

# UNITED STATES PATENT OFFICE.

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## CONSTRUCTION OF GRINDING EMERY-WHEELS.

SPECIFICATION forming part of Letters Patent No. 504,388, dated September 5, 1893.

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*To all whom it may concern:*

Be it known that I, ALLEN JOHNSTON, of Ottumwa, Iowa, have invented a new and useful Improvement in the Construction of Grinding-  
5 Wheels, which is fully set forth in the following specification.

This invention has reference to the manufacture or preparation of abrading surfaces or wheels for use in wet grinding, and is based  
10 upon observation of the action and effect of water in grinding tempered steel articles. When the grinding or abrading wheels are made compact with grains close together, making a surface nearly even, the water is in  
15 great part scraped off by the front edge of the article being ground so that but a thin film of water actually passes between the latter and the grinding surface and this minute quantity of water is quickly evaporated by  
20 the heat generated in grinding. This is especially the case in grinding wide surfaces, the water being often entirely dissipated before passing across the entire face of the article being ground. The result is that the  
25 temper of the article is likely to be drawn by the heat which the water is intended to absorb, and the wheel to be softened and disintegrated too soon to permit the performance of the required amount of work. These detrimental effects will, of course, be obviated if  
30 sufficient water can be supplied across the entire face of the article being ground to conduct away the heat and keep the temperature of the surfaces in contact below the point at  
35 which the temper is affected. Moreover, by applying a sufficient quantity of water a deeper cut can be made upon the article being ground. According to the present invention these results are attained by incorporating  
40 with the emery or other abrading material and the binder, a substance which absorbs or is soluble in water, which substance is dissolved out or loosened from the grinder and washed away by the water, leaving in-  
45 terstices which are occupied by the water during the grinding operation. This soluble substance is most conveniently applied in the form of grains and I have found common salt to be the substance most suitable to the pur-  
50 pose, in point of economy and efficiency. This substance quickly absorbs water, speed-

ily dissolves, and is washed and swept away in the grinding process.

The mode of preparation of the wheel will vary according to the precise use for which  
55 it is designed. If the article to be ground is narrow, say half an inch in width, a comparatively small amount of water will be required between the article and grinder. But in grinding articles of greater width, say six  
60 inches, a greater proportion of water with respect to the area of the surface acted upon will be required since each grain of emery, in this case, in contact with the article and subjected to friction for a relatively long period  
65 of time, and more heat is generated. Provision for a greater or less quantity of water is made by varying the proportions, or the size of the grains, of the soluble material. It is obvious that the larger the grains of the solu-  
70 ble material, the larger will be the spaces left for occupation of the water when dissolved out by the water.

According to my invention an ordinary wheel for common use in grinding steel is  
75 composed of emery, shellac, and common salt, in the following proportions:—emery six pounds, shellac one pound, and salt one pound, but these proportions can be varied within considerable limits, and should be va-  
80 ried to obtain the best results according to the use for which the wheel is designed, and the kind of abrading material used.

In preparing the wheel the shellac is rendered fluid by heat and mixed with the salt  
85 and abrading material. The shellac when in a melted state does not dissolve or destroy the granular condition of the salt. I do not, of course, confine myself to any specific abrading material or to any specific soluble mate-  
90 rial, or to any specific binding agent, since any known or suitable materials for these purposes may be employed, and though common salt is mentioned as particularly available for the purposes of the invention, it is  
95 obvious that its objects will be measurably accomplished by any substance which is absorbent of or soluble in water, and is readily removed in the operation leaving interstices or spaces by means of which water is sup-  
100 plied in sufficient quantity between the grinder and the article ground thereon. A



result practically the same, for the purposes of the invention, may be obtained by using salts or granular substances not soluble in water, but which can be dissolved out by  
5 other liquids as oil, which may be used during or preceding the grinding operation.

From the theoretical considerations stated it will be understood that a wheel constructed according to this invention will cut much  
10 faster and with better results than a wheel similarly made, but without the soluble or absorbent ingredient. This is verified in practice and it is moreover found that the improved wheel can, with very advantageous  
15 results, be employed in grinding steel, cast-iron, marble, granite, oil stone, and other substances not easily ground upon ordinary composition or artificial grind-stones.

Having thus described my invention, what  
20 I claim as new is—

1. A grinding surface or wheel composed of abrading material, a binder, and a substance

readily absorbent of or soluble in water or other liquid, substantially as described.

2. A grinding-wheel composed of emery, a  
25 suitable binder, and a substance soluble in water or other liquid incorporated into the wheel in the form of fine particles of grains, substantially as described.

3. A grinding wheel composed of abrading  
30 material, a binding agent, and common salt, substantially as described.

4. A grinding wheel composed of emery, shellac, and common salt in approximately  
35 the proportions specified, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALLEN JOHNSTON.

Witnesses:

J. T. HACKWORTH,  
GEO. F. HALL.