July 8, 1941. C. A. FOURNESS ET AL 2,248,667

METHOD AND MACHINE FOR FOLDING SANITARY NAPKINS

Filed Jan. 5, 1938 4 Sheets-Sheet 1

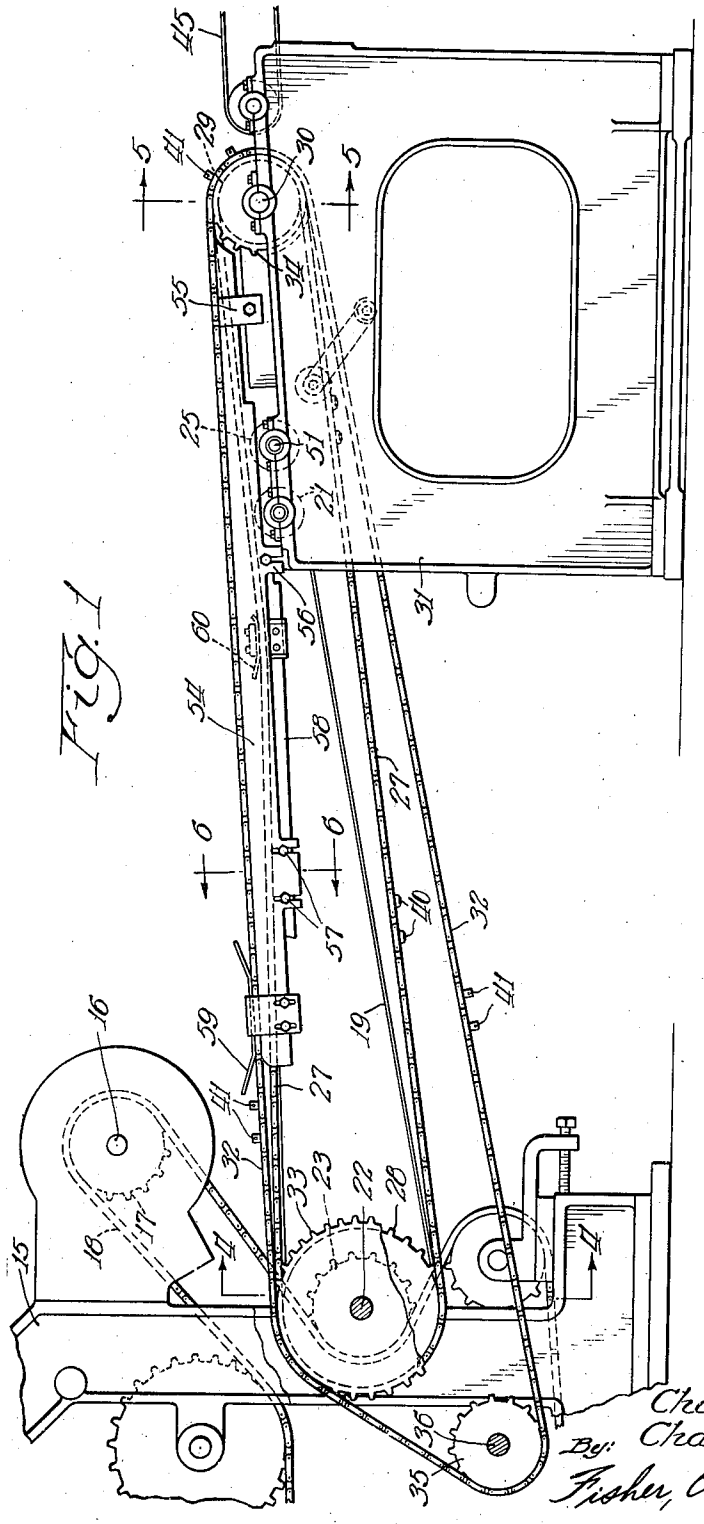


Fig. 1

Inventors:
Charles A. Fourness
By: Charles J. Greiner
Fisher, Cluff, Soans & Paul
Attys.

July 8, 1941. C. A. FOURNESS ET AL 2,248,667

METHOD AND MACHINE FOR FOLDING SANITARY NAPKINS

Filed Jan. 5, 1938 4 Sheets-Sheet 2

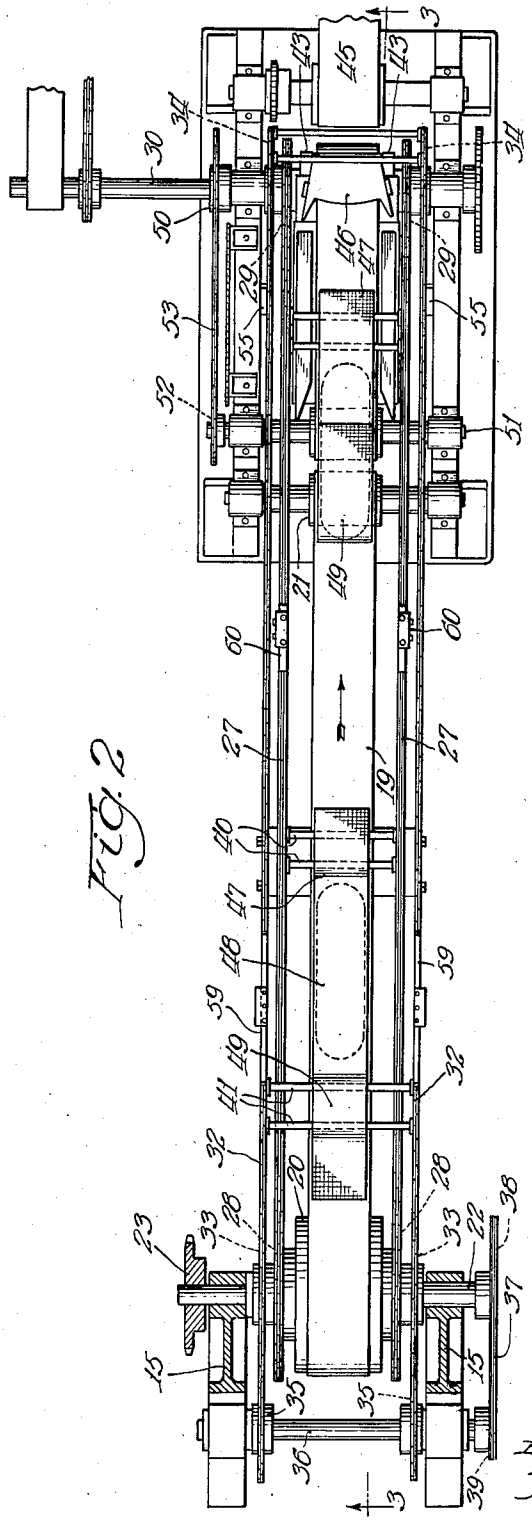


Fig. 2

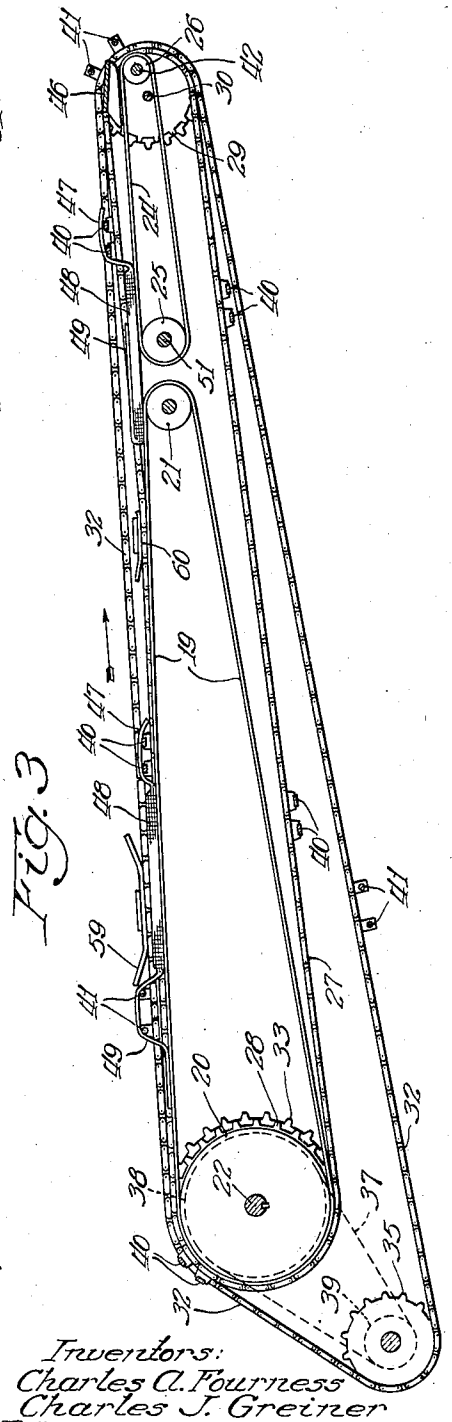


Fig. 3

Inventors:
Charles A. Fourness
Charles J. Greiner
By:
Fisher, Clapp, Soans & Pond
Attys

July 8, 1941. C. A. FOURNESS ET AL 2,248,667

METHOD AND MACHINE FOR FOLDING SANITARY NAPKINS

Filed Jan. 5, 1938 4 Sheets-Sheet 3

Fig. 4

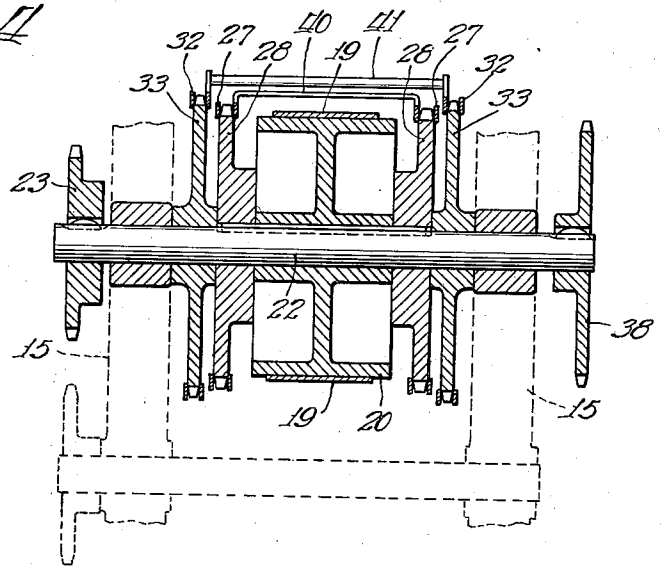


Fig. 5

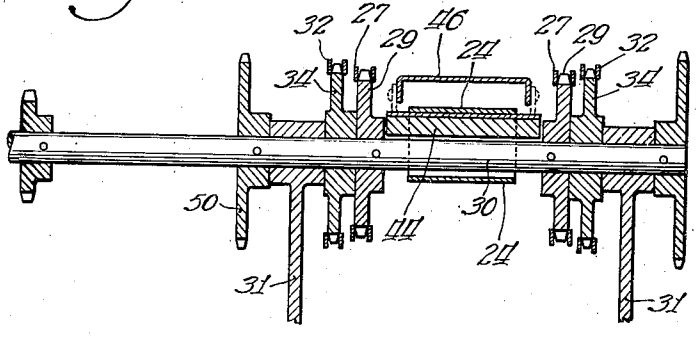
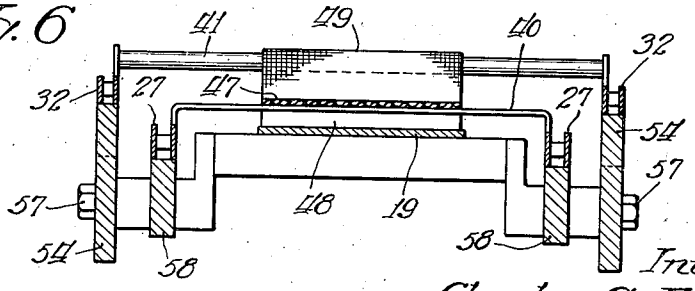


Fig. 6



Inventors:
Charles A. Fourness
Charles J. Greiner
By: Fisher, Cluff, Soans & Pond
Attys.

July 8, 1941. C. A. FOURNESS ET AL 2,248,667

METHOD AND MACHINE FOR FOLDING SANITARY NAPKINS

Filed Jan. 5, 1938 4 Sheets-Sheet 4

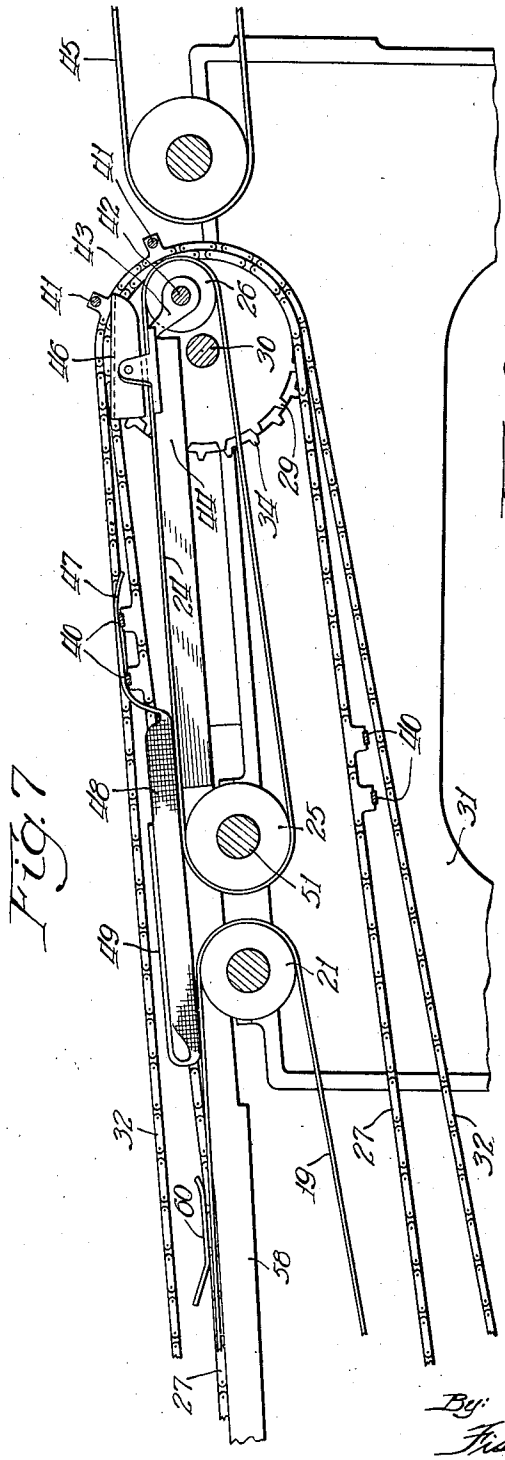


Fig. 7

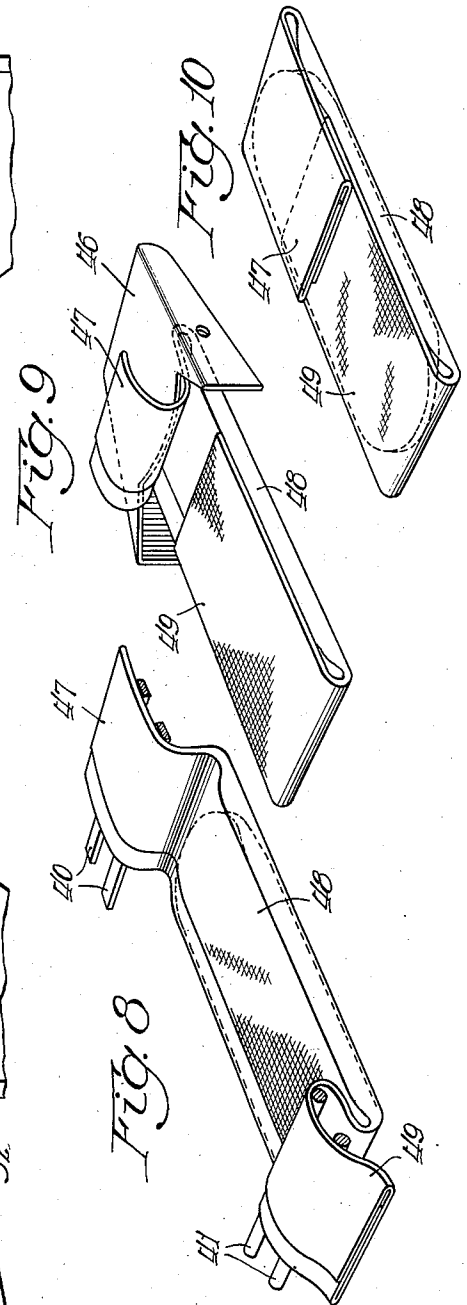


Fig. 9

Fig. 10

Fig. 8

Inventors:
Charles A. Fourness
Charles J. Greiner
By: Fisher, Clapp, Soans & Pond
Attys

Patented July 8, 1941

2,248,667

UNITED STATES PATENT OFFICE

2,248,667

METHOD AND MACHINE FOR FOLDING SANITARY NAPKINS

Charles A. Fourness, Appleton, and Charles J. Greiner, Menasha, Wis., assignors to International Cellucotton Products Company, Chicago, Ill., a corporation of Delaware

Application January 5, 1938, Serial No. 183,514

6 Claims. (Cl. 154—29)

This invention relates to the folding of sanitary napkins and more particularly to the folding of the end tabs of sanitary napkins of the type which embody an absorbent pad portion and flaps or tabs which extend endwise from the opposite ends of the pad portion.

The main objects of the invention are to provide a method and a machine whereby the end tabs of sanitary napkins may be folded over the pad portions thereof into properly aligned and smoothly adhering position in a minimum of time so that production may be carried on at a high rate.

Other objects of the invention are to provide a machine for folding sanitary napkin tabs which will operate smoothly and quietly and which is of relatively simple but durable construction and efficient in operation.

In general, it is the object of the invention to provide an improved method and machine for the purpose indicated and other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (four sheets) wherein the improved method and a selected embodiment of the improved mechanism are illustrated. In the drawings:

Figure 1 is a side elevation.

Figure 2 is a plan.

Figure 3 is a section on the line 3—3 of Figure 2.

Figures 4, 5 and 6 are sections respectively on the lines 4—4, 5—5 and 6—6 of Figure 1.

Figure 7 is a section corresponding approximately to a portion of Figure 3 but on a somewhat enlarged scale.

Figures 8 and 9 are perspectives illustrating the folding of the end tabs, and—

Figure 10 is a perspective illustrating the completely folded sanitary napkin.

The folding mechanism herein shown is adapted to be connected to a pad making machine of the type shown in the patent to Bauer, No. 1,794,358, issued March 3, 1931. The said Bauer patent machine operates to fold a strip of gauze longitudinally around an absorbent pad, the absorbent pads being spaced longitudinally along the strip of gauze. At the delivery end of the pad making machine, the longitudinally folded gauze is severed intermediate the successive pads so as to deliver relatively independent sanitary napkins.

In Figure 1, the delivery end of a Bauer type machine is shown, such portion of the machine comprising frame work 15 and a shaft 16 suitably journalled at its opposite ends in portions of said frame. The shaft 16 has affixed to it a sprocket 17 and also suitable gauze cutting mechanism such as illustrated in the aforesaid Bauer patent. The shaft 16 is driven by means of a chain 18 which engages the sprocket 17 and other sprockets including a suitably driven sprocket (not shown). The relatively independent napkins delivered by the pad making machine are deposited one by one on an endless conveyor belt 19 which is supported at its receiving end by a pulley 20 and at its delivery end by a smaller pulley 21. The conveyor belt 19 is driven through the agency of the pulley 20 which is keyed to a shaft 22. The shaft 22 is suitably journaled in suitable supports (in this instance portions of the frame 15) and it has affixed to one end a sprocket 23 which is engaged by the driven chain 18.

The conveyor belt 19 delivers the pads to a second, shorter conveyor belt 24 which is supported at its receiving end by a pulley 25 and at its delivery end by a smaller pulley 26. The conveyors 19 and 24 are driven at the same speed. The arrangement for driving the conveyor belt 24 will be presently described.

A pair of conveyor chains 27—27 are associated with the belts 19 and 24 and are driven at the same speed as said belts. The chains 27—27 are supported adjacent the receiving end of the conveyor belt 19 by means of sprockets 28—28 and at the delivery end of the conveyor belt 24 by means of smaller sprockets 29—29. The sprockets 28—28 are keyed to the shaft 22 so as to rotate therewith and whereby the chains 27—27 are driven in unison with the conveyor belts 19 and 24. The sprockets 29 are pinned to a shaft 30 which is suitably journalled in frame elements 31—31 as best shown in Figure 5.

Another pair of chains 32—32 is associated with the belts 19 and 24, the said chains 32—32 being located outwardly of the chains 27—27 and driven at a higher speed. The conveyor chains 32—32 are supported adjacent the receiving end of the conveyor belt 19 by means of sprockets 33—33 which are rotatably mounted on the shaft 22 (see Figure 4) and adjacent the delivery end of the belt 24 by means of sprockets 34—34 which are rotatably mounted on the shaft 30. The chains 32—32 also extend around sprockets 35—35 which are secured to a shaft 36 journalled in the frame structure 15. The shaft 36 is driven by means of a chain 37 which engages sprockets 38 and 39 on the shafts 22 and 36, respectively.

It will be observed that the chain 37 will serve to drive the shaft 36 from the shaft 22 and thereby drive the faster moving conveyor chains 32—32. The pitch diameter of the sprockets 38 and 39 are so selected as to obtain the desired speed of rotation in the shaft 36 and hence the desired speed of travel in the chains 32—32.

The chains 27—27 are connected at predetermined intervals by means of pairs of cross members 40 and the chains 32—32 are similarly connected at predetermined greater intervals by means of pairs of cross members 41.

The belts 19 and 24 and the chains 27 and 32 may be supported intermediate their end supports by any suitable guides constituting, in effect, portions of the machine frame. The pulley 26 for supporting the delivery end of the conveyor belt 24 is mounted on a shaft 42 which is journalled in suitable brackets 43—43 which are in turn secured to a supporting table 44 for the upper reach of the belt 24. The purpose of providing the small pulley 26 for the delivery end of the belt 24, instead of supporting the delivery end of the belt on a pulley on the shaft 30, is to carry the delivery end of the belt as near as possible to a further conveyor belt 45. The conveyor belt 45 may conduct the sanitary napkins delivered to it by the belt 24 to mechanism for performing other operations such as packaging the sanitary napkins in boxes.

A folding device comprising a downwardly facing more or less channel shaped member 46 is mounted over the delivery end of the conveyor belt 24. The short conveyor belt 24 may conveniently be driven by being connected to the shaft 30 which is driven by either the chains 27—27 or the chains 32—32 by securing the sprockets 29—29 or 34—34 to the shaft. In this instance the sprockets 29—29 are shown as being pinned to the shaft 30. The shaft 30 is also provided with a sprocket 50 and the shaft 51 of the pulley 25 is provided with a sprocket 52. An endless chain 53 extends around the sprockets 50 and 52 to thereby transmit rotation from the shaft 30 to the shaft 51 and pulley 25. The ratios of the pitch diameter of the sprockets 50 and 52 are, of course, selected to effect rotation of the pulley 25 and travel of the belt 24 at the proper speed.

In the operation of the machine, the relatively independent sanitary napkins delivered from the pad making machine are deposited one by one on the conveyor 19, the napkins being so deposited that one end tab rests on one pair of connecting bars 40 of the chains 27—27 and so that the rearwardly extending end tab rests on the connecting bars 41—41 of the chains 32—32. The pad portions of the napkin rests on the conveyor belt 19 intermediate the tab supporting cross members 40 and 41 as best illustrated in Figures 2 and 3. The front tab of the sanitary napkin is designated 47, the pad portion 48 and the rear tab 49.

In this instance the chains 27—27 which move in unison with the conveyor belts 19 and 24 are connected by five sets of cross members such as 40 and the faster moving conveyor chains 32—32 are connected together by three sets of cross members 41. The travel of the faster moving chains 32—32 is so synchronized with the travel of the chains 27—27 of the conveyor belt that cross members 40 and 41 will always be in proper position at the receiving end of the belt 19 to receive in the manner described each napkin delivered by the napkin making machine.

The napkin will be carried upwardly by the belt 19 and the cross members 40. The cross members 41 which are carried by the faster moving chains 32 will, of course, gain on the pad portion of the napkin and will carry the rear tab portion 49 thereof over the top of the pad portion. The speed of travel of the chains 32 and their cross members 41 is such that the rear tab 49 is completely folded over the pad portion 48 by the time the sanitary napkin reaches the delivery end portion of the conveyor belt 19.

The conveyor 24 receives the sanitary napkin with its front tab 47 held in an elevated position by the cross members 40—40 (see Figures 3 and 7) and the latter are carried by the chains 27—27 over the top of the downwardly facing channel shaped folding member 46. The arrangement is such that the members 40—40, upon traveling around the sprockets 29—29, leave the front tab 47, permitting the latter to rest on the top of the folding member 46. The pad, however, continues its forward movement on the conveyor 24 and is carried under the member 46 with the result that the forwardly extending tab 47 is folded rearwardly over the top of the napkin and into overlapping relation to the end portion of the first folded tab 49. The timing of the mechanism is, of course, such that the cross members 40 and 41 will have cleared the path of travel of the napkin as it emerges from the folding member 46.

The upper reach of the chains 32—32 may travel in a substantially straight line between the sprockets 33 and the sprockets 34. As evident from an inspection of Figure 3, the arrangement is such that the upper reaches of the chains 32 diverge upwardly somewhat from the path of travel of the upper reach of the belt 19 but such that it travels substantially parallel to the upper reach of the belt 24. In order to provide for a desirable degree of control of the path of movement of the cross members 41 relative to the upper reach of the belt 19 during the time in which the rear flap is being folded, the supporting members for said upper reaches of the chains 32 are adjustably mounted. As shown in Figure 1, the chains 32 are supported by a member 54 which is supported near the delivery end of the machine by a bracket 55, the same being adjustably or pivotally secured to an upstanding portion of the frame 31. At suitably spaced intervals, the supporting members 54 are adjustably connected as indicated at 56 and 57 to relatively fixed or rigid members 58 which are carried by the frame-work 31. Near the free ends of the members 54, there are provided upper chain guides 59 which serve to hold the chains 32 to their seats on the upper edges of the members 54. It will be apparent that by suitably adjusting the chain supports 54, the path of travel of the chains 32 and their cross members 41 may be adjusted.

The upper reaches of the chains 27 travel substantially parallel with the upper reach of the conveyor belt 19 until the chains approach the delivery end of the belt 19 whereupon the chains diverge upwardly so as to cause their connecting members 40 to elevate the front tab 47 supported thereon sufficiently to clear the top of the folding member 46. For this purpose guide members such as indicated at 60 are provided, the same being carried by the frame element 58.

The described structure serves to continuously propel the sanitary napkins delivered thereto at a constant, relatively high speed. Hence the machine operates rapidly and smoothly and con-

sumes a minimum of power. Because of the absence of any complicated mechanism, the machine is relatively trouble-free and durable.

Changes may be made in the described structure without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible consistent with the state of the art.

I claim:

1. In a machine of the class described, the combination of a conveyor for receiving in succession and propelling endwise a plurality of sanitary napkins each having a pad portion and tabs extending endwise from the ends of the pad portion, means for driving said conveyor at a substantially constant speed, movable means independent of but associated with said conveyor for receiving and supporting the rearwardly extending tabs of said napkins, said movable supporting means being arranged to receive the tabs when the napkins are delivered to said conveyor and said movable means being movable along a path of travel substantially parallel with the path of travel of said conveyor and the napkins thereon, and means for effecting faster movement of said tab supporting means than of said conveyor, whereby said tab supporting means is operative to move forwardly relative to the conveyor and the napkins thereon to fold said rearwardly extending tabs over said pad portion.

2. In a machine of the class described, the combination of a conveyor for receiving in succession and propelling endwise a plurality of sanitary napkins each having a pad portion and tabs extending endwise from the ends of the pad portion, means for driving said conveyor at a substantially constant speed, movable means independent of but associated with said conveyor for receiving and supporting the rearwardly extending tabs of said napkins, said movable supporting means being arranged to receive the tabs when the napkins are delivered to said conveyor and said movable means being movable along a path of travel substantially parallel with the path of travel of said conveyor and the napkins thereon, means for effecting faster movement of said tab supporting means than of said conveyor, whereby said tab supporting means is operative to move forwardly relative to the conveyor and the napkins thereon to fold said rearwardly extending tabs over said pad portion, and means for folding the forwardly extending tab over said pad portion while the travel of the pad continues at the same speed.

3. In a machine of the class described, the combination of a conveyor for receiving in succession and propelling endwise a plurality of sanitary napkins each having a pad portion and tabs extending endwise from the ends of the pad portion, means for driving said conveyor at a substantially constant speed, an endless chain mounted so that one reach thereof is adapted to travel in the same direction as and along a course substantially parallel to the forwardly moving reach of said conveyor, a plurality of tab supporting members extending transversely of said conveyor carried by said chain and spaced longitudinally thereof, means for feeding said succession of sanitary napkins to said conveyor in substantially uniformly spaced relation, and means for driving said chain and members carried thereby at greater speed than but in such synchronized relation to said conveyor as to cause said members to be successively positioned to receive the rearwardly extending tabs of the napkins as they are delivered to said conveyor and, as an incident to the greater speed of travel of said members, to carry such rearwardly extending tabs forwardly over the pad portions from which said tabs extend.

4. The method of folding the end tabs of sanitary napkins which comprises the steps of continuously propelling the sanitary napkins at a constant speed with the end tabs of the napkin extending forwardly and rearwardly from the opposite ends of the pad portion, effecting forward movement of the rearwardly extending tab at a speed greater than the normal speed of the travel of the napkin to thereby fold the rear tab over the pad portion of the napkin, and while continuing said normal speed of travel of the napkin, effecting rearward folding of the forwardly extending tab.

5. The method of folding the end tabs over the pad portion of sanitary napkins delivered successively by a machine for making such napkins, which comprises the steps of conveying the napkins successively in an endwise direction at a constant rate of travel at least equal to that at which they are delivered by said machine, lifting and dragging the rearwardly extending tab progressively, from adjacent its pad end to its free end, forwardly over the pad portion while the latter continues its forward movement at said constant rate of travel, and then, while the napkin continues to travel at said constant rate, folding the forwardly extending tab.

6. In a machine for folding the end tabs which extend endwise from the ends of the pad portion of a sanitary napkin, the combination of means for propelling the napkin endwise in a continuously forward direction and at a substantially constant speed of travel, means movable forwardly relative to the napkin during its travel on said propelling means for engaging and, as an incident to its travel relative to the napkin, folding the rear end tab of the napkin onto the pad portion of the napkin, and means operative while maintaining said constant speed of travel of the napkin for engaging and retarding the forward movement of the front end tab to effect folding thereof rearwardly onto said pad portion.

CHARLES A. FOURNESS.
CHARLES J. GREINER.