June 6, 1933. H. L. JOHNSON 1,912,375

GRAIN CLEANING AND SEPARATING MACHINE

Filed July 22, 1929 4 Sheets-Sheet 1

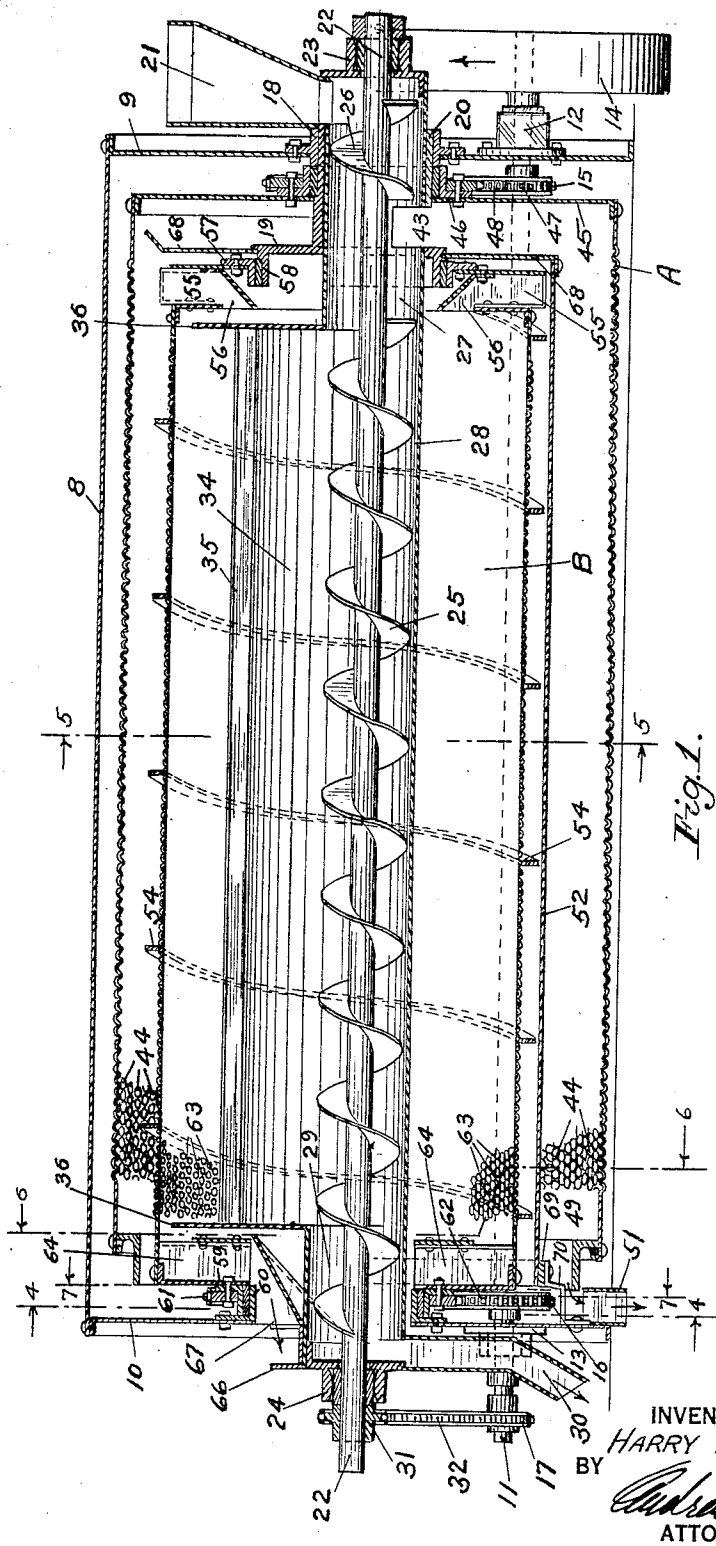


Fig. 1.

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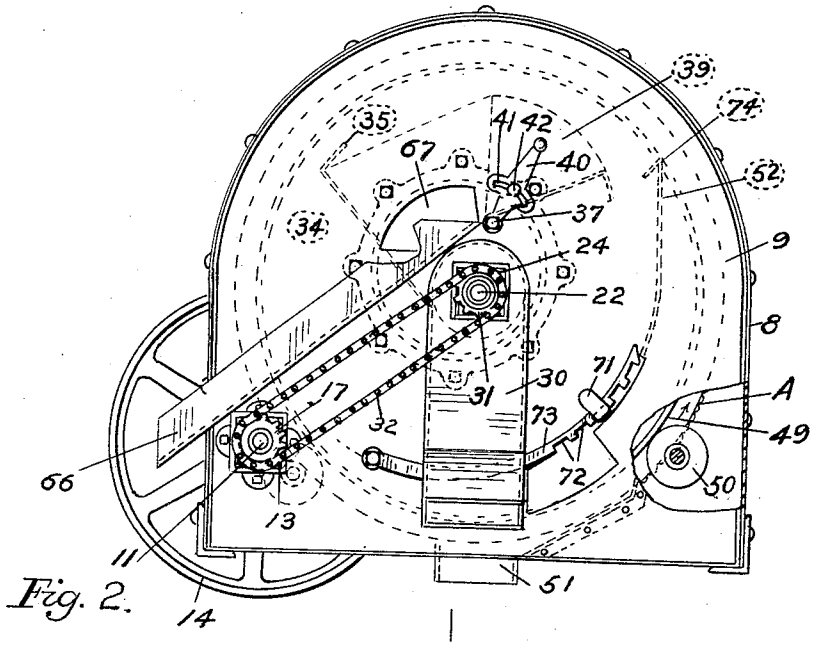


Fig. 2.

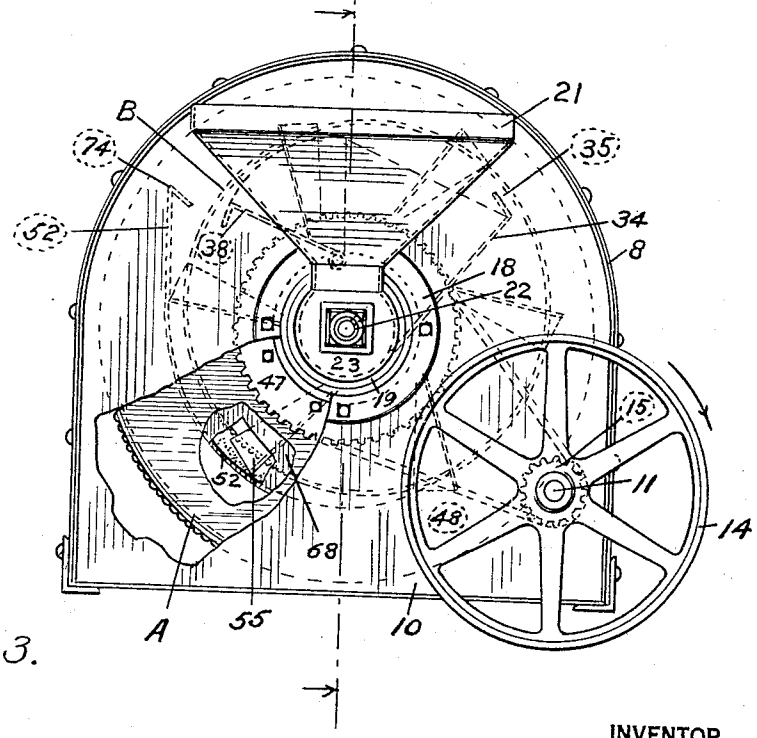


Fig. 3.

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GRAIN CLEANING AND SEPARATING MACHINE

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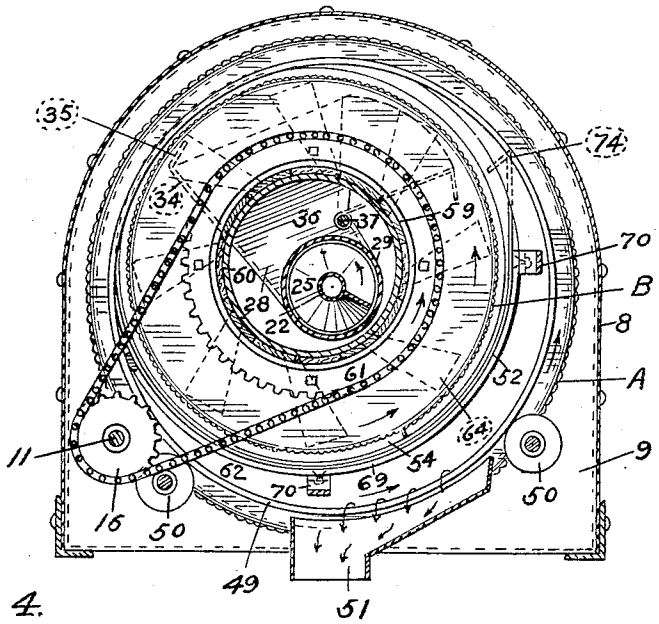


Fig. 4.

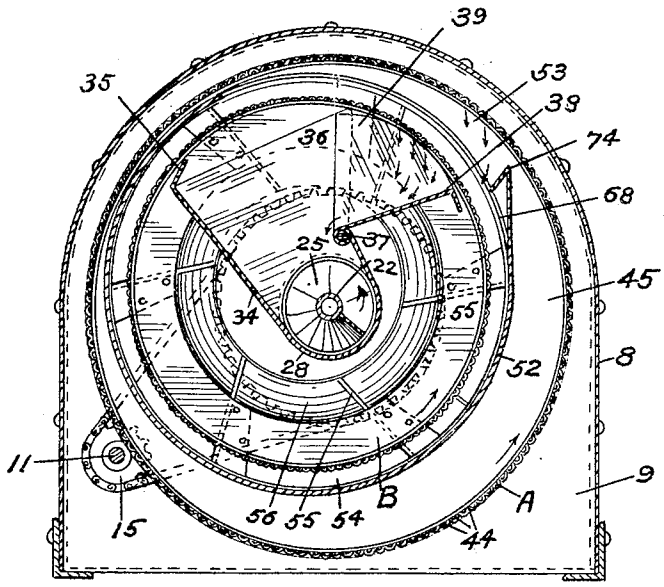


Fig 5.

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GRAIN CLEANING AND SEPARATING MACHINE

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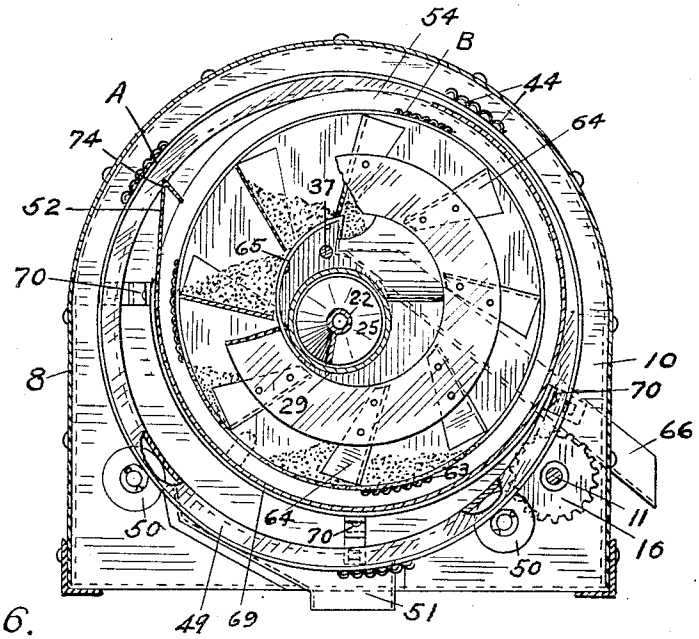


Fig. 6.

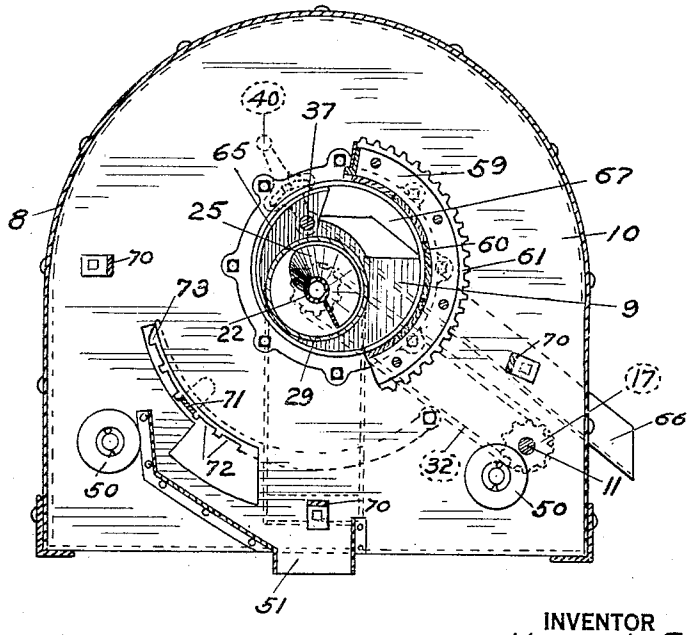


Fig. 7.

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Patented June 6, 1933 1,912,375

UNITED STATES PATENT OFFICE

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GRAIN CLEANING AND SEPARATING MACHINE

Application filed July 22, 1929. Serial No. 380,077.

This invention relates to grain cleaning and separating machinery, and the main object is to provide an efficient and practical machine for separating a mass of grain, seed and dust particles into its constituent elements, and particularly for separating out wheat from a mass containing seed or other particles that are larger or smaller than the wheat grains. A further object is to so construct the machine that it is compact, to thereby conserve space, is comparatively simple, to reduce the manufacturing cost, but which is also sturdy in construction and is so designed that it is capable of handling or separating a large volume of grain in a relatively short space of time. Further and more specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional elevation taken centrally through the machine, substantially as on the line 1—1 in Fig. 3.

Fig. 2 is an end view of the machine as seen from the left in Fig. 1.

Fig. 3 is an end view of the machine as seen from the right in Fig. 1, with fractional portions broken away for purpose of illustration.

Fig. 4 is a sectional elevation on the line 4—4 in Fig. 1.

Fig. 5 is a sectional elevation on the line 5—5 in Fig. 1.

Fig. 6 is a sectional elevation on the line 6—6 in Fig. 1.

Fig. 7 is a sectional elevation on the line 7—7 in Fig. 1.

Referring to the drawings more particularly and by reference characters, 8 designates an arched housing for the machine, and is closed by a pair of end walls 9 and 10, which are riveted or otherwise suitably secured to the housing proper. A power shaft 11 is journaled in suitable bearings 12 and 13, secured to the end walls 9 and 10, and is driven by a pulley 14 which is connected by a belt (not shown) to any suitable power unit. The shaft 11 carries sprocket gears 15, 16, and 17, all of which drive various parts of the machine, as will presently be described. The end wall 9 carries a ring-shaped bearing member 18 in which is secured a casting 19, and which casting has a tubular central portion 20 through which the unseparated grain passes from a hopper 21. A shaft 22 extends centrally through the machine, and is carried by bearing boxes 23 and 24 which are disposed at opposite ends of the machine. Formed integrally with the shaft 22 is a long feed screw 25 and a short feed screw 26, the latter of which operates in a tubular end portion 27 of a trough 28. The opposite end of this trough has a similar tubular portion 29 which terminates in a chute 30, through which the finest of the separated particles are discharged.

The worm shaft 22 has a sprocket pinion 31 that is driven from the sprocket pinion 17 by a sprocket chain 32. The tubular portions 27 and 29 of the trough 28 are carried by the casting 19 at one end, and in a suitable housing bracket at the other end. This trough, as shown in Fig. 5, has an inclined wall 34, the upper end of which has a flange 35 operative immediately within the inner surface of the cleaning drum B, which drum in turn operates within a larger and primary separating drum A.

The trough 28 is provided with end plates 36, and opposite the wall 34 is provided with a shaft 37 which carries a shelf plate 38, having end walls 39 which close against the end walls 36. The shaft 37, as shown in Fig. 2, extends outside of the end wall 9, and is there provided with an adjusting lever 40 having a segmental slot 41, through which a set screw 42 operates to secure the lever in any adjusted position. By adjusting the lever 40 it will be seen that the shelf plate 38 will be raised and lowered within the drum B, for a purpose later to be described.

As shown in Fig. 1, the members 19 and 27 are provided with a slot 43 through which the uncleaned grain drops as it is delivered from the hopper 21, by the short feed screw 26. As the stream of material drops down through the opening 43 it is received by one end of the large drum A. This drum A consists of a sheet metal cylinder having profusely distributed indents or pockets 44, that extend over substantially the entire area of the drum. The drum or cylinder A is provided with a sheet metal end wall 45, that is carried by a bearing ring 46 that rotates about the casting 19, and carries a sprocket gear 47 that is driven from the pinion 15 by a sprocket chain 48. At its other end the drum or cylinder A is provided with a large bearing ring 49, which rests on a pair of spaced rollers 50, and these rollers constitute the only support for this end of the cylinder. The bearing ring 49 also serves to reinforce this end of the cylinder, and as a third function serves as a stop to prevent a too rapid discharge of grain from the cylinder as the grain flows from the right end of the machine to the left, as seen in Fig. 1.

It may here be noted that as the cylinder A rotates the large particles of grain or other matter that are not carried up and otherwise delivered from it, will pass over the bearing ring 49 and drop down through a spout 51. The drums A and B are eccentric with respect to each other, as shown particularly in Fig. 5, so as to afford a maximum grain capacity to cylinder A, and they are separated with respect to each other by a cylindrical guard or trough 52, the upper end of which is open to receive the grain that is picked up by the indents in the cylinder A, and dropped, as indicated by the arrows 53 in Fig. 5. Secured upon the outer surface of the drum B is a spiral worm or feed screw 54, which operates in the member 52 as the cylinder B rotates, to continually move the grain in the trough 52 towards the right end of the machine, as shown in Fig. 1. As the grain is crowded by the feed screw 54 into the right end of the trough 52, it is picked up by a series of paddles or catch plates 55, each of which is angularly disposed with respect to the radius of operation, whereby it will pick up the grain and deliver it into the drum or cylinder B, through openings 56 in the end wall of this drum.

The cylinder B is supported at one end by a ring 57 that bears upon a flange 58 of the casting 19, and at its other end this cylinder is provided with a ring 59 which has bearing engagement with an angle iron ring member 60 secured to the end wall 10. The bearing member 59 carries a sprocket gear 61 that is driven from the sprocket pinion 16 on the shaft 11 by a sprocket chain 62. The cleaning cylinder B is provided with indents or small pockets 63 that function in the same manner as the indents 44, but are considerably smaller in size. If the machine is to be used for cleaning wheat, the indents 44 are preferably of a size to carry the wheat and small kernels and particles upwardly, and drop them into the trough 52, all larger particles, such as oats and other foreign matter, being delivered out through the spout 51. As the wheat and smaller particles are delivered into the interior of the drum B, the pockets or indents 63 are too small to engage the wheat kernels, but do receive all the smaller particles and carry them up so that they will drop into the trough 28. All these smaller particles are then carried off by the feed screw 25, from which they are delivered through the spout 30. The wheat kernels, on the other hand, have now been completely separated from all grain, seed, or other particles that are either larger or smaller than the wheat kernels, and as the cleaned wheat now progresses to the left end of the cylinder B, as seen in Fig. 1, it is picked up by a series of angularly formed spoons or catch plates 64 that are secured in the end of the cylinder and, like the members 55, are disposed at an angle to the operating radius of the cylinder.

As shown in Fig. 6, the inner ends of the members 64 operate against a sector or curved guard plate 65, as they move upwardly. In this manner the feed paddles 64 each engages a considerable volume of grain, and the guard plate 65 serves to retain it upon the paddle until it reaches the uppermost position, at which time the grain is dropped down into a delivery spout 66, first passing through the opening 67 in the end wall 9. The object of angling the members 64 with respect to the operating radius is to insure the proper delivery of the grain into the opening 67, and to prevent it being carried past the same by centrifugal force.

In order that the grain and other particles delivered by the indents 44 of the cylinder A to the trough 52 may be regulated as to size, the trough is mounted for oscillating adjustment, and with this purpose in mind I have provided one end of it with an end wall 68 that has an oscillating bearing engagement with the casting 19, while the opposite end is carried in a segmental strap 69 that is secured to the end wall 10 by brackets 70. The trough 52 is then provided with a spring latch 71 (see Figs. 2 and 7) that projects out through the housing end wall 10 and releasably engages the notches 72 in a sector 73 secured to this end wall. By releasing the spring latch 71 and moving it to one of the other notches 72 it will be seen that the trough 52 may be oscillatably adjusted and resecured in any desired position, and that such adjustment will raise or lower the grain receiving edge 74 of the trough.

receiving material at one end and discharging a part thereof from the other end, a trough disposed within the cylinder for receiving the undischarged grain elevated thereby, a second pocketed cylinder operating in the trough and for receiving grain therefrom, and a second trough disposed within the second cylinder for receiving relatively small particles therefrom.

7. A grain separating machine comprising a primary pocketed separating cylinder for receiving material at one end and discharging a part thereof from the other end, a trough disposed within the cylinder for receiving the undischarged grain elevated thereby, a second pocketed separating cylinder operating in the trough and for receiving grain therefrom, and means for adjusting the position of the trough.

8. A grain separating machine comprising a primary pocketed separating cylinder for receiving material at one end and discharging a part thereof from the other end, a trough disposed within the cylinder for receiving the undischarged grain elevated thereby, a second pocketed separating cylinder operating in the trough and at one end for receiving grain therefrom, and means carried by the second cylinder for agitating the grain in the trough toward said receiving means.

9. A grain separating machine comprising a primary pocketed separating cylinder for receiving material at one end and discharging a part thereof from the other end, a trough disposed within the cylinder for receiving the undischarged grain elevated thereby, a second pocketed separating cylinder operating in the trough and for receiving grain therefrom, and a second trough disposed within the second cylinder for receiving relatively small particles elevated thereby, said second cylinder having a peripheral feed screw operating in the first mentioned trough.

10. A grain separating machine comprising a primary pocketed separating cylinder for receiving material at one end and discharging a part thereof from the other end, a trough disposed within the cylinder for receiving the undischarged grain elevated thereby, a second pocketed separating cylinder operating in the trough and for receiving grain therefrom, and a second trough disposed within the second cylinder for receiving relatively small particles elevated thereby, said second cylinder having a peripheral feed screw operating in the first mentioned trough, and a second feed screw, disposed in the said second trough, for discharging material therefrom.

11. A grain separating machine comprising a pair of rotatable separating cylinders disposed one within the other, and with the inner surface of each of said cylinders provided with profusely distributed indents, means for delivering unseparated grain to one end of the outer cylinder means for discharging relatively large particles from the other end of said cylinder, means for conveying grain, separated from said relatively large particles and elevated by the outer cylinder, to the inner cylinder, means for discharging the cleaned grain from the inner cylinder, and means for receving relatively small particles from the inner cylinder and discharging them from the machine.

12. A grain separating machine comprising an outer pocketed separating cylinder for initially acting upon the grain, an arcuate trough disposed within the cylinder to receive material therefrom, an inner pocketed separating cylinder rotatable in the trough and having peripherally disposed means for advancing the material in the trough toward one end thereof as the inner cylinder rotates, said inner cylinder having elevating means including openings at one end to receive the material advanced in the trough by said peripherally disposed means.

13. A grain separating machine comprising an outer pocketed separating cylinder for initially acting upon the grain, and discharging a part thereof from one end of the cylinder an arcuate trough disposed within the cylinder to receive the undischarged part of material therefrom, an inner pocketed separating cylinder rotatable in the trough, and having peripherally disposed means for advancing the material in the trough toward one end thereof as the inner cylinder rotates, and means at the end of the inner cylinder adjacent the trough end to which the grain is advanced to effect a delivery of such grain into the inner cylinder.

14. A grain separating machine comprising an outer cylinder for initially acting upon the grain, and discharging a part thereof from one end of the cylinder an arcuate trough disposed within the cylinder to receive the undischarged part of material therefrom, an inner cylinder rotatable in the trough and having peripherally disposed means for advancing the material in the trough toward one end thereof as the inner cylinder rotates, and means carried by the inner cylinder and operative by rotation of the latter, to engage the grain advanced in the trough member and direct it into the interior of the inner cylinder for secondary treatment, said cylinders being provided with means on the interior surfaces thereof to effect a separating action on the grain therein as the cylinders rotate.

15. In a grain treating machine the combination of a receptacle for grain, means for advancing grain in the receptacle to one end thereof, a grain treating cylinder rotatable with respect to and having one end disposed adjacent to the receptacle end to which the

The operation and use of the device may be briefly described as follows:

With power applied to the pulley 14 it and the cylinders and feed screws operate in the directions indicated by the arrows in the various figures. As the uncleaned and unseparated grain is fed into the hopper 21 it is moved by the feed screw section 26 inwardly, until it drops down through the opening 43 and into the adjacent end of the cylinder A. The incoming column of grain and the agitation caused by the rotation of the cylinder effects a movement of the grain toward the ring 49 at the opposite end of the cylinder. As the grain body moves lengthwise of the cylinder it drops into the indents 44 which tend to carry it upwardly toward the trough edge 74. As the cylinder wall approaches the vertical the particles that are too large to be received by the indents will fall back, but the wheat (if the machine is a wheat cleaner) 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 52 will of course primarily depend upon the size and conformation of the indents 44, but, within certain limits, the size of particles delivered over the edge 74 will also depend upon the speed of the cylinder and the relative height of the edge 74, both factions of which are subject to adjustment in order that the desired results may be had. As previously noted, all the oversize particles or grain, such as sticks, oats, and other foreign matter, will be discharged out through the spout 51, but to prevent the accidental discharge of any wheat it is desirable to thoroughly subject the entire mass of material to the action of the indents, and to this end the ring 49 acts as a retarder, and the larger material can only escape over the inner periphery of this ring.

The larger materials having been separated out the grain and smaller particles now drop down in the trough 52, but outside of the cylinder B, and in so doing is subjected to the action of the feed worm 54 which impels it toward the paddles or scoops 55 which pick it up and drop it into one end of the cylinder B. The grain then moves toward the opposite end of the cylinder under a like influence to that described in connection with the movement through the outer cylinder. The pockets or indents 63 now operate to pick up the dust, dirt, seed and even undesirably small grains of wheat, and delivers such material over the shelf plate 38 so that it will be received in the trough 28. The trough proper is stationary, but by adjusting the position of the shelf plate, by the lever 40, the size of the small particles separated out from the wheat may be controlled. The cleaned and separated wheat is now picked up by the paddles 64 and carried up against the guard segment 65 to be delivered from the machine out through the port 67, and chute 66. Meanwhile the undesirably small material is fed outwardly by the feed screw 25 until it is discharged from the machine out through the spout 30.

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 my Letters Patent is:

1. A grain separating machine comprising a primary pocketed separating cylinder adapted to receive material in one end and discharge a part thereof at the other end, a secondary pocketed separating cylinder for separating a relatively lesser volume of material than that of the primary cylinder disposed within the primary cylinder, and means for conveying the undischarged material elevated by the primary cylinder to the interior of the secondary cylinder.

2. A grain separating machine comprising a pair of rotatable pocketed separating cylinders disposed one within the other and having end discharge openings, a trough arranged between the cylinders to catch material elevated by the outer cylinder except that which may have been discharged through such end openings, and means for conveying the material in the trough to the inner cylinder.

3. A grain separating machine comprising a pair of rotatable pocketed separating cylinders disposed one within the other, means for receiving a part of the material separated by the outer cylinder and delivering it to the inner cylinder, and a trough arranged to receive material elevated by the inner cylinder, said trough being provided with an adjustable grain receiving shelf.

4. A grain separating machine comprising inner and outer pocketed separating cylinders, a trough having an arcuate portion concentric with the inner cylinder disposed between the cylinders to receive grain separated from a mass of material in the outer cylinder, means for transferring the grain from the trough to the inner cylinder, and means for adjustably oscillating the trough to regulate the size of grain particles received.

5. A grain separating machine comprising a primary pocketed separating cylinder for receiving material at one end and for discharging a part thereof from the other end, a trough disposed within the cylinder to receive the undischarged part of the grain elevated thereby, a second pocketed cylinder operating in the trough and arranged to receive grain therefrom.

6. A grain separating machine comprising a primary pocketed separating cylinder for

grain is advanced, and a series of circumferentially spaced plate members at said end of the cylinder for engaging the grain advanced in the receptacle and directing it into the cylinder for treatment, said cylinders being provided with means on the interior surfaces thereof to effect a separating action on the grain therein as the cylinders rotate.

Signed at Minneapolis, in the county of Hennepin, and State of Minnesota, this 12 day of July 1929.

HARRY L. JOHNSON.