May 7, 1935. T. W. MILLER 2,000,779

MACHINE FOR BRUSHING CITRUS OR OTHER FRUITS

Filed May 11, 1933 2 Sheets-Sheet 1

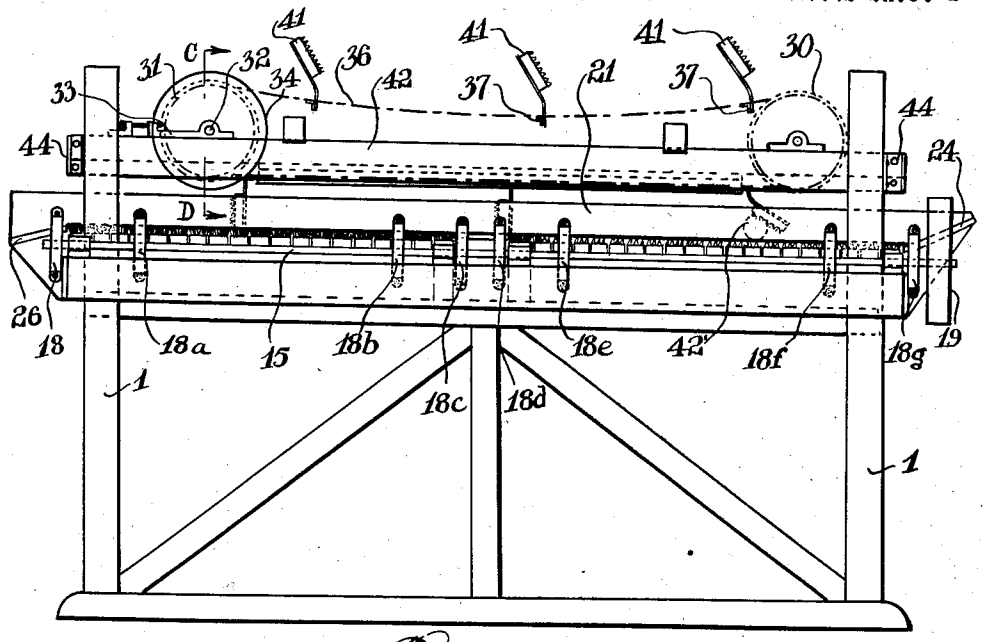

Fig. 1.

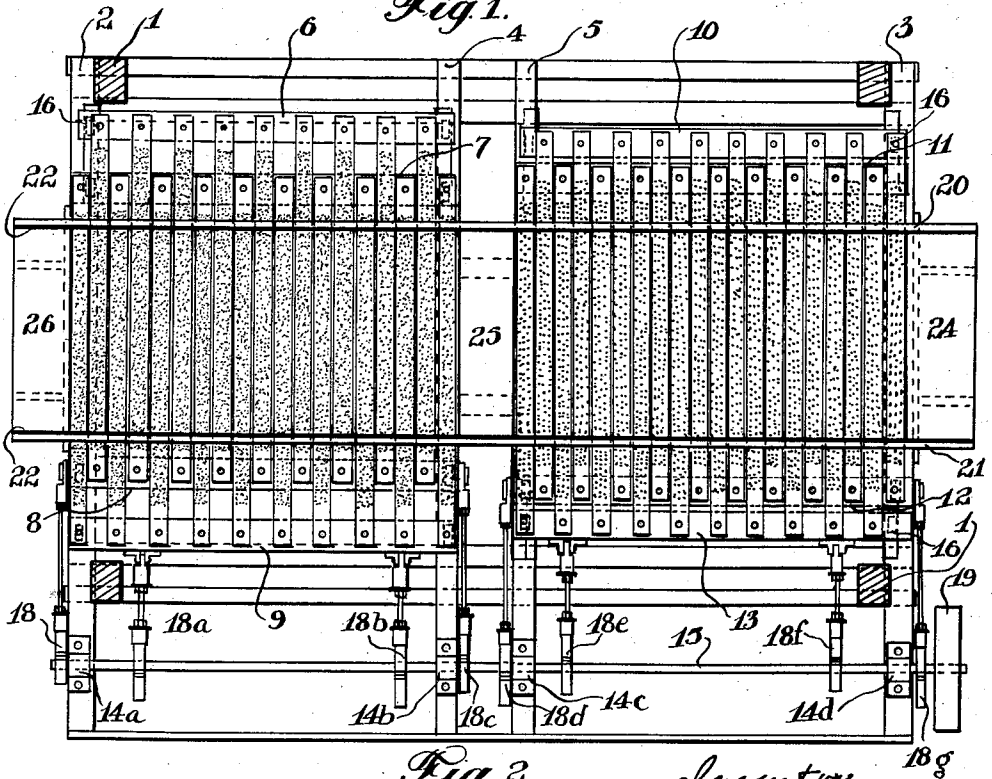

Fig. 2.

Inventor
T. W. Miller
By E. F. Neudeck
Atty

May 7, 1935. T. W. MILLER 2,000,779

MACHINE FOR BRUSHING CITRUS OR OTHER FRUITS

Filed May 11, 1933 2 Sheets-Sheet 2

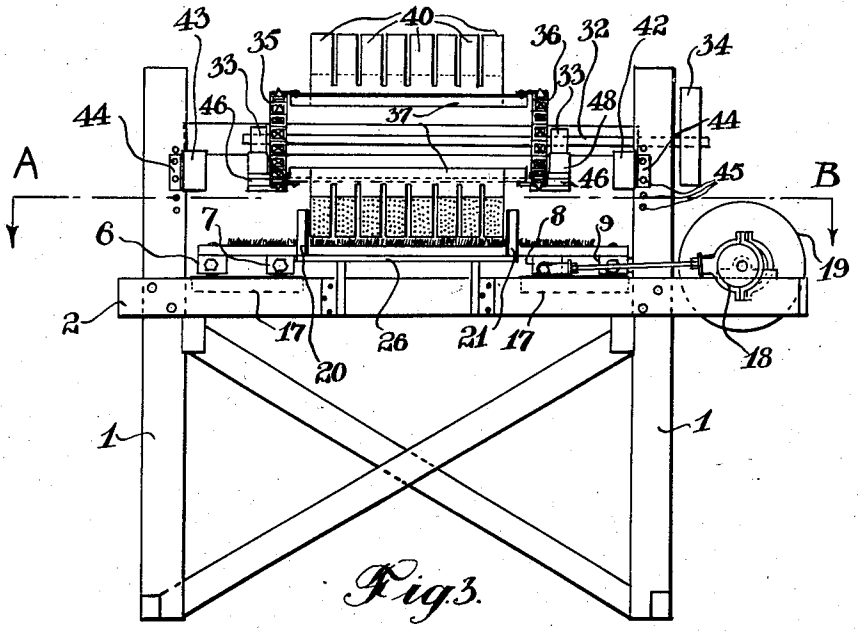

Fig. 3.

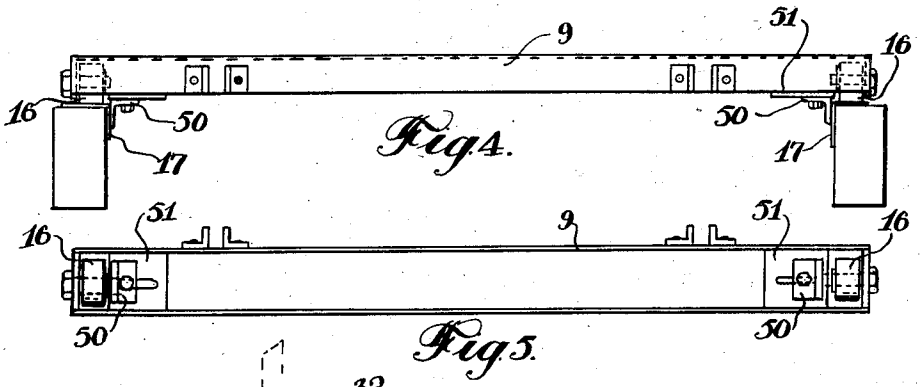

Fig. 4.

Fig. 5.

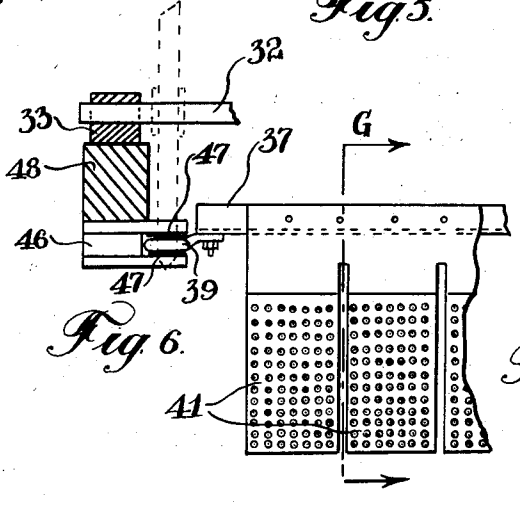

Fig. 6.

Fig. 7.

Inventor:
T. W. Miller
By
G. F. Rendreth
Atty

Patented May 7, 1935 2,000,779

UNITED STATES PATENT OFFICE

2,000,779

MACHINE FOR BRUSHING CITRUS OR OTHER FRUITS

Trevlyn Whittal Miller, Malvern, Komgha, Union of South Africa

Application May 11, 1933, Serial No. 670,608
In Union of South Africa July 14, 1932

4 Claims. (Cl. 146—202)

This invention relates to an improved machine or apparatus for brushing citrus or other fruits, for the purpose of removing dirt or scale adhering to the skin thereof, in readiness for packing for transport or shipment to distant markets.

According to a preferred embodiment of the invention, the machine comprises a series of narrow upturned brushes placed adjacent one another at right angles to the direction of the flow of fruit through the machine. The brushes in sets are attached to their ends to brush carrying members mounted on rollers and arranged to be reciprocated by means of eccentrics or the like keyed to a shaft mounted in bearings on one side of the machine. Alternate brushes are fixed to alternate pairs of brush carrying members mounted in parallel relationship, which are arranged to be reciprocated oppositely to one another by means of the eccentrics referred to. The set of brushes connecting one pair of brush carrier members will reciprocate in the spaces between the brushes connecting the other pair in an interlocking fashion. The brushes will preferably be constructed in the form of comparatively long narrow strips of equal widths, while the spaces between them will be sufficiently wide to accommodate the brushes of the opposing set so as to allow free reciprocating movement, and a gap for rubbish to fall through.

In the preferred machine the brushes will be arranged in one, two or more separate banks or units and each unit will be set to operate so that the vibrations and oscillations of one, tend to neutralize or damp out those set up by the other. A further advantage in this arrangement is provided by enabling one unit to be equipped with rubber brushes and the other with hair or bristle brushes.

Mounted above the brushing units is a chain or pusher conveyor. In a preferred modification cross bars connect two endless parallel chains suitably mounted on chainwheels. Fixed to each cross bar is a row of flexible strips or tongues to each of which is attached a brush preferably of rubber. The whole unit is adjustable vertically as regards its distance from the bed of reciprocating brushes and is driven independently thereof. The independent action of these brushes is a brushing or wiping one which increases the output and efficiency of the whole machine, since the pressure applied to the fruit by these brushes through their flexible connections, increases the contact pressure and consequently enhances the effectiveness of the whole brushing operation.

To enable the invention to be more readily understood and carried into practice, reference will now be made to the accompanying sheets of drawings in which like references refer to like parts throughout all views.

In the drawings:—

Fig. 1 is a side elevation of the complete machine.

Fig. 2 is a plan view of the brushing units only taken on line A—B in Fig. 3.

Fig. 3 is an end elevation on Fig. 1 neglecting the slope of the brushing gear.

Fig. 4 is a side elevation to an enlarged scale of one of the roller mounted brush carrying members in relation to the supporting cross bearers.

Fig. 5 is an under plan view on Fig. 4.

Fig. 6 is a part sectional end elevation taken on line C—D in Fig. 1 showing chain guiding means with wiper brush mounting.

Fig. 7 is a view taken on line G of Fig. 6 showing a side view of a wiper brush.

Referring to the drawings reference numeral 1 denotes the four wooden upright frame members which carry the rest of the cross members supporting the various parts of the machine. Two end cross bearers 2 and 3 and two intermediate cross bearers 4 and 5 form supporting means for the roller mounted brush carrying end members 6, 7, 8, 9, 10, 11, 12 and 13, and the bearings 14*a*, 14*b*, 14*c* and 14*d* in which is journalled the eccentric shaft 15. Each end of the brush carrying members carries a roller 16 adapted to roll along steel wearing angle strips 17 fixed to the supporting cross bearers 2, 3, 4 and 5. The brush carrier members are reciprocated by means of the eccentrics 18, 18*a*, 18*b*, 18*c*, 18*d*, 18*e*, 18*f* and 18*g* keyed to the shaft 15 and connected to the brush carrier members by adjustable connecting rods and brackets of known construction, as clearly shown in Fig. 2.

It will be noted that there are two units making up the reciprocating brush gear, and that the eccentrics driving one unit are 180 degrees in advance of those driving the other unit. This arrangement divides the machine into two sections and besides tending to damp out vibration reduces the weights of the reciprocating masses.

The shaft 15 is provided with a pulley 19 which may be driven from any suitable source. Preferably some form of change speed device

such as coned pulleys or the like will be incorporated in the drive to allow of variation in the reciprocating speed of the brushes.

To guide the fruit over the machine, two parallel side boards 20 and 21 pass from one end thereof to the other. Their inside faces are preferably lined with sponge rubber strip 22 to prevent damage to the fruit. The feed board 24, the centre board 25, and the discharge board 26 are likewise similarly covered for the same reason, as well as other parts of the machine in contact with the fruit.

As will be seen from Figs. 1 and 2 the brushes in both units are of narrow width connected at either end to their respective carrier members. Furthermore they are arranged so that the brushes of one set reciprocate in the spaces between the brushes of the other set. In the machine illustrated the brushes forming the unit at the feed end are of rubber while the other unit at the discharge end is made up of hair, fibre or ordinary bristle brushes. The action of the rubber brushes is more severe than the hair or fibre brushes and consequently the greater proportion of the dirt and scale is removed by them, while the hair or fibre brushes act in the nature of finishing and polishing means.

The brushes and operating gear will preferably slope to the feed end from the discharge end which will cause the fruit to gravitate against the top brushes while being acted upon by the reciprocating bed of brushes. To assist in this action; and in addition, to provide further brushing means, a brusher conveyor is mounted as a separate unit above the reciprocating brushes as clearly shown in Figs. 1 and 3.

This unit comprises a pair of driven chain wheels 30 a pair of driving chain wheels 31 mounted on a shaft 32 journalled in tightening bearings 33, and carrying at its outer end the driving pulley or chain wheel 34. Two endless chains 35 and 36 pass over the chain wheels and carry angle iron cross bearers 37 to which are attached the flexibly mounted wiping brushes 41. The chains are of known type provided with lugged or tabbed links 39 at suitably spaced intervals to take the ends of the cross bearers 37.

The flexible means comprises in this case a sheet of rubber impregnated belting cut to form tongues 40 each of which is fixed to a rubber brush 41 whose action is clearly illustrated in Fig. 1, where 42' represents an orange being acted upon by one of the brushes 41. The whole weight of the brusher conveyor is supported on two longitudinal bearers 42 and 43 adapted to be vertically adjustable in relation to the reciprocating brusher units. This may be arranged by means of angle cleats 44 locatable vertically by the series of holes 45, or screw or other mechanical means may be employed for achieving this purpose. It will be evident that this vertical adjustment of the brusher conveyor is an important feature, since it enables the contact pressure between the fruit and the reciprocating brushes to be controlled within wide limits, thereby regulating the severity of the brushing action. In addition it assists in propelling the fruit over the machine, and in this manner also controls the capacity. The brusher conveyor is driven independently from the reciprocating brush units and has some form of change speed mechanism incorporated in its drive, which adjustability of speed provides a controlling means for the output of the machine.

To prevent turning or canting of the cross bearers 37 due to the twisting moment caused by the flexing of the tongues 40 when in contact with the fruit, chain ways 46 are provided for guiding the tight side of each chain. These chain ways will preferably be lined with friction strips 47 and may conveniently be fixed beneath the bearing supporting frame members 48. Fig. 4 shows the method of supporting the brush carriers and locating them longitudinally of the machine.

The horizontal legs of the angle wearing strips 17 support the rollers 16 while their vertical legs provide side rubbing strips for the adjustable locating or guiding angle cleats 50. The brush carriers are conveniently constructed from channel sectioned steel, a slotted plate 51 being welded on adjacent each end to form adjustable attaching means for the cleats 50. In a modified construction, single-flanged rollers may be used as the locating and guiding means for the reciprocating brush carriers.

In operation the machine works in the following manner: The fruit to be cleaned is delivered to the feed board 24 whence it rolls onto the reciprocating brushes between the side boards 20 and 21. Simultaneously the brushes of the brusher conveyor continually pass over it, imparting a wiping action and a downward pressure and at the same time partly propelling or rolling the fruit towards the discharge end. In this manner the whole surface of the skin of the fruit is subjected to a thorough brushing and polishing action which removes scale and dirt adhering to its surface. In the machine illustrated the first brusher unit is composed of rubber brushes while the second is made up of hair or fibre brushes. The arrangement of the brushes may of course be altered to suit the conditions of working. In some cases, such as with very dirty or scaly fruit, more than half the brushes may be of rubber, while with less scaly fruit the greater proportion may be of the hair fibre or bristle type. By suitably proportioning the types of brushes it is therefore possible to deal with various conditions of fruit in the most efficient manner.

In addition the entire apparatus may be used as a fruit washing machine, by the provision of spray lines and liquid containers built and positioned to suit conditions, or a portion only of the machine may be used for washing purposes while the remainder is used for drying and polishing.

Although the embodiment of the invention described and illustrated is constructed to deal more particularly with citrus fruits, modifications may be readily made to adapt the machine for use with other types of fruit.

The machine may also be used to treat fruit with wax or other preservative, which when applied to the brushes by suitable means, will be transferred to the surface, of the fruit. The last few rows of brushes will then act as polishing means.

What I claim is:—

1. An apparatus for treating fruit comprising a frame, means for feeding fruit through said apparatus, a set of spaced upwardly directed brushes arranged at right angles to the direction of movement of said fruit and supporting said fruit in its travel through the apparatus, means for reciprocating said set of brushes, a second set of upwardly directed brushes located between the brushes of said first set, means for

reciprocating said second set of brushes oppositely to said first set, endless means located directly above said sets of reciprocating brushes, flexible tongues attached to said endless means and brushes carried by said tongues to brush or wipe the fruit upon said sets of reciprocating brushes and to assist in propelling the fruit through the apparatus and to increase the effectiveness of the cleaning operation.

2. An apparatus for treating fruit comprising a frame, means for feeding fruit through said apparatus, a set of spaced upwardly directed brushes arranged at right angles to the direction of movement of said fruit and supporting said fruit in its travel through the apparatus, means for reciprocating said set of brushes, a second set of upwardly directed brushes located between the brushes of said first set, means for reciprocating said second set of brushes oppositely to said first set, a pair of endless chains mounted above said reciprocating sets of brushes, independent means for driving said chains, cross bars carried by said chains, flexible tongues mounted upon said cross bars and brushes mounted upon said flexible tongues.

3. An apparatus for treating fruit comprising a frame, means for feeding fruit through said apparatus, a set of spaced upwardly directed brushes arranged at right angles to the direction of movement of said fruit and supporting said fruit in its travel through the apparatus, means for reciprocating said set of brushes, a second set of upwardly directed brushes located between the brushes of said first set, means for reciprocating said second set of brushes oppositely to said first set, a pair of endless chains located above said reciprocating sets of brushes, cross cars carried by said endless chains adapted to move in the direction of movement of the fruit through said apparatus, flexible tongues carried by said cross bars, brushes mounted upon said tongues and guiding means for said endless chains located along the course of movement of said endless chains in proximity to said fruit.

4. An apparatus for treating fruit comprising a frame, means for feeding fruit through said apparatus, a set of spaced upwardly directed brushes arranged at right angles to the direction of movement of said fruit and supporting said fruit in its travel through the apparatus, means for reciprocating said set of brushes, a second set of upwardly directed brushes located between the brushes of said first set, means for reciprocating said second set of brushes oppositely to said first set, a pair of endless chains located above said reciprocating sets of brushes, said chains moving in the direction of travel of said fruit through said apparatus along their lower courses, cross bars carried by said endless chains, flexible tongues mounted upon said cross bars, brushes mounted upon said flexible tongues and means for adjusting the vertical distance between said chains and said reciprocating sets of brushes.

TREVLYN WHITTAL MILLER.