July 13, 1926. 1,592,230

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COUNTING MECHANISM FOR PRINTED PRODUCTS

Filed Nov. 28, 1922 2 Sheets-Sheet 1

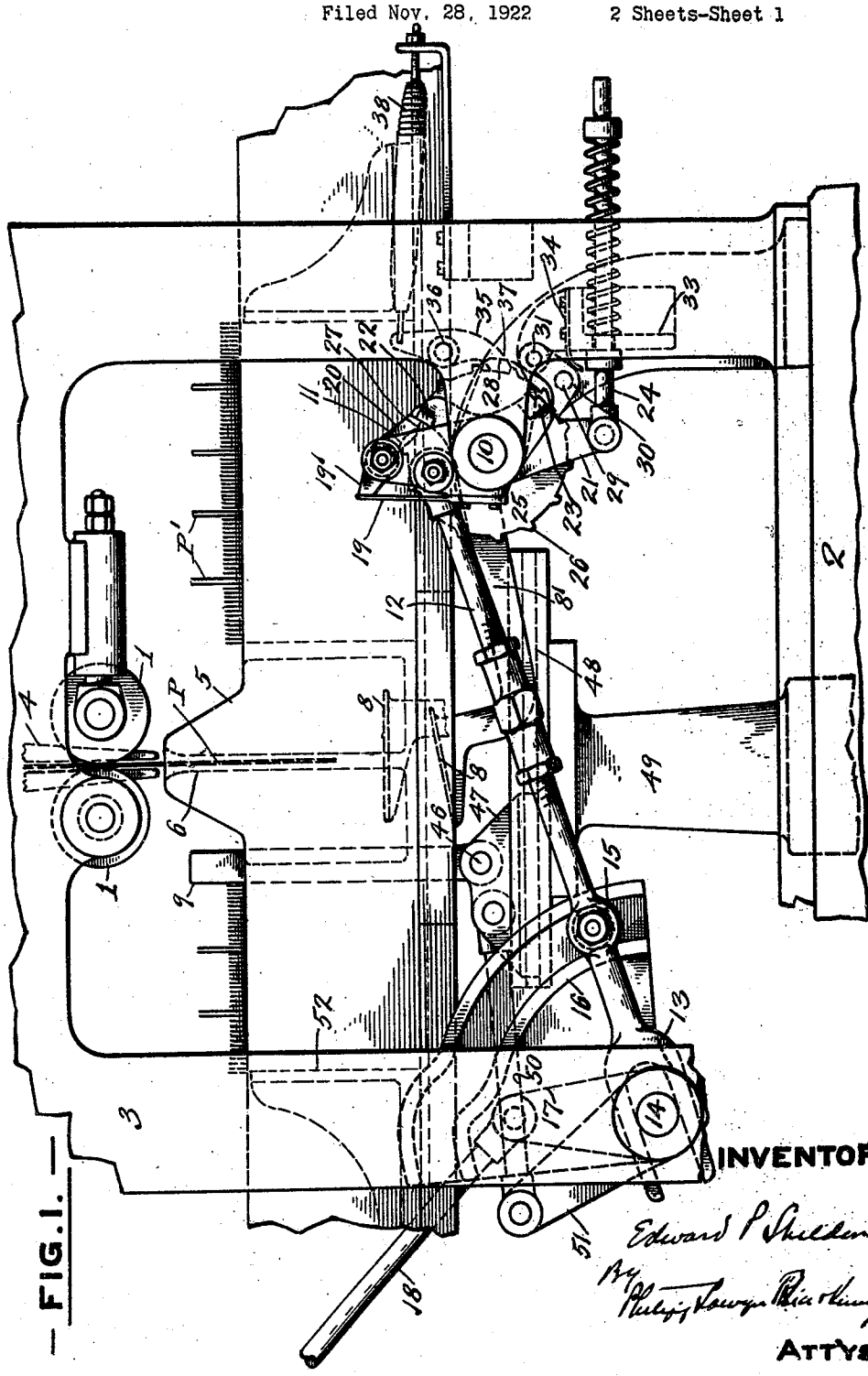


FIG. 1.

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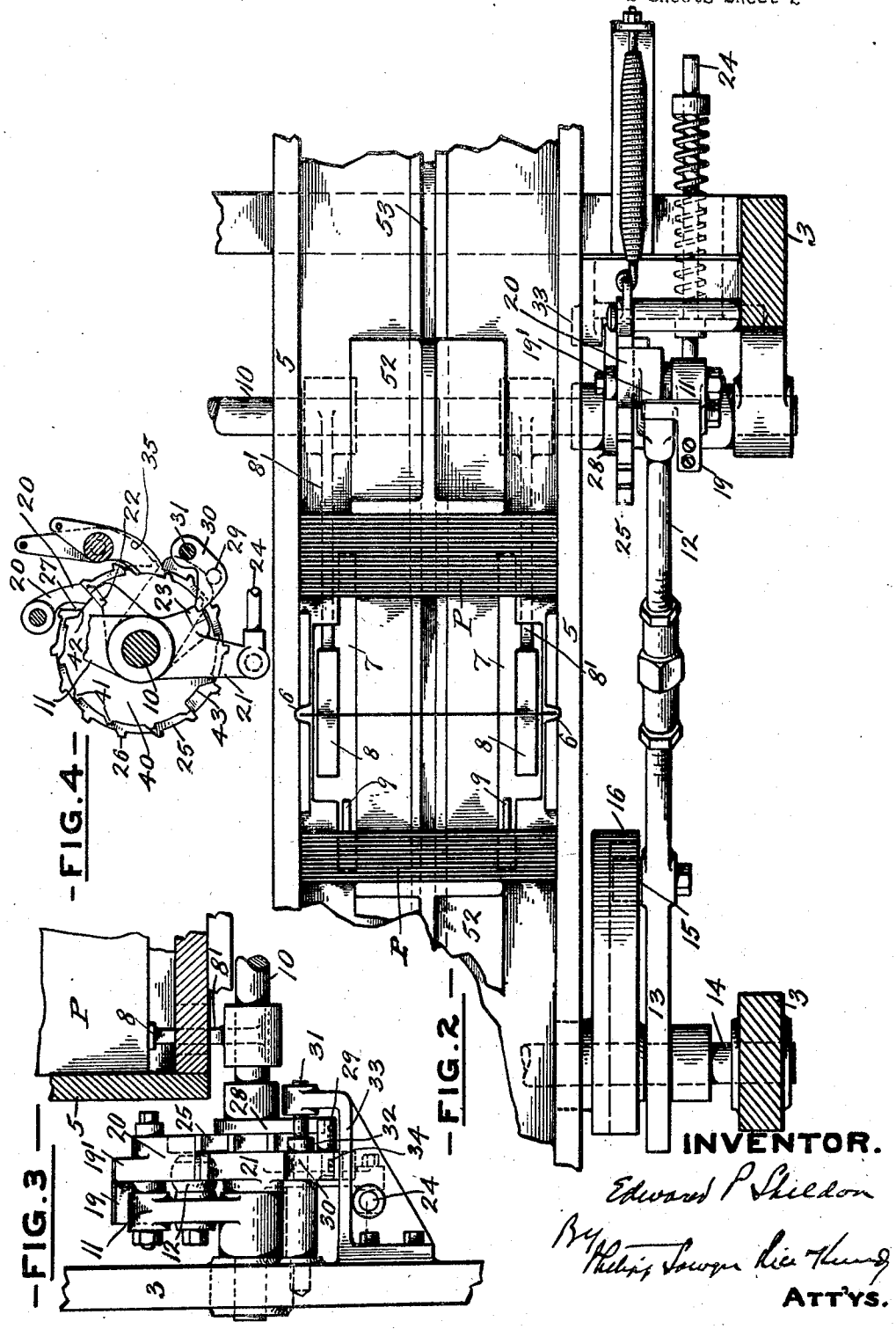


FIG. 4

FIG. 2

FIG. 3

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Patented July 13, 1926. 1,592,230

UNITED STATES PATENT OFFICE.

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COUNTING MECHANISM FOR PRINTED PRODUCTS.

Application filed November 28, 1922. Serial No. 603,309.

This invention relates to certain improvements in counting mechanisms for printed products.

In the production of printed products, such for instance, as printed blanks, thin sheets and various other products, it is desirable that these thin products be counted, preferably in multiples of a predetermined number, means being provided whereby the multiple units each having a predetermined number of products, may be readily separated, either when they are delivered or at any subsequent time, so that a further handling of the products for obtaining a count is made unnecessary.

In handling such thin products as single sheets or once-folded thin sheets, difficulty has been experienced in manipulating the sheets to effect their counting. The manipulating mechanisms usually employed for this purpose comprise devices whereby a certain product is engaged by a kicker or lifter mechanism by which the sheet is raised, so as to project beyond products assembled on either side thereof. In dealing with folded products such as newspapers, assembled signatures, and other heavy products, these mechanisms operate satisfactorily. In dealing with light products, however, as single or thin folded sheets, a kicker mechanism very often causes a buckling of the sheet with the result that the sheet instead of being raised to its proper position buckles and no count is effected. Furthermore, this is apt to cause damage to the sheets.

It is the especial object of the present invention to provide a simple and effective mechanism for displacing a thin product so that it will project beyond products assembled on either side thereof in which this tendency to buckle is overcome and in which the sheet is properly positioned to effect its counting function and is not liable to be damaged, whereby such products may be counted in multiple units, each unit having a predetermined number of products so that the units may be readily separated either at the time of the delivery or at any subsequent time, without the necessity of a recount.

It is a further object of the invention to provide a construction by means of which, with a very slight change in the mechanism, the number of products in a unit may be varied within considerable limits, the operating mechanism otherwise remaining unchanged so that a wide range of counted products may be effected with the same counting mechanism.

With these and other objects not specifically referred to, the invention consists in certain novel parts, arrangements and combinations, which will be fully described in connection with the accompanying drawings and the novel features thereof pointed out in the claims hereunto annexed.

Referring now to these drawings—

Figure 1 is a side elevation, partly broken away, of so much of a counting mechanism embodying the invention, as is necessary for an understanding thereof, the mechanism shown being capacitated to count multiple units each having a predetermined number of products.

Figure 2 is a plan view, partly in section and partly broken away, of the construction shown in Fig. 1.

Figure 3 is a detail end view, partly in section, of the pawl and ratchet mechanism whereby the counting is effected.

Figure 4 is a detail side view, partly in section, of a mechanism whereby the number of products in each multiple unit may be increased as compared with the number counted by the construction illustrated in Fig. 1.

Referring to the drawings, the invention has been illustrated as employed at the delivery end of a printing machine, the printing elements of which have not been illustrated as unnecessary to an understanding of the invention, and the particular product to be counted has been illustrated as a collected product of two thin sheets. It will be understood, however, that the invention is capable of use in other relations, and particularly with products that have not been collected.

In the particular construction illustrated, the various operative parts of the machine are supported in side frames 3 rising from a base 2. The product, indicated by the letter P, is a collected product, this product being collected by suitable collecting mechanism, not illustrated. This product may be forwarded to the counting and delivery mechanism in various ways, but in the particular construction illustrated, it is forwarded by a pair of forwarding rolls 1,

which forwarding rolls, in the particular construction illustrated, co-operate with a pair of guides 4 by which the product is guided to the counting and delivery mechanism.

While the particular delivery mechanism may be varied, that illustrated is a stacker delivery in which the products are delivered vertically. In the particular construction illustrated, this stacker delivery includes a receiving box 5, which is provided at its sides with side channels 6, which receive the side edges of the products so as to properly position them in the box.

As the products are delivered to the box they are counted in what may be termed multiple units, that is, in units each having a number of products, this number being any desired predetermined number. In machines constructed in accordance with the invention, these multiple units are formed by providing certain indicating means arranged between the units so as to divide the units up. In the particular construction illustrated, this is effected by causing one or more of the products to be displaced relatively to the others, so as to stand above the others and thus afford a simple and easy means for separating the products into units or bunches having the desired number in each bunch or unit. While the particular means for effecting this may be varied, in the particular machine illustrated, these raised products marked P′ are displaced relatively to the remaining product by means of an intermittently operating stop by which the spacing product P′ is prevented from being forwarded as far as the other products and is thus elevated above the rest of the products at the sides thereof, and the products thus separated into units or bunches.

While various means may be provided for effecting this, in the particular construction illustrated, the receiver box 5 is provided with openings 7 at each side, in which may be operated a pair of stops in the form of fingers 8, these fingers operating between the side guiding channels 6, before referred to. The openings 7 are, furthermore, formed to permit the operation of certain pushing or stacking devices 9, hereinafter referred to. These pushers have a sliding movement in the box working inside the lifter fingers 8.

These stop fingers are operated intermittently so as to stop one or more of the spacing products after the desired predetermined number of products have been delivered into the box and stacked. The specific mechanism for effecting this may, of course, be somewhat varied, but a simple and efficient one is that illustrated and which may be described as follows:

In this mechanism, the stop fingers are carried on arms 8′ fast on a transverse rock shaft 10 suitably journalled in the side frames 3, before referred to. This shaft 10 is intermittently operated through a lever 11 loosely mounted on the shaft. To this lever 11 is secured one end of a cam rod 12, the other end of this rod being forked, as indicated at 13, this fork taking over a cross-shaft 14. This rod 12 carries a roll 15 which works in the groove of a cam 16 also carried by the shaft 14. This shaft 14 carries a lever 17 connected to the end of an operating rod 18 which is actuated in any suitable manner, not shown, so that the speed of the shaft 14 is properly proportioned to the speed at which the products are forwarded by the forwarding rolls 1. The operating connections from the lever 11 to the shaft 10 for actuating the latter include a spring 19 secured at one end to the lever, and at its free end bearing against one arm 19′ of a pawl 20, secured to the top of the lever 11, before referred to.

Secured on the shaft 10 and adjacent to the lever 11 is a second lever 21, this lever 21 being provided with one pawl face, indicated by the numeral 22 and a second pawl face indicated by the numeral 23, one arm of this lever being secured to a spring rod construction 24.

This lever 21 is fast on the shaft, and as the lever 21 is moved the shaft 10 is rocked. Connections are provided for rocking the shaft after any predetermined number of products have been stacked into a unit or bunch, and in the best constructions these means will be such that by adding an additional ratchet to the controlling mechanism the number of products in a bunch may be widely varied.

Referring first to Figures 1 to 3, there is provided a ratchet wheel 25 provided with ratchet teeth 26, this ratchet wheel being loosely mounted on the shaft 10 and adjacent to the lever 21. This ratchet wheel is provided in addition to the usual teeth 26 with a deep tooth 27 into which the operating end of the pawl 20 may be dropped after the ratchet has made a complete revolution. The hub of the ratchet wheel 25 carries a cam 28 which extends into the path of a pin 29 secured to a pawl 30, this pawl being supported on a stud 31 and held in position by a collar 32, all as best shown in Fig. 3. The stud 31 is supported in any suitable manner, as by being secured at one end in a bracket 33 suitably secured to the side frames 3, before referred to, and this bracket also acts as a support for a spring 34 which normally tends to hold the pawl 30 in a position to engage the pawl face 23 of the lever 21.

The ratchet wheel 25 is prevented from rotating in the opposite direction by means of a locking pawl 35 pivoted at 36 in one of the side frames of the machine, before referred to, and having a locking nose 37, this

pawl being normally held in position to engage the teeth 26 of the ratchet wheel by a spring 38.

In the operation of the parts as so far described, the rod 12, actuated by the cam 16, oscillates the lever 11 and causes the operating end of the pawl 20 to engage the teeth 26 of the ratchet 25 thus advancing the ratchet step by step until the ratchet has made a complete revolution. After one revolution of the ratchet the deep tooth 27 comes in register with the operating end of the pawl 20 and the pawl 20 drops into this deep tooth. When the parts are in this position, the operating end of the pawl 20 is thus permitted to engage with the pawl face 22 on the operating lever 21. The next movement of the parts causes the pawl to rock the lever 21 to the right, as shown in Fig. 1, thereby causing the rocking of the shaft 10 and the elevation of the stop fingers 8, these fingers being moved into the position shown in dotted lines in Fig. 1. This movement of the lever 21 causes the pawl face 23 to be moved toward the left in Fig. 1, whereupon the pawl 30 is forced by the spring 34 into engagement with the pawl face 23 so that the lever 21 is prevented from rocking toward the right and the lifter fingers 8 are held in raised position for one stroke of the lever 11. The following stroke of the lever 11, however, moves the ratchet wheel so that the cam 28 strikes the pin 29 freeing the pawl 30 from the pawl face 23 of the lever 21, thereby causing the lever 21 to swing to the right through the spring 24, thus rocking the shaft 10 in the reverse direction and lowering the stop fingers 8, as shown in full lines in Fig. 1. After the lever 21 has thus returned to its initial position it remains in this position until the ratchet wheel has made another complete revolution under the action of the pawl 20.

With this construction, therefore, a spacing product P′ is prevented from dropping to the bottom of the box 5, and a predetermined number of products is permitted to accumulate in the box until another spacing product P′ is forced up after a revolution of the ratchet wheel, the products P′ being held in raised position by the closeness of their fit between the sides of the box 5 and the pressure of the following products packing against them. Thus the spacing product is not subjected to a pushing or lifting action and any buckling of the product is prevented. The product is, therefore, always in position to effect its counting function, and the product is not crumpled or otherwise damaged.

In some instances it may be desirable to space off or count bunches having more products than would be possible with the single ratchet wheel and connections described. It is desirable, however, that the connections so far described may be utilized in the counting of such larger bunches of products and means are provided by the present invention whereby by the addition of another ratchet an increase in the number of products in a unit or bunch may be permitted without in any way affecting the operation of the mechanism thus far described, and one such construction is illustrated in Fig. 4.

In the particular mechanism illustrated in this figure the ratchet wheel 25 is provided with the usual teeth 26 and the deep tooth 27. Loosely mounted on the shaft 10 and closely adjacent the ratchet wheel 25 is a second ratchet wheel 40, this ratchet wheel being provided with the usual ratchet teeth 41, and in the particular construction shown two deep teeth 42, 43, though it will be understood, of course that one or more deep teeth 42 may be provided depending on the number of products it is desired to accumulate between the spacing products. This ratchet wheel 40 may be suitably positioned on the shaft so that the ratchet teeth 41 are within the range of the operating face of the pawl 20.

With this construction as the ratchet wheel 25 is revolved by the pawl and the pawl approaches the deep tooth 27 the pawl is allowed to drop. At this time, however, it will drop on the ratchet wheel 25, the spaces 45 between the teeth 41 being sufficiently high to prevent the pawl from dropping a sufficient distance to reach the pawl face 22 on the lever 21. In the particular construction shown, therefore, in this Fig. 4, the ratchet wheel 25 will make a complete revolution for one tooth of the ratchet 40, and it will not be until the ratchet 20 has made this revolution that one of the deep teeth 42, 43 of the ratchet 40 will register with the deep tooth 27 of the ratchet 25, and at the same time with the ratchet operating face 22 of the lever 21. This results in that the lever 21 is only rocked on every six revolutions of the ratchet 25 and thus a number of products six times as great are stacked or bunched before the stop fingers raise a delivery product to the indicating position. It will, of course, be understood that if the deep tooth 43 be omitted from the ratchet 40 that twice as many products will be accumulated before the spacing fingers operate. Thus a simple and effective multiplying device is provided.

As before stated, in the particular construction illustrated, the products are arranged in bunches or stacks by the pusher fingers 9, before referred to, these pusher fingers 9 reciprocating back and forth in the box 5 and stacking the products on each side of the box. These pusher fingers may be operated in any suitable manner. In the particular construction illustrated the push-

er fingers are journalled at 46 in slides 47 which work in guides 48 suitably secured in a standard 49 rising from the base 2, before referred to. These slides are operated in the particular construction illustrated by means of an operating rod 50, this rod being secured at its outer end to the lever 51 fast on the operating shaft 14, before referred to. The products are or may be stacked against suitable abutments, such as follower frames 52 which slide in guides 53 in the bottom of the box 5, before referred to, these follower frames retreating as the products are accumulated against them by the pusher fingers.

With the construction shown and described, a very simple and efficient mechanism has been provided for counting products in multiple units or bunches of predetermined number of products each and a very simple and efficient spacing means for effecting this has been provided. While the mechanism shown and described is an efficient one for the purpose, it will, of course, be understood that the specific arrangement of the parts may be varied without departing from the invention.

What I claim is:

1. The combination of means for forwarding thin products vertically, a receiver to which the products are forwarded, means for preventing certain of the products from being forwarded as far as other products as the products are received in the receiver to cause such stopped products to project beyond the others and separate the products into units or bunches each having a predetermined number, and means for assembling the products in a stack by a right line movement.

2. The combination of means for forwarding thin products vertically, a receiver to which the products are forwarded, stop means normally below the bottom of the receiver, means for elevating the stop means for stopping certain of the products from being forwarded as far as other products as the products pass into the receiver to cause such stopped products to project beyond the others and separate the products into units or bunches each having a predetermined number, and means for assembling the products in a stack with a right line movement.

3. The combination of means for forwarding thin products vertically, a receiver to which the products are forwarded, stop means normally below the bottom of the receiver, means for elevating the stop means for stopping certain of the products from being forwarded as far as other products as the products pass into the receiver to cause such stopped products to project beyond the others and separate the products into units or bunches each having a predetermined number, means for assembling the products in a stack with a right line movement, and means whereby the number of products assembled in the receiver may be increased between the operations of the product stopping mechanism.

4. The combination of means for forwarding products, of a packer box into which the products are delivered vertically, mechanism in the box for stopping the product from reaching the bottom thereof so as to elevate certain products relatively to the others, means for operating the product elevating mechanism after a predetermined number of products have been delivered to the box, and means whereby the number of products assembled in the box may be increased between the operations of the product elevating mechanism.

5. The combination of means for forwarding products, of a packer box into which the products are delivered vertically, mechanism in the box for stopping certain of the products from reaching the bottom thereof so as to elevate such products relatively to the others, and a pawl and ratchet for intermittently operating the mechanism.

6. The combination of means for forwarding products, of a packer box into which the products are delivered vertically, mechanism in the box for stopping certain of the products from reaching the bottom thereof so as to elevate such products relatively to the others, and slides in the box operating to assemble the products in stacks with a right line movement.

7. The combination of means for forwarding products vertically, a packer box into which the products are delivered, stops in the box, a rock shaft on which the stops are mounted, a pawl, a ratchet operated thereby, and a second ratchet having a different number of teeth operated by the pawl.

8. The combination of means for forwarding products vertically, a packer box into which the products are delivered, stops in the box, a rock shaft on which the stops are mounted, a pawl loose on the shaft, a ratchet loose on the shaft, and a lever fast on the shaft and actuated by the pawl after a predetermined movement of the ratchet.

9. The combination of means for forwarding products, a packer box into which the products are delivered, stops in the box, a rock shaft on which the stops are mounted, a pawl loose on the shaft, a ratchet loose on the shaft, a lever fast on the shaft and actuated by the pawl to rock the shaft after a predetermined movement of the ratchet, a pawl acting to hold the lever momentarily in rocked position, and means for freeing the pawl.

10. The combination of means for forwarding products vertically, a packer box into which the products are delivered, stops

in the box, a rock shaft on which the stops are mounted, a pawl loose on the shaft, a ratchet loose on the shaft having a deep tooth, and a lever fast on the shaft having an operating face engaged by the pawl when the pawl enters the deep tooth of the ratchet.

11. The combination of means for forwarding products vertically, a packer box into which the products are delivered, stops in the box, a rock shaft on which the stops are mounted, a pawl loose on the shaft, a ratchet loose on the shaft having a deep tooth, a lever fast on the shaft and having an operating face engaged by the pawl when the pawl enters the deep tooth of the ratchet to rock the shaft, and means for momentarily holding the lever in rocked position.

12. The combination of means for forwarding thin products vertically, means for assembling the products in a stack or pile, means for stopping certain of the products as they are forwarded to cause such stopped products to project beyond other products at each side thereof to separate the stack into units or bunches each having a predetermined number of products, and means for varying the operation of the stopping mechanism whereby the number of products assembled in a unit may be varied.

13. The combination of means for forwarding products, a packer box into which the products are delivered vertically, guides on the sides of the box for holding a product, means for stopping certain of the products, and pushers working inside the guides for assembling the products in a stack.

14. The combination of means for forwarding products, a packer box into which the products are delivered vertically, guides on the sides of the box for holding a product, pivoted stop fingers arranged in the product path, means for operating the fingers to stop certain products, and pushers working inside the guides for assembling the products in a stack.

15. The combination of means for forwarding products, a stop, means for moving the stop into the product path to stop the product, said means including a pawl and ratchet, a power shaft, connection from the shaft for operating the pawl and ratchet, pushers for stacking the products in a stack, and connections from the shaft for operating the pushers.

In testimony whereof, I have hereunto set my hand.

EDWARD P. SHELDON.