

this model, so he devised a rotary engine, which he thus describes:

"A cylinder of brass, about eight inches in diameter, and four inches long, was placed horizontally on the bottom of the boat. By the alternate pressure of the steam on two sliding wings, an axis passing through the center was made to revolve. On one end of this axis, which passed through the stern of the boat, wings like those on the arms of a wind-mill were fixed, adjusted to the angle most advantageous for operating on the water [as a propeller]. This constituted the whole of the machinery. Working with the elasticity of steam merely, no condenser, no air-pump, was necessary. And as there were no valves, no apparatus was required to open and shut valves. This simple little engine was, in the summer of 1802, placed on board a flat-bottomed boat I had built for the purpose. This boat was about twenty-five feet long, and five or six feet wide. She occasionally kept going until cold weather stopped us. When the engine was in the best order, her velocity was about four miles an hour. I found it, however, impracticable on so contracted a scale to preserve due tightness in the packing of the wings in the cylinder for any length of time. This determined me to resort again to the reciprocating engine. But the unsuccessful experiment in which I had been engaged with Chancellor Livingston and Mr. Roosevelt had taught me the indisputable necessity of guarding against the injurious effects of partial pressure, and, accordingly, I constructed an engine, although differing much from those described in my patents, yet so modified as to embrace completely the principle stated therein. During the winter this small engine was set up in a shop I then occupied at the Manhattan Works, and continued occasionally in operation until spring, when it was placed aboard the above-mentioned boat, and by means of bevel cogged wheels it worked the axis and wheels above described, and gave the boat somewhat more velocity than the rotary engine. But after having gone some time in crossing the river, with my son on board, the boiler, which was constructed of small tubes inserted at each end into metal heads, gave way, so as to be incapable of repair.