United States Patent [19]

Bessett et al.

[11] **3,844,337**

[45] **Oct. 29, 1974**

[54] **POURING SPRUE**

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[73] Assignee: **Packaging Corporation of America,** Evanston, Ill.

[22] Filed: **Dec. 18, 1972**

[21] Appl. No.: **315,864**

[52] **U.S. Cl.** **164/412,** 141/337, 249/205

[51] **Int. Cl.** **B22d 35/04**

[58] **Field of Search** 164/244, 412, 34; 249/108, 249/205, 134; 222/574, 566; 141/337, 338

[56] **References Cited**

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Attorney, Agent, or Firm—Neuman, Williams, Anderson & Olson

[57] **ABSTRACT**

A pouring sprue is provided which is adapted to be used in a variety of foundry casting operations. The sprue is of unitary construction and is capable of disintegrating when subjected to a predetermined temperature for a finite period of time without an undesirable residue being formed. Prior to being used, the sprue may be readily nested with sprues of like configuration so as to form a compact stack for storage or shipment. The sprue includes a pair of elongated complemental sections which are integrally connected along one elongated side and foldable relative to one another to a closed position forming a funnel member. The opposite elongated side of each section is provided with complemental locking means. The complemental locking means of the sections interlock with one another and retain the sections in closed relation. The interlocked elongated sides of the sections are provided with seal means which form a sealed joint between the interlocked sections.

9 Claims, 8 Drawing Figures

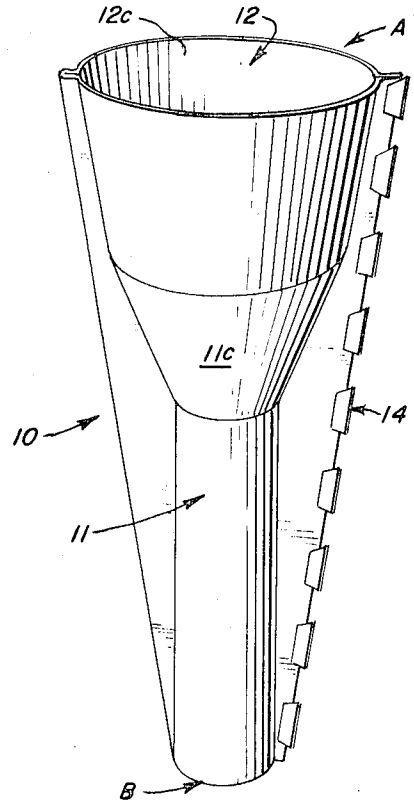


FIG. 1

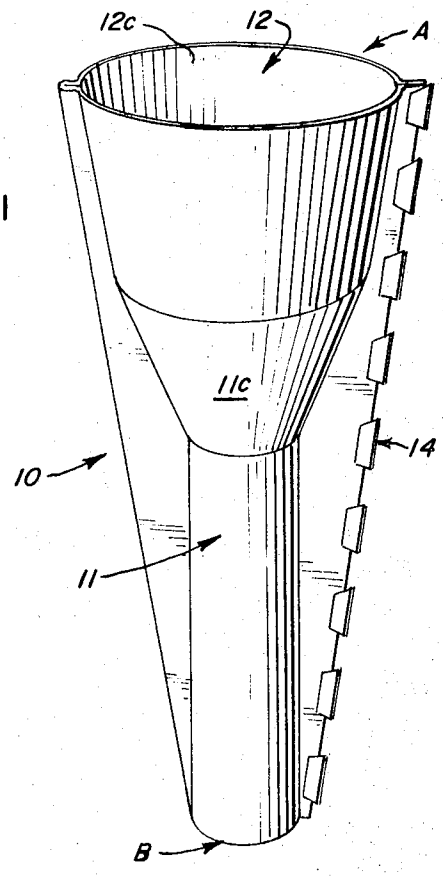


FIG. 8

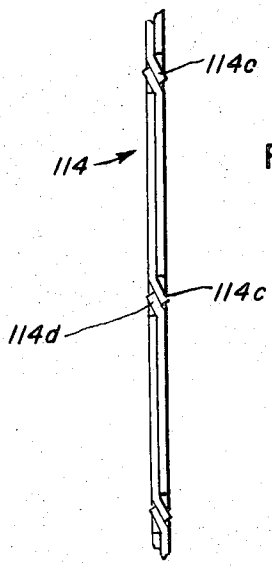


FIG. 5

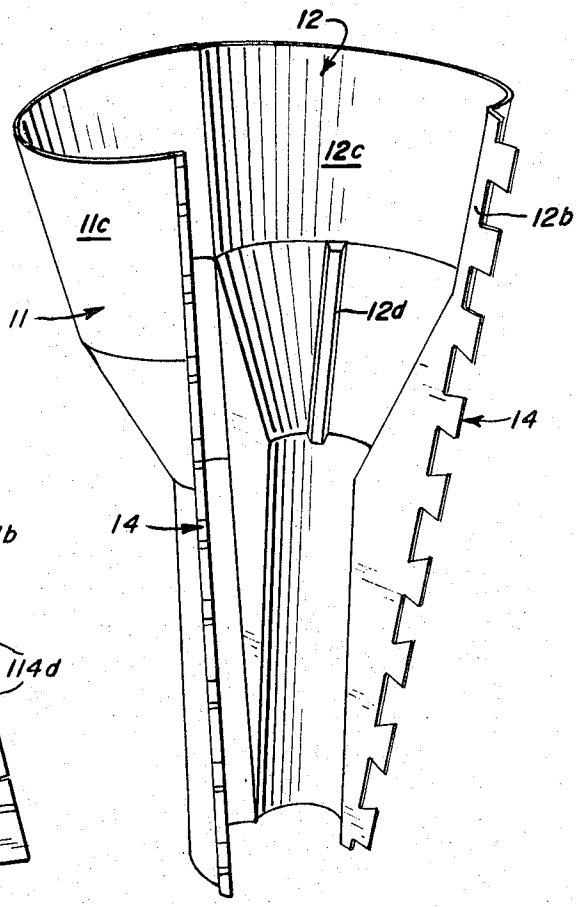


FIG. 7

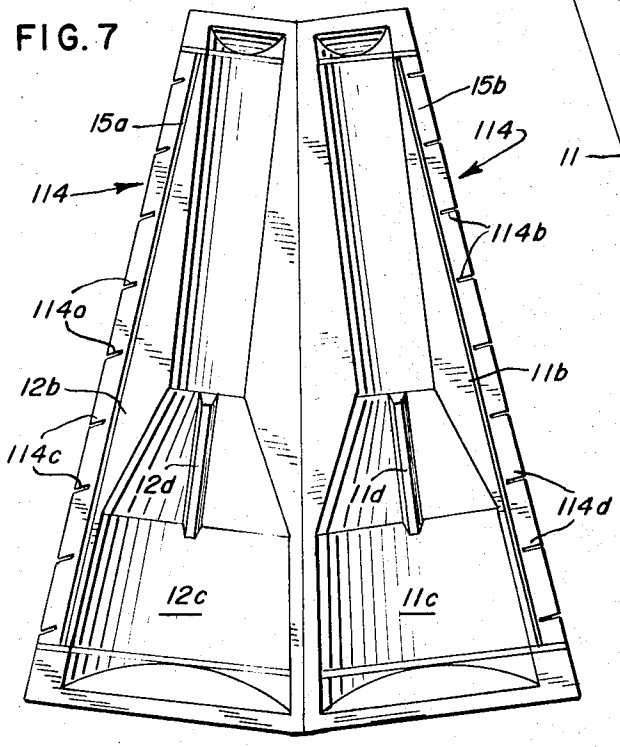


FIG. 2

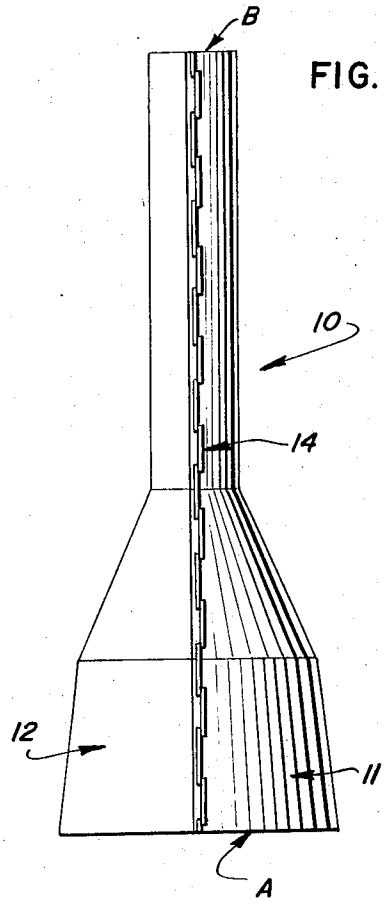


FIG. 6

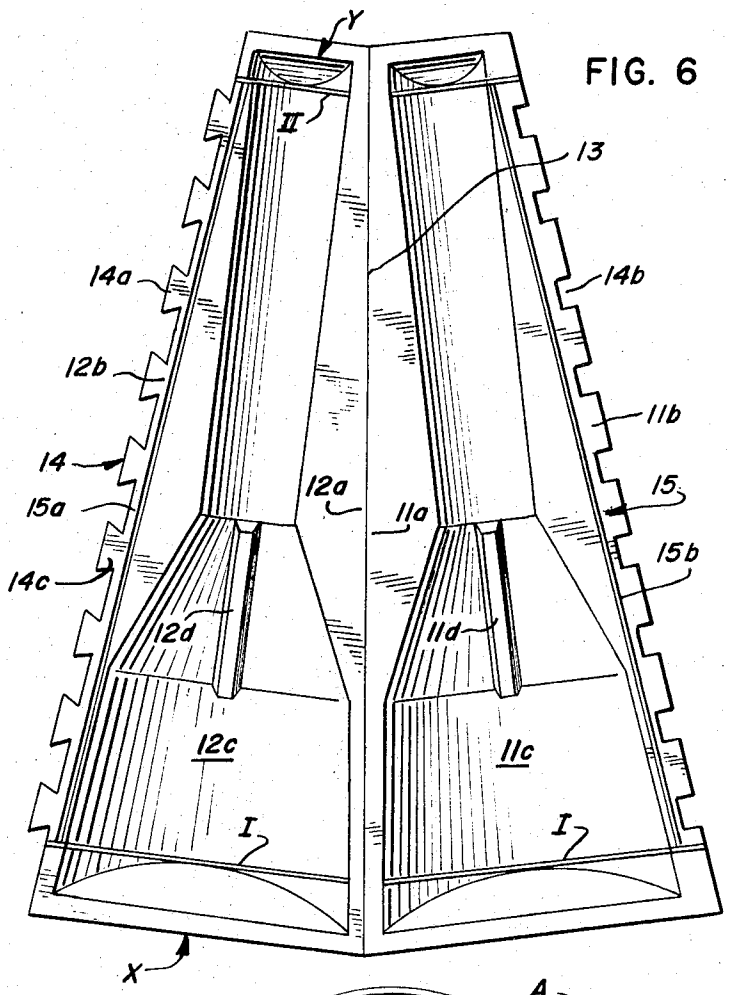


FIG. 3

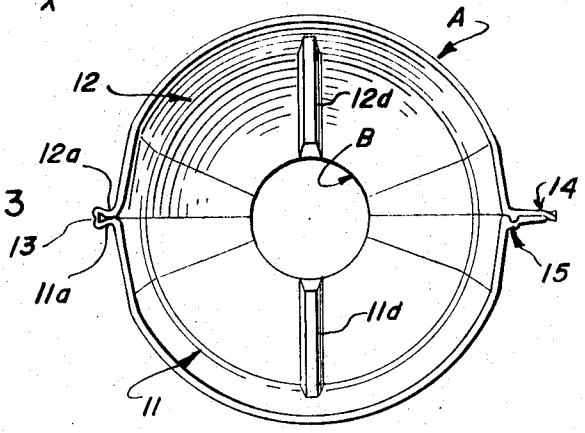
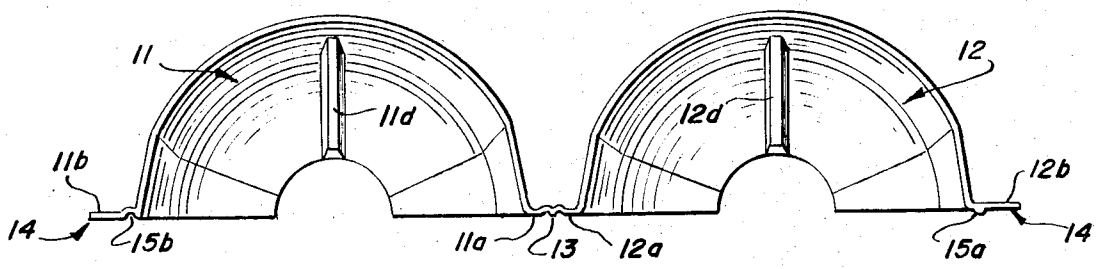


FIG. 4



POURING SPRUE

BACKGROUND OF THE INVENTION

In various foundry operations, such as a closed mold process, an initial casting or form of the desired product is made from expanded polystyrene beads or the like whereby the configuration thereof simulates that of the desired product. At a given area on the initial casting, a circular projection is provided which is adapted to extend upwardly and receive one end of a pouring sprue. Heretofore, such a pouring sprue was customarily made of a suitable core sand mixture. Once the initial casting has been made and the pouring sprue is accommodating the projection, the casting and sprue are then firmly held in place by compacted foundry sand which surrounds same. Molten metal is then poured through the sprue onto the initial casting causing the latter to melt away as it is contacted by the molten metal. During pouring of the molten metal through a pouring sprue made of a core sand mixture, the latter becomes charred, but does not disintegrate. Thus, once the molten metal has solidified, the foundry sand is removed and the pouring sprue is broken up. when the sprue is broken up, the charred core sand mixture intermixes with and contaminates the foundry sand. Thus, heretofore in order to reuse the contaminated foundry sand, it was necessary to remove therefrom by sifting or other suitable means the core sand mixture. Such a sifting operation was awkward, costly, and time-consuming.

A further shortcoming which beset the prior pouring sprues was that each sprue must be completely formed at the outset and, thus, storage of an inventory of such formed sprues required a considerable amount of space. In addition, to such sprues being expensive to make, they were fragile and required care in handling.

SUMMARY OF THE INVENTION

Thus, it is an object of the invention to provide a pouring sprue which is of simple inexpensive construction and when not in use may be readily nested with like sprues so as to form a compact stack or bundle suitable for shipping or storage.

It is a further object of the invention to provide a pouring sprue which is lightweight, easy to set up for use, and capable of withstanding abusive handling.

It is a still further object of the invention to provide a pouring sprue which will disintegrate when subjected to a predetermined temperature after a finite period of time and will not contaminate the foundry sand when it disintegrates.

Further and additional objects will appear from the description, accompanying drawings and appended claims.

In accordance with one embodiment of the invention, a pouring sprue of unitary construction is provided which includes a pair of elongated sections foldably connected along one side, and when folded to a closed position forming a funnel member. Complemental locking means are carried by the edges of the sections opposite the connected edges and are adapted to interlock with one another so as to retain the sections in closed position. Each section is provided with a seal means which coacts with the other when the sections

are closed and forms a sealed joint between the sections.

DESCRIPTION

For a more complete understanding of the invention, reference should be made to the drawings, wherein:

FIG. 1 is a perspective view of one form of the improved pouring sprue shown in set up condition;

FIG. 2 is a right side elevational view of the pouring sprue of FIG. 1, but shown in an inverted position;

FIG. 3 is a top view of the pouring sprue shown in FIG. 1;

FIG. 4 is similar to FIG. 3 but showing the pouring sprue in a fully unfolded condition, ready for nesting with other sprues of like configuration;

FIG. 5 is a perspective view of the pouring sprue of FIG. 1 shown in a partially set up condition;

FIG. 6 is a plan view of the pouring sprue of FIG. 1 shown as it would be removed from a forming mold;

FIG. 7 is a fragmentary view, similar to FIG. 6, but on a reduced scale, of a second form of the improved pouring sprue; and

FIG. 8 is an enlarged fragmentary edge view of the locking means of the pouring sprue of FIG. 7, and showing the sections thereof in interlocking relation.

Referring now to the drawings and more particularly to FIGS. 1 and 2, one form of an improved pouring sprue 10 is shown which is adapted to be used in a variety of foundry operations, such as in a closed mold process. In such a process, an initial, or temporary casting of the desired product is made from a material such as expanded polystyrene beads. The initial casting is normally provided with an upwardly extending projection which is adapted to be accommodated by one end of the pouring sprue. The initial casting and the accommodated sprue are then held in place by compacted foundry sand. Molten metal is poured through the sprue and, as it contacts the expanded polystyrene beads, it will cause same to melt and then evaporate. The void resulting from the disintegration of the initial casting is replaced by the molten metal. While the molten metal is solidifying, the heat generated thereby will cause the improved sprue to disintegrate leaving little or no residue which will contaminate the foundry sand.

Heretofore, sprues used in the closed mold process were formed of a core sand mixture, and did not disintegrate, but instead, were broken up at the time the metal casting was removed from the compacted foundry sand. When the sprue was broken, particles thereof became intermixed with the foundry sand and caused contamination thereof. As a result, the contaminated foundry sand had to be discarded, or the contaminant removed before the sand could be reused. Performing such an operation on the foundry sand was awkward, time-consuming, and costly.

The improved sprue 10 shown in the drawings is preferably formed of molded paper pulp and is of a unitary construction. In the illustrated embodiment, the sprue 10 comprises a pair of elongated sections 11 and 12 which are normally of substantially like configuration. Each section has one elongated side thereof 11*a* or 12*a* in the form of a lateral flange connected to the other section by a foldline 13. When the sections are folded to a closed position, the pouring sprue 10 is set up, see FIGS. 1 and 2.

The opposite elongated side 11*b* or 12*b* of each section is also in the form of a lateral peripheral flange, and is provided with complemental locking means 14 which will be described more fully hereinafter.

Each section 11 or 12, as aforementioned, is normally of substantially the same configuration, and includes a recessed, elongated central portion 11*c* or 12*c* which extends the full length of each section. The central portion is of tapered concave configuration with one end thereof of greater dimension. The one end combines with the corresponding end of the other section so as to form the upper inlet end A of the sprue. The opposite, or smaller, end of the central portion in a like manner combines with the corresponding smaller end of the other section so as to form the lower outlet end B of the sprue. The lower end B of the sprue is dimensioned so as to accommodate the upwardly extending projection formed on the initial casting, not shown. The configuration of the central portion of each section may vary from that shown if desired.

The complemental locking means 14 shown in FIGS. 1–6 includes a plurality of longitudinally spaced, substantially wedge-shaped tabs 14*a* which are formed in and extend laterally from the side 12*b* of section 12. Corresponding slots 14*b* are formed in the side 11*b* of section 11. The dimension of the slots 14*b* is such that only the narrow neck portions 14*c* of the tabs will fit therein. Once the tab has fit into the corresponding slot, the inherent fight back plus the stiffness of the molded pulp material of which the sprue is made, will cause the sections to remain effectively interlocked.

A modified form of complemental locking means 114 is shown in FIGS. 7 and 8. Locking means 114 includes a first set of slits 114a formed on side 12*b* of section 12. The slits are longitudinally spaced and extend obliquely outwardly towards the inlet end A of the sprue. A second set of longitudinally spaced slits 114*b* is formed on side 11*b* of section 11 and each slit 114*b* extends transversely outwardly. When the sections are closed, the sets of slits 114*a* and b interlock with one another so that an edge portion 114*c* adjacent each slit 114*a* will overlap an edge portion 114*d* adjacent each slit 114*b*, see FIG. 8. Besides the interlocking tabs and slots or the sets of slits, the sprue sections will be urged into closed relation by the compacted foundry sand surrounding same.

It is important when the sections are in closed position that the interlocked sides of the sections form a sealed joint, thereby preventing the compacted foundry sand from seeping through the joint and contaminating the molten metal as it is poured through the sprue. One form of seal means 15 is shown in the drawings for effecting the desired sealed joint between the interlocked sides of the sections. Seal means 15 includes an elongated continuous bead 15*a* which is formed on the side 12*b* of the section 12 inwardly of the tabs 14*a* or slits 114*a*. The bead extends the full length of the side and is adapted to snugly fit within an elongated groove 15b formed on the side 11b of section 11, see FIGS. 3 and 4. Thus, once bead 15a is disposed within groove 15*b*, a barrier is formed preventing seepage of the foundry sand through the joint. Because the opposite sides 11*a* and 12*a* are integrally connected, no problem of seepage of the foundry sand occurs along that side of the sprue.

In the illustrated embodiments of the unfolded pouring sprues shown in FIGS. 6 and 7, the recessed central portion 11*c* or 12*c* of each complemental section 11 or 12 is provided with an elongated, longitudinally extending protuberance 11*d* or 12*d*. Each protuberance projects inwardly towards the axis of the funnel member when the latter is set up to receive the molten metal. The protuberances 11*d* and 12*d* are substantially diametrically opposed to one another and serve to prevent the molten metal from spinning or swirling as it is being poured through the funnel member. It has been found if such spinning or swirling motion occurs, undesirable foreign materials are drawn into the mold thereby resulting in an unsound casting.

While the pouring sprues shown in FIGS. 6 and 7 include a pair of diametrically opposed protuberances, it is to be understood, of course, that the number of protuberances may be increased or decreased and the location thereof may be varied from that shown without departing from the scope of the invention.

As aforementioned, the sprue 11 is preferably formed of molded pulp or a similar inexpensive material. The sprue 11, when removed from the forming dies, is in a fully open or unfolded condition, as seen in FIG. 6. When the sprue is formed within the forming dies, end pieces X and Y are included at opposite ends of the sections. Prior to the complemental sections being folded so as to form the sprue, each end piece is separated from the remainder of the sections along weakened scorelines I and II. The scorelines I and II define the upper and lower limits, respectively, of the sprue 10 when it is set up. By keeping the end pieces intact until the sprue is set up, the sprue, when stored or shipped in an unfolded condition, is reinforced by the end pieces.

The utilization of molded pulp as the material for making the sprue is desirable for numerous reasons. First, and perhaps foremost of the reasons, is the fact that the material can withstand the intense heat of the molten metal for a period of time sufficient to allow the molten metal to fill the void caused by the disintegration of the initial casting or form; and yet, as the molten metal solidifies, the sprue will disintegrate completely, leaving only a minute amount of residue which will not cause any serious contamination problem; and thus, does not need to be removed from the foundry sand before the latter is reused. Secondly, the molded pulp is capable of permitting the escape therethrough of the gases generated within the mold during the pouring operation. Furthermore, the molded pulp is inexpensive, lightweight, and because of its inherent stiffness, can be readily manipulated into set up condition and placed in accommodating position with a portion of the initial casting. The improved sprue is of unitary, non-fragile construction, and when not in use, can be readily nested with other sprues of like construction so as to form a compact stack suitable for storage or bulk shipment to the ultimate user. No special tools or dexterous talents are required for setting up the sprue or for effecting interlocking of the sprue sections in a closed relation.

We claim:

1. A pouring sprue of unitary construction for molten metal or the like, comprising a pair of elongated complemental sections, each section having a recessed center portion and an elongated first side portion extending from said center portion and being integral with and foldably connected to a corresponding elongated first side portion of the other section, said sections, when

folded to a closed position having the center portions thereof forming an elongated funnel having an inlet opening at one end and an outlet opening at the opposite end; complemental locking means on corresponding elongated second side portions of said sections and adapted to lock said sections in said closed position, the first and second side portions of a section being separated by the center portion thereof; and seal means formed on said sections adjacent said complemental locking means and extending longitudinally of said sections and effecting a continuous sealed joint between the elongated side portions of said sections when the latter are locked in said closed position, said sealed joint extending substantially the entire length of said funnel.

2. The pouring sprue of claim **1** wherein said seal means includes an elongated male portion formed on one section and disposed adjacent to and coextensive with the juncture of the second side portion and the center portion of the one section, and an elongated female portion formed on the other section and disposed adjacent to and coextensive with the juncture of the second side portion and the center portion of the other section, said male and female portions form a sealed joint located intermediate the complemental locking means and the funnel.

3. The pouring sprue of claim **1** wherein the complemental locking means on one section comprises a plurality of longitudinally spaced tabs formed along the elongated second side portion of the one section, and the complemental locking means on the other section comprises a plurality of longitudinally spaced slots formed along the elongated second side portion of the other section, said slots being aligned with said tabs and sized relative thereto for interlockingly receiving said tabs when said sections assume a closed position.

4. The pouring sprue of claim **1** wherein said pair of complemental sections is formed of a gas-pervious material capable of disintegrating after being subjected to a predetermined temperature for a finite time period.

5. The pouring sprue of claim **4** wherein same is of molded pulp material and the sections of said sprue are adapted to normally assume a fully open position wherein the center portions of said sections are disposed in side-by-side relation and the corresponding open sides of the center portions face in substantially the same direction.

6. The pouring sprue of claim **1** wherein the center portions of the complemental sections are of like configuration.

7. The pouring sprue of claim **3** wherein each locking tab is of substantial wedge configuration and having a narrow neck portion connected to the second side portion of one section, and each slot of the other section is dimensioned to accommodate only the narrow neck portion of a corresponding tab when said sections are in a closed position.

8. The pouring sprue of claim **1** wherein the complemental locking means formed on one section comprises a first set of longitudinally spaced open end first slits, each slit of the first set extending obliquely outwardly, and the complemental locking means formed on the other section comprises a second set of longitudinally spaced open end slits, each slit of the second set extending outwardly at a different angle than that of said first sets of slits whereby the first and second sets of slits interengage each other in interlocking relation and retain said sprue sections in a closed position.

9. The pouring sprue of claim **1** wherein the center portion of at least one complemental section is provided with an elongated protuberance extending longitudinally of said center portion and projecting into the funnel formed by said center portions when said sections are in a closed position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,844,337 Dated October 29, 1974

Inventor(s) Clifford H. Bessett and James W. Boyd

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 25 - "when" should be - When

Column 5, line 12 (Claim 1) - after "elongated"

insert - second

Signed and sealed this 31st day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334