(No Model.) 4 Sheets—Sheet 1.

J. H. GOODALL.

MIDDLINGS PURIFIER.

No. 484,633. Patented Oct. 18, 1892.

Fig. 1.

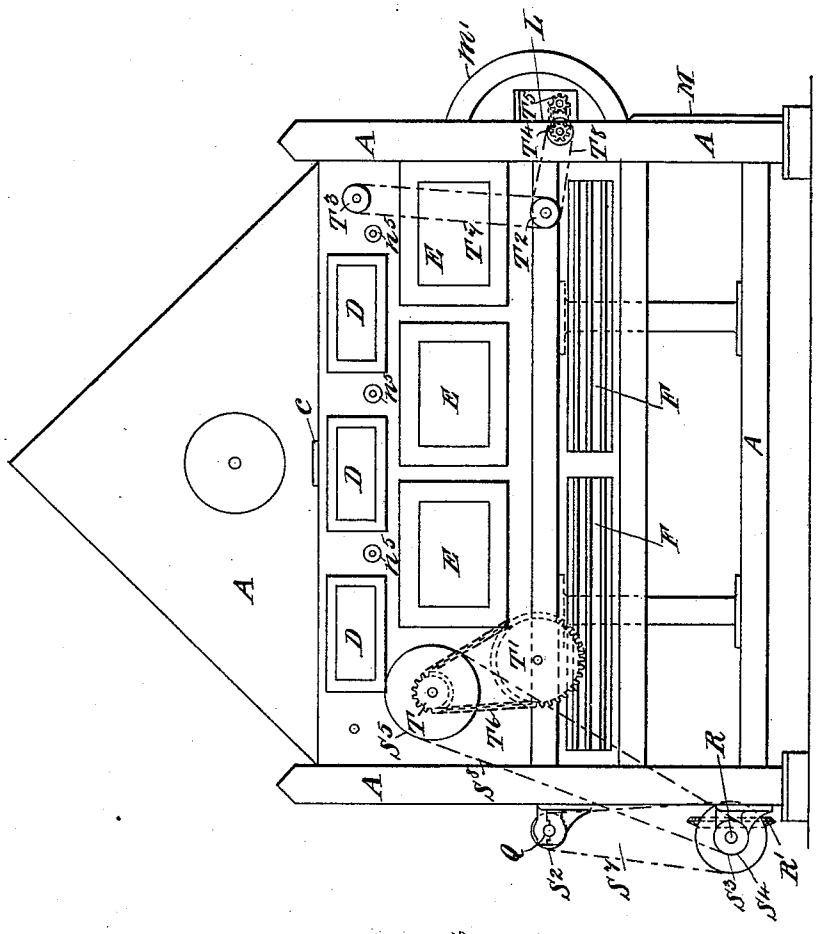

Fig. 2.

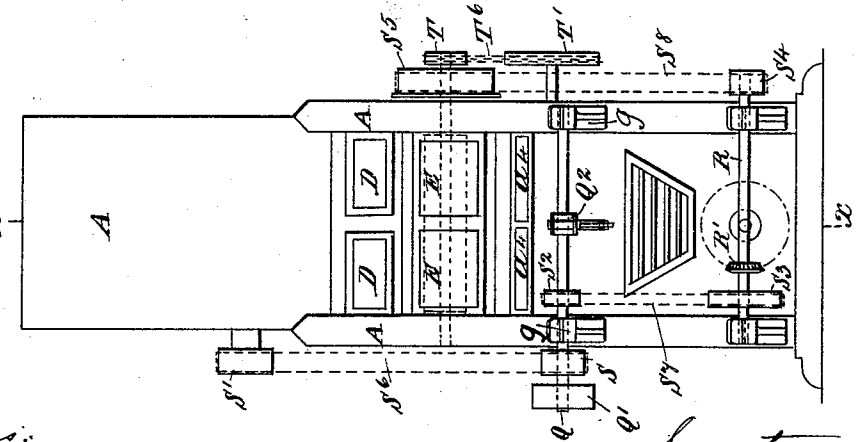

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Fig. 3.

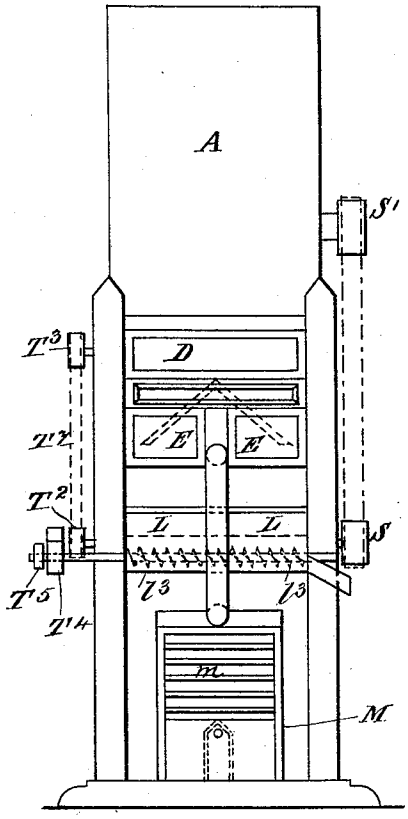
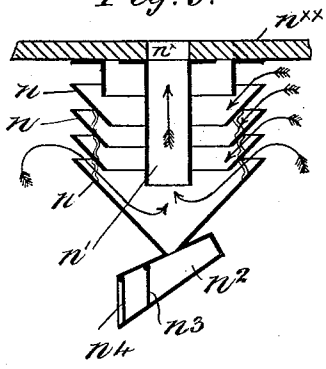


Fig. 9.



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MIDDLINGS PURIFIER.

No. 484,633. Patented Oct. 18, 1892.

Fig. 5.

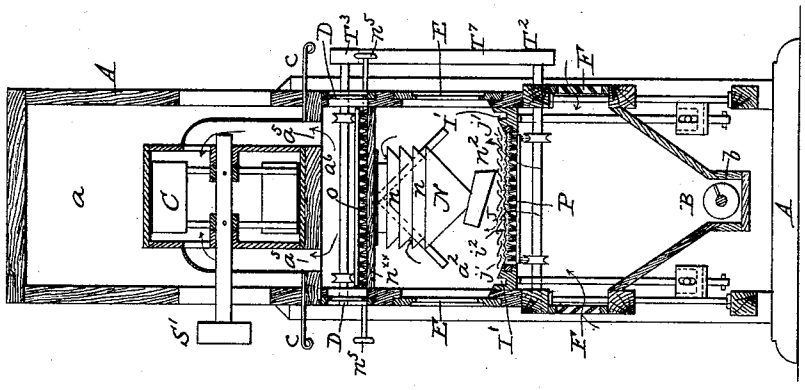
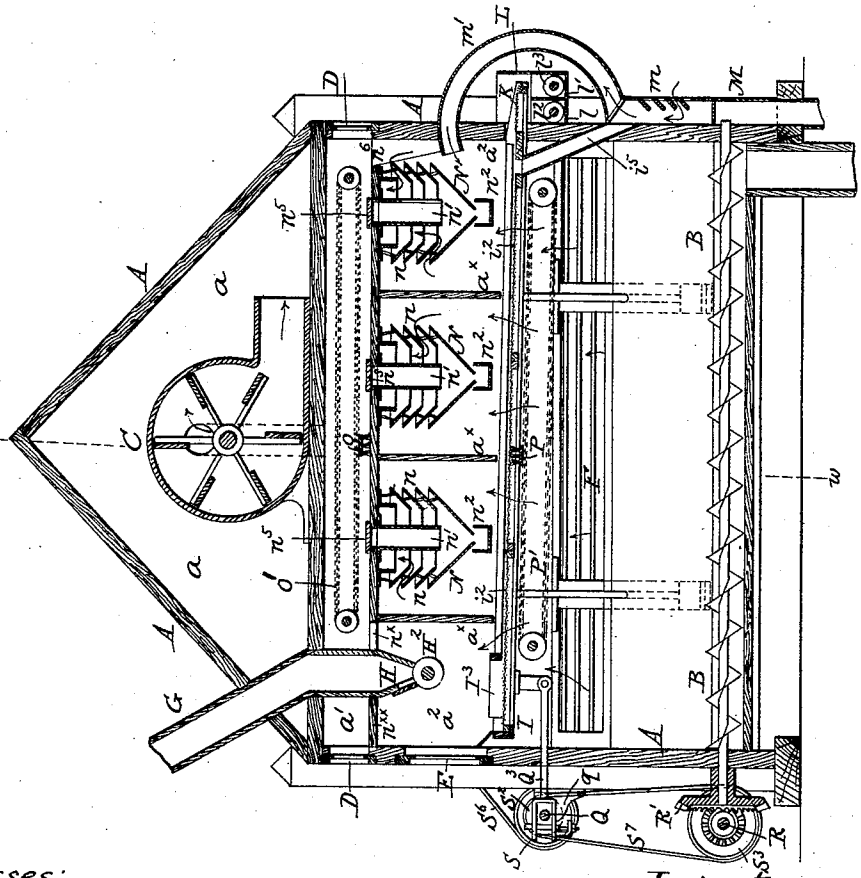


Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

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MIDDLINGS PURIFIER.

No. 484,633. Patented Oct. 18, 1892.

Fig. 8.

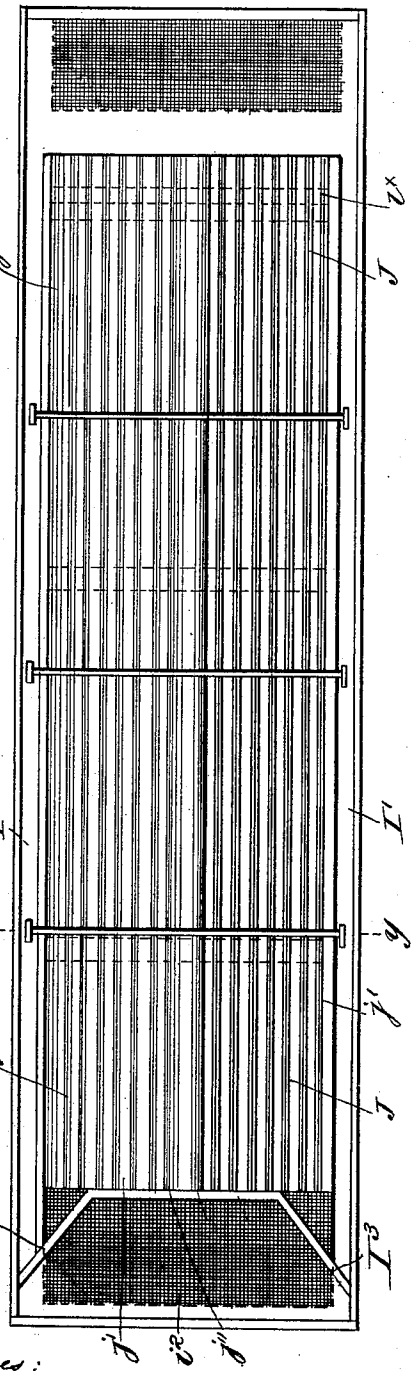


Fig. 6.

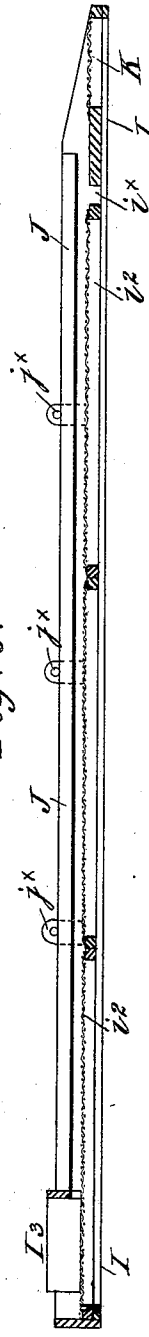
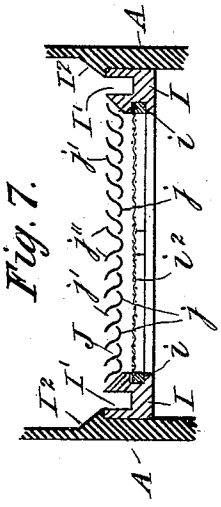


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSHUA HAMILTON GOODALL, OF CASTLEFORD, ENGLAND.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 484,633, dated October 18, 1892.

Application filed May 17, 1892. Serial No. 433,324. (No model.) Patented in England February 10, 1892, No. 2,575, and May 2, 1892, No. 8,225.

To all whom it may concern:

Be it known that I, JOSHUA HAMILTON GOODALL, a subject of the Queen of Great Britain, residing at Castleford, in the county of York, England, have invented new and useful Improvements in Middlings-Purifiers, (for which I have filed a provisional specification in England on the 10th day of February, 1892, No. 2,575, and on the 2d day of May, 1892, No. 8,225,) of which the following is a specification.

My invention relates to improvements in middlings-purifiers in which a horizontal reciprocating sieve operates in conjunction with a grid of catch-trays and an arrangement of dust-catchers for more thoroughly purifying middlings, semolina, and the like.

The object of my improvements are, first, to provide a grid of catch trays or troughs above the horizontal reciprocating sieve; second, to afford facilities for separating the loose or small particles from the dust-laden air and depositing the settlings onto the catch-trays, and, third, to reduce the amount of material passing to the offal-sack by means of a second sieve arranged at the tail of the horizontal sieve. I attain these objects by mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine; Fig. 2, an end elevation of the head of the machine; Fig. 3, an end elevation of the tail of the machine; Fig. 4, a longitudinal section of the entire machine on line $x\ x$, Fig. 2; Fig. 5, a transverse section on line $w\ w$, Fig. 4; Fig. 6, an enlarged view in section of the horizontal sieves and catch-trays; Fig. 7, an enlarged transverse section of the same on line $y\ y$, Fig. 8; Fig. 8, an enlarged plan of the same; Fig. 9, an enlarged sectional elevation of a dust-catcher.

Similar letters refer to similar parts throughout the several views.

A is the framework or casing of the machine, which is of ordinary construction and divided into chambers in the usual manner; but it is made narrower than machines now in use; B, the Archimedean screw which works in the trough b near the base of the machine for conveying the "throughs," the material which has passed through the sieves, to the rolls, and C, the exhaust-fan, which is preferably fixed in the chambers a at the top of the machine. D and E are windows for the inspection, respectively, of the dust-chamber a' and sieve-chamber a^2. F F are frames provided with louvers for the admission of air below the sieve for purifying the material operated upon. G is a spout for the admission of the material to the feed-roller and hopper H. All the above-described parts and the means for imparting motion to the machine may be of ordinary construction.

In or about the center of the machine is a reciprocating frame I, made of iron or wood, arranged to fit between the sides of the framework A, and preferably to work at a slight inclination longitudinally—that is, from head to tail of the machine—and provided with recesses $i\ i$ for the reception of frames $i^2\ i^2$, covered with any suitable reticulated covering, such as silk, wire, or perforated glass, or parchment, which form and are hereinafter termed the "main sieve."

Instead of making the sieve in one piece, as is usually done, extending from end to end of the machine, I divide it into any number of portions or sections. In the drawings I have shown the main sieve divided into three such portions or sections, and an opening a^4 is provided in the framework at the head of the machine, whereby the portions or sections of the main sieve may be readily withdrawn whenever it is required to change the same.

Suspended above the main sieve, at a distance, say, about an inch, by rods $j^\times$, so as to reciprocate it, is a grid composed of a number of catch trays or troughs J to permit of the dust and other material arising from the main sieve being drawn up between them by the fan C and to prevent such material falling back again onto the main sieve i^2. The troughs are arranged longitudinally over and parallel, or nearly so, or at a slight angle to the sieve to permit of the material gravitating to the tail end of the machine. The catch-trays J may be made of metal—such as tin—or any other suitable material, and may consist of any desired number of hollow single or double troughs, which are shaped somewhat like the letter S, the troughs extending nearly the full length of the above-mentioned main sieve and partially over a second sieve

K, to be hereinafter described—that is to say, the troughs J are placed about six or eight inches from the head of the machine and extend over the second sieve K to, say, about one or two inches from the tail end. Each trough J is made of the shape shown at Fig. 7—that is, the bottom or hollow portion j is semicircular about an inch in diameter, and the upper or deflector lip portion j' may be an inverted semicircle of the same or slightly larger diameter. The said troughs J are arranged parallel, or nearly so, with each other at suitable distances apart—say about one-eighth or three-sixteenths of an inch—to permit of the dust and other material arising from the sieve i^2 being drawn up between them, and in order to prevent the said material from falling back onto the sieve the upper or lip portion j' of each trough is made to overhang the next trough. One-half of the lips j' are arranged to overhang to the right hand and the other half to the left hand, the center trough being provided with a lip j'' on each side.

At the tail end of the main sieve i^2 and in line therewith is fixed in or onto the same frame I a second short sieve K. This sieve is arranged at a distance from the sieve i^2 of, say, about an inch or so to form a space $i^\times$. The sieve K is clothed with a reticulated covering of silk, wire, or perforated glass or parchment of the same width as the sieve i^2 and about, say, eight or ten inches in length. The sieve K is arranged to pass through the framework at the tail end of the machine and to work over a box L, divided into two compartments $l\,l'$, in which are mounted two small worms l^2 l^3, which are about two or three inches in diameter and are arranged at right angles to the sieves i^2 and K. The worms are arranged to deliver their contents at either end of the box L, as may be determined—that is, worm l^2 may deliver its contents to a spout communicating with a second purifier, while worm l^3 delivers its contents into the offal-sack. The small particles passing through the reticulated covering of the sieve K fall into worm-box l, and the tailings from the same sieve fall into the other box l'. The sides of the main sieve i^2 are also provided with longitudinal troughs or recesses I′ I′, communicating at the tail end of the machine with the second sieve K for catching the loose or small particles which are drawn by the air from the troughs J. To the sides of the machine-framework A may also be fixed inclined or other pieces I^2 I^2 for directing any portion of the material escaping from the troughs J into the side troughs I′. Suitable stops I^3 are also provided for preventing any material from entering into the troughs J or side trays I′ I′ from the compartment a^2, in which the roller is arranged, without previously passing onto the main sieve i^2. The space $i^\times$ is for the purpose of permitting the tailings from the main sieve i^2 to pass therefrom down the spout i^5 to the gravity-exhaust M, which is provided at m with any desired number of louver-boards for the admission of a current of air. At the top of the exhaust M is provided a pipe m', which communicates with the chamber a^2 above the main sieve i^2 through the pipe m'. The dust-laden air is drawn by the fan C into the chamber a^2, when the heavier particles will be deposited onto the troughs J, while the lighter dust will be drawn into the Venetian dust-catchers N to be described.

The chamber a^2 above the main sieve i^2 is divided into any desired number of practically air-tight compartments by the partitions $a^\times$. Four of such compartments are shown in the drawings. In the first of these compartments is placed the feed roller and hopper H, and to the roof or division-board $n^{\times\times}$ of each of the other compartments, at a suitable distance above the main sieve i^2, is or are fixed one or more Venetian dust-catchers N, arranged to communicate with dust-chamber a' by means of one or more openings $n^\times$ made in the division-board $n^{\times\times}$, through which the exhaust-current is drawn for separating the heavier particles therefrom and purifying the dust-laden air as much as possible prior to its entering the dust-chamber a'. The Venetian dust-catchers N may be made of any suitable metal, such as tin or the like. Each dust-catcher N consists of any desired number of square, polygonal, or circular-tapering louvers or rings n, hereinafter termed "conical" louvers. In Figs. 4, 5, and 9 of the drawings I have shown four such louvers arranged one above the other at a suitable distance apart—say about three-fourths of an inch—and attached to each other by any suitable means—such as, for instance, by pieces of wire soldered to them. In the center of each of these conical louvers n may, when required, be fixed a central parallel tube n'—say about three inches in diameter—when the largest diameter of the conical louvers is, say, about twelve inches. Each tube n' is fixed to the under side of the division-board $n^{\times\times}$ (which forms the roof of chamber a^2 and the floor of the dust-chamber a') immediately under an opening $n^\times$, and it is arranged to project therefrom in a downward direction to, say, about one or more inches below the top of the lowest conical louver for causing the dust-laden air passing through any of the said conical louvers to be deflected into the lowest louver before passing up the tube n' into the dust-chamber a', thereby permitting the particles carried by said air being deposited in a box n^2, which is provided with one or more clack-valves n^3 n^4, fixed to the lowest part of the bottom conical louver for automatically returning said particles to the troughs J for conveying same to sieve K and worm l^3. In order to prevent the air-current passing into the conical louvers n through the box n^2, the two clacks n^3 n^4 are so hung that a given weight of the particles will readily open one clack at a time, while the exhaust keeps the other one closed. The openings $n^\times$ may be covered by suitable valves n^5, whereby the

area of the same may be regulated at pleasure. Openings a^5 are also formed in the division-board a^6 (which forms the roof of chamber a' and floor of chamber a) between the dust-chamber and fan-chamber. Over these openings a^5 the fan C is placed, and suitable valves c may be provided for regulating their area. Any air drawn from the dust-chamber through the openings a^5, after passing through the fan, is discharged into space. Brushes O and P, mounted on endless chains or bands O′ and P′, may also be arranged, respectively, to travel under and act upon the main sieve i^2 for cleaning its meshes and for removing any dust accumulating on the floor of the dust-chamber and depositing it through one or more openings n^6 onto the troughs at the end of the machine or onto the second sieve K at the tail of the machine.

Motion for actuating the various moving parts of the machine may be imparted to the main driving-shaft Q, carried in bearing q q, fixed to the framework A from any convenient source through driving-pulley Q′—that is to say, the reciprocating motion is imparted to the main sieve i^2 by one or more cranks Q^2 on the driving-shaft Q through connecting rod or rods Q^3. While the Archimedean screw B, fan C, feed-roller H, worms l^2 l^3, and brushes O and P are respectively actuated by bevel-gearing R′, mounted on suitable shaft R, pulleys S S′ S^2 S^3 S^4 S^5, and belting S^6 S^7 S^8, chain-wheels T T′ T^2 T^3 T^4 T^5, and endless chains T^6 T^7 T^8.

Other parts of the machine not shown or described may be of ordinary construction.

The action of the machine is as follows: The material to be operated upon is admitted to the feed-roller and hopper H through the spout G. From the roller H it is allowed to fall onto the head of the main reciprocating sieve i^2 and to gravitate to the tail of the machine. In so doing it passes over the reticulated covering of the main sieve. Any portion of the material that passes through the meshes of the main sieve falls into trough b, and is conveyed by the Archimedean screw B to the rolls; while by causing a current of air to be drawn by the fan C through the main sieve and material passing over it the bran, dust, and other extraneous material are carried up with the air-current between the interstices of the grid J into the compartments of the chamber a^2. The heavier particles of the dust-laden air fall into the troughs j (which prevent it returning to the main sieve) on side trays I′ I′ and gravitate onto the second sieve K, where the troughs pass, as previously described, into worm-box l for conveyance to the second purifier or where required, and the tailings pass into worm-box l', the lighter particles passing, as already described, through the Venetian dust-catchers N, where the particles are again separated from the air prior to its entering the dust-chamber and out into space through the fan, while the particles are deposited in the troughs, as described. The tailings from the main sieve that fall through opening $i^\times$ between the sieves are again submitted to the action of another air-current in the gravity-exhaust M before reaching the second purifier, and the dust and other matter separated therefrom are conveyed through pipe m' to chamber a^2, where it is acted on, as above described.

It will readily be understood that when desired the meshes of the sieves i^2 and K may be of the same or different sizes, and by submitting the material several times, as described, to the action of the air-currents all or nearly all dust and deleterious matter will be removed and better results obtained, besides which I am enabled to greatly reduce the speed of the fan.

I would have it understood that the various dimensions herein given may be varied as circumstances require; also, that I am aware that it has been proposed to construct a grid of adjustable trays and of spouts arranged for directing the dust-laden air to one side of the machine only. I therefore do not claim such a combination broadly; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a middlings-purifier, of an inclosing casing, the main sieve having side trays communicating with a second short sieve carried by the same framework as the main sieve, but at a distance therefrom, the superimposed grid of troughs, the Venetian dust-catchers, and means, substantially as described, for inducing the air-currents and actuating the moving parts of the machine.

2. The combination, with the feeding-roller and supply-trough, of an interposed reciprocating and divided main sieve having side trays, a second short sieve lineal with the main sieve, but at a little distance therefrom, a superimposed grid of troughs, means for reciprocating said sieves from the driving-shaft, an inclosing casing, and means for producing an upward air-current through the sieve and casing.

3. In a middlings-purifier, the combination, with the framework, of a main sieve divided into sections and having side trays running parallel with its reticulated covering, said sieve being interposed between a dust-chamber and an Archimedean screw, a second sieve lineal with the main sieve, but a little distance therefrom, a grid of troughs mounted above said sieves, arranged to reciprocate therewith and to deliver their contents onto said second sieve, means for reciprocating the same, an inclosing casing, and means for producing an upward air-current through the sieve and casing.

4. In a middlings-purifier, a reciprocating frame I, mounted within the framework A, having a main sieve i^2, divided into sections,

and a short sieve K, mounted thereon, as described, in combination with side trays I′ I′, a grid of troughs J, as described, suspended on rods $j^{\times}$ above main sieve for delivering their contents onto said second sieve, an inclosing casing, and means for producing an upward air-current through the sieve and casing, all substantially as set forth.

5. In a middlings-purifier, a reciprocating frame I, interposed on framework A between an Archimedean screw B and a dust-chamber a', a main sieve i^2, divided into sections, a second sieve K, mounted in frame I, side trays I′ I′, a grid of troughs J, substantially as described, and Venetian dust-catchers N, armed with clack-boxes n^2, said dust-catchers communicating with the dust-chamber a' by a tube n', means for reciprocating said sieves, an inclosing casing, and means for producing an upward air-current through the sieve and casing, all substantially as set forth.

6. In a middlings-purifier, the combination of sieves i^2 and K, mounted in the same reciprocating frame I at a small distance apart, said frame I being interposed between the dust-chamber a' and Archimedean screw B on framework A, side trays I′ I′, the grid of troughs J, as described, for directing the air-current to both sides of the machine at the same time, chamber a^2, divided into compartments, Venetian dust-catchers N, provided with clack-boxes n^2, dust-chamber a', divided box L, worms l^2 l^3, fan C, and chamber a, all substantially as set forth.

7. The combination of sieves i^2 and K, frame I, troughs J, conical louvers m, tube n', clack-boxes n^2, clacks n^3 n^4, division-board $n^{\times\times}$, having openings $n^{\times}$, communicating with tube n', dust-chamber a', and brushes O and P, substantially as set forth.

8. In a middlings-purifier, the combination of sieves i^2 and K, mounted in the same reciprocating frame I at a small distance apart, said frame I being interposed between the dust-chamber a' and Archimedean screw B on framework A, side trays I′ I′, the grid of troughs J, as described, for directing the air-current to both sides of the machine at the same time, chamber a^2, divided into compartments, Venetian dust-catchers N, armed with clack-boxes n^2, dust-chamber a', divided box L, worms l^2 l^3, fan C, chamber a, spout i^5, tailings gravitating exhaust M, and brushes O and P, all substantially as specified.

9. The combination, in a middlings-purifier, of framework A, having windows D and E and louver-frames F F, Archimedean screw B, trough b, chambers a a' a^2, fan C, spout G, feed roller and hopper H, frame I, having recesses i i, main sieve i^2, divided into sections, side trays I′ I′, spout i^5, troughs J, sieve K, box L, worms l^2 l^3, tailings gravity exhaust M, louvers m, pipe m', conical louvers n, tube n', clack-box n^2, clacks n^3 n^4, division-boards $n^{\times\times}$ and a^6, having openings a^5 and $n^{\times}$, brushes O and P, valves c and m^5, shafts Q and R, cranks Q^2, connecting-rod Q^3, pulleys Q′ S S′ S^2 S^3 S^4 S^5, belting S^6 S^7 S^8, chain-wheels T T′ T^2 T^3 T^4 T^5, and endless chains T^6 T^7 T^8, all substantially as specified.

In testimony whereof I have hereunto signed my name to this specification in presence of two subscribing witnesses.

JOSHUA HAMILTON GOODALL.

Witnesses:
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ADAM C. HART.