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Pepmeier et al.

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[54] **WRAPPING APPARATUS**

[75] Inventors: **Carl R. Pepmeier,** Spotsylvania, Va.; **Edward G. Lowe,** Gloucester, N.J.

[73] Assignee: **FMC Corporation,** Philadelphia, Pa.

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[52] **U.S. Cl.** **53/329,** 53/221

[51] **Int. Cl.** **B65b 11/38**

[58] **Field of Search** 53/329, 220, 221, 225, 53/234, 204, 296, 298, 307, 345, 359, 360, 32, 42

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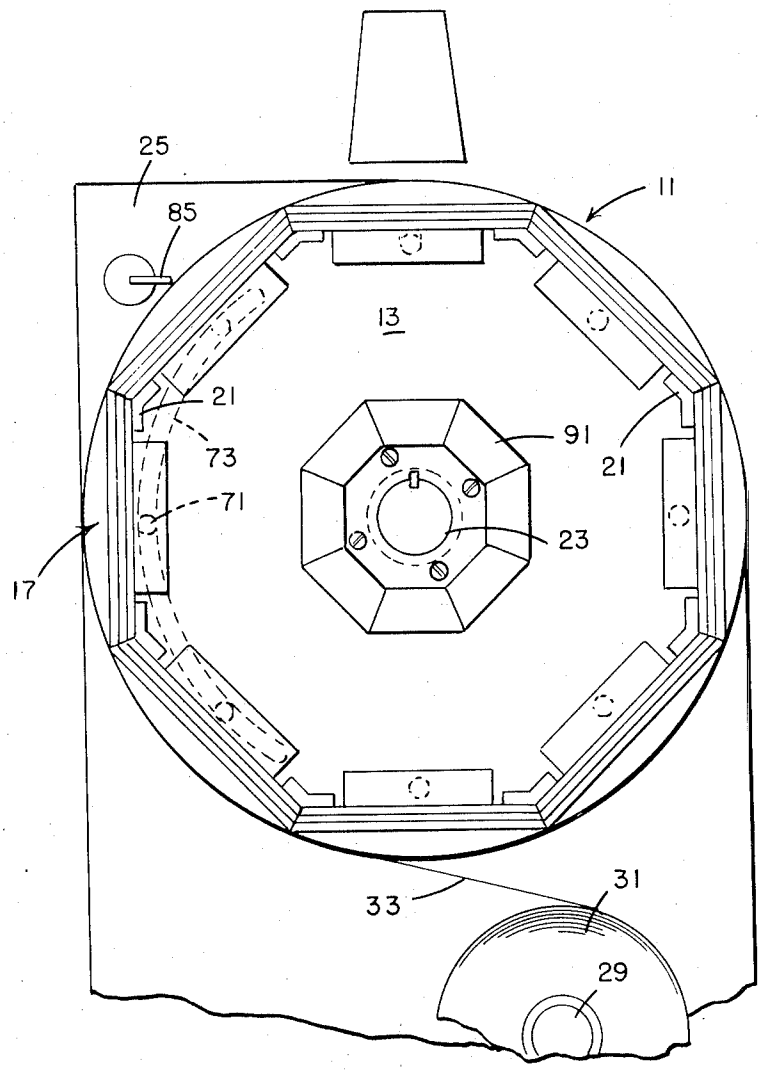
Primary Examiner—Travis S. McGehee
Assistant Examiner—Horace M. Culver

[57] **ABSTRACT**

Article wrapping apparatus including a drum having openings extending through its periphery and which is rotatable sequentially through different locations at which a continuous web of wrapping material is first applied to its periphery across the openings therein, then cut at locations between the drum openings to provide separate sheets, and finally the sheets are at least partially enveloped about articles by urging individual of such articles against the separate sheets and through the drum openings.

4 Claims, 6 Drawing Figures



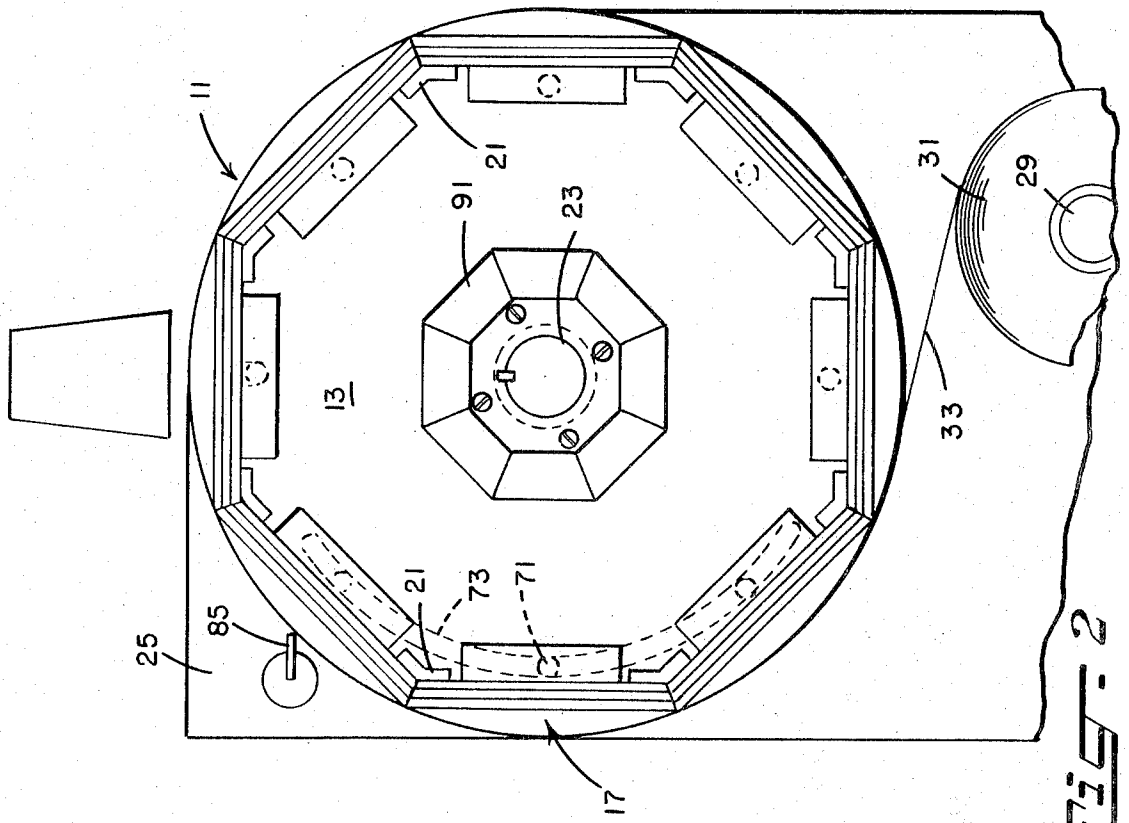

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FIG. 2

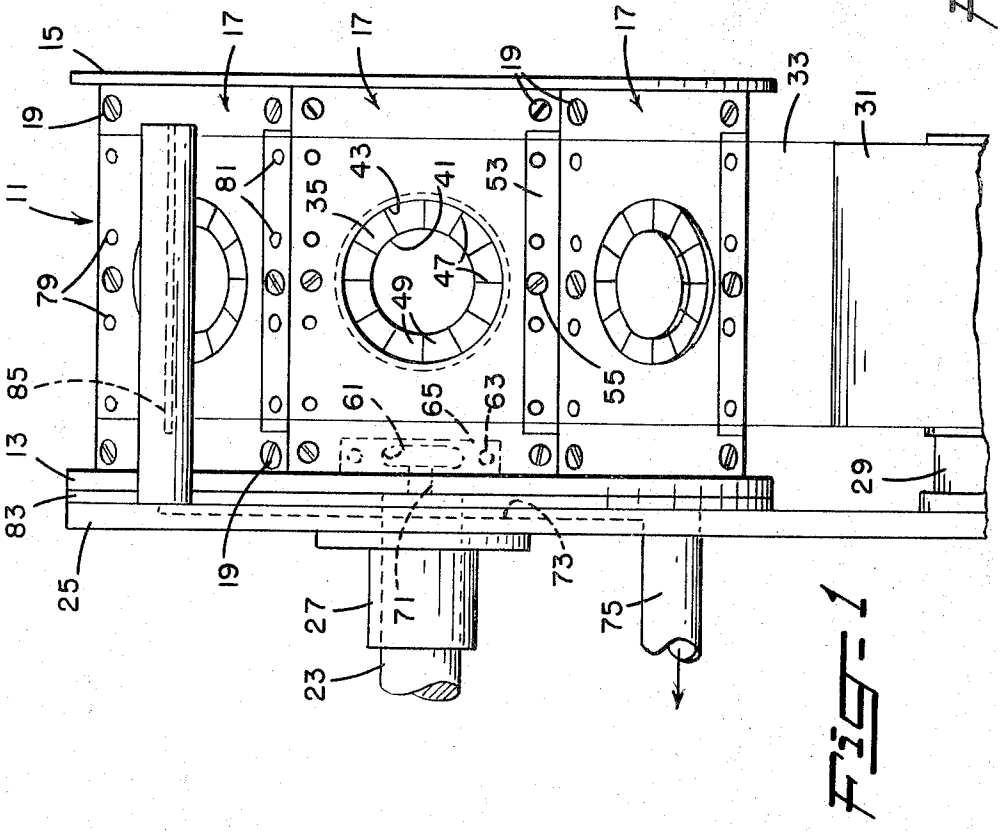
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FIG. 1

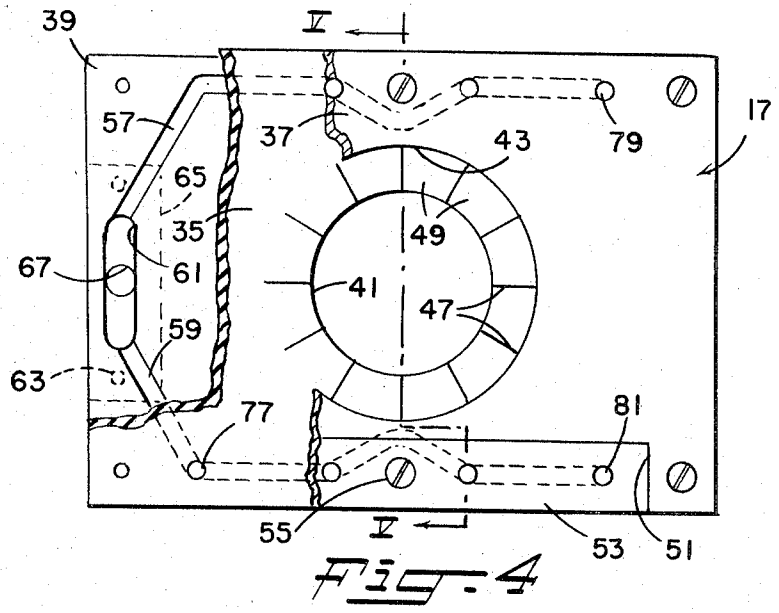

Fig. 4

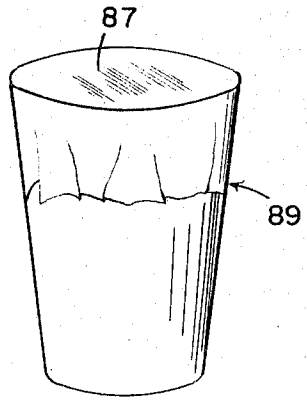

Fig. 6

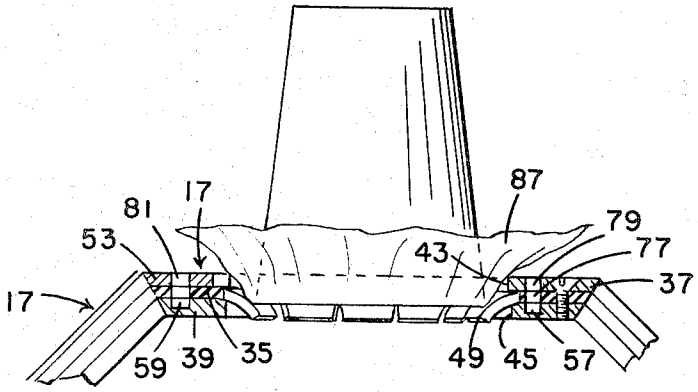

Fig. 5

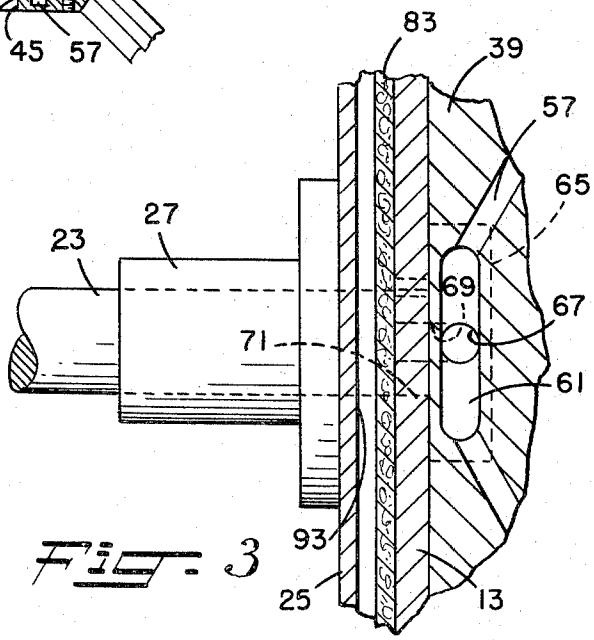

Fig. 3

WRAPPING APPARATUS

The present invention is directed to an improved article wrapping apparatus.

A primary object of this invention is the provision of a new or generally improved and more satisfactory apparatus for at least partially enveloping individual articles with separate sheets of wrapping material.

Another object of this invention is to provide an improved apparatus for capping the open ends of containers.

Still another object is the provision of an apparatus within which a continuous web of wrapping material is severed into individual sheets and at least partially enveloped about individual articles by movement of the articles against such sheets and relative to the apparatus itself.

A further object is the provision of an improved article wrapping apparatus which can be operated continuously or intermittently, requires a minimum of operator skills, and entails low cost in manufacture and use.

These and other objects are accomplished in accordance with the present invention by an apparatus which includes a drum having openings extending radially through its periphery and which is rotatable through a number of different locations or stations at which a continuous web of wrapping material is first applied to its periphery across the openings therein, then severed into separate sheets, and finally at least partially enveloped about individual articles.

More particularly, the apparatus includes means outwardly of the drum for delivering a continuous web of wrapping material onto its periphery and across the openings therein as the drum is rotated through and beyond one location and means for applying a vacuum through the drum periphery to retain thereon the delivered web as the drum is rotated from a position beyond the one location to a position beyond a second location. At this second location the apparatus includes means for severing the drum-retained web inbetween the drum openings as the drum is rotated relative thereto to provide separate sheets of wrapping material. Once formed, the separate sheets of wrapping material, while still retained on the drum periphery, are at least partially enveloped about articles which are to be wrapped by urging individual articles against such sheets and through the respective drum openings. Smooth envelopment of the separate sheets of wrapping material about the individual articles is encouraged by resilient members which extend along the peripheries and project into the respective drum openings, with each such member having a plurality of radial slits to facilitate the passage of the article relative thereto.

The drum is mounted for rotation about a generally horizontal axis and is open at one end thereof. A deflector is mounted within the drum itself and serves to urge the wrapped articles toward and outwardly of the open end thereof for collection.

While the apparatus of the present invention may be employed with a variety of wrapping materials, it is particularly suited for use with wrapping materials, such as polyvinyl chloride films which have a tendency to cling to themselves or to the parts of the apparatus and article with which they come into contact.

The terminology "article wrapping" as employed herein is intended to include the partial as well as complete envelopment of an article with a sheet of wrapping material. Partial envelopment of an article includes, for example, the application of a sheet of wrapping material about the major portion of a produce article, such as a head of lettuce, onto the edible portion of a stick supported confection, or across the open end of a container to cap the same.

The apparatus of the present invention is particularly well suited for capping of containers since no heat, adhesives or significant pressure is required in the capping operation. Moreover, the cover applied to the open end of such container adequately protects the container cavity yet can be easily removed to gain access into the container.

The container being capped may be completely or partially filled with a rigid or solid material which is fixed relative to the container, as in the case of a frozen food product. Alternatively, and as hereafter described in detail, the container being capped may be empty, as for example a drinking tumbler, wherein the applied cover serves to protect the container or tumbler cavity as well as a substantial lip area thereof from contamination.

Sanitary drinking tumblers, as generally provided for hotel guests, are usually covered with a loose-fitting paper envelope, the open end of which may be folded or twisted. Wrapping of such tumbler is done by hand and is slow and expensive. Moreover, since the fold or twist closure of such paper envelope is often loosened during normal handling by hotel personnel or by relaxation, guests are often reluctant to use such tumblers.

On the other hand, capping of tumblers with the apparatus of the present invention can be achieved rapidly, economically, and with little skill required by the operator. Moreover, the cover applied by such apparatus serves admirably to protect the necessary portions of the tumbler and remains intact until intentionally ruptured or removed.

In the drawing,

FIG. 1 is a side view of the apparatus of the present invention;

FIG. 2 is an end view of the apparatus shown in FIG. 1 with a portion thereof removed;

FIG. 3 is a fragmentary vertical section taken through a portion of the apparatus shown in FIGS. 1 and 2;

FIG. 4 is a plan view of one member of the apparatus shown in FIGS. 1 and 2, with a portion hereof broken away;

FIG. 5 is a vertical section taken along the line V—V of FIG. 4; and

FIG. 6 illustrates a drinking tumbler which has been capped with the apparatus of the present invention.

With reference to FIGS. 1–3, the illustrated apparatus includes a drum 11 having wall 13 at one end, an annular flange 15 at its opposite end, and a series of planar member 17 joined in end-to-end relationship to define an endless peripheral surface. By means of screws 19 the planar members 17 are fastened to angle members 21 which are in turn fixed at their opposite ends to the drum end wall 13 and flange 15. The flange 15 is only of such width as to impart rigidity to the drum and thus the side of the drum opposite to the wall 13 is essentially uncovered or open.

At its center, the drum wall 13 is keyed to a shaft 23 which extends through and is supported by a vertical plate or wall 25 of a suitable fixed structure. A flanged

sleeve 27 is fixed to the plate 25 and assists in supporting the shaft 23, and a conventional slip drive means, not shown, is provided for rotating the shaft 23 and the attached drum 11. Fixed also to the plate 25, at a location or station below the drum 11, is a rod 29 or similar structure for rotatably supporting a supply roll 31 of wrapping material, as for example, a continuous polyvinyl chloride web or film 33.

The planar members 17 are of like construction and, for simplicity, only one of such members is hereafter described in detail. As shown in FIGS. 4 and 5, the planar members 17 includes a resilient sheet 35 which is interposed between a pair of plates 37 and 39, with aligned openings 41, 43 and 45 extending through the respective sheet and plates. The annular portion of the sheet 35 which projects beyond the opening 43 is provided with a plurality of spaced radially extending slits 47 to thereby form a series of sheet deflecting or smoothing fingers 49. To provide greater flexibility of the fingers 49 in a direction toward the center of the drum 11, the diameter of the plate opening 45 is slightly larger than that of the opening 43.

Referring to FIGS. 1, 4 and 5, the plates 37 of the planar members 17 are each formed with a recess 51 within which a blade 53 is fixed by a screw 55.

The outer side of the plate 39 is provided with channels 57 and 59 which are closed at one end and, at their opposite ends open into a common slot 61 which extends through such plate. Fastened by screws 63 to the inner side of the plate 39 is a block 65 having an L-shaped passage which, as best shown in FIG. 3, has one leg 67 opening into the plate slot 61 and its other leg 69 aligned with an opening or perforation 71 in the drum end wall 13. As shown by broken lines in FIG. 2, the openings 71 aligned with the respective passages in the blocks 65 are located so as to sequentially communicate with an arcuate slot 73 which is formed in the adjacent face of the plate 25 and which is connected by a pipe 75 to a suitable vacuum pump, not shown.

In effect, the plate channels 57 and 59 and the overlying resilient sheet 35 together define conduits which open into the common slot 61. The sheet 35 is provided with passages 77 which open into the plate channels 57 and 59 and are aligned with passages 79 and 81 in the plate 37 and blade 53, respectively. Thus, with air being exhausted through the pipe 75, a suction or vacuum effect will be created at plate and blade passages 79 and 81.

A soft porous member 83 is interposed between and snugly engaged by the opposing faces of the drum wall 11 and plate 25. Such porous member 83 may be a felt pad, for example, and serves to minimize air leakage between the drum wall 11 and the plate 25, thus eliminating a precise sliding fit between these members, and also as a friction brake for controlling drum rotation.

With the structure thus far described, a continuous web of wrapping material 33 is initially drawn by hand from the roll 31 and laced onto the drum periphery. Suction is applied through the pipe 75 whereby the web 33 is maintained snugly against those planar members 17 which are aligned with openings 71 in the drum end wall 13 having communication with the plate slot 73. As a result of this suction, slippage between the drum and the web which is on its periphery is avoided as the shaft 23 and drum 11 are turned in the direction indicated in FIG. 2 to withdraw successive portions of the web 33 from the supply roll 31.

At a location or station spaced from the web supply, the free or trailing edges of the blades 53 engage with a similar fixed blade or knife 85 projecting from the plate 25 to thereby sever the web of wrapping material which is on the drum periphery into individual sheets, as indicated at 87. It will be noted from FIG. 2 that the length of the plate slot 73 is such as to maintain suction on the web 33 until after it has been severed.

With continued drum rotation, the severed sheet 87 is carried to a location or station at which the article which is to be wrapped or capped is merely urged against such sheet and through the underlying opening in the planar member. For example, in the capping of a drinking tumbler 89 as shown in FIG. 5, the open end of the tumbler is engaged with the sheet 87 and moved through the aligned opening in the planar member. During this movement, the fingers 49 are flexed downwardly, and serves to resiliently deflect or sweep the trailing edge portions of the sheet 87 onto the sides of the tumbler 89. Once the tumbler 89 has been moved beyond the fingers 49 flex back into a generally common plane, while the capped tumbler falls into the drum.

Preferably, and as shown in FIG. 2, a deflector 91 is fixed to the inside surface of the drum wall 13 for urging the capped tumblers toward the open end of the drum 11 from which they are discharged and then collected.

As heretofore mentioned the web 33 is preferably a material, such as polyvinyl chloride film, which has a tendency to cling to itself and to structures with which it comes into contact. Thus, once such web is cut, its clinging tendency retains the same on the planar member and, in the capped tumbler 87 shown in FIG. 6, causes the applied sheet 87 to adhere tenaciously to a substantial area of the tumbler lip. The sheet 87 on the capped tumbler is taut across the tumbler cavity and, as illustrated in FIG. 6 protects both such cavity and a substantial area of its lip from contamination. Use of the tumbler 87 merely requires the simple peeling of the sheet 87 therefrom.

The apparatus described is rather simple in construction and, being free of any heating or pressure sealing means, minimizes the risk of injury to the operator. Obviously, the apparatus can be operated either continuously or intermittently without repeated lacing of the web 33.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. An article wrapping apparatus including a drum having only one end wall and a peripheral wall, said peripheral wall formed of a series of like, rectangular, planar members each having an opening extending therethrough and which are joined in end-to-end relationship to together define a polygon, means for rotating said drum including a stationary plate disposed in directly adjacent, spaced relationship with the drum end wall and a shaft fixed substantially centrally of said end wall and extending through and supported for rotation by said plate, means at one location for delivering a continuous web of wrapping material onto successive portions of the outer surface of said drum peripheral

wall and across the openings in said planar members as the drum is rotated, vacuum means for retaining the delivered web on the successive portions of the drum peripheral wall as they travel from the one location to slightly beyond a second location spaced circumferentially from such one location, a separate blade fixed to each of said planar members at like ends thereof, each of said blades forming a portion of the outer surface of the drum peripheral wall and each having an edge which is aligned with the end of the planar member to which it is fixed, a stationary knife at the second location in position to be engaged by said blade edges as the drum is rotated to thereby effect severance of the web into separate sheets whereby at a third location, outwardly of said drum and circumferentially spaced from the second location, individual articles to be wrapped may be urged against the separate sheets of wrapping material and into and through the respective drum openings underlying such sheets and be removed from the open end of said drum, and resilient means carried by and projecting into the openings of the respective planar members for smoothing traveling portions of the separate sheets of wrapping material onto individual articles as they are passed through such openings.

2. Apparatus as defined in claim **1** further including a deflector within said drum for urging the individual wrapped articles toward and outwardly of the open end of said drum.

3. An apparatus as defined in claim **1** wherein said vacuum means includes conduits within each of said planar members at locations spaced from the openings therein, a series of spaced passages extending from said conduits and opening at the outer surfaces of said planar members, perforations extending through the drum end wall with the conduits in the respective planar members together opening into an individual perforation, a channel formed in the surface of said stationary plate in alignment with said perforations and extending arcuately from the one location to a position slightly beyond the second location, a fibrous element positioned between and snugly engaging with the opposing surfaces of said plate and said drum end wall, and means connected to said channel for removing air from said conduits through said perforations, fibrous element and channel.

4. Apparatus as defined in claim **3** wherein said fibrous element is a felt and serves to minimize the leakage of air between said stationary plate and the drum end wall, and also as a friction brake for controlling drum rotation.

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