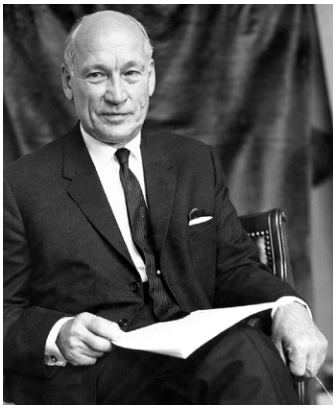
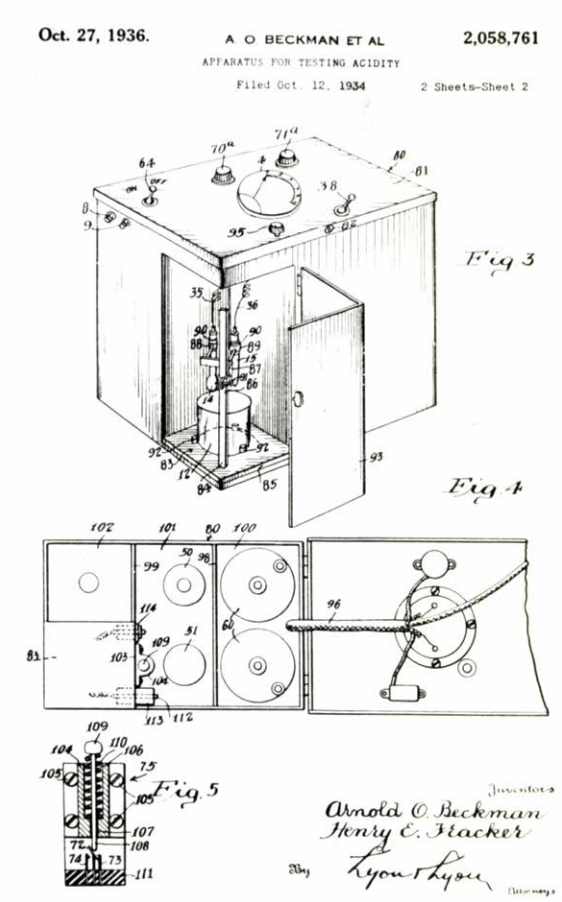


MAKING LEMONADE FROM LEMONS:
The Birth of the pH Meter

Arnold O. Beckman was a Caltech alumnus (PhD '28), former faculty member, and trustee. He was also the founder of Beckman Instruments (now Beckman Coulter), a company that began with Beckman's invention of the pH meter, now one of the most widely used pieces of laboratory equipment in the world. The pH meter's story started in 1934, when one of Beckman's undergrad classmates from the University of Illinois at Urbana—Glen Joseph, who was then working for the California Fruit Growers Exchange—came to Beckman's Caltech office with a lemon problem. Here is how Beckman recalled that encounter during a 1978 interview with Mary Terrall for the Caltech Oral Histories Project.



[Joseph] had to measure the acidity of lemon juice that had been treated with sulfur dioxide. He was making by-products from lemon juice—pectin, citric acid, things like that. . . . He had to use a glass electrode. And at that time the only glass electrode available was one made by Leeds & Northrup, and that used a high-sensitivity galvanometer.

Well, because of the poor electrical sensitivity of the galvanometer, the glass electrode had to be made so large in diameter that it was very fragile. The glass electrodes were always breaking, and if it wasn't that, the galvanometer itself would break. So . . . I built him an instrument in late '34, maybe early '35. He came back in two or three months and wanted to know if I could build him another one—others in the laboratory were using the first one and he wanted to have one for his own use. So I did build him another. Then I thought, "Gee, if he could use two of these in that little laboratory he has, maybe there's a market for them."

I was doing this work out at 3600 East Colorado Street, where Fred Henson had an instrument shop. Fred Henson used to be the instrument maker for the chemistry department. . . . He allowed me to set up space in the back of the sheet-metal shed he had, where he stored his lumber and his Studebaker truck. We partitioned off nine feet across the back of the shed, and that was where we started.

None of the work was done on the campus. The reason for that was that at that time there was a very strong feeling that commercialism should never enter into the thinking of anybody on the staff.

That, of course, all changed with World War II. . . .

By 1939, the company had grown to the size that somebody had to run it full-time. I was running it just part-time, evenings and weekends. So I had to make a decision—and this was a major decision—whether to leave Caltech, give up the academic field, and go into business, or to stay there and get somebody else to run the business. Well, by this time, I was having much fun with the business, and furthermore I found that I would be keeping in touch with science, because the instruments were, of course, being used in scientific laboratories. I was exposed to all sorts of new applications in science, so I felt I would not be divorcing myself from science entirely. So I made the decision to leave and go into business.

This abridged excerpt appears courtesy of the Caltech Archives. Find the full transcript online at oralhistories.library.caltech.edu/78.