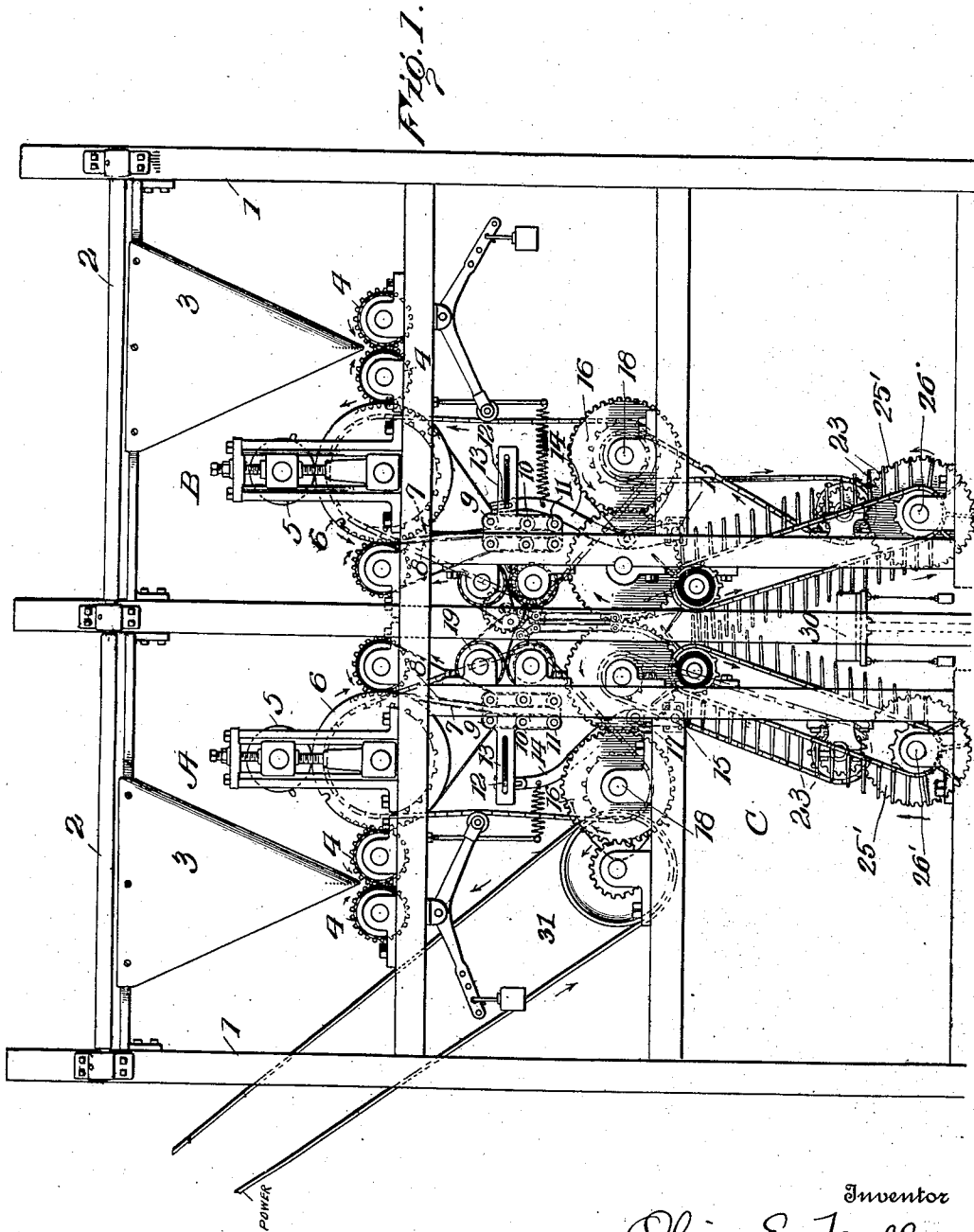


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 APPARATUS FOR FOLDING AND INTERLEAVING PAPER SHEETS.
 APPLICATION FILED APR. 21, 1916.

1,290,800.

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



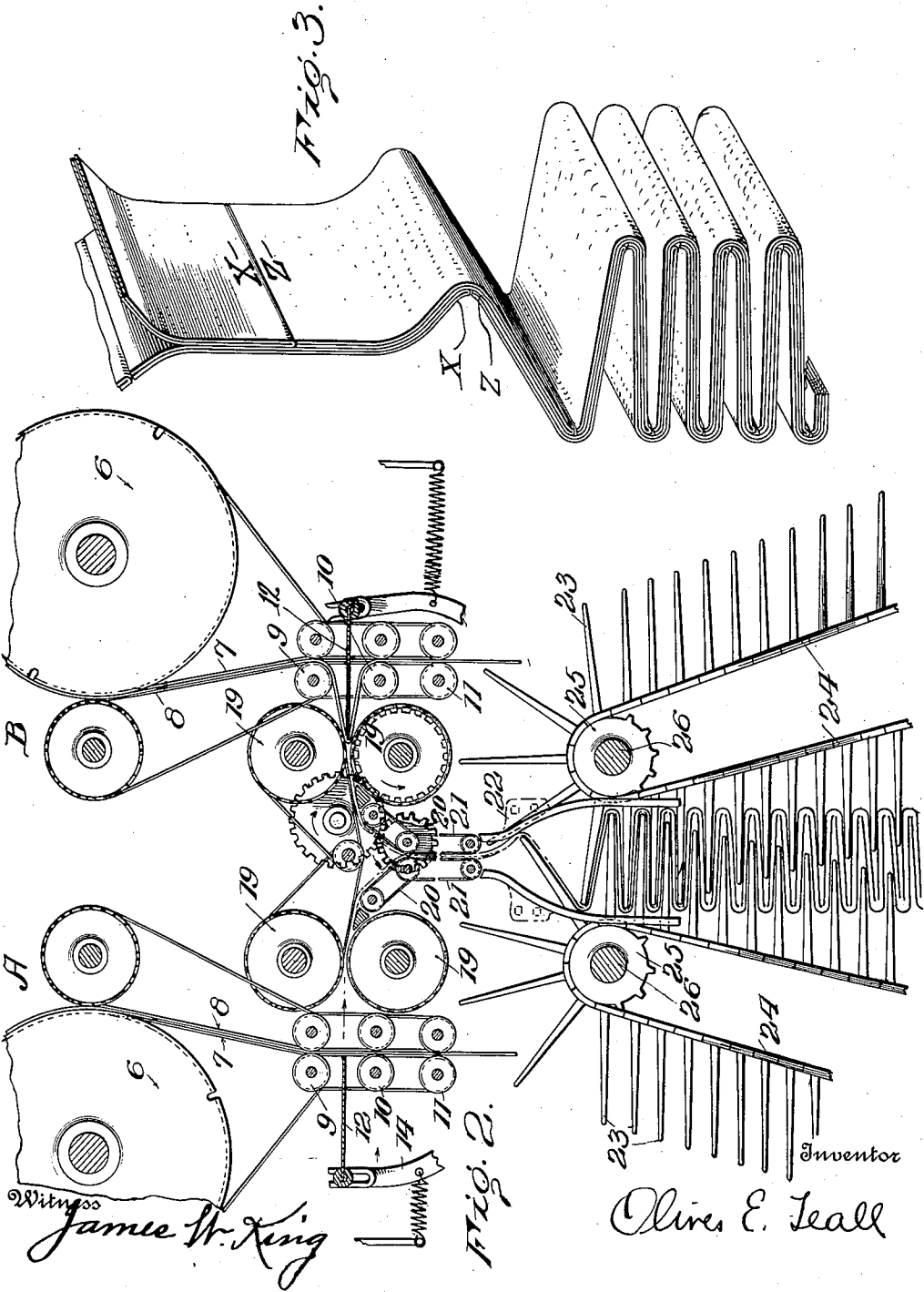
Witness
James M. King

Inventor
Olive E. Teall

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UNITED STATES PATENT OFFICE.

OLIVER E. TEALL, OF SOUTH HADLEY, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO THE TISSUE COMPANY, OF SAUGERTIES, NEW YORK, A CORPORATION OF NEW YORK, AND ONE-THIRD TO JAMES W. KING, OF SPRINGFIELD, MASSACHUSETTS.

APPARATUS FOR FOLDING AND INTERLEAVING PAPER SHEETS.

1,290,800.

Specification of Letters Patent.

Patented Jan. 7, 1919.

Application filed April 21, 1916. Serial No. 92,637.

To all whom it may concern:

Be it known that I, OLIVER E. TEALL, a citizen of the United States, of South Hadley, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Folding and Interleaving Paper Sheets; 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 improvements in folding machines and has particular reference to machines for folding paper napkins and then interfolding them so as to produce packages of napkins successively interleaved.

The object of the invention is to provide a simple and efficient machine of this character, the paper to be folded being suspended for feeding purposes in roll form, and the web continuously passed through a series of rollers for imparting the initial fold and then between cylinders for perforating the web for a given sized sheet, the paper being thereafter given an accelerated movement to sever the advancing sheet from the web, such advancing sheet being then acted upon to provide a cross fold. The napkins thus folded are then fed to a hopper-like member where they are acted upon by a series of folding fingers to interleave the articles.

In the accompanying drawings, Figure 1 is an end elevation. Fig. 2 is an enlarged sectional view showing the second fold members and the interfolding means. Fig. 3 shows in perspective the napkin in the stages of interfolding.

Referring to the drawings, the machine as a whole embodies duplicate folding mechanisms A and B and an interfolding mechanism C to which the articles are fed from the folders A and B, all parts being suitably supported by a frame work 1.

In describing the mechanism for folding the napkins reference will be made to but one of the folders, the arrangement of the elements in both being the same. A roll of crape paper such as is ordinarily employed in making paper napkins is supported in the frame work of the machine in known manner, its web being fed over a roller-bar 2 and

over a folding horn 3 to a pair of creasing rollers 4 mounted in bearings on the frame 1. These rollers are provided with felt facing to more effectively act upon the crape paper and to aid in feeding the folded sheet to cylinders 5 and 6 carrying the male and female dies for perforating the web. From these perforating cylinders the paper which is now folded longitudinally and the continuity of which is not broken is carried between pairs of endless tapes 7 and 8 to a series of rollers 9, 10 and 11 arranged in pairs each below the other.

12 designates a horizontally disposed pusher bar mounted in suitable guides 13 of the frame. This bar is reciprocated through the instrumentality of a spring held lever 14 secured at one end to the bar and at its other end pivoted to the frame of the machine as at 15, such lever being moved against the tension of the spring by a cam 16 engaging a roller 17 on the lever, the cam being fast on a shaft 18 to which power is applied from a prime mover. Movement of the reciprocating bar is so timed that it will engage the sheet which has at that point but a single fold about midway of its ends to effect a preliminary bending of the sheet and its feed into the bite of a pair of creasing rollers 19. These rollers are positively driven at a surface speed greater than the surface speed of the perforating cylinders so as to impart to the paper a slightly accelerated movement for severing the advancing sheet from the web on the line of the perforations. To secure the best results the reciprocating bar is arranged between the upper and intermediate pairs of rollers 9 and 10. As the creasing rollers 19 take hold of a sheet the bar is withdrawn to allow of the further feed of the paper between the series of rollers 9, 10 and 11. The creasing rollers 19 give to the paper napkin a fold which is transverse of the original fold. The napkin which is now completely severed from the web is then advanced to a series of feeding tapes 20 by which it is fed to a common point between guiding belts 21 into a hopper-like member 22. Inasmuch as the speed of the rollers 19 is slightly greater than the surface speed of the perforating rollers and their complementary tapes and because the napkin as now folded is but one half its length, it is necessary to provide for slowing

up the feed of the folded napkin after it leaves the creasing rollers 19 so that the lead end X of one napkin will be immediately adjacent the tail end Z of a preceding napkin when received between the tapes 21. This I accomplish by so arranging the driving gears for the tapes 20 that such tapes will be driven about one half the surface speed of the perforating cylinder. Gearing appropriate for this purpose is shown in Fig. 2. It is understood, of course, that in starting the machine the paper from one of the rolls must be fed slightly in advance from that of the other in order that after the napkins are completely folded they may reach the interfolding mechanism in such manner that one napkin from one folding mechanism will cover a portion of each of two napkins from the other folding mechanism. In other words as the napkins reach the guiding belts 21 parallel napkins will overlap.

The mechanism for interleaving the folded napkins comprises a series of spaced apart fingers 23 mounted on endless conveyers 24 which I have shown in the form of sprocket chains supported by sprockets 25 on shafts 26, such chains being driven by sprocket wheels 25' fast on horizontally disposed shafts 26'. There are two of these conveyers, each of which is equipped with fingers 23. As illustrated, the fingers of one conveyer overlap the fingers of the opposite conveyer at the upper portion of the flights, the conveyers being inclined toward each other at their upper ends. The sides of the hopper-like member 22 are provided with openings through which the fingers 23 enter to engage the napkins being fed therein. As clearly shown in Fig. 2, the conveyers operate in synchronism so that the fingers of first one conveyer then the other act as a form over which the feeding napkins are bent by the other fingers, the interleaving napkins being given a slight pressure between the advancing fingers, which latter are gradually withdrawn from the napkins by reason of the divergence of the lower ends of the conveyers. The napkins when freed of the conveyer fingers may be discharged in any preferred manner as upon a table 30. In Fig. 3 I have shown, in perspective, the position of the napkin in course of transit between the tapes 20 and 21 and through the hopper 22. The tapes and hopper are not shown in this figure. Each napkin at the time it reaches the tapes 20 has been folded longitudinally and transversely. The lead edge X, which is the transverse fold of the napkin, lies adjacent the tail end Z of the preceding napkin. These two ends lie about midway of a napkin folded and advanced from the opposite machine. As the napkins so arranged reach the hopper 22 the fingers 23 on the conveyers 24 will effect the folding

of the napkins, the ends of the napkins of one side lying within the fold of the napkins from the other side. This is clearly indicated in Fig. 3.

It is manifest that the elements for feeding the articles through the machine may be driven in any preferred manner. I have shown a prime mover 31 from which power may be taken to different parts of the machine in any well known way.

I claim as my invention:

1. In a machine of the character described, in combination, means for imparting an initial longitudinal fold to each of continuously fed webs of paper, means for perforating said folded webs, mechanism for detaching the advancing perforated portions of said webs and for effecting a transverse fold in each separated portion, feeders for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, and a series of cooperating members for engaging alternate sides of said overlapped sheets for interleaving the sheets.

2. In a machine of the character described, in combination, means for imparting an initial longitudinal fold to continuously fed webs of paper, means for perforating said folded webs, mechanism for detaching the advancing perforated portions of said webs and for effecting a transverse fold in each separated portion, feeders for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, and endless conveyers having each spaced apart members for engaging alternate sides of said overlapped sheets for interleaving the sheets.

3. In a machine of the character described, in combination, means for imparting an initial longitudinal fold to continuously fed webs of paper, means for perforating said folded webs, cooperating elements for separating the advancing perforated portions of said webs and for effecting a transverse fold in each separated portion, feeders for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, and endless conveyers having each spaced apart fingers, the fingers of one conveyer serving as forms over which the cooperating fingers of the other conveyer fold the overlapped sheets.

4. In a machine of the character described, in combination, means for imparting initial longitudinal folds to continuously fed webs of paper, means for perforating said folded webs, cooperating elements for separating the advancing perforated portions of said webs and for effecting a transverse fold in each separated portion, feeders for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, series of spaced apart fingers,

endless conveyers on which said fingers are mounted, said conveyers being inclined toward each other at their upper ends, the fingers of both series intermeshing throughout a portion of the conveyer flight, said intermeshing fingers engaging and folding the advancing overlapped sheets.

5 5. In a machine of the character described, in combination, means for imparting initial longitudinal folds to continuously fed webs of paper, means for perforating said folded webs, cooperating elements for separating the advancing perforated portions of said webs and for effecting a transverse fold in each separated portion, feeders for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, series of spaced apart fingers, endless conveyers upon which said fingers are mounted, said conveyers being so arranged that the fingers of one series intermesh with those of the other throughout a portion of the flights of said conveyers, and serve as forms over which the overlapped sheets are folded, such fingers being gradually withdrawn from the interleaved sheets.

6. In a machine of the character described, in combination, means for imparting initial longitudinal folds to continuously fed webs of paper, means for perforating said folded webs, cooperating elements for effecting a transverse fold in each of the advancing perforated portions of said web and for separating said advancing perforation portions, feeding means for depositing the folded sheets at a common point with portions of one sheet overlapping adjacent sheets, series of spaced apart fingers, conveyers upon which said series of fingers are mounted, said conveyers being so arranged that the fingers of one series intermesh with those of the other throughout a portion of the flights of the conveyers, one series of fingers serving as forms over which

the cooperating fingers fold the overlapped sheets, said fingers of each series forming pressers in the continuing engagement with the sheets.

7. In a machine of the character described, in combination, means for initially and longitudinally folding webs of paper, means for perforating said folded webs, means for imparting a transverse fold to the advancing perforated portion of each perforated web, rollers for creasing the transversely folded advancing portion of the web and separating such portion on its perforated line and for feeding the sheets to a common point, said sheets reaching said point with the advancing edge of one sheet overlapping a portion of the preceding sheet, and a series of cooperating fingers for engaging alternate sides of said overlapped sheets for interleaving the sheets.

8. In a machine of the character described, in combination, a plurality of rollers for initially and longitudinally folding webs of paper, cooperating perforating cylinders for said folded webs, reciprocating arms for imparting a transverse fold to the advancing perforated portion of each perforated web, cooperating rolls for creasing the web on the transverse fold, said rolls having an accelerated motion for separating the advancing portion of each web and said rolls being adapted to feed the sheets to a common point with the advancing edge of one sheet overlapping a portion of the preceding sheet, and a series of cooperating fingers for engaging said sheets on alternate sides for interleaving the sheets.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

OLIVER E. TEALL.

Witnesses:

JAMES W. KING,
HARRY A. BUZZELL.