No. 783,269. PATENTED FEB. 21, 1905.

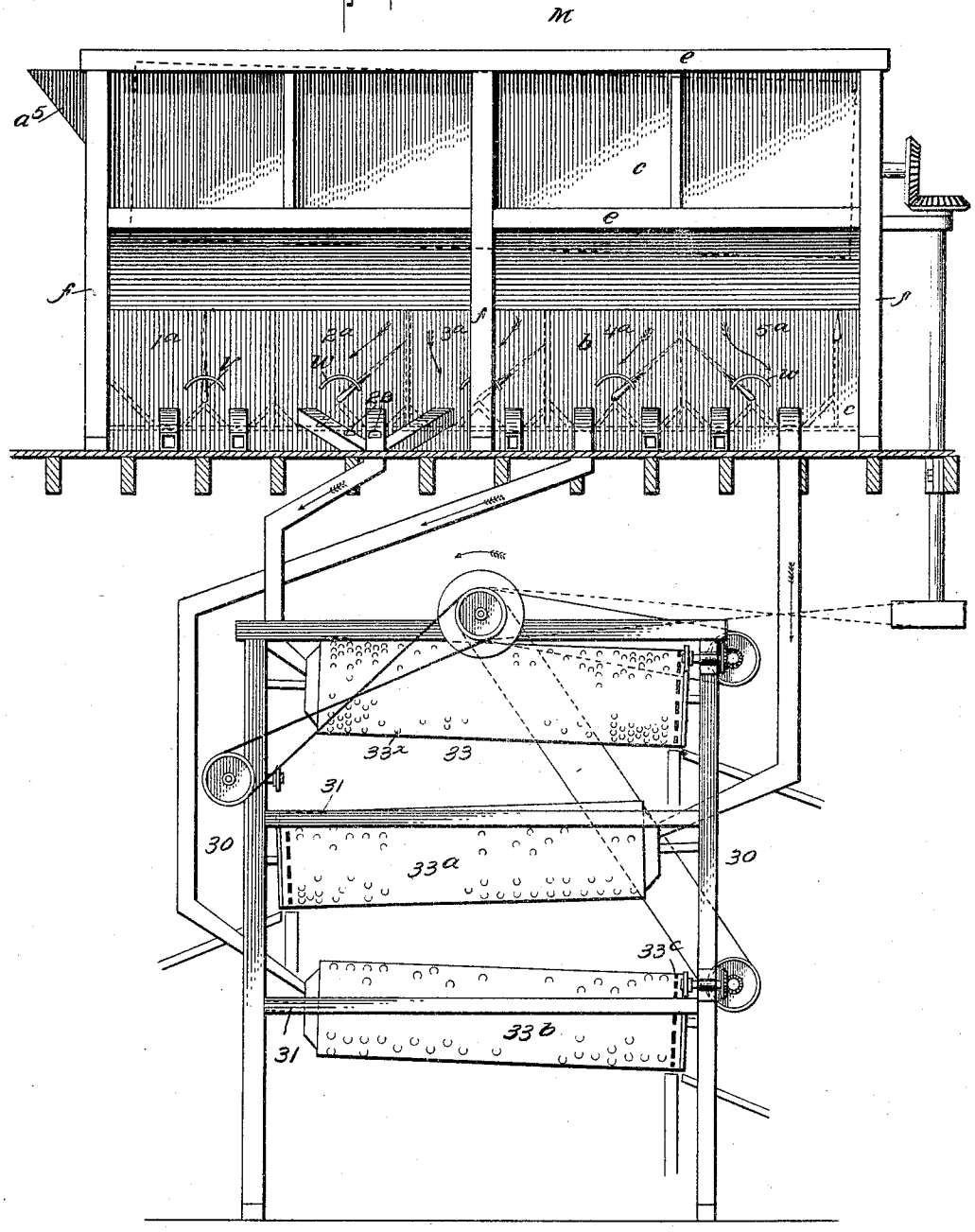
D. J. HAYES.

RICE GRADING AND SEPARATING MEANS.

APPLICATION FILED JULY 28, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



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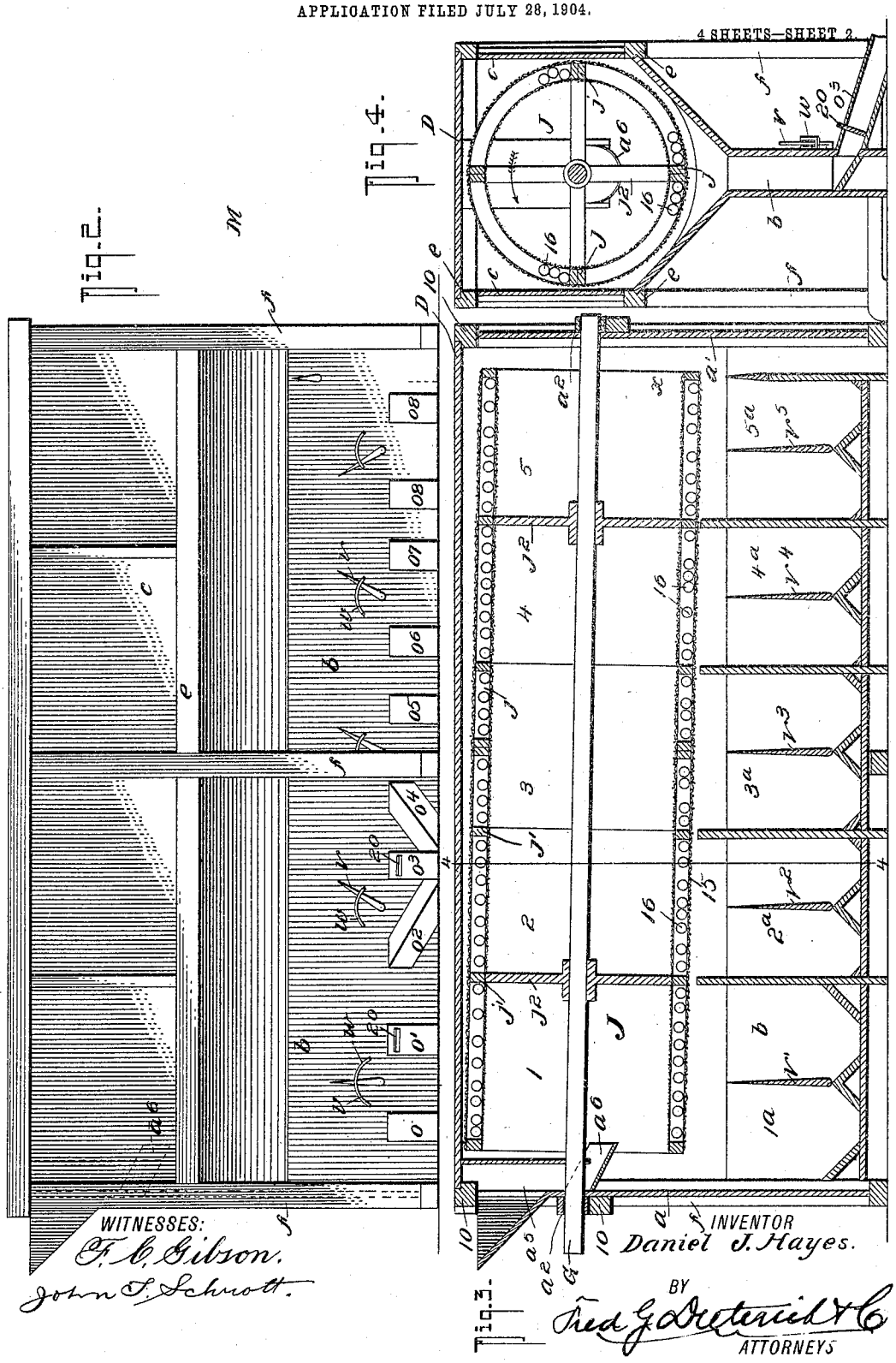
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 5.

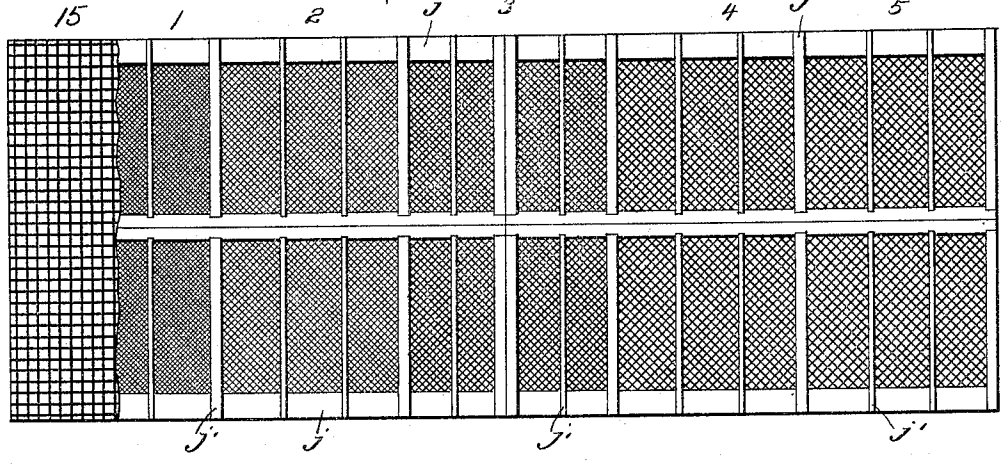
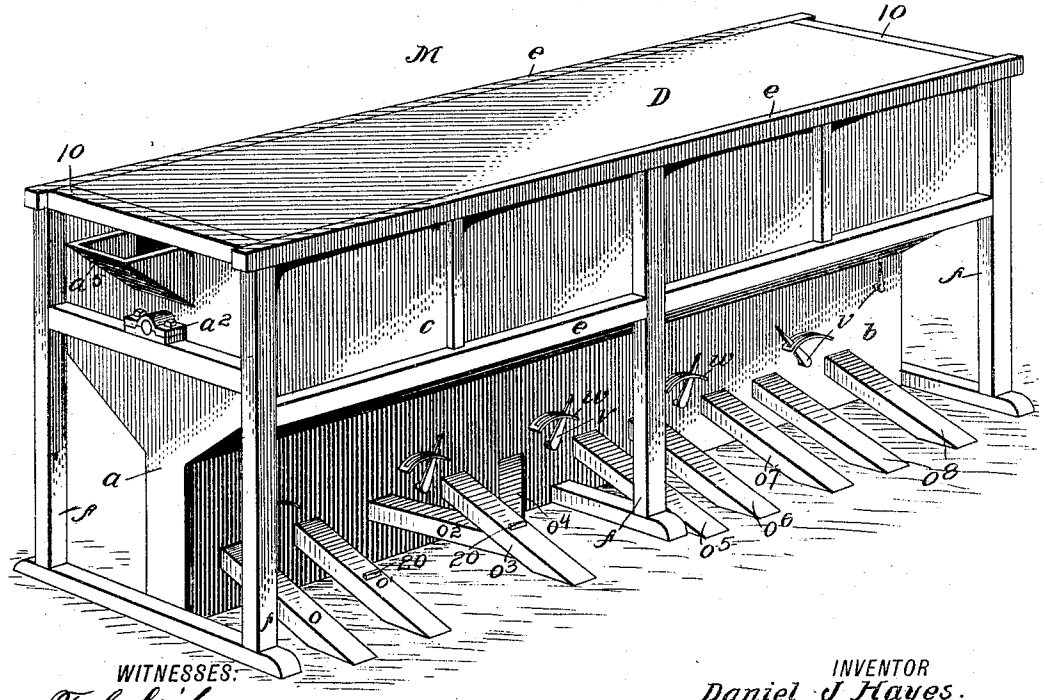


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

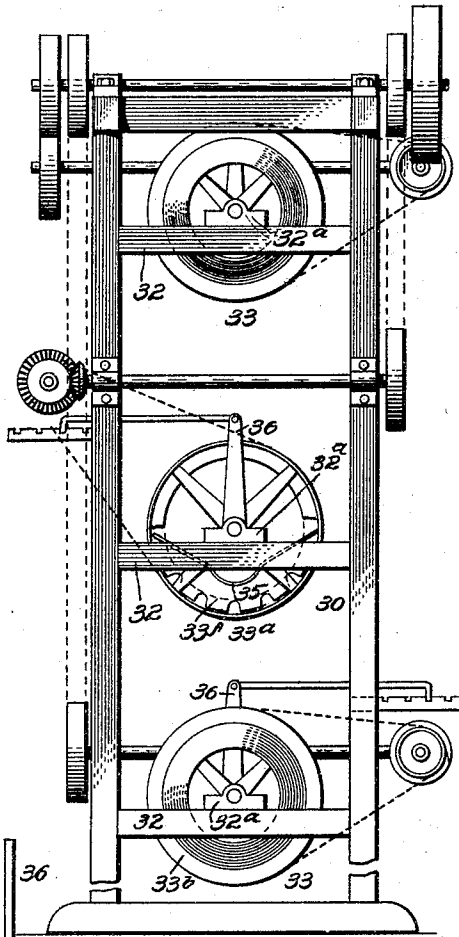


Fig. 9.

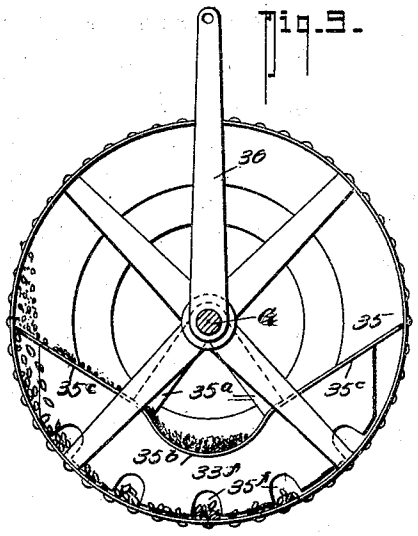
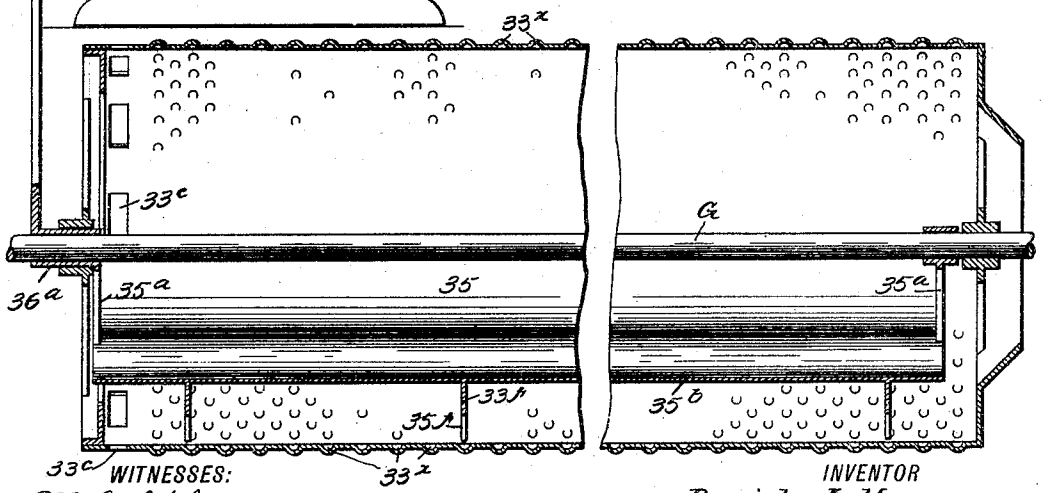


Fig. 8.



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No. 783,269. Patented February 21, 1905.

UNITED STATES PATENT OFFICE.

DANIEL J. HAYES, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF TWO-THIRDS TO HARRY K. IVENS AND JOSEPH K. BOLAND, OF NEW ORLEANS, LOUISIANA.

RICE GRADING AND SEPARATING MEANS.

SPECIFICATION forming part of Letters Patent No. 783,269, dated February 21, 1905.

Application filed July 28, 1904. Serial No. 218,574.

To all whom it may concern:

Be it known that I, DANIEL J. HAYES, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Rice Grading and Separating Means, of which the following is a specification.

My invention seeks to provide a means whereby the grading of rice can be conveniently, economically, and expeditiously accomplished and whereby the different grades are treated to a supplemental grading and separating action and the staple before being finally discharged is so treated that the head-rice in each special grade is cleared or effectively separated from the "screening" and seed-rice and whereby the lower grades or screenings are rendered of a more uniform and valuable condition.

My invention comprehends in its generic sense a main rotary grading-cylinder arranged to separate the staple into the different grades from the fine "Honduras" grains to the ordinary screenings, a series of supplemental separating-cylinders coöperatively connected with the main grading-cylinder, and conveyers for leading the several rice portions initially separated and graded by the main cylinder into the respective supplemental separating-cylinders, the several parts constituting my complete apparatus or machine having such correlative arrangement whereby the operation of effecting the initial grading, the supplemental regrading, cleaning, or separation of the screenings or seed-rice in each initially-graded portion is a continuous and simultaneous one.

My invention also embodies certain features of construction whereby the supplemental separating or grading means is adjusted to separate a greater or less amount of the inferior quantity or screenings in the initial grades of rice that passes from the main grading-cylinder, the complete construction of parts being especially designed to first separate the product into the usual grades and then enhancing the quality of said grades by separating the inferior screenings from the higher grades of screenings and headers within each of the said initial grades of rice that pass from the main grading means.

In the present methods of grading rice a large percentage of the head-rice usually passes off with the screenings to such an extent that often from twenty to thirty per cent. of the head-rice is carried off with the lower or screening grades and is sold as screenings. In my method of treating the staple the lower or screening grades by reason of the peculiar and improved regrading or separating action they receive are raised to a higher grade of rice, and hence the selling quality thereof is proportionately increased.

In its subordinate features my invention consists in certain novel construction and peculiar arrangement of parts, all of which will be fully described, specifically pointed out in the appended claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic side elevation showing the general arrangement and correlation of the main grading means, the supplemental grading or separating cylinders, the conveyers, and the actuating devices that control the valves of each main grading mechanism. Fig. 2 is a side elevation of the main grader. Fig. 3 is a longitudinal section thereof. Fig. 4 is a transverse section of the same, taken on the line 4 4 of Fig. 3. Fig. 5 is a plan view of the main grading-cylinder frame. Fig. 6 is a perspective view illustrating the general arrangement of the valve-controlling and deflector chutes. Fig. 7 is an end view of the supplemental grading or separating means. Fig. 8 is a longitudinal section of the supplemental grading and separating cylinders and the adjusting means for regulating the amount of seed or screenings to be separated from the initially-graded product. Fig. 9 is an end view thereof.

In the practical application of my invention I arrange the main grading or separating mechanism above the supplemental grading means, preferably by mounting the main grading means on an upper floor of a mill-house and the supplemental or regrading means on

the lower floor in the manner generally disclosed in Fig. 1, although it will be understood that the two different parts of my apparatus or rice-treating means may be otherwise supported or arranged as conditions may make desirable.

The main grading or separating means (designated M in the drawings) comprises a suitable frame which is formed of two ends *a a'*, the trough-shaped bottom *b*, that extends from the front end *a* to the rear end *a'*, the casing sides *c c*, and the closed top D, all of which parts are suitably braced by the longitudinal bars *e* and the vertical posts *f*, as shown.

10 10 designate the cross-bars secured one upon each end portion *a a'*, and each of said bars has a central hub or bearing a^2 to receive the journals or opposite ends of the shaft G of the grading-cylinder, which extends the full length of the housing or casing and so disposed that its lower edge is in close proximity to the upper end of the trough-like bottom members *b b*.

In the entrant end *a* of the casing or cylinder-housing is a feedway a^5, the lower end of which is in the nature of a concaved chute a^6, that extends into the open front end of the cylinder J. The cylinder J in my construction has an inner circumferential covering of fine screening-wire, having portions thereof (designated 1 2 3 4 5) of different meshes, gradually increasing in size from the entrant to the exit end of the cylinder, and the said cylinder is also provided with an external coarse-wire mesh 15, the purpose of which is to retain rubber balls 16 within the annular spaces formed between the inner and outer screen-coverings and the cross members of the cylinder-frame. The balls 16 serve for keeping open the meshes in the inner or grading screen-cylinder covering, which balls by frictional and impacting action jar or agitate the said screen-covering sufficiently to prevent choking or stopping up of the meshes in the grading-screen surfaces.

The rotary grading-cylinder is composed of a skeleton frame formed of longitudinal bars *j j* and transverse segmental bars *j' j'*, made fast to each other and in any suitable manner, and at each end the cylinder has radial members j^2 j^2 for fixedly connecting the shaft G, that imparts the rotary motion to the cylinder, and to provide for a slow feed of the rice from the entrant to the exit ends, therefore, the cylinder is mounted in a slightly-longitudinal dip from the front to the rear end, as shown. The trough-shaped bottom in the grading-cylinder in my construction is divided into a number of compartments 1^a 2^a 3^a 4^a 5^a, that correspond with the different grades of the screening-covering 1 2 3 4 5 of the grading-cylinder, and the several compartments referred to receive the different screenings of the product that passes slowly through the rotating cylinder from the lowest grade of screenings, that falls into the compartment 1^a, to the highest grade, that passes into the compartment 5^a, it being understood that the maximun high grade of head-rice passes out of the cylinder through the open end *x* of the cylinder. The several compartments 1^a to 5^a referred to are formed by the transverse partitions, whose upper edges are projected close up to the periphery of the rotating cylinder, whereby to prevent the different grades of grains from passing into other than the particular compartments for which they are intended, and each compartment 1^a to 5^a has a pair of outlets, which outlets are designated O O' O^2 O^3 O^4 O^5 O^6 O^7 O^8, and in each of the said compartments 1^a to 5^a is mounted a valve, which valves are designated V' to V^5, and the several valves are so mounted that by a proper adjustment thereof the droppings in each of the compartments 1^a to 5^a can be deflected to pass out of both of the outlets or one of the outlets in each compartment.

While I have shown each of the compartments with two outlets, they may each have but one outlet. I prefer, however, to provide two outlets for each compartment, since by such arrangement, by a proper adjustment of the valves referred to, the graded product for each compartment can be deflected to discharge into a bag or other receiver or into the offtake-chutes that lead to the respective supplemental or regrading cylinders. Furthermore, by using a plurality of outlets in each compartment the product of several of the compartments can be joined to pass into the regrading-cylinders, which is preferably the case in the practical use of my invention, or a portion of the product in each compartment can be used to deflect into a suitable bag or receiver, while the remainder is led off to the regrading and separating means, and to further provide for conveniently dividing or shifting the direction of the discharges from the several compartments 1^a to 5^a the offtake-chutes are provided with cut-off gates or valves 20 20, which are preferably arranged as shown in Fig. 5.

To facilitate the discharge of the material from the several compartments 1^a to 5^a, the bottoms of the several compartments are dished or concaved, and to provide for easily setting the several valves V' to V^5 and also to indicate their adjustments each of the several valves has a combined pointer and shifting-handle *v*, and the several handles are movable within slotted bracketed guides *w*, the purpose of which will be clearly understood from the drawings.

The regrading means that forms a coöperative part of my complete invention for treating the rice for the purposes stated and which *per se* forms an essential feature of my present invention comprises a suitable supporting-

frame consisting of the end frames 30 30, the longitudinal tie-beams 31, and the front and rear end cross-beams 32, which beams (three of which are shown in the drawings) each have journal-boxes 32^a 32^a supported thereon to receive the shafts of the several regrading-cylinders 33 33^a 33^b. In the drawings I have shown but three regrading-cylinders for regrading the five initial grades of the product into three regraded products, it being understood that a greater or less number of regrading-cylinders may be used to operate upon all or upon a part of the initial grades of the product. The several cylinders 33, 33^a, and 33^b are horizontally supported on a slight incline, whereby to cause the product that enters at one end of the said cylinders to slightly travel toward the rear or exit end thereof. The cylinders 33 33^a 33^b are driven by any suitable motive power, for example, as shown, so as to operate in harmony with the main grading-cylinder and the conveyer devices that are coöperatively joined with the main and the supplemental grading-cylinders. As the construction and operation of each of the several cylinders are alike except in the size of the indentation or pockets formed in the circumferential walls thereof, a detailed description of one of the said cylinders, it is believed, will suffice for all.

A cylinder 33, which, for example, receives the low grade of screenings from the compartments 2^a and 3^a of the main grading mechanism, consists of a cylindrical shell that is formed of sheet metal and stamped or otherwise made with concaved or slightly-spherical-shaped indentations or pockets $33^\times$ its entire length, the pockets $33^\times$ of the several cylinders of such length and width as the character of the initially-graded material fed therein may make necessary. In the present presentation of my invention the indentations or pockets of the cylinder 33 are of a size to hold the broken grains or screenings of only that grade of rice initially produced by the main grading-cylinder and that passes from the main grading-cylinder, and the said pockets and concavities referred to are such that the broken or low grades of screening-grains are sustained within the said pockets on the upgoing side of the cylinder 33 until it passes beyond the plane or axis of the larger header-grains that may be mixed with the low-grade rice which drop out of the said pockets or indentations and then work out through the discharge-outlets 33^c in the lower ends of the cylinders, as clearly shown in the drawings. The three cylinders 33, 33^a and 33^b are correspondingly formed with indentations and concavities, except that the concavities or indentations are proportionately larger than those of the cylinder, whereby to effect the desired separation of the different grades of the initially-separated rice fed therein.

To obtain a practically perfect regrading of the initially-separated product, I have found from practical experiment that the initially-graded products after they enter the regrading-cylinders 33 33^a 33^b are separated by being subjected to a slow movement through the said cylinders from end to end and during the longitudinal movement through the said cylinders to be repeatedly subjected to a centrifugal or transverse whirling action, which serves to thoroughly separate the small broken or low grades of screenings from the better grains or headers. For effecting such results each of the cylinders 33 33^a 33^b is provided with a series of transversely-disposed baffles 33^f in the nature of segments that are loosely supported over the bottom surface of the cylinder and over which the grain gravitates in its course through the said cylinders, as best shown in Figs. 8 and 9, by reference to which it will be seen the segmental baffles are fixedly connected with the trough-shaped combined deflector and conveyer 35, that is loosely suspended from the shaft G′ by the hanger 35^a and which primarily acts as a receiver for the small, broken, and inferior particles of that initial grade of the product which passes through the cylinder. The member 35 includes a central trough-like portion 35^b and side wings 35^c, that extend in opposite directions to the perimeter of the cylinder and close up against the inner side of the said cylinder, as shown, and the normal correlation of the said wings and the cylinder's sides is such that the point of contact of the ends of the wings 35^c and the cylinders is in a plane below the horizontal axis of the said cylinder.

The combined conveyer and deflector 35 and the baffles 33^f, it will be observed, are loosely supported from the shaft G′, so as to maintain a substantial fixed position during the rotation of the cylinder, and the said baffles at their lower edges are notched, as at 35^f, for the passage of the grains therethrough.

By reason of the internal construction of the regrading-cylinders as stated and shown the initially-graded product as it enters the cylinders is subjected to a slow feed through the cylinders and also to a series of transverse or centrifugal whirling movements, and since the grains, owing to the slow feed of the same through the cylinder, constantly seat themselves within the pockets or concavities in the wall of the cylinder it follows that the grains are constantly lifted on the upgoing side of the cylinder, and as they are thus lifted the larger grains will drop back to the bottom of the cylinder as the smaller grains are carried to a much higher point with respect to the horizontal axis of the cylinder. In the construction shown and which I find best in practice the indentations or pockets are of such size that the small or inferior grains are raised up to a plane above the axis of the cylinder. Now by having the wings of the member 35

contact with the cylinder sides at a point near or below the said cylinder axis all of the small, broken, and inferior grains will as they drop out of the cylinder-pockets fall back onto the top of the wings in the said member 35 and be conveyed to the end of the machine and discharged, while the larger or header grains are constantly thrown back to the bottom of the cylinder and caused to gradually work to the end of the cylinder and discharge through the end outlets 33^c. The wings of the member 35 also serve as deflectors, since by reason of feeding close up to the cylinder-walls (see Fig. 9) the larger grains that may become so firmly lodged in the pockets as to pass up above the horizontal line of the cylinder will be deflected and caused to drop back. For properly gaging the separation of the initially-graded product the member 35 is adjustably mounted, so that the wings on the upgoing side of the cylinder may be raised or lowered with respect to the horizontal axial plane of the cylinder, it being understood that the higher up the end of the wings f^3 on the upgoing side of the cylinder is set the less amount of inferior or small-size grains will pass up over and be deflected on top of the wings f^3, while a correspondingly lower set of the said wing edge will serve to separate a greater quantity of the lower grades of grains, and hence a less proportion of the initially-graded product that passes in the regrading-cylinder will pass out through the openings 33 as headers or high-graded grains. For conveniently setting the member 35 a handle 36, having a hub 36^a connected to the member 35, is provided, (see Fig. 8,) and said handle may be held to its adjustment by any well-known rack or equivalent device. (See Fig. 9.)

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a rice-grading means of the character described, a suitable supporting-frame, a rotary cylinder mounted therein and slightly inclined, said cylinder having indented pockets on its inner faces adapted to receive the rice-grains and to lift them on the upgoing side of the cylinder, baffles within the cylinder for retarding the longitudinal movement of the grains through the cylinder and a means within the cylinder for separating the larger from the smaller grains and for catching the smaller grains as they drop out of the cylinder-pockets and for discharging the same as set forth.

2. In a rice-grading machine of the character described; a suitable supporting-frame, a rotary cylinder mounted thereon and slightly inclined, said cylinder having indented pockets for lifting the rice-grains, a means within the cylinder that divides the said cylinder its full length into an upper and a lower compartment and acts as a receiver for the grains that are lifted into the upper compartment, means within the lower compartment for retarding the flow of the grains toward the discharge end of the cylinder, said grain-receiving means being constructed to discharge the grain that falls thereon, at the lower end of the cylinder as set forth.

3. In a rice-grading machine, a suitable supporting-frame, an open-ended rotary cylinder mounted thereon and inclined, said cylinder having indented pockets for lifting the grain on the upgoing side thereof, means within the cylinder that divides the cylinder into independent upper and lower compartments that extend substantially the full length of the cylinder, the said means including side wings and a central trough, and devices for retarding the flow of the grain in the lower compartment of the cylinder to the discharge end thereof, the said cylinder-dividing means being adjustably mounted, whereby to set the side wing on the upgoing side of the cylinder high or low for the purpose specified.

4. In a rice-grading means of the character described, a suitable supporting-frame, a rotary cylinder mounted thereon, said cylinder having indented pockets on its inner faces adapted to receive the rice-grains and to lift them on the upgoing side of the cylinder, the combined receiver and conveyer 35 loosely suspended from the axis of the cylinder and mounted within the cylinder, said member 35 comprising a central trough-like portion and side wings, the latter being extended to close proximity within the inner walls of the cylinder, a series of segmental baffles that extend over the bottom of the cylinder, said baffles being notched, and a means for adjusting the member 35, all being arranged substantially as described.

DANIEL J. HAYES.

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