

March 10, 1942.

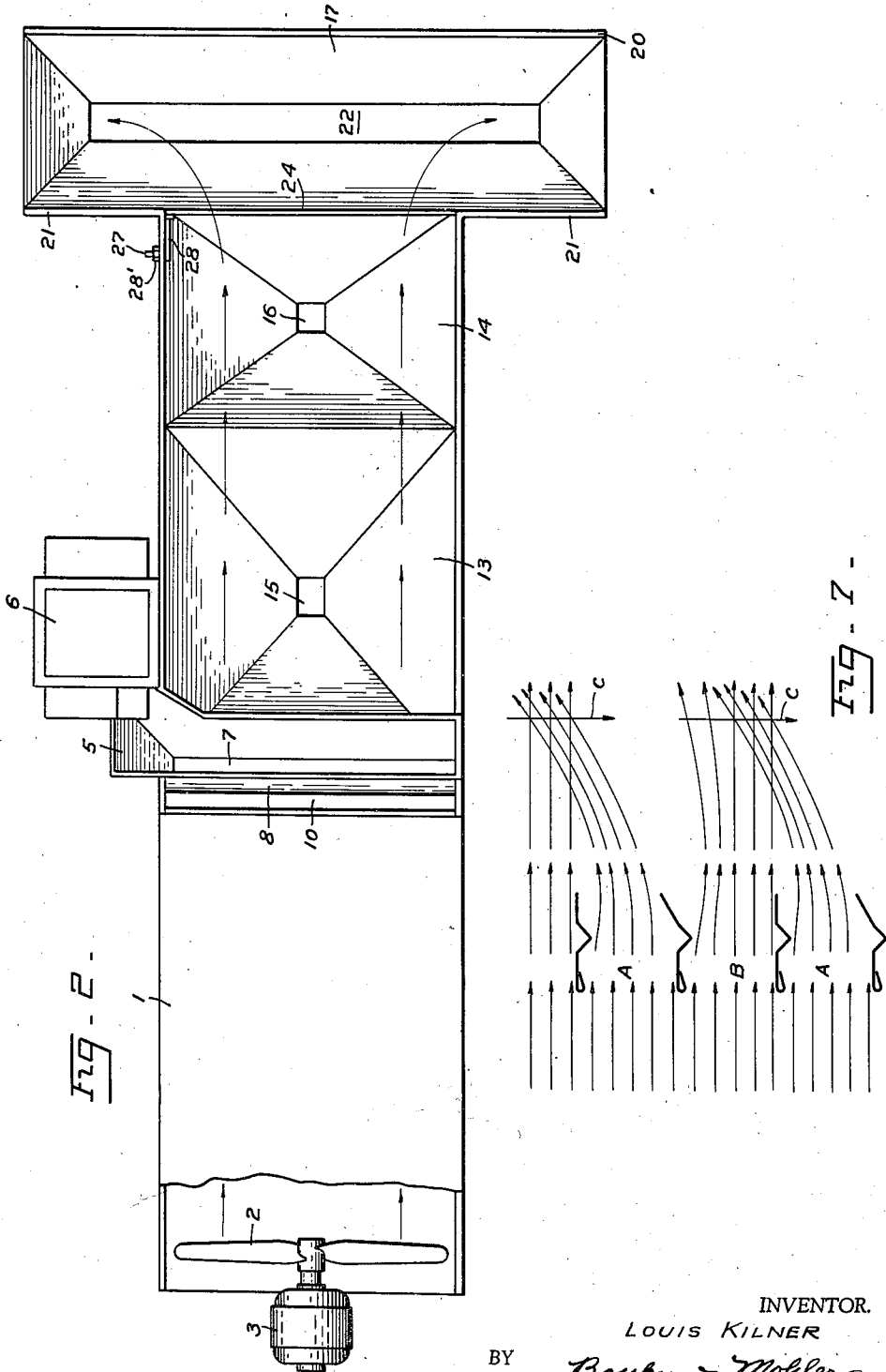
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RAISIN CLEANING APPARATUS

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3 Sheets-Sheet 2



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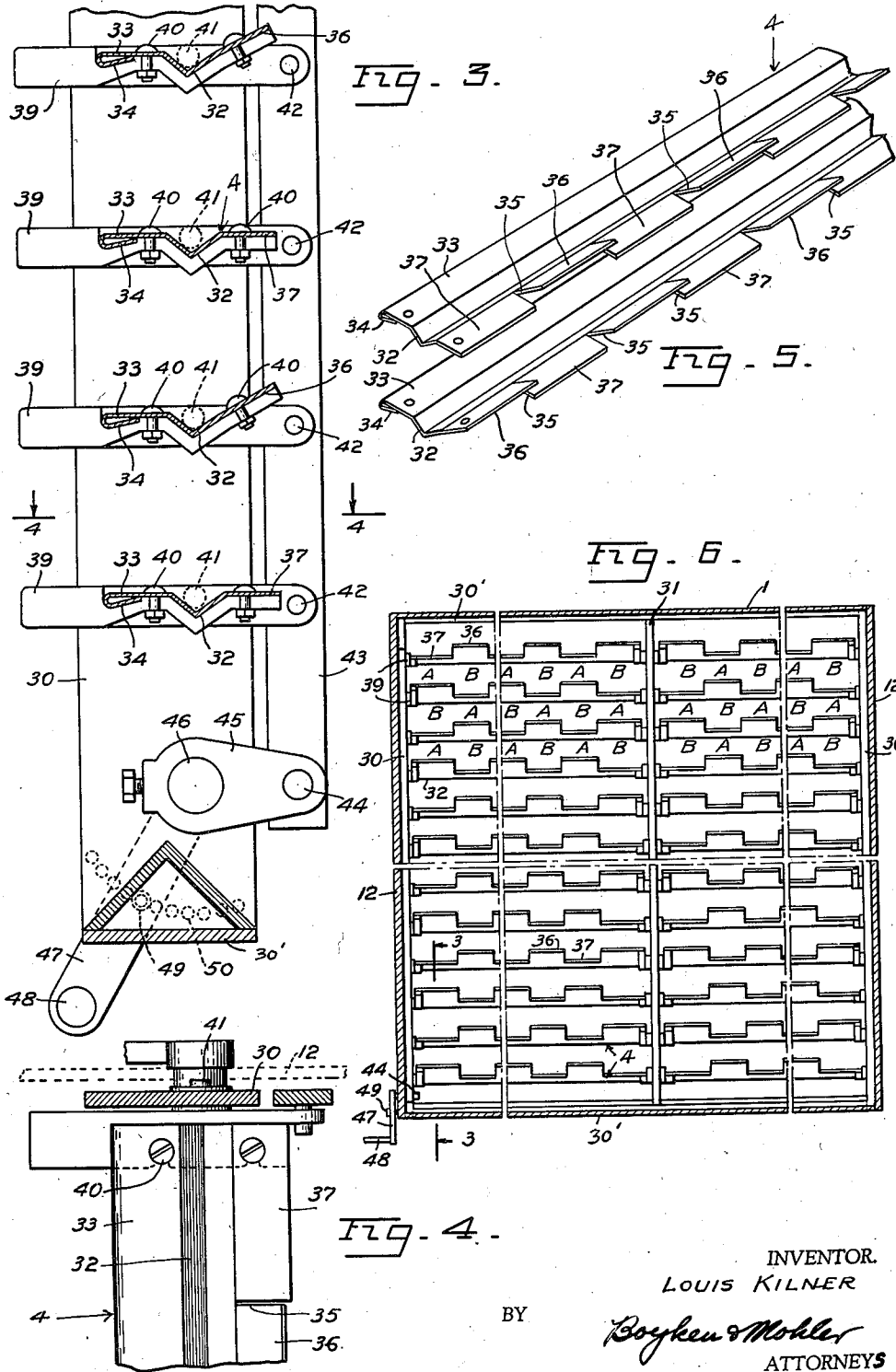
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UNITED STATES PATENT OFFICE

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RAISIN CLEANING APPARATUS

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Application August 9, 1937, Serial No. 158,192

2 Claims. (Cl. 209—135)

This invention relates to improvements in raisin cleaning apparatus and has for its objects the provision of improved means for classifying and segregating the raisins from loose caps and lighter particles of foreign material, which means includes the use of air as the medium for effecting the separation, and provision for controlling the air to effect the desired separation. Other objects and advantages will appear in the description and drawings annexed hereto.

Fig. 1 is a semi-diagrammatic sectional view taken vertically through the length of the apparatus.

Fig. 2 is a plan view of the apparatus shown in Fig. 1.

Fig. 3 is a fragmentary enlarged sectional view of a portion of my device taken along the line 3—3 of Fig. 6.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 is a perspective view of a pair of adjacent louvers indicated in section in Fig. 3, the louvers being shown separate from the supporting structure and broken in length to accommodate the view to the sheet.

Fig. 6 is an enlarged sectional view of a portion of my device as shown along line 6—6 of Fig. 1.

Fig. 7 is a diagrammatic view illustrating generally the air currents flowing between the louvers indicated in the elevation in Fig. 7.

In detail, the apparatus comprises a relatively large dimensioned wind tunnel 1, which may be square in cross-section or any other suitable shape and dimension, although in actual practice, a square tunnel with sides eight feet in width have been found to be very satisfactory in apparatus for cleaning a large volume of raisins. This tunnel is open at opposite ends and extends horizontally. Within one end X I centrally mount a relatively large propeller 2 of the airplane type for blowing air through the tunnel and out of the opposite open end Y, said propeller being driven at a relatively high rate of speed by a motor 3, or by a pulley connected with an electric motor or other source of power disposed outside the tunnel, as desired.

Across the open end Y of the tunnel are a plurality of horizontally extending vertically spaced louvers 4, which louvers will be later described more in detail.

A horizontally elongated feed hopper 5 extends transversely of the length of the tunnel above the louvers and opening Y, into which are fed raisins, together with light foreign material from

a conventional elevator 6, which raisins pass through opening 7 in the bottom of the hopper to a distributing roller 8 driven by any suitable source of power in the direction of the arrow for distributing the raisins and loose material longitudinally therealong, and for the feeding of the raisins in a substantially single layer into a second hopper 9 below the roller, the hopper 9 having an inclined side 10 for guiding the raisins downwardly to horizontally elongated downwardly directed opening 11. The opening 11 is disposed adjacent the side of the louver assembly facing outwardly of the wind tunnel so that the air blown through the tunnel and between the louvers will then encounter the raisins falling from opening 11 for effecting a separation of lighter materials from the raisins.

In substantially horizontal continuation of the lateral sides of tunnel 1 are side walls 12 and a pair of generally funnel-shaped connecting hoppers 13, 14 which extend between the lower edges of said side walls, one of said hoppers (13) being adjacent the open end Y of tunnel 1 and below the level of the bottom side of said tunnel and connecting therewith and the hopper 14 being disposed in a direction longitudinally of the tunnel adjacent hopper 13 and connecting therewith. Hopper 13 has a substantially central opening therein and hopper 14 is provided with a similar opening 16.

Beyond hoppers 13, 14 and in horizontal alignment therewith is a third hopper 17 which hopper 17 is beyond the end edges of sides 12 and which hopper 17 is elongated in a direction transversely of the length of the channel formed by sides 12. The upper edge of hopper 17 adjacent the hopper 14 connects with the adjacent upper edge of hopper 14 in the same manner as the upper adjacent edges of hoppers 13, 14 connect together, thus in the direction of the length of the channel between sides 12 the connecting edges of the adjacent pairs of hoppers form inverted V-shaped apexes 18, 19 extending transversely between the sides 12, apex 18 being the connecting edges of hoppers 13, 14 and apex 19 being the connecting edges of hopper 14, 17.

Hopper 17 extends outwardly at the opposite ends of sides 12 and is provided with an upstanding wall 20 along its longitudinal edge remote from the ends of the sides 12 and short walls 21 parallel with wall 20 extend oppositely outwardly of the free ends of walls 12. The outer ends of walls 21 and wall 20 are free and an elongated opening 22 in the bottom of hopper 17 extending longitudinally relative to wall 20

is provided for ejection of any material falling in said hopper.

Along the apex 19 an upstanding baffle 24 is hingedly connected at 25 to the apex, which baffle extends between sides 12 at their free outer edges. An arcuate slot 26 is provided in one or both of the sides 12 through which extends one end 27 of an arm 28, the opposite end of said arm connecting with baffle 24 for swinging the baffle between the positions indicated in dotted line in Fig. 1, a lock nut 28' or other suitable means being provided on the end 27 of the arm for locking the baffle in adjusted position.

Referring now more specifically to the louvers generally designated 4, as best shown in Figs. 3 to 7.

A rectangular vertically disposed frame having vertical opposed sides 30 supports said louvers in horizontally extending position across the open end Y of the tunnel. While each of the louvers may be continuous between the sides of the frame, in the larger sized machines I prefer to secure a vertically extending flat bar 31 midway between the sides 30, which bar connects at its opposite ends with the upper and lower sides of the rectangular frame and to divide the lengths of each of the louvers into halves, one half being between bar 31 and one side 30 of the frame and the other half extending in alignment with the first mentioned half between bar 31 and the opposite half of the frame, each of said halves, however, being considered as a unitary louver, for the purpose of description thereof.

Each louver comprises a horizontally extending strip of sheet metal formed centrally of its length to provide a V-shaped central portion 32 (Figs. 3, 4) extending from end to end of the louver thus leaving a margin 33 along one side of the V portion and a similar margin along the opposite side thereof. The margin 33 is continuous and is disposed in the tunnel toward the oncoming air. The edge along said margin 33 is folded under as at 34, so that a smooth rounded edge at the point of the bend will face toward the oncoming air, and the double thickness provided by said folding also adds materially to the rigidity of the louver. The margin of the louver opposite margin 33 is cut inwardly at uniformly spaced points 35 therealong from its free edge to the V portion along lines at right angles to the length of the louver. Alternate portions 36 between said cuts are disposed in the same plane as the side of the V portion 32 to which the portions 36 are directly connected, while the portions 37 between said portions 36 are in the same plane as the margin 33.

The louvers as above described are mounted in spaced, parallel relation in vertical rows between opposite sides of bar 31 respectively and the sides 30 of the frame.

The louvers of the vertically adjacent pairs in each row are arranged so that the inclined portion 36 of one louver is directly over, or below, the portion 37 of the other louver adjacent thereto, thus, referring to Figs. 6, 7, a checkerboard arrangement of different dimensioned areas A, B is provided between the portions 36, 37 of the adjacent pairs of louvers within the projected area of the frame supporting the same, to impinge and perhaps to partially curve the air passing through areas B at about the plane C, in about which plane the sheet of raisins fall from the opening 11.

Inasmuch as the areas A, B, (Fig. 6) are stag-

gered in checkerboard fashion, it will be apparent that the falling raisins will pass through a plurality of zones of different air pressure and flow characteristics, and the raisins will to a certain extent be deflected in a direction away from the louvers. However, it has been found that the creation of zones of the characteristics described through which the raisins fall, very effectively separates the caps, and lighter impurities from the raisins, and practically all of the raisins will fall in hopper 13 following generally the arrows indicated 50 in Fig. 1 while the undesirable lighter foreign material will be carried into hopper 17 generally following the path of the arrows indicated at 51 in Fig. 1. It so happens that at times few of the raisins that may be unusually light or that may be caught by some of the lighter impurities will be carried past hopper 13 and these are caught in hopper 14, following the path of the arrows indicated at 52 in Fig. 1, from the lower opening of which a conduit 53 leads to the elevator 6 for again dropping past the louvers and for separation during the second passage past the louvers.

The provision of the hinged baffle 24 enables a simple and accurate adjustment of the partition between hoppers 14, and 17 according to the size and weight of the raisins being passed through the apparatus.

The ends of each of the louvers are seated on elongated castings 39 that extend transversely of the length of the louvers, the contour of the upper sides of the castings respectively being formed to follow the cross-sectional contour of the end of the louver seated thereon, bolts 40 securing the louver ends to the castings. Due to the alternating of the portions 36, 37, the alternate castings in each row will, of course, correspond to the cross-sectional shape of the louvers at portions 36 while the between castings will correspond to the cross-sectional shape of the louvers at portions 37.

The castings along opposite sides of central bar 31 are connected by a short shaft rotatably extending through said bar, and the castings along opposite sides 30 of the frame are respectively provided with short stub shafts 41 rotatably extending through openings in said sides to the outside thereof and through openings in sides 12 of the tunnel.

The castings 39 project outwardly of a side of the frame at the ends thereof extending in the direction of the air flow, which ends respectively are pivotally connected at 42 to a vertically extending bar 43, thus the castings, and therefore the louvers, are maintained in parallel relation for movement on shafts 41 in generally the same manner as ordinary shutters.

At its lower end, one of the bars 43 is pivotally connected at 44 to one end of a crank arm 45, the opposite end of which arm is secured on a shaft 46 that rotatably extends through side 30 and side 12 to outside the tunnel. A crank arm 47 having a handle 48 at one end is secured at its opposite end to the outwardly projecting end of shaft 46, thus enabling an operator to manually and simultaneously vary the degree of transverse inclination of the louvers by movement of handle 48 to rotate shaft 46. The louvers may be maintained in any desired degree of inclination by any suitable means, such as by providing a spring urged pin, 49 on arm 47 for engagement with any one of a row of recesses 50 in side 12 of the tunnel.

In actual practice, after the caps have been

separated from the raisin by suitable means, such as shown in my co-pending application, Ser. No. 158,194, said raisins, and loose caps are conveyed to elevation 6 are discharged therefrom into hopper 5 where they are distributed to substantially a single layer of roller 8 and are dropped in a sheet-like stream across the projected area of this frame supporting the louvers on the side of the frame between the latter and the various hoppers 13, 14, 17.

The air being blown through tunnel i passes between the louvers, as designated in Fig. 7.

The air passing through areas B will substantially pass straight through without deflection other than is caused by striking a side of the V-portion of the louvers, but this air passing through areas A will be deflected upwardly (where the louvers are horizontal).

The air, after passing over the hoppers follows the arrows shown in Fig. 2 out of the ends of hopper 19, at right angles to the general directional flow of the air.

It is important to note that the upper side of the compartment, the two lateral sides of which are defined by walls 12, and the bottom of which is defined by the hoppers 13, 14, is open, thus the upwardly directed air carrying the impurities that are lighter than the raisins are not deflected by a top wall in said compartment as heretofore. Instead, the impurities are carried by the air, without resistance of obstruction, the proper distance for effecting a clean and accurate separation from the raisins. This result is not found where there is a top wall against which the lighter raisins or the lighter impurities are deflected. Also, a top wall in the compartment beyond the louvers 4, creates an objectionable resistance to the air that is blown into such compartment, whereas, the air directed upwardly by the louvers must be free from the resistance to its upward movement in order to function properly in carrying the lighter impurities and lighter raisins to effect efficient separation thereof from the heavy raisins. The provision of the end wall 20 spaced from the free end edges of walls 12 and that are adjacent thereof, provides means for insuring the collection of impurities and also for the escape of the air and a reduction in its velocity to facilitate the dropping of impurities therefrom.

It is obvious, of course, that variations may be made in the construction as described, but such variation as may come within the scope of the invention are intended to be covered by the following claims.

Having described my invention, I claim:

1. In a raisin cleaner of the character described, an elongated, horizontally extending, open-ended air tunnel, an elongated channel at one open end of said tunnel in longitudinal extension of the lateral side walls and bottom of said tunnel, the upper side of said channel being open and an end wall at the end of said channel remote from said tunnel, said end wall being spaced from the adjacent end edges of the lateral side walls of said channel providing laterally outwardly opening air outlets for air between said end wall and said edges, a fan in said tunnel at the end thereof remote from said channel for blowing air through said tunnel and into said channel for exit from the latter through the upper open side thereof and through said outlets, means for dropping raisins and lighter material used therewith by gravity across the path of said air at a point adjacent the juncture between said tunnel and said channel, and a plurality of air deflecting louvers in said tunnel in advance of said point and positioned across said path, said louvers being arranged to deflect at least some of the air in said path in an upward direction as it crosses said point for carrying lighter material mixed with said raisins upwardly toward the open side of said channel and toward said end wall for separation from the heavier raisins.

2. In a raisin cleaner of the character described, an elongated, horizontally extending, open-ended passageway, a fan in said passageway at one of its open ends for blowing air from said one end to the opposite end, an end wall extending across said opposite end and spaced therefrom for deflecting air ejected from said opposite end laterally outwardly of said passageway, a vertical row of spaced, horizontally extending louvers disposed across said passageway at a point intermediate opposite ends of the latter arranged to deflect air passing said louvers in an upward direction, means adjacent said louvers and over said passageway at a point between the louvers and said end wall for dropping raisins and lighter material mixed therewith across the path of the air directed upwardly by said louvers whereby such lighter material will be carried upwardly by said upwardly directed air and toward said end wall, and a hopper in the bottom of said passageway adjacent said end wall for receiving such lighter material as may be carried by the air to said end wall.

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