Feb. 10, 1925. 1,525,834

E. C. TRAVES

MACHINE FOR CLEANING GRAIN

Filed June 23, 1922 3 Sheets-Sheet 1

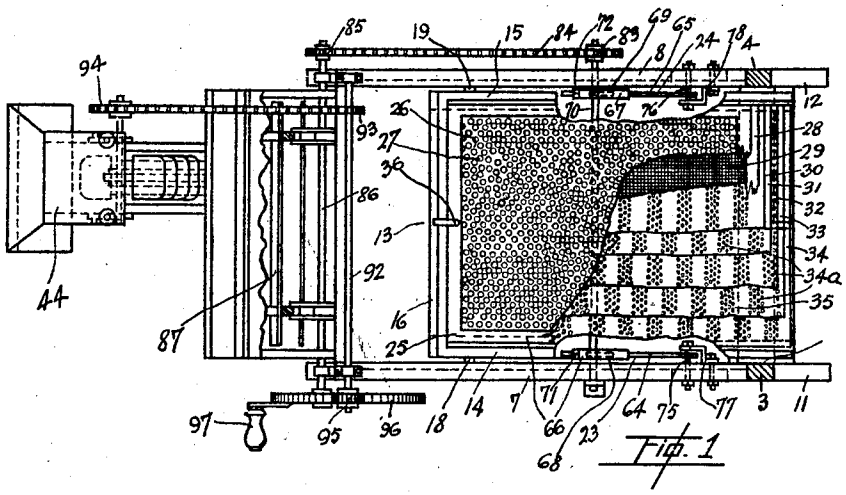


Fig. 1

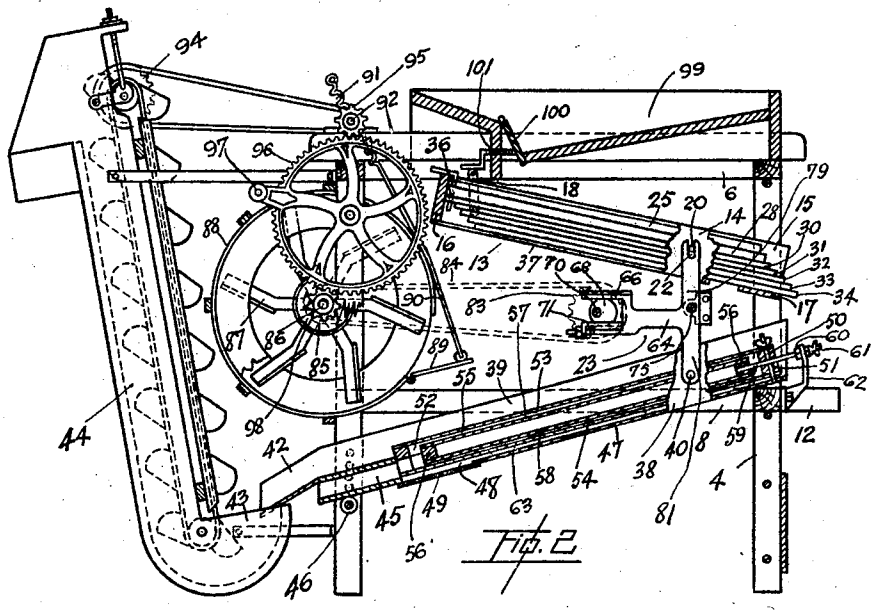


Fig. 2

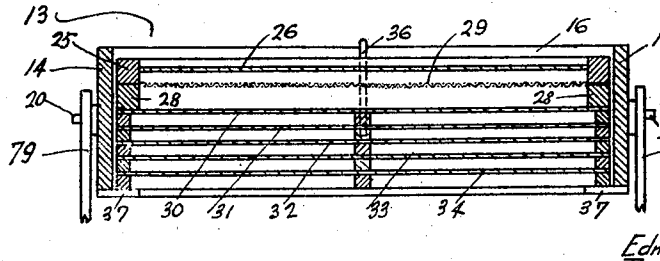


Fig. 3

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MACHINE FOR CLEANING GRAIN

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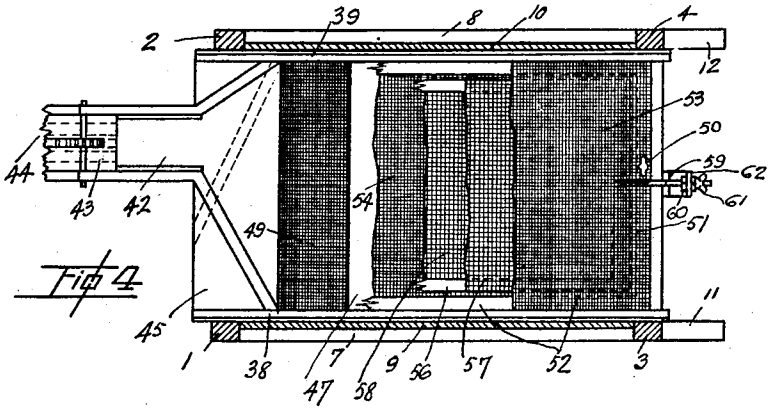


Fig. 4

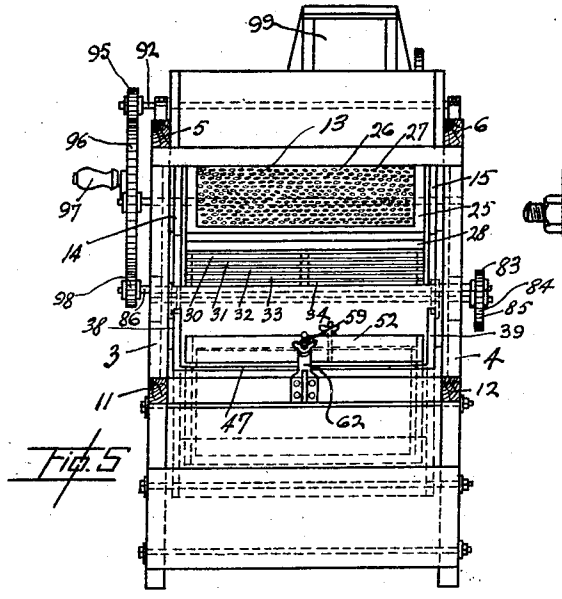


Fig. 5

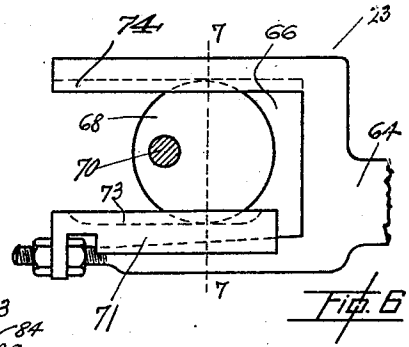


Fig. 6

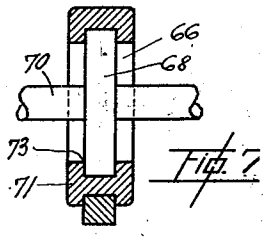


Fig. 7

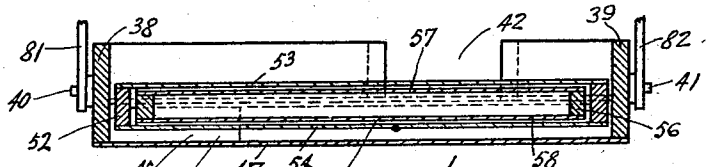


Fig. 8

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MACHINE FOR CLEANING GRAIN

Filed June 23, 1922 3 Sheets-Sheet 3

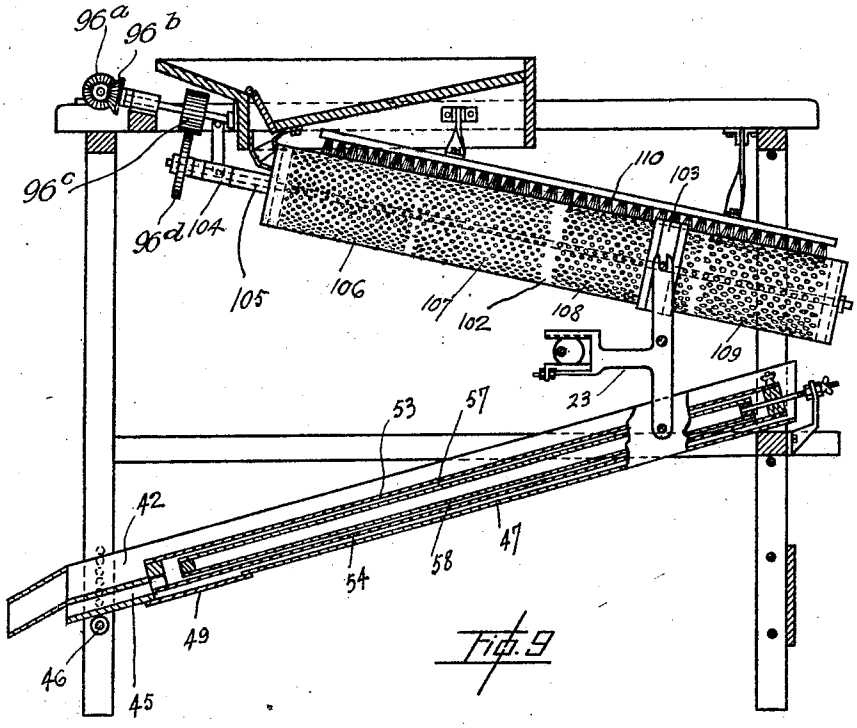


Fig. 9

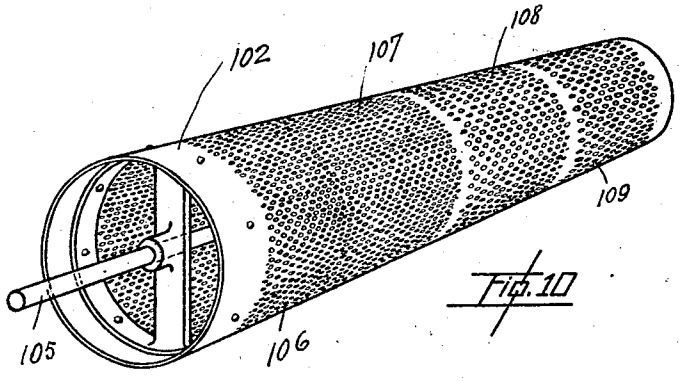


Fig. 10

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Patented Feb. 10, 1925. 1,525,834

UNITED STATES PATENT OFFICE.

EDMUND CORNELIUS TRAVES, OF NEW WESTMINSTER, BRITISH COLUMBIA, CANADA.

MACHINE FOR CLEANING GRAIN.

Application filed June 23, 1922. Serial No. 570,392.

To all whom it may concern:

Be it known that I, EDMUND CORNELIUS TRAVES, a subject of the King of Great Britain, residing at the city of New Westminster, in the Province of British Columbia, Canada, have invented certain new and useful Improvements in Machines for Cleaning Grain, of which the following is a specification.

My invention relates to improvements in machines for cleaning grain, and the object of my invention is to devise a machine of this character the use of which renders it possible to remove entirely foul seed, weeds, refuse, and in particular wild oats from the wheat and to grade the wheat in the several standard grades, the operation being performed in a simple and highly efficient manner. A further object is to provide a machine for the above purpose in which the number of parts is reduced to the minimum, thereby enabling it to be constructed economically and sold at a comparatively low cost without detracting in any degree from its efficiency and practicability.

I attain these objects by the construction illustrated in the accompanying drawings in which—

Fig. 1 is a plan view of the machine, with parts broken away to show the upper screen arrangement.

Fig. 2 is a side elevation, in part section.

Fig. 3 is a cross sectional view through the upper shoe.

Fig. 4 is a plan view showing the lower screens.

Fig. 5 is an end view of the machine.

Fig. 6 is a detail view of the rocker arm jaw and eccentric, in side elevation.

Fig. 7 is a cross sectional view taken through the line 7—7 of Fig. 6.

Fig. 8 is a cross sectional view through the lower shoe.

Fig. 9 is a side view showing an alternative construction of the upper screen.

Fig. 10 is a detail view, in perspective, of the alternative upper screen member.

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

1—2 and 3—4 indicate respectively the front and rear supports of the machine, between which extend the upper and lower side bars 5—6 and 7—8 to which are secured side panels 9 and 10, the lower side bars 7 and 8 being extended to form handles 11 and 12. Disposed within the framework just described is what is termed the "upper shoe", indicated generally by the numeral 13, which shoe consists of two parallel sides 14 and 15 connected together at their front ends by a wall 16 and at their rear ends by a slat 17 which extends across and is secured to the bottom edges of the walls, as shown in Fig. 2. The shoe is swingably supported at its front end by links 18 and 19, these links being freely attached at their upper ends to the upper side bars 5 and 6 and at their lower ends to the side walls 14 and 15, and it, the shoe, is inclined downwardly at its rear end and is provided in its side walls with outwardly projecting pins 20 and 21 which engage freely in U-shaped slots 22 formed in the ends of the upper arms of rocking members 23 and 24, which are more fully described hereinafter, from which it will be seen that the shoe is supported in an inclined position by the links 18 and 19 at its front end and the arms of the rocking members at its rear end and is therefore capable of longitudinal movement.

Disposed within the upper shoe are the upper screens grouped together in what is termed a "gang" in the following manner: A topmost screen consisting of a wood frame 25 to which a plate 26 having perforations 27 of a size which will allow all the wheat, wild oats, and other matter of similar sizes to pass through but which prevent the passage of larger matter is mounted on a second screen immediately below it which consists also of a frame 28 to which is secured a wire mesh screen 29 of a size to permit the further passage of the wheat, wild oats, and smaller seed but prevents the passage of larger matter. This second screen is mounted in turn on the upper screen of a group of screens, preferably five in number 30, 31, 32, 33, and 34, all of which are secured to one another and are provided with perforations 34ª arranged in groups of transverse rows, each group being spaced equidistant from the other, the space occupied by each group of rows being equal to the space between the groups, as shown more particularly in Fig. 1, that is to say, between each pair of groups is a blank space, indicated by the numeral

35, and these five screens 30, 31, 32, 33 and 34 are arranged so that the groups of rows of perforations in one screen are directly above the blank spaces 35 of the screen below it, as shown in Fig. 1. The respective perforations in the five screens are of the same size, that is, sufficient to permit the passage therethrough of all the wheat and smaller seeds but without the wild oats. Thus, the "gang" consists preferably of seven screens, arranged as described above and in order to be movable with the shoe the "gang" is detachably held thereto at its front, or high end, by means of a pin 36 secured to the shoe and passed through registering holes in the respective frames 25 and 28 of the screens 26 and 29 and also through the topmost screen 30, the "gang" being supported on ledges 37 formed at the bottom of the side walls 14 and 15 and also by the slat 17, as it rests thereon at its rear end.

Disposed directly under the "upper shoe" at a suitable distance therefrom is the "lower shoe", formed of two side walls 38 and 39 having outwardly projecting pins 40 and 41 secured thereinto adjacent their rear ends and fitting freely holes provided in the lower arms of the rocking members 23 and 24 adjacent the rear ends of the same, from which it will be seen that the rear end of the lower shoe is supported by the lower arms of the rocking members. This lower shoe is inclined oppositely to the upper one and at its front end is formed into upper and lower delivery chutes, the upper one 42 being in depth approximately half the depth of the shoe and leading forwardly to discharge into the receiving hopper 43 of an elevator 44 arranged on the front end of the machine, while the lower chute 45 extends transversely under the upper one and discharges out at the side of the machine, this chute 45 being open on its rear side. The bottom of the chute 45 forms the front part of the bottom of the lower shoe and rests on a roller 46, carried by the supports 1 and 2 so that the shoe is thus supported at its front lower end on the roller 46. For the greater part of its length from its rear end the lower shoe is closed by a solid plate 47 secured to the lower edges of its side walls, the end of this plate, however, being spaced from the lower chute 45 so that an opening 48 is thus formed in the bottom of the lower shoe, and this opening is covered with a fine wire mesh 49 of a size designed to permit the passage therethrough of foul seed, weeds, and other refuse of a size smaller than the wheat kernels. Secured into the plate 47 at its rear end is an upstanding stud 50 which extends through and is secured to the transverse rear end bar 51 of a frame 52 fitting within the lower shoe, the front end of which frame extends adjacent the chute 45 and is open so as to communicate with the chute, as shown in Fig. 2. Screens 53 and 54 are secured to the top and bottom of the frame 52 respectively from which it will be seen that there is a space, indicated by the numeral 55, between the screens equal to the depth of the frame and in this space is disposed an inner frame 56 also covered on its top and bottom sides with screens 57 and 58 and the depth of this frame is such that its upper and lower screens 57 and 58 are respectively in rubbing contact with the upper and lower screens 53 and 54 of the frame 52. In the transverse rear end bar of the frame 56 is secured a rod 59 which extends freely through an opening in the rear end bar 51 of the frame 52, this rod being rigidly secured at its opposite end by double nuts 60 and 61 into a bracket 62 rigidly secured to the frame of the machine, and thus the frame 52 is longitudinally movable on the rod 59 while the inner frame 56 is immovable. The bottom surface of the lower screen 54 lies in the same plane as the floor of the transverse chute 45, while the plate 47 is spaced from the screen 54 so that a passage 63 is formed between them, and the size of the openings in the upper screen 53 is designed to permit the passage therethrough of the No. 3 wheat but prevent the passage of Nos. 1 and 2 wheat, while the size of the openings in the lower screen 54 permits the passage therethrough of all foul seed and other small refuse but prevents the passage of the No. 3 wheat.

The rocking members, indicated generally by the numerals 23 and 24, hereinbefore referred to, are formed substantially T-shaped each having a horizontal bar 64 and 65 respectively each of which terminates at one end in a jaw, 66 and 67 respectively, within which jaws are rotatably mounted the respective eccentrics 68 and 69 secured to a transverse shaft 70, and in order to take up any slackness due to wear between the jaws and the eccentrics each jaw is provided with a longitudinally adjustable wedge, 71 and 72, each having an oil groove, 73 and 74, in which grooves the eccentrics operate. At their opposite ends the rocking members are formed as stated T-shaped and are pivoted on pivots 75 and 76 carried by brackets 77 and 78 being provided with upper and lower vertical arms 79 and 80, and 81—82, in the upper ends of which arms are U-shaped slots 22 which engage the pins 20 and 21 of the upper shoe and in the lower ends of which lower arms are the holes which engage the pins 40 and 41 of the lower shoe. The transverse shaft 70 on which the eccentrics are secured is provided with a sprocket 83 chain-connected by a chain 84 to a sprocket 85 secured to a transverse shaft 86 on which shaft is also mounted a fan 87 en-

closed in a casing 88, which casing is provided with a hinged door 89 the opening of which allows a current of air to be directed on to the screens of the upper shoe when the fan is in operation, and to open the door a rod 90 is connected thereto the opposite end of which rod is provided with a plurality of semi-circular notches 91 any of which is adapted to be seated over a transverse shaft 92 by the rod in any adjusted position. The shaft 92 is provided on one end with a sprocket 93 chain-connected to a head end sprocket 94 on the elevator while on its opposite end is secured a gear 95 meshing with a large driving gear 96 rotatably mounted on the frame and provided with a handle 97, and also meshing with this gear 96 is a smaller gear 98 secured to the shaft 86 of the fan 87.

Mounted directly above the upper shoe is a hopper 99 having a door 100 arranged to permit discharge from the hopper on to the front, or high, end of the upper screen 26, and the amount of door opening is adjustably controlled by a handled screw 101, as shown in Fig. 2.

The operation of the machine will be readily apparent and may be briefly described. The hopper 99 is loaded with the grain to be cleaned and the hopper would then contain not only wheat, but wild oats, foul seed, and other matter foreign to the wheat itself. The door 100 being opened the contents of the hopper are discharged on to the upper end of the screen 26 and the gear 96 being rotated by means of the handle 97 the upper and lower shoes are caused to move longitudinally in opposite directions by the rocking of the members 23 and 24, which are operated by the eccentrics, since the eccentrics are themselves rotated by means of the chain-connected sprockets 83 and 85 secured to the eccentric shaft 70 and gear shaft 86. The upper and lower shoes being thus caused to move, or shake, alternately back and forth all matter of larger size than the perforations in the screen 26 travels along the screen towards and passes over its rear end while the other matter including wheat, wild oats, foul seed, passes through on to the wire mesh screen 29 where a further separation takes place, the wheat, wild oats, foul seed passing through on to the top screen 30 of the "gang" while the separated matter travels along and passes over the end of the screen 29. The mixture now on screen 30 is shaken to and fro by the movement of the shoe and the wheat is gradually separated from the wild oats, the wheat falling through the perforations of screen 30 on to the blank spaces of screen 31, then through the perforations of screen 31 on to the blank spaces of screen 32 until it falls through the lowermost screen 34 with all the wild oats removed, the oats passing along and over the end of the gang as it becomes separated from the wheat. The clean wheat now falls on to the screen 53 of the lower shoe and that of a size larger than the perforations of the screen travels downwardly along the screen and passes out through the chute 42 into the elevator where it is elevated and delivered at the upper end as No. 1 and No. 2 wheat, while the smaller kernels pass through the perforations on to and through the screens 57 and 58 and those kernels larger than the perforations of the lower screen 54 travel along the screen and pass over its lower end into the lower chute 45 to be discharged therefrom. All the smaller seeds, foul seed, weeds, and foreign matter of a size to pass through the screen 54 pass on to the plate 47 and travels down along the same and out through the fine wire mesh 49, the separation which takes place in the lower shoe being assisted by the rubbing of the movable screens 53 and 54 on the inner immovable ones 57 and 58, since the rubbing action prevents clogging of the screens.

In certain instances it happens that the mixture to be separated and cleaned is exceptionally dirty and in such cases it is preferable to pass the mixture through a longer screening period than is possible with the screens described in the foregoing. To suit these conditions I provide an alternative screen attachment to be substituted for the "gang" hereinbefore described, which attachment consists of a revolving inclined cylinder 102 substantially twice as long as any of the gang screens, which cylinder is rotatable by the operation of the driving gear 96 through a suitable gear connection 96^a, 96^b, 96^c, and 96^d shown in Fig. 9 and is longitudinally movable alternately in opposite directions by the rocking members in the manner already described, the cylinder being revolvably mounted at its lower end in a circular band 103 carried by the upper arms of the rocking member and at its upper end by a link-supported sleeve 104 through which the shaft 105 of the cylinder rotatably extends. The sieve is perforated with a series of perforations of different sizes, indicated by the numerals 106, 107, 108, 109 of a size to permit the passage therethrough of the wheat to fall on the lower shoe screens, the wild oats passing along the interior and out at the end of the cylinder as it is simultaneously rotated and shaken longitudinally, and in order to force back any kernels protruding through the perforations on the top side of the cylinder a brush 110 is mounted to extend longitudinally thereof and normally in contact with the cylinder periphery.

Thus the cleaning and grading of wheat is accomplished in a highly practical and efficient manner by the use of the machine described, which machine is simple in con-

struction and easy to operate so that it may be manufactured, sold, and maintained at a low cost.

What I claim as my invention is:—

1. In a machine of the character described, a grader comprising a pair of superposed spaced and longitudinally reciprocable screens and a pair of superposed screens immovably mounted between the spaced screens and in rubbing contact with the same, the reciprocable screens and the immovable ones being perforated according to grading sizes.

2. In a machine of the character described, a grader comprising a pair of superposed spaced and longitudinally reciprocable screens and a pair of superposed screens immovably mounted between the spaced screens and in rubbing contact with the same, the reciprocable screens and the immovable ones being perforated according to grading sizes, and a plate disposed below and spaced from the lower reciprocable screen having a discharge opening.

3. In a machine of the character described, a grader comprising a pair of superposed spaced and longitudinally reciprocable screens and a pair of superposed screens immovably mounted between the spaced screens and in rubbing contact with the same, the reciprocable screens and the immovable ones being perforated according to grading sizes, a delivery chute with which the upper superposed spaced screen communicates, and a delivery chute with which the lower screen communicates, the floor of the last-mentioned chute being in the same plane as the bottom of the screen.

4. In a machine of the character described, a grader comprising a pair of superposed spaced and longitudinally reciprocable screens and a pair of superposed screens immovably mounted between the spaced screens and in rubbing contact with the same, the reciprocable screens and the immovable ones being perforated according to grading sizes, a delivery chute with which the upper superposed spaced screen communicates, a second delivery chute with which the lower screen communicates, the floor of said second chute being in the same plane as the bottom of the screen, and a plate secured to and spaced below the said lower screen provided with a discharge opening forming a delivery chute for matter passing through the said lower screen.

5. In a machine of the character described, a grader comprising a longitudinally reciprocable frame, a plate closing the bottom of said frame for the greater part of its length whereby a discharge opening is provided in the frame bottom, an upstanding stud secured into the plate at the end remote from said opening, a frame covered by a pair of superposed spaced screens mounted within said reciprocable frame connected thereto to be reciprocable therewith by the said stud, and a pair of superposed screens mounted between the screens aforesaid and in rubbing contact therewith, said latter screens being provided with an immovable rod extending freely through the frame of the first-mentioned screens on which the said frame reciprocates.

In testimony whereof I affix my signature at the city of Vancouver, B. C., this 14th day of June, 1922.

EDMUND CORNELIUS TRAVES.