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2,801,540

SCRATCH TESTER

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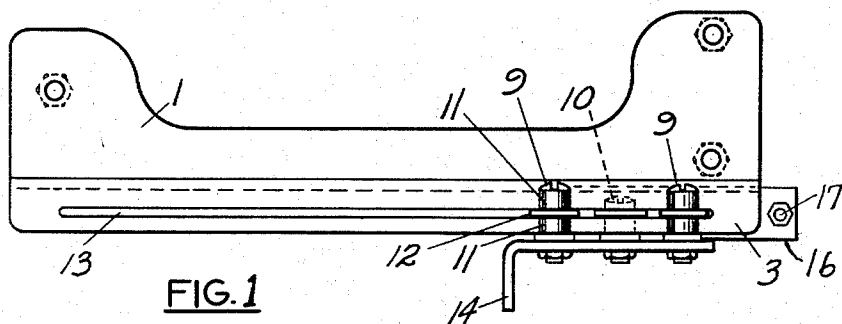


FIG. 1

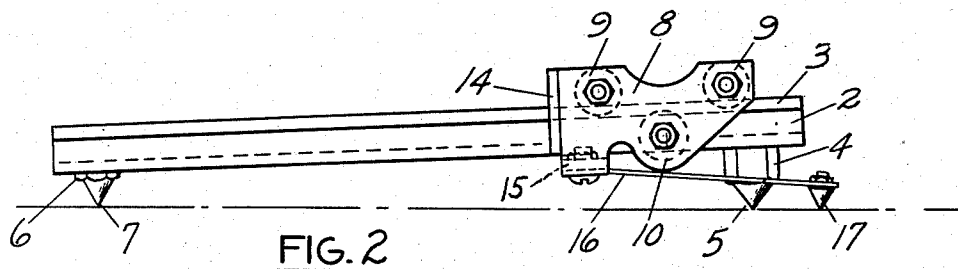


FIG. 2

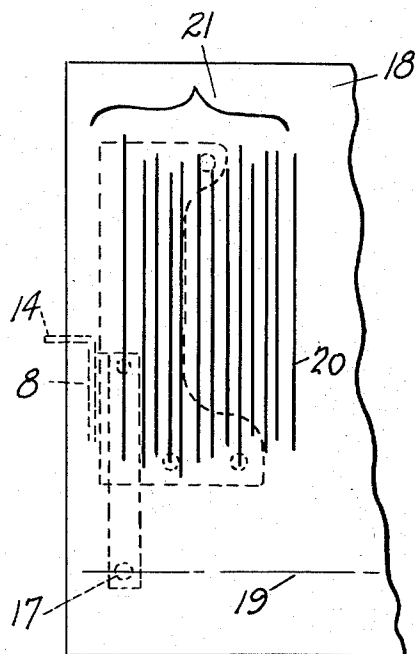


FIG. 4

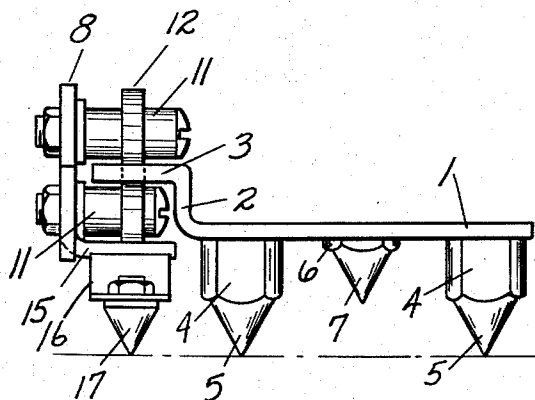


FIG. 3

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SCRATCH TESTER

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4 Claims. (Cl. 73—150)

This invention is a scratch tester for measuring the relative hardness, adhesion, and abrasion resistance of paint films. In a preferred form it comprises a stylus supported on a spring and movable along an inclined track which progressively increases the tension in the spring and thereby produces a corresponding increase in the pressure with which the stylus bears on the paint film. By starting the stylus at the low pressure end of the track and moving it toward the other end of the track, the distance the stylus moves before it breaks through the paint film is a measurement of the scratch hardness and abrasion resistance of the paint. The appearance of the scratch gives an indication of the adhesion. By making a number of scratch tests side by side on the same sample, a statistical average can be obtained which will also reveal variations in the uniformity of application of the paint.

In the drawing, Fig. 1 is a top plan view of the scratch tester, Fig. 2 is an edge view, Fig. 3 is an end view, and Fig. 4 is a view of a sample which has had a plurality of scratch tests.

In the drawing, 1 indicates a flat support having at one side edge an angular section 2 terminating in a flange 3 parallel to the main body of the support. At the front the support is provided with two legs 4, each having points 5 which precisely determine the elevation of the front end of the flange 3 above the supporting surface. At the back there is a single shorter leg 6 likewise terminating in a sharp point 7 which determines the elevation of the rear end of the flange 3. The three legs provide a three point support which accurately locates the flange 3 with respect to a surface and also accurately determines the downward and rearward inclination of the flange 3 with respect to that surface.

From one aspect, the flange 3 serves as an inclined trackway for a carriage 8 which is slidably supported on the flange by upper and lower rollers 9 and 10. Each of the rollers has a cylindrical section 11 which rides on either the upper or the lower surface of the flange 3 and each roller has a larger diameter collar 12 which is slidably received in an elongated slot 13 in the flange. In the particular construction illustrated, there are two upper rollers 9 and one lower roller 10, that being a sufficient number of rollers to provide a stable support for the carriage. The carriage has an outwardly extending tab 14 which serves as a handle by which the carriage may be moved along the slot. The tab 14 projects out away from the flange 3 so that it is readily accessible without in any way interfering with the remainder of the device. On the under side of the carriage is a tab 15 which extends beneath the slot 13 in the flange 3. Substantially directly under the slot 13, there is attached to the tab 15 a cantilever spring 16 carrying at its forward end a stylus 17 which is to engage the paint surface and determine the scratch hardness of the paint. The stylus is made of a material much harder than paint, such as tool steel or tungsten carbide. When the carriage 8 is at the forward or high end of the inclined trackway, the pressure exerted by the stylus 17 on the paint surface is a minimum. As

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the carriage moves toward the back or lower end of the trackway, the pressure progressively increases and finally reaches a value at which the stylus breaks through the paint. By having a plurality of cantilever springs 16, the rate at which the pressure exerted by the stylus on the paint builds up can be varied so that the range of the device can be extended.

When making tests on a test panel 18, for example, the device is arranged normal to a reference line 19 and is positioned so that when the carriage 8 is in its forwardmost position, the stylus 17 is directed above the reference line. Then by moving the carriage rearward, a scratch 20 is obtained starting at the point at which the pressure exerted by the stylus on the paint is sufficient to break through the paint film. If the paint has good adhesion, indicating proper under surface treatment and paint application, the scratch will have clean, sharp, well defined edges. If the adhesion is poor, the scratch will be jagged, indicating a tendency of the paint to flake. Since the paint obviously is never completely uniformly applied it is usually desirable to make a plurality of tests side by side in which case there is produced the random distribution of scratches enclosed by the bracket 21. The random distribution produces an indication of the uniformity of paint application and it also averages out any inaccuracies in the measurement.

The scratch testing can be very quickly made and is entirely independent of the skill of the operator. The operator has no control over the pressure exerted by the stylus on the paint because that is determined entirely by the inclination of the track and the stiffness of the cantilever springs. Since the paint tester is always started with the carriage in the forwardmost position and with the pointed stylus directly above a reference line 19, the initial position can be very accurately determined without requiring extensive training or unusual skill. The point at which the paint breaks through, that is, the beginning of the visible scratch, is very easily determined. The distance between the reference line 19 and the start of the scratch accordingly provides a readily determined measurement of the scratch hardness of the paint.

What is claimed as new is:

1. A paint scratch tester comprising a planar support having supporting legs longer at the front than at the rear for resting on a painted surface and locating the support in a plane inclined downwardly and rearwardly toward said surface, a carriage slidable on said support from front to rear, a cantilever spring fixed at one end to the carriage, and a paint engaging stylus carried on the other end of the spring and exerting a pressure on the paint increasing as the carriage is moved on the support from front to rear whereby the distance from the front to the point at which the stylus breaks through the paint is a measurement of its scratch hardness.

2. A paint scratch tester comprising a support inclined downwardly and rearwardly toward a painted surface, a carriage slidable on said support from front to rear, a cantilever spring fixed at one end to the carriage, and a paint engaging stylus carried on the other end of the spring and exerting a pressure on the paint increasing as the carriage is moved on the support from front to rear whereby the distance from the front to the point at which the stylus breaks through the paint is a measurement of its scratch hardness.

3. A paint scratch tester comprising a supporting frame for resting on a painted surface, a trackway on the frame inclined downwardly and rearwardly toward said surface from front to rear, a carriage on said trackway, a stylus, and a spring between the stylus and carriage for pressing the stylus against the painted surface with pressure increasing as the carriage moves toward the rear of the trackway whereby the distance from the front to the point

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at which the stylus breaks through the paint is a measure of its scratch hardness.

4. A paint scratch tester comprising a trackway inclined downwardly toward a painted surface from front to rear, a stylus, means movably mounting the stylus on the trackway including a spring in force transmitting relation between the stylus and the trackway for pressing the stylus against the painted surface with pressure increasing as the stylus moves toward the rear of the track-

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way whereby the distance from the front to the point at which the stylus breaks through the paint is a measure of its scratch hardness.

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