"Having taken away the borer, he found that 839 grains of metallic dust had been cut away. 'Is it possible,' he exclaims, 'that the very considerable quantity of heat produced in this experiment—a quantity which actually raised the temperature of upward of 113 pounds of gun-metal at least 70°—could have been furnished by so inconsiderable a quantity of metallic dust, and this merely in consequence of a change in the capacity for heat?'

"To measure more precisely the heat produced, he next surrounded his cylinder by an oblong wooden box in such a manner that it could turn water-tight in the centre of the box, while the borer was pressed against the bottom. The box was filled with water until the entire cylinder was covered, and the apparatus was set in action. The temperature of the water on commencing was 60°. He remarks, 'The result of this beautiful experiment was very striking, and the pleasure it afforded amply repaid me for all the trouble I had taken in contriving and arranging the complicated machinery used in making it. The cylinder had been in motion but a short time when I perceived, by putting my hand into the water and touching the outside of the cylinder, that heat was generated.'

"As the work continued, the temperature gradually rose; at two hours and twenty minutes from the beginning of the operation, the water was at 200°, and in ten minutes more it actually boiled! Upon this result Rumford observes, 'It would be difficult to describe the surprise and astonishment expressed in the countenances of the bystanders, on seeing so large a quantity of water heated and actually made to boil without any fire. Though there was nothing that could be considered very surprising in this matter, yet I acknowledge fairly that it afforded me a degree of childish pleasure which, were I ambitious of the reputation of a grave philosopher, I ought most certainly rather to hide than to discover.'

"Rumford estimated the total heat generated as sufficient to raise 26.58 pounds of ice-cold water 180°, or to its boiling-point; and he adds, 'from the results of these computations, it appears that the quantity of heat produced equally, or in a continuous stream, if I may use the expression, by the friction of the blunt steel borer against the bottom of the hollow metallic cylinder, was *greater* than that produced in the combustion of nine wax candles each three-quarters of an inch in diameter, all burning together with clear bright flames.