

Jan. 14, 1941.

A. R. ROGERS

2,228,977

SEPARATOR

Filed Jan. 26, 1939

3 Sheets-Sheet 1

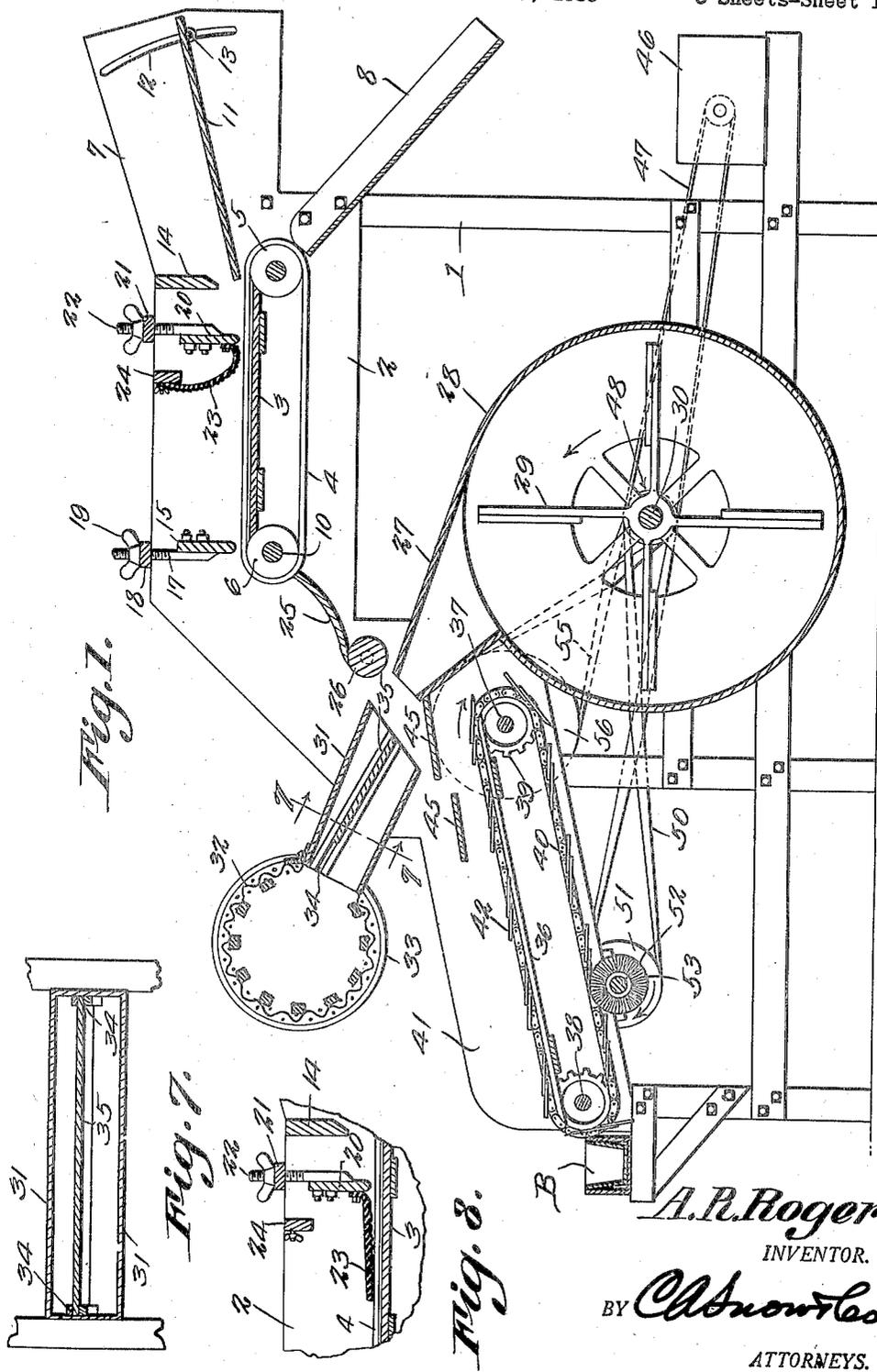


Fig. 1.

Fig. 7.

Fig. 8.

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Fig. 2.

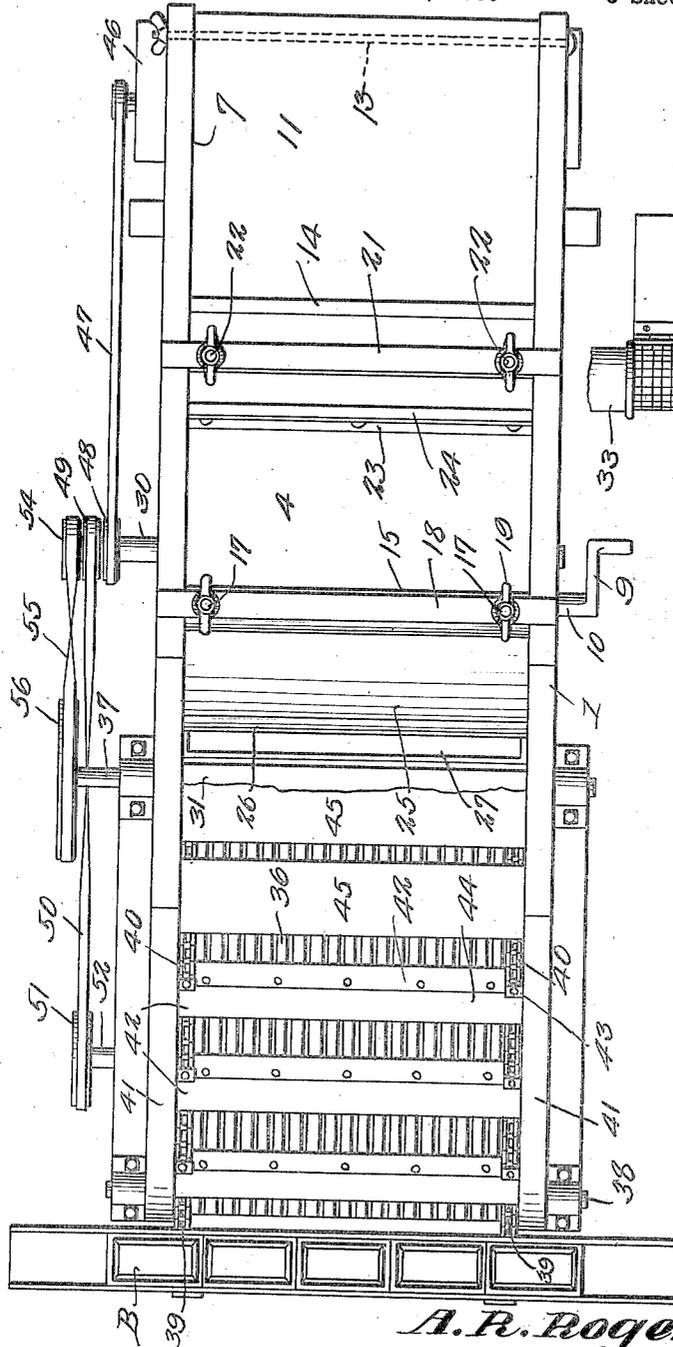
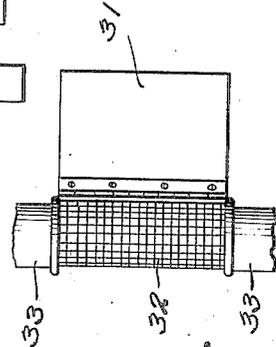


Fig. 9.



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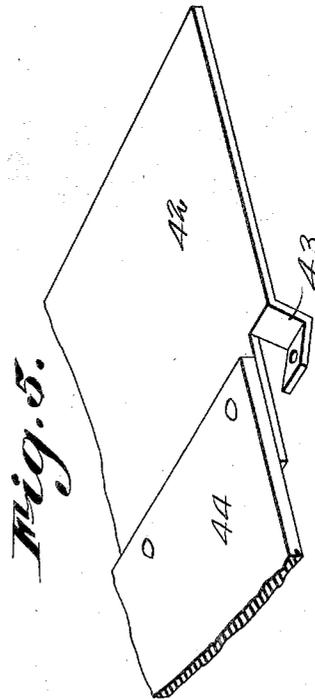
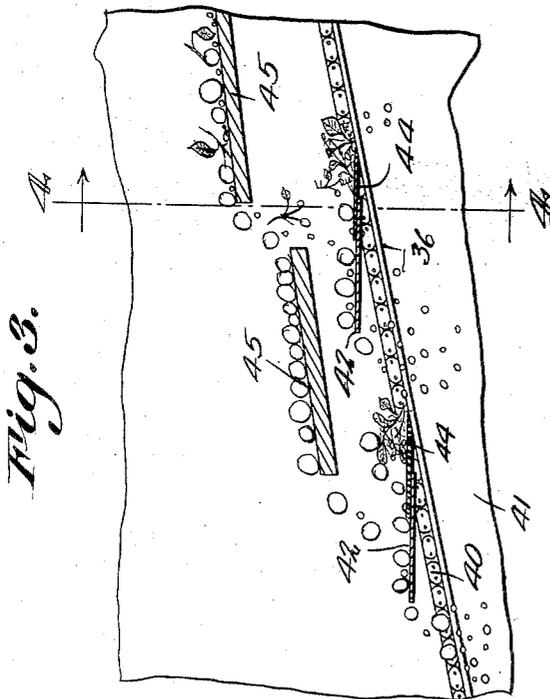
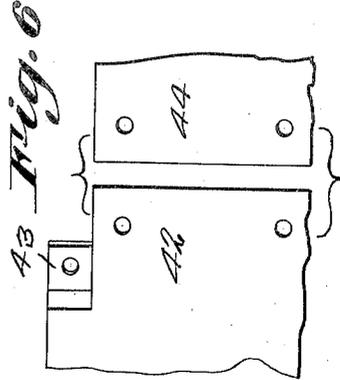
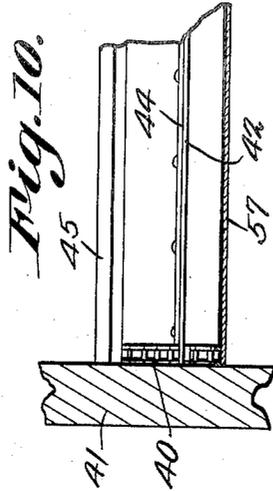
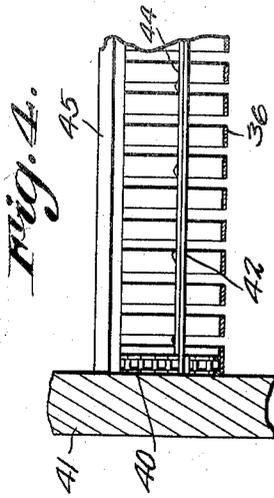
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3 Sheets-Sheet 3



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2,228,977

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Application January 26, 1939, Serial No. 252,986

7 Claims. (Cl. 209—12)

This invention relates to grading machines and while the same can be used for grading different kinds of berries, etc., it is designed primarily for use in separating blueberries from trash and other waste material usually mixed therewith after they have been gathered.

In view of the increasing demand for "market" berries or, in other words, berries in quart boxes contained within crates, various means have been devised for winnowing the berries before they have been crated and shipped to the factories or other points of use. While many of these machines have operated satisfactorily in separating berries from leaves, twigs and like materials, none of them have been able thus far, as far as I am aware, to separate the good berries from berries which are crushed.

An object of the present invention is to provide a simple but efficient machine which will not only remove dirt, leaves and stems from the bulk material but also operate to separate from the goods, full grown berries, undersize berries, berries which are crushed, and berries which are still clinging to stems.

A further object is to provide a machine to which the freshly gathered berries can be delivered and from which the cleaned, uncrushed berries will be delivered into containers while all other or waste material will be eliminated.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:

Figure 1 is a vertical longitudinal section through the machine.

Figure 2 is a plan view, parts being broken away.

Figure 3 is an enlarged vertical longitudinal section through a portion of the separating and grading deck and the parts cooperating therewith, the direction of movement of the trash and berries during the separating operation being indicated by arrows.

Figure 4 is a section on line 4—4, Figure 3.

Figure 5 is a perspective view of a portion of one of the scrapers.

Figure 6 is a plan view of a portion of one of the scrapers with its parts separated.

Figure 7 is an enlarged section on line 7—7, Figure 1.

Figure 8 is a section through a portion of the feeder showing the drag apron in active position.

Figure 9 is a plan view on a reduced scale of the separating screen and its flue.

Figure 10 is a view similar to Figure 4 showing a modified form of deck.

Referring to the figures by characters of reference 1 designates a frame of any suitable construction provided, at one end with side boards 2 between which is located a feeder. This includes a table 3 supporting the upper flight of a feed apron 4 which is mounted on rolls 5 and 6. A feed chute 7 is adapted to deliver bulk material onto the top flight of the apron while a discharge chute 8 extends downwardly and outwardly from the frame for receiving material from belt 4 should said belt be moved oppositely to the direction indicated by the arrow in Figure 2.

Apron 4 extends up to the side boards 2 and is adapted to be actuated by any suitable means. Preferably a hand-operated crank 9 is connected to the shaft 10 of roll 6 so that the belt can be actuated at will by the operator.

The chute 7 of the feeder has a bottom 11 pivotally mounted above one end portion of the apron 4 while the other end portion is mounted to swing upwardly or downwardly, there being arcuate slots 12 for receiving clamping bolts 13 carried by the bottom 11 whereby said bottom can be held at any desired angle so that the flow of bulk material therealong by gravity to the apron 4 can be regulated. This flow is further regulated by a transverse stop strip 14 connecting the side boards 2 above the lower or delivery end of the bottom 11 and spaced from said bottom to provide a throat through which unrestrained material can flow.

Supported above the other end portion of apron 4 where roll 6 is located, is a gate 15 suspended by adjusting bolts 17 from a cross strip 18. By means of nuts 19 mounted on these bolts, the gate can be raised or lowered relative to the top flight of apron 4 so as to permit only a predetermined thickness of bulk material to be delivered from the apron.

Adjustably supported between the side boards 2 and also between gate 15 and top strip 14, is a cross strip 20 which can be raised or lowered relative to its supporting strip 21, by means of nuts and bolts indicated generally at 22. To the bottom of this strip 20 is secured one edge portion of a drag apron 23 formed preferably of a sheet of corrugated rubber and when this drag apron

is not in use, the free end portion thereof can be fastened to a cross strip 24 connecting the side boards so that all portions of the apron will be held out of contact with any material supported by apron 4. When the machine is in operation, however, the drag apron 23 is released from strip 24 and permitted to rest on materials supported by the upper flight of apron 4 so that the said material will be spread out or smoothed on the apron under the light pressure to which it is subjected by the drag apron 23.

A downwardly extending delivery plate 25 is positioned to receive bulk material as it is discharged from the upper flight of apron 4. This plate is preferably concave and suitably supported at its lower end, as by means of a cross strip 26 which can be round or of any other desired configuration. This supporting strip is located above the outlet end of a flue 27 extending from the casing 28 of a blower 29 which is secured to a rotatable shaft 30. This blower is located within the lower portion of frame 1 and the outlet spout 27 thereof is inclined upwardly so as to direct a blast of air past the lower end of plate 25 and its supporting strip 26 and into a flue 31 which is spaced from flue 27 and opens into a separating screen 32 which can be cylindrical or of any other desired form. The screen 32 opens at its ends into pipes 33 through which trash can be discharged.

Arranged on the side walls of the flue 31 are guide channels 34 in which an air gauge, in the form of a plate 35 is slidably mounted, these channels being inclined relative to the longitudinal axis of flue 31 so that the air gauge plate 35 will be supported obliquely to the flue and, when moved in one direction, will control the size of the outlet between the top of the flue and the gauge plate at the upper end of said plate.

A deck 36 formed preferably of metal slats, is inclined downwardly away from the outlet flue 27 and rotatably mounted under the ends of this deck are shafts 37 and 38 each of which is provided with a pair of sprockets 39. Endless chains 40 are mounted on the sprockets and travel close to side boards 41 located at the side edges of the deck 36 and extending upwardly therefrom.

A series of scrapers are carried by the two chains. Each scraper includes a plate 42 of steel or other suitable stiff material which can be provided with laterally extending ears 43 secured to the adjacent links of the chains. Each scraper is supported in a substantially horizontal position by the chains and thus diverges from the inclined deck 36 as shown. To those edges of the plates 42 nearest the deck are secured scraping strips 44 formed preferably of rubber and these are adapted to contact with and move along the upper surface of the deck.

Any desired number of these scrapers can be used and they are regularly spaced. They are adapted to travel successively under steps 45 connecting the side boards 41 above the level of the scrapers and inclined downwardly toward the delivery end of the machine.

As shown in Figure 1 the berries or other bulk materials, as they are delivered from the lower end of the conveyer formed by chains 40 and scrapers 42-44, can be deposited directly into boxes B fed transversely across the outlet end of the machine. However should grading of the berries be advisable before they are boxed, the deck 36 can be formed of spaced parallel slats as shown in Figures 2 and 4. The slats are so spaced so as to allow small size berries to fall between them while the larger sizes will travel

along the slats to the boxes. It is preferred to make the slats of thin strips of metal, so that there is no danger of choking the slots formed between the slats.

The machine is adapted to be operated by any suitable mechanism. For example, and as shown in the drawings, a motor 46 can be employed for transmitting motion through a belt 47 to a pulley 48 on the shaft 30 of blower 29. Another pulley 49 on said shaft 30 operates a belt 50 which is adapted to drive a pulley 51 on the transverse shaft 52. This latter shaft carries a cylindrical brush 53 the upper portion of which contacts with the scrapers as they are brought successively to position thereabove during the movement of the separating conveyer in the direction indicated by the arrow in Figure 1.

A third pulley 54 drives a belt 55 mounted on a pulley 56 secured to the shaft 37.

It will be obvious from the foregoing that during the operation of the machine, the blower 29 will be driven at a high speed and will deliver a strong current of air upwardly between plate 25 and steps 45 and into flue 31, the air ultimately being dissipated through the screen 32. At the same time motion will be transmitted by the mechanism to the brush 53 and to the separating conveyer. The upper flight of this conveyer will move upwardly along the deck 36 as indicated by the arrow so that the scrapers will be moved beneath the steps 45.

The gathered berries with the trash commingled therewith are fed onto the apron 4 through bottom 11 of the feeder. The operator rotates shaft 10 so as to feed this material under the lowered drag apron 23 and under gate 15 at any desired speed. By adjusting the gate, the material will be free to flow from the hopper as rapidly as desired. As the material drops off of plate 25 it will be compelled to enter the air current being discharged from flue 27. Consequently leaves and other light particles such as dust, etc., will be blown upwardly into flue 31, passing over plate 35 into screen 32.

Bunches which are not carried off by the air current will fall upon the steps 45 while loose berries will fall on the deck of the separating conveyer. Crushed berries, twigs and other waste material deposited upon the inclined deck 36 and incapable of rolling, will be drawn upwardly by the scrapers as shown in Figure 3. The desirable uncrushed berries free from trash will roll downwardly from one step 45 to another and between the steps so as to be deposited on the trash being scraped upwardly by the blades. These berries will roll over the trash because the scrapers are substantially horizontal and they will ultimately reach the delivery or lower end of the conveyer while at the same time, the trash is being scraped upwardly and allowed to gravitate at the upper end of the conveyer. Should any material adhere to the scrapers after reaching the point of delivery, the brush 53 will operate efficiently to forcibly remove the adhering material. Under-size berries and small waste particles will fall between the slats of the deck.

By providing a machine operating as described crushed berries and berries adhering to stems will be separated from the cleaned perfect berries and at the same time other waste matter such as leaves, dirt, etc., will all be removed in an efficient manner so that the machine although fed with bulk material containing all of these undesirable accumulations, will nevertheless deliver berries

only to the awaiting boxes or other containers and these berries will not be crushed.

Should it be desired to reject a supply of berries because of their condition, it would merely be necessary for the operator to reverse the movement of the feed apron 4 while the berries are being delivered from the chute 7. This would result in immediate return of the berries through the outlet chute 8.

Obviously, and as shown in Figure 10, the deck can be made solid instead of slats should it not be desired to grade the berries while they are travelling through the machine. The solid deck has been indicated at 57.

15 What is claimed is:

1. A berry separator including an inclined deck, parallel scrapers extending transversely of the deck and disposed in upwardly stepped relation, each scraper being positioned in a plane above and substantially parallel with the planes occupied by the other scrapers, and converging toward the deck in the direction of movement of the scraper means for moving the scrapers while in stepped relation upwardly along the deck to accumulate trash in the path of each scraper and back of the next adjoining scraper in advance thereof, and means for directing berries onto the deck and into the path of the scrapers for rolling movement over the scrapers and trash accumulated therebetween.

2. A separator of the class described including an inclined deck, means for directing a mixture of berries and trash onto the deck, an endless series of spaced parallel scrapers extending transversely of the deck and disposed in upwardly stepped relation, each scraper being positioned in a plane above and substantially parallel with the places occupied by the other scrapers, and converging toward the deck in the direction of movement of the scraper, and means for moving the scrapers upwardly along the deck, said scrapers converging upwardly toward the deck as to collect and drag material which will not roll but to release for gravitation over the steps all material capable of rolling.

3. A separator of the class described including an inclined deck, means for directing a mixture of berries and trash onto the deck, an endless series of spaced parallel scrapers extending transversely of the deck and disposed in upwardly stepped relation, each scraper being positioned in a plane above and substantially parallel with the places occupied by the other scrapers, and converging toward the deck in the direction of movement of the scraper, and means for moving the scrapers upwardly along the deck, said scrapers converging upwardly toward the deck as to collect and drag material which will not roll but to release for gravitation over the steps all material capable of rolling, each of said scrapers comprising a sub-

stantially horizontal plate, and a resilient portion connected to and extending forwardly from and longitudinally of the advancing edge of the plate for sliding contact with the deck.

4. A separator of the class described including an inclined deck, means for directing onto the upper portion thereof a mixture of berries and trash, a separating conveyer, and means for moving the conveyer upwardly along the deck, said conveyer comprising spaced scrapers disposed in stepped relation, and flexible connections between the scrapers, each of the scrapers being positioned substantially horizontal and diverging from but contacting at its advancing edge with the deck, each scraper including a plate and a resilient deck contacting portion connected to and extending from the plate in the direction of movement of the plate.

5. A separator of the class described including spaced parallel slats providing an inclined deck, spaced steps fixedly supported above the deck, a separating conveyer movable upwardly along the deck and beneath the steps, said conveyer including spaced substantially horizontal scrapers contacting at their advancing edges with and diverging from the deck, said scrapers being stepped upwardly in the direction of their movement and occupying substantially horizontal superposed planes.

6. In a separator of the class described an inclined deck, a reversible feed apron for directing material toward or from the deck, adjustable means for controlling the flow of material from the apron, means for directing an air current upwardly between the apron and deck, and an endless series of scrapers contacting with and movable upwardly along the deck, each of said scrapers including a flat substantially horizontal plate positioned for gravitation thereover of material capable of rolling, and a flexible portion for sliding contact with the deck.

7. In a separator of the class described an inclined deck, a reversible feed apron for directing material toward or from the deck, a drag apron thereabove, adjustable means for controlling the flow of material from the apron, means for directing an air current upwardly between the apron and deck, and an endless series of scrapers contacting with and movable upwardly along the deck, each of said scrapers including a flat substantially horizontal plate positioned for gravitation thereover of material capable of rolling, and a flexible portion for sliding contact with the deck, and steps fixedly supported above the path of the scrapers and inclined downwardly away from the hopper, said steps being positioned to receive and permit gravitation thereonto and therebetween of material to be separated.

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