations into the space surrounding it and so that air-currents can pass from the surrounding space through the perforations into the scouring-case and back from the interior of the scour- 90 ing-case into the surrounding space.

The scouring-case is provided at both ends with discharge-spouts *f f*, through which the scoured grain finally escapes from the scouring mechanism and drops into a conveyer- 95 trough *G*, which is arranged lengthwise underneath the scouring-case.

g represents a duplex screw-conveyer arranged in the conveyer-trough and moving the grain which enters the conveyer-trough at 100 both ends toward the middle thereof, where the trough is provided with an elevated discharge-opening *h*, through which the grain overflows and escapes from the trough. This

opening has the form of a longitudinal slot, so as to discharge the grain in a sheet transversely of the machine. The opening is provided with an adjustable gate h' , by which its height can be regulated. The opening is arranged at a sufficient height above the bottom of the conveyer-trough to insure the distribution of the grain over the entire length of the opening. The conveyer-trough is preferably provided with perforations for the escape of the dust which is detached from the grain in being agitated by the conveyer-screws.

I represents a hopper, which is arranged below the conveyer and which receives the grain discharged therefrom. The front wall i of this hopper is arranged directly underneath the conveyer and is provided at its lower end with a valve i' . The rear wall i^2 extends backwardly and upwardly and is connected with the top of the inclosing case a by the vertical wall i^3 .

K represents the fan-case, which is arranged in the middle portion of the machine, in rear of the scouring mechanism, and which has its eyes k communicating with the rear and upper portions of the hopper I, so as to draw an air-current upwardly through the hopper and into the fan-case.

k' represents the fan-blades, which rotate within the fan-case, and k^2 represents the blast-spout, through which the air is discharged rearwardly from the fan-case.

L represents a vertical wall, which is arranged opposite the mouth of the blast-spout and in rear thereof, so that the blast of the fan is delivered against this wall. This wall is provided at its upper end with a forwardly-projecting valve l , whereby an eddy is formed on the front side of the wall, in which the heaviest solid particles contained in the air-current are separated therefrom, while the air-current escapes upwardly around the edge of this valve. This heaviest grade of solid material, consisting principally of light, shrunken, and broken grain, collects in the pocket l' at the lower end of the wall L, from which pocket it is discharged intermittently by a rotating valve l^2 into a spout l^3 , which conducts this material through the rear wall of the inclosing case a of the machine. Below the wall L there is arranged a similar wall L' , which extends downwardly from the pocket l' . Between the walls L L' and the rear wall of the inclosing case a are arranged rearwardly-inclined boards m m' , which form zigzag passages, through which the dust-laden air-current passes downwardly from the upper valve l to the lower edge of the lower wall L' . The inclined boards m are secured at their front ends to the walls L L' and are separated from the rear wall of the inclosing case sufficiently to allow the air-current to pass around the rear ends of these boards. The inclined boards m' are arranged between the boards m and are separated from the walls L L' by spaces of sufficient width to allow the air-cur-

rent to pass around the front ends of these boards, which latter are also separated from the rear wall of the inclosing case by narrow passages m^2 , which are just wide enough to discharge the dust which is thrown out of the air-current at these points, but which do not allow any considerable part of the air-current to pass through. In passing through these zigzag passages between the boards m m' the air-current throws off the dust and other light matter which it contains. This separated solid matter passes into a spout N, arranged underneath these inclined boards, and provided with a rotating valve n , by which the dust is intermittently discharged without permitting the ingress or egress of air.

O represents the separating-chamber, which is arranged in the front side of the lower vertical wall L' and which communicates by an opening O' with the spout N. This chamber flares upwardly, whereby the air-current is weakened and any solid material which is still contained in it is allowed to drop out.

P represents a return-spout, which extends from the upper end of the separating-chamber O downwardly to the front portion of the machine underneath the hopper I. The lower end of this return-spout terminates in a discharge-spout Q, which is provided with a rotating valve q , by which the plump grain is discharged.

The scouring-case has the form of a trough and forms above the scouring-cylinder a capacious chamber, in which the light dust floats and in which the grain passes out of reach of the rotating scouring-cylinder. The motion which is imparted to the grain by the rotating scouring-cylinder is arrested by the grain coming in contact with the inclined rear wall of the scouring-case. The grain then falls back upon the scouring-cylinder and is again set in motion by the same. This repeated retardation of the motion of the grain causes a more thorough scouring than the uniform movement which exists when the grain rotates continuously with the scouring-cylinder. The impact of the grain against the rear wall of the scouring-case clears the openings of the latter from dust and enables the floating dust to pass out of the scouring-case. It also dislodges the dust which has collected in the seams of the kernels, and so assists in the operation of cleaning the grain. The plump grain, light and broken grain, dust, &c., fall from the conveyer upon the front wall i of the hopper I and flow over the lower edge thereof, where this material encounters the ascending air-current which is drawn through the discharge-opening of the hopper I by the fan. This air-current separates the light grain, chaff, dust, &c., from the plump grain and carries this separated material to the fan, while the plump grain passes through the discharge-opening of the hopper I into the lower portion of the return-spout P, and thence to the discharge-spout Q, through which it escapes from the machine. The air-current

which is employed for separating the light grain, chaff, and dust from the plump grain is kept in continuous circulation within the machine, so that practically no air is discharged from the machine and none is drawn into the same. The rotating valves which are employed in the discharge-spouts or any other suitable valves which may be employed for the purpose discharge the different grades of material without permitting the ingress or egress of air. The dust which is liberated by the scouring mechanism escapes through the perforations of the scouring-shell into the hopper I, from which it passes, with the air-current, to the fan, and the same is true of the dust which is liberated in passing through the conveyer and which escapes into the hopper through the perforations of the conveyer-trough.

It is desirable that the air which is used in a scouring-machine should be of uniform temperature. By keeping the same body of air in circulation changes in the temperature are avoided. Cold air chills the impurities and renders them brittle, so that they are easily pulverized, and warm air renders them soft and adhesive. In either case it is difficult to free the grain completely from its impurities. If moisture is present, which is often the case when the scourer is located in the basement of a mill, it is drawn into the machine and impairs the separation. These difficulties are avoided in my improved machine by keeping the air in circulation.

I claim as my invention—

1. The combination, with a scouring mechanism provided with a perforated scouring-case, of a fan having its eye connected with the space inclosing the perforated scouring-case and drawing the dust-laden air from the interior of the case through the perforations thereof, a dust-separator through which the fan causes the dust-laden air to flow, and a return-passage by which the purified air is conducted from the dust-separator to the perforated scouring-case, substantially as set forth.

2. The combination, with a scouring mechanism provided with a perforated scouring-case, of a receiving-hopper for the scoured grain, arranged underneath the same, a fan having its eye connected with the space inclosing the perforated scouring-case and with the receiving-hopper and drawing the dust-laden air from the scouring-case and an ascending air-current through the receiving-hopper, a dust-separator through which the fan causes the dust-laden air to flow, and a return-passage by which the purified air is returned to the receiving-hopper and the perforated scouring-case, substantially as set forth.

3. The combination, with a trough-shaped scouring-case, of a scouring-cylinder arranged within the lower portion thereof and separated from its top by a chamber in which the dust floats and which is provided with per-

forations for the escape of the air and dust, a fan having its eye connected with the dust-outlet of the chamber above the scouring-cylinder, a dust-separator through which the fan causes the dust-laden air to flow, and a return-passage by which the purified air is conducted from the dust-separator to the perforated scouring-case, substantially as set forth.

4. The combination, with a scouring mechanism, of a receiving-hopper arranged underneath the same and receiving the scoured grain, a fan whereby an air-current is drawn upwardly through the receiving-hopper, a separating-passage receiving the blast of the fan at its upper end, and a return-passage whereby the lower end of the separating-passage is connected with the receiving-hopper, substantially as set forth.

5. The combination, with a scouring-cylinder, of a scouring-case provided with discharge-openings at both ends, a conveyer-trough arranged underneath the scouring-case and receiving the grain therefrom, a duplex screw conveyer arranged in said conveyer-trough, which latter is provided with an elevated discharge-opening, a hopper which receives the grain from said discharge-opening, and a fan by which an air-current is drawn upwardly through said hopper, substantially as set forth.

6. The combination, with a scouring-cylinder, of a scouring-case provided with discharge-openings at both ends, a conveyer-trough arranged underneath the scouring-case and receiving the grain therefrom, a duplex screw conveyer arranged in said conveyer-trough, which latter is provided with an elevated discharge-opening, a hopper which receives the grain from said discharge-opening, a fan by which an air-current is drawn upwardly through said hopper, a separator which receives the air-current from said fan and in which the solid matter is separated from the air-current, and a return-spout which connects the tail end of said separator with the receiving-hopper, substantially as set forth.

7. The combination, with a scouring mechanism, of a hopper which receives the grain therefrom, a fan by which an air-current is drawn upwardly through said hopper, a pocket arranged in the blast-spout of said fan for the separation of the heaviest material contained in the air-current, a descending zigzag passage which receives the air-current after it has deposited the heaviest material and in which the light material is separated from the air-current, and a return-passage connecting the tail end of said zigzag passage with the receiving-hopper, substantially as set forth.

Witness my hand this 21st day of January, 1892.

AUGUST HEINE.

Witnesses:

JNO. J. BONNER,
ALICE G. CONNELLY.