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2,655,909

FLAME FINISHING OF GRANITE SURFACES

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Fig. 1.

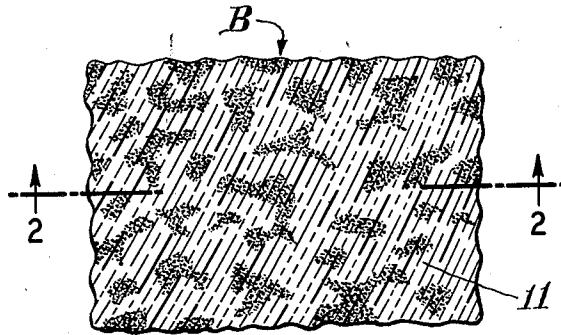


Fig. 2.

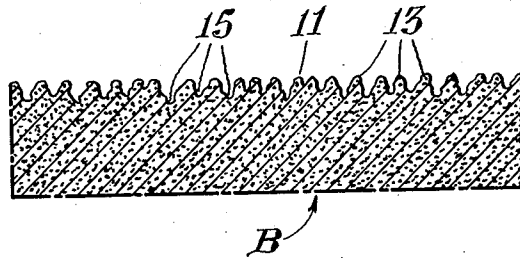


Fig. 3.

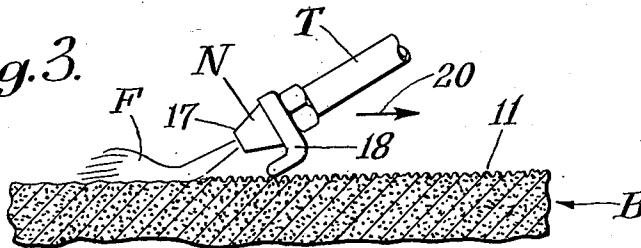
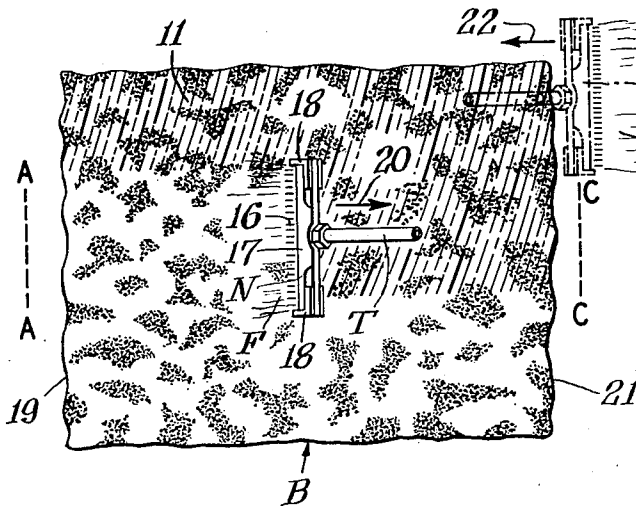


Fig. 4.

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2 Claims. (Cl. 125—1)

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This invention relates to a novel method for rapidly, inexpensively and effectively conditioning the surface of a granite block by means of a flame.

In the quarrying art, huge blocks of granite are taken from the quarry and are then cut into smaller blocks by gang saws for use in monuments and for industrial purposes. Gang saws produce rough scored surfaces having numerous hills and valleys which may be $\frac{1}{8}$ inch or more in height or depth. Such rough surfaces have in the past been smoothed off by impacting tools, such as pneumatic hammers, and when a very smooth surface is required grinding has been used. These mechanical smoothing procedures are slow and expensive to perform, leave the treated surface with bruises and minute cracks, and also require a large investment in heavy and expensive machinery. Bruises and cracks in the surface are undesirable because water may be absorbed subsequently, which upon freezing will cause the surface material to disintegrate. Also such a surface tends to absorb and retain dirt, which detracts from its physical appearance.

Among the objects of the present invention are to provide a novel procedure for smoothing the surface of a rough gang-sawed granite block more rapidly and less expensively than heretofore; to provide such a method which requires a relatively small investment in equipment; and to provide such a method which produces a relatively smooth surface free from bruises and cracks. Other objects of the invention are the provision of a novel flame-surfacing method whereby the surface of a granite block can be smoothed while retaining relatively sharp edges, and whereby the detritus produced by the action of a flame will not interfere with the surfacing operation.

The above and other objects will become apparent from the following description, having reference to the accompanying drawing wherein:

Fig. 1 is a plan view showing schematically the appearance of the rough surface of a gang-sawed block of granite;

Fig. 2 is a cross-sectional view taken along the line 2—2 in Fig. 1;

Fig. 3 is a schematic view, partly in cross-section and partly in side elevation, showing a granite block having the surface upon which the novel method of the invention is being performed positioned up and substantially horizontal; and

Fig. 4 is a plan view of the granite block of Fig. 3 showing a blowpipe performing the method of the invention.

In accordance with the present invention, there

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is provided a novel method for smoothing a rough surface of a gang-sawed granite block having numerous hills and valleys thereon, which comprises positioning a wide ribbon-like flame short of an edge of the surface but approximately parallel thereto. The flame is then moved continuously in a direction transversely thereof to the edge of the block and then along the surface parallel thereto and impinging thereon to remove portions of the surface, including the projecting hills. In order to prevent decrepitation of the edge of the block and to retain a sharp edge, the ribbon-like flame is directed obliquely to the plane of the surface and oppositely to the direction of movement, at least during its movement to and just past the edge. If the flame is directed normally of the plane or is inclined toward the plane in the same direction as movement, the edge of the block is subjected not only to the intense heat of the flame but also to the dynamic action of the flame jets which is strong enough to cause undesirable decrepitation of the edge.

It is also advantageous to maintain the oblique angle of the flame with respect to the surface of the block while continuing to traverse the flame in a rearward direction relatively to the direction of flow of the flame across the block lengthwise of a selected path and parallel to the surface. By maintaining this obliquity with respect to the direction of movement, the particles of granite spalled off by the flame are blown in front of the flame away from the direction of movement and accumulate on that portion of the surface which has already been smoothed, where they will not interfere with the action of the flame. If the flame were inclined toward the surface in the direction of movement, the spalled off particles would accumulate on the rough surface ahead of the flame and interfere with flame action.

Having reference to the drawings, Figs. 1 and 2 show a granite block B having a rough gang-sawed surface 11 which is characterized by numerous hills 13 and valleys 15, including numerous parallel scores or furrows produced by the action of the saw.

Figs. 3 and 4 show an oxy-acetylene blowtorch T having a wide nozzle N adapted to produce a series of small parallel oxy-acetylene flame jets 16 arranged close together and merging laterally with one another to form, in effect, a ribbon or sheet of flame F across the path to be traversed. Suitable blowpipes for this purpose are shown in United States Patents Nos. 2,337,087 and 2,356,196. The tip 17 of the nozzle N is maintained at a substantially constant distance from

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the surface by a surface riding shoe 18 carried by the nozzle and adapted to rest on the surface of the block B as the blowpipe is moved across the granite surface. Traverse of the flame across the surface can be accomplished manually, or the blowtorch T can be secured in any suitable type of mechanical traversing device such as an oxy-acetylene cutting machine of the type shown in United States Patent No. 2,183,605.

When performing a surfacing operation by the method of the invention, the blowtorch T is placed so that the nozzle N and the ribbon-like flame F are just short of the edge 19 of the block B and the tip 17 of the nozzle is parallel to the plane of the surface 11 but spaced slightly above the plane, for example, at the position A—A in Fig. 4; and the nozzle is so arranged that the ribbon-like flame F is inclined at an acute angle to the plane of the block surface and away from the edge 19. Continuous movement of the nozzle N across the surface in a rearward direction relatively to the direction of flow of flame F, as indicated by the arrow 20, is then begun and continues to the edge 19 and then across the surface of the block and past the opposite edge 21 to a position such as indicated at C—C in Fig. 4 where the flame no longer plays on the block.

Movement of the nozzle should be continuous and so rapid that only a thin surface layer of the granite block is heated to a temperature at which particles spall off, while the bulk of the block remains relatively cool. A speed in excess of 48 inches per minute is satisfactory, when using a nozzle N producing a flame six inches wide to surface a swath eight inches wide. Under these conditions the gas consumption is about 132 cubic feet per hour of oxygen and about 40 cubic feet per hour of acetylene. Different amounts of gas would be consumed for flames of different width, but in general the oxygen consumption and the acetylene consumption should be respectively about 22 and about 7 cubic feet per hour per inch of flame width.

If the granite block being treated is no wider than the ribbon-like flame F, a single traverse of the block by the flame is sufficient to produce the desired results. Generally, however, surfaces which are much wider than the flame F must be treated. When such is the case the flame application must be repeated along successive adjoining paths, preferably overlapping one another slightly at their sides to assure an even appearance. One way to treat such successive path is to return the nozzle to a position adjacent its initial position, move the nozzle sideways, and repeat the traversing operation across the surface in the same direction for each successive path. However, it has been found most advantageous from the standpoints of economy, efficiency, and speed to move the nozzle N in opposite directions across adjoining paths. Thus, when the nozzle N has reached the position C—C shown in Fig. 4, it is moved sideways to the position shown in dash lines at N', inclination of the flame F and the nozzle N is reversed, and the nozzle and flame are then moved in the reverse direction indicated by the arrow 22 to the edge 21 and then along a second path on the surface adjoining, and preferably overlapping, the first path to a position past edge 19 while maintaining the reversed inclination of the flame opposite the direction of movement.

Variations in the appearance of the treated surface can be obtained, if desired, by re-direct-

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ing the flame across the paths of original traverse, thereby producing a difference in the surface highlights over the area so treated which will produce a different visual aspect.

A granite block treated by the method described above is characterized by having a substantially plane flame-finished surface which is only moderately uneven. The surface also has relatively sharp peripheral edges, is free from cracks and bruises, and glimmers with a pleasing sheen when the observer views it at an acute angle. A close examination of the surface shows that this sheen is distributed over the surface in uneven splotches, but the general impression when viewed at a distance is that the whole surface is shiny. These characteristics of granite blocks surfaced by the present invention make it especially useful as a building stone. Apparently the sheen is due to the action of the flame in exposing whole flat crystal faces of feldspar and quartz which reflect light, whereas in the conventional mechanically prepared surfaces shattering of the crystal faces occurs and but little reflection of light is obtained.

While the principles of the invention have been described in detail in connection with surfacing granite, it is to be understood that they also apply to the flame surfacing of other rocks such as quartzite, sandstone, or dolomite.

What is claimed is:

1. A method for removing portions of the surface of a granite block which comprises moving a wide ribbon-like oxy-fuel flame in a direction transversely of said flame from a position short of an edge of said surface to said edge and then along said surface parallel thereto and impinging thereon to remove portions of said surface, said ribbon-like flame being directed obliquely to the plane of said surface and oppositely to said direction at least during movement thereof to said edge.

2. In a method for removing portions of the surface of a granite block, wherein said block is positioned with said surface up and substantially horizontal, a wide ribbon-like oxy-fuel flame is applied obliquely against said surface across a selected path, and said flame is moved in a rearward direction relative to the direction of flow of said flame lengthwise of said path and parallel to said surface to remove portions of said surface along said path while blowing the removed material in front of said flame in a direction away from the direction of movement thereof, the improvement which comprises initially moving said wide ribbon-like flame from a position short of an edge of said surface to said edge, and then along said surface, said ribbon-like flame being directed obliquely to the plane of said surface and oppositely to the direction of movement thereof to said edge.

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