

CLAIMS

1. A compact muffler for an engine exhaust system comprising an exhaust gas flow path between an inlet and an outlet, the exhaust gas flow path comprising a plurality of adjacent flow passages, wherein at least two of the adjacent flow passages are fluidly connected in series to enable the flow of exhaust gas from one to the other along the flow path, the adjacent flow passages also being configured for fluid flow therealong in opposed directions, and wherein a bypass passage is provided between the two adjacent flow passages for further communication between the two flow passages and to promote an equalisation of fluid pressure within the two adjacent passages.
2. The muffler according to claim 1 wherein the bypass passage is configured to open onto the respective flow passage in a direction laterally of fluid flow along the respective flow passage.
3. The muffler according to claim 1 or 2 wherein each flow passage is bounded by a side wall and the bypass passage opens onto the respective flow passage through the side wall.
4. The muffler according to claim 1, 2 or 3 wherein two adjacent flow passages are disposed directly adjacent one another to provide neighbouring flow passages.
5. The muffler according to claim 4 wherein the two neighbouring flow passages are separated by a common wall, wherein the bypass passage between the two neighbouring flow passages opens laterally at one end onto one flow passage and opens laterally at an opposed end onto the other flow passage.
6. The muffler according to claim 5 wherein the bypass passage comprises an opening in the common wall between the two neighbouring flow passages.
7. The muffler according to any one of the preceding claims further comprising at least one further bypass passage between the two adjacent flow passages for further communication between the two flow passages.
8. The muffler according to claim 7 wherein the bypass passages are spaced at intervals along the common wall between the two adjacent passages.

9. The muffler according to any one of the preceding claims wherein the exhaust gas flow path comprises three or more of the flow passages fluidly connected in series.
10. The muffler according to claim 9 wherein the flow passages are arranged in pairs such that there is at least one of the bypass passages between the two flow passages in each pair.
11. The muffler according to any one of the preceding claims wherein the exhaust gas flow path comprises a first flow passage with which the inlet communicates, and a plurality of further flow passages arranged in series with the first flow passage, wherein there are bypass passages associated with all adjacent flow passages.
12. The muffler according to any one of claims 3 to 11 wherein two adjacent side walls defining a respective flow passage therebetween each has one or more openings to provide bypass passages, wherein the locations of the openings providing the bypass passages in the two side walls are offset.
13. The muffler according to any one of the preceding claims further comprising a compact body configured to define the inlet, the outlet, and the exhaust gas flow path comprising the plurality of adjacent flow passages.
14. The muffler according to claim 13 wherein the compact body comprises a casing defining an interior chamber, wherein there are portions within the interior chamber defining internal walls between the flow passages, wherein the internal walls partition the interior chamber to define the plurality of adjacent flow passages and thus the exhaust gas flow path.
15. The muffler according to claim 14 wherein the casing is configured as a shell having a two-part construction.
16. The muffler according to claim 15 wherein the shell may comprise first and second shell parts adapted to be assembled together to define the interior chamber into which the muffler inlet and muffler outlet each open.
17. The muffler according to claim 16 wherein either one or both of the first and second shell parts incorporate partition elements to define the internal walls within the interior chamber, the internal walls being in spaced apart relation to define the flow passages therebetween.

18. The muffler according to claim 17 wherein at least one of the internal walls is provided with one or more recesses arranged therealong to define one or more respective bypass passages.
19. The muffler according to claim 17 or 18 wherein each partition element on one shell part has an edge adapted to abut an edge of a counterpart partition element on the other shell part, with the two partition elements having recesses which extend to the respective edges, whereby the two recesses cooperate to define a respective bypass passage when the two partition elements are in abutting relation.
20. The muffler according to any one of claims 13 to 19 wherein the body has a first end section and a second end section, the first end section being adapted for mounting onto an engine with the interior chamber in communication with an exhaust outlet of the engine to receive exhaust flow therefrom.
21. The muffler according to claim 20 wherein muffler body is elongate and has a longitudinal extent between the first and second end sections.
22. An internal combustion engine fitted with an exhaust system comprising a muffler according to any one of the preceding claims.
23. A vehicle having an internal combustion engine fitted with an exhaust system comprising a muffler according to any one of the preceding claims.
24. A UAV comprising a fuselage presenting an exterior surface, and an internal combustion engine fitted with an exhaust system comprising a muffler, wherein the muffler presents an outer surface coincident with or recessed with respect to the exterior surface of the fuselage, and wherein the muffler is in accordance with any one of the preceding claims.