W. S. HILLS.
Smut-Machine.

No. 208,241. Patented Sept. 24, 1878.

Fig. 1.

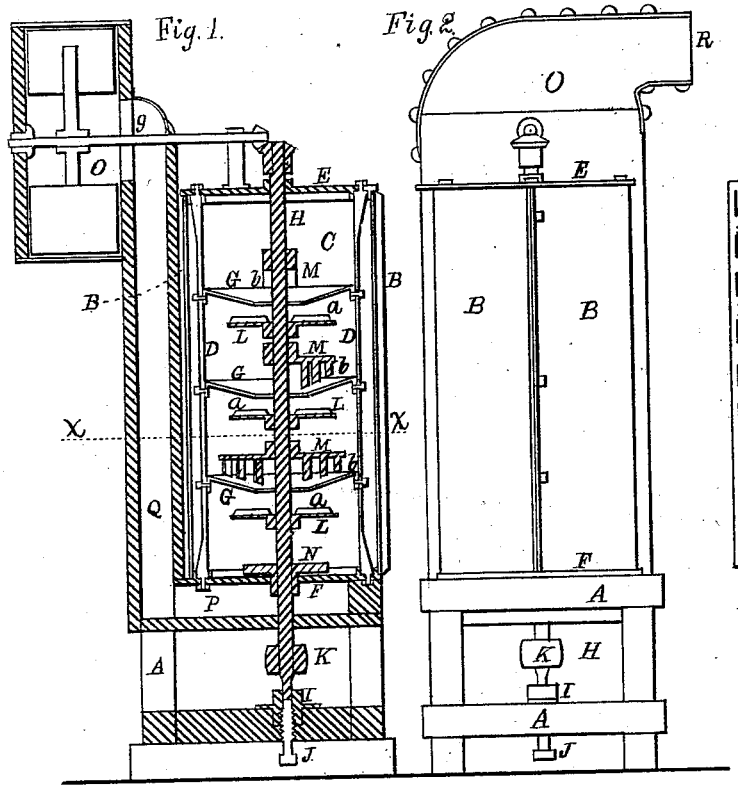


Fig. 2.

Fig. 3.

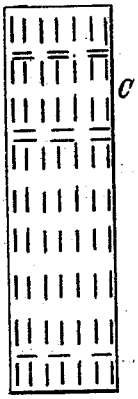


Fig. 4.

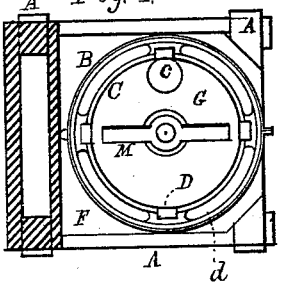


Fig. 5.

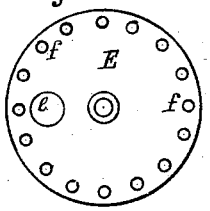
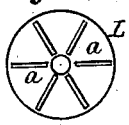


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

WINFIELD S. HILLS, OF BOONE, IOWA.

IMPROVEMENT IN SMUT-MACHINES.

Specification forming part of Letters Patent No. **208,241**, dated September 24, 1878; application filed April 17, 1878.

To all whom it may concern:

Be it known that I, WINFIELD SCOTT HILLS, of Boone, in the county of Boone and State of Iowa, have invented certain Improvements in Smut-Machines, of which the following is a specification:

This invention is designed to furnish an efficient means for scouring grain and removing from it the smut and other impurities which may adhere to the outside of the kernels thereof; and consists in the combinations and arrangements of parts hereinafter described for that purpose.

In the accompanying drawings, Figure 1 is a vertical axial section of a machine constructed according to my invention. Fig. 2 is a front elevation of the same, the plane of this figure being at right angles to the plane of Fig. 1. Fig. 3 is a detail view, showing a side elevation of a section of the internal sheathing which surrounds the beaters and other internal parts. Fig. 4 is a horizontal section, showing the parts below the dotted line *x x* drawn across Fig. 1. Fig. 5 is a plan or top view of the top plate of the cylinder, showing the perforations through which air is admitted between the inner and outer casings. Fig. 6 is an under-side view of one of the beaters. Fig. 7 is a plan of one of the distributers, which receives the grain from the inclined plate above it and discharges it outward against or near to the internal casing.

A is the frame on which the machine is supported, which frame should be of sufficient strength and firmness to prevent any injurious effect from the vibrations of the machinery.

B is the outer casing, which may be made of sheet metal in the usual manner, and put together in halves with vertical joints. It is intended to be air-tight, or substantially so.

C is the inner casing, which is perforated to allow the smut and dust to escape from the grain after it has been freed from the kernel by the action of the internal machinery. This may be perforated in the manner in which the internal casings of smut-machines are usually perforated; but the form of perforations which I prefer is that shown by the black lines inclosed within the outlines of Fig. 3, these perforations being omitted in Fig. 1 to avoid confusion in the view of the other parts. This casing C is made in sections, as shown in Fig. 3, and is secured in position by the sections being placed between the bolts or uprights D D and the top and bottom heads E and F, which are provided with flanges, as shown, to secure the sections of this casing in position and to give internal support to the ends of the outer casing, B.

G G are circular plates of metal, inclining inward and downward, as shown, and having an opening in the center of each to allow the grain to pass through. These plates are permanently bolted or otherwise secured to the bolts or uprights D D, so as to keep them stationary and permanently in position.

H is the main shaft of the machine, which is secured in bearings in the upper and lower plates or heads E and F, and supported in a footstep, I. An adjusting-screw, J, furnishes the means for raising and letting down this shaft as may be required, and for purposes which will be hereinafter mentioned.

K is a pulley on the main shaft H, by means of which rotary motion is communicated to the latter by a belt from any suitable driving power or pulley.

L L are disks of metal secured to the main shaft H, and revolving with it, and provided with radial ribs *a a* to keep the grain from slipping circumferentially on said disks. These disks or plates L receive the grain from the central openings in the plates G, and by the centrifugal force caused by the rotation of the shaft to which they are hung discharge the grain toward and against the casing C.

M M are beaters, also hung upon the shaft H, a portion of the office of which beaters is to gather the grain from the outer portion of the plates G to the central opening in said plates, so that it will be discharged downward through said openings. The teeth *b b* of these beaters (which are the parts which operate on the grain) are for this purpose made concave on their inner sides in the manner shown in Fig. 6, or at any rate convergent on their inner faces, so as to draw the grain toward the shaft as they are revolved.

N is a double arm, attached to the shaft H near the plate F, to drive the grain outward from the center and cause it to fall through the opening *c* in the plate F, through which opening it is discharged from the machine.

O is a fan-blower, which may be operated by the main shaft by means of friction or toothed bevel-gear, as shown in the drawings, or by a belt passing from a pulley on the main shaft, over turn-pulleys, to give it the right direction, to a pulley on the shaft of the blower, or by a separate belt from the prime mover, or by any other appropriate means, the office of this fan-blower being the removal of the smut and other dirt which are detached from the grain by the operation of the machine.

The lower cylinder-head, F, has circular openings in it, as shown at *d d* in Fig. 4, to allow the smut and other dirt to fall and be drawn through by the action of the fan-blower into the trunk or receiver P, from which latter it is drawn, by the action of the blower, up through the vertical trunk Q and discharged through the spout R.

Operation: The grain is received into the machine through the opening *e* (shown in Fig. 5) in the upper cylinder-head, E, from which it falls on the upper one of the plates G, on which it is drawn inward by the action of the beater placed over said plate and discharged through the central opening in the plate G, and falls upon the upper disk, L, which latter, by centrifugal force, discharges it toward and against the perforated inner casing, C, when it falls upon the next of the concave plates G, and the same operation is repeated till the grain has passed the beaters, concave plates, and disks L, when it falls upon the lower cylinder-head, F, and is discharged through the opening *c* in the said lower cylinder-head, and passes from the machine.

I prefer to set the beaters at a radial angle to each other upon the shaft, as indicated in the drawings, so as to equalize their action. Most or all of the grain will, by the centrifugal force caused by the revolution of the ribbed disks L, be thrown with considerable force against the inner casing, C, and that, together with the rapid revolution of the beaters, will scour the grain and generally very efficiently remove from the outside of the kernel any smut or dust which adheres to it on its entrance to the machine. A portion of this dirt and smut would naturally pass through the openings in the inner casing, C, in consequence of it, together with the grain, being thrown against said casing from the disks L, and the outward direction given by these disks and the beaters to whatever air may enter with the grain, and the remainder will be forced to do so by the draft created by the fan-blower O. Air to supply a draft for this purpose is admitted between the outer casing, B, and the inner casing, C, through openings *f f* (shown in Fig. 5) in the upper cylinder-head, E. This current of air is, by the action of the fan-blower, drawn downward through the space between the inner and outer casings and through the openings *d* in the lower cylinder-head into the lower trunk, P, and from that up through the vertical trunk Q, and from that through an opening at *g* into the fan-blower, and discharged with the smut and dirt from the grain through the spout R.

When the fan-blower is run by friction bevel-gear from the main shaft, and such gear has no automatic adjustment, the adjusting-screw J performs an important service in furnishing means for keeping one of the bevel-wheels to a proper pressure and bearing upon the other, so as to insure the proper action of the fan-blower, and at the same time avoid undue friction.

But in practical operations the differences in the grain to be cleaned may often render it desirable to modify the action of the beaters upon it, or to accelerate or retard its passage through the machine, and this may be done by raising or lowering the beaters, which, as will readily be seen, may be accomplished by means of the adjusting-screw J, by which the main shaft, and with it the beaters, may be raised or lowered for that purpose, the raising of the beaters causing the grain to pass through the machine more rapidly and with less scouring, while the lowering of the beaters makes the scouring process more thorough and retards the passage of the grain.

When, however, the adjustment of the elevation of the main shaft is changed to the extent necessary for this purpose it will evidently be necessary to either employ some other mode of connecting the shaft of the fan-blower to the main shaft than friction bevel-wheels, or else to provide some means of compensation for the change of position of the main shaft—as, for example, deep-toothed bevel-gearing might perhaps be used, or a belt from the main shaft might be run over turn-pulleys to the shaft of the fan-blower, to give motion to the latter; or the friction bevel-gear on the main shaft might be so attached to the shaft as to slide freely thereon longitudinally, and be kept up to its work by means of a spring or some equivalent device; or the shaft of the fan-blower might be hung on a spring-bearing, either of which arrangements might allow the main shaft to be raised and lowered for these purposes without interfering with the proper action of the fan-blower.

It will be obvious from the foregoing description that while the disks or plates L, when run at proper speed, will throw the grain with the necessary centrifugal force against the perforated casing, thus securing the advantages of the machines operating by centrifugal force, and performing this duty at proper intervals between the action of the beaters, the converging beaters gathering the grain inward upon the inclined plates insure a scouring of the grain which will not otherwise be realized, and especially in view of the fact that the centrifugal tendency of the grain as it is acted upon by said beaters has the effect to hold the grain to the said beaters instead of throwing it off from them, as would be the case were the inclination of the beaters outward instead of inward, while the combination of the in-

wardly and downwardly inclined plates with the inwardly-inclined beaters, as described, gives sufficient facility of discharge of the grain at the center on the plates below.

These combinations, while giving an efficiency in the result which cannot be realized by other means, except possibly at great expense and loss of power, have also the advantage of bringing the operations of the machine within a very small compass, so that really a comparatively small machine constructed according to my invention is made capable of more thorough work than a much larger one otherwise constructed would be.

I claim as my invention—

1. The combination of the concave plates G G, having openings in the center for the discharge of the grain, and the beaters M, having teeth *b b* converging on their inner faces toward the main shaft, substantially as hereinbefore set forth.

2. The combination of the concave plates G, beaters M, with converging teeth, and disks or plates L, attached to the main shaft, substantially as hereinbefore set forth.

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