DISCUSSION

(pps. 89-91)

E. Schmidt. It is gratifying that high temperature bomb tests are now possible. The new adiabatic compression apparatus allows measurements over a wider range than previously. In Braunschweig we have built a similar apparatus, also operated by compressed air. Similar paths are naturally followed in different quarters because the problem is not clear. For our part however we cannot as yet report on our tests.

Jost. I shall be brief. We agree with the conclusions of Schmidt. We do not completely exclude engine tests but we want to limit them to a minimum. As regards the pressure effect on the ignition law, our disagreement is a controversy on the meaning of "large" and "small". By an effect inversely proportional to the pressure we mean a small pressure effect, such as was also found by Teichmann. Von Weber's tests showed a rather small pressure effect; my figures on reaction velocity agree within accuracy limits with F.A.F. Schmidt's results for pressure effect. I should only remark that we cannot form an opinion on the temperature effect found by Schmidt as long as it is below the ignition lags measured by us. If however Schmidt's figures are correct, then it is no longer the case of the temperature dependence of a reaction velocity producing a heat explosion. The indicated figures cannot be "real" activation heats of a chemical reaction.

F.A.F. Schmidt. The decisive question is whether the pressure effect observed in engine knocking is intrinsic in the reaction process which characterises the fuel; or whether pressure has only an indirect effect on knocking, e.g. through heat transfer. It is highly important whether the pressure effect can be nearly neglected, as assumed by Jost; or whether the pressure affects directly and extensively the reaction process, so that the ratio of pressure and temperature effect is decisive for the investigation. It is not a question of equal results, if the absolute value of the pressure effect found by Jost is about the same as mine (1), whilst the exponents of the temperature effect (2) differ considerably (3); the main question is the relative size of pressure and temperature effects.

It remains to decide whether as a first approximation, and taking into account the very strong temperature effect, the pressure effect can be neglected; or whether the pressure effect in relation to the temperature effect must be introduced as factor and always considered in fuel testing. This is a fundamental difference of theories, which disagree both in meaning and in effect.

H. Teichmann. I should ask Schmidt whether the temperatures in the graph "Ignition lag in terms of temperature" have been taken from the various piston positions at the ignition onset or from a given compression ratio with stationary piston. Undoubtedly it is very

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(1) Pressure exponent $n = 1.1$ to 1.5

(2) b in the expression $\frac{e^{b/T}}{p^n}$

(3) In Jost's investigations very large, in my investigations small.

difficult to determine the temperature when the piston moves; at high compression ratios a 0.1 mm. play may vary the temperature by 20°C. Or else have you measured the time before the ignition onset for a given compression ratio?

F.A.F. Schmidt. The apparatus was systematically examined before starting the tests. The compression temperature was obtained from the measured compression ratio and checked with the measured pressures. The compression ratio test gives the more accurate results.

Teichmann. Then you caught the piston in a certain position.