

July 1, 1969

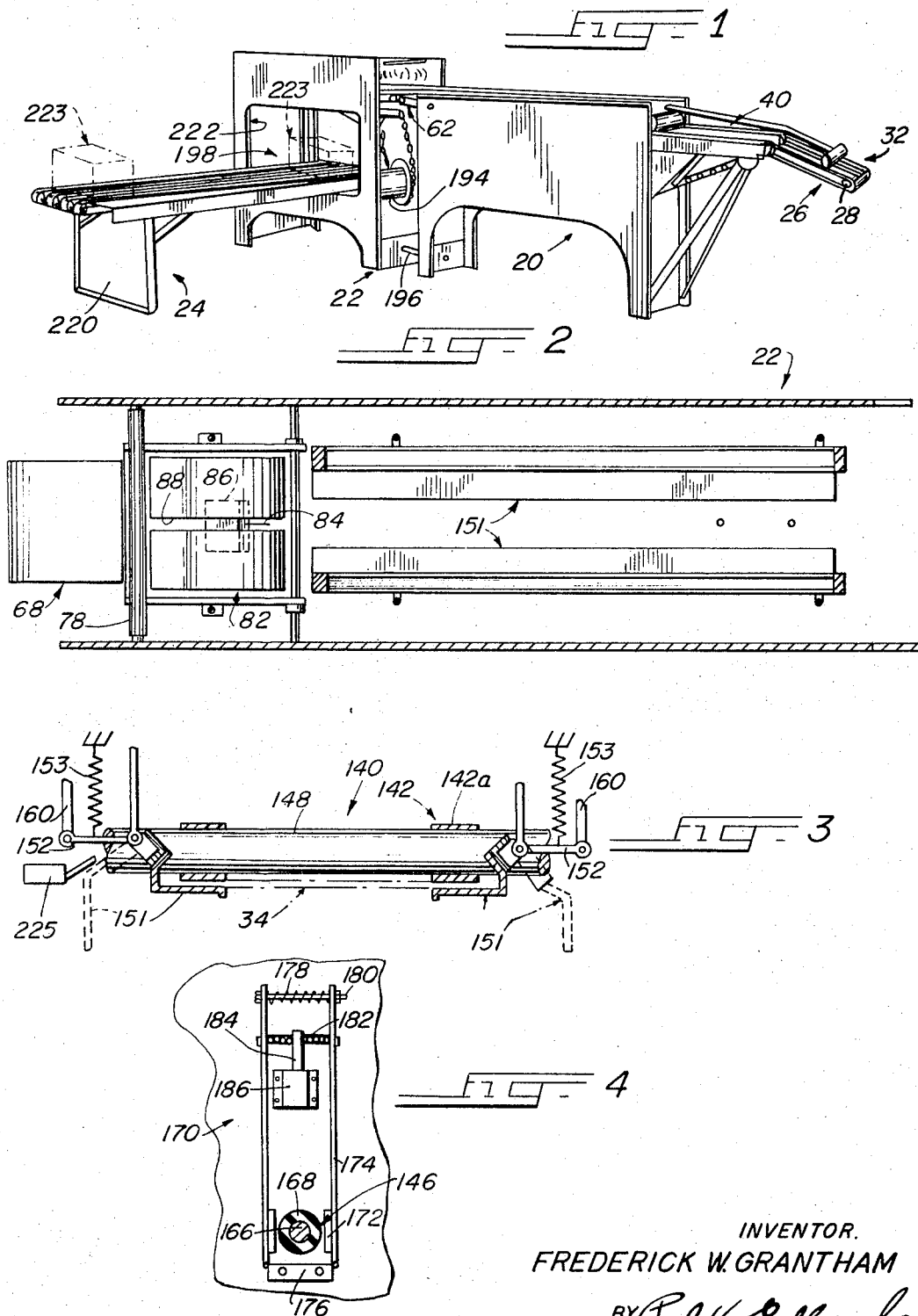
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3,452,979

LAUNDRY FOLDER

Filed May 21, 1965

Sheet 1 of 5



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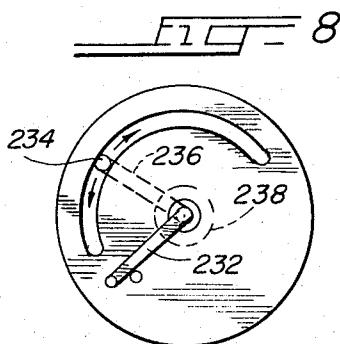
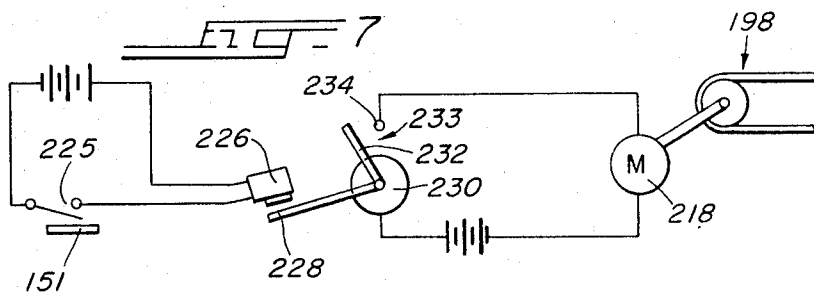
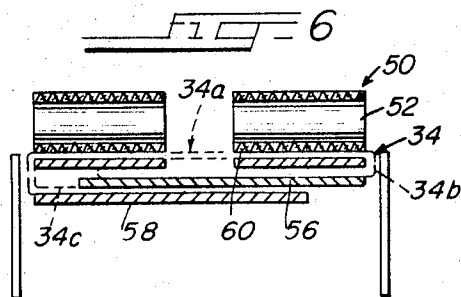
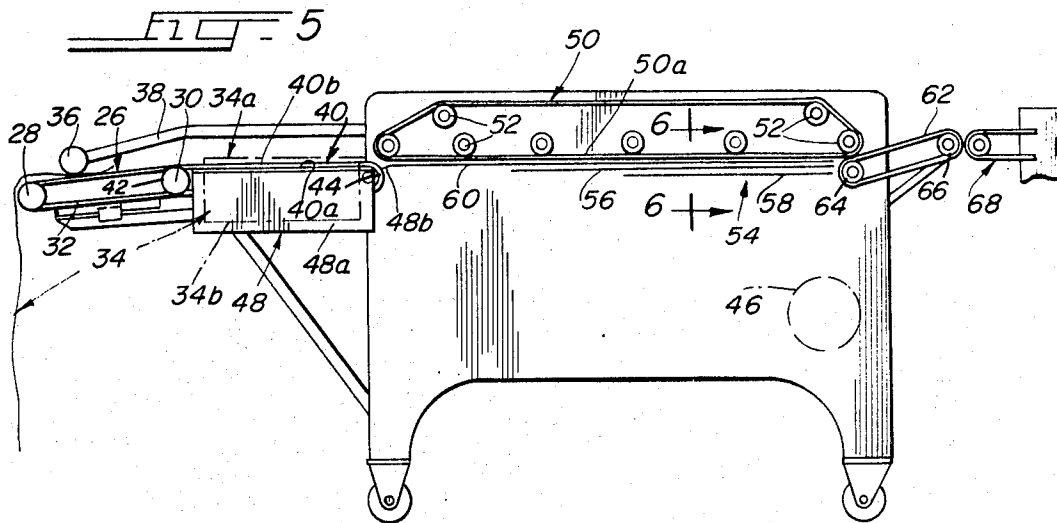
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Sheet 2 of 5



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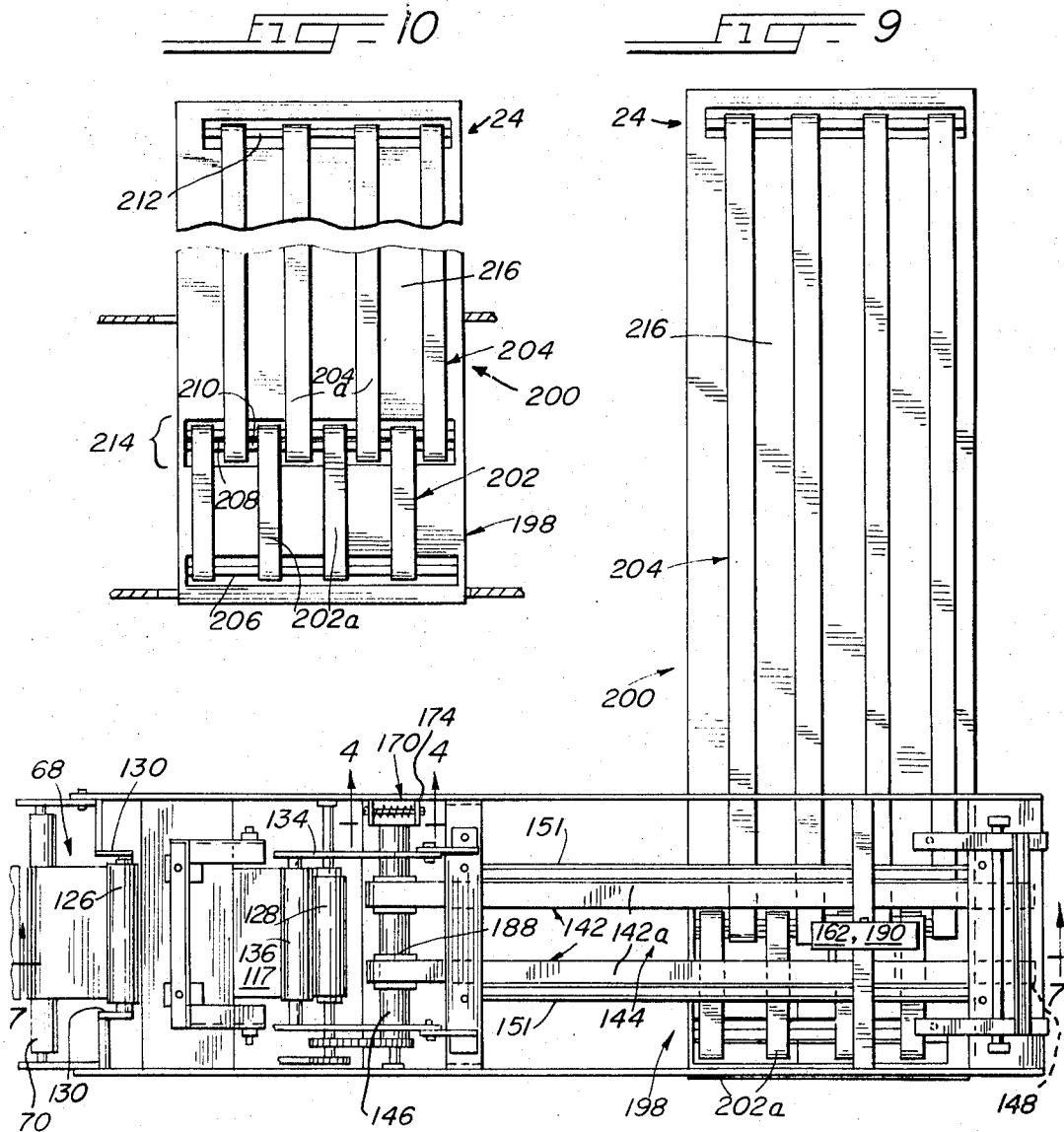
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Sheet 3 of 5



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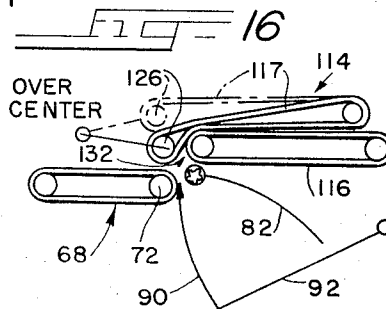
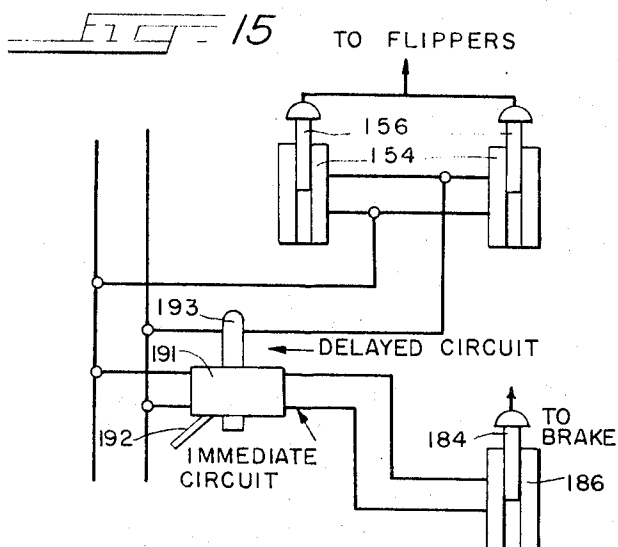
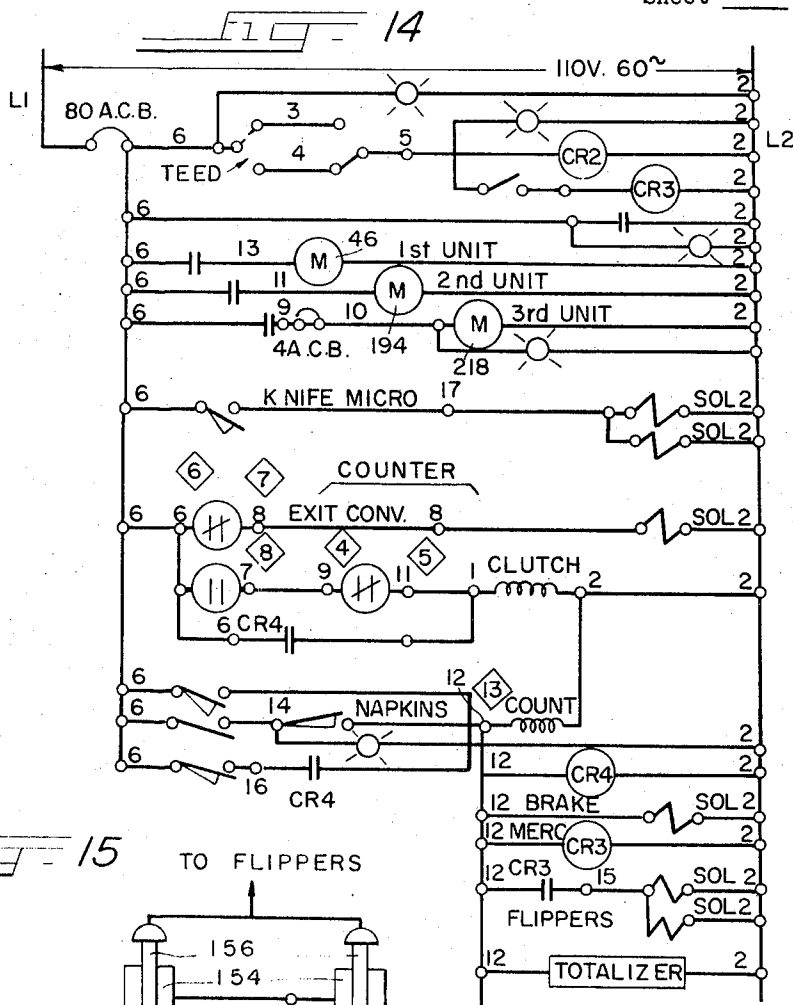
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3,452,979

LAUNDRY FOLDER

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Filed May 21, 1965, Ser. No. 457,742

Int. Cl. B65h 45/12

U.S. Cl. 270—62

11 Claims

ABSTRACT OF THE DISCLOSURE

Folder having a plurality of units (e.g., three) each separate and independent of the others in operation, producing different kinds of folds, and including conveyor means in the last unit for conveying the folded laundry pieces from the final folding means.

The present invention relates to a laundry folder and more particularly to such a folder for use in industrial installations.

A principal object of the invention is to provide a novel laundry folder especially adapted to form a plurality of different kinds of folds in laundry pieces.

Another object is to provide a laundry folder especially effective for use with laundry pieces of different sizes and thicknesses, such as bath towels, napkins, etc.

A more specific object is to provide a laundry folder which is made up of a plurality of separate and independent units or components, each unit being adapted to form a different kind of fold, and which are adapted to cooperative use and which convey the laundry pieces to an intended remote point.

Still another object is to provide a laundry folder of the character just referred to in which the different units or components are usable and effective independently of one another, whereby to provide great flexibility in adapting the folder to laundries of different character and capacities.

Still another object is to provide a laundry folder of the character just referred to in which each of the different units is a complete operative mechanism in itself, and wherein the different units can be individually adjusted, relative to each other, whereby to provide greater accuracy in alignment of the folding of the laundry pieces throughout their progression through the folder.

A further object is to provide a laundry folder of the foregoing general character of such novel construction as to provide effective transfer of the laundry pieces from one unit to the next.

Still another object is to provide a laundry folder having means therein for conveying laundry pieces there-through and folding the laundry pieces, having novel means for transferring the laundry pieces between conveyor means.

Still another object is to provide a laundry folder of the foregoing general character made up of a plurality of units each of which is separate and independent from the others and constitutes a complete workable mechanism, wherein the operating parts of each unit are specially designed for effective operation under electrical control, the electrical character of the units facilitating operative relation between the units and thereby facilitating the combination of the different units in a workable ensemble, as distinguished from utilizing such means as pneumatic or hydraulic operating devices.

Still another object is to provide a laundry folder of the character just referred to in which the conveyor means is intermittently stopped, and the laundry pieces are released therefrom during the intervals in which the conveyor means is stopped.

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A further object is to provide, in a laundry folder of the character just referred to, novel brake means for stopping the conveyor means.

Still another object is to provide an industrial laundry folder of the foregoing general character which is of extreme simplicity and which contains a minimum of operating controls, but is highly automatic and requires a minimum of attention and manual operation for completion of the operation thereof.

Still another object is to provide a laundry folder of the foregoing general character which, being made up of a plurality of independent units, is adaptable to extreme accuracy in the folding of laundry pieces because of the adjustability permitted between the units relative to one another.

Other objects and advantages of the invention will appear from the following detail description taken in conjunction with the accompanying drawings in which—

FIGURE 1 is a perspective view of a laundry folder made according to the present invention;

FIGURE 2 is a view taken at line 2—2 of FIGURE 11;

FIGURE 3 is a view taken at line 3—3 of FIGURE 11;

FIGURE 4 is a view taken at line 4—4 of FIGURE 9;

FIGURE 5 is a longitudinal vertical sectional view of the first unit of the folder;

FIGURE 6 is a view taken at line 6—6 of FIGURE 5;

FIGURE 7 is a portion of the control circuit of the folder;

FIGURE 8 is a diagrammatic illustration of a kind of switch used in the circuit of FIGURE 7;

FIGURE 9 is a plan view of the second and third units of the folder, in assembled and partially superposed position;

FIGURE 10 is a plan view of the third unit;

FIGURE 11 is a longitudinal vertical sectional view of the second unit, and showing fragments of the first and second units;

FIGURE 12 is a flow diagram of laundry pieces conveyed through the second unit, as viewed from the side;

FIGURE 13 is a view from the top of the laundry pieces of FIGURE 12;

FIGURE 14 is a diagram of the electrical circuit utilized in the folder;

FIGURE 15 is a diagram of the control circuit for the conveyor brake and flippers; and

FIGURE 16 is a view of a portion of the unit shown in FIGURE 11, in a different position.

Referring now in detail to the drawings, attention is directed first to FIGURE 1 showing a general overall view of the laundry folder of the present invention. It includes three main units or components, a first unit 20, a second unit 22, and a third unit 24, each in itself a complete mechanism operative for treating laundry pieces, such as folding, conveying, or both. These units as will be seen from the detail description, are each separate and detached from the others, and each is operative for performing its own functions independently of the other units and thus the units may be used together in a single assembly, or individually, or in conjunction with other units or components.

Referring first to the first unit 20, this unit includes a feed board 26 having a pair of longitudinally spaced transverse rollers 28 and 30 (FIGURE 5) about which is trained an endless belt 32 preferably made up of a plurality of transversely spaced individual belt elements (FIGURE 1). Preferably the feed board is arranged for vertical adjustment of the roller 28 at its leading end for convenience of the operator in placing laundry pieces thereon. Such a laundry piece is shown at 34 and may be a towel or napkin or any other of various pieces encountered in an industrial laundry. However for convenience herein, such laundry pieces will be generically re-

ferred to as towels, unless the context indicates otherwise. A guide roller 36 is mounted on the swinging end of a rod 38 pivotally mounted on the frame of the unit for vertical swinging movement, the guide roller resting on the feed board for guiding the towels when placed thereon for conveyance through the unit.

Posterior to the feed bar is a conveyor means or segment 40 for receiving the towels from the feed board and in the present instance includes an endless belt made up of a pair of transversely spaced belt elements 40a. The belt is trained on suitable rollers 42, 44, one of which is driven by the main drive of the unit, which is preferably an electric motor 46 contained entirely in the unit. Suitable drive means is provided from the motor to the conveyor belt and other driven parts in the unit. Each belt element includes a top run 40b directly receiving the towel from the feed board. In the present instance these belt elements may be spaced apart a distance of, for example, 6 or 8 inches. Directly under the top runs of these belt elements is a horizontal gap plate 48 extending throughout the length of the top runs and forwardly thereof as referred to again hereinbelow. As the towel leaves the feed board it progresses onto the belt elements 40a while the center portion 34a of the towel may rest on the gap plate and the side portions or flaps 34b, 34c (see also FIGURE 6) depend at the sides thereof. If desired, side panels 48a may be provided for enclosing certain of the pulleys of the belts as well as other elements of the unit.

Beyond the conveyor means 40 in the direction of conveyance of the towels through the unit is another conveyor means or segment 50 in the form of an endless belt, in this case also preferably including a plurality of transversely spaced belt elements. This endless belt is trained over a plurality of rollers 52 and includes a lower run 50a which is directly engaged by the towels in their travel through the unit. Below the conveyor means 50 is a folding means 54 for forming a french fold in the towels, this folding means in itself being of known type and includes a pair of blades or baffles 56, 58 together with longitudinal plates 60 below and adjacent the lower run of the belt, and respectively in register with the separate elements thereof. The posterior end 48b of the gap plate 48 extends over the receiving end of the plates 60, whereby to form a continuous support for the towels in their travel through the machine, i.e., as the towels leave the gap plate 48 they are fed onto the plates 60, and the latter are sufficiently close to the lower run of the belt 50 that when a towel is on the plates 60 it is frictionally engaged by the lower run of the belt and carried by the latter therealong. Preferably the positioning of the plates 60 and the lower run of the belt 50 is such that even without a towel the run of the belt engages and wipes on the plate.

The baffles 56 and 58 are arranged with their receiving ends staggered longitudinally of the machine so that as the towel progresses through the machine the flap 34b first engages the baffle 56 and is folded under the main portion of the towel and then the other flap 34c engages the corresponding baffle and it is folded under, the spacing and proportions of the various elements being such that the two flaps overlies and form a french fold. Preferably the plates 60 are adjustable toward and from each other. The baffles continue to a position closely adjacent another conveyor means or segment 62 which also is in the form of an endless belt, and in this case may be a single belt element. This belt is trained on rollers 64 and 66, the former being adjacent the delivery end of the plates 60 and closely adjacent the bottom run 50a of the belt 50 whereby the french-folded towel is fed onto the belt 62 and carried thereby. The roller 64 is preferably mounted for vertical adjusting movement for setting the delivery end of the belt 62 at a suitable height for transfer of the towels therefrom onto the conveyor means in the second unit.

Reference is now made to the detail construction of the

second unit. The second unit receives the french-folded towel from the first unit and forms a second fold in this case a half fold, in the towel and transfers it to the third unit. The second unit includes conveyor means indicated in the aggregate at 67 and made up of several segments a first one of which, indicated at 68, receives the towels delivered from the first unit. This first segment 68 includes transverse rollers 70 and 72 and an endless belt 74 which in this case may also be a single belt unit. The roller 70 at the receiving end of the belt segment is preferably arranged for vertical adjusting movements and spaced slightly below the roller 66 at the delivery end of the conveyor segment 62 in the first unit. The relative vertical spacing between the delivery end of the conveyor segment 62 and the receiving end of the conveyor segment 68 is as desired and sufficient for effecting movement of the towel from the segment 62 onto the segment 68, the gap 76 or horizontal spacing between the conveyor segments being such that the inertia of the towel carries it therepast.

Beyond the conveyor segment 68 in the direction of conveyance of the towel through the apparatus, is a fluted roller 78, with a gap 80 therebetween, and beyond the fluted roller is a shield or apron 82 curving downwardly in the direction of movement of the towel through the folder. The towel progresses along the conveyor belt 74 at a suitable speed such that the leading edge thereof by inertia moves over the gap 80 onto the fluted roller which, because of its fluted shape, provides high friction for gripping the leading edge of the towel and carries it thereover and onto the shield 82. The towel then slides down the shield until it engages the finger 84 of a switch 86, the finger extending upwardly through a slot 88 in the shield. The finger actuates the switch which controls mechanism (described below) for actuating a folding blade 90 mounted on swinging arms 92 pivoted at 94. The folding blade 90 is arranged upon actuation thereof for moving upwardly through the gap 80 between the roller 72 and the fluted roller 78 whereupon it engages the towel at about its midpoint and forms a half fold therein and moves it upwardly for engagement at its then leading edge 34d (FIGURE 12) by the next segment of the conveyor means as described in detail hereinbelow.

The switch 86 (FIGURE 11) is mounted for positioning the finger 84 thereof at a certain position relative to the gap 80, according to the length of the towel, so that the folding blade 90 will be actuated at the proper time for engaging the towel at or closely adjacent to its midpoint, longitudinally, for forming a half fold. In order to accommodate towels of different lengths, the switch is adjustable longitudinally of the shield 82 so that it is actuated by the towel at the proper instant, i.e., when the middle of the towel is over the gap 80. For this purpose the switch is mounted on the end of an arm 96 pivoted on a shaft 98. For convenience a hand wheel 100 is provided on the shaft, which on rotation thereof rotates the shaft and swings the switch to the desired position. A suitable scale 102 may be provided to visually indicate the position of the switch.

The folding blade 90 is actuated or moved upwardly by suitable means, preferably electrically operated means in the form of electro-magnets or solenoids 104 (FIGURE 11). If the desired two separate solenoid units may be employed to provide the desired moving power, each having an armature 106 connected to a lever arm 108 in turn connected through a link 110 with the respective one of the arms 92 on which the folding blade is mounted. Actuation of the switch 86 controls a circuit, such as by closing the circuit for energizing the solenoids 104 for lifting the folding blade for performing the folding operation. The folding blade may return to its normal or lowered position by gravity or by any other suitable means if desired, such as tension spring means 112. The solenoids are of suitable construction and characteristics as to be momentary-actuated so that immediately upon being thrown to full actuated position they become de-energized and drop to their normal position.

Included in the conveyor means 67 in the second unit is a second conveyor segment 114 including a lower conveyor 116 and an upper conveyor 117 each including an endless belt 118 and 120, respectively, preferably single belt elements. The lower belt is trained on transverse rollers 122 and 124 while the upper belt is trained on transverse rollers 126 and 128.

The upper conveyor 117 overhangs the lower conveyor 116 at the leading end to form a bight 132 at the receiving end. The roller 126 is floating, i.e., it is mounted for vertical movement as shown in FIGURE 16. In its lower position the belt 120 firmly engages the belt 118 for receiving thin items such as napkins, while in an upper position, thicker items such as bath towels are accommodated.

The bight 132 is disposed directly above the gap 80 through which the folding blade 90 projects in folding the towel as described above. The new folded edge 34d (FIGURE 12), then constituting the leading edge of the half folded towel, is moved upwardly by the folding blade into the bight 132 and into firm friction engagement with the two belts 116 and 117 and carried by and between those belts in further conveying direction. The roller 126 may be mounted on an overcenter device, as indicated in FIGURE 16, to assume its opposite positions, or it may be biased downwardly by gravity, or a spring or equivalent, and yields upwardly in response to a thick item being carried upwardly by the folding blade. If desired a belt tightener 134 (FIGURE 11) may be provided having a roller 136 resting on the top conveyor belt 117 as by gravity.

The delivery end of the belt 120 may extend beyond the lower belt 118 also, if desired, as shown in FIGURE 11, to form a bight 138, or may terminate short of the lower belt as shown in FIGURE 16. In either case, the half-folded towel is delivered from the conveyor segment 114 and transferred to a final conveyor segment 140 in the second unit (FIGURES 9 and 11). This conveyor segment also includes an endless belt 142 which in the present instance includes a pair of transversely spaced belt elements 142a (FIGURE 9) forming a gap 144 therebetween. The belt is trained over a pair of rollers 146 and 148, the first one of which is adjacent the roller 128 of the previous conveyor segment. A shield 150 is disposed partially under the rollers 128 and 146 and under the gap 152 therebetween, and preferably is positioned for constant engagement by the lower run of the belt 142. As the towel emerges from the conveyor segment 114 it moves onto the shield 150 partially by inertia, and partially by continued friction engagement with the lower run of the belt 120, and when it reaches the roller 146 it is gripped by the belt 142 and drawn over the shield. As it passes beyond the shield it then is carried into the space between the belt and a pair of retainers or "flippers" 151 (FIGURES 3, 9, and 11). These flippers are movable between a normal retaining position as shown in full lines in FIGURE 3, and a releasing position shown in dot-dash lines in that figure, whereby the towel is released and permitted to drop. The flippers are mounted for rocking movement about longitudinal axes, being moved by linkages including crank arms 152. The flippers may be retained in their normal position for retaining the towel in engagement with the belt by suitable means such for example as compression spring means 153 and they are moved outwardly to their releasing position by suitable motor means and preferably electrically controlled motor means such as solenoids or electro-magnets 154 (FIGURE 11). The armatures 156 of the solenoids are connected to lever arms 158 which in turn are connected through links 160 with the crank arms 152. The solenoids are controlled by switch means 162 (FIGURES 9 and 11) mounted in the gap 144 between the belt elements 142a and having a finger 164 extending downwardly in that gap to a position below the flippers, and when the towel moves along between the belt and the flippers as described, the leading edge thereof engages the finger and actuates the switch, energizing the electro-magnets

and thereby swinging the flippers to releasing position, whereupon the towel drops onto the conveyor in the third unit.

Preferably the flippers 151 are similar in transverse dimension to the belt elements 142a (FIGURE 3) registering with the side edges of the gap between the belt elements. The electro-magnets 154 are of suitable kind, momentary in their action, i.e., upon energization they throw the flippers outwardly and after they reach such position, the electro-magnets are immediately de-energized and the flippers are enabled to return to their normal retaining position.

When the towel is to be dropped from the conveyor segment 140, it is desired that the conveyor belt thereof first be stopped in its operation so as to produce an accurate stack formed by the dropped towels. The belt is brought to a stop by stopping the drive roller, in this case the roller 146 constituting such drive roller. As will be seen in FIGURE 4, such roller includes a central shaft 166 and an outer tubular roller body 168 mounted thereon with high friction therebetween, so that upon rotation of the shaft the roller body rotates therewith in the absence of substantial braking force. Such braking force is provided by brake means indicated in its entirety at 170 (FIGURES 4 and 9) and including brake shoes 172 mounted on arms 174 which are pivoted on a fixed element 176. The brake shoes are positioned in register with the roller end normally are spaced therefrom. The arms are biased apart at their swinging ends by a compression spring 178 surrounding a bolt 180 limiting the outward movement of the arms. A flexible element 182 such as a chain interconnects the arms adjacent their swinging ends, and connected to this element, at a midpoint thereof, is the armature 184 of a solenoid 186. Upon energization of the solenoid the armature is retracted, pulling the chain downwardly at its center portion, shortening the effective length of the chain between the arms. The arms are thus swung inwardly and the brake shoes are applied against the roller whereupon the roller body 168 is held stationary against the tendency to rotate by the shaft which continues to rotate. Preferably the roller includes collars 188 (FIGURE 9) of high-friction material engaged by the belt elements 142a for respectively driving them and holding them stationary. The solenoid 186 is controlled by a suitable switch 190 (FIGURES 9 and 11) having an actuating finger 192 (FIGURE 11) which may be incorporated in common switch means with the switch 162, or separate therefrom, as desired. The switch means 162, 190, whether incorporated in common switch means, or are separate switches, are arranged for stopping the conveyor first and shortly thereafter moving the flippers to releasing position, for releasing the towel. The towel travels at a substantial rate of speed (e.g., more than 200' per min.—see below) and a significant amount of travel of the towel takes place between the actuation of the switch means and the time the conveyor belt comes to a full stop, as for example, several inches, and if the flippers were released before the belt came to a full stop, the towels would likely form an uneven stack. In the case where those switch means are incorporated in a common switch means, a suitable time delay means of known kind is incorporated therein to effect first applying the brake means 170 and after the desired time delay to assure stopping of the conveyor belt, to effect releasing of the flippers. In the case where the switch means is made up of separate switches 162, 190, they are arranged in tandem so that the first one is actuated for applying the brake means and the second one for releasing the flippers. Where common switch means with a time delay provision is utilized, an adjustable time delay means is selected for regulating the time between stopping the conveyor belt and releasing the flippers, while if separate switches are utilized, they are mounted for independent adjustment longitudinally, i.e., in the direction of movement of the conveyor belt.

FIGURE 15 illustrates a common switch means of

known kind, including a portion 191 corresponding to the switch 190 and acting to immediately actuate the brake solenoid 104, and another portion 193 which is operative after a predetermined time delay to actuate the flipper solenoids 154. Other devices are also adaptable to use in the arrangement, such as a clock timer. Still other known means may be utilized to cause a delayed action, such as a dashpot. Additionally, when pneumatic means are used, the inherent delay in such means may be utilized for producing the desired delay, but in the present case where the full electrical control is used for all the advantages provided thereby, a separate timing arrangement is incorporated in the mechanism.

The second unit preferably is provided with individual driving means, and as in the case of the first unit, such driving means is preferably an electric motor 194. Suitable belt means are provided from the motor to the various drive rollers, it being unnecessary to refer to these belts individually.

The first and second units 20, 22 are positionable relative to each other for adjusting purposes. For example, the units may be moved closer together, or farther apart, according to conditions encountered in practical operation. If desired a tie 196 may be utilized for securing the units temporarily together, this tie being either flexible, for example, for preventing them from separating farther, or rigid to maintain the relative spacing between the units in both directions.

The two units 20, 22 are also adjustable angularly, i.e., about vertical axes between the units, whereby to provide alignment between the conveyor means in the two units. Ideally the conveyor means lie in a straight line, but due to practical inaccuracies encountered in all such installations it often becomes necessary to make angular adjustments in order to assure proper positioning of the towels on the conveyor means in their travel through the machine. Such inaccuracies may be due to any of various factors, such as twisting and distortion of the flexible belts which may be of canvas, etc. Another feature of the invention is that the gap plate 48 (FIGURE 5) is flexible, whereby its end 48b can be shaped or positioned to aid in maintaining accuracy of alignment of the towels.

The third unit incorporates conveyor means which includes a first segment 198 (FIGURE 10) and a second segment 200 including endless belts 202 and 204 preferably made up of a plurality of transversely spaced belt elements 202a and 204a, respectively, with the elements of the two belts alternately arranged. The belt 202 of the first segment is trained on rollers 206 and 208, while the second belt is trained on rollers 210 and 212. The rollers 208 and 210 are arranged in transposed position whereby the two belts have common portions lying in a common area 214. The unit 24 is provided by a supporting element or deck 216, over which the upper runs of the belt ride, and which supports the stack of towels placed thereon.

Preferably the belt 204 is constantly operated while the belt 202 is intermittently operated, according to the predetermined size of the stack to be formed, as mentioned above and described hereinbelow. Suitable drive means such as an electric motor 218 (FIGURE 11) is incorporated in the third unit for driving the conveyor segment therein. The third unit includes suitable frame means having a stand or leg 220 (FIGURES 1 and 11) at one end and its other end is conveniently supported by the frame of the second unit, the third unit projecting through an opening 222 in the frame of the second unit. If desired however that end of the third unit may be provided with a stand or leg for supporting it directly on the floor. The third unit may be positioned on either side of the second unit i.e., so as to carry the towels therefrom through either side selectively. The unit 24 is placed with the smaller conveyor segment 198 directly under the flippers 151 in the second unit. As the towels are dropped under the control of the flippers, they stack up on the smaller conveyor segment in the third unit which

is normally stationary, being intermittently operated as stated above. The stack, identified 223, is shown in FIGURES 1 and 12. If desired the third unit may be so positioned that the towels are dropped only on the stationary segment 198 of the conveyor means, or if desired the third unit may be projected further into the second unit so that the towels drop at least partially in the area 214 and onto the end of the segment 200 of the conveyor means. The greater area of the stationary conveyor segment 198 provides substantially greater friction to hold the stacked towels stationary notwithstanding the constant movement of the other conveyor segment. When it is desired to move the stack of towels, the segment 198 is moved, which carries the stack onto the other segment and the latter continues to convey the stack to the end of its reach. That conveyor segment 200 may be of any desired length according to conditions encountered in practical applications.

Means is provided for counting the towels placed in the stack, whereby to provide for automatically conveying the stack after a predetermined number of towels have been placed therein. Such counting means is under the control of a suitable element that may be located where desired, such as in the second unit, although the means for conveying the towels after the stack is formed is incorporated in the third unit. Preferably the means for controlling this operation is of electrical character whereby to facilitate the operative connection between the second unit and third unit notwithstanding the fact these units are in themselves separate and completely operative mechanisms. The switch means 162, 190 (FIGURES 9 and 11) may incorporate additional switches or control elements which are actuated by the towels, or it may include for example another switch 225 (FIGURES 3 and 7) actuated by one of the flippers 151 as it is moved to releasing position.

When the switch 225 is engaged by the flipper upon each actuation thereof, an electromagnet 226 is energized, drawing up an arm 228 which in turn, acting through a ratchet 230, advances an arm 232 of a switch 233 carrying a contact which engages another contact 234 after a predetermined number of actuations of the arm 228 according to the setting of the contact 234. The latter is made adjustable, as illustrated in FIGURE 8, being mounted for example on an arm 236 settable by a hand knob 238. Upon closure of the switch 233, the motor 218 is energized and it drives the normally stationary belt segment 198 to carry the stack onto the next segment 200 as described above. The drive incorporates a suitable and known means operable for advancing the conveyor means desired interval and thereupon terminating the drive until again energized under the control of the switch 233. The contact 234 can be set to form a stack of any convenient number, such as 10, 15, 20, etc.

FIGURE 14 shows a complete electrical circuit of the controls of the folder. It is believed unnecessary to describe it in detail in view of the descriptive legends thereon.

The electrical aspects of the third unit facilitate effective connection between the units which are otherwise separate, for the purpose of co-ordinating their operations.

Preferably the conveyor belts are operated at increasingly greater speeds successively through the first and second units so that as a towel leaves one conveyor segment and passes on to the next, it is conveyed at an increasingly greater speed whereby to eliminate any possibility of jamming of the towels in the conveyors. The folder has great capacity, being capable of handling a large number of towels (or other laundry pieces) such for example as that number, according to length, that can be accommodated at the rate of 200 feet per minute, the speed of the slowest moving segment.

The apparatus is designed for use completely with electrical controls for the operating means, to the exclusion of other means such as hydraulic, pneumatic, etc. This

results in a much greater and more efficient operation because of the adaptability of the apparatus to electrical control, regardless where the various units are installed. Moreover they are more readily incorporated in other combinations and assemblies, with other units and other kinds of apparatus.

Another great advantage of the invention is that the different units of the folder may be used with other units of different kinds, and even by themselves without other units. For example the first unit may be used for making french folds; the second unit may be used independently and alone, for making half folds; and the third unit may be used with any other kind of unit in an arrangement in which the towels are deposited thereon, irrespective of the kind of folds form therein.

While I have disclosed herein a preferred form of the invention, it will be understood that changes may be made therein within the scope of the appended claims.

I claim:

1. A laundry folder comprising, in combination, a first conveyor segment including an endless belt arranged horizontally and having an upper run adapted for carrying a towel thereon, the first conveyor segment having a delivery end and being operative for delivering the towel beyond the delivery end, a folding blade operative for engaging the towel upon its delivery beyond the first conveyor segment and folding a crease therein and raising it, a second conveyor segment including a pair of vertically superposed endless belts, both arranged horizontally and the upper belt being longer than the lower one and overhanging the lower one at both ends and the two having operative interengagement throughout the length of the lower belt, the two belts of the second conveyor segment forming a bight at a receiving end and a bight at a delivery end, and the second conveyor segment being arranged with the bight at the receiving end positioned for receiving a towel from the folding blade and operative for conveying the towel between the belts thereof, the towel emerging from the second conveyor segment through the bight at the delivery end, a third conveyor segment including an endless belt and having a receiving end adjacent to the delivery end of the second conveyor segment with a gap therebetween, the endless belt of the third conveyor being generally aligned with the upper endless belt of the second conveyor, a shield below the gap and disposed immediately below the endless belt of the third conveyor segment and the upper endless belt of the second conveyor segment adapted for guiding a towel emerging from the second conveyor segment to the third conveyor segment in engagement with the lower run of the belt of third conveyor segment, and retaining means under the third conveyor segment operative for retaining a towel in engagement with the lower run thereof, and the retaining means being movable to a releasing position enabling a towel retained thereby to drop.

2. A laundry folder comprising a conveyor means including rollers and an endless belt trained thereon, means cooperating with the endless belt for confining a towel therebetween and effectuating conveyance of the towel by the endless belt, said rollers including a drive roller and a driven roller, and brake means operative for stopping the drive roller and thereby stopping the conveyor belt, said brake means including a pair of arms on opposite sides of the roller and pivoted adjacent the roller and having brake shoes operatively engageable with the roller upon movement of the arm toward each other, and means for so moving the arms toward each other including a flexible link extending directly transversely of and interconnecting the arms at a substantial distance from the roller, and power means operatively connected with the flexible link at a central point thereof and effective upon energization thereof for drawing the central portion of the flexible link transversely of the line of the connections of the link with the arms, thereby shortening the effective length of the link between the arms and drawing the arms inwardly and applying the brake shoes to the roller.

3. A laundry folder comprising, in combination, a conveyor including a pair of rollers and an endless belt trained thereon, the rollers including a drive roller and a driven roller, the drive roller including a central shaft adapted for connection with driving means and a tubular roller body on and frictionally engaging the shaft and adapted to rotate therewith in the absence of applied external forces, and brake means including a pair of arms on opposite sides of the roller pivoted closely adjacent the roller and each having a brake shoe, the arms being swingable toward each other to active position in which the brake shoes operatively engage the roller body and outwardly to an inactive position in which the brake shoes are released from the roller body, means biasing the brake arms outwardly to inactive position, and means for moving the arms inwardly to active position including a flexible link extending directly transversely of the arms and having its ends connected thereto, and a power device connected with a central portion of the link operative upon energization thereof for drawing the central portion of the link out of the line of the connection of the ends of the link with the arms whereby to shorten the effective length of the link between the arms and draw the arms inwardly to active position.

4. A laundry folder of the character disclosed for folding towels comprising, a first and a second unit separate from each other and each being a complete self-contained unit having a complete operative mechanism and fully operative independently of the other unit, the operative mechanism of each unit including conveyor means and drive means therefor, the units also being portable and movable into and out of operative relation to each other as referred to again hereinbelow.

(a) the first unit including a first main conveyor having a receiving end for receiving towels, and including an endless belt trained on transverse rollers and having a bottom run, folding means operatively associated with the first main conveyor and positioned on the under side thereof for forming a french fold in the towels, and including a plate under the bottom run of the conveyor, the towels being thereby moved along between the endless belt and the plate and delivered therefrom beyond a delivery end, a first supplementary conveyor including an endless belt on transverse rollers and having a receiving end under said plate at the delivery end of the first main conveyor and operative for receiving towels from the latter, and having a delivery end therebeyond, the delivery end of the first supplementary conveyor being vertically adjustable,

(b) the second unit including a second supplementary conveyor including an endless belt on transverse rollers having a receiving end vertically adjustable and a delivery end, the receiving end of the second supplementary conveyor being positioned for receiving towels from the delivery end of the first supplementary conveyor when the units are in their said operative relation, the second unit also including a second main conveyor including an endless belt on transverse rollers and including a bottom run, folding means operatively associated with the second main conveyor for forming a transverse fold in the towels, the second main conveyor having a receiving end positioned for receiving towels from the second supplementary conveyor under its bottom run, retainer means under the second main conveyor and operative for retaining towels thereunder in operative association with its bottom run, and means for releasing the retainer means to enable the towels to drop therefrom,

(c) the units when in said operative relation being capable of producing a continuous conveying and folding operation through the units, and the vertical adjustability of the supplementary conveyors enabling mutual vertical positioning therebetween.

5. A laundry folder of the character disclosed for fold-

ing towels comprising, a first, second and a third unit separate from each other and each being a complete self-contained unit having a complete operative mechanism, and fully operative independently of the other units, the operative mechanism of each unit including conveyor means and drive means therefor, the units also being portable and movable into and out of operative relation to each other as referred to again hereinbelow,

(a) the conveyor means in the first unit including a conveyor having a receiving end and a delivery end, the first unit including means cooperable with the conveyor therein for folding the towels,

(b) the conveyor means in the second unit including a conveyor having a receiving end and a delivery end, and positioned when the units are in said operative relation for receiving towels at its receiving end from the delivery end of the conveyor in the first unit, the second unit including means cooperable with the conveyor therein for folding the towels,

(c) the conveyor means in the third unit including a conveyor having a receiving end and a delivery end, and positioned when the units are in said operative relation for receiving towels at its receiving end from the delivery end of the conveyor in the second unit,

(d) the first and second units being mutually arranged so that the conveyors therein convey towels in generally the same longitudinal direction, the folding means in the first and second units being operative for folding the towels in mutually transverse directions, the third unit being positionable in a plurality of positions, in said operative relation, relative to the second unit within an angular range of about 180° in which it conveys the towels in corresponding direction from the second unit.

6. The invention set out in claim 5 wherein the conveyor means in the second unit is so constructed and arranged that the towels upon being delivered therefrom drop therefrom, and the third unit is so constructed, and arranged with its receiving end under the delivery end of the second conveyor, as to receive the towels from the second conveyor and convey them therefrom in the direction corresponding to its position, and the second unit includes an element supporting the end of the third unit at the receiving end of the conveyor therein.

7. The invention set out in claim 6 wherein the second unit includes a frame with a transverse opening therethrough defined at its lower extremity by a longitudinal frame element which constitutes said supporting element, the end of the third element at the receiving end of the conveyor therein being, when the units are in one position in said operative relation, positioned in said transverse opening and supported by said longitudinal frame element.

8. The invention set out in claim 6 wherein the conveyor in the third unit includes endless belt means having a first portion at its receiving end under the delivery end of the conveyor in the second unit for receiving towels from the latter and a second portion reaching from the first portion to its delivery end, the first portion being intermittently operated and the second portion being continuously operated, and control means responsive to towels successively dropping from the conveyor in the second unit for controlling the first portion of the conveyor in the third unit and operating that portion upon a predetermined number of towels being stacked thereon, whereby to convey the so stacked towels from that portion onto the second portion and conveying them therealong.

9. The invention set out in claim 8 wherein, in the conveyor in the third unit, the first portion is of relatively

short length and the second portion is of indeterminate length.

10. The invention set out in claim 9 wherein each portion of the conveyor in the third unit includes belt means made up of transversely spaced belt elements, the belt elements of the two portions being alternately arranged and the belt means in the two portions overlapping in longitudinal direction, whereby the stack of towels when resting on the first portion at least partially overlies and engages the second portion, and the linear dimension of the first portion and the stack of towels on the conveyor, together are such that the friction provided by the belt means in the first portion on a stack of towels, when the first portion is stationary, is sufficient to prevent the towels from being carried from the first portion by the belt means in the second portion.

11. A laundry folder of the character disclosed for folding towels comprising, a first conveyor segment including a horizontal endless belt having an upper run, a folding blade adjacent the delivery end of the first conveyor segment and arranged for movement upwardly and engaging a towel emerging from the delivery end of the first conveyor segment and carrying it upwardly, a second conveyor segment having a receiving end positioned for receiving a towel moved upwardly by the folding blade, the second conveyor segment including a pair of horizontal endless belts with one disposed over the other, and the belts having adjacent runs substantially interengaging throughout the effective length of that conveyor segment and travelling in the same direction throughout that length, said adjacent runs constituting the means in the second conveyor segment for directly receiving the towels from the first conveyor segment, the second segment being adapted for conveying towels therethrough and delivering them beyond a delivery end thereof, the upper endless belt of the second conveyor overhanging the lower endless belt at the receiving end, the upper endless belt being mounted for swinging movement of its receiving end portion in vertical direction about an axis at its opposite end toward and from the lower endless belt for accommodating laundry pieces of different thicknesses, and belt tightener means yieldingly biasing the upper endless belt downwardly toward the lower endless belt.

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U.S. Cl. X.R.

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