

July 7, 1953

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2,644,645

WAX WINDING AND SLABBING DEVICE

Filed Nov. 20, 1948

3 Sheets-Sheet 1

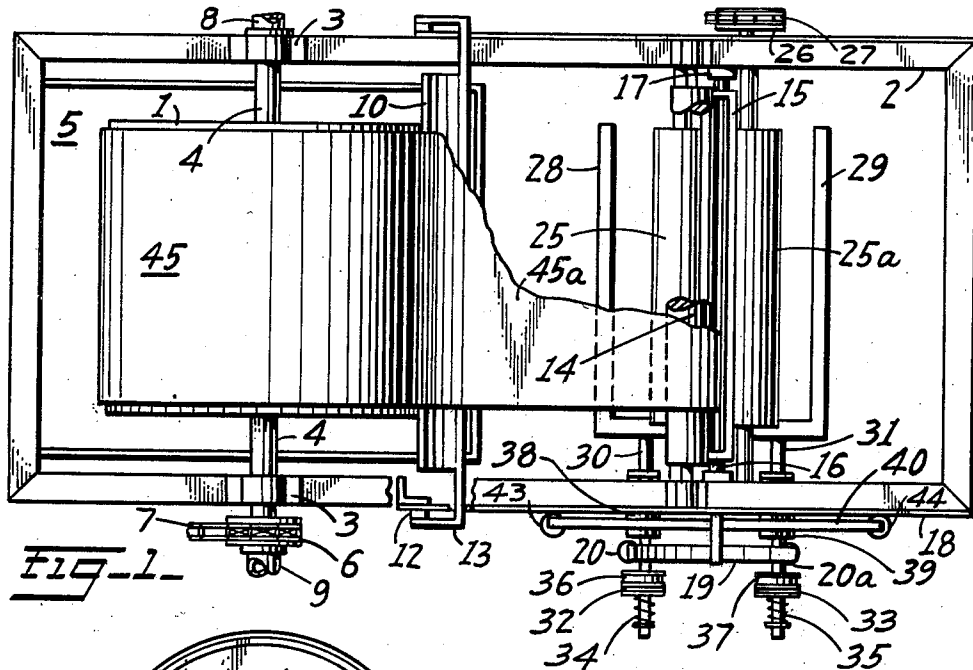


FIG. 1-

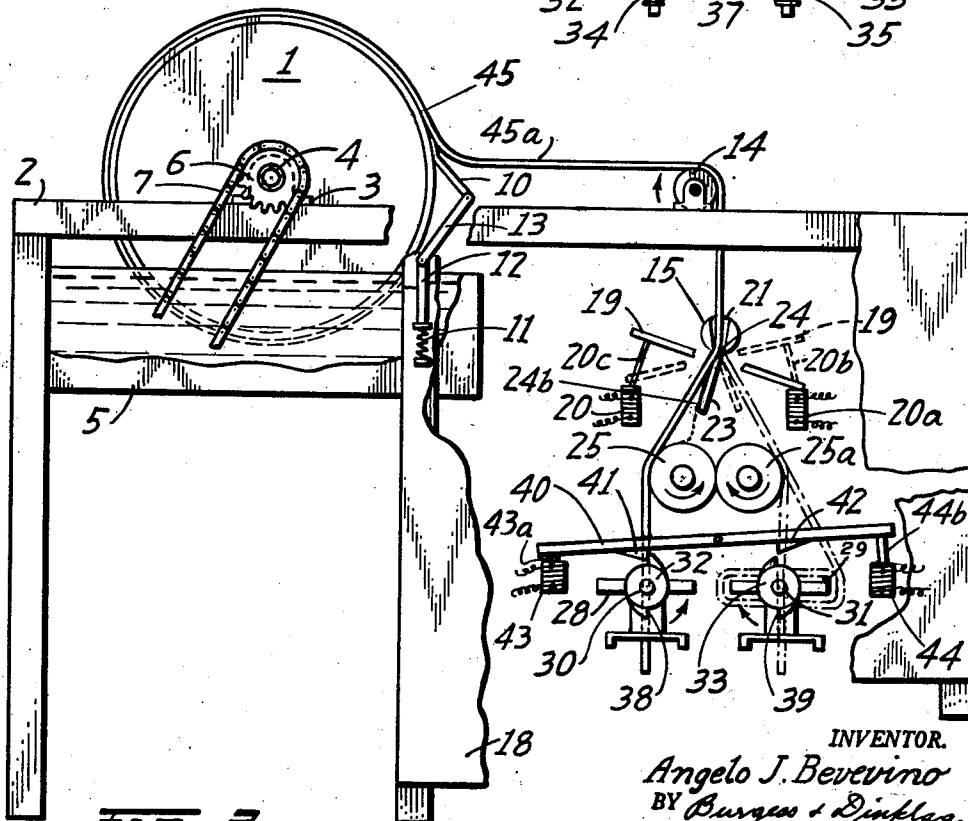


FIG. 2-

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3 Sheets-Sheet 2

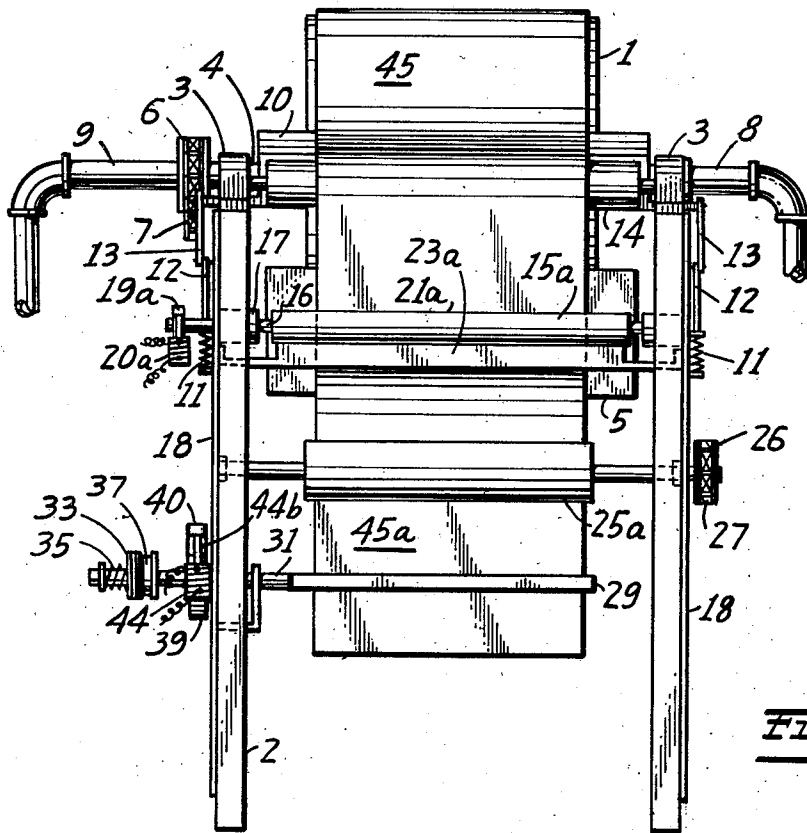


Fig. 4-

Fig. 3-

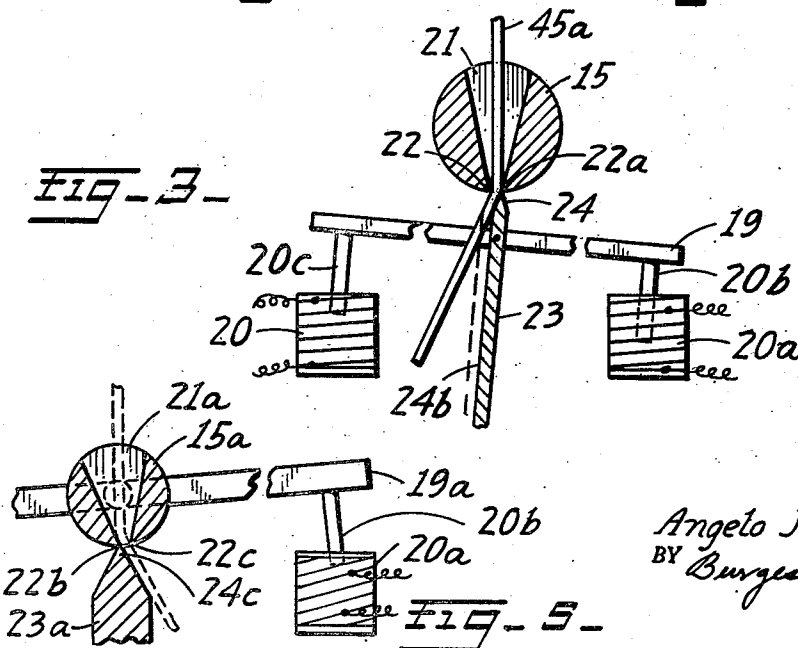


Fig. 5-

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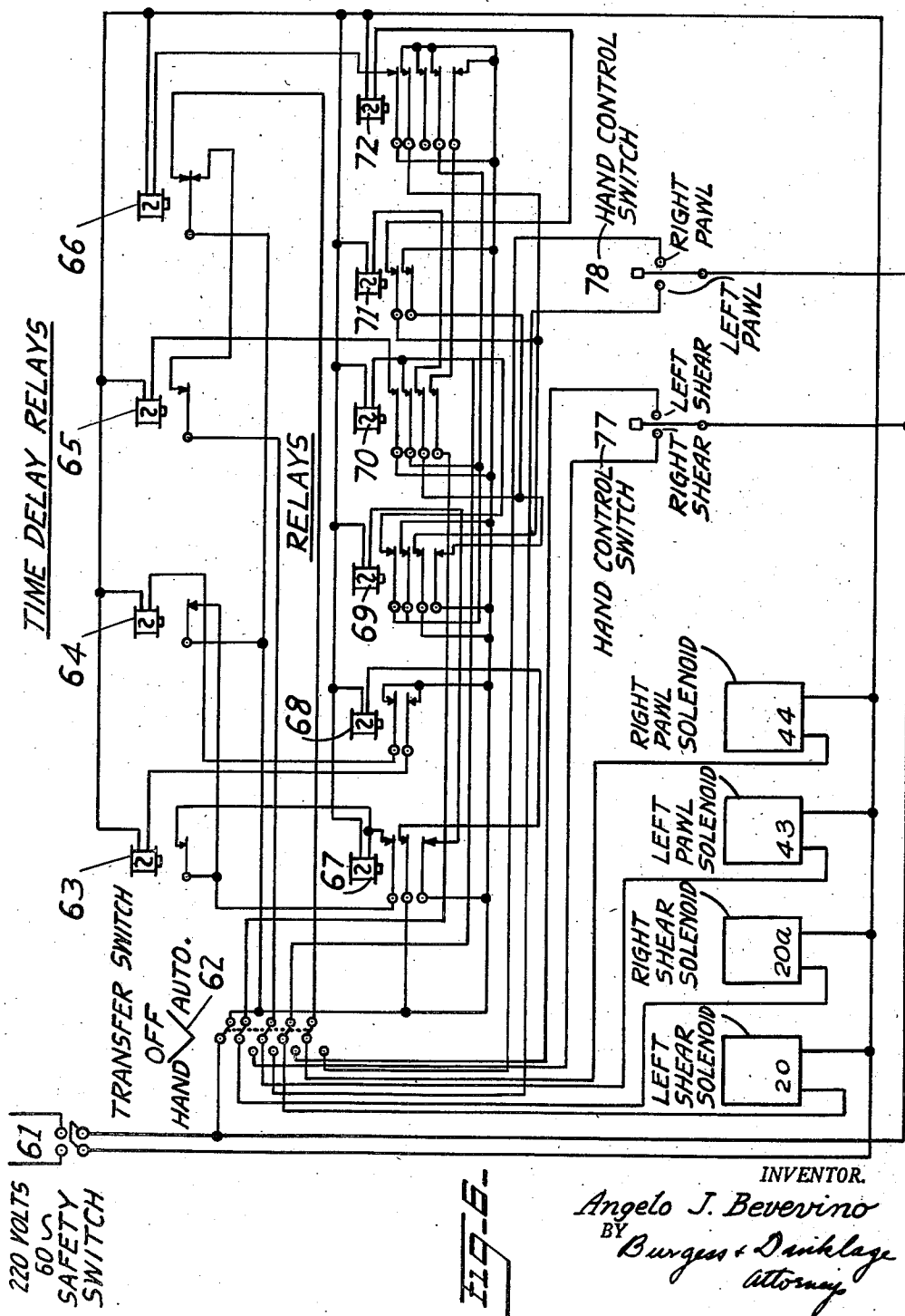
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,644,645.

WAX WINDING AND SLABBING DEVICE

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13 Claims. (Cl. 242—56)

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This invention relates to a new and useful wax winding and slabbing device.

Wax, and particularly wax of petroleum origin, is normally supplied to the trade in the form of blocks or slabs. One method of producing these blocks or slabs is by moulding of the wax in suitable forms into which the wax is poured in substantially molten condition and removed after chilling.

One object of the invention comprises inter alia a new wax slabbing device.

Another object of the invention comprises a new wax slabbing device permitting substantially continuous operations.

Still another object of the invention comprises a wax slabbing device requiring a minimum of manual operations.

The foregoing and still further objects of the invention will be seen from the following description read in conjunction with the drawings in which:

Fig. 1 represents a top view, with parts broken away, of a construction including one embodiment of my invention;

Fig. 2 represents a side view of the construction shown in Fig. 1 with parts broken away;

Fig. 3 represents an enlarged side view, with parts in cross section, of the cutter bar and knife construction shown in Figs. 1 and 2;

Fig. 4 illustrates an end view of a construction which includes an alternative embodiment of my invention;

Fig. 5 shows an enlarged side view of the cutter bar and knife construction illustrated in Fig. 4; and

Fig. 6 is a wiring diagram schematically showing the various relay and time switch connections involved in the automatic timing operations as applied to the preferred embodiment of the invention.

Specifically referring to the drawings, 1 designates a cooling drum mounted on a frame 2 with its hollow axle 4 and the bearings 3. The lower periphery of cooling drum 1 dips into the wax tank 5. Hollow axle 4 of cooling drum 1 carries on one side the driving sprocket 6 connected by way of the sprocket chain 7 to a suitable motor (not shown). Hollow axle 4 of drum 1 carries at its ends water connections 8 and 9 for the circulation of cooling medium through the hollow interior of drum 1 suitably provided with circulating means in the conventional manner. Scraper blade 10 is mounted against cushioning spring force of the spring 11 by way of the upright member 12 and the hinged arm 13. Guide roller 14 is

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mounted on frame 2 with its periphery on one side in substantially tangential alignment with a cutter bar 15 (Figs. 1, 2 and 3) pivotally mounted by way of the shaft portions 16 and bearings 17 on the upright framework 18. The shaft portion of cutter bar 15 is extended through frame 18 to carry at its end the tilting or pivot bar 19 actuable by the solenoid elements 20 and 20a respectively. The cutter bar 15 defines a slot 21, being substantially of inverted frustoconical cross-section. The opposing edges 22 and 22a at the lower ends of the slot 21 of cutter bar 15 define relatively sharp cutting edges. A cutter knife 23 having the pointed head portion 24 (Fig. 3) is mounted on frame 18 with its pivot directly in line with the center of the cutter bar 15 and with the knife head portion 24 extending just sufficiently into the lower end of space 21 to be brought into cutting engagement with cutting edges 22 and 22a upon tilting the cutter knife on its pivot.

A pair of guide rolls 25 and 25a is suitably mounted on frame 18. A sprocket 26, driven by sprocket chain or belt 27, is suitably connected to a motor or other driving force (not shown). In the arrangement illustrated sprocket 26 drives guide roll 25a and the driving arrangement is preferably such that the peripheral speed of the guide roll is substantially synchronized to approximate that of the cooling drum 1. In the arrangement shown, guide roll 25 is driven by guide roll 25a but may carry an independent sprocket and chain arrangement identical with that of sprocket 26 and chain 27 driving guide roll 25a and synchronized for a peripheral speed approximating that of drum 1. The guide rolls 25 and 25a are so mounted relative the stationary knife 23 that the latter is positioned substantially symmetrical with respect to the opposing peripheries of these guide rolls.

Two forks 28 and 29, carried respectively on shafts 30 and 31, are mounted on frame 18. Fork shafts 30 and 31 carry at their ends the clutch disks 32 and 33 secured for axial movement under the spring pressure of springs 34 and 35 but mounted for rotation with shafts 30 and 31. Shafts 30 and 31 carry pulleys 36 and 37 freely rotatable on shafts 30 and 31 but substantially mounted against axial movement and for frictional engagement with the clutch disks 32 and 33 respectively.

Fork shafts 30 and 31 carry, substantially fixedly secured thereto, ratchet disks 38 and 39 respectively. A pivotally tiltable bar member 40 carrying the ratchet stops 41 and 42 is secured to the

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frame 18, and is controlled in its pivoting movement by the solenoids 43 and 44. The bar is mounted for engagement of the stops 41 and 42 with the ratchet cams or teeth of the ratchet disks 38 and 39 respectively, depending upon the position of pivot of the bar 40.

In practical operation the rotation of the cooling drum 1 picks up a chilled coating of wax 45 on the drum periphery from the molten wax in tank 5. The coating of wax is separated from the drum as the latter rotates, by means of the scraper knife 10 yielding the wax sheet 45a which passes over the guide roll 14 into the slot 21 of the cutting bar 15.

As shown in Figs. 2 and 3, the knife 23 is in a tilted position, with its head member 24 substantially in cutting contact with the cutting edge 22a, and forms with its lower inclined surface portion 24a, an apron or guide surface for the wax sheet 45a as it passes through the slot 21 and onto the roll 25. The knife 23 is substantially held in position by the bar 19, which is kept in the position shown by the energization of the solenoid 20a pulling the core member 20b into the solenoid coil.

As illustrated in Fig. 2 the wax sheet 45a has passed through a slot 21 alongside roll 25 and between the arms of the fork 28 to a short distance below the same. At this point the solenoid 43 is still energized, pulling the core 43a into its coil, thereby tilting or pivoting bar 40 into the position shown, in which the ratchet stop 41 engages one of the ratchet teeth of the ratchet disk 38. In this position the motor or other moving force (not shown) rotates the clutch pulley 36 which is freely rotatable on fork shaft 30 and frictionally engages the clutch disk 32 against the force of the spring 34. Though clutch disk 32 is secured to the shaft 30 to rotate with the same, the ratchet stop will prevent the rotation of the shaft and thus of the fork.

If now the solenoid 43 is de-energized and solenoid 44 energized, the latter will pull the core 44b into the coil, thereby moving the stop 41 out of engagement with the ratchet tooth of the disk 38, whereupon the frictional engagement between clutch disk 32 and the rotating disk 36 will cause shaft 30, and with it fork 28, to commence turning. As may be readily seen, the continuing rotation of the fork will wind up the wax sheet on the same.

After a predetermined amount of wax has been wound onto the fork 28, solenoid 20a is de-energized and solenoid 20 energized, causing core 20c to be pulled into the coil, thereby pivoting the bar 19 into the opposite direction, now moving the head portion 24 of the knife 23 against the cutting edge 22 of the slot 21 of the cutter bar 15, thereby cutting the wax sheet 45a.

After the bar 19 has moved into tilted cutting position for the wax sheet 45a being wound onto fork 28, the knife 23 is now slanted to form an apron or guide surface in the direction of the roll 25a. The wax sheet 45a continuing to feed from drum 1 over guide roll 14 and through slot 21, will now pass through the aperture between the knife head portion 24 and the cutting edge 22a of bar 15 onto and over the apron surface defined by the body portion 24b of the inclined knife 23. Wax sheet 45a is thus passed into contact with the roll 25a and picked up by the same, to be led along its periphery, away from roll 25, to between the arms of the fork 29.

After the cutting of pivot bar 19 by the energization of the solenoid 20, the fork 28 will con-

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tinue to rotate while fork 29 is prevented from rotation by the stop 42 held in position by the energized solenoid 44. The rotation of fork 28 and stop-motion position of fork 29 is maintained until the cut-off portion of the wax sheet 45a is completely wound onto fork 28 and until the new end of the wax sheet 45a now feeding over roll 25a has reached winding position. At this point solenoid 44 is deenergized, solenoid 43 is energized, thereby tilting bar 40 into stop-motion position for the fork 28, and moving the stop 42 out of engagement with the ratchet tooth of the ratchet disk 39 and permitting fork 29 to commence winding of the wax sheet 45a. The operator will then remove the wound-up wax sheet from the stopped fork 28 by slipping the same from the fork arms. The wound-up wax may then be slightly compressed to form the desired wax slab.

Conventional individual hand switches may be used to operate the solenoids. It is preferred, however, to connect the solenoids to conventional type time switches and to so set the same that the time switches alternating the energization of solenoids 20 and 20a will permit a time interval for the feeding of the wax sheet 45a sufficient to give the desired thickness of slab. The time switch alternately energizing solenoids 43 and 44 is then set for about the same time interval between energizations but for a definite lag of a predetermined period sufficient in each case to permit the complete winding of the cut-off portion of the wax sheet 45a and the moving of the end of the feeding wax sheet into winding position on the other fork after energization of the solenoids 20 and 20a and cutting operation of the bar 23. Depending upon the requirements of the trade or other considerations, the amount of wax wound on the forks for the preparation of a wax slab may be varied, as desired, by varying the setting of the time switch for the time interval desired to elapse between the energization of the solenoids on bar 19.

The speed of rotation of the pulleys 36 and 37 is preferably so adjusted that they will rotate forks 28 and 29 by way of the clutch disks 32 and 33 somewhat faster than the feeding speed of the web 45a onto the fork. The springs 34 and 35 are then preferably so arranged that the frictional engagement between the clutch disks 32 and 33, with their respective pulleys 36 and 37, is such that the spring tension is less than the strength of the wax sheet feeding onto the fork, so that when the fork starts to wind the sheet on its periphery, the speed is never greater or less, but the same as the sheet speed, regardless of the number of layers on it, since in each case the differential in speed between the rate of travel of the wax sheet and the peripheral speed of the fork, when empty, is compensated by slippage of the clutch.

Specifically referring to Figs. 4 and 5, an alternative embodiment of the invention is illustrated. As there shown, the cutter bar 15a is mounted for pivotable movement on shaft 16 resting in bearing 17, mounted on frame 18. The knife 23a is in this case substantially stationary. Slot 21a in cutter bar 15a is substantially of the same type as slot 21 in the previously described embodiment and has cutting edges 22b and 22c respectively. A pivot bar 19a, similarly controlled by solenoids (only one shown) as the pivot bar 19 of the above described embodiment, is secured to the cutter bar 15a. In this case, instead of moving the knife 23a into cutting positions, the latter remains sub-

stantially stationary and the cutter bar is subjected to a limited axial movement by pivoting the bar 19a by means of its solenoids, so that in one position of pivot the cutting edge 22b is engaged by the head portions 24c of the knife 23a, while in the other position the cutting edge 22c engages the head portion 24c of the knife. In the first stated position the wax sheet 45a moves along the right side of the relatively wide body portion of the knife 23a, which is so arranged that the web end will hit the right guide roll 25a, while when the cutting bar is in the last mentioned position, the web will be guided over the knife body portion onto the left roll 25. In other respects the operation of this embodiment is substantially the same as hereinabove described with respect to the first mentioned illustration of my invention.

Specifically referring to Fig. 6 showing the wiring diagram and related parts of a wax slabbing machine in connection with the invention, the following is an illustrative example of the modus of operation involved.

Assuming safety switch 61 is closed to energize the circuit, the timer 63 and relay 69 become energized. The contacts of relay 69 energize relay 70 which in turn energizes the right shear solenoid 20a, relay 69 sealing relay 70 and starting timer 65 to time for the desired predetermined period permitting the wax sheet to pass through the right fork 29 into reeling position. At this point, timer 65 times out and closes to energize the left pawl or ratchet solenoid 43 of bar 40 thereby lifting the stop 42 out of its stop position and permitting the right fork 29 to turn and thereby reel up the continuously feeding wax sheet. Timer 63, having been energized by the closing of switch 61, is set to time out after a predetermined interval permitting the desired amount of wax to be reeled onto the right fork. After the lapse of this interval, timer 63 times out and energizes relay 67 which operates to seal relay 67, de-energize relay 69 and energize relay 68. Relay 68 in turn operates to de-energize timer 63 for re-setting and starts timer 64 to time. De-energization of relay 69 closes the contacts to energize relay 71 which in turn closes to seal relay 71. After timer 63 has had approximately one to two seconds to re-set itself, timer 64 times out, opening to de-energize relay 67. De-energization of relay 67 opens the contacts to break the seal, de-energizes relay 68 and closes to energize relay 69. Relay 68 opens to re-set timer 64 and closes to start timer 63. Relay 69 closes to energize relay 72 which in turn de-energizes the right shear solenoid 20a, closes to seal relay 72, closes to energize the left shear solenoid 20 causing the wax to be sheared and directed onto the left reel 25 and left fork 28, and further closes to start timer 66 to time for a predetermined interval set to permit the wax sheet to pass into reeling position relative left fork 28. At the end of the predetermined interval for timer 66, the same times out, de-energizing thereby the left pawl or ratchet solenoid 43 of the bar 40, and energizes the right pawl or ratchet solenoid 44. This causes coil 44b to be drawn into solenoid coil 44 causing stop 42 to be pulled into stop position for the right fork 29. The wax reeled or wound onto the right fork 29 can then be removed while the left fork 28 is rotating to reel in the wax sheet continuously feeding onto the same.

As a sufficient amount of wax has been reeled up onto the left fork 28 after a period pre-set therefor, timer 63 again times out, energizing

relay 67. Relay 67 upon being energized, closes to seal itself, opens to de-energize relay 69 and closes to energize relay 68, which in turn opens to de-energize timer 63 and closes to start timer 64 to time. Timer 63 opens, though there is no action as relay 67 is sealed. Relay 69 opens to de-energize relay 70, which in turn opens to re-set timer 65 and to de-energize relay 71. Timer 65 opens without action. Relay 71 opens to de-energize relay 72, which in turn opens to break the seal, de-energizes the left shear solenoid 20 and opens to re-set timer 66. Timer 66 opens to de-energize the right hand pawl or ratchet solenoid. While timer 64 was timing out, timer 63 has re-set. Timer 64 times out, opening to de-energize relay 67, which in turn opens to de-energize relay 68 and closes to energize relay 69. Relay 68 opens to re-set timer 64 and closes to start timer 63 to time again. Timer 64 closes. This completes one entire cycle of operations and the circuit is now again in the starting position. Both shear solenoids 20 and 20a and pawl solenoids 43 and 44 are de-energized. During this timing period of timer 63, relay 69 and relay 70 are energized which will again energize the right hand shear solenoid 20a and the operation continues for another cycle.

As may be also seen from the wiring diagram, instead of conducting all operations substantially automatically, manual control may be resorted to. Thus, transfer switch 62 may be placed in the hand controlled position, in which case safety switch 61 should be closed. Shear action of the knife 24a can then be controlled by manual switch 77. Fork action can be controlled by manual switch 78. All timers and relays are then de-energized.

I claim:

1. Wax slabbing device comprising a substantially continuously operating arrangement including two wax sheet winding means, wax sheet cutting means defining a first cutting edge and two second cutting edges, means for passing a continuously feeding sheet of wax to said wax sheet cutting means, means for actuating said cutting means for alternate cutting engagement of said first cutting edge with each of said second cutting edges, said cutting actuation and engagement of said first cutting edge with one of said second cutting edges, shifting the direction of travel of such wax sheet from one to the other of said winding means.

2. Device according to claim 1 in which said actuating means include time switch means for actuating said cutting means at predetermined intervals.

3. Device according to claim 2 in which there are additionally included stop means for each of said winding means and each positioned and arranged to be actuable for stopping its winding means while the other is operating.

4. Device according to claim 3 in which there are additionally included means for substantially continuously alternately actuating said stop means at predetermined intervals and arranged to stop that winding means from which the direction of travel of such wax sheet has been shifted upon the last actuation of said cutting means, and in which said stop actuating means are substantially synchronized with said cutting actuating means for a predetermined time lag of the former sufficient to permit winding of the cut off wax sheet portion by the operating winding means and passage of the shifted wax sheet into

winding position relative to the non-operating winding means.

5. Wax slabbing device comprising means defining two substantially parallel, spaced-apart opposing wax sheet cutting edges, knife means for cutting engagement with both said edges, one of said knife means and said cutting edges being pivotably positioned for cutting engagement of said knife means with either of said edges and said edges being spaced apart sufficient to define one of a first and second slot for the passage of a wax sheet between the knife means and the non-cutting edge when said knife means are in cutting engagement with the other edge, means for continuously feeding a sheet of wax to between said edges, first and second wax sheet winding means below said cutting edges, means for pivoting one of said knife means and said edges for alternate cutting engagement between said knife means and said edges at predetermined intervals, first means for guiding a wax sheet onto said first winding means from said first slot, second means for guiding such wax sheet onto said second winding means from said second slot, stop means for each of said winding means and each positioned and arranged to be actuable for stopping its winding means while the other is operating, and means for substantially continuously alternately actuating said stop means at predetermined intervals and arranged to stop that winding means from which the direction of travel of such wax sheet has been shifted by the pivoting of one of said knife means and edges upon the last actuation thereof, and in which said stop actuating means are synchronized with said pivoting means for a predetermined time lag of the former sufficient to permit winding of the cut-off wax sheet portion of the operating winding means and passage of the shifted wax sheet into winding position relative to the non-operating winding means.

6. Wax slabbing device according to claim 5 in which said cutting edges defining means comprise a cutter bar having a substantially longitudinal slot forming said cutting edges with its lower opposing length edges, in which said knife means are substantially stationary, in which said cutter bar is substantially pivotably mounted, and in which said pivoting means are means for pivoting said cutter bar for alternate cutting engagement between said knife means and said cutting edges at predetermined intervals.

7. Wax slabbing device in accordance with claim 6 in which said pivoting means include time switch means for actuating the pivoting of

said cutter bar for cutting engagement at predetermined intervals.

8. Wax slabbing device in accordance with claim 7 in which said pivoting means comprise a solenoid controlled pivot bar secured to said cutter bar, and in which said time switch means actuate the solenoids of the pivot bar at predetermined intervals.

9. Wax slabbing device in accordance with claim 8 in which said stop means are carried by a pivot bar, and in which said stop actuating means are solenoids controlling the alternate pivoting of said last mentioned pivot bar.

10. Wax slabbing device in accordance with claim 5 in which said cutting edges defining means comprise a cutter bar having a substantially longitudinal slot forming said cutting edges with its lower opposing length edges, in which said knife means are substantially pivotably mounted, in which said cutter bar is substantially stationary, and in which said pivoting means are means for pivoting said knife means for alternate cutting engagement between said knife means and said cutting edges at predetermined intervals.

11. Wax slabbing device in accordance with claim 10 in which said pivoting means include time switch means for actuating the pivoting of said knife means for cutting engagement at predetermined intervals.

12. Wax slabbing device in accordance with claim 11 in which said pivoting means comprise a solenoid controlled pivot bar secured to said knife means, and in which said time switch means actuate the solenoids of said pivot bar at predetermined intervals.

13. Wax slabbing device in accordance with claim 12 in which said stop means are carried by a pivot bar, and in which said stop actuating means are solenoids controlling the alternate pivoting of said last mentioned pivot bar.

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