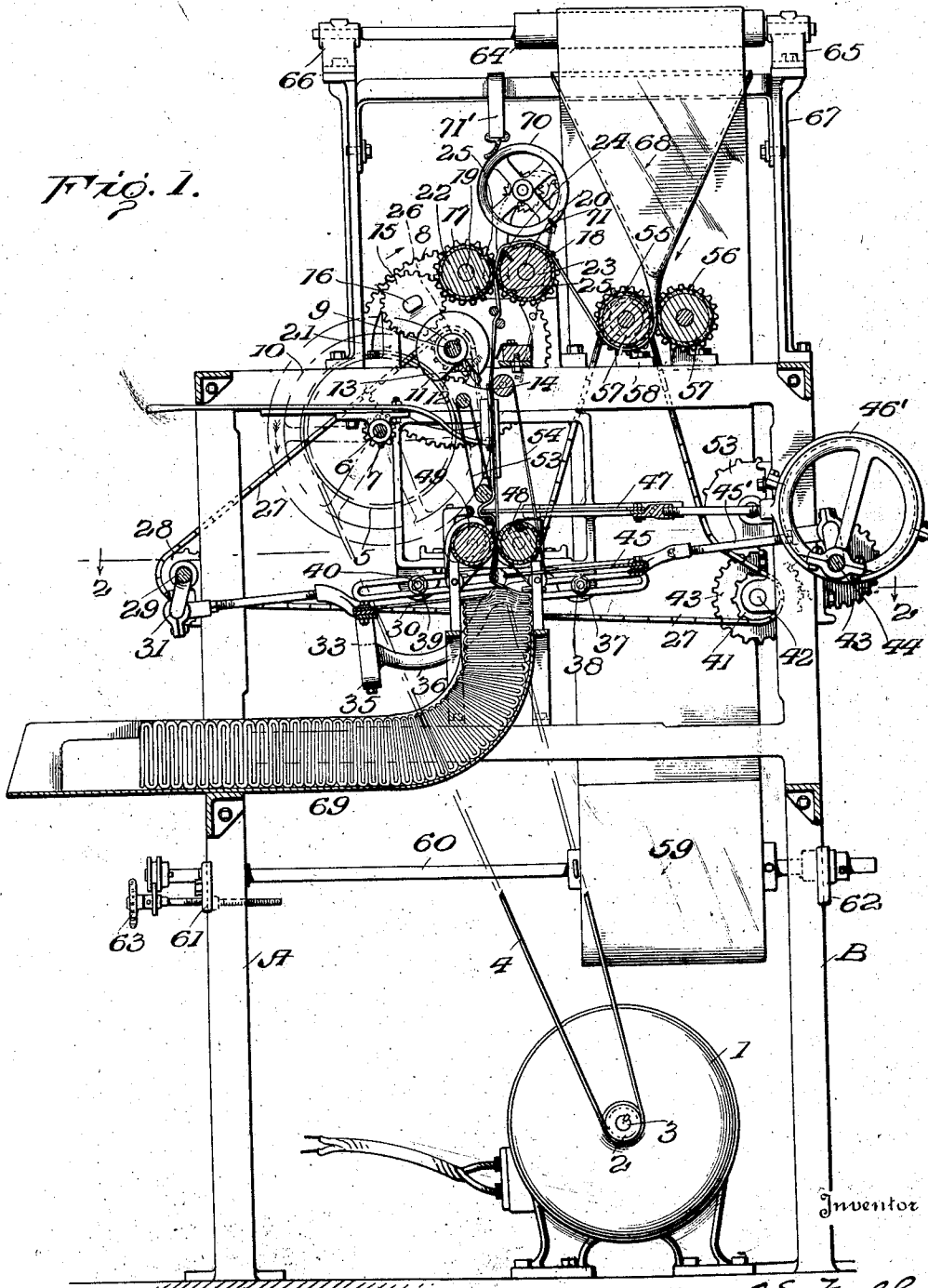


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FOLDING AND INTERLEAVING MACHINE.
APPLICATION FILED APR. 16, 1918.

Patented Jan. 7, 1919.
3 SHEETS—SHEET 1.

1,290,801.



Inventor

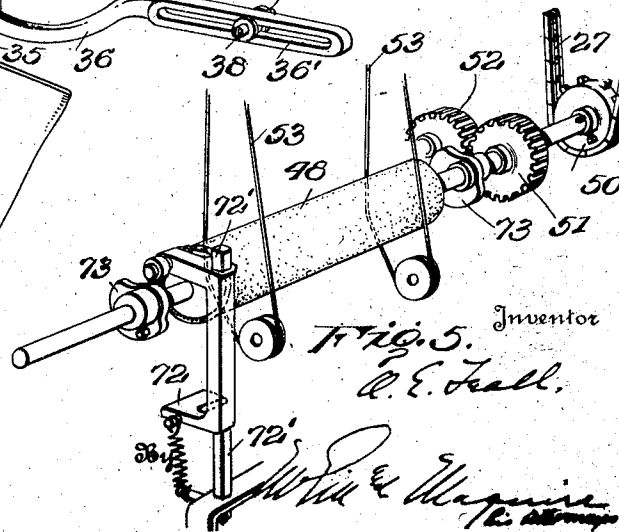
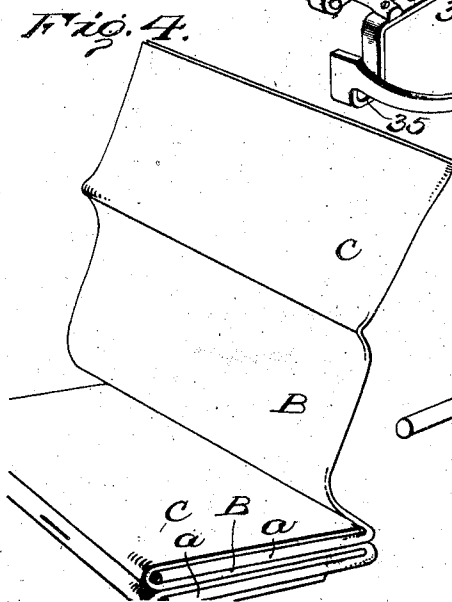
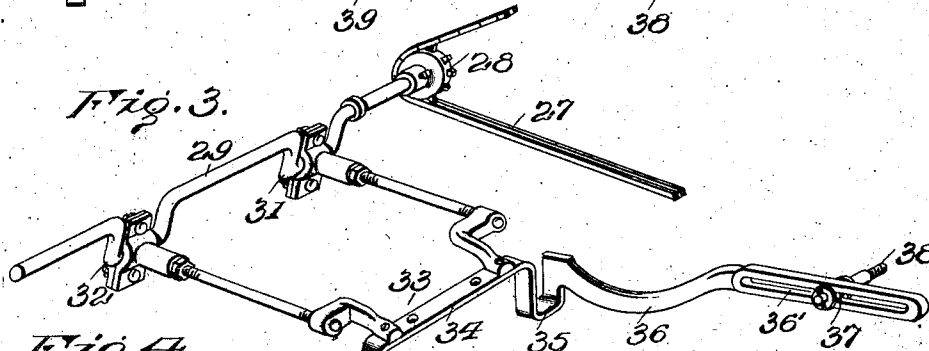
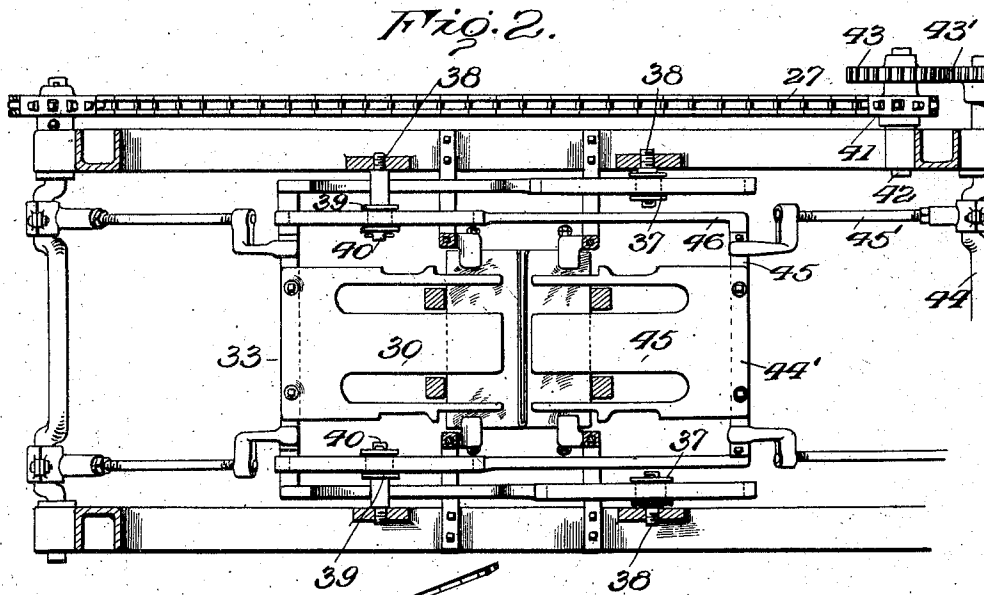
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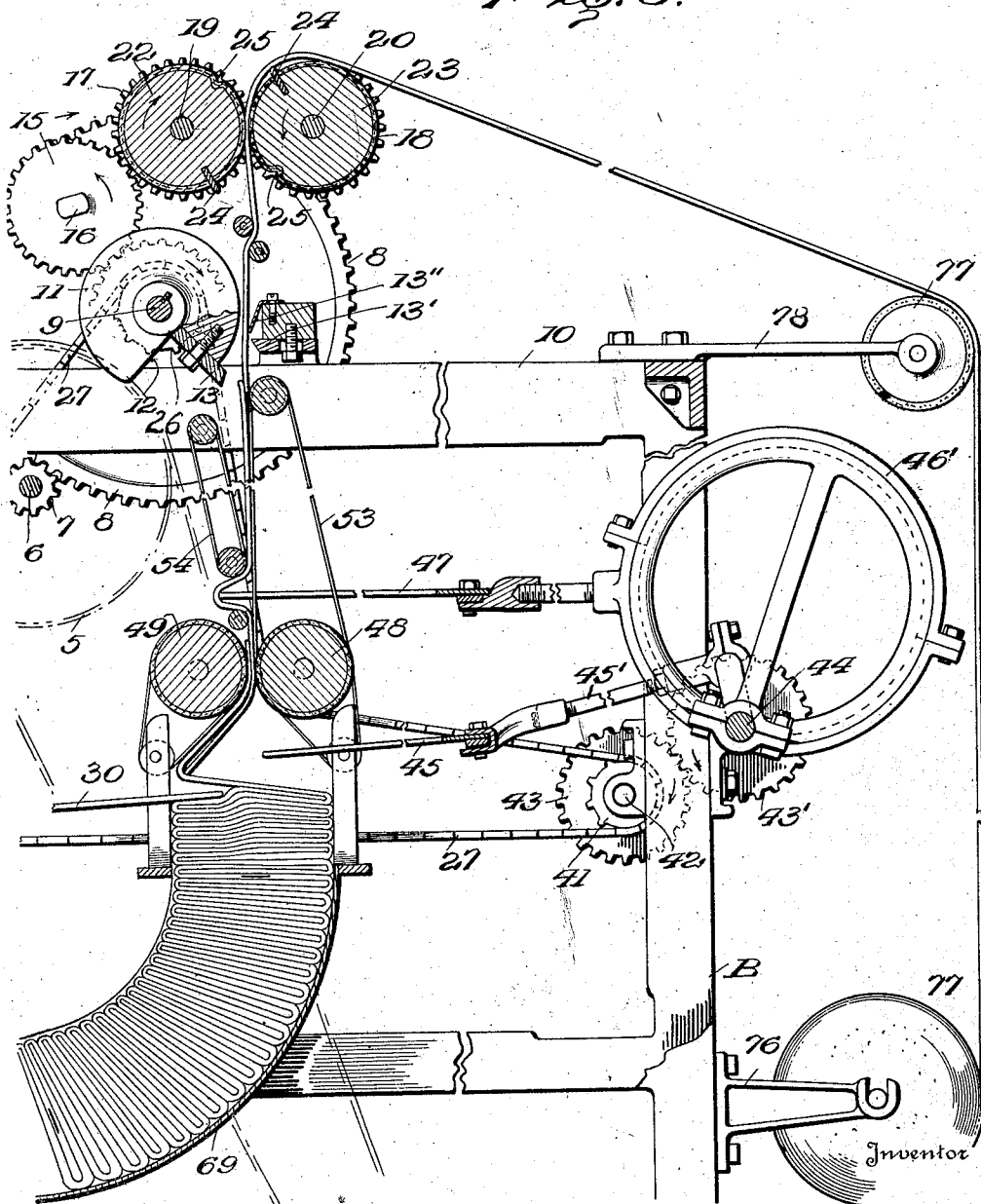


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Fig. 6.



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UNITED STATES PATENT OFFICE.

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FOLDING AND INTERLEAVING MACHINE.

1,290,801.

Specification of Letters Patent.

Patented Jan. 7, 1919.

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To all whom it may concern:

Be it known that I, OLIVER E. TEALL, a citizen of the United States, of Saugerties, in the county of Ulster and State of New York, have invented certain new and useful Improvements in Folding and Interleaving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to folding machines and particularly to such machines as are adapted to fold paper napkins and towels and to interleave such articles so that when a package is placed in a container the withdrawal of one napkin or towel will bring the edge of the following article into position to be readily extracted from the container. The invention comprehends simple and improved mechanism for producing interleaved napkins or towels. The former are ordinarily first folded lengthwise of the feed and then transversely at two different points. Towels, on the other hand, usually have only two folds, both being transverse of the paper as it is fed from the roll. According to my invention, when the machine is used for folding napkins, a roll of paper is appropriately supported upon a shaft fitted upon the framework of the machine and the web is led up over a roller bar superposed on the framework and then down over a folding horn between a pair of rollers which complete the initial fold, and then between a second pair of rollers which effect a creasing of the paper transverse of the feed and in alternate directions, the creasing means of these rolls being so disposed that the desired length of paper for a napkin is divided into three equal portions, severance of each napkin being then effected by a rotating member which carries a cutting blade for coöperating with a stationary cutting member. The napkins as they are severed pass between guiding tapes to a pair of rollers by which they are fed into a hopper, the tail end of each napkin being forcibly withdrawn from engagement with the guiding tapes while its leading edge is in the bite of the feeding rollers so as to make way for the next succeeding napkin which is then traveling at a speed greater than the speed at which the napkin in advance is being fed to a hopper. In this way

the advancing or leading edge of a napkin following another overtakes such preceding napkin to the extent of one-third its length, thus providing for the tucking of such advancing or leading edge within one of the folds of the first napkin. In the adaptation of the machine for folding towels, the web of paper is led directly to the rollers for effecting the transverse creases, no longitudinal folding of the web being required. The cutting of the web and the interleaving are identical in both napkin and towel folding.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view through a machine embodying my improvements. Fig. 2 is a cross sectional view on line 2—2, Fig. 1. Fig. 3 is a perspective view of one of the pusher bars. Fig. 4 is a view in perspective showing the napkins in partly folded position. Fig. 5 is a view in perspective showing the gearing for driving the feed rolls, only one of which is illustrated, and the cams for operating the clamping feet. Fig. 6 is an enlarged vertical longitudinal sectional view showing the upper portion of the machine in position for use as a towel folder.

At 1 I have shown a motor adapted to drive the several parts of the machine through the instrumentality of a pulley 2 on the end of shaft 3 of the motor, the pulley driving a belt 4 which is connected to a band pulley 5 supported on a shaft 6 suitably journaled near the upper part of the machine. This shaft carries a small pinion 7 which meshes with a large gear 8 fixed on a shaft 9 journaled in the framework of the machine, which latter I have indicated at 10. On the shaft 9 are a series of concentric disks 11, each of which is notched as at 12 the notched portions of the several disks collectively forming a seat for a knife 13 adapted to coöperate with a cutting blade 13' fixedly secured to the framework, these two cutting members severing the paper in appropriate napkin or towel lengths as it is passed therebetween, a spring bar 13'' preventing any sticking of the paper to the fixed bar.

A gear 14 on the end of shaft 9 is adapted to mesh with an idler gear 15 on a stub shaft 16, the gear 15 driving a pair of gears 17, 18 on the ends of two parallel shafts 19 and 20, both of which and the stub shaft

16 are journaled in a frame 21 forming part of the main frame of the machine. The shafts 19 and 20 support the feed rollers 22 and 23, each of which latter is provided with a male and female member 24 and 25, these members extending the full length of the rollers, and being adapted to crease the paper as it is passed between these rollers. The members 24, 25 are so located that the paper passing between the rollers will be creased so as to divide the napkin lengths into three equal portions.

Mounted on the shaft 9 between the large gear 8 and the small gear 14 is a sprocket wheel 26 which drives a chain 27, the latter extending forwardly and downwardly around a sprocket 28 on a crank shaft 29 suitably journaled in uprights A of the machine, the crank actuating a folding blade 30. As clearly shown in Fig. 3, the crank shaft 29 has two drop cranks 31, 32 to which are fitted clamps which support the outer ends of the folding blade support 33. This support is shown as comprising a bar 34 having dropped end portions 35 of U-shape and upwardly curved side members or arms 36, each of which side members has a slot 36' at its free end to receive a roller 37. These rollers are mounted on stub shafts 38 projecting laterally from the frame of the machine and which form a support for the inner ends of the frame of the blade carrying member 33, and permit a rocking movement of the frame as it is reciprocated through the connection with the crank shaft 29. This construction produces an undulating movement of the blade 30.

The sprocket chain 27 after passing around the sprocket wheel 28 extends to the opposite side of the machine and engages a sprocket wheel 41 on a stub shaft 42 suitably mounted on the standard B, and is adapted to drive a spur gear 43 keyed to the shaft 42. Gear 43 is in mesh with a second spur gear 43' on a crank shaft 44 which is similar in construction to the shaft 29. This shaft 44 forms the support for one end of a support 44' for a second folding blade 45 which is complementary to the member 33. The support for this blade includes connecting rods 45' which are clamped to cranked portions of the shaft 44 and a bar 45'' to which the inner ends of the rods 45' are connected. Side arms 46 extend forwardly from the bar 45'' and terminate in slotted ends which are adapted to receive supporting rollers 39 mounted upon laterally extending stub shafts 40 secured to the frame. The support 44' like the support 33 is adapted to rock upon its supporting shafts 40. Its construction is such that it can be manipulated without in any way interfering with its complementary support 33, the side arms 46 of the support 44' lying within the plane of the arms 36

of the support 33, the U-shaped portions 35 of the cross bar 34 allowing free movement of the arms 46 of the support 44'. The upwardly curved portions of the arms 36 of the support 33 work under the supporting pins 40. Upon the crank shaft 44 is located an eccentric strap throwing member 46' to which latter is secured an arm 47 of blade-like form. This arm has a large throw and is adapted to take up the slack of the last cut or severed end of the napkin, thus forcibly freeing the tail end of the napkin from guiding tapes as the advancing edge of the napkin is caught between feeding rollers 48 and 49. These rollers 48 and 49 are driven by the sprocket chain 27, engaging a sprocket 50 on the shaft of the roller 48, the roller 49 being driven by the gears 51 and 52. The speed at which these feed rollers travel is less than the speed of the rollers 22, 23 so that a second napkin will be speeded up in its feed toward the hopper to overtake the tail end of the advancing napkin and be interfolded therewith. 53, 54, designate cooperating feeding tapes which direct the severed portion of the paper to the rollers 48 and 49.

The operation of the machine when adapted to fold paper napkins is as follows:

A roll 59 of crape paper is supported upon a shaft 60 suitably mounted in the frame of the machine and so arranged in brackets 61 and 62 as to permit a lateral shifting for centering by means of a hand screw 63. The web of paper is carried up over a roller bar 64 suitably supported in brackets 65—66 on a superposed frame 67 and thence down over a folding horn 68 which effects the initial folding of the paper longitudinally of its length, the paper being effectively creased in its passage between rollers 57 which are positively driven by sprocket chain 27 which engages the sprocket 58 on the shaft of the left hand roller, motion being imparted to the complementary roller by gears 55—56. The web of paper which is now folded longitudinally of its length is fed between rollers 22—23, the series of male and female members 24 and 25 of which give to the paper spaced transverse creases first to one side then to the other. The paper so creased then passes the disks supporting the cutting blade 13 and is severed in appropriate lengths by the blade 13 co-acting with the cutting member 13' the severed sheets passing on to the feeding tapes 53—54 which direct it into the bite of the rollers 48—49. As the advancing edge of the napkin is gripped by these rollers the blade-arm 47 begins its initial movement forcing the tail end of the napkin from engagement with the feeding tapes. Inasmuch as the speed of the rollers 48—49 is less than the speed of the rollers 22—23, the advancing edge of a following napkin will reach the bite of the rollers

48—49 at the moment the preceding napkin has been fed therebetween about two-thirds of its length so that the tail end of one napkin is overlapped by the advancing end of the succeeding napkin which latter (indicated at A in Fig. 4) is tucked in between the leaves (B and C, Fig. 4) of the preceding napkin. The paper is positively folded through the instrumentality of the undulating arms or fingers 30 and 45 which alternately engage the napkins at the points creased by the members 24 and 25. These fingers tuck the advancing end of one napkin in between the last folds of the preceding napkin. By reason of the undulating movement of the fingers in the retracting movement they rest upon the folds of the napkin and have a tendency to push the same down into the hopper 69. To prevent backward crowding of the napkins toward the mouth of the hopper I provide pairs of presser feet 72 having hollow uprights which are guided on posts 72', secured to the frame of the machine, and laterally extending arms the outer ends of which carry rollers which are adapted to engage cams 73 on the shafts of the rollers 48 and 49. The presser feet are arranged in pairs on each side of the path of the napkins and are operated by the cams 73, being caused to be intermittently raised and lowered so as to receive and hold the folds of the napkins as they are released by the folding fingers.

In using the machine for folding paper towels, which, as before stated, have only transverse folds, I detach the superposed frame 67 which supports the roller bar 64, and folding horn 68, and I also remove the initial creasing rollers 57. The roll of paper is supported by brackets 76 secured to the standards B, the web being passed upwardly and over a roller 77 suitably supported by laterally projecting brackets 78, and thence to the rollers 22, 23. From this point the operation is the same as has been described with reference to the folding of the napkins.

For the purpose of aiding in packaging the napkins in various sized lots, I provide a marking mechanism by which every fiftieth napkin is marked so that the operative may take out the desired number from the hopper without having to stop to count them. This mechanism includes a wheel 70 carrying a marker 71, the wheel being driven, step by step through a pawl and ratchet connection, operation being effected by a pin on the large gear 8. The marking member 71 is supplied with ink from an ink feeding member 71' having a section of felt which rides against the counting wheel.

I claim as my invention:

1. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or

towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, means for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, and means for folding the articles along their transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead.

2. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, a reciprocating element for folding the articles along their transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead.

3. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, a reciprocating element for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, and oppositely disposed reciprocating blades for folding the articles along their alternate transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead.

4. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, means for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, blades for folding the articles along their alternate transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead, and means for alternately reciprocating said blades.

5. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, means for moving the tail end of one napkin from the path of feed of the follow-

ing napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, blades for folding the articles along their alternate transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead, and means for effecting an undulating reciprocation of said blades.

6. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said roll, means for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, means for folding the articles along their transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead, and presser feet for holding the folded napkins in said hopper.

7. In a machine of the class described, means for feeding a web of paper from a roll, means for transversely creasing the web, means for severing the web into napkin or towel lengths, a hopper, means for feeding the napkins into said hopper at a speed less than the speed of the initial feed from said

roll, means for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, means for folding the articles along their transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead, and intermittently operated presser feet for holding the folded napkins in said hopper.

8. In a machine of the class described, rollers for feeding a web of paper from a roll, means carried by said rollers for transversely creasing the web, cooperating cutting members for severing the web into napkin or towel lengths, a hopper, rollers for feeding the napkins into said hopper at a speed less than the speed of the initial feed rollers, a blade for moving the tail end of one napkin from the path of feed of the following napkin to permit the advancing end of the latter to overlap the tail end of the preceding napkin, means for reciprocating said blade, and means for effecting a folding of said napkins along their alternate transverse creases and tucking the advancing end of a napkin within the folds of the napkin ahead.

In testimony whereof, I have signed this specification.

OLIVER E. TEALL.