

No. 863,958.

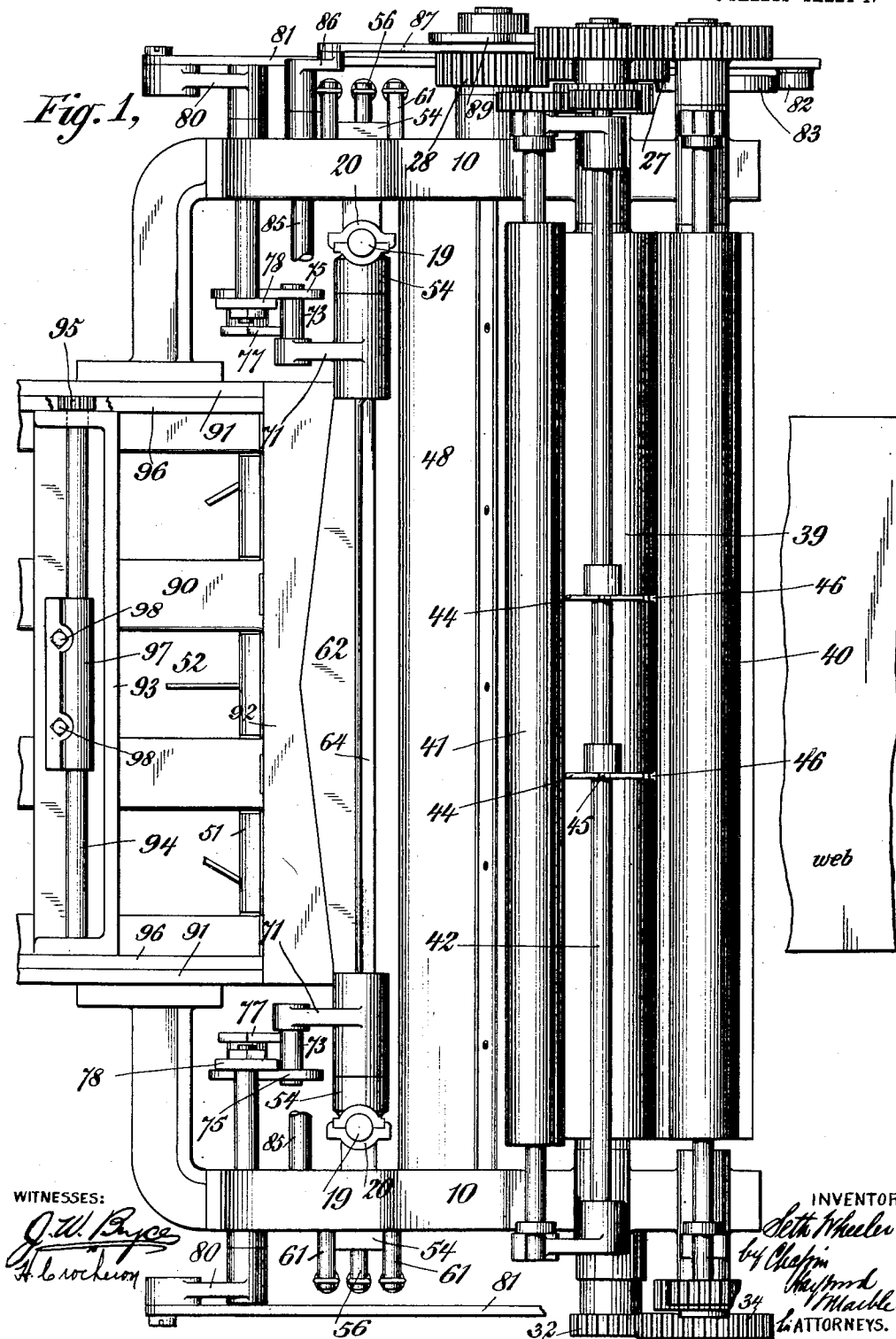
PATENTED AUG. 20, 1907.

S. WHEELER.

APPARATUS FOR PRODUCING INTERFOLDED PAPER PACKAGES.

APPLICATION FILED OCT. 10, 1905.

6 SHEETS—SHEET 1.



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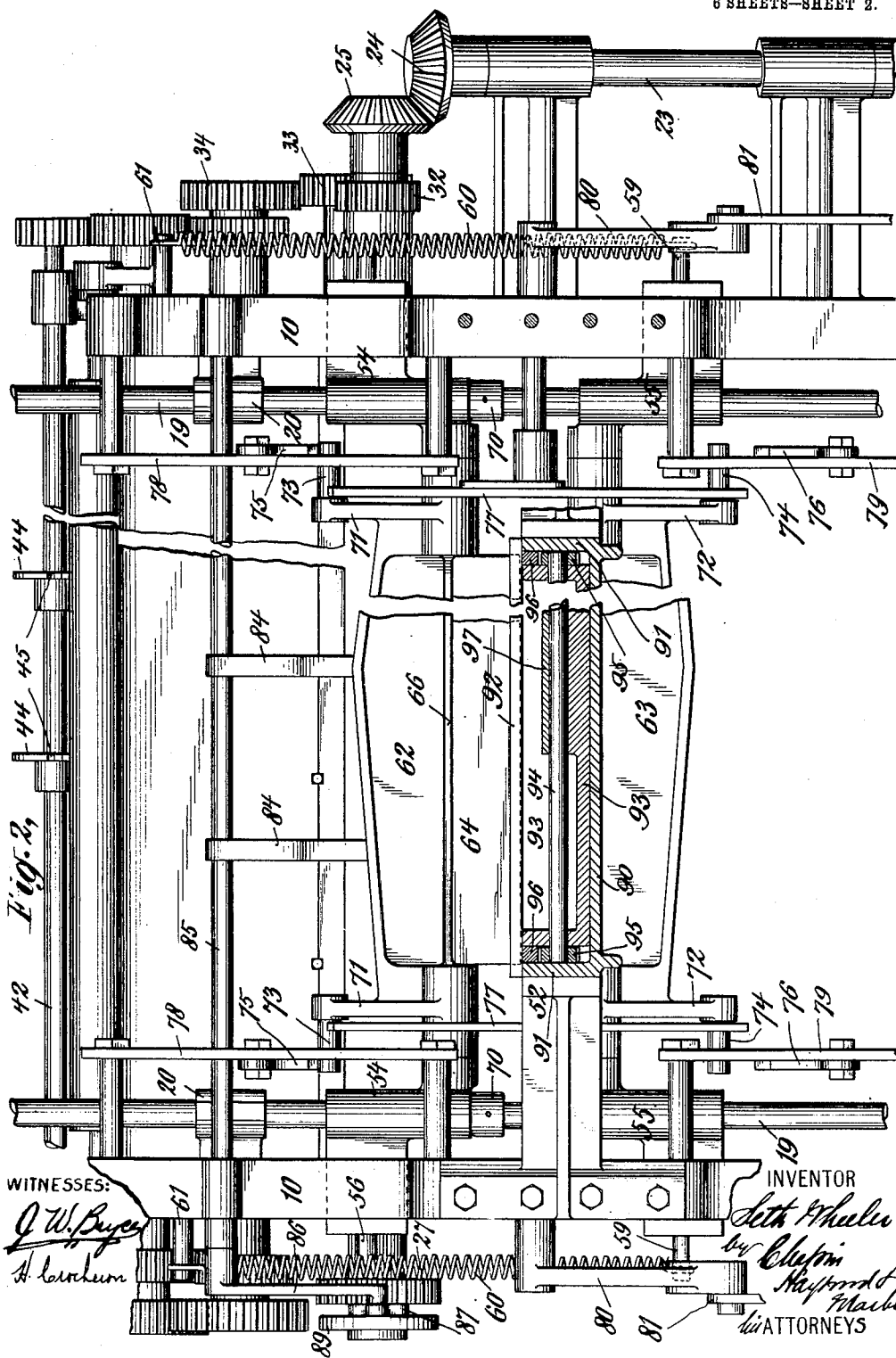
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6 SHEETS—SHEET 2.



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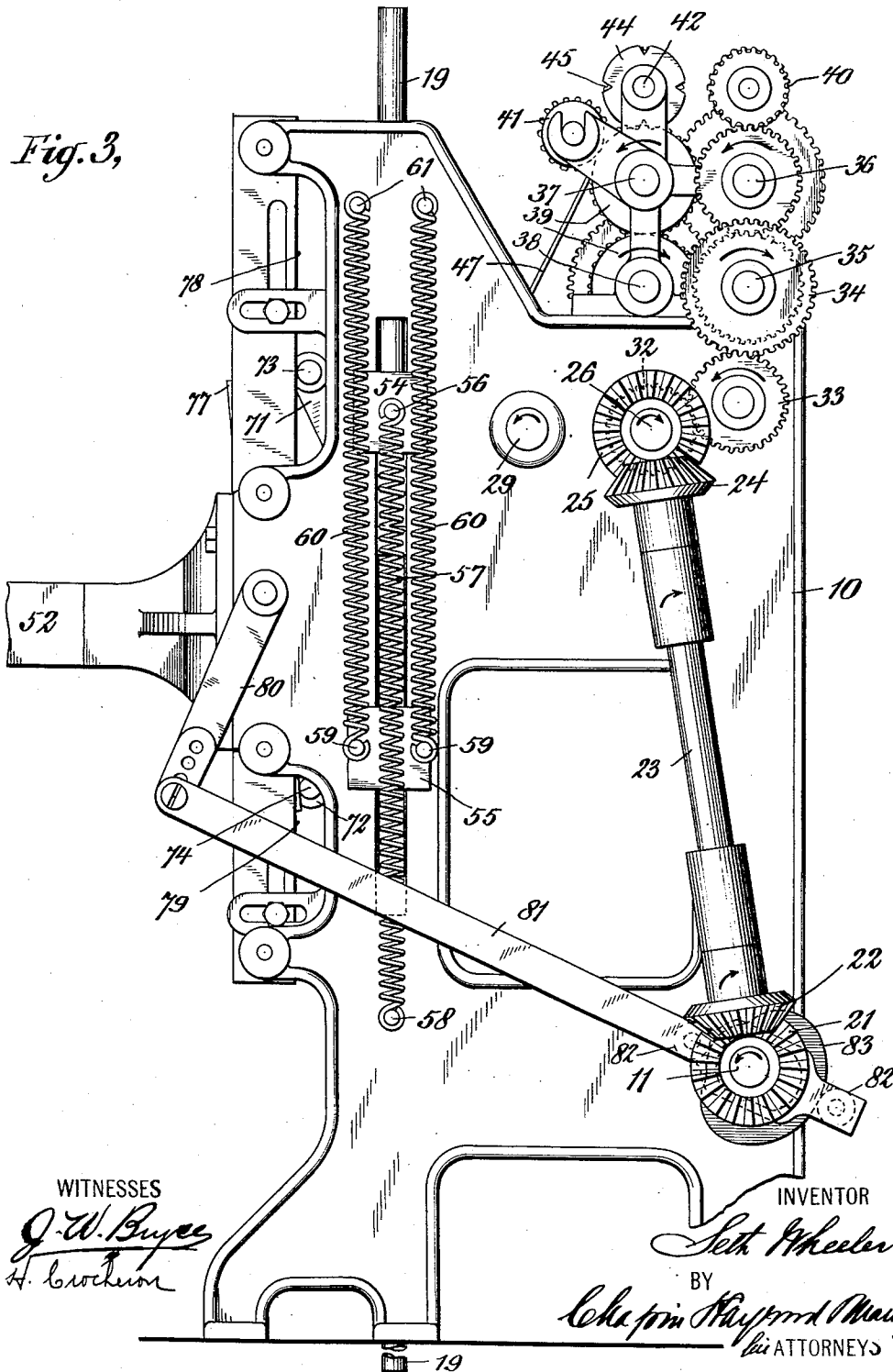
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6 SHEETS—SHEET 3.

Fig. 3.



WITNESSES

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BY

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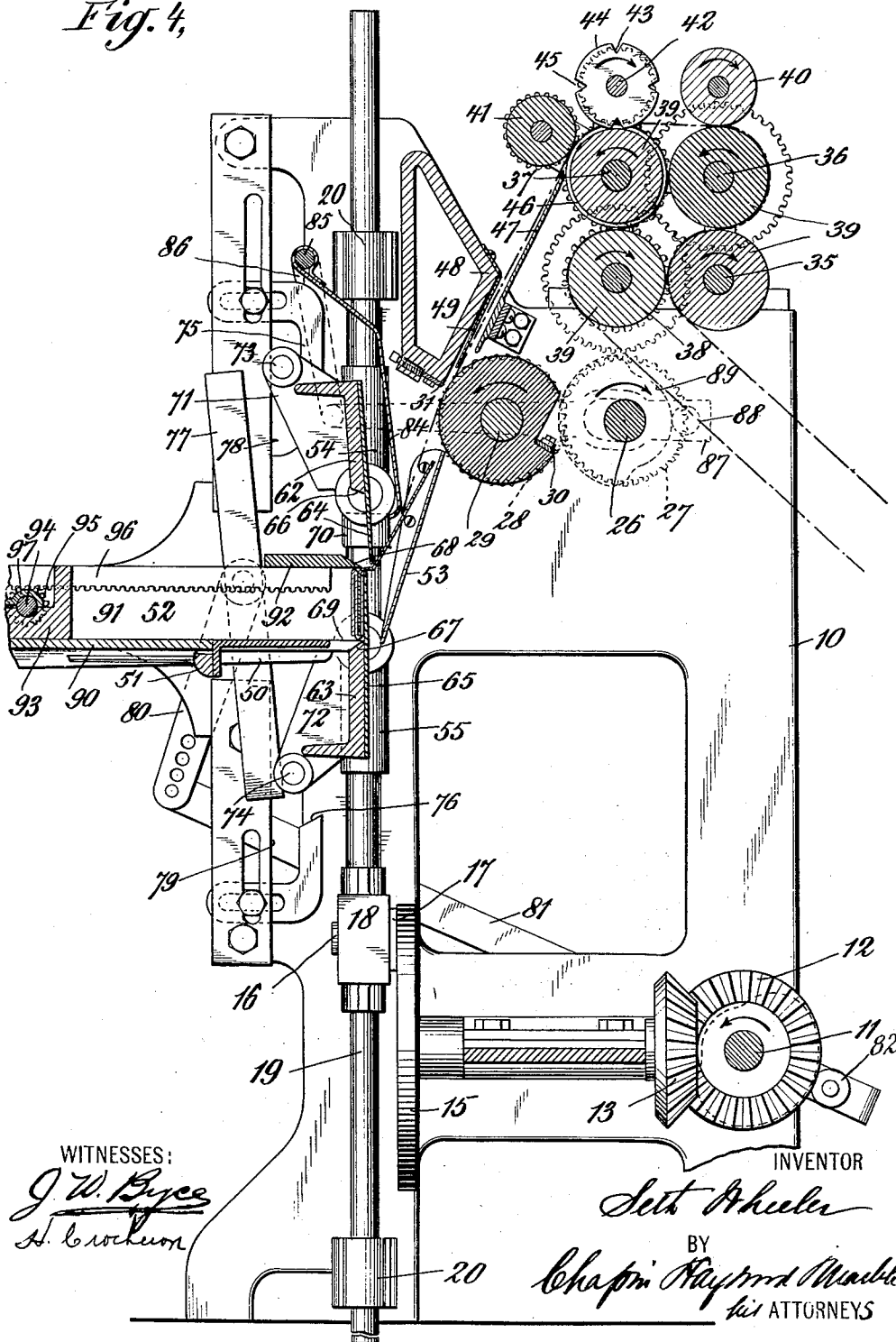
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6 SHEETS—SHEET 4.

Fig. 4,



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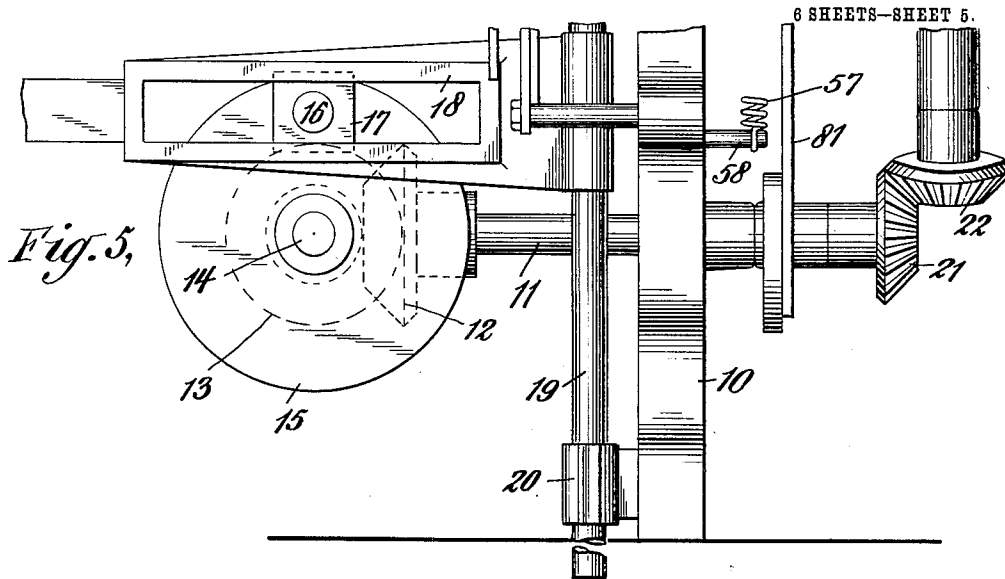
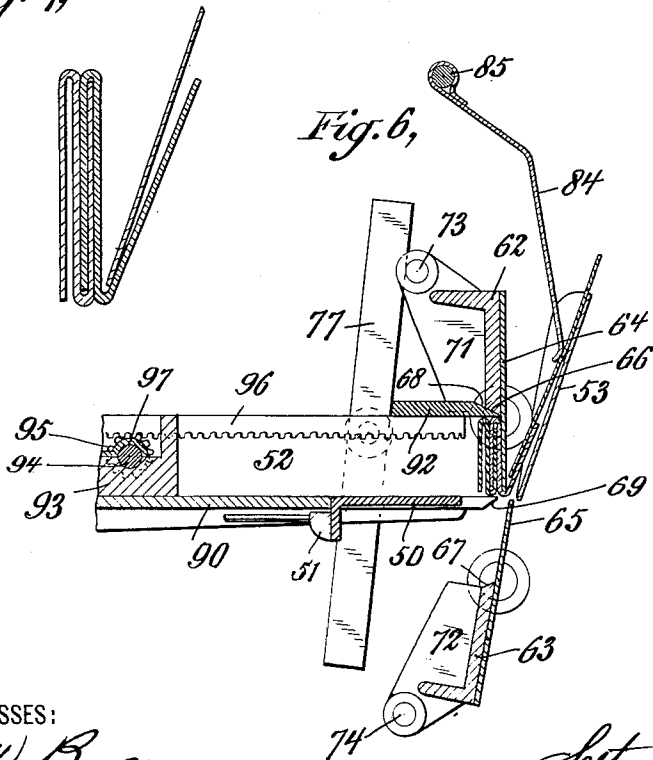


Fig. 7,



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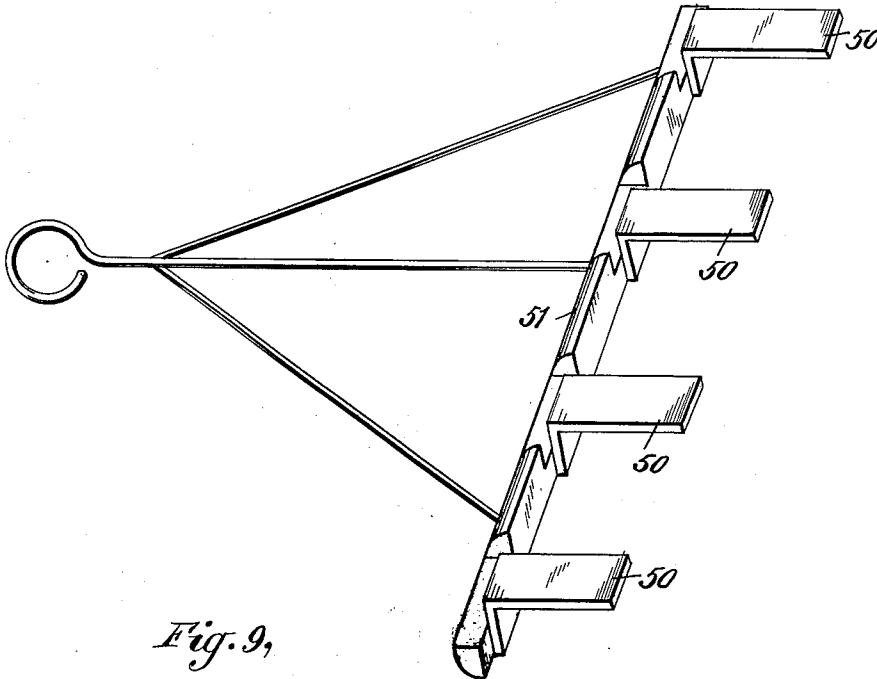
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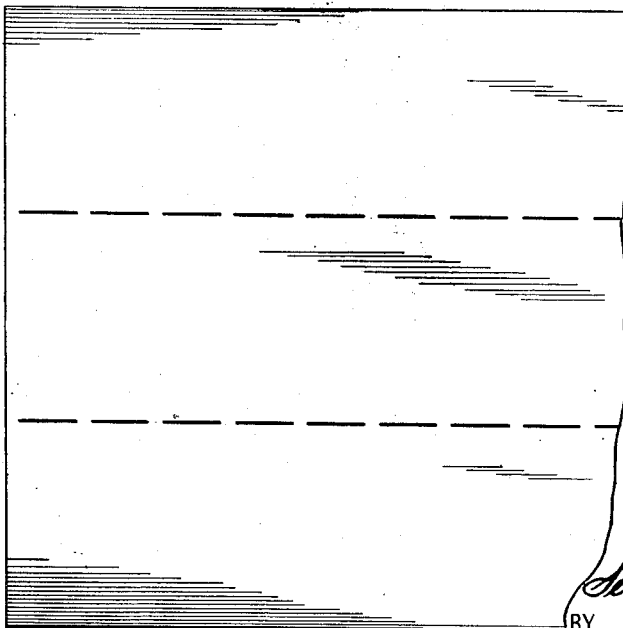
APPLICATION FILED OCT. 10, 1905.

6 SHEETS—SHEET 6.

*Fig. 8,*



*Fig. 9,*



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# UNITED STATES PATENT OFFICE.

SETH WHEELER, OF CASTLETON, NEW YORK.

## APPARATUS FOR PRODUCING INTERFOLDED PAPER PACKAGES.

No. 863,958.

Specification of Letters Patent.

Patented Aug. 20, 1907.

Application filed October 10, 1905. Serial No. 282,151.

*To all whom it may concern:*

Be it known that I, SETH WHEELER, a citizen of the United States of America, and a resident of Castleton, in the county of Rensselaer, State of New York, have invented certain new and useful Improvements in Apparatus for Producing Interfolded Paper Packages, of which the following is a specification, reference being had to the accompanying drawings forming a part thereof.

My invention relates to improvements in folding machines, and particularly to machines for folding and interfolding a series of units, each comprising one or more sheets, so as to simultaneously produce a plurality of interfolded packages, the units of each package having three or more leaves, the terminal leaves of which are interfolded with the terminal leaves of adjacent units.

In a former U. S. patent No. 777,761, granted to me Dec. 20th, 1904, I disclosed a process and apparatus for folding and interfolding units comprising single or superposed sheets, but the capacity of the machine therein illustrated was limited to the interfolding of but a single series of units, and thus to the production of but a single package at a time.

It is the main object of my present invention to produce a plurality of such packages at a time without correspondingly increasing the instrumentalities employed for folding and interfolding.

In an attempt to produce a plurality of packages simultaneously, I have found, first, that it is impracticable to fold a wide sheet into a single package and then sever the package so produced to form a number of packages, owing to the difficulty and expense attached to the severing of the material after the packages are completed. I have also tried to sever a wide sheet into a plurality of strips as or before the same is fed to the folding instrumentalities, but the result thereof has been that the edges of the interfolded sheets of one series of packages would slightly overlap the edges of the sheets of adjacent packages on one side or the other thereof. This caused the adjacent packages to be connected together in such a way as to render their division quite difficult. Further, when finally the adjacent packages were divided one from another, the edges thereof, instead of being true, so that the packages would fit nicely into the receptacles for dispensing them, were rough and uneven, certain of the units projecting beyond the body portion of the packages on both sides thereof. To attempt to straighten out such a package would take so much time as to increase the cost of manufacture to a prohibitive point. I finally tried the experiment of only partially slitting the sheets lengthwise thereof, (such being performed by producing a series of slits interrupted by uncut portions which served as frangible ties) whereby lateral relationship of the resulting units would in no case be disturbed, then folding and interfolding the sheets in this condition,

(thus forming a single wide package, comprised, however, of a number of smaller packages frangibly connected together) and finally severed the said smaller packages laterally from each other along the lines of previous partial severance. The connecting portions or ties were so small and fragile that the severance was very easily accomplished, but even this slight connection was sufficient to prevent any lateral overlapping, and a plurality of perfectly formed packages was economically produced.

My invention, then, consists in an improved apparatus for producing interfolded paper packages consisting in means for partially severing a web longitudinally and for folding and interfolding a combined package the entire width of the web, so that the product thus formed may be separated into a plurality of packages by completely severing the web along its lines of partial severance; and, broadly, in an apparatus comprising the combination with folding means for folding and interfolding sheets, of means for partially severing the sheets widthwise.

My invention also consists in novel means for operating the folding devices, in a reciprocating guide device or deflector for the severed units, and in certain novel details of construction and combination of parts as will hereinafter be more fully pointed out.

In order that my invention may be fully understood, I will now describe a machine forming an embodiment thereof, the said machine being illustrated in the accompanying drawings, in which

Figure 1 shows a top view of the machine. Fig. 2 shows a view in rear elevation of the upper portion of the machine, with certain parts in vertical longitudinal section and other parts broken away. Fig. 3 is a view in end elevation of the machine with certain parts broken away. Fig. 4 is a view in central vertical transverse section of the machine with certain parts broken away. Fig. 5 is a detail view in rear elevation of certain parts comprised in the lower portion of the machine, including means for imparting a vertical movement to the operating spindles. Fig. 6 is a detail transverse sectional view of certain parts shown in Fig. 4, but in different positions, in order to illustrate the folding operation. Fig. 7 is a detail view on a larger scale showing two interfolded units, with the end of a third unit received within the uncompleted terminal fold of one of the units. Fig. 8 is a view in perspective of a temporary supporting device, employed when first starting up the machine. Fig. 9 is a view of a portion of a web, partially severed into strips.

The machine comprises a suitable framework supporting a drive shaft 11. Miter gears 12 are fixed upon the said drive shaft arranged in mesh with miter gears 13 upon short shafts 14 arranged at right angles to the shaft 11. Each of the shafts 14 carries a disk 15 (see particularly Figs. 4 and 5,) said disks provided with

crank pins 16. Bearing blocks 17 are mounted upon the said crank pins 16, and are arranged to slide in yokes or cross heads 18, secured, respectively, to operating spindles 19. The operating spindles 19 are located, as will be seen, upon opposite sides of the machine, being arranged to slide vertically in stationary bearings 20 secured to, or formed as a part of, the main frame 10. Rotation of the short shafts 14, which will take place synchronously with the driving shaft 11, will, then, produce a reciprocating movement of the operating spindles 19, and the said operating spindles, in their reciprocation, are arranged to operate folding devices in a manner to be presently described. The drive shaft 11 also drives feeding, slitting and cutting mechanism. For this purpose the said shaft is provided at one end thereof outside of the frame 10 with a miter gear 21, said miter gear being in mesh with a corresponding miter gear 22 upon an obliquely arranged shaft 23. Said shaft 23 is provided at its upper end with a miter gear 24 arranged in mesh with a similar miter gear 25 secured to and carried by a horizontal shaft 26. This shaft extends all the way across the machine, and, at the opposite end thereof, carries a gear-wheel 27 in mesh with another gear 28 fast upon a cutter shaft 29 arranged parallel therewith. The cutter shaft 29 carries a rotary cutter 30 which, in its revolution, co-acts with a stationary cutter 31 to sever the web transversely into sheets. The shaft 26 is also provided, at a point near the miter gear 25, with a pinion 32, arranged in mesh with an idler pinion 33, in turn arranged in mesh with a gear-wheel 34. The gear-wheel 34 is mounted upon the end of a horizontal shaft 35, said shaft forming one of a group of feed-roller-supporting shafts. The other shafts of this group are designated by reference characters 36, 37 and 38, being geared together by suitable gearing driven from the shaft 35, as will be well understood. Feed rollers 39 are arranged upon each of the said shafts 35, 36, 37 and 38, pressure rolls 40 and 41 being arranged adjacent the rollers 39 of the shafts 36 and 37, respectively.

A horizontal shaft 42 suitably driven by a pinion 43 in mesh with the same train of gearing, is arranged immediately above the shaft 37, the pressure roll 41 being set off to one side of a vertical plane passing through the axis of the shaft 37 to accommodate the same, and also to clear slitting disks 44 with which the said shaft is provided. The slitting disks 44, which are arranged upon the shaft 42 at suitable intervals, have portions of their peripheries cut away, as at 45, so that their cutting edges are not continuous. By reason of this the longitudinal slitting accomplished thereby will be interrupted at intervals, short spaces being left across the lines of slitting, constituting ties of unsevered web portions. The peripheral edges of the said slitting disks are received within grooves 46 in the feed roller 39 upon the shaft 37 (see particularly Figs. 1 and 4).

A stationary guide or shield 47 is secured to the frame of the machine, with one end in proximity to the point of contact of the pressure roll 41 with one of the feed rolls 39, and the other end in proximity to the roll carrying the rotary cutter 30. A transverse portion 48 of the frame 10, the lower end of which forms a support for the stationary cutter 31, also constitutes a support for another guiding member 49, arranged opposite the lower end of the guide 47, the web being arranged to travel

between the two said guides, as will be readily understood by an inspection of Fig. 4 of the drawings.

One or more sheets forming the web from which the units are finally cut, are introduced into the machine by means of the feed rolls 39, being superposed and passed together beneath the slitting disks 44, the web thereby formed being partially severed, as above explained, by the said slitting knives, longitudinally into a plurality of strips, said strips passing beneath the pressure roller 41 down over the guide or shield 47, and between it and the other guiding member 49, to and past the roller carrying the rotary cutter 30. In its rotation, the rotary cutter will sever the strips transversely into the desired length of individual units. But it will be remembered that the units so severed from the strips will be united together laterally by small ties or connecting portions, so that their relative lateral positions with respect to each other cannot be changed. These units as they are severed will fall together, until they are caught in the bight of the partially folded terminal fold of the preceding units, or, on first starting up the machine, by some means temporarily placed in position for this purpose. Such a means is shown in detail in perspective in Fig. 8, and comprises a plurality of fingers 50 upon a bar 51, said bar arranged to slide beneath the receiving box 52. In first starting up the machine, when there are no units contained in the receiving box, this device will be pushed forward, so that the fingers 50 will project beyond the front of the said box, and the first set of units will be caught thereby. Afterwards, such a device is not necessary, as the partially open fold will receive the fresh units, as above stated. A hopper or guide 53 is arranged beneath the roller carrying the rotary cutter 30, leading obliquely down to the point near the open mouth of the receiving box.

Now, taking up the folding means, the same comprises two folders carried by the upper and lower heads 54 and 55 respectively. These heads, of which there are two each, are mounted to slide freely upon the operating spindles 19, and have portions which project laterally through vertical slots in the said frames 10 of the machine. The upper heads 54 (see particularly Fig. 3) are provided with pins 56, to which are connected the upper ends of coil springs 57. The lower ends of the said springs are secured to stationary pins 58 upon the side frames. The heads 55 are provided with pins 59, to which the lower ends of coil springs 60 are connected, the upper ends of which are secured to stationary pins 61 upon the side frame. In order to get a balanced pull, there are two coil springs 60 for each coil spring 57, the coil springs 57 being arranged centrally, and the coil springs 60 upon opposite sides thereof. The action of the springs is to force the upper heads 54 downward and the lower heads 55 upward. The heads 54 and 55 form supports for the folder blade holders 62 and 63, constituting carriers for the folding blades 64 and 65. The holders, or carriers 62 and 63 are provided with trunnions, pivoted in the heads 54 and 55, so that the blades may be suitably rocked, as desired. The lower edge of the cross bar portion of the carrier 62 terminates in an angular abutment 66, while the upper edge of the cross bar portion of the holder or carrier 63 terminates in a similar angular abutment 67, and the said angular abutments 66 and 67 are fitted to,

and arranged to contact with, corresponding abutments 68 and 69, at the mouth of the receiving box 52. These abutments, then, form limiting stops against further downward movement of the upper heads 54, and against further upward movement of the lower heads 55.

The operating spindles are provided with collars 70, rigidly secured thereto at points between the upper and lower heads 54 and 55. When the operating spindles are raised, the said collars will engage the upper heads, and lift them, together with the blade carried thereby, from their position resting upon the abutment 68, against the tension of the springs 57; while in their downward movement, the said operating spindles will first permit the aforesaid parts to come to rest upon the abutment, and then, after a certain amount of lost motion (due to the distance between the upper and lower heads being greater than the width of the collars) will force the lower heads, and folder blade carried thereby, downward against the tension of the springs 60. These folder blades, then, it will be seen, have a vertical movement of reciprocation imparted thereto, one at a time, by the operating spindles in their reciprocating movements, but both of the blades will be at a position of rest for a short period, in each reciprocation of the said spindles. In Figs. 2, 3 and 4 of the drawings the reciprocating spindles are shown at the extreme limit of their upward movement, and the upper folder blade is, therefore, at the limit of its upward movement, while the lower folder blade is resting in its uppermost position against the abutment 69. With the parts shown as in Fig. 6, the reverse is the case, the upper folder blade being in a position resting against the upper abutment 68, while the lower folder blade is in its lowermost position. The folder blades have a movement, however, other than their reciprocating movement, namely, a rocking movement upon their trunnions. To accomplish this, I have provided the holders or carriers 62 63 with rearward projections 71 72 respectively, the same provided with studs 73 74 constituting cam followers. These cam followers are arranged to engage with stationary upper and lower cams 75 76, and with rocking cam bars 77. Stationary tracks 78 79 are also provided for limiting the rearward rocking movement of the said blades. The rocking cam bars 77 are operated by means of arms or levers 80, the same being connected at their swinging ends to reciprocating bars 81, carrying cam follower rollers 82, in engagement with cams 83, upon the drive shaft 11. The cams 83 are so proportioned and timed as to rock the cam bars 77, to cause same to engage the studs 73 and 74, at about the time the said folder blades reach the limit of their movement toward the receiving box. In Fig. 4 the lower folder blade has been rocked to this position by the rocker bars, while the upper folder blade has been tilted by means of the engagement of its stud 73 with the stationary cam 75. As the upper folder blade is moved downward, it will so move in the tilted position, until it is rocked to a substantially vertical position by the rocking of the bars 77, which will take place at about the time the said blade gets to its lowermost position. At this time the lower folder blade will be free to tilt, but will not so tilt until it has moved downward a distance necessary to withdraw it from behind the upper blade, when it will be tilted by engagement with the cam 76 to substantially the position shown in Fig. 6 of the drawings. The

effect of the foregoing will, it is seen, be to perform folding operation similar to the operation described in my former patent, above referred to, which is substantially as follows: The parts being substantially in the position shown in Fig. 6, with the upper folder blade in its lowermost position, and held vertically, while the lower blade is in its lowermost position and tilted, a fresh gang of units will be fed to a position supported in the bight of the terminal fold of preceding units (or will be supported by the fingers 50 of the bar 51, if there are no such preceding units in the receiving box 52), and the lower folder blade will be brought up in a tilting position behind the terminal fold, to its uppermost position, when it will be straightened out to a vertical position by the rocking cam bars 77. This will complete the terminal fold of the preceding units, and will hold the incoming end of the new units, while the upper blade is withdrawn. The upper blade will be withdrawn in a substantially vertical position, and will be tilted by the stationary cam 75, as it gets near the limit of its upward movement. This folder blade will then commence to move downward in its tilted position, folding the fresh units around the terminal fold of the preceding units, and around the lower folder blade, until finally the said upper blade will be brought to about its lowermost position, when it will be tilted back to a vertical position by the rocking bars 77, so as to complete the fold, and partially complete the terminal fold of the units being operated upon. After a slight interval, the lowermost blade will be withdrawn, until, near its lowermost position, it is moved back to its tilted position by the lower stationary cam 76, when the parts will again be in the position in which they are shown in Fig. 6. At some time after the commencement of the downward movement of the upper folder blade, another gang of units will be cut and delivered, so that they will finally be received in the bight of the terminal fold of the units just operated upon, ready for a new operation. While this folding operation is substantially similar to that of my previous patent, the operating mechanism herein is essentially different, in that in the present case the upward movement of the upper folder blade, and the downward movement of the lower folder blade, is accomplished by the gradual movement of the reciprocating spindles, while in my former invention, the springs therefor were placed under tension by the said spindles, and a rapid movement of the folder blades was permitted under the tension of the said springs, when the heads thereof were tripped by certain releasing mechanism. In my present machine, the operation is quieter, more gradual, and results in less wear and shock upon the parts.

In order to compel the portion of the web following the severed units to pass in front, and not at the back, of the upper edge of the said units, I have provided a deflector comprising fingers 84, mounted upon a rock shaft 85, and operated through an arm 86, a bar 87, and cam followers 88, by a cam 89, upon the shaft 26. The cam is so proportioned and timed as to cause the deflector to engage the severed units soon after they have been so severed by the transverse cutters, so that the upper edge of the detached units will be deflected backwards towards the face of the hopper or guide 53. This will insure the upper edge of the free units being at the rear of the path of downward movement of the low-

ermost end of the descending web, as is necessary for the proper operation of the device.

The receiver box 52 comprises a fixed base 90 and sides 91. It is open at the top, except for a cross bar 5 92, which includes the abutment 68, and is entirely open at the front, to receive the folded product. It is also provided with a movable rear wall 93, which constitutes a rear support for the said product. This rear wall is provided with a resistance device, which 10 acts to resist the rearward movement of the wall, but permits its rearward movement against such resistance. This will keep the folded units tightly pressed against each other, and in compact form. The resistance device includes a shaft 94, mounted in bearings 15 in the movable member 93, pinions 95 at the opposite ends of the shaft, and rack bars 96 at the sides of the said receiving box, said pinions arranged in mesh with the said rack bars,—and a friction bearing 97. The friction bearing is constructed in the form of a spring clip, 20 with bolts 98, by which the clip may be caused to frictionally bear upon the shaft with more or less pressure, as may be desired. In accordance with the amount the bolts are screwed up, so is the resistance against movement of the wall 93 varied, because the said wall 25 can only move as the shaft 94 revolves, owing to the engagement of the pinions 95 upon the shaft with the stationary rack bars 96, and hence friction, such as will tend to prevent the shaft revolving, will oppose movement of the wall. It will also be seen that the shaft 94, 30 pinions 95 and rack bars 96 tend to compel a parallel movement of the rear wall, and to prevent its getting out of line with respect to the receiving end of the box.

While I have described the receiver box 15 and parts therein, including the resistance means etc., in detail 35 herein in order that the operation of the machine, as a whole, may be clearly understood, I wish it to be understood that I make no claim thereto in the present specification, the same forming a part of a co-pending application Serial No. 308,398 filed March 28 1906.

40 The interior of the receiving box 52 is about equal in width to the width of the web, and will receive the entire gang of packages, connected it will be remembered by the slight connecting portions above referred to. After a sufficient quantity of the series of units 45 have been fed into the receiving box, a gang of packages, each comprising a corresponding plurality of interfolded units, may be removed from the rear of the box, by hand, and the rear wall 93 pushed up against the remaining packages. In the drawings, the receiving 50 box is illustrated as containing but a few units, and with the movable wall towards the rear thereof, but it will be understood that in actual practice the rear wall will be pressing against the rear units, while the machine is in operation. The machine, then, comprises 55 but a single set of folding devices, and but a single receiving box, but it is capable of producing a plurality of packages at one time, and this without any possible interference between the units of one package and the units of another. In speaking herein of units, the 60 same will be understood as referring to a single sheet, if so desired, or to a plurality of two or more sheets, superposed one upon the other.

In the drawings I have shown a machine adapted for producing a gang of three packages at a time, but it 65 will be well understood that this is merely for the pur-

poses of illustration, for in actual practice I contemplate producing a much greater number. In a machine actually built and in operation I produce a gang of six packages at a time, and have not by any means reached the possible limit.

The process described herein, which consists of partially severing the units lengthwise prior to the folding and interfolding of successive units and then completely severing the gang of connected packages thereby 70 formed, along the lines of partial severance, is not claimed herein, but forms the subject matter of a separate application which was co-pending with the present application but upon which a patent has been allowed, such patent being numbered 837,892 and dated December 4, 1906. 75 80

#### What I claim is:

1. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving folder blades for the said units, said folder blades spring pressed toward each other, and means for moving each of the said folder blades, 85 against such spring tension, away from the other, and for permitting it to return gradually under said spring tension.
2. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving folder blades for the said units, said folder blades spring pressed toward each other, and a crank for moving each of the said folder blades, 90 against such spring tension, away from the other, and for permitting it to return gradually under said spring tension.
3. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving folder blades for folding the said units, heads carrying the folder blades, operating spindles carrying said heads, and provided with an abutment between said heads for engaging them, and springs 100 tending to force said heads toward said abutment.
4. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving swinging folders at the entrance of the receptacle, means for moving the folders to fold and interfold the units, a rocking member for engaging said folders, to swing them toward the receptacle 105 at the termination of each folding movement, and means other than said rocking member for enforcing return swinging movements of said folders.
5. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving swinging folders at the entrance of the receptacle, means for moving the folders to fold and interfold the units, a rotary cam, means intermediate the rotary cam and the folders, for imparting 110 movements to the folders to swing them toward the receptacle at the termination of each folding movement, and other means for enforcing return swinging movement of said folders.
6. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving swinging folders at the entrance of the receptacle, means for moving the folders to fold and interfold the units, a rocking member for engaging said folders, to swing them toward the receptacle 120 at the termination of each folding movement, and stationary cam means for enforcing return swinging movements of the folders.
7. In a folding machine, the combination with a receptacle, and means for feeding units to be received therein, of oppositely moving swinging folders at the entrance of the receptacle, means for moving the folders to fold and interfold the units, a rocking member for engaging said folders, to swing them toward the receptacle 135 at the termination of each folding movement, and other means for enforcing return swinging movements of said folders, said means operating when the folders are near 140

the limit of their respective movements away from each other.

8. In a folding machine, the combination with means for folding paper units, and for interfolding the terminals  
5 of such units, of feeding means for the units, and a vibrating deflector for deflecting the units prior to the feeding forward of succeeding units.

9. In a folding machine, the combination with means for severing units transversely from a web, and folding means  
10 for folding and interfolding the units so severed, of a vibrating deflector for deflecting the severed units, in advance of the movement of the succeeding units.

10. In a folding machine, the combination with means for severing units transversely from a web, and folding means for folding and interfolding the units so severed, of  
15 a deflector for deflecting the severed units, in advance of the movement of the succeeding units, and a cam for operating said deflector.

In witness whereof, I have hereunto set my hand this 7th day of October, 1905.

SETH WHEELER.

Witnesses:

EDGAR WHEELER,  
SETH WHEELER, Jr.