## CLAIMS

1. Device (100) for detecting ~~the~~ a position of a laser beam (15) with a determined diameter and emitted by a laser of an additive manufacturing machine, said detection device (100) comprising an upper part (102) comprising a scanning zone (108) of the laser beam (15), said scanning zone (108) being situated below a circular central opening (107) in an upper surface (101) of the upper part (102) and comprising ~~at the centre thereof~~ a circular hole (111) at a centre of the upper surface, ~~with~~ wherein the circular hole has a diameter essentially equal to the diameter of the laser beam and with a determined position; wherein the upper part (102) further comprises a first (104) and a second (106) element, the second element (106) comprising the circular hole (111), and the first (104) and the second (106) element being configured such that reflections of the laser beam (15) between the first and the second element (104, 106) are infinite to dissipate energy of the laser beam (15),

the detection device (100) comprising a lower part (103), the lower part (103) comprising at least one sensor (114) for capturing a part of ~~the~~ an energy transmitted by the laser beam (15) an graphite martyr plate (54) to absorb a remaining part of the energy transmitted by the laser beam (15);

such that when the laser beam (15) scans the scanning zone (108) according to a plurality of positions, the sensor (114) captures a part of the energy transmitted by the laser beam for each position, the part of the transmitted energy being maximum when the laser beam (15) is aligned with the circular hole (111).

~~2. Detection device according to claim 1, the scanning zone (108) being situated below a circular central opening (107) in an upper surface (101) of the upper part (102).~~

~~3. Detection device according to claim 1 or 2, the lower part (103) comprising a graphite martyr plate (54) to absorb the remaining part of the energy transmitted by the laser beam (15).~~

~~4.~~2. Detection device according to ~~one of the preceding claims~~claim 1, the sensor (114)

comprising one photodiode.

~~5.~~3. Detection device according to claim ~~4~~2, the sensor (114) comprising three photodiodes.

~~6. Detection device according to one of the preceding claims, the upper part (102) comprising a first (104) and a second (106) element.~~

~~7.~~4. Detection device according to ~~claim 6~~any one of the preceding claims, the first element (104) comprising vents (110).

~~8. Detection device according to claim 6 or 7, the second element (106) comprising the circular hole (111).~~

~~9. Detection device according to one of claims 6 to 8, the first (104) and the second (106) element being configured such that the reflections of the laser beam (15) between the first and the second element (104, 106) are infinite to dissipate the energy of the laser beam (15).~~

~~10.~~5. Method for detecting ~~the~~ a position of a laser beam (15) emitted by a laser of an additive manufacturing machine comprising the following steps performed by a detection device according to any one of the preceding claims:

- emission of a laser beam (15) with a determined diameter;
- scanning of the laser beam (15) over the ~~entire determined~~ scanning zone (108) comprising a circular hole (111) with a diameter essentially equal to the diameter of the laser beam (15) and with a determined position, said scanning comprising a plurality of positions of the laser beam (15);
- detection of a part of the energy transmitted by the laser beam (15) for each position of the laser beam (15) during the scanning;
- emission of an electrical signal corresponding to ~~the~~ a quantity of energy detected for each position of the laser beam (15) during the scanning;
- determination of ~~the~~ a maximum electrical signal value;
- search for ~~the~~ a time t corresponding to the position of ~~the~~ a manufacturing head for the maximum electrical signal value;

- determination of the position of the laser beam (15).