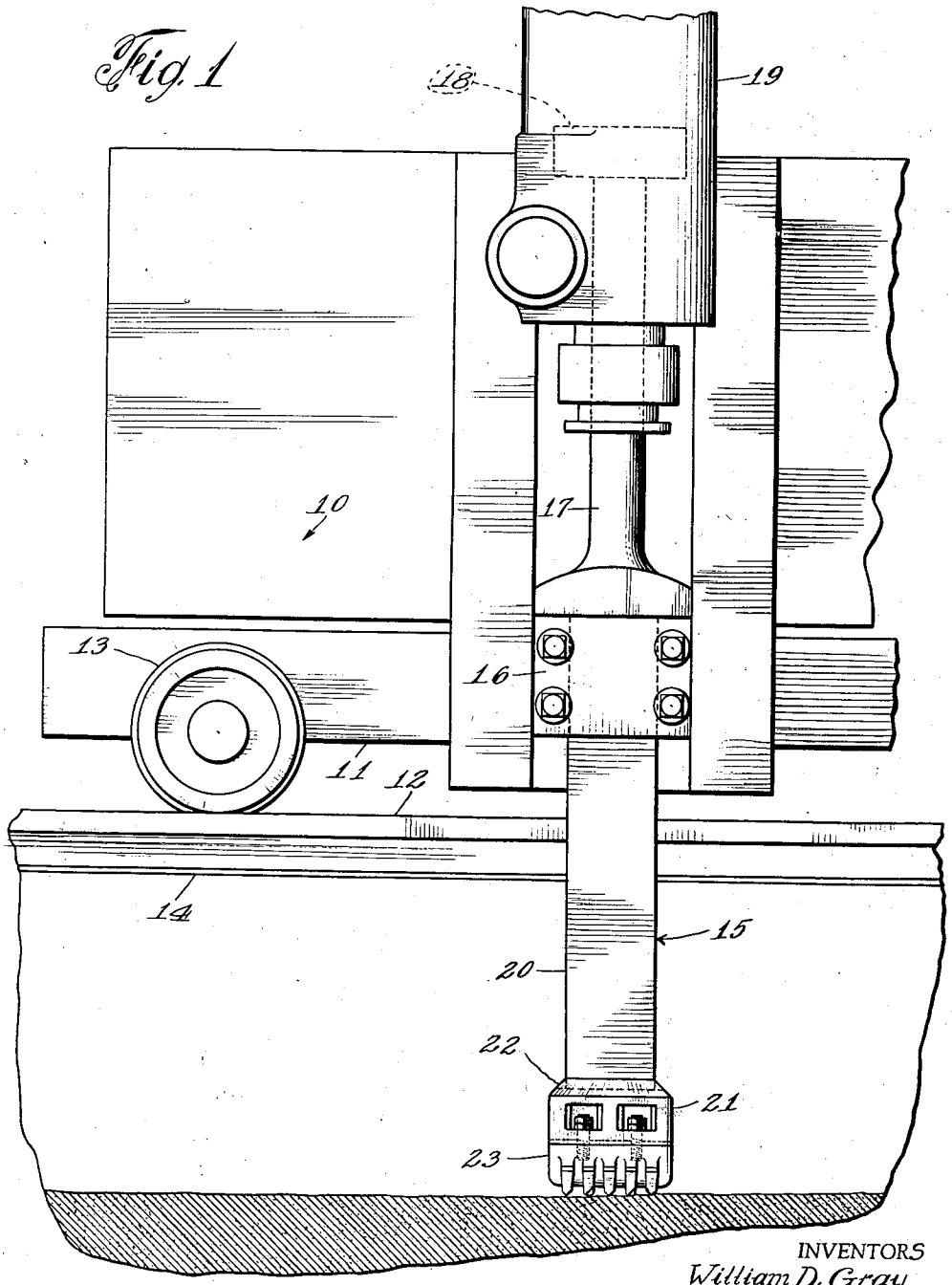
March 19, 1935. W. D. GRAY ET AL 1,995,062

STONE CHANNELING BIT

Filed Dec. 27, 1933 4 Sheets-Sheet 1

Fig. 1



INVENTORS
William D. Gray
Frank F. Graham

BY E. Archer Turner
ATTORNEY.

March 19, 1935. W. D. GRAY ET AL 1,995,062

STONE CHANNELING BIT

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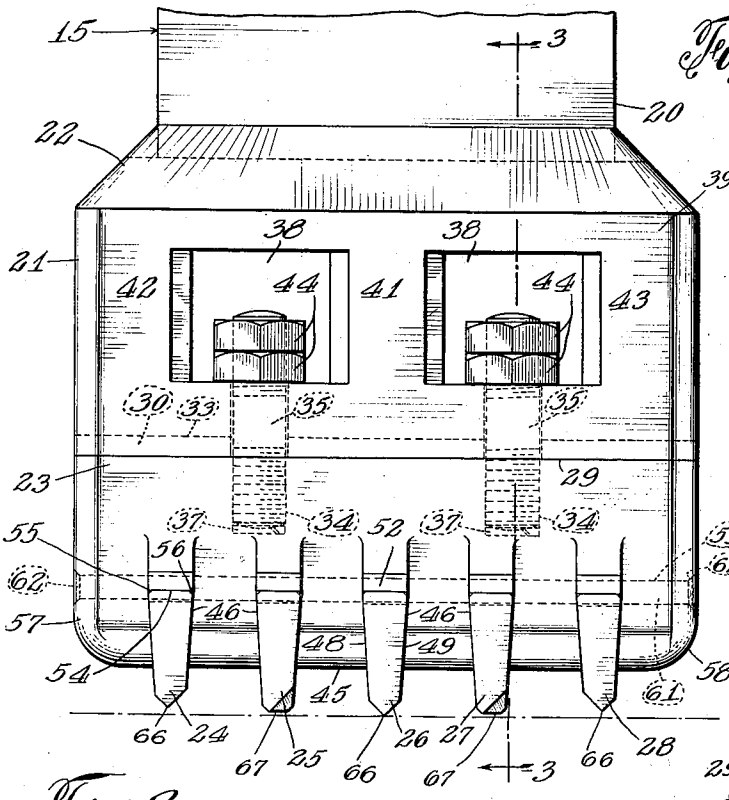


Fig. 2

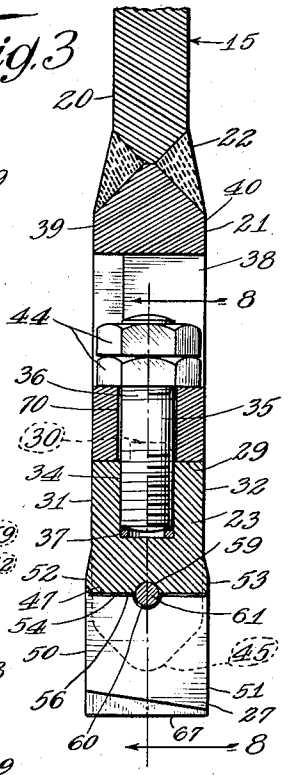


Fig. 3

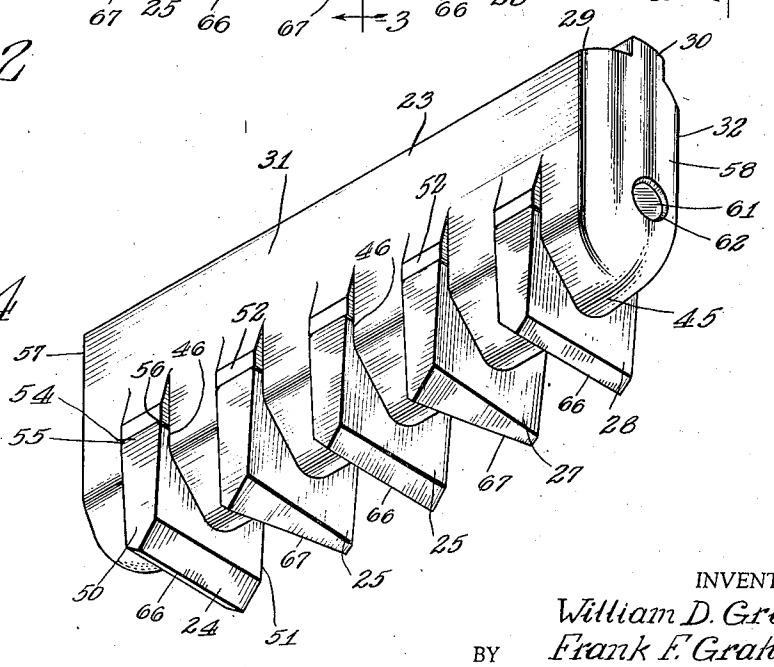


Fig. 4

INVENTORS
William D. Gray
Frank F. Graham

BY E. Archer Turner
ATTORNEY.

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STONE CHANNELING BIT

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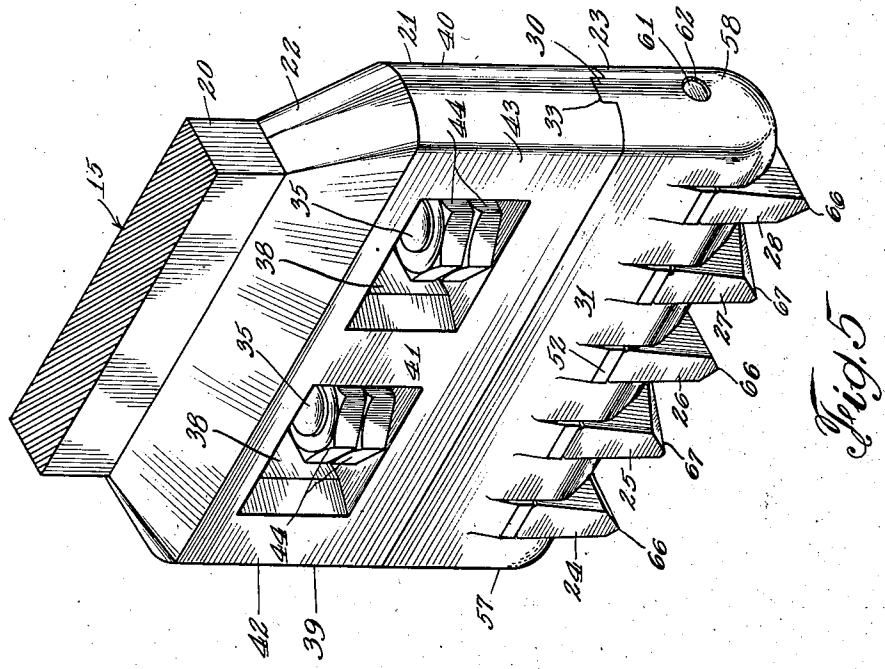


Fig. 5

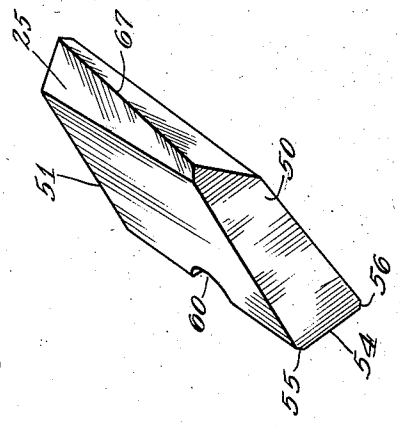


Fig. 6

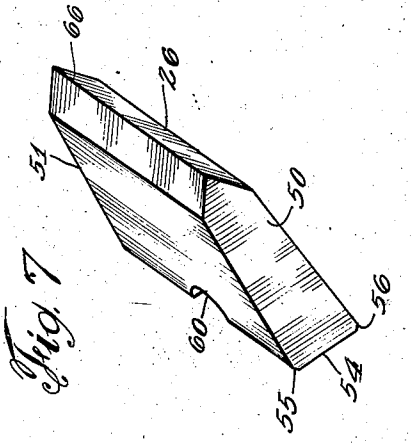


Fig. 7

INVENTORS
William D. Gray
Frank F. Graham

BY

E. Archer Turner
ATTORNEY.

March 19, 1935. W. D. GRAY ET AL 1,995,062

STONE CHANNELING BIT

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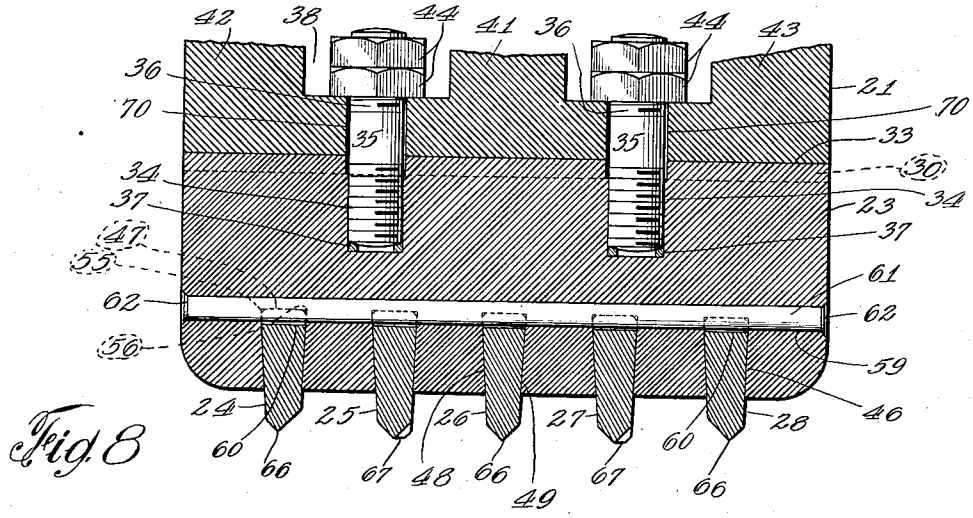


Fig. 8

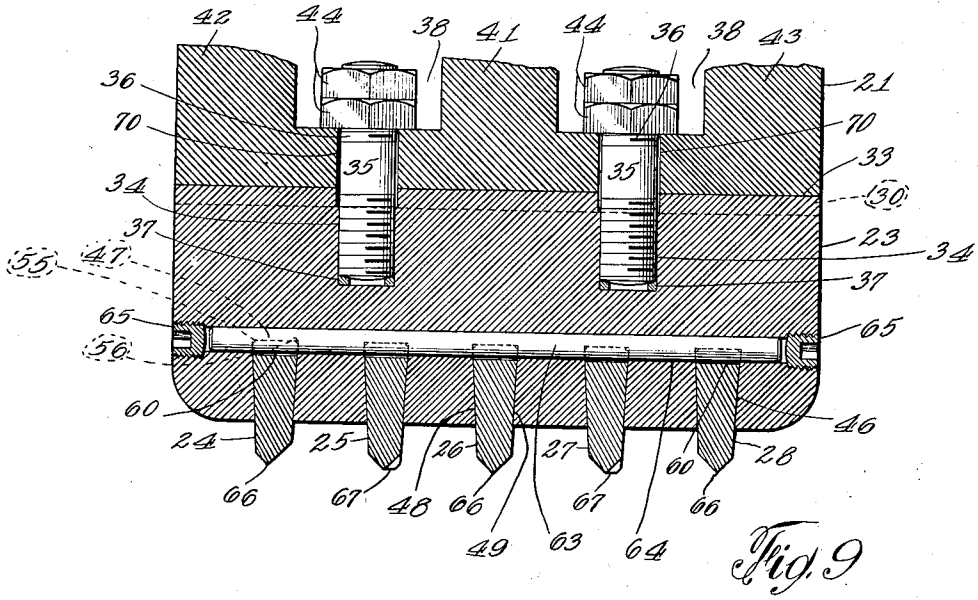


Fig. 9

INVENTORS
William D. Gray
Frank F. Graham

BY

C. Archer Turner
ATTORNEY.

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UNITED STATES PATENT OFFICE

1,995,062

STONE CHANNELING BIT

William D. Gray, White Plains, N. Y., and Frank F. Graham, Cardiff, Md., assignors to Peyton du Pont, Incorporated, a corporation of Delaware

Application December 27, 1933, Serial No. 704,070

19 Claims. (Cl. 262—33)

Our present invention relates to improvements in stone channeling bits which are employed in quarries to cut blocks of marble or other stones. Marble deposits usually occur in regions where great folding and contortion of the rock has taken place as a result of tremendous geological forces, which are ultimately locked within the marble bed; in numerous instances the beds are separated by open fissures. These conditions present many difficult problems which must be overcome before blocks of marble can be profitably removed from the quarry beds.

Among the difficult problems which have not been successfully solved prior to our invention was the manner of channeling marble. In removing marble from the bed of a quarry, a channeling machine mounted to roll on a track is employed and consists primarily of a rod reciprocated by a suitable piston. Secured to this piston rod, in the prior construction, are a plurality of long, slender channeling bits or bars and because of their length, these bars are made of ordinary steel in order that their cost would not be prohibitive. As a consequence, these bits, after having been in operation for a short time, become blunt and actually do not cut the marble but rather batter and sever the marble from the bed by fracturing the same. This battering of the marble produces strains therein which release internal forces suddenly, causing seams to open, especially in marble of a delicate nature.

The channeling bits or bars are firmly secured at their upper ends to the piston rod, but at their lower ends are unsupported because any clamp therefor would necessarily be wider than the width of the bits and hence could not pass into the channel cut by them. Because of the lack of support for the individual bits there is some deflection between them which often is as great as four inches, depending upon the depth of the cut or the length of the bits. The blocks of marble thus quarried have side faces which are irregular, and after being removed from the quarry bed the blocks must be cut square in order to be salable. This increases the cost of production and results in a loss of marble.

These disadvantages of the individual bar bits of past practice are obviated by our present invention, and accordingly this forms the principal object of this invention.

Among the more specific objects of our invention is that of providing a stone channeling tool including a shank having a cutter head formed at one end thereof, a cutter block detachably secured to said head and having a plurality of grooves crossing its outer end, a cutter removably seated in each groove and means for locking the cutters in their respective grooves of the cutter block.

Other objects reside in the novel construction of the individual parts and in their novel relation with one another to produce our improved channeling tool, as set forth in the specification.

In the drawings which accompany the description of our invention

Figure 1 is a side elevation of our improved stone channeling machine,

Figure 2 is an enlarged view of the lower end of the channeler shown in Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 2,

Figure 4 is a perspective view of the cutter block and cutters which we have devised for use in our invention,

Figure 5 is a perspective view of that part of our improvement shown in Figure 2,

Figure 6 is a perspective view of one of the cutters,

Figure 7 is a perspective view of another of the cutters used in our improved channeler,

Figure 8 is a sectional view taken on line 8—8 of Figure 3, and

Figure 9 is a sectional view similar to Figure 8 showing a modification of certain features of our invention.

In carrying out the objects of this invention, we utilize a channeling machine 10 of the well known "Electric-air" type and, in actual practice, subjected our improved channeler to severe tests under all operating conditions. The channeling machine includes a frame 11 which is supported on rails 12 by the flanged wheels 13. The rails rest upon the floor 14 of a quarry and serve as runways for the channeling machine as it moves back and forth on the rails during operation. Our novel channeling bit 15 is firmly secured at 16 to the piston rod 17 which is reciprocated by the piston 18 of the motor 19, all of which parts are carried by the channeling machine 10.

Our novel channeling bit or tool 15 is constructed in the following manner, and the numerous tests which have been conducted have proven conclusively that when a channeling bit is fashioned after our invention, the difficult problems encountered in quarrying marble or other stone with similar tools of the prior construction are overcome in a very efficient and positive manner. Instead of the long, slender bars of past practice, we employ a solid slab-like shank 20 which is preferably made of ordinary steel in order that the cost thereof may not be excessive. At its one end, the shank 20 is adapted to be attached to the operating mechanism of the channeling machine 10, while at its opposite end, the shank is provided with a somewhat enlarged head 21. A very good method of forming this enlarged head 21 is to weld it to the shank 20 as at 22, and in this manner a steel of stock size can be utilized for the shank. Of course, if found desirable, the

shank 20 and the head 21 may be cast or forged as an integral structure.

To the outer or lower end of the head 21 we detachably secure a cutter block 23 which carries a plurality of cutter teeth such as 24, 25, 26, 27 and 28. These cutter teeth are in a novel relation with the cutter block 23, as will be described subsequently. Extending upwardly from the top face 29, the cutter block 23 is provided with a key 30 which extends between and parallel to the side faces 31 and 32 of the cutter block. The key 30 fits snugly into a key way 33 of the head 21 and in this manner relative lateral movement between these two members is effectively prevented. Tapped holes such as 34 are provided in the block 23 and each receives a stud 35 which is threaded thereinto and having a threaded portion 36 extending upwardly beyond the top face 20. A lock washer 37 may be employed under each stud 35 to insure firm engagement between the threaded portions of each hole 34 and stud 35. Each threaded portion 36 passes freely through a hole such as 70 of the head 21 and each stud extends into an aperture 38 cut between the side faces 39, 40 of the head 21. These apertures are spaced apart, thereby affording a heavy section of metal at 41, which together with the end sections 42, 43 is sufficient to produce the desired rigidity and strength between the upper and lower edges of the head 21. A pair of threaded members, such as the nuts 44, engage the threaded portions 36 of each stud 35 and in this manner firmly join the head 21 and the cutter block 23. The particular means for detachably securing the block 23 to the head 21 has proven in actual service to be highly efficient and durable.

As stated hereinbefore, the relation between the cutters and the block 23 is a novel one, and will now be described in detail. At the lower end thereof, the cutter block 23 when considered in cross section is somewhat V shaped, the apex of which is well rounded as at 45. Crossing such lower end, are the spaced channels or grooves 46, one for each cutter, and extending from side face to side face of the cutter block. The base 47 of each groove 46 forms a seat for a cutter and the side walls 48 and 49 of each groove taper inwardly as they extend downwardly from the base 47. Each cutter is fitted snugly into its respective groove 46 and these cutters are preferably of a size such that their end faces 50, 51 extend beyond the side faces 31, 32 respectively, of the block 23, in order that the channel as cut will be slightly larger than the width of the head 21 and the block 23. Shoulders such as 52, 53 extend outwardly from the side faces 31, 32, respectively and form an extended seat of the base 47 for the upper face 54 of each cutter. To insure perfect seating of each cutter in its respective groove, the upper face 54 of each cutter is chamfered or beveled as at 55, 56.

Drilled between the rounded ends 57, 58 of the block 23 is a long bore 59, the center of which is approximately on the plane of the base 47 of the grooves 46. Each cutter, 24, 25, 26, 27 and 28 has a small portion of its upper face 54 recessed as at 60 slightly beyond the limits of the bore 59. After each cutter is positioned properly in its respective groove, a rod or pin 61 is passed from one round end of the block 23 to the other end thereof. Thus the recessed portion of each cutter is engaged by the pin 61 to prevent endwise movement, while the cooperating tapered portions of each cutter and groove prevent their upward movement. Each end of the pin 61 may be peened over, at 62, to prevent movement thereof, or, as shown in Figure 9, the pin 63 may "float" within the bore 64, and screw plugs 65 used to maintain the pin in its proper locking position.

It will be observed from Figure 2 that the cutters 24, 26 and 28 each have a cutting edge 66 which extends substantially at right angles to the side faces 31, 32 while the cutters 25 and 27 each have a cutting edge 67 which is oblique thereto. In this manner, the cutters 24, 26 and 28 make small triangular shaped cuts as the channeling machine 10 rolls on the tracks 12, while the oblique cutters 25 and 27, which are interposed between the first group of cutters, act as scavengers and break the small triangular shaped sections of uncut marble between the triangular cuts. We have found that in order to produce cutters which will have a uniform life, the central cutter 26 should extend downwardly a slight distance below the cutting edges of the remaining cutters, and also that each cutter 25, 27 be slightly below the end cutters 24, 28. By this construction, a more uniform distribution of the blow of the piston 18 if effected. Also, since the end cutters 24, 28 each make the preliminary cut on the shoulder of marble left by the preceding cut, we form these cutters in a novel manner. The tapered side of each cutter 24, 28 adjacent the respective rounded end of the block 23 is extended downwardly closer to the plane of the cutting edge 66 than the opposite tapered side, and in this manner reinforces that portion of the cutters 24, 28 which receives the maximum wear.

In operating the improved channeling tool of our invention, it will be found that the air pressure on the piston 18 can be materially reduced, as demonstrated in actual quarry use, and that the rate of channeling will be doubled in many instances as compared with the previous method in which the long, slender bars were employed. In the use of these bar bits of past practice, resharpening is necessary after about three hours of channeling; while in our constructions, the short cutters, since they can be made of high grade steel without incurring great expenditure of money, will channel marble for approximately fifteen hours before any signs of dullness. By the use of a solid shank and the short, stub cutters, deflection of the channeling tool is prevented and the marble blocks as quarried will have perfectly straight side faces.

When these stub cutters become dull, the operator can easily detach the block 23 from the head 21, apply another head with its complement of cutters and then continue the channeling operation. The dull cutters can be resharpened or a new set of cutters readily substituted.

To those familiar with the problems involved in quarrying marble and similar stone, the advantages of our invention will be apparent. Various modifications of our invention are embraced in the appended claims.

We claim:

1. A stone channeling tool including a shank having substantially parallel side faces, said tool having one end thereof arranged for attachment to a reciprocating member, the opposite end of said tool having a plurality of separated grooves crossing its other end transversely of said side faces, a cutter removably seated in each of said separated grooves, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves.

2. The combination in a stone channeling

tool including a shank and a cutter head formed at one end of the shank, a cutter block detachably secured to said head, said cutter block having substantially parallel side faces and a plurality of separated grooves crossing its outer end transversely of said side faces, a cutter removably seated in each of said separated grooves, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves of said cutter block.

3. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces and an outer end portion, said outer portion having a plurality of separated grooves extending from one side face to the other side face, a cutter removably seated in each of said separated grooves and having a cutting edge at least equal to the distance between said parallel side faces, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves of said cutter block.

4. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces and an outer end portion, said outer portion having a plurality of separated grooves extending from one side face to the other side face, a cutter removably seated in each of said separated grooves and having a cutting edge at least equal to the distance between said parallel side faces, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves of said cutter block, said means including a pin extending into said block from one end toward the other end thereof and engaging each cutter.

5. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces and an outer portion, said outer portion having a plurality of separated grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each of said separated grooves and having corresponding portions which contact the base and tapering sidewalls of each groove, said cutters being spaced apart from each other throughout their length, the cutting edge of each cutter being at least equal to the distance between said parallel side faces, and means for locking said cutters in their respective grooves of said cutter block.

6. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces and an outer portion, said outer portion having a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such groove, and means for locking said cutters in their respective grooves of said cutter block.

7. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces and an outer portion, said outer portion having a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such groove, and means for locking said cutters in their respective grooves of said cutter block, said means including a pin extending into said block from one end toward the other end thereof and engaging each cutter.

8. The combination in a stone channeling tool including a shank and a cutter head formed at one end of said shank, a cutter block detachably secured to said head, said cutter block including substantially parallel side faces, end faces, and an outer portion, said outer portion having a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such groove, each cutter adjacent an end face of said cutter block having a cutting edge which extends at right angles to the substantially parallel side faces, there being at least one cutter interposed between the last named cutters having a cutting edge extending obliquely of the substantially parallel end faces, and means for locking said cutters in their respective grooves of said cutter block.

9. A stone channeling tool including a cutter block having substantially parallel side faces, end faces and an outer portion provided with a plurality of separated grooves extending from one side face to the other side face, a cutter removably seated in each of said separated grooves, said cutters being spaced apart from each other throughout their length and means for locking said cutters in their respective grooves of said cutter block, said means including a pin extending from one end face toward the other end face and engaging each cutter.

10. A stone channeling tool including a cutter block having substantially parallel side faces, end faces and an outer portion provided with a plu-

rality of separated grooves extending from one side face to the other side face, a cutter removably seated in each of said separated grooves and having a cutting edge at least equal to the distance between said parallel side faces, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves of said cutter block.

11. A stone channeling tool including a cutter block having substantially parallel side faces, end faces and an outer portion provided with a plurality of separated grooves extending from one side face to the other side face, a cutter removably seated in each of said separated grooves and having a cutting edge at least equal to the distance between said parallel side faces, said cutters being spaced apart from each other throughout their length, and means for locking said cutters in their respective grooves of said cutter block, said means including a pin extending into said block from one end toward the other end thereof and engaging each cutter.

12. A stone channeling tool including a cutter block having substantially parallel side faces, end faces and an outer portion provided with a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such grooves, and means for locking said cutters in their respective grooves of said cutter block.

13. A stone channeling tool including a cutter block having substantially parallel side faces, end faces and an outer portion provided with a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such groove, and means for locking said cutters in their respective grooves of said cutter block, said means including a pin extending into said block from one end toward the other end thereof and engaging each cutter.

14. A stone channeling tool including a cutter block having substantially parallel side faces, end faces, and an outer portion provided with a plurality of grooves extending from one side face to the other side face, the opposite sidewalls of each groove tapering inwardly from the base thereof, a cutter removably seated in each groove and having side faces which contact the tapering sidewalls of each groove, each cutter being provided with a cutting edge and a face which seats against the base of its respective groove, such cutting edge and face extending outwardly beyond the parallel side faces of said block, a shoulder formed at each parallel side face adjacent the base of each groove and forming an extended seat for the face of the cutter in such groove, each cutter adjacent an end face of said cutter block having a cutting edge which extends at right angles to the substantially parallel side faces, there being at least one cutter interposed between the last named cutters having a cutting edge extending obliquely of the substantially parallel side faces, and means for locking said cutters in their respective grooves of said cutter block.

15. A cutter block for a stone channeling tool having substantially parallel side faces, end faces, and an outer portion provided with a plurality of spaced grooves extending from one side face to the other side face, the base of each groove lying in substantially the same plane, said cutter block being provided with a drilled hole extending from one end face toward the other end face and having its axis lying between the side faces on the plane of the bases of said grooves.

16. A cutter block for a stone channeling tool having substantially parallel side faces, end faces, and an outer portion provided with a plurality of spaced grooves extending from one side face to the other side face, the base of each groove lying in substantially the same plane and the sidewalls thereof tapering inwardly from said base, said cutter block being provided with a drilled hole extending from one end face toward the other end face and having its axis lying between the side faces on the plane of the bases of said grooves.

17. A cutter for a stone channeling tool including an upper surface, end faces and sidewalls which taper inwardly from said upper surface, and a cutting edge extending between the side faces and remote from said upper surface, said cutting edge being formed by the intersection of a pair of planes extending inwardly from said tapering sidewalls at a point remote from said upper surface, the upper surface being provided with a recess which extends between the tapering sidewalls.

18. A cutter for a stone channeling tool including an upper surface, end faces and sidewalls which taper inwardly from said upper surface, and a cutting edge extending between the side faces and remote from said upper surface, said cutting edge being formed by the intersection of a pair of planes extending inwardly from said tapering sidewalls at a point remote from said upper surface, one tapering sidewall extending closer to said cutting edge than the other sidewall, the upper surface being provided with a recess which extends between the tapering sidewalls.

19. A cutter for a stone channeling tool including an upper surface, end faces and sidewalls which taper inwardly from said upper surface, and a cutting edge extending obliquely between the side faces and remote from said upper surface, said cutting edge being formed by the intersection of a pair of planes extending inwardly from said tapering sidewalls at a point remote from said upper surface, the upper surface being provided with a recess, which extends between the tapering sidewalls.

WILLIAM D. GRAY.
FRANK F. GRAHAM.