Nov. 1, 1938. H. L. JOHNSON 2,135,343

GRAIN SEPARATOR

Filed Sept. 30, 1935 5 Sheets-Sheet 1

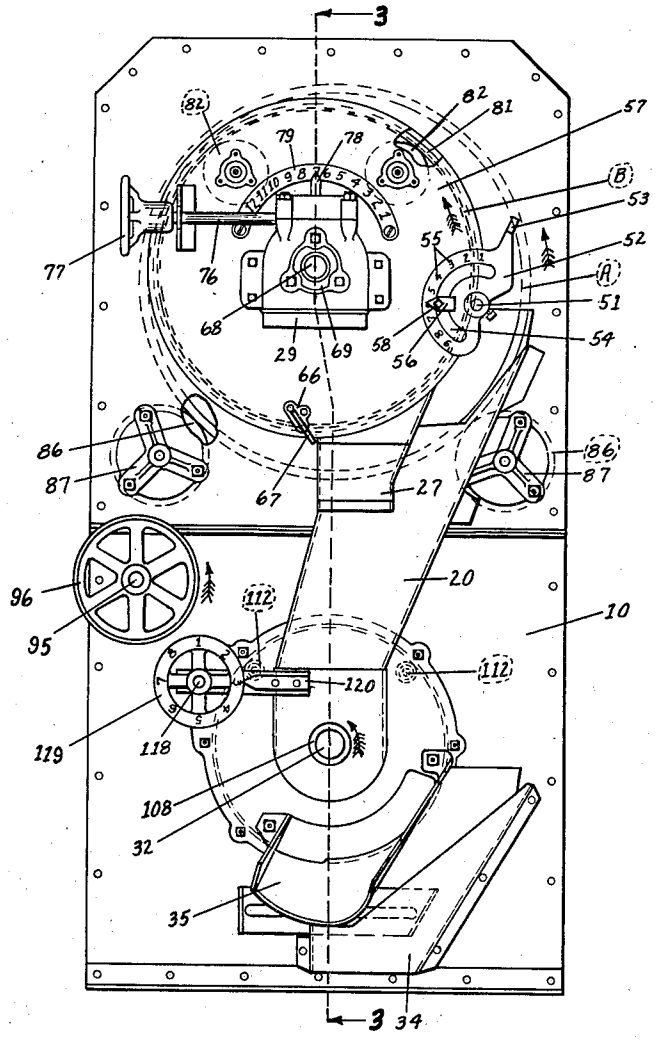


Fig-1

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GRAIN SEPARATOR

Filed Sept. 30, 1935 5 Sheets-Sheet 2

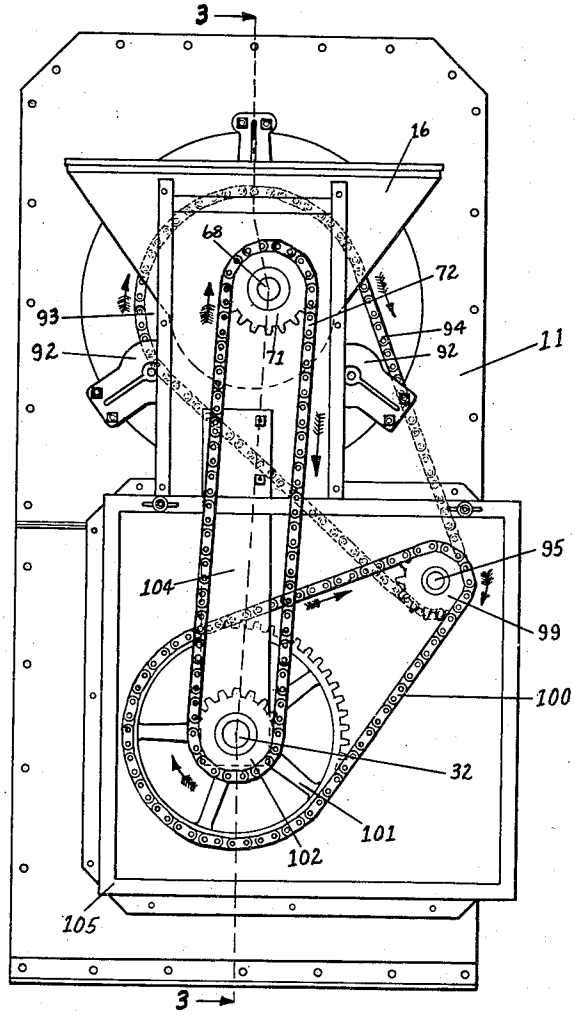


Fig. 2

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GRAIN SEPARATOR

Filed Sept. 30, 1935 5 Sheets-Sheet 3

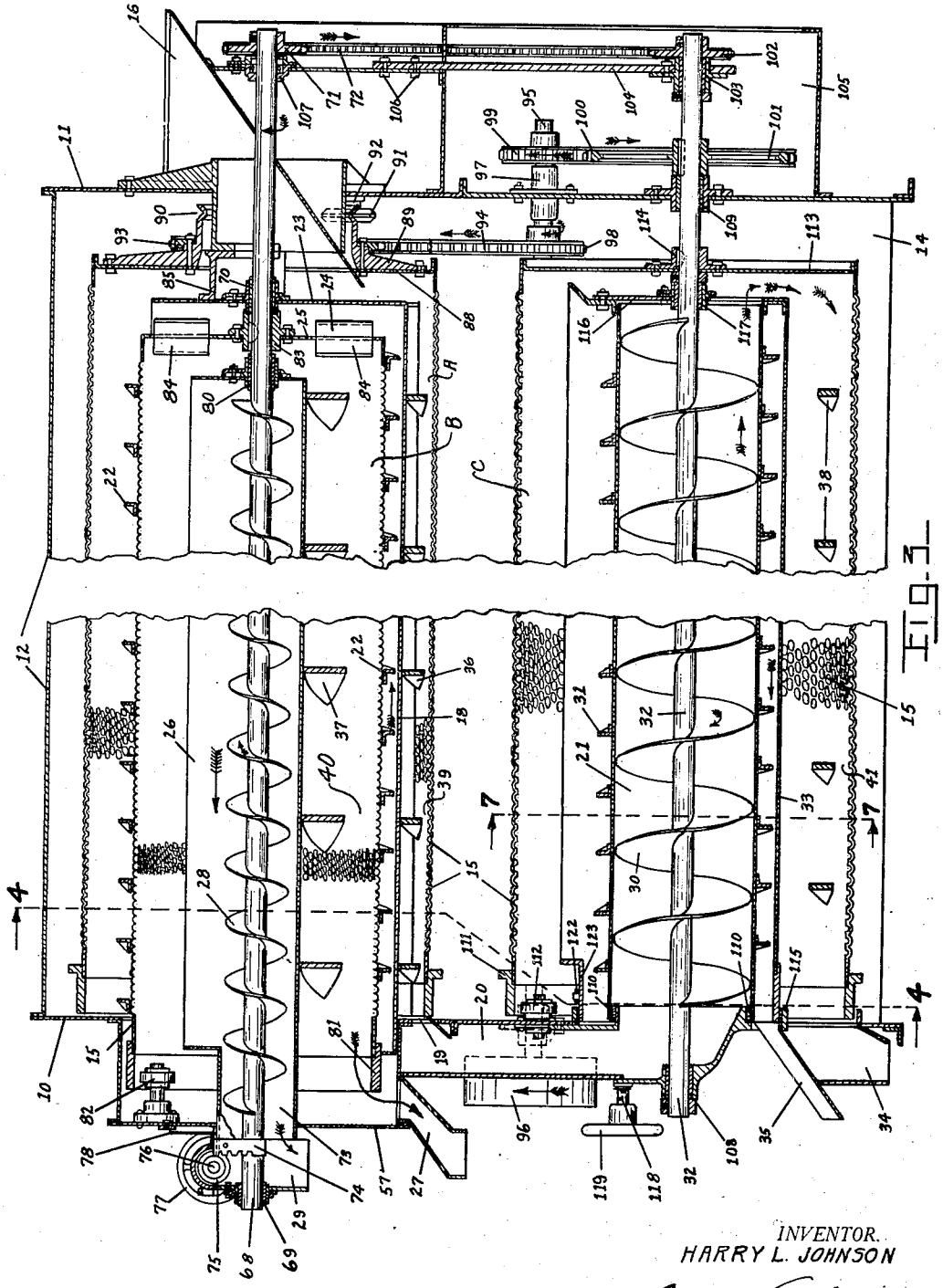


FIG. 3

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GRAIN SEPARATOR

Filed Sept. 30, 1935 5 Sheets-Sheet 4

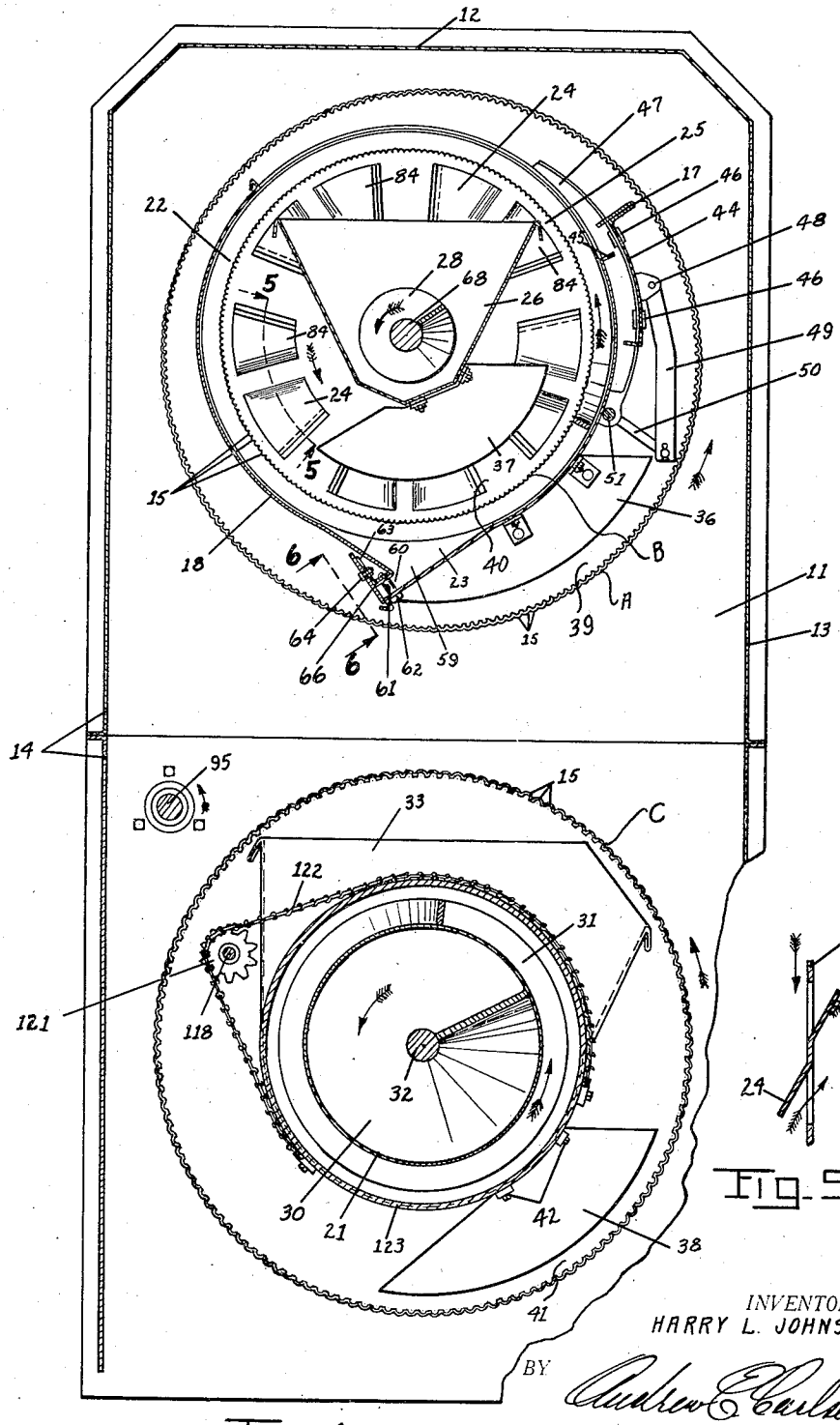


Fig. 4

Fig. 5

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Nov. 1, 1938. H. L. JOHNSON 2,135,343

GRAIN SEPARATOR

Filed Sept. 30, 1935 5 Sheets-Sheet 5

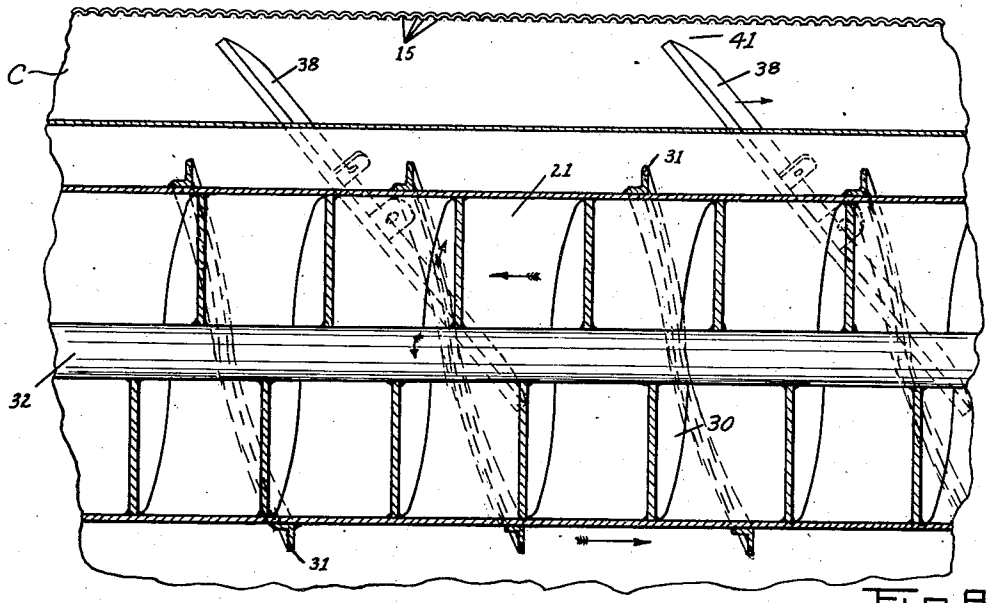


Fig. 8.

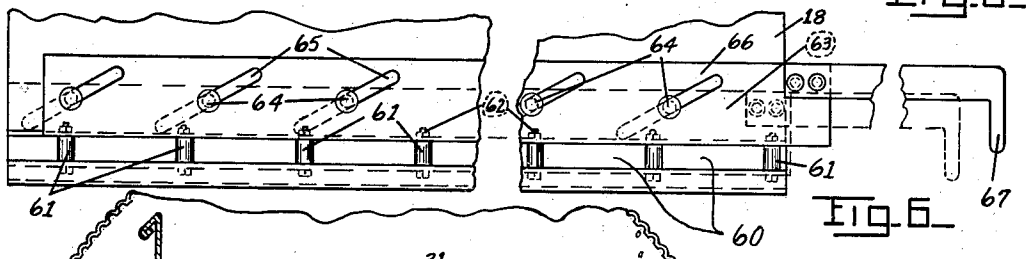


Fig. 6.

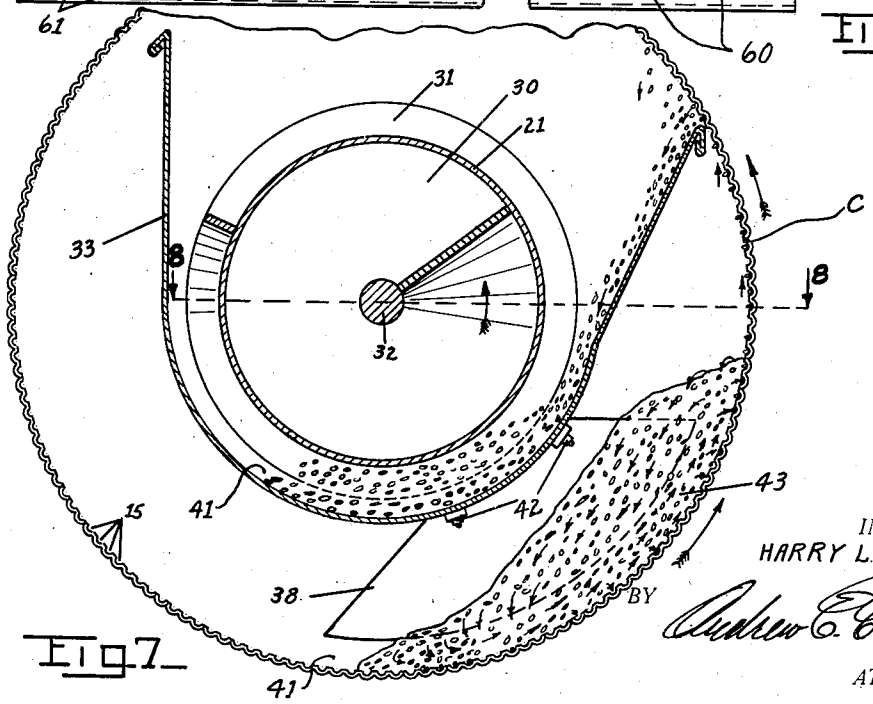


Fig. 7.

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Patented Nov. 1, 1938 2,135,343

UNITED STATES PATENT OFFICE

2,135,343

GRAIN SEPARATOR

Harry L. Johnson, Minneapolis, Minn.

Application September 30, 1935, Serial No. 42,811

2 Claims. (Cl. 209—95)

This invention relates to the art of grain separation and the main object is to provide a comparatively simple, compact, and practical machine that will receive a heterogeneous or conglomerate mass of seed, small wheat, large wheat, oats, and/or other grains and efficiently separate such mass into its constituent elements in a minimum space of time and with a minimum amount of power and equipment. Further objects are to provide improved means for conveying and distributing the grain flows within the machine, and means for driving, cleaning, adjusting and regulating the various machine parts. The machine incorporates and utilizes some of the features disclosed and claimed in my United States Patent No. 1,912,375 issued June 6th, 1933 for Grain cleaning and separating machine, and is also capable of use in association with the scalping and aspirating mechanisms disclosed in United States Patent No. 1,966,443 issued July 17th, 1934 to Carl C. Gray and myself as joint patentees. In further particular the present invention includes numerous features, details of construction, and advantages disclosed in the accompanying drawings and set forth in the following specification and claims. In said drawings—

Fig. 1 is an end elevation of what may be conveniently referred to as the front end of the machine.

Fig. 2 is a rear end elevation of the machine.

Fig. 3 is a longitudinal sectional elevation through the machine as on the lines 3—3 in Figs. 1 and 2, but with fractional portions broken away.

Fig. 4 is an enlarged, cross sectional elevation on the line 4—4 in Fig. 3.

Fig. 5 is a detail section on line 5—5 in Fig. 4.

Fig. 6 is an enlarged detail view of the trough clean-out device as seen on line 6—6 in Fig. 4.

Fig. 7 is an enlarged detail section on line 7—7 in Fig. 3.

Fig. 8 is a detail, sectional plan view on the line 8—8 in Fig. 7.

Referring to the drawings more particularly and by reference characters, 10 designates the front wall of an outer case or housing having a rear wall 11, top 12, and side walls 13 and 14.

The grain separating work is performed by three cylinders A, B, and C which are rotatably mounted within the housing and successively act upon the grain flow to respectively remove selective sizes of grain kernels until the entire original mass is segregated or separated into its constituent elements and as such delivered from the machine. Each of these cylinders A, B, and C receives grain into its trough-like bottom and has its inner surface provided with profusely distributed pockets or indents 15 which, as the cylinder rotates under the grain body, will receive the relatively smaller particles or kernels and carry them up until they drop out into a receiving trough disposed within the cylinder. This method of separation which has proved commercially successful in practice is fully disclosed in my aforementioned Patent No. 1,912,375, and the present invention primarily concerns itself with the arrangement of cylinders, flow control, adjusting devices, etc., all to the end that this method of separation may be practiced with a greater degree of efficiency, speed, and uniformity of results.

The machine is provided at one end here designated as the rear, with an upper receiving hopper 16 which initially receives the unseparated grain mass. Such grain may be filled into the hopper in any suitable manner, and may be discharged from a scalper or aspirator placed on top of the housing 10—14, as indicated in Fig. 1 of the aforementioned Gray and Johnson Patent No. 1,966,443. It may also be explained that it is frequently desirable to simultaneously employ several separating units, such as here disclosed, in one machine, in which event such units are secured together side by side, suitable power connections are made to each unit, and grain may be uniformly distributed and fed to the respective units as by a feed mechanism such as shown in Figs. 1, 7, 8, and 10 of said Patent No. 1,966,443.

The grain mass placed in hopper 16 is immediately discharged into the rear end of rotating cylinder A, and as the grain body moves forwardly and transversely under the cylinder movement all particles are eventually brought into contact with the indented inner surface of the cylinder.

As the grain moves lengthwise of the cylinder A it drops into the pockets or indents 15 which tend to carry it upwardly toward the ledge 17, and the grain which passes over the edge of this ledge drops into a trough 18 which extends about the sides and under the bottom of separating cylinder B. The grain passing through the cylinder A tends to lodge in the indents 15 as the cylinder rotates, and when the cylinder wall approaches the vertical the grain particles that are too large to be received by the indents will fall back, but the wheat (if the machine is a wheat separator) and all smaller seed and particles will remain in the indents until forced out by gravity. The maximum size of the wheat and other particles delivered into the trough 18 will of course primarily depend upon the size and conformation of the indents 15, but within certain limits

the size of particles delivered over the ledge 17 will also depend upon the speed of the cylinder and the relative height of the ledge 17, both factors of which are subject to adjustment in order that the desired results may be had, as will presently be described.

Thus the cylinder A operates to divide or separate the grain body into two parts, one having the relatively smaller particles being delivered into the trough 18, while the other part, including all kernels and particles too large to be conveyed by the pockets 15 of the cylinder A are discharged through a port 19 at the front end of the cylinder and drops down through a delivery spout 20 into the forward end of a conveyor tube 21.

The separating cylinder B is disposed eccentrically within the cylinder A but rotates in the same direction and is concentric within the trough 18. The outer surface of the cylinder B is provided with a spiral feed screw 22 which operates in the trough 18 to move the grain therein rearwardly where it accumulates and builds up against the rear wall 23 of the trough, where it is picked up by blades 24 and delivered through openings in the rear end wall 25 of the cylinder B. The grain thus passing into and through the cylinder B is subjected to a separating action similar to that which previously took place in cylinder A, but inasmuch as the pockets 15 of cylinder B are smaller than pockets 15 of cylinder A, the grain delivered into cylinder B will again be separated into two parts, the finer or smaller particles being delivered up into a trough 26 while the larger particles which pass through the cylinder B are delivered out through a spout 27. The smaller sized grain delivered into the trough 26 is conveyed therefrom by a conveyor screw 28 which is rotatably mounted therein, and is discharged thereby from the machine through a discharge spout 29. The coarser body of grain discharged through the port 19 from the outer cylinder A drops under gravity through the chute 20 into the conveyor cylinder or tube 21. This tube is provided with an internal feed screw 30 and an external feed screw 31, both of which are rigidly secured to the tube and rotate together with it and with the shaft 32, upon which these elements are mounted.

The grain fed into the forward end of the tube 21 is conveyed by the screw 30 rearwardly and is discharged into the rear end of the cylinder C, which is also provided with indents 15 but which indents are of a larger size than those of either of the cylinders A or B. Consequently the grain supplied to cylinder C is divided or separated into two parts, the smaller particles being carried up by the indents and dropped into a trough 33, while the larger particles are discharged from the machine through a delivery spout 34. The conveyor screw 31 operating in the trough 33 acts upon the grain delivered into this trough to convey it forwardly where it is discharged from the machine through a delivery spout 35.

As already indicated, the machine may be used for separating out various classes of grain according to the size of the kernels or particles. If it be assumed that the original mass of grain dumped into the hopper 16 comprises relatively small and large wheat kernels and also includes seed, sand, or other particles smaller than the smaller grade of wheat, and oats or other larger grains and particles which are larger than the larger grade of wheat, then the cylinder A will separate out the small wheat and seed and deliver such material into the trough 18, whereupon such smaller material will be treated by the cylinder B, with a result that the second separation produced thereby will convey the seed, sand, dust, and other relatively small particles into the trough 26 so that such seed and smaller particles will be conveyed to the discharge spout 29. Meanwhile the smaller grade of wheat now being separated from both the seed as well as the larger wheat, oats, etc., will be conveyed by the conveyor 22 to the discharge spout 27. The coarser materials passing to the cylinder C will in turn be separated into two parts, one including the larger grade of wheat which is carried over into the trough 33, and impelled by conveyor screw 31 to the discharge spout 35. The oats and other larger grains and particles will of course pass through the cylinder C and be discharged from the machine through the spout 34. Thus the passage of grain through the three cylinders A, B, and C will successively and efficiently separate the original mass of grain into four parts, each of which will comprise grain of a size and character different from the others.

One of the main features of the present invention is the provision of means for insuring the proper progress of the grain through the respective separating cylinders, and without interfering with the proper functioning of the indents 15 thereof. This feature contemplates the provision of deflector vanes or flights 36 for cylinder A, 37 for cylinder B, and 38 for cylinder C, and these flights are respectively and rigidly secured to the receiving troughs 18, 26, and 33. The flights are angularly disposed with respect to the axes of the respective cylinders, as best indicated in Fig. 8, and have arcuate lower edges which are parallel with but spaced inwardly or upwardly with respect to the inner surfaces of the cylinders so as to provide clearance spaces 39, 40, and 41 (see Figs. 3, 4, 7, and 8). The purpose and function of the flights are identical in each cylinder, and will presently be explained in detail.

It may first be explained that in a machine such as shown in my Patent No. 1,912,375, where similar separating cylinders are employed, the lengthwise flow of grain through the cylinders is dependent entirely upon cylinder movement agitation aided by gravity and the incoming grain flow pressure, and while the separation principle is found to be correct, the grain movement through the cylinders is neither entirely efficient nor satisfactory, particularly where high speed separation is desired. Tilting the cylinder axis, thus accelerating gravity action, will facilitate the flow but is unsatisfactory for many reasons, among which are the added complications of bearing and driving mechanisms, and the possibility of discharging too rapidly or before all grain particles have had an opportunity to contact with the indented cylinder surface. This objection was recognized in the Gray Patent No. 1,728,238, where a device was designed to retard the grain flow in an indented, inclined cylinder so that proper cylinder contact with the grain might be had. But this too has its objections, and because of the grain accumulation adjacent the retarder prevented an equal distribution of separating work throughout the length of the cylinder. The use of screw or other conveyors adjacent the inner cylinder surface is found unsatisfactory because of the interference thereof with the efficient and proper functioning of the indents.

The design and arrangement of flights as dis-

closed in this application not only permits of the use of horizontally disposed cylinders but overcomes the objections above noted as found in other devices, and very substantially increases the treating speed and efficiency of the machine, as proven in actual and commercial practice.

The action of the devices in question can best be explained in connection with the disclosure of Figs. 7 and 8, wherein the flights **38** are shown as attached by bolts **42** to the trough **33**, and are so disposed that they will be angularly positioned in the body of grain **43** supported in and traveling lengthwise through the trough, and assumes the lateral position shown due to the rotation of the cylinder in the direction indicated by the arrows.

Because of the spacing **41** between the arcuate lower edges of the flights **38** and the inner cylinder wall the flights **41** in no way influence or deflect the grain body immediately adjacent to the cylinder, and therefore do not disturb or in any way interfere with the action of the indents **15** on the grain. If the flights extended down to substantially close the gap **41** they would defeat the very object for which they are intended, for the grain would then be pushed rearwardly by the back faces of the flights and could not pass to the discharge spout **34**. If the lower edges of the flights have any retarding action at all on the grain it is merely to prevent a too thick or heavy upward layer movement of grain with the cylinder, which in turn insures cylinder surface contact with a maximum amount of grain material. The real significance and importance of the flights lies in the fact that they contact the upper layer or downflow of grain which is not retained in the upwardly moving indents, and as this released grain rolls back off of the cylinder surface it drops down upon the front surfaces of the flights and is by the action of gravity deflected forwardly where it will again be progressively subjected to another cylinder treatment or separation before the next flight again deflects it forwardly. Thus the clearances **41** prevent the flights from in any way interfering with the separating function, and the flights in addition to increasing the efficiency of the separation will only progressively advance such grain as has first been in separating contact with the indents traveling upwardly and laterally under it. With the flights properly angled, spaced, and proportioned it is found that instead of bunching the grain flow up in one end of the cylinder it will pass in a uniform flow through it so that the separation work will be uniformly distributed throughout the length of the cylinder and over a maximum transverse area.

Further important features of the present invention are the provisions which I make for cleaning out the trough **18** and for adjusting the position of the receiving ledge **17**. In designing the machine so that it may accommodate and separate out various classes and sizes of grains it is necessary to provide adjustment to regulate the receiving position of the ledge **17** inasmuch as the vertical position of this ledge determines to a large extent the type of material that is to be discharged from the cylinder A into the trough **18**; but the trough **18**, unlike troughs **26** and **33**, is not tiltably secured as a unit within the cylinder A, but is made rigid with respect to the main housing or frame of the machine proper. For this reason the ledge **17** and the plate **44** of which it is a part is made adjustable in an arcuate path immediately adjacent to the flanged edge **45** of the trough side nearest to it. The plate **44** extends the length of the trough immediately over the edge flange **45**, and is slidably secured at its ends by a pair of clips **46** carried by castings **47** (see Fig. 4), and the grain dropping out of indents **15** of cylinder A inwardly above the ledge **17** will drop upon the ledge and be deflected or conducted into the space between the trough **18** and the cylinder B.

At its opposite ends the plate **44** is provided with lugs **48** connected by links **49** to arms **50** of a shaft **51** which is journaled in the machine proper, and extends out through the forward wall **10** as shown in Fig. 1. At its outer or forward end the shaft **51** is provided with a casting **52** which is rigid with the shaft, and is provided with a handpiece **53** by which the casting **52** and shaft **51** may be oscillated. The casting has an arcuate slot **54**, and adjacent this slot is provided with a series of numbers **55** forming a scale readable in connection with a pointer **56** which is secured to a housing extension **57** and extends through the slot **54**. A set screw **58** extending through the pointer **56** may be used to releasably secure the bracket or casting **52** in adjusted positions. It will thus be seen that by releasing the casting **52** and moving it so that a predetermined number **55** will be positioned adjacent the pointer **56**, the ledge **17** may be adjusted arcuately within the cylinder A so that the receiving angle or elevation thereof may be controlled as circumstances may require.

The trough **18** is provided in its bottom with an inner discharge valley or gutter **59** (see Fig. 4) formed by the lower converging portions of the side plates which make up the trough as a unit. These lower plate portions are spaced apart to form openings **60**, and these openings are maintained by spacers **61** to which the side plates are secured by bolts **62**. An angularly bent flange **63** of one of the side plates is provided with a series of headed studs **64** which pass through angularly disposed slots **65** in a bar **66** which has a handle extension **67** extending through one end of the machine for manual manipulation. When the bar **66** is pushed inwardly by the handle **67** the angular position of the slots **65** causes the bar to move downwardly to close the openings **60**, and the bar is maintained in this position during the normal operation of the machine.

When it is desired to clean out the machine the handle **67** is pulled out, thus raising the bar **66** to open the elongated slot **60** between the trough plate members. This will permit any accumulation of grain in the trough, and particularly in the gutter **59**, to run out and into contact with the cylinder A. As the cylinder A then continues to rotate, the material so discharged will be carried up, and if the speed of the machine is slightly reduced will drop back and be deflected by flights **36** forwardly until the material has all been removed through the port **19** and down into the lower cylinder, where it will be acted upon by the feed screws **30** and **31**, and also the flights **38**, until it is entirely removed from the machine.

The structural details of the machine may be further described as follows:

The feed screw **28** within the upper and inner trough **26** is rigidly secured upon a shaft **68** mounted in bearings **69** and **70**, and extends through the hopper **16** at the rear of the machine. Upon its rear end the shaft **68** has a sprocket gear **71** (see Figs. 2 and 3) driven by a sprocket chain **72** in a clockwise direction, as indicated by the arrows. Thus the conveyor

screw 28 operates in a direction to move the material in the trough 26 forwardly to the discharge spout 29. The trough 26 is also made adjustable for oscillating movement about the axis of shaft 68 so that the elevation of its receiving edge with respect to the point of grain discharge from the indents of cylinder B may be regulated. This is done by providing the forward tubular end portion 73 of the trough with a toothed segment 74 which meshes with a worm 75 of a shaft 76 mounted transversely upon the front end of the machine. This shaft 76 has a hand wheel 77 (see Figs. 1 and 3) which, when turned, will cause the worm 75 to rotate the rack 74 in one direction or the other, and thereby transversely tilt the trough.

To the end that this trough adjustment may be accurately made, I provide the segment 74 with a pointer 78 which is readable in connection with an arcuate numbered scale 79 secured upon the front face of the housing extension 57. Thus by turning the hand wheel 77 the pointer 78 will accurately indicate the transverse, tilted position of the trough 26, and thereby also indicate to the operator the exact grain receiving elevation of the right edge of the trough, as viewed in Fig. 4. The tubular front end 73 of the trough merely oscillates in the front wall of the housing extension 57, while the rear end of the trough is trunnioned on the shaft 68 as at 80.

The forward end of the cylinder B is provided with a rigidly secured and comparatively heavy flange or ring 81 which is carried upon rollers 82 to thus rotatably support the front end of the cylinder B. The rear end of the cylinder is supported by having its rear end wall 25 rigidly secured to a collar 83, which is in turn keyed to the shaft 68 between the bearing members 70 and 80. Thus the shaft not only operatively supports the rear end of the cylinder, but also provides the necessary driving connection to the cylinder. It may here be noted, with particular reference to Figs. 4 and 5, that this end wall 25 of the cylinder B is punched out to provide not only the pickup blades 24, but also has inwardly angled supplemental blades 84 which tend to urge the material forwardly into the cylinder.

The trough 18, as previously stated, is stationary within the machine, and merely rests with its front end in the housing extension 57, while its rear end is supported by bracket 85, and in turn supports the bearing 70 for the rear end of the shaft 68.

The outer cylinder A is rotatably supported by a pair of rollers 86 carried by suitable bearing brackets 87 secured to the front wall of the machine, as shown in Fig. 1. The rear of the cylinder A has an end wall 88 to which is secured a large bearing casting 89 having a groove 90 which rotatably engages and is supported upon bearing rollers 91 secured by brackets 92 to the rear wall 11 of the main housing, as shown in Figs. 2 and 3. The casting 89 has a sprocket ring 93 over which passes a sprocket chain 94 which also rotates in a clockwise direction, as viewed in Fig. 2. Thus driving power is conveniently applied to cylinder A, notwithstanding that it rotates on an axis that is eccentric with respect to the shaft 68 and the cylinder B and feed screws 28 and 22, all of which rotate with the shaft.

The main driving shaft of the machine is that which extends longitudinally through one side of the housing, and is designated as 95. This shaft has a pulley 96, or other means, by which power may be transmitted to it from a motor or other power element. The rear end of the shaft 95 is mounted in a bearing 97 carried by the rear wall 11 of the main housing, and immediately inside of this bearing the shaft is provided with a sprocket gear 98 under which passes the previously mentioned sprocket chain 94. Outwardly of the bearing 97 the shaft 95 has a sprocket gear 99, which drives the lower shaft 32 through the medium of a sprocket chain 100 and a sprocket gear 101. The rear extremity of the shaft 32 has a sprocket gear 102 under which passes the chain 72 from sprocket gear 71, to thereby drive the upper shaft 68 and its associated parts.

In order to form a more rigid support for the rear extremity of the shaft 32, I provide a bearing 103 immediately adjacent to the sprocket gear 102, and this bearing is supported in a depending plate or bar 104, the upper end of which is rigidly secured to a rear housing extension 105 as at 106. Similarly, the rear extremity of the shaft 68 has a bearing support 107 immediately adjacent to the sprocket gear 71.

From the drive connections as thus described it will be seen that all three of the separating cylinders, as well as all of the screw conveyors, move in a clockwise direction when looking at the rear end of the machine, and in an anticlockwise direction as seen from the front, as shown in Fig. 1.

The shaft 32 is supported at its front extremity in a bearing 108 in the front of the machine, and at its rear is supported in bearing 109 and the previously noted bearing 103.

The conveyor unit, including the conveyor screw 30, the tube 21, and the outer conveyor screw 31, are all rigidly connected in one unit, and are rotatable on and together with the shaft 32. However, the two conveyor screws 30 and 31 are so designed that they will feed or convey in opposite directions. Thus the screw 30 will convey material discharged into the tube 21 from the down spout 20 rearwardly until it is discharged into the rear end of the cylinder C; while the feed screw 31 operates upon the separated grain discharged into the trough 33 so as to move this material forwardly until it is discharged out through the chute 35.

It may here be noted that in order to prevent leakage of grain between the forward end of the tube 21 and the lower end of the spout 20, I insert a gasket or lining 110, preferably made of a strip of sheepskin with the wool attached.

The forward end of the separating cylinder C is provided with a rigid ring 111 similar to the previously described ring 81 of cylinder B, and this ring 111 is rotatably supported on a pair of rollers 112, to thereby also support the forward end of the cylinder. The rear end of cylinder C has a closed wall 113 having a collar 114 which is keyed to the shaft 32, whereby rotation of the shaft will also rotate the cylinder. Provision is made for oscillating adjustment of the receiving trough 33, and in order that this adjustment may be effected I mount the forward end of the trough in a supporting ring 115 of the front housing wall 10, and at its rear I provide the end wall 116 of the trough with a trunnion 117 for supporting engagement upon the shaft 32.

The mechanism for adjustably regulating the position of the trough 33 is shown in Figs. 1, 3, and 4, and includes a shaft 118 journaled in the front housing wall, and having a hand wheel 119

with graduations thereon to be read in connection with the fixed pointer 120. The inner end of the shaft 118 is provided with a sprocket pinion 121 over which passes a chain 122, the ends of which extend partially around and are anchored to a circular extension 123 of the trough 33. When the hand wheel 119 is now turned it will be seen that it will operate through the shaft 118, the pinion 121, and chain 122, to oscillate the trough 33 and thereby raise or lower the grain receiving edge as may be desired.

While the operation of the machine will no doubt be understood from the foregoing description, a brief résumé may be made as follows:

The angles of the troughs 18, 26, and 33 are first regulated by adjusting the members 52, 77, and 119, respectively, these adjustments being made in accordance with a predetermined setting depending upon the character and class of material to be separated. Power is thus applied to the shaft 95 through the pulley 96 or other suitable power connection, and at a constant predetermined speed. It will be understood that the driving speed must be accurately controlled because if the separating cylinders A, B, and C are driven at too slow a speed they will not properly carry the correct percentage of smaller particles up and over into the receiving troughs. On the other hand, if the cylinders are driven at too fast a speed the centrifugal force thus created will carry over more material than is desired, and the indents 15 will not be able to perform their separating function; and in fact if the speed is too great the centrifugal force will even prevent any of the material from being dropped into the troughs. Slight variations in speed, however, are permissible, and in some cases may be resorted to for the purpose of controlling the separating function.

The mass of unseparated grain delivered to or placed in the hopper 16 is initially received at the rear end of the cylinder A which is supported at its rear by rollers 91, and at its front by rollers 86, and is driven by the sprocket chain 94 from the sprocket 98 on shaft 95. The material thus received progresses forwardly toward the discharge port 19, but before arriving at this point is thoroughly subjected to the separating action of the indents 15 of the cylinder. The flights 36 carried by the trough 18 will in no way interfere with the layer of grain being acted upon by the cylinder A, but will receive the downward flow of treated grain, as indicated in Fig. 7, and advance this upper grain flow progressively through the cylinder until all portions of the grain have been in separating contact with the cylinder surface; and by the time the grain mass reaches the forward end of the cylinder only the relatively larger particles remain to be discharged through the port 19 and down through the spout 20 to the tube 21.

The material which has been separated out by the cylinder A, and delivered over the ledge 17 into the trough 18, is now moved rearwardly under the action of the screw 22 on the outer periphery of the cylinder B, this cylinder being supported at its front by rollers 82, and at its rear is supported on and driven by the shaft 68, which is rotated through the medium of chains 72 and 100, and sprocket gears 71, 102, 101, and 99, the last mentioned gear being secured directly on the power shaft 95. As the grain in trough 18 is urged rearwardly by the screw 22 it accumulates and piles up against the rear wall 23 of the trough 18, where it is subjected to the pickup action of the vanes or wings 24 and 84, and thus conveyed through the cylinder wall 25 and into the cylinder B. Here the grain is subjected to a similar separating action, and is progressed through the cylinder by flights 37 which correspond in function to the flights 36 of cylinder A. Consequently the larger grain particles ultimately reach the discharge spout 27, while the smaller particles are dropped into the trough 26 and conveyed by feed screw 28 to the discharge spout 29.

The large kernels or grain particles delivered into the forward end of the tube 21 are conveyed through this tube by the feed screw 30 which rotates with the tube, and discharged into the rear end of cylinder C. The grain is then moved forwardly in this cylinder under the action of the flights 38, while the separating action takes place, and the oats and other larger particles are conveyed to the discharge spout 34; while the relatively smaller particles which are dropped into the trough 33 are conveyed under the action of feed screw 31 to the discharge spout 35. The cylinder C and conveyor members 20, 30, and 31 are of course all supported at their rear ends on and driven by the shaft 32, receiving power from shaft 95 through sprocket chain 100.

It will thus be seen that the grain mixture placed in the hopper 16 is quickly and efficiently separated into four distinct parts or classes, each of which has characteristics different from the others.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a grain separating machine, a rotatable, pocketed separating cylinder for separating grain from a grain body moving longitudinally therethrough, a trough for receiving grain elevated by the pockets when the cylinder is rotated, and a series of obliquely disposed normally stationary flights disposed in the cylinder below the trough and for projecting downwardly into said grain body, said flights each being disposed at an angle presenting a forward face inclined in the direction of progress of grain axially in the cylinder whereby such forward face will receive a return flow of unelevated grain and advance it forwardly in the cylinder, said flights having their lower edges spaced from the cylinder surface sufficiently so as not to interfere with the grain layer being elevated thereby.

2. In a grain separating machine, a rotatable, pocketed separating cylinder for separating grain from a grain body moving longitudinally therethrough, a trough for receiving grain elevated by the pockets when the cylinder is rotated, and a series of obliquely disposed normally stationary flights disposed in the cylinder below the trough and for projecting downwardly into said grain body, said flights each being disposed at an angle presenting a forward face inclined in the direction of progress of grain axially in the cylinder whereby such forward face will receive a return flow of unelevated grain and advance it forwardly in the cylinder, said flights being secured to and carried by the trough and having lower arcuate edges radially spaced from the cylinder surface so as to not interfere with the grain separating action of the pockets therein.

HARRY L. JOHNSON.