

(No Model.)

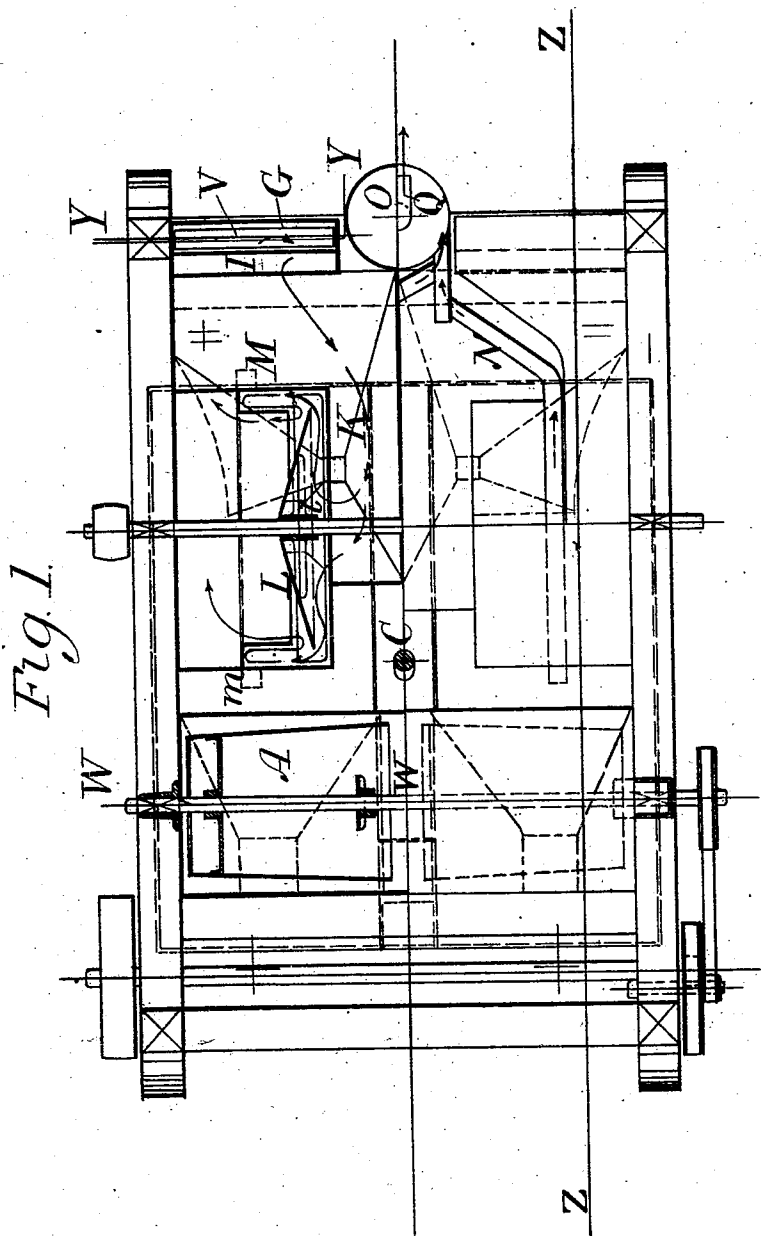
4 Sheets—Sheet 1

H. SIMON.

APPARATUS FOR CLEANING GRAIN AND COLLECTING DUST.

No. 537,241.

Patented Apr. 9, 1895.



WITNESSES:

Chas. F. Burkhardt.

Emil Meuchart.

Henry Simon

INVENTOR.

By Wilhelm H. Humer

ATTORNEYS.

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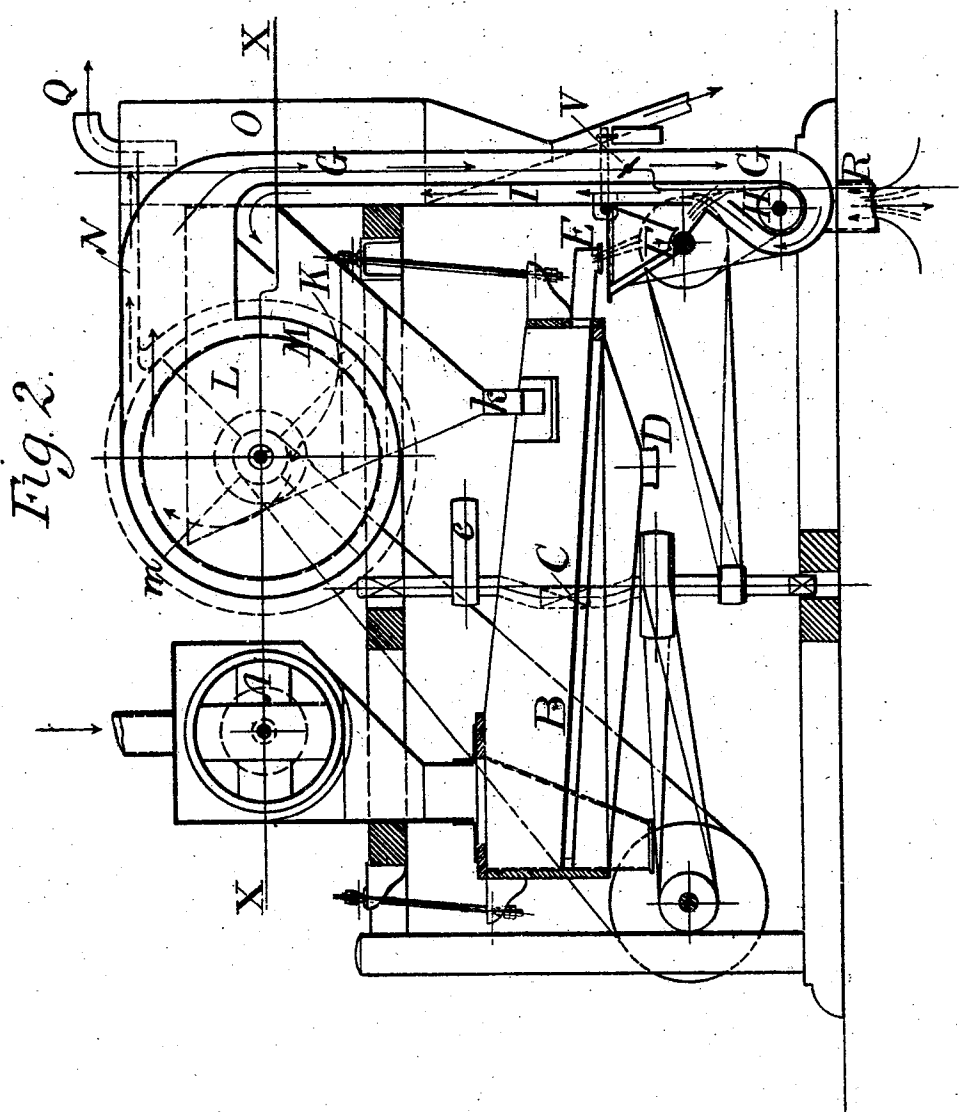
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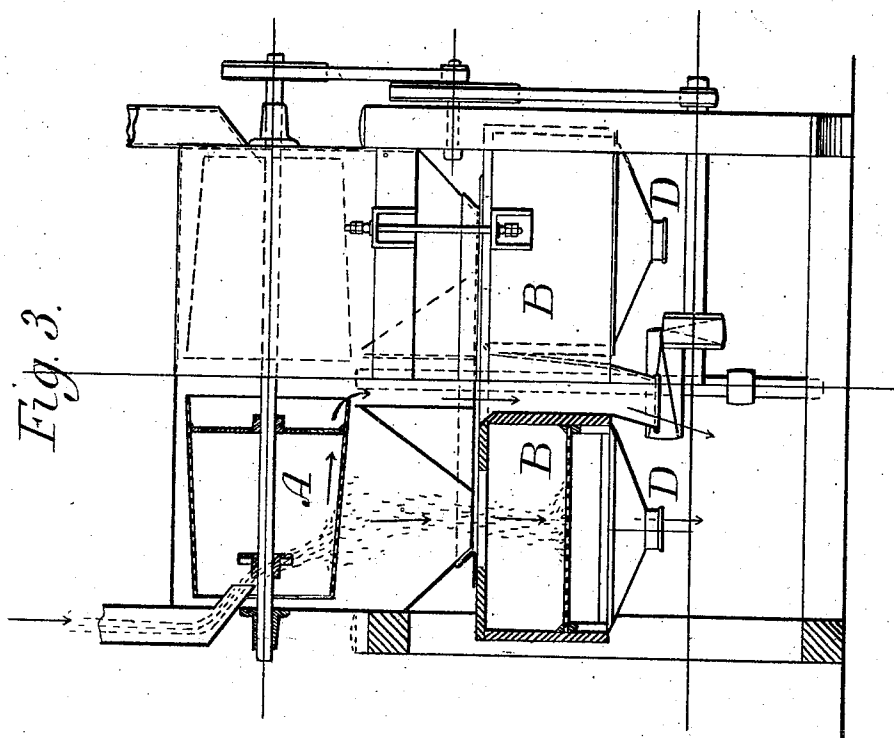
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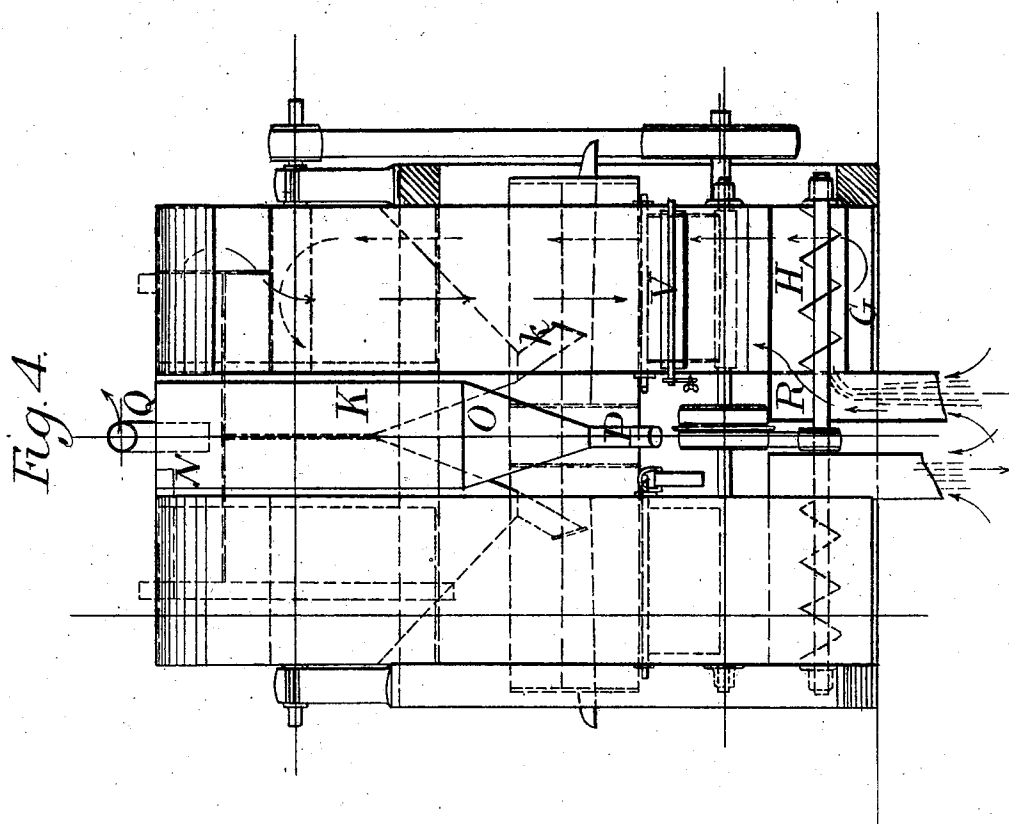
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WITNESSES.

Chas. F. Burkhardt.

Emil Neuhart.

Henry Simon INVENTOR.

By Wilhelm H. Borne.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRY SIMON, OF MANCHESTER, ENGLAND.

APPARATUS FOR CLEANING GRAIN AND COLLECTING DUST.

SPECIFICATION forming part of Letters Patent No. 537,241, dated April 9, 1895.

Application filed October 30, 1893. Serial No. 489,505. (No model.) Patented in England October 28, 1892, No. 19,388, July 13, 1893, No. 13,626, and August 19, 1893, Nos. 15,769 and 15,770; in France September 28, 1893, No. 283,108; in Belgium September 29, 1893, No. 106,583; in Austria-Hungary April 25, 1894, No. 54,275 and No. 8,295, and in Switzerland May 2, 1894, No. 8,400.

To all whom it may concern:

Be it known that I, HENRY SIMON, a citizen of England, residing at 20 Mount Street, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for Cleaning Grain and Collecting Dust, (for which patents have been granted in the following countries: Great Britain, dated October 28, 1892, No. 19,388, July 13, 1893, No. 13,626, and August 19, 1893, Nos. 15,769 and 15,770; France, dated September 28, 1893, No. 283,108; Belgium, dated September 29, 1893, No. 106,583; Austria-Hungary, dated April 25, 1894, No. 54,275 and No. 8,295, and Switzerland, dated May 2, 1894, No. 8,400,) of which the following is a specification.

My invention relates to apparatus for cleaning grain, separating sound grain in a clean state from small or imperfect grain, foreign seeds, pieces of string, shavings or other impurities, clearing it also from dust, and collecting the dust from the air employed in the process, so that the air may be discharged without offense, or the bulk of the air may be used repeatedly. For this purpose I construct a machine as I shall describe, referring to the accompanying drawings, in all of which similar letters are employed to denote the same parts.

Figure 1 is a plan the upper half being sectional on the line X X of Fig. 2 which is a longitudinal section on line Z Z of Fig. 1. Fig. 3 on the right side is a front view and on the left a half vertical section on line W W of Fig. 1. Fig. 4 is a rear elevation, the right half sectional on the line Y—Y of Fig. 1.

The machine is duplex or consists of two similar machines accommodated in one framing with one shaft for a pair of rotating screens, one crank shaft for a pair of circularly swinging sieves, and one shaft for a pair of fans, and a single dust collector. It is therefore to be understood that what I am about to describe, except in respect of these single parts, applies to both sides of the machine. I feed the grain into one end of a revolving tapering screen A so that while the grain passes through the holes of the screen, string, shavings and other matters that cannot

pass through the holes are carried onward by gravity within the screen and delivered at its larger open end. The screen, instead of being tapering may be cylindrical with helical ribs directing the shavings or the like to the open end. When the grain treated has no string, shavings or the like, the revolving screen may be dispensed with. In either case the grain passes on to a suspended sieve B which is swung in a nearly horizontal plane by a revolving crank C having counterbalance c. There may be two of these sieves, the one above the other, the upper serving to separate the larger impurities, allowing the grain and smaller impurities to pass through its meshes to the lower sieve. The smaller grain and foreign seeds pass through the sieve, or the lower of the two sieves, and are discharged thence at D. The sound grain passes over the end of the sieve B at E into a hopper F preferably provided with a feed roller and a counterweighted front between the lower edge of which and the roller the grain descends in a shower subject to a blast of air caused by a fan to pass through the grain as it falls. Should the hopper F be empty or nearly so, the lower edge of its front is pressed by the counterweight against the roller, so that no part of the air current can pass through the hopper.

The air current, caused by a fan about to be described, descends by a channel G, passes around under the casing of a worm or other conveyer H and ascends the channel I. The air blast passing through the shower of grain clears it from light impurities and dust, and carries them along with it to a pyramidal settling chamber K, in which some of the impurities and dust is deposited and from which it passes away by a chute k. The air, still more or less dust laden passes through a circular opening from K into the case of the fan L and, by the blades in front of the conical shield M, is caused to revolve rapidly while it passes the edge of L into an annular pocket M formed in the fan casing. In this pocket the air still rapidly revolving first advances and then retreats, while the dust, being heavier than air, is by the centrifugal force, caused to hug the outer wall of the annular pocket,

and as the air, mostly cleared of dust, passes to the descending channel G, the dust, accompanied by a small portion of the air, passes to a dust collector O by a tube N which enters O tangentially. In this dust collector, the dust descends wheeling round, gathers at the bottom and issues at P, while the air separated from it issues at Q.

The pipe N instead of issuing from one part of the pocket M, may issue from an annular channel indicated by the dotted lines *m* which may be formed around the pocket M communicating with it at one or more places or all around.

The main body of the air, being freed from dust by the action of the fan is led back by the channel G to operate again on the grain, some air being drawn in to make up for the small quantity which passes away with the dust. This air is preferably drawn in so as to pass through R where the grain is delivered from the conveyer, so as to carry with it dust which may have descended with the grain into the casing H. In order that the air may thus be drawn in, the descending-channel G is provided with a valve V for throttling it more or less, so that the suction of the fan on the channel I causes the pressure of air under the valve V to be somewhat under that of the external atmosphere.

Obviously instead of the specially arranged hopper F, a chute adapted for delivering a nearly uniform shower of grain might be employed, and, instead of the worm conveyer in the casing H, an inclined chute might serve to convey away the cleaned grain, but a worm is to be preferred as it keeps the grain in motion while air is being drawn in, as above described.

Although I have described a grain separator as a complete machine including the screen A, sieve B, hopper F, conveyer H, air channels G and I, pan L and dust collector O, it is obvious that the arrangement of the air channels G and I and conveyer H might be used for acting with an air current on grain delivered in a shower from other apparatus; also that the fan and its casing with annular pocket might be employed, with or without the dust collector O, for separating dust from dust laden air derived from grain cleaning apparatus other than that described, or from sources other than the cleaning of grain. Nor is it essential that the main body of the air discharged by the fan should be returned, to perform cleaning work again, though this is of advantage in all cases where a large volume of air is required. The fan might discharge into the open air or elsewhere without offense, as the air discharged from it is almost entirely freed from dust.

In my improved apparatus the specifically lighter substances, which I will call dust for the sake of brevity, are separated from the heavier substances, such as grain, for instance, by the ascending air-current, and such

of the dust as is carried by the air-current to the fan is there concentrated by centrifugal force in a small portion of the air current, which carries the concentrated dust to the dust collector in which the dust is separated from this small volume of air and from which this small volume of air is discharged, practically free from dust, while the bulk of the air-current, which is also substantially free from dust, is returned from the fan to the point at which the separation of the dust from the heavier substances is effected. The loss of air by discharge from the dust collector is compensated for by pure external air entering the air circuit through the grain discharge spout, or otherwise. The air entering through the spout picks up any light particles which may still be mingled with the heavy particles and so effects a final separation before the heavy particles are discharged from the machine. By discharging a small portion of the circulating volume of air from the dust collector and replenishing that volume by pure external air, the volume of air circulating in the separator is slowly but constantly renewed and the circulating volume of air is thereby prevented from becoming gradually charged with dust, whereby the separation would become gradually impaired and a practically useful separation would finally become impossible.

Having thus described the nature of my said invention and the best means I know for carrying the same into practical effect, I claim—

1. The combination with a separating conduit through which the material to be separated descends, of a fan which draws an air current through said conduit, said fan having its case provided with a separating chamber into which the dust drawn into the fan case is driven by the action of the fan and with an outlet for the purified air, a dust collector which receives from the separating chamber of the fan case the comparatively small volume of air into which the dust has been concentrated and which separates that dust from the air current on which it is carried, and a return spout through which the purified air is conducted from the air outlet of the fan case to the separating chamber, substantially as set forth.

2. The combination with a separating conduit through which the material to be separated descends, of a fan which draws an air current through said conduit, said fan having its case provided with a separating chamber into which the dust drawn into the fan case is driven by the action of the fan and with an outlet for the purified air, a dust collector which receives from the separating chamber of the fan case the comparatively small volume of air into which the dust has been concentrated and which separates that dust from the air current on which it is carried, a return spout through which the purified air is conducted from the air outlet of the fan case to

the separating chamber and an air inlet through which external air is admitted to the air circuit, substantially as set forth.

5 3. The combination, with a separating conduit through which the material to be separated passes, of a fan which draws an air-current through said conduit and which is provided with a chamber into which the dust and
10 some air are driven, a dust collector which receives the dust-laden air from said chamber, a return spout through which the purified air is returned from the fan to said separating
15 conduit, a valve arranged in said return spout, and an air-inlet arranged in the air-circuit between said valve and the suction orifice of the fan, substantially as set forth.

4. The combination, with a fan case having an air-inlet and an air-outlet on opposite sides
20 and a peripheral dust chamber surrounding the air outlet, of blades arranged to rotate in said case near the air inlet, and a partition ar-

ranged between said blades and the air outlet, substantially as set forth.

5. The combination, with a fan case having an air inlet and an air outlet on opposite sides
25 and a peripheral dust chamber provided with an exit passage for air and dust, of blades arranged to rotate in said case near the air inlet, a partition arranged between said blades and the air outlet, and a dust collector con-
30 nected with the exit passage of the peripheral chamber and receiving the air and dust therefrom, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of
35 two subscribing witnesses, this 22d day of September, A. D. 1893.

HENRY SIMON.

Witnesses:

JOSEPH INGLEBY,
ARTHUR STANLEY.