I develop an account of scientific representations building on Charles S. Peirce’s rich, and still underexplored, notion of iconicity. Iconic representations occupy a central place in Peirce’s philosophy, in his innovative approach to logic and in his practice as a scientist. Starting from a discussion of Peirce’s approach to diagrams, I claim that Peirce’s own representations are in line with his formulation of iconicity, and that they are more broadly connected to the pragmatist philosophy he developed in parallel with his scientific work. I then defend the contemporary relevance of Peirce’s approach to iconic representations, and specifically argue that Peirce offers a useful ‘third way’ between what Mauricio Suárez has recently described as the ‘analytical’ and ‘practical’ inquiries into the concept of representation. As a philosophically minded scientist and an experimentally inclined philosopher, Peirce never divorced the practice of representing from questions about what counts as a representation. I claim that his account of iconic representations shows that it is the very process of representing, construed as a practice which is coextensive with observing and experimenting, that casts light on the nature of representative relations.