Nov. 3, 1936. P. D. PARSONS 2,059,960

MACHINE FOR COMPRESSING AND LOADING ARTICLES OF FLAT FORM

Original Filed July 30, 1932 4 Sheets-Sheet 1

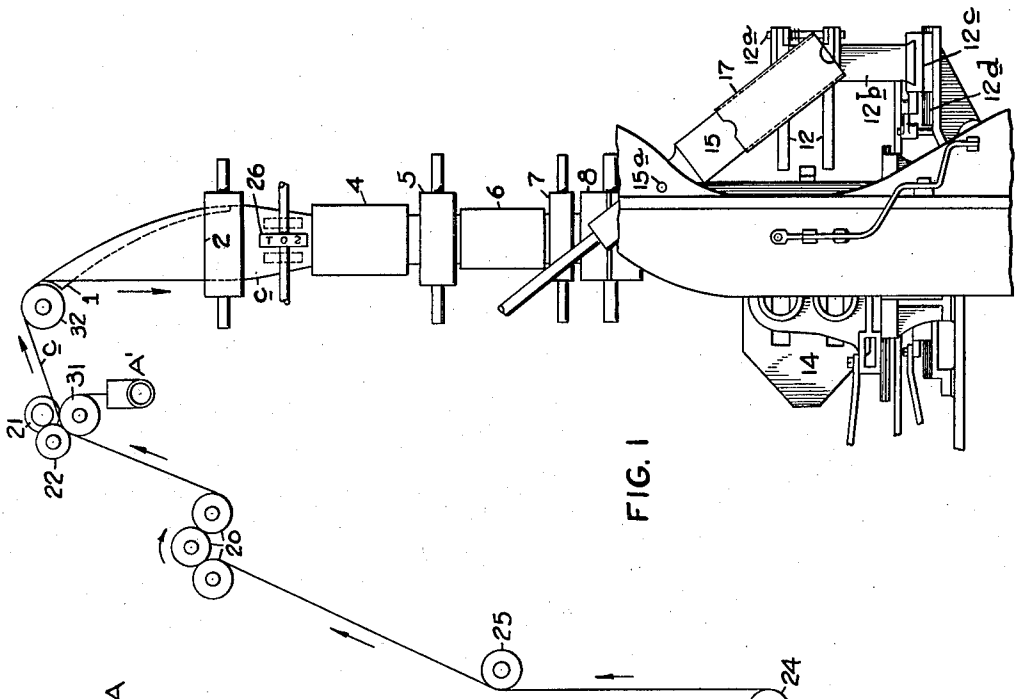


FIG. 1

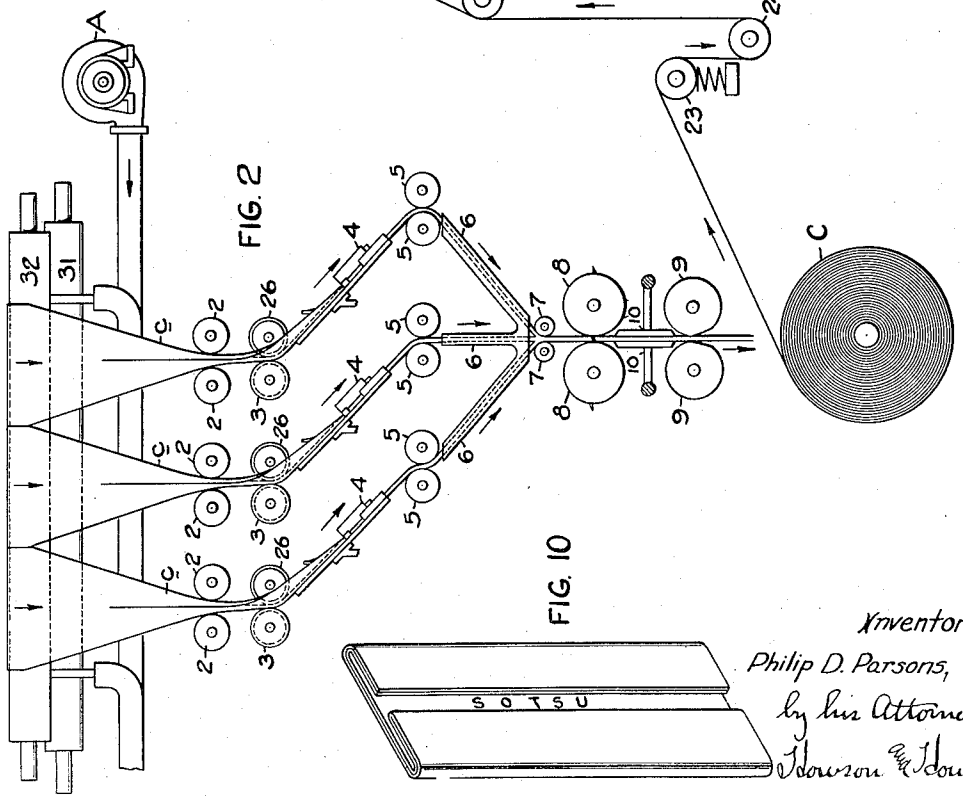


FIG. 2

FIG. 10

Inventor:
Philip D. Parsons,
by his Attorneys,
Dowson & Dowson

Nov. 3, 1936. P. D. PARSONS 2,059,960

MACHINE FOR COMPRESSING AND LOADING ARTICLES OF FLAT FORM

Original Filed July 30, 1932 4 Sheets-Sheet 2

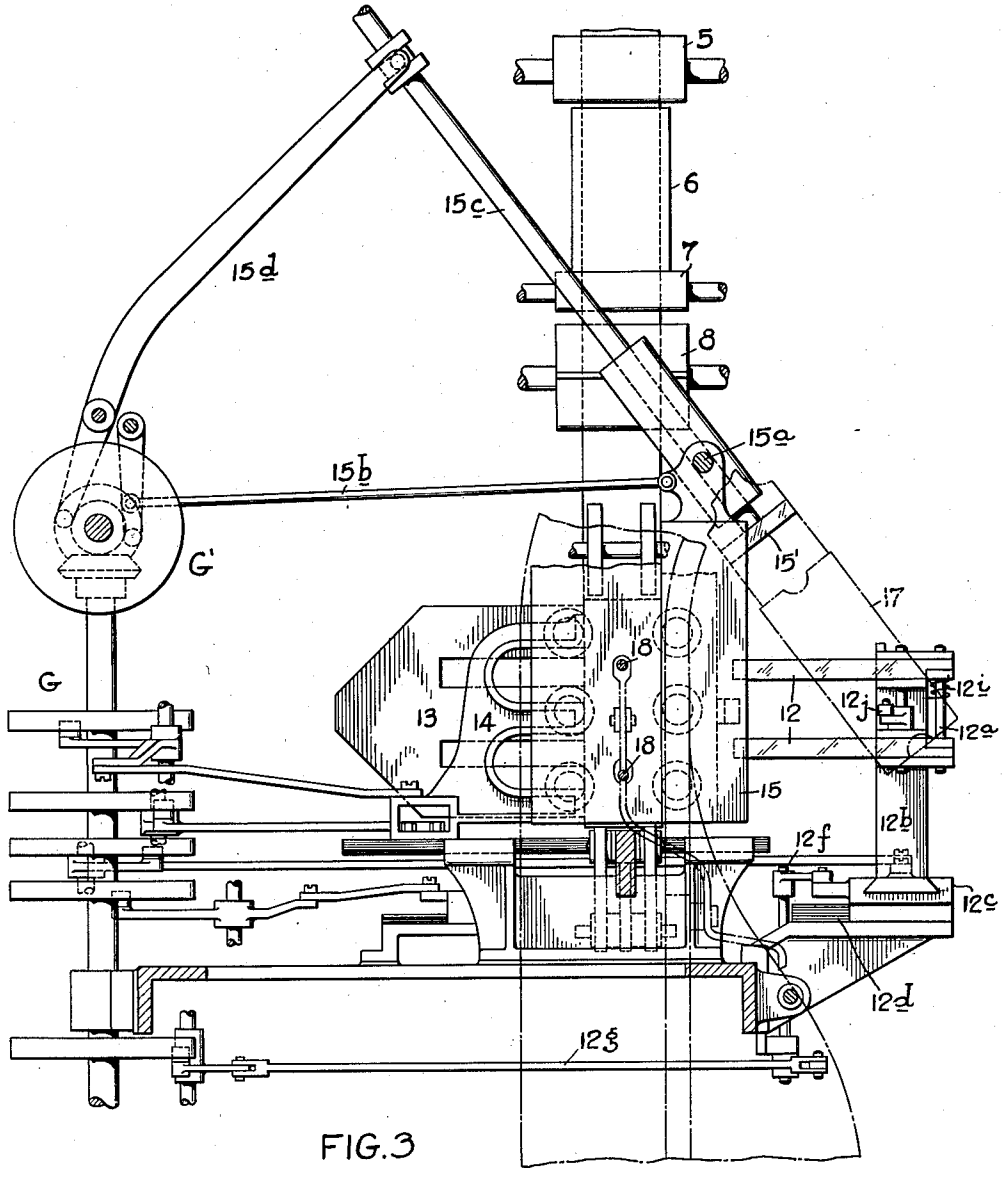


FIG. 3

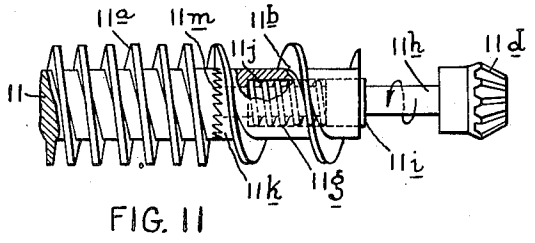


FIG. 11

Inventor.
Philip D. Parsons,
by his Attorneys,
Howson and Howson.

Nov. 3, 1936. P. D. PARSONS 2,059,960

MACHINE FOR COMPRESSING AND LOADING ARTICLES OF FLAT FORM

Original Filed July 30, 1932 4 Sheets-Sheet 3

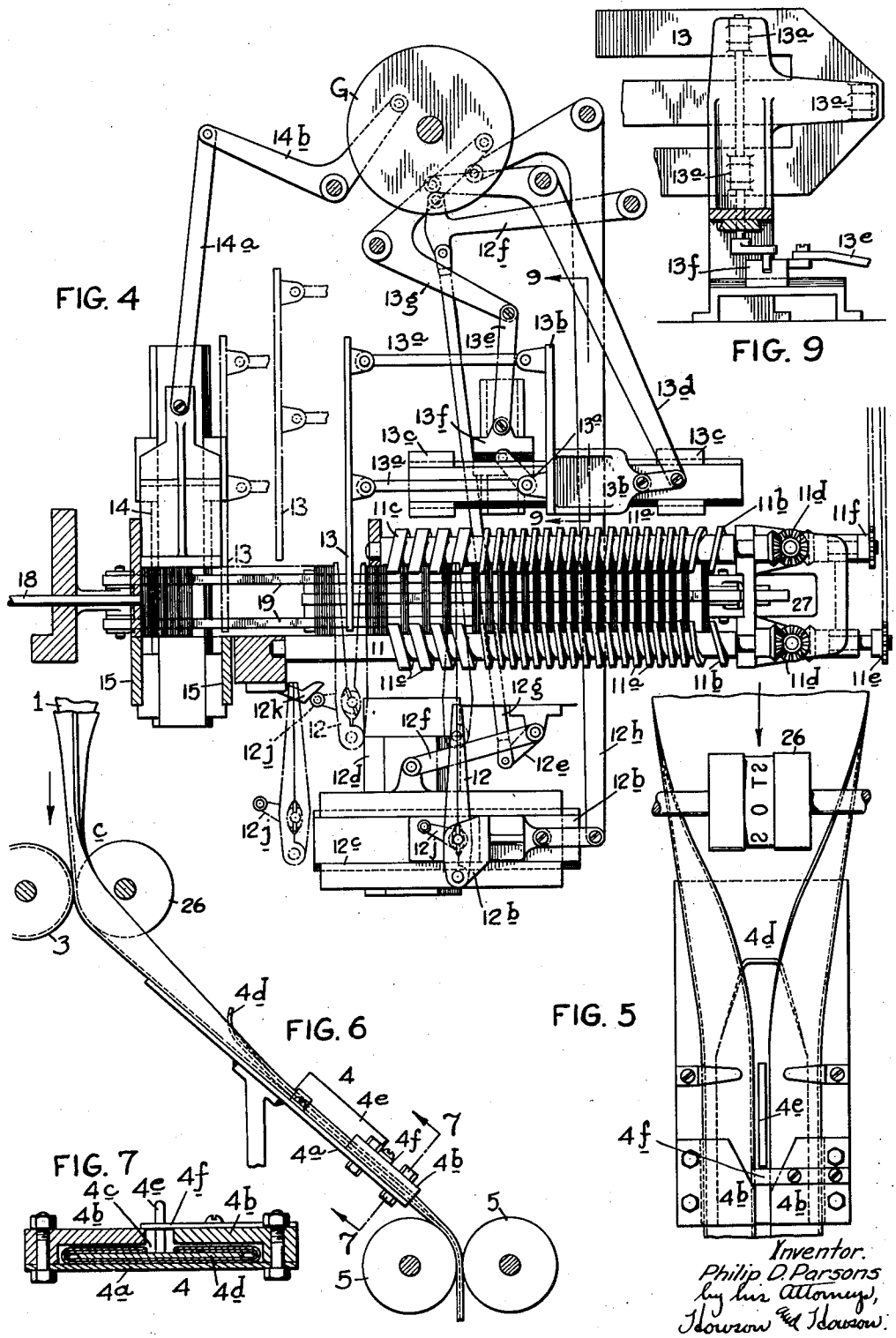


FIG. 4

FIG. 9

FIG. 5

FIG. 6

FIG. 7

Inventor.
Philip D. Parsons
by his Attorneys,
Dowson and Dowson.

Nov. 3, 1936. P. D. PARSONS 2,059,960

MACHINE FOR COMPRESSING AND LOADING ARTICLES OF FLAT FORM

Original Filed July 30, 1932 4 Sheets-Sheet 4

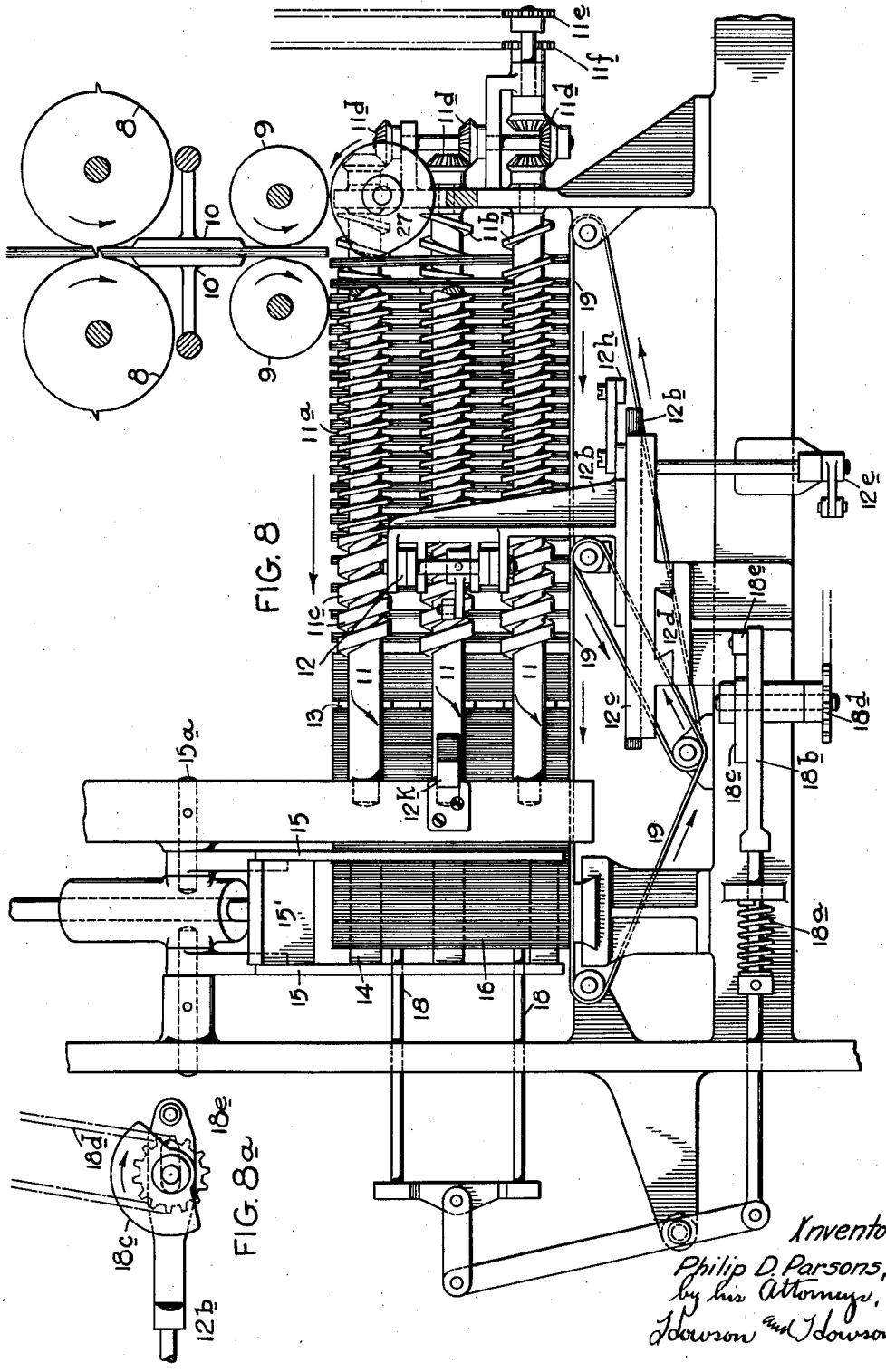


FIG. 8

FIG. 8a

Inventor.
Philip D. Parsons,
by his Attorneys,
Dawson and Dawson.

Patented Nov. 3, 1936 2,059,960

UNITED STATES PATENT OFFICE

2,059,960

MACHINE FOR COMPRESSING AND LOADING ARTICLES OF FLAT FORM

Philip D. Parsons, Swarthmore, Pa., assignor to Scott Paper Company, Chester, Pa., a corporation of Pennsylvania

Original application July 30, 1932, Serial No. 626,282. Divided and this application April 3, 1935, Serial No. 14,535

7 Claims. (Cl. 271—87)

The general object of my invention is to provide means for commercially subdividing and folding paper webs into such form that they may be severed transversely into rectangular folded structures for use as towels, napkins, etc.; and which may be further automatically operated upon for grouping the finished articles into spaced relation so that the same may be delivered into separate cartons to constitute separate packages; and the articles included in the package may be automatically counted to insure each package receiving the predetermined requisite number of articles.

Heretofore, I have provided means for making paper towels and articles of that character from paper webs and, at the same time, separating the article so produced into separated quantities whereby they may be successively assembled into individual packages. Prior patents of mine for means for making paper articles, such as towels, are the following:—Patent No. 1,433,148 dated October 24, 1922, discloses a machine for folding a single web upon itself while being fed in a substantially horizontal manner through the machine and transversely severed into short lengths to form what is technically known in the trade as a C fold towel. The machine of this patent, furthermore, feeds the completed towels into separate groups or quantities to provide the proper number of towels to be placed in each of the separate cartons or packages. The improvements comprised in the machine of said Patent No. 1,433,148 consist of means for supporting a roll of paper, means comprising formers for folding the paper into the desired form, suitable power driven means including friction rolls for causing the paper to be fed through said machine and including cutting mechanism capable of severing the folded paper into predetermined lengths, and means to deliver the folded paper towels in assembled and preferably counted batches.

My Patent No. 1,553,955 dated September 15, 1925, sets out a modified form of the original machine set out in my Patent No. 1,433,148 referred to, differing therefrom in splitting a wide paper web into narrower webs and separately folding said narrow webs into multi-ply webs by suitable folding means or formers, means for bringing together the folded webs and severing them into towel structures in sets of three, means for assembling the towels into groupings, whereby certain of the web lengths (at intervals) are held at a higher elevation than the intermediate web lengths to indicate a given number of web lengths to constitute a package and to be fed into a carton, the packing of the towels being done alternately to each side of their place of reception, this being done by a reciprocating packer blade arranged for alternately packing the successive web lengths delivered by the severing devices first in one direction and then in the other.

My present invention incorporates features from the aforesaid patents insofar as they relate to web folding devices, both singly and in multiple, where the output of the machine is to be increased, but more particularly relates to the final handling of the fully formed towels and napkins or other articles in respect to the separate package assemblages of said articles for convenient disposition in cartons or packages in the proper quantities, and it is to the compressing and loading means for such a machine that my invention relates. These special improvements embody the employment of propellers of worm-like construction in cooperation with package separating and counting devices, the propellers being preferably made up of three distinct worms of different pitch, the first pitch being flared to enable the towels to be drawn into the propeller conveyer, the worm of second pitch consisting of uniformly spaced blades in which three sets of towels are confined and carried along the package section, and the third pitch consisting of wide openings to create a separation of the towels in order to permit suitable separating finger mechanism to enter in timed relation between every one hundred and fifty (150) towels (or other predetermined number), the construction being such that the separation of the successive package assemblage of towels will permit the entrance of a suitable cam pressure blade which carries the paper packages to the carton loading compartment.

This application is a division of my application Serial No. 626,282, filed July 30, 1932, and relates more particularly to the construction of the worm-like propellers or conveyers which receive and feed the paper articles, side by side, along the machine to the loading and packing means at the delivery end of the machine.

Referring to the drawings: Fig. 1 is a diagrammatic end view of elements of my improved apparatus illustrating the successive stages of treatment of the paper during the forming of the individual towels and also illustrating a portion of the assemblage and packing of the towels in the receiving cartons; Fig. 2 is a diagrammatic front view of the upper portion of the mechanism illustrated in Fig. 1; Fig. 3 is an elevation of that portion of the apparatus embody-

ing my invention by means of which the paper towels as formed are fed to a means for receiving and packing the same within the cartons; Fig. 4 is a plan view of the mechanism of Fig. 3 with a diagrammatic illustration of means for operating the elements for receiving and packing the same within the cartons; Fig. 5 is a plan view of the former and embosser mechanism; Fig. 6 is a side view of the same; Fig. 7 is a cross section on line 7—7 of Fig. 6; Fig. 8 is a side elevation of the mechanism for assembling and packing the towels in cartons; Fig. 8*a* is a detail thereof; Fig. 9 is a vertical section on line 9—9 of Fig. 4; Fig. 10 is a perspective view of one of the completed towels; and Fig. 11 is an enlarged fragmentary and partial sectional view showing details of the propeller mechanism.

The illustrating of my improvements by schematic diagrams indicating the successive operations required in producing the towels and enclosing them in suitable cartons has been followed as being the most effective manner of illustrating the correlation between the operative parts.

While Fig. 8 is more particularly directed to the means for receiving the separate towels as made and assembling them in predetermined numbers and thereafter causing them to be introduced into cartons to constitute commercial packages, the preliminary steps involving the making of the towels from a parent roll of paper are more fully disclosed in Figs. 1 and 2 and thereby insure a preliminary treatment of the paper web before the assemblage and packaging of the finished towels. I will first refer to the devices and mechanism illustrated in Figs. 1 and 2.

C represents the parent roll of absorbent paper suitable for use in towelling. This web of paper passes over a spring supported roller 23, thence under an idler guide roll 24, thence in contact with a crowned idler roll 25 and subjected to the pull created by three rolls 20 which are positively driven. From the pull rolls 20, the paper web is next guided over a steel hardened guide roll 31 and upon which the paper web is slit by slitter knives 21 while being pressed in firm contact therewith by rubber rolls 22. Of these various rolls, spring roll 23 takes up any unevenness in the paper web, the crowned roll 25 removes any wrinkles which may occur in the web, while the pull rolls 20 impart a positive pull to the web and measure the requisite amount of paper which is to be delivered to the forming devices. The rubber rolls 22 are frictionally driven by contact through the paper web with the driven roll 31 which insures the paper web running straight when such rubber rolls are properly adjusted. The slitter knives 21 are constructed to trim the ends and to slit the paper to divide it into a plurality of separate webs (preferably three in number). The trimmings from the outer edges of the web at the time it is being subdivided are blown through suitable pipes A' by blower A.

The three separate webs *c*, *c*, *c*, are next guided over guide roll 32 and thence downward over separate formers 1. The webs *c* then respectively pass between idler rolls 2 which guide the folded webs through the embossing and creasing rolls 3 and 26 arranged in pairs. The folded webs then respectively pass through the formers 4 which fold the tabs over the body portion. The folded paper is then of a construction which is known in the trade as a C fold towel. The specific construction of these formers will be better understood by reference to Figs. 5, 6 and 7. These formers may be similar to those shown in my aforesaid patent No. 1,433,148.

The folded webs after leaving the formers 4 are pulled downward by rolls 5 and fed into guide plates 6, then through a set of knurled pull rolls 7 which press the three folded webs upon each other. The driven pull rolls 7 positively feed the assembled webs downward between the double-knife severing cylinders 8 which may be of any ordinary construction and are driven at a speed which assures the right length of towel.

As the towels pass from the severing rolls, they are received between knurled pull rolls 9, a portion of one of which is cut away to permit freedom of towel against pulling during period of cutting. Guides 10 may be arranged between the cutting rolls 8 and the feed or delivery rolls 9 to guide the towels during their descent from the cutting rolls and to the knurled pull rolls.

When the paper webs in folded condition, as finished towels, have reached the state in which they are required to be counted and placed in cartons, each of which cartons or packages contains a predetermined number of towels (one hundred and fifty, for example), the means for doing this consists of the following instrumentalities:—The towels, in sets of three, are fed vertically downward by the knurled rolls 9 and are received between two sets of worm-like propellers 11, each set being of three such worm-like devices positively rotating upon horizontal axes, and the two sets rotating in opposite directions, so that their propelling action is to feed the towels in the same direction and at substantially the same speeds. These worm-like propellers are all similar and the two sets have their blades respectively right and left-handed. The propellers are made with blades 11*a* so formed as to provide three different pitches, as well be seen by reference to Fig. 8.

The propellers may be rotated by any suitable means, that shown comprising mitre gears 11*d*, one set being driven in a right handed direction by transmission means 11*e* and the other in a left handed direction by means 11*f*. Any other suitable manner of driving these two sets of propellers may be employed if so desired, keeping in mind that for every revolution of the propellers, the web should be fed downward the length of one towel.

The blades 11*b* of the propellers which first receive the towels have a large pitch and so shaped as to give a very wide lead, whereby the towels, in sets of three, freely pass into the spaces between the blades of the two sets. This insures the towels passing into the custody of the propellers and avoids all danger from clogging. The middle blades of the propellers are of uniform and relatively small pitch, and there are preferably one third as many blades as there are towels to constitute a package or required for a carton, that is to say, if the number of towels to each carton is one hundred and fifty (150), there will be fifty helical teeth or blades.

The delivery ends of the propellers are provided with blades 11*c* each having a wide pitch, approximately the pitch at the receiving end, as shown. In this case, however, there is a relatively wide lead and large pitch to enable the towels to feed from the middle blades of small pitch into the delivery blades of large pitch and wide lead. This wide lead at the delivery end of the propellers permits the successive sets of

towels to separate and enable laterally movable separating fingers 12 to enter between the towels and separate them into packs of one hundred and fifty (150) towels each, to be delivered into the cartons 17.

The separating fingers are shown at 12 in Fig. 4, and ready to advance between two sets of towels shortly before they leave the propellers and approximately when the towels reach the wide pitch blades on the delivery end of the rotating propellers. These separating fingers 12 are hinged upon a vertical axis 12a on a slide 12b and reciprocated thereby longitudinally upon a slide 12c relatively to the propellers and also in turn movable toward and from the propellers upon a fixed guide 12d.

When the separating fingers 12 pass between two sets of towels and open as shown in Fig. 4, a gap will be made between the towels to form separate packages; and as this separation takes place just beyond the discharging end of the propellers and in line with the compressor blade 13, the latter may be introduced to constitute a compressor for the towels. The compressor blade is hinged to one end of parallel links 13a, said links hinged at their other ends to a slide 13b movable longitudinally on guide 13c parallel to the propellers during the act of compression. After the separating fingers 12 have performed their function of permitting the introduction of the compressor blade into compressing position and beginning its functioning, the separating fingers back out and return to their normal position, ready to enter between the next set of one hundred and fifty (150) towels to be compressed and those being delivered by the propellers.

I have, in a broad way, referred to the movements of mechanism which operate the separating fingers and associated parts, and will now describe the same more in detail. Cam mechanism G of any suitable character is arranged for operating the various levers and arms which insure the timed movements of the separating fingers 12, the compressor 13, and the pack pusher 14. More specifically, the separating fingers 12 are reciprocated toward and from the propellers by reciprocating slide 12c under the action of the lever 12e, link 12g, and rocker arm 12f, actuated by cam mechanism G. The movement of the separating fingers longitudinally of the propellers 11 and at the speed of travel commensurate with the movement of the towels through the propellers, is assured by the lever 12h (linked to slide 12b), and cam mechanism G. The opening and closing of the hinged separating fingers 12 is accomplished by a spring 12i to normally cause the fingers to close upon themselves and a pivoted arm 12j and cam 12k to oppose the spring when opening the fingers. When the slide 12c moves the arm 12j in contact with cam 12k the fingers open to separate the packages of the towels; and when the slide is moved in the reverse direction to withdraw the arm 12j from the cam 12k and the fingers away from the compressor blade 13, the fingers close and move to the inactive position (Fig. 4).

The compressor blade 13 receives motion in a direction toward the separating fingers by lever 13g, link 13e and horizontally movable slide 13f, said slide operating one of the links 13a acting as a crank arm for moving the blade 13 toward and from the fingers 12 when separated.

When the towels are being compressed by the compressor blade 13, they are forced into a compression chamber at the end of the runway 19 over which the bottom edges of the towel pack slide. When the pack is compressed, a pusher 14 pushes the same between the two loading blades 15, which are then swung outwardly about axis 15a, with the package of towels 16 between said blades. At this time a carton 17 is slipped over the blades 15, and the towels then pushed into it by action of the ejector 15'. After the package is ejected, the loading blades and ejector return to normal position for action upon the next succeeding towel assemblage.

The means for operating these parts 14, 15, 15' and 17 are shown in Figs. 3, 4 and 8, in which the pusher 14 is reciprocated for the purpose of pushing the compressed package of towels from the compression chamber forward into the space between the loading blades 15 which at that time are arranged vertical as shown in Fig. 3. When the towels have been thus transferred to the loading blades, the latter is swung about the pivot 15a into an oblique position as indicated in dotted lines in Fig. 3. This movement of the loading blades about the pivot 15a is caused by the rod 15b and cam mechanism G'. When the loading blades are thus adjusted to the oblique position shown, the carton 17 is placed over the loading blades and the ejector plunger 15' is forced downward in an oblique direction and between the loading blades, with the result that the towels are pushed from between the loading blades into the carton. The movement of this ejector plunger is caused to take place by the rod 15c being reciprocated by the lever 15d and cam mechanism G'.

While I do not restrict myself to any particular details in respect to the construction of the formers for folding the paper webs, nevertheless, I show in Figs. 5, 6 and 7 the preferred construction, especially for folding the web with the two tabs on the same side of the body in the C shaped form before referred to, but it is manifest that the tabs may be folded on opposite sides of the body such, for example, as is shown in Letters Patent No. 1,122,108 dated December 22, 1914, and designated in the trade as a Z fold. Referring to Figs. 5, 6 and 7, the former therein comprises in addition to the bottom plate 4a overhanging side plates 4b leaving a gap 4c between them. Within the space between the plate 4a and the plates 4b is arranged a loose plate 4d about the edges of which the flaps of the folded towel are bent during their longitudinal travel through the former. This loose plate 4d is provided with a rib 4e extending upwardly through the space 4c and rests against an overhanging arm 4f. The forward end of the loose plate 4d is tapered so as to permit the free travelling of the paper web c through the former. Before the paper web is folded, the embossing of the trade-mark is performed upon the middle of the body portion by the embossing and creasing rolls 3 and 26. By performing this embossing feature in advance of the action of the former 4, the side flaps may be of a width which allows them to almost meet, whereas if the embossing rolls performed their function after the tabs are folded, it could be more desirable to provide the flaps of less width so that the embossing of the paper could take place upon the body between the location of the tabs; but I do not restrict myself in this respect.

As it is desirable to hold or delay the succeeding package in entering the chamber 15 until full compression is reached, this is done by providing two hold-back fingers 18 spring pressed against the towel package while it is being compressed to

a position within the compression chamber 15, the object being to quickly advance the hold-back fingers under action of spring 18a to meet a succeeding package and then provide by the spring a gradually increasing resistance to the compression. In this manner, the towels are under a substantially continual compression during preparation of the pack for the carton, and under full compression when the carton is packed.

The means for controlling the operation of the hold-back fingers 18 is such that the normal pressure exerted by the spring 18a through hold-back fingers upon the towels, namely, at a time when the towel assemblage is being delivered between the loading blades 15 and prior to the operation of the ejector device 15' is temporarily removed. To accomplish this, the rod 18b which is actuated by the spring 18a in one direction is caused to be moved in the other direction (with a compression of the spring 18a and removal of the spring pressure upon the towels) by means of a cam 18c rotated by a shaft and sprocket wheel 18d, said cam operating upon a shoulder 18e forming a part of the said rod 18b. The parts 18d are chain geared with the carrier chain 19 and, therefore, the action of the cam 18d is in timed relation to the towel assemblage means.

To enable the finished towels to freely pass into the propellers and down to the supporting and travelling floor compressed in the carrier chain, I provide a suitable jogging means which may jog or jar the propellers to prevent clogging of the descending towel. For this purpose, I provide a jogging cam wheel 27, positively rotated and imparting successive jars or blows during the operation of the machine. It is immaterial how the rotating of the jarring cam is provided.

As before pointed out, the assemblage of one hundred and fifty (150) towels is assumed to form a package which, while under pressure, is introduced into a carton for commercial exploitation. It is a function of my improved machine to automatically insure this predetermined quantity or number of towels to be assembled and constitute the package of commerce, and as a secondary result, to count as it were the number of towels packed in each carton and the number of cartons so packed. Each revolution of the worm-like propellers feeds three towels. Thus, one thousand packed cartons would mean one hundred and fifty thousand towels; and as the number of towels is a multiple of the number of cartons packed, these figures may be registered upon a registering device of any ordinary construction, either in terms of the number of cartons packed or in terms of the number of towels packed.

In addition to the jogging cam 27, there is preferably attached on opposite sides of it two cam portions pressed upon the upper end of the towels which are standing in a vertical position between the propellers; and the object of bending the upper end of the towel to one side in the direction of its movement is to prevent any obstruction under the next descending set of towels, as will be clearly understood by reference to Fig. 8. This permits the release of the descending towel sets from the cutters for a quick delivery into the propelling means and without any interference between the successive towels.

In Fig. 11, I show some special features of my improved propeller construction and more particularly for adjusting the circumferential position of the blades 11b at the receiving end of the propellers relatively to the receiving end of the blades 11a of the intermediate portion of the propellers, which improvements are more specifically described as follows: The receiving blades of wide pitch 11b are formed about a tubular hub portion 11g, the said hub portion sleeved upon the spindle 11h of the propeller as a whole, and at its delivery end it is provided with circumferentially arranged ratchet teeth 11k which engage ratchet teeth 11m on the receiving ends of the blades 11a of the propeller. A coil spring 11j is arranged within the tubular core 11g and operates between the collar 11i and a shoulder on the core which causes the ratchet teeth 11k and 11m to yieldingly engage in such manner that the rotation of the propeller during the feeding action will cause the core of the wide pitch blades to rotate with the blades 11a but which will permit relative circumferential adjustment of the blades 11b relatively to the blades 11a, so as to adjust the blades of the adjacent parts relatively to each other. It will be seen that the hub 11g having the wide pitch blades 11b may be adjusted for any circumferential position desired.

It will now be apparent that I have devised a novel and useful construction of apparatus and method of operation thereof which embodies the features of advantage enumerated as desirable, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that I do not restrict myself to the details as the same are susceptible of modification in various particulars, without departing from the spirit or scope of the invention.

I claim:

1. In a machine of the character stated, means for receiving flat-shaped articles in succession and feeding them transversely to the plane of their surface, said means consisting of a plurality of rotating helically-grooved worm-like propellers arranged in pairs in parallel relation and with the grooves of each pair of propellers respectively made right- and left-handed, and a flat travelling belt-like carrier support for the paper articles arranged in a plane below and substantially parallel to the axes of the worm-like propellers, whereby the paper articles are supported while being propelled by the propellers.

2. In an invention of the character stated, a plurality of worm-like propellers arranged in pairs in parallel relation and rotating in opposite directions at the same time for feeding flat articles horizontally while holding said articles in upright position, and a belt-like travelling carrier support for the flat articles arranged in a plane below and substantially parallel to the axes of the worm-like propellers, whereby the flat articles are supported against downward movement while being propelled by the worm-like propellers.

3. In an invention of the character stated, means for receiving and feeding a plurality of flat articles side by side, consisting of a plurality of worm-like propellers whose normal helical grooves are the same, said worm-like propellers arranged in two parallel sets facing each other in right and left hand relation whereby a flat article is simultaneously received in and moved by the conjoint action of the grooves of the several worm-like propellers, and wherein further, means are provided for producing a jogging effect upon the article during its descent into the worm-like propellers.

4. In a machine of the character stated, a propeller formed of a plurality of parts sleeved in

axial alinement each part provided with helical blades having a different pitch and a yielding connection between the parts whereby the circumferential position of the blades of greater pitch may be relatively adjusted circumferentially to cooperate with the blades of lesser pitch, whereby an article being propelled by the blades of greater pitch may be delivered to the blades of lesser pitch.

5. In a machine of the character stated, a propeller formed of a plurality of parts sleeved in axial alignment, each part provided with helical blades having a different pitch, and a yielding connection between the parts whereby the circumferential position of the blades of greater pitch may be relatively adjusted circumferentially to cooperate with the blades of lesser pitch, whereby an article being propelled by the blades of greater pitch may be delivered to the blades of lesser pitch, said yielding connection consisting of engaging ratchet teeth on the two parts of the propeller, and spring means for yieldingly holding said ratchet teeth in yielding connection.

6. In a machine of the character stated, means for receiving flat-shaped articles in succession and feeding them transversely to the plane of their surface, said means comprising a pair of rotating helically-grooved worm-like propellers arranged in parallel relation and with the grooves thereof respectively made right- and left-handed, the pitch of the helical grooves in corresponding portions of said propellers being increased to effect a relatively wide spacing of the articles, and means operating synchronously with said propellers for separating the series of articles passing therethrough into groups of predetermined number, said separating means comprising a member adapted for insertion between two adjacent articles when the latter are relatively widely spaced by those portions of the propellers wherein the helical grooves are of increased pitch.

7. In a machine of the character stated, means for receiving flat-shaped articles in succession and feeding them transversely to the plane of their surface, said means comprising a pair of rotating helically-grooved worm-like propellers arranged in parallel relation and with the grooves thereof respectively made right- and left-handed, the pitch of the helical grooves in corresponding portions of said propellers being increased to effect a relatively wide spacing of the articles, a member adapted for insertion into said relatively wide spaces, and mechanism operating in synchronism with said propellers for inserting said member at predetermined periods to thereby separate the series of articles passing through said propellers into groups each containing a predetermined number of said articles.

PHILIP D. PARSONS.