CLAIMS

1. A method of fabricating a part, the method comprising the following steps:

a) supplying a material in the form of powder particles (60) forming a powder beam (94);

b) heating a first quantity of said powder to a temperature higher than the melting temperature T_F of the powder with the help of a high energy beam (95), and forming, at the surface of a support (80), a first pool comprising this melted powder and a portion of the support (80);

c) heating a second quantity of said powder to a temperature higher than its melting temperature T_F with the help of said high energy beam (95), and forming, at the surface of the support (80), a second pool comprising this melted powder and a portion of the support (80) downstream from the first pool;

d) repeating step c) until a first layer (10) of said part is formed on said support (80);

e) heating an $[n]^{th}$ quantity of said powder to a temperature higher than its melting temperature T_F with the help of a high energy beam (95), and forming an $[n]^{th}$ pool comprising in part this melted powder above a portion of said first layer (10);

f) heating an $[n+1]^{th}$ quantity of said powder to a temperature higher than its melting temperature T_F with the help of said high energy beam (95), and forming an $[n+1]^{th}$ pool comprising in part this melted powder downstream from said $[n]^{th}$ pool above a portion of said first layer (10);

g) repeating step f) so as to form a second layer (20) of said part above said first layer (10); and

h) repeating steps e) to g) for each layer situated above an already-formed layer until said part is substantially in its final shape;

said method being characterized in that the powder beam (94) and the high energy beam (95) are substantially coaxial in that the powder particles (60) reach each of the pools at a temperature that is cold relative to the temperature of

said pool, and in that the focal point F_L of the high energy beam (95) is situated above the working plane P, and the focal point F_P of the powder beam (94) is situated beneath the working plane P, the working plane P being defined as the plane containing the surface on which said layers are being formed.

2. A method of fabricating a part according to claim 1, characterized in that the focal point F_L of the high energy beam (95) and the focal point F_P of the powder beam (94) are arranged such that powder particles do not at any time cross the high energy beam (95) between the outlet from a nozzle (190) and the working plane P.

3. A method of fabricating a part according to claim 2, characterized in that in order to obtain the focal point F_L of the high energy beam (95) and the focal point F_P of the powder beam (94) in accordance with claim 2, the defocus distance $Defoc_P$ of the powder beam (94) is increased, and/or the divergence half-angle β of the laser beam (95) relative to the perpendicular to said working plane P is decreased, or the defocus distance $Defoc_L$ of the high energy laser beam (95) is decreased.

4. A method of fabricating a part according to any one of claims 1 to 3, characterized in that the size distribution of the powder particles (60) is narrow.

5. A method of fabricating a part according to any one of claims 1 to 4, characterized in that each of said pools has a shape defined by $\theta<90^\circ$, $H_{app}/e_{app} < 1$, and $H_{ZR}/H_{app} \geq 0.6$, where θ designates the angle between the top surface of said pool and said working plane P, H_{app} designates the apparent height of the fillet, e_{app} designates its width, and H_{ZR} designates the height of the remelted zone.

6. A method of fabricating a part according to claim 5, characterized in that the three quantities θ, H_{app}/e_{app}, and H_{ZR}/H_{app} satisfy the following relationships:
$15° \leq \theta \leq 60°$, $0.04 \leq H_{app}/e_{app} \leq 0.75$, and $1 \leq H_{Zr}/H_{app} \leq 6$.