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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, or importing into the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

Lucia Staret Kes

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Schumacher et al.

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(54) **SUBMERGED NOZZLE**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 10 days.

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,736,935 A *	3/1956	Shea	.....	251/319
5,046,647 A *	9/1991	Kawai et al.	.....	222/594
5,681,499 A *	10/1997	Benson et al.	.....	222/606
5,954,989 A *	9/1999	Brook et al.	.....	222/600
6,675,996 B1 *	1/2004	Miyamoto et al.	.....	222/594

FOREIGN PATENT DOCUMENTS

FR	2227728	*	11/1974
RU	2167031	*	5/2001
RU	2236326	*	9/2004

* cited by examiner

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(57) **ABSTRACT**

A submerged nozzle has a lower part with a bottom and two outlet side channels above the bottom, and a skirt with a center fixed to the lower part of the nozzle above the outlet side channels. The skirt has two parallel flat surfaces each having side edges that are smoothly connected to each other by two respective cylindrical surfaces, the two outlet side channels being identical and lying along a common longitudinal axis making an acute angle with the parallel flat surfaces. A portion of the skirt is spaced apart from the nozzle to allow hot metal to flow in the space between the nozzle and the skirt.

5 Claims, 1 Drawing Sheet

