United States Patent

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[54] **WRAPPING METHOD AND APPARATUS**
7 Claims, 14 Drawing Figs.

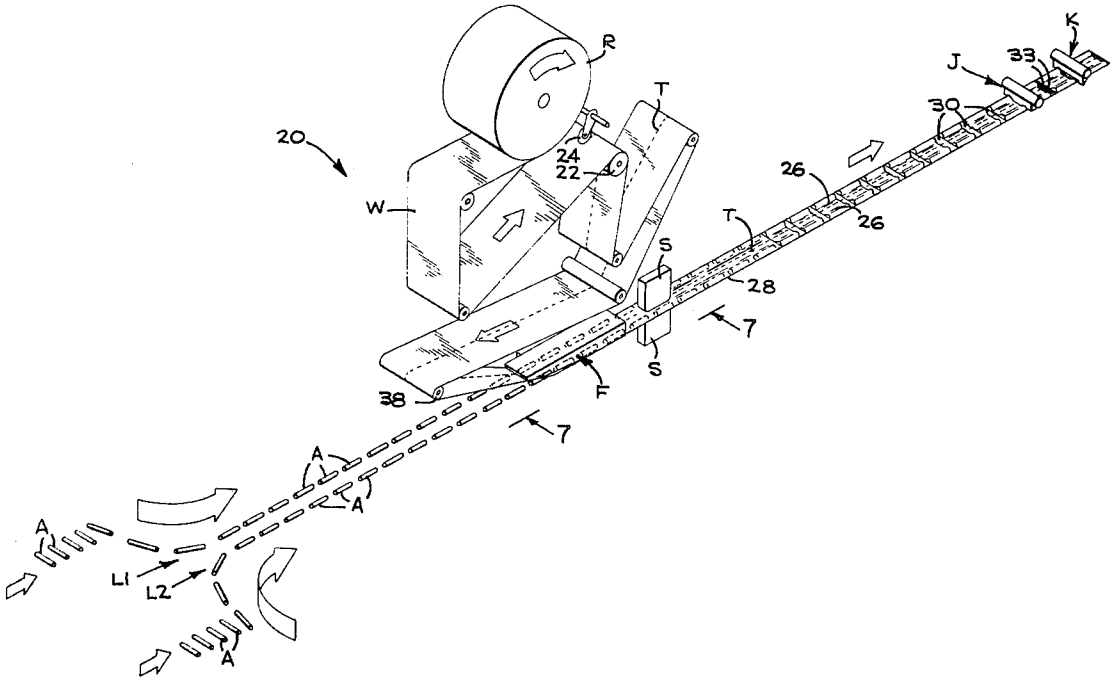
[52] **U.S. Cl.** **53/28,**
53/178, 53/202, 206/56, 229/51, 229/56
[51] **Int. Cl.** **B65b 9/06,**
B65d 71/00
[50] **Field of Search** 206/56 A3;
229/56, 51 DB; 53/28, 32, 178, 180, 182, 202, 209

[56] **References Cited**
UNITED STATES PATENTS

2,565,444	8/1951	Waters	53/178X
2,691,257	10/1954	Vogt	53/28X
2,805,814	9/1957	Calasibetta et al.	229/56
2,885,071	5/1959	Rodnon	206/56X

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Assistant Examiner—Neil Abrams
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ABSTRACT: The disclosure concerns a wrapping machine, a wrapping method, and the package formed by the machine and method. The side edges of a single web are folded around two laterally aligned articles and edge sealed to the remaining web near a central tear line along the single thickness of web interconnecting the packages. By forming two packages from a single web, the web can be run about as fast as any single web used in the known single file wrapping method, whereby the output of the machine in finished packages is substantially doubled over the output of a machine producing packages with the single file method.



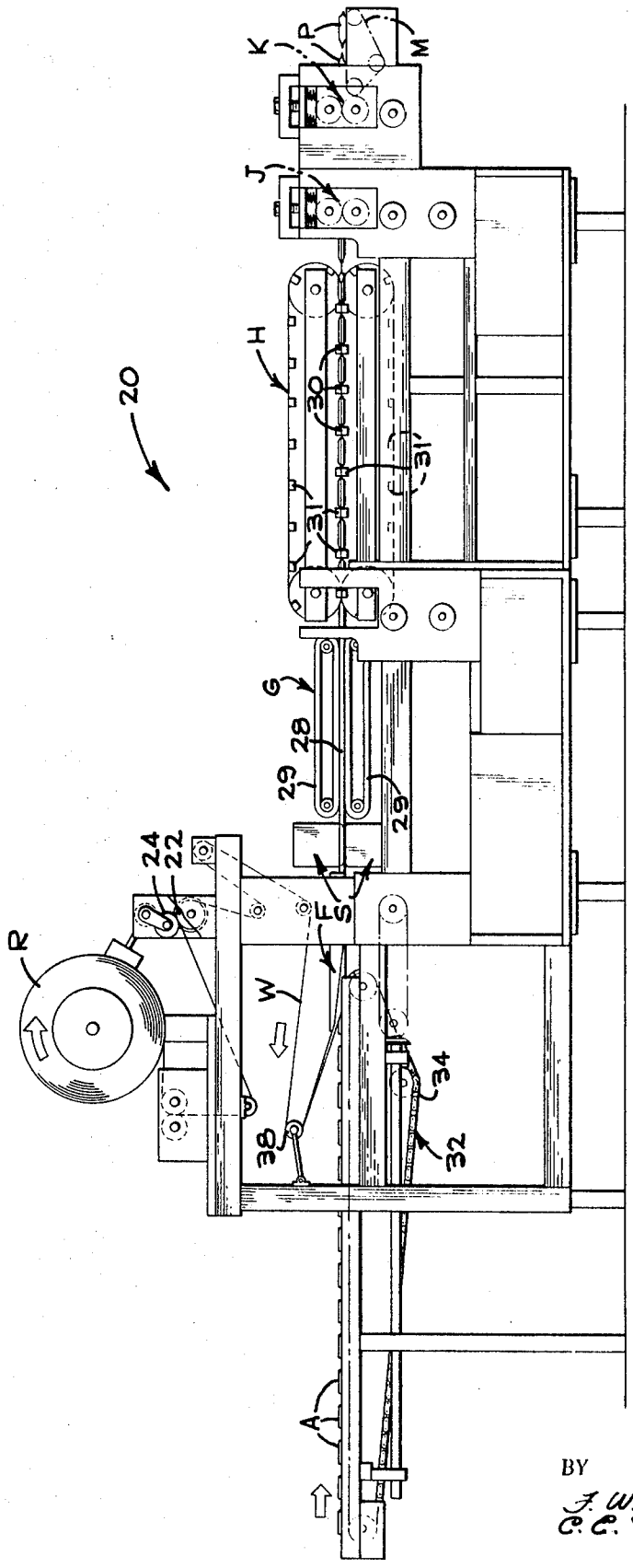


FIG_1

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ATTORNEYS

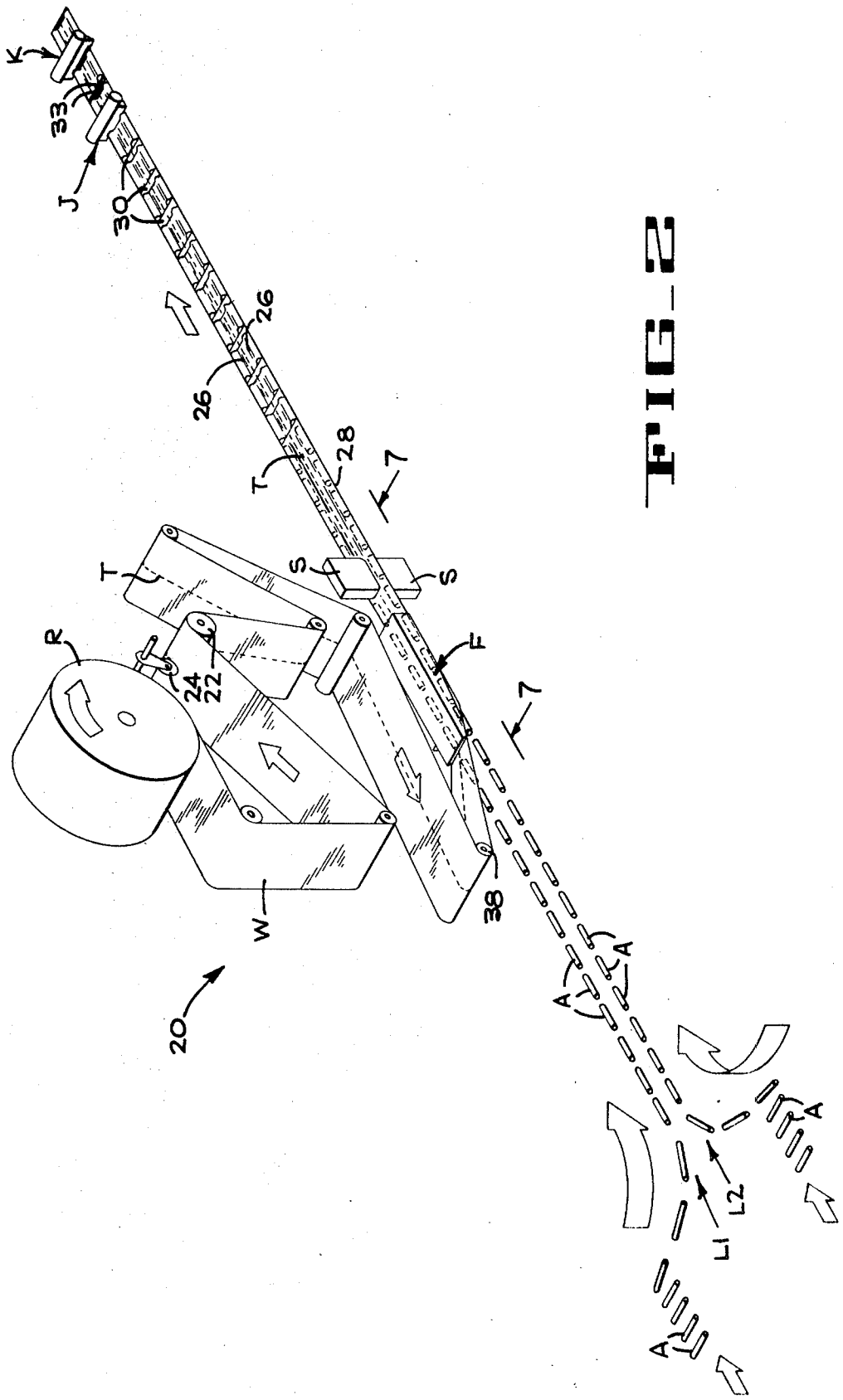


FIG_2

FIG. 3

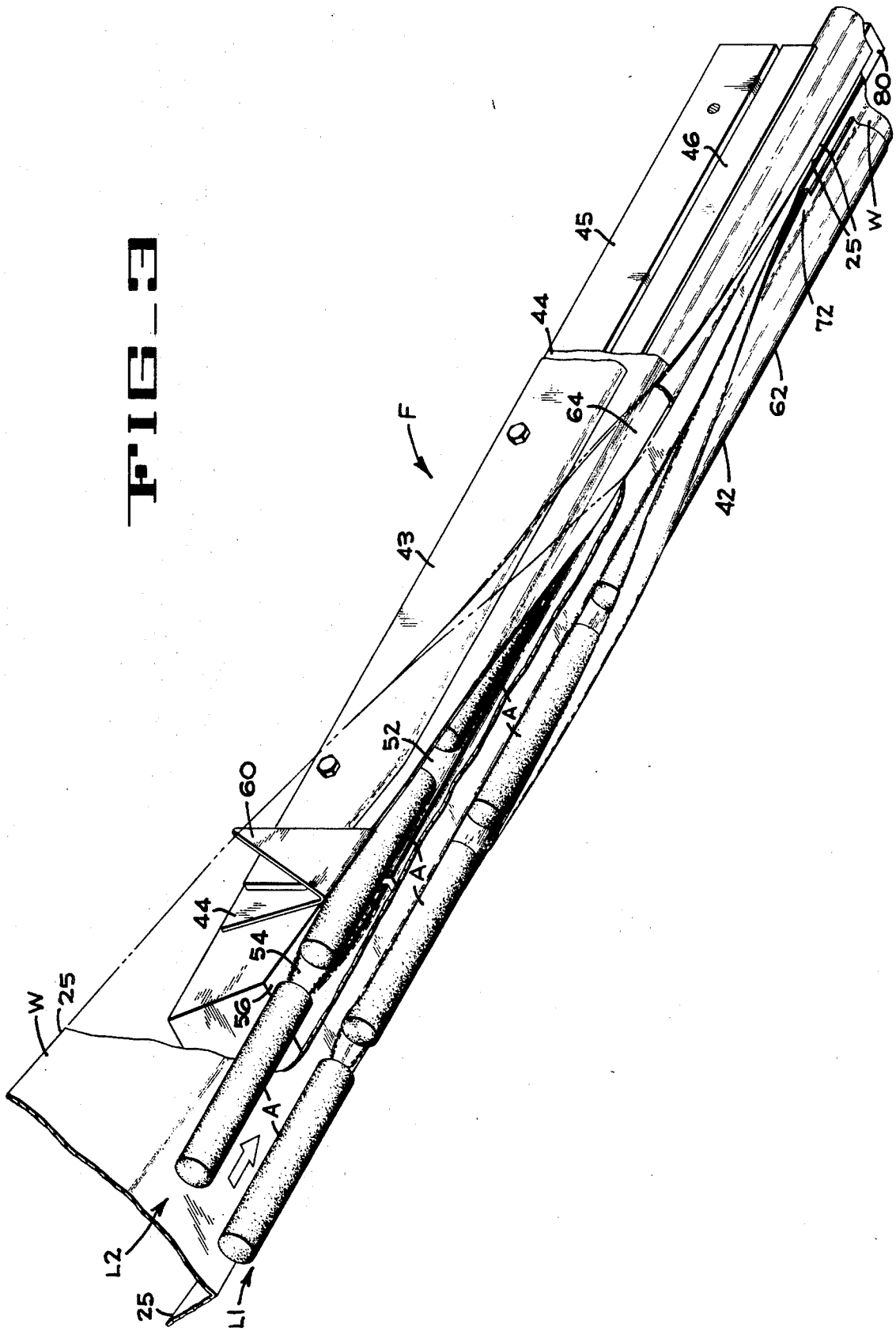


FIG_4

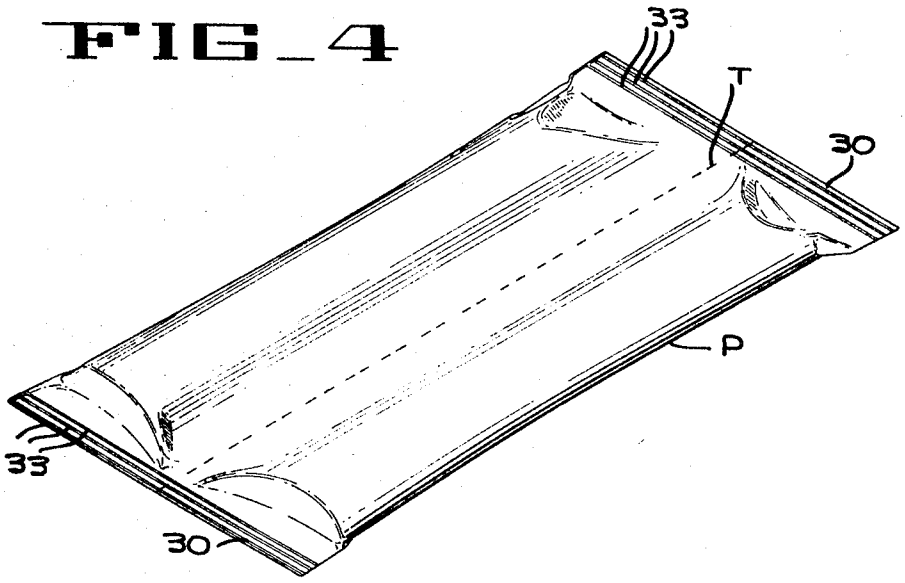
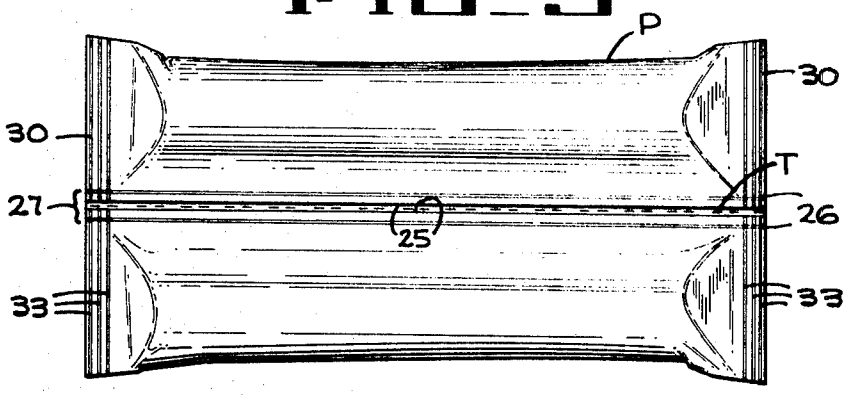


FIG_5



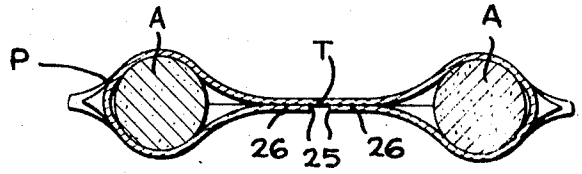


FIG_6

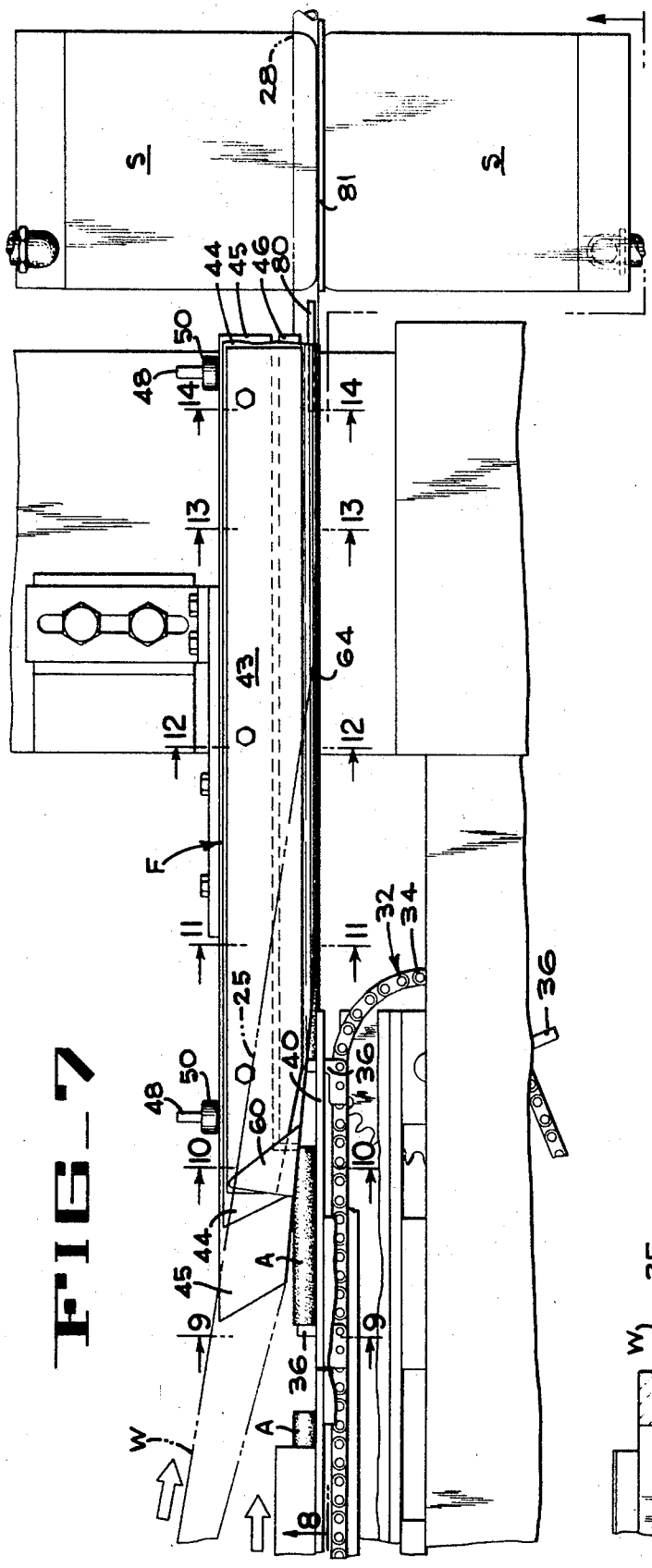


FIG_7

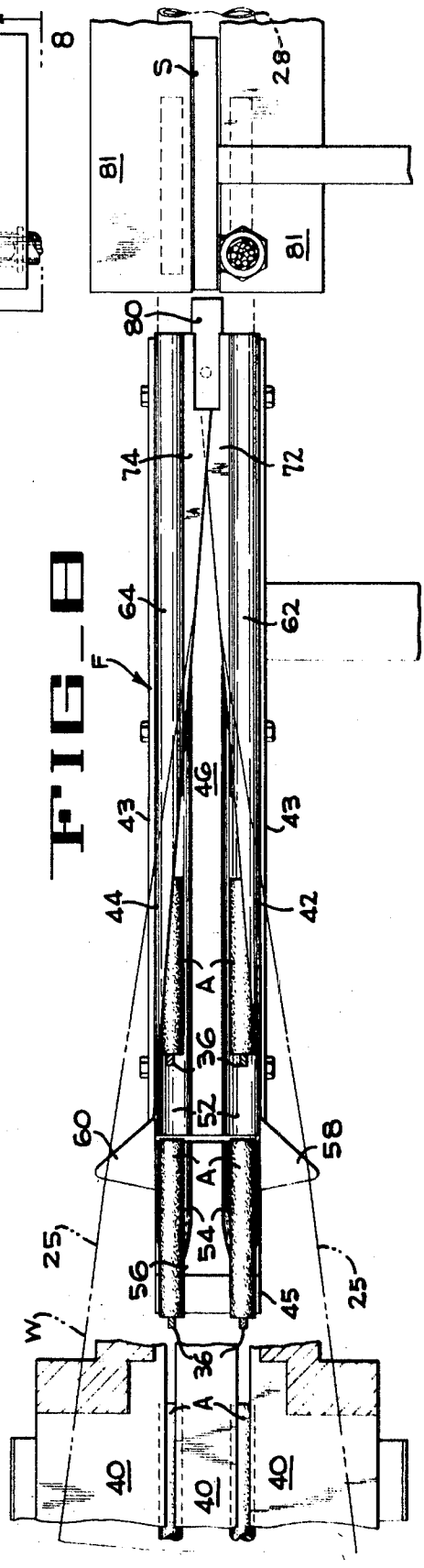


FIG_8

FIG_9

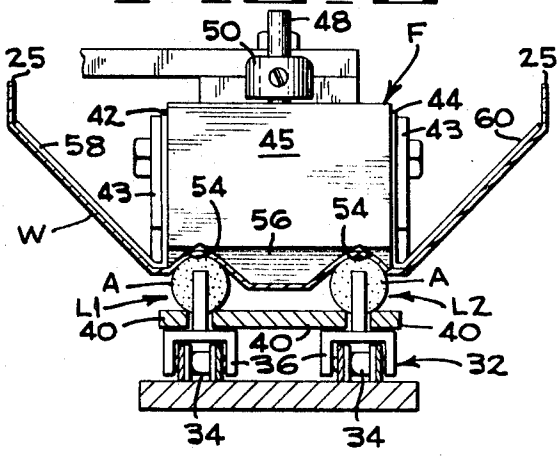


FIG_10

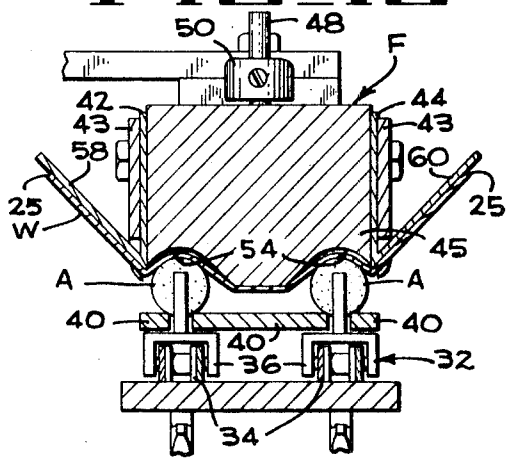


FIG_11

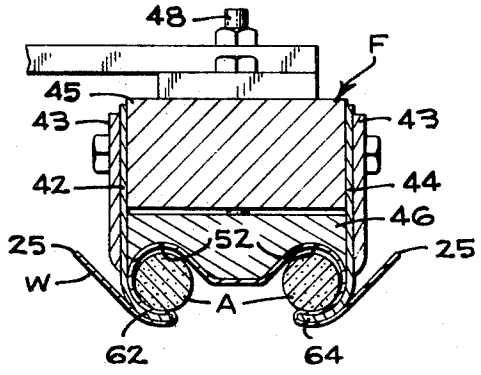


FIG_12

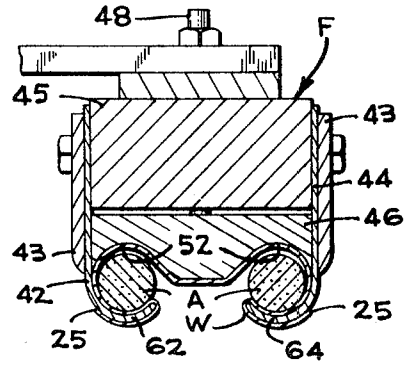


FIG_13

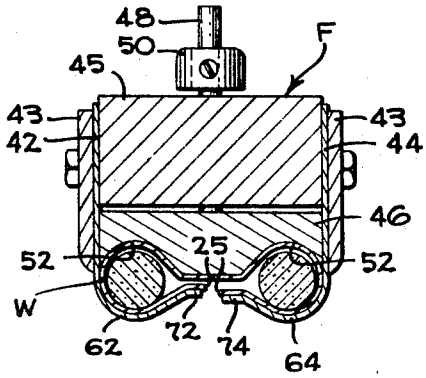
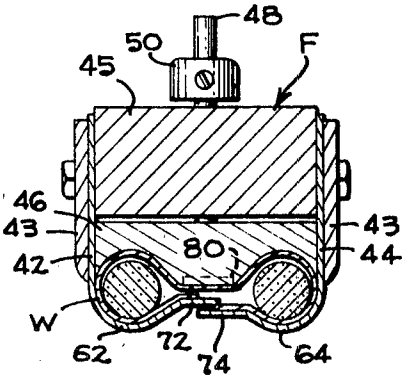


FIG_14



WRAPPING METHOD AND APPARATUS

BACKGROUND OF THE INVENTION

The present invention concerns high-speed wrapping machines, such as the machines disclosed in U.S. Pat. No. 2,682,331 and 2,882,662, which entube a single file of articles in a single folded web which is sealed together around the article and severed from the tube to form single wrapped packages, seriatim. The package output of this type of machine is limited to the highest practicable speed with which the various feeding, wrapping and sealing functions can be carried out, and may be in the order of about 300 packages per minute. In order to increase the output of this general type of machine, it has been proposed to individually process several lanes of articles at once. U.S. Pat. No. 2,462,254 discloses such a machine wherein a single web fed from a supply roll is slit into four narrow webs, one for each of four processing lanes. Each processing lane requires individual feeding, wrapping, folding and sealing mechanism. Thus, while the machine theoretically quadruples the output of a single-lane machine, it is in effect four machines sharing a common web roll and drive mechanism, and for this reason is relatively complicated and costly. The present invention provides a dual-lane wrapping machine which requires only the wrapping, folding and sealing means of a single-lane wrapping machine, and thus doubles the output of a single-lane machine without being more costly or complicated. Interrelated with the apparatus aspect of the invention is a unique package construction which in conjunction with the wrapping machine enables the attainment of the stated result.

SUMMARY OF THE INVENTION

Important aspects of the invention are a unique wrapper type of package, a wrapping method, and a wrapping machine for carrying out the method. The package is formed by transversely curling a single web, to enclose two laterally aligned and spaced articles, without overlapping the free edges of the web. The web is (optionally) perforated along its longitudinal centerline to form a tear line. Both edges are longitudinally sealed and the web is then transversely sealed and severed so that the finished package contains two individually enclosed articles, and, if perforated, may be readily separated into two individual packages. Because the web is not overlapped, all seals are formed with only two web thicknesses. In practical terms, this means that the output of packaged articles is about doubled, that the seals are formed with optimum sealing effectiveness, and that rejected packages with imperfect seals are virtually eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic side elevation of the wrapping machine of the present invention.

FIG. 2 is a diagrammatic perspective illustrating the sequential method steps and apparatus functions of feeding two lanes of articles under a common web former where the free edges of a web are transversely curled around each lane of articles, and the sealing and severing of the web between longitudinally adjacent pairs of articles.

FIG. 3 is an enlarged diagrammatic perspective, partly broken away, showing the underside of the web former and the manner in which the web is curled to entube a lane of articles.

FIGS. 4—6 are respectively a perspective, viewed from above, a bottom plan and a transverse section of a finished package.

FIG. 7 is an enlarged elevation, partly broken away, of the web former area indicated by the arrows 7—7 of FIG. 2.

FIG. 8 is a horizontal section taken along lines 8—8 on FIG. 7, and illustrates the FIG. 7 web former in bottom plan.

FIGS. 9—14 are enlarged sections taken along the corresponding section lines 9—9 to 14—14 on FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The general sequential steps and functions of the packaging method and apparatus of the present invention are diagrammatically illustrated in FIG. 2. Two files of articles A are fed into a wrapping machine 20 by conventional feeding apparatus, not shown, that does not form any essential part of the present invention. The particular shape and size of the articles, here illustrated as cylindrical objects, are similarly unimportant to the inventive concept.

The two files of articles A are reoriented in the feeding apparatus into two lanes L1 and L2, and the articles are advanced endwise into the wrapping machine along parallel linear paths. A web W is fed from an overhead web roll R over the usual rollers for guiding and tensioning the web, and around an anvil roll 22 with which a perforator wheel 24 is selectively engageable to pierce the web W and form a central tear line T. Any of the usual web materials are suitable; the particular web illustrated is an opaque material such as one of the foil and plastic laminars which can be heat sealed.

The web W travels under a web former F and over the articles A. In the web former F, the lateral edges are curled downward and inward around the articles, as shown in FIGS. 2 and 5, until the two edges 25 are in closely spaced relation and contact the undersurface of the central portion of the web at each side of the tear line T on the centerline of the web. The thus folded web travels between upper and lower longitudinal heat sealing bars S (FIG. 2) which simultaneously seal the web portions together and form two parallel longitudinal seal areas 26 (FIG. 5) having the transverse limits of the bracket 27. It will be noted that the edge portions 25 of the web do not overlap the tear line T, and that the visible edges of the sealed web are on the bottom of the package P.

The web is pulled, from a point downstream of the web former F (FIG. 1), by a pair of vertically aligned driven belts 29 of a driving conveyor G which is a conventional structure that grips and pulls the tube 28 of articles toward the discharge end of the machine.

Downstream of the conveyor G, chain-driven heated bars 31 of a conventional sealing unit H transversely seal the web at 30 between longitudinally adjacent pairs of articles. A rotary crimper J then crimps along lines 33 (FIG. 4 and 5) the transverse seal areas (if required by the particular web material being used) and a rotary cutter K bisects the transverse seals to complete a finished package P. The finished packages are ejected from the wrapping machine 20 by a discharge conveyor M.

With more detailed reference to the structural arrangement of the wrapping machine 20 each lane L1 and L2 (FIG. 1 and 2) of the articles A are conveyed into the input end of the machine on a pusher conveyor 32 which includes a driven endless chain 34 (FIG. 7) for each lane, and upstanding pusher lugs 36 on the upper flight of the chain for propelling the articles. Near the web former F (FIG. 2) the web W is trained around a tensioning roller 38 and extends forwardly under the web former and over the lanes of articles.

The articles A are supported for movement into the web former F by three interconnected dead plates 40 (FIGS. 7—10) which are spaced to provide a vertically open slot for each lane of pusher lugs 36. The edges of the plates defining the slots support the articles, and the plates extend longitudinally under the web former F until curved portions of two web-forming shoes 42 and 44, and the folded web W, assume support of the articles. The two web-forming shoes are formed of sheet metal bent symmetrically about the longitudinal center of the web former F.

Each forming shoe is secured by a retaining plate 43 to a central elongate mounting block 45 and cooperates with a floating web-forming block 46. The block 46 depends from the mounting block 45 and is retained by means of two spaced studs 48 that extend upward through the mounting block 45. Each stud carries a set collar 50 which keeps the forming

block in place when no web or articles are in the machine. In operation, the forming block **46** rests on the web and articles to apply a slight downward pressure.

As shown in FIGS. **8**, and **11—14**, the bottom surface of the web-forming block **46** is provided with two laterally spaced coextensive arcuate grooves **52** which are aligned with similar grooves **54** in a beveled underface **56** of the mounting block **45**. The web is trained under the beveled underface and its side portions are splayed outward by guide wing portions **58** and **60** of the web-forming shoes **42** and **44**. As shown in phantom line in FIG. **7**, the free edge **25** of the web extends diagonally about half the length of the web former F, and is rolled under the lower portion of the forming shoe **44**. In a similar manner, the other edge of the web is rolled under the forming shoe **42**. The forming shoes **42** and **44** (FIG. **8**) are curved at **62** and **64** to cooperatively form tubular article-enclosing passages with the recesses **52** in the forming block **46**.

Best shown in FIG. **8**, the lower portions **62** and **64** of the forming shoes **42** and **44**, rearward of the inlet end of the web former F, progressively curve farther around the articles, while the edges **25** (FIGS **9—12**) of the web W are initially outward of the web former F. Thus, the web is recurved or double back on itself, as shown in FIGS. **11** and **12**, as it progresses through the web former F. The web edges **25** continue to be moved toward each other by the curved forming shoe portions **62** and **64**, until the web edges **25** lie within the forming shoes, are respectively supported by horizontal overlapping ledges **72** and **74** (FIGS. **13** and **14**) and are equidistant from the central tear line of the web. It will be noted that the articles act as forming mandrels for the web.

The horizontal ledges **72** and **74** are vertically offset and overlap, as shown in FIGS. **8** and **14**, in proximity to a rectangular presser plate **80** which is secured to the web-forming block **46**. The presser plate rides on the web to keep the web smooth as it is gripped between the heat-sealing bars S which form the longitudinal seals **26** (FIG. **4**) to entube the article A at each side of the package. As the longitudinal seals are formed, each side of the tube **28** is supported by a skid plate **81**.

As previously indicated, the transverse sealing unit H is a conventional type which includes upper and lower pairs of driven endless chains which carry the heater bars **31**. The heater bars become vertically aligned along their confronting flights and simultaneously grip the web, convey it downstream, and effect the seal across the web. It is to be particularly noted that, as shown in FIGS. **5** and **6**, only two nonoverlapping thicknesses of web material lie between the heater bars **31**. Since all the web surfaces to be sealed are in coextensive contact, a perfect seal is virtually assured. To further insure a leakproof seal, some web materials may be advantageously crimped after they leave the sealing unit H. Thus, the conventional rotary crimper J has a corrugated die that presses each transverse seal area of the web against an anvil to corrugate and consolidate the seal in the known and usual manner. From the crimper the web enters the rotary cutter K where a knife severs the web across each sealed and crimped area to complete the finished package.

From the preceding description, it is believed evident that an important aspect of the present invention is the concept of forming a single web into two longitudinal article-entubing portions (with an optional central tear strip) and sealing the edges of the web in confronting nonoverlapping relation to the underside of the package. Therefore, with the entubed articles laterally aligned as disclosed, each adjacent pair of transverse sealing and severing operations produces, in effect, two interconnected packages which may be readily separated into individual packages if desired. The nonoverlapping relation of the web portions assures that unconsolidated sealed areas are practically eliminated, and the forming of two packages from a single web results in a capability of handling the web as fast as in present single-web machines producing single packages, thereby doubling the output of finished packages over present conventional wrapping machines without adding to the number or complexity of individual parts.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

What we claim is:

1. A wrapping machine comprising means for continuously feeding s single web, a web former for folding each free longitudinal edge portion of the moving web back on the remaining unfolded web portion, the free edges of the web being in confronting spaced relation and defining elongate side edges of two laterally adjacent packages, means for feeding a double file of transversely aligned articles under the web, said web former including a forming shoe adjacent each edge of the web for transversely curling the web downwardly around the articles so that the visible seams formed by said edges are on the underside of the package, longitudinal sealing means for continuously sealing each of said free longitudinal edge portions to the adjacent surface of the moving web, transverse sealing means for sealing the web at each end of the two adjacent packages to complete an individual peripherally sealed article compartment at each side of the confronting longitudinal edge portions, and means for transversely severing the web through the transverse sealed areas to complete an individual double compartment package.

2. A method of forming dual compartment packages comprising the steps of continuously moving a single web along a predetermined path in indexed relation with two files of laterally spaced and laterally aligned moving articles, transversely and simultaneously curling the longitudinal edge portions of the web around two laterally aligned articles with the articles functioning as web-forming mandrels, sealing the edge portions of the web to the unfolded central portion of the web, and transversely sealing and severing the web at spaced intervals intermediate longitudinally adjacent pairs of articles to form individual dual compartment packages.

3. A method of packaging articles comprising the steps of advancing two articles along interspaced linear paths, advancing a single web in superposed relation with the articles, folding each free longitudinal edge of the web downward and inward to the longitudinal centerline of the web to envelop the adjacent article, sealing each of said free longitudinal edge portions to the adjacent surface of the unfolded web, and transversely sealing the folded web at each end of the two laterally adjacent articles to complete an individual peripherally sealed article enclosure at each side of said centerline.

4. Apparatus according to claim **1** and means for centrally perforating the web to form a tear line, said web former positioning the free edges of the web in straddling relation with the tear line so that the completed double-compartment package can be readily separated into two individual packages.

5. A package forming method comprising the steps of moving an elongate web endwise in substantially planar condition, advancing a double file of articles in contact with the web, progressively curling the free edge portions of the web inward to engage and wrap around the articles until the edge portions lie flat over the planar median portion of the web and are closely adjacent at the centerline of the web, continuously sealing said edge portions to the planar portion of the web to provide continuous and interspaced longitudinal seal lines straddling the centerline, and transversely sealing the thus folded web between longitudinally adjacent pairs of articles to provide a flat strip of interconnected double-compartment packages.

6. A package forming method comprising the steps of moving an elongate web endwise in substantially planar condition, advancing a double file of articles at web speed in contact with the web, progressively curling the free edge portions of the web inward to engage and wrap the web around and under the articles until the edge portions lie flat against the planar median portion of the web and are closely spaced from each other and the centerline of the web, continuously sealing said edge portions to the planar portion of the web to provide continu-

ous and interspaced longitudinal seal lines straddling the centerline, and transversely sealing and severing the thus folded web between longitudinally adjacent pairs of articles.

7. A package forming method comprising the steps of moving an elongate planar web endwise, longitudinally perforating the moving web along its longitudinal centerline to form a tear line, advancing a double file of laterally aligned articles at web speed underneath and in contact with the web, progressively folding the free edge portions of the web inward into contact with and around the articles until the edge portions lie flat against the planar median portion of the web and are closely adjacent at the centerline of the web, continuously sealing said edge portions to the web to provide continuous and interspaced longitudinal seal lines straddling the tear line, and transversely sealing and severing the thus folded web between longitudinally adjacent pairs of articles.