United States Patent

Brooks

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[54] TRAFFIC MACHINE FOR CARPETS

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[52] **U.S. Cl.** **73/7**

[51] **Int. Cl.** **G01n 31/56**

[58] **Field of Search** 73/7

[56] **References Cited**

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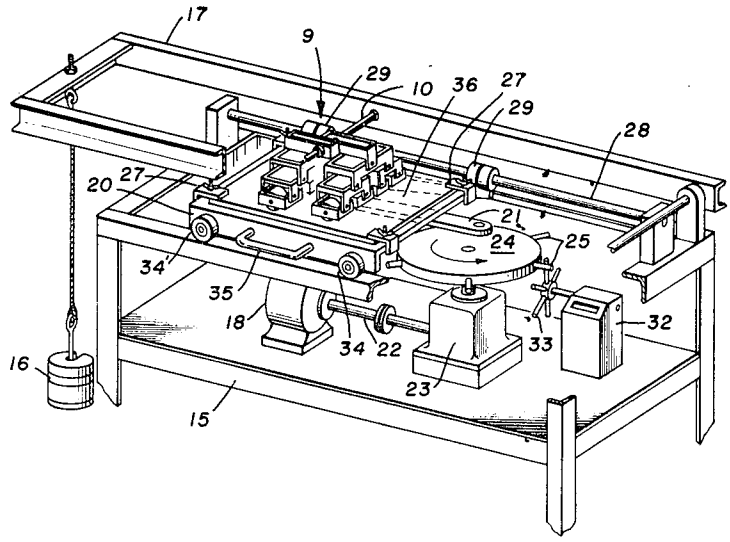
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[57] **ABSTRACT**

A traffic machine for testing carpets to simulate the effect of flat floor wear thereon, said machine having a roller assembly comprising a beam pivotally connected to a lever, the beam being adapted to pivot on an axis substantially parallel to the direction assumed by the path of travel of a table, a plurality of rollers connected to said beam, the rollers being adapted to move substantially perpendicular to the direction of travel of the table.

1 Claim, 2 Drawing Figures



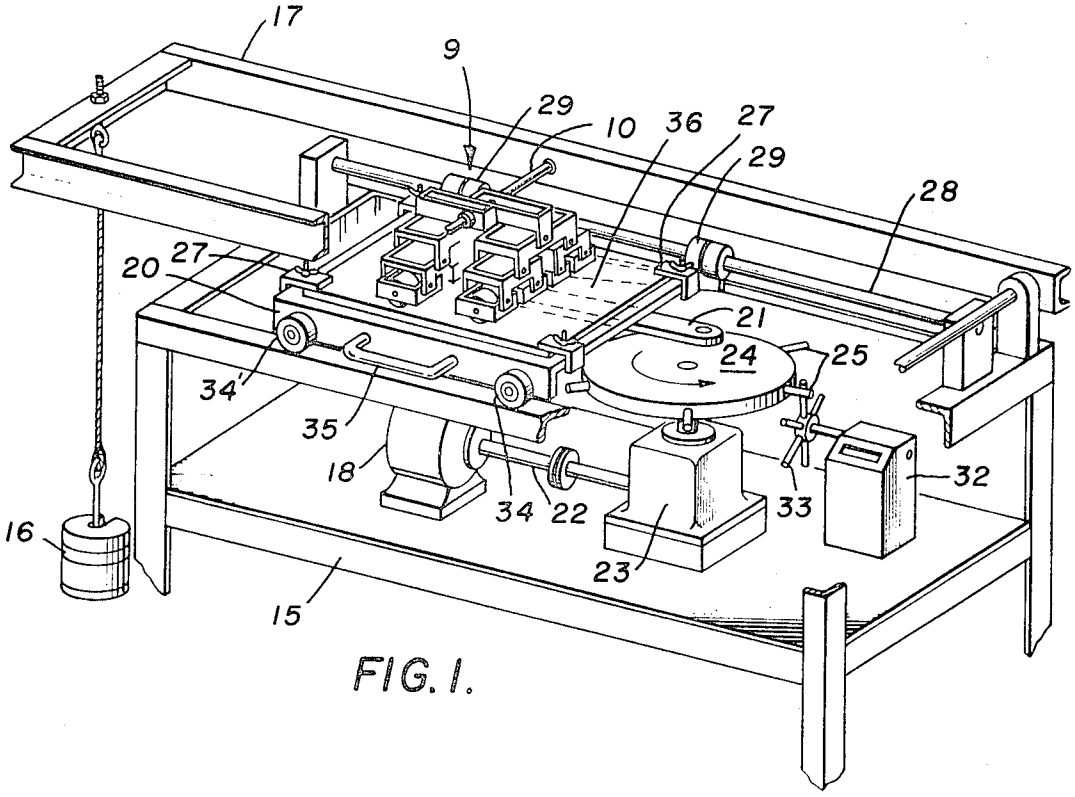


FIG. 1.

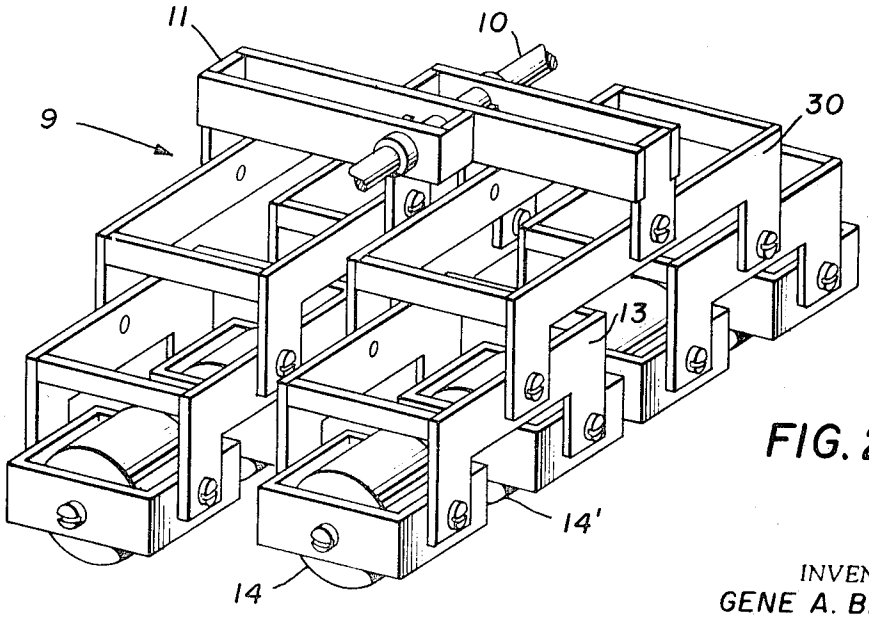


FIG. 2.

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TRAFFIC MACHINE FOR CARPETS

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for testing wear resistance of floor covering and the like. In particular, the subject invention relates to a laboratory method and apparatus for testing carpet to simulate the effect of flat floor wear thereon.

A number of tests such as tensile strength, elongation, abrasion and compression resistance are made upon surface covering to determine the wearing qualities of textile fabrics and related materials. Compression resistance or thickness retention is very important since it is an index to fabric durability and appearance.

Various attempts have been made to develop a laboratory test apparatus to duplicate the wear received by a carpet laid in substantially flat position and subjected to floor traffic. In practice many of the conventional wear testers are not fully satisfactory since test data obtained therefrom cannot be correlated with actual wear data.

As would be apparent the method of actually placing carpet samples under a high amount of floor traffic has disadvantages inherent therein, the most objectionable being, the variability of carpet wear from different steps, lack of control over environmental conditions such as humidity and temperature, the number of samples which can be tested and the time required for obtaining data. In view of the foregoing discussion, it would be highly desirable to have an apparatus capable of performing a simulated wear test and predict how well a carpet will perform in a flat floor installation.

SUMMARY OF THE INVENTION

In evaluation of carpets a number of factors are carefully considered to determine how well a carpet retains its original appearance, thickness and compression properties. Although a number of devices are in current use they often suffer from a lack of positive correlation between actual floor traffic to laboratory traffic simulated by a particular device. A number of factors effect variation in attempting to relate actual specimens to simulated specimens, some factors being the type and kind of footwear employed, average weight of individuals walking over the test specimen, variation in soiling mixtures and the amount thereof, etc.

Surface covering testers are limited generally to impact alone or to impact and abrasion. The subject invention by its constant pressure and rolling action of a novel assembly to be more fully described hereafter serves to compress and abrade the covering reproducing conditions of actual walking traffic. Hence, it now becomes possible to check the wearing properties of a surface covering to be installed, especially the compression characteristics, without actually installing it in the environment in which it is to be used.

It is a primary object of the subject invention to provide a method and apparatus for simulating actual flat floor wear on a test specimen in a uniform manner under controlled environmental conditions.

It is another major object of the invention to provide a method and apparatus to give carpet specimens accelerated wear for obtaining test data in a minimum time period.

Another object of this invention is to provide a method and apparatus for accelerated wearing of carpet specimens whereby the thickness retention of the carpet specimen is directly correlated with actual floor traffic. Other objects and advantages of the present invention will become apparent from the disclosure.

In accordance with the subject invention, it has been discovered that the performance of carpets laid on a flat floor can be accurately predicted from test data recorded in a matter of hours rather than in several weeks normally required by actual field studies for carpet fabricated from natural and synthetic fibers.

A preferred embodiment for accomplishing the objects of the present invention contemplates a frame, a table movably

mounted on the frame, the assembly including a plurality of roller members arranged in a spaced-apart relationship, means for exerting a uniform force upon said assembly during the reciprocation of said table and thus, a specimen supported thereon.

In order to better understand the construction and use of this novel testing device, it will be described in relation to its use for simulating a condition which a carpet encounters when installed on a flat surface face. It is also to be understood that various other uses may be found for this novel apparatus. For example, it could be utilized to test other surface covering such as linoleum, tile, asphalt, concrete, wood and others. Furthermore, the apparatus may be used to simulate conditions wherever impact and abrasion forces exist. Other uses will be readily apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a prospective view of the apparatus of this invention having portions of the apparatus cut away to show selected interior components, and

FIG. 2 is a view of the roller assembly of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the embodiment illustrated in the drawing and, in particular, FIG. 1 a frame **15** supports a motor **18** having a shaft **22** extending into a gearbox **23** which translates the drive motion of said motor **18** to a plate **24** having a number of arms **25** around the periphery thereof. Adjacent the gearbox **23** is a counter **32** having a spoked actuating element in mesh with arms **25** of a plate **24**. A link **21** is attached pivotally to the plate **24**, the other end of which is pinned to the base of a table **20** to permit oscillation of the table **20**. The upper surface of table **20** is employed to hold in place a test specimen via clamps **27**. Table **20** has wheels **34** and **34'** along one side between which a handle **35** is secured. The wheels **34** and **34'** roll along a portion of the frame **15** and support one side of the table **20** while a pair of guide sleeves **29** and **29'** secured to and located along the opposite side of the table **20** are slidably attached to a guide rod **28**. Pivotally attached to the frame **15** is a lever **17** to which is attached at its free end weight **16**.

A principal assembly bar **10** traverses the lever **17** and is attached thereto. Pivotally secured to the bar **10** is the pressure roller assembly designated generally as **9** and more fully shown in FIG. **2** herein. The assembly includes a key beam **11** the terminal portions of which are pivotally attached to a U-shaped structure or intermediate support **30**, each arm of which pivotally couples at least one roller housing **13**. The housing **13** of the assembly support a plurality of rollers **14**, the longitudinal axes of which are parallel to that of the principal assembly bar **10** and at right angle to the direction of movement at table **20**.

As illustrated, an array of eight rollers (2 inches in diameter and 1⅛ inches wide) made of hard rubber are arranged to form the assembly. It is found that the load placed on the assembly by setting on the lever **17** a given weight **16** presents an even distribution over all the rollers **14**, regardless of the irregularities of the surface on which the wheels are running.

The operation of the traffic machine is thus readily apparent. The free end of the lever **17** is lifted and a test specimen **36** is secured to the table **20** by means of clamps **27**. The lever **17** is lowered into position whereby the roller assembly **9** is placed into contact with the test specimen **35**. Weights **16** are placed upon the lever **17** to present a given load upon the specimen to be tested. The motor **18** drives the plate **24** which in turn moves link **21** to reciprocate table **20** upon the frame **15**. Upon rotation of plate **24** the number of revolutions is determined by the counter **32**.

The load exerted on the carpet may be varied over a wide range, preferably from 15 to 500 pounds total load. Thus, the load or pressure on the carpet may be varied from less than 2 pounds per inch of roller up to more than 55 pounds per inch of roller.

Carpet specimens are first measured for thickness and compression and then exposed to the apparatus herein disclosed. After allowing the specimen to recover they are measured for thickness and compression and the percent thickness retained and percent residual compression can be calculated therefrom for various traffic levels and loads.

Carpet thickness denotes the overall thickness of carpet as measured under pressure 0.1 p.s.i. whereas carpet compression denotes the difference between carpet thickness when measured under pressure of 1.0 p.s.i. and that measured under 9.0 p.s.i.

It can be appreciated that the wearing action of the carpet specimen is applied by the plurality of rollers and that the pressure upon the specimen can be maintained constant throughout the test period or can be varied momentarily or over different periods by regulation of the amount of weight placed upon the lever. As illustrated herein, the lever can be subjected to more pressure by the addition or subtraction of weights placed thereon. It is understood that other means for placing pressure of the specimen would become apparent to one skilled in the art as by employing a pressure control valve using gas or fluid therein.

It can also be seen from the foregoing that specimens may be withdrawn easily from the apparatus for measurements to determine by laboratory instruments the degree of wear at different stages of the test period.

Although the specimen may be subjected to various temperatures and conditions specimens are normally maintained at ambient temperature and conditions. At any rate, to determine the optimum characteristics of a particular carpet it is generally necessary to subject it to testing in an environment which duplicates as closely as possible actual environmental conditions.

The rate of reciprocation can be varied over a wide range. Preferably a rate of 26 cycles per minute under pressure of 15 to 25 pounds per inch of roller is adequate.

Speeds and sizes of materials used can be varied, but for testing various types of carpet, certain combinations are more advantageous than others in that they appreciably wear the specimen within a reasonable time and yet do not wear it so rapidly that it becomes difficult to observe and measure small differences in the specimen.

From the foregoing it is apparent that wearability produced by this apparatus is uniform and reliable for accurately predicting future performance of carpets and other floor coverings.

I claim:

1. An apparatus for testing wear resistance properties of a test specimen comprising:
   a. a frame,
   b. a table for supporting the test specimen, said table being movably mounted on the frame;
   c. means for reciprocating said table at a predetermined rate;
   d. a lever mounted pivotally to the frame, a roller assembly mounted on said lever, said assembly including a beam pivotally connected to said lever, said beam being adapted to pivot on an axis substantially parallel to the plane of movement of the table, a plurality of rollers connected to the beam for engaging said test specimen, the rollers being adapted to be moved in a direction substantially perpendicular to the plane of movement of the table; and
   e. means applied to said lever for exerting a uniform force upon said assembly during the reciprocation of said table, and, thus, the test specimen supported thereon.

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