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TONGUE AND SLOT JOINT CONSTRUCTION FOR FILLING MACHINES

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FIG_1

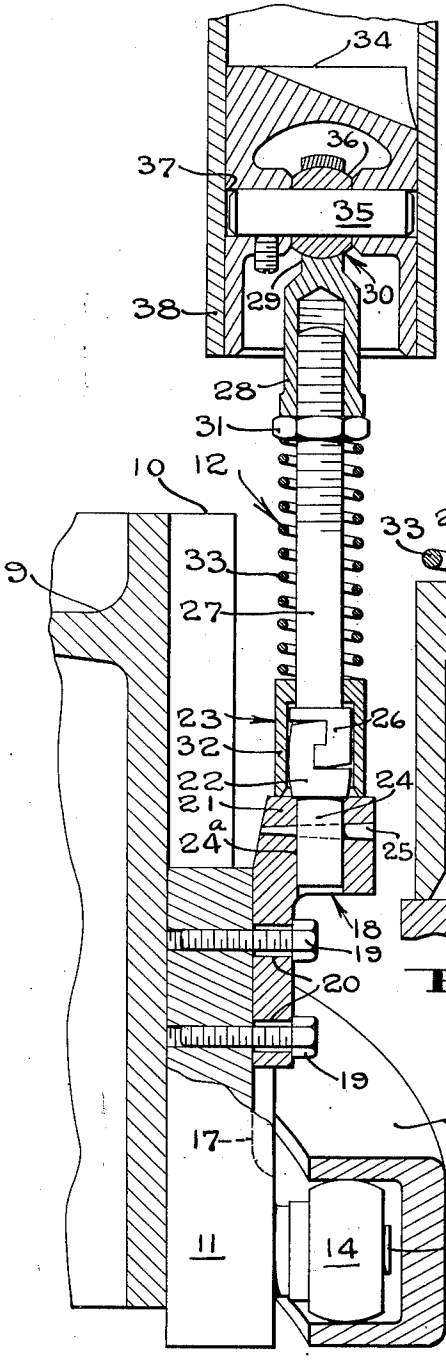


FIG_2

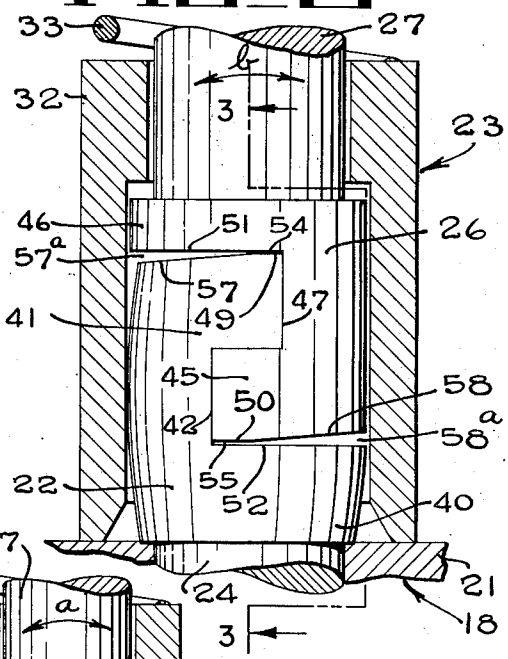


FIG_3

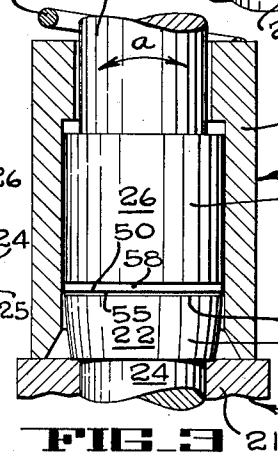
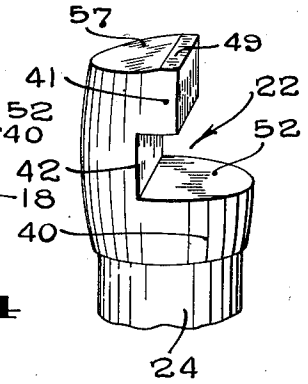


FIG_4



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TONGUE AND SLOT JOINT CONSTRUCTION FOR FILLING MACHINES

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3 Claims. (Cl. 287—101)

The present invention relates to a tongue and slot joint construction.

One object of the present invention is to provide a tongue and slot joint which may be easily and quickly coupled and uncoupled.

Another object of the present invention is to provide an improved, inexpensive, tongue and slot joint which permits pivotal motion of the joined parts in one direction and is substantially rigid in all other directions.

Another object of the present invention is to provide a tongue and slot joint which cannot become uncoupled during the operation of the connected parts.

Another object is to provide a tongue and slot joint which will compensate for misalignments between relatively moveable parts, thereby eliminating the time, labor, and cost of making and assembling parts so that they will be exactly in line.

A further object is to provide a tongue and slot joint that substantially prevents longitudinal motion between connected parts but which permits relative tilting of the joined parts.

These and other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

Figure 1 is a vertical section of a portion of a plunger-type filling machine showing one use of the tongue and slot joint of the present invention.

Figure 2 is an enlarged vertical section of the tongue and slot joint of the present invention with certain parts shown in elevation.

Figure 3 is a reduced section taken along the line 3—3 of Figure 2, certain parts being shown in elevation.

Figure 4 is a perspective view of one of the members of the tongue and slot joint of the present invention.

The tongue and slot joint of the present invention, shown in Fig. 1, is illustrated as embodied in a plunger-type filling machine provided with a circular container path. This type of filling machine used for filling food products, such as baby food, into containers is well known in the art, and only the portions of the complete filling machine necessary for a complete understanding of the present invention have been illustrated. The filling machine comprises a rotatable, turret 9, partially shown in Fig. 1, which is provided with a plurality of vertical guide ways 10, only one being shown. Slidably mounted in each guide way is a guide block 11 of a piston assembly unit 12. The guide block 11 is provided with a stub shaft 13 on which a roller 14 is journaled. The roller 14 is adapted to ride in an annular stationary hill and dale cam track 16 which encircles the turret 9, whereby the guide block 11 is supported for vertical reciprocation in the guide way 10 associated therewith.

Each guide block 11 is formed with a slot 17 in which a bracket 18 is held for both vertical and horizontal adjustment by means of cap screws 19 and enlarged holes 20 formed in the bracket 18. The bracket 18 has an enlarged head 21 to which one member 22 of a tongue and slot joint 23 is secured. The member 22 has a stud 24

extending therefrom which is retained in a hole 24*a*, provided in the head 21, by a tapered pin 25, thereby firmly attaching the member 22 to the head 21. Mated with the joint member 22 is a similarly configured tongue and slot joint member 26 provided with a threaded connecting rod 27. The connecting rod 27 is threadably engaged with an internally threaded portion 28 formed on the socket member 29 of a ball and socket joint 30. A lock nut 31 mounted on the connecting rod 27 and threaded tightly against the internally threaded portion 28 prevents relative movement between said connecting rod 27 and the socket member 29. Loosely mounted on the connecting rod 27 is a sleeve 32 for retaining members 22 and 26 in mated relationship. The sleeve 32 is constantly urged downwardly around the engaged members 22 and 26 and against the head 21 by a spring 33 mounted on the connecting rod 27 between the lock nut 31 and the sleeve 32.

The ball and socket joint 30 is attached to a piston 34 by means of a wrist pin 35, that has a ball 36 of the joint 30 mounted thereon and which is journaled in diametrically opposed holes 37 provided in the wall of the piston 34. The piston 34 is adapted to reciprocate vertically within a cylinder 38 secured to the turret 9, by means not shown. When the connected turret 9 and cylinder 38 are rotated, by means not shown, the piston assembly unit 12, will rotate with them and will be caused to reciprocate vertically due to the hill and dale configuration of the annular stationary cam 16.

The tongue and slot joint member 26 (Figs. 2 and 3) is generally cylindrical in shape and the tongue and slot joint member 22 (Figs. 2, 3 and 4) is generally barrel-shaped being tapered toward both its ends. The member 22 comprises a base portion 40 from one side of which extends upwardly a hooked or L-shaped tongue 41 which, in conjunction with the base portion 40, defines a straight-sided slot 42 for the reception of another hooked or L-shaped tongue 45, similar to the tongue 41, that depends from a base portion 46 of the joint member 26. The depending tongue 45 defines in conjunction with the base portion 46 a straight-sided slot 47 which is adapted to receive the tongue 41. This engagement of the tongues 41 and 45 in the slots 47 and 42, respectively, may be quickly and easily accomplished and makes possible the insertion and removal of the piston 34 (Fig. 1) from the cylinder 38 without the necessity of dismantling the entire piston assembly unit 12.

The tongues 41 and 45 (Figs. 2, 3 and 4) have narrow elongated flat surfaces 49 and 50 on their free ends, which surfaces, when the members 22 and 26 are engaged, are normally parallel to and slightly spaced from inner surfaces 51 and 52, of the members 26 and 22, respectively, as shown at 54 and 55 in Fig. 2. These spaces 54 and 55 between the engaged parts 22 and 26 are so small that there is substantially no longitudinal play or movement between the tongue and slot members 22 and 26. Moreover, since the opposed surfaces 50 and 52 and the corresponding opposed surfaces 49 and 51 are closely spaced, parallel and of considerable relative length (Fig. 3) there is substantially no transverse or to-and-fro, rocking or tilting movement between the engaged members 22 and 26 in the directions of double arrows *a*.

Adjoining the surfaces 49 and 50 (Figs. 2, 3 and 4), the free ends of the tongues 41 and 45 are cut away forming inclined flat surfaces 57 and 58 and provided enlarged spaces 57*a* and 58*a*, respectively, between the members 22 and 26 when they are engaged. Because of the spaces or clearances 54 and 55 between the mated parts 22 and 26, the enlarged spaces 57*a* and 58*a* between the surfaces 51 and 57, and the surfaces 52 and 58, respectively, and the relatively small width of the surfaces

49 and 50, the tongue and slot members 22 and 26 are adapted to mate readily with each other and to tilt or pivot laterally in the directions of double arrows *b* (Fig. 2) when engaged. Should there be any lateral misalignment of the cylinder 38 and the bracket 18, this lateral pivotal action of the member 26 will compensate therefore by allowing the connecting rod 27 to tilt laterally so that the piston 34 (Fig. 1) may align itself with the cylinder 38 and reciprocate smoothly therein. Any other misalignment of the cylinder 38 and the bracket 18 may be corrected by adjustment of the bracket 18 in the slot 17, as previously described.

The piston 34 is quickly disposed in operative position in the cylinder 38 by first introducing the piston 34, with the connecting rod 27 attached and depending therefrom, into the cylinder 38 at its upper end. The sleeve 32 is then raised against the tension of the spring 33, the members 22 and 26 engaged, and the sleeve 32 released whereupon the spring 33 will urge the sleeve 32 down upon the bracket head 21, thus preventing disengagement of the members 22 and 26 during the operation of the joint 23. The tongues 41 and 45 will mate easily with their respective slots 47 and 42 since the closely spaced tongue end surfaces 49 and 50 are relatively small in width (Figs. 2 and 4) and have abutting them the inclined flat surfaces 57 and 58, thus allowing the members 22 and 26 to mate although they may be disposed at a slight angle with each other. Since the sleeve 32 is mounted on the connecting rod 27, it will tilt with said connecting rod 27 and will ride or cam on the curved substantially barrel-shaped sides of the member 22 when the joint 23 is tilted. Therefore the sleeve 32 will not interfere with the aligning action of the joint 23 although the clearance between the sleeve 32 and the member 22 may be relatively small.

While I have described a preferred embodiment of the present invention it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the spirit and the scope of the appended claims.

Having thus described the invention what I claim as new and desire to protect by Letters Patent is:

1. A tongue and slot joint comprising a first member provided with a longitudinally extending L-shaped tongue having oppositely facing transverse surfaces, said tongue defining a slot having oppositely facing transverse surfaces, and a second member mating with said first member and provided with a longitudinally extending L-shaped tongue having oppositely facing transverse surfaces, said tongue defining a slot having oppositely facing transverse surfaces, the transverse surfaces on the tongues closely overlying the transverse surfaces defining the slots thereby restraining said members from substantial relative longitudinal movement and transverse rocking movement in a first plane, a marginal portion of one of the transverse surfaces on each member being cut away to form a planar surface and to provide enlarged wedge-shaped spaces between said members to permit relative transverse angular movement thereof in a second plane at right angles to the first plane.

2. A tongue and slot joint, comprising first and second complementary interengaged members, the first member having an external barrel shaped surface intersected at right angles by transverse surfaces forming a tongue and slot, the second member having an external cylindrical surface intersected by transverse surfaces forming a tongue and slot interlocked with the slot and tongue respectively of the first member, the transverse end surfaces of said members being inclined with respect to the opposed transverse surfaces and cooperating therewith for relative rocking movement of said members in one plane only, and a sleeve movably mounted on one of said members and enclosing the external surfaces of both members for retaining the same in interlocked relation, the inner surface of said sleeve being spaced from the opposite ends of the barrel shaped surface of the first member to permit said relative rocking movement.

3. A tongue and slot joint, comprising first and second complementary interengaged members, the first member having an external barrel shaped surface intersected by transverse surfaces forming a tongue and slot, the second member having an external cylindrical surface intersected at right angles by transverse surfaces forming a tongue and slot interlocked with the slot and tongue respectively of the first member to hold said members against substantial relative longitudinal movement, the transverse end surfaces of said members being inclined with respect to the opposed transverse surfaces and cooperating therewith for relative rocking movement of said members in one plane only, said interlocked transverse surfaces holding said members against relative rocking movement in a plane at right angles to said first mentioned plane, and a sleeve movably mounted on and surrounding said second member and extending around said first member for retaining the members in mated relationship, the inner surface of said sleeve being spaced from the opposite ends of the barrel shaped surface of the first member to permit said relative rocking movement in said first mentioned plane.

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