

April 1, 1930.

S. J. CAMPBELL

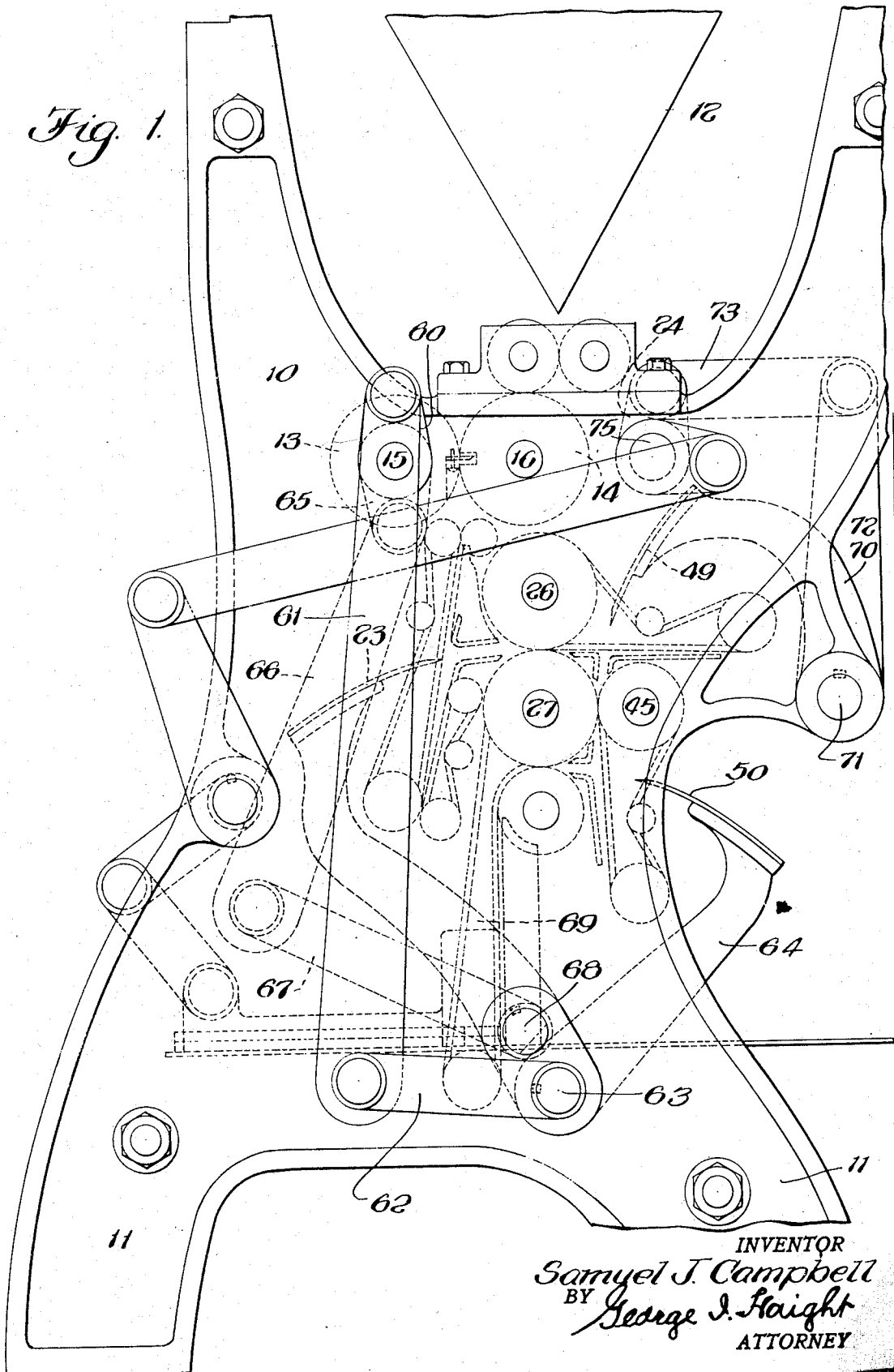
1,752,415

FOLDING MACHINE

Filed Feb. 6, 1929

4 Sheets-Sheet 1

Fig. 1.



April 1, 1930.

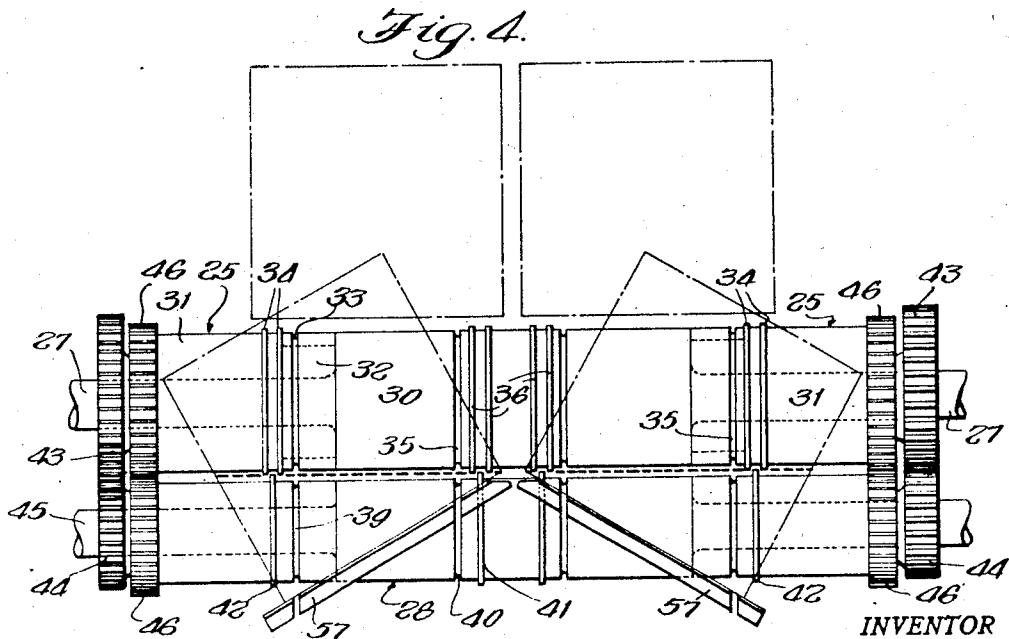
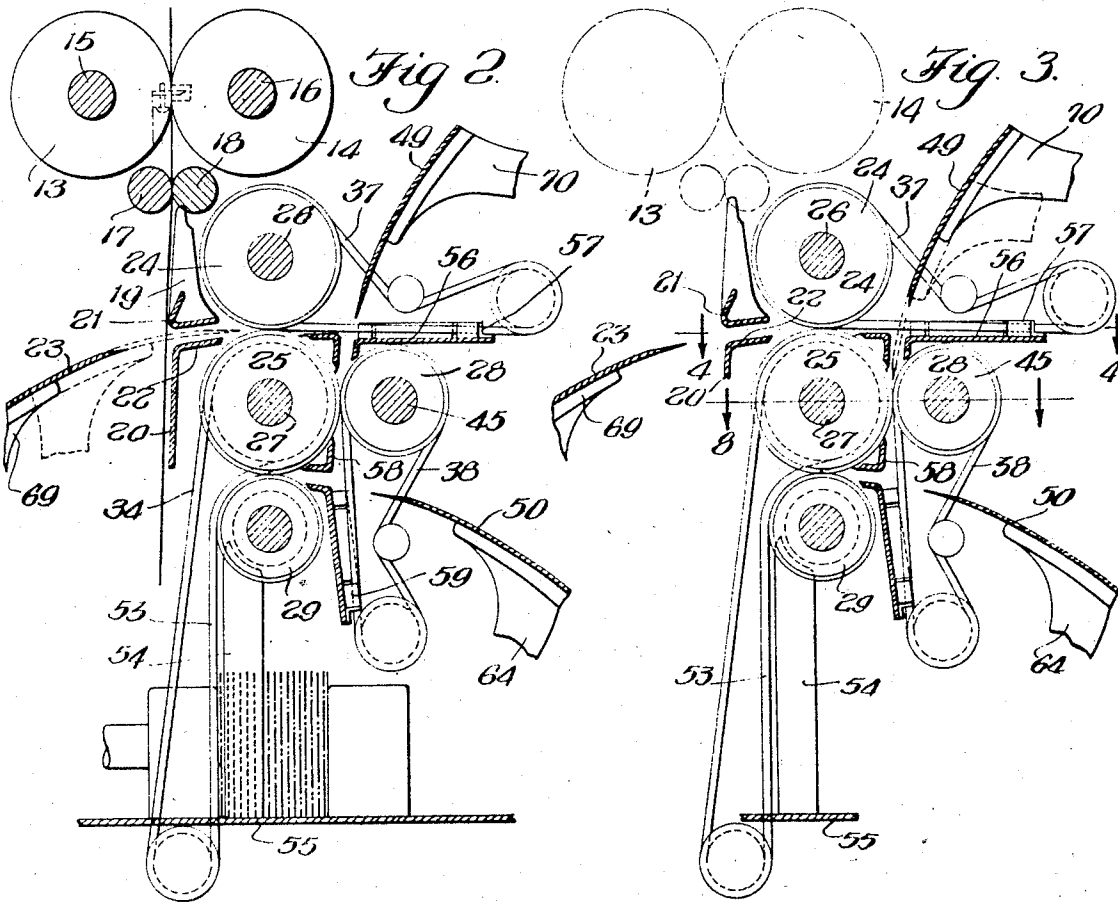
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1,752,415

FOLDING MACHINE

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

Fig. 5

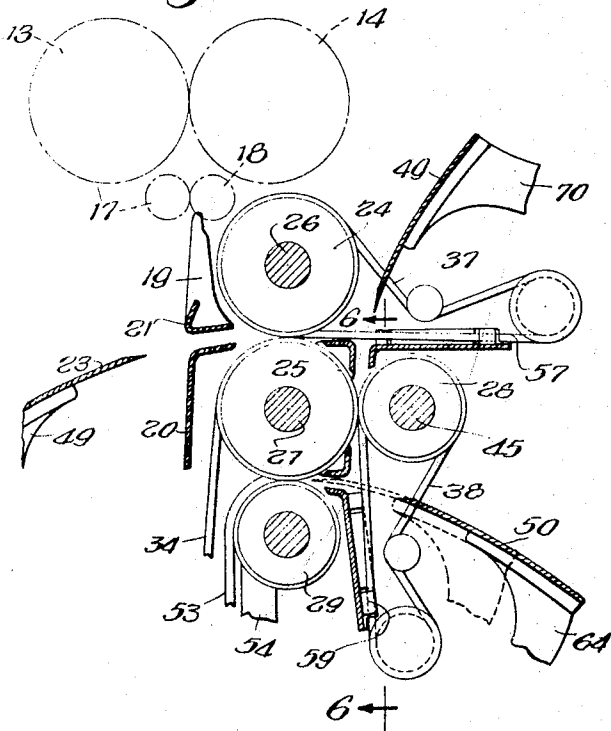
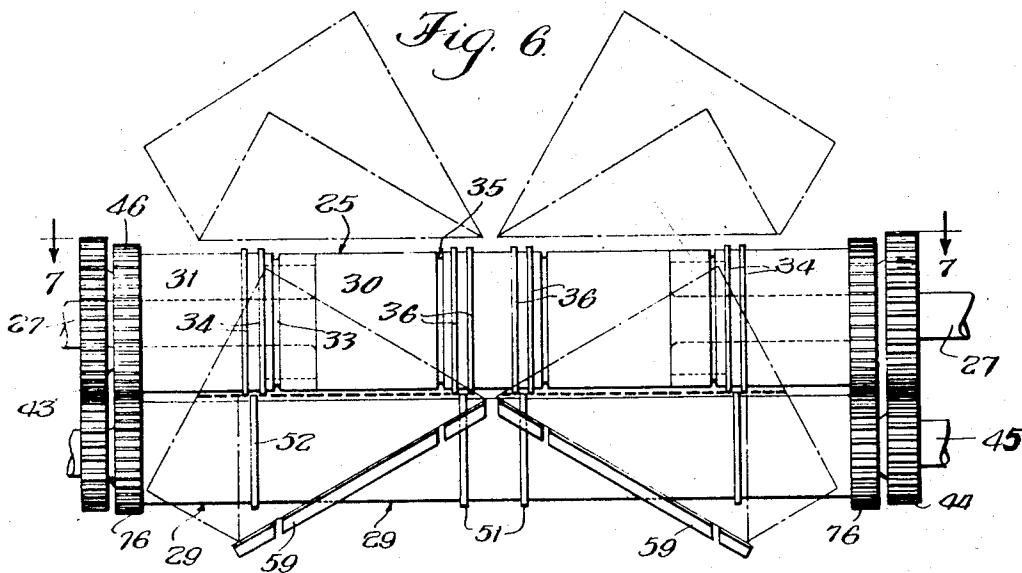


Fig. 6



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4 Sheets-Sheet 4

Fig. 7.

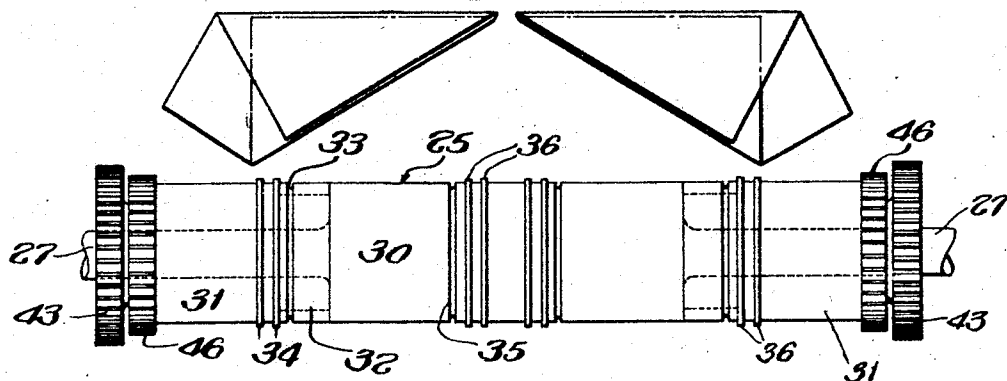
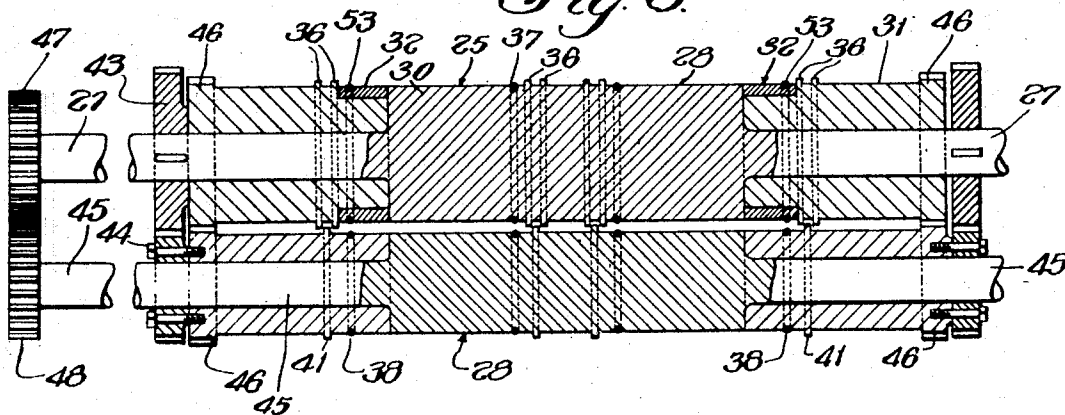


Fig. 8.



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UNITED STATES PATENT OFFICE

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FOLDING MACHINE

Application filed February 6, 1929. Serial No. 337,752.

This invention relates to improvements in folding machines, of which the following is a specification:

The machine of the present invention is designed primarily for the folding of paper napkins into what is known in the trade as the cornucopia fold, and the arrangement of the folding blades is so as to provide for a fold of this character. The material, tissue paper or the like, is fed in a continuous web or roll to the machine of the present invention and is first folded longitudinally or in line with its advance, after which it is delivered to cutting rolls which sever from the advancing web a length of folded material sufficient to constitute a rectangular article such as a napkin or the like. At the time the material is cut from the web, it will be once folded and the fold of two-ply material will be of a length equal to twice the width of the folded strip. The first folding blade then advances and initiates a fold cross-wise of the cut-off two-ply strip which results in a folding of the latter into a four-ply square folded section. It is necessary in order to fold this square four-ply section into the cornucopia shape to fold the square section inwardly along diagonal folding lines from opposite sides, and in order to secure these diagonally extending folds, provision is made for swinging or turning the section as it advances through the rollers so that it will fold on oblique rather than transverse lines. To secure this result, the feeding rollers are made in sections which were rotated at differential speed so that one side of the folded blank will be advanced more rapidly than the other and the present invention relates primarily to the construction and arrangement of these feeding rollers, and to the combination of such rollers with the folding blades in such way as to secure the end in view.

The invention also relates to the provision of guide belts running in conjunction with the rollers to assist in the feeding and ultimate delivery of the articles and to the general construction and arrangement of the machine as a whole and to the constituent parts thereof.

In the drawings:

Figure 1 is a side elevation of the machine

of the present invention, showing in dotted lines the general arrangement of the rollers and folding blades and their relation to one another.

Figure 2 is a diagrammatic view showing the folding blades in position to act upon the projected end of a sheet or strip of paper at the moment of severance and prior to the making of the first cross fold.

Figure 3 is a similar view with the paper sheet omitted and indicating in dotted lines the operation of the second folding blade in making the second fold.

Figure 4 is a plan view of the rollers taken on line 4—4 of Figure 3.

Figure 5 is a figure similar to Figures 2 and 3 illustrating the operation of the third folding blade.

Figure 6 is a view taken on line 6—6 of Figure 5.

Figure 7 is a view looking downwardly upon the center feeding roll in the act of delivering the napkin in its finally folded form.

And Figure 8 is a sectional plan view taken on line 8—8 of Figure 3.

The machine as a whole comprises a suitable or adequate framework which, in the form shown, comprises end plates or sections 10, mounted upon legs 11. A folder or former 12 of the character commonly employed in printing presses for longitudinally folding a web of paper is suitably supported above the machine and over this former, the continuous web travels in delivering the web in longitudinally folded condition to a pair of cutting rolls 13 and 14, the former of which may be considered as the male cutting roller and the latter of which as the female cutting roller. These cutting rollers are suitably carried upon shafts 15 and 16 suitably journaled in the end sections 10 of the frame.

The advancing once-folded web is carried on downwardly through a pair of rollers 17 and 18 and past guide members 19 and 20 until a length of the once-folded web has been downwardly projected sufficient, when unfolded, to constitute a rectangular napkin. Ordinarily the feeding rollers will be proportioned to feed a length of the once-folded web twice that of its width by the time the cutting

knives reach the point of severance, which is the condition indicated in Figure 2. The guide members 19 and 20 are provided with lips or flanges 21 and 22 suitably spaced from one another to provide a gap into which the folder blade or tucker 23 reciprocates as indicated in dotted lines in Figure 2.

The plane of movement of the folder blade is co-incident with the biting plane between a pair of folding rollers 24 and 25 mounted upon shafts 26 and 27, respectively. These rollers 24 and 25 are of special or peculiar construction and consist, in each case, of inner and outer sections, the latter of which rotate at greater speed than the former, to the end that, as the twice folded napkin passes through the rollers, it will be swung or skewed around as indicated in Figure 4 in preparation for the next fold which must be along an oblique line in order to conform to the ultimate folding of the napkin into cornucopia form. The roller 25, in addition to its co-operation with the overlying roller 24, co-operates with a horizontally adjacent roller 28 and also with an underlying roller 29, and since the rollers 24, 25 and 28 are all of the sectional formation above referred to, a description of one will, in the main suffice for all.

By referring to Figure 4, it will be noted that the machine is of duplicate construction and that the rollers are of a length to simultaneously fold two strips or webs of paper but since this is a matter of mere duplication, it is not deemed necessary to describe each end of each of the rollers, since a description of one end will suffice for both. The roller 25 comprises an inner or slow moving section 30, which is integrally formed with or rigidly mounted upon the shaft 27. Outwardly adjacent the slow section 30 is located a fast section 31 which surrounds the shaft and is freely rotatable thereon. The section 31 has rotatably or freely mounted thereon a ring 32 provided with a groove 33 adapted to receive a belt 34. Immediately adjacent to the ring 32, the fast section is provided with a pair of circumferential ribs or ridges 34. The slow section is likewise provided with a groove 35 and a pair of adjacent ribs 36 located near the center of the roller. The groove 35 is provided to receive a belt 37 (see Fig. 8) which belt corresponds in its line of travel to the belt 34.

The roller 24 is constructed in precisely the same manner to afford a fast section and a slow section and similar provision is made for the mounting of a pair of belts 37.

The roller 28 is in all respects similar to the roller 25 save in the matter of size, the roller 28 being of smaller diameter and in the case of the roller 28 similar provision is made for the mounting of a pair of belts 38, which are mounted in grooves 39 and 40 respectively. The slow section of the roller 28 is

provided with a single rib or ridge 41 which stands in staggered relation to the ribs 37 and similarly the fast section of the roller 28 is provided with a single rib 42 which stands in staggered relation to the ribs 34. The manner in which the rollers 25 and 28 are constructed and mounted is best illustrated in Figure 8. The shaft 27, which is formed rigidly with the slow section 30 of the roller, passes freely through the fast section 31 and has keyed thereon a spur pinion 43 which, in turn, meshes with a spur pinion 44 which is bolted or otherwise rigidly secured to the fast section of the roller 28. The spur pinion 44 is of lesser diameter than the pinion 43 and is freely mounted upon the shaft 45 which is rigid with the slow section of the roller 28. Each of the fast sections of each of the two rollers is provided with a spur pinion 46 which, in each instance, is of the same pitch diameter as the roller to which it is attached. These two spur pinions mesh with one another and maintain a uniform peripheral speed between the two fast roller sections. The shafts 27 and 45 are provided with inter-meshing spur pinions 47-48 which, in each instance, are formed to have a pitch diameter equal or proportionate to the diameters of the respective rollers so that the slow sections of each of the two rollers will run at the same peripheral speed.

As a result of the construction and arrangement above described, the slow sections of the co-operating rollers will be positively driven by the inter-meshing gearing at the same peripheral speed. The rotation of the shaft 27 which carries the keyed or splined pinion 43 will impart an increased speed of rotation to the fast section of the roller 28, and this increased rotation will, in turn, be imparted at the same peripheral speed to the fast section 31 of the roller 25 so that in the operation of the rollers, the coacting inner sections of the two rollers will travel together at a slower rate of speed, and the coacting two outer sections of the same rollers will rotate together at a higher rate of peripheral speed with the result that a section of paper fed into the bite of these rollers will be turned or skewed around during the passage therethrough, and this turning or swinging is made possible by the fact that the area of compressive contact against opposite sides of the paper is limited to the ribs or ridges 36-41 at the inner ends of the slow roller sections and by contact of the ribs or ridges 34-42 at the inner ends of the fast roller sections so that in passing through the rollers, the paper section previously folded will swing or pivot around its inner corner as shown in Fig. 6. It will be understood that Fig. 4 particularly illustrates the rollers 25-28, but the same construction, relation and mode of operation is preserved in the construction and mounting of the roller 24 so

that in passing between the rollers 24 and 25, the paper sheet will be swung or skewed into the position indicated in Figure 4 preparatory to descent of the second folder blade, which carries the paper down into the bite of the rollers 25—28. During the passage of the paper between these latter rolls 25—28, the folded napkin will be a second time swung or skewed around so that when the final fold is given, the napkin will pass out of the machine folded as indicated in Figure 7.

In order to produce the fold between the rollers 25—28, the second folder blade or tucker 49 is provided which from above works downwardly toward the bite between these rollers and this tucker blade is notched or slotted at suitable points to clear the narrow belts 37.

A third folder blade or tucker 50 is provided which works toward the bite between the rollers 25 and 29 and this folding blade or tucker acts upon the napkin after it has been given the first oblique fold and after it has been turned in position to receive the second oblique fold so that further turning or skewing of the folded napkin, as it passes between the rollers 25 and 29 is undesirable. For this reason the lowermost roll 29 is integrally formed and is driven as a one-speed fast roll having the same peripheral speed as the slow section of the roll 25. The roll 29 is provided with ribs 51 and 52 which coact with the ribs 36 and 34 respectively, but in view of the fact that the roll 29 is a one speed roll, the napkin will not be turned or skewed around during its final passage between these rolls.

The tucker or folding blade 50 is suitably notched or recessed to clear the belt 38 and in order to finally guide the folded napkins down to the point where they are stacked, belts 53 are provided which travel within the grooves 35 and 33 in the roller 25 and around and over the periphery of the roller 29, and which carry the folded napkins downwardly behind the edges of guide plates 54 until the napkins are stacked upon a table 55 along which they are fed in any suitable manner to the point of delivery.

Above the rollers 25 and 28, the machine is provided with spaced plates 56 which constitute a slotted table through which the folder blade works and in order to properly gauge the folds, the blade 56 is provided with an obliquely disposed gauge bar 57, positioned as shown in Fig. 4 which limits the outward movement of the twice-folded blank so as to bring it into the desired oblique relation in preparation for the downward movement of the second folder blade. In like manner, spaced plates 58 are provided adjacent the rollers 25 and 29, through which the tucker or folding blade 50 operates, and in this instance also, obliquely disposed

gauge bars 59 are provided for properly gauging the napkins in preparation for the final fold.

While the present invention is not concerned with any particular means or mechanisms for imparting the necessary movements to the folding blades or tuckers in proper timed relationship, Fig. 1 serves to illustrate an adequate mechanism appropriate for this purpose. As shown, the shaft 15 has mounted on its outer end a short crank 60 which carries a long link 61 operating a longer crank 62 mounted upon a rocking shaft 63, upon which is mounted a tucker arm 64 which carries the folding blade or tucker 50. This arrangement causes a rocking of the shaft 63 and a swinging of the folder blade 50 at proper intervals. The shaft 15, at its opposite end, carries a short crank arm 65 oppositely disposed in relation to the crank arm 60, which crank arm 65 serves to operate a link 66 which, in turn, operates a long crank arm 67 on a shaft 68 which carries the tucker arm 69 carrying the tucker or folder blade 23, causing this blade to act in opposition to the blade 50. The tucker 49 is carried by the tucker arm 70 which is mounted upon shaft 71 carrying the long crank 72, which is connected by a link 73 with a short crank 74 mounted upon a shaft 75. The rotation of the shaft 75 serves to rock the shaft 71 and with it the tucker arm and folding blade. The rollers are all driven from the centrally disposed roller 25, the rollers 24 and 29 being provided in each instance with suitable gears which it is not deemed necessary to illustrate in detail. The lowermost one-speed roll 29 is driven by a pinion 76 which meshes with the fast speed pinion 46 of the centrally disposed two-speed roller 25 so that the peripheral speed of the lowermost roll will be the same as that of the fast section of the center roll with which it co-operates.

In operation the once-folded strip or web of paper is fed downwardly past the cutting rollers until the proper length has been delivered, at which point the section is severed and the first folding blade advances to initiate a straight cross-fold between the rollers 24 and 25. The napkin thus delivered will be folded down between these rollers along the transverse line initiated by the folding blade and as the napkin passes between the rolls, it will be skewed around into oblique relation preparatory to the initiating of the first oblique fold which is caused by the downward thrust to the second folding blade. This oblique fold is completed as the napkin enters between the rollers 25 and 28, and as it passes between these rolls it will be further skewed around or turned in position to receive the final oblique fold which is initiated by the advance of the third folding blade 50. In the final passage between the middle roll

25 and the lower roll 29, the folded napkin will be fed through without further turning at the fast speed due to the gear co-action between the fast section of the middle roll and the lowermost roll 29 and in this condition of the fold, the contact of the slow section of the middle roll will be ineffective to retard the advance of the inner or pointed end of the folded napkin since the roller contact at this end will be but momentary by reason of the fact that the pointed end of the folded napkin presents but a slight area of contact so that the napkin will be fed through at its pointed end before it is further turned or displaced.

While I have herein shown and described what I now consider the preferred manner of carrying out my invention the same is merely illustrative, and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In a folding machine, the combination of coating roller elements, each roller element being constructed in sections, means for driving one set of coating sections of the respective roller elements at one rate of speed, and means for driving other coating sections of the respective roller elements at a different speed to cause a turning or skewing movement of material fed through the roller elements.

2. In a folding machine, the combination of coating roller elements, each roller element being constructed in sections, means for driving one set of coating sections of the respective roller elements at one rate of speed, and means for driving other coating sections of the respective roller elements at a different speed to cause a turning or skewing movement of material fed through the roller elements, and a folder blade coating with the roller elements to initiate a fold in sheets of material fed between the roller elements.

3. In a folding machine, the combination of coating roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections.

4. In a folding machine, the combination of coating roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections con-

nected therewith, and gear elements in train with the other roller sections and in train with one of the shafts, and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections.

5. In a folding machine, the combination of coating roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements.

6. In a folding machine, the combination of coating roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and in train with one of the shafts, and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements.

7. In a folding machine, the combination of coating roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements, and each of the roller elements being provided with a continuous belt to facilitate feeding of the material.

8. In a folding machine, the combination

of coacting roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and in train with one of the shafts, and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements, and each of the roller elements being provided with a continuous belt to facilitate feeding of the material.

9. In a folding machine, the combination of coacting roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements, and each of the roller elements being provided with a continuous belt to facilitate feeding of the material, one of the roller sections being provided with a freely mounted ring upon which the belt for that section is carried to permit travel of the belt independently of the peripheral speed of the roller section.

10. In a folding machine, the combination of coacting roller elements, each roller element comprising a fast section and a slow section, a shaft for each roller element, rigidly connected with one of the sections and having the other section journaled thereon, means for driving the shafts to impart uniform peripheral speed to the sections connected therewith, and gear elements in train with the other roller sections and in train with one of the shafts, and adapted to impart to the last mentioned set of roller sections a peripheral speed different from that of the first mentioned set of roller sections, each set of roller sections being ribbed around a confined area to center the compressive action along certain defined lines to facilitate the turning or skewing of the sheets of material fed through the roller elements, and each of

the roller elements being provided with a continuous belt to facilitate feeding of the material, one of the roller sections being provided with a freely mounted ring upon which the belt for that section is carried to permit travel of the belt independently of the peripheral speed of the roller section.

11. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers.

12. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, and belts passing around certain of the rollers to assist in the feeding of the material.

13. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, the coacting surfaces of the roller pairs which serve to turn or skew the folded material being ribbed throughout confined areas to concentrate the compressive action along certain lines to facilitate the turning or skewing movements.

14. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, and belts passing around certain of the rollers to assist in the feeding of the material, the coacting rollers of the roller pairs which serve to turn or skew the folded material being ribbed throughout confined areas to concentrate the compressive ac-

tion along certain lines to facilitate the turning or skewing movements.

15. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, an obliquely disposed gauge bar for positioning the material in obliquely disposed relation after passage between the upper and central rollers, and an obliquely disposed gauge bar for positioning the fed material after passage between the central and intermediate rollers.

16. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first roller blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller co-acting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, and belts passing around cer-

tain of the rollers to assist in the feeding of the material, an obliquely disposed gauge bar for positioning the material in obliquely disposed relation after passage between the upper and central rollers, and an obliquely disposed gauge bar for positioning the fed material after passage between the central and intermediate rollers.

17. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, the coacting surfaces of the roller pairs which serve to turn or skew the folded material being ribbed throughout confined areas to concentrate the compressive action along certain lines to facilitate the turning or skewing movements, an obliquely disposed gauge bar for positioning the material in obliquely disposed relation after passage between the upper and central rollers, and an obliquely disposed gauge bar for positioning the fed material after passage between the central and intermediate rollers.

18. In a folding machine for folding sheets of material into cornucopia form, means for first longitudinally folding a continuous web of material, means for cutting sections from the first folded web, an upper roller and a central roller in coacting relation, each of said rollers being provided with a fast section and a slow section, adapted to cause a turning or skewing of the sheets of material while being fed through the rollers, a first folder blade positioned to initiate a cross fold in the first folded cut-off section and to introduce a sheet in four-ply folded condition between the upper and central folding rollers, an intermediate folding roller coacting with the central roller and consisting of fast and slow sections coacting with the fast and slow sections of the central roller, a second folding

blade adapted to initiate an obliquely directed fold in the four-ply folded material delivered through the first set of rollers, and to introduce the material thus folded between the central and intermediate folding rollers, a lower folding roller coacting with the central folding roller, and a third folder blade adapted to initiate a fold in the material delivered from the central and intermediate folding rollers, and belts passing around certain of the rollers to assist in the feeding of the material, the coacting rollers of the roller pairs which serve to turn or skew the folded material being ribbed throughout confined areas to concentrate the compressive action along certain lines to facilitate the turning or skewing movements, an obliquely disposed gauge bar for positioning the material in obliquely disposed relation after passage between the upper and central rollers, and an obliquely disposed gauge bar for positioning the fed material after passage between the central and intermediate rollers.

In witness that I claim the foregoing I have hereunto subscribed my name this 31st day of January, 1929.

SAMUEL J. CAMPBELL.