Die vielen Väter des Transistors

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Dieses Dokument ist eine Ergänzung zum gleichnamigen Artikel in **Physik in unserer Zeit**, 39. Jahrgang 2008, Nr. 6, S. 296.

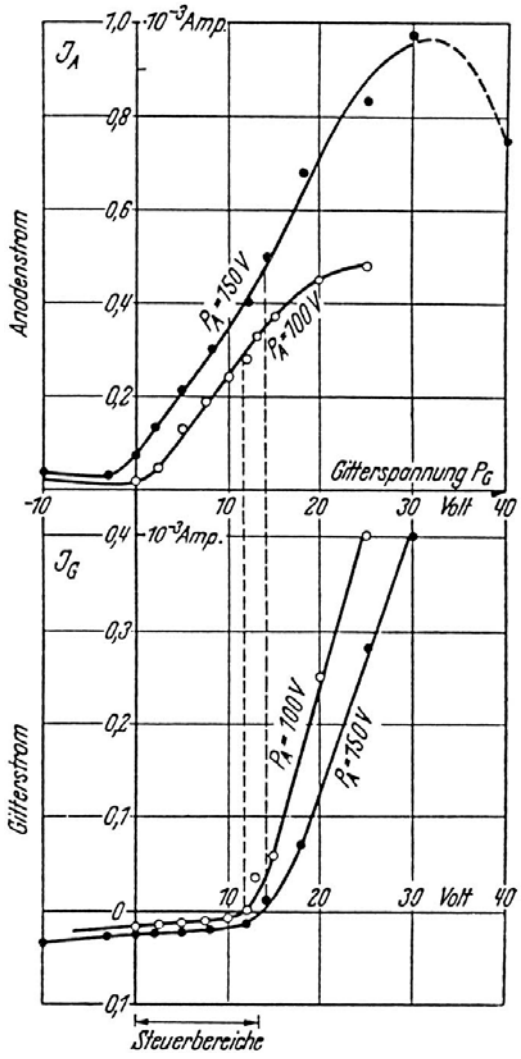
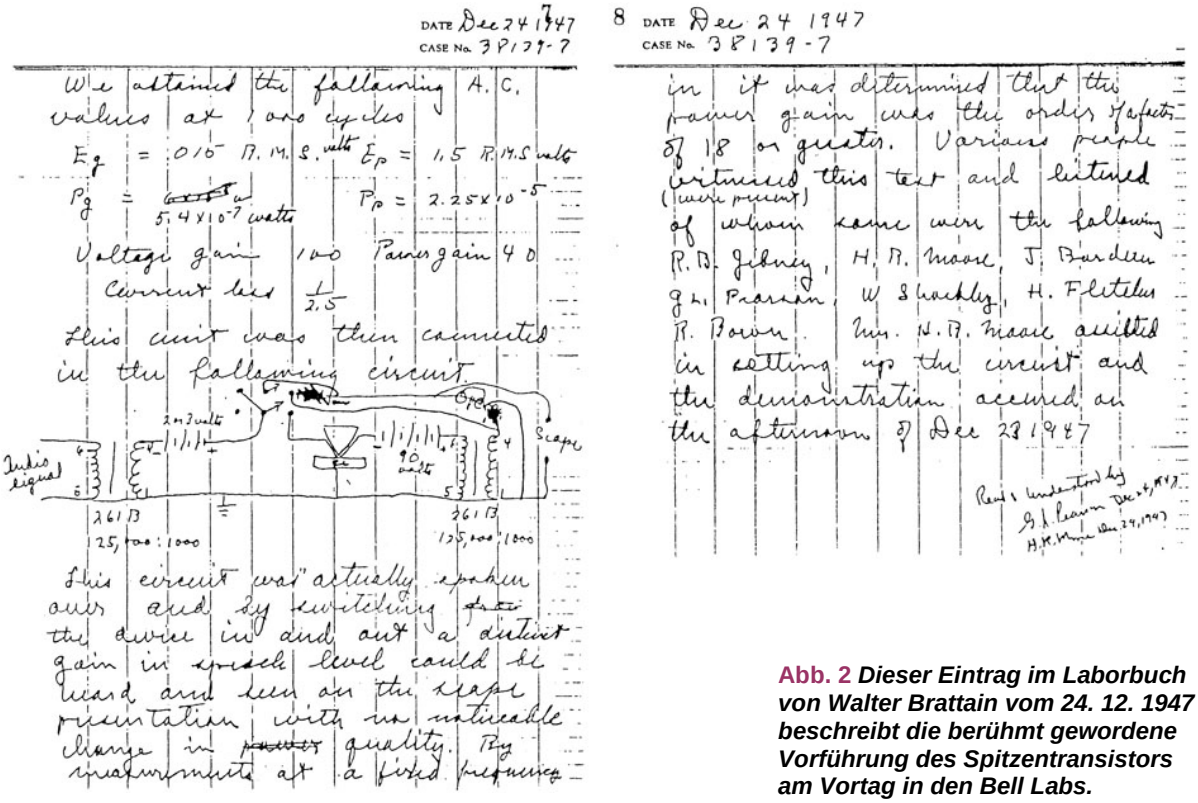


Abb. 1 ***Dreielektroden-Kristallverstärker von Hilsch und Pohl aus einer 1938 eingereichten Publikation (siehe gedruckten Artikel): Experimentell ermittelte Kennlinien. Der KBr-Kristall befand sich bei der Messung auf einer Temperatur von 490°C.***



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We obtained the following A. C. values at 1000 cycles

E_g = .010 R.M.S. volts E_p = 1.5 R.M.S volts

P_g = ~~6 x 10^{-7}~~ 5.4 x 10^{-7} watts P_p = 2.25 x 10^{-5}

Voltage gain 100 Power gain 40

Current loss $\frac{1}{2.5}$

This unit was then connected in the following circuit.

This circuit was actually spoken over and by switching the device in and out a distinct gain in speech level could be heard and seen on the scope presentation with no noticeable change in ~~power~~ quality. By measurements at a fixed frequency

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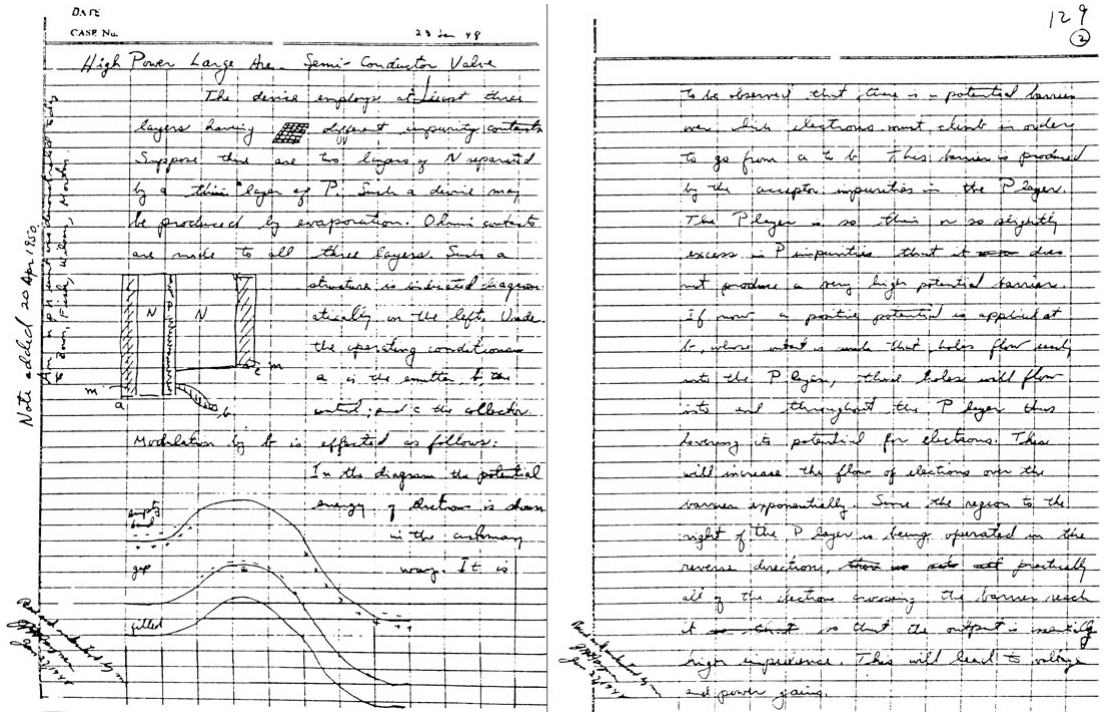
in it was determined that the power gain was the order of 40 or greater. Various people witnessed this test and listened (were present) of whom some were the following R. B. Gibney, H. R. Moore, J. Bardeen G. L. Pearson, W. Shockley, H. Fletcher R. Bown. Mrs. N. R. Moore assisted in setting up the circuit and the demonstration occurred on the afternoon of Dec 23 1947

Read & understood by G. L. Pearson Dec 24, 1947
H. R. Moore Dec 24, 1947

Abb. 2 ***Dieser Eintrag im Laborbuch von Walter Brattain vom 24. 12. 1947 beschreibt die berühmt gewordene Vorführung des Spitzentransistors am Vortag in den Bell Labs.***



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High Power Large Area Semi-Conductor Valve

The device employs at least three layers having different impurity contents. Supporting these are two layers of N separated by a thin layer of P. Such a device may be produced by evaporation. Ohmic contacts are made to all three layers. Such a structure is sketched diagrammatically on the left. Under the operating conditions a is the emitter, b the control, and c the collector. Modulation of b is effected as follows. In the diagram the potential energy of electrons is shown in the customary way. It is

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(2)

To be observed that there is a potential barrier for the electrons which must climb in order to go from a to b. This barrier is produced by the acceptor impurities in the P layer. The P layer is so thin or so slightly in excess of P impurities that it does not produce a very high potential barrier. If now a positive potential is applied at b, where what is made that holes flow easily into the P layer, these holes will flow into and throughout the P layer thus lowering its potential for electrons. This will increase the flow of electrons over the barrier exponentially. Since the region to the right of the P layer is being operated in the reverse direction, there are not practically all of the electrons crossing the barrier reach it ~~so that~~ so that the output is meeting high impedance. This will lead to voltage and power gains.

Abb. 3 ***Die erste und zweite von fünf Seiten, die William Shockley am 23. 1. 1948 in seinem Laborbuch beschrieb. Hier ist bereits eine npn-Struktur im Querschnitt zu sehen und darunter das korrespondierende Bänderschema im Ortsraum.***