

APPARATUS FOR ACCELERATED TESTING OF THE LIGHT AND WEATHER RESISTING ABILITY OF DIFFERENT MATERIALS

This application is a continuation of Ser. No. 734,770, filed June 5, 1968, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for the accelerated testing of the sunlight and weather fastness of different materials, i.e., the resistance of these materials to the effects of sunlight and weather.

In order to be able to determine the light and weather fastness of substances such as paints, emulsions, and other materials more rapidly than is possible under natural conditions, testing devices of the prior art have employed centrally located artificial radiation sources. In these prior art devices, the artificial radiation sources are used as a substitute for normal sunlight. The intensity of these artificial radiation sources is made high enough so that the total radiant energy impinging on the test specimens in these devices during the course of one day is considerably greater than the total radiant energy which would impinge on the same specimens if they were exposed to ambient sunlight only, thus greatly accelerating the changes produced by irradiation.

Since materials in actual daily use are not only subject to the action of sunlight, but also to the action of the ambient atmosphere, i.e., to the effects of weathering, it is also necessary in these accelerated testing devices to provide means which subject the test specimens to the simulated effects of ambient atmospheres, i.e., to simulated weathering effects. For this reason, well-known testing apparatuses include both artificial radiation sources and means for subjecting the test specimens to selected atmospheric conditions, i.e., to simulated weathering conditions (see, for example, German Pat. DBP No. 1187401 or the corresponding U.S. Pat. No. 3,224,266 to Hans U. Klippert).

The artificial radiation source used in such devices may be an arc light or a xenon lamp having a spectral energy distribution in the visible and ultraviolet regions which is similar to that of ambient sunlight.

SUMMARY OF THE INVENTION

While these prior art devices have been helpful in reducing the time consumed in testing, the test results produced thereby have not been satisfactorily reproducible. For this reason, these prior art devices have been of limited usefulness in standardization and in comparing the effects of the same sunlight and weathering conditions on different materials. In particular, the test results produced by these devices have been of little value when high intensity irradiation of the test specimens was involved.

I have discovered, however, that useful test results may be obtained at high irradiation intensities, even exceeding the radiation intensities employed in the prior art, when gas-tight container means are employed so that the test specimens can be subjected to atmospheres having different properties than those of ordinary ambient atmosphere.

This discovery is utilized in a preferred embodiment of the present invention wherein one or more gas-tight test containers made at least in part of ray permeable material are disposed about the artificial radiation source, each container being provided with means whereby it can be filled with a selected gas, vapor, or mixture thereof at a selected pressure or whereby such a gas, vapor, or mixture thereof, at a selected pressure, can be passed through it.

According to one embodiment of the invention, a single gas-tight test container may be provided which is of a hollow cylindrical configuration, and this test container may be subdivided into separate sections.

According to a preferred embodiment of the invention, a separate gas-tight container may be provided for each test specimen and these separate containers may be adapted to be mounted in known accelerated testing devices. Thus, known

accelerated testing devices may continue to be used and only the test mounts or specimen carriers thereof need be modified.

It will now be appreciated that these embodiments of the present invention offer very great advantages over the devices of the prior art in which the whole test chamber, including the radiation source and all of the specimen carriers is sealed to permit the introduction of special atmospheres. In addition to permitting individual test specimens to be simultaneously subjected to the action of different atmospheres, and radically reducing the amounts of special atmospheric gases and vapors which must be employed, with the attendant advantage of reducing the time consumed in changing test specimens, and the pumping capacity necessary for effecting such changes, the present invention also eliminates the hazard of immersing the artificial ray source, which may both be hot and present exposed electrical connections, in the special atmosphere of the test chamber. This last feature of the present invention is of particular importance because the special atmospheres employed in carrying out the present invention will often comprise oxygen at pressures greater than those hitherto employed.

It is therefore an object of the present invention to provide improved light and weather fastness testing apparatus by means of which testing may be carried out at high irradiation intensities with reproducibility of test results greater than that hitherto achieved.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention, accordingly, comprises the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a testing apparatus in which a test container according to the invention is mounted.

FIG. 2 represents a test container or chamber according to the invention.

FIG. 3 is a partial side view in section of the structure shown in FIG. 2.

FIG. 4 represents an alternative form of test container according to the invention.

FIG. 5 illustrates in perspective an alternative embodiment of the invention wherein plural test chambers are incorporated in a single structure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a testing apparatus 10 of the prior art in which a test container according to the invention is mounted.

Testing apparatus 10 includes a test chamber 12 along the axis of which is mounted an artificial radiation source 14, e.g., a xenon lamp. A plurality of test mounts 16 are detachably mounted on a ring or flange 18 which rotates about the axis of test chamber 12 and thus causes test mounts 16 to circulate around radiation source 14. Test mounts 16 are further caused to rotate 180° around their own axes during each cycle of circulation around radiation source 14 by means (not shown) the provision of which is within the scope of those having ordinary skill in the art.

Test chamber 12 is provided with means for producing desired atmospheric conditions therewithin, as exemplified by schematically indicated spray device 20.

Each test mount 16 is adapted to carry two test specimens 22, and is provided with spring clamps 24 for maintaining the test specimens in position.