June 5, 1934. R. BURNS 1,961,333

FINISH TESTING METHOD AND APPARATUS

Filed Oct. 23, 1929 2 Sheets-Sheet 1

FIG. 1

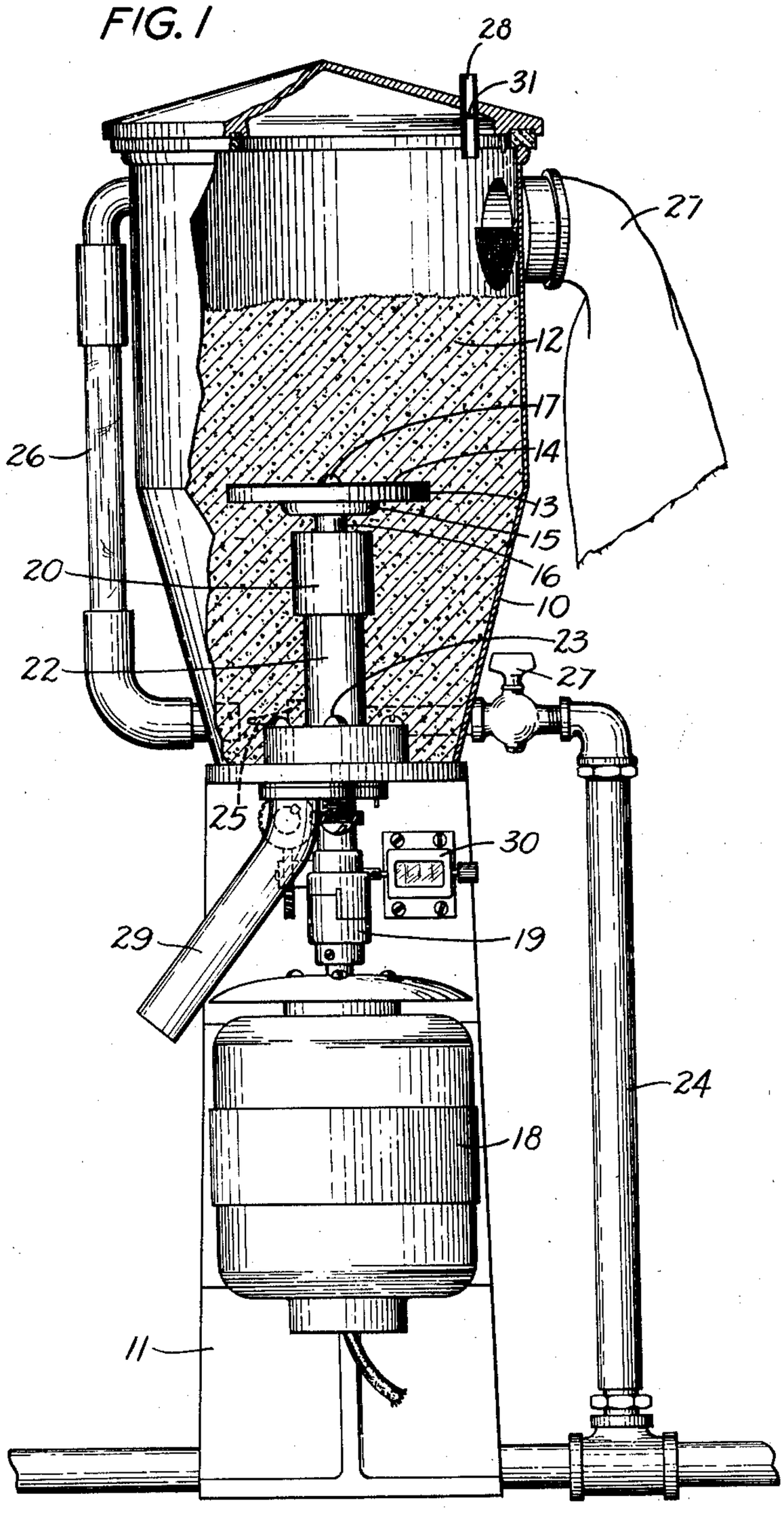

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FIG. 2

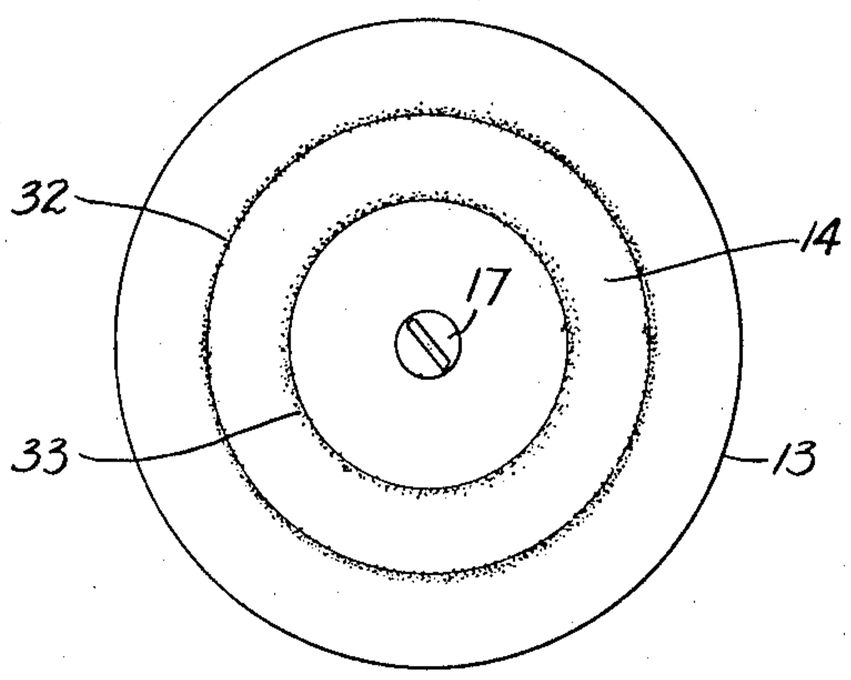
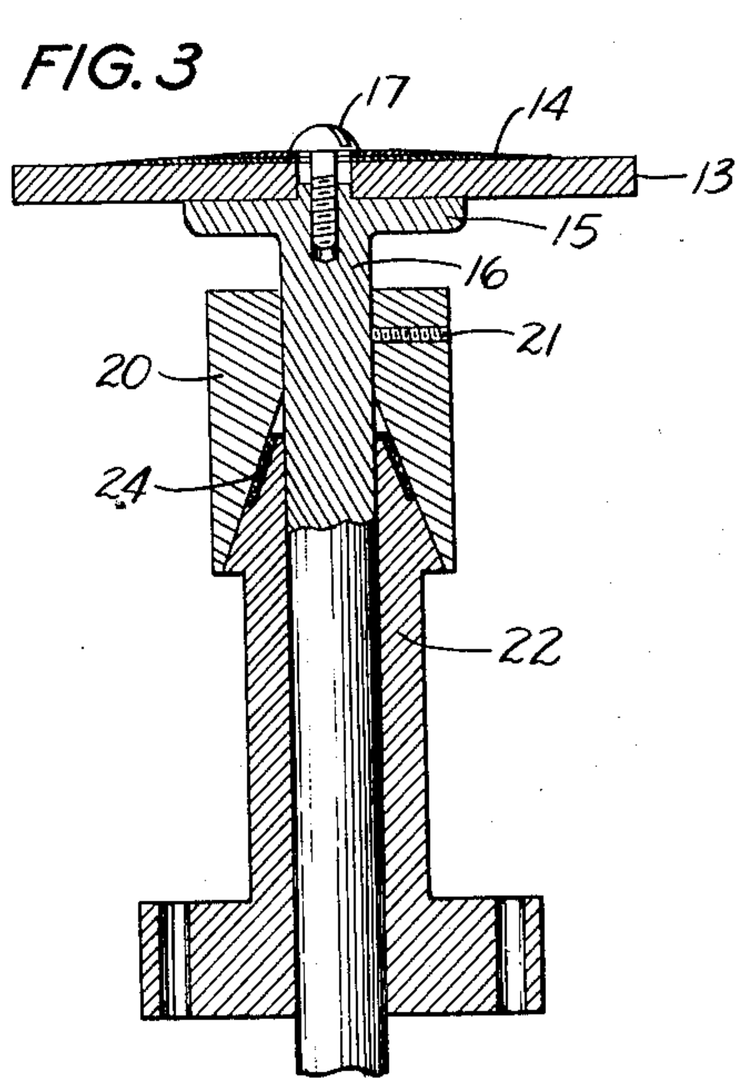


FIG. 3



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Patented June 5, 1934

1,961,333

UNITED STATES PATENT OFFICE

1,961,333

FINISH TESTING METHOD AND APPARATUS

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Application October 23, 1929, Serial No. 401,896

5 Claims. (Cl. 73—51)

This invention relates to testing devices and more particularly to a device for testing the wearing qualities of surface finishes.

In accordance with the present invention the wearing qualities of a surface finish are determined by rotating a member on which a coating of the finish to be tested has been applied in a bath of an abrasive material for a predetermined length of time and noting the amount of finish that has been removed from the member.

In the preferred form of this invention the finish to be tested is applied in any suitable manner to a test piece of the same material as that on which the surface finish is to be used in practice. This test piece may be of any size or shape, although for test purposes it is preferably to employ a thin flat disk having a circular cross section. The surface finish to be tested is then subjected to the action of an abrasive material for a predetermined length of time. This is preferably accomplished by rotating the disk in a hopper containing sand or finely divided carborundum. The rotation of the disk in the abrasive material wears off the surface finish which disappears first at the outer edge and gradually wears in toward the center, thus making it possible to measure the wear quantitatively. In order to prevent the abrasive material from heating and thus softening the finish under test, a current of air is forced through an opening in the bottom of the hopper, thus maintaining the abrasive material in circulation during the test. The dust which is formed due to the constant circulation of the abrasive material is removed by any suitable vacuum arrangement.

A clearer understanding of this invention may be had by reference to the accompanying drawings in which Fig. 1 is a front elevation partly in cross section showing the arrangement of parts embodied in the invention; Fig. 2 a plan view of the test piece and Fig. 3 a cross-sectional view of the test piece and the apparatus for supporting the same.

As shown by Fig. 1 a hopper 10 is mounted on a suitable support 11 and is partially filled with abrasive material 12 such as sand or finely divided carborundum. A test piece 13 on which a layer or a plurality of layers of the surface finish 14 to be tested has been applied is secured to the flange portion 15 of shaft 16 by screw 17 and is adapted to be rotated by power supplied by motor 18 through coupling 19. The test piece 13 which is preferably made from the same material as that on which the particular surface finish is to be used in practice may be of any size or shape but for test purposes it is preferable to use a thin flat disk as shown. To prevent the escape of abrasive material from the hopper which, if permitted, would cause excessive wear on the bearings in which shaft 16 rotates as well as gradually reduce the amount of abrasive material, that portion of the shaft 16 extending into the hopper is enclosed in a housing. This housing, as shown by Fig. 3, comprises a rotatable V shaped bushing 20 which is secured to shaft 16 by set screw 21 and a stationary bushing 22, one end of which is fixedly attached to the base of hopper 10 by screws 23 and the other end of which is adapted to fit snugly into the V shaped bushing 20. A collar 24 of soft material such as felt or rubber serves to prevent any dust from working its way up between the contacting faces of the bushings 20 and 22. In order to prevent the abrasive material from heating and thus softening the finish under test and also to keep clean sharp material in contact with the finish under test, this abrasive material is kept in constant circulation by means of an injector, which comprises a pipe 26 leading from the bottom to the top of the hopper 10 and a similar pipe 24, one end of which is connected to a suitable source of compressed air (not shown) and the other end of which extends into the hopper and terminates in a nozzle 25, the end of this nozzle being slightly separated from the opening in the lower portion of pipe 26. When the stop cock 27 is opened, air is forced through nozzle 25 into pipe 26 and the suction thus formed draws the abrasive material from the bottom portion and redeposits it in the top portion of hopper 10. Any dust formed by the constant circulation of the abrasive material is collected by bag 27, the dust being forced into the bag by the air which escapes from the top portion of pipe 26. The bag 27 is preferably made from a porous material in order to permit the excess air to escape from the hopper. Pipe 28 containing a perforated check valve 31 permits the introduction of additional abrasive material from time to time to take the place of the abrasive material which is removed as dust, thus maintaining the amount of abrasive material substantially constant and also provides an outlet for the excess air in the hopper. A pipe 29 permits a rapid removal of the abrasive material from the hopper 10.

In operation, the test piece, after being provided with the finish to be tested, is buried in the bath of abrasive material 12 and rotated for a predetermined length of time, the number of rotations which the test piece makes during this

interval of time being recorded preferably by a revolution counter 30 attached to shaft 16. During this test and all subsequent tests, care should be taken that the head of abrasive material on the test piece is maintained substantially constant. The rotation of the disk in the abrasive material wears off the finish which disappears first at the outer edge and gradually in towards the center, the actual amount of wear depending upon the number of rotations that the test piece makes in a given period of time and the weight of the head of abrasive material to which the test piece is subjected.

The test piece after being rotated for a predetermined length of time is removed from the abrasive material and the distance that the surface finish has been removed from the outer rim of the test piece in towards the center is measured. This measurement, taken in connection with the number of rotations that the test piece has made and the weight of the head of abrasive material to which the test piece has been subjected, is a measure of the wearing qualities of the finish.

This method of test not only gives a measure of the wearing qualities or surface finishes, but it also may be employed to indicate the number of coats of finish which has been applied to a test piece.

Heretofore it has been difficult if not impossible to determine the number of coats of the same finish which have been applied to a given surface. In accordance with the present invention it is possible to do this since it has been found that the separate coats do not entirely merge but remain separate and distinct from each other to such an extent that a clear line of demarcation becomes visible between the several coats when a test piece so coated is rotated in a bath of abrasive material in accordance with this invention. The rotation of the test piece in the abrasive material first wears away the last coat applied, this coat disappearing first at the periphery and gradually in towards the center of rotation. This leaves a line of demarcation between the last coat applied and the coat immediately underneath. If the rotation of the disk is continued the second last coating applied disappears in a similar manner and also leaves a line of demarcation between it and the coating immediately underneath. By continuing the rotation of the disk a line of demarcation is established between each of the successive coats of finish on the test piece as illustrated for example by Fig. 2 which shows a test piece on which two coats of the surface finish was applied. After rotating the test piece 13 in the bath of abrasive material 12 for a predetermined length of time, the second coating was worn from the periphery of the test piece back to line 32 and the first coating applied was worn from the periphery back to line 33. These lines were distinct lines of demarcation between the test piece and the first and second coats of surface finish respectively.

What is claimed is:

1. The method of testing the wearing qualities of a surface finish which consists in applying a coating of the finish to be tested to a surface of a test piece, rotating said test piece about an axis passing through said coated surface in a bath of an abrasive material for a predetermined length of time and measuring the distance from the center of rotation to the inner periphery of the surface from which the finish has been removed.

2. The method of testing the wearing qualities of a surface finish which consists in applying a coating of the finish to be tested on a surface of a test piece of substantially disc shape of the same material as that on which the surface finish is to be used in practice, rotating said test piece about an axis passing through said coated surface in a chamber containing an abrasive material for a predetermined length of time, maintaining said material in an agitated condition and measuring the distance that the finish has been removed from the outer edge in towards the center of rotation of said test piece.

3. The method of determining the number of coats of finish which has been applied to a given test piece of substantially disc shape which consists in rotating said test piece about an axis passing through the surface of said piece having said coats in a bath of an abrasive material until the finish has been entirely removed from the outer periphery of said test piece, and noting the number of lines of demarcation on the abraded surface.

4. In a testing device a receptacle containing an abrasive material, a member adapted to be coated with the material to be tested, means for causing relative movement between said member and said abrasive material, and means independent of said first means to agitate the entire mass of said abrasive material.

5. The method of testing the wearing qualities of a surface which consists in applying a coating of the finish to be tested to a surface of a test piece of substantially disc shape, rotating said test piece about an axis passing through said coated surface in a bath of an abrasive material and measuring on said test piece the radial distance of exposed surface from which the finish has been removed.

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