

10 LEADING AMERICAN INVENTORS

In 1804, Colonel Stevens planned a ferryboat to be driven by a steam engine of modified design. To bore its two cylinders, each sixteen inches in diameter, he erected a boring machine in Hoboken. Both the furnace and the boiler of this boat proved faulty, and she was dismantled. Her cylinders afterward did duty on the *Phoenix*, to be presently mentioned.

Colonel Stevens, in successful practice, originated many distinctive features for steamboats. He thus set them forth:

1. The cylinder, condenser, and air-pump are all firmly bedded upon a single plate of cast-iron, and the power of the engine exerted without causing strain to any part of the boat.
 2. The air-pump has a double stroke, and its piston pumps out the injection water from the bottom of the condenser when the piston rises, and by exhaustion removes the air from the top of the water as the piston descends.
 3. A new parallel motion for preserving the vertical position of the piston rod of the air-pump.
 4. A new method of fixing the valve-seats with firmness and accuracy.
 5. Valves with perforated stems passing through from the upper seat downwards, and from the lower seat upwards.
 6. The levers for opening and shutting the valves are worked by a rotary motion, instead of the reciprocating motion of the common plug frame, the working gear of which is liable to get out of order.
 7. The guide-posts are triangular, greatly increasing their strength and firmness.
 8. By means of a cylinder placed above, between the two main cylinders of which the boiler is built, a supply of water is furnished to the boiler whenever it is necessary to stop the engine. This contrivance, if the stop is not very long, prevents the safety valve from rising and making a loud noise, and thus avoids loss of steam and heat; while the engine is going it furnishes more steam room to the boiler.
- "It is very true," he says, "that I now make use of water-