(57) Abstract: A die (10) particularly for on-road vehicle wheels, of the type that comprises lower (11), upper (13) and lateral (14) die parts that form an impression to be filled with molten material, comprising at least two die filling points arranged at two openings of the design of a wheel (15) where the lower die part and the upper die part are in contact when the die is the closed configuration.
DIE PARTICULARLY FOR ON-ROAD VEHICLE WHEELS

Technical Field

The present invention relates to a die particularly for on-road vehicle wheels.

Background Art

Currently, light alloy wheels produced by low-pressure die casting are formed by means of a shell-type die in which the filling material is fed from the center of the die at the center of the impression that forms the shape of the wheel.

The die is fixed to a hydraulic press for the opening and closing actions.

Below the die supporting bed a pressurized furnace is provided that contains the alloy in the liquid state, which is introduced at low pressure into the center of the die through a riser, and a PLC (electronic controller) that controls all the steps of its filling electronically.

The die is filled for a machine cycle time that varies between five and six minutes and comprises in succession the steps of filling, feeding, cooling, solidification, forming and preparation of the die for the next wheel.

Feeding from the center of the wheel produces a uniform distribution of material, causes no turbulence problems and provides a good feed when the wheel is small and has a very simple design.

However, when the wheel design is particularly complicated in terms of shape and thickness, porosities can be generated and are visible under X rays.

Usually these porosities form due to poor feeding as a consequence of turbulent motions of the alloy and overheatings.

Disclosure of the Invention

The aim of the present invention is to provide a die particularly for on-road vehicle wheels that solves or reduces substantially the problems of known die types.

Within this aim, an object of the present invention is to provide a die by
virtue of which the feeding step is improved.

Another object is to provide a die that allows to form wheels with few porosity defects that are visible under X rays.

Another object is to provide a die that allows to obtain a wheel that has high alloy uniformity.

Another object is to provide a die that allows to form a wheel that has improved mechanical characteristics.

Another object is to provide a die by means of which the machine cycle time is reduced, particularly with reference to the filling, feeding and solidification steps.

Another object is to provide a die that has a simple structure and can be manufactured with conventional systems and technologies.

This aim and these and other objects that will become better apparent hereinafter are achieved by a die particularly for on-road vehicle wheels, of the type that comprises lower, upper and lateral die parts that form an impression to be filled with molten material, characterized in that it comprises at least two die filling points arranged at two openings of the design of the wheel where the lower die part and the upper die part are in contact when the die is in the closed configuration.

**Brief description of the drawings**

Further characteristics and advantages of the present invention will become better apparent from the following detailed description of some embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figures 1 and 2 are transverse sectional views of two embodiments of die particularly for forming on-road vehicle wheels, according to the invention;

Figure 3 is a plan view of the lid of the furnace for the embodiment shown in Figure 2;

Figures 4 and 5 are respectively a plan view and a transverse sectional view of the lower part of a die having the structure according to the
invention;

Figures 6 and 7 are plan views of the two components that constitute the upper part of the die.

Ways to carrying out the Invention

With reference to Figure 1, a die particularly for on-road vehicle wheels having the structure according to the invention, in a first embodiment, is generally designated by the reference numeral 10.

The die 10 comprises a lower die part (bottom) 11, which is arranged above a pressurized furnace generally designated by the reference numeral 12, an upper die part (male plug) 13, and lateral die parts 14 that have an overall annular shape and form, when they are in the closed configuration, an impression into which the alloy in the liquid state is to be injected to form a wheel, generally designated by the reference numeral 15.

The upper die part 13 comprises a central body 13a to be fixed to an annular body 13b; the bodies are shaped in a downward region so as to form the rear shape of the wheel 15.

The lower die part 11 is instead constituted by a single body that is shaped in an upward region so as to form the front shape of the wheel 15.

The die 10 comprises two filling points, described in greater detail hereinafter, which are arranged at two openings 17 of the design of the wheel 15, where the lower die part 11 and the upper die part 13 are in contact when the die 10 is in the closed configuration.

In practice, the filling points are formed by passages for the filling material that arrives from the furnace 12, which are constituted by through holes 16 of the lower die part 11, which are arranged at two spaced openings 17a of the design of the wheel 15 and at which ducts, described in greater detail hereinafter and connected to the furnace 12, end.

The ducts are constituted by channels 19, which are arranged below the lower die part 11, one for each through hole 16, and are connected to a common riser 20, which is in turn connected to the furnace 12.
The channels 19 run radially from the upper end of the riser 20, which is arranged in a central region below the die 10, with a substantially vertical end portion 19a that ends at the through holes 16.

The upper die part 13 has, at the through holes 16 of the lower die part 11, cavities 21 that are substantially radial with respect to the wheel 15 and form inlets for the filling material at the center and at the outer rim of the wheel 15.

At the cavities 21, the upper die part 13 is further provided with fixed redirection elements 22 for the incoming molten material.

Figure 2 illustrates a die for on-road vehicle wheels according to the invention in a second embodiment, generally designated by the reference numeral 110.

The die 110 has a lower die part 111, an upper die part 113, and lateral die parts 114 that are substantially identical to those of the die 10.

The difference lies in the fact that the die 110 comprises two risers 120 that are connected to the pressurized furnace 112, one for each through hole 116 of the lower die part 111.

The risers 120 are thus for example fed directly by the pressurized furnace 112.

As regards operation, the die 10/110 is used to form a wheel 15 by means of a processing cycle that comprises the steps of filling, feeding, cooling, solidification, forming and finally preparation of the die for the next wheel.

The presence of inlets for the filling material at the openings 17 of the design of the wheel allows to dose the material simultaneously at the center of the wheel and at the outer rim.

Accordingly, the material is distributed very uniformly, avoiding turbulence problems and achieving good distribution thereof.

If there is a central riser from which radial channels connected to the through holes of the lower die part branch out, a good feed of the filling material, few X-ray porosity defects, alloy uniformity and good mechanical
characteristics of the finished product are obtained.

Moreover, the machine cycle time is reduced considerably, with particular reference to the reduction of the die filling time, the feeding time and the solidification time.

If instead the die comprises a plurality of risers fed directly by the pressurized furnace, in addition to the above-described advantages, which relate to the first embodiment, there is a further reduction in machine cycle time and a reduction in die preparation time.

In practice it has been observed that the present invention has achieved the intended aim and objects.

The present invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

The technical details can be replaced with other technically equivalent elements.

The materials, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to requirements.

The disclosures in Italian Patent Application No. PD2001A000208 from which this application claims priority are incorporated herein by reference.
CLAIMS

1. A die particularly for on-road vehicle wheels, of the type that comprises lower, upper and lateral die parts that form an impression to be filled with molten material, characterized in that it comprises at least two die filling points arranged at two openings of the design of a wheel where the lower die part and the upper die part are in contact when the die is in the closed configuration.

2. The die according to claim 1, characterized in that at said filling points said lower and upper die parts are shaped so as to form passages for the filling material.

3. The die according to the claim 1, characterized in that said lower die part is arranged above a furnace and is provided with through holes, at said filling points, for the passage of the filling material that arrives from ducts connected to said furnace.

4. The die according to claim 3, characterized in that said ducts are constituted by risers, one for each through hole, which are fed by said furnace.

5. The die according to claim 3, characterized in that said ducts are constituted by channels, one for each through hole, that protrude from a common riser fed by said furnace.

6. The die according to claim 5, characterized in that said channels lie radially starting from the upper end of said common riser, which is arranged in a substantially central region below said die, with an end portion that is substantially vertical and ends at said through holes of the lower die part.

7. The die according to claim 3, characterized in that said upper die part has, above said through holes of the lower die part, cavities that allow the inflow of the filling material that arrives from said ducts into the impression formed between the two die parts with the die in the closed configuration.

8. The die according to claim 7, characterized in that said cavities are substantially radial with respect to the wheel, forming inlets for the filling
material at the center and at the outer rim of said wheel.

9. The die according to claim 8, characterized in that said upper die part has redirection elements for the filling material at said cavities, above said through holes of the lower die part.