

F. W. ROBERTS.

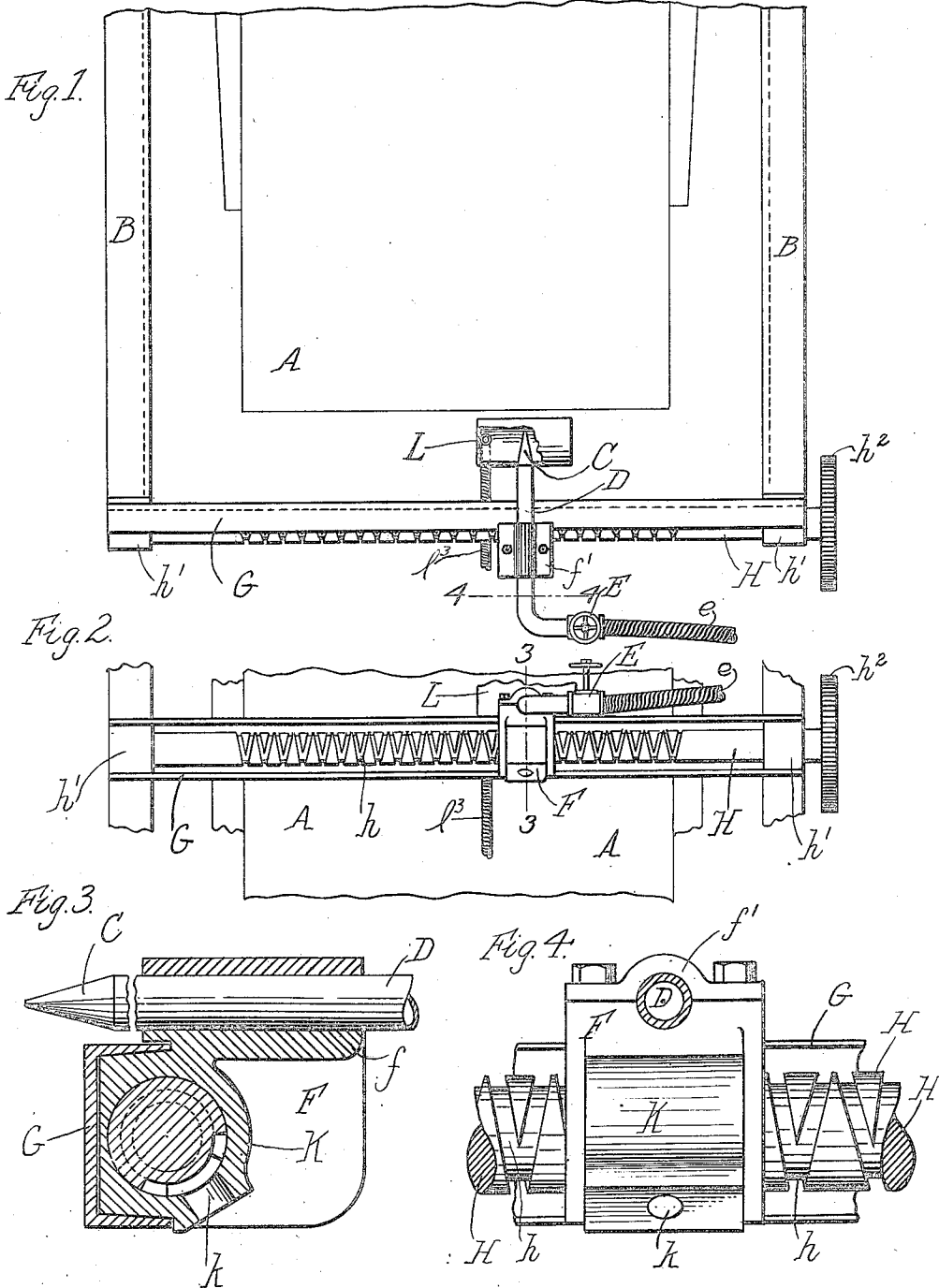
METHOD OF AND APPARATUS FOR DRESSING GRINDSTONES AND THE LIKE.

APPLICATION FILED APR. 13, 1920.

1,413,060.

Patented Apr. 18, 1922.

3 SHEETS—SHEET 1.

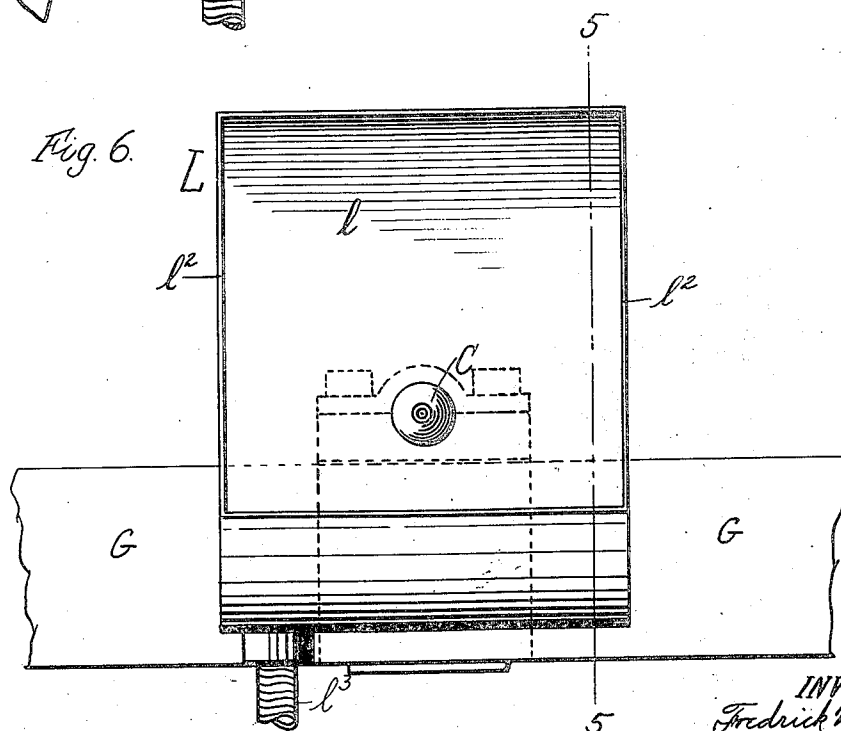
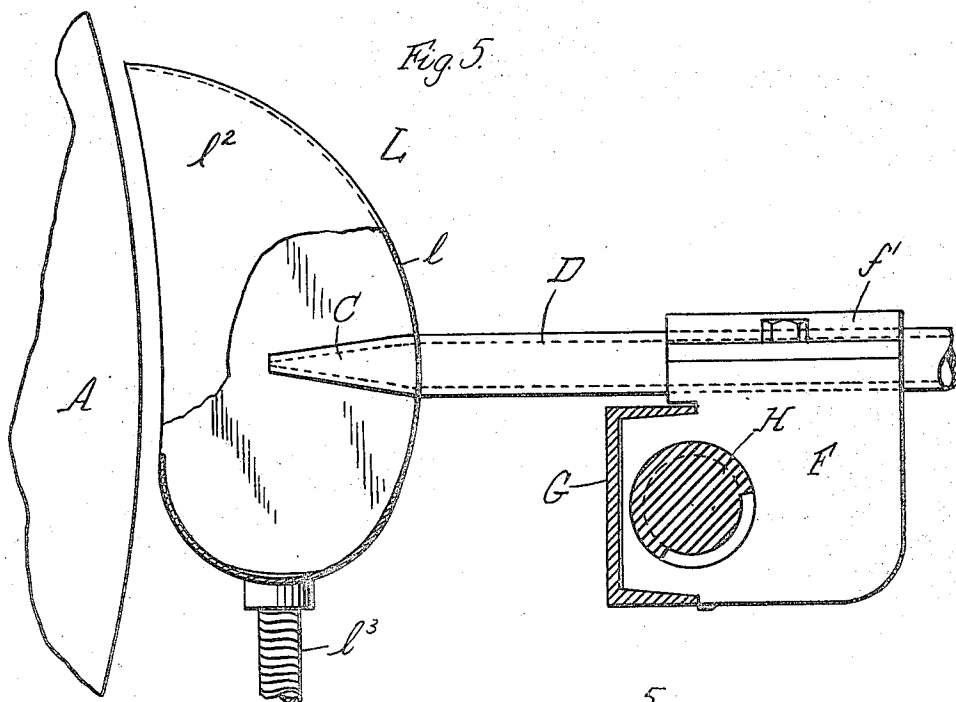


INVENTOR
Fredrick W. Roberts
B. Parker & Co.
 ATTORNEYS

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INVENTOR
Fredrick W. Roberts
BY *Parker & Prochnow*
ATTORNEYS

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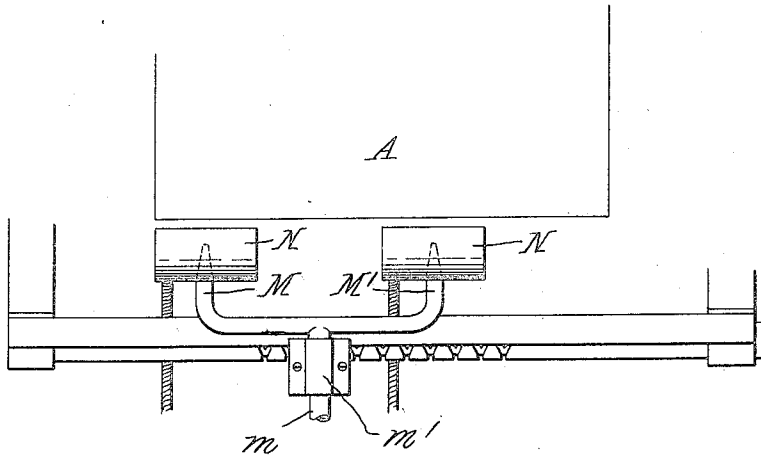
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3 SHEETS—SHEET 3.

Fig. 7



INVENTOR.
Fredrick W. Roberts
by *Parker & Prosser*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

FREDRICK W. ROBERTS, OF LOCKPORT, NEW YORK, ASSIGNOR TO ROBERTS MANUFACTURING CO., OF LOCKPORT, NEW YORK.

METHOD OF AND APPARATUS FOR DRESSING GRINDSTONES AND THE LIKE.

1,413,060.

Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed April 13, 1920. Serial No. 373,475.

To all whom it may concern:

Be it known that I, FREDRICK W. ROBERTS, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented a new and useful Improvement in Methods of and Apparatus for Dressing Grindstones and the like, of which the following is a specification.

This invention relates to methods and apparatus for facing or dressing grind stones.

After a grind stone has been used for some time, the surface thereof becomes smooth so that the abrasive action of the stone is greatly reduced. It is thus necessary to dress or face the stone and this has commonly been done by means of a burr or dressing tool which removes a part of the surface of the stone, and the fresh surface thus produced has a greater abrasive action. In the making of wood pulp there is a gradual decrease in quantity and change in quality of the pulp produced by a stone from the time a stone is dressed until it is necessary to again dress the stone.

The objects of this invention are to produce an improved method of and apparatus for dressing or facing grind stones; also to provide a method and apparatus which may act on the stone continuously, thereby keeping the stone in operation at its greatest efficiency; also to provide a method and apparatus of this kind by means of which the condition of the surface of the stone can be controlled as desired; also, to provide a method and apparatus of this kind by means of which sand or grit removed from the stone is not mixed with the material which is being ground so that if the stone is used in connection with the manufacture of wood pulp, this sand or grit does not mix with the wood pulp; also to improve the construction of apparatus of this kind in other respects hereinafter specified.

In the accompanying drawings:

Fig. 1 is a top plan view of a part of a grind stone and its housing, having a dressing apparatus embodying the invention arranged on the housing.

Fig. 2 is an elevation thereof.

Fig. 3 is a sectional elevation thereof, on an enlarged scale, on line 3—3 Fig. 2.

Fig. 4 is a fragmentary elevation thereof showing the travelling carriage of the apparatus.

Fig. 5 is a sectional elevation thereof on line 5—5, Fig. 6.

Fig. 6 is a fragmentary end view of the trough for receiving the water and sand from the stone.

Fig. 7 is a top plan view of a dressing apparatus of modified construction.

In the drawings and description the invention is disclosed as being applied to apparatus for dressing grind stones of a kind used for making wood pulp, but it is not intended to limit the invention to such use since the apparatus could be equally well used for dressing grind stones of other kinds, as shown in Fig. 7, in which M M' represent two nozzles which are connected to a common pipe or tube *m*, secured on a carriage *m'*. The travel of the carriage in this case is about one-half of that shown in Figs. 1 and 2. Each nozzle in the construction shown in this figure is also provided with a trough N for receiving the water and particles of stone or other stone articles.

In the use of grind stones, the surface of the stone becomes worn smooth by continual use, the smooth surface being due partly to the fact that the face of the stone itself is worn down by the material which is being ground, and that particles of the material become embedded in the depressions and interstices of the stone. When the stone is in this condition it has heretofore been customary to remove the smooth surface by means of a hard substance, such as a burr or dressing tool, and thereby produce a new surface. In accordance with my improved method, a small jet of water or other liquid is projected at the surface of the grind stone at a high pressure, in such a manner that the particles of foreign matter are washed out of the stone and small particles of the stone itself are washed or broken out or eroded by the force of the stream of water, thereby producing a roughened or cutting surface on the stone. I have found that

stones of the kind commonly used for grinding wood pulp, for sharpening tools, and for other purposes can be readily dressed or faced by the erosive action of a jet of liquid projected at the stone by high pressure. This jet of water may be used only at intervals when the surface of the stone needs dressing, but is preferably kept in practically continuous operation and moved across the surface of the stone in such a manner as to keep all particles of the stone in good cutting condition. The pressure at which the water is projected at the face of the stone can be regulated in accordance with the hardness of the stone or in accordance with the surface desired on the stone. For example, when the method is used in connection with a wood pulp grinding stone, by projecting a jet of water at a high pressure at the surface of the stone, the surface is roughened to a greater extent than when the pressure is lower. Consequently with a high pressure the stone is kept in a condition to produce a large quantity of coarse grade of pulp. When the pressure is reduced the surface of the stone is roughened to a lesser extent, thus producing a finer grade of pulp. The stream of water may be directed from one or more nozzles which preferably move across the surface of the stone. By keeping the jet of water continuously projected at the stone during the time that the stone is in operation, the surface of the grind stone is continually kept sharp so that the stone operates at its maximum efficiency practically all of the time, while with the use of burrs or dressing tools, the grind stone was sharpened only at considerable intervals of time which results in a gradual decrease in efficiency and a continual change in the quality and quantity of pulp produced.

The pressure at which the water is supplied to the nozzle varies in accordance with the work to be done by the stone and the hardness of the stone, and pressures varying from 150 pounds to 2000 pounds or more per square inch may be used. By varying the pressure of the water projected at the stone, the condition of the face of the stone can be controlled as may be desired, so that the quality of the pulp produced can be kept under the control of the operator, and is not dependent upon the judgment of the laborers who operate the grind stones.

In accordance with the method, it is also possible to prevent a large percentage of the sand or particles of the stone removed by the jet of water from mixing with the paper pulp. This may be done by collecting the water deflected from the stone and draining it from the apparatus. Consequently when this method of dressing grind stones is used in connection with pulp grinders, a large percentage of the sand or

particles of the stone is kept out of the pulp, thereby producing a better grade of paper.

The apparatus shown in the drawings and embodying the invention is constructed as follows:—

A represents the grind stone and B represents the housing in which the stone is mounted to rotate about a horizontal axis. These parts may be of any suitable or desired construction and of themselves constitute no part of this invention.

C represents the nozzle by means of which a jet of water or other liquid is projected against the face of the stone A. This nozzle may be of any suitable construction, being preferably so formed as to project the water in a substantially unbroken stream at the stone. In the construction shown, the nozzle is mounted on a pipe D and the pressure of the water discharged through the nozzle may be regulated by any suitable or desired means, such, for example, as a reducing or regulating valve E, which, in the construction shown, is arranged on the pipe D and connected by means of a hose or flexible tube *e* with any suitable source of water supply.

Any desired means may be employed for moving the nozzle back and forth across the face of the stone while the same is being revolved. In the construction shown for this purpose, the pipe D is mounted on a carriage F which is mounted to slide back and forth on a guide rail or track G suitably secured to the grinder frame B. The track G in the construction shown, consists of a channel beam or member, the outer portions of the flanges of which form guides for the carriage F. This carriage has a portion *f* which extends upwardly beyond the upper face of the channel G and to which the pipe D is adjustably secured. In the construction shown for this purpose, a cap or clamping member *f'* secured to the extension *f* of the carriage serves to hold the pipe D in any desired position relatively to the carriage F so that the nozzle C may be moved toward and from the surface of the stone. Consequently, as the stone becomes worn down and of smaller diameter, the nozzle may be advanced toward the face of the stone.

In order to move the carriage back and forth lengthwise of the guide track G a shaft H is provided which has a double spiral screw thread or groove *h*. The shaft is suitably journaled in bearings *h'* arranged at the ends of the guide track G, and may be rotated in any suitable manner, for example, by means of a sprocket or gear wheel *h*². The screw *h* consists of spiral grooves extending around the shaft in opposite directions and having their ends connected to form a continuous thread. The shaft H extends through a hole formed in a part K of the carriage F, and a key or

spline *k* is pivoted in the portion *K* of the carriage and extends into the spiral groove *h*. Consequently, when the shaft *H* is rotated, the key *k* following the groove causes the carriage to move back and forth lengthwise of the shaft. Any other means for moving the nozzle *C* back and forth across the face of the stone may be employed.

In order to prevent the sand or particles of the stone which are removed by the jet of water from passing into the pulp or ground material, a trough *L* is preferably provided which is adapted to collect the water deflected from the stone and which in the construction shown, is secured to the nozzle *C*. This trough includes a curved wall *l*, and side walls *l'* and the edges of the walls are arranged to extend into close proximity to the stone so that the water which is deflected from the stone is caught by the trough *L*. The bottom of the trough is provided with a discharge opening to which a flexible discharge tube or the like *l''* is secured. By means of this construction any of the particles of the stone which are washed away by the stream of water are carried away from the stone and thus do not mix with the ground material.

The discharge orifice in the nozzle need only be of comparatively small diameter, a $\frac{1}{32}$ inch opening having been found satisfactory. Consequently, the apparatus uses only a small quantity of water. If it is desired to produce a greater erosive action on the stone, a plurality of nozzles may be provided.

The erosive action of the jet of water on the stone may also be varied, if desired, by arranging the nozzle from which the jet is discharged at different distances from the face of the stone. This can easily be done by releasing the cap or clamping member *f'* and moving the nozzle toward or from the face of the stone as may be desired. If the nozzle is arranged at a distance from the stone the jet will obviously have a less erosive action thereon than if the nozzle is nearer to the stone.

The erosive action of the jet of water can be used to good advantage in connection with burrs on dressing tools as heretofore used, the dressing tools being used on the stone at much greater intervals of time when the water jet is used than when the dressing of the stone is done by burrs or dressing tools only. The burr produces grooves or depressions in the face of the stone which to a certain extent control the nature of the pulp produced and these depressions in the stone are kept clean and in good cutting condition by the erosive action of the water. It is also desirable at intervals to dress the face of the stone by a burr or other dressing tool for the purpose of keeping the periphery of the stone concentric with the axis

thereof. Very good results can therefore be obtained by occasionally dressing the stone with a dressing tool to produce the desired surface thereon and thus keeping the surface so produced in good cutting condition and the stone working at its highest efficiency by the use of the jets of water.

I claim as my invention:

1. The hereindescribed method of dressing grind-stones and the like consisting of directing a jet of liquid at the part of the stone to be dressed and moving said jet and said stone relatively to each other while said stone is being dressed.

2. The hereindescribed method of dressing grind-stones and the like consisting of directing a jet of liquid at a high pressure at different parts of the surface of the stone to be dressed so that the entire surface to be dressed is subjected to the erosive action of the jet of liquid.

3. The hereindescribed method of dressing grind-stones and the like consisting of subjecting the face of the stone to the erosive action of a jet of liquid while the stone is rotating.

4. The hereindescribed method of dressing grind-stones and the like consisting of subjecting the face of the stone to the erosive action of a jet of liquid while the stone is rotating, and moving said jet across the surface of the stone.

5. The hereindescribed method of dressing grind stones and the like consisting of subjecting all portions of the surface to be dressed to the erosive action of a jet of liquid, and continuing said action during the use of the stone.

6. The hereindescribed method of continuously dressing grind stones and the like while the same are in use, consisting of directing a jet of liquid at high pressure at the face of the stone while the same is rotating, and continually moving the jet transversely of the face to be dressed.

7. The hereindescribed method of dressing grind stones and the like consisting of directing a jet of liquid at a high pressure at the part of the stone to be dressed, and draining the liquid and particles of the stone deflected from the stone to keep the particles of the stone out of the material which is being ground.

8. The hereindescribed method of dressing grind stones and the like consisting of directing a jet of liquid at a high pressure at the part of the stone to be dressed, said stone and jet being movable relatively to each other to cause said jet to act on all parts of the surface to be dressed and controlling the pressure of the liquid to vary the extent to which the stone is dressed.

9. The hereindescribed method of dressing pulp grind stones consisting of directing a jet of liquid at a high velocity at the cut-

ting face of the stone, varying the velocity of the liquid in the jet in accordance with the nature of the pulp desired, and moving the jet continuously across the surface of the stone transversely to the direction of the movement of the stone.

10. An apparatus for dressing grind stones and the like consisting of a nozzle arranged in operative relation to the stone and adapted to direct a jet of liquid at high pressure at the face of the stone, said nozzle and stone being movable relatively to each other to cause the jet to be directed to all portions of the surface to be dressed.

11. An apparatus for dressing rotary grind stones and the like consisting of a nozzle arranged in operative relation to the stone and adapted to direct a jet of liquid at high pressure at the face of the stone, and means for continuously moving said nozzle transversely of the direction of movement of the circumferential portions of the stone.

12. An apparatus for dressing grind stones and the like consisting of a nozzle arranged in operative relation to the stone and adapted to direct a jet of liquid at high pressure at the face of the stone, means for producing relative movement between said stone and said jet to cause said jet to act on all portions of the surface to be dressed and means for regulating the pressure at which the liquid is discharged to the stone.

13. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, a carriage in which said nozzle is held, and means for moving said carriage transversely of said stone.

14. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, a carriage in which said nozzle is held and which is movable transversely of the surface to be dressed, and means on said carriage for adjustably holding said nozzle at different distances from the stone.

15. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, a carriage in which said nozzle is held, a track for guiding the carriage, and means for moving the carriage back and forth across the face of the stone.

16. An apparatus for dressing grind stones

and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, and means for catching the water and particles of stone deflected from said stone.

17. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, and means mounted on said nozzle and adapted to receive water and particles of stone deflected from the surface of said stone.

18. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, a carriage in which said nozzle is held, a trough movable with said carriage and extending into close proximity to said stone and receiving water and material washed from said stone, and means for draining the material from said trough.

19. An apparatus for dressing grind stones and the like including a nozzle for directing a jet of liquid at a high velocity against the surface of the stone, means for moving said nozzle back and forth across the surface of said stone, and means for regulating the velocity at which the liquid is discharged from said nozzle.

20. The hereindescribed method of dressing grind-stones and the like consisting of dressing the stone in the usual manner by means of a dressing tool, and keeping the cutting face of the stone sharp by the erosive action of a jet of liquid.

21. The hereindescribed method of dressing grind-stones and the like consisting of providing the cutting face of the stone with the desired surface by means of a dressing tool, and keeping the surface thus produced sharp by the erosive action of a jet of liquid of high velocity.

22. The hereindescribed method of dressing grind-stones and the like consisting of subjecting all portions of the surface to be dressed to the erosive action of a jet of liquid while the stone is rotating, and varying the extent of the erosive action of the jet.

Witness my hand this 12th day of April, 1920.

FREDRICK W. ROBERTS.

Witnesses:

F. E. PROCHNOW,

M. J. PITMAN.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,413,060, granted April 18, 1922, upon the application of Fredrick W. Roberts, of Lockport, New York, for an improvement in "Methods of and Apparatus for Dressing Grindstones and the Like," errors appear in the printed specification requiring correction as follows: Page 1, line 70, commencing with the word "as", strike out all to and including the word "stone", line 78; page 3, line 36, after the syllable "vided" and before the period insert the comma and words "*as shown in Fig. 7, in which M M' represent two nozzles which are connected to a common pipe or tube m, secured on a carriage m'. The travel of the carriage in this case is about one-half of that shown in Figs. 1 and 2. Each nozzle in the construction shown in this figure is also provided with a trough N for receiving the water and particles of stone*"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of May, A. D., 1922.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.