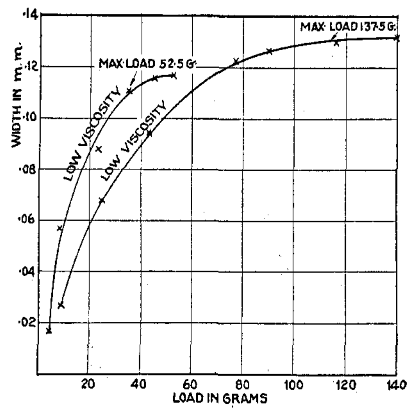

FIGURE 8. CHARACTERISTIC SCRATCH-WIDTH CURVES FOR NITROCELLULOSE

Figure 5. When the width of the scratch produced at each load is measured, this can be plotted as a function of the scratch load. There is thus obtained a characteristic abrasion curve for the surface in question under the given point.

APPEARANCE AND QUALITY OF SCRATCH. It is frequently of value to get an idea of the qualitative character of the scratch, such as tendency to splinter along the furrow, to give a ragged, rough, or smooth furrow, etc. The appearance can, of course, be noticed during the scratch-width measurement, but a permanent record can be obtained by substituting a small camera for the eyepiece micrometer and taking a photograph at low magnification.

EXPERIMENTAL RESULTS

The experimental data presented at this time are given by way of illustration. In Figure 8 are given curves of scratch-width, illustrating the behavior of a low-viscosity nitrocotton film. It can be seen that the scratch seems to start from finite value of the load, which would be practically identical with what has been termed the "scratch susceptibility." The effect of some so-called plasticizers upon the scratch susceptibility is shown in Table I.

TABLE I. EFFECT OF PLASTICIZERS

(Low-viscosity nitrocellulose (half-second), 100 parts)

PLASTICIZER	AMOUNT	THRESHOLD VALUE Max. load, 52.5 grams	Max. load, 137.5 grams
	%	*Grams*	*Grams*
...	..	17	21
Camphor	60	4	9
Triphenylphosphate	60	25	32
Tri-*o*-cresylphosphate	60	34	41
Ethyl phthalate	60	35	47

This shows the distinctly characteristic effect of camphor with nitrocellulose, compared with other so-called plasticizers. To compare these values with other surfaces, the following values may be cited:

SUBSTANCE	THRESHOLD VALUE Max. load, 52.5 grams	Max. load, 137.5 grams
	Grams	*Grams*
Nitrocellulose (low viscosity)	17	21
Nitrocellulose (high viscosity)	14	20
Spar varnish	32	28

The characteristic action of plasticizers actually requires measurement at different proportions, giving a characteristic curve for each plasticizer.

ACKNOWLEDGMENT

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Determination of Melting Points of Special Waxes

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IN THE course of some work on determining the melting points of special waxes, it was noticed that the standard methods—i. e., the drop method, wherein the thermometer bulb is given a thin coating of the wax whose melting point is to be determined, and the capillary tube method, wherein the finely powdered wax is shaken into the tube—were inaccurate. The chief difficulty encountered was that these waxes have the property of becoming transparent and gelatinous at a point varying from 18° to 35° C. below their melting points.

In the case of the capillary tube method, the softening point could not be distinguished from the melting point. In the case of the drop method, the melting and softening points were more easily distinguishable. Nevertheless, neither of the methods was adequate, and, therefore, a method which is applicable to these special waxes and also to other waxes was worked out.

Fill a 4-inch (10.16-cm.) length of 0.25-inch (0.62-cm.) tubing having a $^3/_{16}$-inch (0.58-cm.) bore to a depth of 2 inches (5.08 cm.) with the wax by sucking it up into the tube while molten. Hold the thumb over the unfilled end of the tube and blow on the filled end until the wax has cooled sufficiently to retain its position in the tube. Then lay it down and allow to remain for a half hour to cool to room temperature, leaving it open at both ends. Fasten it to a thermometer so that the upper level of the wax is on a level with the water in the beaker. Raise the temperature at the rate of about 3° C. per minute, and make readings as follows:

1. Softening point = temperature at which wax becomes transparent.
2. Melting point = point at which mass first starts to rise in tube.

Taking Table I as a basis for comparison, in which tests were made on three samples of special waxes and three other standard waxes, the results obtained by all three methods show that:

1. Softening points can be determined in all cases by the float method.
2. Melting points can be determined in all cases by the float method, whereas they cannot be determined accurately by the capillary tube method.
3. Melting points can be determined with greater accuracy by the float method than by the other two methods.
4. The float method is more accurate for the determination of the melting point because the melting point is taken at an exact point rather than at a range of several degrees.

TABLE I. RESULTS OF TESTS

WAX	DROP METHOD S. P.	M. P.	CAPILLARY TUBE S. P.	M. P.	FLOAT TEST S. P.	M. P.
	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*
I. Paraffin	...	56–58	..	54–56	..	56
II. Carnauba wax	...	85–87	..	84–86	..	86
III. Carnauba wax, refined	...	84–86	..	83–85	..	86
IV. Gelowax 1	60	78	?	56–58	59	78
V. Gelowax 2	60	95	?	55–57	60	95
VI. Gelowax 3	56–60	79–87	?	56	60	90

S. P. = softening point; M. P. = melting point.

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