

[54] APPARATUS FOR PACKAGING
EXTRUDABLE MATERIAL

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[58] Field of Search 53/122; 425/246, 248, 377

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[57] ABSTRACT

An apparatus for packaging an extrudable material provides an extruder with a retractable nozzle which engages one of a series of molds mounted on a rotatable member and fills the mold against a back pressure exerted on a pressure plate within the mould. After filling the filled mold by the extrusion of a bar of material into the mold forcing the pressure plate back, a block is cut off the bar and the filled mold has a bag placed thereover and the block is ejected into the bag which is subsequently sealed and transported while confined to predetermined dimensions. A series of such blocks are then automatically loaded on to a pallet and covered with a carton.

12 Claims, 9 Drawing Figures

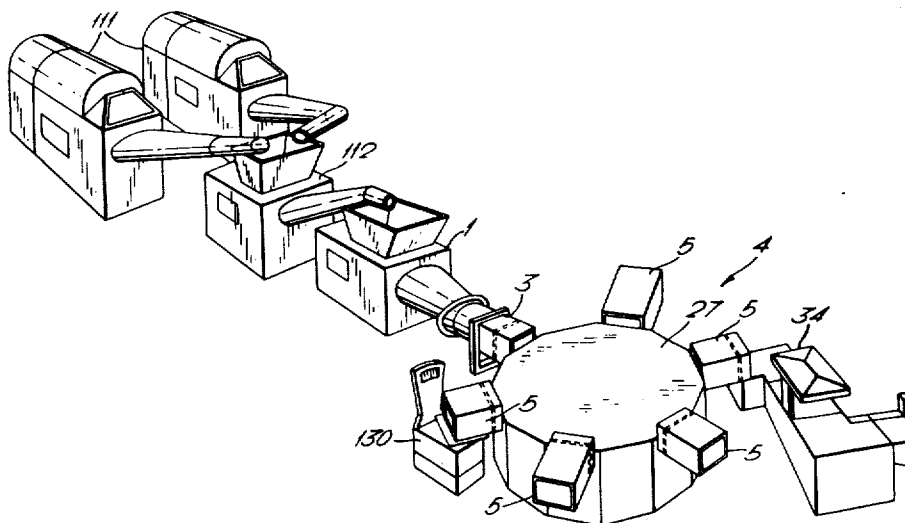
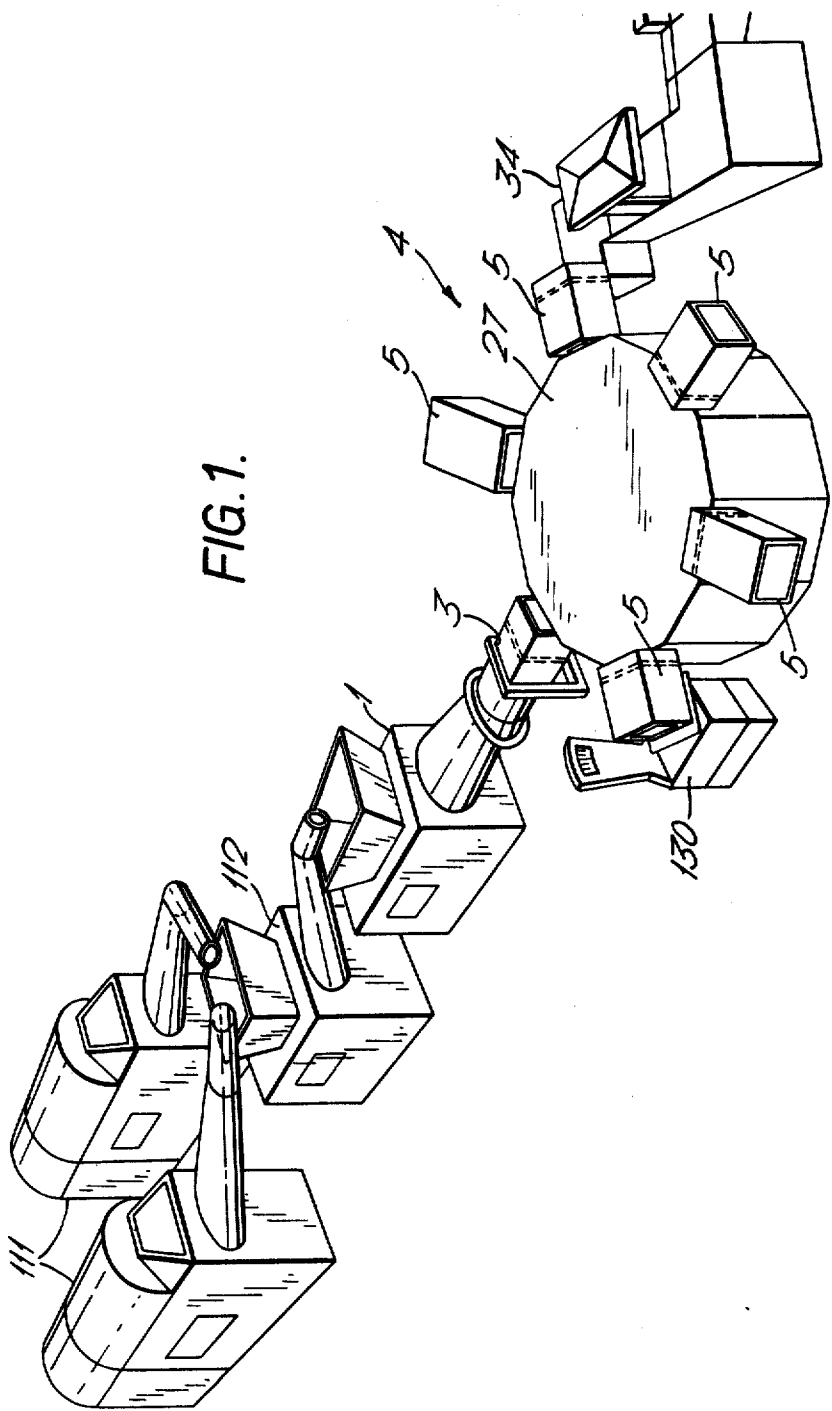
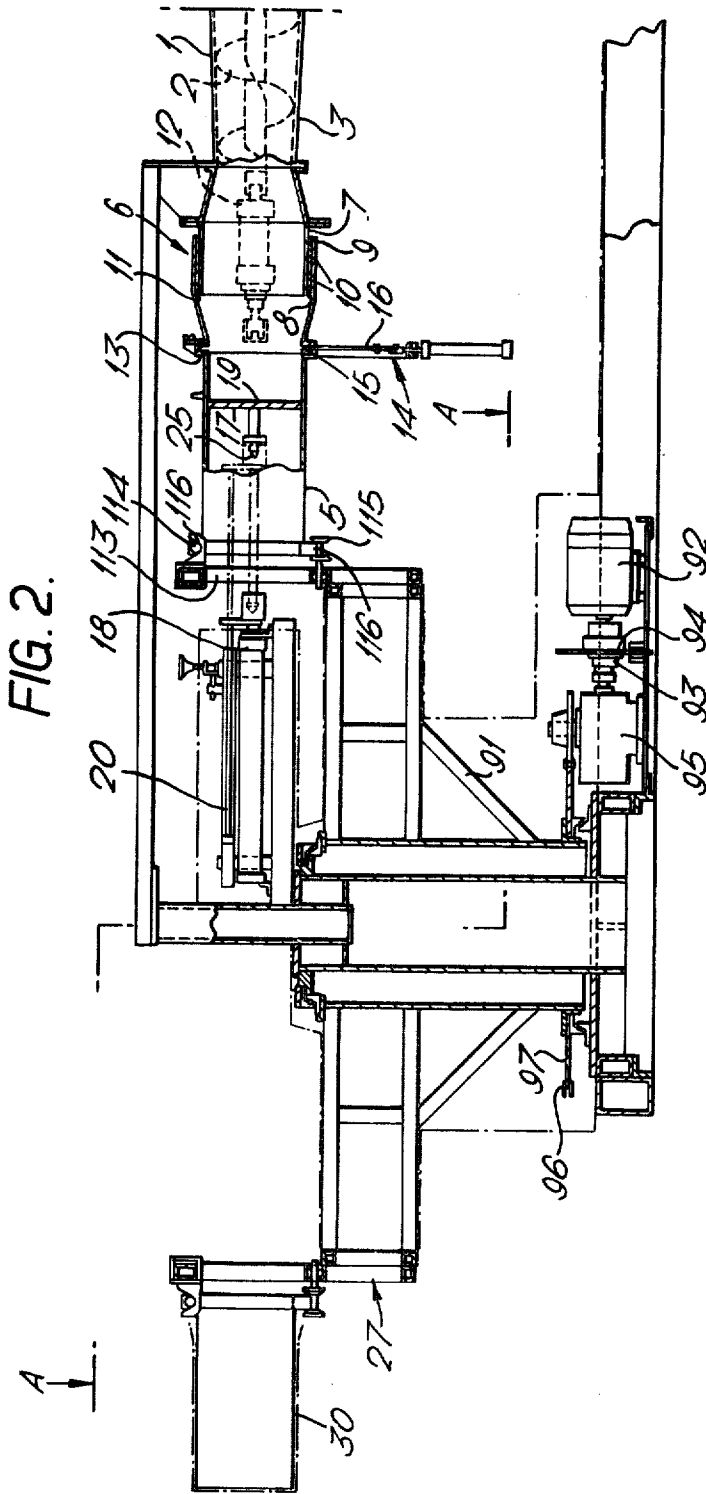


FIG. 1.





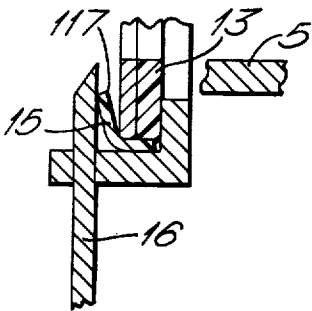


FIG. 3.

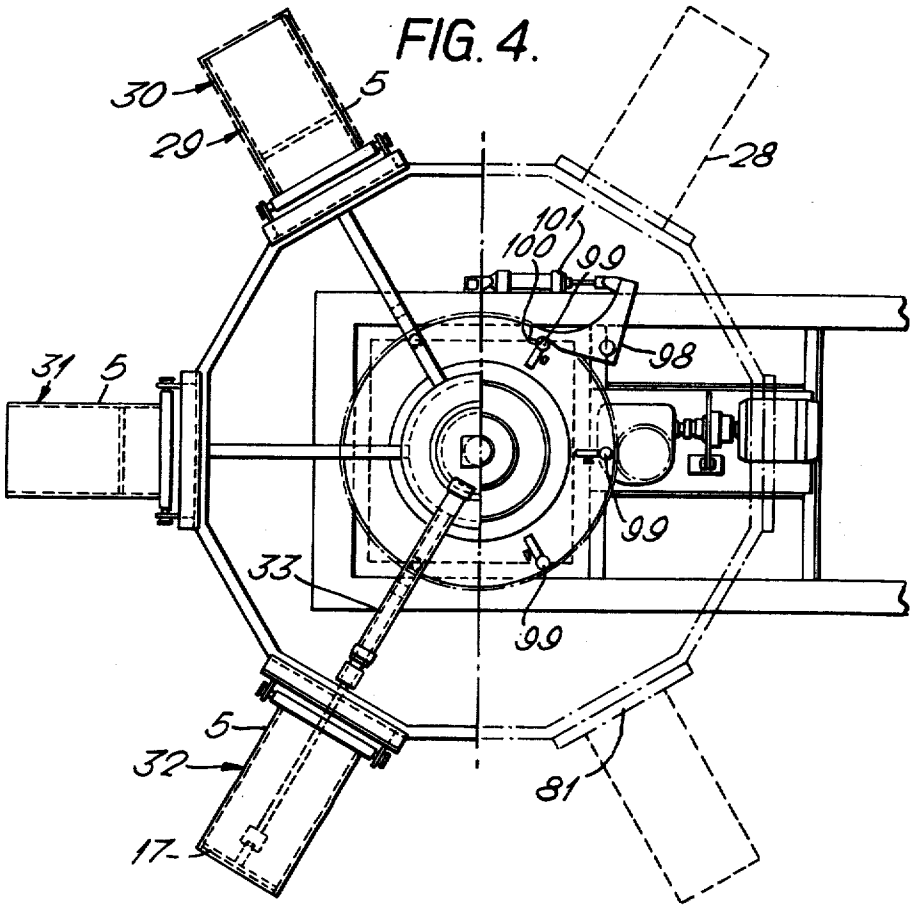
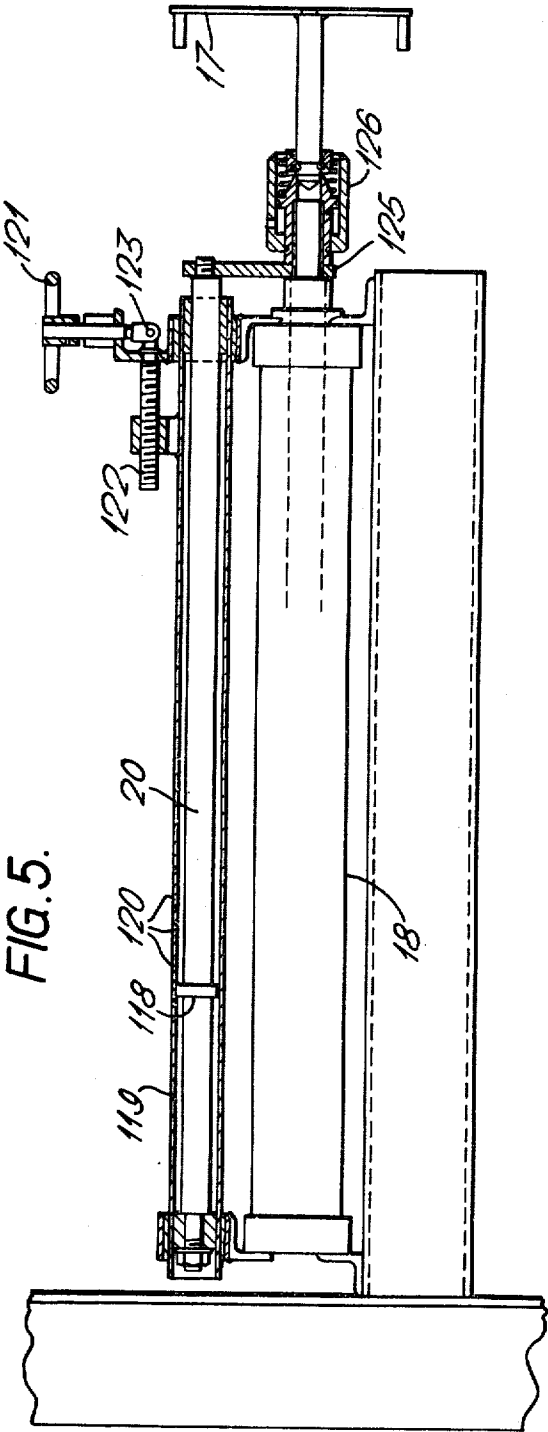


FIG. 4.



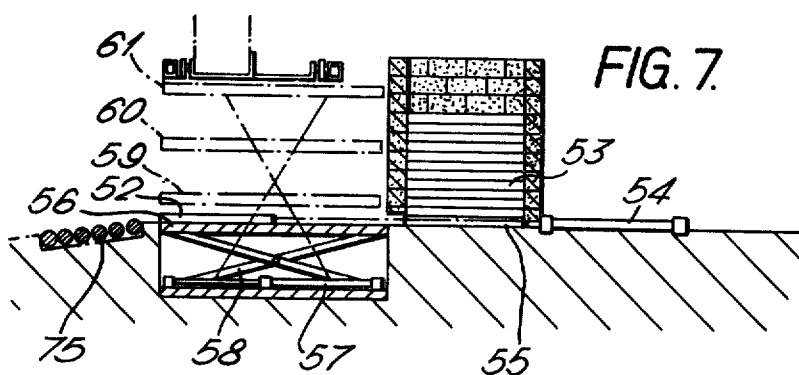


FIG. 8.

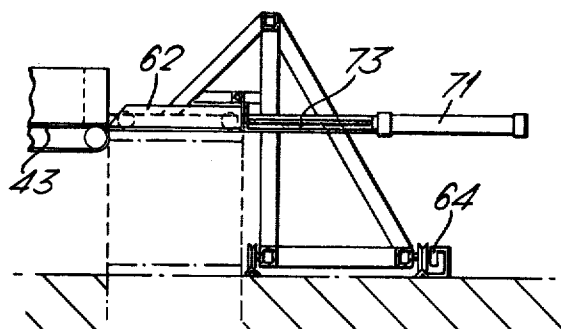
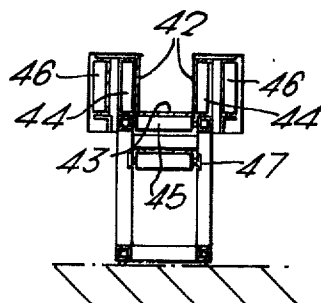


FIG. 9.



APPARATUS FOR PACKAGING EXTRUDABLE MATERIAL

BACKGROUND OF THE INVENTION

This invention relates to packaging and has been devised particularly though not solely for use in packaging butter.

PRIOR ART

At present, bulk butter is packaged by extruding a block of butter and placing the block on two thicknesses of parchment, with the parchment being folded around the block and the parchment block then placed in a carton which is closed, the flaps glued shut and the crevices sealed by the use of a strip of adhesive coated sealing material. Various proposals have been made in an attempt to mechanise the above packing method, but each of these methods still involves a considerable amount of labor with consequent expense or the equipment is complex, expensive and not particularly reliable, especially with soft-bodied butter which has the disadvantage, for packing purposes, of slumping rapidly.

OBJECT AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide apparatus for packaging which will obviate or minimize the foregoing disadvantages in a simple yet effective manner, or which will at least provide the public with a useful choice.

Generally, the invention consists in packaging apparatus comprising an extruding apparatus adapted to extrude a bar of extrudable material to be packaged molding means comprising a series of molds adapted in use to be presented to the extruding apparatus in sequence so that the bar of material is extruded into each mold in turn as the mold is presented to the extruding apparatus, cutting off means adapted to cut off a block of the material being packaged from the bar, indexing means adapted to index movement of the molds so that when a mold has been filled with material, the mold will be moved to a next station at which the article to be packaged is covered with a covering selected from an envelope, bag or tube and ejecting means at a next station adapted to eject the covered block of material from the mold for sealing of the cover about the article.

BRIEF DESCRIPTION OF THE DRAWINGS

One preferred form of the invention will now be described with reference to the accompanying drawings in which

FIG. 1 is a perspective sketch of a butter maker, butter blender, butter extruder, packaging apparatus and sealing unit arranged accordingly as to the invention,

FIG. 2 is a section through the center line of a loading station of the packaging apparatus shown in FIG. 1,

FIG. 3 is a diagrammatic view of a mold seal and blade wiper,

FIG. 4 is a section on the line AA FIG. 1,

FIG. 5 is a longitudinal section of a pressure plate, actuating and control means,

FIG. 6 is a plan view of a sealing unit, set up conveyor and a pallet loading mechanism, the apparatus shown in FIG. 3 being shown in outline,

FIG. 7 is section on the line EE FIG. 3,

FIG. 8 is a view from arrow X FIG. 3, and

FIG. 9 is a section on the line BB FIG. 3.

DETAILED DESCRIPTION OF THE DRAWINGS

In the preferred form of the invention packaging apparatus is described suitable for packaging butter. Referring to the drawings,

Butter is produced, for example, from continuous butter making machines 111 and the butter is passed from a butter worker 112 associated with the machines 111 to a known extruder having a very positive forward motion and where the butter from more than one butter machine is feeding the extruder, a butter pumping and blending drive to blend the butter to uniform consistency and composition is incorporated. Thus, the extruder may be a known type in which a worm or worms 2 (FIG. 2) extrude the butter forwardly through a molding nozzle 3. The extruder preferably has a pair of interlocking tapered worms, with the worms converging from the inlet to the extruder towards the converging extruder nozzle. Mounted close to the nozzle is a molding means 4 which, preferably, comprises a rotatable member 27 or wheel having a series of molding pockets or molds 5 associated therewith. The molds 5 are open at both ends, and are of a suitable size to receive the desired weight or volume of butter from the bar of butter extruded by the extruding machine. The molds 5 are each removably attached to frames 113 by a pair of upper pins 114 fixed to the mold and a single lower pin 115 fixed to the frame 113, with V-shaped notches 116 engaging the pins and the pins are adjustable to alter the position and alignment of the molds to give accurate alignment.

The filling of each mold is effected under pressure and accordingly a connecting means 6 is provided for connecting each mold to the nozzle of the extrusion machine which connecting means is disconnectable to allow the mold 5 to be presented thereto sequentially. To this end, a round tube 7 is fixed to the extrusion machine nozzle and a telescopic portion 8 of the connecting means telescopes relative to e.g. over this tube, with suitable seals and bearings being provided. For example, the tube 7 may be of two diameters, a larger diameter carrying an O ring seal 9, and the smaller diameter carrying a pair of bearings e.g. short cylinders 10 of a bearing material such as a polyamide bearing material, PTFE, bronze or any other suitable bearing material. Close to the free end of the tube is a further O ring seal 11 and the telescopic portion has corresponding diameters to run over the seals and bearings. To move the telescopic portion backwards and forwards, moving means are provided preferably in the form of a pair of hydraulic or preferably pneumatic piston and cylinder assemblies 12, suitably connected to move the telescopic portion.

The outer free end of the telescopic portion is provided with a sealing means, for example, a suitably shaped rubber or neoprene seal 13 (FIG. 3) which seals against the open end of the mold 5 when the telescopic portion is extended. In addition, cutting means 14 are arranged at the end of the telescopic section adapted to cut a block of material e.g. butter from the extruded bar thereof, extended through the connecting means under pressure from the extrusion machine. A thin flexible inner lip 15 is provided which lies against the blade 16 under the operating conditions so that the edge of the lip 15 presses against or comes close to the blade 16 of the cutting means 14. This results in a wiping ac-

tion between an upturned edge 117 of the lip 15 and the blade clearing the blade of butter.

When butter is extruded into the mold it presses against a back pressure plate 17 moved forward by a piston and cylinder arrangement 18 which is moved rearwardly so as to apply a suitable pressure e.g. of the order 5 PSI against a leading face 19 of the plate 17 as the plate 17 is moved into the mold due to the extrusion pressure forcing the back pressure plate to retract. The fluid in the cylinders of the assembly 18 is discharged through a regulating valve which is adjustable to allow for variation in butter consistency.

A rod 20 (FIG. 5) moves with the back plate 17 and carries a piston 118 which runs in a tube 119 having holes 120 therein. The position of the tube 119 is adjustable by a hand wheel 121 driving a screw 122 through a right angle drive 123 and appropriate holes 120 are connected to a pneumatic control device so that on the piston 118 covering a selected hole 120, the control device operates. One hole 120 when covered by the piston 118 controls the extruder to stop its operation. This gives a desired length of block.

Substantially simultaneously with the stopping of the extruder the blade 16 is extended to cut off the block.

The plate 17 is connected to piston rod 125 by a releasing means e.g. an electromagnet or preferably a pneumatically releasable coupling 126. After cutting off of a block of butter from the bar, the piston and cylinder assembly 18 is actuated to continue rearward piston, i.e., away from the extruder and because of the adherence of the butter to the plate 17, this draws the butter a small distance say half an inch into the mold 5. This results in a further selected hole 120 being covered by the piston 118 which causes operation of the coupling 126 to release the plate 17 from the rod 125, and the coupling 126 is then completely withdrawn clear of the mold. The rotatable member 27 is mounted with either its axis horizontal or preferably vertical as shown but depends on the requirements of the user. If the axis is vertical, the rotatable member 27 is arranged whereby molds are indexed so that at a first station a mold 5 is engageable by the extruding nozzle and the bar of butter is extruded into the mold and a block cut off therefrom as above described.

Various further stations are provided at intervals around the rotatable member 27 and preferably after the filling station, the next station 28 is a check weighing station in which the weight of butter and the mold is checked and weighed on a weighing machine 130 by the weighing platform raising the mold 5 sufficiently to free the pins 114 and 115 free of the notches and if necessary, butter added or removed from an open end of the mold. At a next station 29, a bag or envelope 30, preferably of a thin flexible material e.g. a plastic film, is applied to the filled mold, this may be effected either automatically or manually, for example, if effected manually, a plastic bag dispenser may be provided from which plastic bags may be removed one at a time by an operator. An air nozzle and a foot operated valve are provided so that air may be blown into the bag to open the same so that the operator may then quickly pass the bag over the open end of the filled mold.

At a next station 31, the factory registration number may be stamped on the outer end of the butter i.e. the end covered by what is normally regarded as the bottom of the plastic bag. This numbering may be effected either by providing the stamp on one end of a bell

crank lever, the other end of which is hinged to a suitable pneumatic or other hydraulic piston and cylinder assembly, so that a rolling stamping action is given or the stamp may be provided on the end of a short ram, but the rolling action is preferred since this tends to give a better impression.

At a next station, the bagged butter may have a carton applied thereto, the carton being provided from a suitable carton erecting unit and the carton being flipped over the filled mold which has already been covered with a plastic bag.

However, preferably a next station 32 is an ejecting station in which an ejecting piston and cylinder assembly 33 presses against the back plate 17 as shown or presses a similar plate against the end of the filled mold to eject the butter and therewith the enclosing bag onto a conveyor table where final folding and/or sealing of the bag mouth and preferably heat sealing is effected in a "Swiss Vac" vacuum sealing unit 34. This unit is made by Transvac Maschinen A.G. Zurich, Switzerland. Heat sealing of the bag mouth is effected in this sealing unit 34. After sealing, the blocks are moved into a conveying chamber 41 with moving sides 42 and a moving bottom 43, the sides being supported by rollers 44 and the bottom by rollers 45 with return rollers 46 and 47 respectively. Belt adjusters 48 are provided on the side belts which are continuous belts as shown in the drawings as is the bottom belt. The length of the conveying chamber is sufficient to allow the butter to "set up" under the holding effect of the sides and to allow this a time in the conveying chamber of about 1 minute is allowed. This reduces slumping of the butter until the blocks are palletted.

The conveying chamber 41 transports the blocks of butter to a semi-automatic palleting machine 51 wherein the tare weight of the pallet is indicated and printed on a card by known means.

To supply pallets so that they may be loaded, a store of pallets 53 is provided and a hydraulic or pneumatic piston and cylinder assembly 54 is arranged to eject a lower most pallet 55 to move it onto a retractable plate or platform 56 arranged to be raised by a hydraulic or pneumatic piston or cylinder assembly 57 with scissors legs 58. Three substantially predetermined positions of the pallets are shown at 59, 60 and 61 and a loading tray 62 is arranged to be moved transversely to the longitudinal access of the conveying chamber 41 a suitable distance for example 12 inches so that the butter blocks may be placed side by side on the loading tray. The side ways movement is given by the loading tray 62 and its associated mechanism running on rails 63 and 64, being moved side ways by the hydraulic or pneumatic piston and cylinder assembly 65.

When the loading tray has been loaded, for example, with four or six blocks of butter, it is pulled from under the blocks of butter by a pneumatic piston and cylinder assembly 71 running on wheels 72 on tracks 73 and a power or stop 74 prevents the butter from moving so that the butter is deposited on the pallet 52 which is arranged directly below the loading tray 62 when the latter is in the position shown in FIG. 2. The piston and cylinder assembly 57 is then operated so that the pallet and associated layer of butter is lowered to position 60, the processes repeated and then the pallet lowered to position 59, the process repeated. The pallet may then be slid off on gravity rollers 75. When the required number of layers are placed on the pallet, the pallet is

again weighed and the weight printed on a card attached to the pallet. The delivery on the rollers 75 is preferably effected with a motorized conveyor which has sides sufficient to prevent the butter slumping on the pallet e.g. a further conveyor such as the conveyor 41 being provided.

Finally, in the preferred form, a large three part carton is placed over the pallet of butter and is then closed, for example, by the use of wire bands, metal or plastic strapping in the known way and the carton covered with a shrink wrap material in a known way.

Returning to the rotatable member, a further station 81 is provided at which an anti-adhering or anti-stick material is applied for example, a silicant solution applied to the molds by spray. The blade 16 is also preferably cleaned and sprayed with this solution. Of course, at the next station, the filling operation above described is carried out.

The drive of the rotatable member 27 is effected by a motor 92 through a clutch 93 and a brake 94 is provided. The clutch drives a gear box 95 and the gear box in turn drives through a chain 96 to a chain wheel 97 which rotates the member 27. An indexing or positioning means is provided comprising a bell crank lever 98 which associates with pins 99 by a notch 100 engaging a pin 99 when the bell crank lever 98 is appropriately operated by the piston and cylinder assembly 101. This assists in ensuring positive location of the molds 5 at the various stations above described.

I claim:

1. Packaging apparatus for bulk extrudable material comprising an extruding apparatus adapted to extrude a bar of extrudable material to be packaged, molding means comprising a series of molds adapted, in use, to be presented to the extruding apparatus in sequence so that the bar of material is extruded into each mold in turn as the mold is presented to the extruding apparatus, a cut-off knife adapted to cut off a block of the material being packaged from the bar, indexing means adapted to index movement of the molds so that when a mold has been filled with material, the mold will be moved to a next station where the article to be packaged is covered with a covering selected from an envelope, bag or tube, and ejecting means at a next station adapted to eject the covered block of material from the mold for sealing of the cover about the article.

2. Apparatus as claimed in claim 1 wherein a back up plate is provided within each mold during filling thereof, and back up plate actuating means are provided the extrusions of the bar of material into the mold causing the material to press against the back up plate so that the material is filled into the mold under pressure which pressure is controlled by control means controlling said actuating means.

3. Apparatus as claimed in claim 1 wherein a connecting means is provided between said extruding apparatus and said mold when the mold is at the filling position so that the mold may be filled under pressure generated by said extruding apparatus.

4. Apparatus as claimed in claim 3 wherein said connecting means comprises a tube having a retractable telescopic section.

5. Apparatus as claimed in claim 4 wherein said telescopic apparatus is extendable and retractable by at least one piston and cylinder assembly.

6. Apparatus as claimed in claim 1 wherein said moulds are provided on a rotatable member and index-

ing means being provided so that successive molds are brought before the extruding means for filling.

7. Apparatus as claimed in claim 6 wherein a weighing station is provided arranged adjacent said rotatable member so that the weight of a filled mold may be taken on load cells with electronic read and print out and means activating a servo-motor to adjust ramstroke of filing station on subsecant blocks and the weight of the filling adjusted as necessary.

8. Packaging apparatus comprising an extruding apparatus adapted to extrude a bar of extrudable material to be packaged, molding means comprising a series of molds adapted, in use, to be presented to the extruding apparatus in sequence so that the bar of material is extruded into each mold in turn as the mold is presented to the extruding apparatus, cutting off means adapted to cut off a block of the material to be packaged from the bar, indexing means adapted to index movement of the molds so that when a mold has been filled with material, the mold will be moved to a next station where the article to be packaged is covered with a covering selected from an envelope, bag or tube, ejecting means at a next station adapted to eject the covered block of material from the mold for sealing of the cover about the article, a back-up plate within each mold during filling thereof, and backup plate actuating means, the extrusions of the bar of material into the mold causing the material to press against the back-up plate so that the material is filled into the mold under pressure which pressure is controlled by control means controlling said actuating means, said back pressure plate held to the bar of material by a piston and cylinder arrangement and a regulating valve arranged to release excess pressure from the cylinder as the mold fills.

9. Apparatus as claimed in claim 8 wherein said back pressure plate is connected to said piston and cylinder arrangement through a connecting device such that the back pressure plate may be disconnected from the piston and cylinder arrangement.

10. Packaging apparatus comprising an extruding apparatus adapted to extrude a bar of extrudable material to be packaged, molding means comprising a series of molds adapted, in use, to be presented to the extruding apparatus in sequence so that the bar of material is extruded into each mold in turn as the mold is presented to the extruding apparatus, cutting off means adapted to cut-off a block of the material to be packaged from the bar, indexing means adapted to index movements of the molds so that when a mold has been filled with material, the mold will be moved to a next station where the articles to be packaged are covered with a covering selected from an envelope, bag or tube, ejecting means at a next station adapted to eject the covered block of material from the mold for sealing of the cover about the article, a table on to which the covered article is ejected for sealing, and the sealed article being passed to a conveyor chamber having a moving floor and sides so that the article is confined to substantially predetermined dimensions during its conveyance through said conveyor.

11. Apparatus as claimed in claim 10 wherein the packaged article is delivered to palletizing means comprising a movable raisable and lowerable platform, means adapted to supply a pallet from a supply of such pallets to said platform, a loading tray movable in two directions and onto which articles to be palletized are placed, moving means adapted to move said loading

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tray in its two directions and unloading means comprising a bar adapted to sweep articles off the loading tray as the latter moves below the loading means so that the articles fall onto a pallet disposed below the loading tray.

5 raisable and lowerable platform is moved to dispositions such that as the articles are deposited on the pallet the pallet can be lowered to receive a further layer of articles.

12. Apparatus as claimed in claim 11 wherein said

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