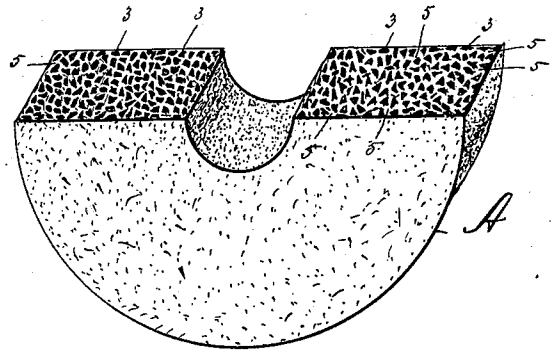
(No Model.)

H. S. LUCAS.

GRINDING WHEEL.

No. 402,682. Patented May 7, 1889.



Witnesses
M. F. Bellamy
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Inventor,
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UNITED STATES PATENT OFFICE.

HEMAN S. LUCAS, OF CHESTER, MASSACHUSETTS.

GRINDING-WHEEL.

SPECIFICATION forming part of Letters Patent No. 402,682, dated May 7, 1889.

Application filed March 26, 1888. Serial No. 268,572. (No model.)

To all whom it may concern:

Be it known that I, HEMAN S. LUCAS, a citizen of the United States, residing at Chester, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Grinding-Wheels, of which the following is a specification.

This invention relates to porous grinding-wheels made from emery, corundum, or similar materials by the admixture therewith of vitrifiable substances—such as alumina, silicate of soda, and similar well-known substances—which have for a long time been used in making what are commonly called "vitrified emery-wheels," the object being to improve the construction of such wheels by adding thereto, after the vitrifaction of their component parts, materials capable of rendering said wheels non-porous and of adding greatly to their strength and durability.

In the drawing forming part of this specification is shown in the single figure thereof a perspective view of a section of an emery-wheel, which illustrates, so far as can be done in a drawing, the herein-described improvements.

In the drawing, A indicates a section of an emery-wheel transversely through its axis, and in which 3 indicates certain of the particles of emery or corundum constituting the main body of the wheel, and 5 indicates the interstices between said particles of emery, the latter being shown in the drawing as separated from each other to a greater degree than would occur in the wheel when broken sectionally, as shown, for the purpose of making it clear that said interstices exist in a vitrified emery-wheel to a greater or less extent, thereby causing the wheel to be porous.

In the manufacture of vitrified emery-wheels the emery or corundum and the above-referred-to vitrifiable substances are mixed together in a moist condition and the wheel is molded to give it the proper size and form, and in that condition it consists of a pasty solid substance. Said wheel is then dried and finally exposed to such a degree of heat in a kiln or oven as will produce the vitrifaction of said substances, which constitute the binding elements which cause the adhesion of the particles of emery or corundum in a wheel form, and the sole dependence of the wheel as to strength of resistance against the centrifugal force occasioned by rotating the wheel at great speed, whereby it is prevented from bursting, is upon the cohesive strength of the aforesaid vitrifiable substances, which unite the particles of emery solely at their points of contact with each other, said substances, in practice, after vitrifaction, not filling the interstices 5 of the wheel, and hence the said porous nature of a vitrified wheel.

The above-referred-to vitrifiable elements, which are in common use with emery or corundum in the construction of vitrified grinding-wheels, do not possess great cohesive strength of themselves, and for this reason the manufacturers of such wheels, when sending them to market for sale, are accustomed to send with them printed directions indicating the maximum speed at which they may be run without danger of breaking, and notwithstanding such caution such breakages, or "bursting," as it is often termed, are almost a daily occurrence, resulting in serious injury almost invariably to persons running such wheels; and the main purpose of the within-described improvements is to so improve a vitrified emery-wheel that it may be run without any especial limit as to speed without danger of bursting the same, and whereby such cohesion of the cutting substances which enter into the construction of the wheel is obtained as permits of constructing the wheel with such acutely-formed edges as more particularly adapts it for use in gumming saws and for similar purposes than has heretofore been possible.

In carrying out my invention I treat a porous vitrified emery-wheel to a solution of glue and water, or of water containing a certain amount of bichromate of potash dissolved therein and glue, allowing said wheel to remain in said solution until the said interstices 5 thereof shall have become wholly charged with said solution, after which the wheel is removed from the latter and dried. The said solution contains glue to such an amount that after the wheel is dried, as aforesaid, the pores of the wheel are substantially solidly filled with the glue, and the latter constitutes a substance of such cohesive nature

and so intermingled and in contact with the vitrified and emery or corundum portions of the wheel that it acts as a binder of great strength and tenacity to hold the parts of the wheel together; and such is the efficiency of said glue in the wheel, as aforesaid, that its resistance to breakage transversely when one edge is held rigidly and a weight applied to the other, or when the opposite edges are supported and a weight is applied centrally therebetween, is more than doubled, and a vitrified emery-wheel whose normal maximum of speed is fourteen hundred revolutions per minute is run safely at three thousand revolutions without breaking.

When the emery-wheel treated as aforesaid is to be run on dry work—that is to say, without water or without being wetted—it may be filled with glue without the addition of bichromate of potash; but when the wheel is to be used for "wet grinding," as it is termed, the requisite quantity of bichromate of potash is added to the solution, which will prevent the glue from becoming dissolved by the water which is in contact with the wheel. Other similar substances than glue may be used to fill up the pores of a vitrified wheel and to a certain extent serve the purpose of glue—as, for instance, a solution of silicate of soda, "liquid glass," as it is sometimes called. This latter substance is applied to the wheel in substantially the same manner as the glue; but its cohesive strength is less than the latter, and therefore the glue is preferable. The pores of the wheel may also be filled with a solution of rubber, if desired, or of shellac.

What I claim as my invention is—

1. A grinding-wheel, substantially as described, consisting of a porous vitrified body and a cohesive substance, as described, applied thereto and filling the pores thereof, substantially as set forth.

2. A grinding-wheel, substantially as described, consisting of a porous vitrified body and a cohesive substance consisting of a composition of glue and bichromate of potash applied thereto and filling the pores thereof, substantially as set forth.

HEMAN S. LUCAS.

Witnesses:
WM. S. BELLOWS,
G. M. CHAMBERLAIN.