March 4, 1924. 1,485,598

F. C. CROXFORD

PACKING AND WRAPPING UP ARTICLES FOR TRANSIT AND STORAGE

Filed Feb. 8, 1921 3 Sheets-Sheet 1

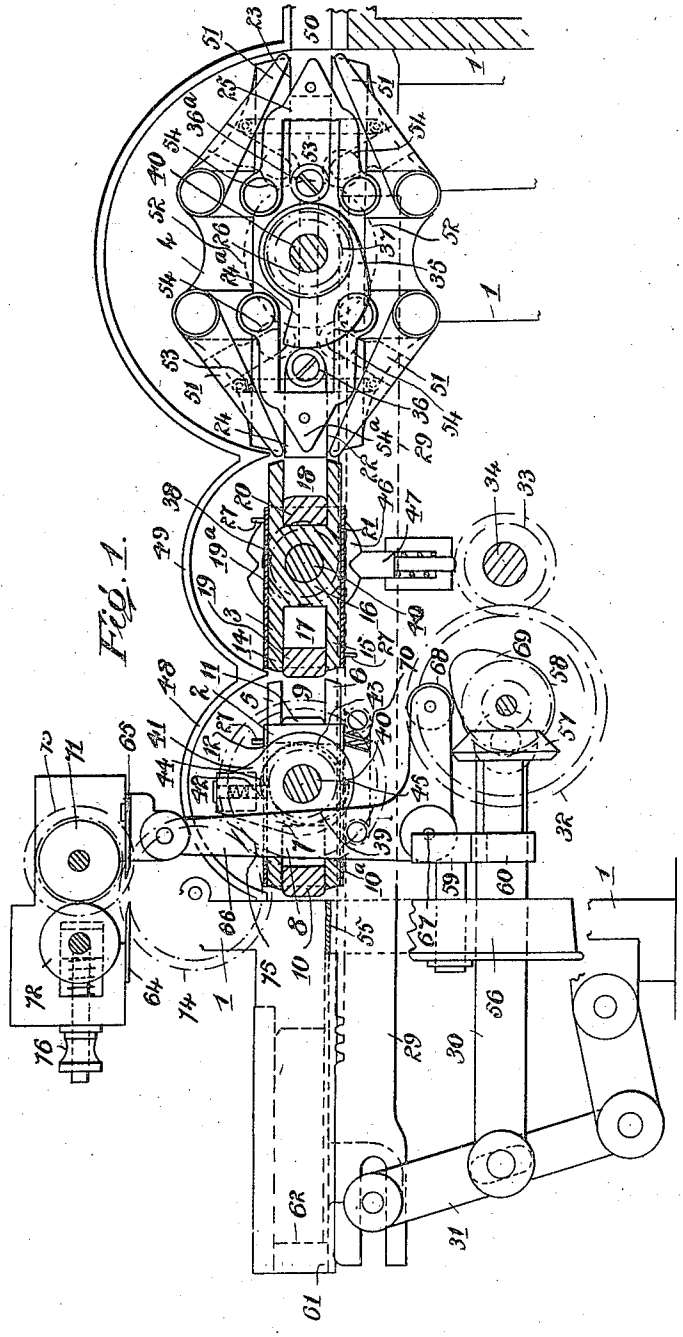


Fig. 1.

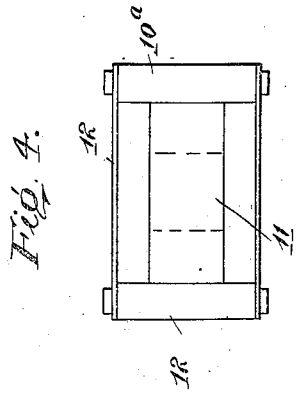


Fig. 4.

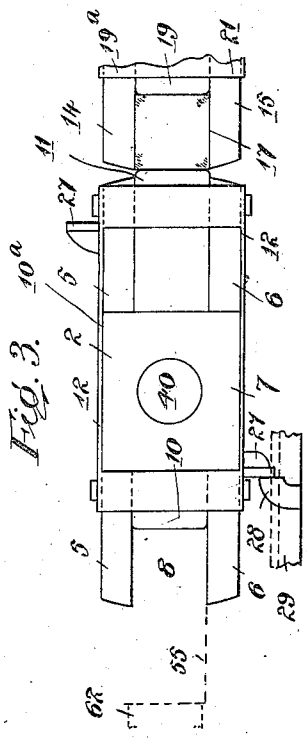


Fig. 3.

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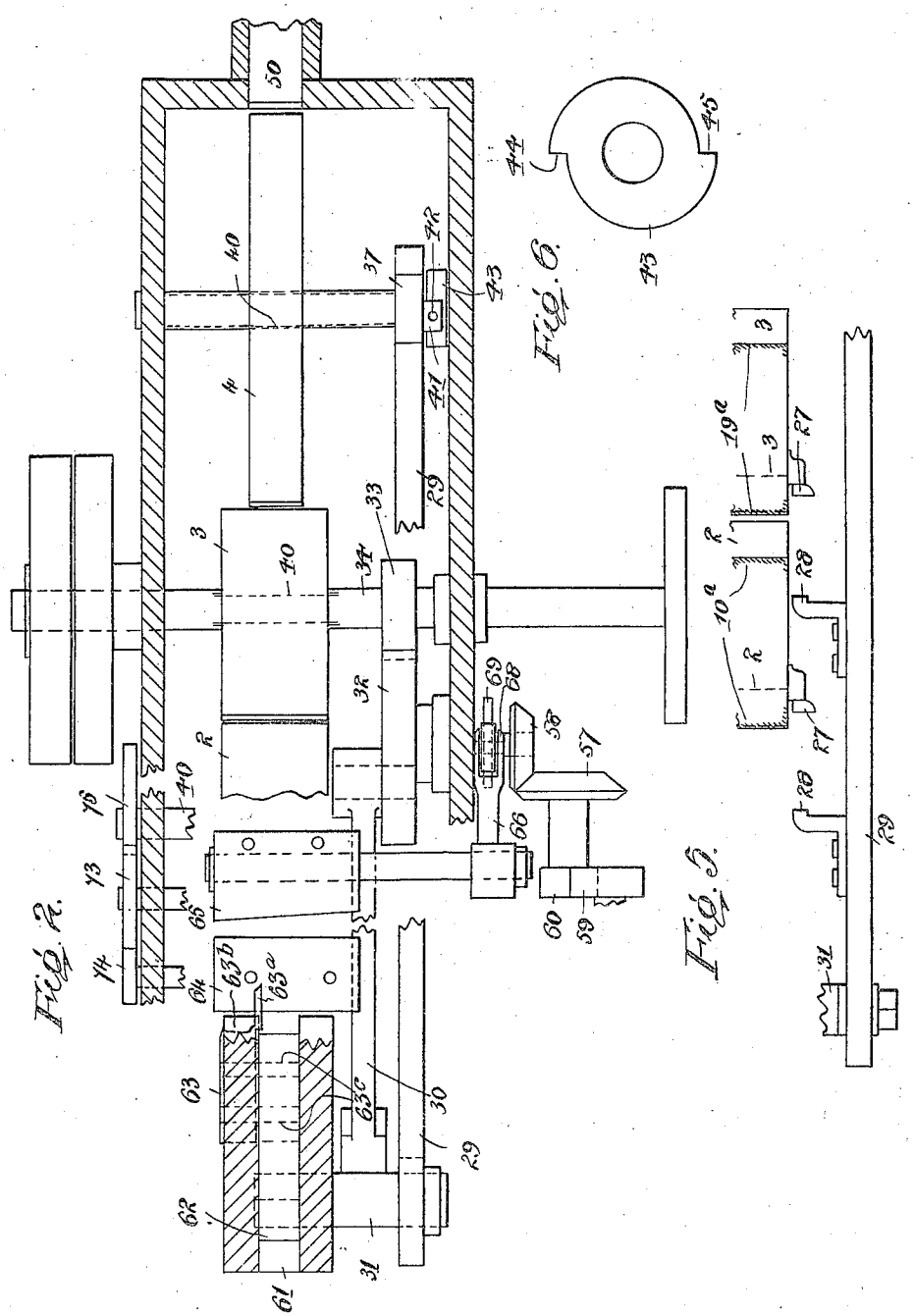


Fig. 2.

Fig. 6.

Fig. 5.

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PACKING AND WRAPPING UP ARTICLES FOR TRANSIT AND STORAGE

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Fig. 7.

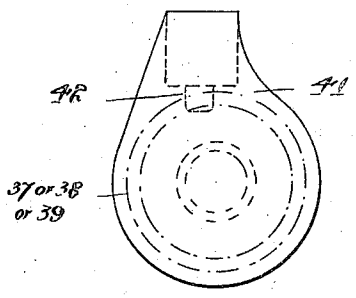


Fig. 8.

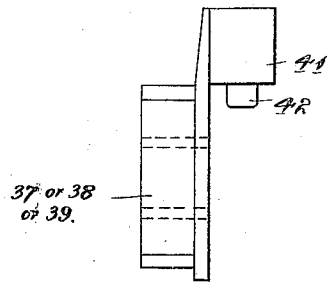


Fig. 9.

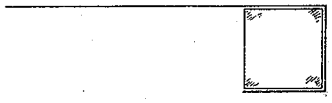


Fig. 10.

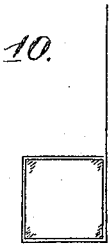


Fig. 11.

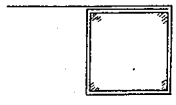


Fig. 12.

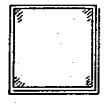
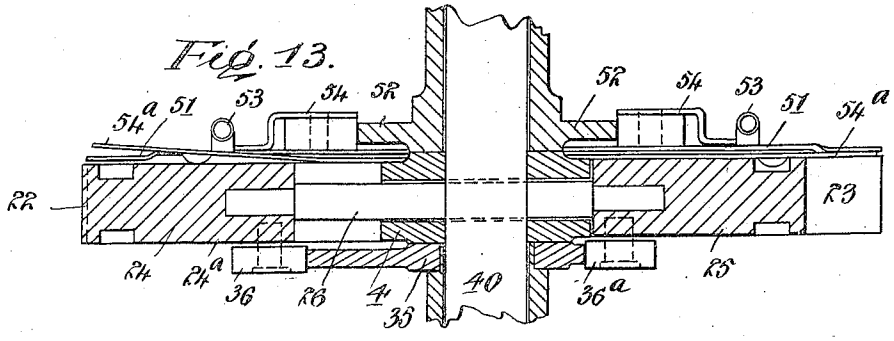


Fig. 13.



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Patented Mar. 4, 1924. 1,485,598

UNITED STATES PATENT OFFICE.

FREDERICK CHARLES CROXFORD, OF LONDON, ENGLAND.

PACKING AND WRAPPING UP ARTICLES FOR TRANSIT AND STORAGE.

Application filed February 8, 1921. Serial No. 443,455.

To all whom it may concern:

Be it known that I, FREDERICK CHARLES CROXFORD, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in and Relating to Packing and Wrapping Up Articles for Transit and Storage, of which the following is a specification.

The present invention relates to improvements in and relating to packing and wrapping up articles for transit and storage, and being particularly applicable to wrapping up articles to form square angled packets it will be hereinafter described in that application.

The invention is directed to that type of machine having intermittently rotated drums or holders provided with diametrically disposed article receiving slots or pockets and reciprocated elements, or plungers forming the bases of the diametrically opposed pockets, means being provided for actuating positively these plungers or reciprocated elements, so that when one plunger is advanced to eject an article at one end of the drum or holder, the plunger of the other end is receded to admit an article. There may be provided means for automatically feeding the articles and also automatic means for feeding the wrapper and cutting this from the web.

In a machine of this kind for packing and wrapping up articles it is desirable that the article and its wrapper shall not be damaged or distorted while passing through the machine. Further in cases where a series of stepwise rotatable holders are comprised in a machine, it is desirable, in order to secure an efficient working of the machine, that the holders are correctly aligned at the end of each stage in the step by step rotation.

Under the present invention there is provided a machine in which the driving means for operating the plungers is in operative timing with the angular displacement of the holders, the plunger driving means being positively connected to the driving means for imparting the angular displacement of the holders. As hereinafter described there is provided a machine in which the rotatable holder, or series of holders, and the plunger or reciprocating elements are dependent for operation on a rack, movement of which rack in one direction operates a plunger in the holder for ejection of the article and its wrapper therefrom and the return movement of the rack imparts an angular displacement to the rotatable holder or holders for setting or positioning the holder or holders for the next ejection stroke.

Thus a machine according to the present invention is eminently suited for its work and is notably free of complicated working parts, hence defects due to slackness and wear of the working parts are considerably reduced.

As a machine unit there may be incorporated means for delivering the articles to the line of feed, in strip or other form, means for severing the unit article from a strip, means for feeding the articles into the machine, means for feeding the wrappers to position, means for cutting the wrappers from a roll web, and means for feeding the paper from a roll web.

Mechanically controlled end flap folding devices may also be provided on a put-out holder for automatically folding in the ends of a wrapper as hereinafter referred to.

Means are preferably provided especially when a series of holders are arranged in tandem whereby each holder is independently registered or positioned in correct alignment.

In the accompanying drawings is shewn by way of example a form of machine for carrying the present invention into practical effect, the machine hereinafter described having been found by actual trial to work efficiently.

Fig. 1 is a diagrammatic sectional side view of the entire machine, shewing the relationship of the principal parts thereof, but with a portion of the framework and various detail parts and fittings removed for clearness of illustration. Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a side view of one of the holders and Fig. 4 an end view thereof.

Fig. 5 is a side view of the rack.

Fig. 6 is a side view of the ratchet wheel for imparting the angular movement to the holders.

Figs. 7 and 8 are side and end views respectively of the pinion wheel and allied parts for operating the ratchet wheel.

Figs. 9, 10, 11 and 12 are diagrammatic views hereinafter referred to.

Fig. 13 is a sectional plan view of the put-out holder.

Referring to the drawings the form of machine illustrated is an example of a three

pass machine constructed under the present invention giving a five lateral fold wrap.

In a suitable frame or support 1 is rotatably mounted with their axes parallel a tandem series of three holders 2, 3 and 4 hereinafter referred to as the take-in, medial, and put-out holders respectively.

The take-in holder 2 comprises a top plate 5 and bottom plate 6 and a medial connecting portion 7, the overhanging portions of the plates 5 and 6 thus forming open-sided slots or jaws 8 and 9, one on each side of the medial portion 7 and diametrically set the one to the other.

In the holder works a duplex or double-acting ejector 10^a comprising a pair of sliders or plungers 10 and 11 connected to a sliding frame 12 the slider 10 working in the slot 8 and the slider 11 working in the slot 9, the ejector being so arranged that when, for example, the plunger 10 is advanced to eject an article at one end of the holder 2, the plunger 11 is receded at the other end of the holder to admit an article.

The medial holder 3 also comprises a top plate 14 and bottom plate 15 and a medial connecting portion 16, thus providing open sided slots or jaws 17 and 18. Working in the slots 17 and 18 is a double-acting ejector 19^a comprising a pair of slides or plungers 19 and 20 connected to a sliding frame 21, the ejector being arranged to function in like manner to the ejector in the take-in holder 2, and working in operative timing therewith.

The put-out holder 4 has a single pair of diametrical open-sided slots or jaws 22 and 23. Working in these slots is a duplex or double-acting ejector or slider 24^a comprising plungers 24 and 25 with a connecting rod 26 therebetween, the ejector being so arranged as to advance and eject an article at one end as it recedes at the other end to admit an article.

All three holders are so operatively connected or inter-related by appropriate mechanism that a 180° angular displacement of the take-in holder 2 is accompanied by a simultaneous angular displacement of 180° of the medial and put out holders, the three holders being so set and if desired combined with positioning pins or equivalent, that in each and every rest position a triad of ejectors and their corresponding slots or jaws form a tandem series allowing a multiple forward feed in a straight line through the machine.

Any appropriate connexion of the ends of a duplex or double-acting slider may be adopted and the connexion may be arranged within or without the holder according as the general design of the machine may give the preference.

In the particular arrangement shewn for imparting movement to the ejectors 10^a and 19^a, there is provided on the top and bottom plates thereof stops 27 with which engage projections 28 (Fig. 5) on a rack 29. This rack 29 is operatively connected by crank and pivoted link mechanism 30 and 31 to a gear wheel 32 meshing with a second gear wheel 33 on the main driving shaft 34 of the machine. By the movement of the crank and pivoted link mechanism the rack is moved back and forth.

From Fig. 1 it will be seen that the plungers at the left hand of the holders 2, 3 and 4 are at the outer ends of the slots or jaws. Now upon movement of the main driving shaft 34 the rack 29 is moved in a direction towards the put-out holder 4. At a predetermined point in this movement the projections 28 on the rack 29 (see Fig. 5) engage the appropriate stops 27 on the ejectors 10^a and 19^a and movement is thus imparted to the ejectors 10^a and 19^a, the plungers thereof moving in their respective slots or jaws so as to advance and eject an article at the right hand side, and recede at the left hand side to admit an article.

Movement is imparted to the ejector or slider 24^a by means of a cam disc 35 co-operating with abutments 36 and 36^a on the ejector or slider 24^a. The cam disc 35 is on a sleeve bearing a pinion wheel 37 engaging the rack 29 so that upon movement of the rack 29 the cam disc is given a partial rotatory movement of 180° and acting on the abutment 36^a moves the ejector or slide 24^a to the right hand of Fig. 1 thus allowing an article to be received at the left hand side and eject an article at the right hand side.

At the return movement of the rack 29 the projections 28 are withdrawn from the stops 27, and upon the next advance of the rack 29, engage the stops 27 which were out of action during the first advance of the rack, the three holders having been moved through 180° during the retraction of the rack as hereinafter explained.

During this return movement of the rack 29 the cam disc 35 is also returned to the full position shewn in Fig. 1.

The rack on its retraction or movement towards the left of Fig. 1 imparts a 180° angular displacement to the take-in holder 2, the medial holder 3 and the put-out holder 4. This is effected as follows:—

Each holder is mounted on a separate shaft 40 and loosely mounted on the shafts as by a sleeve are pinion wheels 37, 38 and 39 respectively, these wheels engaging the rack 29. Fixed to each pinion wheel is a holder 41 carrying a spring urged pawl 42. The pawl 42 engages a ratchet wheel 43 having two engaging faces 44 and 45. The wheel 43 is on the holder carrying shaft and in fixed connection therewith.

Upon advance of the rack 29 the pinion

wheels 37, 38 and 39 move anti-clockwise, the extent of movement being such that the pawl 42 engages the face 45. Now upon the return movement of the rack 29 the pawl 42 through the face 45 turns the ratchet wheel 43 and the holder through 180° in a clockwise direction.

A locking disc 46 and spring urged peg or stop 47 may be provided for retaining the holders against unintentional movement.

In operation and referring to Fig. 3 plungers having been positioned so as to allow the left hand slots or jaws capable of receiving an article, the article is pushed upon a wrapper into the first of the tandem series of slots. Wrapping of three faces is thereby effected by this first pass-in as indicated in Fig. 9. Angular displacements of the take-in holder and the medial and put-out holders through 180° now takes place. During the rotation of the take-in holder, the still unfolded portion of the wrapper is wiped by for example a cover plate 48 and at the end of the 180° movement the relationship of the article and the wrapper is as shewn in Fig. 10, in which four faces of the article is covered. The second pass-in to the registering slot of the medial holder 3 is now effected by the plunger mechanism, and this second pass-in covers the already folded end of the wrapper as illustrated in Fig. 11.

Upon angular movement of the medial holder 3 through 180° the remaining unfolded portion of the wrapper is wiped by a cover plate 49 and at the end of the 180° movement the article and the wrapper is as shewn in Fig. 12.

The third pass-in to the registering slot of the put-out holder 4 is now effected this third pass-in making a definite or sharply defined final fold and wrapping or covering a second time that face of the article which was the leading face when the first two folds were formed.

The put-out holder 4 comprises a single pair of diametrical open-sided slots or jaws 22 and 23 these jaws being formed by top and bottom plates and having a medial connecting portion or hub bored to receive the shaft 40. Working in the slots 22 and 23 are the plungers 24 and 25, the connecting rod 26 for which extends through the medial connecting portion of the holder 4 and also through the shaft 40.

The lateral folding being completed (see Fig. 12) by the feeding of the article and its wrapper into the put-out holder 4, this put-out holder may be fitted with mechanically controlled end flap folding devices of known character which as the put-out holder rotates through 180°, automatically fold in two flaps of each end of the wrapper from opposite points, leaving at each end a pair of opposite disposed last flaps or ears to be folded over against opposite faces of the article, which last folding may be done by pushing the wrapped articles upon these flaps into the grooved track 50 along which the articles are discharged from the machine as they arrive in succession to the end of the line of feed. In Figs. 1 and 13 are shewn folders 51 controlled by a cam disc 52 for effecting the end fold on the wrappers, the folders 51 being under the influence of springs 53. Cam rollers 54 on the folders 51 engage with the cam disc 52. The folders 51 are on the holder 4 and move therewith while the cam disc 52 is stationary.

As conducing to sharply defined folds and as tending to accommodate to irregularities in size and figuring of the articles themselves, the slots or jaws may be formed with spring sides so as to yieldingly embrace the article and its wrapper, an example of spring side 54^a being shewn applied to the holder 4.

Once the cycle of operations is started, further feeding of the articles into that which is the first slot or jaw in the tandem series at any rest period is accompanied by a simultaneous feed forward of all the other articles in the series from holder to holder. From the last holder, the end article of the series may be put out into a grooved track 50.

The articles may be manually delivered to the line of feed, and may be either automatically or manually fed in to the machine by a suitable plunger or slider mechanism.

In the machine illustrated the articles in strip or other form are automatically delivered up to the entry of the machine by a travelling band 55 passing at one end over a pulley 56 under drive by a gear 57, 58, 59 and 60.

In a guide-way 61 is placed a plunger or slider mechanism 62 for automatically feeding the articles into the machine. This plunger 62 is operated by a suitable extension of the crank and link mechanism 30. For a strip feed there is provided a knife holder 63 (Fig. 2) the cutting edge 63^a of which is in a plane slightly in advance of the adjacent wall of the slot so that the unit is cut to size. The knife 63 works in a slot 63^b and is linked to the plunger 62 by pins 63^c. On movement of the plunger 62 movement is also imparted to the knife 63 through the pins 63^c. As the knife holder 63 is in advance of the plunger 62 the unit is severed by the cutting edge 63^a from the strip before the plunger is operative on the unit.

The drive for the travelling band 55, and the back and forth movement of the plunger and knife is arranged in unison with the drive for the rack 29, so that the operations

of delivery, severing, and feed to the machine is in operative timing with the go and return strokes of the ejector plungers.

The wrappers may be manually or automatically fed to position. Means automatic or otherwise may be provided to sever the wrappers from a roll web.

In the arrangement shewn a roll web is fed to a pair of cutters 64 and 65, the cutter 64 being fixed and the cutter 65 movable. Movement is imparted to the cutter 65 by a bell crank lever 66 pivoted at 67 to a fixed part of the machine frame, and having at the end remote from the cutter 65 a roller 68. A cam disc 69, mounted on the spindle of the gear wheel 32 of the crank and link mechanism 30 for operating the rack, co-acts with the roller 68 to cause the cutter 65 at a predetermined time to approach the fixed cutter 64 and sever the unit wrapper from the roll web. A spring 70 assists in the return of the cutter 65 to normal position.

The operation of the cutters 64 and 65 is in timed relationship with the go and return strokes of the ejector plungers.

The feed of the roll web is controlled by a feed roller 71 and blanket roller 72, the feed roller 71 being rotated by a gear 73, 74, and 75, the gear 75 being fixed on the shaft of the holder 2 so that movement is imparted thereto when the holder receives the angular displacement. Suitable means 76 for adjusting the blanket roller to the feed roller is provided.

Thus in the machine described the means for the delivery of the strip, the means for cutting the unit articles therefrom, and the means for feeding into the machine of the unit articles, the means for delivery and severing of the wrappers and positioning thereof are so interrelated with the holders and the ejector mechanism as to be in operative timing with the go and return strokes of the plungers of the ejectors and the angular displacement of the holders.

The usual devices for ensuring an efficient working of the machine are embodied in the construction described.

The machine may be appropriately made fully automatic, or semi-automatic or manually controlled as desired.

Fig. 9 shews the wrapper and unit article after the first push-in into the holder 2, Fig. 10 after angular movement of the holder 2, Fig. 11 after the second push-in into the holder 3, and Fig. 12 after the angular movement of the holder 3 ready for the third push-in to the third or put-out holder and end folder 4.

What I claim is:—

1. A wrapping machine of the kind described comprising in combination a stepwise rotatable holder having related pairs of jaws, plunger means associated with said pairs of jaws, and a rack, the movement of which rack in one direction operates said plunger means for ejection, and the return movement of said rack imparts an angular displacement to said rotatable holder for positioning the holder for the next ejection stroke, substantially as described.

2. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws, comprising a series of stepwise rotatable holders mounted tandem fashion, related pairs of jaws in said holders, double-acting plungers associated with said pairs of jaws, a rack for operating said plungers, and means operated by said rack for imparting an angular displacement to the holders, the latter movement being in operative timing with the movement of the plungers.

3. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper into and out of pairs of jaws, comprising a series of stepwise rotatable holders mounted tandem fashion, related pairs of jaws in said holders, double-acting plungers associated with said pairs of jaws, a rack for operating said plungers, means operated by said rack for imparting an angular displacement to the holders the latter movement being in operative timing with the movement of the plunger, and a locking disc, and co-operating element, for the purposes described.

4. A wrapping machine of the kind referred to comprising a take-in holder, a medial holder and a put-out holder, double-acting sliders for the purposes described, means comprising a rack for operating the sliders and for imparting an angular displacement to said holders in operative timing therewith.

5. A wrapping machine of the kind referred to comprising a take-in holder, a medial holder and a put-out holder, double-acting sliders for the purposes described, means comprising a rack for operating the sliders and for imparting an angular displacement to said holders in operative timing therewith, and means for feeding the article and its wrapper into the take-in holder, substantially as described.

6. A wrapping machine of the kind referred to comprising a take-in holder, a medial holder and a put-out holder, double-acting sliders for the purposes described, means comprising a rack for operating the sliders and for imparting an angular displacement to said holders in operative timing therewith, means for feeding the article and its wrapper into the take-in holder, and means for folding the end of the wrapper, substantially as described.

7. A wrapping machine of the kind referred to comprising a take-in holder, a medial holder and a put-out holder, double-acting sliders for the purposes described, means comprising a rack for operating the sliders and for imparting an angular displacement to said holders in operative timing therewith, means for severing the unit article from a strip and means for feeding the article and the wrapper into the take-in holder, substantially as described.

8. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws comprising a series of holders mounted tandem fashion and axially parallel, related pairs of jaws in said holders, driving means for imparting an angular displacement to the holders, double-acting plungers, driving means for operating the plungers in operative timing with the angular displacement of the holders, said latter driving means being positively connected to the said first driving means, means for feeding the article and its wrapper in to the take-in holder, and means for folding the ends of the wrapper.

9. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws comprising a series of holders mounted in tandem fashion and axially parallel, related pairs of jaws in said holders, driving means for imparting an angular displacement to the holders, double-acting plungers, driving means for operating the plungers in operative timing with the angular displacement of the holders, said latter driving means being positively connected to the said first driving means, means for delivering the articles to the line of feed, means for feeding the wrapper to position, and means for feeding the article and its wrapper in to the take-in holder.

10. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws, comprising a series of holders mounted tandem fashion and axially parallel, related pairs of jaws in said holders, driving means for imparting an angular displacement to the holders, double-acting plungers, driving means for operating the plungers in operative timing with the angular displacement of the holders, said latter driving means being positively connected to the said first driving means, means for delivering the articles to the line of feed, means for severing the unit article from a strip, means for feeding the wrapper to position, and means for feeding the article and its wrapper in to the take-in holder.

11. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws, comprising a series of holders mounted tandem fashion and axially parallel, related pairs of jaws in said holders, driving means for imparting an angular displacement to the holders, double-acting plungers, driving means for operating the plungers in operative timing with the angular displacement of the holders, said latter driving means being positively connected to the said first driving means, means for delivering the articles to the line of feed, means for severing the unit article from a strip, means for feeding the paper from a roll web, means for cutting the wrappers from a roll web, means for feeding the wrapper to position, and means for feeding the article and its wrapper in to the take-in holder.

12. Wrapping machine in which lateral folding of the wrapper on the article to be wrapped is effected by successive passes of the article with its wrapper in to and out of pairs of jaws, comprising a series of holders mounted tandem fashion and axially parallel, related pairs of jaws in said holders, driving means for imparting an angular displacement to the holders, double-acting plungers, driving means for operating the plungers, in operative timing with the angular displacement of the holders, said latter driving means being positively connected to the said first driving means, means for delivering the articles to the line of feed, means for severing the unit article from a strip, means for feeding the paper from a roll web, means for cutting the wrappers from a roll web, means for feeding the wrapper to position, means for feeding the article and its wrapper in to the take-in holder, and means for folding the ends of the wrapper.

In testimony whereof, I affix my signature.

FREDERICK CHARLES CROXFORD.