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(57) **ABSTRACT**

A magnetic logic device having two magnetic elements and a conductive element coupled to the two magnetic elements and arranged at least substantially perpendicular to the magnetic elements, wherein the device is configured, for each magnetic element, to have a magnetisation state with a perpendicular easy axis, and to switch the magnetisation state in response to a spin current generated in the magnetic element in response to a write current applied to the magnetic element, and configured to generate, as an output, a Hall voltage across the conductive element in response to a respective read current applied to each magnetic element, wherein a magnitude of the Hall voltage is variable, depending on a direction of the magnetisation state of each magnetic element and a direction of the respective read current applied to each magnetic element, for the device to provide outputs corresponding to one of a plurality of logical operations.

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