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[54] **APPARATUS FOR FORMING AND FILLING CONTAINERS**

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[51] **Int. Cl.** **B65b 47/02**

[58] **Field of Search** .... 53/184, 30, 141, 112 A, 53/329; 425/345, 347, 348, 353, 358, 384, 387, 388, 398, 423, 451, 453, 454

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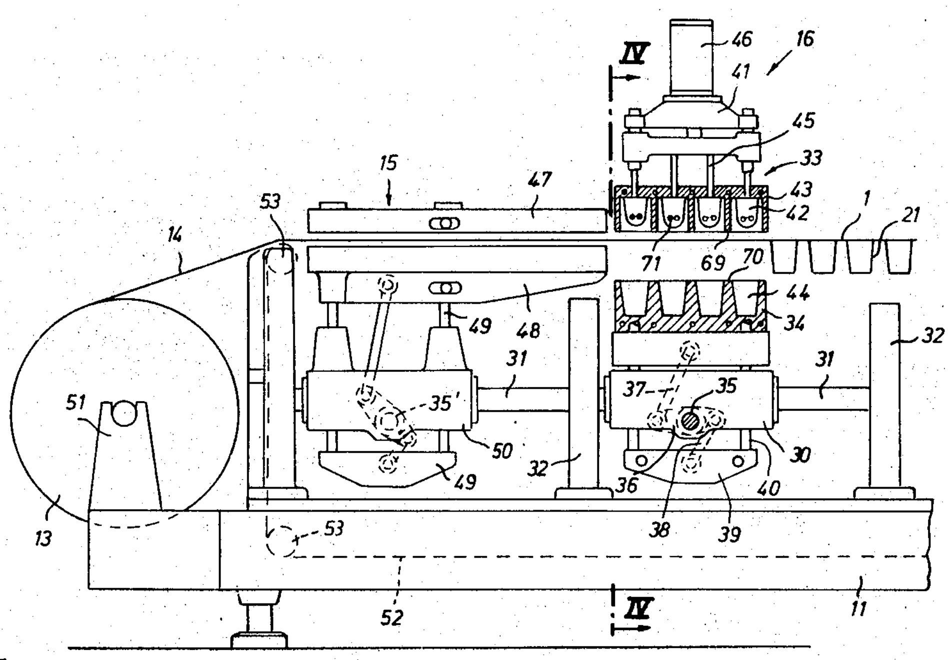
[57] **ABSTRACT**

A combined container making and filling machine, and associated process. Operating on a continuously moving web of thermoplastic material, the machine includes stations which heat the web, mold the web into connected containers, fill the connected containers, cover and seal the filled containers, and separate the containers, successively. The web is grasped at its edges and conveyed from a roll. Synchronizing drive means cyclically move the heating, container molding, and severing apparatus in the direction of web conveyance, and into engagement with the web. The filling nozzles move with the newly formed containers while filling.

18 Claims, 5 Drawing Figures



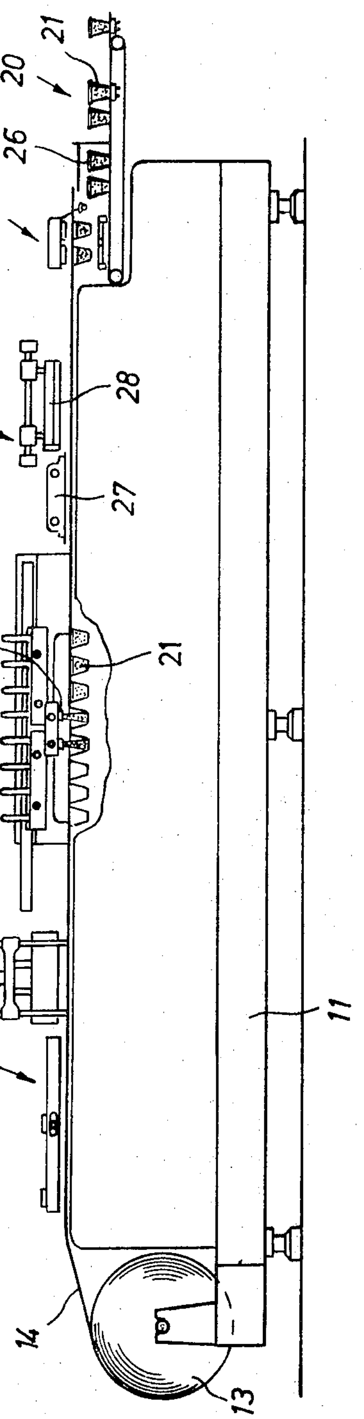


Fig.1

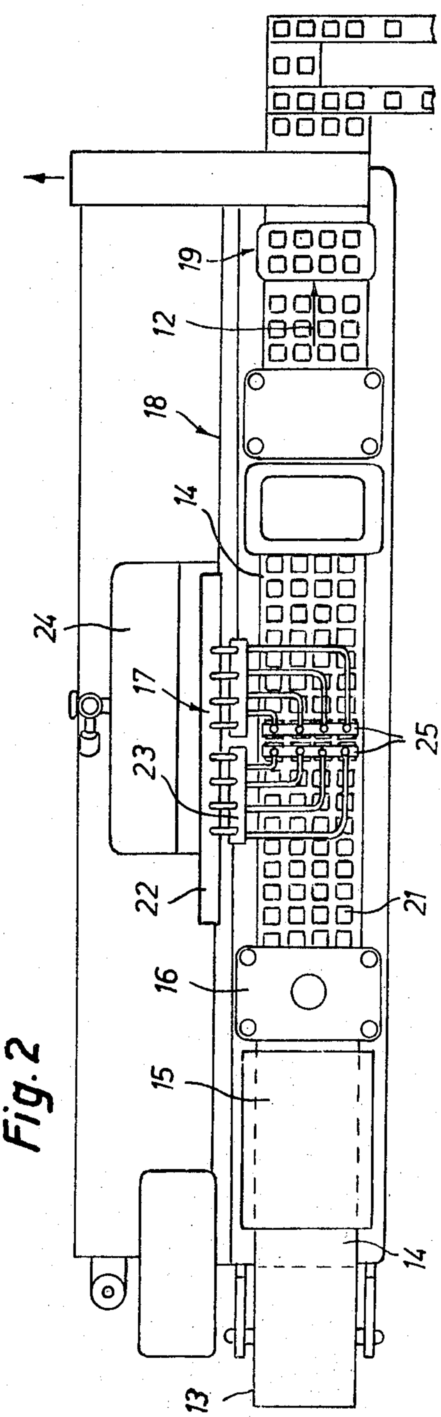


Fig.2

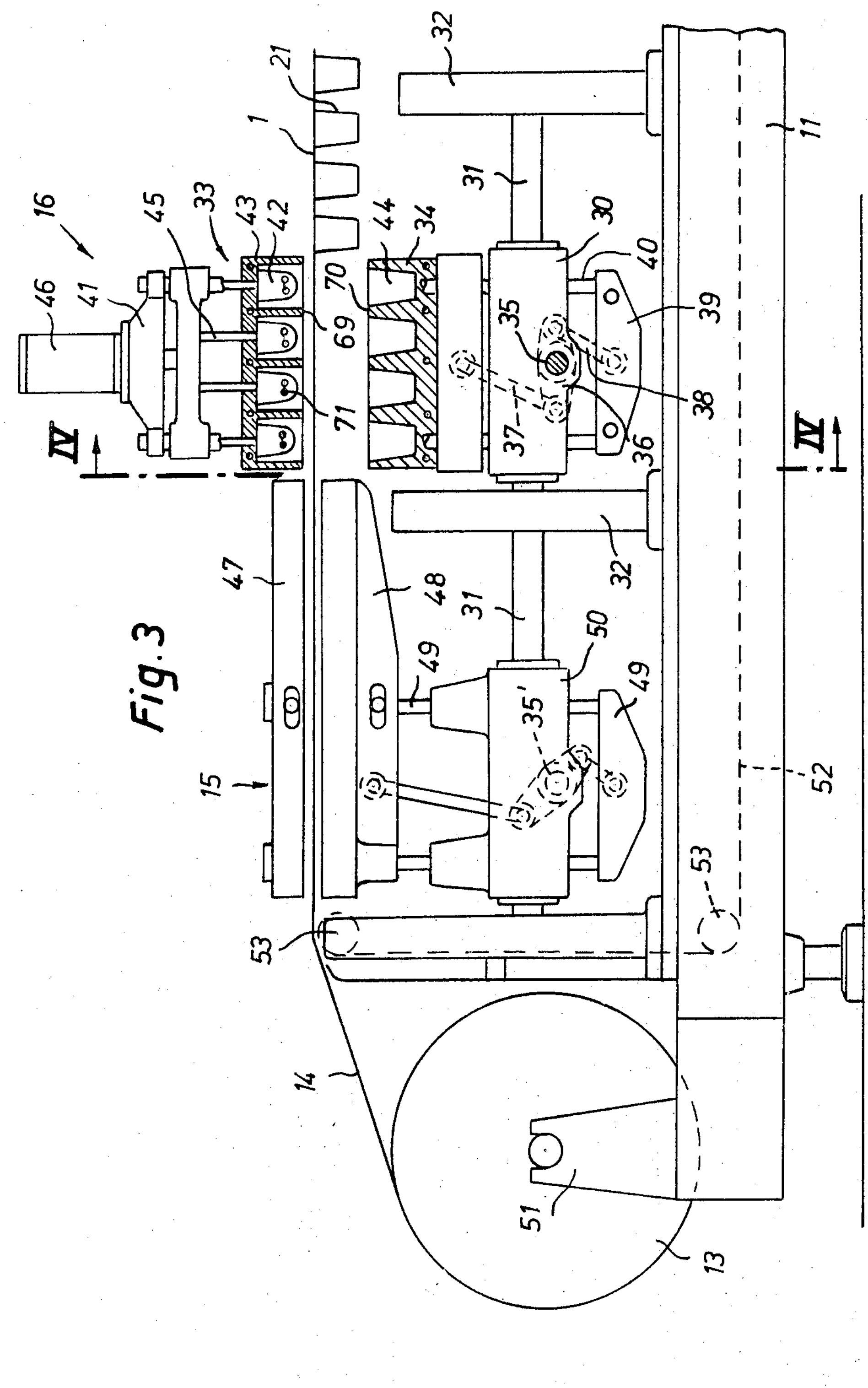


Fig.3

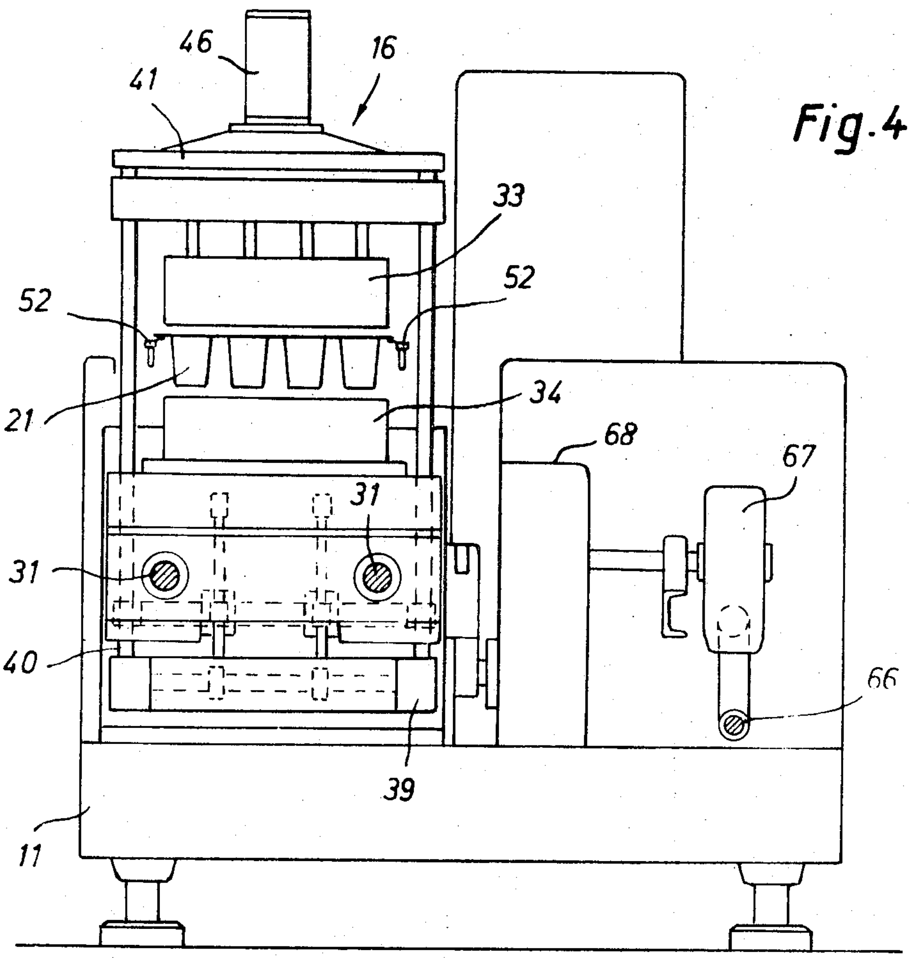
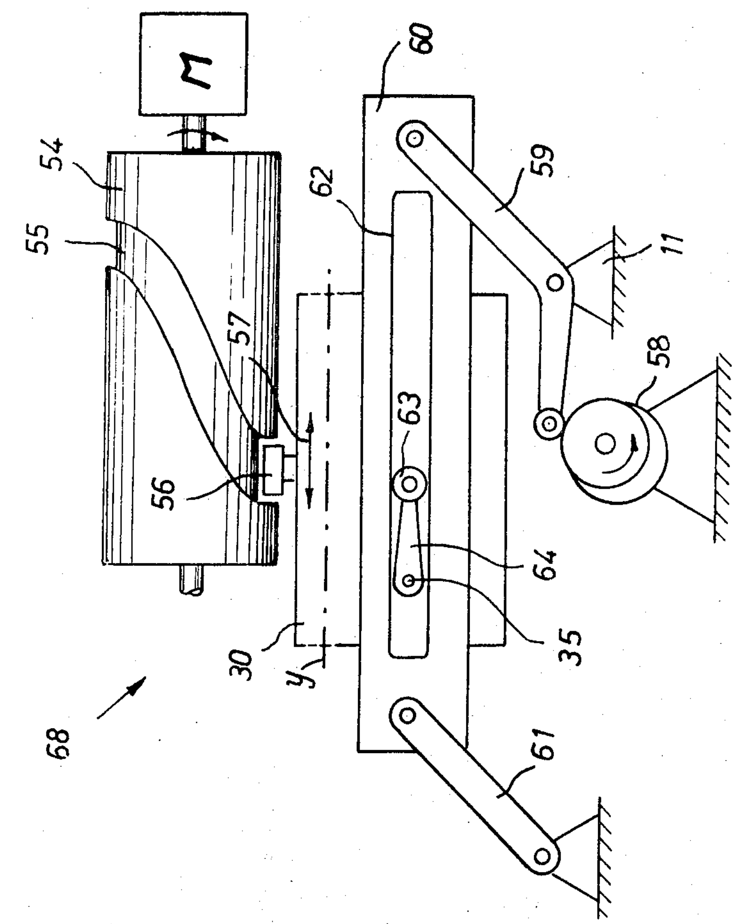


Fig.4

Fig.5



APPARATUS FOR FORMING AND FILLING CONTAINERS

BACKGROUND OF THE INVENTION

This invention relates to a filling machine, and more particularly to a filling machine of the kind in which the containers to be filled are delivered to continuously associated filling apparatus and sealing apparatus.

A filling machine has been known in which the filling outlets or nozzles move, during the filling process in the same direction as the containers to be filled. The containers are placed on a continuously moving conveyer. The containers are delivered to the conveyer by means of a feeder device, and when filled, and possibly sealed, are again removed at the outlet from the machine.

In such known techniques, containers are produced separate from the filling machine. They must be conveyed from the place of production, possibly after intermediate storage, to the filling machine and must be loaded into the magazine of the machine subsequently to be placed on the conveyor for filling. The transporting of the containers which are very light and sensitive is quite expensive, particularly if the containers require inordinate amounts of space. The filling of the magazines must be supervised and it is not infrequent that stoppages at the magazine result in disturbances in the operation of the entire filling machine. From the point of view of hygiene, it would likewise be desirable if transportation between the container making apparatus, which may be located in a completely different plant, and the filling machine could be eliminated.

SUMMARY OF THE INVENTION

It is therefor an important object of this invention to create a filling machine and method of the type referred to above in which the disadvantages mentioned do not occur. Specifically, this invention has an object to facilitate production of containers directly on the filling machine, without any intermediate storage or conveying, without thereby adversely affecting the continuous passage of the containers in the area of filling.

In accordance with the invention, the objects of the invention are attained by the association of the filling machine with container molding apparatus shaping containers from a web of material. The web of material moves continuously in the zone of the molding machine and the molding apparatus is provided with a drive which moves the mold parts parallel to and at equal speed with the web, over at least an associated distance corresponding to the molding time. The drive returns the mold parts, following the molding operation to begin a further cycle.

Accordingly, the molding apparatus for producing the containers can be directly integrated with the filling machine. The containers are produced only shortly prior to filling so that contamination need not be feared. Most important, in spite of immediate incorporation of the forming device, continuous travel of the containers through the entire filling machine, including the molding apparatus, can be maintained so that no adverse effects are created by otherwise necessary speed-ups or delays whereby the output of a machine can be considerably reduced. The latter applies especially to the filling of thin liquids (fruit juices, etc.) particularly susceptible to being splashed out by accelerations and decelerations.

The movement to and fro of the molding apparatus is preferably effected in a straight line. In accordance with a further preferred characteristic of the invention, the containers formed from the web of material travel continuously and remain joined together by the web of material through the filling, and possibly sealing, operations. Thus, the containers are simply formed out of the material web but are not initially separated from it. This considerably simplifies the conveying mechanism which, in effect, includes the very web of material and the containers themselves.

Several molding parts (male or female molds) can be disposed in the molding apparatus transverse to the direction of moving of the material web to form several containers across the web. Similarly, several molding units may be arranged successively in the direction of travel. It may be of special advantage if the number of molding units arranged in succession in the direction of the web of material does not equal the number of the filling nozzles, and if applicable, sealing arrangements. This permits the length of the distance to be travelled through by the molding units and by the filling, and sealing, units to differ according to the number of units employed, Hence, the cadences of the individual processes (molding, filling, sealing, etc.) may differ, and it is not necessary that the slowest station determine the number of cycles of all other stations. Increased numbers of slower units permits efficient use of faster units. For example, if the filling of a container requires only half of the molding time, the number of molding units in line may be doubled, the filling units may be run at optimum speed, increasing the output. On the other hand, only half as many filling units as molding units can be provided with resulting economic machine construction.

The molding apparatus preferably employs blow molding or vacuum molding arrangements whereby an air pressure differential across the web forces the web into conformity with a mold. A carriage displaced on straight guide rails may carry the molding apparatus. The carriage supports an upper mold part and lower mold part which move with the carriage and are moved toward and away from one another and across the path of travel of the web. The upper and lower mold parts carry the molding units. The upper part and the lower part move towards each other and into cooperation at the start of the associated running distance of the molding apparatus and move apart to a retracted position away from the web at the end of the associated running distance in order to release the molded containers. In this retracted position the carriage executes its return.

If a hot molding material web is used, the molding station will be preceded by a heating device which, preferably, comprises at least two plates to be heated and pressed against the web on opposite sides. The heating device is carried along at the speed of the web during the time in which the plates are pressed against the web. Even though different manners of heating of the material web might be contemplated, for example radiation, this heating method was found to be especially suitable. A further advantage results from push-pull operation of the molding and heating devices whereby inertia forces generated can be compensated.

To convey the web, the filling machine may be provided with an endless, moving conveyer seizing the web at its edges in the filling zone. By this means, and a common drive, absolute synchronism of the web and the individual moving units is ensured by a simple means. Similarly, the several movable units may be driven from a single synchronizing drive shaft or the like, via appropriate individual drive means including arms and levers. Smooth, synchronous operation is assured by simple economical construction.

Further advantages and characteristics of the invention will become apparent from the claims and the description together with the drawings. The drawings represent an example of an embodiment of the invention which is explained in detail below.

In the drawings:

FIG. 1 is a diagrammatical side view of a filling machine according to the invention.

FIG. 2 is the diagrammatic plane view of the machine in FIG. 1.

FIG. 3 is an enlarged side view of a part of the machine in FIG. 1.

FIG. 4 is a diagrammatic cross section through the line IV—IV in FIG. 3; and

FIG. 5 is a diagrammatic illustration of the drive for the molding and heating arrangements in which the parts shown above the line *y* have been displaced for clarity.

DESCRIPTION OF PREFERRED EMBODIMENT

The filling machine shown in FIGS. 1 to 4 has a frame **11** on which are arranged successively in the conveying direction shown by arrow **12** the following sections: a delivery or stock roll **13** for a material web **14**, a heating station **15**, a molding station **16**, a filling station **17**, a sealing station **18**, a separating station **19**, and a conveyer **20** for removal of containers **21**, which are formed and filled by the FIG. 1 apparatus.

Coming from the feed roll **13**, the material web **14** runs continuously through the entire filling machine as far as the separating station **19**. The heating and molding stations **15** and **16** will later be described in detail. The filling station **17** is provided with measuring or dosing pumps **23** arranged on a carriage **22**. The pumps **23** are supplied from a stationary supply container **24** and mete out measured quantities of flowable fill to the newly formed containers **21**, via the filling outlets or nozzles **25**. "Flowable fill" is meant to include any medium that can be dispensed in doses or measured quantities. The preferred embodiment of FIG. 1 is especially suitable for the filling or decanting of either a thin liquid such as fruit juice or a pasty substance with a consistency like that of cream or yoghurt.

The carriage **22** is movable parallel to the web of material **14**. The actual filling of a container by the releasing of the fill is accomplished while the carriage moves in the conveying direction shown by arrow **12** at the same speed as the material web **14** and while the nozzles **25** are situated above the containers **21** formed in the web material. After filling has been completed, the carriage **22**, pumps **23**, and nozzles **25** return, opposite the conveying direction to begin a new cycle.

In the example shown, four rows of containers **21** are formed along the web **14**. Two rows of filling nozzles **25** extend across the web **14**. As will be explained further, the number of filling nozzles in line can be selected in accordance with both the filling speed and the velocity of the material web.

The sealing station **18** and the separating station **19** can be constructed conventionally. However, care must be taken that these stations, too, move at equal speed and in the same direction as the material web **14** by the use of appropriate carriages like the carriage **30**. The sealing station **18** includes a covering unit **27** and sealing apparatus **28**. The covering unit **27** supplies a cover onto the now-filled containers. The cover may be an additional web of thermoplastic material. The cover then is sealed to the containers by the apparatus **28** which may be, for example, a heat sealing arrangement. The filled and sealed containers **21** then are punched out of the web **14** at the separating station **19**.

FIGS. 3 and 4 show in detail the heating station and the molding station. The molding station **16** is provided with a carriage **30** running on slide rails **31** and displaceable parallel to the material web **14**. In the example shown, the slide rails **31** consist of round guide columns arranged in frame carriers **32**. The carriage **30** supports an upper mold part **33** and a lower mold part **34** of the molding station **16**. The mold parts **33, 34** are movable toward and away from each other. This movement is achieved by means of a crank mechanism which is controlled by a shaft **35** and is provided with a two armed lever **36** as well as the connecting levers **37, 38**. The connecting lever **37** causes the movement of the lower mold part **34** while the lever **38** acts on a yoke **39** which, via connecting rods **40**, is coupled with an upper yoke **41** carrying the upper mold part **33**.

The design of the upper and lower mold parts depends upon the type of molding procedure. In this exemplary preferred embodiment, the material web **14** consists of a thermoplastic foil which is molded by the apparatus of the molding station **16** in blow or vacuum molding method. Moreover, the upper mold part **33** is provided with pre-expansion dies **42**. Movably supported from the upper yoke **41**, a frame **43** surrounds the dies **42**. The frame **43** and the dies **42** are relatively movable by means of a compressed air cylinder **46**. The lower part **34** of the mold **16** is provided with mold cavities **44** which are concave molds for the exact outer shape of the containers to be molded.

In the example shown in the drawings, blow molding is used. Therefore the frame **43** is sealed, in suitable fashion, with respect to the guide rods **45** supporting the dies **42** and movably retaining the frame **43**. The pre-expansion dies have blow openings from which emerges the air to finish forming the containers. The lower mold cavities are ventilated by means of thin bores, not shown. In this embodiment, the upper and lower mold parts define sixteen molding units, four rows of four each. The units work simultaneously so that during any given cycle of the molding station **16**, a total of 16 containers is formed.

Preceding the molding station in the direction of advance is arranged the heating station **15**. It consists of two heated plates, **47** and **48**, movable towards each other by means of a lever arrangement which essentially corresponds to the lever arrangement **35, 36, 37,** and **38** of the molding station **16**. These plates touch the material web **14** on either side as they are moved towards each other by the rotation of shaft **35'**. The plates **47, 48** are attached by means of guides **49** to a carriage **50** running on the slide rails **31** and fastened to the frame supports **32**. The slide rails, carriage, and guides may correspond to those of the molding station.

The feed roll **13** for the material web **14** is arranged on a bearing support **51** in the frame **11** and is removable for changing when exhausted. FIG. **3** shows, in broken lines, a circulating conveyer **52** which runs over the rollers **53** and seizes the edge of and guides the material web **14**, by means of its upper run. Cooperation of the conveyer and web continues over almost the entire length of the filling machine. The conveyer **52** may be a pair of belts with protrusions perforating the material web **14** in the edge area to grasp the web and thereby to take it along positively, or, for example, the conveyer **52** may be a pair of known clip chain arrangements in which the clips hold the material web **14** in the edge areas. By either arrangement, one ensures that the web of material, which is frequently quite likely to stretch, runs in precise synchronization with the individual stations which act in association. It is possible, and advantageous, to compensate transverse expansion or shrinking of the material web by varying the space between the two edge grasping belts of the conveyer **52.** For example, in the event of cross expansion due to the effect of heat, sagging of the material web can be prevented by having the belts run in slightly divergent directions.

FIG. **5** is a diagram of the drive for the carriage **30** of the molding station **16.** A like drive for the heating station **15** may be used. Longitudinal movement of the carriage **30** on the slide rails **31** is obtained by means of a drum cam, rotated, for example, by a motor M. For clarity, in FIG. **5** the drum cam **54** is shown above the carriage **30,** whereas more practically, the cam is located behind the carriage **30,** as viewed in FIG. **5.** That is to say all of elements of FIG. **5** above the axis *y* would be swung 90° about the axis into the plane of the paper. The drum cam **54** has a guide slot **55** which forms an endless curved guide groove for the roller about the circumference of the drum. When the drum **54** rotates, the carriage **30** moves to and fro in the direction of the double arrow **57** and parallel the conveying direction.

The vertical motions, which impart closing and opening movements to the mold parts, are controlled by a revolving disc cam **58.** In the example shown, the cam **58** rotates with the same number of rotations as the drum cam **54.** The disc cam **58** drives a lever **59** which, intermediate its ends, has a fulcrum on the frame **11** and a roller at its cam follower end. The other lever end is attached to a guide plate **60.** A further support lever **61** attached to the guide plate, maintains the guide plate parallel to the carriage during movement. The guide plate has a slot **62** which receives a roller **63.** By means of a lever **64** the roller **63** is connected with the shaft **35** and actuates the shaft. As mentioned above in relation to FIG. **3,** the shaft **35** controls the opening and closing of the mold parts.

When the disc cam **58** drives the lever **59,** that lever pivots so that the guide plate **60** is displaced upwards or downwards, remaining parallel to the direction of movement of the carriage. The roller moving in the slot **62** pivots the lever **64** and the shaft **35.** Due to the always parallel disposition of the guide plate **60** and of the slot **62,** the position of the carriage relative to the guide plate has no effect on the arc through which the roller **63,** lever **64,** and shaft **35** are driven.

For the sake of simplification, FIG. **5** shows the drive of the disc cam **58** independent from the drive of the drum cam **54.** However, for synchronization, it is preferred that all movements be derived from a common drive shaft **66** as shown diagrammatically in FIG. **4.** The motor M, which is part of the drive **68,** may be coupled to the shaft **66** via a transmission **67** and a belt or chain. Or the shaft **66** may be driven directly to control similar carriage drives **68** via the belt and gearing **67.** In FIG. **5,** the driving device **68,** of FIG. **4** appears only as a block.

OVERALL OPERATION

From the feed roller **13,** the web **14** advances to between the plates **47, 48** of the heating station **15.** At the entrance into the heating station, the edges of the web **14** are seized by the conveyer belts **52** and are carried forward. In the extreme upstream position of the carriage as in FIG. **3,** the plates **47, 48** close as a result of the swinging of the shaft **35'** in clockwise direction. The plates come to rest against and heat the web **14.** Simultaneously, the carriage **50** moves downstream at precisely the same velocity as the material web, the two being preferably commonly driven. Shortly before the downstream limit of the carriage movement, the plates **47, 48** separate again. The material web **14,** which is now heated, advances into the molding station **16** with constant speed. The plates **47, 48** remain opened while the carriage **50** again runs back upstream.

In the extreme upstream position of the molding station's carriage **30,** the upper and lower mold parts **33, 34** are separated. The molding station is open. The drive of FIG. **5** moves the carriage **30** forward, accelerating at as constant a rate as possible, thereby holding transient forces to a minimum throughout the system. The carriage **30** is brought by the drum cam **54** to a constant speed which is precisely the speed of the web **14.** The upper and lower mold parts, **33** and **34,** are then moved towards each other by the pivoting of the shaft **35** clockwise in the manner described above. Due to the unequal arms of the lever **36,** as shown in FIG. **3,** the lower part **34** moves up faster than the upper part **33** moves down. The opposing faces **69** and **70** of these two parts, respectively, come to rest against the web **14.**

In the embodiment represented here, care should be taken to assure that the face **69** of the frame **43** comes tightly to bear against the material web. Thereafter occurs the molding operation. The pre-expansion dies **42** are lowered by means of the compressed air cylinder **46.** The material is pressed into the molding cavities **44** corresponding to their outside shape. The dies **42** do not yet cause the displaced web portions to correspond to the final shape determined by the mold cavities, since the dies are smaller than the subsequent interior shape of the containers. These dies merely effect the initial mechanical shaping of the containers. Thereafter, compressed air is forced into the container interior via the blow nozzles **71** in the pre-expansion dies. As a result, the heated material is forced to the walls of the mold cavities **44,** thereby acquiring its final shape. The air present in the mold cavities may escape through the bores mentioned above. The lower mold part **34** may be cooled in order to achieve fast hardening or stabilization of the soft synthetic material.

It should be mentioned here that it may be of advantage frequently to employ a vacuum molding method instead of the blow molding method described. Only a few modifications of the process described have to be applied in such a case. The blow openings **71** in the pre-expansion dies **42** may then be dispensed with, and the frame **43** need not be sealed tight with respect to the dies **42** and guide rods **45.** On the other hand, a vacuum source is connected to the molding cavities **44** which, for the purpose of final molding of the material, sucks the material against the inside walls of the molding cavities.

During the molding process described, the carriage **30** has, of course, been moving to the right at the same speed as the material web **14.** Shortly before arrival at the downstream reversing point, the mold parts open due to the swing of the shaft **35** counterclockwise. The containers are thus freed from the mold cavities **44** and continue advancing as the carriage stops and returns upstream to mold further containers from the web. The return of the carriage **30** in the direction counter to the direction of conveying need not be effected with constant speed but can be executed, for example, with constant acceleration over half of the return path and then with constant deceleration so that, as a whole, the return is effected faster than downstream travel.

The containers **21,** which have now been fully molded, but which are still connected at their upper edges, continue their travel towards the filling station. Filling takes place as previously described. The now-filled containers are closed by the placement of a cover foil conventionally over all. This foil then is sealed on. Only afterwards the containers are punched out by the punching station which also travels with the containers. The punching apparatus which separates the containers from the web may be like web cutting or punching apparatus well known in the art, but is preferably driven by a drive like that discussed above in relation to FIG. **5.**

It is evident that the machine can be adopted easily to meet varying requirements. For example, if molding requires double as much time as filling, one provides, for example, for double the number of molding units arranged in series. The slowest station, i.e., the station which takes the longest time to act on the web or containers, thus does not determine the cycle speed of the entire machine. The through put speed of the entire operation can therefore be multiplied, without any branching, by simple increasing of the units or assemblies at each station which act on the web or containers.

Many variants of the preferred embodiment can be achieved within the scope of the invention. The type of machine described can be employed for many kinds of containers and materials.

The molding station, on the other hand, can be easily adjusted to the molding methods required in each case. As already mentioned, the contact heating method described may be replaced by radiation heating. In the event that the cycle of operation times are chosen to be equal for the heating operation and for the molding operation and mass compensation by contrary motion is of no concern, the carriages **30** and **50** may be moved by means of an entirely common drive moving both carriages at the same time and in the same direction, or even by carrying the heating plates and the mold parts on one carriage. To offset forces in the apparatus resulting from acceleration of the two carriages, and the members supported thereby, the driving provisions which move the carriages linearly should be adjusted to operate in a push-pull or out of phase relationship in which the acceleration of one carriage in one direction substantially offsets the acceleration of the other carriage in the other direction. If two drum cams are employed, adjustment of the relative rotary positions thereof, one to the other, may lend the desired result.

The preferred embodiment illustrates and describes only one exemplary method and machine and should not be understood to limit the scope of protection, which scope is defined solely by the claims appended hereto.

I claim:

1. Combined container forming and filling apparatus comprising:

means for continuously conveying a web of thermoplastic material along a path at a selected and substantially constant speed;

heating means for heating the web;

heater driving means for driving the heating means along said path parallel to and at equal speed with the web for a distance sufficient to afford adequate time for softening of the thermoplastic material as the web moves and then returning the heating means in the direction opposite the direction of web movement;

molding means located along said path downstream from said heating means for molding containers in the web;

mold driving means for driving the molding means along said path parallel to and at equal speed with the web for a distance sufficient to afford adequate time for molding the web as the web moves and then returning the molding means in the direction opposite the direction of web movement after containers have been molded in the web, said mold driving means and said heater driving means being adapted to operate in push-pull out of phase relationship so as to reduce acceleration forces in the apparatus; and

filling means located along said path downstream from said molding means for filling the containers formed in the web.

2. Apparatus according to claim **1** wherein the means for conveying comprises means for moving the molded containers past the filling means continuously and without interruption as the containers are formed, the filling means comprising at least one fill dispensing outlet adapted to dispense fill into containers, and means for moving the outlet with the moving container during dispensing and for returning the outlet thereafter.

3. The apparatus according to claim **2** wherein the molding means comprises a plurality of mold units, each for molding a separate container, arranged longitudinally in the conveying direction along the web, the number of molding units arranged in the conveying direction differing from the number of filling outlets in the conveying direction, and the length of distance travelled by the mold units and outlets during operation being a function of the number of mold units and outlets, respectively.

4. Combined container forming and filling apparatus including means for filling containers formed by the apparatus, means for continuously conveying a web of material along a path at a selected speed, molding means located along said path for molding containers in the web, and means for first driving the molding means along said path parallel to and at equal speed with the web for a distance sufficient to afford adequate time for molding the web as the web moves and then returning the molding means in the direction opposite the direction of web movement after containers have been molded in the web, said molding means comprising:

a carriage driven by said driving means;

slide rails attached to said apparatus for guiding the carriage for linear movement;

upper and lower mold parts carried by said carriage movable toward and away from each other and disposed above and below the path of web travel, respectively;

a shaft carried by the carriage and adapted for partial rotation;

means coupling the shaft to the upper and lower mold parts to move the upper and lower mold parts upon partial rotation of the shaft;

a drive lever affixed to the shaft;

a slotted plate extending in the conveying direction and receiving an end of the drive lever in a slot therein, the drive lever end received in the slot being freely movable along the slot in the conveying direction without pivoting; and

means for cyclically moving the slotted plate to pivot the lever and the shaft, and control the movement of the mold parts.

5. Combined container forming and filling apparatus including means for filling containers formed by the apparatus, means for continuously conveying a web of thermoplastic material along a path at a selected speed, molding means located along said path for molding containers in the web, means for first driving the molding means along said path parallel to and at equal speed with the web for a distance sufficient to afford adequate time for molding the web as the web moves and then returning the molding means in the direction opposite the direction of web movement after containers have been molded in the web, means for heating the web upstream of the molding means to cause softening of the thermoplastic material, and means for driving the heating means along said path parallel to and at equal speed with the web for a distance sufficient to afford adequate time for softening of the thermoplastic material as the web moves and then returning the heating means in the direction opposite the direction of web movement, said heating means comprising:

a heating means carriage;

means for guiding the heating means carriage for linear movement by said heating means driving means;

at least one heating plate carried by said carriage and movable into and out of engagement with the web, and

plate motive means for first moving the plate toward the web as the carriage begins movement in the direction of conveying and for then moving the plate away from the web as the carriage approaches the limit of travel downstream, whereby the retracted plate is then returned upstream by the carriage.

6. Apparatus according to claim **5** wherein said molding means includes means movable linearly with and opposite movement of the web to carry the molding means, said mold driving means being coupled in driving relation to said linearly movable means.

7. Apparatus according to claim **6** wherein said linearly movable means comprises a carriage, the apparatus further including slide rails guiding the carriage for linear movement by said driving means, upper and lower mold parts carried by said carriage movable toward and away from each other and disposed above and below the path of web travel, respectively, the apparatus further including motive means for first moving the mold parts toward each other and into engagement with the web as the carriage begins movement in the direction of conveyance and for then moving the mold parts away from each other as the carriage approaches the limit of travel downstream, whereby the separated mold parts are then returned upstream by the carriage.

8. Apparatus according to claim **5** wherein the means for filling is adapted to fill the moving containers molded in the web, the means for continuously conveying comprising means for moving the molded containers past the filling means continuously and without interruption as the containers are formed.

9. Apparatus according to claim **8** including means for closing and sealing the containers immediately after filling thereof by said filling means and as the containers move.

10. Apparatus according to claim **5** wherein said molding means comprises a plurality of mold units, each for molding a separate container, arranged transversely of the conveying direction and across the web, whereby rows of containers are formed across the moving web.

11. Apparatus according to claim **10** wherein said molding means further including a plurality of mold units, each for molding a separate container, arranged longitudinally in the conveying direction along the web, whereby a plurality of rows of containers are formed along the web simultaneously and affording additional time for the molding of each container as the web travels a predetermined distance.

12. Apparatus according to claim **5** wherein said molding means comprises a plurality of mold units, each for molding a separate container, arranged longitudinally in the conveying direction along the web, whereby a plurality of containers are formed along the web simultaneously to afford additional time for the molding of each container as the web travels a predetermined distance.

13. Apparatus according to claim **5** wherein the molding means comprises means for applying an air pressure differential across the web to cause the web to be shaped by the molding means.

14. The apparatus according to claim **5** wherein the mold driving means and the heater driving means are adapted to operate in push-pull relationship to cause out of phase movement thereof reducing the forces in the apparatus resulting from acceleration.

15. The apparatus according to claim **5** wherein the means for continuously conveying includes means for cooperating with the web throughout the combined forming and filling apparatus to impart substantially constant spaced speed movement to the web and formed containers throughout the apparatus.

16. The apparatus according to claim **15** wherein the means for cooperating and moving includes an endless conveyer member having means for engaging the web at least at one longitudinal web edge to draw the web through the combined apparatus.

17. The apparatus according to claim 5 further including means for separating the containers from the web downstream of the filling means.

18. The apparatus according to claim 17 further including means for covering the newly filled container immediately downstream of the filling means and means for sealing the covered containers before they are severed from the web.

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