

Dec. 4, 1928.

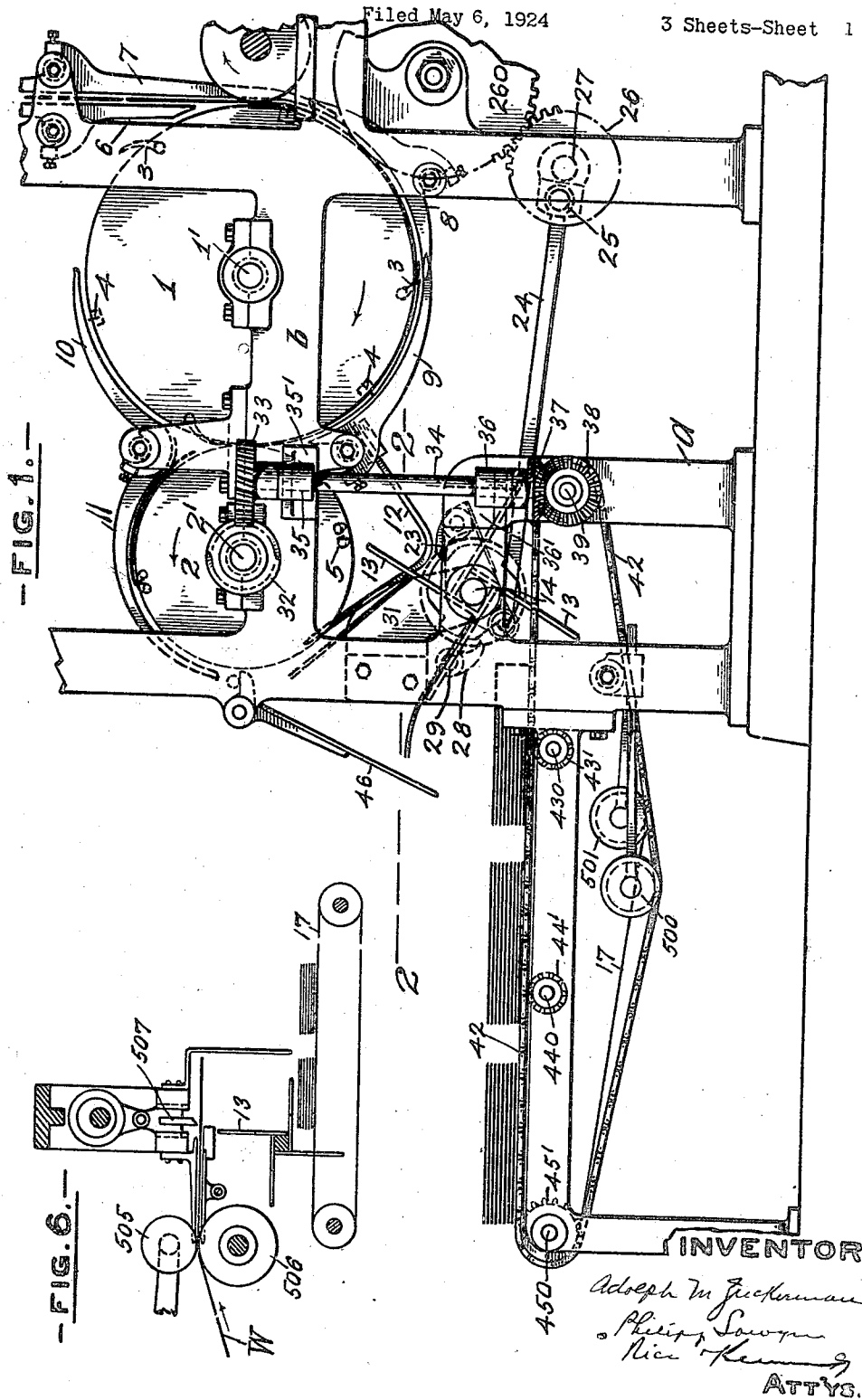
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DELIVERY MECHANISM

Filed May 6, 1924

3 Sheets-Sheet 1



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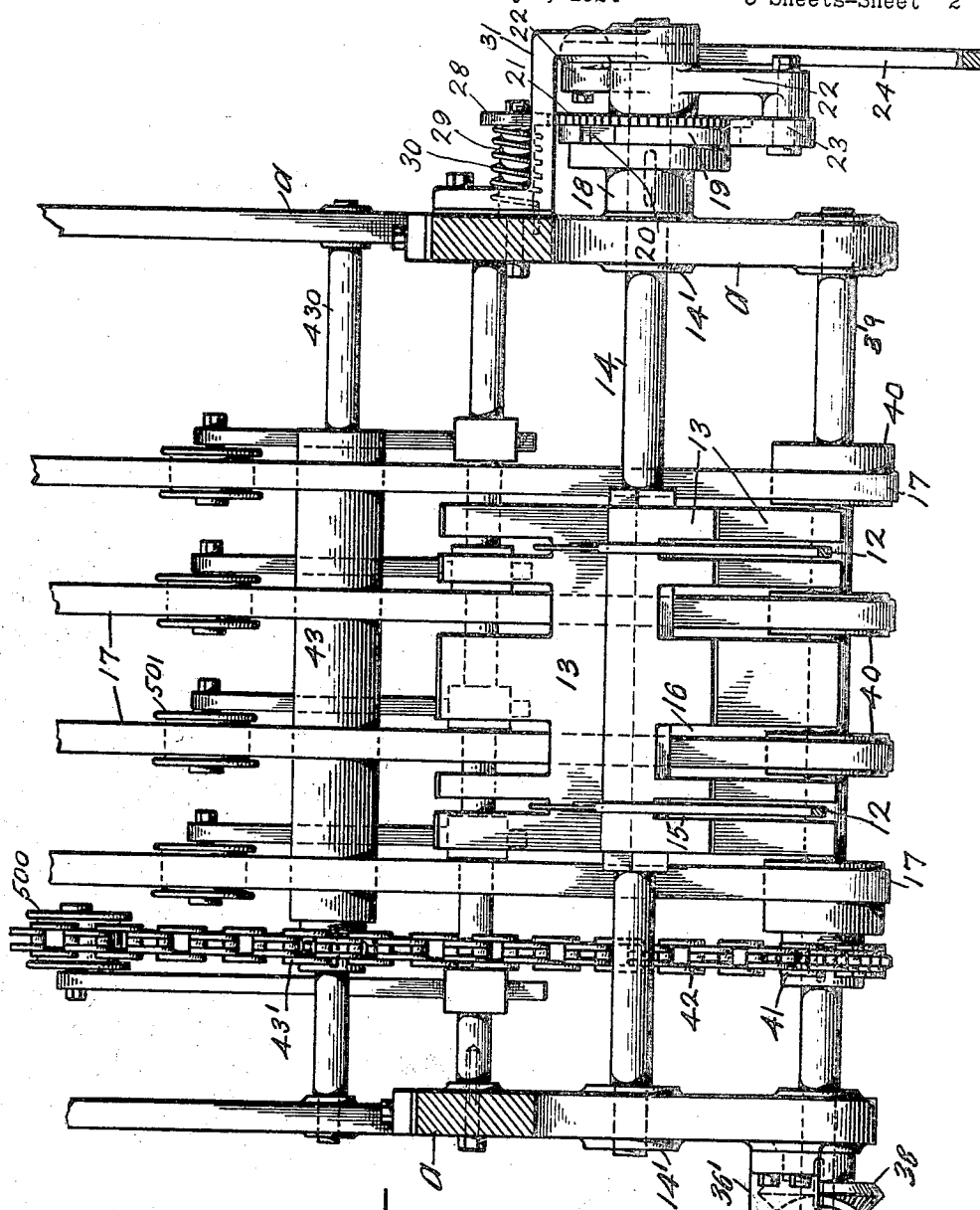
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DELIVERY MECHANISM

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- FIG. 2. -

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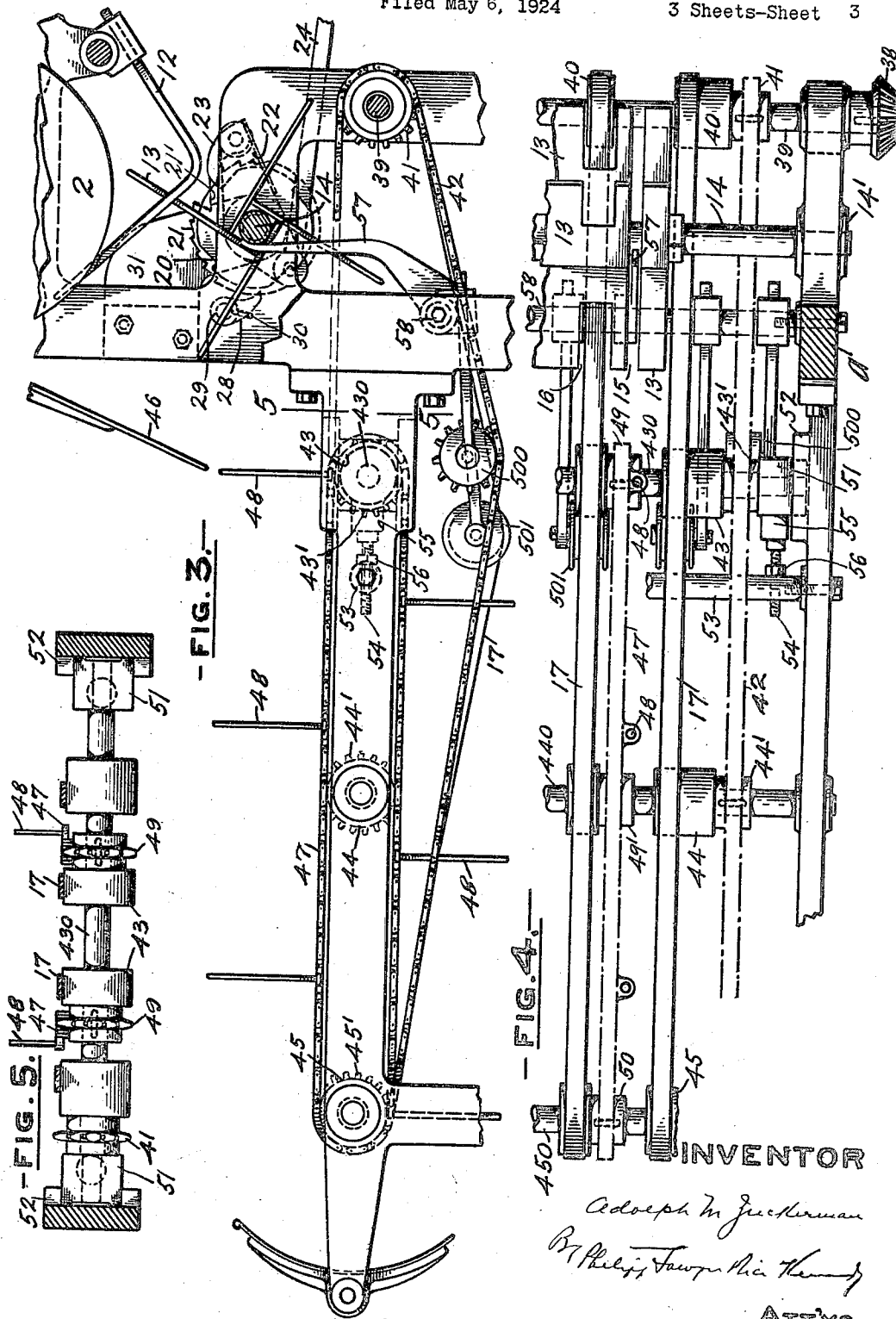
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DELIVERY MECHANISM

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UNITED STATES PATENT OFFICE.

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TO R. HOE AND CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DELIVERY MECHANISM.

Application filed May 6, 1924. Serial No. 711,346.

This invention relates to certain improvements in delivery mechanisms, and particularly to that class of delivery where the products are delivered in piles or stacks.

5 In deliveries, particularly deliveries used in delivering products from printing machines, it is frequently desirable to deliver the products in stacks or piles, each stack or pile containing a predetermined number of products of the character being produced by the machine, such as books, signatures, sheets, and the like. The constructions usually employed for effecting this include a traveling carrier of tapes, chains, or the like, onto which the products are deposited or dropped on top of each other or side by side from the delivery end of the printing machine. After a predetermined number of the products have been piled on the carrier, the carrier, including the various shafts, pulleys, sprockets, etc. of which the carrier is made, is moved ahead sufficiently to provide a fresh surface or space for the next pile. This forward movement of the carrier has to be completed during the interval between the deposit of the last product on the pile and the first product of a succeeding pile. When such structures are used with collected or folded products the time available for this movement, particularly in high speed machines, is very short, barely a fraction of a second. When this mechanism is used with uncollected or unfolded products the time available is so short as to be practically instantaneous, the products following each other from the printing machine with scarcely any space between them. Consequently, a very abrupt movement must be given the carrier, which, with the heavy mechanism required, causes great strains and vibrations in the parts, necessitating frequent adjustment and repair, and, furthermore, in many instances, where dealing with high speed machines, it cannot be accomplished at all within the time available, thus causing one or more products to follow into the space between the piles, this resulting in piling the products with incorrect numbers in the pile, which is a serious objection to this type of delivery.

50 A special object of the present invention is to produce a pile or stacker delivery mechanism in which the carrier may be run at a constant slow speed, thus doing away with the abrupt starting and stopping, and consequent wear of the parts above referred to, and

in which the products, no matter at what speed they are being produced, will be neatly piled and in piles having the desired predetermined numbers. A further object of the invention is to produce mechanism of this character which shall be simple and which, because of its comparatively slow speed, will last for considerable periods without necessitating adjustment and repair, thus increasing the capacity of the mechanism. With these and other objects not specifically referred to, the invention consists in certain novel arrangements, parts, and combinations, which will be fully described in the accompanying drawings, and the novel features pointed out in the claims hereunto annexed.

In these drawings—

Figure 1 is an end view, partly broken away, of so much of the delivery end of a printing machine as is necessary for an understanding of the invention;

Figure 2 is a plan view, partly broken away and partly in section, of the mechanism shown in Figure 1, the view being taken on line 2—2 of that figure;

Figure 3 is an end elevation of the delivery mechanism showing a modified form of the carrier;

Figure 4 is a plan view, partly broken away and partly in section, of the structure shown in Figure 3;

Figure 5 is a detail sectional view, the section being taken on line 5—5 of Figure 3, and

Figure 6 is more or less of a diagrammatic side elevation showing a modification which may be employed, particularly in the case of uncollected unfolded products.

The invention, generally speaking, consists in the provision of a traveling carrier which may be run at a continuous speed which may be as fast or slow as is desirable, depending upon the products being produced. This moderate constant speed of the carrier is rendered possible by what may be termed a collector cooperating with the carrier, this collector being stationary relatively to the rest of the mechanism, that is, it has no abrupt forward or backward movement. This collector is mounted to rotate, and is formed by a plurality of product receiving compartments or pockets, each of which is capacitated to receive a predetermined number of products to form a pile of a desired number. After the collector has received the required number it is given a partial rotation to deposit the

pile on the carrier, this movement bringing into receiving position another pocket. Thus the mechanism is adapted to operate practically instantaneously between piles without any strains or vibration or abrupt starting or stopping movements.

The invention thus briefly outlined may be embodied in various concrete structures, and the preferred structures are illustrated in the accompanying drawings.

Referring first to Figures 1 and 2, the invention is illustrated as used at the delivery end of a printing machine in which a collected folded product is being produced, though it will, of course, be understood, and as will hereinafter appear, the invention is not to be restricted to this particular use. As shown in these figures, the various parts of the mechanism are supported in suitable frame work consisting of vertical standards *a* and cross bars *b* of any usual or desirable configurations. The particular mechanism shown in these figures includes a folding and collecting cylinder 1, this cylinder being provided with usual sheet taking devices as grippers 3 and folding blades 4. These folding blades fold off into folding jaws 5, on what may be termed a delivery cylinder 2. These cylinders 1—2 are or may be supported in any usual or suitable manner, as on shafts 1', 2' suitably supported in the frames *b*, before referred to. These cylinders may, if desired, have associated therewith guides 6, 7, 8, 9, 10 for folding cylinder 1 and a guide 11 for the delivery cylinder 2, these guides acting to accurately pass the products through the mechanism. The products are forwarded to the guides 6—7 from any usual printing mechanism, not illustrated.

Associated with the delivery cylinder 2 are or may be provided stripper fingers 12, these fingers acting to guide the product from the delivery cylinder to the collector hereinafter referred to.

The collector or receiver which forms one of the important features of the present invention may be of various configurations, but will be stationarily mounted with respect to the mechanism with which it is associated and will include a plurality of pockets or compartments. The collector chosen to illustrate the invention comprises a fan shaped structure provided with a plurality of blades or arms 13, which are in the construction shown set at right angles, thus forming four adjacent pockets or compartments into which the products may be deposited from the delivery cylinder 2. It will, of course, be understood that the form, arrangement, and number of these pockets may be varied as desired, depending on the particular class of work for which the machine is designed or used.

These blades are mounted on a shaft 14 suitably supported in bearings 14' in the frame of the machine and are, see Figure 2,

provided with recesses 15 to permit them to pass the stripper fingers 12, before referred to, and with other wider recesses 16 to permit the passage of mechanisms hereinafter referred to.

The receivers in the particular construction illustrated are formed to receive a bunch or pile of a predetermined number of products which are to form the pile required, such a number being received or collected in one of the pockets. After this number has been collected the receiver is given a rotary movement, a quarter turn in the present instance, and the succeeding pocket brought into receiving position, the collected pile being deposited on a carrier, hereinabove referred to. While this collector actuating mechanism may be of various characters, in the particular construction illustrated it is actuated through a pawl and ratchet mechanism driven in any suitable way. In the particular construction shown the shaft 14, outside the side frames, has secured thereto a hub 18, having fast thereon a ratchet 19. This ratchet in the particular construction illustrated has a series of deep teeth 20, the number of these teeth being equal to the number of the fan blades, so that as the ratchet is moved the length of a deep tooth the collector is given the required rotary advancing movement. Adjacent the ratchet 19 is a second ratchet 21, this ratchet being provided with a number of teeth, depending on the number of products it is desired to collect in a pile. This second ratchet 21 is loose on the hub and is provided with one or more deep teeth 21', one such tooth being shown. These ratchets are operated by means of a lever 22, pivoted loosely on the shaft 14, before referred to. One arm of this lever has secured thereto an operating pawl 23, which cooperates with the ratchets 19, 21 to advance the same, this advancing movement taking place when the deep teeth 20, 20' in the ratchets 19, 21 register; to the other arm of the lever 22 there is secured one end of an operating rod 24, the other end of this rod being secured to a stud 25, on a gear 26, mounted on stud 27 supported in one of the standards *a* of the machine frame, this gear 26 being driven from the collecting cylinder driving gear 260.

In the best constructions means are provided to prevent backward movement of the ratchets or any undesired movement in the ratchets or their associated parts. In the particular construction illustrated this is effected by means of a locking pawl 28, carried on a stud 29 secured in the machine frame, this stud being spring pressed to keep the pawl 28 in operative relation with the ratchet 21, by means of coiled spring 30 interposed between the ratchet and the machine frame. If desired to strengthen the parts and assist in supporting the ratchet mechanism and its associated parts, a bracket 31

may be secured to the machine frame, the depending leg of this bracket forming additional bearing for the shaft 14 beyond the ratchet mechanism.

5 Cooperating with the receiver or collector is a carrier, this carrier having a traveling movement to receive and advance successive piles or stacks of products deposited thereon by the collector. This carrier may be of various constructions and operated in various ways. It will, however, be operated so as to have a continuous motion, and this motion will be at a comparatively slow speed, so that abrupt starting or stopping movements are avoided and there is very little wear and tear on the parts. This movement may be given the carrier in any suitable manner. In the particular machine illustrated this movement is effected from the delivery cylinder, the parts being timed so that the carrier has moved slightly more than the width of a pile by the time another pile is ready for deposit thereon from the collector. As shown, the shaft 2' of the delivery cylinder 2 has secured thereto a worm 32, which engages with a worm 33 on the end of a short vertical shaft 34, this shaft running in bearings 35—36, mounted in brackets 35', 36' secured to the frame of the machine. The shaft 34 carries on its lower end a mitre gear 37, which meshes with a mitre 38 on a cross shaft 39 suitably mounted in the machine frame. This shaft 39 is the driving shaft for the traveling carrier, and imparts to the carrier a steady motion at the desired speed.

The specific construction of the carrier may be varied within wide limits, and two forms of carrier are illustrated in the drawings.

Referring first to Figures 1 and 2, the carrier is shown as comprising a series of endless belts 17, which are given a continuous advancing movement through the folding mechanism. On the shaft 39, before referred to, is a series of pulleys 40, one such pulley being provided for each of the belts; likewise, fixedly secured on this shaft is a sprocket wheel 41, which drives a sprocket chain 42. This sprocket chain imparts movement to supporting and driving rolls 43, 44 and 45, supported on shafts 430, 440 and 450 by means of sprockets 43', 44' and 45' secured on one end of the shafts. As before stated, the fan blades 13 are provided with the wide recesses 16 to permit the passage of the belts on the rotation of the fan. The speed of the carrier may be as desired; it will, however, be such in relation to the speed of the delivery cylinder that as each pile or stack of products is deposited on the carrier by the fan such pile will be advanced so as to clear the fan and provide a space for the next succeeding pile of products.

A guard 46, suitably secured on the framework of the machine, may be provided if desired for preventing displacement of the prod-

ucts as they are deposited in the pockets of the fan.

Referring now to Figures 3 and 4, a somewhat modified form of carrier is shown. In the construction here shown the pile receiving surface of the carrier is in the form of pockets, this construction being adapted for use with special types of products, such, for instance, as uncollected or unfolded sheets, which class of products are difficult to pile evenly on plain flat belts. In the particular construction illustrated these pockets are formed by a series of fingers 48, which are carried on a pair of sprocket chains 47, these sprocket chains being spaced so as to form pockets of the required width. While these chains may be mounted and driven in any desired manner, they are, as shown, arranged to extend from a point in advance of the arc described by the fan blades so that they do not interfere with the fan and to lie on each side of a pair of the belts 17, before referred to. In the particular construction illustrated the roll shaft 430, before referred to, is provided with a pair of fixed sprockets 49 (see Figure 5), the shaft 440 with loose sprockets 49', and the shaft 450 with sprockets 50, the chains 47 thus being driven to advance the chains a pocket length at the required time. With this construction the pile of products is deposited by the fan on the belt 17, as in the construction shown in Figures 1 and 2, the pile being advanced by the belts for a short advancing movement. However, a pocket finger is brought into position to engage the rear end of the pile and the pile is forwarded under control of the pocket fingers to effect the deposit of an even pile of products. As the products are deposited by the fan blades they bring up against stop fingers 57, suitably supported on a shaft 58, suitably secured in the frame, the function of these fingers being to keep the pile in alignment. These fingers project through the fan blade in the spaces 15, before referred to, so as not to interfere with the rotation of the fan blades.

In the best constructions means are provided for tightening the sprocket chains 47. While this may be effected in various ways, as shown, the shaft 430 of the roll 43 is mounted in sliding bearings 51, which move in runways 52 formed in the side frames of the machine. One of these bearings 51 is provided with a projection or abutment 55, against which bears one end of an adjusting screw 54, threaded through a thrust block 53, this adjusting bolt being locked in adjusted position by a lock nut 56.

The chains 42 and belt 17 may be tightened by means of a chain adjusting sprocket 500 and a belt adjusting roll 501, as is used in these chain carriers.

In Figure 6 is illustrated the improved delivery as used in connection with a machine for delivering cards and the like, in which

the product is separated from a web and delivered to a fan, practically continuously without collecting or folding. As here shown diagrammatically, a web W is fed through a pair of slitting rolls 505, 506, this slit web being directed under a reciprocating knife 507 which cuts off the products and delivers them to the collector or receiver. In this modification the collector and carrier will be constructed and operated as above described in connection with Figures 1—5.

The operation of the mechanism described may be briefly summarized as follows: The carrier belts are driven with a slow continuous movement at a speed depending on the products it is desired to associate in a pile. The products are delivered to the collector, and through the pawl and ratchet mechanism 19, 21 the desired number of products are delivered to a pocket of the collector. After this has been done, the collector is given a quarter turn and, as the blades of the collector pass between the belts, the associated products are laid or deposited on the belts in an even pile. This rotary movement of the collector may be very quickly effected, and by this movement a succeeding holder or pocket of the collector is brought into product receiving position for assembling a second pile of products, and the carrier has moved forward a sufficient distance to provide space for another pile of products.

With the construction shown and described a very efficient pile delivery has been provided, in which the products are delivered, accurately counted in piles, and in which time lost, due to stoppage of the mechanism for repairs or adjustment, is reduced to a minimum.

While the invention has been shown and described in its preferred forms, it will be understood that various changes may be made in the specific structures for effecting the object of the invention without departing from the invention, as set forth in the appended claims.

What I claim is:

1. In a pile or stack delivery, the combination of a traveling carrier, means for advancing the carrier, a collector having means for receiving products, means for delivering a number of products to the collector, and means for actuating the collector so that the product receiving means are lowered below the surface of the carrier to lay the collected products on the carrier in a pile.

2. In a pile or stack delivery, the combination of a traveling carrier, means for advancing the carrier, a collector having a plurality of product holders, means for delivering to a holder a number of products, and means for actuating the collector so that the holders are lowered below the surface of the carrier to lay the collected products from a holder onto the carrier in a pile.

3. In a pile or stack delivery, the combination of a traveling carrier, means for advancing the carrier, a rotary collector having a plurality of product holders, and means for effecting a step by step movement of the collector so that the holders are lowered below the surface of the carrier to lay products from one holder on the carrier in a pile and bring another holder into product receiving position.

4. In a pile or stack delivery, the combination of means for advancing products, a traveling carrier, a collector having product receiving means and intermediate the advancing means and the carrier, and means for actuating the collector so that the product receiving means are lowered below the surface of the carrier to lay collected products onto the carrier in a pile.

5. In a pile or stack delivery, the combination of means for advancing products, a carrier having a continuous advancing movement, a collector having product receiving means and intermediate the advancing means and the carrier, means for actuating the collector so that the product receiving means are lowered below the surface of the carrier to lay the collected product on the carrier in a pile, and means for driving the carrier from the product advancing means.

6. In a pile or stack delivery, the combination of product advancing means, a traveling carrier, means for continuously advancing the carrier, a rotary collector having a plurality of blades forming holders, said blades on the rotation of the collector passing below the surface of the carrier whereby a pile of collected products is laid on the carrier, and means for rotating the collector.

7. In a pile or stack delivery, the combination of product advancing means, a rotary collector having a plurality of blades forming holders, a traveling carrier including spaced belts between which the blades are arranged to pass, and means for rotating the collector so that the blades are lowered below the belts to lay a pile of products on the belts.

8. In a pile or stack delivery, the combination of product advancing means, a rotary collector having a plurality of blades forming holders, notches in the ends of the blades, a traveling carrier including spaced product supports between which the notched ends of the blades pass, and means for rotating the collector.

9. In a pile or stack delivery, the combination of product advancing means, a rotary collector having a plurality of holders, a traveling carrier, means for counting out into a holder a predetermined number of products, and means for then rotating the collector so that the holders are lowered below the surface of the carrier to lay the counted products on the carrier in a pile and advance an empty holder into product receiving position.

10. In a pile or stack delivery, the combination of product advancing means, a rotary collector having a plurality of blades forming holders, notches in the ends of the blades, 5 a traveling carrier comprising spaced belts between which the notched ends of the blades pass to lay a product on the belts, and means for rotating the collector. 25

11. In a pile or stack delivery, the combination of a collecting and folding cylinder, a delivery cylinder cooperating therewith, a rotary collector, means including a pawl and ratchet for giving the collector a step by step rotary movement, a traveling carrier onto 10 which products are laid by the collector, and a worm and worm gear driven from one of the cylinders for giving the carrier a slow even advancing movement. 30

12. In a pile or stack delivery, the combination of means for advancing products, a ro-

tary collector, means for rotating the collector with a step by step movement, a traveling carrier below the collector including spaced product supports on which products are laid by the collector, a second carrier having product 25 receiving pockets, and means for driving the carriers.

13. In a pile or stack delivery, the combination of product advancing means, a rotary collector having a plurality of blades forming holders, means for delivering to each 30 holder a number of products, a traveling carrier having spaced product supports between which the blades are arranged to pass, and means for rotating the collector to lay a pile 35 of products flatwise on the product supports.

In testimony whereof, I have hereunto set my hand.

ADOLPH M. ZUCKERMAN.