

Jan. 13, 1953

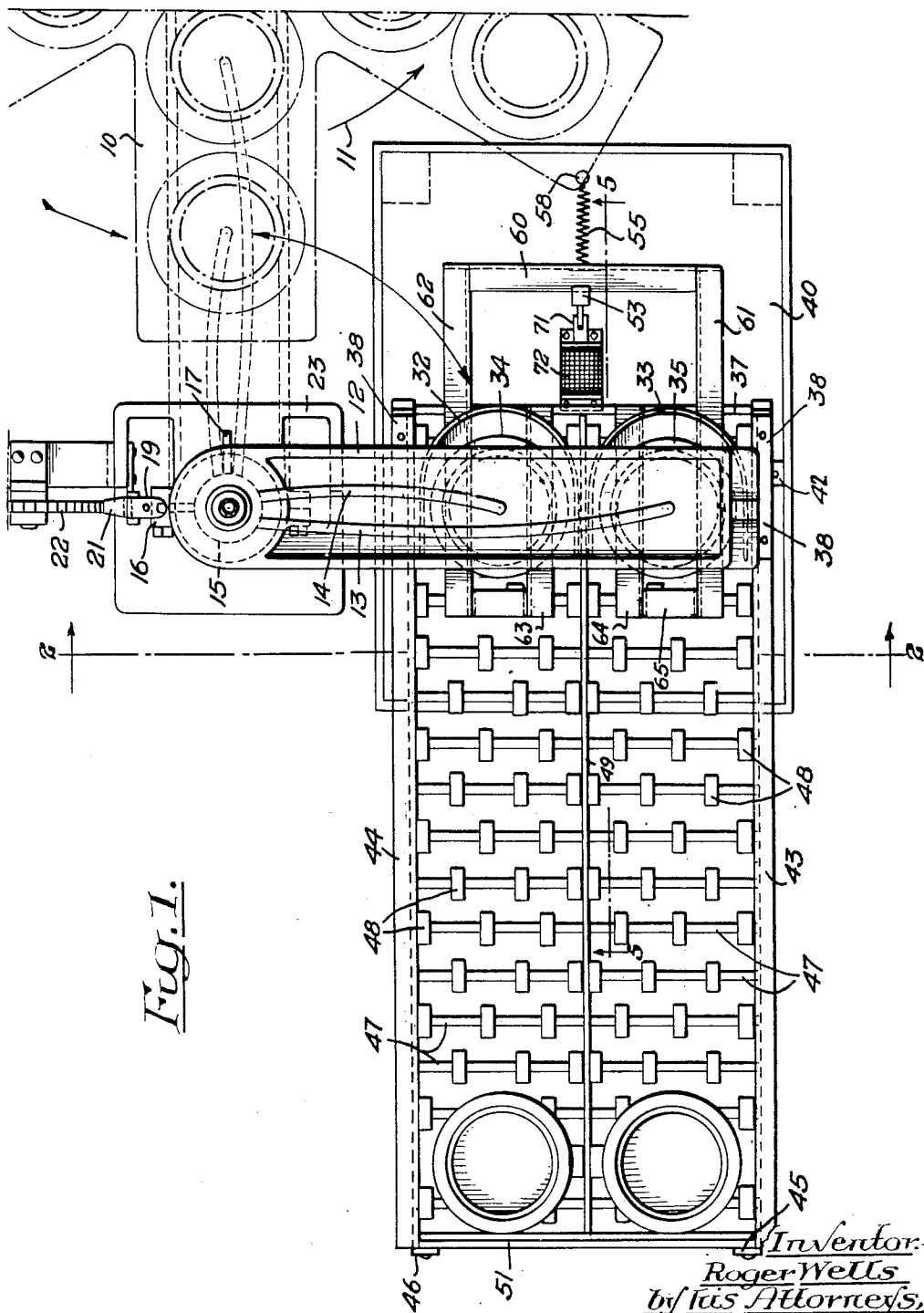
R. WELLS

2,625,329

PLATE COUNTER AND STACKER

Filed Jan. 3, 1951

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

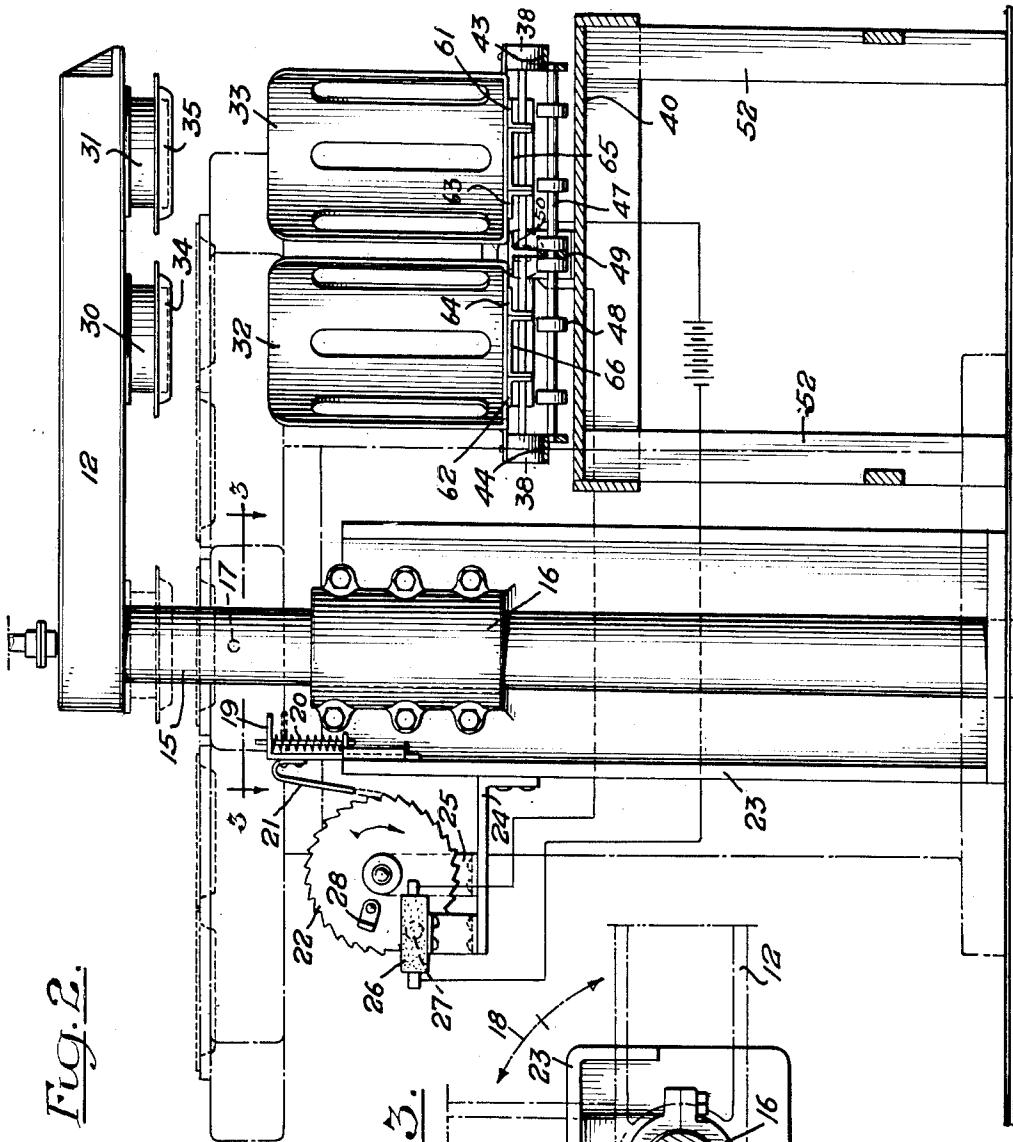
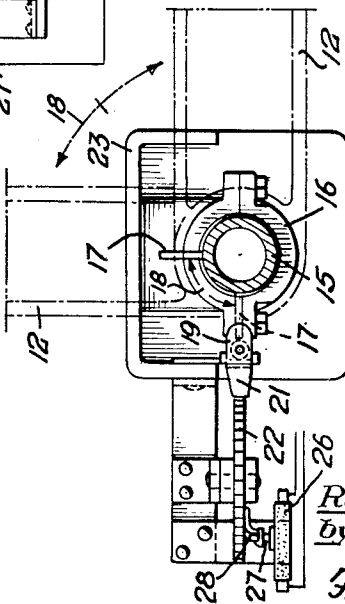


Fig. 2.

Fig. 3.



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5 Sheets-Sheet 3

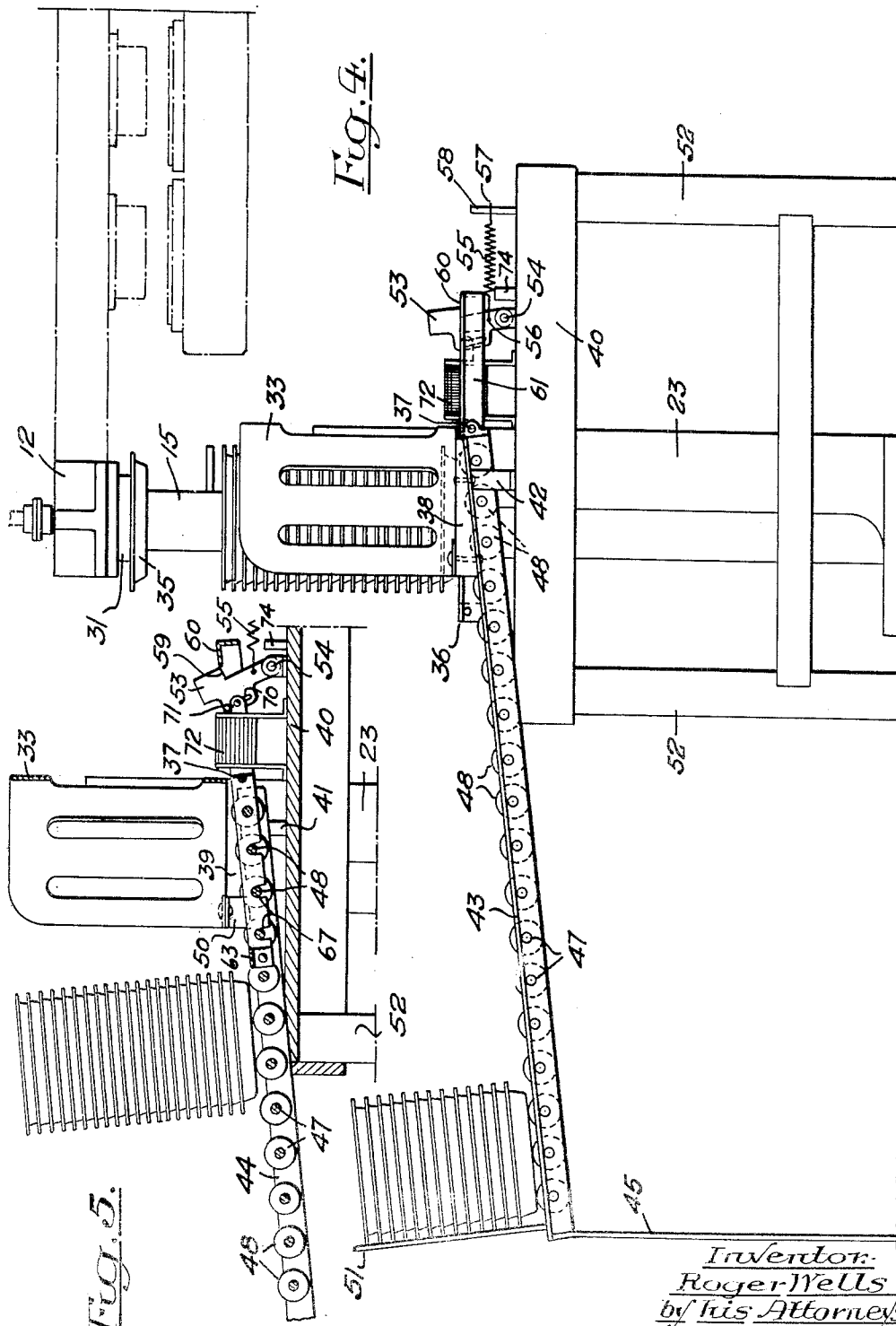


Fig. 4.

Fig. 5.

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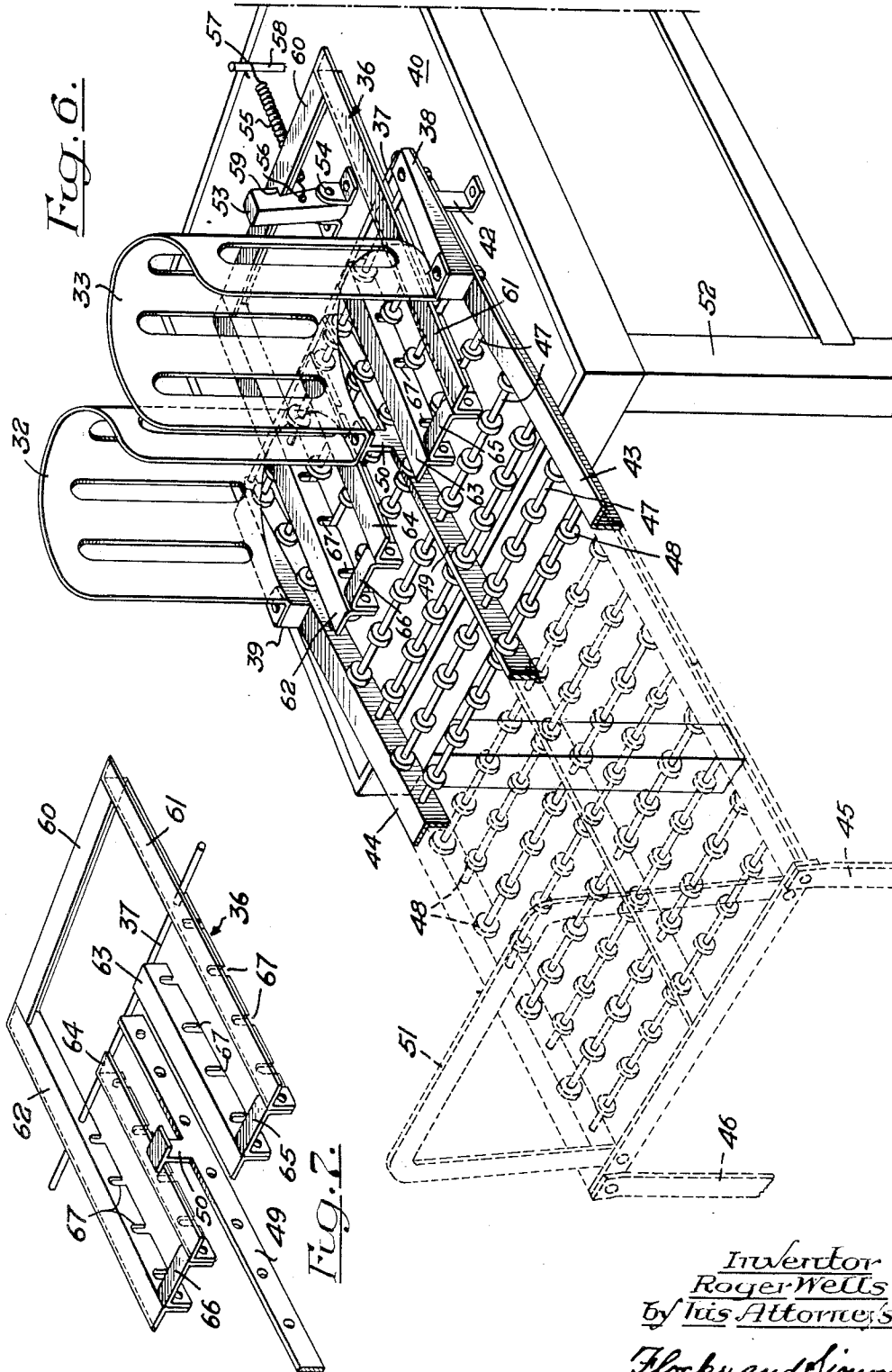
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5 Sheets-Sheet 4



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5 Sheets-Sheet 5

Fig. 8.

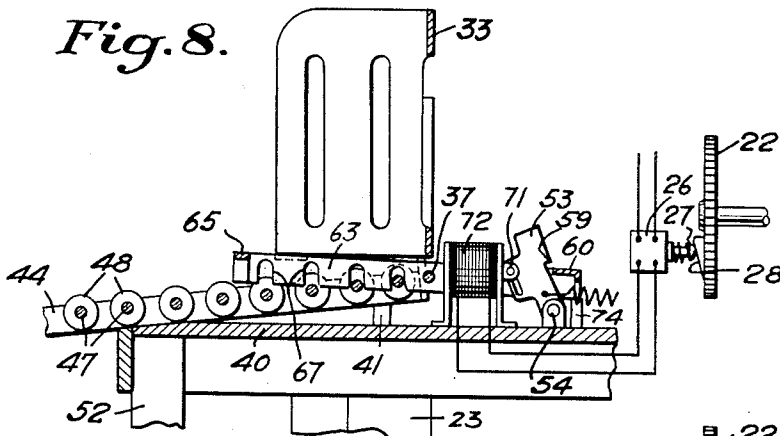


Fig. 9.

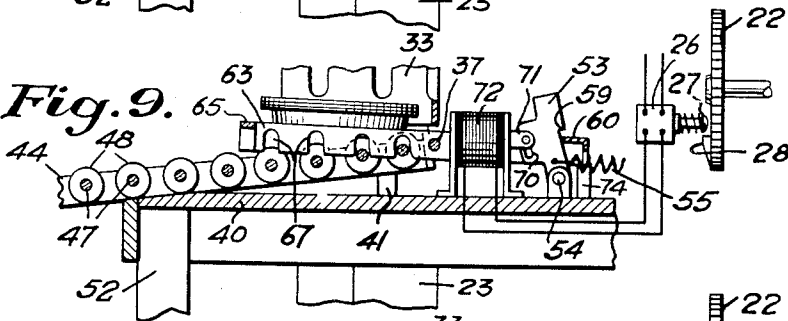
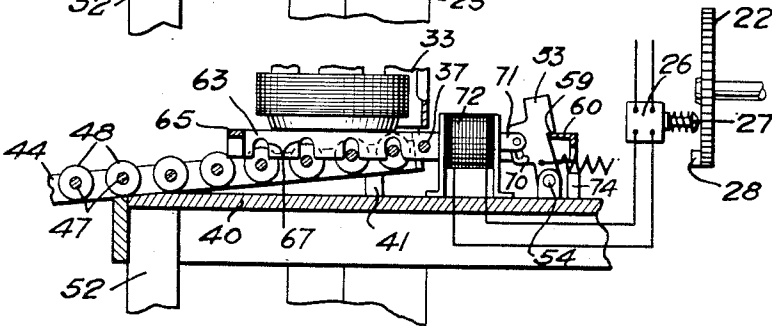


Fig. 10.

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2,625,329

PLATE COUNTER AND STACKER

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12 Claims. (Cl. 235—98)

1

The present invention relates to a plate counter and stacker.

More particularly the present invention relates to a device for assembling and counting plates which may be formed of stiff paper or molded pulp.

A general object of the present invention is to provide a device for receiving plates usually of molded pulp from a pulp molding machine and/or drier, assembling the plates in a stack or stacks composed of a predetermined number of plates and periodically discharging the stacks for further handling or packaging.

A second object of the present invention is to provide in a device of the character described a counting mechanism associated with a movable portion of a molding machine or a plate-forming machine, the portion being moved in synchronism with plate formation so that the number of plates being formed and discharged from the machine are counted so that the plates may be segregated in suitable quantities for packaging.

A third object of the present invention is to provide in a device of the character described a movable plate accumulating means effective to move and discharge the accumulated plates after the accumulation of a predetermined number thereof.

Still another object of the present invention is to provide in association with a movable plate accumulation means suitable positive latching means for preventing the movement of the plate accumulating means until a predetermined number of plates have been assembled.

Other objects and advantages of the present invention will become apparent from the subsequent description and figures of the drawings wherein:

Fig. 1 is a plan view of the counter and stacker of the present invention;

Fig. 2 is a section taken generally along the line 2—2 of Fig. 1 with the plates there indicated assembled for the sake of clarity;

Fig. 3 is a section taken generally along the line 3—3 of Fig. 2 showing the details of the counting mechanism;

Fig. 4 is a side elevation of the mechanism according to the present invention;

Fig. 5 is a section taken generally along the line 5—5 of Fig. 1 with the parts in the position immediately after discharge of an accumulated and counted plate stack;

Fig. 6 is a perspective view of the machine

2

with the accumulator platform in the horizontal or latched position;

Fig. 7 is a detail perspective of the accumulator platform and certain of the associated parts of the machine;

Fig. 8 is a detail section partially diagrammatic illustrating the position of the accumulator platform after the plates have been discharged and the platform has returned to its normal position.

Fig. 9 is a view similar to Fig. 8 showing the accumulator platform in the same position as in Fig. 8, and the latch in position to engage the edge of the platform frame; and

Fig. 10 is a view similar to Figs. 8 and 9 showing the position of the accumulator platform when a sufficient number of plates have been deposited to balance the weighted end thereof and to move the weighted end up into engagement with the latch.

Referring to the figures of the drawing and particularly to Fig. 1 thereof, a turntable 10 is shown which normally forms part of a pulp molding machine and functions to convey and discharge finished plates therefrom. As shown, the turntable 10 normally moves in the direction of the arrows 11 in stepwise fashion so that it pauses in the position shown. A suction arm 12 is provided which is also part of the plate machine assembly and which moves from the position shown in dotted lines to the full-line position of Fig. 1. The suction arm 12 is also capable of upward and downward motion so that after it moves to the dotted-line position it moves downwardly to engage the plates on the turntable 10. Suction is then applied through the conduits 13 and 14 and the plates are lifted with the suction arm and move to the full-line position where the suction is terminated and the plates dropped. The suction arm 12 therefore functions as a conveying means for moving the plates between the two positions indicated. The turntable 10 and the suction arm 12 are of the type generally indicated and disclosed in United States Reissue Patent No. 19,856, February 18, 1936, to R. W. Chapman and per se forms no part of the present invention. It will be noted that the arm 12 moves upwardly and downwardly with a shaft 15 which is suitably journaled for rotation and upward and downward motion in the bearing 16, the shaft 15 being rotated and reciprocated by a mechanism of the type disclosed in the aforementioned patent.

Fixed to the shaft 15 is a pin 17, best shown in Fig. 3, which rotates in the direction of the

arrow 18 and also reciprocates upwardly and downwardly with the shaft 15. When the arm 12 therefore is in the position shown in dotted lines in Fig. 1 and then moves downwardly to pick up plates, the pin 17 will be rotated to the position shown in dotted lines in Fig. 3 and then moved downwardly to engage a pusher 19 ordinarily spring-pressed upwardly by the spring 20.

Carried by the pusher 19 is a pawl 21 which, upon downward motion of the pusher 19 by the pin 17, engages one of the teeth of a counting ratchet wheel 22 so as to move the ratchet wheel the distance of one tooth. The bearing 16 is suitably supported from a vertically extending standard 23 and the pusher member 19 is also slidably mounted on one of the walls of the standard.

Extending from a wall of the standard 23 is a bracket 24 which serves to support, as by the member 25, the ratchet wheel 22. It will be understood that the ratchet wheel 22 is conventionally provided with suitable means, such as a spring or other common means, to prevent rotation except in response to the movement of the pawl 21. Positioned adjacent the ratchet wheel 22 is a switch 26 provided with an actuating button 27. A cam member 28 is provided on one face of the ratchet wheel 22 for actuating the button 27 when moved into contact therewith.

When the suction heads 30 and 31 are in the full-line position of Fig. 1 they are directly over a pair of baskets or guides 32 and 33, respectively, so that when the suction is terminated the plates indicated at 34 and 35 will be dropped into the baskets and guided thereby in their downward motion. Positioned beneath the lower end of the baskets is an accumulator platform, best shown in Figs. 6 and 7 and indicated in general by the reference numeral 36. The platform is mounted for pivotal movement upon a pivot 37 which is in turn supported at each of its ends by the members 38 and 39 supported from a table 40 as by a pair of brackets 41 and 42. The brackets also serve to support one end of the angle irons 43 and 44 which are supported at their lower end by the legs 45 and 46. The angle irons 43 and 44 form a roller track for conveying segregated and nested plates and for this purpose are provided with a plurality of transversely extending shafts 47 having mounted thereon the rollers 48. The shafts 47 are also supported by a central bar 49. It will be noted that the basket members or guides 32 and 33 are supported at their outer ends on the members 38 and 39 and at their inner ends upon a portion 50 extending upwardly from the bar 49. At the lower end of the track formed by the angles 43 and 44 and the rollers just described, there is provided a bumper or stop 51 which serves to arrest the downward motion of the stacks of plates, as shown in Fig. 4.

The table 40, previously described, is supported by suitable legs, such as the leg 52, and is provided on its upper surface with a pivoted latch member 53 which is pulled in a clockwise direction about its pivot 54 by a spring 55 having one end 56 connected to the latch and the other end 57 connected to a pin 58 extending upwardly from the table 40. The latch 53 is provided with a shoulder 59 which engages the transverse end member 60 which connects the two sides of the accumulator platform or frame 36.

As shown in Fig. 7 the platform or frame 36 includes in addition to the cross member 60 the angle or side members 61 and 62 and the intermediate members 63 and 64, the members 63 and 64 together with the forward portions of the

members 61 and 62 forming the platform for the support of the plates. At their forward end the members 61 and 63 are connected by a U-shaped member 65 and the members 62 and 64 are similarly connected by the member 66. The lower legs of the members 61, 62, 63 and 64 are provided at their forward portions with notches 67 so that they move downwardly over the shafts 47 adjacent thereto to a substantial degree.

Referring in particular to Figs. 5 and 8-10, it will be noted that the pawl 53 is provided with a slot at its rear end 70 and pinned through this slot 70 at its rear end is an armature 71 movable into and out of the solenoid 72. The solenoid 72 is connected in a circuit with the switch 26 previously described so that when the switch 26 is actuated the solenoid 72 will be energized to draw the armature 71 inwardly and move the latch 53 in a counter-clockwise direction about its pivot 54 against the action of the spring into the position shown in Figs. 5 and 8.

Operation

Referring in particular to Fig. 8, it will be noted that the accumulator platform 36 is normally so balanced that it tends to assume the position wherein its forward end is slightly above the horizontal and its lower end is slightly below the horizontal, this normal position being produced by the weight of the angle member 60 which is sufficiently heavy to lift the forward end and cause normal rotation about the pivot 37 to the position shown in Fig. 8 when the plates are removed. In this position the angle member 60 rests against a stop 74. It will be noted also that in this initial position the switch 26 has been moved to "on" position by the cam 28 to close a circuit to the solenoid 72 so that the latch 53 has been moved against the resistance of the spring 55 to unlatching or extreme counterclockwise position.

The arm 12 is operating between the two positions shown in Fig. 1 to intermittently take plates from the turntable 10 and discharge these plates over the baskets or guides 32 and 33 so that the plates are accumulated upon the platform 36. As shown in Fig. 9, three plates have been deposited and the counting ratchet wheel 22 has moved to the point where the switch 26 is in off position and the latch 53 has moved to the right so that the shoulder 59 thereof is above the angle 60. However, the weight of the three plates on the platform is not yet sufficient to counterbalance the weight of the angle member 60 and the platform 36 remains in the position of Fig. 8. When, however, approximately ten plates have accumulated on the platform, as shown in Fig. 10, the weight of the plates will counterbalance the normal balance of the platform 36 and the platform will be moved in a counterclockwise direction to the position shown in Fig. 10 where the shoulder 59 of the latch is firmly engaged with the angle member 60 to prevent further movement. At this time it will be noted that the plates are held in an approximately horizontal position so that they become stacked vertically and above the upper surface of the rollers 48. Upon successive movement of the arm 12, more and more plates will be accumulated within the baskets and upon the platform 36 until a desired number is reached, as for example 125, whereupon the counting wheel 22 will be moved to position where the cam 28 operates the push-button 27 of the switch 26. As hereinbefore set forth, each movement of the transfer

5

arm 12 in a downward direction causes the pin 17 to engage the pusher member 19 to move the ratchet counting wheel 22 one tooth. After the final plate making up the count is being picked up for deposit on the platform 36, the downward movement of the arm 12 to pick up the next plate or plates, i. e. the first plates of the next counting operation, will move the ratchet wheel the final step to engage the cam 28 with the button 27 to close the switch 26. Upon closure of the switch the solenoid moves the latch 53 so that the latch is moved to unlatching position after the deposition of the final plate, as for example the 125th plate. When the latch 53 is disengaged from the angle 66, the platform 36 swings in a counter-clockwise direction about its pivot to the position shown in Fig. 5. The plates then contact the rollers 48 and move by gravity until they reach the bumper 51 where they may be removed by the operator for packaging purposes. As soon as the plates leave the platform 36, the platform starts to move, due to its balance, back to the position of Fig. 8 from the position shown in Fig. 5.

I claim:

1. A plate counting and stacking device comprising, means for periodically feeding plates, plate accumulating means pivotally positioned to receive plates from said first means in one position and movable to a second position in response to the weight of said plates to discharge said plates, latch means to prevent movement of said accumulating means to said second position, counting means for counting the number of said plates fed to said accumulating means, and means responsive to predetermined movement of said counting means for moving said latch means and permitting the pivotal movement of said accumulating means to discharge position.

2. A plate counting and stacking device comprising, means for periodically feeding plates, a conveyor means for receiving plates from said first means and conveying said plates to packaging position, plate accumulating means pivotally positioned to receive plates from said first means in one position and thereby preventing movement of said plates by said conveyor means, said plate accumulating means being movable to a second position in response to the weight of said plates to discharge said plates to said conveyor means, latch means to prevent movement of said accumulating means to said second position, counting means for counting the number of said plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to discharge position.

3. A plate counting and stacking device comprising, means for periodically feeding plates, a gravity conveyor means having its upper end positioned beneath said means for periodically feeding plates so as to receive plates therefrom, pivotally mounted plate accumulating means interposed between said first means and said conveyor means in one position to prevent deposition of plates upon said conveyor means by said first means, said plate accumulating means being movable to a second position in response to the weight of said plates to permit movement of accumulated plates by said conveyor means, latch means to prevent movement of said accumulating means to said second position, counting means for counting the number of said plates fed to said accumulating means and means re-

6

sponsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to said second position.

4. A plate counting and stacking device comprising, means for periodically feeding plates, a gravity roller way including a plurality of rolls having its upper end positioned beneath said feeding means, pivotally mounted plate accumulating means having a portion normally positioned above the rolls of said roller way to support said plates and prevent deposition of said plates upon said rolls by said feeding means, said portion being movable to a second position in response to the weight of said plates to allow movement of accumulated plates upon said rolls, latch means to prevent movement of said portion to said second position, counting means for counting the number of said plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to said second position.

5. A plate counting and stacking device comprising, means for periodically feeding plates, pivoted plate accumulating means positioned to receive plates from said first means when in horizontal position and rotatable to an inclined position in response to the weight of said plates to discharge said plates, latch means cooperating with said accumulating means in horizontal position to prevent movement of said accumulating means to inclined position, counting means for counting the number of said plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to inclined position.

6. A plate counting and stacking device comprising means for periodically feeding plates, an inclined conveyor having its upper end positioned beneath said feeding means to receive and convey plates therefrom, pivoted plate accumulating means positioned adjacent the upper end of said conveyor and movable to an inclined position below the plane of incline of said conveyor to permit movement of plates thereupon and also movable to a substantially horizontal position above the plane of incline of said conveyor to prevent movement of plates thereon and accumulate the same, latch means to prevent movement of said accumulating means to inclined position, counting means for counting the number of said plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to inclined position.

7. The plate counting and stacking device of claim 6 wherein means are provided for normally moving said plate accumulating means to horizontal position and the plate accumulating means is provided with a pivot so arranged that the weight of accumulated plates tends to move said accumulating means to inclined position.

8. A plate counting and stacking device comprising means for periodically feeding plates, plate accumulating means pivotally positioned to receive plates from said first means in one position and movable to a second position in response to the weight of said plates to discharge said plates, latch means to prevent movement of said accumulating means to said second position,

7

counting means actuated by said first mentioned means for counting the number of plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to discharge position.

9. A plate counting and stacking device comprising, means for periodically feeding plates, plate accumulating means pivotally positioned to receive plates from said first means in one position and movable in response to the weight of the plates to a second position to discharge said plates, guide means interposed between said first means and said plate accumulating means to guide plates from said first means to said second means and ensure nesting thereof, latch means to prevent movement of said accumulating means to said second position, counting means for counting the number of plates fed to said accumulating means and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to discharge position.

10. A plate counting and stacking device comprising, an intermittently rotatable turntable for conveying plates, a suction arm rotatable and vertically movable to remove plates from said turntable in one position of rotation and to drop said plates in a second position of rotation, plate accumulating means positioned beneath the second position of said suction arm to receive plates therefrom in one of its positions and movable to a second position to discharge said plates, latch means to prevent movement of said accumulating means to said second position, counting means for counting the number of said plates fed to said accumulating means, means responsive to vertical movement of said suction arm to actuate said counting means, and means responsive to predetermined movement of said counting means for moving said latch means and permitting movement of said accumulating means to discharge position.

11. A plate counting and stacking device comprising, an inclined conveyor, plate feeding means for feeding plates to the upper end of said conveyor, a plate accumulating means pivotally positioned adjacent the upper end of said conveyor and rotatable to a first position wherein one of its ends is positioned below the plane of

8

inclination of said conveyor, to a second position in response to the weight of said plates wherein it is substantially horizontal and said end is above the plane of said conveyor so as to retain and accumulate plates and also rotatable to a third position wherein the aforementioned end is above the position occupied in said second position and the end remote from said first end is below the position occupied in said second position, and latch means for retaining said accumulating means in said second position.

12. A plate counting and stacking device comprising, an inclined conveyor, plate feeding means for feeding plates to the upper end of said conveyor, a plate accumulating means pivotally positioned adjacent the upper end of said conveyor and rotatable to a first position wherein one of its ends is positioned below the plane of inclination of said conveyor, to a second position in response to the weight of said plates wherein it is substantially horizontal and said end is above the plane of said conveyor so as to retain and accumulate plates and also rotatable to a third position wherein the aforementioned end is above the position occupied in said second position and the end remote from said first end is below the position occupied in said second position, latch means for retaining said accumulating means in said second position, counting means for counting the number of plates fed to said conveyor, and means responsive to predetermined movement of said mounting means for moving said latch means and permitting movement of said accumulating means from said second position to said first position.

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