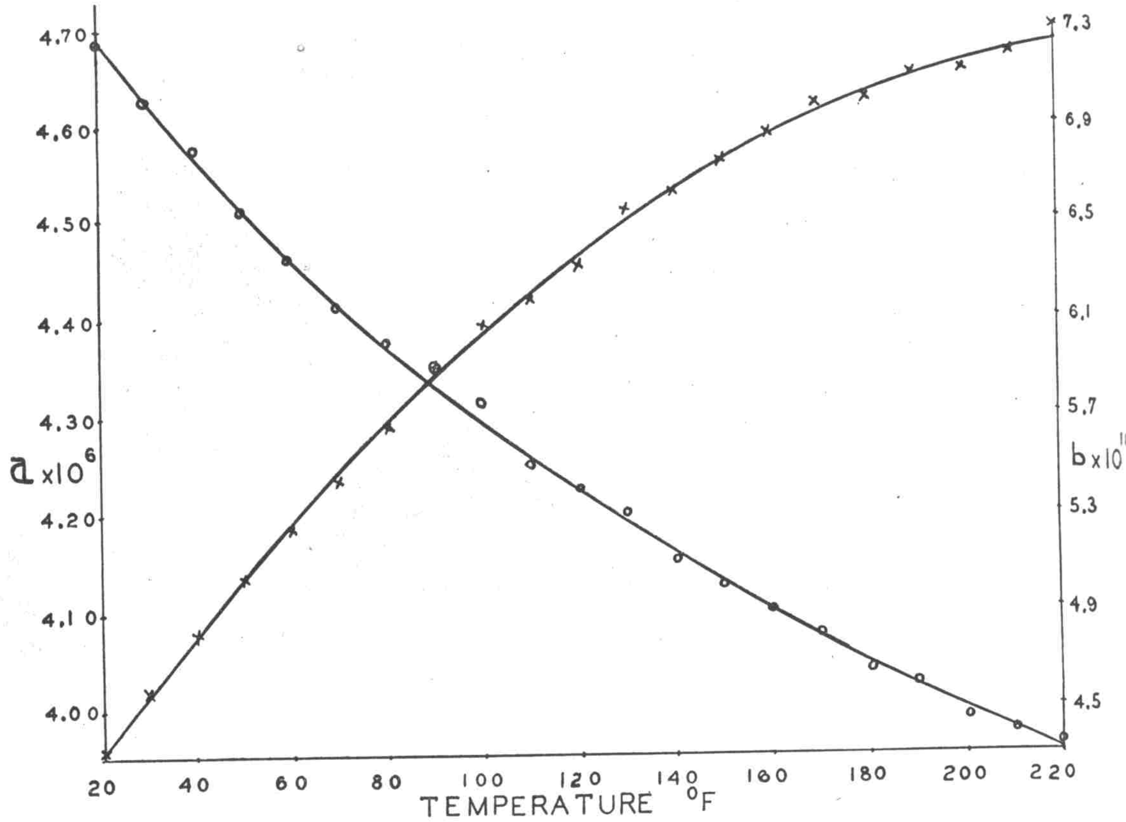

FIG. 1. Calculated values of a and b as functions of temperature; ax, bo.

from values read from smooth curves through these plots.

If the density of an oil is known at atmospheric pressure and it is desired to calculate its density at some other pressure, it is only necessary to refer to the values of a and b of Table II at the temperature under consideration and make the calculation by means of Eq. (1). If the known atmospheric density is at a temperature different from that required in the final answer, the atmospheric density is first adjusted to the desired temperature by means of one of the methods already known to the petroleum industry, as, for example, the National Bureau of Standards tables[6] referred to already.

Discussion

It is the belief of the writers that the system developed in this paper offers the best means so far described for the calculation of density of lubricating oils at various pressures from their known densities at atmospheric pressure. Taking all of the possible sources of error, discussed in a previous section, into account, it is believed that the error in any density computed by this system is not above 3 to 5 percent.

While the density equation, as given above, was derived from data on mineral oils, it is of interest to note that it has been found to hold equally well, using the same table of values for the constants a and b, for animal, vegetable, and fish oils, insofar as there are data available. Hyde[1] obtained data at one temperature on castor oil, trotter oil, rape oil, and sperm oil. Dow[2] obtained data at three temperatures on lard oil and sperm oil. Using the atmospheric densities reported by these investigators for these oils, a number of density computations were made at various pressures and temperatures using Eq. (1). The values so obtained were then compared with the experimental values reported by Hyde and Dow. For ten such calculations made, the equation reproduced the experimental