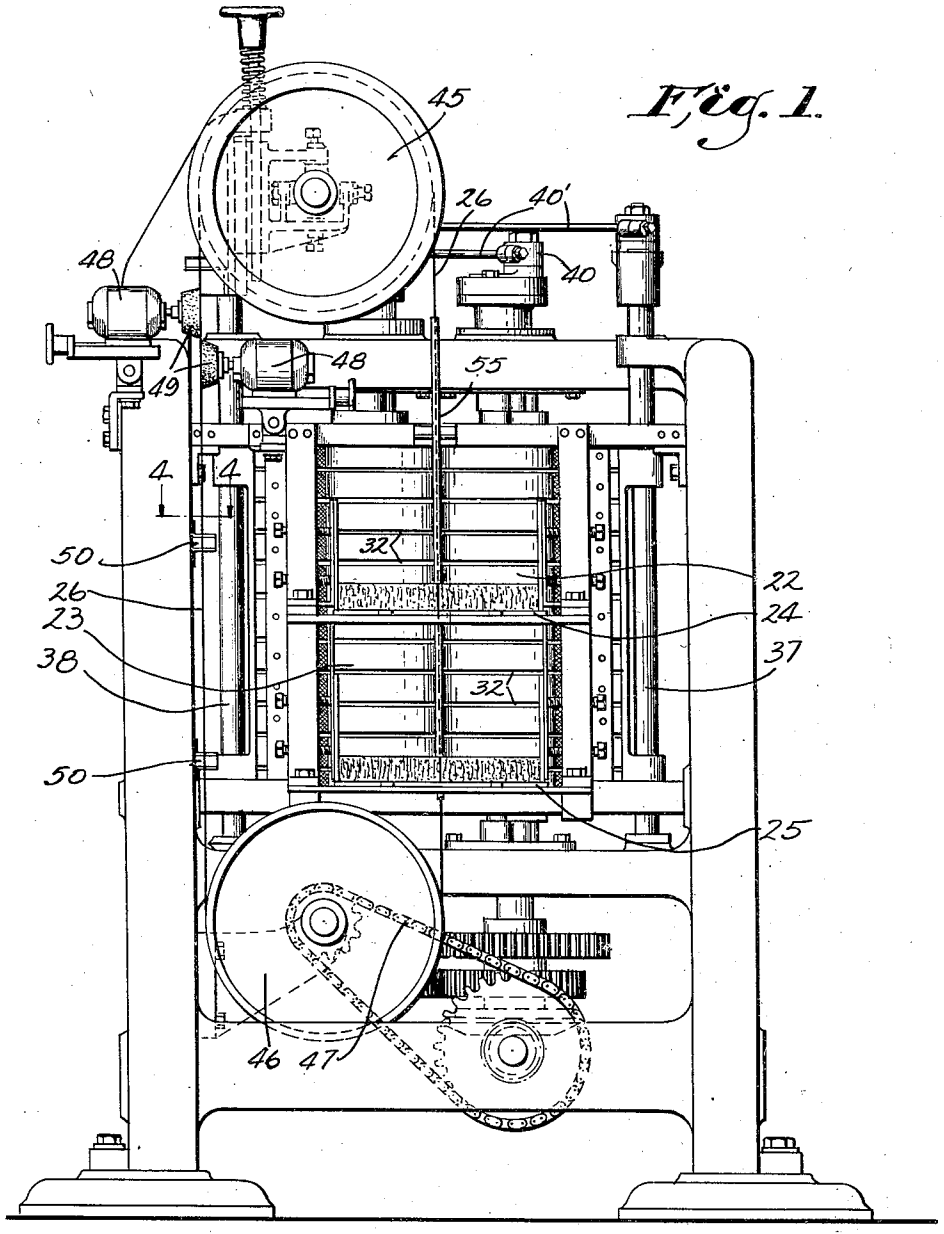
April 19, 1938. S. J. CAMPBELL 2,114,415

ART OF MANUFACTURING FOLDED PAPER ARTICLES

Original Filed July 31, 1933 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

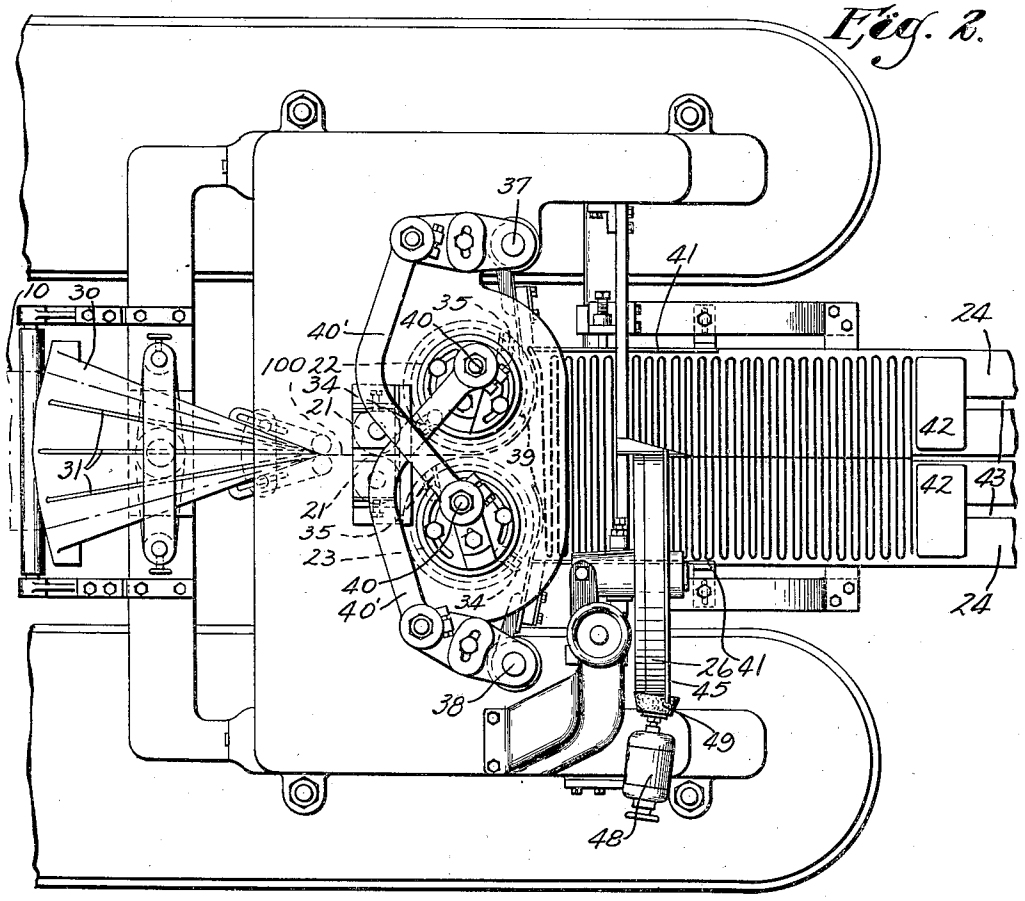


Fig. 3.

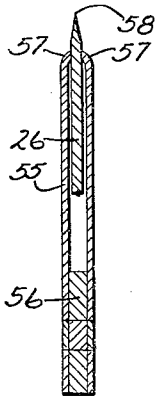


Fig. 4.

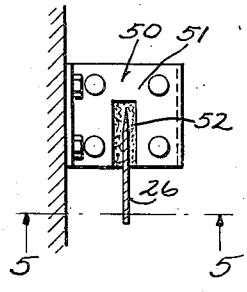
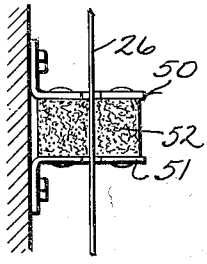


Fig. 5.



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ART OF MANUFACTURING FOLDED PAPER ARTICLES

Samuel J. Campbell, Green Bay, Wis., assignor of one-half to Hudson Sharp Machine Company, Green Bay, Wis., a corporation of Wisconsin

Original application July 31, 1933, Serial No. 682,930. Patent No. 2,057,879. Divided and this application April 13, 1936, Serial No. 74,042

3 Claims. (Cl. 164—35)

This invention relates to improvements in the art of manufacturing folded paper articles. The present application is a division of my application Serial Number 682,930, filed July 31, 1933, and bearing the same title.

Broadly speaking, it is the object of the present invention to provide novel and compactly organized means for folding and severing a web to produce folded paper articles therefrom. More particularly, however, the present application pertains to the severing operation and the means by which the previously folded web is slit in a continuous operation to form quarter folded paper sheets.

It is my purpose to avoid the streaking or the spoiling of the paper by using a band knife having means for continually sharpening and wiping the band and means protecting the paper from contact with the knife, except at the cutting edge thereof.

In the drawings:

Figure 1 is a front elevation of a machine embodying the invention.

Figure 2 is a plan view of the apparatus shown in Figure 1.

Figure 3 is an enlarged detail view in horizontal section showing the cutting knife and its guard.

Figure 4 is an enlarged detail view taken in section on the plane indicated at 4—4 in Fig. 1.

Figure 5 is a front elevation of the parts shown in Fig. 4 taken on the plane indicated at 5—5 in Fig. 4.

Like parts are designated by the same reference characters throughout the several views.

The folding apparatus will be but briefly described herein.

The web 10 passes over a forming plate 30 having ribs 31 which longitudinally fold the paper in a known manner. The folded web is squeezed between the rolls 21 which crease the folds therein. Thence the folded web passes directly between the folding rolls 22 and 23 which preferably rotate on vertical axes and have sufficient length so that a plurality of webs may be acted upon simultaneously.

The folding rolls 22 and 23 are equipped with any suitable paper engaging means, and are arranged to act alternately upon the paper so that the web is engaged first by one roll and then by the other, to be folded in zigzag convolutions. There are several web engaging means well known to the art. Fig. 2 illustrates broadly vise jaws and tucking blades for this purpose, but any other suitable means may be substituted for the purposes of the present application. It is sufficient for the purposes of this general description to note the fact that the folded and convoluted web is discharged directly from the folding rolls 22 and 23 on to the packer guides 24 and 25 where it is acted upon by a cutting knife or saw 26 which may or may not have teeth, according to the particular requirements of the paper stock of which the web is composed.

The folding rolls have peripheral grooves at 32 in which operate the packer and stripper fingers hereinafter to be described. As above noted, the folding rolls are so made as to engage the longitudinally folded web 100 alternately to draw it first in one direction and then the other, so as to produce a series of zigzag convolutions in a horizontal plane upon the packer guides 24 and 25. In accordance with one conventional type of machine, I have illustrated tucker blades at 34 in each of the rolls 22 and 23 co-acting with vise jaws 35 in the other roll, to thrust the paper into the vise, first of one roll and then the other.

Laterally adjacent the folding rolls 22 and 23 are rock shafts 37 and 38. Each of these is provided with a set of stripping and packing fingers 39 which normally ride in the grooves 32 of the respective rolls, as shown in connection with roll 22 in Fig. 2, but are movable out of the grooves as shown in connection with roll 23 in Fig. 2, to pack the previously completed transverse fold in the web. Each of the rolls carries a crank pin 40 which transmits motion through a connecting rod 40' to the rock shaft 37, 38 of the other roll.

The longitudinally and transversely folded and packed web is delivered on to the packing guides 24 and 25 between the adjustable side plates 41 and against the resistance of the weights 42 which are movable longitudinally of the guides along the slots 43 therein. The folded, packed, and convoluted web is now sawed or cut by the knife 26 to produce two sets of folded and packed paper articles, such as napkins or the like.

The saw or knife preferably comprises a band knife operating over two pulleys 45 and 46, the upper pulley 45 being adjustable to maintain the knife under proper tension, and the lower pulley being driven by chain 47 from the drive gearing which is concentrated in the bottom of the machine as shown in Fig. 1. The small motors 48 are available to be operated when the knife 26 requires sharpening. The motors are adjustable and are provided with abrasive wheels 49, as best shown in Figs. 1 and 2. They may operate on the knife while the machine is in operation with-

out soiling the paper, due to the feature now to be described.

A knife used without special protection will discolor the severed sheets upon which it acts. This discoloration is produced even if the knife is not sharpened while in use. It results partly from small particles of metal and dirt carried by the knife, partly from material worn from the knife while in use, and partly by the friction upon and possible scorching of the web due to the rapidity of motion of the knife.

On the frame of the machine just beyond the abrasive wheels **49** in the direction of knife movement, is a cleaning device **50** shown in detail in Figs. 4 and 5, which comprises a notched housing **51** packed with felt at **52** through which the knife blade **26** operates. This cleaning device removes foreign matter from the knife, particularly such as accumulates during the sharpening operation. In addition, however, it is very important that the paper be protected from the frictional abrasion of all portions of the knife except the edge used in cutting through the convoluted web.

Fig. 3 shows in detail a guard **55** which is illustrated in Fig. 1. A pair of plates connected together about a spacer **56** converge at **57** on opposite faces of the annulus knife **26**, immediately adjacent the cutting edge **58** thereof. As soon as the knife has severed the folded and convoluted web, the folded sections or articles are separated on the guides **24** and **25** by the converging marginal portions **57** of the guard plates, so that the area of the band knife required to give it suitable strength will not contact the margins of the severed articles. It has been found that the use of such a guard enables the satisfactory commercial production of clean edged articles, such as could not otherwise be produced. The folded and convoluted web is preferably packed prior to cutting in order to facilitate the operation of the band knife which operates in a given position intermediate the path upon which the packed and convoluted portions of the web are forced. The movement of the convoluted portion of the web past the knife severs the web in between the transverse or convolution-folds and leaves the completed folded product in two rows on each side of the knife.

The present machine is a multiple machine handling a plurality of webs with a single set of creasing and folding rolls and a single knife. The rolls may be extended to produce a machine of any desired capacity.

The substantially horizontal movement of the web in passing through the machine is a feature making for great compactness, simplicity and economy of construction. As above noted, the driving gearing is all disposed at the bottom of the machine and is thereby enclosed to prevent possible injury to the operator. The vertical disposition of the folding and creasing rolls enables them to be driven directly from the mechanism at the bottom of the machine. The exact details of the driving connections are not disclosed because it will be obvious to anyone skilled in the art how driving connections may be organized to operate the various shafts disclosed.

I claim:

1. Paper converting apparatus comprising the combination with a paper cutting blade having a continuous edging, of means for actuating said blade at high speed, means at a certain station in the path of movement of said edge for advancing paper thereto, means at another station in the path of movement of said edge for the resharpening thereof, and soft wiping pads interposed between said resharpening means and said first mentioned station and positioned to engage both faces of the blade.

2. A device of the character described, comprising means for packing and advancing plies of paper in substantial face contact, the direction of advance being transverse with respect to the plane of the face of the paper in each successive ply, a cutting tool in the path of paper advance comprising a blade substantially aligned with the direction of paper advance and disposed centrally to sever the successive plies into substantially equal parts, said blade having a marginal cutting edge, means for operating the blade transversely of the face of the paper, and a guard housing portions of the blade having said edge, said guard including side members diverging from a point near said edge to spread the paper articles severed by said edge and to protect their exposed severed fibers from abrasion by said blade.

3. A device of the character described, comprising the combination with means for packing and advancing plies of paper in substantial face contact, the direction of advance being substantially at right angles to the plane of the face of each ply, a band knife disposed centrally in the path of advance of the packed plies of paper and having a marginal cutting edge substantially aligned with the direction of paper advance presented to the successive plies, a guard housing portions of said band knife presented to said plies and including side members diverging from a point near said edge to spread the exposed severed fibers of the plies cut by the knife, said knife being substantially symmetrically tapered toward said edge, sharpening means engaging opposite faces of said band knife for sharpening the edge thereof, and wiping pads engaging both faces of said blade adjacent the edge thereof and disposed in the path of advance of said knife from said sharpening means to the point where said knife acts upon the plies of paper, said wiping pads being adapted to remove foreign matter from that portion of the blade which is not protected by the guard.

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