Oct. 29, 1935. E. E. MILLER ET AL 2,018,967

MACHINE FOR CLEANING EGGS

Filed Dec. 7, 1932 4 Sheets-Sheet 1

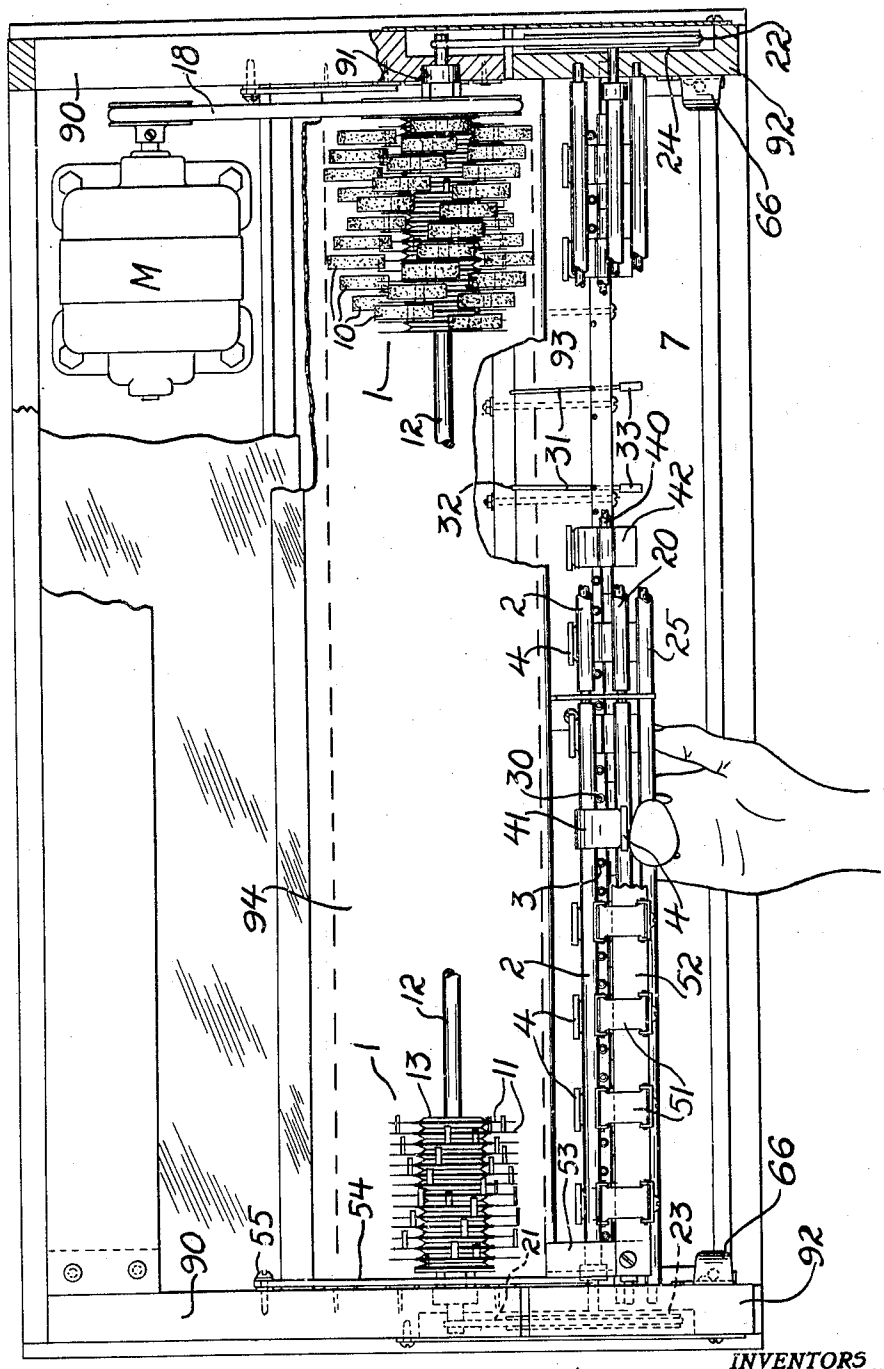


Fig. 1

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FIG. 5

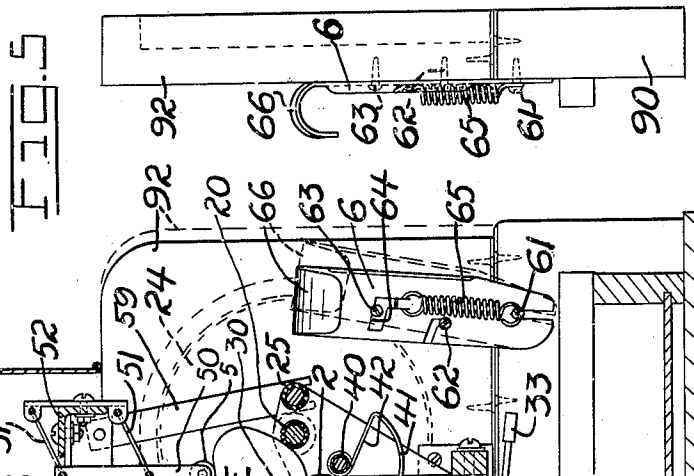


FIG. 2

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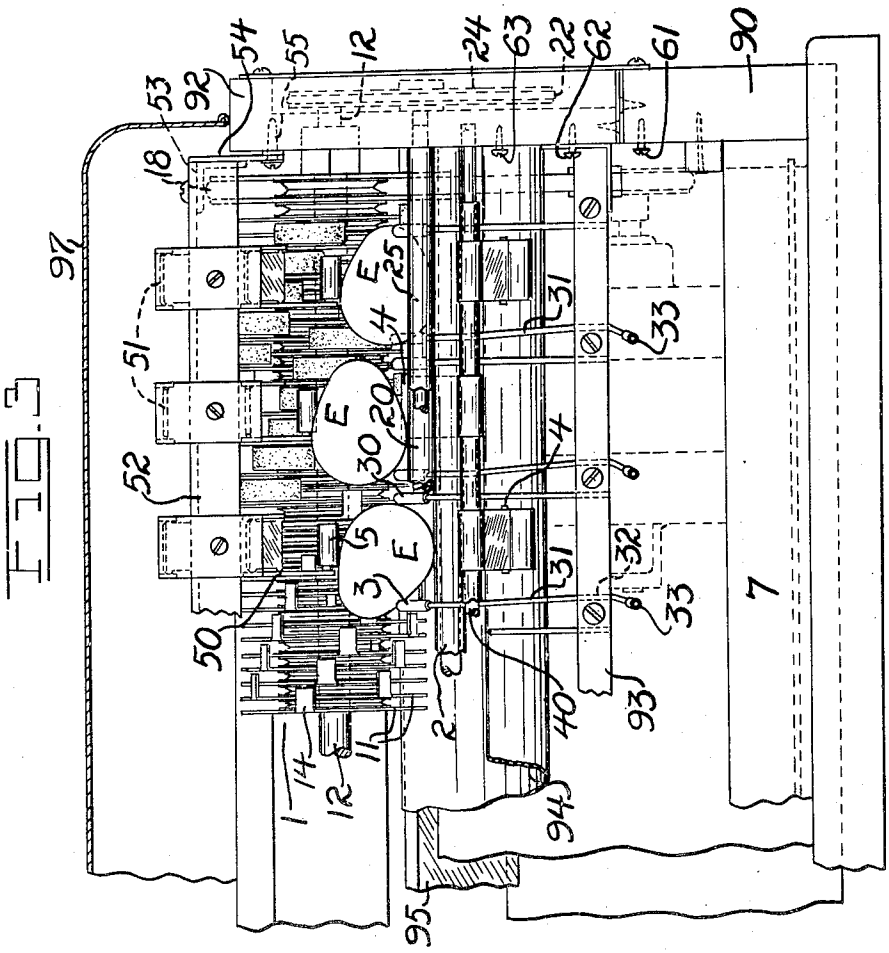


FIG. 3

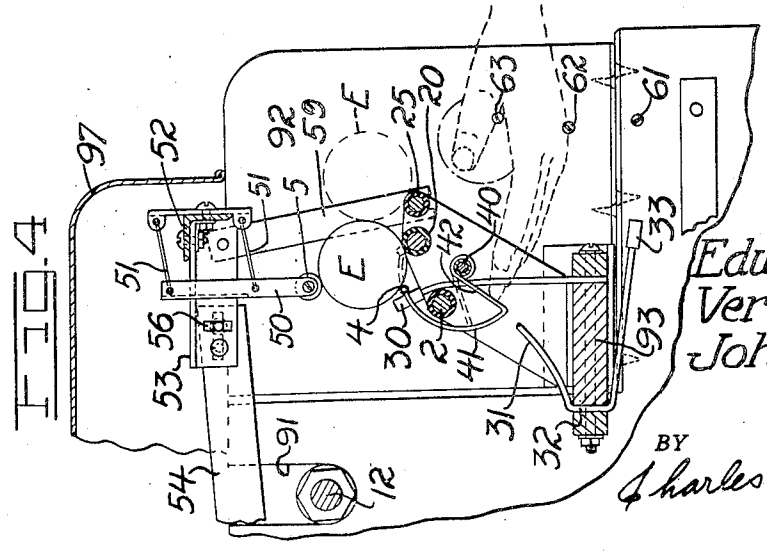


FIG. 4

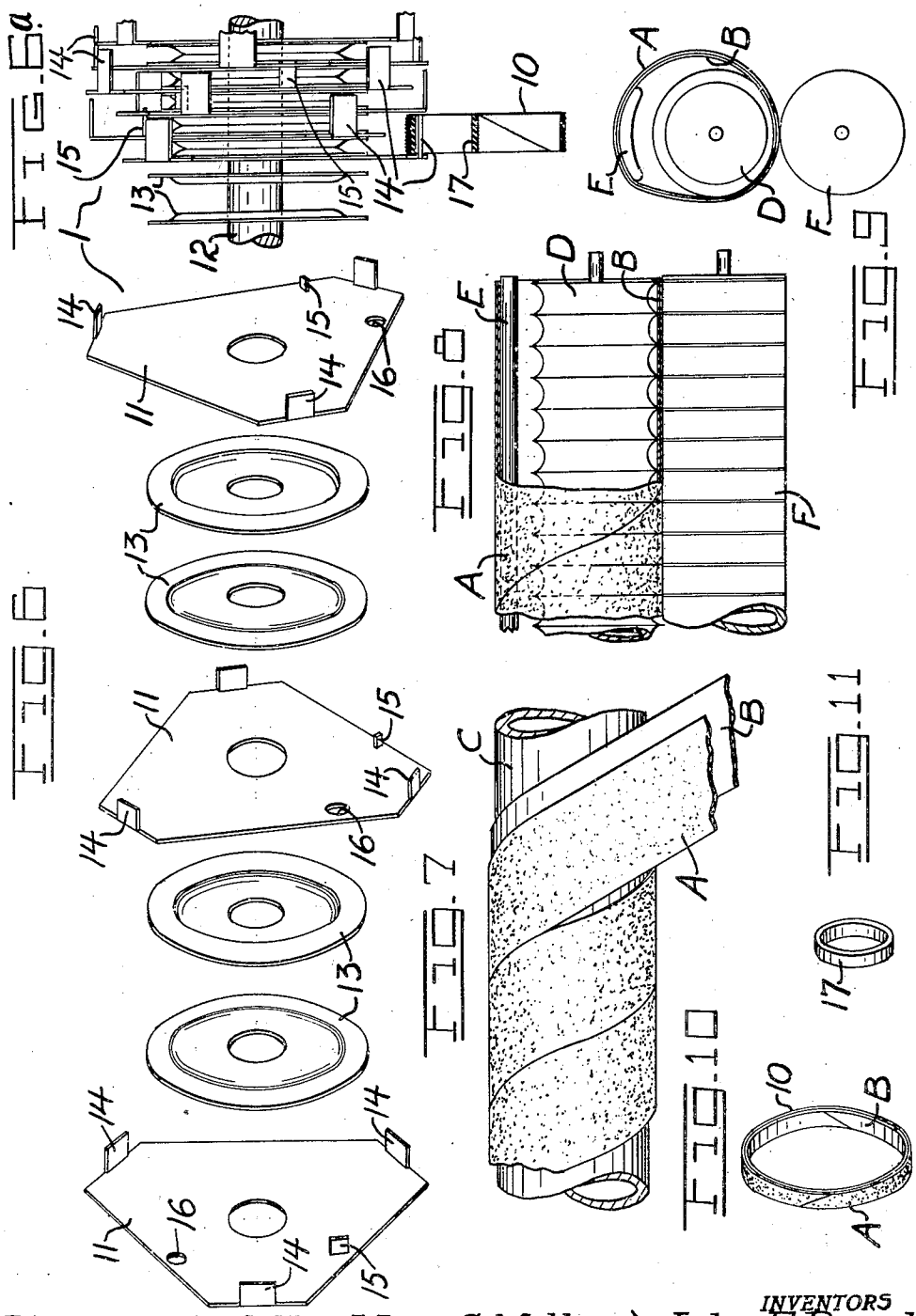
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2,018,967

MACHINE FOR CLEANING EGGS

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Application December 7, 1932, Serial No. 646,088

16 Claims. (Cl. 51—103)

Our invention relates to egg cleaning machines of the general character disclosed in our application Serial No. 590,110, filed February 1, 1932, now Patent No. 1,964,295, dated June 26, 1934. It is an object of the present device to provide a machine which will clean eggs by abrasive action, without the use of any liquid, and without the application of force sufficient to break, check, or in any way injure the egg, and which will accomplish this end without attention on the part of an operator other than to position the eggs and to remove them when they are cleaned.

It is an object of this invention to provide means of the character indicated, which shall be simple and inexpensive in construction, and adapted to quantity manufacture.

It is a further object to provide means so arranged that all parts of an egg will be engaged in rapid succession by light abrasive loops to clean the same, and to provide simple means for attaching or renewing such loops.

It is a further object to provide simple means to hold an egg in position, and to prevent its being thrown out of position by the action of the abrasive elements, such means being so constructed that they cannot readily be injured or moved from proper operative position, yet it is a further object to provide, in conjunction with such hold-down means, means whereby the position can be adjusted in accordance with the size of the eggs being cleaned.

It is a further object to provide means whereby the machine may be readily adjusted to accommodate eggs of different sizes, to the end that they may be most advantageously presented to the abrasive elements.

It is a further object so to construct such an egg cleaning machine that all parts are accessible, and so that parts which may have to be changed, renewed or worked upon can be readily taken out, yet which is strongly and simply constructed.

Still another object is to provide means whereby the dust and dirt resulting from abrasive action can be removed and, if desired, can be collected, so that it will not fly in the face of the attendant, nor into the air of the room.

In connection with the abrasive loops employed, it is an object to provide a simple and inexpensive loop and a method of constructing the same, whereby they may be made strong, light, and flexible, yet quickly and inexpensively.

Other objects may be ascertained from a study of the attached drawings, and of this specification and the claims.

In the accompanying drawings we have shown our invention embodied in a form which is at present preferred by us, and have illustrated the steps involved in the manufacture of the abrasive loops.

Figure 1 is a plan view of the machine, the hood being removed, and various parts being broken away and others omitted, the better to illustrate the construction.

Figure 2 is a transverse section on a vertical plane through the device, certain parts being omitted.

Figure 3 is a front elevation of the machine, certain parts being omitted for clearness of illustration.

Figure 4 is a detail section on a transverse vertical plane through the machine, certain parts being omitted.

Figure 5 is a detail front elevation of an adjusting means employed in the machine.

Figure 6 is a view in elevation, illustrating the process of assembly of the abrasive elements.

Figure 6*a* is a view in elevation illustrating the completed assembly of the abrasive elements.

Figure 7 is an elevation, illustrating a step in the process of manufacture of the abrasive loops, and Figure 8 is a similar elevation of a further step in this process, while Figure 9 is an end view of the latter step.

Figure 10 is a perspective view of the completed abrasive loop, and Figure 11 is a perspective view of a supporting loop employed in association with the abrasive loop.

Dirty eggs, of which there are a high percentage, are graded down considerably from the price of eggs of the same age and size which are clean. It is scarcely economical to remove the dirt by hand, and washing to clean the eggs injures their keeping qualities, and in itself lowers their grade. Dirty eggs thus represent a distinct loss to the poultryman and our invention is designed to remove the dirt in a manner which is not objectionable to the packing houses, and which is convenient, economical and rapid, thus saving the time and energy of the poultryman, yet withal in a manner to prevent the possibility of injury to the eggs. For instance, the cleaning must be accomplished in a manner which avoids jarring or vibrating the eggs, for it has been found that recurrent vibration, even such as accompanies transportation by steamer, will break down the air cells in certain eggs, and thus will lower their grade. Obviously, the cleaning must be so accomplished that the shells are not cracked nor checked, yet the eggs must be thor-

oughly cleaned, not only about their side surfaces, but the end surfaces as well.

The abrasive element, in the present form of our invention, is generally represented by the numeral 1. In effect, it comprises a plurality of light, flexible abrasive loops 10 suitably supported to rotate about an axis, and by such rotation to be thrown centrifugally outward to move through a definite circular path, into which path the eggs E may be moved and held, together with means controlling the egg so that it may be moved about to present all sides and both ends to the rapidly recurring action of the abrasive loops 10.

As a convenient means of best supporting the abrasive loops and accomplishing this rotative movement, the abrasive element 1 may be formed of a plurality of disks 11 which, as shown, are substantially triangular in form, and apertured at their center, whereby they may be received upon an axial shaft 12. These disks are suitably spaced, as for instance by the cupped washers 13, two of which are interposed between each adjoining disk 11, as may be seen in Figure 6. Each of the disks 11 has one or more lugs 14 projecting from one side thereof toward an adjacent disk. Preferably the disks are so positioned, and the lugs are of such lengths, that they extend beyond the next adjacent disk to a point close to the second adjacent disk, as may be seen in Figure 6. These lugs form the supporting means for the flexible loops 10, which thus are held at a fixed distance outwardly from the axis of the supporting shaft 12.

It is preferable that the lugs 14 be disposed in a plurality of helical series, so that the loops in each of these series are disposed in end to end relationship lengthwise of the abrasive element, but are angularly offset by a slight amount, each from the adjoining loop in the series. It is also preferable that the loops in one series be disposed in the radial plane of the space between loops of another series. This result is conveniently accomplished by extending the lugs 14 from one disk past the next adjacent disk to the second adjacent disk, as described above, and by providing means registering between adjacent disks, as they are received upon the shaft 12, to hold them with their lugs angularly offset from each other in each series. Such registering means may comprise an ear 15 upstanding from each disk and received within an aperture 16 of an adjoining disk, as is best observed in Figure 6, whereby when the disks are assembled, each ear 15 engaging within the hole 16 of the next previously assembled disk, the lugs 14 will naturally and inevitably be disposed in the several helical series.

It is preferred that the lugs 14 do not quite touch the disk toward which they extend, and this, or the springing apart of the disks, which may be made of sheet metal, permits a loop 10 to be passed over the end of the lug, and also permits passage over the end of the lug of a loop 17, preferably of greater mass and stiffness than the loop 10, but of considerably less diameter. Such a loop 17 may be a section of rubber tubing, and its functions are, first, to maintain the sides of the loop 10 spaced apart, when the latter is thrown centrifugally outward, so that the loop is always an open loop, and the two sides do not come together, even when engaging the egg or passing thereover, as may be seen in Figure 2, and second, to serve as a means to prevent binding between the loop 10 and the lug 14 or equivalent means which supports the loop, whereby the loop, upon engaging the surface of the egg, and tending thereby to be slowed up, will rotate somewhat circumferentially of the individual loops, and in this manner each loop will, with each engagement of the egg, present a fresh surface to the egg, to the end that wear does not occur at any localized point, and the life of the loop is very materially extended.

The abrasive element, formed after the manner described or in any equivalent manner, is suitably supported in a main frame, including the fixed ends 90. These ends may be notched from the top downward, as indicated at 91, for the reception of the ends of the shaft 12 and bearings which may be carried thereby, and the ends of the shaft may be grooved for the reception of belts 21 and 22, the purpose of which will appear hereafter. The abrasive element 1, as a whole, is suitably driven, as for instance by a belt 18, from an electric motor M mounted upon the main frame.

At one side of the abrasive element 1 are mounted the egg supporting means, which include small rotative rollers 2 and 20. These may be covered with rubber or like material to protect the eggs. Preferably these egg supporting means are carried upon a secondary frame including the end members 92 supported upon and slidable relative to the end members 90 of the main frame in a direction towards and from the axis of rotation of the abrasive element 1. The roller 2 carries a pulley 23, and the roller 20 carries a similar pulley 24, over which run the belts 21 and 22, respectively, whereby the rollers 2 and 20 are rotated from the shaft 12. Because of the adjustment of the end members 92 of the secondary frame relative to the main frame, the belts 21 and 22 are preferably of elastic material, as rubber.

The egg supporting means may also include or have associated therewith a rod 25, which is non-rotative, and which is fixed outside of the outer roller 20. To hold the egg against movement axially of the abrasive element, and to cause it to wabble about an axis which is parallel to the axis of rotation of the abrasive element, but in such a manner that the egg's axis is inclined relative to this axis about which the egg wabbles, we may provide posts 3 and 30, which in effect are part of the egg positioning means. These are disposed in pairs the length of the machine, the post 30 being fixed in position, and the post 3 being adjustable towards and from the complemental fixed post 30 of the pair. Preferably these posts stand up between the rollers 2 and 20, and they form part of the egg positioning means. Movement of the post 3 may be effected by mounting it upon an arm 31, which is pivotally supported at 32 from a frame member 93 (see Figure 4), this frame member 93 being adjustable with the secondary frame members 92. An arm 33 may be engaged by the operator's hand to effect adjustment of the post 3.

By adjusting the spacing between the posts 3 and 30 such that they are spaced apart less than the major axis of an egg, the egg is placed with one end of its major axis lying outside one post, and the opposite end of the major axis lying inside the complemental post, and by rotation of the rollers 2 and 20 and by the urging of the abrasive loops which drag over it, it is caused to rotate about its own major axis, and also about the axis around which it wabbles, and which was previously referred to. This will shortly cause

reversal of the ends of the egg's major axis; that is to say, that end which was formerly outside of a post will now be found inside that same post, while the opposite end, formerly inside the complemental post, will now be found outside such complemental post, and so on, the egg gradually wabbling and reversing the position of its ends to present each end of the egg towards the action of the abrasive loops. The adjustment of the posts may be such as almost to cause end for end rotation of the egg about a minor axis, although this is not usually necessary, a wabbling action only being sufficient.

The eggs might be lifted by hand out of the cleaning position, but it is preferable to provide ejecting means for this purpose, and to that end, at each egg cleaning station we have provided an ejector 4 (see, for example, Figures 1, 2 and 4) which is pivotally swung from a rod 40, which ejectors may be mounted upon an arcuate portion 41 supported by a straight portion 42, the latter of which is engageable by the tips of the operator's fingers, as illustrated in Figure 4, thus causing the operator's hand to be positioned to receive the egg as it is ejected by the member 4. The device, when released, swings back to a position out of the way by its own weight. As is the case with the egg positioning means, the egg ejecting means are likewise carried upon the adjustable supplemental frame of which the ends 92 are a part.

In order to hold down the egg, so that it will not be thrown from the egg supporting rollers 2 and 20 by the action of the abrasive loops, we provide members 5 immediately above each egg station, these members being of light weight, so that they will not interfere with the wabbling action, yet of sufficient weight to hold the eggs down upon the rollers 2 and 20. Preferably they are movable substantially vertically, and they may take the form of rollers 5 supported in brackets 50, which in turn are carried by the parallel links 51 mounted upon a bar 52 which extends across the front of the machine. Being thus supported, there is no possibility of the operator's twisting or bending the hold-down means or otherwise moving them from proper position.

Because eggs vary in size, and it is preferable that the machine be made to accommodate different sizes of eggs, we have provided the adjustments heretofore described of the secondary frame and the egg supporting and positioning elements carried thereby relative to the axis of rotation of the abrasive element 1. As a means of accomplishing this adjustment, yet holding the secondary frame in any given adjustment, we provide frictional means, for instance, the lever 6, fulcrumed at 61 upon the main frame ends 90, having a slot within which is received a pin 62 by which it is pivoted upon and controls movement of the secondary frame ends 92, and a third pin 63 which engages an inclined surface 64 of the lever, being drawn into engagement with this inclined surface 64 by means of a spring 65 anchored at one end upon the main frame, and engaging the lever 6 at its other end to draw the lever down in such fashion that the surface 64 engages the pin 63. The upper end of the lever is so formed, as indicated at 66, that it may be engaged by the fingers of the operator, and by tilting the lever on its fulcrum 61 the secondary frame is adjusted in the manner indicated by the dotted lines in Figure 2.

Since the egg positioning means are adjustable to accommodate different sizes of eggs, it is preferable that the hold-down means 5 be also adjustable, and in fact it might be supported on the secondary frame ends 92. Being supported as shown, the bar 52 which supports the hold-down means may be also supported upon struts 59, the notched lower ends of which rest upon the rod 25, and are carried upon arms 53, which in turn are supported upon arms 54 pivoted upon the main frame at 55. The arms 53 are adjustable relative to the arms 54, both forward and back and vertically, by means of the pin and slot arrangements illustrated at 56. By locating the pivots 55 to the rear of the abrasive element 1 the entire hold-down means may be swung back, permitting access to the abrasive element and to the other parts of the machine.

The abrasive action produces dust and dirt, and to prevent this flying into the face of the operator and out into the room we may provide a casing about the abrasive element, for instance, a member 94 closely embracing the lower portion of the path of the loops and terminating in a baffle 95 at the rear of the machine, leading to an aperture 96 in its rear wall, and in conjunction with this we may provide a hood 97 pivoted at 98, whereby it can be thrown back to permit access to the abrasive element and other parts, but normally overlying the abrasive element and the hold down means, thus providing a conduit whereby the dust is drawn beneath the hood and is discharged through the aperture 96, where it may be caught in a bag (not shown).

For the convenience of the operator we may provide a tray 7 in the lower portion of the machine, this forming, in effect, a drawer which may be pulled out in front of the operator, and in which eggs may be placed while the operator is working at the machine.

The construction of the abrasive loops 10 is of considerable importance. They must be light, and therefore thin, yet they must be strong and tough, and have sufficient inherent stiffness that the sides cannot be drawn together, nor can a sharp abrupt end be formed such as might strike or snap against the shell of the egg. To these ends and for convenience in manufacture, we prefer to employ two strips of woven cloth or like material, both comparatively light in weight and yet by their adherence one to the other supplying sufficient stiffness to prevent the sides of the loop coming together. One of these strips, designated A, is abrasive covered, and the other strip, designated B, is preferably covered with adhesive, or at least adhesive is interposed between the two strips (see Figure 7).

The loops are manufactured by winding these two strips A and B simultaneously and helically upon a mandrel C. Each strip is so wound that its edge abuts the edge of the preceding wrapping of the same strip upon the mandrel, but the strips A and B are offset one from the other, so that their abutting edges break joint, one with the other. The mandrel C preferably rotates to facilitate this wrapping action, and is preferably heated, either at the time of or after applying the strips A and B, to an extent which causes the adhesive on the strip B to adhere firmly to the under side of the strip A. The strip A may be an ordinary emery-covered cloth strip, and the strip B may be a strip of surgeon's tape or adhesive tape.

According to the step just described there is produced a cylinder of some length formed of number of turns of these two tapes A and B, one tape overlying the other. This cylinder, when

the adhesive has set, is moved from the mandrel, and is then cut circumferentially into loops. To accomplish this end we prefer to employ a cutter roll D of smaller diameter than the inside of the cylinder formed of the tape, over which and over a shoe E the cylinder is slipped. A pressure roller F is then brought into engagement with the outer side of the cylinder, whereby the cylinder is rotated, and the shoe E may likewise be moved to tension the cylinder, thus by pressure between the roll E and the cutter D causing the cutter to cut through the cylinder from the inside. This avoids dulling the cutter by the action of the abrasive.

Because of the offsetting of the edges of the strips A and B, the loops when formed have the joint in one strip at one side of the loop, and the joint in the other strip at a position considerably removed therefrom. Thus the loop is strong throughout, the two strips reinforce each other when in the finished loop, and while the loop is light, it has a sufficient stiffness to maintain it always open.

What we claim as our invention is:

1. In an egg cleaning device, in combination, a plurality of flexible abrasive loops of width less than the minor axis of an egg, means supporting the loops with certain thereof in slightly spaced end to end relationship to encompass the length of an egg, and others in end to end relationship opposite the spaces of the first-mentioned loops, and means to revolve the loops through a fixed path, to engage and clean an egg presented thereto.

2. In an egg cleaning machine, in combination, a plurality of flexible abrasive loops of width less than the minor axis of an egg, rotative loop supporting means, the loops being supported therein in end to end relationship in a plurality of helical series, spaced slightly endwise from adjoining loops in each series, the loops of one series being disposed in the radial plane of the spaces between loops of another series, and means to revolve the supporting means to throw the loops centrifugally outward to engage and clean eggs presented to the loops.

3. In an egg cleaning machine, in combination, a plurality of flexible abrasive loops, and means to support the same comprising a plurality of disks, spacer means interposed between disks, means to retain the disks and spacer means in alignment about a central axis of rotation, and a lug upon each disk projecting towards an adjacent disk to receive and retain a loop.

4. In an egg cleaning machine, in combination, a plurality of flexible abrasive loops, and means to support the same comprising a plurality of disks centrally apertured, a shaft extending through such apertures to hold said disks in alignment, spacer means interposed between the disks to space them approximately half the width of said loops, and a lug on each disk projecting beyond the next adjacent disk towards the second adjacent disk, to receive and retain a loop.

5. In an egg cleaning machine, in combination, a plurality of flexible abrasive loops, and means to support the same comprising a plurality of disks centrally apertured, a shaft extending through such apertures to hold said disks in alignment, spacer means interposed between the disks to space them approximately half the width of said loops, a lug on each disk projecting beyond the next adjacent disk towards the second adjacent disk, to receive and retain a loop, and means interengageable between adjacent disks to position the lugs of alternate disks in a helical series about the assembly thus formed.

6. In an egg cleaning machine, in combination, a rotary abrasive element including a plurality of closed abrasive loops each freely movable about its immediate support, and as a whole movable in a definite path, means to support an egg in position for engagement by said loops upon rotation of said element, and means to adjust the egg support towards and from the path of movement of the loops, to vary the extent of engagement of the loops with the egg, and the extent of movement of each loop relative to its immediate support.

7. In an egg cleaning machine, in combination, a rotary abrasive element including abrasive loops movable in a definite path, a main frame supporting the same, means to support an egg in position for engagement by said loops upon rotation of said element, including a secondary frame movable upon the main frame towards and from the path of said loops, a lever fulcrumed upon the main frame and pivotally connected to the secondary frame, a pin upon the secondary frame frictionally engaged by said lever, and a spring anchored upon the main frame and engaging said lever to draw it against said pin, whereby upon movement of said lever the secondary frame is movable relative to the main frame, and is frictionally held in any adjusted position.

8. The combination of claim 7, wherein the egg supporting means includes a rotative member, a drive means therefor carried by the main frame, and an elastic belt connecting said drive means and said rotative member.

9. In an egg cleaning machine, in combination, a rotative abrasive element, means to support an egg in position for engagement by said abrasive element, and to rotate it about an axis inclined relative to its major axis, and means movable substantially vertically above said egg, thus positioned, to hold it down upon said support, but yieldable to permit the wobbling action caused by the egg's rotation.

10. In an egg cleaning machine, in combination, a rotative abrasive element, means to support an egg in position for engagement by said abrasive element and to rotate it about an axis parallel to the axis of rotation of the abrasive element, and inclined relative to the egg's major axis, means movable substantially vertically above said egg, thus positioned, to hold it down upon said support, but yieldable to permit the wobbling action caused by the egg's rotation, and means to adjust the position of the hold down means towards or from the axis of rotation of the abrasive element.

11. In an egg cleaning machine, in combination, a rotative abrasive element, means to support an egg in position for engagement by said abrasive element, a bar supported above the egg's position, and a parallel link supported hold down means carried by said bar and engageable with the egg.

12. In an egg cleaning machine, in combination, a rotative abrasive element, means to support an egg in position for engagement by said abrasive element, a bar supported above the egg's position, a parallel link supported hold down means carried by said bar and engageable with the egg, and arms supporting said bar and themselves pivotally supported, whereby the hold down means may be swung to an inoperative position.

13. In an egg cleaning machine, in combination an abrasive element movable in a fixed path,

means to support and position an egg for engagement by said abrasive element, and to rotate the egg about an axis inclined relative to its major axis, whereby its ends tend to rise and fall, means movable substantially vertically and resting upon the egg from above to hold it upon its support, but yielding to its rise and fall, means to adjust the position of the egg supporting and positioning means as a unit towards or from the path of movement of the abrasive element, and means to correspondingly adjust the position of the hold-down means.

14. In an egg cleaning machine, in combination, a rotative abrasive element, egg-rotating means rotating about an axis parallel to the axis of rotation of said abrasive element, and means to move said egg-rotating means to adjust the spacing of said parallel rotating axes to accommodate eggs of various sizes.

15. In an egg cleaning machine, in combination, an abrasive element, egg-supporting means including spaced parallel rollers, means to rotate said rollers, to rotate in turn eggs supported thereby relatively to said abrasive element, means upstanding between the rollers and spaced less than the major axis of an egg, to impart a wobbling motion to the egg, as it rotates, and means to adjust said latter means and the rollers as a unit towards and from said abrasive element to accommodate eggs of various sizes.

16. In an egg cleaning machine, in combination, an abrasive element, egg-supporting means including spaced parallel rollers, means to rotate said rollers, to rotate in turn eggs supported thereby relative to said abrasive element, means upstanding between the rollers and spaced less than the major axis of an egg, to impart a wobbling motion to the egg, as it rotates, means to adjust said latter means and the rollers as a unit towards and from said abrasive element, and means to adjust the spacing between said upstanding means, thus to accommodate eggs of various sizes.

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