Dec. 14, 1965 D. P. SMITH ETAL 3,222,844

METHOD AND MACHINE FOR WRAPPING CONTINUOUSLY MOVING PRODUCTS WITH A FLEXIBLE OVERWRAP

Filed April 4, 1962 5 Sheets-Sheet 1

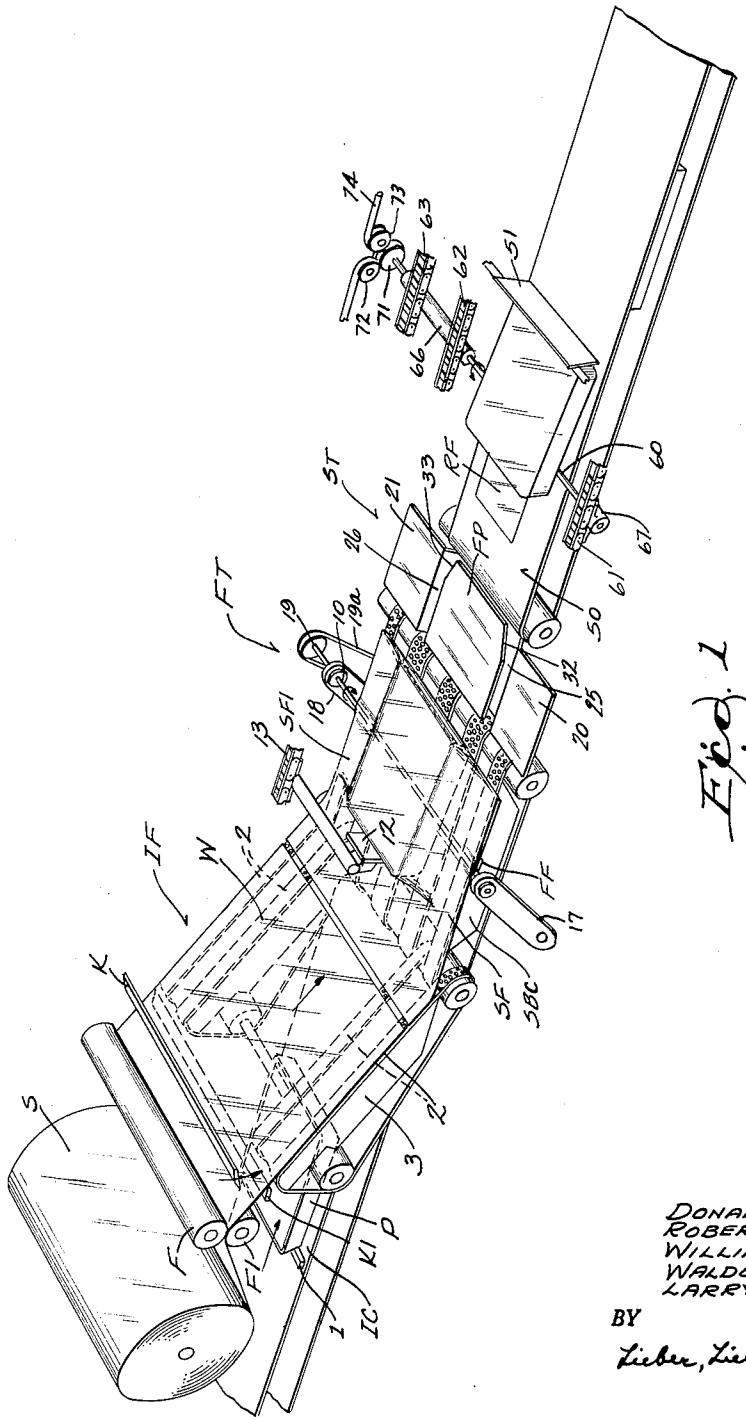

Fig. 1

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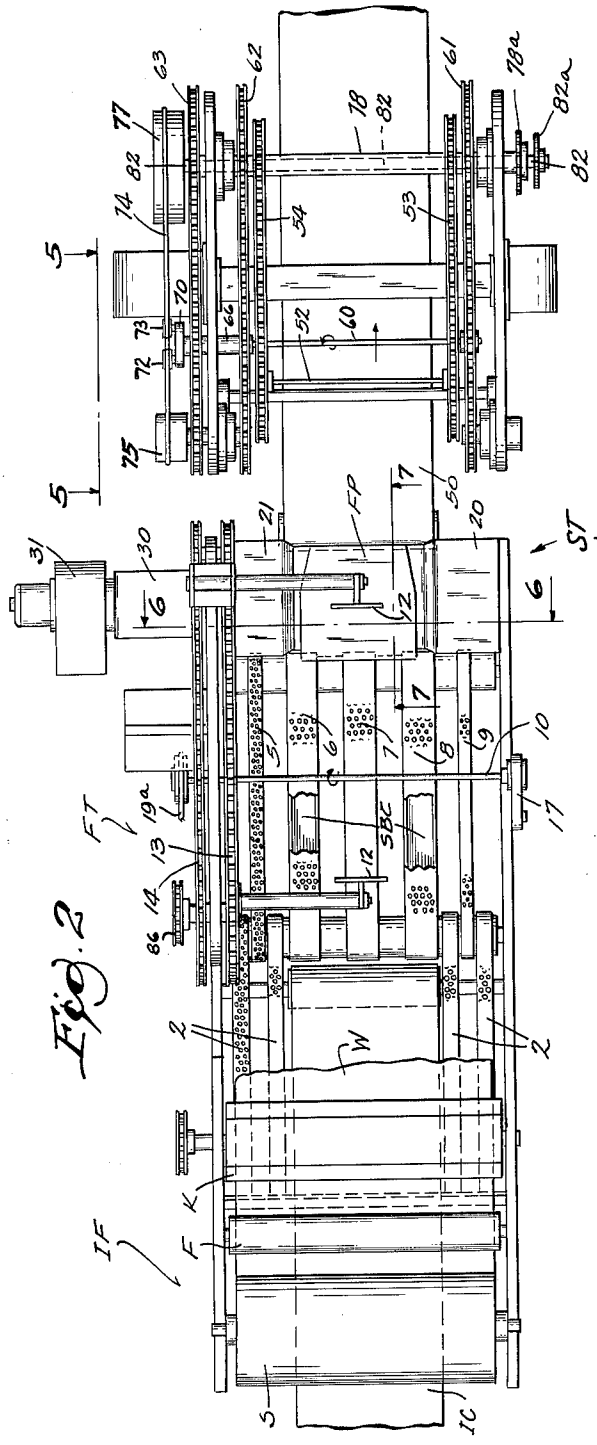

Fig. 2

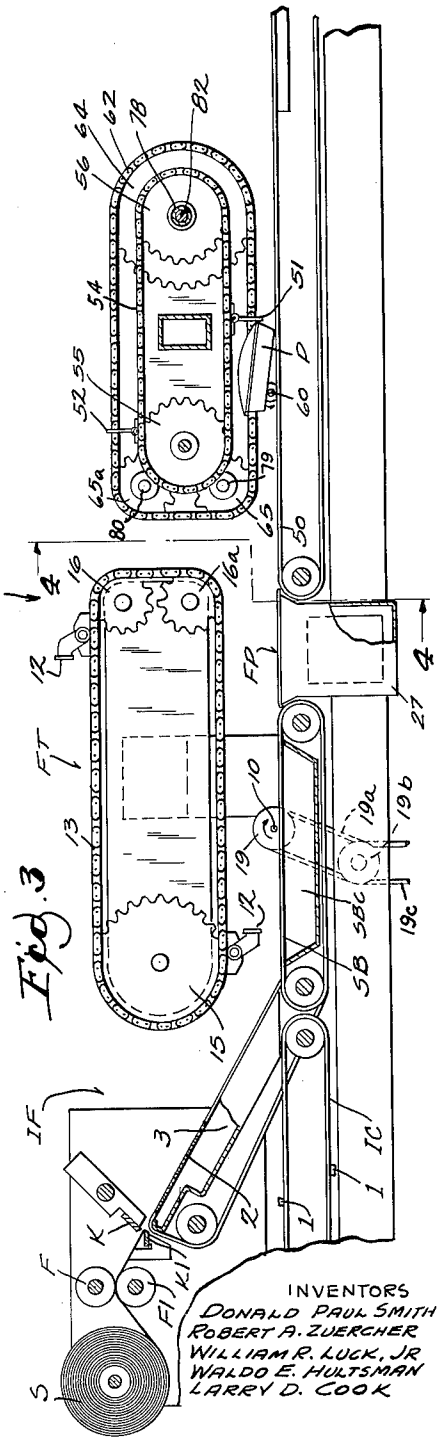

Fig. 3

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Filed April 4, 1962 5 Sheets-Sheet 3

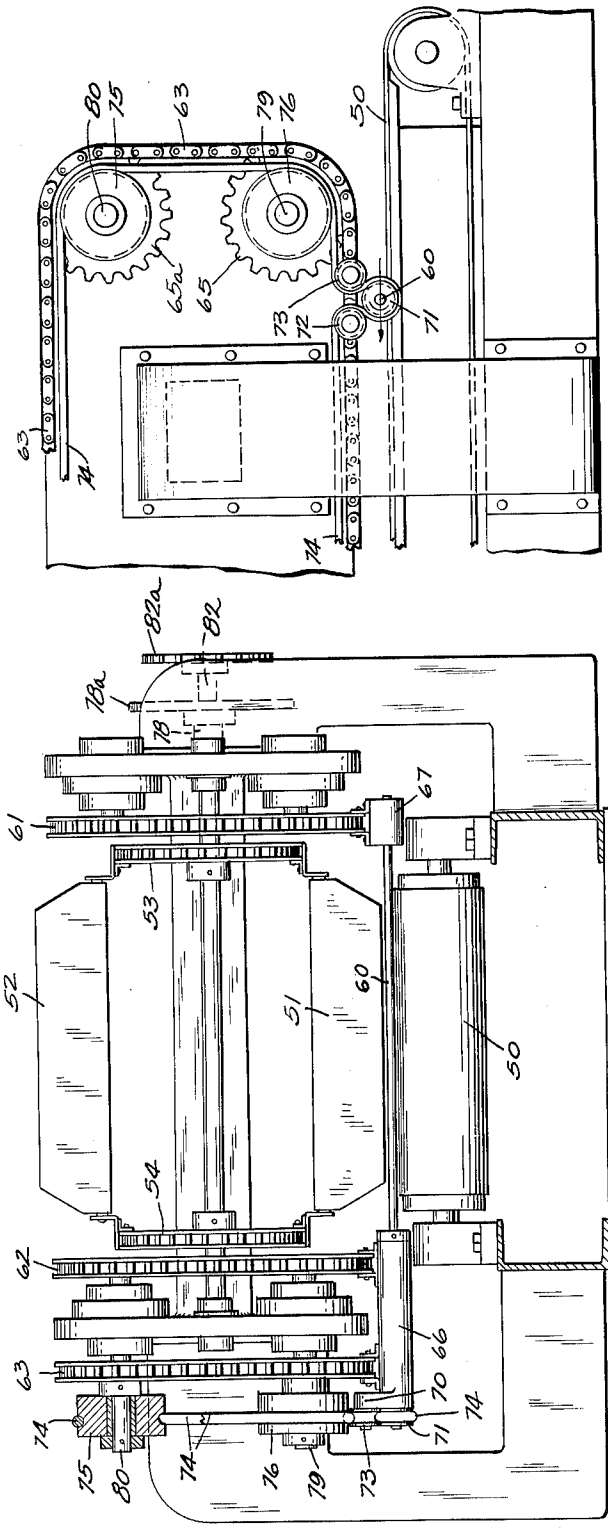

Fig. 4

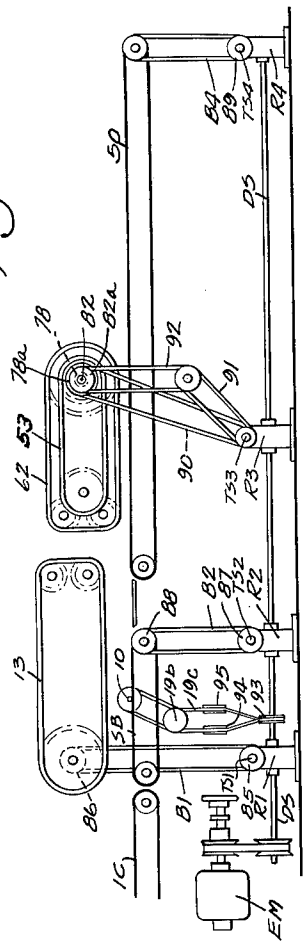

Fig. 5

Fig. 16

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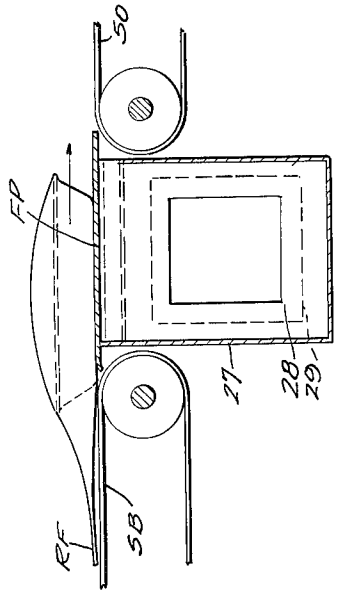

Fig. 7

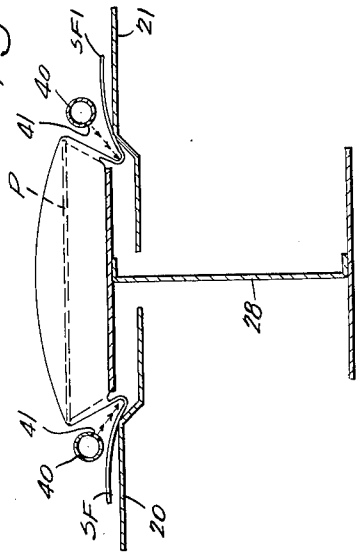

Fig. 8

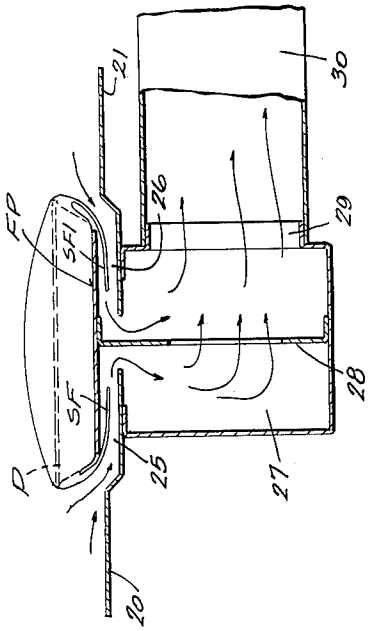

Fig. 6

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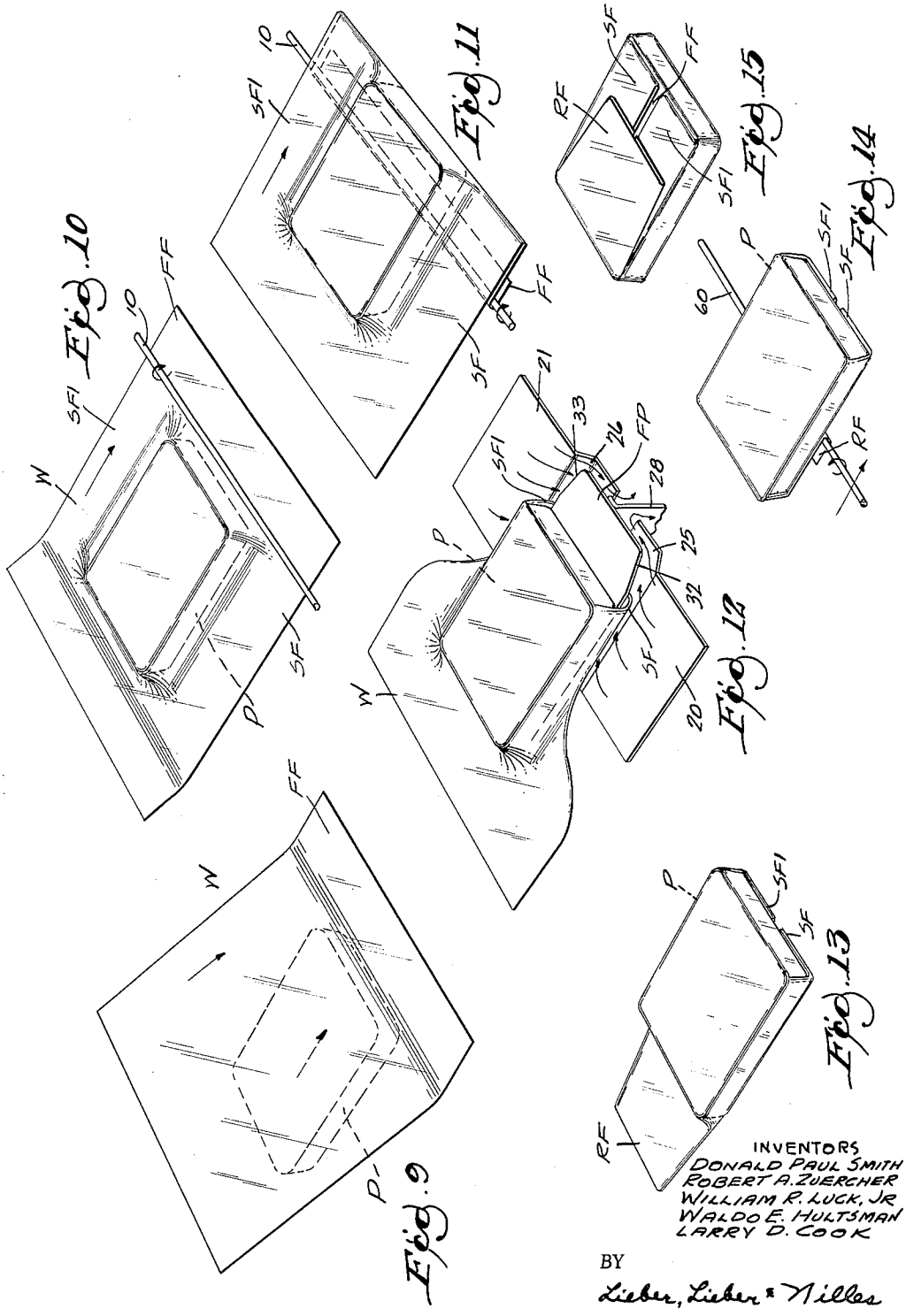

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United States Patent Office 3,222,844 Patented Dec. 14, 1965

3,222,844

METHOD AND MACHINE FOR WRAPPING CONTINUOUSLY MOVING PRODUCTS WITH A FLEXIBLE OVERWRAP

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Filed Apr. 4, 1962, Ser. No. 185,156
34 Claims. (Cl. 53—32)

This invention relates generally to high-speed wrapping machines of the type wherein as the products continuously move they are wrapped and sealed with a flexible wrapper.

More particularly, this invention relates to a method of wrapping and a machine of the above type in which the wrapper is deposited on top of the moving product and extends outwardly beyond the sides of the product.

Various devices have heretofore been proposed in a machine of the above type for folding or tucking the flaps under the product. For example, in the U.S. Patent 2,918,772 to Bell et al., issued on December 29, 1959, there is employed a folder bar for tucking the rear flap under the moving product; that machine also utilizes top folders for folding the opposite sides of the wrap downwardly over the sides of the product. In addition, in the machine shown in the co-pending U.S. application, Serial No. 55,073, filed November 9, 1960, issued on July 30, 1963 as Patent Number 3,099,118 and assigned to a common assignee with the present application, there are disclosed tucker plates which plow the opposite sides of the wrapper inwardly around the bottom of the product, and these plates act in cooperation with suction belts for tightly drawing the side flaps under the product.

The present invention relates to machines of this general character, and one aspect of the invention relates to improved means for tucking the front flap under the product; another aspect relates to an improved means for tucking the side flaps under the product to thereby define a trailing folded flap which can subsequently be tucked under the otherwise completed package.

Another more specific aspect of the present invention relates to a high-speed wrapping machine of the above general type which can do transverse "banding" of the products in an improved manner, and for this purpose it utilizes rotatable tucking rods for the front and rear tucking operations, which rods are positively rotated in such a direction as to pull the free end of the wrapper inwardly under the product and at the same time positively feed and apply the film to the package. By thereby positively driving the rods in this particular direction, a positive application of the film to the package is insured, and this is particularly important when utilizing a limp, "sticky" film, such as, for example only, polyvinylidene chloride and soft copolymers.

Another aspect of the invention provides that such positively rotatable rods work in close cooperation with the suction belt means that act to convey the product and pull the wrapper down tightly against the belt for easy and definite entry under the rods without obstruction or interference therewith.

Another aspect of the present invention relates to a continuous and high-speed wrapping machine in which after the leading flap of the wrapper has been tucked under the continuously moving product, the side flaps are then forced laterally inwardly under the opposite sides of the product by a path of moving air. This moving air may be the result of suction which draws the side flaps along a particular path of movement to thereby insure

complete and tight wrapping of the product. Alternatively, this moving air may be the result of jets of air pressure which are specifically directed to move the side flaps in the desired laterally inward direction. In either event, the side folds so formed extend all the way to the rear of the wrapper and thereby precisely define a tail portion which can subsequently be neatly tucked under the product.

A more specific aspect of the invention relates to a side tucking apparatus of the type described immediately above, in which the package, while being wrapped around its sides, rests on a former plate generally of a narrower width as the package. The side flaps so directed by the moving paths of air are caused to encircle or embrace and thereby enclose the former plate together with the package. In this manner, longitudinal "banding" of the products is accomplished.

The present invention also provides a wrapping machine of the overwrap type in which the leading flap of the film early in the wrapping sequence is tucked under the forwardly moving product so that it is positively controlled and need not be pushed ahead of the product as the latter moves along. The side flaps are then folded inwardly for their entire remaining length and under the package to thereby precisely define a trailing edge of the proper width; this is accomplished by utilizing a forming plate over which the side flaps are drawn. The last stage in the folding sequence is then to tuck the defined trailing edge under the continuously moving and partially formed package, and this last tuck is accomplished by means of a positively rotated rear tucking rod which also moves bodily and at a greater linear speed than the continuously moving package.

Both the front tuck and rear tuck spinning rods are positively rotated in such a direction so that they act to pull the free end of their respective flap inwardly under the package and at the same time deliver the flap from the tucker rod in a positive manner and positively apply it to the moving product. With this arrangement, even though the film is sticky and otherwise hard to handle, it is positively applied to the product.

The present invention also relates to an improved method of applying an overwrap of flexible material to a continuously moving product. More particularly, the wrapper is placed on top of the moving product with edges of the wrapper protruding beyond the front, rear, and opposite sides of the product. The wrapper is then caused to be moved downwardly over the product. The front flap is then tucked under the moving product and thereby the otherwise uncontrollable flexible and limp leading edge is at once brought under control and doubled over to present a new leading edge of greater stiffness. The opposite side flaps are then folded under the product, preferably by suction, to thereby form a trailing flap having folded sides. This trailing flap is of a predetermined width not greater than the width of the bottom of the then partially formed package. The last step in the flap tucking sequence is to fold the trailing flap under the product by moving it forwardly at a greater rate of travel than that at which the product moves. In this manner, the leading edge is not pushed ahead of the product for any extent, but instead is folded under the product as the first folding operation. The sides are then folded to define a tail of proper width, which tail is then neatly tucked under the product so as not to protrude from the sides of the package.

These and other objects and advantages of the present invention will appear hereinafter as this disclosure progresses, reference being had to the accompanying drawings, in which:

FIGURE 1 is a fragmentary, perspective view, generally schematic in nature, with parts broken away or

removed for clarity in the drawings, and showing a machine made in accordance with the present invention;

FIGURE 2 is a fragmentary plan view of the machine shown in FIGURE 1 but on an enlarged scale, certain parts being in section, removed, or broken away for clarity;

FIGURE 3 is a side elevational view of the machine shown in FIGURE 2, certain parts being shown in section, broken away, or removed for clarity;

FIGURE 4 is a sectional view taken along line 4—4 in FIGURE 3, but on an enlarged scale, certain parts being shown in section and broken away;

FIGURE 5 is a fragmentary, rear side elevational view, taken along line 5—5 in FIGURE 2, but on an enlarged scale;

FIGURE 6 is a transverse sectional view taken along line 6—6 in FIGURE 2, but on an enlarged scale;

FIGURE 7 is a fragmentary side elevational view taken along line 7—7 in FIGURE 2 but on an enlarged scale;

FIGURE 8 is a view similar to FIGURE 6, but showing a modified form of that portion of the machine for creating air currents in the side tuck section;

FIGURES 9 to 14 inclusive are perspective views showing the progressive steps of wrapping the product as the latter moves through the machine;

FIGURE 15 is a bottom, perspective view of a completed package as wrapped on the present machine; and

FIGURE 16 is a schematic side elevational view of the drive for some of the various parts of the machine.

Infeed section

The product infeed section IF is shown generally at the left end of FIGURE 1, and is of a generally conventional nature, having an endless infeed conveyor IC with projections **1** which push the product from left to right as viewed in FIGURE 2, which direction is the forward direction, in respect to product travel. The flexible wrapping material may be of various types and is supplied from the supply roll S from which the web passes to and through the feed rolls F and F1, and between rotary knife K and cooperating shear bar K1.

As the knife forms the individual wrappers W, they are successively carried by the four downwardly inclined and perforated endless belts **2**. A vacuum chamber **3** is located between the flights of the belts in the conventional manner and creates a suction through the perforated belts so the wrappers are positively and accurately conveyed downwardly and forwardly by these belts and placed on top of the product P which moves underneath and between them from the conveyor IC.

One wrapper is precisely placed on top of each of the products, with the edges of the wrapper extending outwardly beyond all sides of the product. Thus, front, rear, and opposite side flaps of the wrapper extend outwardly from the product, which flaps are subsequently drawn downwardly along the sides of the product by other suction in an improved manner, all as will presently be described.

Film laying and front tuck section

As the wrapper is placed on the product P, it leaves the infeed section and is smoothly transferred to the front tuck section FT.

The front tuck section includes a product conveyor means for moving the product and wrapper together along a defined path of movement. This conveyor means is shown as taking the form of an endless suction belt means SB which act to continue to move the product P along its path of travel and also act to pull the extending flaps of the wrapper tightly down over the product where they lay flat against the suction belt means.

The suction belt means SB has been shown as a series of endless, flexible, and perforated belts **5**, **6**, **7**, **8**, and **9** arranged in parallelism, and all traveling at the same speed. However, any number of these belts may be utilized as desired. For example, a single but much wider belt may also be satisfactory. A suction chamber SBC is located between the flights of the belts and acts to create a suction downwardly through the perforated belt means.

Means are provided for tucking the front flap FF (FIGURES 1, 9, and 10) under the product as the latter continuously moves along in the forward direction, and this means consists of a transversely extending and positively rotated bar **10** (FIGURES 1–3 and 10). This bar is located above and closely adjacent to the upper surface of the suction belt means and intermediate the length thereof.

As the product and its wrapper approach the bar **10**, and the front flap FF passes beneath the bar (FIGURE 10), the flap is held tightly down and flat on the suction belt means by suction and extends forwardly of the product. As a result, the front flap passes beneath the spinning rod without hesitation or interference therewith.

In wrapping certain types of products of more or less irregular shape, such as head lettuce, it may not be essential to utilize suction to pull the front flap under the bar **10**. Instead, sufficient clearance beneath the bar may be provided or the bar can be swingably mounted to provide the necessary clearance, as will be referred to later.

As the product itself then reaches the rod, it rides up over the bar and passes thereover (FIGURES 1 and 11), thus causing the flap to be laid back under the product.

Pusher means are provided in the form of transverse paddles **12** (FIGURES 1–3) attached to a pair of continuously moving and endless chains **13** and **14** trained around pairs of rotating sprockets **15**, **16**, and **16***a*. These pushers act in timed relationship with the products as they move onto the suction belt means and act to insure that the product does not hesitate as it contacts and passes over the tucker rod.

It will be noted that the rod **10** is positively driven in the direction indicated by the curvilinear arrow so that the upper surface of the rod is moving in the same direction as the product. This particular direction of rotation and positive rotational drive of the rod is important to a dependable and positive tucking operation, particularly when sticky and limp wrappers are used. The action is such that the free end of the flap is pulled in and around the rod and it is then positively fed from the rod and laid on or applied to the underside of the product. This has been found to be particularly advantageous, especially from a reliability standpoint, as compared to simply permitting rolling contact drive of the rod on the bottom of the product, which often resulted in film stretching, tearing, wrinkling or in wrapping of the film around the rod itself.

The peripheral speed of the rod as compared to the linear speed of the product may vary somewhat but they should be generally equal.

With the above arrangement, the front flap is tucked under the package as the first step in the complete flap tucking sequence, and this occurs early in the combined movement of the wrapper and its product. This is important when using sticky and very flexible or limp film, particularly when used with suction belt means for conveying and pulling the wrapper down over the product. The forwardly extending and usually difficult-to-control leading edge of the front flap is promptly tucked under the package to form a folding leading edge which extends laterally outwardly from the product at both sides and as an extension of the front side thereof.

The rod **10** is suitably journalled at one end in arm **17** (FIG. 1) mounted at its lower end on the machine frame. The other end of the rod is rotatably journalled in a similar arm **18** and has a pulley **19** fixed thereto. An endless flexible drive member **19***a*, which is trained over pulley **19** and over another pulley **19***b* (FIGURE 3) on

the machine, transmits power to the rod from a power source, such as an electric motor EM (FIGURE 16), as will more fully appear later.

When a wrapping material is being used that is heavier and comparatively easy to handle and not quite so sticky, or when more or less irregularly shaped articles are to be wrapped, such as head lettuce, it may not be essential to use suction to pull the front flap under the bar **10**. In that case, the bar may be oscillated by arms **17** and **18** in timed relationship with the oncoming package, so as to provide sufficient clearance thereunder for the leading edge of the wrapper.

After the front flap has been tucked under the continuously moving product as above described, it continues its travel and is transferred by the pusher paddles **12** to the sides of tucking section ST (FIGURES 1–3, 6–8, and 12).

Sides tucking section

The side flaps SF and SF1 (FIGURES 1 and 11) are tucked under the product as it passes over the section ST, as shown in FIGURE 12, and these side tucks are accomplished by laterally inwardly moving currents of air which act on the side flaps and cause them to be instantaneously tucked under the product as the latter moves rapidly over section ST.

A preferred form for performing this side tucking operation is shown which utilizes suction for drawing the side flaps laterally inwardly and tightly under the product. Vacuum slots are defined at each side of the side tucking section for directing the suction effect in a precise path, and the construction and operation of the side tucking section is as follows:

A former plate FP forms a surface over which the product slides with its leading edge tucked thereunder. This plate is of a width generally narrower than the width of the bottom of the product, at any rate the plate is not of a greater width than the bottom of the product, although it may be narrower. Preferably, however, the plate is of a width generally the same as the width of the bottom of the product, so as to form a trailing flap (as will appear) that can be tucked neatly under the product without protruding therefrom.

The former plate FP is also preferably made interchangeable with others of different width to accommodate runs of products having different bottom widths. It should be mentioned that it is necessary to change only this plate to adapt the present invention to a large variety of products to be wrapped.

Side plates **20** and **21** extend from adjacent the sides of the former plate and then bend downwardly beneath the former plate and extend along its underside, thus forming laterally inwardly directed air passages **25** and **26** which communicate with the interior of the suction chamber **27**. A central, vertically disposed plate **28** supports the former plate and directs the passages downwardly into the chamber. A vacuum is drawn off the chamber through its outlet **29** and conduit **30** from a source of suction, such as the blower **31** of conventional nature (FIGURE 2).

As the product passes over the former plate, the side suction pulls the side flap laterally inwardly under the product and former plate. As the product leaves the former plate, the suction continues to pull that portion of the side flaps to the rear of the product, inwardly around the former plate. In other words, the side flaps are folded inwardly along their entire longitudinal length. This forms a trailing flap which is folded beneath itself along each of its longitudinal edges.

The former plate is tapered inwardly along its front sides at **32** and **33** to form an inwardly converging taper at its front end which permits the trailing flap to be more easily drawn off of the former.

An alternative form of the invention is shown in FIGURE 8, wherein elongated nozzles **40** having a series of apertures **41** direct jets of compressed air against the side flaps and laterally inwardly beneath the former plate and from each side thereof. This air blast action also folds the side flaps inwardly and tightly around the sides of the product and former plate. Thereby, other means for causing specifically directed currents of air may be employed with the present invention, other than the suction means, but the latter has been found to be easier to control and with better definition of flap movement.

Rear tuck section

The pusher paddles **12**, in discharging the partially formed package from the side tuck section ST, also push the package onto a wide, endless belt conveyor **50** that continues to move the packages along their path of travel and through the rear tucking operation.

Retarder means are provided for the packages as they are moved by conveyor **50** and act to hold or retard the packages from being moved ahead too rapidly by the action of the bodily moving rear tucker bar **60** (to be described). This retarder means takes the form of a pair of spaced apart retarders **51** and **52** carried by and between a pair of endless roller chains **53** and **54**. These chains are suitably trained over the pairs of sprockets **55** and **56** that in turn are journalled for rotation in the machine frame in any well-known manner. It is believed sufficient to say that chains **53** and **54** are arranged in parallelism, and the pair of sprockets **56** fixed on shaft **78** is driven to furnish positive and continuous rotation of the chains and the retarders carried thereby. As the retarders move in their lower portion of their travel, they act to retard, control, and steady the package that abuts against their rear side as the tucker rod **60** moves forwardly and beneath the package at a much faster rate. The linear speed of the retarders is approximately the same as the speed of the conveyor and the timing and phase of the retarders relative to pushers **12** are such that a retarder is provided for each package discharged by a pusher.

The transversely positioned rear tucker rod **60** is mounted for bodily movement under the package and in the same direction of package movement but at about three times the speed of the package. This bodily movement is accomplished by rotatably mounting the rod across and on three endless roller chains **61**, **62**, and **63** (FIGURES 1, 2, and 4) arranged in parallelism and for orbital movement in vertical planes. The chains are trained over the three sets of three sprockets **64**, **65**, and **65***a*, the set **64** of which is rotatably driven through the drive sheave **78***a* fixed on shaft **78**, as will appear, to positively and continuously rotate the rod **60** through its orbital path of travel.

The rod **60** is also mounted for rotation about its own axis, that is to say, the rod positively rotates or spins as it also moves bodily as above described. To provide for this spinning, the rod is journalled in the elongated housing **66** fixed between chains **62** and **63** and in the housing **67** fixed to chain **61**.

The outer end of the elongated housing **66** has an enlarged portion **70** (FIGURES 2 and 4). A sheave **71** is fixed to rod **60** and is rotatably mounted on portion **70** and adjacent to idler sheaves **72** and **73** also rotatably mounted on portion **70**. An endless and flexible drive cord **74** is trained around these sheaves and is also trained around sheaves **77**, **76**, and **75** mounted, respectively, on the end of shafts **78**, **79**, and **80** which carry some of the sprockets of sets **64**, **65**, **65***a*, respectively.

Thus, shaft **78** is the drive shaft for the three large sprockets **64** and the chains **61**, **62**, and **63** trained thereover, and also drives the sprockets **56** fixed thereto and consequently the retarders.

Another drive shaft **82** is mounted within the tubular shaft **78**, and the cord sheave **75** is fixed thereto and thus driven thereby to drive the cord. Thus, as the rod is bodily moved by its three endless chains, it is also rotatably driven in the direction indicated by the curvilinear arrows.

The direction of rotation of the rod is shown by the curvilinear arrow in FIGURE 1 and is such that the top side of the rod moves in a direction opposite to that in which the package moves. As the package moves in the same direction as bodily movement of the rod, but at a much slower rate than the rod, the direction of rod rotation is the same relative to the package as would be provided by simple rolling contact therebetween if the rod were not positively rotatably driven. However, it has been found to be important to positively spin the rod, and in fact necessary with the type of films previously referred to. The positive rotation of the rod causes the free end of the rear flap RF to be pulled in toward the rod and around it for positive application to the underside of the package. In other words, the spinning rod positively reels the flap in and then pays it out, both at a definite rate. This action eliminates winding on the rod and stretching or crinkling of the wrapper.

The rod is carried bodily by the chains at a speed approximately three times that of the package, and furthermore the rod is driven to make it rotate about its own axis at a peripheral speed roughly equal to that of the bottom side of the package on which the wrapper is laid. With this arrangement, the rod does not disturb the previous folds.

Drive means

The general drive arrangement is shown in FIGURE 16, and the electric motor EM drives the main drive shaft DS in the conventional manner. A series of conventional right-angle gear reducers R1, R2, R3, and R4 transmit power from the main shaft to the transverse shafts TS1, TS2, TS3, and TS4. An endless belt B1 acting through suitable sheaves 85 and 86 fixed to shafts TS1 and with sprocket 15, respectively, transmits power from the main drive shaft DS to the pusher unit. Belt B2 acting through sheaves 87 and 88 drives the conveyor means from shaft TS2. Belt B4 furnishes drive from sheaves 89 on shaft TS4 to the conveyor 50 in the conventional manner. Similarly, sprocket 78*a* and 82*a* of the rear tuck section are driven from the transverse shaft TS3 by belts 90, and 91, 92, respectively.

The main drive shaft DS also furnished power to rotate the front spinning tuck rod 10 through belt 19*c* trained around pulleys 93, 94, 95, and 19*b*.

Résumé

The high-speed and continuous wrapping machine provided by the present invention utilizes positively rotated tucker bars for tucking both the front and rear flaps. These bars are rotated in a particular direction which acts to draw the free end of the flap inwardly over the bar and apply it in a positive manner to the underside of the package. This is important when used in certain types of flexible wrappings, particularly those of a sticky and especially limp nature.

The use of suction for drawing the flaps downwardly over the product and holding the front flap tightly against the suction belt means is important in many wrapping conditions, particularly with sticky film, and has a cooperative effect with the front tucker bar, in that the latter can clear the front leading edge of the flap without obstruction or inadvertent winding of the flap on the spinning bar. However, the use of the suction for drawing the flaps under the front tucker is not required if the rotating rod is lifted over the leading edge of the film and dropped in proper position to go under the package.

The present invention also provides novel means for performing the side tucking functions, and which means acts to tightly draw the material over the product even though the latter may be of an irregular shape. These side tucking means also work in cooperation with the former plate to thereby precisely define the shape and width of the trailing flap which can then subsequently be neatly tucked under the package.

The sequence of folds is such that the front flap is turned rearwardly early in the wrapping process and thereby this otherwise uncontrollable edge is brought into control at an early stage in the folding process. The side flaps are then folded for their entire length including those portions which extend rearwardly with the rear flap. This side folding operation is performed in such a manner that the resulting trailing flap can be neatly tucked under the package without protruding from the sides thereof.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention:

1. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, tucker means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side flaps to be folded inwardly under said product as the latter moves along.

2. A continuous wrapping machine for a moving product comprising, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, suction belt means for moving the product along a path of travel and acting on said flaps to pull them downwardly around the product, means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side flaps to be folded inwardly under said product as the latter moves along and around and under said plate to form a trailing folded flap of a width not greater than the width of the bottom of said product.

3. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, tucker means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and suction means beneath said plate for drawing said side flaps inwardly around said plate and under said product as the latter moves along.

4. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, said rod being rotated in a direction whereby its upper surface moves in the same direction as the product, a former plate over which said product is moved with said front flap tucked thereunder, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side

flaps to be folded inwardly under said product as the latter moves along.

5. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, said rod being rotated in a direction whereby its upper surface moves in the same direction as the product, a former plate over which said product is moved with said front flap tucked thereunder, and suction means beneath said plate for drawing said side flaps inwardly around said plate and under said product as the latter moves along.

6. A continuous wrapping machine for wrapping a moving product comprising, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, suction belt means for moving the product along a path of travel and acting on said flaps to pull them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, said rod being rotated in a direction whereby its upper surface moves in the same direction as the product, a former plate over which said product is moved with said front flap tucked thereunder, suction means beneath said plate for drawing said side flaps inwardly under said product as the latter moves along, a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product, and means for positively rotating said rear tucker rod in a direction whereby its upper surface moves in a direction opposite to the bodily movement of said rear tucker rod.

7. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, means for positively rotating said rod in a direction whereby its upper surface moves in the same direction as the product, means for folding said side flaps under said product, to thereby form a folded rear flap, a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product, and means for positively rotating said rear tucker rod in a direction whereby its upper surface moves in a direction opposite to the bodily movement of said rear tucker rod.

8. A machine for wrapping a moving product comprising, suction belt means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, said suction belt means acting on said flaps to pull them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, means for positively rotating said rod in a direction whereby its upper surface moves in the same direction as the product, and means for folding said side flaps under said product, to thereby form a folded rear flap.

9. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite side flaps extending beyond said product, the combination of suction belt means for conveying said product and for pulling said flaps tightly downwardly over the product, means for tucking said front flap under the product, a former plate over which the product is moved, said plate having an elongated air passage formed therein and along each side of said product, and means for causing a laterally inwardly directed current of air to pass through said air passages at each of opposite sides of said product for folding said side flaps inwardly under said moving product.

10. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite side flaps extending beyond said product, the combination of suction belt means for conveying said product and for pulling said flaps tightly downwardly over the product, means for tucking said front flap under the product, a former plate over which the product is moved, said plate having an elongated air passage formed therein and along each side of said product, and laterally inwardly directed suction means at each of opposite sides of said product and acting through said air passages for drawing said side flaps inwardly under said product.

11. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite side flaps extending beyond said product, the combination of suction belt means for conveying said product and for pulling said flaps tightly downwardly over the product, means for tucking said front flap under the product, and a laterally inwardly and downwardly directed suction passage at each of opposite sides of said product, and means for creating suction pressure in said passages whereby said side flaps are pulled inwardly under said product as the latter moves along.

12. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond the front, rear, and opposite sides of the product, drawing said flaps downwardly over the product by suction, tucking the front flap under the product, folding the opposite side flaps under the product to thereby form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

13. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond the front, rear, and opposite sides of the product, drawing said flaps downwardly over the product by suction, tucking the front flap under the product, applying a laterally inwardly directed current of air to said opposite side flaps to thereby fold said side flaps under the product and form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

14. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of

the wrapper extending beyond the front, rear, and opposite sides of the product, applying suction from beneath and to said flaps to draw said flaps downwardly over the product, tucking the front flap under the product, applying suction from beneath and generally between the opposite side flaps to thereby draw said side flaps laterally inwardly under the product to thereby form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

15. The method as set forth in claim 14 including the step of limiting the inward movement of said side flaps due to the influence of said suction to thereby limit the width of said trailing flap to a predetermined size.

16. A machine for wrapping a moving product comprising, conveyor means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, tucker means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side flaps to be folded inwardly under said product as the latter moves along.

17. A continuous wrapping machine for a moving product comprising, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, conveyor means for moving the product along a path of travel, means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side flaps to be folded inwardly under said product as the latter moves along and around and under said plate to form a trailing folded flap of a width not greater than the width of the bottom of said product.

18. A machine for wrapping a moving product comprising, conveyor means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, tucker means for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, and suction means beneath said plate for drawing said side flaps inwardly around said plate and under said product as the latter moves along.

19. A machine for wrapping a moving product comprising, conveyor means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, said rod being rotated in a direction whereby its upper surface moves in the same direction as the product, a former plate over which said product is moved with said front flap tucked thereunder, and suction means beneath said plate for drawing said side flaps inwardly around said plate and under said product as the latter moves along.

20. A continuous wrapping machine for wrapping a moving product comprising, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, a product conveyor for moving the product along a path of travel including means for acting on said flaps to move them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, a former plate over which said product is moved with said front flap tucked thereunder, suction means beneath said plate for drawing said side flaps inwardly under said product as the latter moves along, and a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product.

21. A machine for wrapping a moving product comprising, a conveyor for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, means for holding said side flaps under said product, to thereby form a folded rear flap, and a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product.

22. A machine for wrapping a moving product comprising a conveyor for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front, rear, and two opposite side flaps of the wrapper protruding around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, means for positively rotating said rod in a direction whereby its upper surface moves in the same direction as the product, and means for folding said side flaps under said product, to thereby form a folded rear flap.

23. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite side flaps extending beyond said product, the combination of conveying means for conveying said product and for moving said flaps tightly downwardly over the product, means for tucking said front flap under the product, a former plate over which the product is moved, said plate having an elongated air passage formed therein and along each side of said product, and means for causing a laterally inwardly directed current of air to pass through said air passages at each of opposite sides of said product for folding said side flaps inwardly under said moving product.

24. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite side flaps extending beyond said product, the combination of conveying means for conveying said product and for moving said flaps downwardly over the product, means for tucking said front flap under the product, a former plate over which the product is moved, said plate having an elongated air passage formed therein and along each side of said product, and laterally inwardly directed suction means at each of opposite sides of said product and acting through said air passages for drawing said side flaps inwardly under said product.

25. In a high speed, continuous wrapping machine of the type in which a wrapper is deposited on top of a continuously moving product with a front, rear, and opposite

side flaps extending beyond said product, the combination of conveyor means for conveying said product, means for tucking said front flap under the product, and a laterally inwardly and downwardly directed suction passage at each of opposite sides of said product, and means for creating suction pressure in said passages whereby said side flaps are pulled inwardly under said product as the latter moves along.

26. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond the front, rear, and opposite sides of the product, causing said flaps to move downwardly over the product, tucking the front flap under the product, folding the opposite side flaps under the product to thereby form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

27. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond the front, rear, and opposite sides of the product, tucking the front flap under the product, applying a laterally inwardly directed current of air to said opposite side flaps to thereby fold said side flaps under the product and form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

28. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond the front, rear, and opposite sides of the product, tucking the front flap under the product, applying suction from beneath and generally between the opposite side flaps to thereby draw said side flaps laterally inwardly under the product to thereby form a longitudinally folded trailing flap of a width not greater than the bottom of the product, and then tucking said trailing flap underneath said moving product by advancing said trailing flap at a faster rate than that with which said product moves.

29. A continuous wrapping machine for a moving product comprising, means for depositing a wrapper on the top side of said moving product with two opposite side flaps of the wrapper protruding beyond the product, conveyor means for moving the product along a path of travel, a former plate over which said product is moved, and means for causing a laterally inwardly directed current of air at each of the opposite sides of said product and under said former plate to thereby cause said side flaps to be folded inwardly under said product as the latter moves along and around and under said plate.

30. A machine for wrapping a moving product comprising, conveyor means for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with two opposite side flaps of the wrapper protruding beyond the product, a former plate over which said product is moved, and suction means beneath said plate for drawing said side flaps inwardly around said plate and under said product as the latter moves along.

31. A machine for wrapping a moving product comprising, a conveyor for moving the product along a path of travel, means for depositing a wrapper on the top side of said moving product with a front and a rear flap of the wrapper protruding beyond the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, and a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product.

32. A continuous wrapping machine for wrapping a moving product comprising, means for depositing a wrapper on the top side of said moving product with front and rear flaps of the wrapper protruding beyond the product, a product conveyor for moving the product along a path of travel including means for acting on said flaps to move them downwardly around the product, a transversely positioned and positively rotated tucker rod under which the front flap passes and over which the product passes for tucking said front flap rearwardly under the product as the latter moves along, and a transversely positioned and positively rotated rear tucker rod mounted for bodily movement over said rear flap and beneath said product and in the same direction as but at a faster linear speed than said product, to thereby tuck said rear flap under said moving product.

33. The method of wrapping a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond opposite sides of the product, applying a laterally inwardly directed current of air to said opposite side flaps and downwardly beneath said product and toward the centers thereof, to thereby fold said side flaps tightly and inwardly under the product, and passing the product and inwardly folded side flaps which are located under the package over a flat surface to form a longitudinally folded package as said product moves along.

34. The method of longitudinal banding a continuously moving product with a flexible wrapper which comprises, placing said wrapper over said moving product with the flaps of the wrapper extending beyond opposite sides of the product, applying suction from beneath and generally between the opposite side flaps to thereby draw said side flaps laterally inwardly tightly and toward one another and under the product, and passing said package and inwardly folded side flaps over a flat surface to thereby form a longitudinally folded package as said product moves along.

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