

March 15, 1927.

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1,621,301

DELIVERY MECHANISM FOR BOX FILLING MACHINES

Filed April 22, 1926

4 Sheets-Sheet 1

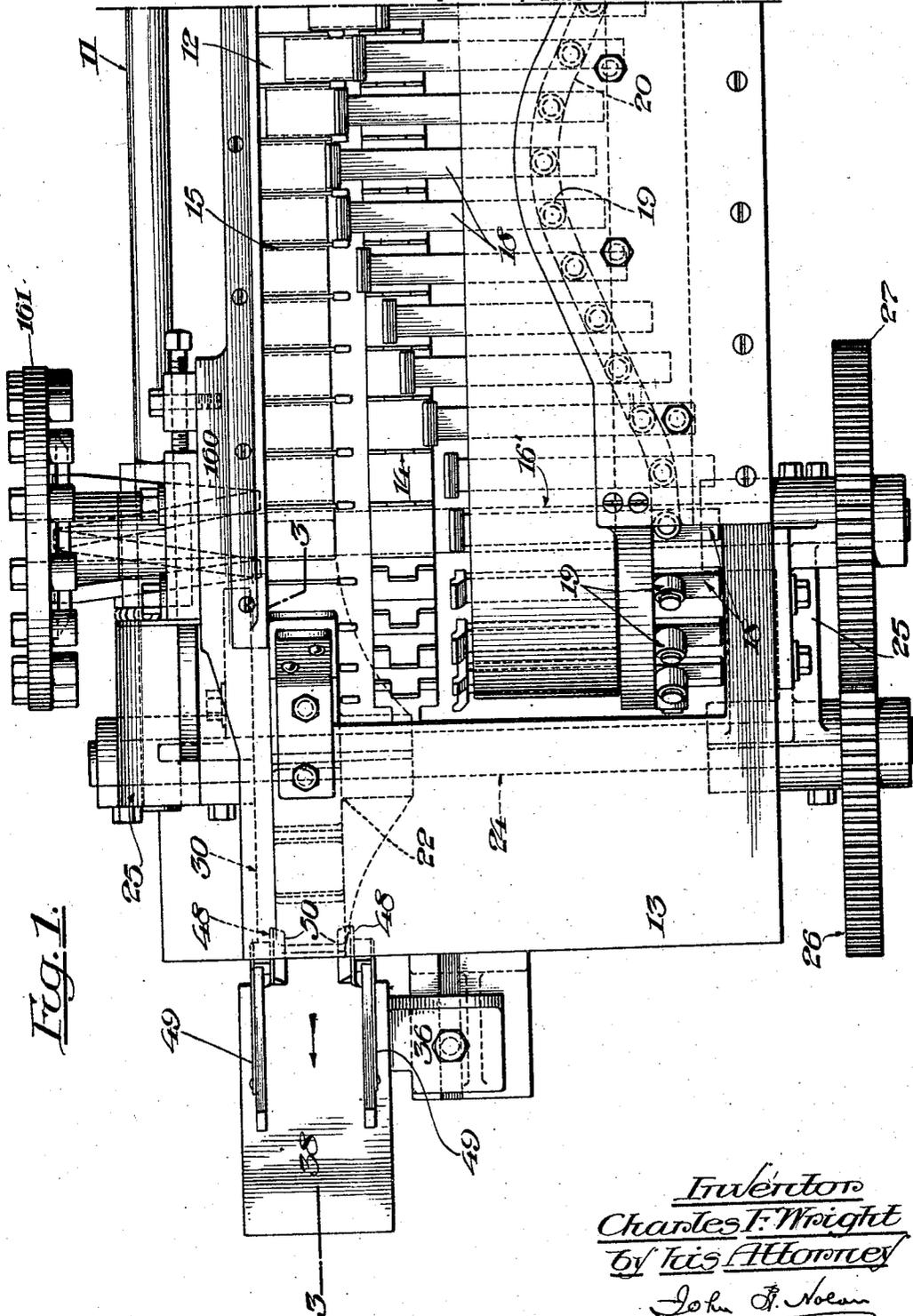


Fig. 1.

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4 Sheets-Sheet 2

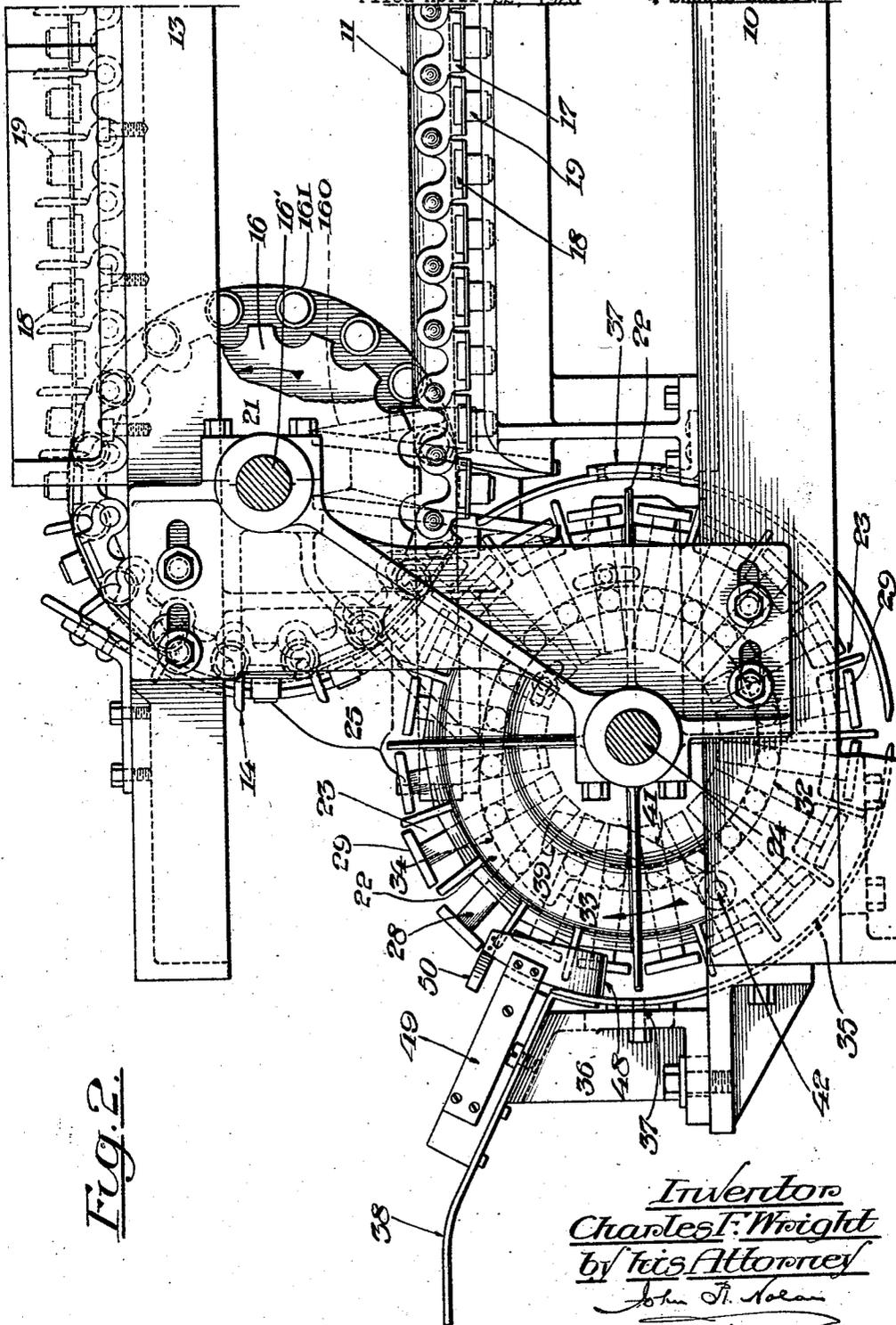


Fig. 2.

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Filed April 22, 1926

4 Sheets-Sheet 3

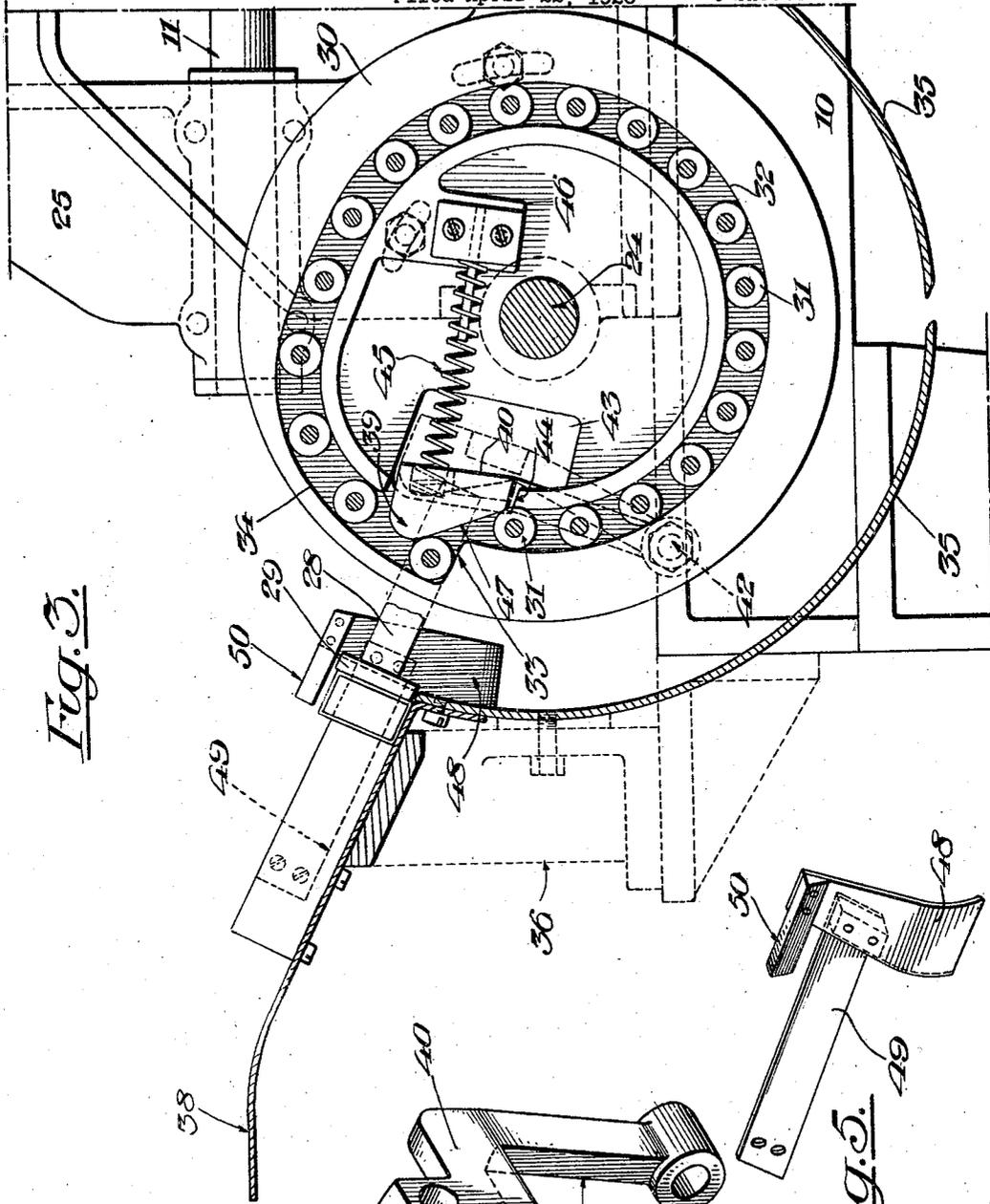


Fig. 3.

Fig. 4.

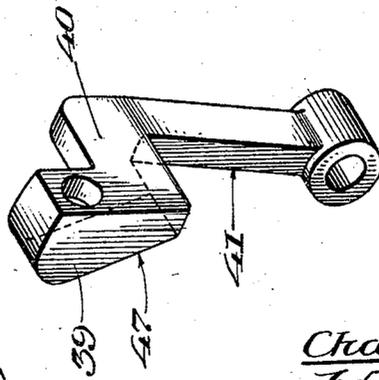
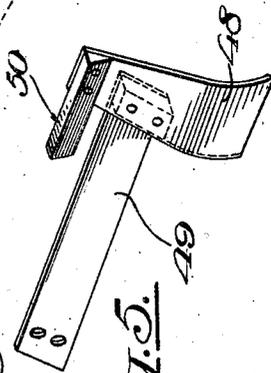


Fig. 5.



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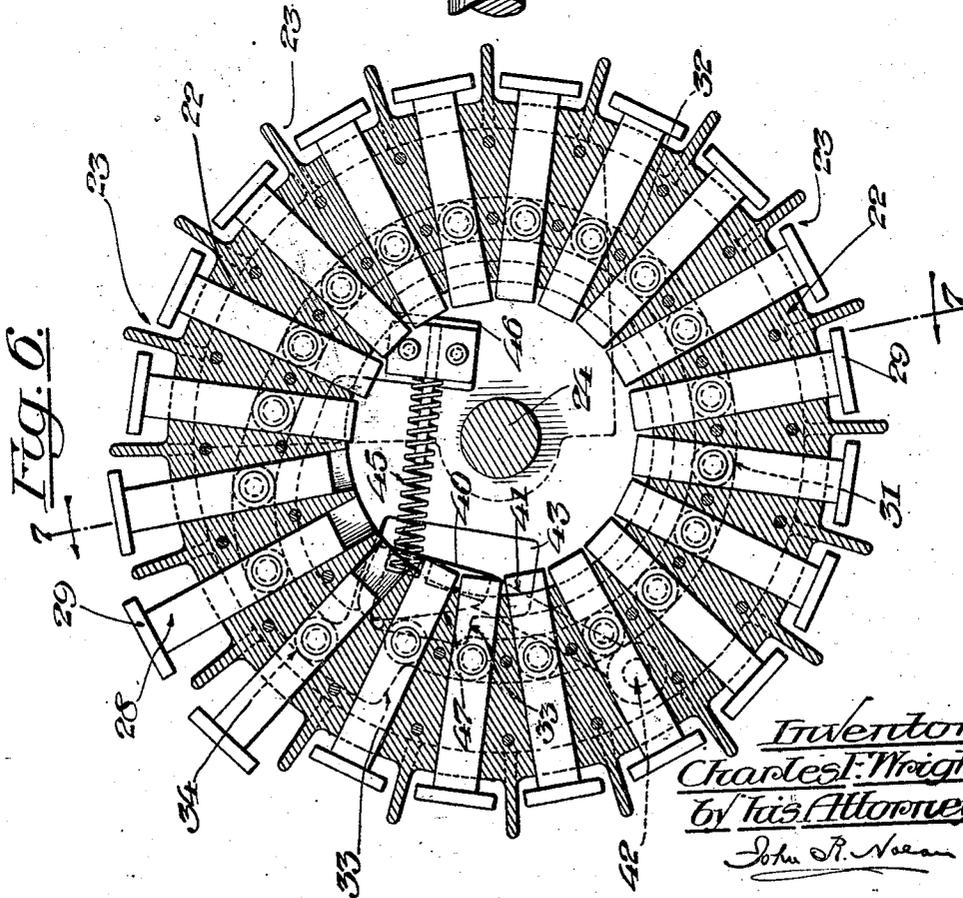
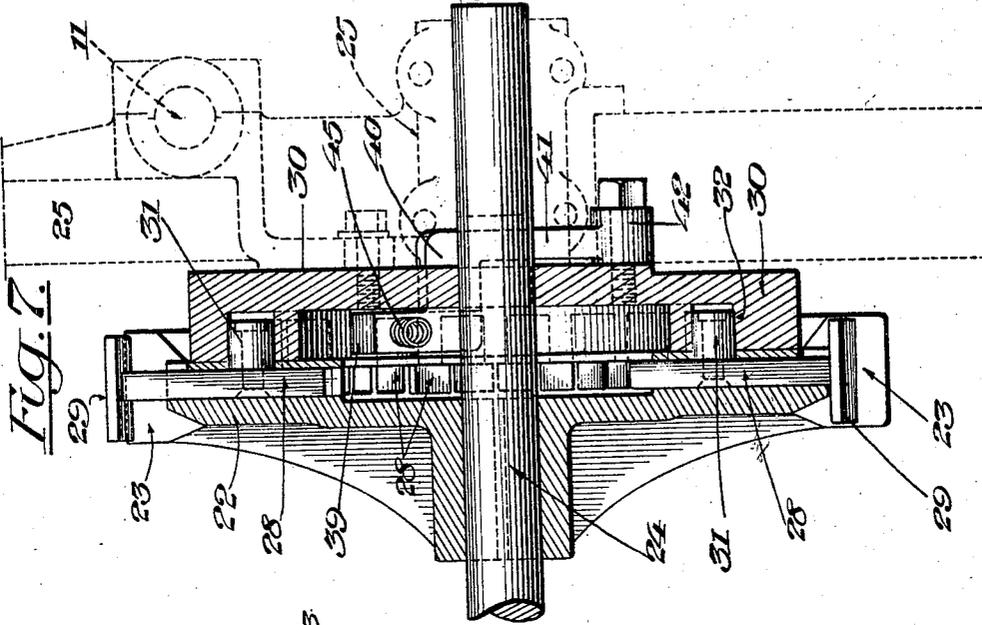
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DELIVERY MECHANISM FOR BOX FILLING MACHINES

Filed April 22, 1926

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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DELIVERY MECHANISM FOR BOX-FILLING MACHINES.

Application filed April 22, 1926. Serial No. 103,674.

This invention relates to box filling machines, and more especially to machines for filling match boxes of the tray and shuck type, such, for example, as illustrated in Letters Patent of the United States No. 1,300,762.

The patented machine includes an endless conveyer for transporting complementary trays and shucks, means for filling the trays with matches, and means for inserting the filled trays in their shucks. The filled and closed boxes are advanced by the conveyer to a position where they are discharged from the conveyer by gravity down an inclined chute leading to a suitable receiving table.

The object of the present invention is to provide a simple and efficient mechanism whereby the boxes as rapidly as they are discharged from the conveyer are transported thence to, and are arranged in an orderly manner in, a receiving element from which they may be manually removed in predetermined quantities for wrapping or be transferred to a wrapping machine.

Accordingly, the invention comprises novel features of construction and combinations of parts which will be hereinafter described and claimed.

In the drawings—

Figure 1 is a plan of the discharge end of a box filling machine embodying a preferred form of my invention.

Fig. 2 is a side elevation of the same, partly in section.

Fig. 3 is a longitudinal vertical section through the delivery mechanism, as on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of a spring-actuated box-ejecting device included in said delivery mechanism.

Fig. 5 is a detail of one of the spring and guard members at the receiving end of the take-off trough.

Fig. 6 is a vertical section through the pocketed delivery wheel.

Fig. 7 is a transverse section of the same, as on the line 7—7 of Fig. 6.

Referring to the drawings, 10 designates a part of the main frame, and 11 a part of the main drive shaft of a machine for filling trays with matches and associating the filled trays with their complementary shucks or covers. 12 designates the delivery end of a continuously driven tray and shuck conveyer, the upper longitudinal run whereof is ar-

ranged to travel along a bed or table 13 supported by the frame. This conveyer preferably comprises a chain of links having outwardly projecting blade-like members 14, 15 which are relatively arranged to afford a succession of aligning holders for complementary trays and shucks. The conveyer passes about suitably-located sprocket wheels at the respective ends of the table, one of which wheels is shown at 16 fast on a shaft 16' to which motion is suitably transmitted from the main shaft, as, for example, by the cam 160 and pin wheel 161 fast on the shafts 11 and 16' respectively.

Located at one side of the conveyer 12 is a second continuously moving conveyer 17 comprising preferably a chain of box-like links suitably provided with reciprocating transverse plungers 18 having rolls 19 which travel in an appropriate stationary cam-way 20 and are thereby actuated to reciprocate the plungers, which latter in their inward strokes push the filled trays into their complementary covers on the conveyer 12. The plunger conveyer 17 passes about suitably-located sprocket wheels, one of which is shown at 21 fast on the driven shaft 16'.

The associated shucks and trays supported by the conveyer 12 are advanced thereby to a position partially around the wheel 16, and they are thence discharged by gravity, all as fully set forth in Patent No. 1,300,762 aforesaid.

Mounted below and rearwardly of the discharging end of the conveyer 12 is a delivery element comprising in its preferred construction a wheel 22 having spaced peripheral ribs forming pockets 23 which are adapted in the rotation of the wheel to register with the shuck holders in succession and receive therefrom the filled and closed boxes discharged from the conveyer 12. The wheel 22 is fast on a shaft 24 having its bearings in suitable brackets 25 supported by the main frame. One end of the shaft 24 is equipped with a gear 26 in mesh with a similar gear 27 on the driven shaft 16', whereby the delivery wheel is rotated at the same surface speed as the conveyer 12. This wheel is equipped with radially movable plungers 28 which enter the respective pockets and are provided with expanded end portions 29 which afford, in effect, movable bottoms for the pockets. Fixed to the main frame, at one side of the wheel 22, is a

face cam 30 in the race of which run laterally-projecting rolls 31 on the respective plungers. The cam race has a concentric portion 32, which maintains the plungers in retracted position, and which portion extends from the region of discharge of the boxes from the conveyer to a location well around the delivery wheel, as shown. At this location the concentric portion 32 is interrupted by an outwardly extending portion 33 that permits each succeeding plunger to be moved abruptly outward. This portion 33 leads to an outer curved portion 34 which continues to and merges with the concentric portion 32 of the cam race, so as gradually to retract the plungers 28 in succession as they progress to the initial end of the concentric portion.

When each succeeding box is discharged from the conveyer 12 into a pocket of the delivery wheel, the latter carries the box therewith while the roll of the plunger is traversing the concentric cam portion 32. The succession of boxes thus introduced in and carried by the wheel are maintained in place by means of a guard comprising segmental sections 35 which are suitably spaced from the pocketed periphery of the wheel and are supported by appropriate brackets 36, 37 on the main frame. The guard terminates in the vicinity of the outward lead 33 of the cam race, and is connected to a suitable receiving element comprising, in the present instance, an upwardly inclined take-off trough 38 which is supported by the adjacent bracket 36. As each succeeding box, in the rotation of the delivery wheel, clears the guard, the roll of the plunger which is associated with the pocket in which the box is seated, escapes the concentric portion 32 of the cam race and the plunger is thereupon immediately projected outward by the action of a reciprocating ejecting member 39 with which the roll of the plunger co-acts at this stage, the plunger thus forcing the opposing box to and upon the take off trough, as seen in Fig. 3. The member 39 preferably comprises a head formed on an angular arm 40 at the upper end of a lever 41 which is fulcrumed at its lower end on a stud 42 projecting from the outer face of the cam body 30. The wall of this cam body is formed with an enlarged opening 43 through which the angular arm extends so as to support the head 39 adjacent the outward lead 33 of the cam race, the inner wall of the latter being cut-away, as at 44, to permit the head to be swung into and from the race. The head is maintained normally with its acting face within the cam race by means of a stout spring 45 which is interposed between the head and a fixed depending portion 46 within the cam body, such face being inclined, as at 47, from a point below the cam por-

tion 33 to a point within the same and above the plane of the floor of the take-off trough.

As a plunger, in the rotation of the wheel, approaches the upper end of the concentric portion of the cam race, the roll 31 of the plunger bears against the opposing inclined face of the head 39 and presses the latter inward against the force of the spring 45, and when the roll escapes the end of such cam portion the expansion of the spring quickly drives the head outward, thus projecting the plunger and delivering the opposing box to the take-off trough 38, as previously described. The inclined face of the head is engaged by the rolls 31 of the respective plungers in succession, during the rotation of the wheel, and in consequence a rapid and uniform delivery of the boxes to the take-off trough is accomplished.

As each succeeding plunger roll escapes the head 39, the roll enters the cam portion 34 and passes thence to the concentric portion 32 of the cam race, at which period the plunger is retracted to permit the entry of another box in the wheel.

Arranged at the sides of the receiving end of the trough are a pair of flared spring plates 48 which depend below the trough and are positioned to embrace and bear yieldingly against the ends of each box as it approaches and reaches the end of the take-off trough. These plates are preferably supported by a pair of spring strips 49 which are secured to the respective side walls of the trough. The resilient plates by their action against the ends of the box keep the latter in a central position relative to the trough preparatory to the entry of the box into the trough, and after such entry the plates resume their normal position and perform the function of back stops to prevent the box from rebounding and obstructing the passage of the next incoming box.

The flare of the plates is such that the upper corner of the incoming box passes the lower corner of the box previously entered in the take-off trough, before the plates have been sufficiently spread apart to allow the passage of the incoming box to the trough; and the upper ends of the plates 48 extend slightly above the side walls of the trough and support on their inner sides inclined bars 50 which are so disposed as partially to overhang the ends of the upper side of the box and thus prevent its being accidentally carried upward from the trough by the projected plunger during the upward travel of the latter.

From the foregoing it will be seen that a mechanism is provided whereby the boxes as rapidly as they are discharged from the traveling conveyer 12 of the filling machine enter the successive pockets of the rotating delivery wheel and are advanced thereby to

a location where they are successively introduced in the take-off trough in an orderly row from which predetermined quantities of the boxes can be manually removed for wrapping or be transferred to a wrapping machine.

I do not limit my invention to the particular construction herein disclosed, as the mechanism may be modified within the principle of the invention and the scope of the appended claims.

I claim—

1. The combination with a conveyer having a succession of box holders, of a delivery element movable concurrently with the conveyer and having a succession of box receivers into which the boxes are discharged from said box holders, plungers reciprocable in said receivers and having cam-engaging portions, a stationary plunger-controlling cam having an outward lead remote from the conveyer, a resilient discharge member normally positioned in the said lead and in the path of the cam-engaging portions of the plungers, said member being operative to effect the quick outward movement of the succeeding plungers, and a box-receiving element to which the boxes are transferred by the outwardly-moving plungers.

2. The combination with a conveyer having a succession of box holders, of a delivery element movable concurrently with the conveyer and having a succession of box receivers into which the boxes are discharged from said box holders, plungers reciprocable in said receivers and having cam-engaging portions, a stationary plunger-controlling cam having an outward lead remote from the conveyer, an ejecting head reciprocable in said lead, a spring maintaining the head normally located within the lead and in the path of the cam-engaging portions of the plungers, said head being operative to effect the quick outward movement of the successive plungers, and a box-receiving element to which the boxes are transferred by the outwardly moving plungers.

3. The combination with a conveyer having a succession of box holders, of a delivery wheel movable concurrently with the conveyer and having peripheral pockets into which the boxes are successively discharged from the said box holders, radially movable plungers carried by said wheel and entering the pockets, said plungers having cam engaging portions, a fixed cam body located adjacent the wheel and having a suitable cam race for said engaging portions, said race having an outward lead remote from the conveyer, a resilient discharge member normally projecting into said lead and in the path of the cam-engaging portions of the plungers, whereby the head is operated to throw such portion and its plunger outward, and a box receiving element to which

each succeeding box is transferred by the outwardly moving plunger.

4. The combination with a conveyer having a succession of box holders, of a delivery wheel movable concurrently with the conveyer and having peripheral pockets into which the boxes are successively discharged from the said box holders, radially movable plungers carried by said wheel and entering the pockets, said plungers having cam engaging portions, a fixed cam body located adjacent the wheel and having a suitable cam race for said engaging portions, said race having an outward lead remote from the conveyer, an ejecting head reciprocable in the said lead and having an inclined acting portion, a spring maintaining the head in a position with its inclined portion normally within the lead and in the path of the cam-engaging portions of the plungers, whereby the head is operated by such portions in conjunction with the spring to effect the quick outward movement of the successive plungers, and a box-receiving element to which the boxes are transferred by the outwardly moving fingers.

5. The combination with a conveyer having a succession of box holders, of a delivery wheel movable concurrently with the conveyer and having peripheral box receivers into which the boxes are successively discharged from the said box holders, radially movable plungers mounted in said wheel and affording bottoms for the pockets, said plungers having cam-engaging portions, a fixed cam body located adjacent the wheel and having a suitable cam race for said engaging portions, said race having an outward lead remote from the conveyer, and said body also having an opening adjacent the lead, a lever fulcrumed exteriorly of the cam body and having an arm extending through the opening and terminating in an ejecting head reciprocable in said lead, a spring maintaining the head normally located within the lead and in the path of the cam-engaging portions of the plungers and operative to effect the quick outward movement of the successive plungers, and a box-receiving element to which the boxes are transferred by the outwardly-moving plungers.

6. The combination with a box delivery element having receptacles for boxes, means for actuating said element, means for temporarily retaining the boxes in the receptacles, and means, including plungers, for successively ejecting the boxes from said receptacles, of a trough situated adjacent the delivery path of the said receptacles and adapted to receive the successively ejected boxes, and lateral resilient members arranged at and depending below the receiving end of the trough so as to embrace and frictionally hold each succeeding box as it approaches the trough.

7. The combination with a box delivery

element having receptacles for boxes, means for actuating said element, means for temporarily retaining the boxes in the receptacles, and means, including plungers, for successively ejecting the boxes from said receptacles, of a trough situated adjacent the delivery path of the said receptacles and adapted to receive the successively ejected boxes, and flaring resilient members arranged laterally of and depending below the receiving end of the trough so as to embrace and hold each succeeding box as it approaches the trough and also to serve as a back stop for the box when it is entered in the trough.

8. The combination with a box delivery element having receptacles for boxes, means for actuating said element, means for temporarily retaining the boxes in the receptacles, and means, including plungers, for successively ejecting the boxes from said receptacles, of a trough situated adjacent the delivery path of the receptacles and adapted to receive the successively ejected boxes, lateral resilient members arranged at and

depending below the receiving end of the trough so as to embrace and frictionally hold each succeeding box as it approaches the trough, and stop bars supported by said members so as to overhang the receiving end of the trough.

9. The combination with a box delivery wheel having peripheral receptacles for boxes, means for rotating said wheel, a guard member for temporarily retaining the boxes in the receptacles, radial plungers carried by said wheel, and a resilient member for rapidly moving each succeeding plunger outward to eject the opposing box from its receptacle, of a trough arranged to receive the successively ejected boxes, and lateral resilient members arranged at and depending below the receiving end of the trough so as to embrace and frictionally hold each succeeding box as it approaches the trough.

Signed at Barberton, in the county of Summit and State of Ohio, this 19 day of April A. D. 1926.

CHARLES F. WRIGHT.