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[54] POUCH FORMING APPARATUS AND METHOD

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[51] Int. Cl. B65b 11/02

[58] Field of Search....53/13, 29, 183, 184, 180, 224, 53/225, 373, 112 A

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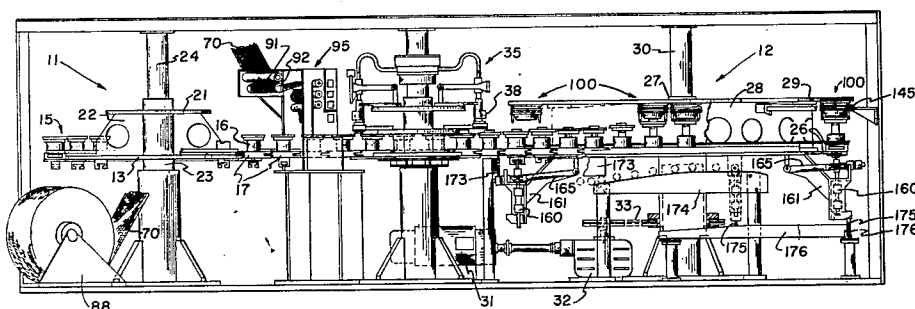
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[57]

ABSTRACT

This apparatus operates to form from a blank of wrapping material a circular pouch for containing an annular article. The opposed plies of the wrapping material are bonded together by inner and outer sealed areas in the shape of concentric circles which define therebetween an annular pocket which completely confines the article. Coincident with the sealing of said material, the apparatus punctures the center area of the pouch and slices through said wrapping material in a continuous cut around the periphery of the outer seal to trim away the edge portions of said blank.

19 Claims, 8 Drawing Figures



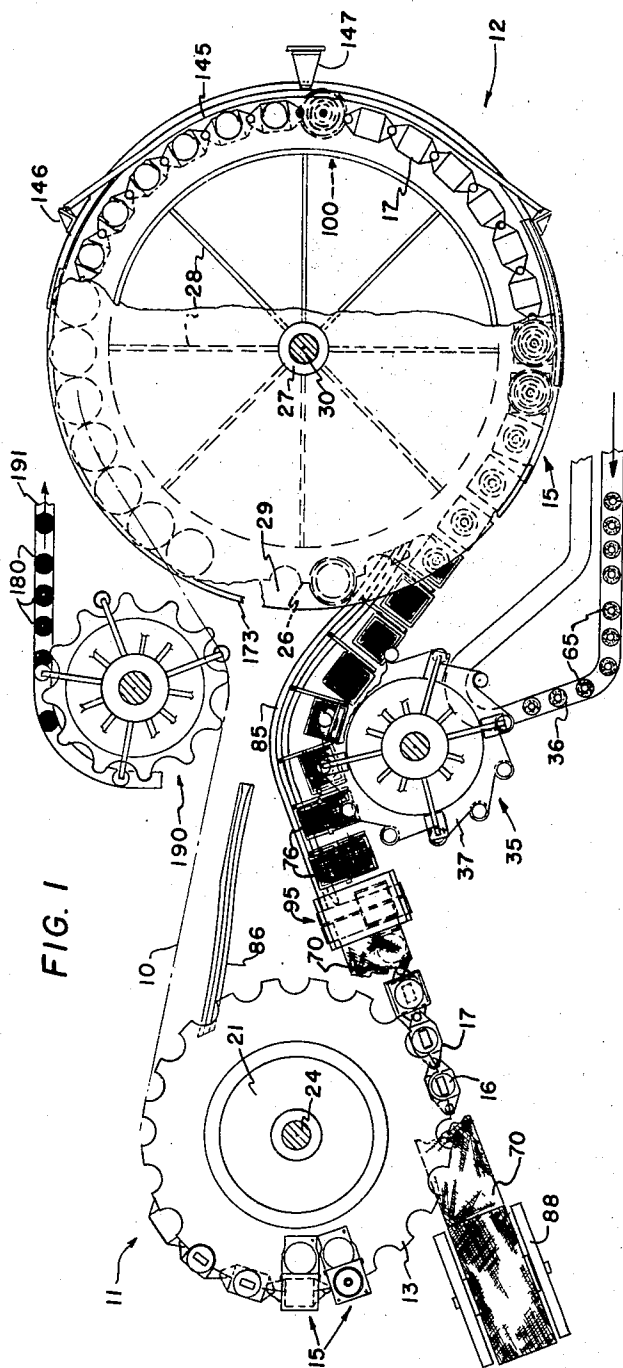


FIG. 1

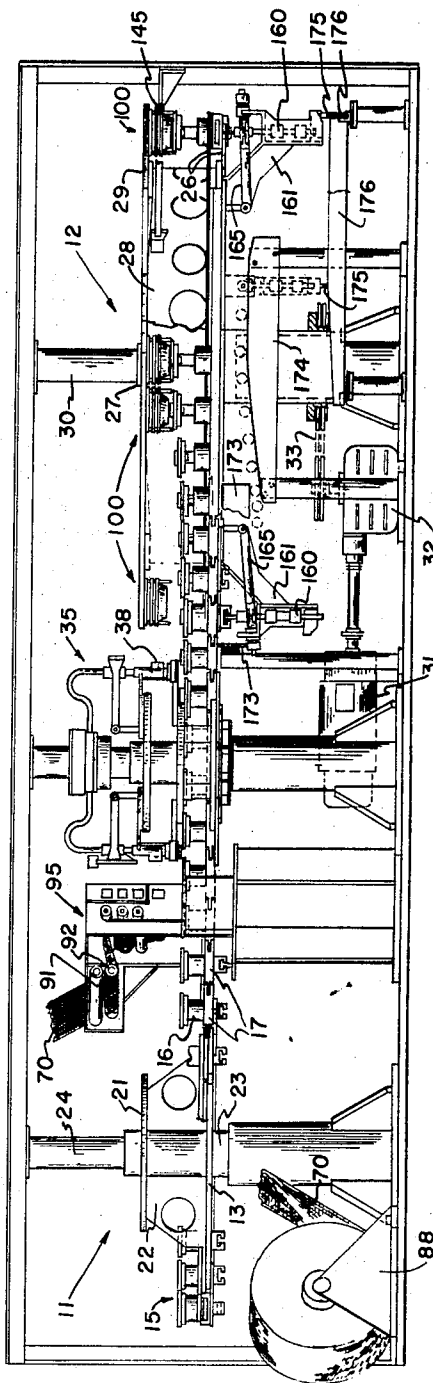


FIG. 2

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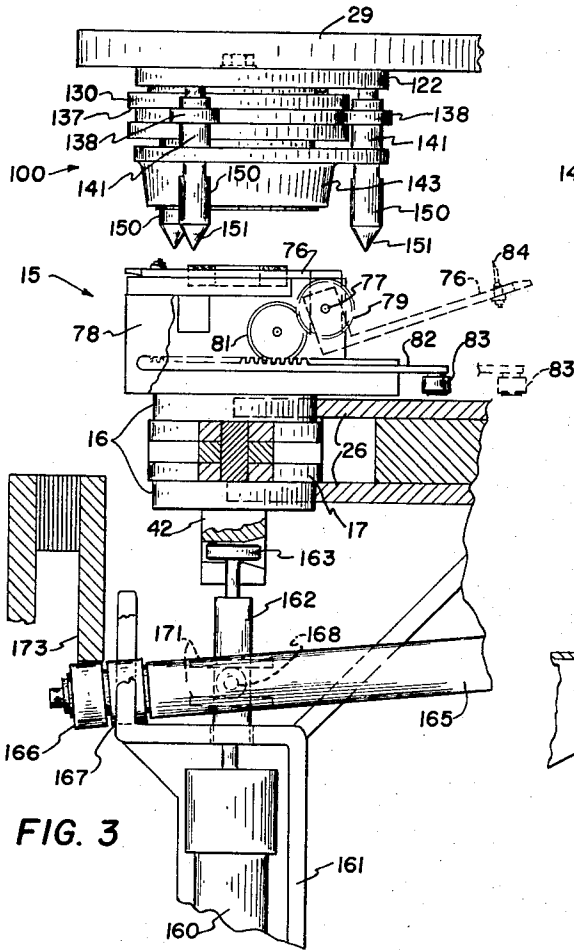


FIG. 3

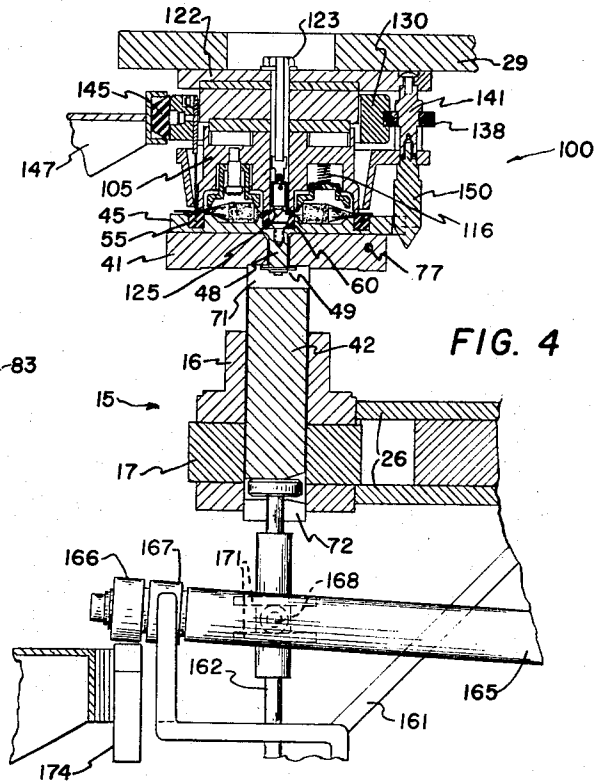


FIG. 4

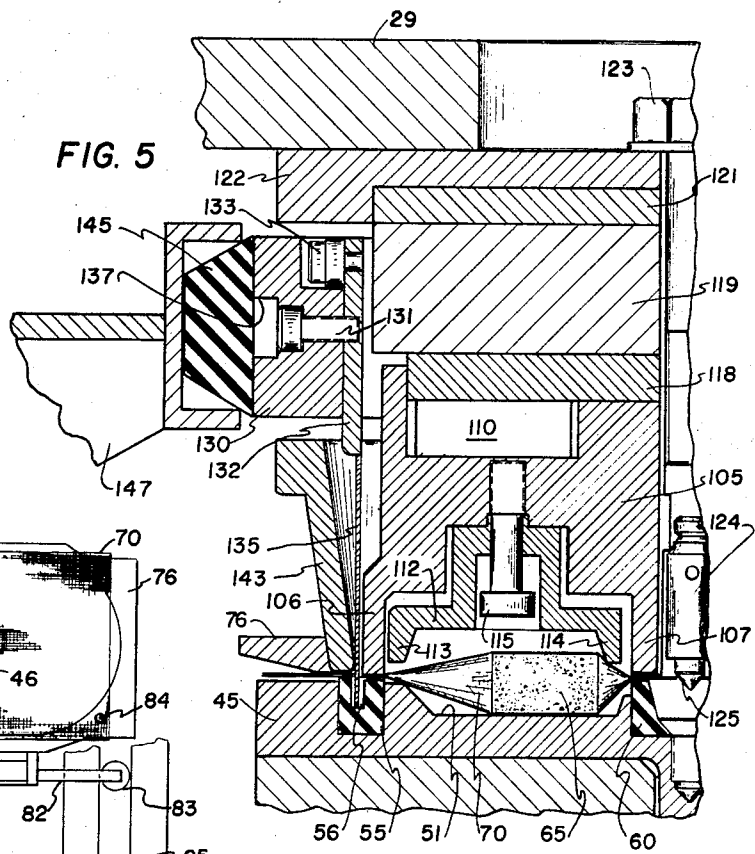


FIG. 5

FIG. 6

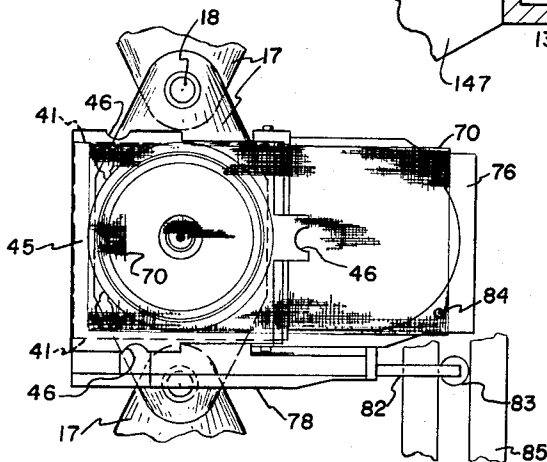


FIG. 7

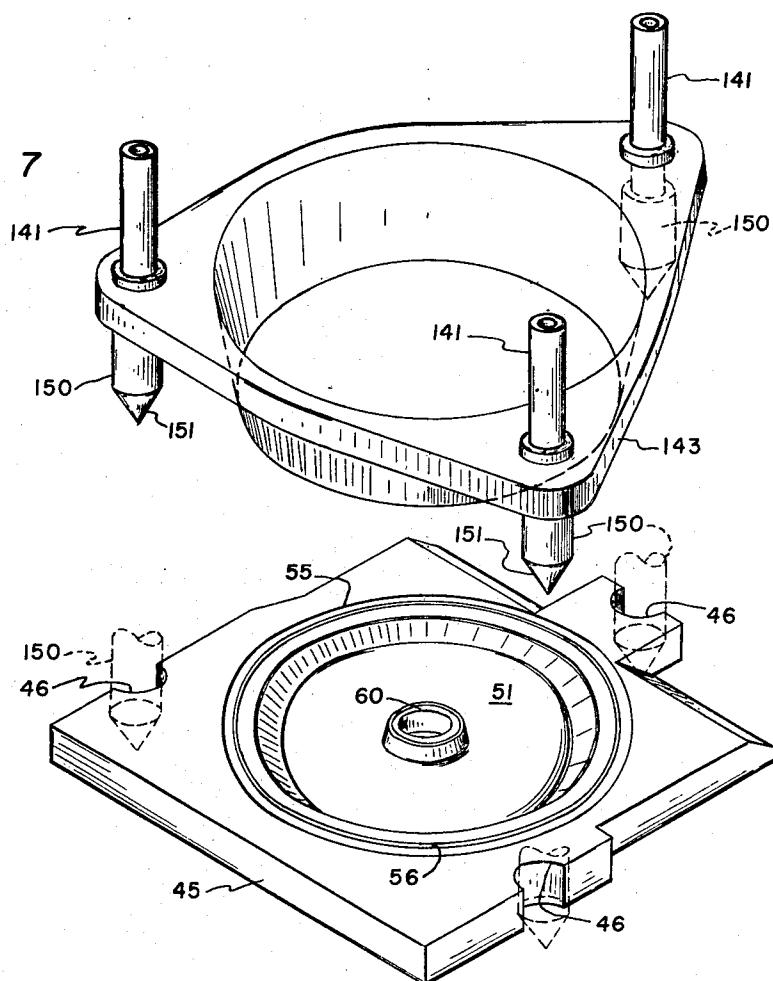
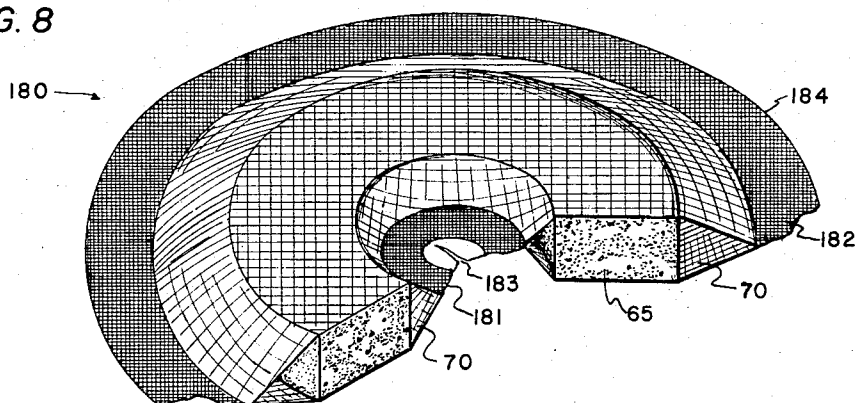


FIG. 8



POUCH FORMING APPARATUS AND METHOD**BACKGROUND OF THE INVENTION**

This invention is concerned with the packaging of an annular article of a fragile nature in a special type pouch formed with an annular pocket completely confining the article. The invention has particular adaptability for packaging an article such as a tablet of compressed coffee which is designed for use in a home-type percolator and which contains a measured amount of roasted and ground coffee, in tablet form, and wrapped in a pouch of filter material to enable unimpeded extraction of the coffee solids while confining the coffee grounds within the pouch for easy discard thereof after use.

The annular pocket in which the article is completely enclosed is necessitated by the use to which the pouch will be put so as to maintain the individual coffee grounds in a circular pattern conforming to the shape of a percolator basket after the structural integrity of the compressed tablet has been destroyed from the moistening thereof during the percolating process. The formation of an annular pocket requires that the opposed plies of the wrapping material be joined together in a seal extending around the inner circumference of the annular article, and this seal will be hereinafter referred to as the "inner" seal. Such a pocket also requires that a seal be placed around the outer circumference of the annular article and this seal will be hereinafter referred to as the "outer" seal. In making either seal, particularly with wrapping material having a low stretch factor, sufficient slack in the material is required, depending upon the thickness of the annular article, to enable the opposed plies of material to be brought into sealing contact with one another without tearing or placing excessive strain thereon.

Conventional equipment for forming a pouch of the type above described characteristically operates to fold a continuous web of wrapping material around the article to be ensealed and then advance the articles intermittently through a succession of sealing stages by intermittently feeding the web material. Severance of a completed pouch from the web material is accomplished at a final stage in the advance of the article through the equipment. In mechanism operating on this principle, problems of registration are encountered in view of the plural stages in which the several sealing and cutting operations are performed. Equipment of this type also has problems which involve straining of the wrapping material by reason of its inability to drape freely around the article as a seal is being made because of the need to retain the fabric firmly in the grip of the feeding mechanism. Furthermore, by running on an intermittent feed basis and by forming respective seals in separate stages, unnecessary time is required for the overall pouch forming function to thus mitigate against high-speed operation.

SUMMARY OF THE INVENTION

The machine according to the present invention overcomes problems of the sort above-enumerated by operating on a continuous feed basis to enseat the article within a blank precut from a web of packaging material and between inner and outer seals which are simultaneously formed in one sealing stage. The mechanism includes an endless chain strung about a

pair of opposed sprockets, each link of said chain being fitted with a platen for supporting the article to be packaged, said platen being projectable in a direction perpendicular to the direction in which said chain is driven. A continuously feeding web of packaging material is cut into individual wrapper blanks which are first laid upon said platens in succession. The article to be wrapped is then deposited, preferably by an infeed unit, on a platen on top of said wrapper blank, and the blank is subsequently folded over so as to loosely cover both surfaces of the article.

One of the sprockets around which said chain is drawn comprises part of an integral turret structure upon which are mounted sealing head assemblies disposed in register with the platens carried by the section of said chain drawn around the turret structure. During this portion of chain travel, means are provided to project the platens into sealing contact with the heated die of the sealing head assembly registering therewith and to maintain such contact for sufficient time to effect a heat seal bond between the two plies of wrapping material covering the article. The heated die is shaped to provide an inner and outer seal in cooperation with correspondingly shaped surfaces of said platen. Each sealing head assembly includes registering pins having tapered ends which guide the platen into precisely aligned relationship with the heated sealing die, the mounting for said platen having sufficient tolerance to enable precise alignment thereof. Included in said sealing head assembly is a yieldably mounted stripper member bearing on the pouch and adapted to drape the material around the article prior to sealing and to separate the pouch from the heated sealing die after the platen is retracted at the completion of the sealing operation.

Coincident with the sealing of the opposed plies of the wrapper blank, a trimming away of excess material is performed by a knife blade disposed to slice through the wrapper blank when the platen is in its fully projected position. Said blade is secured to an annular blade carrier mounted on said assembly for rotational movement relative thereto. Rotation of said carrier is effected by a frictional member disposed to engage the carrier during a predetermined arc of rotation of the turret structure, at which time the platen is in its fully projected position. The rotation of the knife blade by said carrier effects a slicing cut through said wrapper blank around the exterior edge of the outer seal at the same time that the seal is being formed by the operation of the sealing die in cooperation with the platen. During the cutting operation, an outer collar forming part of the sealing head assembly grippingly engages the material of the wrapper blank exterior of the line of cut so as to maintain tautness therein and thereby facilitate the cutting operation. The sealing head assembly also includes a blade disposed to puncture the central area of the wrapper blank as the platen is brought into sealing engagement with the heated die of the assembly.

As each chain link completes its travel around said turret structure, its platen is retracted with the sealed pouch resting thereon. The link then continues along its endless path preferably into engagement with a discharge unit which operates to lift each pouch off its respective platen and transfer it to a take-away conveyor for further handling.

OBJECTS OF THE INVENTION

It is therefore an object of this invention to improve upon apparatus and methods for enclosing an annular article within a pouch between seals bordering the inner and outer circumference of the article.

It is a further object of the invention to form a pouch around an annular article in a continuous manner and wherein an inner and outer seal are effected in one sealing operation.

It is a still further object of the invention to provide an improved apparatus and method for trimming away marginal areas of a wrapper blank coincident with the ensembling of an annular article within said wrapper blank.

It is a still further object of the invention to provide continuously operating heat sealing mechanism with improved means for precisely aligning the platen element of the mechanism with the heated sealing die elements of the mechanism as said platen is being extended into sealing engagement with said die element.

Further objects of the invention together with the features contributing thereto and the advantages accruing therefrom will be apparent from the following description when read in conjunction with the drawings herein.

FIGURE DESCRIPTION

FIG. 1 is a plan view of the general organization of the apparatus embodying the present invention.

FIG. 2 is a side elevational view of the apparatus shown in FIG. 1.

FIG. 3 is a side elevational view of a sealing head assembly and a platen carrier assembly as they move into substantially registered relationship prior to projection of the platen into sealing engagement with the sealing head die.

FIG. 4 is a sectional view of the mechanism of FIG. 3 but with the platen projected into sealing contact against the sealing die element of the sealing head assembly.

FIG. 5 is a sectional view in enlarged scale of part of the mechanism illustrated in FIG. 4.

FIG. 6 is a plan view of a platen carrier assembly with the wrapper blank foldover yoke indicated in its open position and supporting a portion of a wrapper blank previously applied thereto.

FIG. 7 is an isometric view of the platen illustrating its interaction with the registering pins of the sealing head for precisely aligning the platen as it is projected for engagement with the sealing die.

FIG. 8 is a view of the completed pouch showing the annular article confined between inner and outer seals and with the marginal portions of the wrapper blank trimmed away around the periphery of the outer seal to provide the pouch with a circular configuration.

DETAILED DESCRIPTION

Referring now to the drawings, FIG. 1 illustrates the general layout of the apparatus which can be seen to comprise an endless chain 10 strung about two opposed turrets 11, 12, of which the turret 11 includes a sprocket 13 fitted to the chain and driven thereby. The chain 10 acts as a conveyor for the annular articles to be wrapped by the mechanism and consists of a series of links 17 pivotally connected to one another with

each constituting an element of a platen carrier assembly 15. Each said link comprises a casting shaped with a central circular sleeve or boss 16 projecting above and below the flattened end portions of the link which is formed with a single flange at one end and spaced apart double flanges at its opposite end, see also FIG. 6. The single flange of each link is fitted between the double flanges of the next adjoining link and is pivotally joined thereto by a pivot pin 18 so as to result in the endless chain structure 10. The turret 11, as best seen in FIG. 2, comprises a weldment which includes the aforesaid sprocket 13, a reinforcing disc 21 and radial struts 22 integrally secured to a hub 23 keyed to a vertical shaft 24, the shaft being suitably journaled in the framework of the apparatus.

The turret 12, which will hereinafter be referred to as the sealing turret, comprises a chain double sprocket 26 secured to a weldment which includes a hub 27, radial support struts 28 and an outer sealing head mounting ring 29, all of which are mounted for rotational movement on a vertical shaft 30 suitably journaled in the framework of the machine. The sprocket teeth are shaped to engage the bosses 16 of links 17. Rotational motion, in a counterclockwise direction as viewed in FIG. 1, is imparted to the sealing turret by a motor 31 secured to the machine framework and driving a reduction gear box 32 which is operatively coupled by chain 33 with the aforesaid weldment of the sealing turret 12. The drive is continuous causing each of the several platen carrier assemblies 15 pivotally joined to one another in a chain-like arrangement to continually progress around the respective turrets in endless succession.

Also cooperating with the article conveyor chain 10 and driven thereby is, preferably, an infeed turret 35 disposed along the reach of the chain running from the turret 11 to the sealing turret 12. Said infeed turret functions to transfer the articles to be wrapped individually from an infeed conveyor 36 to the conveyor 10 by depositing said articles on the platen carrier assemblies 15 in succession as they proceed around the infeed turret. This operation is performed by a pocketed wheel 37 which picks up an article in each pocket and which is provided with a vacuum cup 38 associated with each pocket. Said cup is cam actuated and operates to lift the article from the pocket and at the proper time of its rotation to deposit the article onto a platen carrier assembly of the chain 10.

FIGS. 3 to 5 illustrate in greater detail the structure of a platen carrier assembly 15, which includes a platen carrier formed with a flat platen support head 41 joined integrally to a vertically disposed slide bar 42. The bar 42 is slide fitted in an interior bore extending vertically through the cylindrical sleeve or boss 16 of the flattened link element 17 of the assembly. Loosely supported on the top surface of the carrier head 41 is a platen 45 which, as can be seen in FIG. 6, is essentially rectangular and has edge portions slightly overhanging the edges of the carrier head 41. The overhanging edges of said platen are formed with arcuate recesses 46 cut out therefrom, there being three such recesses which are located substantially equidistant from one another about the vertical axis of the assembly for purposes to be hereinafter described. The underside of the platen 45 is shaped to provide a stem 48 extending

through a bore in the carrier head 41, said stem at its lower extremity being fitted with a retainer clip 49 by which the platen is loosely attached to the carrier head. The bore in the carrier head for accommodating said stem is oversized which enables the platen 45 to be laterally shifted a limited extent relative to the carrier head 41 by registering means hereinafter described. The top surface of the platen 45 is shaped to present an annular recess 51 which is concentric with the vertical axis of the assembly to provide a seat for the annular article to be wrapped. Surrounding said recess 51 is an annular insert 55 fitted into the surface of the platen and formed of a slightly compressible material having good heat resistant and release properties such as silicon rubber or the like. The top surface of said insert provides the actual sealing surface for forming the pouch outer seal in cooperation with the sealing head in the manner hereinafter described. As can be seen in FIG. 5, the platen insert 55 is formed with a groove 56 which accommodates the pouch trimming means hereinafter described.

Also fitted within the top surface of the platen interiorly of the recess 51 is an insert 60 made preferably from the same material as the insert 55 and shaped with an open center so as to provide at its top surface an annular sealing surface which in cooperation with the sealing head forms the inner seal around the article to be wrapped.

As can be seen from FIG. 8, the article which the present apparatus is designed to enwrap is in the shape of an annulus or toroid having an essentially rectangular cross section and which in the present instance comprises a tablet 65 of tightly compressed roasted and ground coffee. The wrapping material 70 from which the pouch is formed is a porous material, preferably a fabric of non-woven fibers of which a substantial portion are of a thermoplastic substance which enables opposed plies of the material to be bonded together under the influence of heat and pressure. Due to the need for containing the article between inner and outer seals by reason of the use to which the packaged article is to be put, as heretofore explained, the gathering together of the opposed plies draws in the edges of the material because of the thickness of the tablet 65. In order to minimize any wrinkling of the fabric when so gathered and to permit it to adapt more readily to the shape of the tablet with the drawn in amounts of both opposed plies substantially equal, the recess 51 in the platen is cut to a depth so that the sealing plane defined by the top surfaces of inserts 55, 60 is a plane which substantially bisects the tablet when seated on the platen. By precutting the wrapping material into individual blanks prior to the sealing operation, the ability of the fabric to drape around the tablet with minimum distortion and wrinkling is thereby enhanced.

As can best be seen in FIG. 4, the upper extremity of the bar 42 constituting part of the platen carrier is slotted, as at 71, to enable attachment thereto of the platen by means of the clip 49. The lower extremity of said bar is formed with a T-slot 72 to accommodate platen elevating means, hereinafter described, mounted on the sealing turret and disposed to move into effective actuating relation to the platen carrier as each platen carrier assembly reaches its entering point of tangency with the turret. As will be seen, the con-

struction of the platen carrier assembly enables the platen to be raised and lowered between the positions shown in FIGS. 3 and 4 during its arcuate travel around the axis of the sealing turret 12, at which time the assembly is being supported and driven by the double sprockets 26 forming part of the sealing turret structure.

The platen carrier assembly also includes mechanism for folding over a wrapper blank so as to cover the top surface of the tablet resting on the platen with a ply of the wrapper material constituting approximately one-half of the wrapper blank, said wrapper blank having been deposited on the platen carrier assembly prior to placing thereon the tablet to be wrapped. The foldover mechanism can best be seen in FIGS. 3 and 6 and includes a foldover yoke 76 having its arms carried by a shaft 77 pivotally mounted in the head 41 of the platen carrier. Shaft 77 carries a gear 79 meshing with a gear 81 rotatably mounted in a housing 78 and driven by a slidable rack 82 also mounted in said housing which is secured in any suitable manner to the platen carrier head 41. The inner end of rack 82 supports a roller 83 disposed to engage cam rail means 85, 86, see FIG. 1, located at appropriate areas adjacent the conveyor chain 10 for sliding the rack 82 in one direction or another to thereby rotate the yoke 76 between its open and closed position through the mechanism just described. Said yoke as shown in full lines in FIG. 3 is in its closed foldover position, the open position being shown in broken lines. The wrapper blank is of sufficient size to loosely cover both surfaces of the tablet and is deposited on the assembly with one-half thereof spread across the platen 45 and with the extended half portion thereof to be subsequently folded over being laid on said yoke and impressed on retainer pins 84 mounted in the yoke. The pins 84 prevent the extended half portion of the blank from slipping during the foldover operation. After a tablet 65 has been deposited by the infeed turret 35 on the half portion of the wrapper blank spread across the platen, and before the assembly progresses into engagement with the sprocket of the sealing turret, the cam rail 85 acting on roller 83 pushes the rack outward, to the left as seen in FIG. 3, causing the yoke 76 to swing to its closed position thereby loosely draping substantially half of the wrapper blank over the top surface of the tablet supported on the platen.

As can be seen in FIGS. 1 and 2, the wrapping material 70 is supplied from a continuous web thereof wound in a roll rotatably supported by a stand 88 located near the base of the turret 11. The web material 70 is drawn upwardly and around suitably disposed overhead pulley means, not shown, from whence it is fed between rollers 91, 92 of a web feed and cutoff unit 95 which is mounted above the article conveyor chain 10 at a point where it approaches the infeed turret 35 after having disengaged from the sprocket 13 of the turret 11. The web feed and cutoff unit may be of any suitable design operating to advance the web and to sever it laterally at measured lengths to form individual blanks which are discharged from the unit and spread upon the platen carrier assemblies in succession as they pass continually beneath the unit. At this stage in the progression of the platen carrier assemblies, the foldover yokes 76 are in their open extended position so

that the blanks are received in substantially flattened condition with approximately one-half of the blank being supported on the platen 45 of each carrier assembly and the other half of each blank being supported by the extended foldover yoke associated with each platen carrier assembly. As each platen carrier assembly approaches the infeed turret 35, the yoke actuating cam 85 becomes effective to start swinging each yoke to its closed position so that by the time each platen carrier assembly reaches the infeed turret 35 the yoke thereof is partly closed and in a substantially vertical position. During the time that the platen carrier assemblies are in engagement with the infeed turret 35, a tablet 65 is deposited upon the platen on top of the wrapper blank portion supported by the platen. Each tablet 65 is accurately centered on a platen by the infeed turret 35 and rests in the recess 51 formed in the platen surface. The deposit of each tablet on a platen has the effect of drawing in slightly the wrapper blank by reason of being placed within the recess 51 by the infeed turret. This drawing in of the wrapping material is accomplished with minimum straining and distortion of the material because the material is in the form of an individual blank, not a continuous web and, therefore, has free edges loosely supported on the platen abling it to conform to the shape of the tablet. As a platen carrier assembly leaves the infeed turret and proceeds toward the sealing turret, the foldover yoke 76 completes its operation by moving to its fully closed position to cover the top surface of the tablet on the platen with a ply of the wrapper blank now in a folded condition.

As the platen carrier assemblies comprising the conveyor chain 10 reach the entering point of tangency of the chain with the sprocket 26 of the sealing turret 12, they become registered with means, hereafter described, mounted on the turret for actuating the platen carrier to achieve the double sealing and pouch trimming operation. For accomplishing the sealing operation, the sealing turret 12 has mounted thereon about its periphery a plurality of sealing head assemblies 100. Said assemblies are secured in any suitable manner to the overhanging sealing head mounting ring 29 forming part of the weldment of the turret structure.

Each sealing head assembly 100 includes a sealing head or die 105 having a generally circular configuration and made from a material having good heat conducting properties. Extending around the bottom peripheral portion of the head is a depending outer flange 106, and a similar inner flange 107 extends around the inner central area of the head. The bottom surface of flange 106 constitutes the sealing surface for forming the outer seal on the pouch in cooperation with the platen insert 55 heretofore described. The bottom surface of flange 107 constitutes the sealing surface for forming the inner seal of the pouch in cooperation with the platen insert 60. The sealing head is maintained in an appropriately heated condition by an electrical heating element 110 of annular configuration and fitted in an annular recess formed in the upper surface of the sealing die. The flanges 106, 107 define with the recess 51 formed in the platen a cavity for accommodating the tablet 65 supported on the platen 45. Also accommodated within said cavity is a pouch stripper 112 having an outer leg 113 disposed adjacent

the outer flange 106 and an inner leg 114 disposed adjacent the inner flange 107 of the sealing head. The stripper 112 is supported for vertical sliding movement on bolts 115, one shown in FIG. 4, threaded into the undersurface of the sealing head. Compression springs 116, one shown in FIG. 4, interspersed alternately in a circular pattern with the bolts 115 and compressed between the sealing head and the stripper provide a downward bias on the stripper to assure separation of the wrapper material from the heated surfaces of flanges 106, 107 at the completion of a sealing operation. It will, of course, be understood that heating element 110 is connected to a source of electrical energy by suitable means not shown and that a thermocouple device, not shown, may be also provided for appropriately measuring and controlling the temperature of the sealing head. Said heating elements are retained in the recess of the sealing head by a disc 118, preferably metal, fitted over the top of the sealing head.

Also included in the assembly is an insulator block 119 overlying the disc 118, and another disc 121 is fitted over insulator block 119. The parts just described all depend from an assembly mounting member or plate 122 and are securely held in juxtaposition to another by a retainer bolt 123 threaded into a center bore in the sealing head 105 and accommodated within a central bore formed in the other elements just described of the assembly. Also mounted in the center bore of said sealing head below the bolt 123 is a plug 124 provided with a downwardly projecting pointed blade 125. The tip of said blade is disposed below the plane of the sealing surface of platen insert 60 with the result that when the platen is brought into sealing contact with the sealing head in the manner hereinafter described, the blade 125 will puncture the wrapping material 70 at the center of the pouch being formed.

Mounted for rotational movement around the sealing head is a trimming knife carrier 130 of a generally ring-shaped configuration to the inner surface of which is secured, by a bolt 131, a blade holder 132. Attached to the holder 132 by a bolt 133 is a depending trimming knife blade 135, the lower tip of which is accommodated within the slot 56 of the platen insert 55 when the platen is in its raised sealing position. Said blade and carrier are supported for rotational movement around the sealing head by means which include a plurality of appropriately spaced bearings 138 having their outer races fitted in a peripheral groove 137 formed in the outer surface of the carrier. Said bearings are mounted on depending posts 141 suitably secured by bolts or the like to the sealing head mounting plate 122. In the present instance there are three such posts fitted with a bearing 138 arranged about the vertical axis of the sealing head at the same radius and at substantially equal angular positions from one another.

Also supported from the posts 141 is a flanged collar 143 which surrounds the sealing head die 105, the bottom surface of said collar being disposed in registration with that portion of the top surface of the platen insert 55 which is exterior of the slot 56 in said insert. The bottom surface of said collar serves the function, in cooperation with said insert, of gripping the wrapping material 70 at a point exterior of the outer seal formed by the sealing die flange 106 so as to maintain said wrapping material taut and thereby assure the even

cutting away of excess wrapping material by the trimming knife blade 135 as it is rotated within the slot of the platen insert during the heat sealing operation in the manner hereinafter described. It will be noted that the bottom surface of collar 143 is slightly elevated above the sealing surface of the sealing die flange 106. This is because the pressure required to grip the fabric and hold it taut is less than that required to effect a heat seal bond between the opposed plies of the wrapping material, it being understood that the pressure applied by the platen against the sealing die results in a slight compression in the sealing surface of the platen insert 55. The knife carrier is rotated about the sealing head by means of a stationary friction belt 145 supported at its ends from the frame of the machine by brackets 146 and at its midpoint by a bracket 147. The belt is drawn partly around the turret and disposed to engage the outer surface of carriers 130 at that portion of their travel with sealing turret 12 when the associated platen is in its raised sealing position. Rotation of a carrier 130 by belt 145 causes the associated cutting knife blade 135 to effect a continuous cut through the wrapping material 70 in a circular line at the outer edge of the outer seal thereby trimming away marginal areas of the rectangular wrapper blank to result in a pouch having a circular configuration

The fabric gripping collar 143 is attached to the posts 141 by means of shouldered pins 150 threaded into the bottom of the posts and constituting in effect downward extensions of the posts 141. The bottom ends of said pins 150 are formed with a tapered tip 151 which in cooperation with the cutout recesses 46 formed in the platen 45 serve to precisely align the platen with the sealing head die as the platen is raised into sealing contact with the die. Each said recess, see FIG. 7, is located so as to precisely register with a respective pin 150 when the axes of the sealing head and the platen are in precise alignment. As aforementioned, the platen 45 is loosely supported for limited lateral adjustment on the head 41 of the platen carrier. The tapered tips 151 of said pins 150 serve as camming surfaces acting on said platen recesses to laterally adjust the platen as it is being raised by mechanism hereinafter described so that the platen inserts 55, 60 will register precisely with the sealing surfaces 106, 107 of the heated sealing die 105 of the sealing head assembly.

The mechanism for actuating each platen carrier during its progress around the axis of the sealing turret and while the platen carrier assembly is in register with a respective sealing head, as can be seen in FIG. 2, includes a pneumatic cylinder 160 supported in a cast bracket structure 161 secured in any suitable manner to the underside of the sealing turret weldment heretofore described. The piston rod 162 of each said piston is formed with a flat rounded head 163 which is adapted to ride into the T-slot at the lower end of the platen carrier slide bar 42 as the platen carrier assembly reaches the entering point of tangency with the sealing turret. At this point in the progression of the chain 10, the carriers are in their lowermost position, as shown in FIG. 3, and the piston of the respective cylinder 160 is retracted. In this position of the parts the T-slot is in a location to receive the piston head 163 of a respective cylinder, it being understood that the

cylinders are mounted in register with respective sealing heads, the platen carrier assembly being drawn into register with both a cylinder and a sealing head upon reaching the entering point of tangency with the sealing turret. includes

In the present instance, elevation of the platen carrier is preferably accomplished through the successive action of two separate actuating mechanisms. The action is initially by mechanical cam means and finally by the pneumatic action of the cylinder in order to better control the amount of force applied against the sealing die. However, if desired, either means alone could be utilized to raise the platen fully from its retracted position into sealing engagement with the sealing die. The mechanism for initially elevating the platen carrier includes a lever 165 pivotally joined at its inner end to the bracket 161 and carrying at its outer end a roller 166. An adjacent roller 167 is disposed within a slot formed by a bifurcated upright extension of the bracket 161 which serves to guide the lever for vertical swinging movement about its pivot. Disposed further inwardly from the outer end of the lever is a roller 168 fitted between spaced collars 171 fastened to the piston rod 162. Actuation of the lever 165 is achieved by stationary cam rail means disposed at appropriate locations around the sealing turret and secured to the frame of the machine in any suitable manner. FIG. 3 shows the parts at the entering point of tangency of chain 10 with turret 12 and illustrates a cam rail 173 acting on the lever 165 to maintain it and the platen carrier in their lowermost retracted position. This rail is located about the turret in a position to start acting upon the lever after the completion of a sealing operation to retract it as the platen carrier assembly reaches the departing point of tangency of the chain with the sealing turret. Cam rail 173 extends around the sealing turret to hold the parts retracted until they reach the entering point of tangency of the chain 10 with the turret, thus assuring horizontal alignment of piston head 163 with the T-slot 72 of a slide bar 42. In FIG. 4 is shown a cam rail 174 effective for raising the lever 165 and the associated platen towards sealing engagement with the associated sealing head 100. FIG. 4 shows the mechanism at the start of sealing engagement with the roller 166 having advanced beyond the cam rail 174. Rail 174, as can be seen in FIG. 2, is located about the turret in a position to engage the lever soon after the respective platen carrier assembly has reached the entering point of tangency of the chain with the sealing turret. The rail 174, effective for elevating the platen, is designed to bring the platen into close proximity to the sealing die whereupon air under pressure is admitted to the associated cylinder 160 to effect the actual sealing contact between the platen and the sealing die at a controlled pressure and to maintain said sealing contact for the appropriate time during the rotation of the sealing turret for achieving a bond between the opposed plies of wrapping material enveloping the tablet 65. It will, of course, be understood that the amount of force applied by the pneumatic cylinder and the length of time over which it is applied are matters of choice and depend on many factors including the nature of the wrapping material 70 and the degree of heat at which the sealing die 105 is maintained. The design of the apparatus offers wide latitude in the length of time that is available

for maintaining sealing contact between the platen and the sealing die since these members are maintained in registration for more than one-half revolution of the sealing turret, the major portion of this extent of rotation of the sealing turret being available for maintaining the parts in sealing engagement with one another. The air supply means for each cylinder 160, not shown, may be of any suitable form and includes a spring biased normally vented valve element 175 disposed for engagement with a cam rail 176 mounted in the frame of the machine and located so as to actuate element 175 and apply pressure to the air cylinder at the desired degree of rotation of the parts by the sealing turret and after the platen has been initially raised by the cam rail 174. The cam rail 176 extends around the sealing turret for maintaining pressure on the cylinder and terminates to shut off the air supply and vent the cylinder at the point whereat sealing contact between the platen and the sealing die has been maintained for the desired time interval. Preferably, a small counter pressure is continuously applied to the cylinder for retracting the piston. Retraction of the piston is further assured by operation of the cam rail 173 as previously described.

FIG. 7 illustrates the completed pouch or package 180 which is formed by the mechanism and which is left resting on a platen as it retracts at the termination of a sealing operation. As seen, the annular tablet 65 is contained between opposed plies of the wrapper material 70 within an annular pocket defined by an inner seal 181 and an outer seal 182. The inner seal, which was formed by the coaction of the inner flange 107 of the sealing die with the platen insert 60, extends over a circular area of the pouch bordering the inner circumference of the tablet 65. Inside the surface area of the pouch embraced by the inner seal, the unsealed wrapping material is punctured with a slit 183 which was made by operation of the pointed blade 125 mounted in the sealing head. The outer seal 182, formed by coaction of outer sealing die flange 106 with platen insert 55, extends in a circular path around the outer circumference of the tablet 65. Excess material of the wrapper blank, not shown in FIG. 8, has been trimmed away by the operation of the trimming blade 135 which cut through the wrapper material at the outer edge 184 of the outer seal to produce a pouch having an overall circular configuration.

The completed pouches 180 remain on the platens as the respective platen carrier progresses past the departing point of tangency of chain 10 with the sealing turret. At this point of travel, the platens have been fully retracted to their lowermost position. The conveyor chain 10 in running to the opposed turret 11 preferably coacts with a pouch discharge unit 190, shown in the form of a turret, and disposed to engage with the chain as it leaves the sealing turret 12. The pouch discharge unit may be of any suitable design operative for removing the finished pouches 180 from the conveyor chain 10 and transferring them to a discharge conveyor 191. As each platen carrier assembly of chain 10 advances past the discharge unit 190 and approaches the turret 11, its associated wrapper blank foldover mechanism is actuated to swing the foldover yoke 76 to its open position in preparation for another cycle of operation, there being located at this point the cam rail 86 for actuating the foldover yoke in this manner.

To summarize the operation of the apparatus, individual blanks of wrapping material 70 are severed from a continuous web of the wrapping material and applied individually to sealing platens 45, each of which is mounted in a platen carrier assembly 15, the several assemblies being joined together to form an endless conveyor chain 10. The wrapper blanks are of a size to envelop the tablet 65 being packaged when folded thereover, and after the wrapper blank is applied a tablet is placed on the platen by any suitable means, preferably an infeed turret 35, which transfers the tablets individually from an infeed conveyor 36.

As the conveyor chain 10 progresses past the infeed conveyor, the wrapper blank foldover mechanism is actuated to drape a half portion of the blank over the top surface of the tablet. As the platen carrier assembly reaches the entering point of tangency of the chain 10 with the sealing turret 12, it is brought into vertical registration with a sealing head 100 mounted on the turret. At the same time it becomes coupled with actuating mechanism operable for elevating the platen into sealing engagement with the heat sealing die of the sealing head while the carrier advances with the rotating turret. The platen actuating means at this point becomes effective for raising the platen into sealing engagement with the heated sealing die causing dual seals to be made between the opposed plies of the wrapping material, one seal being an inner seal 181 around the interior circumference of the tablet and the other seal being an outer seal 182 around the outer circumference of the tablet. The elevation of the platen into sealing engagement is achieved initially by mechanical cam action and finally by pneumatic means operating under a predetermined pressure. As the platen is elevated into sealing engagement, registering pins 150 cooperating therewith and mounted on the sealing head guide the platen into precise alignment with the heated sealing die.

Coincident with the elevation of the platen into sealing engagement, a puncture is made through the wrapping material at the central area thereof by the blade 125. Additionally, while the platen and die are in sealing engagement, a trimming cut is made around the outer edge of the outer seal by blade 135 to trim away the marginal and corner areas of the wrapper blank, thus producing a pouch 180 of circular configuration. After sealing contact between the platen and sealing die has been maintained for the selected time interval, the platen is lowered as the platen carrier assembly continues to progress with the rotating turret 12 and until it reaches the departing point of tangency of the chain 10 with the turret. The platen carrier assembly then proceeds along the route of the conveyor chain into engagement preferably with a discharge unit operating to remove the packaged tablet from the platen and transfer it to a discharge conveyor 191 for further handling. Thereafter, as the platen carrier continues to progress towards the turret 11 of the mechanism, the wrapper blank foldover mechanism is restored to its original open position and, preferably, any scrap material from the wrapper blank is removed in preparation for the deposit of a new wrapper blank after proceeding about the turret 11.

While there has been shown and described what is considered to be a preferred embodiment of the inven-

tion it will, of course, be understood that various changes in form could obviously be made without departing from the spirit of the invention. It is therefore intended that the invention be not limited to the exact form herein shown and described nor to anything less than the whole of the invention as hereinafter claimed.

What is claimed is:

1. Apparatus for ensealing a tablet-like article within a pouch of heat sealable wrapping material comprising,

a. an endless conveyor chain consisting of a series of pivotally interconnected platen carrier assemblies each including a projectable platen loosely fitted in the assembly for supporting a said article between opposed plies of said wrapping material,

b. a rotatably mounted sealing turret continuously driven and provided with coaxial sprocket means supporting the carrier assemblies of a chain section wrapped partly around said turret for continuously advancing said chain along an endless path,

c. a plurality of sealing head assemblies mounted on said turret and rotated therewith, each said sealing head assembly including a heated sealing die disposed to register with a carrier assembly platen of the chain section wrapped around said turret and platen guide means for aligning the platen with the sealing die in register therewith, and

d. platen actuating means disposed to engage said carrier assemblies of the chain section wrapped around said turret for projecting the platen of each carrier assembly into sealing engagement with the sealing die in register therewith to form a seal between the opposed plies of said material around the article enveloped thereby.

2. The invention according to claim 1 wherein said platen is mounted for limited shiftable displacement relative to the associated carrier assembly and wherein each sealing head assembly includes,

a. a plurality of tapered pins disposed around the axis of said sealing die for guiding said platen into precise alignment with the sealing die while being projected into sealing contact therewith.

3. Apparatus for ensealing a tablet-like article within a pouch of heat sealable wrapping material comprising,

a. an endless conveyor chain consisting of a series of pivotally interconnected platen carrier assemblies each including a projectable platen for supporting a said article between opposed plies of said wrapping material,

b. a rotatably mounted sealing turret continuously driven and provided with coaxial sprocket means supporting the carrier assemblies of a chain section wrapped partly around said turret for continuously advancing said chain along an endless path,

c. a plurality of sealing head assemblies mounted on said turret and rotated therewith, each said sealing head assembly including a heated sealing die disposed to register with a carrier assembly platen of the chain section wrapped around said turret, said sealing die and platen having sealing surfaces shaped to form a circular peripheral seal around said article,

d. platen actuating means disposed to engage said carrier assemblies of the chain section wrapped around said turret for projecting the platen of each carrier assembly into sealing engagement with the

sealing die in register therewith to form a seal between the opposed plies of said material around the article enveloped thereby, and

e. a blade mounted for rotation around the sealing head and disposed to cut through said wrapping material exteriorly of said circular seal while said platen and sealing die are in sealing engagement.

4. The invention according to claim 3 wherein said blade is secured to a rotatable blade carrier surrounding the sealing head and including,

a. a rotation drive member disposed to frictionally engage the effective for carriers of the chain section wrapped around said turret, said blade carrier being rotated by the rotary movement of said turret when resisted by said rotation drive member.

5. The invention according to claim 3 wherein each said sealing die and platen have sealing surfaces shaped to form a circular seal around said article and said sealing head includes,

a. a blade mounted for rotation around the sealing head and disposed to cut through said wrapping material exteriorly of said circular seal while said platen and sealing die are in sealing engagement, and

b. a collar surrounding said sealing die and disposed to coact with said platen to grip said wrapping material adjacent the line of cut therethrough made by said blade.

6. The invention according to claim 1 wherein each said platen is supported on a platen carrier slide fitted in the associated carrier assembly and wherein said platen actuating means comprises,

a. a cam rail disposed around said turret and effective for sliding said platen carrier within said assembly to project said platen into sealing engagement with said sealing die.

7. The invention according to claim 1 wherein each said platen is supported on a platen carrier slide fitted in the associated carrier assembly and wherein said platen actuating means comprises,

a. a pneumatic actuator mounted on said turret and disposed for coupling engagement with the platen carrier of a carrier assembly while supported by the said sprocket means, said actuator being effective for sliding said carrier to project said platen into sealing engagement with said sealing die.

8. The invention according to claim 1 wherein each said platen is supported on a platen carrier slide fitted in the associated carrier assembly and wherein said platen actuating means comprises,

a. a cam rail disposed around said platen and effective for sliding said platen carrier within said assembly to project said platen towards sealing engagement with said sealing die, and

b. a pneumatic actuator mounted on said turret and disposed for coupling engagement with the platen carrier of a carrier assembly while supported by the said sprocket means, said actuator being effective for sliding said carrier within said assembly to project said platen into sealing engagement with said sealing die.

9. Apparatus for ensealing a tablet-like article within a pouch formed from a blank of heat sealable wrapping material comprising,

- a. an endless conveyor chain consisting of a series of pivotally interconnected platen carrier assemblies each including a projectable platen for supporting a said article between opposed plies of said wrapping material, and wrapper blank foldover means disposed to support a portion of a wrapper blank, another portion of which is supported by said platen, said foldover means being operative for folding over the portion of said blank supported thereby on top of an article deposited on the portion of said blank supported by said platen,
- b. a rotatably mounted sealing turret continuously driven and provided with coaxial sprocket means supporting the carrier assemblies of a chain section wrapped partly around said turret for continuously advancing said chain along an endless path,
- c. a plurality of sealing head assemblies mounted on said turret and rotated therewith, each said sealing head assembly including a heated sealing die disposed to register with a carrier assembly platen of the chain section wrapped around said turret, and
- d. platen actuating means disposed to engage said carrier assemblies of the chain section wrapped around said turret for projecting the platen of each carrier assembly into sealing engagement with the sealing die in register therewith to form a seal between the opposed plies of said material around the article enveloped thereby.
10. The invention according to claim 9 wherein said foldover means includes,
- a. a yoke pivotally mounted on the carrier assembly and rotatable from an open position, in which it is adapted to support a portion of a wrapper blank applied thereto, to a closed position in which said yoke supported portion of said wrapper blank is folded over the portion of said wrapper blank supported by the platen, and
- b. cam rail means mounted adjacent said conveyor chain and effective for swinging said yoke between its open and closed positions.
11. The invention according to claim 1 wherein each said platen and said sealing die have coacting sealing surfaces operative for bonding together the plies of said wrapping material in a seal extending around said article and wherein each said sealing head includes,
- a. stripper having a surface adapted to bear on said material along the area thereof adjacent said seal when said platen is projected into sealing engagement with said die, said stripper being mounted on said sealing die for yielding displacement by the projecting movement of said platen and operative for separating said wrapping material from the sealing surface of said die when the platen is retracted from sealing engagement with said sealing die.
12. The invention according to claim 1 wherein each said sealing die and platen have sealing surfaces shaped to form a circular seal around said article and wherein each said sealing head assembly includes,
- a. a blade mounted in the central area of said sealing die and extending toward said platen, said blade being operative for puncturing said wrapping material within the area bounded by said seal as said platen is projected into sealing engagement with the sealing die.

13. Apparatus for ensealing an annular tablet-like article within a blank of heat sealable wrapping material comprising,

- a. an endless conveyor chain consisting of a series of pivotally interconnected platen carrier assemblies each including a projectable platen loosely fitted in the assembly for supporting a said article between opposed plies of said wrapping material blank, each said platen having circular sealing surfaces arranged concentrically with one of said surfaces having a diameter greater than the outer diameter of said article and another of said surfaces having a diameter less than the inner diameter of said article,
- b. a rotatably mounted sealing turret continuously driven and provided with coaxial sprocket means supporting the carrier assemblies of a chain section wrapped partly around said turret for continuously advancing said chain along an endless path,
- c. a plurality of sealing head assemblies mounted on said turret and rotated therewith, each sealing head assembly including a heated sealing die disposed to register with a carrier assembly platen of the chain section wrapped around said turret and platen guide means for aligning the platen with the sealing die in register therewith, said sealing die having sealing surfaces corresponding in configuration to the sealing surfaces of said platen, and
- d. platen actuating means disposed to engage said carrier assemblies while wrapped around said turret for projecting the platen of each carrier assembly into sealing engagement with the sealing die in register therewith to seal said article within said blank between seals extending around the outer and inner circumference thereof.

14. The invention according to claim 13 wherein each said platen is mounted for limited shiftable displacement relative to the associated carrier assembly and wherein each sealing head assembly includes,

- a. a plurality of tapered pins disposed around the axis of the sealing die and spaced to embrace said platen for guiding it into precise alignment with the sealing die while being projected into sealing contact therewith.

15. The invention according to claim 13 wherein each said sealing head includes a blade mounted for rotation about the sealing head and disposed to cut through said wrapper material blank exteriorly of the seal extending around the outer circumference of the article while the platen and sealing die are in sealing engagement.

16. A method for ensealing a tablet-like article between opposed plies of heat sealable wrapping material comprising the steps of,

- a. transporting on a platen said article and material continuously within a predetermined plane along a route of which a section thereof extends circularly part way around a vertical axis,
- b. rotating a heated sealing die within a plane parallel to said predetermined plane about said vertical axis with the same velocity as that of said platen and at the same radius as said route section to bring said sealing die into substantial registration with said platen while transversing said route section, and

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c. projecting said platen with said article and material thereon out of said predetermined plane and into sealing contact with said heated die to join together the plies of said wrapping material in a seal around said article while transporting same along said route section, and

d. precisely aligning said platen relative to said sealing die by laterally adjusting the position of the platen while projecting it into sealing engagement with said die.

17. The method according to claim 16 including the step of,

a. progressively cutting through said wrapping material exteriorly of said seal and completely around said article while said platen is held projected in sealing contact with said sealing die.

18. The method according to claim 16 wherein said article is placed on a portion of said wrapping material while being transported toward said route section and including the step of,

a. folding over another portion of said wrapping material onto said article before said article reaches said route section.

19. A method for ensealing a tablet-like article within a blank of heat sealable wrapping material com-

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prising the steps of,

a. severing a continuous web of said material into individual wrapper blanks,

b. transporting said blanks seriatim and continuously within a predetermined plane along a route of which a section thereof extends circularly part way around a vertical axis,

c. placing one said article on a portion of each said blank while progressing along said route,

d. folding over another portion of each said blank on top of said article before said article reaches said route section,

e. rotating a heated sealing die within a plane parallel to said predetermined plane about said vertical axis with the same velocity as that of said articles and at the same radius as said route section to bring said sealing die into substantial registration with said article while traversing said route section, and

f. projecting said article and blank out of said predetermined plane and into sealing contact with said heated die to join together the plies of said blank in a seal around said article while transporting same along said route section.

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