July 2, 1940. N. LESTER 2,206,098

PLASTIC CASTING DEVICE

Filed Sept. 2, 1938

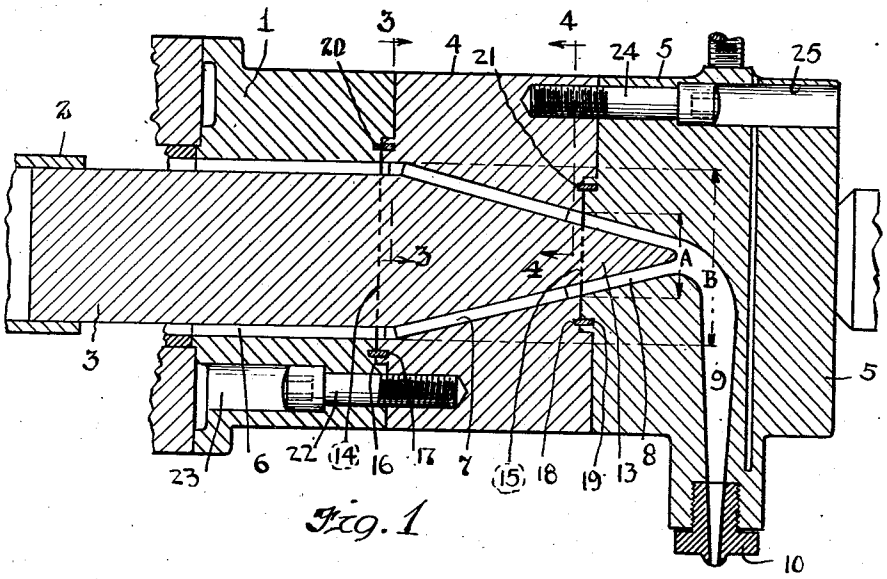


Fig. 1

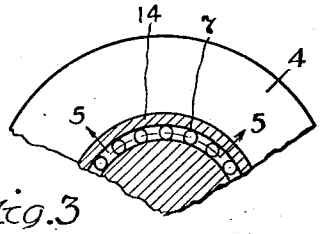


Fig. 3

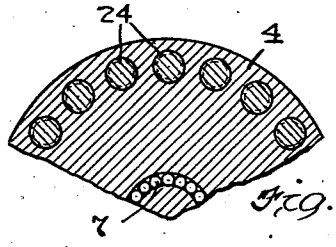


Fig. 4

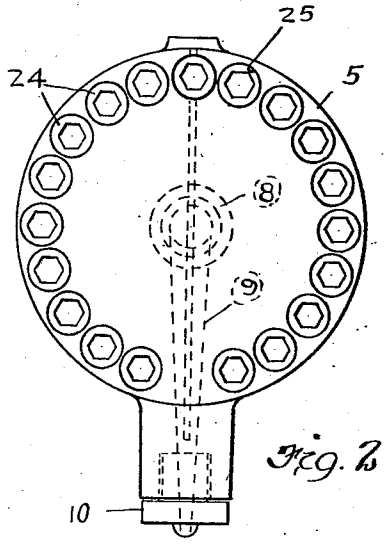


Fig. 2

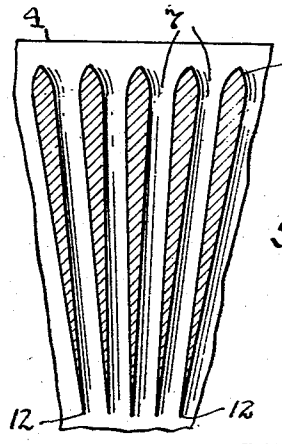


Fig 5

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PLASTIC CASTING DEVICE

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Application September 2, 1938, Serial No. 228,190

5 Claims. (Cl. 18—30)

The present invention relates to a plastic casting device which comprises that particular portion of an injection type plastic casting machine commonly referred to as the "injection assembly." Such assembly consists of four essential components, viz., the cylinder, plunger, nozzle or nozzle body, and the spreader. The function of the latter, as indicated by its name, is to thin out the cross-sectional thickness of the material to be cast in order to more readily plasticize the latter under the application of heat and pressure.

The novel construction of the present invention is an improvement upon that embodied in my copending application Serial No. 200,347, filed April 6, 1938.

In my aforesaid copending application, the spreader member is mounted in the assembly by means of a laterally extending integral collar or ring fitted into a recess in the cylinder wall, and having material transfer passages parallel to the cylinder walls. In my presently improved construction, the integral laterally extending portion of the spreader is made coextensive with the walls of the cylinder and of the nozzle body, and these three elements assembled in surface to surface contact with the laterally extending portion of the spreader spacing apart the ends of the cylinder and of the nozzle body. By reason of this improved construction, I am able to obtain a much more rigid and satisfactory assembly of the spreader with the other component parts, a tighter and more effective joint at the meeting surfaces of the parts, and much more efficient conduction of heat from the exterior to the interior of the assembly.

My improved construction also provides for a convergence of the material transfer passages in the laterally extending portion of the spreader from their inlet to their outlet ends. By reason of this last-named improvement, the resistance to flow of the material through the injection assembly is substantially reduced and such flow "stream lined" to a greater extent; the possibility of accumulation of material at the "down stream" or outlet ends of the material transfer passages practically eliminated; and a substantial reduction in the exertion of pressure tending to separate the spreader from the nozzle body is achieved.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing—

Fig. 1 is a cross-sectional, longitudinal view of an injection assembly embodying the principle of my invention; Fig. 2 is an end elevational view looking at the right hand end of Fig. 1; Fig. 3 is a detailed sectional view taken substantially along line 3—3 of Fig. 1; Fig. 4 is a detailed sectional view taken substantially along line 4—4 of Fig. 1; and Fig. 5 is a detailed sectional view taken substantially along the arcuate line 5—5 of Fig. 3.

Now referring more particularly to the accompanying drawing, there is shown therein a pressure cylinder 1 in which the annular plunger 2 is reciprocable. The cylindrical shank portion 3 of the spreader fits within the interior of the plunger 2, and the laterally extending integral portion 4 of the spreader is mounted between the end of the cylinder 1 and of the nozzle body 5. Referring to Fig. 1, it will be seen that the outer walls of the cylinder 1, portion 4 of the spreader and of the nozzle body 5 are coextensive.

An annular space 6 is formed between the shank portion 3 and inner wall of the cylinder 1 for the reception of material to be cast and for movement of the plunger 2. Circular holes or passages 7 lead from the annular space 6 through the laterally extending portion 4 of the spreader to the conical shaped inlet end of the nozzle passage 9. A nozzle tip 10 mounted on the end of the nozzle body 5 continues the nozzle passage 9 to the die plate (not shown). The material to be cast is of course intermittently fed into the annular space 6, such as in the manner explained in detail in my copending application Serial No. 174,175, filed Nov. 12, 1937.

As will best be seen in Fig. 5, the passages 7 converge toward each other from their inlet or upstream ends to their outlet ends at which latter point they merge one into the other. The ribs 11 between the passages 7 are thus in the form of practically perfectly streamlined obstructions to fluid flow, so that resistance of such flow is reduced to a minimum. It will be seen that the cross-sectional thickness of the ribs 11 tapers from their upper ends to a sharp point 12 at their lower ends. Thus, there is no possibility for the formation of dead spaces or any pocket at the lower or down stream ends 12 of the ribs 11.

It will also be noted that by reason of the con-

verging construction of the passages 7 to meet the inlet end of the nozzle body passage 8, that the effective pressure exerted upon the nozzle body 5 and upon the spreader portion 4, and tending to separate the two is substantially reduced. Thus, the pressure exerted upon the nozzle body 5 and tending to force it in a right hand direction away from the spreader portion 4 is effective only over the area whose diameter is indicated by the reference numeral A. That pressure which is exerted upon the cross-sectional area whose diameter is indicated at B (like the cross-sectional area of the passages 7) and which would otherwise tend to force the spreader portion 4 away from the nozzle body 5 is not entirely so operative, since a portion of it is dissipated as a component in a radial direction with respect to the longitudinal center of the spreader and in proportion to the difference between the distance B and the distance A.

An annular projection 14 is provided upon the upstream side face of the spreader portion 4 which fits into a complementary recess in the end of the cylinder 1. A similar projection 15 on the nozzle body 5 extends into a complementary recess in the spreader portion 4. The projections 14 and 15 thus form the double shoulders 16 and 17 and 18 and 19 respectively which present a more effective seal betwen the contacting surfaces of the cylinder 1, spreader portion 4 and nozzle body 5 and also aid in maintaining the proper alignment of these parts upon assembly. Annular gaskets 20 and 21, preferably composed of a relatively softer metal such as copper are inserted in recesses in the meeting faces of the cylinder 1, spreader portion 4 and nozzle body 5, and further aid in perfecting a tight and efficient seal between the parts. A series of socket headed studs 22, countersunk in the holes 23 in the cylinder 1 join the latter to the spreader portion 4. Similar studs 24, countersunk in the holes 25 in the nozzle body 5 fasten the latter to the other side of the spreader portion 4.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a plastic casting device comprising a pressure cylinder, a plunger movable therein, a nozzle body, a spreader having a cylindrical wall portion located within said cylinder and forming an annular space therein, and a laterally extending portion on said spreader, said laterally extending portion being mounted between and in contact with opposed end surfaces of said cylinder and of said nozzle body, the latter having a passage of relatively smaller cross-sectional area at its inlet end than the cross-sectional area of said cylindrical wall portion, and passages through said laterally extending portion leading from said annular space to said nozzle body passage.

2. In a plastic casting device comprising a pressure cylinder, a plunger movable therein, a nozzle body, a spreader having a cylindrical wall portion located within said cylinder and forming an annular space therein, and a laterally extending portion on said spreader, said laterally extending portion being mounted between and in contact with opposed end surfaces of said cylinder and of said nozzle body, the latter having a passage of relatively smaller cross-sectional area at its inlet end than the cross-sectional area of said cylindrical wall portion, and passages through said laterally extending portion leading from said annular space to said nozzle body passage, said passages in said laterally extending portion converging toward each other from their inlet to their outlet ends and merging with each other at such outlet ends.

3. In a plastic casting device comprising a pressure cylinder, a plunger movable therein, a nozzle body, a spreader having a cylindrical wall portion located within said cylinder and forming an annular space therein, and a laterally extending portion on said spreader, said laterally extending portion being mounted between and in contact with opposed end surfaces of said cylinder and of said nozzle body, the latter having a passage of relatively smaller cross-sectional area at its inlet end than the cross-sectional area of said cylindrical wall portion, passages through said laterally extending portion leading from said annular space to said nozzle body passage, said passages in said laterally extending portion converging toward each other from their inlet to their outlet ends and merging with each other at such outlet ends, and an extension on the end of said spreader beyond the outlet ends of said converging passages, the surface of said extension being parallel to said passages.

4. In a plastic casting device comprising a pressure cylinder, an annular plunger movable therein, a nozzle body, a spreader having a cylindrical shank portion fitting within said plunger, a laterally extending portion on said spreader, said laterally extending portion being mounted between and in contact with opposed surfaces of said cylinder and of said nozzle body, and a plurality of passages extending through said laterally extending portion and communicating with the interior of said cylinder and of said nozzle body, said passages being disposed in a cone-shaped arrangement with the base of such cone located adjacent said shank portion and the apex thereof in said nozzle body.

5. In a plastic casting device comprising a pressure cylinder, an annular plunger movable therein, a nozzle body, a spreader having a cylindrical shank portion fitting within said plunger, a laterally extending portion on said spreader, said laterally extending portion being mounted between and in contact with opposed surfaces of said cylinder and of said nozzle body, means for fastening said cylinder and said nozzle body to said laterally extending portion, and annular interfitting shoulders on the contacting surfaces of said cylinder, of said laterally extending portion and of said nozzle body, and a plurality of passages extending through said laterally extending portion and communicating with the interior of said cylinder and of said nozzle body, said passages being disposed in a cone-shaped arrangement with the base of such cone located adjacent said shank portion and the apex thereof in said nozzle body.

NATHAN LESTER.