

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

Filed Aug. 20, 1946

8 Sheets-Sheet 1

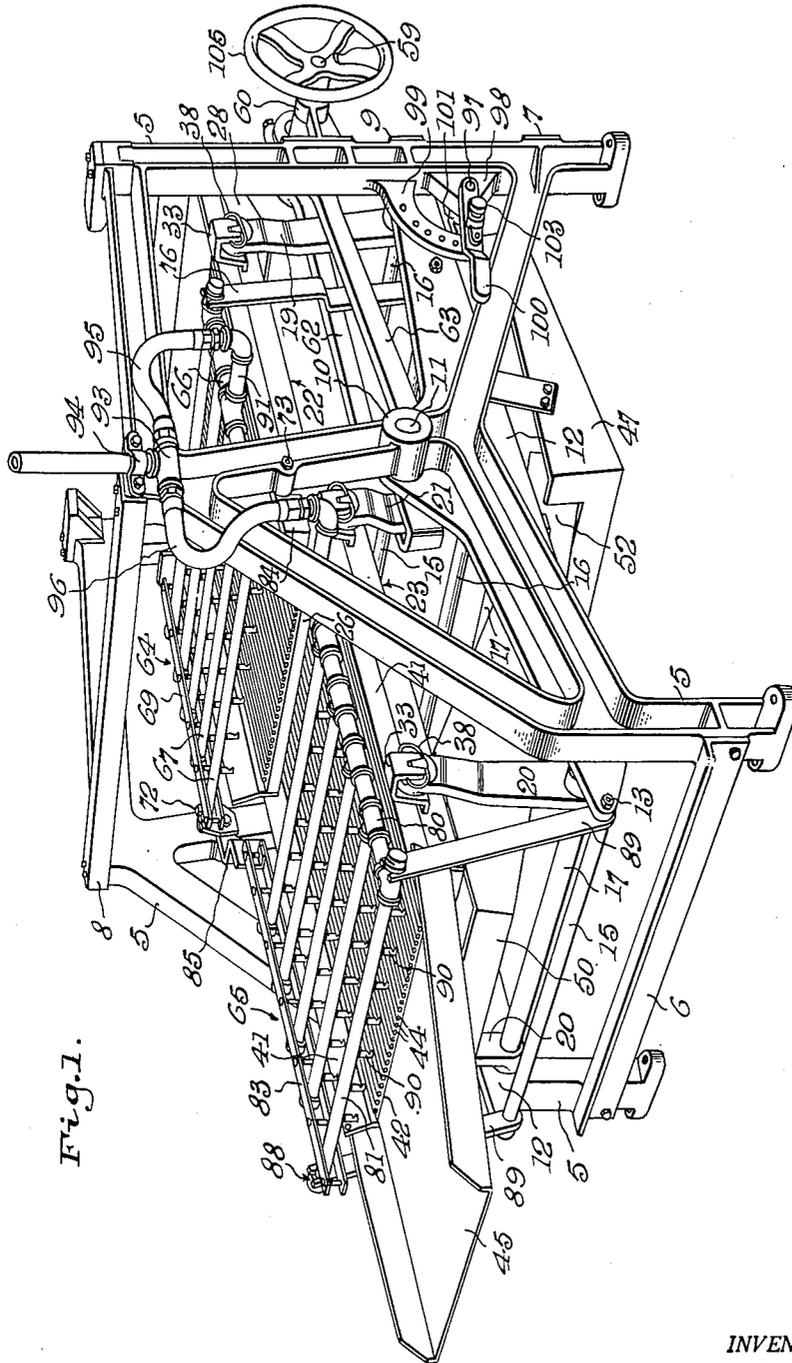


Fig. 1.

INVENTOR.

Ralph Cover

BY

Maun, Porter, Miller & Stewart  
ATTORNEYS

March 4, 1952

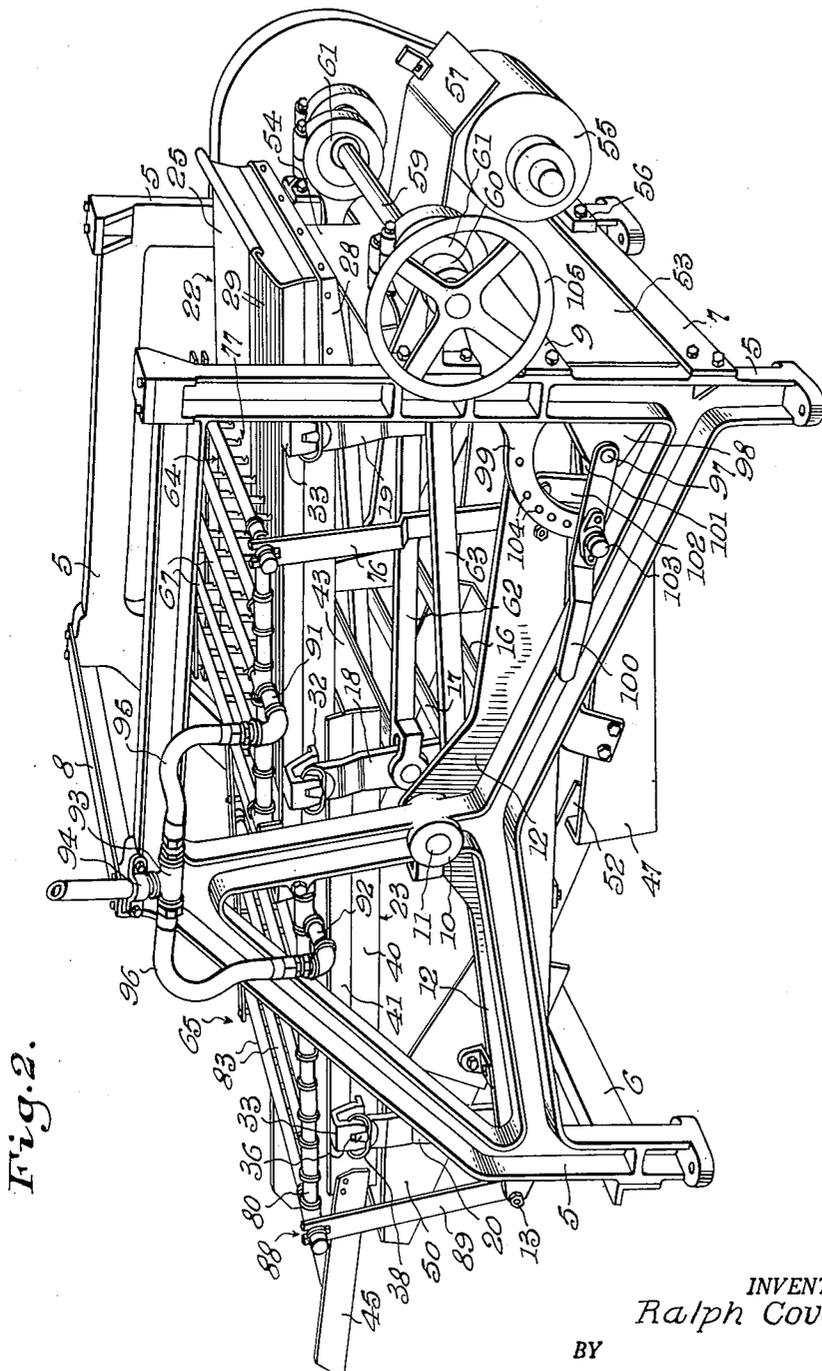
R. COVER

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WASHING AND SCREENING MACHINE

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8 Sheets-Sheet 2



INVENTOR.  
Ralph Cover

BY

Mason, Porter, Miller & Stewart  
ATTORNEYS

March 4, 1952

R. COVER

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WASHING AND SCREENING MACHINE

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8 Sheets-Sheet 3

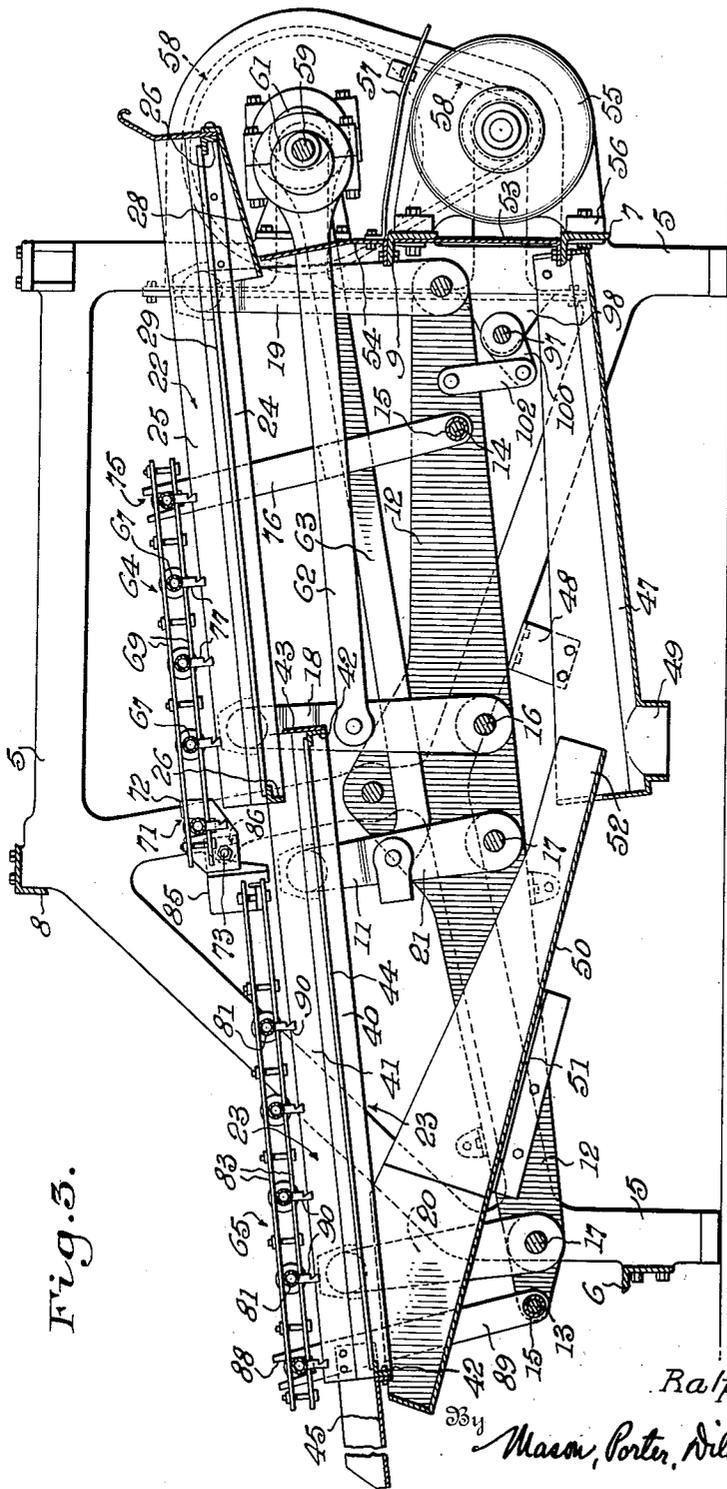


Fig. 3.

Inventor

Ralph Cover

Mason, Porter, Miller & Stewart  
Attorney

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

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8 Sheets—Sheet 4

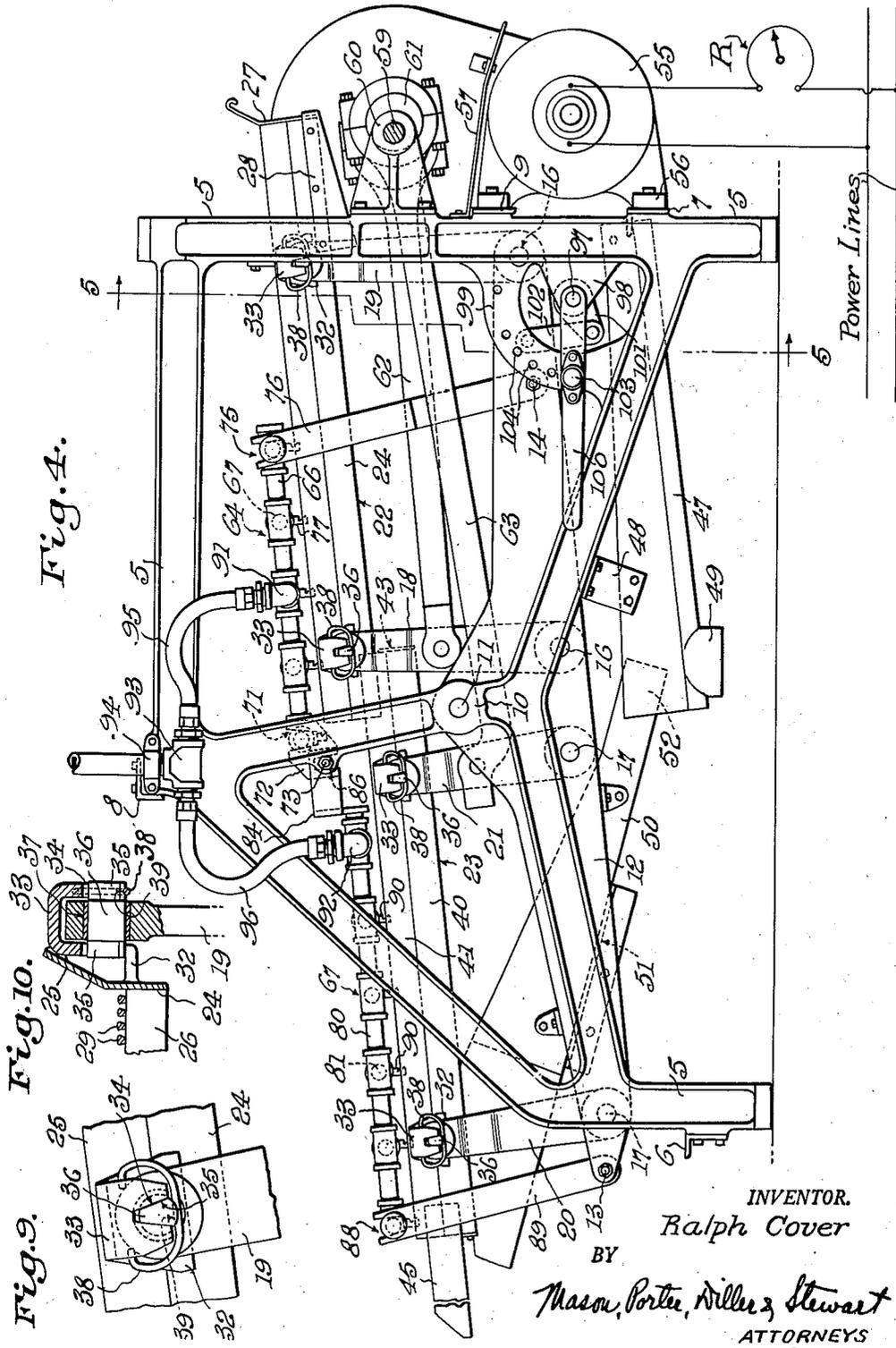


Fig. 4.

Fig. 9.

Fig. 10.

INVENTOR.  
Ralph Cover

BY  
Mason, Porter, Miller & Stewart  
ATTORNEYS

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

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8 Sheets-Sheet 5

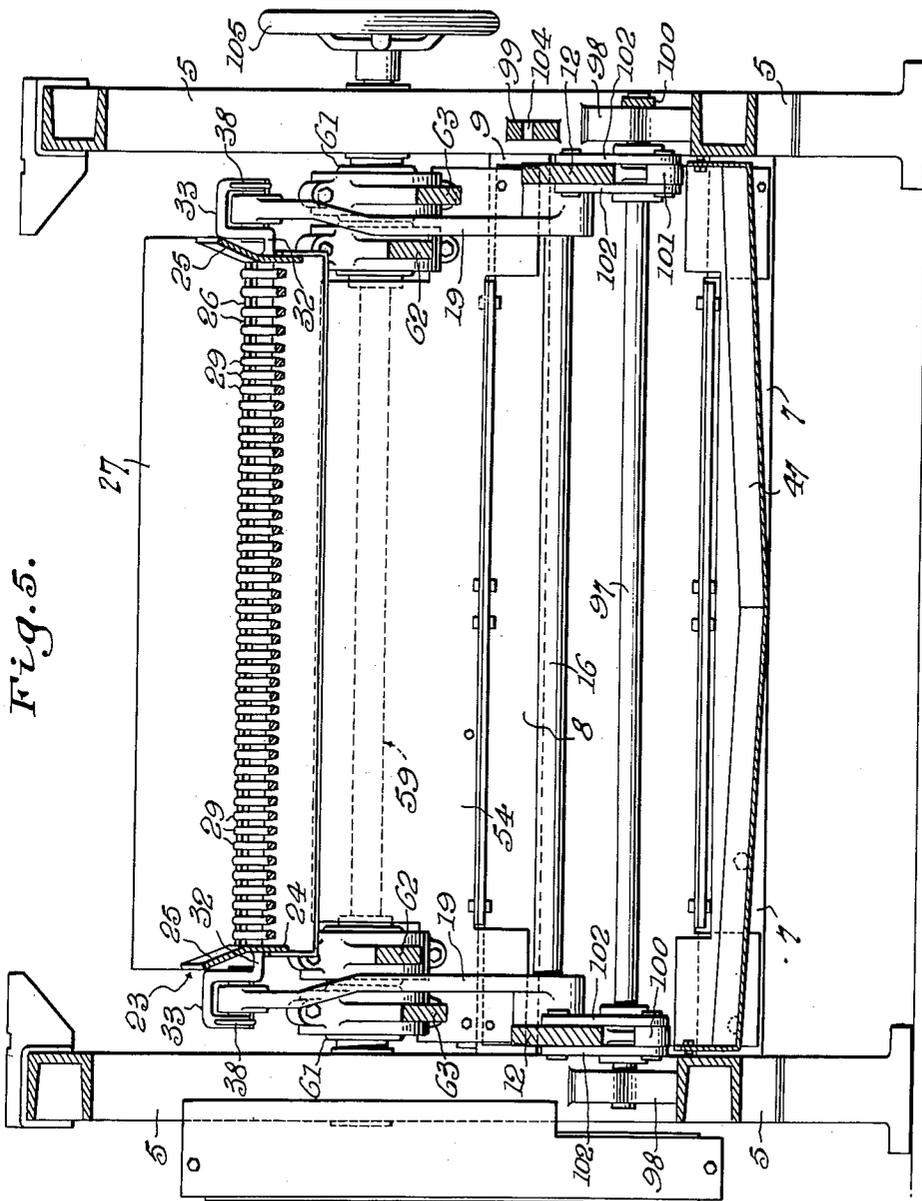


Fig. 5.

Inventor

Ralph Cover

334 Macdon, Porter, Miller & Stewart  
Attorneys

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

Filed Aug. 20, 1946

8 Sheets-Sheet 6

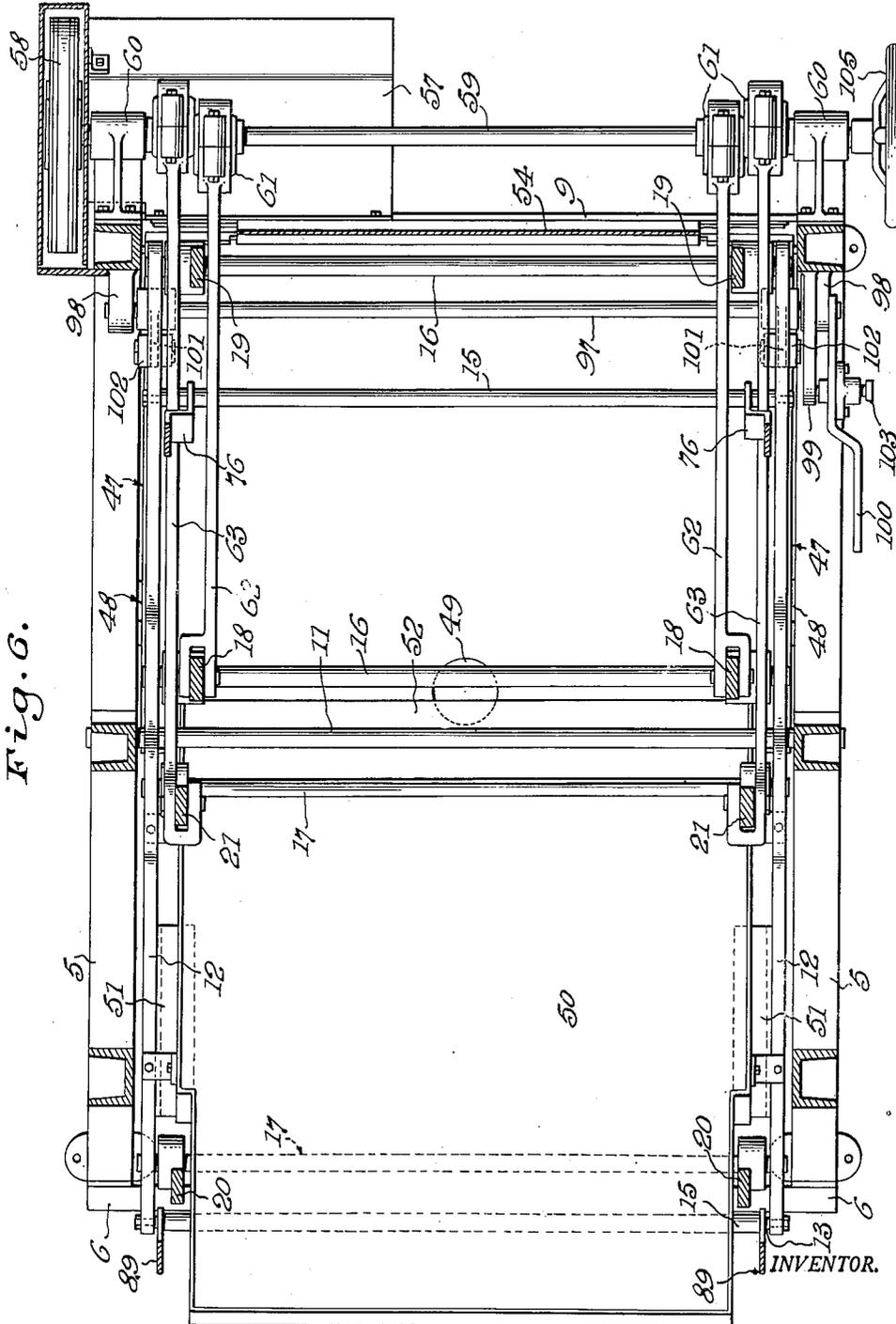


Fig. 6.

Ralph Cover  
BY *Mason, Porter, Miller, Stewart*  
ATTORNEYS

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

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8 Sheets-Sheet 7

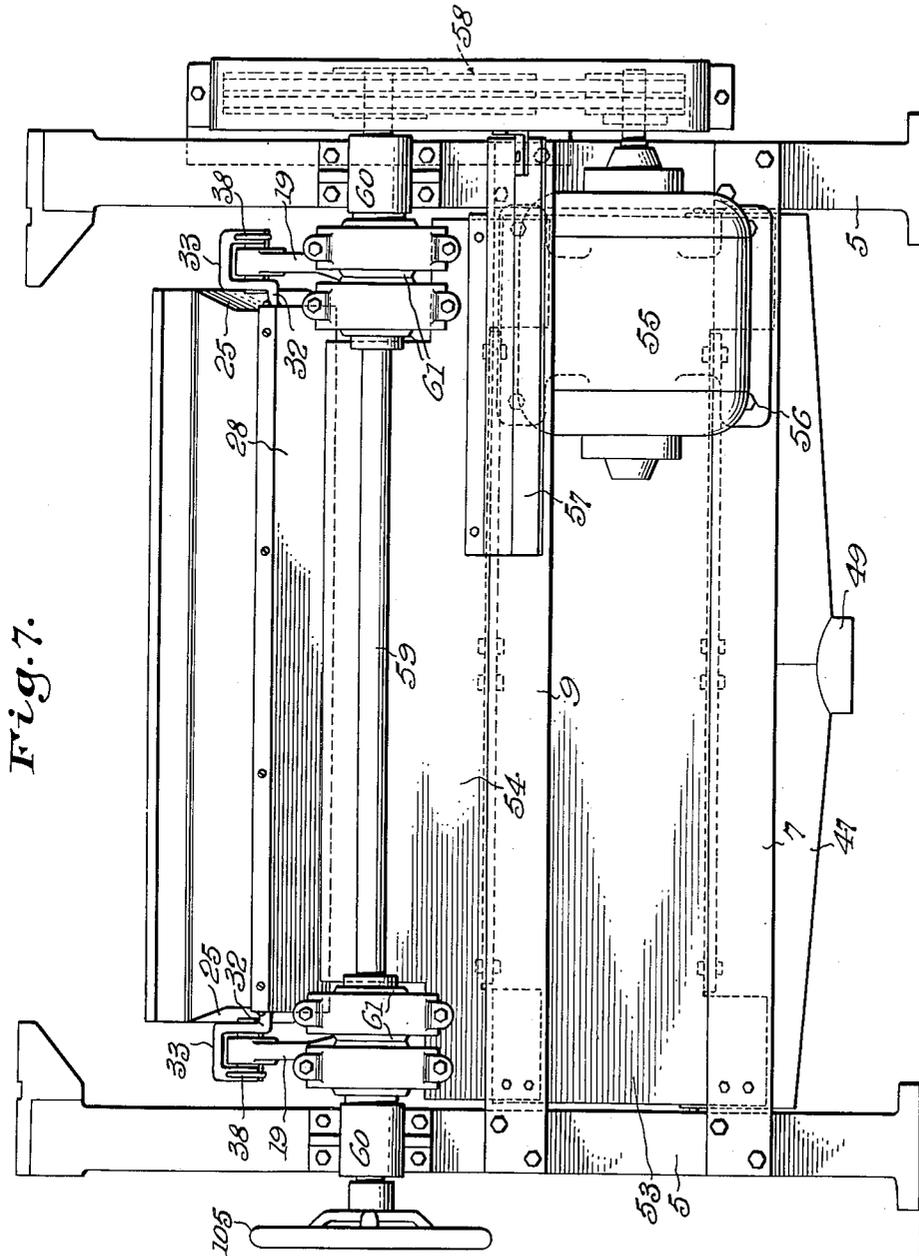


Fig. 7.

INVENTOR.

Ralph Cover

BY

Mason, Porter, Diller & Stewart  
ATTORNEYS

March 4, 1952

R. COVER

2,588,088

WASHING AND SCREENING MACHINE

Filed Aug. 20, 1946

8 Sheets—Sheet 8

Fig. 11.

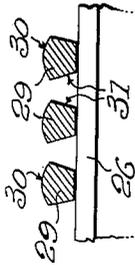


Fig. 12.

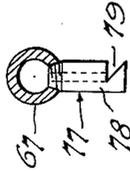


Fig. 13.

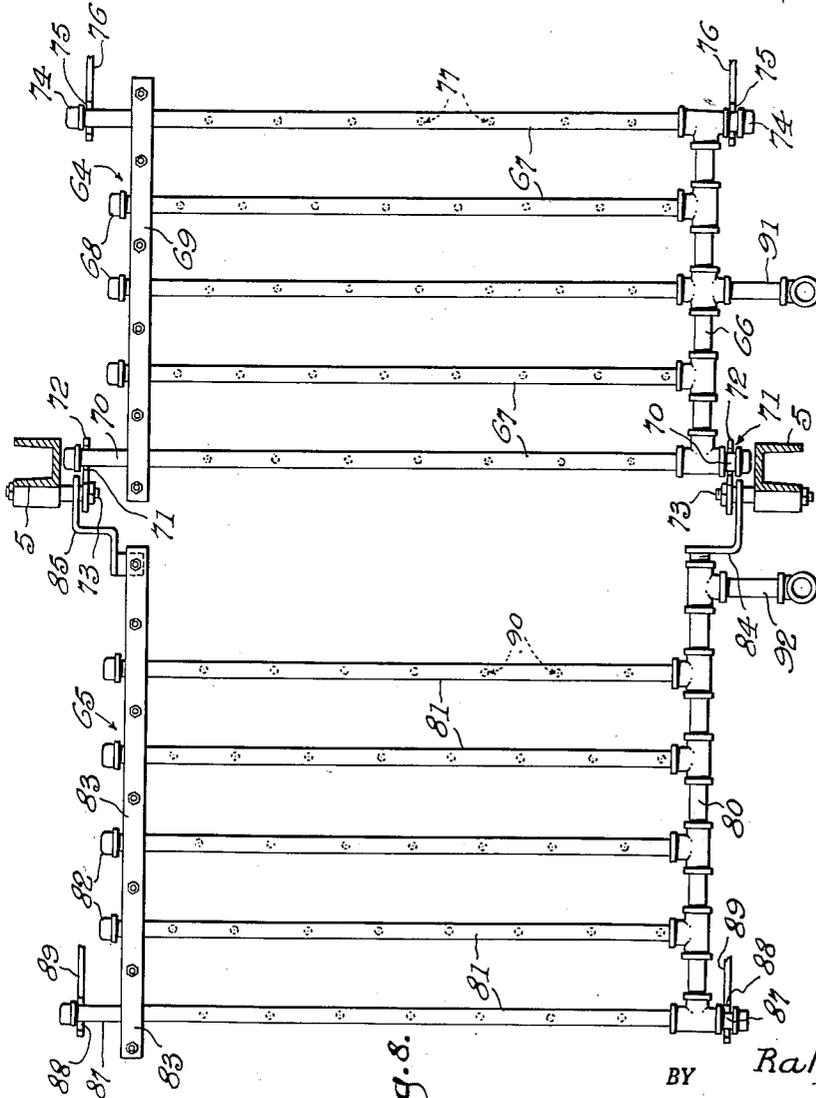
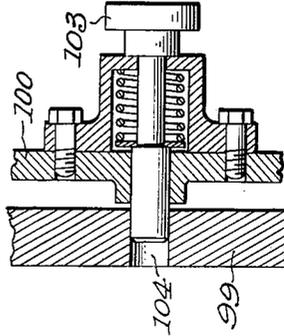


Fig. 8.

INVENTOR.

BY *Ralph Cover*

*Maun, Porter, Miller & Stewart*  
ATTORNEYS

# UNITED STATES PATENT OFFICE

2,588,088

## WASHING AND SCREENING MACHINE

Ralph Cover, Westminster, Md.

Application August 20, 1946, Serial No. 691,757

9 Claims. (Cl. 209—269)

1

The invention relates generally to washing and screening apparatus and primarily seeks to provide an improved washing and screening machine structure particularly intended for the washing and screening of cut corn preparatory to the canning thereof but which may be employed as well in the processing of various other products, of which mushrooms and gooseberries are examples.

Many forms of washing and screening machines are, of course, known, but presently known machines have not been found entirely satisfactory for various reasons, such as lack of adaptability to the treatment of a variety of products, inefficiency of the washing and screening accomplished therein, high cost of manufacture because of the complicated nature of the structure, and the difficulties experienced in attempting to maintain such machines in the sanitary, bacteria free state which is so essential in the processing of foods. Much of the bacteria built up in processed foodstuffs has been traced to lack of cleanliness in units of the processing equipment, including washing and screening units, and in the faulty construction of such units which makes it practically impossible to maintain said units in a clean condition. It is a purpose of the present invention to produce an improved machine structure of the character stated in which all of the above mentioned objectionable features are avoided.

An object of the invention is to provide a machine of the character stated in which there are provided screen means disposed on an incline, spray washer means disposed over the screen means, means for vibrating the screen means, and means for varying the degree of inclination of the screen means while said screen means are being vibrated.

Another object of the invention is to provide a machine of the character described in which there are included means for varying the degree of inclination of the screen means, and means for varying the speed of vibration of said screen means.

Another object of the invention is to provide a machine of the character stated in which the screen means comprises two screen units disposed so that one delivers onto the other, and in which the screen vibrating means comprises a rotary shaft having eccentrics mounted thereon and spaced 180° apart and having strap and pitman connection with the screen units effective to reversely reciprocate them, that is, to cause one screen unit to move forwardly as the other is moving back, and vice versa.

Another object of the invention is to provide a novel screen composed of longitudinally extending, parallel spaced rods each having a convex top and downwardly and inwardly sloping

2

sides and effective to thoroughly screen the products being treated, with a minimum possibility of clogging.

Another object of the invention is to provide a machine of the character stated in which the eccentric vibrated screen units are supported on swingable arms which are in turn supported on members which are rockable to vary the tilt of the screen units.

Another object of the invention is to provide a machine of the character stated in which two novel spray washing frames are disposed in generally parallel relation to and above the screen units, and novel means are provided for supporting said frames in part on the machine framing and in part on the rockable members so that the relation of the spray frames and the screen units will remain substantially the same regardless of the degree of tilt of said screen means.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of a washing and screening machine embodying the invention, said view looking downwardly at one front corner of the machine.

Figure 2 is a view similar to Figure 1 looking downwardly at one rear corner of the machine.

Figure 3 is a vertical central longitudinal section taken through the machine.

Figure 4 is a left side elevation of the machine.

Figure 5 is a vertical cross section taken on the line 5—5 on Figure 4.

Figure 6 is a horizontal section taken below the level of the screen units.

Figure 7 is a rear elevation.

Figure 8 is a fragmentary plan view illustrating the two spray washing units and the mountings therefor.

Figure 9 is an enlarged fragmentary side elevation illustrating one of the releasable mountings for the rear screen unit.

Figure 10 is a vertical cross section illustrating the parts shown in Figure 9.

Figure 11 is an enlarged fragmentary sectional view illustrating the cross sectional shape of the screen rods.

Figure 12 is an enlarged detail sectional view illustrating one of the spray nozzles.

Figure 13 is an enlarged detail horizontal sectional view illustrating the screen tilt securing spring plunger equipment.

In the example of embodiment of the invention herein disclosed, there is included a frame structure comprising side members 5 of cast channel construction held in parallel, upright

3

laterally spaced relation by lower front and rear cross angles 6 and 7 respectively, a top cross angle 8, and a rear intermediate cross angle 9. It will be observed by reference to Figures 1, 2, 3, 5 and 6 of the drawings that the frame side members 5 are so formed and disposed as to present smooth flat surfaces only toward the inner portions of the machine in which the products are treated, thereby to present a minimum of collection points in which foreign matter may collect, and to facilitate to a maximum degree ready cleansing of the frame structure.

The frame side members 5 are equipped with laterally aligned rocker bearings 10 which support a cross shaft 11. Adjacent each bearing 10 and on said shaft a rocker member 12 is mounted, said members being disposed in parallel relation in the manner clearly illustrated in Figures 1, 5 and 6 of the drawings. A cross rod 13 is secured across the front ends of the rocker members 12, and a similar cross rod 14 is secured across said rocker member near the rear ends thereof. Spacer sleeves 15 surround both of the rods 13 and 14. See Figures 3 and 6.

Two cross rods 16 traverse the rear half of the rocker members 12, and two cross rods 17 similarly traverse the front half of said rocker members, all of said rods 16 and 17 being disposed in parallel relation. Two sets of long hanger arms 18, 18 and 19, 19 are uprightly disposed at the rear half of the machine with their lower ends rockably supported on the rods 16 in the manner clearly illustrated in Figures 3 and 6 of the drawings. Two sets of short hanger arms 20, 20 and 21, 21 are uprightly disposed at the front half of the machine with their lower ends rockably mounted on the rods 17. It will be apparent by reference to Figures 1 and 3 of the drawings that the long hanger arms 18, 19 serve to support a screen unit generally designated 22 and the short hanger arms 20, 21 similarly serve to support a screen unit generally designated 23.

The screen unit generally designated 23 includes side members 24 which are upwardly and outwardly flared as at 25, and transverse cross angles 26 extend between said side members in the manner clearly illustrated in Figures 3 and 5. A rear member 27 extends across the side members 24 at the rear end of the unit, and a drain pan 28 is secured to said rear member and the rear angle 26 in position for extending a short distance forwardly and downwardly from the rear end of the unit 22. The screen proper is composed of rods 29 which are supported at their ends on the transverse angles 26 and are arranged longitudinally in parallel spaced relation in the manner clearly illustrated in Figures 5 and 11 of the drawings. It will be apparent by reference to Figure 11 that each rod includes an upper convex surface 30 and downwardly and inwardly sloping sides 31. This particular shaping and placement of the screen rods provides very efficient screening. It has been found that screens constructed in this manner, provide quick clearance and substantially no clogging. By reference to Figures 1, 4, 9 and 10 of the drawings, it will be observed that the screen unit 22 is provided at each side with two brackets 32, said brackets being welded to the side members of the unit in the manner illustrated in Figure 10. Each bracket includes an inverted U-portion 33, and the downwardly turned legs of each U are provided with a downwardly opening notch 34 for straddling and engaging in self-centering contact with the sloping flattened sides 35 of a cross pin 36

4

which is rockably mounted at 37 in the upper end of the respective hanger member 18 or 19. The outer leg of each U is equipped with a swingably mounted resilient bail 38 which is engageable under the adjacent end of the respective pin 36 in a notch 39 formed therein.

It will be apparent by reference to Figures 1, 9 and 10 of the drawings that by snapping the bails 38 out of the receiving notches 39 so as to clear the mounting pins 36, the screen unit 22 may be readily lifted away from the supporting arms 18 and 19.

The other screen generally designated 23 has side members 40 which are upwardly and outwardly flared as at 41, and cross angles 42 extend across between said side members. A short rear wall 43 also is provided, and it will be apparent by reference to Figure 3 that because of the difference in the lengths of the hanger arms 20, 21 and 18, 19, the forward or delivery end of the screen unit 22 extends over the rear wall 43 of the screen unit 23 so as to deliver onto the last mentioned screen unit. Screen rods 44 are supported on the transverse angles 42 in the same manner as in the previously described screen unit 22 and the screen unit 23 also includes a forward extension pan 45, the bottom of which forms an extension from the delivery ends of the screen rods 44. The sides of the pan 45 form an extension of the side of the screen unit 23.

A catch pan 47 extends forwardly and downwardly beneath the rear half of the machine and is supported as at 48 on the machine framing. The pan 47 slopes centrally and downwardly toward a drain 49. A catch pan 50 is supported as at 51 on the rocker members 12 beneath the front screen unit 23, and said pan 50 slopes rearwardly and downwardly and extends over the front end of the pan 47 as at 52 so as to deliver into the pan 47 and the drain 49 thereof.

A rear closure wall 53 is secured to and extends between the rear frame angles 7 and 9, and another rear wall 54 extends above the angle 9 to a point just below the rear screen pan extension 28. It will thus be apparent that any washing liquid and bits of products which pass between the screen rods 29 and 44 will be collected in the pans 28, 47 and 50 and delivered to the drain 49.

An electric motor 55 is mounted as at 56 on the framing at the rear of the machine, and said motor may be a variable speed motor controllable by a rheostat R for varying the speed of vibration of the screen units through vibrating devices soon to be described. It is to be understood, however, that the variable speed motor drive is but an example of any suitable form of variable speed power applying source. A guard plate 57 may be mounted over the motor to protect the same from any washing liquid or solid objects which might fall thereon.

Through pulley and belt transmission connections 58, the motor serves to drive a cross shaft 59 which is supported in bearings 60 secured to the rear upright portions of the frame side members 5. Two sets of eccentrics are mounted on the cross shaft 59 in the manner clearly illustrated in Figures 3, 6 and 7 of the drawings. It will be apparent by reference to Figures 3 and 6 that the eccentrics of each set, or in other words the eccentrics disposed at each side of the machine, are arranged 180° apart. One eccentric of each set is connected by one strap and pitman connection with the long arm 18 at

5

the respective side of the machine, and the other eccentric of each set is connected by a strap and pitman connection 63 with the respective short arm 21. It will be noted that the arms 18 and 21 are the arms nearest the center of the machine. By connecting the screen units 22 and 23 through the pitman 62 and 63 with the shaft 59, said screen units will be vibrated, or reciprocated backwardly and forwardly as the shaft 59 is rotated, and because of the particular positioning of the eccentrics 61, the screen units will move reversely, that is, one will move in a direction opposite that in which the other is moving. In this manner, vibration in the machine such as would tend to damage parts and cause the machine to creep on the supporting floor is avoided.

Two spraying units generally designated 64 and 65 are provided, the former being disposed in generally parallel relation above the rear screen unit 22, and the latter being similarly disposed over the screen unit 23. The screen units are best shown in Figures 1, 3, 4 and 8 of the drawings.

The rear spraying unit comprises a manifold or side duct portion 66 and a plurality of cross pipes 67 extends transversely of the machine in longitudinally spaced parallel relation. The free ends of the pipe 67 are closed as at 68 and are rigidly clamped between clamp bars 69. The ends of the pipe 67 nearest the center of the machine are extended at their ends as at 70, and said ends are supported in notches 71 which open upwardly in brackets 72 secured by stud bolts 73 to the frame side members 5. The ends of the rearmost pipe 67 are extended as at 74 and rest in notches 75 provided in the upper ends of supporting arms 76 which are pivoted at their lower ends on the rod 14 in the manner clearly illustrated in Figures 3 and 4 of the drawings. Spray nozzles 77 depend in spaced relation from all of the pipes 67, and it will be apparent by reference to Figure 12 of the drawings that each nozzle includes a tubular body 78 which is threaded into the supporting pipe, and which is provided with a V-notch in the rearwardly presented lower portion thereof, said V-notch having its lower portion downwardly and rearwardly inclined and its upper extension substantially perpendicular to the axis of the nozzle. Nozzles constructed and arranged in the manner stated direct sprays of washing liquid inwardly and downwardly onto the screen units in a direction counter to the direction in which the products are moved, by agitation of said screen units. The other or front frame unit 65 comprises a manifold or side duct 80 and a plurality of pipes 81 extending transversely in parallel spaced relation. The free ends of the pipes 81 are closed as at 82 and are rigidly clamped between clamp bars 83. The manifold 80 has a bracket secured thereon near the center of the machine, and the clamp bars 83 also serve to support a similar bracket 85 at the opposite side of the unit. The brackets 84 and 85 are provided with downwardly opening notches 86 for straddling and resting upon the stud bolts 73. The foremost pipe 81 is extended at its ends as at 87 to rest in notches 88 provided in the upper ends of the supporting arms 89 which are pivoted at their lower ends on the previously mentioned rod 13. See Figures 3 and 4. Like the previously described pipes 67, the pipes 80 are provided with spray nozzles 90 which depend therefrom in spaced relation.

6

It will be apparent by reference to Figures 1 and 4 of the drawings that the rear spray unit 64 is provided with a supply connection 91, and the front spray unit 65 with a supply connection 92. A common washing liquid supply 93 is provided and secured as at 94 upon one of the frame side members 5. The common supply 93 is connected by flexible duct 95 with the rear spray unit through the connection 91, and through a flexible duct 96 with the front spray unit through the connection 92.

The means for rocking or tilting the rocker members 12 for varying the inclination of the screen units 22 and 23 is best illustrated in Figures 1, 2, 4 and 6 of the drawings. A rock shaft 97 is rockably mounted in bearings 98 provided on the frame side members 5, and it will be noted that one said frame member is equipped with an arc sector 99. A crank arm 100 is secured to the rock shaft 97 in position for swinging adjacent the frame sector 99. Two cranks 101 are fixed to the shaft 97 beneath the rocker members 12, and said cranks have their free ends link connected as at 102 with said rocker members. It will thus be apparent that by swinging the arm 100 over the sector 99 rocking movement can be imparted to the members 12. The crank arm 100 is provided spring pin equipment 103 which is engageable in selected apertures 104 in the frame sector 99 for securing the rocker members 12 in adjusted position.

The driver shaft 59 may be provided with a hand wheel 105 so that the same may be turned over by hand when desired.

In the operation of the invention, the motor 55 is set into operation to impart rotation to the shaft 59, and the rotation of said shaft serves to vibrate the screen units 22 and 23 in the manner previously described. It will be apparent that the spraying units 64 and 65 do not vibrate with the screen units. The corn or other products to be washed and screened are dumped onto the rear end of the screen unit 22 and said products are gradually fed forwardly over the screen rods 29 as a result of the vibration or reciprocation of said screen unit. As the products pass under the spray unit 64, washing liquid is sprayed thereonto from the nozzles 77 in a direction counter to the direction in which the products are being fed. The washing liquid and small bits of products or debris pass downwardly between the rods 29, leaving only clean, whole products on the screen unit. The products then pass from the front end of the screen unit 22 onto the rear end of the reversely vibrating screen unit 23 whereon the washing and screening operation is continued. The cleaned and screened products finally pass out of the machine over the delivery pan 45.

It has been found that the screens constructed and arranged in the particular manner herein described are very efficient in the screening of the products, and because of the peculiar shaping of the screen rods, there is little or no danger of clogging of the screens.

It has been found that in the screening and washing of various products various inclinations of the screening units and speeds of vibration of said units are essential. By reason of the provision of the variable speed motor and the means for variably tilting the screen units, it is possible to accurately adjust the machine so as to cause the same to operate at maximum efficiency on the particular product being processed.

It will be apparent that the washing, spraying

7

units 64 and 65 may be bodily lifted from their mountings, and the screen units 22 and 23 may be similarly removed from their supports by simply swinging away the securing balls 38. By removing the spraying units and the screen units, all remaining parts of the machine are made readily accessible for thorough cleansing, and it will be noted that the framing and said parts are constructed in a manner for greatly facilitating said cleansing.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a machine of the character described, a rocker frame rockable about a pivot disposed approximately centrally of its ends, at least one screen unit reciprocally mounted on said frame in an inclined position endwise of said pivot in each direction of the length of the frame, means for individually reciprocating said screen units, means for rocking the frame to simultaneously vary the inclination of all said screen units in like amount, and washer spray means extending in parallel relation over each said screen unit and supported on said frame so as to be movable with the frame when the latter is moved to vary the inclination of the screen units thereby to retain the relation of the spray means and the screen means at all times.

2. In a machine of the character described, a longitudinal frame structure including parallel upright side frame members, a pair of parallel rocker members rockably supported intermediately of their ends on the frame members, four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at one end thereof, and four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at the other end thereof, two screen units supported in cooperative relation on an incline with the delivery end of one overlapping the receiving end of the other and one unit mounted on the first mentioned four arms and the other unit on the other four arms, means for reciprocating the screen units, and means for tilting the rocker members to vary the inclination of the screen units.

3. In a machine of the character described, a longitudinal frame structure including parallel upright side frame members, a pair of parallel rocker members rockably supported intermediately of their ends on the frame members, four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at one end thereof, and four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at the other end thereof, two screen units supported in cooperative relation on an incline with the delivery end of one overlapping the receiving end of the other and one unit mounted on the first mentioned four arms and the other unit on the other four arms, means for reciprocating the screen units, means for tilting the rocker members to vary the inclination of the screen units, and washer spray means extending over said screen unit and supported on said frame so

8

as to be movable with the frame when the latter is moved to vary the inclination of the screen units thereby to retain the relation of the spray means and the screen units.

4. In a machine of the character described, a longitudinal frame structure including parallel upright side frame members, a pair of parallel rocker members rockably supported intermediately of their ends on the frame members, four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at one end thereof, and four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at the other end thereof, two screen units supported in cooperative relation on an incline with the delivery end of one overlapping the receiving end of the other and one unit mounted on the first mentioned four arms and the other unit on the other four arms, means for reciprocating the screen units, means for tilting the rocker members to vary the inclination of the screen units, fulcrum means supported on the side frame members above the rocking center of the rocker members, a washer spray unit mounted over each said screen unit, and swingable uprights mounted in transversely aligned pairs near the respective ends of the rocker members, said washer spray units being supported at their remote ends on said swingable uprights and at their near ends on said fulcrum means and being subject to being bodily lifted off said uprights and fulcrum means.

5. Machine structure as defined in claim 4 in which each washer spray unit comprises a manifold, a multiple of pipes connected with and extending at right angles from said manifold in parallel spaced relation, clamp bar means rigidly clamping the free ends of the pipes together, and spray nozzles depending in spaced relation from the pipes.

6. In a machine of the character described, a longitudinal frame structure including parallel upright side frame members, a pair of parallel rocker members rockably supported intermediately of their ends on the frame members, four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at one end thereof, and four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at the other end thereof, two screen units supported in cooperative relation on an incline with the delivery end of one overlapping the receiving end of the other and one unit mounted on the first mentioned four arms and the other unit on the other four arms, means for reciprocating the screen units, a rock shaft extending transversely with respect to the rocker members, cranks on said rock shaft, links connecting the free ends of the cranks with the rocker members, and means for rocking said shaft for tilting the rocker members and varying the inclination of the screen units.

7. In a machine of the character described, a longitudinal frame structure including parallel upright side frame members, a pair of parallel rocker members rockably supported intermediately of their ends on the frame members, four upright support arms pivoted at their lower ends in transversely aligned pairs endwise of the rocking center of the rocker members at one end thereof, and four upright support arms pivoted at their lower ends in transversely aligned pairs

endwise of the rocking center of the rocker members at the other end thereof, two screen units supported in cooperative relation on an incline with the delivery end of one overlapping the receiving end of the other and one unit mounted on the first mentioned four arms and the other unit on the other four arms, means for reciprocating the screen units, a rock shaft extending transversely with respect to the rocker members, cranks on said rock shaft, links connecting the free ends of the cranks with the rocker members, a sector on the frame structure approximating concentric relation to the rock shaft and having a plurality of selective apertures therein, an arm secured to the rock shaft in position for swinging over said sector for rocking the shaft and tilting the rocker members to vary the inclination of the screen units, and a spring pressed plunger carried by the arm and engageable in the apertures for secure selective adjustments of the rocker members.

8. In apparatus of the character described, a screen having a screening surface composed of a plurality of rods arranged in parallel spaced relation, each rod having a cross section transversely convex across its top portion and including downwardly and inwardly sloping substantially flat side portions, said convex top portion at any given section perpendicularly across a rod constituting an arc defining the maximum width of the rod and struck from a center lying in a plane passing vertically through the center of the rod, and said arc width being substantially less than the diameter of an imaginary circle of which said arc is a part, each said flat side portion bearing obtuse angular relation to a tangent struck from the arc where it is about to merge into the respective flat side portion in defining said maximum rod width, means for supporting the screen with the rods thereof inclined in the direction of their length, means for reciprocating the screen in the direction of the length of said rods, and means for varying the inclination of the screen.

9. In apparatus of the character described, a screen having a screening surface composed of a

plurality of rods arranged in parallel spaced relation, each rod having a cross section transversely convex across its top portion and including downwardly and inwardly sloping substantially flat side portions, said convex top portion at any given section perpendicularly across a rod constituting an arc defining the maximum width of the rod and struck from a center lying in a plane passing vertically through the center of the rod, and said arc width being substantially less than the diameter of an imaginary circle of which said arc is a part, each said flat side portion bearing obtuse angular relation to a tangent struck from the arc where it is about to merge into the respective flat side portion in defining said maximum rod width, means for supporting the screen with the rods thereof inclined in the direction of their length, means for reciprocating the screen in the direction of the length of said rods, means for varying the inclination of the screen, and means for varying the speed of vibration of the screen.

RALPH COVER.

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