

(No Model.)

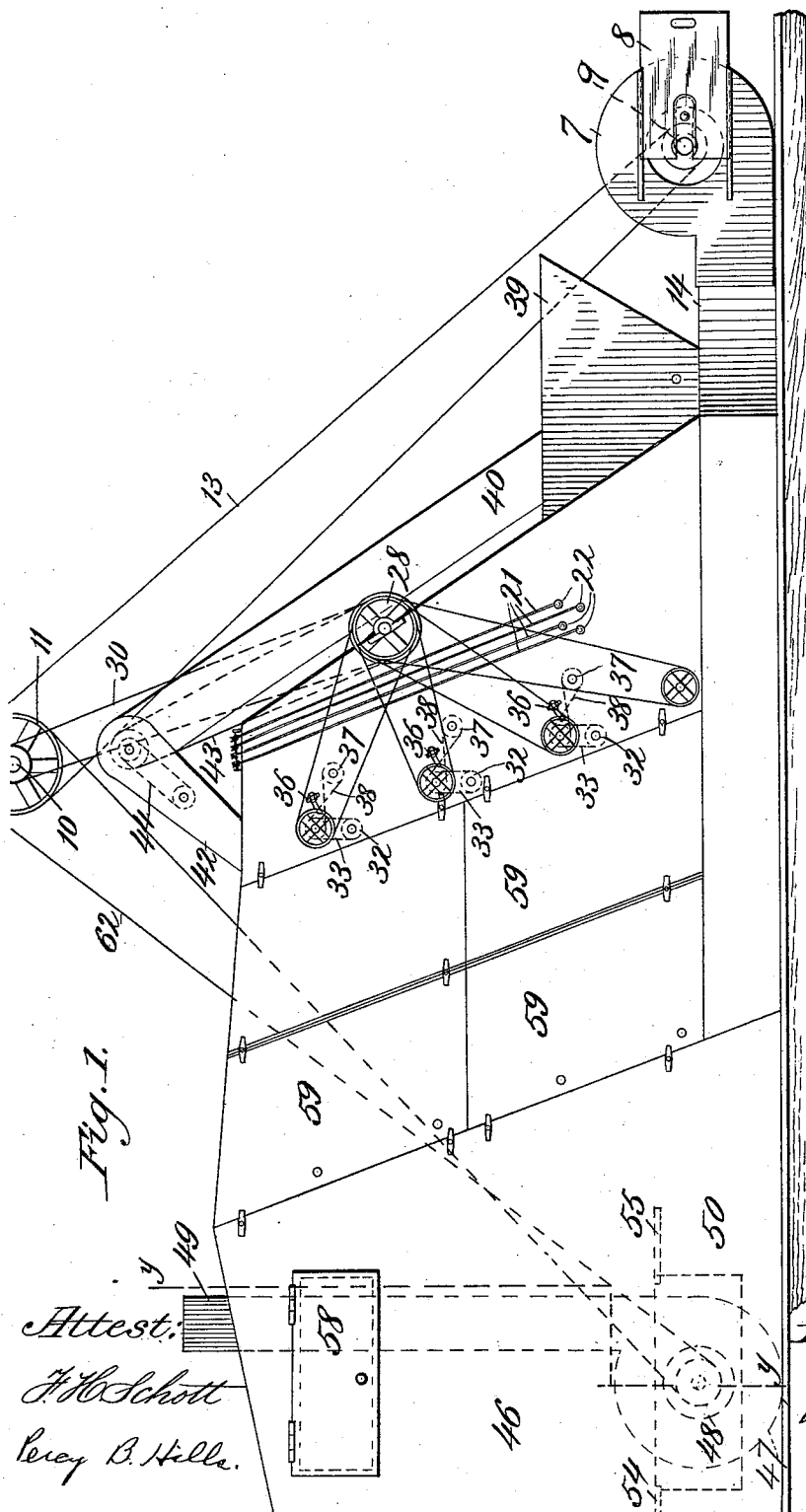
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H. O. MOONEY.

PNEUMATIC GRADING AND SORTING MACHINE.

No. 478,516.

Patented July 5, 1892.



Attest:
J. H. Schott
Per B. H. Hells.

Inventor:
H. O. Mooney,
by J. H. Schott
Waldenborough
Ally.

(No Model.)

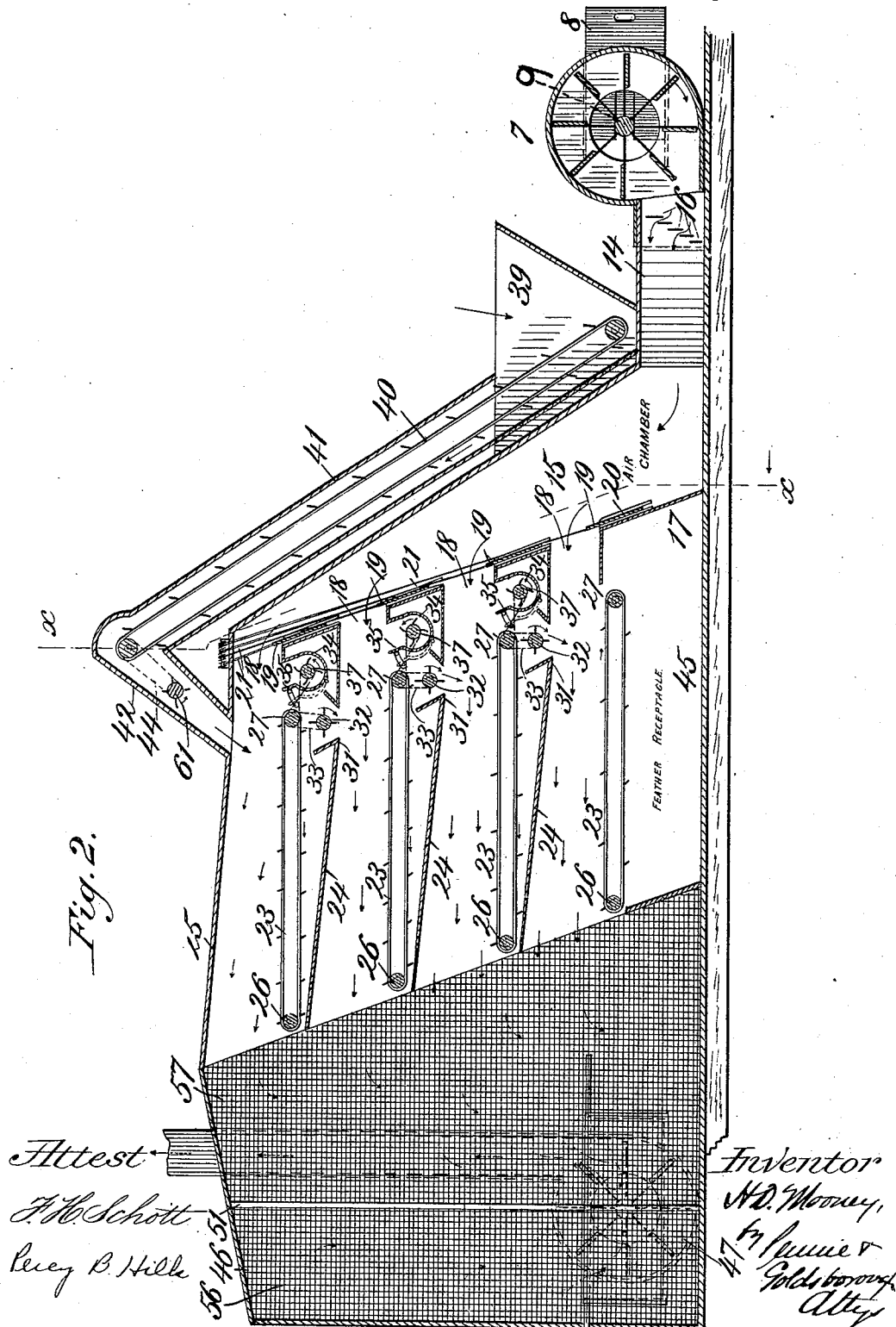
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H. O. MOONEY.

PNEUMATIC GRADING AND SORTING MACHINE.

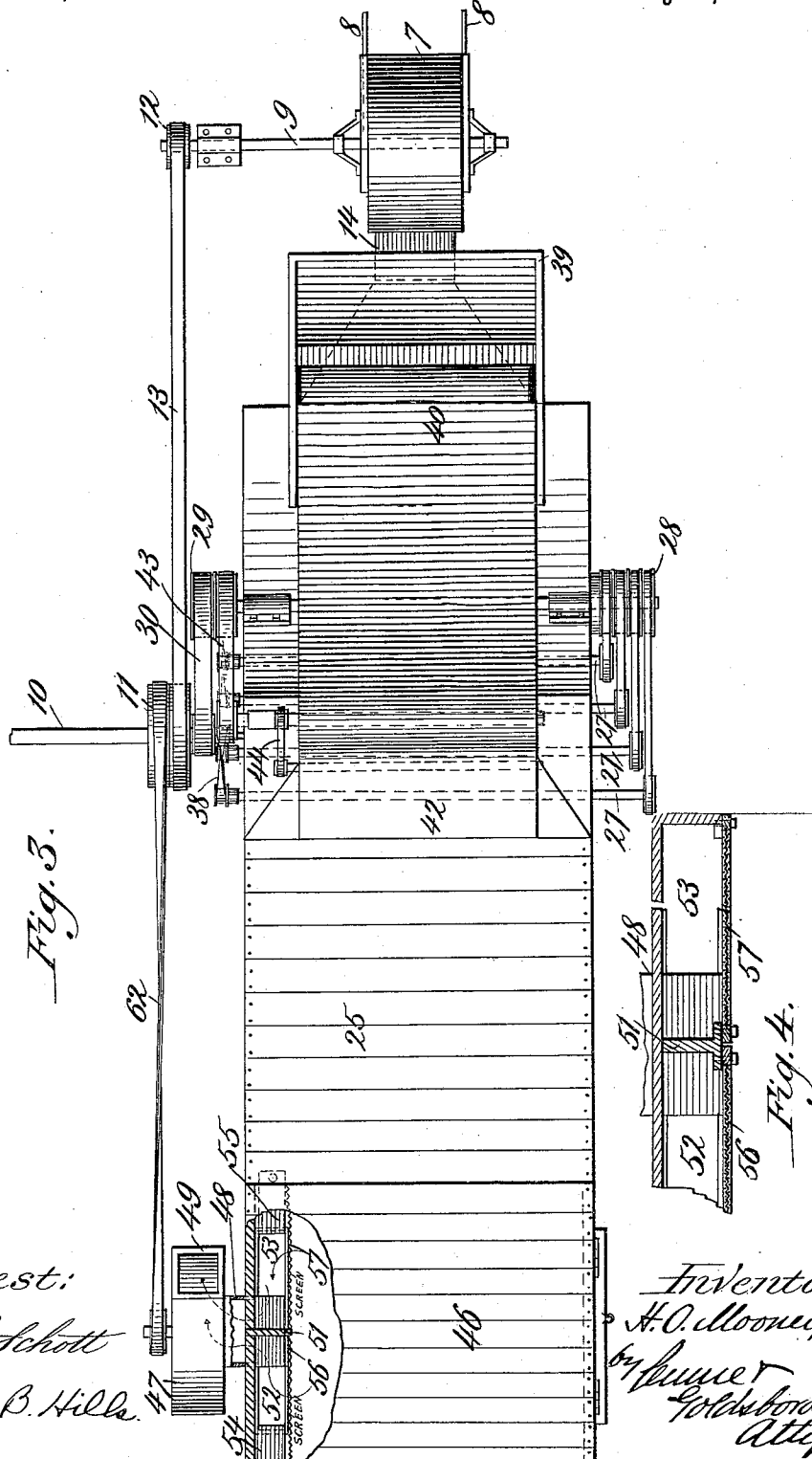
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Attest:
J. H. Schott
Percy B. Hills

Inventor:
H. O. Mooney,
by James
Goldborough
Atty

(No Model.)

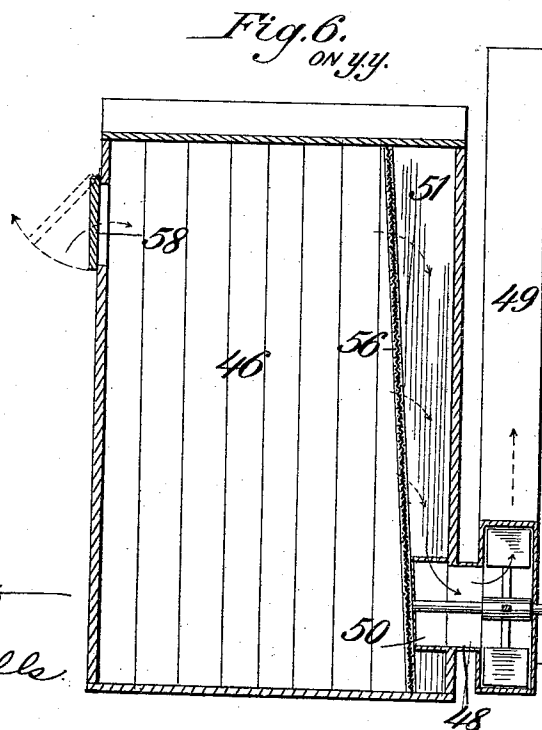
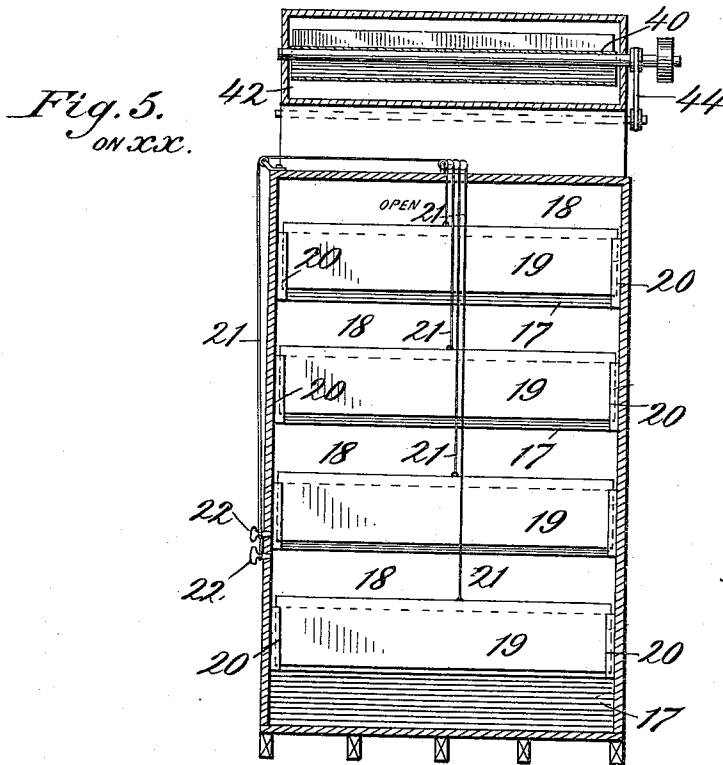
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No. 478,516.

Patented July 5, 1892.



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J. H. Schott
Percy B. Hills

Inventor:
H. O. Mooney
by J. H. Schott
Attorney

UNITED STATES PATENT OFFICE.

HERMAN O. MOONEY, OF FARMINGTON, NEW HAMPSHIRE, ASSIGNOR TO
THE UNITED STATES DOWN EXTRACTOR COMPANY, OF SAME PLACE.

PNEUMATIC GRADING AND SORTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 478,516, dated July 5, 1892.

Application filed August 17, 1891. Serial No. 402,867. (No model.)

To all whom it may concern:

Be it known that I, HERMAN O. MOONEY, a citizen of the United States, residing at Farmington, in the county of Strafford and State of New Hampshire, have invented certain new and useful Improvements in Pneumatic Grading and Sorting Machines; 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 certain new and useful improvements in pneumatic grading and sorting machines, and is designed to be applied to the separation of light substances differing from each other but slightly in specific gravity. It is particularly applicable to the separation of down from feathers and to the sorting of the feathers themselves into different grades, although not restricted to such use, as it may be employed to effect the sorting and grading of other light substances similar in character.

It is incidental to the invention that the dust and dirt present in the material subjected to the operation are separated therefrom and expelled from the machine, leaving the sorted grades in a clean condition.

In the accompanying drawings, Figure 1 represents, in side elevation, a machine embodying my improvements. Fig. 2 represents a central longitudinal section thereof. Fig. 3 represents a top plan view thereof, partly in section. Fig. 4 represents, on a larger scale, the parts in section in Fig. 3. Fig. 5 represents a section on the line *xx* of Fig. 2, and Fig. 6 represents a section on the line *yy* of Fig. 1.

Similar numerals of reference indicate similar parts throughout the several views.

Referring to the drawings, 7 indicates a fan or blower having central air-inlets, as shown, adapted be regulated by the sliding dampers 8. The fan-blades are mounted upon a shaft 9, driven from any suitable source of power—as, for instance, by the power-shaft 10 through the intermediacy of the shaft-pulleys 11 and 12 and the belt 13. The fan-blades revolve in the direction indicated by the arrow, and with a velocity of from two hundred to three hundred revolutions a minute, discharging

the air drawn in at the central openings into the passage-way 14, which leads into the air-chamber 15.

Within the passage-way and in proximity to the fan-blades is located the break 16, consisting of a series of transverse boards extending across the passage and overlapping each other, yet with intervening spaces, the function of this arrangement being to break up and equalize the air-current, so as to avoid the formation of eddies in the passage and deliver a uniformly-moving body of air into the air-chamber 15.

The air-chamber 15 forms the forward part of the main structure of the apparatus, and is divided from the remaining part by an inclined partition 17, extending entirely across the structure. The partition 17 is provided with a number of transverse openings 18, spaced one above the other and adapted to be regulated by the gates 19, adapted to slide in guides 20. The said gates are suspended from cords 21, which, passing over sheaves or pulleys, as shown, are each connected to a turn-plug 22, by means of which they may be shortened or lengthened, (in the same manner as the strings attached to the tuning-pegs of a violin,) so as to raise or lower the gates and vary correspondingly the effective size of the openings 18. It is of course evident that other means may be employed for manipulating the gates; but I prefer the ones described on account of their simplicity and the delicacy of adjustment which they permit.

In the rear of the partition 17 are located in front of the several openings 18 a corresponding series of horizontally-disposed conveyer-aprons 23, extending entirely across the main structure. Above these conveyer-aprons, except the upper one, are located corresponding covers 24, which (together with the roof-cover 25) incline toward the air-chamber, so that the space between each horizontal conveyer and its cover increases in height from the opening 18 rearward, the trumpet-shaped or flaring passages thus provided permitting the air to expand on its way into the free space beyond. The conveyer-aprons 23 are provided with cross-slats, as shown, and are mounted upon rollers 26 27. The rollers 27 are actuated by means of pulleys and belts,

as shown, from the pulley 28, whose shaft carries (at the other side of the apparatus) a pulley 29, operated by a belt 30 from the power-shaft 10.

5 Below the discharge ends of the conveyers 23 the covers 24 are provided with hopper-openings 31, within which are located the winged shafts or beaters 32, actuated by belts 33 from the rollers 27 and revolving in the
10 same direction therewith, so as to beat the dust from the material on its passage through the hopper-openings.

Should it be desired to subject the material to the repeated action of the air-current in
15 any of the flaring passages, I have made arrangements for that purpose. These arrangements consist of trough-shaped receivers 34, having hinged front sections 35, adapted
20 either to be swung back into the position shown in full lines in Fig. 2 and to be clamped in such adjustment by means of the butterfly-nut 36, or (when said nut is unclamped) to be
25 dropped into the position shown in dotted lines in Fig. 2. In the first case supposed the material would not be discharged into the
30 trough-receivers 34; but in the second case it would be and would be thrown up into the air-current once more by means of the winged shafts or beaters 37, mounted within the
35 trough-receivers and actuated from the rollers 27 by the cross-belts 38.

A feed-hopper 39, located, preferably, at the front of the machine, receives the material to be treated, which material is conveyed by
35 the feed-apron 40 through the elevator-hood 41 to the discharge-chute 42, by means of which it is discharged upon the upper conveyer-apron 23. The upper roller of the feed-apron is actuated from a pulley driven by a
40 belt 43 from the pulley 29, and in turn actuates (by means of a belt 44) the shaft of the beater 61, located in the discharge-chute 42. The lowermost conveyer 23 discharges into a collecting-receptacle 45.

45 Beyond the flaring or trumpet-mouthed passages is located a room or chamber 46, directly communicating therewith and of relatively large capacity. An exhaust-fan 47, driven by a crossed belt 62 from the power-
50 shaft 10, communicates with the room 46 by a passage 48 and discharges the dust-laden air from said room into the external atmosphere through the uptake 49. The said passage 48 communicates with the room through
55 the intermediacy of the damper-box 50, which is divided into two separate compartments by a central partition 51. The damper-box is provided on its upper surface with openings 52 53, (one on each side of the separating-
60 partition 51,) either of said openings being adapted to be closed by a corresponding damper 54 55. The separating-partition 51 extends from top to bottom of the room 46 and removable screens 56 57, of wire-gauze or
65 the like, are connected to it, said screens completely separating the damper-openings 52 53 from the main body of the room. The func-

tion of the screens is to prevent any of the down, feathers, or like material from being
70 drawn into the exhaust-fan, while at the same time permitting the dust-laden air to escape therethrough. It will be evident that by sliding in either of the dampers 54 55 the corresponding opening 52 53 will be closed, there-
75 by permitting one of the screens to be removed and cleaned while the machine continues to operate with the other.

In addition to the usual entrance, a hinged flap door or window 58 is provided for the
80 room 46, which window may be opened, if desired, to admit air thereto—a function of especial importance when the feathers or other material treated are very dusty. It will be
85 noted that the sides of the apparatus opposite the conveyers 23 are made up of removable panels 59, held in place by turn-buttons or otherwise, so that ready access may be had to the interior for repairs, substitution of parts,
cleaning, &c.

The operation of the apparatus will be read-
90 ily understood. When, for instance, the apparatus is to be used for separating the dust and down from feathers, the material is conveyed from the feed-hopper 39 by means of
95 the apron 40 and discharged through the chute 42. On its passage through this chute it is struck by the wings of the beater-shaft 61 and shaken well apart. It then falls loosely into the flaring passage above the uppermost of
100 the series of conveyers 23. Just a sufficient amount of air is permitted to pass through this flaring passage to remove the dust and down or the major part thereof, this regulation being accomplished by almost closing the
105 dampers 8 of the fan 7. The feathers being of greater specific gravity than the dust and down are not taken up by the air-current, but fall upon the top of the conveyer 23, together with such portion of the dust and down as has
110 not been presented to the air-current in such manner as to be removed. At the discharge end of the conveyer the feathers are discharged either into the hopper-opening 31 or into the
115 trough-receiver 34, as the operator shall elect, according to the circumstances of the case. If discharged into the hopper-opening 31, they are struck by the beater 32 and fall loosely
120 into the flaring passage above the next lower conveyer 23, where they meet a similar air-current, acting in the same manner to separate and carry off the dust and down. In like
125 manner they may be carried to the next lower conveyer 23, and finally be deposited from the lowest conveyer into the receptacle 25, purified of their down and dirt; or if discharged from
130 any of the conveyers 23 into the trough 34 they will be thrown up into the same air-current and subjected again to its action, as hereinbefore set forth, and this action may be continued, at the will of the operator, for such period
135 as he may deem advisable before the material is discharged upon the next lower conveyer. It will of course be understood that the dust and down are discharged by the air-current

into the room 46. From this room the exhaust-fan constantly withdraws the dust, leaving the down, which cannot pass through the screens behind. The exhaust can be regulated by the exhaust-fan dampers to suit the requirements of each particular case and the flap-window 58 opened correspondingly to furnish fresh air to dilute the dust-laden air in the room when occasion requires, as hereinbefore explained. By practical experience I have ascertained that the apparatus is entirely effective to prevent any material deposit of dust in the room 46, substantially all being taken by the exhaust, and the down remaining behind.

To grade and sort the feathers themselves after the dust and down have been removed, as specified, the feathers are taken from the receptacle 45 and put into the feed-hopper 39 to be again passed through the machine, more air being admitted to the fan 7 by opening the dampers 8 wider. The lighter feathers will be blown into the closed room 46 and the heavier ones collected in the receptacle 45. Any grading of feathers may thus be secured by regulating the fan-dampers and adjusting the slides 19.

The presence of the air chamber 15 is a valuable feature, inasmuch as it serves to equalize and distribute uniformly throughout its larger area the air-current sent in from the fan. The flaring air-passages above the conveyers permit the air to expand on its way toward the closed room, so as to drop upon the conveyer all but the lighter material intended to be removed, and the closed room itself, by reason of its large area, causes the main portion of the down to drop to the bottom, rather than be carried against the screens to clog them and render them ineffective.

I have hereinbefore specified that the fan 7 revolves at the rate of from two hundred to three hundred revolutions per minute. This velocity may, however, be varied as experience may dictate, to suit different conditions of use and different materials treated.

Having thus described my invention, what I claim is—

1. Apparatus for pneumatic grading and sorting, comprising an air-blower, an air-distributing chamber into which said blower discharges, a series of conveyers arranged one above the other and separated by intervening air-passages leading from the air-distributing chamber, a depositing-chamber into which said passages discharge, and a feeding device for supplying the material to the upper conveyer, substantially as described.

2. Apparatus for pneumatic grading and sorting, comprising an air-blower, an air-distributing chamber into which said blower discharges, a series of conveyers arranged one above the other and separated by intervening air-passages leading from the air-distributing chamber, a depositing-chamber into which said passages discharge, and a feeding device for supplying the material treated to the up-

per conveyer, and an exhaust-fan from the depositing-chamber, the exhaust-fan inlet being screened, substantially as described. 70

3. Apparatus for pneumatic grading and sorting, comprising an air-blower, an air-distributing chamber into which said blower discharges, a series of conveyers arranged one above the other and separated by intervening air-passages leading from the air-distributing chamber, and adjustable gates for varying the inlets of said passages, and a feeding device for supplying the upper conveyer with the material to be treated, substantially as described. 80

4. Apparatus for pneumatic grading and sorting, comprising an air-blower, an air-distributing chamber into which said blower discharges, a series of conveyers arranged one above the other and separated by intervening air-passages leading from the air-distributing chamber, and beater-shafts located in the path of discharge from one conveyer to the next in the series, and a feeding device for supplying the material to be treated to the upper conveyer, substantially as described. 90

5. Apparatus for pneumatic grading and sorting, comprising an air-blower, an air-distributing chamber into which said blower discharges, a series of conveyers arranged one above the other and separated by outwardly-flaring air-passages leading from the air-distributing chamber, and a feeding device for supplying the upper conveyer with the material to be treated, substantially as described. 95

6. Apparatus for pneumatic grading and sorting, comprising an air-blower having a regulating-damper, an air-distributing chamber into which said blower discharges, and a series of conveyers arranged one above the other and separated by intervening air-passages leading from the distributing-chamber, substantially as described. 100

7. In apparatus for pneumatic grading and sorting, the combination, with a conveyer, of an air-blower furnishing an air-current above the upper surface of the conveyer at the discharge end thereof and a winged shaft at the discharge end of the conveyer for throwing the material up into the air-current, substantially as described. 115

8. In apparatus for pneumatic grading and sorting, the combination, with a conveyer, of an air-blower furnishing an air-current above the upper surface of the conveyer at the discharge end thereof, and a winged shaft at the discharge end of the conveyer for throwing the material up into the air-current, and a trough in which said winged shaft is located, said trough having an adjustable side, so as to either receive the material from the conveyer or not, according to its position of adjustment, substantially as described. 125

9. In apparatus for pneumatic grading and sorting, the combination, with a conveyer, of an outwardly-flaring air-passage above the upper surface of the conveyer, an air-blower communicating with the air-passage at the 130

discharge end of the conveyer, and a feeding device for supplying to the conveyer the material to be treated, substantially as described.

10. In an apparatus for pneumatic grading and sorting, the combination, with the depositing-room and its exhaust-fan, of a two-part screen interposed between the exhaust-fan and the main-room space and means for cutting off communication between the fan and either screen, substantially as described.

11. In apparatus for pneumatic grading and sorting, the combination, with the depositing-room and its exhaust-fan, of a damper-box communicating with the fan and having two openings provided with separate dampers and separated by an intervening partition extending from top to bottom of the room and removable screens, one on each side of the partition, substantially as described.

12. In apparatus for pneumatic grading and sorting, the combination, with the depositing-room, its exhaust-fan, and screens, of a door

or window adapted to be opened to supply additional air to dilute the dust-laden air of the depositing-room, and thereby facilitate its passage through the screens, substantially as described.

13. In apparatus for pneumatic grading and sorting, the combination, with an air-blower provided with a regulating-damper, a conveyer having an air-passage above its upper surface, communicating with the air-blower, a feeding device for admitting the material to be treated into the air-current above the conveyer, a depositing-room beyond the conveyer, and an exhaust-fan leading from the depositing-room and provided with a damper, substantially as described.

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

HERMAN O. MOONEY.

Witnesses:

SAMUEL S. PARKER,
GEORGE F. RUSSELL.