

Jan. 10, 1967

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3,296,770

ADJUSTABLE PACKAGE-FORMING MACHINE

Filed Jan. 13, 1965

2 Sheets-Sheet 1

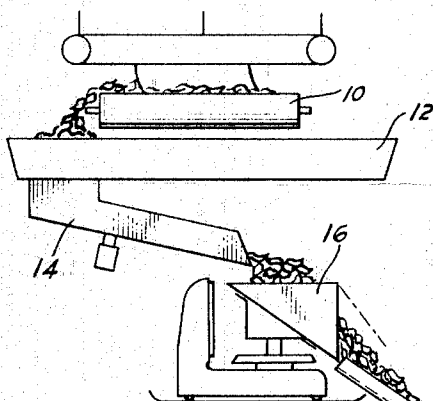
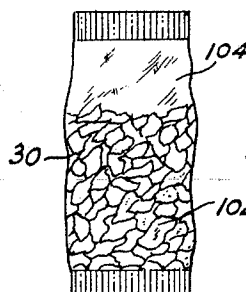
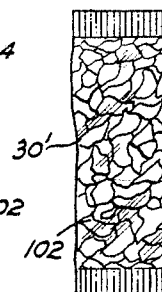


Fig. 9

Fig. 10

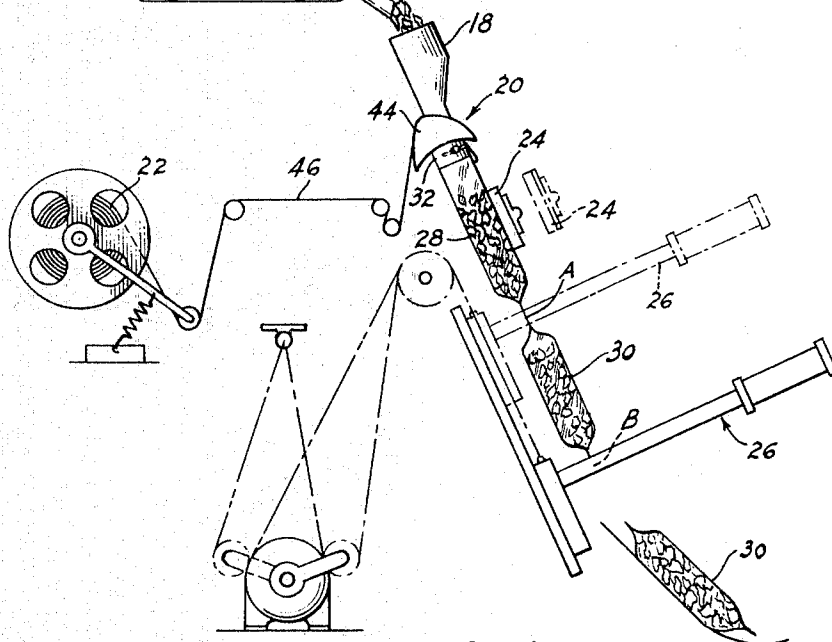


Fig. 1

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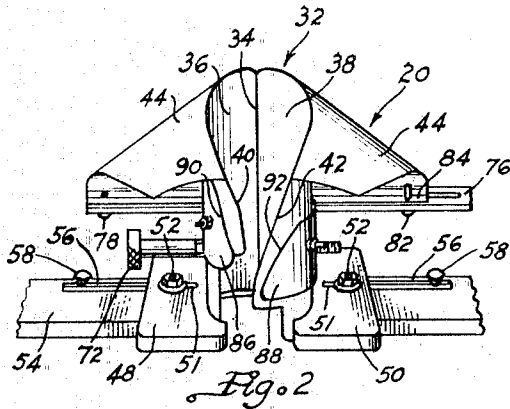
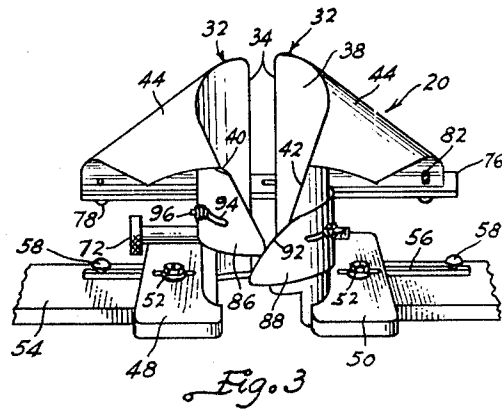
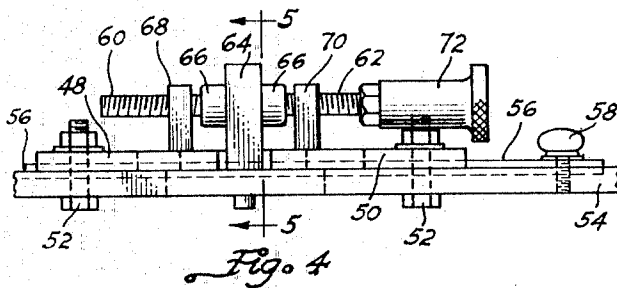
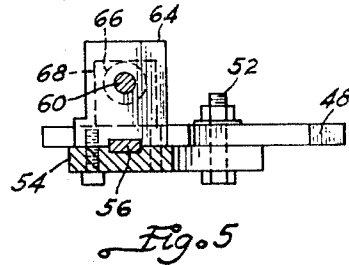
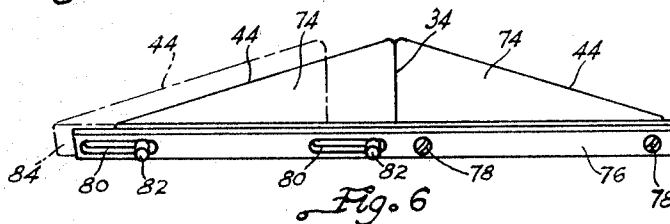
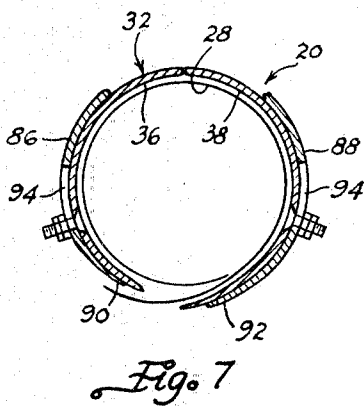
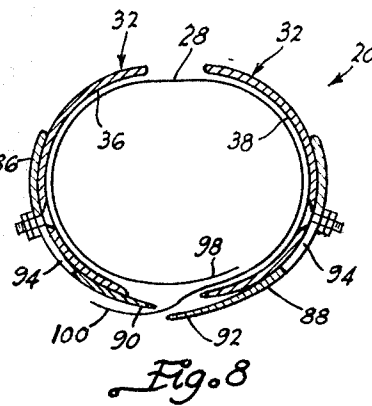
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2 Sheets-Sheet 2



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ADJUSTABLE PACKAGE-FORMING MACHINE

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Filed Jan. 13, 1965, Ser. No. 425,170
14 Claims. (Cl. 53—182)

This invention relates to a package-forming machine capable of forming tubular type packages in continuous succession from sheet material, such as cellophane or the like, but without restriction to such specific type of material. More particularly, the invention relates to the provision of adjustable means in such a machine by which the circumference of the packages may be varied readily and, preferably, even while the machine is operating.

Many types of package-forming machines presently are available for purposes of making tubular type packages from flexible material in sheet form, usually supplied in rolls, the more modern machines employing heat-sealing mechanisms for connecting the overlapping edges of the sheet material when formed into tubular configuration, the opposite ends of the tubular packages likewise being similarly sealed, either with or without the aid of crimping. One of the essential components of machines of this type is a substantially cylindrical collar having shoulder means extending transversely in opposite directions from the axis of the collar adjacent one side thereof and surrounding a substantial portion of the upper end of the collar. The diameters of the collars determine the circumference of the packages in fixed manner as the sheet material is slidably drawn over said shoulders and bound into the interior of the tube for purposes of overlapping the edges of the sheet, sealing the same, and simultaneously effecting filling of the packages through the hollow interior of the collar.

Particularly in connection with the packaging and merchandising of many types of food items, such as potato chips, pretzels, cookies, and substantially innumerable other types of similar products, packages of various sizes are desired. Especially, for example, in packaging potato chips, the current method of packaging the same embodies a substantial number of different sizes of packages, according to weight, varying all the way from a few ounces, up to one pound. Machines of the type referred to are capable of automatically forming such wide variety of different sizes of packages incident to filling and sealing the packages.

The machines referred to operate usually upon the principle of advancing the sheet material through the forming and filling collar, sealing the overlapping edges thereof continuously, sealing the leading edge of the tubular package transversely so as to form a bottom in the package which simultaneously is being filled incident to being formed, advancing the initially sealed leading end of the package to a severance station where the filled and sealed package is severed from the continuous length of tubular container being formed by the machine. In most machines of this type, the transverse sealing of the leading end of a tubular package is accomplished commonly by the same means which seals the trailing end of the preceding package which has been filled by the time such sealing occurs. The sealing mechanism usually is of the type which is movable longitudinally to advance the package and, at the completion of such advancing movement, the filled and completely sealed package is severed. Although adjustment of such longitudinal movement or advancing of the package is possible, it usually can be undertaken only with substantial difficulty and, once the mechanism has been adjusted to a predetermined distance, it usually is maintained in that adjustment for a substantial period unless and until a

2

package, for example, of substantially shorter length is to be formed in order to initiate a run of such different length of packages.

Under the foregoing circumstances, normal operation of machines of the type referred to includes a relatively limited variation in the lengths of packages and, accordingly, where a difference in the volume of packages is desired for a certain run of product, and correspondingly the weight of the merchandise contained in the package is to be varied, such variation presently is accomplished by providing each machine with a rather substantial number or complement of collars which are interchangeable one for the other in the machine, said collars differing only in the diameter of the same. Accordingly, each collar forms a tubular package having a circumference in accordance with the diameter of the collar mounted in the machine at any given time.

Particularly as presently manufactured and sold to the public, collars of the type referred to are relatively expensive, not infrequently costing in the vicinity of \$150.00 each. It is not uncommon also for machines of the type referred to, especially in a plant of substantial capacity, and particularly one supplying a substantial market, including snack bars, taverns, hotels and restaurants, supermarkets and the like, to require a complement of eight or ten different sizes of collars for each machine. Obviously, this represents a very substantial capital investment. Of even greater significance is the fact that while a selected collar is being employed, the remaining eight or nine collars, for example, remain idle upon a rack, which, further, complicates the problem by requiring storage space frequently at a premium in packaging rooms. The nuisance of changing the collars one for the other also requires the services of a mechanic.

One further difficulty encountered in utilizing machines of the present type which employ a set of collars respectively of fixed but different diameters is that, particularly in packaging such commodities as potato chips, where various factors result in a given weight of the same occupying varying volumes, depending upon said factors, it can be seen that when a packaging machine of the type referred to has a certain setting for length of the packages and the selected collar provides a constant circumference or diameter, some of the packages will appear to be filled, while others will have a noticeable empty space in the top of the sealed package, even though the two packages may be identical in weight. The package which is not completely filled can be the subject of criticism on the part of customers, resulting in repercussions upon the manufacturer.

It is the principal object of the present invention to obviate most if not all of the foregoing difficulties through the relatively simple expedient of providing either a single or an extremely limited number of collars for a given packaging machine of the type referred to, said collar or collars being adjustable as to circumference, preferably even while the machine is operating, so as to permit a single collar to form packages having a relatively wide range of cross-sectional areas or differences in circumference, even though the length of all of said packages remains constant.

It is another object of the invention to provide suitable, adjustable supporting means for such adjustable collar and operable to arrange the collar so as to readily and quickly be adapted to utilize rolls of sheet material of different widths commensurate with the circumference, and corresponding cross-sectional areas, of the packages desired, or of varying the amount the opposite edges of the sheet material are overlapped, at least within reasonable limits, and thereby vary the circumference of the formed packages while using sheet material of a single uniform width.

A further object of the invention is to provide an adjustable type collar which, basically and essentially, is substantially a conventional collar, provided with the usual guiding and forming shoulders, but in which the tubular portion is split longitudinally of the side opposite the normally open side of the collar, and include means operable to position and firmly support the split sections of the tubular collar in transversely adjusted relationship with respect to the longitudinal axis of the collar.

Still another object of the invention is to provide curved, transversely extendible and adjustable guide shoes comprising extensions of the normally forward edges of the cylindrical collar defining the conventional opening therein, whereby satisfactory guiding of the opposite longitudinal edges of the sheet material into desired overlapping relationship is assured, notwithstanding the adjustability of the circumference of the tubular packages continuously formed and filled by said collar.

One further object of the invention is to employ relatively simple screw threaded means having sections oppositely threaded and respectively engaging base means movable toward each other and each supporting one of the split sections of the cylindrical collar, whereby said sections are transversely adjustable with respect to the axis of the cylindrical collar simultaneously in opposite directions toward and from each other to effect rapid adjustment of the circumference of the collar and, more particularly, the screw threaded means are manually operable by means so positioned that they may be engaged and operated to effect such adjustment during operation of the machine and without endangering the attendant making such adjustment.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

In the drawings:

FIG. 1 is a vertical side elevation of a typical, exemplary layout showing in diagrammatic manner the essential, related mechanisms of a package-forming and filling machine of the type to which the present invention pertains and employing the principles of the same.

FIG. 2 is a front perspective view of an adjustable package-forming and filling collar of the type shown in FIG. 1 and embodying the principles of the present invention, said view showing the related parts of the collar in the initial, non-adjusted positions thereof.

FIG. 3 is a view similar to FIG. 2, but showing the relatively adjustable sections of the collar in an exemplary adjusted relationship.

FIG. 4 is a fragmentary rear view of the collar supporting means, as viewed from the rear of the mechanism shown in FIGS. 2 and 3 and illustrating details of the manually operable means to adjust the relatively movable sections of the collar.

FIG. 5 is a vertical sectional view taken on the line 5—5 of FIG. 4.

FIG. 6 is a fragmentary perspective view of guide and supporting means for sections of the shoulder mechanism attached to the adjustable collar illustrated in FIGS. 2 and 3, said view showing, in full lines, the initial position of the sections of the collar, and, in broken lines, showing an adjusted position of one of the collar sections with respect to the other.

FIG. 7 is an exemplary transverse sectional view on a scale larger than shown in FIG. 2, but illustrating the manner in which the collar guides the sheet material and forms a tubular package having overlapping edges of the sheet material, the sections of the adjustable collar being in the initial, abutting position in said figure.

FIG. 8 is a view similar to FIG. 7, but showing the collar sections transversely spaced in adjusted relationship and, correspondingly, showing adjusted positions of the curved guide shoes carried by the sections of the collar.

FIGS. 9 and 10 respectively are exemplary illustrations of packages containing substantially identical weights of product and of the same length, but of different circumferences, whereby a space is shown in the top of the package in FIG. 9, while in FIG. 10 no space occurs.

Referring to FIG. 10, the exemplary package-forming and filling machine illustrated therein comprises one which has been selected for purposes of illustrating the present invention in exemplary manner only, said machine being shown, without restriction thereto, as handling potato chips which are to be packaged in accordance with the principles of the present invention. In said figure, a conveyor 10 feeds the exemplary potato chip product to a delivery hopper 12 preferably in a substantially continuous manner. A typical vibrating chute 14 gradually and progressively feeds the potato chips from hopper 12 to a weighing hopper 16, which is illustrated in exemplary manner only. Measured charges of the potato chips, in accordance with the weight thereof, so as to provide uniform masses of such chips, are discharged in sequence from the weighing hopper 16 into the upper end of a package-filling hopper 18 which discharges at the lower end thereof into the combination filling tube and package former 20 with which the present invention primarily is concerned, as will be explained in detail hereinafter.

Sheet material, such as cellophane or the like, from which the packages for the product are to be formed, is supplied in a roll 22 and, after passing suitably through various guide rolls including tensioning means, is delivered to the former 20 in such manner that the sheet material is formed into tubular configuration with overlapping edges which are sealed by conventional means, such as heater mechanism 24, past which the continuous tubular formation is drawn by combination end-sealing, crimping, and severing unit 26 which is provided with rectilinear motion for at least part of the mechanism, especially one of the crimping and sealing dies.

As is illustrated in FIG. 1, the unit 26 moves between an initial sealing station A and a final sealing and severing station B. The sealing and crimping head is illustrated in broken lines at station A and, in solid lines, in station B. The mechanism and operation thereof in the exemplary machine illustrated and described herein is conventional. In general, at station A, the sealing and crimping dies effect, simultaneously, transverse sealing of the leading end of the tubular package 28 shown in process of being formed and filled, and also in sealing the opposite, trailing end of the filled and sealed tubular package 30, different sections of the crimping and sealing dies being employed to accomplish such operations on the respective packages. When the unit 26 reaches the full line position shown in FIG. 1, at station B, severance of the last filled and sealed tubular package 30 occurs relative to the next following filled and sealed tubular package, which actually is completed while located between said stations A and B, as clearly shown in FIG. 1. Inasmuch as such sealing, crimping and severing mechanism is conventional, it is believed that the foregoing description thereof is sufficient.

Referring to FIGS. 2 and 3, wherein details of the combination filling tube and package former 20 are shown, it will be seen that the same comprises a tube 32 which, in cross-section, as best shown in FIG. 7, preferably is cylindrical. Said tube actually comprises a cylindrical collar, the same being split longitudinally along the line 34 to form sections 36 and 38 of said collar. The upper end of the collar slopes forwardly and downwardly, as best seen from FIG. 1 and also as can well be appreciated from FIG. 2 and 3, the forward face or side of the tubular collar being open and defining sloping guide edges 40 and 42.

The tubular collar 32 also, along the side containing the slit 34, has a transversely extending shoulder member 44 which somewhat resembles the shoulder portion of a shirt or coat for a human individual, the same compris-

5

ing a guide surface over which the sheet material 46, see FIG. 1, is guided so as to be transformed from a flat condition to a cylindrical configuration by being directed down the interior of the tubular collar 32 from the sloping and smoothly rounded surfaces of the shoulder 44. As the sheet material passes over the sloping guide edges 40 and 42 respectively of the two sections of the split collar and shoulder arrangement, the opposite edges of the sheet material will be caused to overlap, as shown in exemplary manner in FIG. 7 immediately prior to passing to the heat-sealing means 24, for example, so as to form a sealed tubular package 28, shown in FIG. 1.

The sections 36 and 38 of the tubular collar 32 respectively are fixed to and supported by a pair of base members 48 and 50 which extend transversely to the axis of the tubular collar 32 and are provided with slots 51 through which clamping bolts 52, carried by a fixed supporting bar 54, project. The bar 54 is fixed to any suitable portion of the overall machine shown in FIG. 1 and is stationary. If desired, the base members 48 also may be provided with oppositely extending, longitudinally slotted, aligning keys 56 through which clamping thumb screws 58 extend.

For purposes of facilitating the ready and easy expansion of the opposite sections of the tubular collar 32, the present invention preferably utilizes a threaded bar having oppositely threaded sections 60 and 62, said bar extending through a fixed member 64 carried by supporting bar 54, for example, and positioning collars 66, which are fixedly clamped to the threaded bar respectively adjacent opposite sides of the fixed member 64 to prevent longitudinal movement of the threaded bar with respect to the fixed supporting bar 54. Extending upward from each of the base members 48 and 50 are internally threaded projections 68 and 70, the threads of which are complementary to the reversely threaded sections 60 and 62 of said threaded bar. Also, said bar is provided preferably with a manually operable knob 72.

For purposes of firmly bracing the downwardly extending rear surfaces 74 of the shoulder 44 connected to tubular collar 32, the opposite ends of which respectively project oppositely from the axis of said collar, the present invention utilizes combination guide and bracing means comprising an elongated bar 76, one end of which is secured to one of the sections of the split shoulder 44, by suitable screws 78, and the opposite end portion of the bar is provided with a pair of elongated slots 80 through which adjustable clamping bolts 82 extend for threaded engagement into a clamping flange 84 formed along the lower edges of the rear surface member 74 of the shoulder 44. The screws 78 also extend into the clamping flange of the section of the shoulder to which the elongated bar 76 is fixedly connected by said screws.

When it is desired to adjust the circumference of the tubular package to be formed by the combination filling tube and package former 32, it is only necessary to loosen the clamping bolts 52 and 82 and thumb screws 58, following which the knob 72 is rotated in the proper direction to move the sections 36 and 38 of the tubular collar 32, and the sections of the shoulder 34 respectively carried thereby, either toward or from each other, transversely to the axis of the tubular collar 32, following which the clamping bolts 52 and 72, as well as thumb screws 58, again are tightened to secure the adjusted members in their desired, new relative position with respect to each other. If desired, such adjustment may even be made while the machine is operating because the knob 72 preferably is located in such position that it may be manipulated during operation of the machine without endangering the attendant undertaking the same.

Preferably, the tubular collar 32 and the shoulder 54 extending therefrom are formed from suitable metal, although it is readily conceivable that appropriate material of other kinds, such as seen synthetic resins and the like, may be utilized for the same purpose. It is essential, however, that the outer surfaces of the shoulder 44 and

6

the inner surfaces of the opposed sections of the tubular collar 32 be as smooth as possible, as well as the curved edges where the shoulder 44 unites with the upper end of the tubular collar 32 inasmuch as the sheet material from which the tubular packages are formed bends over said edges when passing to the interior of the tubular collar 32.

Especially for purposes of insuring suitable guidance for the opposite edges of the sheet material when being disposed continuously into overlapping relationship at the forward side of the machine, regardless of the relative adjusted positions of the several opposed sections of the tubular collar 32 and shoulder 44 with respect to each other, the present invention includes the provision of a pair of curved guide shoes 86 and 88 which, when the sections of the collar 32 are disposed in the initial, abutting relationship shown in FIGS. 2 and 7, are not required. However, when the sections of the tubular collar 32 are moved to expanded position, whereby the sloping guide edges 40 and 42 of said sections are spaced farther apart in a transverse direction, as illustrated in FIG. 2, supplements to such sloping guide edges 40 and 42 are required. The curved guide shoes 86 and 88 respectively provide such auxiliary extensions to said guide edges in the form of supplementary guide edges 90 and 92. Accordingly, after the transversely adjustable sections 36 and 38 of the tubular collar 32 are moved to adjusted position, one exemplary adjusted position thereof being shown in FIGS. 3 and 8, the curved guide shoes 86 and 88 are moved transversely to project the outer end thereof, and especially the guide edges 90 and 92, so as to form continuations of the sloping guide edges 40 and 42 of the collar sections 36 and 38, as clearly shown in FIG. 3. The guide shoes 86 and 88 are curved similarly to the curvature of the cylindrical sections 36 and 38 so as to be complementary to the exterior thereof.

To effect the adjusted positions of the curved guide shoes 86 and 88 with respect to the expanded sections of the tubular collar 32, said guide shoes are provided with preferably horizontal slots 94 through which clamping bolts 96 extend, the latter being fixed to the tubular collar sections 36 and 38. Appropriate clamping nuts are threaded to the bolts 96 to maintain the guide shoes 86 and 88 in any desired adjusted position with respect to each other, whereby when the same are mounted in such adjusted positions, as can be observed readily by comparing FIGS. 7 and 8, the guide edges 90 and 92 thereof insure overlapping engagement of the opposite edges 98 and 100 of the sheet material 46 which forms the tubular package 28, it being understood that the illustrations shown in said figures are exemplary and represent the overlapping edge portions prior to the same being connected by heat-sealing or the like.

One of the principal advantages of the present invention is illustrated in FIG. 9 and 10 wherein, in FIG. 9, the completed and sealed package 30 is the same length as the completed and sealed package 30' shown in FIG. 10. However, the package shown in FIG. 9 is of a greater circumference than that shown in FIG. 10. In exemplary manner, there is illustrated in these two figures the same weight of contents 102, such as potato chips, but, due to the greater circumference of the package shown in FIG. 9, there is a space 104 in the upper end of the package 30 shown in FIG. 9, but no space, at least of any recognizable significance, is shown in the package 30' illustrated in FIG. 10. The settling of contents, such as potato chips 102, in a package of this type can occur from numerous causes, such as the more or less curled nature of the chips due to the particular type of potatoes from which they are formed, the cooking temperatures, the length of cooking time, atmospheric conditions, the amount of jostling caused by the products in moving through the various delivery and vibrating chutes, as well as the weighing hopper and the like. When packages of

products such as potato chips are formed in such a way that an appreciable size of space 104 occurs in the upper ends of the packages, the purchasing public has an adverse psychological reaction, notwithstanding the fact that the weight of the contents usually is clearly stamped upon the package and, if weighed, it will be found that the package contains the weight of product so indicated. Nevertheless, adverse psychological effects such as this react upon the producer or manufacturer and it is preferred that no appreciable amount of such space exist in completed packages.

Under the foregoing circumstances, if it is found that packages, as formed when passing from the severance station B, illustrated in FIG. 1, have undesirable amounts of spaces in the trailing ends thereof, the circumference of the package readily can be adjusted by the mechanism and by the technique described hereinabove, particularly to decrease the circumference and thereby form a completed package 30', such as illustrated in FIG. 10, in which no appreciable space occurs at the upper end and yet the weight of the contents is the same as the package illustrated in FIG. 9 and which weight usually is stamped directly upon the package. A much more favorable psychological reaction is generated in the purchasing public from buying packages such as shown in FIG. 10, rather than the type shown in FIG. 9.

Not only is the present invention readily adapted to producing the desired beneficial effects of completely filled packages described immediately above, but it also will be seen that, by providing a split type, multi-part combination filling tube and package former, such as illustrated and described herein as unit 20, it is possible to effect a relatively wide range of different volumes of tubular packages, even while maintaining substantially constant lengths in said packages, simply by adjusting the relatively movable sections of the tubular collar 32 and thereby vary the circumference of the tubular packages so formed within reasonable limits. Accordingly, rather than requiring a package-forming and filling machine of the types referred to hereinabove to require a complement of anywhere from six to ten or more different sizes of fixed types of tubular filling and forming collars, either only a single adjustable type tubular collar or perhaps a maximum of two or at most three different sizes of similarly adjustable tubular collars will accomplish everything that is now performed by the aforementioned full complement of from six to ten fixed collars, thereby greatly minimizing the capital investment required for each machine in order to render the same capable of providing a substantial range of different volumes of packages.

While the invention has been described and illustrated in its several preferred embodiments, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A device for forming and filling packages formed from sheet material of continuous length and comprising in combination, a substantially cylindrical collar comprising a filling tube and package former, means to feed and guide sheet material of continuous length to one end of said collar and draw the sheet through said collar to overlap the edges thereof and form a tubular package, means to seal said overlapping edges continuously, means to seal the leading end of said tubular package, means to discharge a predetermined amount of material into said package, means to seal the opposite end of said package transversely thereof adjacent the trailing portion of the material in said package and sever the same from the oncoming tubular package adjacent said sealed opposite end of said package, in combination with means to adjust the circumference of said collar correspondingly to vary the circumference of the formed packages and

thereby permit adjustability of the volume of the formed packages irrespective of the length thereof.

2. The package-forming and filling device according to claim 1 which further includes means to advance said tubular package a substantially constant distance between the position where the leading end is sealed and the position where the filled and sealed package is severed, thereby to produce a series of filled packages having a substantially constant length capable of having the volume thereof varied.

3. The package-forming and filling device according to claim 1 in which said collar is split longitudinally for transverse adjustment of the severed portions thereof, thereby to adjust the circumference of the tubular portion of said collar.

4. The package-forming and filling device according to claim 3 further including means connected to said severed portions of said collar independently to support the same, and means to guide said supporting means for reverse movement toward and from each other.

5. The package-forming and filling device according to claim 4 further including adjustment means interconnected to said support means and operable to move the same toward and from each other to adjust the circumference of said filling tube.

6. The package-forming and filling device according to claim 5 in which said adjustment means comprises threaded means rotatably mounted and operable selectively to move said support means simultaneously toward and from each other.

7. The package-forming and filling device according to claim 5 in which said rotatable threaded means comprises a threaded rod, sections thereof being reversely threaded and respectively engaging complementarily threaded portions of said support means.

8. The package-forming and filling device according to claim 1 in which said collar has shoulder means extending across one side of said filling tube and extending laterally in opposite directions relative to the axis of said tube to provide guide means for sheet material for introduction of the same into said filling tube and the opposite side wall of said tube being severed longitudinally to provide edges movable toward and from each other to vary the circumference of the tubular package formed by said tube.

9. The package-forming and filling device according to claim 8 further including curved guide shoes adjustably connected respectively to the severed edge portions of said tube for adjustable transverse movement toward and from each other and operable to guide the overlapping edges of the sheet material into desired relationship.

10. The package-forming and filling device according to claim 8 in which the side of said collar along which said shoulder extends also being severed longitudinally, whereby said shoulder comprises a pair of cooperating parts extending in opposite directions from said severance of said collar, and said device including guide means for said parts of said collar extending therebetween to maintain the same accurately in transversely adjusted position relative to the axis of said collar.

11. The package-forming and filling device according to claim 10 further including a pair of base members mounted for reverse movement toward and from each other, means connecting the severed sections of said collar respectively to said base members, screw means having oppositely threaded portions extending transversely to the axis of said collar and mounted for rotation, means maintaining said screw means against longitudinal movement, and threaded means on said base members respectively complementary to the oppositely threaded portions of said screw means and engaging the same to move said base members and the structure carried thereby respectively in opposite directions relative to each other when the screw means is rotated to enlarge or decrease the circumference of said collar in ac-

cordance with the direction of rotation of said screw means.

12. The package-forming and filling means according to claim 11 further including manually engageable means on said screw means by which the same may be rotated to adjust said collar circumference, said manually engageable means being positioned for ready engagement by an operator to effect adjustment of said collar while the device is operating.

13. The package-forming and filling means according to claim 11 further including curved guide shoes respectively adjustably connected to said severed sections of said collar and arranged to be moved toward and from each other in directions transverse to the axis of said collar to guide the overlapping edges of said sheet material into desired relationship with each other while forming said tubular packages.

14. The package-forming and filling means according to claim 13 in which said guide shoes are curved correspondingly to the sections of said collar to which they are connected, said shoes being slotted in directions transverse to the axis of said collar, and clamping bolts carried by said collar sections and extending through said slots and operable to secure said shoes to said sections in desired adjusted relationship.

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GRANVILLE Y. CUSTER, JR., *Primary Examiner.*