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DELIVERY MECHANISM FOR PRINTING AND LIKE MACHINES

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3 Sheets-Sheet 1

FIG. 1.

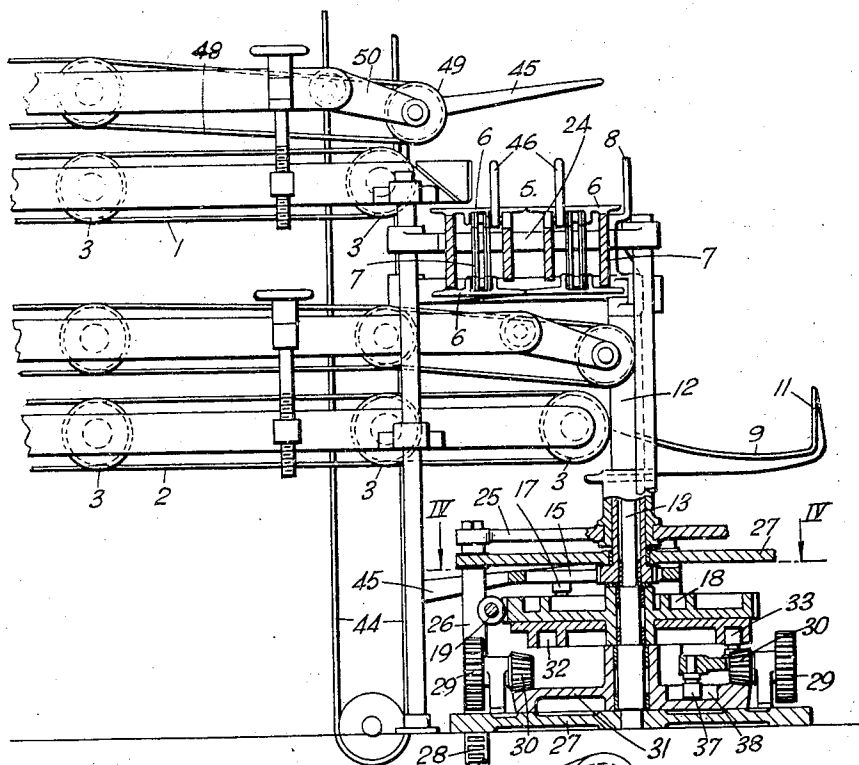
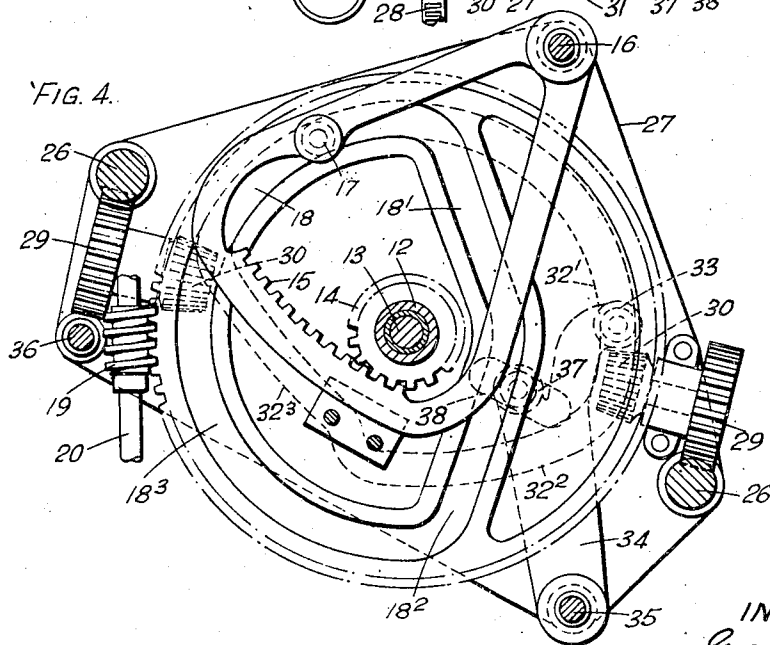


FIG. 4.



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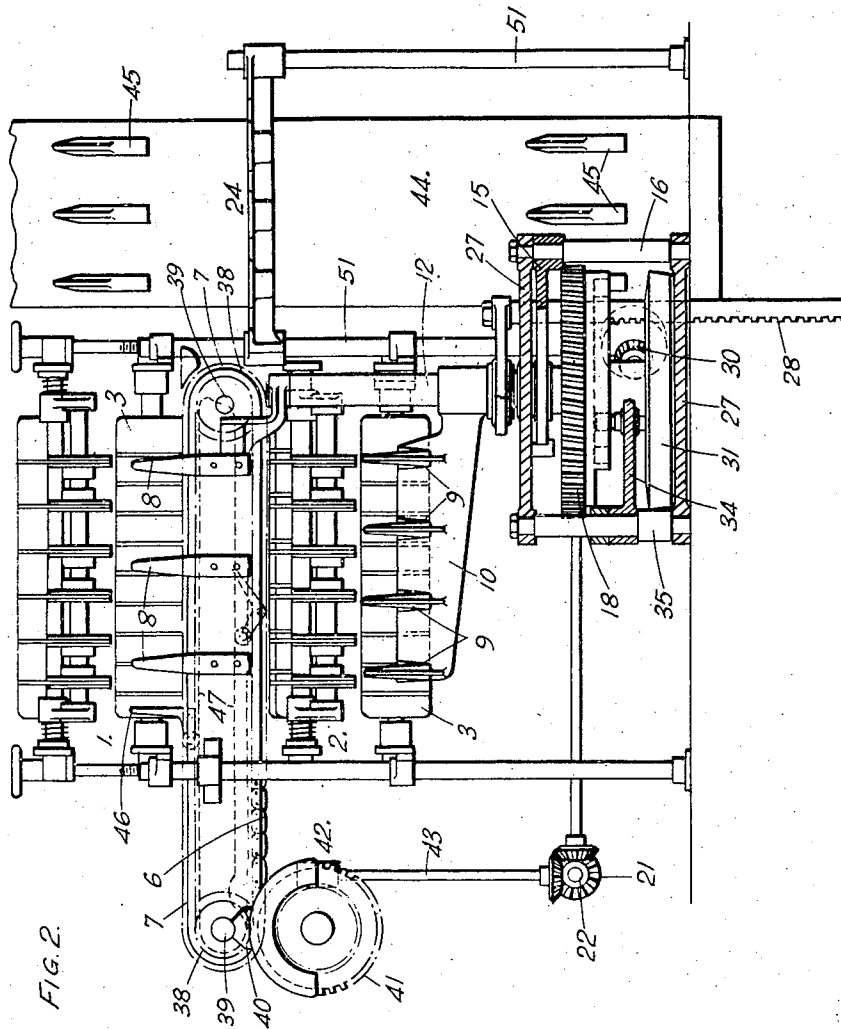
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3 Sheets-Sheet 2



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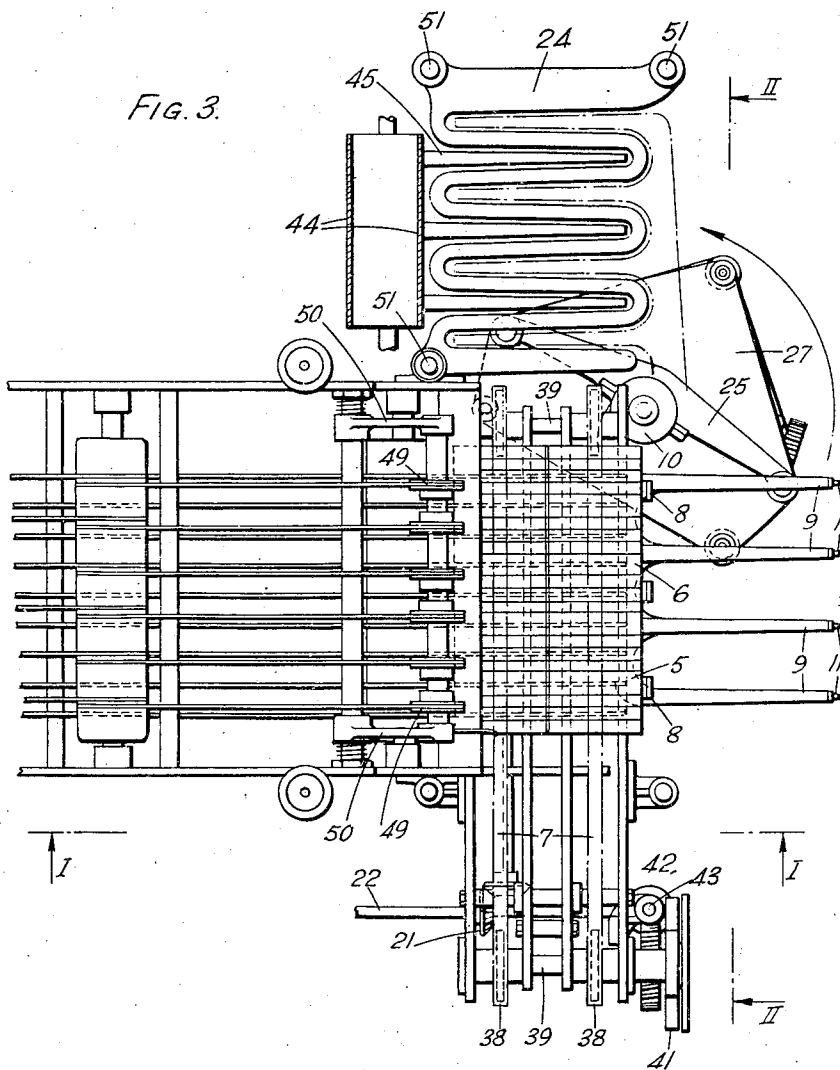
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DELIVERY MECHANISM FOR PRINTING AND LIKE MACHINES

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3 Sheets-Sheet 3



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LIKE MACHINESGeorge Turrall, London, England, assignor to R.
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This invention relates to improvements in delivery mechanism for machines such as printing machines the products of which pass from the machine in regular succession.

It is common at the present time to cause the products of a printing machine to be forwarded from the machine in counted batches; it is usual for the counting to be effected by displacing at "count" intervals a "count" copy in a continuous stream of copies although proposals have been made to deliver the copies in separated stacked batches. In any case it is general for the products to pass along with their folded edges all having the same orientation and it is the usual practice for an operator stationed (either in the press room or, in the case of an extended delivery, in the publishing room) to take one counted batch and reverse it and then to assemble that batch with the following batch, the two batches being taken together and distinguished from one another by the reversed direction of the folded edges of one batch as compared with those of the other batch.

Now the main object of this invention is to provide improved mechanism by which this operation by the operator shall be dispensed with i. e. to provide mechanism by which the products of a printing or other like machine shall be delivered in bundles consisting of two (or more) batches distinguished within the bundle by different orientations of the folded edges.

According to this invention, there is provided mechanism which collects counted stacked batches of products and which assembles them in bundles consisting of two (or more) batches, the mechanism operating to re-orient or turn one batch with respect to another batch so that they are distinguished in the bundle from one another.

It is preferred that the products as they issue from a printing or like machine shall be diverted at count intervals from one path to another preferably by the switch device described in a pending application Serial No. 668,247 and in such a case the mechanism of this present invention would preferably operate to collect, into counted batches, the products passing respectively along the different paths, and to assemble the different batches to form the bundle with a movement which involves turning the batches (in the plane of the products) through an angle relatively to one another, the assembling of one batch with another providing the multi-batch bundle and the relative turning of the batches distinguishing one batch from another in the collected bundle.

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In one arrangement, as applied to the mechanism described in the specification of application No. 668,247, the switch device described in that specification operates to direct a succession of counted products first to one travelling horizontal endless conveyor and then to another similar conveyor at different level from the first.

At the end of one conveyor (preferably the lower one) is a receiving platform which is movable through 180° between the position in line with that conveyor to a position at the side of the other or upper conveyor; the platform is held in position in line with its associated lower conveyor to receive and collect as a stacked batch the products passing along that conveyor in a counted stream and then (while the succeeding batch is passing to or along the upper conveyor) the platform is swung through 180° in the plane of the products to bring that stacked batch to the side of the upper conveyor. During this time, the products passing along with the upper conveyor have been collected (preferably against a stop plate on a tray) to form a second stacked batch so that at this time there are provided two stacked batches side by side (regarded in the sense of travel of the conveyors) but with the folded edges of the products of one batch displaced through 180° with respect to the batch on the tray.

It is now only necessary to displace the batches relatively to superpose them in a collecting position and to collect them to form the required two batch bundle in which the two batches are distinguished.

It would be preferable to displace the second batch transversely from the tray (i. e. to move the batch transversely across the upper conveyor by which it was conveyed from the printing machine) the displacement being such that the batch is positioned over the other batch which is or had been on the platform.

The collection of the batches can be effected by a further vertical conveyor arranged at the side of the position which is occupied by the superposed batches; the conveyor has lateral arms which (as the conveyor moves) passes through the zone occupied by the batches and so receives them as an assembled bundle. It would be preferable to slot the platform so that the arms can pass "through" it and it is also preferable to arrange that the platform shall have a rising motion as it is turned to collecting position, this rising motion being such that the platform lifts the batch on it to above the level of the appropriate arms but below the level at which the

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other batch is displaced transversely, the platform then returning through the arms with a descending motion thus leaving its batch on the arms, the continued movement of which causes the batch on the arms to lift or "take-away" the batch which has by this time been displaced transversely from the second conveyor to the collecting position.

If desired, the platform may deposit its batch on a slotted table and the other batch is transferred to lie on that batch so that as the conveyor arms move up they take the collected batches from the table. Adjustment of the parts for products of varying thickness can be provided for and also of course to accommodate a greater number of products than two.

The transverse displacement of the batch from the second conveyor can be effected by conveyor wires between which the collecting arms can move.

The invention is illustrated in the accompanying drawings in which Figure 1 is a sectional side elevation taken on the line I—I of Figure 3, Figure 2 an end elevation looking in the direction of the arrows II of Figure 3, Figure 3 a plan view and Figure 4 a sectional view taken on the line IV—IV of Figure 1 of part of the mechanism and drawn to a larger scale.

Referring to the drawings, there are provided upper and lower conveyor belts or wires 1, 2 which are carried by guide rollers 3, the wires 1, 2 being driven so that their upper runs pass from left to right as seen in Figure 1. These conveyors act to convey counted batches of products from the delivery of a printing machine, a counted batch being fed first to one conveyor and then to the other conveyor for which purpose the switch device described and claimed in the pending application No. 668,247 could be employed.

The products of the batches would lie on the conveyors in overlapping relationship and to arrange these products in stacked batches there is associated with each conveyor a receiving platform on to which the conveyors discharge the products to build-up the stacked batch. The platform of the conveyor 1 is indicated at 5 and is constituted by sets of slats 6 (Figure 2), carried on endless chains 7 two such sets being employed and which are alternately brought into operation; stops 8 are provided up to which the products are fed by the conveyor 1 and which operate to register the successive products on the platform and to assist in the build-up of the counted batch.

The platform for the conveyor 2 is constituted by fingers 9 extending from a supporting frame 10, the fingers having end stop portions 11 against which the products of a batch on the conveyor 2 are pressed to build-up the stack on the platform 9.

With the mechanism so far described a counted batch will be delivered to and stacked on one platform and then on the other platform and the stacked batches will have the same orientation i. e. assuming for example that the products are passing along the conveyors 1, 2 with their folded edges leading, both stacked batches would be in the same sense with their folded edges at the same side of the stack.

In order now to re-arrange one batch with respect to the other so that they can be collected with their folded edges having different orientations, one of the batches is turned in the plane of the products before the collection is effected. For this purpose, the platform 9 is arranged to

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be angularly displaced and this operation is effected during the time that the other batch is being built up on one or the other sets of slats of platform 5. The frame 10 supporting the platform 9 is secured to a vertical tubular post 12 which is arranged to be turned intermittently through 180° first in one direction and then back by a shaft 13 (Figure 1), on which the post 12 can slide axially while being held against relative rotation with respect to it; the shaft 13 has a pinion 14 (Figure 4), secured to it and the pinion meshes with a sector gear 15 mounted to rock on a post 16. This sector is provided with a cam bowl 17 extending into a box-cam 18 rotatable on the shaft 13 and driven continuously by a worm 19 on a shaft 20, the shaft being itself driven by a gear 21 on a driving shaft 22 driven by some part of the printing machine. The cam 18 is formed with two operating parts 18', 18², and a dwell part 18³ and the parts are so arranged that while the platform 9 is receiving its products, the bowl 17 is in the dwell 18³ after which the continued rotation of the cam presents to the bowl first one operating part 18' to move the platform from its receiving position through 180° and then the part 18² to return the platform to its receiving position.

In order to take the turned batch from the platform 9 and hold it in readiness to be associated with the batch being built up on the platform 5, there is provided a stationary holding platform 24 (Figure 3), on to which the platform 9 lays its batch; this platform 24 is so positioned in relation to the platform 5 that the batch on the platform 5 can pass without change of height on to the top of the batch laid by the platform 9. This involves the location of the holding platform 24 in a position above the receiving level of the platform 9 and therefore this platform 9 is arranged to be raised as it is turned to displace the batch through 180°.

This is achieved by connecting the hollow shaft 12 (which can slide axially on the shaft 13) to a plate 25 connected to posts 26 mounted to slide in fixed plates 27 carrying also the pivot 16 for the sector 15. The posts 26 are formed with racks 28 engaged by pinions 29 fast with bevel wheels 30; these wheels 30 mesh with a ring bevel gear 31 which is turned first in one direction and then in the other by a second box cam 32 fast with the cam 18 this cam 32 having a dwell part 32' and two operating parts 32², 32³; the cam 32 is engaged by a follower 33 on an arm 34 pivoted on a post 35 which together with the post 16 and a further post 36 support the plates 27. The arm 34 has a driving bowl 37 entering a groove 38 in the bevel 31. It will be clear that the continuous rotation of the cam assembly 18, 32 will result not only in the turning of the support 9 but also in phase with that operation, the turning of the bevel pinions 30 and the pinions 29 and hence (through the racks 28 on the posts 26) the raising and lowering of the plate 25 and hence of the tubular shaft 12.

The timing is such that the lifting of the platform 9 takes place before its swinging movement as it passes over the holding support 24. As soon as the support has completed its 180° of movement, the cam 32 commences the lowering operation so that the fingers of the support 9 pass through the grid of the holding support 24 and so leave or deposit the batch on the grid.

The foregoing operation of the platform 9 takes place while the batch is being built up on the platform 5 i. e. the platform 9 is swung forward,

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raised, lowered and swung back during the time taken to build up the stack on the platform 5 so that the platform 9 is in position to receive the next batch from its conveyor 2. During the time that the batch is being built up again on the platform 9 the batch already laid on the operative platform 5 is shifted transversely to be laid on the top of the batch last deposited on the holding platform by the platform 9. This shifting is achieved by moving the chains 7 intermit-

tently for which purpose the chain wheels 38 are mounted on shafts 39 of which one has a gear 40 (Figure 2), co-operating with a mutilated driving gear 41 constantly driven through worms and worm wheel gearing 42 by a shaft 43 itself geared to the shaft 22. To ensure the shifting of the batch on the platform 5 pushers 46 can be pivotally carried by the chains 7 and be controlled by a cam track 47 to rock to push the batch from the platform.

The two batches are now supported one on top of the other on the holding platform 24 and in order to take away those collected stacks (distinguished from one another by the position of their folded edges) there is provided an endless band 44 having supporting arms 45, the band being continuously advanced so that one or other set of arms sweeps through the grid forming the holding platform 24 and carries away the stacks supported by it to for example the publication room.

In order to effect a positive control of the products as they pass across from the conveyor 1 or 2, control belts or wires 48 can be employed these passing over pulleys 49 supported by pivoted arms 50 free to swing to allow the control wires to yield from their normal setting.

The holding platform 24 can be adjusted as to height by slidably mounting that platform on posts 51.

What I claim is:

1. In combination a first means to convey a predetermined number of spaced products in one path, a second means to convey a number of spaced products in a second path, the products in both paths being similarly oriented, a first collecting means to collect in a stack products conveyed by the first conveying means, a second collecting means to collect in a stack the products conveyed by the second conveying means, means to re-orient a stack collected by one of the collecting means by turning it with respect to a stack collected by the other collecting means, and means to form a multi-stack bundle by assembling relatively re-oriented stacks.

2. In combination first and second conveyors supported one above the other and arranged to forward separate batches of similarly disposed products, means associated with each conveyor to collect and stack the batches of products received from the respective conveyor, one such means being arranged to take a collected batch received from one conveyor and to turn it through an angle in the plane of the products and means to take away batches in succession from the other conveyor and from the said batch turning means.

3. In combination first and second conveyors supported one above the other and arranged to forward separated batches of similarly disposed products, means associated with each conveyor to collect and stack the batches of products received from the respective conveyor, a batch holding support, means to take a collected batch from the lower conveyor and to turn it in the plane of the products and to elevate it to be deposited on

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the holding support, and means to take a batch from the upper conveyor and deposit on the batch deposited on the holding support.

4. In combination first and second conveyors supported one above the other and arranged to forward separated batches of similarly disposed products, means associated with each conveyor to collect and stack the batches of products received from the respective conveyor, a batch holding support, means to take a collected batch from the lower conveyor and to turn it in the plane of the products and to elevate it to be deposited on the holding support, means to take a batch from the upper conveyor and deposit on the batch deposited on the holding support, a transporting device guided to move past the holding support and means to move the said device to remove the superposed batches from the holding support.

5. In combination first and second conveyors one above the other and arranged to forward separated batches of similarly disposed products, means associated with each conveyor to collect and stack the batches of products received from the respective conveyor, and means to take a collected batch from one collecting means and to turn it through an angle in the plane of the sheets and to associate it with a stack collected by the other collecting means.

6. In combination first and second conveyors one above the other and arranged to forward separated batches of similarly disposed products, means associated with each conveyor to collect and stack the batches of products received from the respective conveyor, means to take a collected batch from one collecting means and to turn it through an angle in the plane of the sheets and to associate it with a stack collected by the other collecting means, and transporting means to take the associated batches.

7. In a conveyor system arranged to deliver folded products on upper and lower levels, a first support positioned to receive and to hold a batch of folded products at the upper level, a second support positioned to receive and to hold another batch of folded products at the lower level, the batches having their folded edges similarly disposed, a turning and elevating device associated with the second support and arranged to turn the batch through an angle in the plane of the sheets and to raise it to a position where the batch at the upper level may be assembled with it, the said device including a continuously operating component and cam and gear mechanism operated by the operating component and connected to the said second holding means to effect the elevating and turning movements of the said device.

8. In combination with a conveyor mechanism adapted to forward folded products to platforms at a plurality of levels, a first platform positioned to collect a batch of the folded products at a first level, a second platform positioned to collect another batch of the folded products at a lower level, the batches having their folded edges similarly disposed, a raising and turning mechanism associated with the second platform and timed to operate while a batch is being collected on the first platform to raise a batch collected at the second level, to turn that batch in the plane of the sheets and to deposit it on a holding platform in position to support a batch moved thereto from the first platform.

9. In a conveyor system arranged to deliver folded products on upper and lower levels, a

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first support positioned to hold a batch of folded products at the upper level, a second support positioned to hold another batch of folded products at the lower level, the batches having their folded edges similarly disposed, a holding support, a turning and elevating mechanism associated with the second support and arranged to swing it and turn the batch about in the plane of the sheets and to raise the batch to the holding support, and means associated with the first support to move the batch thereon to the holding support.

10. In a machine for producing folded products and having upper and lower deliveries to which products are forwarded in batches, a batch to one delivery and then a batch to the other delivery alternately and in succession with their folded edges positioned in the same relation with respect to their direction of movement, a receiving platform for each delivery, a holding platform, a pivotal support and a cooperating raising mechanism associated with the lower receiving platform, whereby a batch on the lower support is turned to dispose the folded edges of the products in an opposite direction and is raised to deposit the batch on the holding platform, and a pusher device associated with the upper receiving platform, whereby a batch is moved therefrom to position it on top of the batch resting on the holding platform.

11. In a machine for producing folded products and having upper and lower deliveries to

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which products are forwarded in batches, a batch to one delivery and then a batch to the other delivery alternately and in succession with their folded edges positioned in the same relation with respect to their direction of movement, a receiving platform for each delivery, a holding platform, a pivotal support and a cooperating raising mechanism associated with the lower receiving platform, whereby a batch on the lower support is turned to dispose the folded edges of the products in an opposite direction and is raised to deposit the batch on the holding platform, a pusher device associated with the upper receiving platform, whereby a batch is moved therefrom to position it on top of the batch resting on the holding platform, and an endless vertical conveyor driven in timed relation with the motion of the batches of products to the holding platform, and having arms arranged to pick up the batches on the holding platform two at a time and carry them away.

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25 The following references are of record in the file of this patent:

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