March 16, 1937. W. E. GHENT 2,073,837

ARTICLE CLEANING AND SORTING MACHINE

Filed Dec. 18, 1934 4 Sheets-Sheet 1

Fig. 6

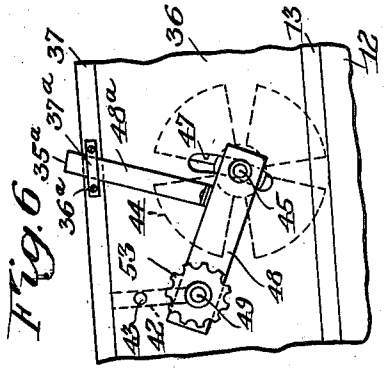
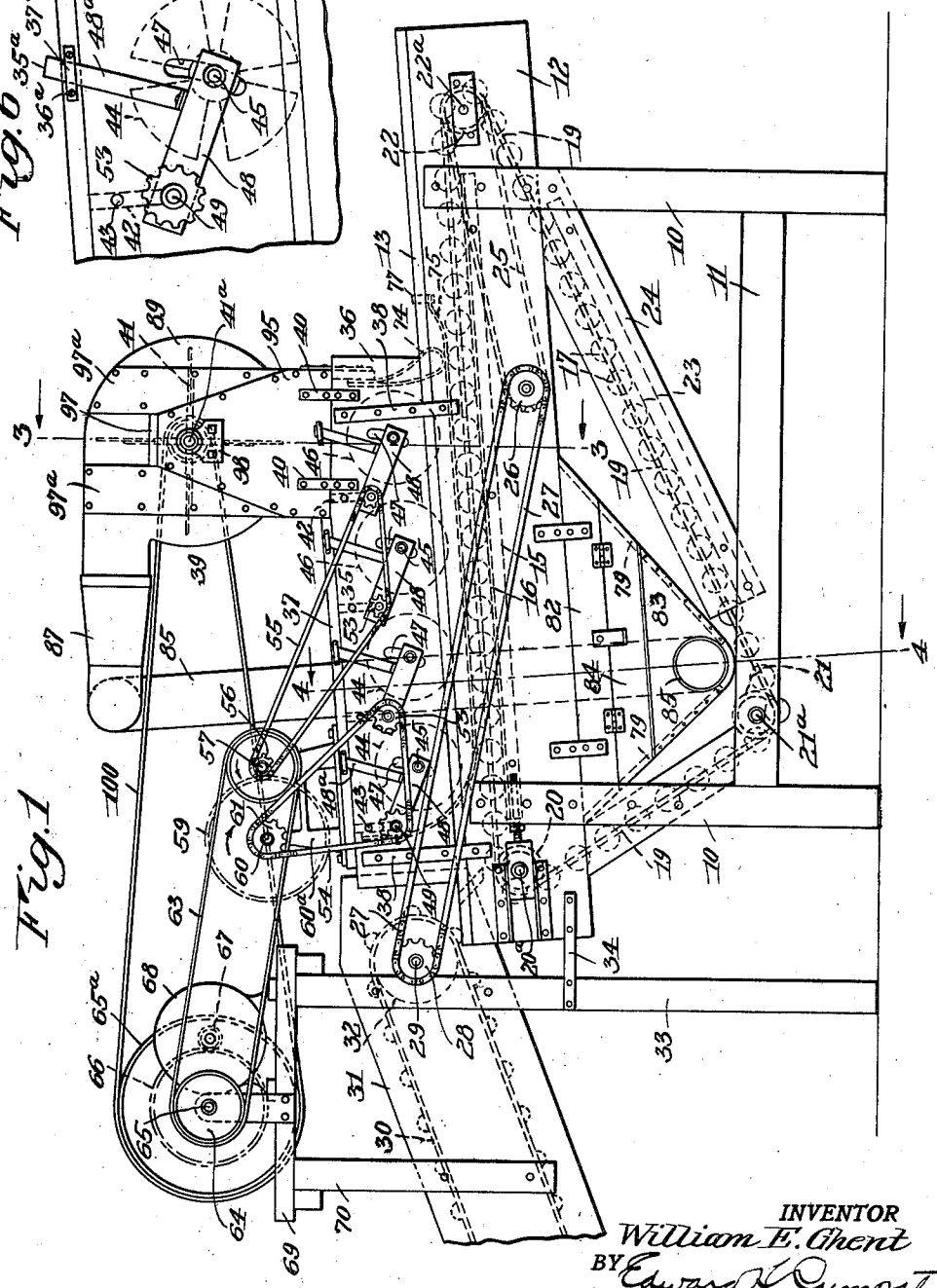


Fig. 1



INVENTOR
William E. Ghent
BY Edward K. Dumpston
his ATTORNEY

March 16, 1937. W. E. GHENT 2,073,837

ARTICLE CLEANING AND SORTING MACHINE

Filed Dec. 18, 1934 4 Sheets-Sheet 2

Fig. 2

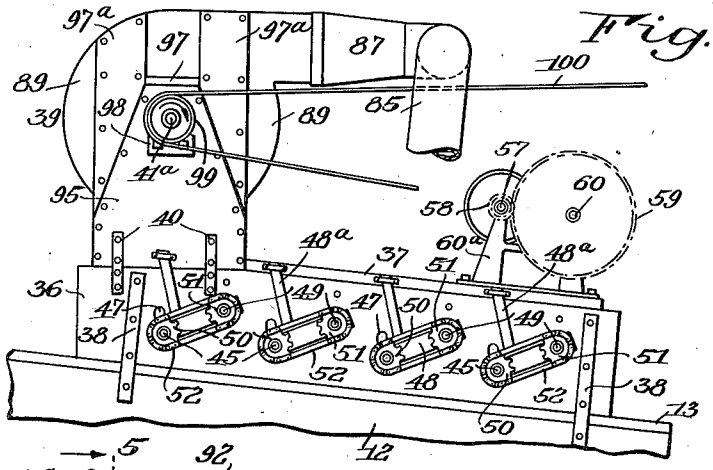


Fig. 3

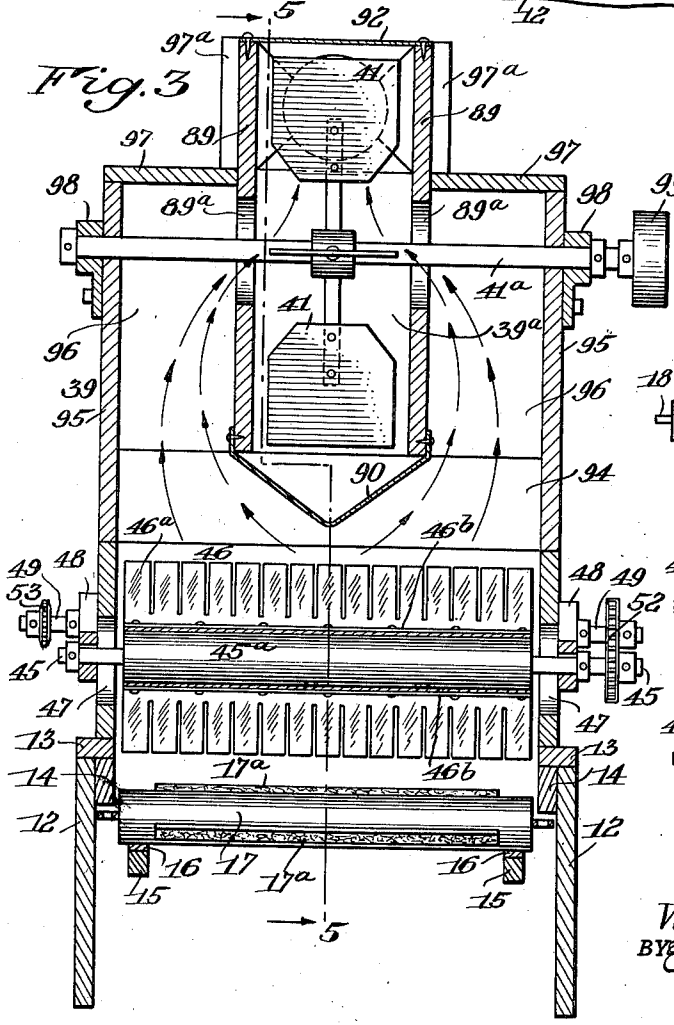


Fig. 11

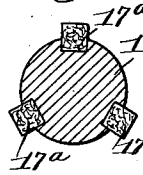


Fig. 12

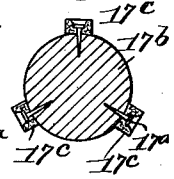


Fig. 13

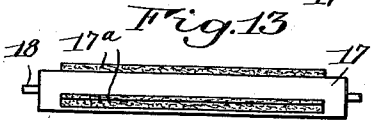


Fig. 9

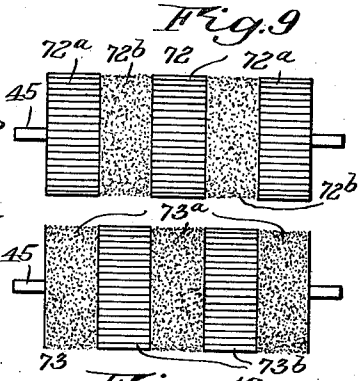


Fig. 10

INVENTOR
William E. Ghent
BY Edward K. Rumpston
his ATTORNEY

March 16, 1937. W. E. GHENT 2,073,837

ARTICLE CLEANING AND SORTING MACHINE

Filed Dec. 18, 1934 4 Sheets-Sheet 3

Fig. 4

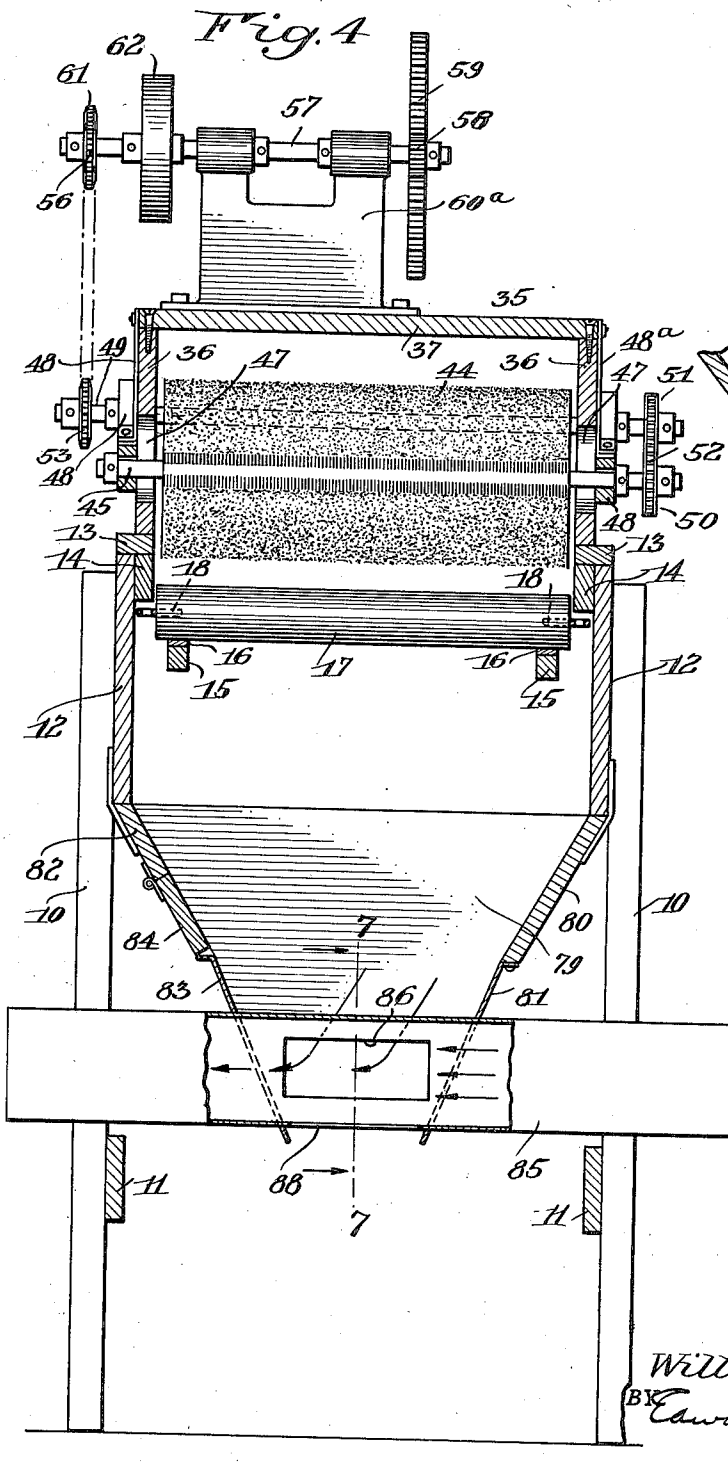
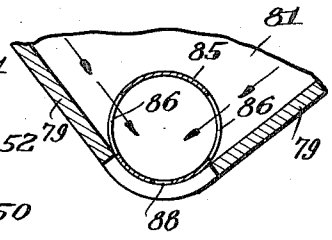


Fig. 7



INVENTOR
William E. Ghent
BY Edward F. Crumpton
his ATTORNEY

March 16, 1937. W. E. GHENT 2,073,837

ARTICLE CLEANING AND SORTING MACHINE

Filed Dec. 18, 1934 4 Sheets-Sheet 4

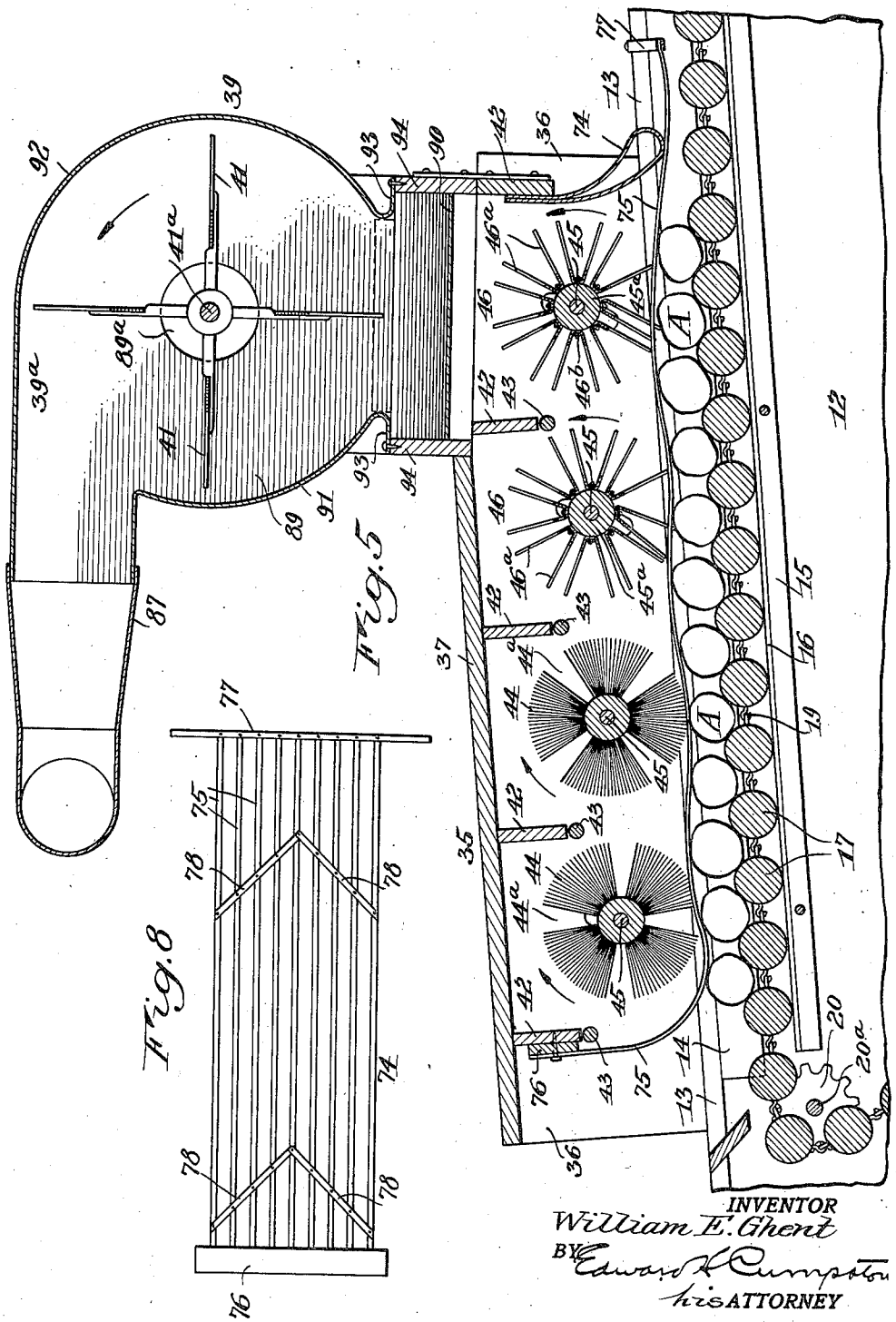


Fig. 5

Fig. 8

INVENTOR
William E. Ghent
BY Edward L. Crumpton
his ATTORNEY

Patented Mar. 16, 1937 2,073,837

UNITED STATES PATENT OFFICE

2,073,837

ARTICLE CLEANING AND SORTING MACHINE

William E. Ghent, Atlanta, N. Y., assignor to Boggs Manufacturing Corporation, Atlanta, N. Y., a corporation of New York

Application December 18, 1934, Serial No. 758,067

10 Claims. (Cl. 146—202)

The present invention relates to a machine for grading or sorting and cleaning articles and has for its object to provide a simplified and efficient machine of this class which can be constructed and operated at a relatively low cost and which will effectively clean the articles without injury thereto.

A further object of the invention is to provide an article advancing and cleaning machine having improved mounting and operating means for the rotary cleaning elements which will permit them to assume different positions one relative to another during operation to accommodate them to articles of different sizes whereby to protect the articles against injury and to effectively insure removal of the foreign particles therefrom.

A further object of the invention is to provide improved operating means for the cleaning or polishing brushes in combination with flexible or yieldable devices for suspending the brushes, individual thereto, which can be conveniently and readily adjusted to vary the relationship or distance between the brushes and the means for feeding the articles in contact therewith.

A further object of the invention is to provide an enclosure for the cleaning brushes having associated therewith a conveyor for advancing the articles to be cleaned and a receptacle for the foreign particles removed by the brushes from a portion of the enclosure together with common means for withdrawing the particles discharging to or accumulating within the receptacle during operation of the machine and for removing foreign particles from another portion of the enclosure through an outlet independent of or at a point remote from the receptacle.

A further object of the invention is to provide in a machine of the class described, a housing or enclosure for different sets of brushes with operating means for driving the different sets at different speeds and common suction producing means for withdrawing from the different sets the foreign particles removed from the articles thereby through different channels, in combination with means for feeding the articles into position to be operated upon by the brushes.

A further object of the invention is to provide an article cleaning and sorting machine embodying a plurality of rotary cleaning devices for the articles having one or more enclosures in which to operate and having associated therewith a conveyor for moving the articles into position to be operated upon by the cleaning devices which serve to present them for inspection and for sorting or grading by hand, together with common suction producing means for withdrawing from the enclosure through different openings the relatively heavy and light foreign particles removed from the articles by the cleaning devices during operation of the machine.

A further object of the invention is to provide an improved conveyor for the articles which will operate to effectively turn or shift the same during advancement to increase the effectiveness of the cleaning devices or brushes while rotating in contact with the articles.

A further object of the invention is to provide an improved conveyor for the articles which is constructed to assist in the cleaning of the articles advanced thereby during operation of the brushes or other rotary cleaning means provided for removing foreign particles from the articles.

A further object of the invention is to provide, in combination with the conveyor and the brushes or cleaning devices for the articles, means for maintaining proper distribution of the articles upon the conveyor whereby to insure effective cooperation between the conveyor and cleaning devices to better insure removal of the dirt and other foreign particles from the articles.

A further object of the invention is to provide an improved flexible device for insertion between the brushes or cleaning devices and the conveyor for advancing the articles in contact with the brushes, which is adapted to overlie the articles and to prevent undue displacement of the latter by the brushes or cleaning devices, without interfering with the effectiveness of the same.

A further object of the invention is to provide a plurality of rollers for use in constructing a conveyor for the articles to be cleaned having means for turning and cleaning the articles during advancement by the conveyor.

A further object of the invention is to provide an improved rotary cleaning element for the articles.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a fragmentary side elevation of the upper portion of the machine as viewed from the side opposite that shown in Fig. 1;

Fig. 3 is a transverse sectional elevation drawn to an enlarged scale taken approximately on line 3—3 of Fig. 1;

Fig. 4 is a transverse sectional elevation taken on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary longitudinal section taken substantially on line 5—5 of Fig. 3;

Fig. 6 is a fragmentary detailed view in elevation showing the manner of supporting one of the cleaning brushes;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 4;

Fig. 8 is a plan view showing a flexible article controlling device for operation between the articles and the cleaning brushes;

Fig. 9 is a diagrammatic view of an improved article cleaning brush;

Fig. 10 is a diagrammatic view illustrating a modification of the brush shown in Fig. 9;

Figs. 11 and 12 illustrate different modifications of the article advancing rollers of the feed belt, having flexible strips applied thereto which assist in advancing and cleaning the articles carried by the belt, and

Fig. 13 is a side view of one of the rollers with the strip shown thereon.

The same reference numerals throughout the several views indicate the same parts.

Referring to the drawings 10 designates a plurality of upright supports suitably connected and braced by the longitudinally extending members 11 and other parts, not shown. The supports have their upper ends connected with oppositely disposed side frame members 12 on the upper edges of which are disposed inwardly projecting side rails 13 having depending cleats 14 provided for a purpose described hereinafter.

Suitably connected with the side frame members 12 in a manner not shown are the longitudinally extending track members 15 having bearing strips 16 thereon for the rollers 17 constituting in part the conveyor for advancing the articles to be cleaned and sorted. The rollers are provided with pintles 18 loosely mounted in their opposite ends to permit the rollers to revolve through frictional engagement with the bearing strips 16 during advancement through operation of the sprocket chains indicated by dotted lines at 19 in Fig. 1, the chains being connected with the pintles 18 in any suitable or well known manner. The chains are each supported by suitable sprockets 20, 21, and 22 preferably disposed on the opposite ends of the transversely extending shafts 20a, 21a, and 22a journaled in suitable bearings, not shown, located on the conveyor supporting frame.

The lower flight of the conveyor extending between the sprockets 21 and 22 is prevented from sagging by providing one or more tracks 23 for the rollers which are supported by the members 24 for bracing and tying together the front supports 10 of the main frame and the longitudinal members 11 connected therewith.

One of the sprockets 22 on the shaft 22a constitutes a driving member for the conveyor which is driven by a sprocket chain 25 on a sprocket 26 driven by another sprocket chain 27, which in turn is driven by a sprocket 28 on the shaft 29 having a driving connection, not shown, with a motor driven shaft for driving the cleaning brushes in a manner described hereinafter.

Suitable means is provided for delivering the articles to be cleaned to the conveyor for advancing the same, such as potatoes, onions, and other articles into position to be operated upon by the cleaning devices. Any suitable means may be provided for this purpose such, for example, as a grading belt 30 operating between the sides of a frame 31 and driven by a sprocket 32 on the shaft 29 for driving the sprocket chain 27, said shaft being journaled in suitable bearings on the frame 31, not shown.

The frame 31 is supported at its front end by oppositely disposed uprights 33, said members and the frame 31 being maintained in proper relation with respect to the conveyor carrying frame, preferably by means of the connecting or tie members 34, as shown in Fig. 1.

Overlying the article advancing conveyor is an enclosure or housing for the cleaning devices designated generally by the reference character 35. The housing comprises oppositely positioned side walls 36 connected by a cover 37, the side walls being secured upon the side rails 13 of the main frame by a plurality of straps 38, as shown in Figs. 1 and 2. At one end of the enclosure 35 is a fan housing designated generally by the reference character 39 and secured upon the enclosure by the straps 40, the housing having an inner chamber 39a containing a fan 41, the operation of which will be described hereinafter.

The housing 35 is provided with a plurality of transversely extending members 42 extending downwardly from the cover 37 to form compartments for partially separating the cleaning devices and for bracing the sides 36 of the enclosure as well, the latter having tie rods 43 extending therethrough to securely hold them in position.

The cleaning devices preferably comprise a plurality of brushes 44 mounted on operating shafts 45 and a plurality of beaters 46 mounted on similar operating shafts, as best shown in Figs. 4 and 5, although the number of cleaning devices of either type may be varied as required by different conditions arising from the treatment or operation upon different kinds of articles. The beaters are preferably formed of strips of cloth 46a cut and folded as shown in Figs. 3 and 5 to afford U-shaped sections, the central portions of which are secured on the spool like members 45a of the beaters by suitable retaining members 46b which are held in position by nails or otherwise as preferred.

The sides 36 of the enclosure 35 are provided with arcuate slots 47 through which the shafts 45 are extended and in which they are free to move up and down to permit of a likewise movement of the cleaning devices in order to accommodate them to articles of different sizes as well as for the purpose of protecting the articles against injury.

Improved means is provided for mounting and operating the cleaning devices whereby they are made to cooperate with the article advancing means to insure a high degree of efficiency in the treatment of the articles for the removal therefrom of dirt, dust, and other foreign particles which may have accumulated thereon previous to conditioning the same for the market.

At this point it may be stated that while the present invention embodies means which is particularly adapted for cleaning onions and potatoes of different varieties, it is also capable of being used for the purpose of cleaning various other articles as well.

The shafts 45 have their opposite ends journaled in the forward ends of the arms or supporting members 48 which are mounted to swing freely on the transversely extending sprocket shafts 49 journaled in the side members 36 of the brush receiving housing 35. At one side of the machine the shafts 45 are provided with driving

sprockets 50 and at the same side of the machine the shafts 49 are provided with sprockets 51, the sprockets 50 being driven by sprocket chains 52 connected with and driven by the sprockets 51 on the transverse shafts 49, as shown in Fig. 2. At the opposite side of the machine, as shown in Fig. 1, the shafts 49 are provided with sprockets 53 for operating the same whereby the sprockets 51 are driven, and through them the sprocket chains 52 and the sprockets 50 for driving the shafts 45 carrying the brushes 44 and the beaters 46.

The sprockets 53 for driving the brushes 44 are driven by a sprocket chain 54 and the sprockets 53 for driving the beaters 46 are driven by a sprocket chain 55 which in turn is driven by a sprocket 56 on a power driven shaft 57. The shaft has a pinion 58 for driving a gear 59 on a shaft 60 provided with a sprocket 61 for driving the sprocket chain 54 operating to drive the sprockets and shafts provided for operating the brushes 44 which are preferably driven at a considerably slower speed than the beaters 46. The shafts 57 and 60 are mounted in suitable bearings carried by a bracket 60a supported on the housing 35 as shown in Figs. 1 and 4.

The shaft 57 carries a pulley 62 driven by a belt 63 operated by a pulley 64 on shaft 65 having a gear 66 driven by a pinion 67 on the shaft of a motor 68. The motor is suitably supported on a platform 69, one end of which is carried by the uprights 33 for supporting the frame 31 and the other end of which is carried by the uprights 70 suitably connected with said frame.

The shaft 65 has a driving connection with the shaft 29, not shown, whereby the motor for driving the rotary cleaning devices is made to operate the conveyor for advancing the articles into contact with said cleaning devices.

One important feature of the invention is the improved mounting and driving means for the rotary article cleaning devices comprising the floating brushes 44 and the beaters 46 overlying the rollers 17 of the conveyor and free to move up and down during operation to accommodate themselves to articles of different sizes such as onions, potatoes, or other vegetables and fruits of different varieties. In this arrangement the arms 48 extending at the opposite sides of the housing 35 have the shafts 45 of the cleaning brushes and beaters journaled therein for movement up and down in the arcuate slots 47 formed in the side walls of the housing. Furthermore the sprocket shafts 49 are extended through the opposite ends of the arms so that the latter are free to swing on said shafts in an upward direction under the pressure exerted by the articles on the brushes and particularly those of relatively large proportions which may be fed to the conveyor from time to time along with those corresponding more nearly to the average size of the particular kind of articles to be treated or cleaned at any given operation.

The distance between the rollers of the conveyor and the brushes and beaters as well, can readily be varied when desired since the floating brush carrying arms 48 are adjustably supported and limited in their downward movement by the resilient supporting members 48a which may be formed of any suitable material such, for example, as strips of a good grade of rubber having the desired degree of elasticity, but which will not offer undue resistance to the upward movement of the arms when the larger of the various articles placed upon the conveyor are advanced beneath the brushes.

The lower ends of the resilient strips are suitably connected with the arms which are preferably made of wood as, for example, by the use of nails. The upper ends of the strips are secured to the cover 37 of the brush receiving housing 35 by any suitable means such, for example, as the clamping plates 37a which frictionally engage and hold the strips in position under the pressure exerted by the screws 36a which take into the housing cover 37. The upper ends 35a of the strips constitute operating portions which may be gripped by the fingers to raise or lower the arms 48 whereby to vary the distance between the cleaning devices and the conveyor according to the size of the articles to be advanced by the latter or the degree of pressure to be applied thereto to effect removal of the dirt and other foreign particles which may have accumulated thereon.

By providing an adjustable strip 48a for each of the shaft supporting arms 48, the rotary cleaning devices can be adjusted up or down as required, one independently of another without stopping or in any way interfering with the operation of the driving means for the cleaning devices.

Furthermore, the independent adjustment of the brushes or beaters permits each of them to be positioned at a distance from the rollers of the conveyor at which it will most effectively operate upon the articles passing beneath the same or at which it will best effect rotation or turning of the articles upon and through cooperation of the rollers to insure contacting of all parts of the articles with the brushes or the beaters in advance of the brushes.

Thus either of the brushes 44 may be raised slightly above the level of the other to facilitate the passage of the articles thereunder or to slightly retard the movement of the same, depending on the nature of the articles and the character of the foreign particles to be removed therefrom.

The brushes 44 are preferably rotated in a clockwise direction as viewed in Fig. 1, or in a direction opposite to that in which the articles are advanced by the conveyor, while it is preferred to rotate the beaters 46 in an opposite direction from that in which the brushes are rotated and at a higher rate of speed whereby to insure proper removal of the dust or lighter particles remaining on the articles after they have passed under and been operated upon by the brushes.

The brushes may be constructed of any suitable material, preferably bristles, which are separated to afford a plurality of sections or segments having openings 44a therebetween as shown in Fig. 5 whereby to facilitate advancement of the articles and removal of the various particles adhering thereto.

Modified forms of cleaning devices are shown in Figs. 9 and 10, which are designated generally by the reference characters 72 and 73, respectively. These are each in the form of a combined brush and beater and may be substituted for the beaters 46 or the brushes 44 shown in Fig. 5 if desired. In the modification shown in Fig. 9, the beating sections 72a are shown in conjunction with two bristle sections 72b while in Fig. 10 three bristle sections 73a are shown and two beating sections 73b. The beating sections in each modification are preferably made of cloth strips

formed and attached to the core or spool of the unit in the manner indicated in Figs. 3 and 5 with the bristle sections constructed as also shown in Fig. 5, but preferably without the spacings 44a.

In order to prevent too rapid advancement of the articles by the end beater 46 beneath which they are carried by the conveyor, a buffer or retarding apron 74 is suspended from the front wall 42 of the housing 35 and is preferably in the form of a loop constructed of any suitable material such, for example, as rubber. The articles are checked by the buffer and the flexible strips 75 depressed thereby and are caused to pass under the strips and the buffer by the rollers toward the front of the machine where they may be sorted, before discharge from the conveyor, by an attendant whose duty it will be to remove those which may be considered defective or unsatisfactory for different reasons.

The rollers of the conveyor belt are preferably provided with flexible or fibrous strips for assisting in the advancement and turning of the articles when moving into position to be operated on by the brushes, as well as for cooperation with the latter or with the beaters to more effectively remove the dirt and other foreign particles from the articles. The preferred embodiment of this idea is shown in Figs. 11, 12, and 13. In Fig. 11 the roller 17 is provided with longitudinally extending grooves within which are placed the strips 17a which may be formed of fibrous or any other flexible material such, for example, as felt, the strips being secured within the grooves by the use of adhesive material or other suitable means not shown.

In the roller 17b shown in Fig. 12 the grooves are omitted and the felt strips indicated at 17c are secured upon the peripheral surface of the roller preferably by means of nails or tacks 17d. The ends of the strips as shown in Fig. 13 terminate short of the ends of the rollers so as not to interfere with the travel of the rollers on the supporting tracks therefor.

The felt or fibrous strips not only assist in the turning of the articles and in carrying them under or into contact with the cleaning devices, but they also constitute means for effecting removal of the dirt and other particles therefrom. This is true for the reason that the articles are effectively agitated by the cleaning devices while being advanced by the rollers and while in contact with the strips whereby relative movement between the articles and the strips is afforded during passages of the articles through the machine. Furthermore by reason of the continuous rotation of the strips in contact with the articles a wiping or cleaning action is afforded which results in the loosening and removal of various substances adhering to the articles. Moreover, the increased agitation of the articles afforded by the action of the strips in positively turning the same will result in an increase in the efficiency of the cleaning devices since there will necessarily be an increase in the extent of the surfaces of the articles presented to the portions of said devices which are adapted to engage and operate upon the articles.

While it may not be necessary to make use of the felt or similar strips in the cleaning of all classes of articles intended for treatment by the present machine, nevertheless it has been found that the strips not only increase the efficiency of the machine, but are particularly effective in the treatment of certain articles such, for example, as sweet potatoes and the like.

While the cleaning or article turning members applied to the rollers for advancing the articles have been shown and described as strips of fibrous or flexible material, it will be understood that any suitable means may be substituted for the strips which will cooperate with the rollers and function or operate to produce the results desired.

Flexible or yieldable means is provided as shown in Figs. 5 and 8 for engaging the articles to assist in maintaining an even distribution of the same on the conveyor between the rollers thereof which is adapted to overlie the articles and to function in such a manner as not to interfere with the proper operation of the cleaning devices. This means is in the form of a flexible unit as shown in Fig. 8, and is designated generally by the reference character 74. It comprises a plurality of relatively narrow flexible strips 75 connected at one end by a transverse support 76 which is preferably in the form of a cleat. At the opposite end of the unit the strips are connected preferably by a flexible strap 77 the ends of which are extended to form portions for attaching it to suitable supporting means such, for example, as the side rails 13 supported on the frame members 12 of the machine. At the opposite end of the unit the cleat 76 is attached to one of the transverse members 42 of the brush housing 35, as shown in Fig. 5. Thus the flexible unit is supported beneath the cleaning devices in overlying relation with respect to the articles carried by the conveyor.

To prevent undue spreading or deflection of the strips 75 by the articles or by the operation of the cleaning devices, said strips are connected one with another between the ends of the unit preferably by means of the diagonally extending members 78 which also comprise flexible strips formed of any suitable material. The strips 75 and 78 are preferably formed of yieldable material such as rubber or rubber-like material, although strips formed of other flexible material may be used if desired.

The strips 75 may be connected with the transverse end members 76 and 77 by the use of nails, rivets, or any other suitable means, and the strips 78 may be connected with the strips 75 in a similar manner.

By using relatively narrow strips and placing them a suitable distance apart they will not in any way interfere with the proper operation of the cleaning brushes or beaters. On the other hand they serve to hold the articles against undue displacement on the conveyor and tend to keep them properly distributed during passage beneath the cleaning devices. Moreover the strips do not interfere with the turning of the articles by the rollers or by the rotary action of the brushes or cleaning devices. Furthermore they will readily accommodate themselves to the movement of the articles on the conveyor and to the up and down movements of the floating brushes and beaters during operation of the same.

With an article retaining unit of this kind the speed of the brushes can be increased without danger of undue displacement of the articles. By increasing the speed of the cleaning devices the articles can be more effectively cleaned and this is particularly true of certain classes of articles from which it has heretofore been found difficult to satisfactorily remove the foreign particles adhering thereto.

By arranging the connecting strips 78 diago-

nally both with respect to the strips 75 and the axes of the rotary cleaning devices, the latter will operate with less strain on the unit 75 than if the strips 78 were placed at right angles to the longitudinally extending strips.

The side walls 12 of the conveyor frame are provided with depending walls cooperating therewith to form a hopper-like receptacle for the heavier particles removed from the potatoes and other articles by the brushes 44, such particles being discharged into the receptacle through the openings between the rollers overlying the receptacle.

The end walls 79 of the receptacle are connected by the side walls 80 and 81 at one side of the frame and are connected at the opposite side of the frame by the upper and lower side walls 82 and 83, respectively, a door 84 being interposed between the walls 82 and 83 and hinged to the wall 82 as shown in Figs. 1 and 4. The door normally closes an opening leading to the interior of the receptacle to render the latter accessible from time to time. The lower side walls 81 and 83 are preferably made of sheet metal and are flanged at their upper edges as shown in Fig. 4, the ends of said walls being connected with the end walls 79 by nails or screws or by any other suitable means.

Extending through openings in the side walls 81 and 83 of the hopper-like receptacle is the horizontal portion of a discharge pipe 85 for carrying off the dirt and other foreign particles removed from the potatoes, onions, and other articles, which are drawn into the pipe through the openings 86 by suction, resulting from the discharge of air through said pipe by operation of the fan 41 in the chamber 39a of the housing 39, said pipe being connected with said chamber by means of a short pipe 87, as shown in Figs. 1 and 2. The pipe 85 is provided with an elongated opening 88, Figs. 4 and 7, formed in its bottom wall between the openings 86 to afford an outlet for such relatively heavy particles as may tend to gravitate to the bottom side of the pipe after entering the latter through the openings 86, and which if not carried along by the force of the current therein might tend to accumulate within and to obstruct the pipe.

The construction of the fan housing is best shown in Figs. 2, 3, and 5. The portion of the housing in which the fan is directly mounted comprises a pair of spaced side walls 89 connected at their lower edges by a V-shaped plate 90, said walls being connected above the V-shaped plate by the curved inner and outer metal plates 91 and 92, respectively. The bottom edges of said plates are flanged outwardly at 93 and suitably secured on a pair of transverse supports 94 extending upwardly from the front end of the housing 35 and being of a length substantially equal to the width of the housing so that they are caused to extend outwardly beyond the side walls of the housing 39.

The air discharge outlet of the fan chamber is substantially rectangular in shape, and the short pipe 87 connected therewith has its inlet end correspondingly shaped, but is of circular construction at its opposite end where it is connected to the pipe 85.

The housing further comprises the spaced side walls 95, the lower ends of which rest on the upper edges of the side members 36 of the housing 35, within which the cleaning devices are mounted, said ends being suitably connected with the ends of the transverse supports 94. Projecting upwardly from said supports between the inner and outer side walls 89 and 95, respectively, are the transversely extending converging walls 96, Fig. 3, which cooperate with the walls 95 to form air receiving chambers at opposite sides of the walls 89, said chambers being closed at their upper ends by the horizontally disposed walls 97, as shown in Fig. 3.

Upstanding cleats or strips 97a are secured to the opposite side walls 89 of the fan receiving chamber to brace and support the latter, said strips being beveled at their inner edges for a portion of their length and seated on the outer faces of the converging walls 96 by which they are supported.

The side walls 95 are provided with bearings 98 for supporting the fan operating shaft 41a which extends through the relatively large air inlet openings 89a formed in the side walls 89 between which the fan operates.

The fan shaft is provided with a pulley 99 driven by a belt 100 operated by a pulley 65a on the motor driven shaft 65 shown in Fig. 1.

The inlet end of the fan housing is in communication with the housing containing the rotary cleaning devices, said fan housing being preferably placed directly over the outer or end beater shown in Fig. 5, which operates in conjunction with the other beater to force the dust and other particles removed from the potatoes and other articles upwardly at opposite sides of the V-shaped deflecting member 90 and into the vertically extending chambers at the opposite sides of the fan. From these chambers said particles are sucked through the openings 89a into the chamber 39a by the fan which operates to discharge them at a relatively high velocity into and through the outlet pipes 87 and 85, the latter being preferably connected with another pipe, not shown, for delivering said particles to a suitable receptacle or for discharging them at a point somewhat distant from the machine.

By extending the fan or blower outlet pipe 85 through the hopper beneath the upper flight of the conveyor and providing it with the inlet openings 86 for receiving the heavier foreign particles removed from the potatoes and other articles, principally by the brushes 44 and partly by the felt strips of the roller 17, economy in the operation of the machine is afforded, since the fan will operate to effect discharge of both the heavier and lighter particles which are withdrawn from the housing, containing both the brushes and the beaters, at different points and carried from the machine through a common outlet pipe.

It will be understood that the beaters in addition to operating as cleaning means for the articles will also operate to force the dust and other relatively light foreign particles through the outlet at the front end of the housing 35 and that the fan will draw said particles into the chambers extending at opposite sides thereof and through the openings 89a and force them into and through the discharge pipes 87 and 85. The force of the current of air driven through said pipes by the fan is sufficient to create suction or a down draft in the hopper whereby to facilitate withdrawal through the openings between the rollers of the conveyor the heavier particles removed from the articles by the brushes and will cause said particles to enter the draft pipe and to be carried off by the current of air discharging therethrough.

In other words, the dust discharging passage-

ways between the end beater 46 and the fan chamber, and also the passageway between that portion of the conveyor underlying the brushes 44, including the hopper extending therebeneath, constitute separate compartments from which the foreign particles removed from the articles are taken up and discharged simultaneously through a common outlet by the operation of the fan.

It will be understood that it is preferred to drive the fan at a relatively high speed as compared to the speed of the cleaning devices, and that although the beaters are driven at a slower speed than the fan it is preferable to drive them at a speed considerably greater than that at which the brushes are operated.

I claim:

1. In a machine for cleaning articles, a frame, a conveyor on the frame for advancing the articles, a housing on the frame at one side of the conveyor including spaced side walls having oppositely arranged slots therein, a plurality of rotary cleaning elements for the articles disposed within the housing and having supporting shafts the ends of which are extended through said oppositely arranged slots, pivotally mounted supporting members rotatably receiving the opposite ends of said shafts whereby the rotary cleaning elements and the supporting shafts are mounted to swing relative to the conveyor to permit the cleaning elements to accommodate themselves to articles of different sizes on the conveyor, means for yieldably suspending said supporting members comprising strips of rubber connected with said members, and devices for securing said strips upon the housing, said devices being releasable to free the strips for adjustment vertically to regulate the position of the cleaning elements relative to the conveyor.

2. In a machine for cleaning articles, a frame, a conveyor on the frame for advancing the articles, a housing at one side of the conveyor, a plurality of rotary cleaning elements within the housing for operating upon the articles, a pair of resilient strips connected with each of said elements and serving to suspend the same above the conveyor whereby to accommodate them to articles of different sizes, driving means for said elements, separate compartments communicating with said housing for receiving the foreign particles removed from the articles by the cleaning elements, and pneumatic means connected with one of said compartments for withdrawing the foreign particles therefrom and having a discharge conduit for said particles, said discharge conduit having an inlet port communicating with the other compartment the foreign particles of which are drawn into said conduit and discharged therefrom by the current of air passing therethrough.

3. In a machine for removing foreign particles from different articles, a frame, a plurality of rotary cleaning elements for the articles, a housing on the frame for said elements, a conveyor on the frame for advancing the articles into contact with the cleaning elements, said conveyor including spaced members for effecting relative movement between the articles during advancement thereof, a receptacle beneath the plane of advancement of the articles for receiving the foreign particles removed by one or more of said cleaning elements in one portion of the housing and discharging downwardly beneath said members, pneumatic means connected with another portion of said housing for withdrawing therefrom the foreign particles accumulating therein, said pneumatic means being also connected with said receptacle for withdrawing therefrom the foreign particles accumulating therein, and operating means for said rotary cleaning elements and said conveyor.

4. In a machine for removing foreign particles from different articles, a frame, a conveyor on the frame for simultaneously advancing a plurality of the articles in spaced relation, a housing on the frame, a plurality of cleaning devices within the housing comprising spaced brush and beater elements for operation upon the articles advanced by the conveyor, said conveyor having openings for the downward passage of the foreign particles removed from the articles by the brush element, operating means for said elements, a receptacle adjacent the conveyor below the plane of movement of the articles for receiving the foreign particles removed by said brush element, and pneumatic means connected with the portion of the housing containing said beater element for removing therefrom the foreign particles accumulating therein, said pneumatic means having a discharge conduit for said last mentioned particles, said conduit having an inlet communicating with said receptacle through which the particles within the receptacle are drawn by the force of the current of air discharging through said conduit.

5. In a machine for removing foreign particles from different articles, a frame, a conveyor on the frame for simultaneously advancing a plurality of the articles in spaced relation, a main housing on the frame overlying a portion of the conveyor, a plurality of rotary brush and beater elements disposed within said housing above the conveyor, said conveyor having openings for the downward passage of the foreign particles removed from the articles by the brush element, means for operating said brush and beater elements, a receptacle beneath the brush element and the portion of the conveyor underlying said element for receiving the particles removed by said brush element, a fan housing overlying the portion of the main housing containing said beater element, said fan housing having oppositely spaced chambers communicating with said last mentioned portion of the main housing and having an intermediate chamber communicating with said oppositely spaced chambers, a fan in said intermediate chamber, a discharge conduit connected with said intermediate chamber and leading to and communicating with said receptacle for receiving the foreign particles discharging thereto, and operating means for said fan.

6. In a machine for cleaning articles, a frame, a conveyor for the articles on the frame, a housing on the frame at one side of the conveyor including spaced side walls having oppositely arranged slots therein, a plurality of rotary cleaning elements for the articles disposed within the housing and having supporting shafts the ends of which are extended through said oppositely arranged slots, means comprising yieldable resilient devices on the frame for suspending each of said shafts for a floating movement whereby said cleaning elements will independently accommodate themselves to articles of different sizes on the conveyor, said yieldable devices also serving to resiliently limit the movement of said cleaning devices toward the conveyor and means for driving said shafts.

7. In a machine for cleaning articles of different sizes, the combination with a frame, means

on said frame for conveying the articles to be cleaned, a plurality of brushes rotatably mounted on the frame for operating in contact with the articles on said conveying means, means for driving the brushes and a flexible unit arranged between the conveyor and a plurality of said brushes, said unit comprising a plurality of relatively narrow flexible strips spaced one from another and having transversely extending connecting members, said strips being adapted to occupy a position resting on the articles on the conveying means and between the articles and brushes to limit the extent of movement of the articles by the brushes during the cleaning operation.

8. In a machine for cleaning articles, a frame, a conveyor for the articles on the frame including spaced rollers for advancing and turning the articles, means frictionally engaging the rollers to effect rotation thereof when in article advancing position, spaced side walls on the frame having oppositely arranged slots therein, a plurality of rotary cleaning elements for contacting the articles and in engagement with which the articles are moved by said rollers, said cleaning elements being disposed between said side walls and having supporting shafts the ends of which are extended through said slots, supporting arms for the shafts disposed adjacent the outer faces of said side walls and rotatably receiving the ends of the shafts, driving shafts corresponding to said supporting shafts located above the conveyor and said supporting shafts and pivotally receiving said arms whereby the cleaning elements and their supporting shafts are mounted to swing relative to the conveyor to permit the cleaning elements to accommodate themselves to articles of different sizes advanced by the conveyor, a yieldable suspending element for each of the arms flexible operating connections between the supporting shafts and the corresponding driving shafts adjacent said side walls, flexible operating members adjacent one of the side walls for operating the driving shafts, and means for driving said operating members and the conveyor.

9. In a machine for cleaning articles, a frame, a conveyor for the articles on the frame, spaced side walls on the frame having oppositely arranged slots therein, a plurality of rotary cleaning elements for the articles disposed between said side walls and having supporting shafts the ends of which are extended through said slots, supporting arms for the shafts disposed adjacent the outer faces of said side walls and rotatably receiving the ends of the shafts, driving shafts corresponding to said supporting shafts and pivotally receiving said arms whereby the cleaning elements and their supporting shafts are mounted to swing relative to the conveyor to permit the cleaning elements to accommodate themselves to articles of different sizes advanced by the conveyor, flexible operating connections between the supporting shafts and the corresponding driving shafts adjacent said side walls, flexible operating members adjacent one of the side walls for operating the driving shafts, means for driving said operating members and the conveyor, and resilient strips connected with and serving to support said arms and permitting them to move up and down with the cleaning elements thereon under pressure exerted by the articles on the cleaning elements.

10. In a machine for removing foreign particles from different articles, a frame, a plurality of rotary cleaning elements for the articles, a housing on the frame for said elements, a continuous conveyor on the frame including spaced rollers for advancing and turning the articles in contact with the cleaning elements to facilitate removal of the foreign particles from the articles for discharge by gravity downwardly between said rollers, a receptacle for receiving said foreign particles located between the upper and lower flights of the conveyor and directly below the upper flight, pneumatic means connected with said housing for withdrawing foreign particles therefrom, said means having a discharge conduit provided with an inlet communicating with said receptacle for withdrawing the foreign particles accumulating therein, and means for operating said rotary cleaning elements and said conveyor.

WILLIAM E. GHENT.