Dec. 18, 1928. 1,695,982

H. E. RUCKERT

MECHANISM FOR COUNTING AND STACKING ARTICLES

Original Filed July 18. 1924 5 Sheets-Sheet 1

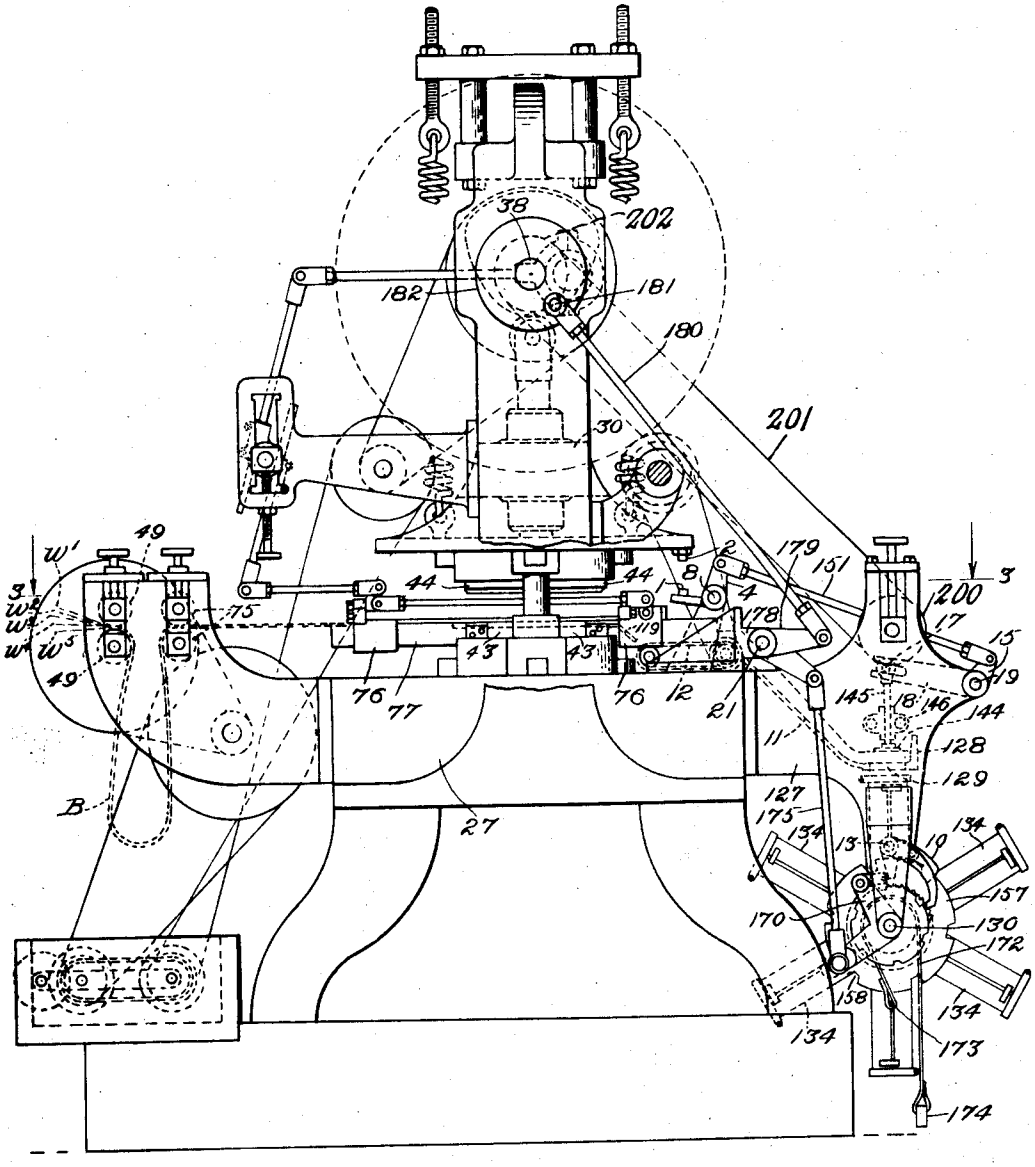


Fig-1-

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MECHANISM FOR COUNTING AND STACKING ARTICLES

Original Filed July 18, 1924 5 Sheets-Sheet 2

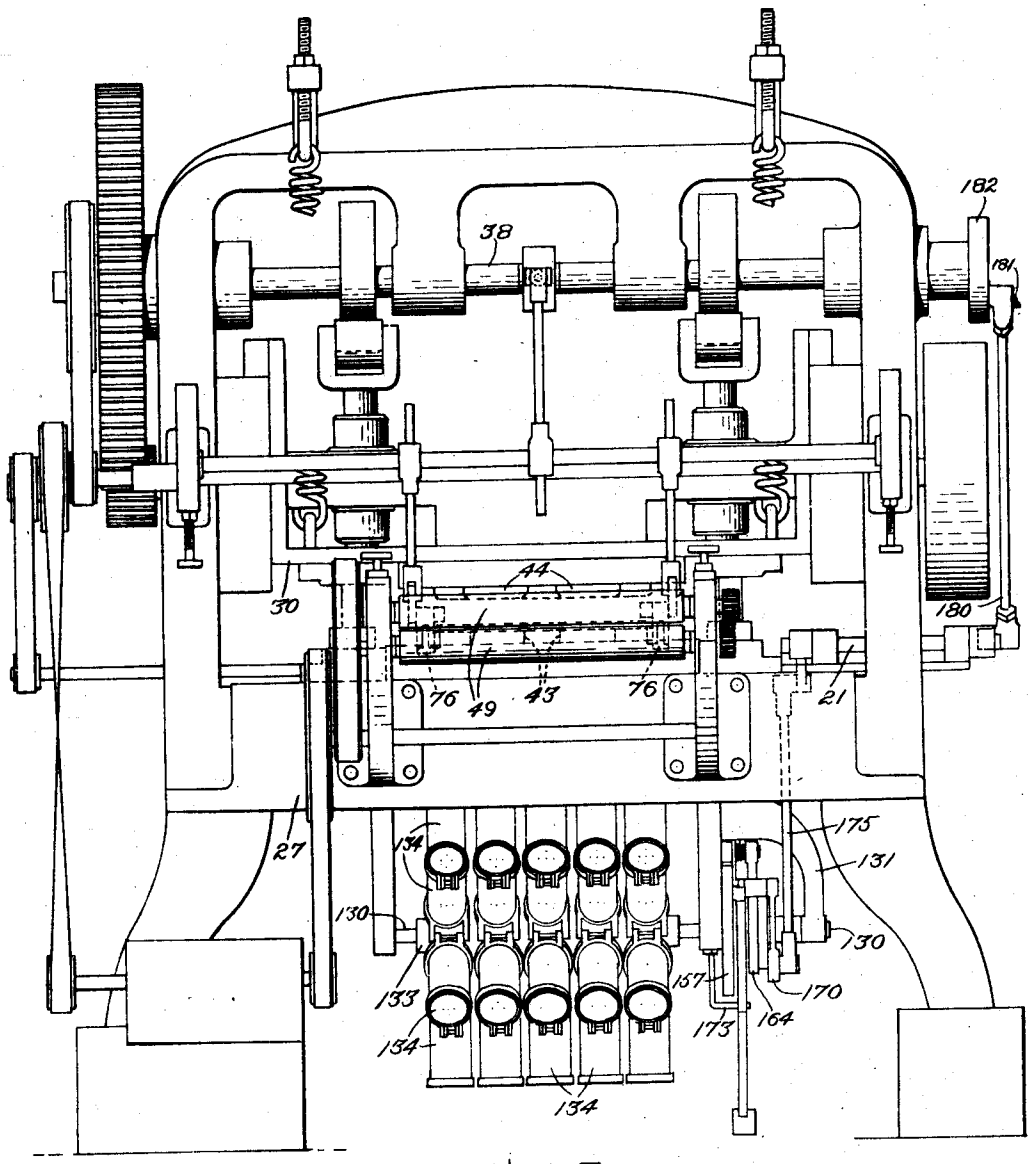


Fig. 2.

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MECHANISM FOR COUNTING AND STACKING ARTICLES

Original Filed July 18, 1924 5 Sheets-Sheet 3

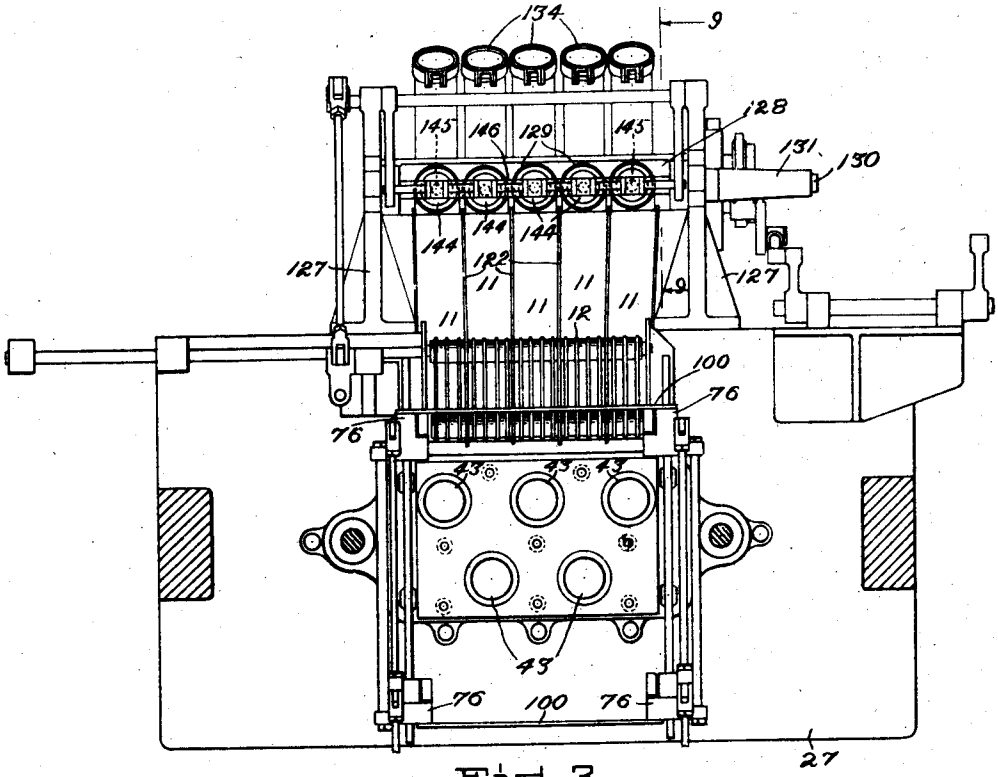


Fig-3-

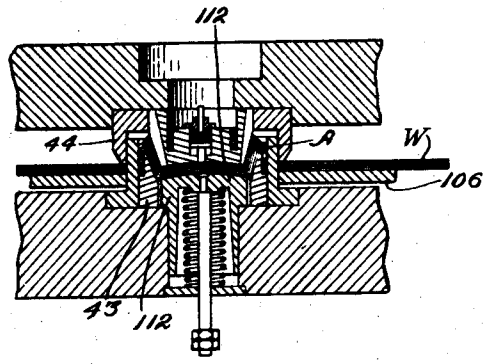


Fig-4-

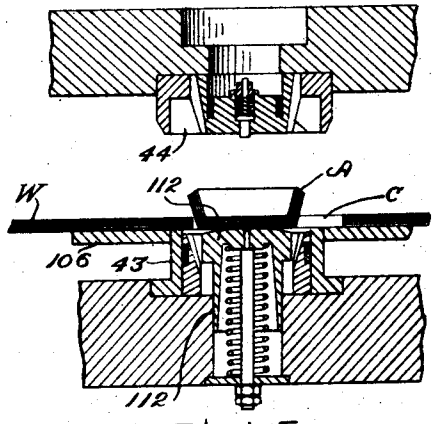


Fig-5-

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MECHANISM FOR COUNTING AND STACKING ARTICLES

Original Filed July 18. 1924 5 Sheets-Sheet 4

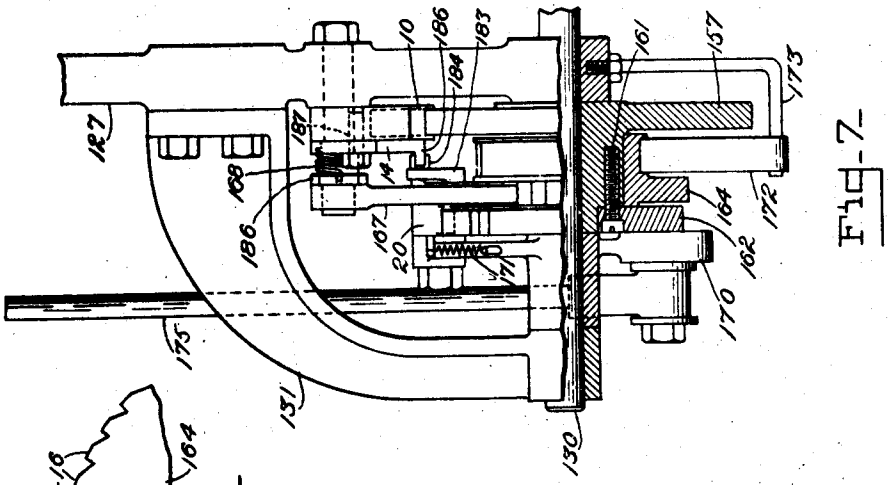


Fig-7

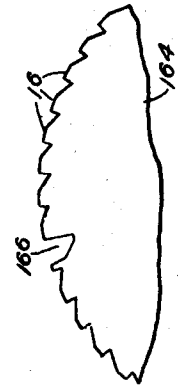


Fig-8

Fig-6

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MECHANISM FOR COUNTING AND STACKING ARTICLES

Original Filed July 18, 1924 5 Sheets-Sheet 5

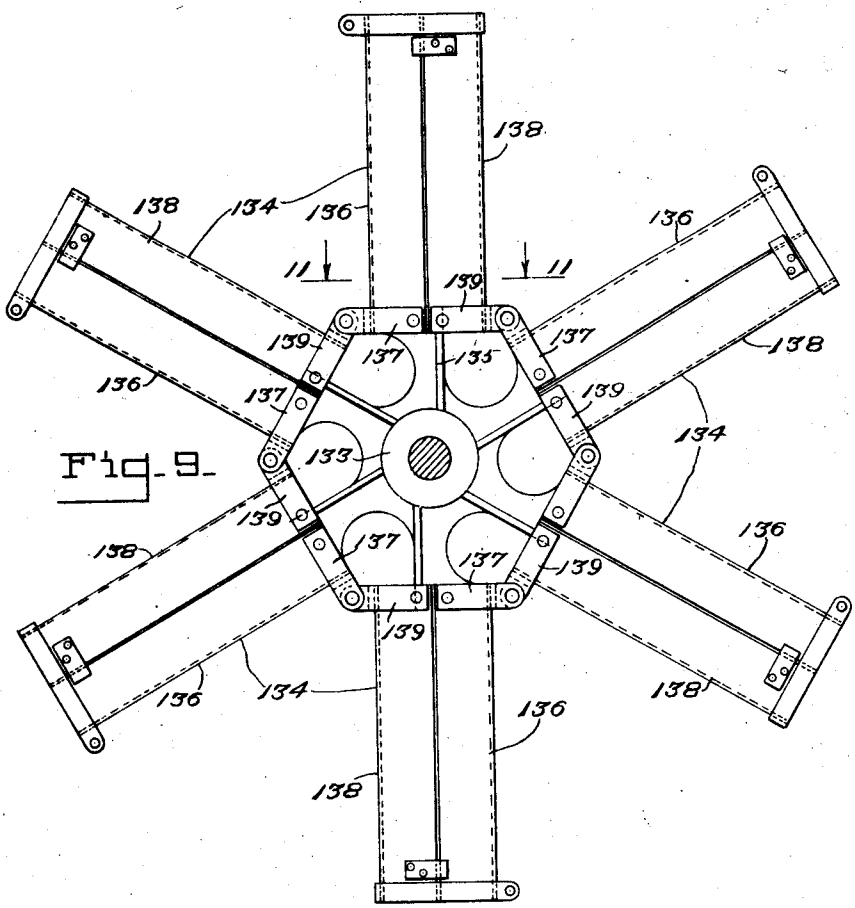


Fig. 9.

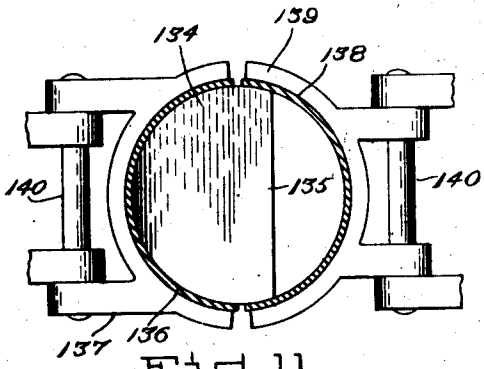


Fig. 11.

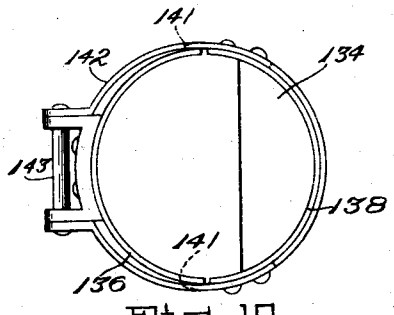


Fig. 10.

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Patented Dec. 18, 1928. 1,695,982

UNITED STATES PATENT OFFICE.

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MECHANISM FOR COUNTING AND STACKING ARTICLES.

Original application filed July 18, 1924, Serial No. 726,863. Divided and this application filed March 30, 1927. Serial No. 179,670.

This invention relates especially, although not exclusively, to mechanism, cooperating with a machine for manufacturing plates, dishes, and the like from paper, fibre and similar stock, for delivering, counting and stacking the articles, and is a division of my copending application Serial No. 726,863, filed July 18, 1924.

The invention has for its general objects to provide means for delivering said articles in nested relation in stacks of a predetermined number each, the operations being carried on automatically and reducing to a minimum the necessary manual labor and personal supervision, and consequently the cost of production.

The more particular objects of the invention will be best understood from the following description of one form of mechanism by which the invention may be carried into effect, as illustrated in the accompanying drawings. It will be understood, however, that the particular constructions and operations described and shown have been chosen for illustrative purposes merely, and that the invention, as defined by the claims hereunto appended may be otherwise practised without departure from its spirit and scope.

In the drawings:

Fig. 1 is a side elevation partly broken away.

Fig. 2 is a front elevation of a machine for forming articles from sheet material embodying the mechanism of the invention.

Fig. 3 is a horizontal section partly broken away taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal vertical section of one pair of cooperating dies, illustrating the forming operation.

Fig. 5 is a view similar to Fig. 4, showing the dies separated, and illustrating the removal of the completed articles by the travel of the web.

Fig. 6 is a side elevation of the nesting and counting mechanism.

Fig. 7 is a rear elevation, partly in section on the line 7—7, Fig. 6, of the mechanism shown in the latter figure.

Fig. 8 is a fragmentary detail view of a portion of the ratchet controlling the shifting of the nesting containers.

Fig. 9 is a side elevation of the nesting devices as viewed from the line 9—9 of Fig. 3.

Fig. 10 is an end view of one of the containers.

Fig. 11 is a section taken substantially on the line 11—11 of Fig. 9.

In my co-pending application Serial No. 726,863, filed July 18, 1924, a machine is described for forming articles from sheet material which are delivered to a counting and stacking mechanism forming the subject matter of the present invention. In that machine the several webs, W^1, W^2, W^3, W^4 and W^5 of sheet material from which the articles are to be formed are continuously drawn from the reels (not shown) by the feed rollers 49, and the composite web W formed by the superposed individual webs passes through the idle rollers 75 between which and the feed rollers 49 a slack portion B of said web depends. The web W is then intermittently fed between the dies 43 and 44 by the feed slides 76, the material advanced at each operation of said feed slides being drawn through the rollers 75 from the slack B which is kept substantially constant by the continuous operation of the rollers 49. Between successive movements of the web by the feed slide 76, the ram 30 decends with the upper dies 44, causing blanks to be punched from the web and formed into articles A, the number of articles formed at each operation by each pair of dies corresponding to the number of superposed individual webs making up the web W. When the upper dies descend, the web W, stripper plate 106, and guides 77 for the feed slide 76 are depressed, as indicated in Fig. 4, said parts being, however, lifted substantially to the top of the lower dies 43 when the ram ascends, as indicated in Fig. 5, and the formed articles A being lifted by the plungers 112 to the level of the upper surface of the stripper plate 106 upon which the web W is guided. When, therefore, the web W is again advanced, the articles A, which still remain in the openings C in the web from

which the blanks were punched, are carried forward with the web to the rear edge of the stripper plate where they fall from the holes C upon the chute 119. The scrap portion of the web W passes rearwardly through the slot (not shown) in the rear guide plate 100 and, in order to prevent the same from interfering with the nesting and counting mechanism, which forms the subject matter of the present invention, may be passed over a roller 200 (Fig. 1) journaled in the brackets 127 and rotated by a belt 201 from a pulley 202 on the main shaft 38. The articles A slide down the chute 119 onto the conveyor 12 in their respective compartments formed by the partitions 122, from which they are discharged by the several compartments of the chute 11 through the corresponding openings 129 in the bridge 128 into suitable containers.

As will be apparent from the foregoing, the formed articles A are delivered into the openings 129 of the bridge 128 in nested groups each of a number corresponding to the number of superposed webs from which they are formed, the number of groups so delivered to each of the openings 129 being the same and equal to the number of cycles of operations of the machine. In accordance with the present invention the groups of nested articles so delivered are in turn nested with one another and are automatically divided or segregated into nested stacks of a predetermined number each by mechanism which will now be described.

Journalled in the brackets 127 is a transverse horizontal shaft 130 one end of which is extended beyond the corresponding bracket 127 and further supported by a second bracket 131 (Figs. 2 to 7) secured thereto. Mounted on the shaft 130 between the brackets 127 is a carrier 133 (Figs. 2 and 9) for a plurality of sets of containers 134. The number of containers in each set is equal to the number of dies, and consequently to the number of groups of articles formed at each cycle of operations of the machine, and the several groups of containers are disposed radially in a substantially vertical plane about the shaft 130 and are arranged to be brought successively under the openings 129 in the bridge 128, so as to receive the articles therefrom, the shaft 130 being automatically and periodically rotated for this purpose by mechanism hereinafter described when the several containers of each set have received a predetermined number of articles.

Each container 134 is of a cross section corresponding substantially to the outline of the articles formed by the machine. The dies, as herein shown, are designed to form dishes of circular outline, and the containers 134 are each shown as of a corresponding cylindrical form with open ends directed outwardly or away from the shaft 130. Each of said containers is split longitudinally into two sections, one of which, designated by the numeral 136 in Figs. 9 to 11, is bolted or otherwise fixed, together with a U-shaped hinge member 137, to the end of one of a series of radial arms 135 on the carrier 133, the end of said arm forming the bottom of the container. The other section 138 of each container has bolted or otherwise secured thereto, a U-shaped hinge member 139, the hinge members 137 and 139 of the corresponding containers of contiguous sets having overlapping lugs connected by a hinge pin 140, whereby the movable section of each container is hinged to the fixed section of the contiguous container. The hinged section 138 of each container is provided with projecting lugs 141, whereby it is guided into alinement with the corresponding fixed section 136 to close the container, which is held in closed position by a bail 142 hinged at 143 to the fixed section and surrounding the movable section. By releasing the bail 142 of any container, said container may be opened by swinging aside its hinged section 138, and the stack of nested articles removed therefrom.

The articles are packed or nested in the several containers by means of a set of reciprocating plungers 144 (Figs. 1, 3 and 6) which operate through the openings 129 in the bridge 128 and are carried by stems 145 guided in a transverse bar 146 (Figs. 1 and 3) supported at its ends by the brackets 127. The stems 145 are connected to a transverse rod 17 which is engaged at its ends by the bifurcated ends of a pair of arms 18 on a rock shaft 19 journalled at its ends in the brackets 127. The rock shaft 19 is provided at its end with a third arm 15 connected by a rod 151 with one arm of a bell crank 4 pivoted at 8 to a bracket 9 on the bed 27. The other arm of the bell crank 4 is provided with an abutment stud 1 which is engaged by a cooperating abutment stud 2 on the ram 30 at each stroke of the latter, thereby depressing the plungers 144 to pack the articles in the containers 134. The stroke of the plungers 144 is constant, being sufficient to pack and compress to the desired extent the articles in the containers when the latter have received a predetermined number of said articles.

The mechanism for rotating the shaft 130 and carrier 133, to bring a second set of containers 134 into operative position under the bridge 128 when the containers of a first set have received the desired number of articles, is illustrated in Figs. 6, 7 and 8. Keyed to the shaft 130 between the bracket 131 and the adjacent bracket 127 is the hub of a locking disk 157 having in its periphery a series of notches 158 corresponding in number and angular position to the sets of containers and

each adapted to receive the end of a locking pawl 10 pivoted on a stud 13 projecting from the bracket 127, said pawl acting normally to hold the shaft 130 and carrier 133 against rotation. The pawl 10 is held in locking position by a spring 168 surrounding the stud 13, one end of said spring being secured to a collar 186 on said stud, and the other being secured to a bell crank 14 pivoted on said stud and one arm of which is rigidly connected with said pawl by a screw bolt 187. Secured, as by screw bolts 161, to the hub of the locking disk 157 is an operating disk 162 also formed in its periphery with a series of notches 163 corresponding in number and arrangement to the sets of containers. Rotatably mounted on the hub of the locking disk 157 is a controlling disk 164 in the form of a ratchet having on its edge a series of teeth 16 formed by relatively shallow notches (Fig. 8) and one or more relatively deep notches 166. The ratchet 164 is held against retrograde movement by a holding pawl 167 pivoted to the stud 13 and is periodically advanced, at each cycle of operations of the machine, by an operating pawl 20 on a swinging pawl carrier 170 pivotally mounted on the shaft 130, said pawl being held in engagement with the ratchet by a spring 171 connecting the same with said pawl carrier. The ratchet 164 is held against overrunning under the influence of the pawl 20 by a brake band 172 secured at one end to an angular arm 173 projecting from the bracket 127, said brake band passing about the hub of the ratchet 164 and carrying at its opposite end a suitable weight 174. The pawl carrier 170 comprises a bell crank fulcrumed on the shaft 130, the pawl 20 being carried by one arm of said bell crank, the other arm of which is adjustably connected to one end of a rod 175 connected at its opposite end to an arm 176 on a rock shaft 21 journalled in a bracket 178 on the bed 27, said rock shaft having a second arm 179 connected by a rod 180 with a crank pin 181 projecting from a crank disk 182 on the main shaft 38.

At each cycle of operations of the machine, the pawl carrier 170 is oscillated through an angular distance corresponding substantially to the angular spacing of the sets of containers 134, and by engagement with the teeth 16 of the controlling ratchet 164 operates to advance the latter through a corresponding angular distance. The spacing of the teeth 16 is so proportioned to the angular movement of the pawl carrier that the pawl 20 is brought into engagement with the deep notch 166 only once in a predetermined number of operations. When said pawl is engaged with the shallow notches forming the teeth 16 it is held out of engagement with the operating disk 162, but when said pawl is engaged with the deep notch 166 it is permitted also to engage one of the notches 163 in said disk 162 so as to turn the latter and with it the shaft 130 and carrier 133, bringing into operative position another set of containers 134. The pawl 20 is provided with an arm 183 having a lug 184 which cooperates with a lug 186 on the free arm of the bell crank 14. When the pawl 20 is engaged with the shallow notches of the ratchet 164 the lug 186 is out of the path of movement of the lug 184 which moves idly thereover. When, however, said pawl is engaged with the deep notch 166, and with a notch 163 in the operating disk 162, the lug 184 is brought into a position to engage the lug 186, so that upon oscillation of the pawl carrier 170 the locking pawl 10 is lifted, thereby disengaging the locking disk 157 and unlocking the carrier. The notches 163 in the operating disk 162 are of a sufficient width to permit a small amount of lost motion between said disk and the pawl 20, as indicated at 188 in Fig. 6, so that said pawl is given an opportunity to disengage the locking pawl 10 from the locking disk 157 before moving the operating disk 162.

The articles A slide down the chute 119 onto the conveyor 12 in their respective compartments formed by the partitions 122, from which they are discharged by the several compartments of the chute 11 through the corresponding openings 129 in the bridge 128 into the respective containers 134 of the set then in operative position beneath said bridge, being packed into said containers in nested relation by the plungers 144. At each operation of the machine, the ratchet 164 is advanced by the pawl 20, and after a predetermined number of operations said pawl enters the notch 166 which permits the same to engage one of the notches 163 in the disk 162. The next operation of said pawl, therefore, causes the same to release the locking pawl 10 and turn the shaft 130 and carrier 133 through a sufficient arc to remove the set of filled carriers 134 from beneath the bridge 128 and bring the next succeeding set into position beneath said bridge. The bails 142 of the filled containers are then released, the hinged sections 138 of said containers swung aside, the stack of nested articles removed, and the containers closed.

The counting and stacking mechanism of the invention is shown herein for the purpose of illustration as used in conjunction with a machine for forming and delivering articles which is provided with five sets of cooperating forming dies, each operating upon five superposed webs of material so as to produce twenty-five articles at each cycle of operation of the machine. The nesting and counting mechanism includes five sets of containers, each set having six containers, the several sets being moved successively into operative position after each

fifty operations of the machine, so that at each movement of the container carrier twelve hundred and fifty articles will be delivered in five nested stacks of two hundred and fifty each.

What I claim is:

1. In a machine of the character described, the combination with mechanism for delivering articles, of a plurality of containers each having a cross-section corresponding to the outline of the articles to be stacked, automatic means for moving said containers successively into position to receive said articles as they are delivered, and means for packing said articles in said containers.

2. In a machine of the character described, the combination with mechanism for delivering articles, of a plurality of containers each having a cross-section corresponding to the outline of the articles to be stacked and an open end, a reciprocating plunger operating through the open ends of said containers to pack said articles therein, a rotary carrier for said containers, and means for periodically rotating said carrier to bring said containers successively into position to receive said articles as they are delivered and into alinement with said plunger.

3. In a machine of the character described, the combination with mechanism for delivering articles, of a plurality of containers each having a cross-section corresponding to the outline of the articles to be stacked and an open end, a rotary carrier on which said containers are radially disposed in a substantially vertical plane with their open ends directed outwardly, and means for periodically rotating said carrier to bring said containers successively into position to receive said articles as they are delivered.

4. The combination with mechanism for delivering a succession of articles, of a plurality of containers for receiving said articles, a carrier for said containers, a pawl for moving said carrier to bring said containers successively into operative position, means operated by said first-named mechanism at each cycle of operations thereof for actuating said pawl, and a ratchet advanced by said pawl at each operation thereof, said ratchet normally holding said pawl out of operative engagement with said carrier but having provision for permitting said engagement when moved into a predetermined position.

5. The combination with mechanism for delivering a succession of articles, of a plurality of containers for receiving said articles, a carrier for said containers, a pawl for moving said carrier to bring said containers successively into operative position, means operated by said first-named mechanism at each cycle of operations thereof for actuating said pawl, and a ratchet advanced by said pawl at each operation thereof, said ratchet having deep and shallow notches engaged by said pawl and being adapted to hold the same out of operative engagement with said carrier when said pawl is in engagement with said shallow notches but to permit said operative engagement when said pawl enters said deep notches.

6. The combination with mechanism for delivering a succession of articles, of a plurality of containers for receiving said articles, a carrier for said containers movable to bring the same successively into operative position, actuating means for said carrier operated by said first-named mechanism at each cycle of operations thereof, means for controlling the operative connection of said actuating means with said carrier, said controlling means being operated by said actuating means at each operation of the latter and being adapted, after a predetermined number of operations, to permit the operative connection of said actuating means with said carrier, and locking means for said carrier released by said actuating means when operatively connected with said carrier.

7. The combination with mechanism for delivering a succession of articles, of a plurality of containers for receiving said articles, a carrier for said containers movable to bring the same successively into operative position, actuating means for said carrier operated by said first-named mechanism at each cycle of operation thereof, controlling means for normally holding said actuating means out of operative engagement with said carrier, said controlling means being progressively moved by said actuating means toward a position to permit such operative engagement, and a pawl for normally locking said carrier, said pawl being normally out of the path of movement of said actuating means but being engaged and released thereby when said actuating means is moved into operative engagement with said carrier.

8. A machine of the character described having mechanism for delivering articles, a container for receiving said articles in nested relation, said container being split longitudinally into two relatively hinged sections separable to remove the stack of nested articles.

9. A machine of the character described having mechanism for delivering articles, a plurality of containers each adapted to receive a plurality of articles in nested relation, each of said containers being split longitudinally into two relatively hinged sections separable to remove the stack of nested articles, and automatic means for moving said containers successively into position to receive articles from said delivering mechanism.

10. A machine of the character described having mechanism for delivering articles,

a series of containers movable successively into position to receive said articles in nested relation, each container being split longitudinally and comprising a fixed section and a movable section hinged to the fixed section of the contiguous container.

11. A machine of the character described having mechanism for delivering articles, a container for receiving said articles in nested relation, said container being split longitudinally into two relatively hinged sections separable to remove the stack of nested articles, and one of said sections having hinged thereto a locking bail adapted to surround the other of said sections to hold the container closed.

12. A machine of the character described having mechanism for delivering articles, a series of containers each adapted to receive said articles in nested relation, each container being split longitudinally and comprising a fixed section and a movable section hinged to the fixed section of the contiguous container, one of said sections having hinged thereto a locking bail adapted to surround the other of said sections to hold the container closed, and automatic means for moving the said containers successively into position to receive the articles from said delivering mechanism.

13. In a machine of the character described, the combination with a plurality of delivering devices, of a plurality of sets of containers each equal in number to the delivering devices, a bridge having openings to receive the articles from the several delivering devices, reciprocating plungers operating through said openings to pack said articles in said containers, and automatic means for moving said sets of containers successively under said bridge.

In testimony whereof I affix my signature.

HARRY E. RUCKERT.