M. HOKANSON.

SHOVEL TESTING MACHINE.

APPLICATION FILED SEPT. 11, 1916.

1,350,458.

Patented Aug. 24, 1920.

FIG. 1

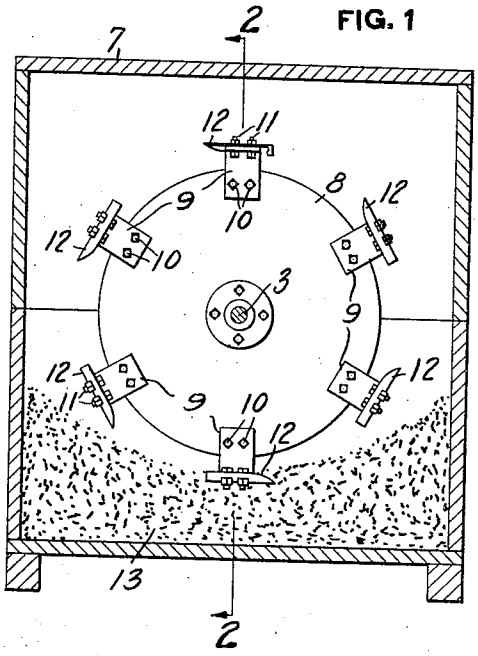


FIG. 2

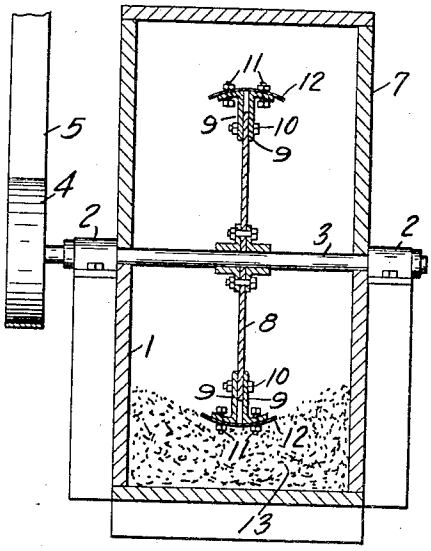
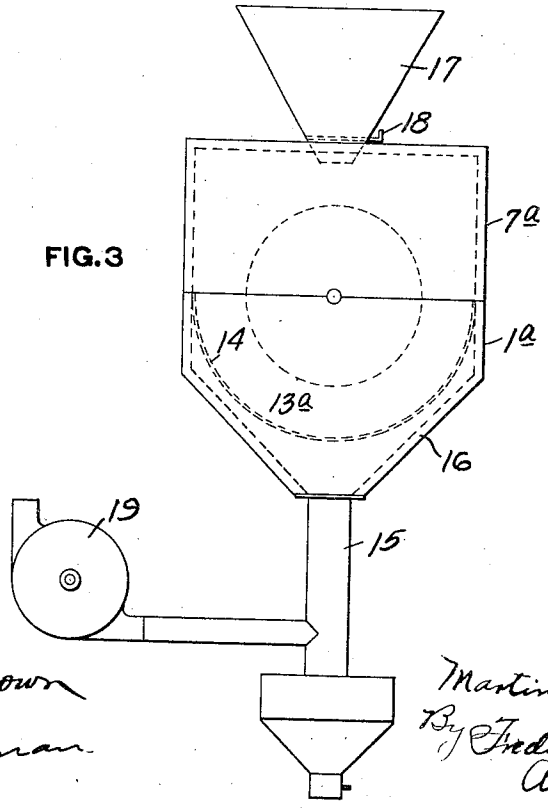


FIG. 3



WITNESSES

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SHOVEL-TESTING MACHINE.

1,350,458. Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed September 11, 1916. Serial No. 119,547.

To all whom it may concern:

Be it known that I, MARTIN HOKANSON, a resident of Duluth, in the county of St. Louis and State of Minnesota, have invented a new and useful Improvement in Shovel-Testing Machines, of which the following is a specification.

This invention relates to machines for testing the blades of tools. The chief object is to provide means for testing the durability of tools used for cutting or digging by causing them to cut through abrasive material a great many times and under conditions closely similar to those of actual use. A further object is to provide means by which a number of blades may be simultaneously tested, under exactly similar conditions, to accurately compare the durability of different blades and also compare new blades with a standard tool. Other objects and uses will appear in the specification.

Referring to the drawings, which illustrate preferred forms of my invention, Figure 1 is an elevation of a shovel testing machine, and a section of the container therefor; Fig. 2 is a central vertical section on the line 2—2 of Fig. 1; and Fig. 3 is a diagrammatic illustration of a modification.

Shovels, spades, scoops, trowels, etc., are subjected to wear at the edges and on their surfaces by abrasion of materials such as earth, sand, gravel, stone, etc., which are handled with such tools. The blades are made of different grades of steel, of varying thicknesses, shapes, etc. It is important for the manufacturer to be able to test the blades of varying qualities and specifications under different conditions of service. My invention provides means for doing this, and means for comparing the blades under any desired conditions of use.

As shown, a dust-tight container 1 carries bearings 2 for a rotary shaft 3 extending through it, and which can be rotated by any suitable means, such as a pulley 4 and belt 5 running to a power shaft. The container is closed by means of a hood 7 which makes a tight joint with the container to prevent the escape of dust. Rigidly mounted on the shaft 3, and midway in the container 1, is a suitable rotor in the form of a wheel or circular disk 8 provided on its periphery with suitable means for readily and temporarily attaching thereto the blades to be tested. As shown, the disk carries a plurality of sets of angle irons 9, each set comprising a pair on opposite sides of the disk and secured thereby by bolts 10. The means for temporarily securing the blades 12 to be tested are shown as bolts 11 which pass through the laterally projecting legs of the angle irons and through the tool blades 12. The container will be provided with a mass of abrasive material 13, such as earth, sand, gravel, crushed stone, ore, etc., according to the test desired or according to the material which the blade is designed to operate in. Usually trap rock of about $\frac{3}{4}''$ screening is used.

The blades to be tested are first carefully measured as to thickness, length, weight, etc., and their cutting edges are noted. If desired one of the blades may be of a certain standard of material and construction, so that the test will constitute a comparison of qualities amounting to a standardization test. The amount of loose material in the box is sufficient to insure that each blade will dig into it, and carry off a normal load. The disk is rotated at any desired speed, say 150 R. P. M. This results in each shovel or other blade digging into the abrasive element, getting a load, and raising and discharging it practically the same as if manually operated, but in rapidly succeeding operations. Thus in a short time the wear incident to the ordinary lifetime of a tool may be applied to it. At intervals the machine is stopped, and the effects of the test noted. The edges will be found to have worn dull, to have broken, gapped, etc., according to the quality, construction and strength of the blades. A blade that will stand up well for sand may not give good results for stone, or a given material may be harder on one type of blade than another, etc., all of which may be determined by this testing machine.

In the operation of the machine the action of the blades being tested grinds up the abrasive material, producing much dust, and it is necessary to replace the material so destroyed by adding more of that element from time to time. In Fig. 3 a container 1^a is illustrated, having a curved screen 14 to retain the abrasive 13^a. This permits the dust to be sifted out and to be drawn off through a pipe 15 leading from the inclined bottom 16 of the box 1^a. A fan 19 may be provided to exhaust the air through the testing box and so aid in drawing off the dust. The hood 7^a may be provided with a hopper,

17, having a gate 18, for supplying additional abrasive when required.

The machine is simple, inexpensive, easy to operate, rapidly tests a number of blades at one time and under conditions closely similar to actual use. These conditions may be changed to correspond to widely different materials to be handled, and varying types of blades and of different qualities may be simultaneously and similarly tested. The many advantages and uses will be obvious.

I claim:—

1. A machine for testing shovel and similar blades to determine their resistance to wear, comprising a rotor having means on its periphery for attaching thereto the blades to be tested, with the blades tangential to the periphery of the rotor and their broad faces normal to the radial plane of the rotor, a casing inclosing said rotor for containing abrasive material of the kind on which the blades are to be used, said casing being provided in its bottom with a screen and with an outlet below said screen for the escape of worn out abrading material, and means to draw air down through the screen and the outlet.

2. A machine for testing shovel and similar blades to determine their resistance to wear, comprising a rotor having means on its periphery for attaching thereto the blades to be tested, with the blades tangential to the periphery of the rotor and their broad faces normal to the radial plane of the rotor, a casing inclosing said rotor for containing abrasive material of the kind on which the blades are to be used, said casing being provided in its bottom with a screen and with an outlet below said screen for the escape of worn out abrading material, and a valved hopper for supplying abrasive material to said casing.

In testimony whereof I have hereunto set my hand.

MARTIN HOKANSON.

Witnesses:
A. B. ANDERSON,
ESTHER RUDD.